Resource Measurement Facility Report Analysis

Version 2 Release 1
Note

Before using this information and the product it supports, read the information in "Notices" on page 457.
## Contents

### Figures ........................................ x

### Tables .......................................... xiii

### About this document ......................... xvii

Who should use this document ................ xvi
How this document is organized ............. xvii
z/OS information ................................. xviii

### How to send your comments to IBM .... xix

If you have a technical problem ............ xix

### Summary of changes .......................... xxi

Summary of changes for z/OS RMF Report
Analysis for Version 2 Release 1, as updated
February 2015 .................................. xxi
Changes made in z/OS Version 2 Release 1 ... xxi
Statistics about CF structures residing in Storage
Class Memory .................................. xxi
Monitoring PCIe function and zEDC activity xi
Support of Group Capacity enhancements and absolute LPAR capacity limits ... xxi
New channel path details in Monitor III and
Postprocessor coupling facility reports ........ xxi
Enhanced Postprocessor Crypto Hardware
Activity report .................................. xxi
Additional Postprocessor reports in XML
format ........................................... xxiii
Cross platform monitoring support for
Windows ......................................... xxiii
SMF Recording Facility for AIX, Linux and
Windows performance data .................... xxiii
Monitoring of pageable large pages activity ...... xxiii
Support of Storage Class Memory for paging .... xxiii

### Chapter 1. Introducing RMF data
gathering and reporting ...................... 1

Gathering data .................................. 1
Short-term data collection with Monitor III ... 1
Snapshot monitoring with Monitor II ........ 1
Long-term data gathering with Monitor I and
Monitor III ..................................... 1

Long-term overview reporting with the Postprocessor 2
Report analysis with the Spreadsheet Reporter ... 2
Monitoring on the workstation ................ 2
What you can gather and report ............. 3
Activity monitoring ............................ 3
Delay monitoring ............................... 4
Long-term performance analysis with RMF XP .... 4
Reporting of other SMF data ................. 5

### Chapter 2. Interactive performance
analysis with Monitor III .................. 7

Using Monitor III reports .................... 7

System activities measured .................. 7
Where to start .................................. 7
Using cursor-sensitive control ............. 11
Common Monitor III report measurements ... 12
Monitor III MINTIME and range ........... 15
Monitor III report options ................... 17
Monitor III sysplex support in different time
zones .......................................... 17

The reporter session ......................... 18
Starting and stopping a Monitor III reporter
session ........................................ 18

The Primary Menu ............................. 19
Selecting a report ............................ 19
Monitor III report commands ............... 20
Header for single-system reports .......... 23
Header for sysplex reports .................. 23

The Sysplex Report Selection Menu ......... 24
The Overview Report Selection Menu ....... 25
The Job Report Selection Menu ................ 25
The Resource Report Selection Menu ........ 26
The Subsystem Report Selection Menu ........ 27
The User Report Selection Menu ............. 27

The Data Index .................................. 28
How to request the Data Index ............. 28
Contents of the Data Index ................... 28

CACHDET - Cache Detail Report .......... 35
How to request this report ................. 35
Contents of the report ....................... 35

CACHSUM - Cache Summary Report ....... 39
How to request this report ................. 39
Contents of the report ....................... 40

CFACT - Coupling Facility Activity Report .... 42
How to request this report ................. 43
Special considerations ....................... 43
Contents of the report ....................... 43

CFOVER - Coupling Facility Overview Report .. 50
How to request this report ................. 50
Contents of the report ....................... 50

CFSYS - Coupling Facility Systems Report .. 52
How to request this report ................. 52
Contents of the report ....................... 52

CHANNEL - Channel Path Activity Report .... 56
How to request this report ................. 56
Special considerations of report output .... 56
Contents of the report ....................... 57

CPC - CPC Capacity Report ................ 60
How to request this report ................. 60
Contents of the report ....................... 60

DELAY - Delay Report ......................... 63
How to request this report ................. 63
Contents of the report ....................... 64

DEV - Device Delays Report ................ 71
How to request this report ................. 71
Contents of the report ....................... 71

DEVN - Device Activity Report ............ 73
How to request this report ................. 73
Contents of the report ....................... 74

DEVR - Device Resource Delays Report .... 75
Chapter 3. Snapshot reporting with Monitor II

Contents of the report

Chapter 4. Real-time reporting with Monitor I

Contents of the report

Chapter 5. Long-term overview reporting with the Postprocessor

Contents of the report
Glossary .................................................. 491
Index ....................................................... 497
Figures

1. Suggested Sequence for Using Monitor III Reports .......................... 10
2. Monitor III Primary Menu .................................................. 19
3. Header of Monitor III Single-System Reports .............................. 23
4. Header of Monitor III Sysplex Reports .................................... 24
5. Monitor III Sysplex Report Selection Menu ................................. 24
7. Monitor III Job Report Selection Menu ..................................... 26
11. Data Index ........................................................................... 29
12. Data Index with Preallocated Data Sets - Detailed View ................. 30
13. Data Index - Condensed Version ............................................. 31
14. Data Index with Preallocated Data Sets - Condensed Version ............ 31
15. Data Index Options Panel ...................................................... 33
16. Data Index - Sort Order Descend ............................................ 34
17. CACHDET Report ............................................................... 35
18. CACHDET Report - Volume Details ......................................... 36
19. CACHDET Report - SSID Details ........................................... 36
20. CACHDET Report Options .................................................... 39
21. CACHSUM Report ............................................................. 40
22. CACHSUM Report - SSID Details ......................................... 40
23. CFACT Report ................................................................. 43
24. CFACT Report - Details for a Lock Structure .............................. 44
25. CFACT Report - Details for a List Structure ............................... 44
26. CFACT Report - Details for a Cache Structure ......................... 45
27. CFACT Report - Details for a List Structure using SCM storage (1) ... 45
28. CFACT Report - Details for a List Structure using SCM storage (2) ... 46
29. Coupling Facility Report Options Panel .................................. 49
30. CFOVER Report .............................................................. 50
31. CPSYS Report ................................................................. 52
32. CPSYS Report - Subchannels and Paths .................................... 53
33. CHANNEL Report .......................................................... 57
34. CPC Capacity report .......................................................... 61
35. DELAY Report ............................................................ 64
36. DELAY Report - Details for Enclave Classification Data .............. 68
37. DELAY Report Options Panel ................................................ 69
38. DELAY Report Job Selection/Exclusion Panel .......................... 70
39. DEV Report ................................................................. 71
40. DEV Report Options Panel .................................................. 73
41. DEVN Report ............................................................... 74
42. DEVR Report ............................................................... 76
43. DEVR Report Options Panel ................................................ 79
44. DEVT Report ............................................................... 81
45. Modified STOR Report Showing all Storage Delays in Detail ......... 83
46. DSND Report ............................................................... 84
47. DSND Report Options Panel ................................................ 86
48. DSNJ Report ............................................................... 87
49. DSNV Report ............................................................... 89
50. DSNV Report Options Panel ................................................ 90
51. ENCLAVE Report .......................................................... 91
52. ENCLAVE Report - Enclave Details ....................................... 93
53. ENCLAVE Report - Enclave Classification Attributes (1) ............ 94
54. ENCLAVE Report Options .................................................. 95
55. ENQ Report ............................................................... 96
56. ENQ Report ............................................................... 100
57. ENQ Report Options Panel ................................................ 101
58. GROUP Report ........................................................... 103
59. GROUP Report - Response Time Components .......................... 104
60. GROUP Report Options Panel ............................................. 110
61. HSM Report ............................................................... 111
62. IOQUEUE Report .......................................................... 113
63. JES Delays report .......................................................... 116
64. Top Part of Job Delays report .............................................. 119
65. Bottom Part of Job Delay report .......................................... 119
66. Device Delay variation of the Job Delay report ........................... 120
67. Enqueue Delay variation of the Job Delay report ....................... 121
68. HSM Delay variation of Job Delay report ................................ 122
69. Operator Message Delay variation of the Job Delay report ........... 123
70. Processor Delay variation of the Job Delay report ...................... 123
71. Quiesce Delay variation of the Job Delay report ......................... 124
72. Storage Delay variation of Job Delay report ............................ 124
73. XCF Delay variation of Job Delay report ................................ 125
74. Job Report Options Panel ................................................. 126
75. Spin Lock Report .......................................................... 128
76. Lock Report Options ....................................................... 128
77. Suspend Lock Report ....................................................... 129
78. OPD Report ............................................................... 131
79. OPD Report - Details for Server Process .............................. 132
80. OPD Report Options Panel ............................................. 133
81. PROC - Processor Delay Report ........................................ 134
82. PROCU - Processor Usage Report ...................................... 137
83. RG Report ............................................................... 139
84. RSLRU Report ............................................................ 141
85. VSAM LRU Overview - Buffer Counts by Pool ....................... 141
86. VSAM RLS Activity by Storage Class - Sysplex Total View ........... 143
87. VSAM RLS Activity by Storage Class - System/CF Structure View ... 144
88. VSAM RLS Activity by Data Set - Sysplex Total View ................ 145
89. VSAM RLS Activity by Data Set - System/CF Structure View ......... 146
90. Disk Space Report ........................................................ 148
91. Storage Space Report ..................................................... 149
92. STOR Report ............................................................ 150
93. STORC Report ........................................................... 153

© Copyright IBM Corp. 1990, 2015
<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>200.</td>
<td>IOQ Report - z/OS Running as z/VM Guest System</td>
<td>392</td>
</tr>
<tr>
<td>201.</td>
<td>OMVS Kernel Activity Report</td>
<td>398</td>
</tr>
<tr>
<td>202.</td>
<td>PAGESP Report</td>
<td>401</td>
</tr>
<tr>
<td>203.</td>
<td>PAGING Report - Central Storage Paging Rates</td>
<td>404</td>
</tr>
<tr>
<td>204.</td>
<td>PAGING Report - Central Storage Movement and Request Rates / Frame and Slot Counts</td>
<td>407</td>
</tr>
<tr>
<td>205.</td>
<td>PAGING Report - Memory Objects and High Virtual Storage Frames</td>
<td>411</td>
</tr>
<tr>
<td>206.</td>
<td>PCIE Activity Report</td>
<td>414</td>
</tr>
<tr>
<td>207.</td>
<td>SDELAY Report - Serialization Delay Summary</td>
<td>418</td>
</tr>
<tr>
<td>208.</td>
<td>SDELAY Report - Serialization Delay Details - CMS Lock Details</td>
<td>420</td>
</tr>
<tr>
<td>209.</td>
<td>SDELAY Report - Serialization Delay Details - CML and Local Lock Details</td>
<td>421</td>
</tr>
<tr>
<td>210.</td>
<td>SDELAY Report - Serialization Delay Details - GRS Latch Details</td>
<td>422</td>
</tr>
<tr>
<td>211.</td>
<td>SDELAY Report - Serialization Delay Details - GRS Enqueue Details</td>
<td>423</td>
</tr>
<tr>
<td>212.</td>
<td>Shared DASD Activity Report</td>
<td>425</td>
</tr>
<tr>
<td>213.</td>
<td>Shared Magnetic Tape Device Activity Report</td>
<td>425</td>
</tr>
<tr>
<td>214.</td>
<td>TRACE Report</td>
<td>432</td>
</tr>
<tr>
<td>215.</td>
<td>VSTOR report - Common Storage Summary</td>
<td>438</td>
</tr>
<tr>
<td>216.</td>
<td>VSTOR report - Common Storage Detail</td>
<td>440</td>
</tr>
<tr>
<td>217.</td>
<td>VSTOR report - Private Area Summary</td>
<td>441</td>
</tr>
<tr>
<td>218.</td>
<td>VSTOR report - Private Area Detail</td>
<td>443</td>
</tr>
<tr>
<td>219.</td>
<td>WLMGL - Service Class Period report - with execution velocity goal for Period 1 and response time distributions</td>
<td>446</td>
</tr>
<tr>
<td>220.</td>
<td>WLMGL - Service Class Period report - with response time distribution (percentile)</td>
<td>447</td>
</tr>
<tr>
<td>221.</td>
<td>WLMGL - Service Class Period report - with subsystem data and response time distribution for response time goal</td>
<td>448</td>
</tr>
<tr>
<td>222.</td>
<td>WLMGL - Service Class Report</td>
<td>449</td>
</tr>
<tr>
<td>223.</td>
<td>WLMGL - Workload Group with associated service classes</td>
<td>450</td>
</tr>
<tr>
<td>224.</td>
<td>WLMGL Report - Service Policy Page</td>
<td>452</td>
</tr>
<tr>
<td>225.</td>
<td>XCF Activity Report - Usage by System</td>
<td>467</td>
</tr>
<tr>
<td>226.</td>
<td>XCF Activity Report - Usage by Member</td>
<td>468</td>
</tr>
<tr>
<td>227.</td>
<td>XCF Activity Report - Path Statistics - (Coupling Facility and Channel-to-Channel)</td>
<td>469</td>
</tr>
<tr>
<td>228.</td>
<td>Exception Report - Low CPU Utilization</td>
<td>471</td>
</tr>
<tr>
<td>229.</td>
<td>Exception Report - CPU Utilization</td>
<td>472</td>
</tr>
<tr>
<td>230.</td>
<td>Overview Report - Exception Version</td>
<td>474</td>
</tr>
<tr>
<td>231.</td>
<td>Overview Report - Summary Version</td>
<td>476</td>
</tr>
<tr>
<td>232.</td>
<td>Summary Report</td>
<td>480</td>
</tr>
</tbody>
</table>

Figures xi
### Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitored activities and SMF record types</td>
<td>3</td>
</tr>
<tr>
<td>Monitor III Heading Information</td>
<td>23</td>
</tr>
<tr>
<td>User-Written Report Commands</td>
<td>23</td>
</tr>
<tr>
<td>Fields in the Data Index</td>
<td>31</td>
</tr>
<tr>
<td>Fields in the CACHDET Report - Volume and SSID Details</td>
<td>37</td>
</tr>
<tr>
<td>Fields in the CACHDET Report</td>
<td>37</td>
</tr>
<tr>
<td>Report Commands</td>
<td>21</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>125</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>126</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>127</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>128</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>129</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>130</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>131</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>132</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>133</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>134</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>135</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>136</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>137</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>138</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>139</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>140</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>141</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>142</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>143</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>144</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>145</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>146</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>147</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>148</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>149</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>150</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>151</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>152</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>153</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>154</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>155</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>156</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>157</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>158</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>159</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>160</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>161</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>162</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>163</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>164</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>165</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>166</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>167</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>168</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>169</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>170</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>171</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>172</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>173</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>174</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>175</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>176</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>177</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>178</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>179</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>180</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>181</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>182</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>183</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>184</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>185</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>186</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>187</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>188</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>189</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>190</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>191</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>192</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>193</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>194</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>195</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>196</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>197</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>198</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>199</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>200</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>201</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>202</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>203</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>204</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>205</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>206</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>207</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>208</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>209</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>210</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>211</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>212</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>213</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>214</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>215</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>216</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>217</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>218</td>
</tr>
<tr>
<td>Additional Fields in the Job Delay report</td>
<td>219</td>
</tr>
<tr>
<td>90. Fields in the XCF Report</td>
<td>220</td>
</tr>
<tr>
<td>91. Fields in the zFS Activity Report</td>
<td>222</td>
</tr>
<tr>
<td>92. Fields in the zFS Summary Report</td>
<td>223</td>
</tr>
<tr>
<td>93. Fields in the zFS Summary Report - I/O Details</td>
<td>225</td>
</tr>
<tr>
<td>94. Fields in the zFS Summary Report - User Cache Details</td>
<td>226</td>
</tr>
<tr>
<td>95. Fields in the zFS Summary Report - Vnode Cache Details</td>
<td>227</td>
</tr>
<tr>
<td>96. Fields in the zFS Summary Report - Metadata Cache/Backing Cache Details</td>
<td>228</td>
</tr>
<tr>
<td>97. Fields in the zFS Summary Report - Transaction Cache Details</td>
<td>228</td>
</tr>
<tr>
<td>98. Monitor II Display Session Areas</td>
<td>233</td>
</tr>
<tr>
<td>99. Fields in the ARD and ARDJ reports</td>
<td>237</td>
</tr>
<tr>
<td>100. Fields in the ASD and ASDJ Report</td>
<td>241</td>
</tr>
<tr>
<td>101. Fields in the ASRM and ASRMJ Report</td>
<td>245</td>
</tr>
<tr>
<td>102. Fields in the CHANNEL Report</td>
<td>247</td>
</tr>
<tr>
<td>103. Fields in the DEV and DEVV Report</td>
<td>252</td>
</tr>
<tr>
<td>104. Fields in the HFS Report</td>
<td>257</td>
</tr>
<tr>
<td>105. Fields in the HFS Report Options Panel</td>
<td>258</td>
</tr>
<tr>
<td>106. Fields in the ILOCK Report</td>
<td>260</td>
</tr>
<tr>
<td>107. Fields in the IQUEUEUE Report</td>
<td>263</td>
</tr>
<tr>
<td>108. Fields in the LLI Report</td>
<td>267</td>
</tr>
<tr>
<td>109. Fields in the OPT Settings report</td>
<td>269</td>
</tr>
<tr>
<td>110. Fields in the PGSP Report</td>
<td>271</td>
</tr>
<tr>
<td>111. Fields in the SDS Report</td>
<td>273</td>
</tr>
<tr>
<td>112. Fields in the SENQ Report</td>
<td>276</td>
</tr>
<tr>
<td>113. Fields in the SENQR Report</td>
<td>279</td>
</tr>
<tr>
<td>114. Fields in the SPAG Report</td>
<td>281</td>
</tr>
<tr>
<td>115. Fields in the SRCs Report</td>
<td>283</td>
</tr>
<tr>
<td>116. Available formats for Postprocessor reports</td>
<td>287</td>
</tr>
<tr>
<td>117. Interval and Duration Reports</td>
<td>289</td>
</tr>
<tr>
<td>118. Monitor II Interval Reports</td>
<td>290</td>
</tr>
<tr>
<td>119. Fields in the Cache Subsystem Summary Report</td>
<td>294</td>
</tr>
<tr>
<td>120. Fields in the Cache Subsystem Activity Report - Header</td>
<td>295</td>
</tr>
<tr>
<td>121. Fields in the Cache Subsystem Activity Report - Subsystem Status</td>
<td>296</td>
</tr>
<tr>
<td>122. Fields in the Cache Subsystem Activity Report - Subsystem Overview</td>
<td>297</td>
</tr>
<tr>
<td>123. Fields in the Cache Subsystem Activity Report - Device Overview</td>
<td>300</td>
</tr>
<tr>
<td>124. Fields in the Cache Subsystem Activity Report - RAID Rank Activity</td>
<td>301</td>
</tr>
<tr>
<td>125. Fields in the Cache Subsystem Activity Report - Cache Device Status</td>
<td>302</td>
</tr>
<tr>
<td>126. Overview names in the Cache Subsystem Activity Report</td>
<td>304</td>
</tr>
<tr>
<td>127. Fields in the Coupling Facility Activity Report - Usage Summary</td>
<td>310</td>
</tr>
<tr>
<td>128. Fields in the Coupling Facility Activity Report - Structure Activity</td>
<td>315</td>
</tr>
<tr>
<td>129. Fields in the Coupling Facility Activity Report - Subchannel Activity</td>
<td>318</td>
</tr>
<tr>
<td>130. Fields in the Coupling Facility Activity Report - Subchannel Activity - Channel Path Details</td>
<td>320</td>
</tr>
<tr>
<td>131. Fields in the CF to CF Activity Section</td>
<td>321</td>
</tr>
</tbody>
</table>

xv  z/OS V2R1.0 RMF Report Analysis
173. Overview names in the Paging Activity report - Central Storage Movement and Request Rates .................................................. 408
174. Fields in the Paging Activity report - Frame and Slot Counts .................................................. 409
175. Overview names in the Paging Activity report - Frame and Slot Counts .................................................. 410
176. Fields in the Paging Activity report - Memory Objects and High Virtual Storage Frames ........ 411
177. Overview names in the Paging Activity report - Memory Objects and High Virtual Storage Frames .................................................. 412
178. Fields in the PCIE Activity Report .................................................. 414
179. Overview conditions in the PCIE Activity Report .................................................. 416
180. Fields in the Serialization Delay Summary section .................................................. 418
181. Fields in the Serialization Delay Details section - CMS Lock Details .................................................. 420
182. Fields in the Serialization Delay Details section - CML and Local Lock Details .................................................. 421
183. Fields in the Serialization Delay Details section - GRS Latch Details .................................................. 422
184. Fields in the Serialization Delay Details section - GRS Enqueue Details .................................................. 423
185. Fields in the Shared Device Activity Reports .................................................. 425
186. Overview names in the Shared DASD Activity Report .................................................. 430
187. Fields in the Trace Activity Report .................................................. 432
188. Variables in the Trace Activity Report .................................................. 432
189. Fields in the Virtual Storage Activity Report - Common Storage Summary .................................................. 438
190. Overview names in the Virtual Storage Activity Report .................................................. 439
191. Fields in the Virtual Storage Activity Report - Common Storage Detail Section .................................................. 440
192. Fields in the Virtual Storage Activity Report - Private Area Summary .................................................. 441
193. Fields in the Virtual Storage Activity Report - Private Storage Map .................................................. 442
194. Fields in the Virtual Storage Activity Report - Bottom Half .................................................. 442
195. Fields in the Virtual Storage Activity - Private Area Detail section Section .................................................. 443
196. Fields in the Workload Activity Report .................................................. 452
197. Fields in the WLMGL Report - POLICY .................................................. 462
198. Exception and Overview names in the Workload Activity Report .................................................. 464
199. Fields in the XCF Activity Report - Usage by System .................................................. 467
200. Fields in the XCF Activity Report - Usage by Member .................................................. 468
201. Fields in the XCF Activity Report - XCF Path Statistics .................................................. 469
202. Fields in the Exception Report .................................................. 472
203. Fields in the Overview Report .................................................. 474
204. Overview Header Record - Prefix Section .................................................. 477
205. Overview Header Record - Header Section .................................................. 477
206. Overview Header Record - Report Column Names Section .................................................. 478
207. Overview Data Record - Prefix Section .................................................. 478
208. Overview Data Record - Data Section .................................................. 478
209. Overview Data Record - Report Data Section .................................................. 478
210. Fields in the Summary Report .................................................. 480
About this document

The Resource Measurement Facility (RMF™) is a performance management tool that measures selected areas of system activity and presents the data collected in the form of System Management Facility (SMF) records, formatted printed reports, or formatted display reports. You can use this data to evaluate system performance and identify reasons for performance problems.

This document describes all RMF reports in detail, how to generate them, what they contain, their options, and how to use them.

For information about starting RMF and session options, see z/OS RMF User’s Guide.

About special purpose processors:

Throughout this document, zIIP refers to IBM System z9® Integrated Information Processors or to IBM System z10™ Integrated Information Processors. zAAP refers to IBM System z Application Assist Processors.

Who should use this document

This document is intended for the system programmer and performance analyst responsible for measuring and improving system performance. Because RMF is a tool for measuring z/OS system performance, this document assumes that the reader has extensive knowledge of the z/OS system. For an overview of RMF, see z/OS RMF User’s Guide.

How this document is organized

This document contains the following chapters:

Chapter 1, “Introducing RMF data gathering and reporting,” on page 1
This chapter explains how RMF is divided into monitors, and what sessions run under the different monitors. It also describes what data you can collect using the different monitors and sessions.

Chapter 2, “Interactive performance analysis with Monitor III,” on page 7
This chapter gives an example of how you can navigate through the Monitor III reports, explains how cursor-sensitive control works, describes some common Monitor III measurements, and explains all reports in detail.

Chapter 3, “Snapshot reporting with Monitor II,” on page 231
This chapter describes the Monitor II reports, includes example reports, and provides a detailed description of the report fields.

Chapter 4, “Real-time reporting with Monitor I,” on page 285
This chapter gives you a table of reports you can request when using a Monitor I session. Since all Monitor I reports are also Postprocessor reports, the detailed description of these reports is located in Chapter 5, “Long-term overview reporting with the Postprocessor,” on page 287.
This chapter describes the reports you can request using the Postprocessor. The descriptions include report examples and detailed descriptions of the report fields.

**z/OS information**

This information explains how z/OS references information in other documents and on the web.

When possible, this information uses cross document links that go directly to the topic in reference using shortened versions of the document title. For complete titles and order numbers of the documents for all products that are part of z/OS®, see [z/OS Information Roadmap](http://www.ibm.com/systems/z/os/zos/bkserv/).

To find the complete z/OS library, including the z/OS Information Center, go to the [z/OS Internet library](http://www.ibm.com/systems/z/os/zos/bkserv/).
How to send your comments to IBM

We appreciate your input on this publication. Feel free to comment on the clarity, accuracy, and completeness of the information or provide any other feedback that you have.

Use one of the following methods to send your comments:
1. Send an email to mhvrdfs@us.ibm.com.
2. Send an email from the "Contact us" web page for z/OS (http://www.ibm.com/systems/z/os/zos/webqs.html).
3. Mail the comments to the following address:
   IBM Corporation
   Attention: MHVRCFS Reader Comments
   Department H6MA, Building 707
   2455 South Road
   Poughkeepsie, NY 12601-5400
   US
4. Fax the comments to us, as follows:
   From the United States and Canada: 1+845+432-9405
   From all other countries: Your international access code +1+845+432-9405

Include the following information:
• Your name and address.
• Your email address.
• Your telephone or fax number.
• The publication title and order number:
  z/OS V2R1.0 RMF Report Analysis
  SC34-2665-01
• The topic and page number that is related to your comment.
• The text of your comment.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute the comments in any way appropriate without incurring any obligation to you.

IBM or any other organizations use the personal information that you supply to contact you only about the issues that you submit.

If you have a technical problem

Do not use the feedback methods that are listed for sending comments. Instead, take one of the following actions:
• Contact your IBM service representative.
• Call IBM technical support.
• Visit the IBM Support Portal at z/OS support page (http://www.ibm.com/systems/z/support/)
Summary of changes

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line to the left of the change.

Summary of changes for z/OS RMF Report Analysis for Version 2 Release 1, as updated February 2015

Changed information

This edition includes the following topics that contain changed information in support of IBM z13:

- Table 12 on page 53 has been updated.
- "CPC - CPC Capacity Report" on page 60 has been updated.
- "ENCLAVE - Enclave Report" on page 90 has been updated.
- "OPD - OMVS Process Data Report" on page 130 has been updated.
- "PROC - Processor Delays Report" on page 133 has been updated.
- "PROCU - Processor Usage Report" on page 137 has been updated.
- "SYSINFO - System Information Report" on page 172 has been updated.
- "CPU - CPU Activity report" on page 329 has been updated.
- "CRYPTO - Crypto Hardware Activity report" on page 348 has been updated.
- "TRACE - Trace Activity report" on page 431 has been updated.
- "WLMGL - Workload Activity report" on page 444 has been updated.
- Table 130 on page 320 has been updated.
- "CF to CF Activity section" on page 321 has been updated.

Changes made in z/OS Version 2 Release 1

This document contains information previously presented in z/OS RMF Report Analysis, SC33-7991-19, which supports z/OS Version 1 Release 13.

Statistics about CF structures residing in Storage Class Memory

Storage class memory (SCM) usage and statistics information is available for coupling facilities and structures which are allocated with storage class memory.

RMF provides SCM related information in SMF record type 74-4, as well as in the SCM Structure Summary and the Storage Summary of the Usage Summary section in the Postprocessor Coupling Facility Activity report.

For structures allocated with SCM, the Monitor III Coupling Facility Activity (CFACT) report displays a new Structure Details pop-up window, showing SCM measurements and general structure data.

In addition, new overview conditions are provided for the Postprocessor based on the enhanced SMF record 74-4.
RMF uses the term *storage class memory* (SCM) as a synonym for *Flash Express memory*.

**Monitoring PCIe function and zEDC activity**

A new Postprocessor *PCIE Activity Report* is available in XML output format and provides measurements about the activity of PCI Express based functions (PCle functions) and their exploitation of hardware accelerators.

A PCIe function is captured by the report if one of the following hardware feature activities has been measured:
- RDMA (Remote Direct Memory Access) over Converged Enhanced Ethernet
- zEnterprise Data Compression (zEDC) capability using zEDC Express

In addition, RMF provides new overview conditions for the Postprocessor based on a new subtype 9 of SMF record 74.

**Support of Group Capacity enhancements and absolute LPAR capacity limits**

WLM introduces negative phantom weights for softcapping and uses initial weights to distribute the group capping limit when it becomes necessary to enforce the group limits. RMF adds new fields to SMF record 70-1 and takes the new WLM functionality into account when reporting about capacity groups.

RMF adds support to report on the new absolute LPAR capacity limit that can be defined via the logical partition controls of the Hardware Management Console (HMC). The Postprocessor *Partition Data* report and the Monitor III *CPC Capacity* report display whether either Initial Capping or an absolute LPAR capacity limit was active during a reporting interval.

New RMF Postprocessor overview conditions based on SMF record 70-1 can be used for a more detailed analysis of the hardware capping options.

**New channel path details in Monitor III and Postprocessor coupling facility reports**

New channel path detail information is available for CIB and CFP channels paths. RMF provides this information in the *Subchannel Activity* and the *CF to CF Activity* sections of the Postprocessor *Coupling Facility Activity* report.

Also, the Monitor III *Coupling Facility Systems* report is enhanced to provide a new *Channel Path Details* section in the *Subchannels and Paths* pop-up.

In addition, RMF stores the newly gathered channel path detail information for coupling facilities into SMF record 74-4.

**Enhanced Postprocessor Crypto Hardware Activity report**

RMF enhances the Postprocessor *Crypto Hardware Activity* report to provide activity measurements from the Crypto Express4S (CEX4) card configured in one of the three ways:
- Cryptographic CCA coprocessor
- Cryptographic PKCS11 coprocessor
- Cryptographic accelerator
New overview conditions are provided for the Postprocessor, based on the enhanced SMF record 70-2.

**Additional Postprocessor reports in XML format**

By specifying appropriate ddnames in the job for the Postprocessor output, users can request the following reports in XML output format:

- **Cache Subsystem Activity**
- **Channel Path Activity**
- **Coupling Facility Activity**
- **Enqueue Activity**
- **Hierarchical File System Statistics**
- **I/O Queuing Activity**
- **Page Data Set Activity**
- **PCIE Activity Report**
- **Shared Device Activity**
- **Virtual Storage Activity**
- **XCF Activity**

**Cross platform monitoring support for Windows**

Beyond the support of the AIX and Linux operating systems, RMF XP has been extended to support Windows systems as monitored endpoints. With the Resource Monitoring plug-in for IBM z/OS Management Facility (z/OSMF), performance metrics from Windows systems can be displayed in the same way and together with metrics from other platforms.

**SMF Recording Facility for AIX, Linux and Windows performance data**

You can now use RMF XP for long-term performance analysis and capacity planning of your AIX, Linux and Windows systems. For this purpose, you can write performance data collected from the monitored endpoints to the new SMF record type 104.

**Monitoring of pageable large pages activity**

RMF provides enhanced performance measurements about memory objects and frames in the following reports:

- In the Postprocessor **Paging Activity** report, the **Memory Objects and Frames** section has been renamed to **Memory Objects and High Virtual Storage Frames** and now contains the following enhanced measurements:
  - additional metrics for high virtual common and shared storage frames
  - metrics for 1 MB frames are now reported in more detail
  - number of auxiliary storage slots for frames from virtual common and shared storage backed on DASD.

  In addition, RMF provides new overview conditions for the Postprocessor based on SMF record 71.

- In the Postprocessor **Virtual Storage Activity** report, the information about 1 MB frames in the **Private Area Detail** section is now separated into the categories **fixed** and ** pageable**.

- The Monitor III **Storage Memory Objects** report now provides measurements for 1 MB frames in more detail at system and address space level.

**Support of Storage Class Memory for paging**

RMF provides measurements about storage type SCM (storage class memory) in the following reports:
The Postprocessor as well as the Monitor II Page Data Set Activity reports provide information about SCM blocks used by the Auxiliary Storage Manager (ASM).

The Postprocessor Paging Activity report provides information about shared and high virtual shared and common frames backed on SCM and also provides information about SCM blocks used by ASM.

RMF uses the term storage class memory (SCM) as a synonym for Flash Express memory.

z/OS Version 2 Release 1 summary of changes
See the following publications for all enhancements to z/OS Version 2 Release 1 (V2R1):

- z/OS Migration
- z/OS Planning for Installation
- z/OS Summary of Message and Interface Changes
- z/OS Introduction and Release Guide
Chapter 1. Introducing RMF data gathering and reporting

This document provides you with detailed information about the RMF reports, which are grouped together as follows:

- Interactive Performance Analysis with Monitor III
- Snapshot Reporting with Monitor II
- Real-time Reporting with Monitor I
- Long-term Overview Reporting with the Postprocessor

Gathering data

RMF gathers data using three monitors:
- Short-term data collection with Monitor III
- Snapshot monitoring with Monitor II
- Long-term data gathering with Monitor I and Monitor III

The system operator starts all monitors as non-interactive (background) sessions with a variety of options that determine what type of data is collected and where it is stored. The data gathering functions run independently on each system, but each monitor can be started for all systems in a sysplex by one operator command.

**Short-term data collection with Monitor III**

A typical Monitor III gatherer session has a gathering cycle of one second, and consolidated records are written for a range which is typically set to 100 seconds.

You can collect short-term data and continuously monitor the system status to solve performance problems using Monitor III reports. You get actual performance data (response times, execution velocity) on a very detailed level for comparison with goals defined in your service policy.

You can collect data that indicate how fast jobs or groups of jobs are running — this is called workflow or speed. You also get data that show how resource-intensive jobs are using the processor, the DASD devices, and the storage. The reports provide this information under the heading using.

There is also information about delays, which are important indicators of performance problems.

**Snapshot monitoring with Monitor II**

The scope of Monitor II data gathering is mainly related to single address spaces or resources, giving snapshots of the current status. You can collect data about address space activities and resource consumption, and about processor, DASD volume, and storage activities and utilization.

With Monitor II, it is also possible to monitor one specific job or volume continuously.

**Long-term data gathering with Monitor I and Monitor III**

Monitor I and Monitor III provide long-term data collection about system workload and resource utilization, and cover all hardware and software
Introduction

components of your system: processor, I/O device and storage activities and utilization, as well as resource consumption, activity and performance of groups of address spaces.

Data is gathered for a specific cycle time, and consolidated data records are written at a specific interval time. The default value for data gathering is one second and for data recording is 30 minutes. You can select these options according to your requirements and change them whenever the need arises. Because Monitor I runs in the background and requires little overhead, it can run continuously to provide data for long-term analyses.

The SMF synchronization function ensures that records are written from all monitors in the sysplex for the same intervals.

Long-term overview reporting with the Postprocessor

The Postprocessor offers different types of reports:

*Interval report*: Draws a picture of the sysplex performance for each interval for which data has been gathered.

*Duration report*: The data is summarized over longer periods of time with a maximum value of 100 hours — practically no time limitation.

*Summary report*: Presents an overview of system activity over a specified reporting period.

*Exception report*: Presents a summary of the values that exceeded installation-defined thresholds over a specified period of time.

*Overview report*: This report provides enhanced exception and summary reporting, and offers records for further processing, for example spreadsheet applications on the workstation.

Report analysis with the Spreadsheet Reporter

RMF reports are presented in tabular form, and one very efficient way of handling data in tables is to use a spreadsheet. The Spreadsheet Reporter, a component of RMF that runs on the workstation, converts Postprocessor listings and Overview records into spreadsheets. At your workstation, independent of the systems you are monitoring, you can use one of several familiar spreadsheet applications to manipulate the data as you wish. In addition, the Spreadsheet Reporter provides sample macros to help you in presenting and analyzing performance data at a glance. You find a detailed description in the z/OS RMF User’s Guide.

Do not hesitate to install and to use this function; you will see that you get a lot of powerful reporting capabilities that help you in running the performance management tasks for your system.

Monitoring on the workstation

IBM z/OS Management Facility (z/OSMF) is a web-browser based management console for z/OS. The z/OSMF Resource Monitoring plug-in allows cross-sysplex performance monitoring from a single point of control. From the z/OSMF task tree, you can select the following subtasks:
Introduction

- The **Sysplex Status task** provides an enterprise-wide health check of all z/OS sysplexes.
- For further analysis, the **Monitoring Desktops task** can graphically display RMF Monitor III as well as AIX®, Linux, or Windows metrics by means of customizable views.

For an introduction to z/OSMF, refer to [z/OS RMF User’s Guide](#), or for detailed information, refer to [IBM z/OS Management Facility Configuration Guide](#).

**RMF Performance Monitoring (RMF PM)** gives you the capability to construct monitoring scenarios and use them whenever necessary. This is done on the Windows workstation, and the access to the current performance data of your z/OS systems is possible without the need to have a TSO/E session running. You find a detailed description in [z/OS RMF User’s Guide](#).

**What you can gather and report**

The type of RMF session you run depends on what you need to know about your system. This section describes which sessions measure and report on each type of activity in the system and the various types of delays. Depending on the type of activity and the system environment, the reports can be either sysplex or single-system reports.

**Activity monitoring**

The RMF gatherer sessions create either SMF or VSAM data that are available for reporting sessions. The following table

- displays the SMF type of all records that will be written by gatherer sessions
- indicates all Monitor III data stored in VSAM data sets
- shows all report capabilities

<table>
<thead>
<tr>
<th>Gathering</th>
<th>Activity</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>Long-term</td>
<td>Interactive</td>
</tr>
<tr>
<td>Mon III</td>
<td>Mon II</td>
<td>Mon I</td>
</tr>
<tr>
<td>SMF</td>
<td>VSAM</td>
<td>SMF</td>
</tr>
<tr>
<td>★</td>
<td>79.1/2/5</td>
<td>Address space</td>
</tr>
<tr>
<td>★</td>
<td>74.5</td>
<td>Cache</td>
</tr>
<tr>
<td>★</td>
<td>79.12</td>
<td>Channel path</td>
</tr>
<tr>
<td>74.4</td>
<td>★</td>
<td>Coupling facility</td>
</tr>
<tr>
<td></td>
<td>70.2</td>
<td>Cryptographic hardware</td>
</tr>
<tr>
<td>★</td>
<td>79.9</td>
<td>Device</td>
</tr>
<tr>
<td>★</td>
<td>74.1</td>
<td>Enclave</td>
</tr>
<tr>
<td>★</td>
<td>79.7</td>
<td>Enqueue</td>
</tr>
<tr>
<td></td>
<td>74.8</td>
<td>Enterprise Storage Server (ESS)</td>
</tr>
<tr>
<td></td>
<td>74.7</td>
<td>FICON director</td>
</tr>
<tr>
<td>79.15</td>
<td>IRLM long locks</td>
<td></td>
</tr>
<tr>
<td>★</td>
<td>79.14</td>
<td>I/O queuing</td>
</tr>
<tr>
<td>79.11</td>
<td>75</td>
<td>Page data set</td>
</tr>
<tr>
<td>79.4</td>
<td>71</td>
<td>Paging</td>
</tr>
<tr>
<td>74.9</td>
<td>PCIE Activity</td>
<td></td>
</tr>
</tbody>
</table>
### Introduction

#### Table 1. Monitored activities and SMF record types (continued)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td></td>
</tr>
<tr>
<td>Reserve</td>
<td></td>
</tr>
<tr>
<td>Serialization Delay</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td>System counters</td>
<td></td>
</tr>
<tr>
<td>UNIX</td>
<td></td>
</tr>
<tr>
<td>Virtual storage</td>
<td></td>
</tr>
<tr>
<td>Workload Service classes and report classes</td>
<td></td>
</tr>
</tbody>
</table>

#### Delay monitoring

In addition to monitoring and reporting system activity, Monitor III reports provide various types of delay information.

**Delayed address spaces and groups**

For each address space or group of address spaces, Monitor III reports the delay experienced for the report interval and identifies the primary cause for the delay:

- System (all jobs)
- TSO, batch, and started tasks
- ASCH and OMVS address spaces
- Service and report classes and workload groups
- Enclaves

For any service class, report class and workload group, Monitor III reports on response time breakdown, using the GROUP report to display the information.

**Delay reasons for address spaces**

For each of the above address space groups Monitor III offers information which of the following resources or subsystems caused the delays:

- CICS and IMS subsystem
- Devices
- Enclaves
- Enqueues
- HSM
- JES
- Operator (message, mount, and quiesce)
- Processors
- XCF

#### Long-term performance analysis with RMF XP

To enable long-term performance analysis of AIX, Linux and Windows systems, you can turn on SMF recording for SMF record type 104. This record type provides one range of subtypes for each supported platform. One specific subtype is used to keep the data for one individual CIM metric category according to the CIM data model on the affected platform.
Subtype 1-12
AIX on System p performance data

Subtype 20-31
Linux on System x performance data

Subtype 40-53
Linux on System z performance data

Subtype 60-64
Windows on System x performance data

For information on the metric categories provided in the subtypes and how to request the collection of SMF record type 104 from the systems of all or selected supported platforms, refer to the topic Cross platform monitoring with RMF XP in z/OS RMF User’s Guide.

Reporting of other SMF data
The Postprocessor provides two reports that are based on SMF data that have been gathered outside of RMF.

WebServer performance reporting
The Postprocessor offers an HTTP Server report to support this important e-business application. The report (based on SMF record type 103 written by the WebServer) provides usage statistics as well as performance information about the WebServer to assist you in tuning and capacity planning.

Lotus Domino support
The Postprocessor Lotus Domino Server report accepts the SMF record type 108 written by Lotus Domino and provides feedback on server load as well as the number and type of messages that the server handled.
Chapter 2. Interactive performance analysis with Monitor III

This information unit:

- guides you through a Monitor III reporter session
- provides a suggested sequence of reports
- explains how to navigate using cursor-sensitive control
- explains some common Monitor III report measurements
- introduces some Monitor III concepts
- explains how a Monitor III reporter session works
- describes the Monitor III menus
- describes each Monitor III report in detail

Using Monitor III reports

Read the following topics to learn how to use Monitor III reports efficiently:

- "System activities measured"
- "Where to start"
- "Using cursor-sensitive control" on page 11
- "Common Monitor III report measurements" on page 12
- "Monitor III MIN TIME and range" on page 15
- "Monitor III report options" on page 17
- "Monitor III sysplex support in different time zones" on page 17

System activities measured

Monitor III reports can provide delay information for any single job and for any of the following job groups or classes:

- System (all jobs)
- Workload groups and service classes
- TSO
- Batch
- Started tasks
- ASCH
- OMVS
- Enclaves

For each job or group of jobs, Monitor III reports the delay experienced during the report interval and identifies the primary cause of the delay. For any service class period, Monitor III provides a breakdown of response time and displays the information on the Group Response Time report.

See chapter "DELAY - Delay Report" on page 63 for more details.

Where to start

This chapter shows how Monitor III can be used for system monitoring and performance analysis, and helps a new or unexperienced user to find his way through the various RMF reports.

It is necessary to:
Using Monitor III reports

- Report goal values versus actual values
- Combine data from the entire sysplex to give you an overview at a glance
- Provide accessibility to reports for each system in the sysplex from a single point of control.

Monitor III addresses these needs by:

- Providing sysplex reports
- Arranging the reports in a hierarchy that allows stepping from an overview screen down to address space or resource specific reports.

Suggested sequence of reports

1. To monitor a sysplex, start with the Sysplex Summary (SYSSUM) report. Use the report options to set the Performance Index threshold to a value of, for example, 0.8 as a warning level, and select a type, so that service class periods are included in the report.
   
   Start the report in GO mode and let it run.
   
   As long as everything is running well, the performance status line at the top of the report shows only green. When the “warning” level for a goal is reached, the corresponding service class with the respective period appears on the report in yellow. And when a goal is not met, the corresponding service class appears on the report in red, followed by the service class period that missed the goal.

2. To find out what is causing the red line, leave GO mode and put the cursor on the line where the goal was not met. If several goals have been missed, the performance index can be of help to find out which goal was “missed most”.
   
   Depending on the type of service class, different detailed reports are shown:
   - For service classes, a response time breakdown is shown on the Response Time Distribution (SYSRTD) report.
   - For subsystem service classes, the transaction states are shown on the Work Manager Delays (SYSWKM) report.

   The SYSRTD report has a sysplex view in the upper part of the screen, and provides a single-system breakdown in a scrollable list on the bottom part of the screen.

   Furthermore, you can step from the SYSWKM report to the SYSRTD report using cursor-sensitive control, if you need some information from that report for additional investigations, or you want to continue navigation from that report.

3. The scrollable section in the SYSRTD report is the link from the sysplex level to the single system. From these lines it is possible to “zoom” into any of the listed systems. Placing the cursor on the system-ID in one of the rows and pressing ENTER, leads to the SYSINFO report of that system, thus allowing further analysis based on the data shown there. Placing the cursor on a specific data column in one of the rows of the scrollable area leads to a specific report of that system that provides additional information related to the selected column.

4. Finally, when the single-system level is reached, navigation among those reports is possible as described in step 5.

5. In the workflow/Exceptions (WFEX) report, you can identify jobs and resources with low workflow values or jobs that have met exceptional conditions. For example, you can check the Reason field to identify the user or the possible cause of delay. Once you recognize a user or a resource with a potential problem, you can analyze the situation using cursor-sensitive control. "Using cursor-sensitive control" on page 11 describes how to invoke reports using this method.
Using Monitor III reports

If you are on the Delay report, check the delay value (for PROC, STOR, DEV, SUBS, OPER, ENQ) with the largest value associated with a job, use cursor-sensitive control to navigate to the Job Delay report for that type of delay to analyze the main reason for the delay.

In case of a delay due to devices (DEV) or enqueued resources (ENQ), you can use cursor-sensitive control to further investigate a problem by looking at the resource-oriented device report (DEVR) and the resource-oriented enqueue report (ENQR). For storage problems involving paging or swapping delays, you can use the resource-oriented storage delay report (STORR). Use either the job entry subsystem (JES), hierarchical storage manager (HSM), or cross-system coupling facility (XCF) delays report for a delay associated with SUBS. For OPER delay, use cursor-sensitive control to see the appropriate Job Delay report.
For a summary of common system storage consumption, use the Common Storage Summary report (STORC). To identify remaining storage, use the STORCR report.

For a summary of how the workflow and delay of the measured system affects performance, use the SYSINFO report.

Figure 1 shows a suggested sequence for using Monitor III reports to resolve potential problems.
Using Monitor III reports

Getting information about data to be reported
For special purposes, where an overview of the available data may be helpful, you can also use the following path:

- You place the cursor on the sysplex field in the header line of a sysplex report and press ENTER.
- You call the DI command.

This leads to the Data Index screen.

The DI report shows all VSAM data sets used during data set recording, including data from other systems, or all preallocated data sets for the display session. From the DI report, you can decide what data in the data sets you want to display.

With the Include data set names option set to NO, this window gives an overview of all the data in the system.

Switching the DDNAMES/DSNAMES option to YES gives a Data Index screen with all data set names.

Based on the available data sets of the respective system, you can continue the analysis for that system.

Using cursor-sensitive control
Cursor-sensitive control lets you place the cursor on a field in a tabular report, and press the ENTER key, to see another report containing additional information about the field where the cursor is positioned. You can easily navigate among the RMF reports without returning to the Primary Menu or entering specific commands.

For example, you can move from the ENQ Delays report to the ENQ Resource Delays report by using cursor-sensitive control on the Major/Minor Names field. Note that the result of using cursor sensitivity depends on the data. For example, if you use cursor-sensitive control on the Primary Reason field in the Delays report, the resulting report is that variation of the Job Delays report that is related to the main reason for the delay.

RMF keeps track of your path. Pressing the END (PF3) key returns you to the previous report until you reach the point at which you started.

Note: If you press the RETURN (PF4) key, RMF displays the Primary menu and you lose all return paths.

If the path extends over reports that are built from different systems, the return path is lost.

If you issue any RMF command while using cursor-sensitive control, RMF will erase the return path.

Cursor-sensitive control is active on:
- most fields on all tabular reports except STORCR
- the Jobname field of the Job Report Selection Menu
- the Report field of the Option Selection Menu.
Common Monitor III report measurements

Most values included in Monitor III session reports are similar in their calculation. The following definitions and general formulas are common to all RMF reports:

- Using (%) for address spaces
- Delay (%) for address spaces
- Workflow (%) for address spaces and resources
- Execution velocity

Using samples

PROC  The number of address spaces found using one or more processors (which can be standard CPs (aka general purpose processors) or special purpose processors). An address space is considered using one or more processors when it has ready work (any ready SRB, interrupted ready task, asynchronous exit routine, or TCB is on the dispatching queue) that could be dispatched by the processor on which the Monitor III data gatherer is running.

DEV  The number of address spaces found using one or more devices. An address space is considered using one or more devices when it issues an I/O request. However, because the channel subsystem accepts an I/O request whether the device, control unit or both are busy or not, the requests might or might not be delayed (queued) in the channel. Therefore, the using requestors for devices might also contain an unknown amount of delay. You must consider this delay when interpreting the workflow value.

Delay samples

PROC  The number of address spaces found waiting for a processor (which can be general purpose or special purpose processors). An address space is considered waiting for a processor when the address space has at least one ready unit of work that is not dispatched. Primary source fields referenced in this calculation are the same as those listed under PROC for using samples.

DEV  The number of address spaces found waiting for a measured device. An address space is considered to be waiting for a measured device when at least one I/O queue element in the I/O queue for the device identifies the address space as the issuer of the I/O request but the request is not active. I/O requests queued in the channel for devices are considered to be using the device, and therefore an unknown amount of delay is missing from the delayed requestor count for devices.

ENQ  The number of address spaces found waiting for serially reusable resources.

HSM  The number of address spaces found waiting for an HSM service.

JES  The number of address spaces found waiting for a JES service.

OPR  The number of address spaces found waiting for operator interventions.

STR  The number of address spaces found waiting for storage operations.

XCF  The number of address spaces found waiting for an XCF path.

Address space workflow (%)

The workflow of an address space represents how a job uses system resources and the speed at which the job moves through the system in relation to the maximum
average speed at which the job could move through the system. The speed at
which the system performs the work of one job depends on the simultaneous work requested by other jobs.

A value from 0% to 100% indicates the workflow within the report interval. A low workflow value indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow value indicates that a job has all the resources it needs to execute, and that it is moving through the system at a relatively high speed.

For example, a job that would take four minutes to execute if all the resources it needed were available, would have a workflow of 25% if it took sixteen minutes to execute.

The following formula defines the workflow of a single address space:

**Single Address Space**

\[
\text{Workflow} \% = \frac{\# \text{ Using Samples}}{\# \text{ Using Samples} + \# \text{ Delay Samples}} \times 100
\]

**Note:** In calculating Workflow, Monitor III counts an address space as using a resource if at least one of its ready tasks is using the resource. Even if the address space has other ready tasks delayed for the same resource, Monitor III counts the address space as using the resource (single state case). For example, if a job has four ready tasks in its address space, and one task is using the processor while three tasks are simultaneously delayed for the processor, Monitor III considers this address space to have a using count of one and a delay count of one.

Also remember that a job can be using one resource and delayed for another at the same sample, or delayed for more than one resource at a time, or using more than one resource. The maximum per sample is two using (PROC and DEV) and eight delays (one for each resource).

**Example**

A job was found to be delayed or productive 75 times. The job was found to be using the processor 5 times and a device 10 times. The job was also found delayed for the processor 15 times, for a device 20 times and for an enqueued resource 25 times. The Workflow (%) of the job would be:

\[
\text{Workflow} \% = \frac{5 + 10}{(5 + 10) + (15 + 20 + 25)} \times 100 = 20\%
\]

The following formula defines the workflow of a group of address spaces:

**Group of Address Spaces**

\[
\text{Workflow} \% = \frac{\sum \text{ Using Samples}}{\sum \text{ Using Samples} + \sum \text{ Delay Samples}} \times 100
\]

**Note:** The sums represent the values for all address spaces in the group.

**Resource workflow (%)**

The workflow of resources indicates how efficiently users are being served. The speed with which each resource performs the work of all users is expressed as a value from 0% to 100%.
A low workflow value represents a large queue of work requests and a large number of delayed jobs, while a high workflow value represents little resource queuing contention and a small number of delayed jobs.

The following formula defines the workflow of a resource (DEV or PROC):

\[
\text{Workflow} = \frac{\text{\# Using Samples}}{\text{\# Using Samples + \# Delay Samples}} \times 100
\]

**Address space using (%)**

Jobs getting service from hardware resources (PROC or DEV) are using these resources. The use of a certain resource by an address space can vary from 0% to 100%, where 0% indicates no use of the resource during the report interval and 100% indicates that the address space was found using the resource in every sample during that period. If you use the default range of 100 seconds, 1% of using is equal to 1 second of using to the user.

The following formula defines the use of a resource by an address space during the report interval:

**Single Address Space**

\[
\text{Using} = \frac{\text{\# Using Samples}}{\text{\# Samples}} \times 100
\]

**Note:** In calculating Using, Monitor III counts an address space as using a resource even if the address space is also delayed for the identical resource (single state case). For example, if a job has four ready tasks in its address space, and one task is using the processor while three tasks are simultaneously delayed for the processor, Monitor III considers this address space to have a Using count of one and a Delay count of one.

PROC and DEV using can add up to more than the overall using percentage, with the maximum being 200%.

The using state of a group of address spaces for a certain resource during a report interval can also range from 0% to 100% and is calculated as follows:

**Group of Address Spaces**

\[
\text{Using} = \frac{\sum \text{\# Using Samples}}{\text{\# Samples} \times \text{Avg \# Address Spaces}} \times 100
\]

**Address space delay (%)**

The delay of an address space represents a job that needs one or more resources but that must wait because it is contending for the resource(s) with other users in the system. The delay of an address space for a specific resource or for all resources can vary from 0% to 100%. A delay of 0% indicates no delay during the report interval, while a delay of 100% represents a job that was found delayed at every sample during that period. Delay is a percent of Time during the period; with the default Range of 100 seconds, 1% delay is equal to one second of delay to the user.

The following formula defines the delay of an address space for a certain resource during a report interval:
Measurements

**Single Address Space**

\[
\text{Delay} (\%) = \frac{\# \text{ Delay Samples}}{\# \text{ Samples}} \times 100
\]

Note: In calculating Delay, Monitor III counts an address space as delayed for a resource if at least one ready user (unit of work) is waiting for a device or processor. In the case of single state sampling, if a job has more than one ready tasks simultaneously delayed for the processor, Monitor III considers this address space to have a delay count of one.

The sum of individual delays can be more than overall delay, with a maximum of 600%.

The delay of a group of address spaces for a certain resource during a report interval can also range from 0% to 100% and is calculated as follows:

**Group of Address Spaces**

\[
\text{Delay} (\%) = \frac{\sum \text{ Delay Samples}}{\# \text{ Samples} \times \text{Avg} \# \text{ Address Spaces}} \times 100
\]

Note: This value needs to be checked carefully if the number of address spaces in the group is very small.

**Execution velocity**

The execution velocity is a measure of how fast work is running compared to ideal conditions without delays.

The calculation of the execution velocity is:

**Execution Velocity**

\[
\text{Execution Velocity} (\%) = \frac{\# \text{ Using samples}}{\# \text{ Using Samples} + \# \text{ Delay Samples}} \times 100
\]

The values are taken from RCAETOTU and RCAETOTD which are described in the IWMWRCAA mapping (see [z/OS MVS Planning: Workload Management](https://www.ibm.com/docs/en/zos/2.4.0?topic=workload-planning-z-os-systems-management)).

**Monitor III MINTIME and range**

The Monitor III data gatherer combines all samples gathered into a set of samples for a time interval called MINTIME. The value for MINTIME is specified as gatherer option. The recommended value is 100 seconds.

Reporting is performed based on this MINTIME interval and is defined by the Range value. Range can be set either on the Session Options dialog or directly in each report header line on the Report Options panel, or using the BREF/FREF command.

When choosing a range for your report interval, there are two things to consider:
- It must be a multiple of the MINTIME that the data was gathered for
- It can be defined in seconds or minutes:
  - nnnnS where nnnn represents a number from 0 to 9999
  - nnnM where nnn represents a number from 1 to 166
Note: If you specify a value that is less than the MINTIME, the default value will be changed to equal the MINTIME.

How the data gathered affects the data reported
If you request a report interval on a report heading that crosses two MINTIMEs, data will be presented for both MINTIMEs and Time and Range will be adjusted accordingly on the report header.

Example
If the data gatherer runs with the recommended MINTIME of 100 seconds, data is gathered in the following intervals:

Time = 12:00:00 :01:40 :03:20 :05:00 :06:40
   |---------|---------|---------|---------|

The report that results from this data will have an initial time of 12:00:00 and a range of 100 seconds to match the data gathered.

If you revise the time to start at 12:02:00 and leave the range unchanged, the report heading changes to reflect a time of 12:01:40 and a range of 200. Here’s why:

Requested Report

Interval: 12:02:00 to 12:03:40
Range: 100 Sec
Time = 12:00:00 :01:40 :03:20 :05:00 :06:40
   |---------|---------|---------|---------|

Presented Report

Interval: 12:01:40 to 12:05:00
Range: 200 Sec
Time = 12:00:00 :01:40 :03:20 :05:00 :06:40
   |---------x-------------------x---------|

Rather than present less data than you requested, RMF displays a report using the minimum number of MINTIMEs that include the interval you requested. In the above example, this means the report interval must start at 12:01:40 and finish at 12:05:00.

To accurately reflect the data presented on the report, the header is adjusted accordingly. Time is changed to 12:01:40 (the start of the first MINTIME in the report interval) and Range is adjusted to 200 seconds (to include the last MINTIME in the report interval).

Note: The Range value that you specify on the Session Options panel is saved in your current option set and applies to all reports displayed when that option set is in effect. If you modify Range either directly in each report header line, or using the BREF/FREF command, the new range temporarily overrides the value on the Session Options panel, but is not saved in your current option set.

Shortened intervals
The following events can cause a shortened report interval:
A policy switch
A report interval containing a policy switch can have data with different gatherer options.

A system IPL
A change of the gatherer CYCLE time

RMF cannot combine data that was collected using different gathering options, and so the reporting range will be adjusted to start where the change occurred.

Example
If the data gatherer runs with the recommended MINTIME of 100 seconds, and a mode switch occurred at 12:02:00, data will be gathered in the following intervals:

<table>
<thead>
<tr>
<th>Time</th>
<th>12:00:00</th>
<th>01:40</th>
<th>03:20</th>
<th>05:00</th>
<th>06:40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Monitor III report options
Most of the Monitor III reports can be tailored by using specific report options. You can either define these options by parameters together with the report command, or you can call the Report Options panel with the command ROPTIONS or RO. Depending on the specific report, you will get a panel where you can select and specify valid options. By pressing PF3, you leave the panel and activate the options which will stay valid until they will be changed explicitly. In addition, you can use the following commands in a Report Options panel:

CANCEL
You can use this command to exit the panel without making any changes.

RESET
To ensure the RMF default settings for option panels are in effect, enter RESET on the command line or the respective panel. RESET reestablishes RMF’s default settings. Because there is no default value for jobname, the RESET command is not valid on the options panel of the Job Delays report.

Monitor III sysplex support in different time zones
This chapter describes how Monitor III is reporting a sysplex with systems running in different time zones.

Monitor III will always work with the local time of the system the reporter session has been started on. When requesting data from a system with a different local time, Monitor III will automatically adapt the begin and end time of the data request. Users do not have to care about different time zones, the Monitor III reporter does it internally.

Example
SYSA (local time is GMT+2)
SYSB (local time is GMT-1)

Monitor III reporter session started on SYSA
MINTIME and range

- Sysplex report requested for data at 10.05 am (GMT 08.05 am)
  - SYSA returns data from 10.05 am local SYSA time
  - SYSB returns data from 07.05 am local SYSB time

Thus, both systems contribute data of the same point of time based on GMT.

- Single system report requested for remote system SYSB 10.05 am
  - SYSB returns data from 07.05 am local SYSB time

This matches 10.05 am local SYSA time. The reporter displays it with Time=10.05.00.

Note:
1. The Monitor III Data Index screen displays in the columns Begin/End Date/Time still the local time from the system.
2. This processing is done only when running a Monitor III reporter session to display data gathered by an active Monitor III gatherer session, not when displaying data from VSAM data sets by preallocating DDNAMEs RMFDSnn before starting a reporter session.

The reporter session

A Monitor III reporter session runs under ISPF and issues online reports about system performance. During a reporter session, you can obtain reports with current data from any system in the sysplex, with data collected earlier, or with preallocated data from any system. You can use the Data Index to choose what data you want to use. See the z/OS RMF User's Guide for information.

The tutorial, which is option T on the Monitor III Primary Menu, is an online introduction to Monitor III. It gives you an overview of an RMF reporter session and contains some examples on using RMF. You can also use the HELP (PF1) key for additional information on a panel, message, or report you are viewing.

Starting and stopping a Monitor III reporter session

You can start the reporter session with the command:

RMF

This presents the RMF Primary Menu, and by selection 3, you get the Monitor III reporter session.

To end the RMF Monitor III data reporter, select X on the Primary Menu, or enter =X on any command line.

Messages during Monitor III start

There are two special cases that you might see a message at your terminal after calling Monitor III:

- ADM0873 I IF AVAILABLE, PLEASE SELECT PCLK, OTHERWISE PRESS 'ENTER'
  
  This indicates that your 3270 terminal either has no graphic capability, or that you run on a multisession terminal (for example 3279) in a session that has not been defined in the VTAM control unit as a graphic session. As result, Monitor III can create tabular reports only.

- IEC130I ADMPC DD STATEMENT MISSING
This message might appear in a 3270 emulator session on your workstation. You can ignore it, and Monitor III will create graphic reports.

The Primary Menu

After the Monitor III reporter session starts, RMF displays the Monitor III Primary Menu.

![Figure 2. Monitor III Primary Menu](image)

You can use the ISPF options to tailor the command and selection lines.

RMF reports and their fields are described later in this chapter. See the z/OS RMF User’s Guide for information on RMF options.

Selecting a report

You can select a report from the Primary Menu or from any other report panel in the following ways:

- Enter the report name or its abbreviation on any selection or command line.
- Enter the selection number of the report name on the selection line of the Primary Menu.
- Use the ISPF 'jump' function to enter the selection number on any selection or command line.

Note: While viewing tabular reports, you can use cursor-sensitive control to obtain additional detailed reports about several individual fields.

Example

To invoke the Delay Report, enter the command DELAY on any selection or command line within Monitor III: Command ===> delay

Or enter a 1 on the Primary Menu: Selection ===> 1

and then a 4 on the Overview Report menu: Selection ===> 4
Or select the report from any other report panel by using the ISPF jump function:

Command ===> =1.4

If you do not specify parameters for report commands (jobname, class, selection, resource), RMF defaults to the options already in effect for the session. If nothing was specified on the Job Delays report, RMF presents you with a report options panel so that you can specify a selection.

To change options for a report, enter the following on the command line of the report:

Command ===> OPTIONS

RMF displays the Report Options panel for that report. On this panel, you can modify what is presented on RMF reports by changing the options. RMF saves any report options you change across sessions. When you are finished specifying the options, press END (PF3) to save your changes and return to the report.

Note: You can also use the option selection (OPTIONS) menu to access a Report Options panel.

Monitor III report commands

Table 2 on page 21 lists all report commands with their parameters and abbreviations. The “How to request this report” section for each report shows an example of the command and parameters.

You can enter the commands on any command line.

The Parameters column in Table 2 on page 21 indicates what parameters, if any, you can specify on the respective commands:

**cfname**
A coupling facility name

**job_class**
One of the following names of a job class:

ALL (A)
ASCH (AS)
BATCH (B)
OMVS (O)
STC (S)
TSO (T)

Notes:
1. This parameter is optional. If it is not specified, ALL is used by default.
2. In addition, ENC (or E) can be specified as class for the DELAY report.

**dsname**
A data set name

**jobname**
A job name

**period**
A service or report class period

**resource**
A resource name
Monitor III - Primary Menu

**service_class**  
A service class name

**s/r-class**  
A service or report class name

**ssid**  
A cache subsystem identifier

**sstype**  
The name of a subsystem that schedules enclaves

**storage_class**  
A storage class name

**volser**  
A serial number of a volume

**wlm**  
The name of a workload group, a service class, or a report class

**Table 2. Report Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Displays</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACHDET</td>
<td>ssid</td>
<td>Cache detail report</td>
<td>CAD</td>
</tr>
<tr>
<td>CACHSUM</td>
<td></td>
<td>Cache summary report</td>
<td>CAS</td>
</tr>
<tr>
<td>CFACT</td>
<td>cfname</td>
<td>coupling facility activity report</td>
<td>CA</td>
</tr>
<tr>
<td>CFOVER</td>
<td>cfname</td>
<td>coupling facility overview report</td>
<td>CO</td>
</tr>
<tr>
<td>CFSYS</td>
<td>cfname</td>
<td>coupling facility system report</td>
<td>CS</td>
</tr>
<tr>
<td>CHANNEL</td>
<td></td>
<td>Channel path activity report</td>
<td>CHAN, CH</td>
</tr>
<tr>
<td>CPC</td>
<td></td>
<td>CPC capacity report</td>
<td></td>
</tr>
<tr>
<td>DELAY</td>
<td>job_class, service_class</td>
<td>Delays report for all jobs or specified job groups</td>
<td>DEL, DLY, DL</td>
</tr>
<tr>
<td>DELAYJ</td>
<td>jobname</td>
<td>Job report variation for specified job reflecting primary delay reason</td>
<td>DLJ, DJ, DELJ, DLYJ, JOB, JO</td>
</tr>
<tr>
<td>DEV</td>
<td>job_class, service_class</td>
<td>Device delays report for all jobs or specified job groups</td>
<td>DD, DVD</td>
</tr>
<tr>
<td>DEVJ</td>
<td>jobname</td>
<td>Device delays variation of job report for specified jobname</td>
<td>DDJ, DVJ</td>
</tr>
<tr>
<td>DEVR</td>
<td>volser</td>
<td>Device delays report for all or specified resources</td>
<td>DR, DVR</td>
</tr>
<tr>
<td>DSINDEX</td>
<td></td>
<td>Data index information</td>
<td>DS, DI</td>
</tr>
<tr>
<td>DSND</td>
<td>dsname</td>
<td>Data set delays report for all or specified data sets</td>
<td>DSN</td>
</tr>
<tr>
<td>DSNJ</td>
<td>jobname</td>
<td>Data set delays - Job report for specified jobname</td>
<td>DSNJ</td>
</tr>
<tr>
<td>DSNV</td>
<td>volser</td>
<td>Data set delays - Volume report for specified volume</td>
<td>DSNV</td>
</tr>
<tr>
<td>ENCLAVE</td>
<td>sstype</td>
<td>Enclave activity report</td>
<td>ENCL</td>
</tr>
<tr>
<td>ENQ</td>
<td>job_class, service_class</td>
<td>Enqueue delays report for all jobs or specified job groups</td>
<td>ED</td>
</tr>
<tr>
<td>ENQJ</td>
<td>jobname</td>
<td>Enqueue delays variation of job report for specified jobname</td>
<td>EJ</td>
</tr>
<tr>
<td>ENQR</td>
<td>resource</td>
<td>Enqueue delays for all or specified resources</td>
<td>ER</td>
</tr>
<tr>
<td>GROUP</td>
<td>s/r-class, period</td>
<td>Group response time breakdown</td>
<td>GP, GRP, GD, RT, GRT</td>
</tr>
<tr>
<td>HSM</td>
<td>job_class, service_class</td>
<td>HSM delays report for all jobs or specified job groups</td>
<td>HD</td>
</tr>
</tbody>
</table>
### Table 2. Report Commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Displays</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSMJ</td>
<td>jobname</td>
<td>HSM delays variation of job report for specified jobname</td>
<td>HJ</td>
</tr>
<tr>
<td>IOQUEUE</td>
<td></td>
<td>I/O queuing activity report</td>
<td>IOQ, IQ</td>
</tr>
<tr>
<td>JES</td>
<td>job_class, service_class</td>
<td>JES delays report for all jobs or specified job groups</td>
<td>JD</td>
</tr>
<tr>
<td>JESJ</td>
<td>jobname</td>
<td>JES delays variation of job report for specified jobname</td>
<td>JJ</td>
</tr>
<tr>
<td>JOB</td>
<td>jobname</td>
<td>Job report variation for specified job reflecting primary delay reason</td>
<td>JO, DELAYJ, DLJ, DELJ, DJJ</td>
</tr>
<tr>
<td>LOCKSP</td>
<td>HELD, SPIN, BOTH</td>
<td>Spin Lock Report about held spin locks and/or address spaces spinning due to a request for a spin lock</td>
<td>LSP</td>
</tr>
<tr>
<td>LOCKSU</td>
<td>LOCAL, GLOBAL, BOTH</td>
<td>Suspend Lock Report about local and/or global suspend locks</td>
<td>LSU</td>
</tr>
<tr>
<td>MNTJ</td>
<td>jobname</td>
<td>Operator delays variation for mount request of job report for specified jobname</td>
<td>MTJ</td>
</tr>
<tr>
<td>MSGJ</td>
<td>jobname</td>
<td>Operator delays variation for message request of job report for specified jobname</td>
<td>MSJ</td>
</tr>
<tr>
<td>OPD</td>
<td></td>
<td>OMVS process data</td>
<td></td>
</tr>
<tr>
<td>PROC</td>
<td>job_class, service_class</td>
<td>Processor delays report for all jobs or specified job groups</td>
<td>PD</td>
</tr>
<tr>
<td>PROCJ</td>
<td>jobname</td>
<td>Processor delays variation of job report for specified job</td>
<td>PJ</td>
</tr>
<tr>
<td>PROCU</td>
<td>job_class, service_class</td>
<td>Processor usage of a job per processor type (standard or special purpose processors)</td>
<td>PU</td>
</tr>
<tr>
<td>QSCJ</td>
<td>jobname</td>
<td>Operator delays variation for quiesce command of job report for specified jobname</td>
<td>QJ</td>
</tr>
<tr>
<td>RLSDS</td>
<td>dname</td>
<td>VSAM RLS activity by data set</td>
<td>RLD</td>
</tr>
<tr>
<td>RLSLSC</td>
<td>storage_class</td>
<td>VSAM RLS activity by storage class</td>
<td>RLS</td>
</tr>
<tr>
<td>SPACEG</td>
<td></td>
<td>Storage space report</td>
<td>SPG</td>
</tr>
<tr>
<td>STOR</td>
<td>job_class, service_class</td>
<td>Storage delays report for all jobs or specified job group</td>
<td>SD</td>
</tr>
<tr>
<td>STORC</td>
<td>job_class, service_class</td>
<td>Common storage report</td>
<td>SC</td>
</tr>
<tr>
<td>STORCR</td>
<td></td>
<td>Common storage remaining at end of job report</td>
<td>SCR</td>
</tr>
<tr>
<td>STORF</td>
<td>job_class, service_class</td>
<td>Detailed information on frame counts for all jobs or specified job group</td>
<td>SF</td>
</tr>
<tr>
<td>STORM</td>
<td>job_class, service_class</td>
<td>Detailed information about the use of memory objects within the system</td>
<td>SM</td>
</tr>
<tr>
<td>STORJ</td>
<td>jobname</td>
<td>Storage delays variation of job report for specified job</td>
<td>SJ</td>
</tr>
<tr>
<td>STORR</td>
<td></td>
<td>Storage space and paging activity report for all system volumes</td>
<td>SR</td>
</tr>
<tr>
<td>STORS</td>
<td>wlm</td>
<td>Summarized storage information by workload group, service or report class</td>
<td>SS</td>
</tr>
<tr>
<td>SYSENQ</td>
<td></td>
<td>Sysplex enqueue delays report</td>
<td>ES</td>
</tr>
<tr>
<td>SYSINFO</td>
<td>wlm</td>
<td>System information, total and by user groups</td>
<td>SY, SYS, SI</td>
</tr>
<tr>
<td>SYSRTD</td>
<td>s/r-class, period</td>
<td>Response time distribution report</td>
<td>RTD</td>
</tr>
<tr>
<td>SYSSUM</td>
<td>wlm</td>
<td>Sysplex summary</td>
<td>SUM</td>
</tr>
<tr>
<td>SYSWKM</td>
<td>s/r-class, period</td>
<td>Work manager delays report for subsystems</td>
<td>WKM</td>
</tr>
</tbody>
</table>
Monitor III - Primary Menu

Table 2. Report Commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Displays</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFEX</td>
<td></td>
<td>Workflow/exceptions screen</td>
<td>WE, WF</td>
</tr>
<tr>
<td>XCF</td>
<td>job_class, service_class</td>
<td>Cross-system coupling facility delays report</td>
<td>XD</td>
</tr>
<tr>
<td>XCFJ</td>
<td>jobname</td>
<td>XCF delays variation of the job report for specified jobname</td>
<td>XJ</td>
</tr>
<tr>
<td>ZFSACT</td>
<td></td>
<td>zFS file system activity</td>
<td>ZFSA</td>
</tr>
<tr>
<td>ZFSSUM</td>
<td></td>
<td>zFS file system summary</td>
<td>ZFSS</td>
</tr>
</tbody>
</table>

Table 3 contains commands for the examples of user-written reports that were delivered with RMF.

Table 3. User-Written Report Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Displays</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVN</td>
<td></td>
<td>Device activity</td>
<td>DA</td>
</tr>
<tr>
<td>DEVT</td>
<td></td>
<td>Device trend</td>
<td>DT</td>
</tr>
<tr>
<td>DSD</td>
<td></td>
<td>Detailed storage delays</td>
<td></td>
</tr>
<tr>
<td>RG</td>
<td></td>
<td>Resource group data</td>
<td></td>
</tr>
<tr>
<td>SYSTREND</td>
<td></td>
<td>System trend</td>
<td>ST</td>
</tr>
</tbody>
</table>

Header for single-system reports

Figure 3 shows the common header for single-system Monitor III reports.

Figure 3. Header of Monitor III Single-System Reports

All Monitor III single-system report headers contain the following information:

Table 4. Monitor III Heading Information

<table>
<thead>
<tr>
<th>Heading</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report title</td>
<td>The type of measurement data</td>
</tr>
<tr>
<td>Date/Time</td>
<td>The starting date and time for the first set of samples included in the report.</td>
</tr>
<tr>
<td>Range</td>
<td>The length of time (in seconds) during which samples were gathered, starting with the time specified in the Time field.</td>
</tr>
</tbody>
</table>

Header for sysplex reports

The sysplex report header differs from single-system reports in the following fields:

1. The sysplex reports show the sysplex name, whereas the single-system reports show the SMF system identification. In Figure 4 on page 24, SYSPLEXN is the eight character sysplex name.

2. For some sysplex reports, for example, SYSSUM or SYSWKM, the RMF sample count is replaced by the number of WLM samples. This value is an average of the MINTIMEs from the different systems, that contributed to the report.

3. The number of systems participating in the report is shown and indicates whether the complete sysplex is contributing to the report or not. To find out...
Monitor III - Primary Menu

which specific system is not included, check the HELP-Screen of the message Not all systems included in the report. Furthermore, the Data Index may be useful.

The sysplex report header is shown in [Figure 4].

![Figure 4. Header of Monitor III Sysplex Reports]

The Sysplex Report Selection Menu

You can navigate to the Sysplex Report Selection Menu by selecting an S on the Primary Menu.

Use this menu to select one of the sysplex reports, or the Data Index. For more information about the Data Index, see “The Data Index” on page 28.

All sysplex reports provide a sysplex view of your system. Whenever you invoke one of these reports, the data from all systems belonging to the sysplex is retrieved and transferred to the reporting system via the RMF Sysplex Data Server.
The Overview Report Selection Menu

On the Overview Report Selection Menu, you can select among various basic and detail reports.

The Job Report Selection Menu

To request the Job Report Selection Menu, select 2 from the Primary Menu or enter JOBS on any command line. Use this menu to choose the specific job and the type of delay which you want to analyze.

To get a list of active job names, use cursor-sensitive control on the Jobname field to invoke the Job Report Options panel.
Job-oriented reports show delay components for jobs, such as resource delays, subsystem delays, operator, and device delays.

The Resource Report Selection Menu

Use this menu to choose what resource you want to see delays or storage problems for.

To request the Resource Report Selection Menu, select 3 on the Primary Menu, or enter RESOURCE on any command line.
The Storage report section of the menu allows you to choose one of the six types of storage report provided by RMF. There are two types of report: Storage reports and Common Storage reports.

The Subsystem Report Selection Menu

The Subsystem report menu allows you to select HSM, JES, and XCF Delay reports.

To request the **Subsystem Report Selection Menu**, select 4 from the Primary Menu or enter SUBS on any command line.

**Figure 9. Monitor III Subsystem Report Selection Menu**

The User Report Selection Menu

The User report menu allows you to select your user-written reports or those examples that are provided with Monitor III.

To request the **User Report Selection Menu**, select U from the Primary Menu or enter USER on any command line.
The Data Index (DI) shows you the data sets that are available throughout the sysplex.

The Data Index provides information about the data that is currently available for your reporter session. The data that it contains is either:

- Current data from all active Monitor III data gatherers in the sysplex. The current data represents all available data from every system that can be found in the sysplex.
- Previously stored data from a Monitor III gatherer session (so called preallocated data sets).

The Data Index displays the list of systems in alphabetical order by system ID of the RMF Monitor III data gatherer that recorded the data. You can also see if data is missing, or could not be retrieved due to one of the following reasons:

- No data is available for the requested system
- The system does not respond to a request for data
- The gatherer for the system is not active
- RMF is not active on a system
- The preallocated data set is empty or has an error

Thus the Data Index provides a compact overview of information about all systems belonging to the sysplex regardless of whether RMF is active or not.

**How to request the Data Index**

Select S on the Primary menu, and then D on the Sysplex Report menu, or you can enter the following command:

```
DI
```

**Contents of the Data Index**

Read the following information about the Data Index:

- "If you are using active Monitor III gatherers in the sysplex" on page 29
- "If you are using preallocated data sets" on page 29
If you are using active Monitor III gatherers in the sysplex

For each active Monitor III gatherer in the sysplex, the following will be displayed on the Data Index:

- The RMF in-storage buffer; and
- If the Monitor III gatherer has been started with data set support, all data sets used by the Monitor III gatherer for recording data.

Rows with data that are available on the local system are displayed in turquoise. All other rows are displayed in dark blue.

Figure 11 shows a sample Data Index that is using data from active Monitor III data gatherers in a sysplex.

If you are using preallocated data sets

If a local session has had data sets preallocated to it before the RMF reporter is started, the Data Index will only display data from those data sets. This is independent of the active Monitor III gatherers in the sysplex. For information about how to preallocate data sets to the local session, refer to the z/OS RMF User's Guide.
Mon III - Data Index

All rows will be shown in dark blue.

Note: It is possible to preallocate data sets from different systems, but only one sysplex can be represented by the data in those data sets. If the data represents more than one sysplex, the Data Index is displayed, and no other report can be generated. To resolve the problem, end the session, deallocate any data sets with a different sysplex ID, and start a new session.

Figure 12 shows a sample Data Index that is using data from preallocated data sets to a reporter session.

Condensed information on the Data Index

The detailed version of the Data Index allows you to display all data sets that are available throughout the entire sysplex, or all data sets that are preallocated to one session. As this may be a long list, you can use the DDNAMES/DSNAMES option on the Report Options panel to compress the data set level information per system.

Figure 13 on page 31 and Figure 14 on page 31 show what the data displayed in Figure 11 on page 29 and Figure 12 respectively, look like if the DDNAMES/DSNAMES option is used to condense the information displayed.
The condensed version of the Data Index displays information about data that is available throughout the sysplex. It shows at a glance, for which time ranges data is available on each system, or if no data is available at all or could not be retrieved due to special conditions.

**Data Index — field descriptions**

For a description of the report header area of the Data Index, refer to "Header for single-system reports" on page 23, and "Header for sysplex reports" on page 23, where the various header fields are described in more detail.

**Note:** The Data Index title line contains a sysplex ID field like in sysplex reports, but instead of a WLM Samples: field, it shows just the Samples: field as in single system reports. The sysplex ID field in the title line can be blank if you are using data from an old RMF gatherer or have preallocated data from a previous release of RMF.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>The four-character SMF system identifier of the Monitor III gatherer that collected the data. If the identification of the system could not be determined, the field contains <code>?? ??</code>.</td>
</tr>
<tr>
<td>Begin/End Date</td>
<td>These are the beginning and ending dates for the data in the usable and not-empty data sets or the in-storage buffers. If the beginning and ending dates are the same, RMF will only display the beginning date. If there is a problem with the data, the dates and times are left blank, and a message is shown.</td>
</tr>
<tr>
<td>DDNAME</td>
<td>For a Data Index using active gatherer's data, the DDNAME is the system generated DD name for the data set that has been dynamically allocated for the data gatherer's session. For a Data Index using preallocated data sets, this is the name that was specified in RMFDSSxx on the ALLOCATE command issued before the reporter session was started. If there is a problem with the data, the field remains blank. Also, note that the field remains blank if this line is representing the gatherer's in-storage buffer.</td>
</tr>
</tbody>
</table>
### Mon III - Data Index

#### Table 5. Fields in the Data Index (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Set Name</td>
<td>This field has two lines. The first line contains the name of the VSAM data set containing the data. The second line is either blank or contains a comment concerning the status of the data. (See &quot;Information and error messages on the Data Index.&quot;) Note that the first line is blank when the data represents a gatherer’s in-storage buffer.</td>
</tr>
<tr>
<td>Begin Date Time</td>
<td>The begin date and time for which data is available on the respective system. This field is blank if there is no data to be represented for the system.</td>
</tr>
<tr>
<td>End Date Time</td>
<td>The end date and time for which data is available on the respective system. This field contains a comment about the status of the data if a problem was encountered.</td>
</tr>
</tbody>
</table>

### Note: If you are using old data, the sysplex ID and other fields may be blank.

#### Information and error messages on the Data Index

The following messages can be shown in special cases:

- **Currently active***
  - The currently active data set for the Monitor III data gatherer session (appears only on the Data Index for a reporter session without preallocated data sets)

- **In-storage buffer***
  - The local storage buffer entry of the Monitor III data gatherer

- **Empty***
  - Data set with no usable data. For a session without preallocated data sets, data set recording might not be active and RMF cannot find the LRECL or CI SIZE for the data sets. For a session with preallocated data sets, the data set might be empty or contain other than sampled data gathered during a Monitor III data gatherer session.

- **No data available***
  - There is no data available for the system listed in the System: field on this line.

- **No response***
  - A system that is part of the sysplex, according to the XCF system name list, does not reply to the request for data

- **Gatherer not active***
  - RMF is active on a system, but the Monitor III gatherer is not started

- **RMF not active in xxxxxxx***
  - The RMF address space is not active on system xxxxxxxx. Therefore, no data can be reported for this system.
    - The eight-character z/OS system name xxxxxxxx is defined in the SYS1.PARMLIB(IEASYSxx) parameter SYSNAME.
    - The four-character SMF system ID, defined in the SYS1.PARMLIB(SMFPRMxx) parameter SID(xxxx) cannot be determined, and is set to ‘????’.

The following messages occur when the data gatherer tried to use the data set.

- **Not Found***
  - Uncataloged data set specified on the DATASET option of the Monitor III data gatherer session (the data set is unusable)
Mon III - Data Index

*** Invalid RECSIZE ***
Data set specified with an invalid record size (the data set is unusable)

*** Invalid CISIZE ***
Data set specified with an invalid control interval size (the data set is unusable)

*** Open Error RC=xx reason=xxx ***
Error in opening the data set (the data set is unusable)

*** Close Error RC=xx reason=xxx ***
Error in closing the data set (the data set is unusable)

*** VSAM error RC=xx reason=xxx ***
Error in reading the VSAM data set (the data set is unusable)

*** DYNALLOC RC=xx IRC=xxxx ERC=xxxx ***
Dynamic allocation error (the data set is unusable)

*** UNALLOC RC=xx IRC=xxxx ERC=xxxx ***
Data set unallocated (the data set is unusable)

*** Sample time exceeds current time ***
Data set with a sample time that is later than the current system time. The system time has probably been incorrectly set. (This message does not appear on the screen with preallocated data sets.)

*** Data from sysplex xxxxxxxx ***
For either preallocated data sets or gatherer data sets, a data set that is from a sysplex other that the one selected has been encountered. Only one sysplex can be represented by the data on the Data Index. No other reports can be shown as long as this error persists.

*** Data from system xxxx ***
The reporter cannot report data from gatherer data sets from another system. The gatherer marks the data sets as unusable if more than one system has written to a data set. The reporter cannot access the data in data sets that are marked unusable.

The reporter also cannot report data from different sysplexes in one session.

Cursor-sensitive control
Cursor sensitivity on the System field switches to the selected system, that means, data from the requested system is retrieved (if available), and the Data Index is redisplayed, with the selected system shown in the header System field, and the corresponding lines of the report shown in turquoise.

Data Index options

<table>
<thead>
<tr>
<th>RMF Data Index Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command ====&gt;</td>
</tr>
<tr>
<td>Change or verify parameters. Press END to save and end.</td>
</tr>
</tbody>
</table>

DDNAMES/DSNAMES  ==> YES Include DDNAMES / DSNAMES information (YES NO)
Sort Order  ==> ASCEND Sort data set names (ASCEND DESCEND)

Figure 15. Data Index Options Panel

The Data Index has two options:
The DDNAMES/DSNAMES option allows you to determine the amount of information that will be displayed. There are two valid values for the DDNAMES/DSNAMES option:

- **YES** This value gives you a more detailed Data Index. It contains, at a data-set level, the data that is used on other RMF reports. You can see if there are any specific problems with the available data. See Figure 11 on page 29 and Figure 12 on page 30 for example screens.

- **NO** This value gives you a condensed version of the Data Index. You can see what systems are available for reporting rather than the actual data that is available. See Figure 13 on page 31 and Figure 14 on page 31 for example screens.

The Sort Order is available on the Data Index Options panel, so that it can be accessed with the ROPTIONS command from the Data Index screen. If more than one row with the same system identification exist, the usable data sets that are not empty are listed first, then the empty data sets, and finally the unusable data sets. The usable data sets that are not empty are sorted according to the end time of the stored data.

The entire Data Index is sorted by system ID. The Sort Order option allows you to change the sorting of the individual data entries for each system. The two valid values for this option are:

- **ASCEND** This value causes the entries in the Data Index to be sorted with the oldest data at the top of the individual system lists. See Figure 11 on page 29 for an example.

- **DESCEND** This value causes the entries in the Data Index to be sorted with the latest data first for each system. See Figure 16 for an example.

**Figure 16. Data Index - Sort Order Descend**

*Note: Since the condensed version of the Data Index (DDNAMES/DSNAMES = NO) has only one entry per system, changing the Sort Order option will not have any effect on the condensed version of the Data Index.*
CACHDET - Cache Detail Report

The CACHDET report provides detailed information about the activities of one cache subsystem.

How to request this report

To request the CACHDET report, select 5 on the Primary Menu, and then select 9 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

CACHDET [subsystem_id]

Contents of the report

<table>
<thead>
<tr>
<th>Command ==&gt;</th>
<th>RMF V2R1 Cache Detail - SYSPLEX Line 1 of 20 Scroll ==&gt; HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume /Num SSID</td>
<td>I/O</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>*ALL</td>
<td>100</td>
</tr>
<tr>
<td>*NOCAC</td>
<td>0.0</td>
</tr>
<tr>
<td>*CACHE</td>
<td>100</td>
</tr>
<tr>
<td>SYSXO 05CB 0043</td>
<td>27.9</td>
</tr>
<tr>
<td>SYSXO 05C3 0043</td>
<td>11.6</td>
</tr>
<tr>
<td>SYSXO 05CA 0043</td>
<td>11.2</td>
</tr>
<tr>
<td>SYSXO 05C6 0043</td>
<td>10.8</td>
</tr>
<tr>
<td>SYSXO 05C0 0043</td>
<td>9.7</td>
</tr>
<tr>
<td>SYSXO 05CB 0043</td>
<td>6.8</td>
</tr>
<tr>
<td>SYSXO 05C5 0043</td>
<td>5.4</td>
</tr>
<tr>
<td>SYSXO 05C2 0043</td>
<td>3.7</td>
</tr>
<tr>
<td>SYSXO 05C4 0043</td>
<td>3.6</td>
</tr>
<tr>
<td>SYSXO 05C7 0043</td>
<td>3.6</td>
</tr>
<tr>
<td>SYSXO 05C7 0043</td>
<td>3.3</td>
</tr>
<tr>
<td>SYSXO 05C0 0043</td>
<td>3.3</td>
</tr>
<tr>
<td>SYSXO 05C4 0043</td>
<td>0.6</td>
</tr>
<tr>
<td>SYSXO 05C9 0043</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSXO 05C1 0043</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSXO 05C0 0043</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSXO 05C8 0043</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSXO 05C7 0043</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Figure 17. CACHDET Report

There is no graphic version of this report available.

If you place the cursor on any field of the first two columns, a pop-up window appears showing details for the selected volume. Cursor-sensitive control of the third column leads you to a pop-up window with details for the selected SSID.
### Volume Details

The following details are available for Volume SYSSM6 on SSID 0043.

**Cache:** Active  
**DFW:** Active  
**Pinned:** None

<table>
<thead>
<tr>
<th>Field</th>
<th>Rate</th>
<th>Hit</th>
<th>Hit%</th>
<th>Rate</th>
<th>Fast</th>
<th>Hit</th>
<th>Hit%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm</td>
<td>3.7</td>
<td>3.6</td>
<td>98.8</td>
<td>0.8</td>
<td>0.8</td>
<td>82.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Seq</td>
<td>0.0</td>
<td>0.0</td>
<td>100</td>
<td>0.1</td>
<td>0.1</td>
<td>93.3</td>
<td>1.0</td>
</tr>
<tr>
<td>CFW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>3.7</td>
<td>3.7</td>
<td>98.9</td>
<td>0.9</td>
<td>0.9</td>
<td>99.1</td>
<td>80.0</td>
</tr>
</tbody>
</table>

#### Misc

- Non-Cache: 0.0
- CKD: 0.0

<table>
<thead>
<tr>
<th>Field</th>
<th>DFW Bypass</th>
<th>ICL</th>
<th>Write</th>
<th>Read Miss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seq</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>CFW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DFW Inhibit</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SSID Details

The following details are available for SSID 0043.

**Cache:** Active  
**DFW:** Active  
**Pinned:** None

<table>
<thead>
<tr>
<th>Field</th>
<th>Rate</th>
<th>Hit</th>
<th>Hit%</th>
<th>Rate</th>
<th>Fast</th>
<th>Hit</th>
<th>Hit%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm</td>
<td>26.8</td>
<td>26.7</td>
<td>99.3</td>
<td>11.5</td>
<td>11.5</td>
<td>99.9</td>
<td>70.0</td>
</tr>
<tr>
<td>Seq</td>
<td>4.1</td>
<td>4.1</td>
<td>99.8</td>
<td>0.4</td>
<td>0.4</td>
<td>97.8</td>
<td>91.3</td>
</tr>
<tr>
<td>CFW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>31.0</td>
<td>30.8</td>
<td>99.4</td>
<td>11.9</td>
<td>11.9</td>
<td>99.9</td>
<td>72.2</td>
</tr>
</tbody>
</table>

#### Misc

- Non-Cache: 0.0
- CKD: 0.0

<table>
<thead>
<tr>
<th>Field</th>
<th>DFW Bypass</th>
<th>ICL</th>
<th>Write</th>
<th>Read Miss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seq</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>CFW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DFW Inhibit</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Field descriptions

**Table 6. Fields in the CACHDET Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device reserve activity can cause a data gatherer interface to wait until a RESERVE has been released. This in turn can cause the cache interval to be much longer than a regular RMF interval.</td>
<td></td>
</tr>
<tr>
<td>Therefore, CDate, CTime and CRRange are used to show the actual point in time to which the cache interval start is related, and the actual cache interval length. All rates shown in the report are based on CRRange, not on Range.</td>
<td></td>
</tr>
<tr>
<td>CDate</td>
<td>Date on which the cache interval started.</td>
</tr>
<tr>
<td>CTime</td>
<td>Time at which the cache interval started.</td>
</tr>
<tr>
<td>CRRange</td>
<td>Cache interval time.</td>
</tr>
<tr>
<td>Volume</td>
<td>Volume serial number or one of the following:</td>
</tr>
<tr>
<td><em>ALL</em></td>
<td>All devices belonging to the reported storage subsystem.</td>
</tr>
<tr>
<td><em>NOCAC</em></td>
<td>All non-cached devices.</td>
</tr>
<tr>
<td><em>CACHE</em></td>
<td>All cached devices.</td>
</tr>
<tr>
<td>These lines will be given only if the report shows data for one specific subsystem ID.</td>
<td></td>
</tr>
<tr>
<td>/Num</td>
<td>Device number.</td>
</tr>
<tr>
<td>SSID</td>
<td>Subsystem identifier; a number assigned during the installation of the subsystem that uniquely identifies the storage subsystem.</td>
</tr>
<tr>
<td>I/O %</td>
<td>Percentage of I/O requests to this device or category, compared to the total number of I/O requests sent to the subsystem.</td>
</tr>
<tr>
<td>I/O Rate</td>
<td>Rate of I/O requests.</td>
</tr>
<tr>
<td>Hit %</td>
<td>Percentage of I/Os that were processed within the cache (cache hits) based on the total number of I/Os.</td>
</tr>
<tr>
<td>Cache Hit Rate - I/O rate of all cache hits.</td>
<td></td>
</tr>
<tr>
<td>Read</td>
<td>Rate of SEARCH/READ requests that completed without accessing the DASD.</td>
</tr>
<tr>
<td>DFW</td>
<td>Rate of DFW requests.</td>
</tr>
<tr>
<td>CFW</td>
<td>Rate of WRITE and READ-AFTER-WRITE requests that are processed in cache.</td>
</tr>
<tr>
<td>DASD I/O</td>
<td>I/O rate of all requests that accessed DASD.</td>
</tr>
<tr>
<td>Total</td>
<td>I/O rate of all requests that accessed DASD. This is the sum of Stage rates (see below) and other request rates (inhibit cache load, DFW BYPASS, CFW BYPASS, DFW INHIBIT).</td>
</tr>
<tr>
<td>Stage</td>
<td>Rate of normal or sequential I/O requests that accessed DASD.</td>
</tr>
<tr>
<td>Seq Rate</td>
<td>Rate of tracks that have been staged due to cache misses for sequential I/O requests.</td>
</tr>
<tr>
<td>Async Rate</td>
<td>Rate of tracks that have been destaged asynchronously.</td>
</tr>
</tbody>
</table>

**Table 7. Fields in the CACHDET Report - Volume and SSID Details**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache</td>
<td>Caching status of the device.</td>
</tr>
<tr>
<td>Active</td>
<td>Caching is active - requests to this device can be processed without DASD access.</td>
</tr>
<tr>
<td>Deact pending</td>
<td>Cache has been deactivated on request from host system or support facility, but transfer of modified data to DASD has failed.</td>
</tr>
<tr>
<td>Deactivated</td>
<td>Caching has been deactivated for this device.</td>
</tr>
<tr>
<td>DFW</td>
<td>Status of the DASD FAST WRITE option.</td>
</tr>
<tr>
<td>Active</td>
<td>DASD FAST WRITE requests can be processed for this device.</td>
</tr>
<tr>
<td>Deact pending</td>
<td>DASD FAST WRITE has been terminated on request by host system or support facility, but transfer of modified data to DASD is in progress or has failed.</td>
</tr>
<tr>
<td>Deactivated</td>
<td>DASD FAST WRITE requests are ignored for this device.</td>
</tr>
</tbody>
</table>
Table 7. Fields in the CACHDET Report - Volume and SSID Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Pinned        | A device has failed, and data that has not yet been written to DASD is pinned in cache or NVS for later recovery.  
None           | No data is pinned for this device.  
DFW not suspend| Pinned data exists, but DASD FAST WRITE has not been suspended.  
DFW suspend    | Pinned data exists, and DASD FAST WRITE has been suspended. |

Cache I/O Request - The channel command DEFINE EXTENT specifies the way the cache will be used. There are three categories: Norm - Seq - CFW

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm</td>
<td>Cache will be managed by least-recently-used (LRU) algorithm for making cache space available.</td>
</tr>
<tr>
<td>Seq</td>
<td>Tracks following the track assigned in the current CCW chain are promoted. They will be transferred from DASD to cache in anticipation of a short-term requirement.</td>
</tr>
<tr>
<td>CFW</td>
<td>WRITE and READ-AFTER-WRITE requests are processed in cache. The data might not be written to DASD. Because CFW does not use the NVS, the application is responsible for restoring the data after a cache or subsystem failure.</td>
</tr>
<tr>
<td>Total</td>
<td>This is either the sum of I/O requests, the total I/O rate, or the average hit ratio for the three categories described above.</td>
</tr>
</tbody>
</table>

Read - Cache I/O requests that searched or read data from DASD. This is the number of channel operations that had at least one SEARCH or READ command but no WRITE commands. It is counted for cache devices only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Rate of SEARCH/READ requests.</td>
</tr>
<tr>
<td>Hit</td>
<td>Rate of SEARCH/READ requests that completed without accessing the DASD.</td>
</tr>
<tr>
<td>Hit%</td>
<td>Percentage of SEARCH/READ requests that completed without accessing the DASD.</td>
</tr>
</tbody>
</table>

Write - Cache I/O requests that wrote data to DASD. This is the number of channel commands that had at least one WRITE command. It is counted for cache devices only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Rate of WRITE requests.</td>
</tr>
<tr>
<td>Fast</td>
<td>Rate of DASD/CACHE FAST WRITE requests.</td>
</tr>
<tr>
<td>Hit</td>
<td>Rate of DASD/CACHE FAST WRITE requests that completed without accessing the DASD (fast write hit).</td>
</tr>
<tr>
<td>Hit%</td>
<td>Percentage of DASD/CACHE FAST WRITE requests that completed without accessing the DASD (fast write hit).</td>
</tr>
<tr>
<td>Read %</td>
<td>Percentage of READ requests based on the sum of all READ and WRITE requests (excluding ICL and BYPASS).</td>
</tr>
<tr>
<td>Tracks</td>
<td>Rate of tracks transferred from DASD to cache.</td>
</tr>
</tbody>
</table>

Misc - Miscellaneous cache activity rates.

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFW Bypass</td>
<td>Rate of DASD FAST WRITE requests that would have resulted in a DFW hit; however, NVS was overutilized causing writes to be sent directly to DASD. This values is also known as DFW RETRY.</td>
</tr>
<tr>
<td>CFW Bypass</td>
<td>Rate of operations that did not transfer a track from DASD into cache because no free segments were available. In this case, there is no destaging in favor of I/O requests with the CACHE FAST WRITE attribute. The I/O goes directly to the DASD.</td>
</tr>
</tbody>
</table>
| DFW Inhibit| If DASD FAST WRITE is active, this is the rate of WRITE requests that inhibit DASD FAST WRITE.  
If DASD FAST WRITE is inactive, this is the rate of WRITE requests that directly accessed the DASD, even with DASD FAST WRITE turned on. |

Non-Cache - I/O READ requests that switched off cache processing.

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICL</td>
<td>Inhibit cache load. Rate of I/O requests that inhibited load of data into cache although the data was not found in the cache.</td>
</tr>
<tr>
<td>Bypass</td>
<td>Rate of I/O requests that explicitly bypassed the cache, irrespective of whether the data is in the cache or not.</td>
</tr>
</tbody>
</table>

CKD - CKD (Count-key-data) is a format used to store data on DASD. The counts shown in this section are contained in the total WRITE count.

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write</td>
<td>Rate of WRITE I/O requests in CKD format.</td>
</tr>
</tbody>
</table>
Table 7. Fields in the CACHDET Report - Volume and SSID Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hits</td>
<td>Rate of I/O requests in CKD format that could be resolved in the cache.</td>
</tr>
<tr>
<td>Record Caching</td>
<td>Record caching is done dynamically upon a decision made by DCME or the microcode. It may improve overall cache performance if caching of whole tracks would waste cache storage. The decision is based on the number of I/Os, the hit ratio, and the locality of reference of a certain entity of data.</td>
</tr>
<tr>
<td>Read Miss</td>
<td>Rate of instances in which a record requested for READ was not found in the cache, and access to DASD was required.</td>
</tr>
<tr>
<td>Write Prom</td>
<td>Rate of instances in which a record requested for WRITE was found in the cache, and access to DASD was not required.</td>
</tr>
</tbody>
</table>

Report options

RMF Cache Report Options

Command ==> Scroll ==> HALF

Change or verify parameters. To exit press END.
Changes will apply to the Cache Detail report.

SSID ==> 0046 ALL or one of the available subsystem IDs below

Available Subsystem IDs
0040 0041 0044 0046 0047 0048 004A 004B 004C 004D
0050 0051 0054 0056 0060 006A 006B 007A 007B 008A

Figure 20. CACHDET Report Options

In the Report Options panel, you can select whether you want to get the CACHDET report with one or with all available subsystem IDs.

CACHSUM - Cache Summary Report

The Cache Summary report (CACHSUM) provides an overview about the activities in the cache subsystem for all SSIDs. You might take this as starting point when analyzing I/O performance to get a first impression about the I/O processing.

If you feel that further analysis is required, you may continue with the Cache Detail report (see “CACHDET - Cache Detail Report” on page 35).

How to request this report

To request the CACHSUM report, select S on the Primary Menu, and then select 8 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

CACHSUM
Contents of the report

There is no graphic version of this report available.

If you place the cursor on any field of the first three columns, a pop-up window appears showing details for the selected SSID. Cursor-sensitive control of the other columns leads you to the CACHDET report.
**Field description**

*Table 8. Fields in the CACHSUM Report*

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device reserve activity can cause a data gatherer interface to wait until a RESERVE has been released. This in turn can cause the cache interval to be much longer than a regular RMF interval.</td>
<td></td>
</tr>
<tr>
<td>CDate</td>
<td>Date on which the cache interval started.</td>
</tr>
<tr>
<td>CTime</td>
<td>Time at which the cache interval started.</td>
</tr>
<tr>
<td>CRange</td>
<td>Cache interval time.</td>
</tr>
<tr>
<td>SSID</td>
<td>Subsystem identifier: a number assigned during the installation of the subsystem that uniquely identifies the storage subsystem.</td>
</tr>
<tr>
<td>CUID</td>
<td>Physical control unit number of the caching subsystem. This is equal to the lowest device number, or the device that has been turned online first, respectively.</td>
</tr>
<tr>
<td>Type-Mod</td>
<td>Hardware type and model.</td>
</tr>
<tr>
<td>Size</td>
<td>Amount of physical storage that is configured in this storage subsystem (in giga- or megabytes).</td>
</tr>
<tr>
<td>I/O Rate</td>
<td>Rate of I/O requests.</td>
</tr>
<tr>
<td>Hit %</td>
<td>Percentage of I/Os that where processed within the cache (cache hits) based on the total number of I/Os.</td>
</tr>
<tr>
<td>Hit Rate</td>
<td>I/O rate of all cache hits. This is the sum of:</td>
</tr>
<tr>
<td>READ</td>
<td>Rate of SEARCH/READ requests that completed without accessing the DASD</td>
</tr>
<tr>
<td>DFW</td>
<td>Rate of DASD FAST WRITE requests</td>
</tr>
<tr>
<td>CFW</td>
<td>Rate of WRITE and READ-AFTER-WRITE requests that are processed in cache</td>
</tr>
<tr>
<td>Miss Total</td>
<td>I/O rate of all requests that accessed DASD.</td>
</tr>
<tr>
<td>Miss Stage</td>
<td>Rate of normal or sequential I/O requests that accessed DASD.</td>
</tr>
<tr>
<td>Read %</td>
<td>Percentage of READ requests based on all READ and WRITE requests.</td>
</tr>
<tr>
<td>Seq Rate</td>
<td>Rate of tracks that have been staged due to cache misses for sequential I/O requests.</td>
</tr>
<tr>
<td>Async Rate</td>
<td>Rate of tracks that have been destaged asynchronously.</td>
</tr>
<tr>
<td>Off Rate</td>
<td>Rate of I/O requests to non-cached devices.</td>
</tr>
</tbody>
</table>

*Note: The reported storage capacities for cache and non-volatile storage (NVS) represents only the Cluster Processor Complex in the storage server, that controls the subsystem. Since a typical storage server has two clusters, you must double the reported capacities to get the actual sizes.*

*Table 9. Fields in the CACHSUM Report - SSID Details*

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUID</td>
<td>Physical control unit number of the caching subsystem. This is equal to the lowest device number, or the device that has been turned online first, respectively.</td>
</tr>
<tr>
<td>Type-Mod</td>
<td>Hardware type and model.</td>
</tr>
</tbody>
</table>
### Table 9. Fields in the CACHSUM Report - SSID Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Cache         | Caching status of the subsystem.  
|               | Active   | Caching is active (online and usable).  
|               | Deact failed | A command requesting deactivation of cache has been received, but destaging to DASD has failed.  
|               | Deact in process | A command requesting deactivation of cache has been received, and destaging from cache to DASD is still in progress.  
|               | Deactivated    | Cache has been deactivated by request from host system or support facility.  
|               | Error termination | An internal error stopped cache (cache is offline).  
|               | Maintenance    | Cache has been disabled for maintenance.  
|               | Pending active  | Caching is pending active, that is, cache is in the process of being brought online.  |
| Cache Config  | Amount of physical storage that is installed in this storage subsystem.  |
| Cache Avail   | Amount of storage that is available for caching. This is the total cache size minus the amount used by the subsystem for the cache directory, minus the amount pinned and offline storage.  |
| Cache Offl    | Amount of storage that is offline because of a host or subsystem error.  |
| Cache Pinned  | Amount of storage that is unavailable because a DASD failure is preventing the subsystem from destaging data. The data is pinned in cache.  |
| NVS           | Overall status of the non-volatile storage (NVS).  
|               | Active   | NVS is online and usable.  
|               | Deact failed | A command requesting deactivation of NVS has been received but transfer from NVS to DASD has failed.  
|               | Deact in process | A command requesting deactivation of NVS has been received, and destaging to DASD is still in progress.  
|               | Deactivated    | NVS has been deactivated by request from host system or support facility.  
|               | DFW inhibited  | DASD FAST WRITE is inhibited because the battery is defective.  
|               | Error termination | An internal error caused termination of NVS.  
|               | Maintenance    | NVS has been disabled for maintenance by the support facility.  |
| NVS Config    | Amount of NVS that is installed in this storage subsystem.  |
| NVS Pinned    | Amount of NVS that is unavailable because a DASD failure is preventing the subsystem from destaging the data. The data is pinned in NVS.  |

Please refer to Table 7 on page 37 for a description of the other fields in the pop-up window of the CACHSUM report.

### CFACT - Coupling Facility Activity Report

The Coupling Facility Activity report (CFACT) gives you information about the activities in each structure.

You can use this report for analyzing in detail each structure in your coupling facilities. You see the type of a structure and the activities from each system that uses a structure. If you want to get more details, you will receive them through cursor-sensitive control. A pop-up window shows the allocation details and the name of the address space which is currently using the structure. If you experience performance problems for one or several structures in your coupling facilities, you should investigate into the appropriate applications.
How to request this report

To request the Coupling Facility Activity report, select S from the Primary Menu and then select 7 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

CFACT [cfname]

In addition, you can navigate to this report through cursor-sensitive control from the CFOVER report or CFSYS report.

Special considerations

Data gathering for this report is enabled by default, using the gathering option CFDETAIL. With CFDETAIL, a large amount of data is being gathered that enables you to get many details about the usage of each structure in the coupling facility. This data gathering is done only on one member of the sysplex. This is called *sysplex master gathering* and has been implemented to reduce performance overhead on non-master members and to reduce the amount of data in SSHs and SMF records. The RMF Sysplex Data Server determines internally which member of the sysplex will be the master. This can be controlled externally by the operator or system administrator specifying the Monitor III MASTER/NOMASTER data gatherer option.

If you run the Monitor III reporter with preallocated VSAM data sets, you should ensure that you have allocated all data sets belonging to the sysplex to be able for reporting everything that has been gathered.

Contents of the report

<table>
<thead>
<tr>
<th>Structure Name</th>
<th>Type</th>
<th>System</th>
<th>Util %</th>
<th>Rate Avg</th>
<th>Chng %</th>
<th>Del %</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISGLOCK</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.5</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.5</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>LSTGENERIC</td>
<td></td>
<td></td>
<td>0.0</td>
<td>27.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>14.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSZWLM_BC772827</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.4</td>
<td>0.1</td>
<td>126.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.4</td>
<td>0.1</td>
<td>126.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSZWLM_WORKUNIT</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>SYSZWLM_7A6862827</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>THRLSTSCMKP1_1</td>
<td></td>
<td></td>
<td>14.6</td>
<td>1106</td>
<td>9.0</td>
<td>121.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1106</td>
<td>6.0</td>
<td>121.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

*Figure 23. CFACT Report*

There is no graphic version of this report available.
If you place the cursor on any of the lines with coupling facility structure values, a pop-up window appears (one out of Figure 24 through Figure 26 on page 45 depending on the structure type), showing details for this structure. The pop-up window from Figure 27 on page 45 appears instead of the one shown in Figure 25 if you select a List Structure which also uses SCM storage.

Some of these detail values are available only, if the Monitor III gatherer is running with the gathering option CFDETAIL, which is the default.
Mon III - CFAC T

Pressing PF8 displays more information as shown in Figure 28 on page 46.

Figure 26. CFAC T Report - Details for a Cache Structure

Figure 27. CFAC T Report - Details for a List Structure using SCM storage (1)

Pressing PF8 displays more information as shown in Figure 28 on page 46.
Mon III - CFACT

Table 10. Fields in the CFACT Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>Each rate is reported as '&lt;0.1' if the value is greater than 0 but would be rounded to 0.</td>
</tr>
<tr>
<td>CF</td>
<td>Coupling facility name.</td>
</tr>
<tr>
<td>Structure Name</td>
<td>Name given to the structure by the coupling facility policy specification in the Function Couple Data Set. It has up to 16 characters and is unique within a sysplex.</td>
</tr>
<tr>
<td>Type</td>
<td>Type indicates whether the structure is a list (LIST), lock (LOCK) or cache (CACHE) structure. The structures being reported are grouped by structure type.</td>
</tr>
<tr>
<td>ST</td>
<td>Status - can be one of following states in the SYSPLEX (*ALL) view data line for a structure:</td>
</tr>
<tr>
<td>A</td>
<td>Active - structure is allocated and connected to at least one system during the entire MINTIME.</td>
</tr>
<tr>
<td>AP</td>
<td>Active/primary - structure has been active as primary structure during MINTIME (rebuild-old).</td>
</tr>
<tr>
<td>AS</td>
<td>Active/secondary - structure has been active as secondary structure during MINTIME (rebuild-new).</td>
</tr>
<tr>
<td>N</td>
<td>New - structure became allocated and connected to at least one system during MINTIME.</td>
</tr>
<tr>
<td>I</td>
<td>Inactive - structure got disconnected from all systems during MINTIME.</td>
</tr>
<tr>
<td>Note:</td>
<td>There is no structure activity data reported for an inactive structure even if it was active earlier in the MINTIME. The same applies for structures that became active during MINTIME. Therefore, all values for these structures are reported as blank.</td>
</tr>
<tr>
<td>System</td>
<td>System name for the system connected to the structure (from IEASYxx Parmlib member, SYSNAME parameter).</td>
</tr>
</tbody>
</table>

In the first data line for a structure, the name is '*ALL' to indicate that this line shows the SYSPLEX view of the data rather than a single system view.
Table 10. Fields in the CFACT Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF Util %</td>
<td>The percentage of CF processor time used by the structure. The sum of the values in this column is less than 100%, because not all CF processor time is attributable to structures.</td>
</tr>
<tr>
<td></td>
<td>'N/A' is shown in this field if the CF level is lower than 15.</td>
</tr>
<tr>
<td>Sync Rate</td>
<td>Number of hardware operations per second that started and completed synchronously to the coupling facility on behalf of connectors to the structure.</td>
</tr>
<tr>
<td>Sync Avg Serv</td>
<td>Average time in microseconds required to satisfy a synchronous coupling facility request for this structure.</td>
</tr>
<tr>
<td>Async Rate</td>
<td>Number of hardware operations per second that started and completed asynchronously to the coupling facility on behalf of connectors to the structure.</td>
</tr>
<tr>
<td>Async Avg Serv</td>
<td>Average time in microseconds required to satisfy an asynchronous coupling facility request for this structure.</td>
</tr>
<tr>
<td>Async Chng %</td>
<td>Percentage of asynchronous requests for this structure that changed from synchronous to asynchronous because the requests could not be serviced as synchronous request. This field reports only those requests which were changed due to a subchannel busy condition and can be used as an indicator of a shortage of subchannel resources.</td>
</tr>
<tr>
<td></td>
<td>Request conversions caused by heuristic sync/async algorithms used to optimize the coupling efficiency of workloads using the CF are not included.</td>
</tr>
<tr>
<td>Async Del %</td>
<td>Percentage of asynchronous hardware operations for this structure being delayed by either subchannel contention or dump serialization.</td>
</tr>
<tr>
<td></td>
<td>This value can exceed 100% if there are several delays for one request during the MINTIME.</td>
</tr>
</tbody>
</table>

Note:
1. The availability of the data in the pop-up panel depends on the CFDETAIL option of the Monitor III gatherer session. If this option is not active, all values marked as follows have to be used carefully:
   - DET Value will not be reported
   - MON I Value is a snapshot value taken at the end of the previous Monitor I gathering interval.
   - In some cases, the values can be blank, for example, if SMF data gathering for the coupling facility (SMF record type 74-I) is not active, or if a structure has no connection to some members in the sysplex.
2. Fields marked with ¹ are only available for a single system, but not for the sysplex view from the *ALL summary line. You get the single systems view by selecting option Beta1 ==>> Yes from the RMF Coupling Facility Report Options [Figure 29 on page 49].
3. Each rate is reported as <0.1 if the value is greater than 0 but would be rounded to 0.
4. Fields marked with ² only apply to List Structures exploiting SCM storage extension.
5. Each rate is reported as <0.1 if the value is greater than 0 but would be rounded to 0.

<table>
<thead>
<tr>
<th>Structure Size</th>
<th>Amount of storage in bytes that is currently allocated for this structure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of CF Storage</td>
<td>The percentage of the total coupling facility storage allocated to this structure.</td>
</tr>
<tr>
<td>List Entries</td>
<td>Number of list entries in use in a LIST or LOCK structure. Total Total number. Current Number of list entries in use.</td>
</tr>
<tr>
<td>Data Elements</td>
<td>Number of data elements in use in a LIST or CACHE structure. Total Total number. Current Number of list data elements in use.</td>
</tr>
<tr>
<td>SCM Algorithm Type²)</td>
<td>Type of algorithm used by the coupling facility to control the movement of structure objects between coupling facility real storage and storage class memory.</td>
</tr>
</tbody>
</table>
### Table 10. Fields in the CFACT Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Augmented Space\(^2\) \((\text{MON I})\) | **Est Max** Estimated maximum amount of augmented space in bytes that can be assigned for this structure.  
 **% Used** Percentage of maximum augmented space that is in use by the structure. |
| SCM Space\(^2\) \((\text{MON I})\) | **Maximum** Maximum amount of storage class memory in bytes that this structure can use.  
 **% Used** Percentage of maximum storage class memory that is in use by the structure. |
| SCM List Entries\(^2\) \((\text{MON I})\) | **Est Max** Estimated maximum number of list entries that can reside in storage class memory for the structure.  
 **Current** Number of existing structure list entries that reside in storage class memory. |
| SCM List Elements\(^2\) \((\text{MON I})\) | **Est Max** Estimated maximum number of list elements that can reside in storage class memory for the structure.  
 **Current** Number of existing structure list elements that reside in storage class memory. |
| Lock Entries \((\text{MON I})\) | **Number of lock table entries in use in a serialized LIST or a LOCK structure.**  
 **Total** Total number.  
 **Current** Number of lock table entries in use.  
 **Note:** This is an approximate number, since it is based on sampling. |
| Contention (%) | **For serialized LIST structures and for LOCK structures only:** percentage of all external requests issued by connectors delayed due to contention on a lock. |
| False Contention (%) | **For LOCK structures only:** percentage of all external requests issued by connectors that experience “hash contention”.  
 This occurs because a hashing algorithm is used to map a lock request to a lock table entry. When more than one lock request maps to a lock table entry, there is the potential for contention delay. You may need to increase the size of the lock table.  
 **Note:** It is possible for an application to have unusual lock reference patterns that cause storage contention regardless of the size of the lock structure. |
| Connection Name\(^1\) \((\text{DET})\) | Name of the last connection from the selected system. |
| Jobname\(^1\) \((\text{DET})\) | Name of the job that made the last connect from the selected system. |
| Status\(^1\) \((\text{DET})\) | The status of the last connection from the selected system.  
 **Active** Connection established.  
 **FailPers** Failed Persistent: Connection with CONDISP=KEEP has failed and all of the event exit responses have been received with RELEASECONN=NO.  
 **Failing** Connection terminated abnormally and not all of the event exit responses have been received.  
 **Disc** Disconnecting: Connection disconnected and not all of the event exit responses have been received.  
 **NotKnown** None of the above. |
| ASID\(^1\) \((\text{DET})\) | ASID of the job that made the last connect from the selected system. |
| CF Level Req\(^3\) \((\text{DET})\) | The CFCC Microcode Level requested by the last connect from the selected system. |
| Directory Entries \((\text{MON I})\) | The number of directory entries in a CACHE structure.  
 **Total** Total number.  
 **Current** Number of currently filled directory entries. |

---

**Mon III - CFACT**

**48** z/OS V2R1.0 RMF Report Analysis
Table 10. Fields in the CFACT Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Rate</td>
<td>Number of external requests to this structure on behalf of connectors per second.</td>
</tr>
<tr>
<td>Read Rate</td>
<td>Number of occurrences the coupling facility returned data on a read request by any connector (read hit) per second. Directory-only caches will always have a zero value reported since there is no data to be returned.</td>
</tr>
<tr>
<td>Write Rate</td>
<td>Number of occurrences per second data has been written to the cache structure. Directory-only caches will always have a zero value reported since there are no data writes possible.</td>
</tr>
<tr>
<td>Castout Rate</td>
<td>Number of CASTOUT processings per second. Castout is the process of writing changed cache data to permanent storage. This rate is of interest for store-in cache structures (for example, DB2® global buffer pool structures) in determining the volume of changed data being removed from the structure.</td>
</tr>
<tr>
<td>XI Rate</td>
<td>Number of times per second a data item residing in a local buffer pool was marked invalid by the coupling facility. XI values are seen for directory, store-in and store-thru caches. This rate reflects the amount of data sharing among the users of the cache and the amount of write or update activity against the data bases.</td>
</tr>
<tr>
<td>Directory Reclaims</td>
<td>Number of cache directory reclaims happened during the RMF MINTIME. Directory reclaims occur when the total number of used unique entities exceeds the total number of directories. Whenever this shortage of directory entries occurs, the coupling facility will reclaim in-use directory entries associated with unchanged data. All users of that data must be notified that their copy of the data is invalid. As a consequence, it may happen that this data must be re-read from DASD and registered to the coupling facility again. Directory reclaim activity can be avoided by increasing the directory entries for a particular structure.</td>
</tr>
</tbody>
</table>

Report options

Command ===>

Change or verify parameters. To exit press END.
Changes will apply to the CFACT, the CFOVER and the CFSYS report.

Name ====> ALL
Type ====> ALL
Detail ====> YES

Available Coupling Facilities

CF5B   CF6B

Figure 29. Coupling Facility Report Options Panel

Name Either ALL or the name of one of the available coupling facilities below. The value for Name that you specify on this panel affects all Coupling Facility reports.

Type To select a specific structure type in the CFACT report, you can request LIST, LOCK, CACHE, or ALL.

Detail With this option, you can select the level of detail in the CFACT report:
YES  The report contains data for the sysplex and all single systems.
NO   The report contains data for the sysplex only.

Available Coupling Facilities
The list of all coupling facilities which are currently connected to the sysplex.

CFOVER - Coupling Facility Overview Report

The Coupling Facility Overview report (CFOVER) gives you information about all coupling facilities which are connected to the sysplex.

You might start the investigation of the performance of the coupling facilities in your sysplex with the CFOVER report. You get an overview about all coupling facilities showing the utilization of the processors and the storage. If you experience high values for these resources, this might indicate contention in the coupling facilities which could lead to internal queues causing performance problems.

In addition, you can evaluate the request rates to analyze whether the usage of the coupling facilities is well balanced. This, of course, will not be the case if you have one coupling facility for production and the other one just as stand-by.

How to request this report
To request the Coupling Facility Overview report, select 5 from the Primary Menu and then select 5 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:
CFOVER [cfname]

Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF Policy</td>
<td>Name of the current coupling facility policy.</td>
</tr>
<tr>
<td>Activated at</td>
<td>Date and time the current coupling facility policy was activated.</td>
</tr>
</tbody>
</table>

Figure 30. CFOVER Report

There is no graphic version of this report available.

Field descriptions
Table 11. Fields in the CFOVER Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coupling Facility</strong></td>
<td>The following information about the coupling facility is provided:</td>
</tr>
<tr>
<td>Name</td>
<td>coupling facility name</td>
</tr>
<tr>
<td>Type</td>
<td>coupling facility processor type</td>
</tr>
<tr>
<td>Mod</td>
<td>coupling facility processor model</td>
</tr>
<tr>
<td>Lvl</td>
<td>coupling facility microcode level</td>
</tr>
<tr>
<td>Dyn</td>
<td>Dynamic CF dispatching status (ON, OFF, or THIN). THIN indicates that coupling thin interrupts are enabled for the coupling facility (only for CFLEVEL 19 or higher).</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>The following information about the processors within the coupling facility is provided:</td>
</tr>
<tr>
<td>Util%</td>
<td>Percentage of processor utilization by the coupling facility.</td>
</tr>
<tr>
<td>In case of a stand-alone coupling facility, the utilization of the individual CPUs should be approximately the same. In a PR/SM environment where this CP is shared with other partitions, the utilization is the logical utilization of the CP (that is, only the utilization by the coupling facility).</td>
<td></td>
</tr>
<tr>
<td>If the utilization is high, you can take the following actions:</td>
<td></td>
</tr>
<tr>
<td>• In a PR/SM environment, you can dedicate the CP to the integrated coupling facility or assign additional CPUs to the partition.</td>
<td></td>
</tr>
<tr>
<td>• Move structures to a coupling facility with lower utilization.</td>
<td></td>
</tr>
<tr>
<td>• Consider additional or larger coupling facilities.</td>
<td></td>
</tr>
<tr>
<td>Def</td>
<td>Number of logical processors defined for the coupling facility.</td>
</tr>
<tr>
<td>Shr</td>
<td>Number of shared processors defined for the coupling facility.</td>
</tr>
<tr>
<td>Wgt</td>
<td>Average weight of shared logical processors. This value is not displayed if no shared processors are assigned to this CF.</td>
</tr>
<tr>
<td>Eff</td>
<td>Number of effective available logical processors in a shared environment. This value is only useful in a CFCC environment. CFCC measures the time of real command execution as well as the time waiting for work. The reported value shows the ratio of the LPAR dispatch time (CFCC execute and wait time) to the RMF MINTIME length.</td>
</tr>
<tr>
<td>For example, if a CFCC CEC contains 6 logical processors, and the measured CF LPAR has 2 logical processors and is limited at 5%, the number of effective logical processors is 0.3.</td>
<td></td>
</tr>
<tr>
<td><strong>Req Rate</strong></td>
<td>The sum of all requests (internal and external) that utilize the subchannel. Specifically:</td>
</tr>
<tr>
<td>• External requests to send/receive data on behalf of a structure. The sum of synchronous and asynchronous requests completed against any structure within this coupling facility per second. This includes requests that changed from synchronous to asynchronous.</td>
<td></td>
</tr>
<tr>
<td>• Internal requests that utilize the subchannels (but are not aggregated by the structure).</td>
<td></td>
</tr>
<tr>
<td>The value is reported as ‘&lt; 0.1’ if the rate is greater than 0 but would be rounded to 0.</td>
<td></td>
</tr>
<tr>
<td><strong>Storage Size</strong></td>
<td>The total amount of coupling facility storage in bytes, including both allocated and available space.</td>
</tr>
<tr>
<td><strong>Storage Avail</strong></td>
<td>The amount of coupling facility space in bytes that is not allocated to any structure, not allocated as dump space, and not allocated as augmented space.</td>
</tr>
<tr>
<td><strong>SCM Size</strong></td>
<td>The total amount of coupling facility storage class memory in bytes which may be concurrently used as structure extensions.</td>
</tr>
<tr>
<td><strong>SCM Avail</strong></td>
<td>The total amount of available storage class memory in bytes.</td>
</tr>
</tbody>
</table>
CFSYS - Coupling Facility Systems Report

The Coupling Facility Systems (CF Systems) report (CFSYS) gives you information about the distribution of coupling facility requests among the systems and about the activities in the subchannels and paths attached to the coupling facilities in the sysplex.

Using the CFSYS report, for each coupling facility, you see their activity and all connected systems. High activity values are indicators for contention and possible bottlenecks in the configuration. The pop-up panel with the details provides information about the configuration and you see the path IDs for all channels which are connecting each coupling facility with a system. You can use the CHANNEL report to get the link utilization for each path.

How to request this report

To request the Coupling Facility Systems report, select S from the Primary Menu and then select 6 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

```
CFSYS [cfname]
```

Contents of the report

<table>
<thead>
<tr>
<th>CF Name</th>
<th>System</th>
<th>Subchannel</th>
<th>-- Paths --</th>
<th>-- Sync --</th>
<th>--------</th>
<th>Async --------</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Delay</td>
<td>Busy</td>
<td>Avail</td>
<td>Delay</td>
<td>Rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>Serv</td>
</tr>
<tr>
<td>X7CFH89</td>
<td>R70</td>
<td>0.0</td>
<td>0.0</td>
<td>4</td>
<td>0.0</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>R71</td>
<td>0.0</td>
<td>0.0</td>
<td>4</td>
<td>0.0</td>
<td>0.7</td>
</tr>
<tr>
<td>X7CFP87</td>
<td>R70</td>
<td>0.0</td>
<td>0.1</td>
<td>4</td>
<td>0.0</td>
<td>1170</td>
</tr>
<tr>
<td></td>
<td>R71</td>
<td>0.0</td>
<td>4.4</td>
<td>4</td>
<td>0.0</td>
<td>246K</td>
</tr>
<tr>
<td>X7CFP89</td>
<td>R70</td>
<td>0.0</td>
<td>0.0</td>
<td>4</td>
<td>0.0</td>
<td>451.3</td>
</tr>
<tr>
<td></td>
<td>R71</td>
<td>0.0</td>
<td>0.1</td>
<td>4</td>
<td>0.0</td>
<td>229.5</td>
</tr>
</tbody>
</table>

Figure 31. CFSYS Report

There is no graphic version of this report available.

If you place the cursor on any of the lines with coupling facility systems values, a pop-up panel appears showing details for the subchannels and paths.
### Field descriptions

**Table 12. Fields in the CFSYS Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note</td>
<td>Each rate is reported as '&lt;0.1' if the value is greater than 0 but rounded to 0.</td>
</tr>
<tr>
<td>CF Name</td>
<td>Coupling facility name.</td>
</tr>
<tr>
<td>System</td>
<td>Name of the system attached to the coupling facility (from IEASYSxx Parmlib member, SYSNAME parameter).</td>
</tr>
<tr>
<td>Subchannel Delay %</td>
<td>The percentage of all coupling facility requests z/OS had to delay because it found all coupling facility subchannels busy.</td>
</tr>
<tr>
<td></td>
<td>If this percentage is high, you should first ensure that sufficient subchannels are defined (see MAX field below).</td>
</tr>
<tr>
<td></td>
<td>If there are sufficient subchannels and this percentage is still high, it indicates either a coupling facility path constraint or internal coupling facility contention.</td>
</tr>
<tr>
<td>Subchannel Busy %</td>
<td>Percentage of the coupling facility subchannel utilization. This value is calculated from the sum of synchronous and asynchronous coupling facility request times related to the MINTIME and to the number of subchannels.</td>
</tr>
<tr>
<td>Paths Avail</td>
<td>Number of physical paths (coupling facility channels) available to transfer coupling facility requests between this system and the coupling facility.</td>
</tr>
</tbody>
</table>
### Table 12. Fields in the CFSYS Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paths Delay %</td>
<td>Percentage of all coupling facility requests that were rejected because all paths to the coupling facility were busy. This value can exceed 100% if requests encounter a path busy condition more than once. A high percentage results in elongated service times which is a reduction of the capacity of the sending processor. If coupling facility channels are being shared among PR/SM partitions, the contention could be coming from a remote partition. <strong>Identifying path contention:</strong> There can be path contention even when this count is low. In fact, in a non-PR/SM environment where the subchannels are properly configured, Subchannel Busy, not Path Busy, is the indicator for path contention. If Path Busy is low but Subchannel Busy is high, it means z/OS is delaying the coupling facility requests and in effect gating the workload before it reaches the physical paths. Before concluding you have a capacity problem, however, be sure to check that the correct number of subchannels is defined in the I/O generation (see Subchannel Max). <strong>PR/SM environment only:</strong> If coupling facility channels are being shared among PR/SM partitions, Path Busy behaves differently. Potentially, you have many subchannels mapped to only a few coupling facility command buffers. You could have a case where the subchannels were properly configured (or even under-configured), Subchannel Busy is low, but Path Busy is high. This means the contention is due to activity from a remote partition. <strong>Possible actions:</strong> Dedicate the coupling facility links on the sending processor or add additional links.</td>
</tr>
<tr>
<td>Sync Rate</td>
<td>Number of hardware operations per second that started and completed synchronously to the coupling facility on behalf of connectors from this system.</td>
</tr>
<tr>
<td>Sync Avg Serv</td>
<td>Average time in microseconds required to satisfy a synchronous coupling facility request on behalf of connectors from this system.</td>
</tr>
<tr>
<td>Async Rate</td>
<td>Number of hardware operations per second that started and completed asynchronously to the coupling facility on behalf of connectors from this system.</td>
</tr>
<tr>
<td>Async Avg Serv</td>
<td>Average time in microseconds required to satisfy an asynchronous coupling facility request on behalf of connectors from this system. This value also includes operations that started synchronously but completed asynchronously.</td>
</tr>
<tr>
<td>Async Chng %</td>
<td>Percentage of asynchronous requests for this structure that changed from synchronous to asynchronous because the requests could not be serviced as synchronous request. This field reports only those requests which were changed due to a subchannel busy condition and can be used as an indicator of a shortage of subchannel resources. Request conversions caused by heuristic sync/async algorithms used to optimize the coupling efficiency of workloads using the CF are not included.</td>
</tr>
<tr>
<td>Async Del %</td>
<td>Percentage of asynchronous hardware operations on behalf of connectors from this system being delayed by either subchannel contention or dump serialization.</td>
</tr>
</tbody>
</table>

### Table 13. Fields in the CFSYS Report - Subchannels and Paths

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subchannels and Paths</td>
<td></td>
</tr>
</tbody>
</table>
### Table 13. Fields in the CFSYS Report - Subchannels and Paths (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subchannels</td>
<td>Subchannel configuration data.</td>
</tr>
<tr>
<td>Generated</td>
<td>Number of subchannels generated by the I/O configuration. This could be more than the number z/OS can optimally use for coupling facility requests.</td>
</tr>
<tr>
<td>In Use</td>
<td>Number of subchannels z/OS is currently using for coupling facility requests.</td>
</tr>
<tr>
<td>Max</td>
<td>Maximum number of coupling facility subchannels z/OS can optimally use for coupling facility requests.</td>
</tr>
<tr>
<td></td>
<td>The limit is calculated by z/OS to be the number of physical paths to the coupling facility times the number of command buffer sets per path. It represents the number of parallel requests the coupling facility configuration can handle.</td>
</tr>
<tr>
<td></td>
<td>If this number is less than the subchannels generated by the I/O configuration, you should reduce the number of coupling facility subchannels in the I/O to match this number. Over-specifying subchannels causes unnecessary storage usage and can cause a high number of rejected coupling facility requests due to path busy.</td>
</tr>
</tbody>
</table>

**Channel Path Details**

*Note:* If the hardware cannot provide values for a measurement, the field remains blank.

<table>
<thead>
<tr>
<th>ID</th>
<th>The hexadecimal identifier of a channel path (CHPID) that is connecting a system with the coupling facility. The physical path utilization for these coupling facility links is shown in the CHANNEL report.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Channel path type.</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Channel path operation mode. It describes the data rate bandwidth, protocol, and adapter type of the channel path.</td>
</tr>
</tbody>
</table>

*Data rates for CFP channel paths:*

- 1GBit - 1.0625 GBit/sec
- 2GBit - 2.125 GBit/sec

*Bandwidth for CIB channel paths:*

- 1x — single bandwidth
- 12x — twelve-fold bandwidth

*Bandwidth for CS5 channel paths:*

- 8x — eight-fold bandwidth

*Protocol for CIB channel paths:*

- IFB
- IFB3

*Protocol for CS5 channel paths:*

- GEN3 PCIe third generation protocol

*Adapter types for CIB channel paths:*

- HCA-O
- HCA-O LR
- HCA3-O
- HCA3-O LR

*Adapter types for CS5 channel paths:*

- PCIe-O SR

*Unknown operation mode:*

- Unknown

| Deg     | Character Y in this column indicates that the channel path is operating at reduced capacity (degraded) or not operating at all. |
### Table 13. Fields in the CFSYS Report - Subchannels and Paths (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **Distance** | Estimated distance in kilometers. The value is calculated as follows:  
| | Average round-trip path time in microseconds  
| | -----------------------------------------------  
| | 10 microseconds / kilometer  
| | A value of zero means that the time was not measured. |
| **PCHID** | Physical channel identifier. |
| **AID** | The hexadecimal adapter ID. For CIB channels it describes the host channel adapter (HCA) ID and for CS5 channels it describes the PCIe adapter ID. |
| **PORT** | The hexadecimal port number. For CIB channels it describes the host channel adapter port number and for CS5 channels it describes the PCIe adapter port number. |
| **IOP IDS** | The hexadecimal identifiers of I/O processors (System Assist Processors) to which the channel path is accessible. |

### CHANNEL - Channel Path Activity Report

The Channel Path Activity report (CHANNEL) gives you information about channel path activity for all channel paths in the system. The report contains data for every channel path that is online during data gathering.

For all channels that are managed by Dynamic Channel Path Management (DCM), additional information is available. DCM allows an installation to identify channels which they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. On top of the report, there is a consolidated data section for managed channels displaying the total number of channel paths for each type and the average activity data. The character M as suffix of the acronym for the channel path type is an indicator that the channel is managed by DCM.

You can use channel path activity information together with I/O device activity and I/O queuing activity information to identify performance bottlenecks associated with channel paths.

To find out which logical control unit is using the channel, look in the I/O Queuing Activity report. From there you can go to check device response times. For example, if a channel path to a device shows excessive use, you could define additional paths to the device or introduce a different job mix to produce better performance.

### How to request this report

To request the Channel Path Activity report, select 3 from the Primary Menu and then select 12 on the Resource Report Selection Menu (shown in Figure 8 on page 27), or enter the following command:

```plaintext
CHANNEL
```

### Special considerations of report output

You can obtain the report whether or not a Monitor I session measuring channel path activity is active.

Data for total utilization and partition utilization is gathered independently. Because the internal interval used to gather this data is a few seconds, the total
utilization and the sum of the partition's utilization sharing that channel might differ if a short RMF interval is specified. If the interval is too small or the appropriate data cannot be gathered, dashes (---) will be reported instead of data. Please refer to the information APAR II05151 for a list of channel types for which channel utilization data is not gathered.

Contents of the report

The graphic form of the Channel Path Activity report shows the percentage of total utilization for each channel.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Path ID</td>
<td>Hexadecimal channel path identifier (CHPID).</td>
</tr>
<tr>
<td>Channel Path No</td>
<td>For each channel type which is managed by DCM, a summary line is shown with the average values for all channels in this group. These summary lines are characterized by an '*' preceding the channel path type, and the number of channels of the group is displayed in column No.</td>
</tr>
</tbody>
</table>

Figure 33. CHANNEL Report

The graphic form of the Channel Path Activity report shows the percentage of total utilization for each channel.
### Table 14. Fields in the CHANNEL Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Path G</td>
<td>Generation. The generation is used to differentiate between channels of the same channel type, when one has significant differences from the other. Newer generations with significant differences (for example, the channel throughput) are indicated by a number (1, 2, ...). For example, for a FICON channel, a number 1 indicates that the channel has an auto-negotiated throughput of 1GBit/sec, or a number 4 indicates a throughput of 2GBit/sec on a FICON Express4 card or a FICON Express2 card.</td>
</tr>
<tr>
<td>Channel Path Type</td>
<td>Type of channel path. You may issue the console command D M=CHP(xx) to see an explanation of the channel path type. If RMF encounters an error while processing the type, this field is blank. RMF continues to measure channel path activity. Check the operator console for messages.</td>
</tr>
<tr>
<td>Channel Path S</td>
<td>The indication of whether a channel path is defined as shared between one or more logical partitions. Y indicates that the channel path is shared. A blank indicates it is not shared.</td>
</tr>
</tbody>
</table>

**Note:**

1. On a machine running in LPAR mode, but with only one LPAR defined, the Part columns for the Read, Write and Utilization fields display a zero value for channels of type FC (FICON).

2. When Channel Path Measurement Facility (CPMF) is not available, for example, on z/OS systems running as z/VM guests, RMF uses sampled data from SRM so that the reported channel utilization is only an approximate value. With increasing channel speed, the channel utilization value becomes more and more inaccurate. Therefore, in such cases, RMF does not provide accurate values of FICON channel utilization.

   Beginning with z990 processors, the channel data from SRM is no longer available. As a result, the channel utilization data on a z/OS system running as z/VM guest, is reported as ‘------’.

<table>
<thead>
<tr>
<th>Utilization (%) Part</th>
<th>The channel path utilization percentage for an individual partition. RMF uses the values provided by CPMF.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td>Channel Path Busy Time</td>
</tr>
<tr>
<td>Utilization (%)</td>
<td>= --------------------------------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Channel Path Elapsed Time</td>
</tr>
</tbody>
</table>

For channels like FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:

<table>
<thead>
<tr>
<th>Part</th>
<th>LPAR # of Channel Work Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilization (%)</td>
<td>= --------------------------------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Max # of Channel Work Units * Channel Path Elapsed Time</td>
</tr>
</tbody>
</table>

For some channels like OSAEGbE, FICON EXPRESS/EXPRESS2, this value reflects the microprocessor utilization.

For hipersockets, this value is not available.
Table 14. Fields in the CHANNEL Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilization (%) Tot</td>
<td>The channel path utilization percentage for the CPC during an interval.</td>
</tr>
<tr>
<td></td>
<td>For processors earlier than z990 and shared channels in LPAR mode, where CPMF is not available, the calculation is:</td>
</tr>
<tr>
<td></td>
<td># SRM Observations of Channel Path Busy</td>
</tr>
<tr>
<td></td>
<td>Total Utilization (%) = ---------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># SRM samples</td>
</tr>
<tr>
<td></td>
<td>For unshared channels in LPAR mode, the value for total utilization is the same as partition utilization.</td>
</tr>
<tr>
<td></td>
<td>For channels like for example FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:</td>
</tr>
<tr>
<td></td>
<td>Total Total # of Channel Work Units</td>
</tr>
<tr>
<td></td>
<td>Utilization (%) = ----------------------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Max # of Channel Work Units * Channel Path Elapsed Time</td>
</tr>
<tr>
<td></td>
<td>For some channels like OSAEGbE, FICON EXPRESS/EXPRESS2, this value reflects the microprocessor utilization.</td>
</tr>
<tr>
<td></td>
<td>For hipersockets, this value is not available.</td>
</tr>
<tr>
<td>Utilization (%) Bus</td>
<td>Percentage of bus cycles, the bus has been found busy for this channel in relation to the theoretical limit.</td>
</tr>
<tr>
<td></td>
<td>For OSAEGbE, the value reflects the PCI bus utilization.</td>
</tr>
<tr>
<td></td>
<td>For hipersockets, this value is not available.</td>
</tr>
<tr>
<td>Read(B/s) Part</td>
<td>Data transfer rates from the control unit to the channel for this partition.</td>
</tr>
<tr>
<td>Total</td>
<td>Data transfer rates from the control unit to the channel for the CPC.</td>
</tr>
<tr>
<td></td>
<td>For hipersockets, this value is not available.</td>
</tr>
<tr>
<td>Write(B/s) Part</td>
<td>Data transfer rates from the channel to the control unit for this partition.</td>
</tr>
<tr>
<td>Total</td>
<td>Data transfer rates from the channel to the control unit for the CPC.</td>
</tr>
<tr>
<td></td>
<td>For hipersockets, this value is not available.</td>
</tr>
<tr>
<td>FICON OPS Rate</td>
<td>Number of native FICON operations per second.</td>
</tr>
<tr>
<td>Actv</td>
<td>The average number of native FICON operations that are concurrently active during the report interval.</td>
</tr>
<tr>
<td>zHPF OPS Rate</td>
<td>Number of zHPF (High Performance FICON) operations per second.</td>
</tr>
<tr>
<td>Actv</td>
<td>The average number of zHPF operations that are concurrently active during the report interval.</td>
</tr>
</tbody>
</table>

Monitor III Utility fields

You can use the Monitor III Utility to customize the CHANNEL report in a way that the following additional values are shown:

Table 15. Additional Fields in the CHANNEL Report

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHACFDFR</td>
<td>Number of deferred native FICON operations per second that could not be initiated by the channel due to a lack of available resources.</td>
</tr>
<tr>
<td>CHACXDFR</td>
<td>Number of deferred zHPF operations per second that could not be initiated by the channel due to lack of available resources.</td>
</tr>
<tr>
<td>The following fields are only available for HiperSockets:</td>
<td></td>
</tr>
<tr>
<td>CHACTMVC</td>
<td>Total message sent rate</td>
</tr>
<tr>
<td>CHACTSVC</td>
<td>Total message sent size</td>
</tr>
</tbody>
</table>
Table 15. Additional Fields in the CHANNEL Report (continued)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHACTFVC</td>
<td>Total receive fail rate</td>
</tr>
<tr>
<td>CHACPMVC</td>
<td>Rate of messages sent by this LPAR</td>
</tr>
<tr>
<td>CHACPSVC</td>
<td>Average size of messages sent by this LPAR</td>
</tr>
<tr>
<td>CHACPFVC</td>
<td>Rate of messages received by this partition that failed due to an unavailable buffer. The value could indicate that more receive buffers are required.</td>
</tr>
<tr>
<td>CHACSFVC</td>
<td>Rate of messages sent by this partition that failed.</td>
</tr>
</tbody>
</table>

CPC - CPC Capacity Report

The CPC Capacity (CPC) report provides the capability to monitor values that are relevant for software pricing as well as partition related processor activities.

Prior to z/OS, software products were typically priced based on the computing capacity of the central processor complex (CPC) on which the software is running. With z/OS running on a zSeries hardware, charging can be based on the capacity defined for workloads. WLM LPAR CPU management offers the support that allows pricing based on partition capacity. It will ensure that the average CPU consumption of a partition does not exceed a defined capacity value (in millions of unweighted CPU service units per hour - MSU/h) over a defined period of time. WLM allows the actual workload to rise above the defined MSU limit, but takes care that the four-hours average stays below. This is done by dynamically turning capping on and off. Prerequisites are uncapped partitions with shared CPs.

With this CPC capacity report, you can compare the defined capacity limits against the actual MSU consumption for all partitions of the CPC. In addition, the report contains MSU information related to the last four hours, for the partition RMF is running in, which clearly shows if the defined capacity limit is appropriate to the workload running in this partition or if WLM has to cap this partition's workload because the defined limit was set too low.

How to request this report

To request the CPC Capacity report, select 1 from the Primary Menu and then 3 on the Overview Report Selection Menu (shown in Figure 6 on page 25), or enter the following command:

```
CPC
``` 

Contents of the report

The CPC Capacity report provides:

- **Header information** which offers MSU related values with the scope of that partition which requested the report as well as the processor type, model, and capacity.

- **Partition data** which displays the values for all partitions belonging to the CPC. If multithreading is enabled for a processor type (LOADxx PROCVIEW CORE parameter is in effect), processor data is reported at core granularity.
Table 16. Fields in the CPC Capacity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>All MSU-related values are measured in MSU/h (millions of service units per hour).</td>
<td></td>
</tr>
<tr>
<td>Values for the partition which requested the report</td>
<td></td>
</tr>
<tr>
<td>Partition</td>
<td>Partition name.</td>
</tr>
<tr>
<td>Processor/Model</td>
<td>Processor family and model number of the measured system.</td>
</tr>
<tr>
<td>CPC Capacity</td>
<td>Effective processor capacity available to the central processor complex (CPC), measured in MSU/h.</td>
</tr>
</tbody>
</table>
| Image Capacity       | Processor capacity available to the z/OS image (partition) which requested the report, measured in MSU/h. The field is calculated as minimum of the following capacities:  
  • the capacity based on the partition's logical CP configuration  
  • the defined capacity limit of the partition, if available (image softcap)  
  • the capacity limit of the related WLM capacity group, if the partition belongs to a capacity group  
  • the absolute physical hardware capacity limit. |
| MT Mode IIP          | The multithreading mode for processor type zIIP designates the number of active threads for each online logical zIIP core. If this value is greater than 1, multithreading becomes effective for zIIP cores.  
  N/A is shown if the LOADxx PROCVIEW CPU parameter is in effect or no IIP is currently installed or online. |
| Prod % IIP           | The multithreading IIP core productivity represents the percentage of the maximum IIP core capacity that was used while the IIP cores were dispatched to physical hardware.  
  When this value equals 100% in multithreading mode, all threads on all IIP cores that were configured ONLINE for the complete MINTIME are being used. If the LOADxx PROCVIEW CPU parameter is in effect or no IIP is currently installed or online, no core productivity is calculated and N/A is reported. |
### Table 16. Fields in the CPC Capacity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight % of Max</td>
<td>Average weighting factor in relation to the maximum defined weighting factor for this partition. With 'Initial Capping ON', which the operator can set on the Hardware Management Console, this value is not available and therefore, this field shows ‘****’ in this case.</td>
</tr>
<tr>
<td>WLM Capping %</td>
<td>Percentage of time when WLM capped the partition because the four-hours average MSU value exceeds the defined capacity limit.</td>
</tr>
<tr>
<td>4h Avg</td>
<td>Average value of consumed MSU/h during the last four hours.</td>
</tr>
<tr>
<td>4h Max</td>
<td>Maximum value of consumed MSUs during the last 4 hours (retrieved from 48 sample intervals of five minutes). This value can be greater than the defined capacity.</td>
</tr>
<tr>
<td>Group</td>
<td>Name of the partition's capacity group. If the partition does not belong to a capacity group, N/A is displayed.</td>
</tr>
<tr>
<td>Limit</td>
<td>Capacity limit (in MSUs) defined for the partition's capacity group.</td>
</tr>
<tr>
<td></td>
<td>An ‘*’ following the limit value indicates that this partition started to be a member of this capacity group less than four hours ago. This partition will have a different view of unused group capacity and, therefore, might cap differently than existing group members.</td>
</tr>
</tbody>
</table>

Values for all configured partitions are grouped by general and special purpose processor types. The term logical processor refers to a logical core if the LOADxx PROCVIEW CORE parameter is in effect.

<table>
<thead>
<tr>
<th>Partition</th>
<th>Partition name.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Note:</td>
</tr>
<tr>
<td></td>
<td>1. Partitions identified by the name PHYSICAL are not configured partitions. Data reported in these lines includes the time during which a physical CPU was busy, but the time could not be attributed to a specific logical partition.</td>
</tr>
<tr>
<td></td>
<td>2. The summary lines (for example, ‘*CP’ or ‘*ICF’) show the total percentages for the indicated processor type.</td>
</tr>
<tr>
<td></td>
<td>3. Starting with z9 processors, IFLs (Integrated Facility for Linux) and zAAPs are reported separately and no longer as ICFs (Internal Coupling Facility).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MSU</th>
<th>Millions of unweighted CPU service units per hour:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Def</td>
<td>Defined MSU capacity limit for the partition.</td>
</tr>
<tr>
<td>Act</td>
<td>Actual MSU consumption.</td>
</tr>
<tr>
<td></td>
<td>These values are only provided for general purpose processors.</td>
</tr>
</tbody>
</table>

| Cap Def         | The hardware capping option of the partition: YES or NO.                                                                                                                                             |
|                 | This field indicates whether the operator has applied any hardware capping mechanism in the logical partition controls of the Hardware Management Console (HMC) for the partition. The value ‘YES’ identifies that either 'Initial Capping ON' or an absolute physical hardware capacity limit (maximal number of CPUs) has been defined. |

| Proc Num        | The number of logical processors which were online during the report interval.                                                                                                                          |

### Average Processor Utilization Percentages.

- The average utilization of logical processors is based on the total online time of all logical processors assigned to the partition.
- The average utilization of physical processors is based on the total interval time of all physical processors.

<table>
<thead>
<tr>
<th>Logical Util % - Effect</th>
<th>The average partition effective dispatch time percentage.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effective Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>--------- *100</td>
</tr>
<tr>
<td></td>
<td>∑ Online Times 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logical Util % - Total</th>
<th>The average partition total dispatch time percentage.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>--------- *100</td>
</tr>
<tr>
<td></td>
<td>∑ Online Times 2</td>
</tr>
</tbody>
</table>
### DELAY - Delay Report

The Delay report allows you to determine which system resources are causing delays for jobs or job groups, and to what extent the jobs are delayed.

The report gives you information about job delay for every type of delay that RMF monitors. This includes processor delay (PRC), device delay (DEV), storage delay (STR), subsystem delay (SUB), operator delay (OPR), and enqueue delay (ENQ). RMF provides a detail report for each of these delays except OPR. Operator delay includes message, mount, and quiesce requests. SUB is divided into an HSM, JES, and XCF detail report. The names of the detail reports correspond to the names that appear in the Delay report.

### How to request this report

To request the Delay report, select 1 from the Primary Menu, and then select 4 on the Overview Report menu (shown in Figure 6 on page 25) or enter the following command using the format:

```
DELAY [job_class,service_class]
```

For example, to get a Delay report for TSO service class TSOPRIME, enter:

```
DELAY T, TSOPRIME
```
The graphic form of this report shows the percent of time that each user spent delayed for the above resources.

### Field descriptions

**Table 17. Fields in the DELAY Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the job, job group or enclave. The enclave names, starting with the letters ENC, and belonging to class E, are created dynamically by RMF. You cannot use the names to track a particular enclave through different time ranges. However, the enclave token is used when combining multiple set-of-samples, so that data are combined only for the same individual enclaves, thus providing consistent data. N/A is shown if the value does not apply to enclaves.</td>
</tr>
<tr>
<td>CX</td>
<td>Abbreviation for the address space types as follows: S Started task T TSO B Batch A ASCH O OMVS ? Data is missing or not valid. Or it can indicate an enclave: E Enclave For summary entries, this field is blank. An O as second character indicates that an OMVS process exists for this address space.</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in. If a job changes its service class during the report interval, RMF displays eight asterisks (********) instead of the service class name. If the service class is not available, RMF displays eight dashes (--------).</td>
</tr>
</tbody>
</table>
### Table 17. Fields in the DELAY Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cr</strong></td>
<td>An indication whether WLM managed the address space as storage critical and/or CPU critical during the report interval.</td>
</tr>
<tr>
<td>C</td>
<td>CPU critical</td>
</tr>
<tr>
<td>S</td>
<td>Storage critical</td>
</tr>
<tr>
<td>SC</td>
<td>Both storage and CPU critical</td>
</tr>
<tr>
<td><strong>WFL %</strong></td>
<td>The workflow percentage of the job or job group. <a href="#">&quot;Address space workflow (%)&quot; on page 12</a> shows the formula used to calculate this value.</td>
</tr>
<tr>
<td><strong>USG %</strong></td>
<td>The using percentage for the job or job group. <a href="#">&quot;Address space using (%)&quot; on page 14</a> shows the formula used to calculate this value.</td>
</tr>
<tr>
<td><strong>DLY %</strong></td>
<td>The delay percentage for the job or job group. See <a href="#">&quot;Address space delay (%)&quot; on page 14</a> for more information.</td>
</tr>
</tbody>
</table>
| **IDL %** | The idling percentage for a job or job group. Jobs in terminal wait, timer wait, or waiting for job selection by JES are in an idling state if they are not using the processor or devices and are not delayed for any monitored reason. Jobs classified as in terminal wait meet all of the following conditions:  
- They are not found using any monitored resource  
- They are not found delayed for any monitored reason  
- They are swapped out  
- They are in terminal wait  
- They are waiting for a user ready indication before being swapped in.  
Jobs classified as in timer wait meet all of the following conditions:  
- They are not using or delayed for a monitored resource.  
- Their address space is waiting for a timer.  
The idling percentage of an address space can vary from 0 to 100%, where 0% indicates that the user is not idling during the report interval, and 100% represents a job that is idle at every sample.  
The idling percentage for an address space during a refresh period is calculated as follows:  
\[
IDL = \frac{\# \text{ Idle Samples}}{\# \text{ Samples}} \times 100
\]

**Idle samples**  
The number of samples that show the job in an idle state.  
The idling percentage for a group of address spaces during a range period is calculated as follows:  
\[
IDL = \frac{\sum \# \text{ Idle Samples}}{\# \text{ Samples} \times \text{Avg # Address Spaces}} \times 100
\]

**Note:** The value reported might include some delay for a non-monitored resource. |
| **UKN %** | RMF considers jobs that are not delayed for a monitored resource, not using a monitored resource, or not in an idling state to be in an unknown state.  
Examples of address spaces in an unknown state are:  
- Idle address spaces that use a non-monitored mechanism for determining when they are active. Most system tasks (STC) show up as unknown when they are idle.  
- Address spaces waiting for devices other than DASD or tape.  
The unknown state percentage for an address space can vary from 0 to 100%, where 0% indicates that the state was always known during the report interval and 100% represents a job in an unknown state throughout the report interval. |
Table 17. Fields in the DELAY Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Delayed for</td>
<td>The percentage that each defined resource contributes to the overall delay of the job or job group. The overall delay value DLY % may exceed the sum of the reported resource delay values, because there are other resources which contribute to the overall delay, such as WLM capping delay. If the percentages add up to more than DLY %, there is an overlap of delay states.</td>
</tr>
<tr>
<td>PRD</td>
<td>The job or job group has ready work on the dispatching queue, but it is not being dispatched.</td>
</tr>
<tr>
<td>DEV</td>
<td>The job or job group is delayed for a DASD or tape.</td>
</tr>
<tr>
<td>STR</td>
<td>The job or job group is waiting for a COMM, LOCL, SWAP, XMEM, HIPR or VIO page, or is on the out/ready queue. See the Storage Delay report.</td>
</tr>
<tr>
<td>SUB</td>
<td>The job or job group is delayed by a JES, HSM, or XCF subsystem request.</td>
</tr>
</tbody>
</table>
| OPR | The job or job group is delayed by a message or a mount request or a quiesce. Quiesce means that the operator has quiesced the address space. A quiesced address space can show unexpected data:  

- A swappable address space will be swapped out, thus it can be OUTR and show storage delays.  
- A non-swappable address space will get lowest priority, thus it can show CPU delay, paging delay, or other delays, and even some USG % from time to time depending on the load on the system. |
| ENQ | The job or job group is waiting to use an enqueued (reserved) resource. |
### Table 17. Fields in the DELAY Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Reason</td>
<td>Reported only for a specific job, this field provides additional information about the primary reason for the delay. The contents depend on the resource having the largest % Delayed for value.</td>
</tr>
</tbody>
</table>

If the resource with the maximum delay is:
- **PRC**: This field contains the name of the job that used the processor most frequently while the reported job was delayed.
- **STR**: This field identifies the cause of the largest percentage of delay:
  - **COMM**: common storage paging (includes shared pages)
  - **LOCL**: local storage paging (includes shared pages)
  - **VIO**: virtual I/O paging
  - **SWAP**: swap-in delay
  - **OUTR**: swapped out and ready
  - **XMEM**: cross memory address space
  - **HIPR**: standard hiperspace paging delays
- **DEV**: This field contains the volume serial number of the device that the reported job was most frequently delayed for.
- **SUB**: This field contains either JES, HSM, or XCF depending on which subsystem is causing the most delay.
- **OPR**: This field contains Message if most of the delay was due to a message or Mount if most of the delay was due to a mount request.

The field can contain QUIESCE if the operator quiesced the address space. A quiesced address space can show unexpected data:
- A swappable address space will be swapped out, thus it can be OUTR and show storage delays.
- A non-swappable address space will get lowest priority, thus it can show CPU delay, paging delay, or other delays, and even some USG % from time to time depending on the load on the system.

Cursor-sensitive control on this field gives you the Quiesce delay variation of the Job Delay report.
- **ENQ**: This field contains the major name of the resource most responsible for the delay.
- **ENCLAVE**: One or more enclaves are holding the processor.
- **RG-Cap**: The job is delayed due to WLM resource capping. That means that:
  - either the resource group for which the job is running, has used up its CPU service specified in the WLM policy,
  - or the work for which the job is running is overachieving its goal. So this work may be capped in order to divert its resources to run discretionary work (see also section 'Using Discretionary Goals' in z/OS MVS Planning: Workload Management).

### Monitor III Utility fields

You can use the Monitor III Utility to customize the DELAY report. In addition to the delays shown above you can use the Utility to have the following delay percentages shown.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| % Delayed for | • JES delay percentage  
                • HSM delay percentage  
                • XCF delay percentage  
                • Operator mount delay percentage  
                • Operator message delay percentage  
                • Operator quiesce delay percentage  
                • WLM resource group capping delay percentage |
Cursor-sensitive control on the Delay report

To see all delays for a particular class or summary line (*SYSTEM, *TSO, *BATCH, *STC, *ASCH or *OMVS), use cursor-sensitive control on any name starting with an asterisk (*) under the name column or on any value in the CX or Service Class columns, to display a subset of the Delay report for that group.

When you use cursor-sensitive control on the *ENCLAVE summary line, you are shown a subset of individual enclave names.

Using cursor-sensitive control on an enclave name displays a pop-up panel that shows information you extracted from the WLM Enclave Classification Data (ECD) control block. You can use this information to identify the transactions that are processed in the enclave. See Figure 36 for an example.

To see all jobs using or delayed for processor, use cursor-sensitive control on any indicator under USG % to display either the Processor Delays or the Device Delays report, depending on which is contributing more to the delay.

To investigate which jobs or resources are contributing to a delay, use cursor-sensitive control on any indicator under DLY % or % Delayed for to display the related resource report or job delay report.

Figure 36. DELAY Report - Details for Enclave Classification Data
Report options

The parameters that you specify on this panel (except Summary and Criterion) affect all job-oriented detail delay reports.

Class
The class of jobs for which you want delay and common storage data reported. For Class, you can request:
- T or TSO
- B or BATCH
- S or STC for started task
- A or ALL for all jobs in the system
- AS or ASCH for ASCH address spaces
- O or OMVS

Your selection for Class applies to all delay and common storage reports and is saved across sessions in the current option set.

Service Class
The service class for which you want data reported. For Service Class, you can specify any of the available service classes listed under Available Service Classes.

If the service class you want is not listed, it was not active during the current report interval. If you specify the service class, it will appear on the report when it is available.

Your selection applies to all delay and common storage reports and is saved across sessions in the current option set.

Summary
Summary allows you to specify whether you want summary lines for the DELAY report.

To produce one summary line for all jobs in the system and one summary line for each class (TSO, BATCH, STC, ASCH or OMVS), enter ALL for Class and YES for Summary.

To only produce a summary line for one class, group or service class, enter the name for Class and YES for Summary.

Your selection for Summary applies only to the DELAY report and is saved across sessions in the current option set.
Criterion
The value (from 0% to 100%) that RMF compares to each job's computed delay value in deciding whether to include the job in the DELAY report.
RMF displays all jobs whose delay values meet or exceed the Criterion.
The value that you specify for Criterion applies only to the DELAY report and is saved across sessions in the current option set.

Jobs
A YES for JOBS displays the name of all the active jobs in the Class, Group or Service class you specified and any jobname that you previously selected or excluded.
You can use this list to view active jobs in the system and to select and exclude jobs from your report.

Available Service classes
The list of available service classes includes all of the service classes that belong to the Class you specified and that had any activity during the current report interval.

Press the END key to make these values active for the session.

Job Selection/Exclusion Option panel
If you select YES for Jobs on the Delay Report Options panel, RMF displays a Job Selection/Exclusion panel shown in Figure 38.

The Job Selection/Exclusion panel allows you to select or exclude specific jobs from your delay reports.

The panel lists:
- Active jobs in the class and group specified on the Delay Report Options panel.
- All jobs that you previously selected or excluded, selection codes appear to the left of jobs previously selected or excluded.

To select a job for your delay reports, type an s to its left, under SEL; to exclude a job, type an x to its left. (You can select *ALL for all jobs in the specified class and group and then exclude specific jobs. Similarly, you can exclude *ALL and then select specific jobs.)

To select several jobs with similar names, use an asterisk (*) as a "wild card" character under Jobname. For example: to request a report for all jobs starting with A, specify 's' under Sel, 'a*' under Jobname and ensure that there is an 'x' beside *ALL.
You can also specify multiple wild card entries, for example, to list all jobs starting with A and all jobs starting with BK, specify:

```
Sel Jobname Sel Jobname
S  A* <----- S  BK* <-----
X  *ALL
```

To select or exclude a job that is not listed, enter the job name in the top row and the appropriate selection code to its left.

All the jobs might not fit on this panel. Use PF8 and PF7 to scroll through the remaining job names.

---

**DEV - Device Delays Report**

The Device Delays report (DEV) shows jobs delayed by contention for devices. RMF lists the jobs included by descending delay percentages; that is, the job experiencing the most significant delay appears first.

**How to request this report**

To request the Device Delays report, select 3 from the Primary Menu and then select 2 on the Resource Report Selection Menu (shown in [Figure 8 on page 27](#)), or enter the following command:

```
DEV [job_class,service_class]
```

For example, to get a Device Delays report for TSO service class TSOPRIME, enter:

```
DEV T, TSOPRIME
```

**Contents of the report**

```
<table>
<thead>
<tr>
<th>Jobname</th>
<th>Service</th>
<th>C Class</th>
<th>DLY</th>
<th>USG</th>
<th>CON</th>
<th>VOLSER</th>
<th>VOLSER</th>
<th>VOLSER</th>
<th>VOLSER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARYPATM B NRPRIME</td>
<td>70</td>
<td>51</td>
<td>54</td>
<td>70</td>
<td>TSOL11</td>
<td>1</td>
<td>DUMP00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICHAELL B NRPRIME</td>
<td>39</td>
<td>15</td>
<td>14</td>
<td>39</td>
<td>BPXLK1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCPDUMP S SYSSTC</td>
<td>36</td>
<td>18</td>
<td>20</td>
<td>36</td>
<td>D24PK2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHARLESR B NRPRIME</td>
<td>33</td>
<td>13</td>
<td>13</td>
<td>28</td>
<td>BPXLK1</td>
<td>3</td>
<td>HSML02</td>
<td>2</td>
<td>BPXSSK</td>
</tr>
<tr>
<td>DFHSM S SYSSTC</td>
<td>30</td>
<td>83</td>
<td>35</td>
<td>10</td>
<td>HSML17</td>
<td>5</td>
<td>SMS026</td>
<td>4</td>
<td>HSMOCD</td>
</tr>
<tr>
<td>SHUMA3 T TSOPRIME</td>
<td>18</td>
<td>52</td>
<td>53</td>
<td>13</td>
<td>D83ID0</td>
<td>5</td>
<td>HSML02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAVEP T TSOPRIME</td>
<td>16</td>
<td>9</td>
<td>10</td>
<td>4</td>
<td>HSM009</td>
<td>3</td>
<td>HSM005</td>
<td>2</td>
<td>HSM06</td>
</tr>
<tr>
<td>CATALOG S SYSTEM</td>
<td>9</td>
<td>5</td>
<td>21</td>
<td>2</td>
<td>CLR007</td>
<td>1</td>
<td>HSM036</td>
<td>1</td>
<td>HSM018</td>
</tr>
<tr>
<td>DB2MD0BM1 S SYSSTC</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>DB2MS2</td>
<td>1</td>
<td>DB2MD0</td>
<td>1</td>
<td>DB2MS0</td>
</tr>
<tr>
<td>GINNI T TSOPRIME</td>
<td>8</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td>HSML17</td>
<td>2</td>
<td>CLR010</td>
<td>1</td>
<td>HSM032</td>
</tr>
<tr>
<td>TREVORJ T TSOPRIME</td>
<td>6</td>
<td>10</td>
<td>11</td>
<td>2</td>
<td>HSM022</td>
<td>1</td>
<td>HSM001</td>
<td>1</td>
<td>RESPK1</td>
</tr>
<tr>
<td>RHANSOON T TSOPRIME</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>HSML17</td>
<td>1</td>
<td>RESPK1</td>
<td>1</td>
<td>NATPK1</td>
</tr>
<tr>
<td>KOCH T TSOPRIME</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>HSML17</td>
<td>1</td>
<td>CLR010</td>
<td>1</td>
<td>HSM018</td>
</tr>
<tr>
<td>RSTSHYS0 B NRPRIME</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>HSML17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEENA T TSOPRIME</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>HSM036</td>
<td>1</td>
<td>HSM020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRISMAN T TSOPRIME</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>HSML17</td>
<td>1</td>
<td>SMS005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JACKF T TSOPRIME</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>HSML17</td>
<td>2</td>
<td>TS0063</td>
<td>1</td>
<td>HSM004</td>
</tr>
</tbody>
</table>
```

*Figure 39. DEV Report*
The graphic form of this report shows each user's device delay percentage and device using percentage.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of a job that is delayed by device volumes. The Device Delay report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows:</td>
</tr>
<tr>
<td>S</td>
<td>Started task</td>
</tr>
<tr>
<td>T</td>
<td>TSO</td>
</tr>
<tr>
<td>B</td>
<td>Batch</td>
</tr>
<tr>
<td>A</td>
<td>ASCH</td>
</tr>
<tr>
<td>O</td>
<td>OMVS</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td>DLY %</td>
<td>Delay the waiting job (address space) is experiencing because of contention for devices during the report interval, expressed as a percentage. Note: This DLY% value is also found in the DEV field on the job delay report.</td>
</tr>
<tr>
<td>USG%</td>
<td>The percentage of time when the job is transferring data between DASD or tape and central storage. (Not just the volumes listed under the VOLSER columns on the report.) Note: To find all the using volumes for a jobname you must scan an entire resource-oriented device delay (DEVR) report, using the FIND command.</td>
</tr>
<tr>
<td>CON %</td>
<td>The percentage of time during the report interval when devices used by the address space were connected to channel path(s) that actually transferred data between the devices and central storage. This value measures connect time of the DEV volumes as well as I/O requests to any device on a block multiplex channel for which the measurement facility is active. RMF obtains connect time at each sample. Note: 1. When comparing the CON % and the USG% fields in this report, you must be aware that CON % is a measured multi-state value, while USG% is a sampled single state value. Thus, CON % includes time while the job was using more than one device at the same time, while USG % does not. The value in the CON % field might include more devices than the USG% field. The USG % field may include a considerable amount of delay. 2. Some of the connect time from the previous range period might be included in the CON % value, while some of the connect time in the current report interval might be absent. This discrepancy is noticeable on devices that have very long channel programs, such as paging devices.</td>
</tr>
<tr>
<td>Main Delay Volume(s)</td>
<td>Up to four DEV volumes contributing most to the delay of the job. The DEV volume having the largest delay percentage appears first.</td>
</tr>
<tr>
<td>VOLSER</td>
<td>The serial number of a DASD or tape contributing to the job delay.</td>
</tr>
<tr>
<td>%</td>
<td>The percentage of delay caused because the job was waiting to use the named volume.</td>
</tr>
</tbody>
</table>
Report options

The DEV Report Options panel is similar to the Delay Report Options panel, but does not contain Summary or Criterion. See “Report options” on page 69 (the Delay Report Options panel) for a description of the fields.

The parameters that you specify on this panel affect all job-oriented detail delay reports.

**DEVN - Device Activity Report**

The Device Activity (DEVN) report gives information about all or a subset of online devices. The report is based on the Device Resource Utilization (DEVR) report, but only shows the average number of jobs using or being delayed for the devices and not every job, as shown on the DEVR report.

The report provides the capability to select a subset of all available devices and to sort the displayed devices. You can rearrange the displayed list of devices by any activity category you want and focus on devices with common characteristics (for example, same volser number or device number prefix, or devices having the same type or are connected to the same control unit type). This is done using cursor-sensitive control (see\[75\]).

**How to request this report**

To request this report, select U from the Primary menu, then DEVN from the User Selection menu, or you can enter the following command:

```
DEVN
```
The DEVN report has two parts.

- The top part provides information about the selection criteria and the sort criteria for the displayed devices.
- The bottom part is based on information from the DEVR report. It is similarly organized as the Postprocessor DASD Activity report (see "DEVICE - Device Activity report" on page 355).

The first four columns show the device identification (volser, device number, device type and control unit type). These columns can be used with cursor-sensitive control to change the scope of displayed devices.

The columns on the right side of the report display the device utilization information. These columns can be used to sort the report.

The graphic form of the report shows for each device the response time in milliseconds broken down in IOS queue time and service time.

Field descriptions

All fields in the DEVN report are the same as in the DEVR report (see Table 22 on page 77) except for the following:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devices reported:</td>
<td>The criteria selected for the devices being reported.</td>
</tr>
<tr>
<td></td>
<td>The devices being reported can be selected using cursor-sensitive control from the fields listed under Device Identification.</td>
</tr>
</tbody>
</table>
Table 20. Fields in the DEVN Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report is sorted by:</td>
<td>The sort criteria for the devices being reported. The sort criteria can be selected using cursor-sensitive control from any of the fields listed under the columns between Activity and Jobs.</td>
</tr>
<tr>
<td>Activity IosQ</td>
<td>The average number of seconds an I/O request must wait on an IOS queue before a SSCH instruction can be issued. A delay occurs when a previous request to the same sub-channel is in progress. The value is calculated as: $\frac{IOS\ Queue\ Count}{#\ Samples} = \frac{IosQ}{Device\ Activity\ Rate}$ This field is not shown on the DEVR report but is available in the ISPF table of the DEVR report.</td>
</tr>
<tr>
<td>Pending Reasons</td>
<td>Only the highest delay reason and percentage is listed.</td>
</tr>
<tr>
<td>Jobs</td>
<td>USG The average number of jobs using the device during the report interval. DEL The average number of jobs being delayed for the device during the report interval.</td>
</tr>
</tbody>
</table>

**Cursor-sensitive control**

Cursor-sensitive control on the DEVN report is extended (compared to other Monitor III reports) by new capabilities. In addition to navigation control as in other reports, you can

- Recreate the report with a different scope of selected devices
- Get a different sort order of the displayed devices

Therefore, cursor-sensitive control does not maintain the return path. Pressing PF3 on a subsequent report will always return you to the Primary menu.

In addition, the latest selection criteria and sort order is saved throughout the session and will be used on the next invocation of the report. The initial display is always shown according to the jobs being delayed for the device in descending order, and the initial selection criteria display all online devices.

The following table provides an overview about selection and sort using cursor-sensitive control.

Table 21. DEVN Report - Cursor-sensitive Control for Select and Sort

<table>
<thead>
<tr>
<th>Cursor- sensitive Column</th>
<th>Cursor Position within Column</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>VolSer</td>
<td>1, 2</td>
<td>Device Activity Trend report for the selected volume</td>
</tr>
<tr>
<td>VolSer</td>
<td>3 - 6</td>
<td>Device Activity report for devices starting with the same volser prefix. Example: Cursor position is 3 below volser TSO060: The result is a DEVN report for all TSOxxx devices.</td>
</tr>
<tr>
<td>Num</td>
<td>1-3</td>
<td>Device Activity report for devices starting with the same Num prefix. Example: Cursor position is 3 below num 006E: The result is a DEVN report for all devices with an address of 006x.</td>
</tr>
</tbody>
</table>
Table 21. DEVN Report - Cursor-sensitive Control for Select and Sort (continued)

<table>
<thead>
<tr>
<th>Cursor-sensitive Column</th>
<th>Cursor Positionwithin Column</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>any</td>
<td>Device Activity report for all online devices with the same device type.</td>
</tr>
<tr>
<td>CU</td>
<td>any</td>
<td>Device Activity report for all online devices with the same CU type.</td>
</tr>
<tr>
<td>S</td>
<td>--</td>
<td>No cursor-sensitive control.</td>
</tr>
<tr>
<td>Rsn %</td>
<td>--</td>
<td>No cursor-sensitive control.</td>
</tr>
<tr>
<td>All other</td>
<td>any</td>
<td>Device Activity report sorted in descending order by the selected column.</td>
</tr>
</tbody>
</table>

**Note:** Selecting the same column (VolSer, Num, Type, or CU) a second time displays the Device Activity report for ALL online devices again.

**DEVR - Device Resource Delays Report**

The Device Resource Delays report (DEVR) shows the devices (volumes) and the jobs using or being delayed by them (as indicated on the Device Delays report).

On the DEVR report, the type of delay is listed under Pend Reasons as:
- **DB** Device busy delay
- **CMR** Initial command response time

**How to request this report**

To request the DEVR report, select 3 from the Primary menu, and then select 3 on the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

DEVR [volser]

**Contents of the report**

The first block of columns in the report contain information related to each volume.
The remaining columns contain information related to each job. RMF sorts the volumes in descending order according to the average number of delayed users (1 user delayed 100% is equivalent to 100 users each delayed 1% of the time), and the waiting jobs by descending delay percentages. If RMF is unable to obtain valid hardware data, it prints dashes (---) for the hardware measurements, while percentages normally appear.

The fields DLY DB % and DLY CU % contain data about I/O request delays caused by contention at the control unit and device level.

The graphic DEVR report shows the average number of active users for each device that were delayed, connected, disconnected or pending.

**Field descriptions**

*Table 22. Fields in the DEVR Report*

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume/Num</td>
<td>The name of an online volume and the device number where the volume is mounted.</td>
</tr>
<tr>
<td>S/PAV</td>
<td>An S in the first line of this column indicates that the device was generated during system generation as a shared device.</td>
</tr>
<tr>
<td>PAV</td>
<td>PAV count — A value in the second line of this column gives the number of parallel access volumes (base and alias) which were available at the end of the reporting.</td>
</tr>
<tr>
<td></td>
<td>If the number has been changed during the report interval, it is followed by an “*”.</td>
</tr>
<tr>
<td></td>
<td>If the device is a HyperPAV base device, the number is followed by an ‘H’, for example, 1.2H. The value is the average number of HyperPAV volumes (base and alias) for that range.</td>
</tr>
<tr>
<td></td>
<td>Accumulated # of HPAV devices</td>
</tr>
<tr>
<td></td>
<td>Average # of HPAV devices = ---------------------------------</td>
</tr>
<tr>
<td></td>
<td>Number of Samples</td>
</tr>
<tr>
<td>Act Rate</td>
<td>The rate per second that I/O instructions (SSCH, RSCH, and HSCH) to a device completed successfully.</td>
</tr>
<tr>
<td></td>
<td>The calculation is:</td>
</tr>
<tr>
<td></td>
<td># I/O Instructions</td>
</tr>
<tr>
<td></td>
<td>Act Rate = ---------</td>
</tr>
<tr>
<td></td>
<td>Range Time</td>
</tr>
<tr>
<td>Resp Time</td>
<td>The average response time (in milliseconds) that the device required to complete an I/O request.</td>
</tr>
<tr>
<td></td>
<td>The calculation is:</td>
</tr>
<tr>
<td></td>
<td>Active Time</td>
</tr>
<tr>
<td></td>
<td>Resp Time = ------------------- + IOS Queue Time</td>
</tr>
<tr>
<td></td>
<td># I/O Instructions</td>
</tr>
<tr>
<td>ACT %</td>
<td>The percentage of time during the report interval when the device was active. To derive this value, RMF computes the accumulated percent active time as follows:</td>
</tr>
<tr>
<td></td>
<td>ACT % = PEND % + CON % + DSC %</td>
</tr>
<tr>
<td>PEND %</td>
<td>Percentage of time all I/O requests wait in the logical control unit queue (CU-HDR) before there is an available path. Pending time includes the time spent waiting for a channel, control unit, or head of string, or for the actual device (if it is a shared device that is reserved by another processor).</td>
</tr>
<tr>
<td>CON %</td>
<td>Percentage of time the device was connected to a channel path to actually transfer data between the device and storage.</td>
</tr>
<tr>
<td>DSC %</td>
<td>Percentage of time the device has an active channel program and is disconnected (not transferring data). Disconnect time includes seek time, normal rotation delay time, and extra rotation delay because the channel was busy when the device needed to reconnect.</td>
</tr>
</tbody>
</table>
### Table 22. Fields in the DEVR Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CON %</strong></td>
<td>The percent connect time. See the description under %ACT. RMF calculates the value as follows:</td>
</tr>
<tr>
<td></td>
<td>Accumulated Connect Time</td>
</tr>
<tr>
<td></td>
<td>CON % = ------------------------ * 100</td>
</tr>
<tr>
<td></td>
<td>Range Time</td>
</tr>
<tr>
<td><strong>DSC %</strong></td>
<td>The percent disconnect time. See the description under %ACT. RMF calculates the value as follows:</td>
</tr>
<tr>
<td></td>
<td>Accumulated Disconnect Time</td>
</tr>
<tr>
<td></td>
<td>DSC % = --------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Range Time</td>
</tr>
</tbody>
</table>

**Note:**

1. When comparing the ACT %, CON %, DSC %, or PND % fields with the USG % field in this report, you must be aware that ACT %, PND %, CON %, and DSC % are measured multi-state values, while USG % is a sampled single state value. If a single I/O request is very long (such as a long-running channel program), the PND %, CON %, and DSC % values might be too low because of timer overflow errors.

2. The channel updates the data fields used to calculate CON %, DSC %, and PND % when the I/O operation completes. Therefore, some of the time from the previous report interval might be included in these values, while some of the time in the current report interval might be absent from these values. This discrepancy is noticeable on devices that have very long channel programs, such as paging devices.

**PND % Reasons**

The first entry is always the pending percentage (PND). See the description under %ACT. RMF calculates the value as follows:

- Accumulated Pending Time
- PND % = ------------------------ * 100
- Range Time

DLY DB % and DLY CU % are included in pending time.

Below PND % are the pend reasons that contribute to the total pending percentage. A value appears only when there is a non-zero delay percentage. Pend Reasons can be one of the following:

- **DB** Device busy delay, which is the percentage of time during the report interval when the channel subsystem measured I/O request delay because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, a head of string busy condition caused the contention, or some combination of these conditions has occurred.
  
  - Accumulated DB Delay Time
  - DLY DB% = ------------------------ * 100
  - Range Time

- **CMR** Command response time delay, which is the percentage of time during the report interval when the first command of an I/O instruction of the channel program is sent to the device, until the device indicates it has accepted the command.
  
  - Accumulated CMR Delay Time
  - DLY CMR% = ------------------------ * 100
  - Range Time

**Note:** If either hardware data or volume-related percentages are not available, this field is blank.

<table>
<thead>
<tr>
<th>DEV/CU Type</th>
<th>The top number represents the device type. The bottom number represents the control unit model.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jobname</strong></td>
<td>Name of a job using or being delayed by the DEV volume. The DEVR delay report does not summarize data by job groups; all jobs within a job group are reported individually. RMF lists all jobs for each device, by descending delay percentages.</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>A one-character abbreviation for the job class as follows:</td>
</tr>
<tr>
<td></td>
<td>S  Started task</td>
</tr>
<tr>
<td></td>
<td>T  TSO</td>
</tr>
<tr>
<td></td>
<td>B  Batch</td>
</tr>
<tr>
<td></td>
<td>A  ASCH</td>
</tr>
<tr>
<td></td>
<td>O  OMVS</td>
</tr>
<tr>
<td><strong>Service Class</strong></td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td><strong>USG %</strong></td>
<td>The percentage of time when the job has had a request accepted by the channel for the specified Volume, but the request is not yet complete.</td>
</tr>
<tr>
<td><strong>DLY %</strong></td>
<td>Delay the waiting job (address space) is experiencing because of contention for a specific volume during the report interval, expressed as a percentage.</td>
</tr>
</tbody>
</table>
Monitor III Utility fields

Table 23 shows additional fields for the Device Resource Delay report.

You can use the Monitor III Utility to customize the DEVR report.

Table 23. Additional Fields in the DEVR Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of pending time</td>
<td>The percentage of time during the report interval when the device was pending.</td>
</tr>
<tr>
<td>IOS queue time</td>
<td>The average number of milliseconds an I/O request must wait on an IOS queue before a SSCH instruction can be issued. Delay occurs when a previous request to the same subchannel is in progress.</td>
</tr>
<tr>
<td>Percentage of device busy delay time</td>
<td>The percentage of time during the report interval when the channel subsystem measured I/O request delay because the device was busy. Device busy might mean that the volume is in use by another</td>
</tr>
<tr>
<td>Percentage of control unit busy delay time</td>
<td>The percentage of time during the report interval when there is I/O request delay because the control unit was busy.</td>
</tr>
<tr>
<td>Percentage of switch port busy delay time</td>
<td>The percentage of time during the report interval when there is I/O request delay because the switch port was busy.</td>
</tr>
</tbody>
</table>

Report options

You can use the DEVR Report Options panel to select the volume to be included in the DEVR report, or all volumes, from a list of available volumes.

Figure 43. DEVR Report Options Panel

VOLSER

The volume serial number of the device that you want information about.

Enter

- ALL for information about all devices that have jobs using it or being delayed by it in the system.
- A name with an asterisk (*) as a "wild card" character. For example: to request a report for all volumes starting with D8, specify 'D8*' for VOLSER.
Mon III - DEVR

Note: You cannot use the wild card when calling the report, that is, when you use the command DEVR volser. Here, volser must be a complete volume serial number; an asterisk will be interpreted as part of the volser.

• One of the volumes listed under Available Volumes.
• The volume serial number of a device that will be in the system at a later time.

If the volume that you specify is not currently available, it will appear on the report when it is available.

Your selection is saved across sessions in the current option set.

Available Volumes
The list of the online volumes in the system.

If the volume you want is not listed, it was not online during the current report interval. If you specify the volume, it will appear on the report when it is online.

DEVT - Device Activity Trend Report

The Device Activity Trend (DEVT) report shows the device activity for a selected volume for the last 20 reporting ranges. The report is based on the Device Activity (DEVN) report and can be used for a selected device as follows:

• To identify times of peak device utilization
• To analyze the device utilization over time
• To analyze device delay situations
• As a device summary report

How to request this report
To request this report, select U from the Primary menu, and then DEVT together with a volser from the User Selection menu.

Note: The report can also be requested from the Device Activity (DEVN) report using cursor-sensitive control. If the report is selected from the User Selection menu and no volser is specified or an invalid volser is specified, the DEVN report is displayed.
Contents of the report

The DEVT report has two parts.

- The top part provides information about the selected device, its volser, device number, device and control unit type, and information about the reported range.

- The bottom part is based on the DEVN report. Each row is preceded by a time stamp to identify the start time of the reporting range. The device activity columns are exactly the same as those shown on the DEVN report. At the right, a column showing the device workflow percentage is added. The workflow column is calculated from the average number of users using or being delayed for the device from the DEVN ISPF table. Please keep in mind that the value is not as precise as workflow values shown on the Workflow/Exception report.

Field descriptions

Table 24. Fields in the DEVT Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>VolSer:</td>
<td>The name of an online volume.</td>
</tr>
<tr>
<td>Number:</td>
<td>The device number where the volume is mounted.</td>
</tr>
<tr>
<td>Type and CU-Type:</td>
<td>The device type and the control unit model.</td>
</tr>
<tr>
<td>Latest:</td>
<td>Begin date and time of the last reported range on the report.</td>
</tr>
<tr>
<td>Range/Line:</td>
<td>Reported range per displayed line on the report.</td>
</tr>
<tr>
<td>Earliest:</td>
<td>Begin date and time of the first reported range on the report.</td>
</tr>
<tr>
<td>Total Range:</td>
<td>Total reported range on the report, expressed in seconds and HH.MM.SS.</td>
</tr>
<tr>
<td>Time</td>
<td>The start time of the reported range.</td>
</tr>
</tbody>
</table>

You find the description of all other fields in the report either in Table 22 on page 77 or in Table 20 on page 74.
Cursor-sensitive control
Placing the cursor on the time stamp for a selected row will recreate the report starting at the selected time period. The return path is not maintained, which means that pressing PF3 will return you to the Primary Menu.

Using cursor-sensitive control from any other column will invoke the Device Resource Utilization (DEVR) report for the selected reporting range and the selected device. In this case, pressing PF3 on the DEVR report will return you to the DEVT report.

DSD - Detailed Storage Delays Report

Figure 45 on page 83 shows a modified version of the Storage Delays report that replaces Working Set Central and Expanded with three columns: VIO, XMEM and HIPR. On the Storage Delays report, this information is combined and shown in the OTHR column.

How to request this report
To request the DSD report, select U on the Primary menu, and then select 2 on the User menu, or enter the following command:

DSD

Contents of the report
DLY %, or delay percentage, is the percentage of time during the report interval that the job is experiencing a delay because of contention for storage. If DLY % is greater than 10%, it could indicate a problem.

% Delayed for breaks down the number under DLY % into the various types of storage delays affecting each job.

The COMM and LOCL fields include shared storage paging.
Field descriptions

The fields in the DSD report are identical to the fields in the STOR report (see Table 60 on page 151) except for the XMEM and HIPR fields.

Table 25. Fields in the DSD Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed for XMEM</td>
<td>This column contains the paging delays from cross memory address spaces.</td>
</tr>
<tr>
<td>Delayed for HIPR</td>
<td>This column contains the paging delays from standard hiperspaces (including waits during scroll wait), but not ESO hiperspaces.</td>
</tr>
</tbody>
</table>

There are no report options to be specified for the DSD report.

DSND - Data Set Delays Report

The DSND report presents information about the utilization (using and delay) of one data set or a group of data sets. For each selected data set, information is given about

- The volume the data set resides on
- All jobs that are using this data set or that are waiting for this data set.

RMF sorts the data sets by descending overall delay percentages.

You can use this report as base for further analysis:

- To investigate the performance of a volume and list all jobs that are delayed because of it, use cursor-sensitive control on any indicator under Volume to display the related DSNV report.
- To see performance information for a specific job, use cursor-sensitive control on any job listed under Jobname to display the related DSNJ report.
To view all data sets which RMF found active in the report interval, or to change
the list of data sets to be reported on, enter the command ROPTIONS to display
the DSND Report Options panel.

How to request this report
To request the Data Set Delays report, select 3 from the Primary Menu, and then
select 3A on the Resource Report Selection Menu (shown in Figure 8 on page 27),
or enter the following command:
DSND [dsname]

In addition, you can navigate to this report through cursor-sensitive control from
the DSNJ report or DSNV report.

Special considerations
The Device Resource Delays report (DEVR) provides USG and DLY values for jobs
that are using devices or are waiting for them. This data is gathered in a multistate
fashion, this means that there may be several wait records for the same job for the
same device. The reporter changes to "pseudo multistate", this can result in one
USG counter and one DLY counter in parallel within a cycle, but does not take
multiple wait records into account.

Data gathering for the Data Set Delays reports (DSND, DSNJ, and DSNV) is
different. Here, several wait records referring to the same device are not treated as
being the same and counted only once because they may refer to different data set
names, and have to be counted individually.

As a result, the sum of the USG and DLY percentage values in these reports can be
different to the USG and DLY percentage values in the DEVR report. Therefore, the
three reports contain the headings DUSG% and DDLY% instead of USG% and
DLY% to indicate a potential difference to the related values in the DEVR report.

Contents of the report

<table>
<thead>
<tr>
<th>Data Set Name</th>
<th>Volume</th>
<th>Jobname</th>
<th>ASID</th>
<th>DUSG%</th>
<th>DDLY%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDA.CTT.MSPCT.SP41XCTT.CTTGUIDE.BOOK</td>
<td>EDSS99</td>
<td>BDECL2</td>
<td>003C</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BGEEET0</td>
<td>0201</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>BDA.CTT.MSPCT.SP41XCTT.GUIDE</td>
<td>EDSS99</td>
<td>BDECL2</td>
<td>003C</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BGEEET0</td>
<td>0201</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>BDA.CTTX.TEST</td>
<td>DATA94</td>
<td>BSHR</td>
<td>0022</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>BDA.CTT0.INFORM.SEQ</td>
<td>DATA67</td>
<td>BSHR</td>
<td>0074</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 46. DSND Report

There is no graphic version of this report available.
## Field descriptions

### Table 26. Fields in the DSND Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Data Set Name</td>
<td>Name of the data set or group of data sets to be reported on. This is the name which has been specified as command parameter or has been selected via report options.</td>
</tr>
<tr>
<td>Data Set Name</td>
<td>Name of a data set which was utilized during the report interval and selected for reporting. RMF lists the data set names by descending overall delay percentages.</td>
</tr>
<tr>
<td>Volume</td>
<td>Name of the volume on which the data set resides.</td>
</tr>
<tr>
<td>Jobname</td>
<td>Name of a job using or being delayed by the data set. RMF lists all jobs for each data set by descending delay percentages.</td>
</tr>
<tr>
<td>ASID</td>
<td>Hexadecimal address space identifier (ASID) of the job using the data set or waiting for its availability.</td>
</tr>
<tr>
<td>DUSG%</td>
<td>Percentage of time when the job has had an I/O request accepted by the channel for the volume on which the data set resides, but the request is not yet complete. <strong>Note:</strong> See &quot;Special considerations&quot; on page 84</td>
</tr>
<tr>
<td>DDLY%</td>
<td>Percentage of time when the job was waiting to use the data set because of contention for the volume where the data set resides.</td>
</tr>
</tbody>
</table>

### Report options

The DSND Report Options panel displays a list of all data set names which have been found active during the report interval. You can select a data set name by placing an **S** in front of the displayed data set name. The selected name is re-displayed in the header field "Selected Data Set Name". This field is an input field which can be used also to enter a data set name or a group of data set names using a "wild card", for example: BDA.CTT*, directly. The wild card example **BDA.CTT*** lets RMF select all data set names which start with the character sequence **BDA.CTT**. If someone specifies only "*", RMF reports on all data sets which are being utilized in the report interval.

The current selection is displayed on top of the data set names list.
Selected Data Set Name
The currently selected name of a data set or group of data sets to be reported on. This field is an input field and can be overwritten according to the rules for z/OS data set names. It is possible also to use an '*' as "wild card" as last character of the data set name. By using a wild card, all data sets starting with the character sequence before the '*' are reported on no matter which characters follow.

Sel can be placed in front of the data set name to be selected. This results in replacing the data set name in the header field "Selected Data Set Name".

Data Set Name
The name of a data set which was found active during the report interval. The data set names are sorted in alphabetical order.

Note:
1. The *RESET* command is not supported.
2. Only one data set name can be selected.
3. If a data set name is selected and the data set name in the input field is changed at the same time, the selected data set name is used.
4. If the data set name is blanked out, it is possible to leave the panel, but the fields in the report will be empty.

DSNJ - Data Set Delays - Job Report
The DSNJ report presents information about data set utilization for a specific job:
• The EXCP rate and the percentage of time when data transfer for this job took place.
• A list of all data sets being utilized by the job.

You can use this report as base for further analysis:
Mon III - DSNJ

- To investigate the performance of a volume and list all jobs that are delayed because of it, use cursor-sensitive control on any indicator under Volume to display the related DSNV report.
- To see performance information for a specific data set, use cursor-sensitive control on any data set listed under Data Set Name to display the related DSND report.

How to request this report
To request the Data Set Delays - Job report, select 2 from the Primary Menu, and then select 1A on the Job Report menu (shown in Figure 7 on page 26), or enter the following command:

DSNJ [jobname]

In addition, you can navigate to this report through cursor-sensitive control from the DSND report or DSNV report.

Contents of the report

<table>
<thead>
<tr>
<th>Command</th>
<th>RMF V2R1 Data Set Delays - Job</th>
<th>Line 1 of 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samples: 100</td>
<td>System: MVS1 Date: 09/28/13 Time: 10.03.20 Range: 100 Sec</td>
<td></td>
</tr>
<tr>
<td>Jobname: BOECL2</td>
<td>EXCP Rate: 123.5 Connect: 41%</td>
<td></td>
</tr>
<tr>
<td>ASID</td>
<td>Data Set Name</td>
<td>Volume</td>
</tr>
<tr>
<td>003C</td>
<td>BDA.CTT.MSPCT.SP41XCTT.CTTGUIDE.BOOK</td>
<td>EDS99</td>
</tr>
<tr>
<td>BSR.FIX.LINKLIB</td>
<td>DATA68</td>
<td>0257</td>
</tr>
<tr>
<td>BDA.CTT.MSPCT.SP41XCTT.GUIDE</td>
<td>EDS99</td>
<td>0312</td>
</tr>
<tr>
<td>RMF.R430.NLS.OLDENG.ERBCOPS3.SEQ</td>
<td>EDS09</td>
<td>0312</td>
</tr>
<tr>
<td>-- N/A --</td>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td>BHEW.ERBMFDTS.LST90514</td>
<td>DATA38</td>
<td>0122</td>
</tr>
</tbody>
</table>

Figure 48. DSNJ Report

There is no graphic version of this report available.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of the job for which reporting was requested.</td>
</tr>
<tr>
<td>EXCP Rate</td>
<td>Number of EXCP requests per second for the job being reported on.</td>
</tr>
<tr>
<td>Connect</td>
<td>Percentage of time during the report interval when devices used by the job were connected to channel path(s) that actually transferred data between the devices and central storage.</td>
</tr>
<tr>
<td>ASID</td>
<td>Address space identifier (ASID) of the job being reported on.</td>
</tr>
<tr>
<td>Data Set Name</td>
<td>Name of the data set being utilized by the current job.</td>
</tr>
</tbody>
</table>

RMF lists all data sets by descending delay percentages.

Note: The using and delay information for all I/Os for which the data set name information is not available is accumulated in a single slot. In this case, --N/A-- is provided instead of a data set name. If these I/Os are directed to different volumes, dashes are shown in columns for Volume and Num. This happens if only those I/O instructions have been detected for which no data set information is provided by the SMS subsystem, like
- I/Os to system data sets (like paging or spooling)
- I/Os to any data set which was opened prior to SMS subsystem initialization
- I/Os like SENSE or RELEASE
- System I/Os not done by an access method
Mon III - DSNJ

Table 27. Fields in the DSNJ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Name of the volume on which the data set resides which was utilized during the current report interval.</td>
</tr>
<tr>
<td>Num</td>
<td>Device number where the volume is mounted.</td>
</tr>
<tr>
<td>DUSG%</td>
<td>Percentage of time when the job has had an I/O request accepted by the channel for the volume on which the data set resides, but the request is not yet complete. Note: See “Special considerations” on page 84.</td>
</tr>
<tr>
<td>DDLY%</td>
<td>Percentage of time when the job was waiting to use the data set because of contention for the volume where the data set resides.</td>
</tr>
</tbody>
</table>

DSNV - Data Set Delays - Volume Report

The DSNV report presents information about the utilization of data sets that reside on a specific DASD volume.

The first part of the report provides a general overview on important activity and delay data for the volume. The second part of the report displays a list of all data sets on this volume that were found active during the reporting interval.

RMF sorts the data sets by descending overall delay percentages.

You can use this report as base for further analysis:

- To investigate the performance of a specific job that is using data sets on this volume or is waiting for them, use cursor-sensitive control on any indicator under Jobname to display the related DSNJ report.

How to request this report

To request the Data Set Delays - Volume report, select 3 from the Primary Menu, and then select 3B on the Resource Report Selection Menu (shown in Figure 8 on page 27). or enter the following command:

DSNV [volser]

In addition, you can navigate to this report through cursor-sensitive control from the DEVR report, the DSND report, or the DSNJ report.
Contents of the report

There is no graphic version of this report available.

Field descriptions

Table 28. Fields in the DSNV Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Data Section</td>
<td>This sections contains identical information as provided in the Device Delays variation of the Job Delay report (see &quot;Device Delay variation&quot; on page 119).</td>
</tr>
<tr>
<td>Data Set Name</td>
<td>Name of a data set which was utilized during the report interval and resides on the selected volume. RMF lists the data set names by descending overall delay percentages.</td>
</tr>
</tbody>
</table>
| Jobname            | Name of a job using or being delayed by the data set. RMF lists all jobs for each data set by descending delay percentages. Note: The using and delay information for all I/Os for which the data set name information is not available is accumulated, and -- N/A -- is provided instead of a data set name. This happens if only those I/O instructions have been detected for which no data set information is provided by the SMS subsystem, like  
  * I/Os to system data sets (like paging or spooling)  
  * I/Os to any data set which was opened prior to SMS subsystem initialization  
  * I/Os like SENSE or RELEASE  
  * System I/Os not done by an access method |
| ASID               | Address space identifier (ASID) of the job using the data set or waiting for it.                                                         |
| DUSG%              | Percentage of time when the job has had an I/O request accepted by the channel for the volume on which the data set resides, but the request is not yet complete. Note: See "Special considerations" on page 84. |
| DDLY%              | Percentage of time when the job was waiting to use the data set because of contention for the volume where the data set resides. |
Report options

The Report Options panel displays a list of all DASD volumes which have been found active during the report interval.

The current selection is displayed on top of the volume list.

**VOLSER**

The volume serial number of the device for which data set level reporting is being requested.

One of the volumes listed under Available DASD Volumes, or, the volume serial number of a device that will be in the system at a later time.

The selection is saved across sessions in the current option set.

**Available DASD Volumes**

The list of the online DASD volumes in the system. The volumes are sorted in alphabetical order.

**Note:**

1. The **RESET** command is not supported.
2. If the volume name is blanked out, it is possible to leave the panel, but the fields in the report will be empty.

ENCLAVE - Enclave Report

The ENCLAVE report provides detailed information about the activities of enclaves.

An enclave is a transaction that can span multiple dispatchable units (SRBs and tasks) in one or more address spaces and is reported on and managed as a unit. It is managed separately from the address space it runs in. CPU and I/O resources associated with processing the transaction are managed by the transaction's performance goal and reported to the transaction.

New types of applications (for example, DDF or ICSS Webserver) create enclave transactions executing in several address spaces, but they need to be managed as own single business units of work. Therefore, a report showing resource consumption and delays by enclave will improve significantly performance management for these new applications.
How to request this report

To request the ENCLAVE report, select 1 on the Primary Menu, and then a 6 on the Overview Report Selection Menu (shown in Figure 6 on page 25), or enter the following command:

ENCLAVE [subsystem-type]

Contents of the report

<table>
<thead>
<tr>
<th>Enclave</th>
<th>Attribute</th>
<th>CLS/GRP</th>
<th>P Goal</th>
<th>% D</th>
<th>X</th>
<th>EAppl%</th>
<th>TCPU</th>
<th>USG</th>
<th>DLY</th>
<th>IDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENC00003</td>
<td>CTT DDF JOECEE</td>
<td>PG004</td>
<td>1</td>
<td>0</td>
<td></td>
<td>18.75</td>
<td>26.78</td>
<td>12</td>
<td>88</td>
<td>0.0</td>
</tr>
<tr>
<td>ENC00001</td>
<td>CTT DDF JOECEE</td>
<td>PG004</td>
<td>1</td>
<td></td>
<td></td>
<td>16.27</td>
<td>23.12</td>
<td>11</td>
<td>89</td>
<td>0.0</td>
</tr>
<tr>
<td>ENC00004</td>
<td>CTT DDF JOECEE</td>
<td>PG004</td>
<td>1</td>
<td>F</td>
<td></td>
<td>14.83</td>
<td>21.12</td>
<td>10</td>
<td>90</td>
<td>0.0</td>
</tr>
<tr>
<td>ENC00005</td>
<td>CTT DDF JOECEE</td>
<td>PG004</td>
<td>1</td>
<td>F</td>
<td></td>
<td>14.13</td>
<td>20.00</td>
<td>8.9</td>
<td>91</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Figure 51. ENCLAVE Report

Note: There may be enclave activity in your system (for example, indicated by EAppl% > Appl% in the SYSINFO report), but the ENCLAVE report issues the message Enclave data is not currently available. The reason is that only those enclaves are shown in the report that have been sampled at least twice and that are active or inactive at the end of the Monitor III MINTIME. Therefore, short-running enclaves will not appear in the report.

When the report interval spans more than one Monitor III MINTIME, the above criteria must match for the last MINTIME in the report interval.

The graphic version of this report provides information about CPU utilization of the enclaves.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subheader Section</td>
<td>You can define the setting of each field in the Enclave Report Options panel.</td>
</tr>
<tr>
<td>Subsystem Type</td>
<td>Reporting only on enclaves that belong to this subsystem type, for example, DB2 or DDF.</td>
</tr>
<tr>
<td>Enclave Owner</td>
<td>Reporting only on enclaves that are owned by the address space with this jobname.</td>
</tr>
<tr>
<td>Class/Group</td>
<td>Reporting only on enclaves that run in this service class.</td>
</tr>
</tbody>
</table>
### Table 29. Fields in the ENCLAVE Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appl%</td>
<td>Percentage of the maximum general purpose processor capacity used by all address spaces during the report interval. This value is divided by the number of logical processors or cores that have been active during this interval.</td>
</tr>
<tr>
<td>EAppl%</td>
<td>Percentage of the maximum general purpose processor capacity used by all address spaces and enclaves during the report interval. This value is divided by the number of logical processors or cores that have been active during this interval.</td>
</tr>
<tr>
<td>Enclave Identification</td>
<td>Generated name to allow association of an enclave with instances shown on other Monitor III reports. *SUMMARY is shown in the summary line that totals up the CPU time for the reported enclones.</td>
</tr>
<tr>
<td>Attribute</td>
<td>Dynamic list of attributes. The reporter lists the attributes (maximal eight characters) in the order at which they are specified in the Enclave Report Options panel.</td>
</tr>
<tr>
<td>CLS/GRP</td>
<td>Service class the enclave is associated with.</td>
</tr>
<tr>
<td>P</td>
<td>Service class period the enclave is currently running in.</td>
</tr>
<tr>
<td>Goal</td>
<td>Response time goal.</td>
</tr>
<tr>
<td>%</td>
<td>Response time percentile or velocity.</td>
</tr>
<tr>
<td>D</td>
<td>Dependent enclave indication. 'Y' if the enclave is an extension of an address space transaction, otherwise blank.</td>
</tr>
<tr>
<td>X</td>
<td>Multi-system Indicator This column gives an indication about the origin of the enclave: O The enclave originated on this system. F The enclave originated on another system in the sysplex but is participating on this system. blank The enclave is a single-system enclave.</td>
</tr>
<tr>
<td>Enclave Performance.</td>
<td></td>
</tr>
<tr>
<td>EAppl%</td>
<td>Percentage of the maximum general purpose processor capacity consumed by the individual enclave or by all reported enclones (in the Monitor III range).</td>
</tr>
<tr>
<td>TCPU</td>
<td>Total CPU time (in seconds) consumed by the enclave (see 'Detailed Performance Statistics').</td>
</tr>
<tr>
<td>USG</td>
<td>Percentage of total USING samples (use samples for CPU and I/O), based on #STS (total number of state samples in the enclave).</td>
</tr>
<tr>
<td>DLY</td>
<td>Percentage of total DELAY samples (delay samples for CPU, I/O, capping, storage, queuing) based on #STS.</td>
</tr>
<tr>
<td>IDL</td>
<td>Percentage of idle samples based on #STS.</td>
</tr>
</tbody>
</table>

### Cursor-sensitive control on the Enclave Report

There are two ways of cursor-sensitive control in the Enclave Report that bring up the following pop-up windows:

- ["Enclave Details"]
- ["Enclave Classification Attributes" on page 94]

### Enclave Details

If you place the cursor on one of the values in the EAPPL%, TCPU, USG, DLY, or IDL columns, a pop-up window is shown, containing the enclave details for the corresponding enclave.
### Table 30. Fields in the ENCLAVE Report - Enclave Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Time</strong></td>
<td><strong>Total</strong> Total CPU time (in seconds) consumed by the enclave on general purpose processors and special purpose processors.</td>
</tr>
<tr>
<td></td>
<td><strong>Delta</strong> CPU time (in seconds) consumed by the enclave on general purpose processors and special purpose processors in the reported Monitor III range.</td>
</tr>
<tr>
<td><strong>zAAP Time</strong></td>
<td><strong>Total</strong> Total CPU time (in seconds) consumed by the enclave on zAAPs.</td>
</tr>
<tr>
<td></td>
<td><strong>Delta</strong> CPU time (in seconds) consumed by the enclave on zAAPs in the reported Monitor III range.</td>
</tr>
<tr>
<td><strong>zIIP Time</strong></td>
<td><strong>Total</strong> Total CPU time (in seconds) consumed by the enclave on zIIPs.</td>
</tr>
<tr>
<td></td>
<td><strong>Delta</strong> CPU time (in seconds) consumed by the enclave on zIIPs in the reported Monitor III range.</td>
</tr>
<tr>
<td><strong>State Samples</strong></td>
<td>Total number of state samples in the enclave.</td>
</tr>
<tr>
<td><strong>Using% and Execution Delays%</strong></td>
<td>In contrast to other Monitor III fields, these states shown in the pop-up panel are multistate. This means, they reflect the real amount of work executing in the enclave.</td>
</tr>
<tr>
<td><strong>All percentages are based on the number of state samples.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Using%</strong></td>
<td>Percentage of:</td>
</tr>
<tr>
<td></td>
<td><strong>CPU</strong> CPU using samples</td>
</tr>
<tr>
<td></td>
<td><strong>AAP</strong> zAAP using samples</td>
</tr>
<tr>
<td></td>
<td><strong>IIP</strong> zIIP using samples</td>
</tr>
<tr>
<td></td>
<td><strong>I/O</strong> I/O using samples</td>
</tr>
</tbody>
</table>

---

**Figure 52. ENCLAVE Report - Enclave Details**

Total CPU Time: 26.78, Total zAAP Time: 6.33, Total zIIP Time: 0.00

Delta CPU Time: 22.50, Delta zAAP Time: 1.01, Delta zIIP Time: 0.00

---

**Mon III - ENCLAVE**
Table 30. Fields in the ENCLAVE Report - Enclave Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Delays%</td>
<td>Percentage of:</td>
</tr>
<tr>
<td>CPU</td>
<td>CPU delay samples</td>
</tr>
<tr>
<td>AAP</td>
<td>zAAP delay samples</td>
</tr>
<tr>
<td>IIP</td>
<td>zIIP delay samples</td>
</tr>
<tr>
<td>I/O</td>
<td>I/O delay samples</td>
</tr>
<tr>
<td>STO</td>
<td>Storage delay samples. This includes:</td>
</tr>
<tr>
<td></td>
<td>• Waiting for paging I/O from common</td>
</tr>
<tr>
<td></td>
<td>• Waiting for cross memory page fault</td>
</tr>
<tr>
<td></td>
<td>• Waiting for shared paging</td>
</tr>
<tr>
<td></td>
<td>• Server private paging delay</td>
</tr>
<tr>
<td></td>
<td>• Server VIO paging delay</td>
</tr>
<tr>
<td></td>
<td>• Server hiperspace paging delay</td>
</tr>
<tr>
<td></td>
<td>• Server MPL delay</td>
</tr>
<tr>
<td></td>
<td>• Server swap-in delay</td>
</tr>
<tr>
<td>CAP</td>
<td>CPU capping samples</td>
</tr>
<tr>
<td>QUE</td>
<td>Queue delay samples</td>
</tr>
<tr>
<td>IDL</td>
<td>Percentage of idle samples.</td>
</tr>
<tr>
<td>UNK</td>
<td>Percentage of unknown samples.</td>
</tr>
</tbody>
</table>

**Enclave Classification Attributes**

If you place the cursor on a selected enclave name in the Enclave column and press Enter, a pop-up window appears showing all available classification attributes for the selected enclave. If not all attributes can be displayed on one screen, you can see an indication: More: +. In this case, press PF8 to see further attributes.

```
RMF Enclave Classification Attributes

The following details are available for enclave ENC00003
Press Enter to return to the Report panel.

More: +

Subsystem Type: DDF    Owner: ENC00003    System: RMF3
Accounting Information . . . :
  Q123ERF7

Collection Name . . . . . : COLLECTION
Connection Type . . . . . :
Correlation Information . . : CTT
LU Name . . . . . . . . . . :
Net ID . . . . . . . . . . . :
Plan Name . . . . . . . . . : TEST
Priority . . . . . . . . . . :
Process Name . . . . . . . . :
Transaction/Job Class . . . : JES3
... 
```

*Figure 53. ENCLAVE Report - Enclave Classification Attributes (1)*

**Report options**

On the ENCLAVE Report Options menu, you can select:

- An enclave filter by one of the following criteria:
- Subsystem type, for example DDF, IWEB, or SOM
- Enclave owner job name, for example DB2MSTR
- Service class
- Performance group
- A list of classification attributes.

By default, the report is generated for every type of subsystem showing no attribute. Going through the options allows you to restrict the report to one subsystem only and to select only the attributes meaningful or of interest for that subsystem type. You can find details about supported attributes by subsystem type in [z/OS MVS Planning: Workload Management](#).

### RMF Enclave Report Options

<table>
<thead>
<tr>
<th>Command ==&gt;</th>
<th>Scroll ==&gt; CSR</th>
</tr>
</thead>
</table>

Select one of the following options:

1. Subsystem Type ==> ALL
   Specify a subsystem type or ALL
2. Enclave Owner ==> Jobname of the enclave owner
3. Service Class ==> 
4. Performance Group ==> 

Select (S) one or more classification attributes:

- Accounting Information  
- Collection Name  
- Connection Type  
- Correlation Information  
- LU Name  
- Net ID  
- Plan Name  
- Priority  
- Process Name  
- Transaction/Job Class  
- Transaction/Job Name  
- User ID

- S Scheduling Environment  
- Subsystem Collection Name  
- Subsystem Instance  
- Subsystem Parameter  
- Subsystem Type  
- Package Name  
- Procedure Name  
- Client IP Address  
- Client User ID  
- Client Transaction Name  
- Client Workstation/Host Name  
- Client Accounting Information

**Figure 54. ENCLAVE Report Options**

### Subsystem Type

Report on enclaves that belong to this subsystem type, for example, DB2 or DDF.

ALL selects all active subsystems.

### Enclave Owner

Report on enclaves that are owned by the address space with this jobname.

### Service Class / Performance Group

Report on enclaves that run in this service class or performance group.

### Classification Attributes

You can select one or more classification attributes to be displayed in the Attribute column of the Enclave Report in a length of maximum eight characters.
ENQ - Enqueue Delays Report

The Enqueue Delays report (ENQ) contains jobs waiting for a resource, the resources associated with each waiting job, and the jobs currently holding each resource. RMF lists the jobs by descending delay percentages.

How to request this report

To request the Enqueue Delays report, select 3 from the Primary Menu, and then select 4 on the Resource Report Selection Menu (shown in Figure 8 on page 27), or enter the following command:

ENQ [job_class,service_class]

Contents of the report

<table>
<thead>
<tr>
<th>Command ====&gt; RMF V2R1 ENQ Delays</th>
<th>Scroll ===&gt; HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samples: 100</td>
<td>System: MVS1 Date: 09/28/13 Time: 10.03.20 Range: 100 Sec</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DLY</th>
<th>Resource Waiting</th>
<th>Holding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>SPEWAK2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWARREN</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LUCKYSM</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+MASTER</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 55. ENQ Report

The graphic form of this report shows the percentage of each user's time spent waiting for a resource.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of a job that is waiting for a resource. The ENQ delay report does not summarize data by job groups; all jobs within a job group are reported individually. If the catalog system address space is processing a catalog request on behalf of the job that is enqueued on a resource, the jobname of the catalog address space, (usually CATALOG) will appear below the jobname preceded by a +.</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DLY %</td>
<td>Delay the waiting job is experiencing because of contention for any enqueued resource during the report interval. This value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td>Delay samples</td>
</tr>
<tr>
<td></td>
<td>DLY % = ----------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Samples</td>
</tr>
<tr>
<td></td>
<td>Delay samples</td>
</tr>
<tr>
<td></td>
<td>The number of samples when the job was delayed for one or more enqueued resources.</td>
</tr>
<tr>
<td></td>
<td>Note: This DLY% value is also found in the ENQ field on the job delay report.</td>
</tr>
<tr>
<td>Resource Waiting %</td>
<td>Indicates how much of the overall delay of the job for enqueued resources is caused by a specific resource. This value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td>Delay samples</td>
</tr>
<tr>
<td></td>
<td>Waiting % = ----------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Samples</td>
</tr>
<tr>
<td></td>
<td>Delay samples</td>
</tr>
<tr>
<td></td>
<td>The number of samples when the job was delayed for the resource.</td>
</tr>
<tr>
<td></td>
<td>Note: If there is no overlap in delay states, the WAITING% value(s) for a job add up to the DLY % value of the job.</td>
</tr>
<tr>
<td>Resource Waiting STAT</td>
<td>The status indicates whether the waiting job wants exclusive (EW) or shared (SW) use of the resource.</td>
</tr>
</tbody>
</table>
### Table 31. Fields in the ENQ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major/Minor Names</td>
<td>The Major name and Minor name of the resource delaying the job. The major name is listed above the minor name. The major name is up to eight characters long, and the minor name is up to 36 characters long. If the minor name contains unprintable characters it will be up to 18 characters long (represented by 36 hexadecimal digits). If the minor name is longer than 36 characters, RMF only displays the first 36 characters. If there are two resources with the same major name and their minor name differs only after the first 36 characters, then RMF considers them as the same resource. Shown on the same line as the major name, Scope shows whether the scope of the resource is system (SYS) or systems (SYSS). It is possible that two resources with the same major and minor name, but different scopes, might exist in the system. The following are the most common enqueue major names and their associated resources:</td>
</tr>
<tr>
<td>Major Name</td>
<td>Resources</td>
</tr>
<tr>
<td>MSFDC</td>
<td>Service processor TP port</td>
</tr>
<tr>
<td>SPFDSN</td>
<td>Data set name</td>
</tr>
<tr>
<td>SPFEDIT</td>
<td>Data set name</td>
</tr>
<tr>
<td>SYSDSN</td>
<td>System data sets</td>
</tr>
<tr>
<td>SYSIAT</td>
<td>JES3 CHKPNT data set</td>
</tr>
<tr>
<td>SYSIEA01</td>
<td>Dump data set</td>
</tr>
<tr>
<td>SYSIEFSD</td>
<td>Serializes device allocations</td>
</tr>
<tr>
<td>SYSIEWLP</td>
<td>SYSIMOD data set (Minor name is data set name)</td>
</tr>
<tr>
<td>SYSIGGV1</td>
<td>Master catalog</td>
</tr>
<tr>
<td>SYSIGGV2</td>
<td>Catalogs (Minor name is catalog name)</td>
</tr>
<tr>
<td>SYSIKJBC</td>
<td>TSO broadcast data set (Minor name is relative block address)</td>
</tr>
<tr>
<td>SYSIKJUA</td>
<td>User attribute data set</td>
</tr>
<tr>
<td>SYSSMF01</td>
<td>SMF SYS1.MANx data set</td>
</tr>
<tr>
<td>SYSVSAM</td>
<td>VSAM data sets</td>
</tr>
<tr>
<td>SYSVTOC</td>
<td>VTOC (Minor name is volser)</td>
</tr>
<tr>
<td>SYSAVM</td>
<td>AVM queue or data areas</td>
</tr>
<tr>
<td>SYSZBDS</td>
<td>z/OS bulk data transfer (Minor name is node name)</td>
</tr>
<tr>
<td>SYSZCAXW</td>
<td>Catalog auxiliary work area</td>
</tr>
<tr>
<td>SYSZCMD</td>
<td>Master trace command or Message loss detection</td>
</tr>
<tr>
<td>SYSZCOMM</td>
<td>Global Resource Serialization ring processing table</td>
</tr>
<tr>
<td>SYSZCSD</td>
<td>CSD control block field</td>
</tr>
<tr>
<td>SYSZEC16</td>
<td>Purge data set</td>
</tr>
<tr>
<td>SYSZGGGI</td>
<td>TSB (Minor name is ASID)</td>
</tr>
<tr>
<td>SYSZIST0C</td>
<td>Configuration restart data set (Minor name is ddname)</td>
</tr>
<tr>
<td>SYSZJES2</td>
<td>JES2 buffer or data set</td>
</tr>
<tr>
<td>SYSZJWTP</td>
<td>Job step messages</td>
</tr>
</tbody>
</table>
Table 31. Fields in the ENQ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major/Minor Names continued</td>
<td>Major Name Resources</td>
</tr>
<tr>
<td></td>
<td>SYSZOPEN System data sets</td>
</tr>
<tr>
<td></td>
<td>SYSZPCCB Private catalog control block</td>
</tr>
<tr>
<td></td>
<td>SYSZPGAD PAGEADD command</td>
</tr>
<tr>
<td></td>
<td>SYSZPSWD Password data set</td>
</tr>
<tr>
<td></td>
<td>SYSZRPWL Catalog name (Minor name is catalog name)</td>
</tr>
<tr>
<td></td>
<td>SYSZSIPS SYSEVENT</td>
</tr>
<tr>
<td></td>
<td>SYSZSMF1 SMF buffer</td>
</tr>
<tr>
<td></td>
<td>SYSZTIOT Device allocation</td>
</tr>
<tr>
<td></td>
<td>SYSZTRC System trace</td>
</tr>
<tr>
<td></td>
<td>SYSZUSRL User label tracks</td>
</tr>
<tr>
<td></td>
<td>SYSZVARY Reconfiguration commands</td>
</tr>
<tr>
<td></td>
<td>SYSZVMV Volume mount and verify</td>
</tr>
<tr>
<td></td>
<td>SYSZVOLS System volumes (Minor name is volser)</td>
</tr>
<tr>
<td></td>
<td>SYSZWTOR WTOR reply (Minor name is REPLYxx, where xx is the message ID)</td>
</tr>
</tbody>
</table>
| Holding % | Indicates how much a specific job is contributing to the holding of a resource. The value is expressed as a percentage. For example, a Holding % of 100 indicates that the specified job was enqueued on the resource and delaying the waiting job for the entire report interval. This value is calculated as follows:  
\[
\text{Holding samples} \\
\text{Holding %} = \frac{\text{Holding samples}}{\# \text{ Samples}} \times 100 \\
\text{Holding samples}
\]  
The number of samples when the holding job held the resource and the delayed job was waiting for it. For primary source fields used in this calculation see the DELAY % field in this report description. |
| Holding Name/SYS | The name of the job that is holding the resource that the delayed job is waiting for. If the holding job is from another system, RMF also provides the system name (global resource serialization system identifier) which will appear below the holding jobname preceded by a /. If the catalog system address space is processing a catalog request on behalf of the job that is holding the resource that the delayed job is waiting for, the jobname of the catalog address space (usually CATALOG) will appear below the jobname preceded by a +. |
| Holding STAT | The status indicates whether the holding job has exclusive (EO) or shared (SO) use of the resource. |

**Report options**

The ENQ Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.
ENQR - Enqueue Resource Delays Report

The Enqueue Resource Delays report (ENQR) is similar to the Enqueue Delays report, but the information about a specific resource is kept together. RMF reports the resources according to the number of waiting jobs in descending order, the jobs waiting for each resource in descending delay percentage order, and the jobs holding the resource in descending holding percentages.

How to request this report

To request the ENQR report, select 3, and then select 5 on the Resource Report Selection Menu (shown in Figure 8 on page 27), or enter the following command:

```
ENQR [resourcename]
```

Contents of the report

The graphic form of this report shows the average number of active users for waiting for each resource.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Name</td>
<td>The Major name and Minor name of the resource delaying the job. The major name is listed above the minor name. The major name is up to eight characters long and the minor name is up to 36 characters long. If the minor name contains unprintable characters, it will be up to 18 characters long (represented by 36 hexadecimal digits). If the minor name is longer than 36 characters, RMF only displays the first 36 characters. If there are two resources with the same major name and their minor name differs only after the first 36 characters, then RMF considers them as the same resource. Shown on the same line as the major name, SCOPE shows whether the scope of the resource is system (SYS) or systems (SYSS). It is possible that two resources with the same major and minor name, but different scopes, might exist in the system.</td>
</tr>
</tbody>
</table>
Table 32. Fields in the ENQR Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed %</td>
<td>The delay percentage of the job for a specific enqueued resource. This value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td>Delayed % = ( \frac{# \text{ Delay Samples}}{# \text{ Samples}} \times 100 )</td>
</tr>
<tr>
<td></td>
<td>Delay samples</td>
</tr>
<tr>
<td></td>
<td>The number of samples when the job was delayed for a specific enqueued resource. RMF calculates the number of samples delayed by incrementing a counter once for each sample when the job is delayed for that resource.</td>
</tr>
<tr>
<td>Delayed Name</td>
<td>Name of the job delayed for the resource. RMF lists all jobs delayed for the resource. If the catalog system address space is processing a catalog request on behalf of the delayed job, the jobname of the catalog address space (usually CATALOG) will appear below the jobname preceded by a +.</td>
</tr>
<tr>
<td>Delayed STAT</td>
<td>The status indicates whether the waiting job wants exclusive (EW) or shared (SW) use of the resource.</td>
</tr>
<tr>
<td>Holding %</td>
<td>The percent of the range that a specific job was holding the resource while the named job was delayed. For example, a Holding % of 100 indicates that the specified job held the resource for the entire range period. This value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td>Holding % = ( \frac{# \text{ Holding Samples}}{# \text{ Samples}} \times 100 )</td>
</tr>
<tr>
<td>Holding Name</td>
<td>The name of the job that is holding the resource that the delayed job is waiting for. If the holding job is from another system, RMF also provides the system name (global resource serialization system identifier) which will appear below the holding jobname preceded by a / . If the catalog system address space is processing a catalog request on behalf of the job that is holding the resource that the delayed job is waiting for, the jobname of the catalog address space (usually CATALOG) will appear below the jobname preceded by a +.</td>
</tr>
<tr>
<td>Holding STAT</td>
<td>The status indicates whether the holding job has exclusive (EO) or shared (SO) use of the resource.</td>
</tr>
</tbody>
</table>

Report options

```
Command ===> Scroll ===> HALF

Change or verify parameters for the ENQR report. To exit press END.

   Major ==> SYSIEFSD   ENQ major name for report or ALL

Available ENQ Major Names
   CLRLOG00  SYSIEFSD  SYSZVVDS
```

Figure 57. ENQR Report Options Panel

The Report Options panel allows you to select from a list of available major names, resources to be included in the report.

For MAJOR, specify the major name of the serially reusable resource for which you want information, or ALL for information about all serially reusable resources in the system. The major name you specify is saved across sessions in the current option set.
A list of all serially reusable resources that had any enqueue contention during the current report interval appears under Available ENQ Major Names.

**Major** The major name of the serially reusable resource that you want information about.

Enter all, for information about all serially reusable resources with enqueue contention during the report interval, one of the names listed under AVAILABLE ENQ MAJOR NAMES, or the major name of a serially reusable resource that might experience contention at a later time.

A resource only appears on the Enqueue Resource Report when it experiences enqueue contention during the report interval.

Your selection is saved across sessions in the current option set.

**Available ENQ Major Names**
The list of the serially reusable resources that had enqueue contention during the current report interval.

---

**GROUP - Group Response Time Report**

The Group Response Time (GROUP) report presents information about using and delay values for a specific service or report class. The using and delay values are average values for all transactions processed during the report interval. The report presents the total using and delay value and a breakdown of this total value into each defined resource.

**How to request this report**

To request the Group Response Time report, select 1 on the Primary Menu, and then select 5 on the Overview Report menu (shown in Figure 6 on page 25), or enter one of the following commands:

GROUP service_class,period

GROUP report_class,period

For example, to get a Group Response Time report for first period of service class HOTBATCH, enter:

GROUP HOTBATCH,1
### Contents of the report

<table>
<thead>
<tr>
<th>RMF V2R1</th>
<th>Group Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>Scroll</td>
</tr>
<tr>
<td>Samples: 100</td>
<td>System: MVS1</td>
</tr>
<tr>
<td>Class: HOTBATCH</td>
<td>Period: 1</td>
</tr>
<tr>
<td>Primary Response Time Component: Using the processor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRANS</th>
<th>--- Response Time ----</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFL</td>
<td>Users</td>
</tr>
<tr>
<td>% TOT ACT</td>
<td>%ACT</td>
</tr>
<tr>
<td>100</td>
<td>1</td>
</tr>
</tbody>
</table>

---AVG USG--- | --------------Average Delay-----------

<table>
<thead>
<tr>
<th>Total</th>
<th>PROC</th>
<th>DEV</th>
<th>PROC</th>
<th>DEV</th>
<th>STOR</th>
<th>SUBS</th>
<th>OPER</th>
<th>ENQ</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Users</td>
<td>0.169</td>
<td>0.08</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
</tr>
<tr>
<td>Response Time ACT</td>
<td>1.749</td>
<td>0.82</td>
<td>0.31</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.52</td>
</tr>
</tbody>
</table>

---STOR Delay--- | ---OUTR Swap Reason--- | ---SUBS Delay---

<table>
<thead>
<tr>
<th>Page</th>
<th>Swap</th>
<th>OUTR</th>
<th>TI</th>
<th>TO</th>
<th>LW</th>
<th>XS</th>
<th>JES</th>
<th>HSM</th>
<th>XCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Users</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Response Time ACT</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Figure 58. GROUP Report**

There is no graphic version of this report available.

If you place the cursor on any of the fields named **WAIT**, **EXECUT**, or **ACTUAL**, the pop-up panel appears showing a detailed breakdown of the different wait reasons and their average duration.
### Field descriptions

**Table 33. Fields in the GROUP Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>The name of the service or report class</td>
</tr>
<tr>
<td>Period</td>
<td>The period number</td>
</tr>
<tr>
<td>Description</td>
<td>The description of the specified class, it is derived from the service policy.</td>
</tr>
<tr>
<td>Primary Response Time Component</td>
<td>A description of the component contributing to the largest percentage of total response time. The description can be:</td>
</tr>
<tr>
<td></td>
<td>• Using the processor</td>
</tr>
<tr>
<td></td>
<td>• Using I/O devices</td>
</tr>
<tr>
<td></td>
<td>• Processor delay</td>
</tr>
<tr>
<td></td>
<td>• Device delay</td>
</tr>
<tr>
<td></td>
<td>• Storage delay for</td>
</tr>
<tr>
<td></td>
<td>• common paging</td>
</tr>
<tr>
<td></td>
<td>• local paging</td>
</tr>
<tr>
<td></td>
<td>• virtual I/O</td>
</tr>
<tr>
<td></td>
<td>• XMEM</td>
</tr>
<tr>
<td></td>
<td>• HIPR</td>
</tr>
<tr>
<td></td>
<td>• swap in</td>
</tr>
<tr>
<td></td>
<td>• out and ready</td>
</tr>
<tr>
<td></td>
<td>• Waiting for</td>
</tr>
<tr>
<td></td>
<td>• JES</td>
</tr>
<tr>
<td></td>
<td>• HSM</td>
</tr>
<tr>
<td></td>
<td>• XCF</td>
</tr>
<tr>
<td></td>
<td>• Waiting for volume mount</td>
</tr>
<tr>
<td></td>
<td>• Waiting for operator reply</td>
</tr>
<tr>
<td></td>
<td>• ENQ serialization delay</td>
</tr>
<tr>
<td></td>
<td>• Delayed for unmonitored reasons</td>
</tr>
</tbody>
</table>
### Table 33. Fields in the GROUP Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFL %</td>
<td>The workflow percentage of the specified class. A value of 100% indicates no workload contention, while a value of 0% indicates that all requests for system resources are delayed.</td>
</tr>
<tr>
<td>Users</td>
<td>The number of users in the specified class. This category includes the following headings:</td>
</tr>
<tr>
<td></td>
<td>TOT Total number of users equals the number of different users found in all address spaces for the specified class during the report interval.</td>
</tr>
<tr>
<td></td>
<td>ACT Average number of active users found in all address spaces for the specified class during the report interval. An active user is either using a monitored resource, delayed for a monitored resource, or performing an activity that RMF does not measure.</td>
</tr>
<tr>
<td></td>
<td>See the definition of Users/Active under “WFEX - Workflow/Exceptions Report” on page 202 for more details.</td>
</tr>
<tr>
<td>Frames %ACT</td>
<td>The percentage of central storage frames used by active users in the specified class during the report interval. For a definition of active users, see Users/Active under “WFEX - Workflow/Exceptions Report” on page 202.</td>
</tr>
<tr>
<td></td>
<td>RMF accumulates the number of central storage frames for all active users during the report interval, then calculates the percentage as follows:</td>
</tr>
<tr>
<td></td>
<td>Frames %ACT = ( \frac{ACSF}{OCSF} \times 100 )</td>
</tr>
<tr>
<td></td>
<td>ACSF Accumulated central storage frames</td>
</tr>
<tr>
<td></td>
<td>OCSF Online central storage frames</td>
</tr>
<tr>
<td>Vector UTIL</td>
<td>The vector time for the specified class as a percentage of total system vector capability. The field contains data only when measured on a system with a vector processor online, otherwise the field contains zeros.</td>
</tr>
<tr>
<td>EXCP Rate</td>
<td>The rate of EXCP requests per second for the specified class:</td>
</tr>
<tr>
<td></td>
<td>( \sum \text{all EXCP Requests} )</td>
</tr>
<tr>
<td></td>
<td>( \frac{EXCP \ Rate \ = \ ------------------------}{\text{Range Time}} )</td>
</tr>
<tr>
<td>PgIn Rate</td>
<td>The rate at which pages are being swapped:</td>
</tr>
<tr>
<td></td>
<td>( \sum \text{Page-in Counts for Class} )</td>
</tr>
<tr>
<td></td>
<td>( \frac{PgIn \ Rate \ = \ ------------------------}{\text{Range Time}} )</td>
</tr>
<tr>
<td>TRANS Ended Rate</td>
<td>The average number of ended transactions per second that occurred for the specified class during the report interval:</td>
</tr>
<tr>
<td></td>
<td>( \frac{# \text{Ended Transactions}}{\text{Range Time}} )</td>
</tr>
</tbody>
</table>

**Mon III - GROUP**
### Table 33. Fields in the GROUP Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Response Time   | The average response time for all transactions that ended during the report interval. The field is divided into WAIT, EXECUT, and ACTUAL response time. The time a job was delayed due to TYPRUN=HOLD or TYPRUN=JCLHOLD is NOT included in any of the transaction times. **Note:** The response times reported are for ended transactions only. If there is a delay while the transaction is queued or running, the problem will not be reported until after the transaction has ended. The WFL % field and the Average Users line can be used to identify the bottleneck. WAIT: The average time (in seconds) that a transaction spent waiting because of one of these reasons:  
  • **Queued:** Average time a job was delayed for reasons other than the ones mentioned below. This field therefore basically includes the time a job was delayed for initiation. For TSO users, this can be a portion of LOGON processing. For APPC, this is the time the transaction spent on an APPC queue.  
  • **R/S Affinity - Resource affinity scheduling delay:** Average time the job was delayed due to resource or system affinity scheduling. This means that resource(s) required for the job to run were not available at some point while the job was queued to JES2.  
  • **Ineligible - Operational or JES scheduling delay:** Average time a job was delayed due to operational delays or JES scheduling delays, examples are:  
    – Job held by operator  
    – Job class or job queue held  
    – Duplicate jobname serialization  
    – Job class execution limits  
  • **Conversion - JCL conversion delay:** Average time a job was delayed for JCL conversion. Jobs held during conversion (due to affinity, HSM recall, or enqueue contention) contribute only to conversion time, not to ineligible or R/S affinity times. Conversion time is not part of the total response time. EXECUT: The average time that a transaction was active in the system. ACTUAL: The sum of the execution time and the wait time, but does not include conversion time. If you place the cursor on one of these fields and press Enter, a Response Time Components Data pop-up panel will show a detailed breakdown of the different wait reasons and their average duration. |
### Table 33. Fields in the GROUP Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Users</td>
<td>The average number of active users in the class during the report interval. The Average Users line is displayed in dark blue to differentiate it from the Response Time ACT line below it. The line is divided into:</td>
</tr>
<tr>
<td>Total</td>
<td>Average number of active users in the class. An active user is either using a resource or is delayed by a resource and includes unmonitored reasons reported in the ‘OTHER’ column.</td>
</tr>
<tr>
<td>AVG USG</td>
<td>Average number of users is summarized for the specified class. RMF takes the sum of using samples for the address space(s) associated with the class and divides by the number of samples. The average number of users is reported for the following categories: PROC The average number of users using the processor during the report interval. DEV The average number of users using devices during the report interval.</td>
</tr>
<tr>
<td>Average Delay</td>
<td>Average number of delayed users is summarized for the specified class. RMF takes the sum of delay samples for the address space(s) associated with the class and divides by the number of samples in the Range. The average number delayed for is reported for the following categories: PROC Waiting for a processor DEV Waiting for a DASD or tape STOR Waiting for a COMM, LOCL, SWAP, XMEM, HIPR, or VIO page, or on the out/ready queue SUBS Waiting for services from JES, HSM, or XCF OPER Waiting for the operator to reply to a message or mount a tape QUIESCE The operator has quiesced the address space. A quiesced address space can show unexpected data: • A swappable address space will be swapped out, thus it can be OUTR and show storage delays. • A non-swappable address space will get lowest priority, thus it can show CPU delay, paging delay, or other delays, and even some USG % from time to time depending on the load on the system. Cursor-sensitive control on this field gives you the Quiesce delay variation of the Job Delay report. ENQ Waiting to use serially reusable resources that other jobs were using OTHER Unknown time STOR Delay</td>
</tr>
</tbody>
</table>
Table 33. Fields in the GROUP Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Users (continued)</td>
<td><strong>OUTR Swap Reason</strong>&lt;br&gt;A breakdown of the STOR Delay OUTR field into the average number of users delayed for specific swap reasons. The swap reasons are sorted by descending swap count; that is, the swap reason having the largest swap count is reported first. The report always displays four swap reason headings.&lt;br&gt;The swap reasons can be:&lt;br&gt;TI  Terminal input wait&lt;br&gt;TO  Terminal output wait&lt;br&gt;LW  Long wait&lt;br&gt;XS  Auxiliary storage shortage&lt;br&gt;RS  Real storage shortage&lt;br&gt;DW  Detected long wait&lt;br&gt;RQ  Requested swap&lt;br&gt;NQ  Enqueue exchange swap&lt;br&gt;EX  Exchange swap&lt;br&gt;US  Unilateral swap&lt;br&gt;TS  Transition swap&lt;br&gt;IC  Improve central storage usage&lt;br&gt;IP  Improve system paging rate&lt;br&gt;MR  Make room for an out-too-long user&lt;br&gt;AW  APPC wait&lt;br&gt;IW  OMVS input wait&lt;br&gt;OW  OMVS output wait&lt;br&gt;SR  In-real swap</td>
</tr>
</tbody>
</table>
| Average Delay - SUBS                 | **SUBS Delay**<br>A breakdown of the Average Delay - SUBS field into the average number of users delayed by each subsystem (JES, HSM, and XCF). The subsystems are sorted by descending delay count; that is, the subsystem causing the largest delay is reported first.
### Table 33. Fields in the GROUP Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Time ACT</td>
<td>The average response time (in seconds) spent in each delay or using category for a transaction that was active during the report interval. The <strong>Response Time ACT</strong> line is divided into:</td>
</tr>
<tr>
<td>Total</td>
<td>Average time (in seconds) that an ended transaction was active in the system. The value is the same as the <strong>Response Time, Ended TRANS (Sec), Active</strong> value.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>The value for Total and the sum of the individual using and delay values can be different. <strong>Total</strong> represents only ended transactions, while the breakdown of using and delay values represents all active transactions during the report interval.</td>
</tr>
<tr>
<td><strong>In addition, Total</strong></td>
<td>can be less than the sum of the individual categories if some of the users are delayed and using at the same time.</td>
</tr>
<tr>
<td>AVG USG</td>
<td>Average time (in seconds) that a transaction was using a processor (PROC) or device (DEV) during the report interval.</td>
</tr>
<tr>
<td>Average Delay</td>
<td>Average time (in seconds) that a transaction was delayed for the following reasons:</td>
</tr>
<tr>
<td>PROC</td>
<td>Waiting for a processor</td>
</tr>
<tr>
<td>DEV</td>
<td>Waiting for a DASD or tape</td>
</tr>
<tr>
<td>STOR</td>
<td>Waiting for a COMM, LOCL, SWAP, XMEM, HIPER, or VIO page, or on the out/ready queue</td>
</tr>
<tr>
<td>SUBS</td>
<td>Waiting for services from job-entry subsystem (JES), Hierarchical Storage Manager (HSM), or Cross-System Coupling Facility (XCF)</td>
</tr>
<tr>
<td>OPER</td>
<td>Waiting for the operator to reply to a message or mount a tape</td>
</tr>
<tr>
<td>QUIESCE</td>
<td>The operator has quiesced the address space. Cursor-sensitive control on this field gives you the Quiesce delay variation of the Job Delay report.</td>
</tr>
<tr>
<td>ENQ</td>
<td>Waiting to use serially reusable resources that other jobs were using</td>
</tr>
<tr>
<td>OTHER</td>
<td>Unknown time</td>
</tr>
<tr>
<td>STOR Delay</td>
<td>Breakdown of the <strong>Average Delay</strong> - <strong>STOR</strong> field into the average time (in seconds) that a transaction was delayed for paging (Page), swapping (Swap), and swapped out and ready (OUTR). See the § of § delayed for field description in Table 60 on page 151 for more information about the storage delays.</td>
</tr>
<tr>
<td>OUTR Swap Reason</td>
<td>Breakdown of the <strong>STOR Delay OUTR</strong> field into the average time (in seconds) that a transaction was delayed for specific swap reasons. The report always displays four swap reason headings. The four swap reasons are determined by the <strong>Average Users OUTR Swap Reason</strong> field. See the field description on page 117 for a list of possible swap reasons.</td>
</tr>
<tr>
<td>SUBS Delay</td>
<td>Breakdown of the <strong>Average Delay</strong> - <strong>SUBS</strong> field into the average time (in seconds) that a transaction was delayed by each subsystem (JES, HSM, and XCF). The subsystems are sorted by descending delay count; that is, the subsystem causing the largest delay is reported first.</td>
</tr>
<tr>
<td>Statistical error</td>
<td>The measure of the statistical validity of the reported data. The statistical error heading and value only appear if the value is 25% or higher. The field is displayed as a warning to you that data reported is not statistically significant.</td>
</tr>
<tr>
<td><strong>Because you want to ensure that the data reported is an accurate representation of what happened during the report interval, the data collected should include response times that are short compared to the report interval and a large enough number of ended transactions to provide a statistically significant sample.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>To decrease statistical error, try increasing the report interval.</strong></td>
<td></td>
</tr>
</tbody>
</table>
Report options

<table>
<thead>
<tr>
<th>Type</th>
<th>Service or Report class (S R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>HOTBATCH</td>
</tr>
<tr>
<td>Period</td>
<td>3</td>
</tr>
</tbody>
</table>

Available Service and Report Classes

- BATCHHI S
- BATCHLOW S
- BATCHMED S
- BATCHSRP S
- BATCH1 S
- BATCH2 S
- BTCHDEF S
- DISCRET S
- ENC_SC S
- ENCLAVE S
- ENCFIL S
- ENCRMF L S
- ENCRMF U S
- IRLM S
- ZOSUN S
- DEICTWLM S
- OMSYS S
- OMSKERN S
- OTHDONR S
- OTHTRAN S
- PROBAT S
- PROBATHI S
- PROTSO S
- RESP20 S
- RESP60 S
- RMF S
- RMFGAT S
- SERVERS S
- STCMD S
- STCDEF S
- STCLO S
- STORPROC S
- SYSTHER S
- SYSTIC S
- SYSTEM S
- TSODEF S
- TSOEVEN S
- TSOHI S
- TSOMED S
- TSOODD S
- TSOEG S
- TSOFAIL S
- TSOFAIL S
- TSTBATHI S
- TSTBATLO S
- TSTBATMD S
- APPC R
- ASCH R
- BCP R
- BCD R
- MASTER R
- MVSNFS R
- ZOSUN R
- OMSYS R
- RDXIRLM R
- REPORT R
- RMF R
- RMFGAT R
- RPTDUMP R
- RPTSTC R
- RRS R
- RSM R
- THRASHER R
- TPNS R
- WLM R
- XCFAS R

Figure 60. GROUP Report Options Panel

**Type**
Here you specify whether you want to select a service or report class.

**Class**
The service or report class for which you want data reported. You can specify any of the classes listed under Available Service and Report Classes.

If the class you want is not listed, it was not active during the current report interval. If you specify the class, it will appear on the report when it is available.

Your selection applies to all delay and common storage reports and is saved across sessions in the current option set.

**Period**
Enter the number (between 1 and 8) of the period you want reported.

**Available Service and Report Classes**
This list includes all service and report classes that had any activity during the current report interval.

**HSM - Hierarchical Storage Manager Delays Report**
The Hierarchical Storage Manager (HSM) Delays report allows you to investigate situations where jobs are delayed when requesting service from HSM.

RMF lists all jobs delayed during the refresh period in order by descending delay percentage.

**How to request this report**
To request the HSM report, select 4 on the Primary menu, and then select 1 on the Subsystem Report menu (shown in Figure 9 on page 27), or enter the following command:

HSM [job_class,service_class]
Contents of the report

The graphic form of this report shows the percentage of each user's time spent waiting for HSM services.

Field descriptions

Table 34. Fields in the HSM Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of the job delayed when requesting service from HSM. The HSM Delays report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
<tr>
<td>DLY %</td>
<td>Delay the waiting job is experiencing because of contention for HSM during the report interval. This value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td># Delay Samples</td>
</tr>
<tr>
<td></td>
<td>DLY % = -------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Samples</td>
</tr>
<tr>
<td>Delay samples</td>
<td>The number of samples when the job was delayed by HSM. RMF calculates this value by incrementing its counter once for each sample when one or more units of work in the address space had HSM delay. RMF considers the user delayed if all of the following conditions are met:</td>
</tr>
<tr>
<td></td>
<td>• The MWE has a request from the user</td>
</tr>
<tr>
<td></td>
<td>• The request is a “waited-on” request</td>
</tr>
<tr>
<td></td>
<td>• The request has not completed processing</td>
</tr>
<tr>
<td></td>
<td>• You receive one of the function codes listed under Main Delay Reason(s).</td>
</tr>
</tbody>
</table>

Note: This DLY % value is also found in the HSM field on the job delay report.
### Table 34. Fields in the HSM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Delay Reason(s)</td>
<td>The subsystem function code that indicates the main reason for the delay. RMF reports the one or two function codes with the highest counts as the main delay reasons.</td>
</tr>
<tr>
<td>% indicates how much of the HSM delay of the job is caused by the reported subsystem function. This value is calculated as follows:</td>
<td></td>
</tr>
<tr>
<td># Delay Samples</td>
<td></td>
</tr>
<tr>
<td>% = ----------------- * 100</td>
<td></td>
</tr>
<tr>
<td># Samples</td>
<td></td>
</tr>
<tr>
<td>Delay samples</td>
<td>The number of samples when the job was delayed for HSM for a specific subsystem function.</td>
</tr>
<tr>
<td>Note: The Main Delay Reason % values add up to the DLY % value of the job if there is no overlap in delay states and there are no more than two function codes responsible for the delay.</td>
<td></td>
</tr>
<tr>
<td>The HSM F-codes (in decimal) and their explanations are as follows:</td>
<td></td>
</tr>
<tr>
<td>F-Code Explanation</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>A data set is being recalled from auxiliary storage.</td>
</tr>
<tr>
<td>05</td>
<td>A data set is being recovered.</td>
</tr>
<tr>
<td>06</td>
<td>A data set is being migrated.</td>
</tr>
<tr>
<td>07</td>
<td>A data set is being backed up.</td>
</tr>
<tr>
<td>08</td>
<td>A control data set record is being read.</td>
</tr>
<tr>
<td>08</td>
<td>A JES3 C/I locate is being done.</td>
</tr>
<tr>
<td>12</td>
<td>A data set is being deleted.</td>
</tr>
</tbody>
</table>

### Report options

The HSM Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

### IOQUEUE - I/O Queuing Activity Report

The I/O Queuing Activity report (IOQUEUE) provides information, grouped by LCU (logical control unit), on the I/O configuration. The information includes contention rate, queue lengths, and percentages of time when one or more I/O components were busy. Information about the LCU is useful because the LCU is the focus of I/O configuration and path management measurements for a related group of I/O devices.

For all channels that are managed by Dynamic Channel Path Management (DCM), additional information is available. DCM allows an installation to identify channels which they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. For each LCU with DCM managed channels, a summary line displays the minimum and maximum number of connected DCM managed channels, the number of defined DCM managed channels and accumulated activity data.

An LCU is the set of devices attached to the same physical control unit (or group of control units that have one or more devices in common). Each device belongs to only one LCU, but the I/O processor (System Assist Processor (SAP)), which is part of the channel subsystem, manages and schedules I/O work requests to the various devices within the LCU.
This report can tell you about the cause of performance problems associated with channel paths and devices. You could, for example, find the reason for an unusually long pending time reported on the device report. Check the relationship between the percentage of requests deferred for device busy and control unit busy for the LCU on the I/O Queuing Activity report.

**How to request this report**

To request the I/O Queuing Activity report, select 3 from the Primary Menu, and then select 13 on the Resource Report Selection Menu (shown in Figure 8 on page 27), or enter the following command:

```
IOQUEUE
```

**Special considerations of report output**

In a VM guest system environment, the report for a z/OS system that is authorized via the VM RMCHINFO directory option, shows static configuration data, only. Measurement data is not available.

Data items that are not valid are marked by dashes (---) in the output display.

**Note:** The report contains data for DASD control units only.

**Contents of the report**

| Command ====> | RMF V2R1 I/O Queuing Activity Line 1 of 54
| Scroll ====> HALF |
| Samples: 30 | System: S5C Date: 09/28/13 Time: 03.23.30 Range: 30 Sec |

<table>
<thead>
<tr>
<th>Path</th>
<th>DCM Group</th>
<th>CTL Units</th>
<th>MN</th>
<th>MX</th>
<th>DEF</th>
<th>LCU</th>
<th>Rate Lngth</th>
<th>CSS</th>
<th>%CHPIO</th>
<th>%OP</th>
<th>%CU</th>
<th>AVG AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>D7</td>
<td>5F00</td>
<td>0048</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.13</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>5F00</td>
<td>0048</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.97</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00 0.00 0.3</td>
<td>2.10</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0 0.02</td>
</tr>
<tr>
<td>B0 PF</td>
<td>8000</td>
<td>0069</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82.17</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>B1 PF</td>
<td>8000</td>
<td>0069</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>83.83</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>B2 NP</td>
<td>8000</td>
<td>0069</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>---</td>
</tr>
<tr>
<td>B3 NP</td>
<td>8000</td>
<td>0069</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>---</td>
</tr>
<tr>
<td>95 PF</td>
<td>8000</td>
<td>0069</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>83.17</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00 0.00 0.4</td>
<td>249.17</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0 0.2</td>
</tr>
<tr>
<td>B0 NP</td>
<td>8100</td>
<td>006A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>---</td>
</tr>
<tr>
<td>B1 NP</td>
<td>8100</td>
<td>006A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>---</td>
</tr>
<tr>
<td>B2 PF</td>
<td>8100</td>
<td>006A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>124.53</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>B3 PF</td>
<td>8100</td>
<td>006A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>124.87</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 62. IOQUEUE Report*

The graphic form of this report shows the contention rate of each LCU.
### Field descriptions

**Table 35. Fields in the IOQUEUE Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Path          | The two-digit hexadecimal channel path identifier (CHPID) of the online channel path attached to the physical control units in the LCU. There can be up to eight channel paths in an LCU.  
If applicable, the path attribute is indicated with the CHPID:  
PF preferred path  
NP non-preferred path  
NS path attribute not specified  
For devices residing in control units that do not support path attributes, only the CHPID is displayed. |
| DCM           | If the channel path is under control of Dynamic Channel Path Management (DCM), this is indicated by a Y in this column. The activities of all DCM channels belonging to the same LCU will be summarized in a separate line. |
| CTL Units     | The hexadecimal identifier of each physical control unit associated with an online channel path in the LCU group. |
| DCM Group     | The values in columns MN MX DEF report the minimum and maximum number of DCM managed channels for one LCU (in this interval) as well as the installation-specified definition for this LCU.  
The line with these values is available only for LCUs with DCM managed channels. It contains in addition the accumulated values of the I/O activity rate, the director port contention, and the control unit contention of all DCM managed channels. These values may include also measurements of managed channels which were partially online. |
| LCU           | The hexadecimal number that identifies the logical control unit (LCU).  
An LCU is the set of devices attached to the same physical control unit or a group of physical control units with one or more devices in common. Each physical control unit and each device can belong to only one LCU. They cannot be shared between LCUs.  
For each LCU, a summary line is reported in addition. |
| Cont Rate     | The rate per second at which the SAP places delayed I/O requests on the CU-HDR for this LCU. This is done when all paths to the subchannel are busy and at least one path to the control unit is busy. For devices with only one path, or for devices where multiple paths exist and the busy condition is immediately resolved, the IOP does not count the condition.  
\[
\text{Cont Rate} = \frac{\# \text{ Enqueued Requests}}{\text{Range Time}}
\] |
| Del Q Lngth   | The average number of delayed requests on the control unit header (CU-HDR). Each time a request is enqueued from the CU-HDR, RMF counts the number of requests remaining on the queue and adds that number to the accumulator. At the end of the interval, RMF divides the total number of accumulated queued requests by the number of times a request was enqueued.  
\[
\text{Del Q Lngth} = \frac{\text{Accumulated Queue Length} - \# \text{ Enqueued Requests}}{\# \text{ Enqueued Requests}}
\] |
| AVG CSS       | The average number of milliseconds of delay that an I/O request encountered after the acceptance of the start or resume function at the subchannel for the LCU, until the channel subsystem’s first attempt to initiate the operation.  
\[
\text{AVG CSS} = \frac{\text{Channel Subsystem Time}}{\# \text{ I/O Operations Accepted}}
\] |
| CHPID Taken   | The rate at which I/O requests to devices of this LCU are satisfied by each CHPID during the interval. By reviewing the rate at which each channel path of the LCU satisfies I/O requests, you can see how evenly the work requests are distributed among the available paths and how effectively those paths are arranged for the LCU.  
\[
\text{CHPID Taken} = \frac{\# \text{ I/O Operations Accepted on that Path}}{\text{Range Time}}
\] |
Table 35. Fields in the IOQUEUE Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% DP Busy</td>
<td>This field indicates director port contention. It is the number of times an I/O request was deferred because the director port was busy during the measurement interval.</td>
</tr>
</tbody>
</table>
|               | \[
| \text{ DPB } \times \frac{\% \text{ DP Busy} \times 100}{\text{DPB} + \text{CUB} + \text{SUC}} \]
|               | Number of deferred I/O requests due to director port busy |
|               | CUB Number of deferred I/O requests due to control unit busy |
|               | SUC Number of successful I/O requests on that path |
| % CU Busy     | This field shows the relationship for each channel path of the LCU, between requests deferred due to control unit busy and total successful requests serviced by that path. Each CHPID of the LCU measures the distribution of control unit contention. |
|               | \[
| \text{ CUB } \times \frac{\% \text{ CU Busy} \times 100}{\text{DPB} + \text{CUB} + \text{SUC}} \]
|               | Number of deferred I/O requests due to control unit busy |
|               | SUC Number of successful I/O requests on that path |
| AVG CUB       | The average number of milliseconds of delay that an I/O request encountered for the channel path because the control unit was busy. |
|               | \[
| \text{ AVG CUB } = \frac{\text{Control Unit Busy Time}}{\# \text{ I/O Operations Accepted on that Path}} \]
| AVG CMR       | The average number of milliseconds of delay that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device. It allows to distinguish between real H/W errors versus workload spikes (contention in the fabric and at the destination port). |
|               | \[
| \text{ AVG CMR } = \frac{\text{Initial Command Response Time}}{\# \text{ I/O Operations Accepted on that Path}} \]

**JES - Job Entry Subsystem Delays Report**

The JES Delays report allows you to investigate situations where executing jobs are delayed when requesting service from JES. RMF lists all jobs delayed during the report interval in descending delay percentages.

**How to request this report**

To request the JES report, select 4 on the Primary menu, and then select 2 on the Subsystem Report menu (shown in Figure 9 on page 27), or enter the following command:

\[ \text{JES [job_class,service_class]} \]
Contents of the report

The graphic form of this report shows the percentage of each user's time spent waiting for JES services.

Field descriptions

Table 36. Fields in the JES Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of the job delayed when requesting service from JES. The JES Delays report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
</tbody>
</table>
| DLY %         | Delay the waiting job is experiencing because of JES during the report interval. This value is calculated as follows:  
                      # Delay Samples  
                      DLY % = ----------------- * 100  
                      # Samples  

Delay samples  
The number of samples when the job was delayed for JES. RMF calculates this number by incrementing its counter once for each sample when one or more units of work in the address space had JES delay.  

For JES2 delay, RMF scans all subsystem job blocks (SJBs).  

See the description of the Main Delay Reason field for valid JES function codes.  

Note: This DLY% value is also found in the JES field on the Job Delay report.
### Table 36. Fields in the JES Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Main Delay Reason   | The subsystem function code that indicates the main reason for the delay. RMF reports the function code with the highest count as the main delay reason. The % column indicates how much of the JES delay of the job is caused by the reported subsystem function. This value is calculated as follows:  
  \[
  \% = \left( \frac{\text{# Delay Samples}}{\text{# Samples}} \right) \times 100
  \]
  
  **Delay samples**  
  The number of samples when the job was delayed for JES for a specific subsystem function. For primary source fields used in this calculation see the DLY % field in this report description.  
  **Note:** The Main Delay Reason % values add up to the DLY % value of the job if there is no overlap in the delay states and there are no more than two function codes responsible for the delay.  
  The JES F-codes (function codes in decimal) and their explanations are:  
  
  **F-Code** | **Explanation** |
  |------------|----------------|
  1          | Processing TSO OUTPUT command request |
  2          | Waiting for JES to cancel a job |
  3          | Waiting for job status information |
  9          | Waiting for WTO/WTOR request |
  12         | Waiting for job termination |
  13         | Waiting for JES to restart a job |
  23         | Waiting for dynamic alloc via SSOBODYCD |
  23         | Waiting for SETUP request |
  26         | Waiting for change DD name |
  27         | Waiting for change ENQ use attribute |
  75         | Processing notify user |
  132        | Waiting for JDS access |
  138        | Validating SYSOUT destination |
  138        | Waiting for JES to cancel a job |
  138        | Waiting for job status information |
  141        | Waiting for ENDREQ |
  144        | Processing TSO OUTPUT command request |
  149        | Dynamically allocating data set to JES3 |
  151        | Changing JES3 DD via dynamic allocation |
  152        | Waiting for FSS request |
  153        | Waiting for CI driver |
  157        | Waiting for SYSOUT API to process request |
  158        | Processing SSI Extended Status |
  162        | Waiting for TCPIP NJE global services |
  163        | Waiting for job class information |
  164        | Waiting for initiator information |
  165        | Waiting for NJE node information |
  166        | Waiting for spool partition information |
  167        | Waiting for JESPlex information |
  168        | Waiting for SJF services |
  169        | Waiting for JES device information |
  255        | Waiting for SPOOL space |

**Report options**  
The JES Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. Select YES for Jobs on the Report Options panel to display the Job Selection/Exclusion panel. See Figure 38 on page 70 for an example.
JOB - Job Delay Report

The Job Delay report describes the reason why a specific job is delayed and provides possible causes leading to the delay.

How to request this report

To request the Job Delay report, select 2 from the Primary Menu and then select 5 from the Job Report Selection Menu (shown in Figure 7 on page 26), or enter the following command:

```
JOB Jobname
```

Contents of the report

The Job Delay report is available in the following delay variations:
- Device delay
- Enqueue delay
- HSM address space delay
- JES address space delay
- Operator message delay
- Operator tape mount delay
- Processor delay
- Storage delay
- Quiesce delay
- XCF address space delay

The following sections explain each Job Delay report variation. The Job Delay report is divided into three sections. Each variation has the same fields in the top and bottom sections. The middle section varies depending on the type of delay being reported. Only the middle section will be described for each variation.

Delay can be either primary delay or requested delay. Primary delay shows information about the type of delay contributing most to the overall delay of a job. Requested delay shows information about a type of delay that you select. Use the Job Report Selection Menu, or cursor-sensitive control to select the type of delay to be reported. See "The Job Report Selection Menu" on page 25 for more information about requesting delay types.

Displaying the Job Delays report

You can display the Job Delays report in several ways:
- Place the cursor on a jobname in any RMF report and press ENTER.
- Place the cursor on a % Delayed for field in a delay report or a Job Delay report and press ENTER.
- Issue the JOB <jobname> command on any command line.
- Use the Job Report Selection Menu to specify a particular job and the type of delay to be reported.

The highlighted line in the bottom section of the Job Delays report identifies the job which is analyzed in the top and middle sections.

Since more than one job with the same jobname may be in the system during the report interval, the address space identifier (ASID) is displayed instead of the jobname. To display a different job with the same name, place the cursor on the appropriate ASID field in the bottom section and press ENTER.
The top and bottom parts of the Job Delays report

All variations of a Job Delays report have the same top part:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job</td>
<td>Name of delayed job.</td>
</tr>
<tr>
<td>Primary Delay or</td>
<td>A more detailed description of the reason stated in the Primary Reason</td>
</tr>
<tr>
<td>Requested Delay</td>
<td>field of the highlighted line in the bottom section of this report.</td>
</tr>
<tr>
<td>Probable causes</td>
<td>Probable causes of the delay. These causes are selected according to the</td>
</tr>
<tr>
<td></td>
<td>primary delay reason and by analysis of the data in the middle section</td>
</tr>
<tr>
<td></td>
<td>of the report. Use the HELP key (PF1) for additional information about</td>
</tr>
<tr>
<td></td>
<td>these causes and how they are determined.</td>
</tr>
</tbody>
</table>

Figure 64. Top Part of Job Delays report

Table 37. Fields in the Job Delays report

The bottom part of the Job Delay report has similar fields as the Delay report. Similar fields also appear on the Delay report. Table 17 on page 64 describes these fields. In the Job Delay report, the address space identifier (ASID) is displayed instead of the jobname since more than one job with the same jobname may have been in the system during the report interval. The Using% field shows the percentage of time the job was using a processor (PRC) and the percentage of time the job was using a device (DEV).

Device Delay variation

This variation of the Job Delay report shows a job delayed by a device.

How to request this variation

To request the Device Delay variation, select 2 from the Primary Menu, and then select 1 on the Job Report Selection Menu (shown in Figure 7 on page 26), or enter the following command:

DEVJ jobname
The fields in the middle section of this report provide information about the device delaying the job.

### Field descriptions

Table 38. Fields in the Device Delay variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number:</td>
<td>The device number where the volume is mounted.</td>
</tr>
<tr>
<td>Device:</td>
<td>The device type.</td>
</tr>
<tr>
<td>Shared:</td>
<td>Indicates if the device is shared.</td>
</tr>
<tr>
<td>PAV</td>
<td>The number of parallel access volumes (base and alias) which were available at the end of the report interval. If the number has changed during the report interval, it is followed by an &quot;*&quot;. The device is a HyperPAV base device, the number is followed by an 'H'. The value is the average number of HyperPAV volumes (base and alias) for that range.</td>
</tr>
</tbody>
</table>
|                     | Accumulated # of HPAV devices = \[
|                     | \frac{\text{Average # of HPAV devices}}{\text{Number of Samples}}\]                                                                                                                                 |
|                     | This field appears only for parallel access volumes.                                                                                                                                                     |
| Active:             | The percentage of time the device was active during the report interval. Dashes in this field indicate hardware data is not available. See Table 22 on page 77 for the calculation of this value.                    |
| Connect:            | The percentage of time the device was connected to a channel path. Dashes in this field indicate hardware data is not available. See Table 22 on page 77 for the calculation of this value. If the following condition exists on the DEVR report, this field will be highlighted to warn you about an excessive condition: |
|                     | CON % > 40                                                                                                                                                                                             |
| Disconnect:         | The percentage of time the device has an active channel program and is disconnected (not transferring data). Dashes in this field indicate hardware data is not available. See Table 22 on page 77 for the calculation of this value. If the following condition exists on the DEVR report, this field will be highlighted to warn you about an excessive condition: |
|                     | DSC % > 40 and CON % < 30                                                                                                                                                                               |
| Pending:            | The percentage of time all I/O requests wait before a path is available. Dashes in this field indicate hardware data is not available. See Table 22 on page 77 for the calculation of this value. If one of the following conditions exist on the DEVR report, this field will be highlighted to warn you about an excessive condition: |
|                     | PND % > 40 and CON % = 0                                                                                                                                                                               |
|                     | PND % > 40 and device is shared                                                                                                                                                                          |
|                     | PND % > 30 and device is not shared.                                                                                                                                                                     |
| Delay DB%:          | Device busy delay, which is the percentage of time during the report interval when the channel subsystem measured an I/O request delay because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, a head of string busy condition caused the contention, or some combination of these conditions has occurred. |
|                     | Accumulated DB Delay Time = \[
|                     | \frac{\text{Delay DB} \times \text{Range Time}}{\text{Number of Samples}}\]                                                                                                                              |

Figure 66. Device Delay variation of the Job Delay report

The fields in the middle section of this report provide information about the device delaying the job.
Table 38. Fields in the Device Delay variation of the Job Delay report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay CM%:</td>
<td>Command response time delay, which is the percentage of time during the report interval, when the first command of an I/O instruction of the channel program is sent to the device, until the device indicates it has accepted the command. Accumulated Command Response Delay Time Delay CM% = ------------------------------- * 100 Range Time</td>
</tr>
<tr>
<td>Average Users Delayed</td>
<td>The average number of users delayed by this device. Average ∑ User Delay Counts Users = ------------------------ * 100 Delayed # Valid Samples</td>
</tr>
</tbody>
</table>

Enqueue Delay variation

This Job Delay report variation shows a job delayed by a serially reusable resource.

How to request this variation

To request the Enqueue Delay variation, select 2 from the Primary Menu, and then select 2 from the Job Report Selection Menu (shown in Figure 7 on page 26), or enter the following command:

ENQJ jobname

--- Jobs Holding Resource ---

<table>
<thead>
<tr>
<th>Job: AMOLLOY</th>
<th>Job: SCHMATE</th>
<th>Job: DRAGON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding: 100%</td>
<td>Holding: 100%</td>
<td>Holding: 100%</td>
</tr>
<tr>
<td>Status: Shared</td>
<td>Status: Shared</td>
<td>Status: Shared</td>
</tr>
</tbody>
</table>

Figure 67. Enqueue Delay variation of the Job Delay report

The fields in the middle section of this report contain information about the three main holders of the resource for which this job is delayed.

Field descriptions

Table 39. Fields in the Enqueue Delay variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>Name of a job holding the resource. Up to three jobs can be displayed in this section.</td>
</tr>
<tr>
<td>Holding:</td>
<td>Indicates how much a specific job is contributing to the holding of the resource. See Table 32 on page 100 for the calculation of this value.</td>
</tr>
<tr>
<td>Status:</td>
<td>Indicates whether the job has exclusive or shared use of the resource.</td>
</tr>
<tr>
<td>System:</td>
<td>The name of the system the holding job is running on. This field appears only if the holding job is running on a different system.</td>
</tr>
<tr>
<td>Server:</td>
<td>The name of the catalog space which does the enqueue. This field appears only when the enqueue was done by a catalog space and is running on the same system.</td>
</tr>
</tbody>
</table>

HSM and JES variations

The HSM and JES variations of the Job Delay report have the same format. They show a job delayed by either the HSM or JES address space.
How to request these variations

Select 2 from the Primary Menu, and then select 3 for HSM or 4 for JES from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter one of the following commands:

HSMJ jobname
JESJ jobname

Field descriptions

The fields in the middle section of this report contain information about the HSM or JES address space.

Table 40. Fields in the HSM/JES delay variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>Name of the JES/HSM address space.</td>
</tr>
<tr>
<td>Workflow:</td>
<td>The workflow percentage of the JES/HSM address space. See &quot;Address space workflow (%)&quot; on page 12 for the calculation.</td>
</tr>
<tr>
<td>Using:</td>
<td>The using percentage of the JES/HSM address space. See &quot;Address space using (%)&quot; on page 14 for the calculation.</td>
</tr>
<tr>
<td>Delay:</td>
<td>The delay percentage of the JES/HSM address space. See Table 17 on page 64 for the calculation.</td>
</tr>
<tr>
<td>Primary delay category:</td>
<td>The category of delay contributing most to the overall delay. See the % Delayed for field in Table 17 on page 64 for details.</td>
</tr>
<tr>
<td>Primary delay reason:</td>
<td>The contents of this field depend on the primary delay category. See the Primary Reason field in Table 17 on page 64 for an explanation.</td>
</tr>
<tr>
<td>Primary delay percent:</td>
<td>The percentage of delay for the primary delay category.</td>
</tr>
</tbody>
</table>

Operator Message and Mount Delay variations

The message and mount delay variations of the Job Delay report have the same format. They show a job delayed by either an operator message request or mount request.

How to request these variations

Select 2 from the Primary Menu, and then select 6 for delay caused by volume mount or select 7 for delay caused by operator reply from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter one of the following commands:

MSGJ jobname
MNTJ jobname
Field descriptions

Table 41. Fields in the Operator Message and Mount Delay variations of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>Name of delayed job.</td>
</tr>
<tr>
<td>Primary Delay:</td>
<td>A more detailed description of the reason stated in the Primary Reason field of the highlighted line in the bottom section of this report. Requested Delay appears instead of Primary Delay if you select operator delays as the type of delay to be reported.</td>
</tr>
<tr>
<td>or Requested Delay:</td>
<td></td>
</tr>
</tbody>
</table>

Processor Delay variation

This Job Delay report variation shows a job delayed by a processor.

How to request this variation

To request the Processor Delay variation, select 2 from the Primary Menu, and then select 8 from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter the following command using the format:

```
PROCJ jobname
```

Table 42. Fields in the Processor Delay variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>Name of job holding the processor. Up to three jobs can be displayed in this section.</td>
</tr>
<tr>
<td>Holding:</td>
<td>The percentage of time the holding job used the processor while the delayed job was waiting for the processor.</td>
</tr>
<tr>
<td>PROC Using:</td>
<td>The percentage of time the holding job spent using the processor. See the USG % field in Table 51 on page 134 for the calculation of this value.</td>
</tr>
<tr>
<td>DEV Using:</td>
<td>The percentage of time the holding job spent using a DASD, tape, or MSC volume. See the USG % field in Table 19 on page 72 for the calculation of this value.</td>
</tr>
</tbody>
</table>
If the sum of the PROC DLY% (not shown on this report) and PROC Using fields of the holding job is 100, the PROC and DEV Using fields in the middle section will be highlighted. This indicates the main job holding the processor may be looping. In this case, “Job may be looping” is listed as a probable cause.

**Quiesce variation**

**How to request this variation**

To request the Quiesce Delay variation, select 2 from the Primary Menu, and then select 9 from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter the following command using the format:

```
QSCJ jobname
```

This report shows a job delayed because it was quiesced by the operator.

---

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Reason QUIESCE</td>
<td>The address space has been quiesced by the operator using the RESET command. A quiesced address space can show unexpected data:</td>
</tr>
<tr>
<td></td>
<td>- A swappable address space will be swapped out, thus it can be OUTR and show storage delays.</td>
</tr>
<tr>
<td></td>
<td>- A non-swappable address space will get lowest priority, thus it can show CPU delay, paging delay, or other delays, and even some USG % from time to time depending on the load on the system.</td>
</tr>
</tbody>
</table>

**Storage Delay variation**

This variation of the Job Delay report shows a job delayed by contention of storage.

**How to request this variation**

To request the Storage Delay variation, select 2 from the Primary Menu, and then select 10 from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter the following command using the format:

```
STORJ jobname
```

The middle fields of this report provide information about the storage usage of the delayed job.
Field descriptions

Table 44. Fields in the Storage Delays variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Frames</td>
<td>The sum of active and idle frames.</td>
</tr>
<tr>
<td>Active Frames</td>
<td>The average number of frames held by the job while it was active. See Table 60 on page 151 for the calculation of this value.</td>
</tr>
<tr>
<td>Idle Frames</td>
<td>The average number of frames held by the job when it was idle. See Table 60 on page 151 for the calculation of this value.</td>
</tr>
<tr>
<td>Working Set</td>
<td>The average amount of storage a user occupied while in storage. See Table 60 on page 151 for the calculation of this value.</td>
</tr>
<tr>
<td>Aux Slots</td>
<td>The average number of auxiliary slots for each address space.</td>
</tr>
</tbody>
</table>
| Page In Rate    | The rate at which pages are being read into central storage.  
\[ \sum \text{all Page-in Counts for Group} \]  
\[ \text{Page In Rate} = \frac{\sum \text{all Page-in Counts for Group}}{\text{Resident Time}} \]  

The resident time is the total time the address space was swapped in.  
The page-in rate includes the shared storage page-ins.  

Fixed Frames     | The average number of fixed frames the job was using during the range period including frames both above and below the 16 megabyte line. See Table 66 on page 158 for the calculation of this value. |
| DIV Frames      | The number of central storage frames used by DIV. See Table 66 on page 158 for the calculation of this value.                                                                                     |
| ES Move Rate    | The rate of pages moved from expanded storage. This includes both single and blocked pages; but does not include hiperspace or VIO pages.                                                        |

XCF variation

The cross-system coupling facility (XCF) variation of the Job Delay report shows a job delayed by XCF.

How to request this variation

To request the XCF variation, select 2 from the Primary Menu, and then select 11 from the Job Report Selection Menu (shown in Figure 7 on page 26) or enter the following command:

XCFJ jobname

Figure 73. XCF Delay variation of Job Delay report

Field descriptions

Table 45. Fields in the XCF Delay variation of the Job Delay report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay:</td>
<td>The delay percentage of the XCF address space. See Table 17 on page 64 for the calculation.</td>
</tr>
<tr>
<td>Dev Number:</td>
<td>The path number corresponding to the delay percentage.</td>
</tr>
</tbody>
</table>
Monitor III Utility fields
You can use the Monitor III Utility to customize the Job Delay report. In addition to the delays shown above you can use the Utility to have the following delay percentages shown.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using percentage</td>
<td>The percentage of time a job was using the processor or a device.</td>
</tr>
<tr>
<td>JES delay percentage</td>
<td>The percentage of time a job was delayed when requesting service from JES.</td>
</tr>
<tr>
<td>HSM delay percentage</td>
<td>The percentage of time a job was delayed when requesting service from HSM.</td>
</tr>
<tr>
<td>XCF delay percentage</td>
<td>The percentage of time a job was delayed when requesting service from XCF.</td>
</tr>
<tr>
<td>Operator mount delay percentage</td>
<td>The percentage of time a job was delayed by an operator mount request.</td>
</tr>
<tr>
<td>Operator message delay percentage</td>
<td>The percentage of time a job was delayed by an operator message request.</td>
</tr>
<tr>
<td>Operator quiesce delay percentage</td>
<td>The percentage of time a job was delayed because the operator quiesced the address space.</td>
</tr>
</tbody>
</table>
| WLM resource capping delay percentage | The percentage of time a job was delayed because  
  • it has used up its CPU service as specified in the WLM policy for the resource group to which the job belongs  
  • or because the work for which the job is running is overachieving its goal. So this work may be capped in order to divert its resources to run discretionary work (see also section 'Using Discretionary Goals' in z/OS MVS Planning: Workload Management). |

Report options
Each variation of the Job Delays report uses the same Report Options panel. Use this panel to view and select an available jobname.

<table>
<thead>
<tr>
<th>RMF Job Report Options</th>
<th>Line 1 of 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command ====&gt;</td>
<td>Line 1 of 66</td>
</tr>
<tr>
<td>Scroll ====&gt; HALF</td>
<td></td>
</tr>
<tr>
<td>Change or verify parameters for all job reports.</td>
<td></td>
</tr>
<tr>
<td>Jobname ====&gt; DCRPROCA Name of job to be reported</td>
<td></td>
</tr>
<tr>
<td>Available Jobs</td>
<td></td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>ADAM</td>
</tr>
<tr>
<td>ALPER1</td>
<td>ALTRAN</td>
</tr>
<tr>
<td>ANANIA</td>
<td>ANDREW</td>
</tr>
<tr>
<td>AXLT</td>
<td>BART</td>
</tr>
<tr>
<td>BERNIEP</td>
<td>BETHP</td>
</tr>
<tr>
<td>BOYCOT</td>
<td>BRICK</td>
</tr>
<tr>
<td>CAROLL</td>
<td>CASTLE</td>
</tr>
<tr>
<td>CHUCKG</td>
<td>CHUWU</td>
</tr>
<tr>
<td>COOK</td>
<td>CORNER</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Jobs</td>
<td></td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>ADAM</td>
</tr>
<tr>
<td>ALPER1</td>
<td>ALTRAN</td>
</tr>
<tr>
<td>ANANIA</td>
<td>ANDREW</td>
</tr>
<tr>
<td>AXLT</td>
<td>BART</td>
</tr>
<tr>
<td>BERNIEP</td>
<td>BETHP</td>
</tr>
<tr>
<td>BOYCOT</td>
<td>BRICK</td>
</tr>
<tr>
<td>CAROLL</td>
<td>CASTLE</td>
</tr>
<tr>
<td>CHUCKG</td>
<td>CHUWU</td>
</tr>
<tr>
<td>COOK</td>
<td>CORNER</td>
</tr>
</tbody>
</table>

Figure 74. Job Report Options Panel
RMF saves the Jobname you enter across sessions.

Jobname
The name of the job for which you want data reported in your job delay report.

Available Jobs
The list of jobs that were active during the report interval.
If the job you want is not listed, it had no activity during the current report interval. If you specify the job, it will appear on your Job Delay reports when it is available.

**LOCKSP - Spin Lock Report**

Through locking, the system serializes the use of system resources by authorized routines and, in a Parallel Sysplex, by processors. Lock holders can impede other work units that need the same lock and must wait until the lock holder releases the lock.

RMF reports about the various types of system resource locks in the Spin Lock Report described in this section and in the Suspend Lock Report described in "LOCKSU - Suspend Lock Report" on page 129.

If a spin lock is unavailable, the requesting processor continues testing the lock until the other processor releases it (spinning). As soon as the lock is released, the requesting processor can obtain the lock and thus can obtain control of the protected resource.

No symptoms for delays due to locks are visible except excessive spinning. Therefore, RMF periodically checks all types of system resource locks.

**How to request this report**

To request the Spin Lock Report, select 1 from the Primary Menu and then select 12 on the Overview Report Selection Menu (shown in Figure 6 on page 25), or enter one of the following commands:

LOCKSP [HELD | SPIN | BOTH]

LSP [HELD | SPIN | BOTH]

**Contents of the report**

The Spin Lock Report provides information about how often a spin lock is held and about jobs that are spinning because of a lock request. It consists of two sections:

- The upper part (Held section) displays information about spin locks which have been observed as held, either exclusively (EXCL) or shared (SHR).
- The lower part (Spin section) displays spin locks and address spaces which are spinning due to a request for this lock.
Table 47. Fields in the LSP Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>The resource name of the spin lock.</td>
</tr>
<tr>
<td>Type/Jobname</td>
<td>Held section: The type of the lock (exclusively or shared).</td>
</tr>
<tr>
<td></td>
<td>Spin section: The jobname (address space), which is spinning due to the lock request.</td>
</tr>
<tr>
<td>CPUID/ASID</td>
<td>Held section: The ID of the logical CPU holding the lock.</td>
</tr>
<tr>
<td></td>
<td>Spin section: The decimal address space identifier of the spinning job.</td>
</tr>
<tr>
<td>Address</td>
<td>The address of the instruction which obtained the lock.</td>
</tr>
<tr>
<td>Held %</td>
<td>The percentage of samples where the lock has been held.</td>
</tr>
<tr>
<td>Spin %</td>
<td>The percentage of samples where the requesting address space (ASID) has been found spinning due to the unavailable lock.</td>
</tr>
</tbody>
</table>

Lock report options

Spin Lock ===> BOTH Information (HELD, SPIN or BOTH) in LOCKSP report
Lock Type ===> BOTH Lock type (GLOBAL, LOCAL or BOTH) in LOCKSU report

Figure 75. Spin Lock Report

Figure 76. Lock Report Options
LOCKSU - Suspend Lock Report

Through locking, the system serializes the use of system resources by authorized routines and, in a Parallel Sysplex, by processors. Lock holders can impede other work units that need the same lock and must wait until the lock holder releases the lock.

RMF reports about the various types of system resource locks in the Suspend Lock Report described in this section and in the Spin Lock Report described in "LOCKSP - Spin Lock Report" on page 127.

If a suspend lock is unavailable, the unit of work requesting the lock is delayed until the lock is available. Other work is dispatched on the requesting processor. All local locks are suspend locks.

No symptoms for delays due to suspend locks are visible. Therefore, this report provides information about the jobs that are holding a suspend lock, because the overall workflow can be impacted by contention situations for the same lock. Especially, if a work unit that is holding a lock is suspended for a longer period of time, other work units can be significantly delayed.

How to request this report

To request the Suspend Lock Report, select 1 from the Primary Menu and then select 13 on the Overview Report Selection Menu (shown in Figure 6 on page 25), or enter one of the following commands:

LOCKSU [GLOBAL | LOCAL | BOTH]
LSU [GLOBAL | LOCAL | BOTH]

Contents of the report

The report contains one segment for local suspend locks in the upper part and one for global suspend locks in the lower part of the report. Within the segments, the report lines are sorted by descending Held%. A separate work unit within the same address space can be identified by the value in column Address, which is the address of the instruction that obtained the lock.
Table 48. Fields in the LSU Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Resource      | The resource name of the suspend lock.  
|               | • for local locks: the home address space name (which is equal to the holder's job name)  
|               | • for cross memory local (CML) locks: the primary address space name (which is different from the holder's job name)  
|               | • for all types of cross memory services (CMS) locks: the lock word name. |
| Type          | The type of the suspend lock:  
|               | L  Local Suspend Lock  
|               | LX Cross Memory Local (CML) Suspend Lock  
|               | G  Global CMS Suspend Lock. |
| Jobname       | The name of the job/address space holding the lock. |
| ASID          | The decimal address space identifier of the job holding the lock. |
| Address       | The address of the instruction which obtained the lock. |
| Held %        | The percentage of samples where the address space held the lock during the report interval. |
| Intr %        | The percentage of samples where the address space was interrupted while holding the lock. |
| Disp %        | The percentage of samples where the address space was dispatchable while holding the lock. |
| Susp %        | The percentage of samples where the address space has been found suspended while another dispatchable unit was holding the lock. |

Note: You can specify options for this report on the Lock Report Options panel described in "Lock report options" on page 128.

OPD - OMVS Process Data Report

z/OS Unix address spaces can consist of several processes, which in turn might run one or more threads. Each process is typically associated with a UNIX command, consumes a certain amount of CPU, and also provides state information. UNIX System Services is the brand for UNIX on z/OS. In this context, it is referred to as open MVS or OMVS.

In addition to other reports that show OMVS address spaces with their jobname and using or delay information, the OPD report can be used for problem determination. It assists the performance analyst to find answers to the following questions:

• What are the delayed processes?
• What command is associated with them?
• What is the status of each of the processes?
• Which processes are high CPU consumers?

Address spaces under OMVS control are indicated by an additional letter O in the class column of the DELAY, the PROC, and the JOB report. The performance analyst can then use cursor sensitivity to navigate to this report or alternatively invoke it directly depending on the task he is trying to accomplish.

The report provides basic performance metrics on the first screen, while additional information specifically related to server processes can be shown by activating a pop-up panel.

How to request this report

To request the OMVS Process Data report, select 1 from the Primary Menu and then select 7 on the Overview Report menu (shown in Figure 6 on page 25), or enter the following command:
### Contents of the report

#### Table 49. Fields in the OPD Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel Procedure</td>
<td>Name of the procedure used to start the OMVS kernel address space.</td>
</tr>
<tr>
<td>Kernel ASID</td>
<td>Decimal ID of the kernel address space.</td>
</tr>
<tr>
<td>BPXPRM</td>
<td>List of suffixes indicating the BPXPRM Parmlib member concatenation.</td>
</tr>
<tr>
<td>Option</td>
<td>Displays the current report option as specified on the Report Options panel.</td>
</tr>
<tr>
<td>Jobname</td>
<td>Jobname associated with the process.</td>
</tr>
<tr>
<td>User</td>
<td>User name associated with the process.</td>
</tr>
<tr>
<td>ASID</td>
<td>Decimal ID of the address space the process is associated with.</td>
</tr>
<tr>
<td>PID</td>
<td>Process ID.</td>
</tr>
<tr>
<td>PPID</td>
<td>Parent process ID.</td>
</tr>
<tr>
<td>LW</td>
<td>If the reported process is waiting for the process latch of another process, 'Y' is shown, otherwise blank.</td>
</tr>
<tr>
<td>State</td>
<td>Cumulated state information of the address space and process. You can place the cursor on any field (except Jobname and PPID) in a process line and press Enter - this will show you a pop-up panel with an explanation of the process state.</td>
</tr>
<tr>
<td>Appl%</td>
<td>Percentage of TCB and local/global SRB time consumed by the address space during the reporting range. <strong>Note:</strong> The calculated value is based on uniprocessor capacity and can exceed 100% on systems with more than one processor. To get the system utilization, this value has to be divided by the number of logical processors or cores.</td>
</tr>
<tr>
<td>Total</td>
<td>Total computing time in seconds, consumed by the address space the process is running within. When only one process is running in the address space, this time represents the accumulated CPU time for that process. In case of multiple processes running in an address space, it is the sum of the CPU time used by all of the work running in that address space.</td>
</tr>
</tbody>
</table>

---

There is no graphic version of this report available.
Table 49. Fields in the OPD Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>If the process represents a server, one of the following is shown: FILE Network file server LOCK Network lock server FEXP Network file exporter SFDS Shared file server</td>
</tr>
<tr>
<td></td>
<td>For non-server processes, 'N/A' is shown.</td>
</tr>
</tbody>
</table>

The following pop-up panel shows an example of process details for a server process. For a non-server process, RMF displays ‘N/A’ in the fields below Server Information.

Table 50. Fields in the OPD Details Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Time/Date</td>
<td>Start time and date when the process has been started.</td>
</tr>
<tr>
<td>Command</td>
<td>The command that created the processes truncated to 40 characters.</td>
</tr>
<tr>
<td>Process-ID</td>
<td>Process ID.</td>
</tr>
<tr>
<td>Parent Process-ID</td>
<td>Parent process ID.</td>
</tr>
<tr>
<td>Jobname</td>
<td>Jobname associated with the process.</td>
</tr>
<tr>
<td>User Name</td>
<td>User name associated with the process.</td>
</tr>
<tr>
<td>ASID</td>
<td>Decimal ID of the address space the process is associated with.</td>
</tr>
<tr>
<td>Hexadecimal ASID</td>
<td>Hexadecimal identifier of the address space.</td>
</tr>
<tr>
<td>Appl%</td>
<td>Percentage of TCB and local/global SRB time consumed by the address space during the reporting range. <strong>Note:</strong> APPL% shows CPU utilization based on uniprocessor capacity. On systems with more than one processor this value has to be divided by the number of processors to get the system utilization.</td>
</tr>
<tr>
<td>Total CT</td>
<td>Total computing time in seconds, consumed by the address space the process is running in. When only one process is running in the address space, this time represents the accumulated CPU time for that process. In case of multiple processes running in an address space, it is the sum of the CPU time used by all of the work running in that address space.</td>
</tr>
<tr>
<td>LW-PID</td>
<td>Process ID of the process on whose latch the reported process is waiting for.</td>
</tr>
<tr>
<td>Server Information</td>
<td>'N/A' is shown next to each field if this is not a server process.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the server process.</td>
</tr>
</tbody>
</table>
Table 50. Fields in the OPD Details Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>If the process represents a server, one of the following is shown:</td>
</tr>
<tr>
<td></td>
<td>FILE</td>
</tr>
<tr>
<td></td>
<td>LOCK</td>
</tr>
<tr>
<td></td>
<td>FEXP</td>
</tr>
<tr>
<td></td>
<td>SFDS</td>
</tr>
<tr>
<td>Active Files</td>
<td>The number of active server file tokens.</td>
</tr>
<tr>
<td>Max. Files</td>
<td>The maximum number of active server file tokens allowed.</td>
</tr>
<tr>
<td>Process State</td>
<td>Cumulated state information of the address space and process. For each possible state a separate line is shown below the field. The following translation table is used:</td>
</tr>
<tr>
<td></td>
<td>State</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>K</td>
</tr>
<tr>
<td></td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Z</td>
</tr>
</tbody>
</table>

Report options

RMF OMVS Process Data Report Options

Command ==>> Scroll ==>> HALF

Change or verify parameters. To exit press END.
Select one of the following options:

1. Process ID ==> 1 ALL or a process ID
2. ASID ==> 0100 ID of an address space in decimal or hexadecimal (with preceding X) format
3. Jobname ==> Jobname associated with a process
4. User ==> User name associated with a process

Figure 80. OPD Report Options Panel

You can specify a process ID, an address space ID (in decimal or hexadecimal format), a jobname, or a user name to tailor the OPD report.

PROC - Processor Delays Report

The Processor Delays report (PROC) displays all jobs that were waiting for or using the processor during the report interval.
RMF reports the jobs by descending overall delay percentages. Because use of the processor by many jobs might contribute to the delay of another job, RMF reports up to three jobs in the Holding Job(s) field. The jobs in this field are those that were most often found using the processor while the job was delayed.

How to request this report

To request the Processor Delay report, select 3 from the Primary Menu, then 1 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

PROC [job_class,service_class]

For example, to get a Processor Delays report for TSO service class TSOPRIME, enter:

PROC T, TSOPRIME

Contents of the report

The graphic form of this report shows each user's processor delay percentage and processor using percentage.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>The name of a job. The processor delay report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
</tbody>
</table>
Table 51. Fields in the PROC Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX Abbreviation for the job class as follows:</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Started task</td>
</tr>
<tr>
<td>T</td>
<td>TSO</td>
</tr>
<tr>
<td>B</td>
<td>Batch</td>
</tr>
<tr>
<td>A</td>
<td>ASCH</td>
</tr>
<tr>
<td>O</td>
<td>OMVS</td>
</tr>
<tr>
<td>An O as second character indicates that the address space is using OMVS services.</td>
<td></td>
</tr>
<tr>
<td>Service Class The name of the service class that a specified job has been running in.</td>
<td></td>
</tr>
<tr>
<td>CPU Type The processor type:</td>
<td></td>
</tr>
<tr>
<td>CP</td>
<td>general purpose processor</td>
</tr>
<tr>
<td>AAP</td>
<td>Application Assist Processor (zAAP)</td>
</tr>
<tr>
<td>IIP</td>
<td>Integrated Information Processors (zIIP)</td>
</tr>
<tr>
<td>DLY % Delay percentage that the waiting job (address space) is experiencing because of contention for the processor of the type indicated in column CPU Type during the report interval.</td>
<td></td>
</tr>
<tr>
<td># Delay Samples</td>
<td></td>
</tr>
<tr>
<td>DLY % = ------------------ * 100</td>
<td></td>
</tr>
<tr>
<td># Samples</td>
<td></td>
</tr>
<tr>
<td>Delay samples The single state count of samples being delayed by the processor. RMF increments this count only once for each sample when one or more units of work (TCBs, SRBs, interrupted ready task or asynchronous exit) associated with the address space are delayed for the processor.</td>
<td></td>
</tr>
<tr>
<td>Note: This DLY% value is also found in the PROC field on the Job Delay report.</td>
<td></td>
</tr>
<tr>
<td>USG% The percentage of time when the job is receiving service from the processor of the type indicated in column CPU Type.</td>
<td></td>
</tr>
<tr>
<td># Using Samples</td>
<td></td>
</tr>
<tr>
<td>USG % = ------------------ * 100</td>
<td></td>
</tr>
<tr>
<td># Samples</td>
<td></td>
</tr>
<tr>
<td>Using samples The number of samples when the job was found using the processor. If the processor running Monitor III has other ready work to do (any ready SRB, interrupted ready task, asynchronous exit routine, or TCB is on the dispatching queue), then it looks for the first address space having a unit of work on the dispatching queue that is not already using another processor. Then the number of samples is incremented by one for the address space having the first dispatchable unit of work according to the dispatcher sequence search order. The processor running Monitor III is not counted as a processor in use if there is no other ready work to do.</td>
<td></td>
</tr>
<tr>
<td>EAppl% Percentage of the processor time used by transactions that executed on the type of processor indicated in column CPU Type. This calculation is based on uniprocessor capacity which means that this value can exceed 100% in systems with more than one processor. To get the system utilization, this value has to be divided by the number of logical processors or cores.</td>
<td></td>
</tr>
<tr>
<td>Note: The processor times that are used to calculate this value is the sum of TCB time, global and local SRB time, preemptable or client SRB time, and enclave CPU time consumed within this address space.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 51. Fields in the PROC Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding Job(s)</td>
<td>Up to three jobs that, by their use of the processor, contributed most to the delay of the job listed under Jobname. % The percentage of delay caused by the named job to the job waiting to use the processor. Name The name of a job contributing to the delay of the job waiting to use the processor. The name &quot;ENCLAVE&quot; in this field means that one or more enclaves are active on the processor. The percentage shown for enclaves is the sum of all enclave using samples found while the reported job was delayed. # Holding Samples % = ----------------- * 100</td>
</tr>
<tr>
<td>Holding samples</td>
<td>The number of samples when the job was using the processor and delaying the other job (indicated in the Jobname field). Note: In a multiprocessor environment, there is a holding job for each processor. For example, in a two-processor environment, two jobs can each account for 100% of the delay of the job waiting for the processor.</td>
</tr>
</tbody>
</table>

### Monitor III Utility fields

Table 52 shows the additional fields you can select for this report.

### Table 52. Additional Fields in the PROC Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRCPCAP</td>
<td>This column contains the actual delay caused by WLM due to a resource group maximum or due to discretionary goal management. This means that the work in question may be overachieving its goal. It may be capped to divert its resources to run discretionary work (see also section 'Using Discretionary Goals' in z/OS MVS Planning: Workload Management). It shows the Dispatchable Unit (TCB or SRB) capped delay, which should be distinguished from the address space capping state shown in the CAPP field on the Work Manager Delays report.</td>
</tr>
<tr>
<td>PRCPODEL</td>
<td>Overall delay percentage for this address space.</td>
</tr>
<tr>
<td>PRCPOUSE</td>
<td>Overall using percentage for this address space.</td>
</tr>
<tr>
<td>PRCPST</td>
<td>Percentage of the processor time used by non-enclave work that executed on behalf of this address space.</td>
</tr>
<tr>
<td>PRCPETST</td>
<td>Percentage of the processor time used by enclave and non-enclave work that executed within this address space.</td>
</tr>
<tr>
<td>PRCPAPPL</td>
<td>Percentage of the processor time used by non-enclave work that executed on behalf of this address space and processor type.</td>
</tr>
<tr>
<td>PRCTWFL</td>
<td>Overall workflow percentage of this address space and processor type.</td>
</tr>
<tr>
<td>PRCPUSE</td>
<td>Overall using percentage for this address space and processor type.</td>
</tr>
<tr>
<td>PRCPUCP</td>
<td>Overall using percentage on general purpose processors for zAAPs and zIIPs.</td>
</tr>
<tr>
<td>PRCPASI</td>
<td>Address space ID of the job.</td>
</tr>
</tbody>
</table>

### Report options

The PROC Report Options panel is similar to the DEV Report Options panel. See Figure 40 on page 73 for an example. Selecting YES for Jobs on the Report Options panel displays the Job Selection/Exclusion panel (see Figure 38 on page 70).
PROCU - Processor Usage Report

The Processor Usage report (PROCU) displays all jobs that were using a general purpose or special purpose processor during the report interval. RMF reports the jobs by descending overall CPU time. The report gives you information about the percentage of CPU time on general purpose processors consumed on behalf of the job. In addition, the percentage of CPU time used by work that is eligible for being offloaded to an Application Assist (zAAP) or Integrated Information (zIIP) processor is shown. You can use this information to understand the benefit of adding a zAAP or zIIP into the configuration.

The EAppl fields also display the percentage of task time, SRB and enclave CPU time consumed within the address space on general purpose processor or special purpose (zAAP and zIIP) processors.

How to request this report

To request the Processor Usage report, select 3 from the Primary Menu, then 1A from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

```
PROCU [job_class,service_class]
```

For example, to get a Processor Usage report for TSO service class TSOPRIME, enter:

```
PROCU T, TSOPRIME
```

Contents of the report

<table>
<thead>
<tr>
<th>Jobname</th>
<th>Service</th>
<th>CX Class</th>
<th>Total</th>
<th>AAP</th>
<th>IIP</th>
<th>CP</th>
<th>AAp</th>
<th>IIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBS3DIST</td>
<td>SO</td>
<td>DB2HIGH</td>
<td>100.6</td>
<td>0.0</td>
<td>0.1</td>
<td>111.0</td>
<td>0.0</td>
<td>21.3</td>
</tr>
<tr>
<td>WS657</td>
<td>0</td>
<td>OMVS</td>
<td>59.4</td>
<td>0.0</td>
<td>0.0</td>
<td>59.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>XCFAS</td>
<td>5</td>
<td>SYSTEM</td>
<td>24.1</td>
<td>0.0</td>
<td>0.0</td>
<td>24.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>WSP1S2F</td>
<td>5</td>
<td>MASCN</td>
<td>14.0</td>
<td>0.1</td>
<td>0.0</td>
<td>14.0</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>TCP1P</td>
<td>5</td>
<td>SYSSTC</td>
<td>16.1</td>
<td>0.0</td>
<td>0.0</td>
<td>16.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>VTM44</td>
<td>5</td>
<td>SYSSTC</td>
<td>14.5</td>
<td>0.0</td>
<td>0.0</td>
<td>14.5</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>WSP1S2FS</td>
<td>5</td>
<td>MASCN</td>
<td>10.2</td>
<td>2.7</td>
<td>0.0</td>
<td>42.5</td>
<td>98.4</td>
<td>0.0</td>
</tr>
<tr>
<td>GMVS</td>
<td>5</td>
<td>SYSTEM</td>
<td>3.7</td>
<td>0.0</td>
<td>0.0</td>
<td>3.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>CICS2FA</td>
<td>5</td>
<td>CICSIGN</td>
<td>3.4</td>
<td>0.0</td>
<td>0.0</td>
<td>3.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>WSP1S6F</td>
<td>5</td>
<td>MASCN</td>
<td>1.9</td>
<td>0.1</td>
<td>0.0</td>
<td>1.9</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>5</td>
<td>SYSTEM</td>
<td>2.4</td>
<td>0.0</td>
<td>0.0</td>
<td>2.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>CICS2AFA</td>
<td>5</td>
<td>CICSIGN</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>RMFGAT</td>
<td>5</td>
<td>SYSSTC</td>
<td>1.7</td>
<td>0.0</td>
<td>0.0</td>
<td>1.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>WSP1S6FS</td>
<td>5</td>
<td>MASCN</td>
<td>1.0</td>
<td>0.3</td>
<td>0.0</td>
<td>5.3</td>
<td>7.7</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Figure 82. PROCU - Processor Usage Report

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>The name of a job using processor time. The processor usage report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
</tbody>
</table>
Table 53. Fields in the PROCU Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX</td>
<td>Abbreviation for the job class as follows: S = Started task, T = TSO, B = Batch, A = ASCH, O = OMVS. An O as second character indicates that the address space is using OMVS services.</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td>Time on CP %</td>
<td>Total: Percentage of CPU time spent on general purpose processors as sum of TCB time, global and local SRB time, and preemptable or client SRB time consumed on behalf of this address space. AAP: Percentage of CPU time on general purpose processors by this address space which was used by zAAP eligible work. This is a subset of the Total percentage. IIP: Percentage of CPU time on general purpose processors by this address space which was used by zIIP eligible work. This is a subset of the Total percentage.</td>
</tr>
<tr>
<td></td>
<td>Note: The calculated values are based on uniprocessor capacity, which means that they can exceed 100% on systems with more than one processor. To get the system utilization, this value has to be divided by the number of logical processors or cores.</td>
</tr>
<tr>
<td>EAppl %</td>
<td>CP: Percentage of CPU time on general purpose processors (CPs) as sum of TCB time, global and local SRB time, preemptable or client SRB time, and enclave CPU time consumed within this address space. AAP: Percentage of CPU time consumed on zAAPs within this address space. IIP: Percentage of CPU time consumed on zIIPs within this address space.</td>
</tr>
<tr>
<td></td>
<td>Note: EAppl% shows CPU utilization based on uniprocessor capacity. This means that the value can exceed 100% in systems with more than one processor. To get the system utilization, this value has to be divided by the number of logical processors or cores.</td>
</tr>
</tbody>
</table>

Monitor III Utility fields

Table 54 shows the additional fields you can select for this report.

Table 54. Additional Fields in the PROCU Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRUPCLA</td>
<td>Class (A, B, E, O, S, or T)</td>
</tr>
<tr>
<td>PRUPTOTC</td>
<td>Percentage of total accumulated CPU time as sum of TCB time, global and local SRB time and preemptable or client SRB time, consumed on behalf of this address space.</td>
</tr>
<tr>
<td>PRUPTOTE</td>
<td>Percentage of total accumulated CPU time as sum of TCB time, global and local SRB time, preemptable or client SRB time, and enclave CPU time consumed within this address space.</td>
</tr>
<tr>
<td>PRUPTCB</td>
<td>Percentage of TCB time consumed in this address space.</td>
</tr>
<tr>
<td>PRUPSRB</td>
<td>Percentage of SRB time consumed in this address space by local or global SRBs.</td>
</tr>
<tr>
<td>PRUPPCS</td>
<td>Percentage of preemptable or client SRB time consumed on behalf of this address space.</td>
</tr>
<tr>
<td>PRUPEPS</td>
<td>Percentage of preemptable or client SRB and enclave CPU time consumed within this address space.</td>
</tr>
<tr>
<td>PRUPASI</td>
<td>Address space ID of the job.</td>
</tr>
</tbody>
</table>

Report options

The PROCU Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed (see Figure 38 on page 70).
**RG - Resource Group Data Report**

This report provides additional information about resource groups. It can also be used with historical data to get information about service policy definitions that are no longer available.

**How to request this report**

To request the Resource Group Data report, select U from the Primary Menu, and then a 3 from the User menu, or you can enter the following command:

```
RG
```

**Contents of the report**

The Resource Group Data report (RG report) is a modification of the Sysplex Summary report. It replaces the Sysplex Summary report columns containing actual values and the Performance Index with columns Duration, Resource Group and Min, Max and Act Capacity. Figure 83 shows the RG report modification of the Sysplex Summary report.

**Field descriptions**

Fields particular to the RG report are described here. For a detailed description of other fields, see Table 79 on page 187.

**Table 55. Fields in the RG Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>Service class period duration in unweighted CPU service units (that means, not multiplied with the service coefficients) per second. A duration is required in all but the last service class period. For single periods or for the last period of multiple periods this value is always zero.</td>
</tr>
<tr>
<td>Resource Group</td>
<td>Name of the resource group associated with the work in this service class.</td>
</tr>
</tbody>
</table>
### Table 55. Fields in the RG Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Min</td>
<td>When capacity is defined in terms of service units with a sysplex scope, MIN is the minimum capacity in unweighted CPU service units per second of task or SRB execution time that should always be available to this resource group. When capacity is defined in terms of percentage of the LPAR share on a system scope, MIN is the percentage of the LPAR share of this system that should always be available to this resource group. When capacity is defined as a number of general purpose processors (CPs), MIN is the number of CPs that should always be available to this resource group. A number of 100 represents the capacity of one CP.</td>
</tr>
<tr>
<td>Capacity Max</td>
<td>When capacity is defined in terms of service units with a sysplex scope, MAX is the maximum capacity in unweighted CPU service units per second of task or SRB execution time this resource group may use across the sysplex. When capacity is defined in terms of percentage of the LPAR share on a system scope, MAX is the percentage of the LPAR share of this system that this resource group should never exceed. When capacity is defined as a number of general purpose processors (CPs), MAX is the number of CPs that this resource group may use, whereby a number of 100 represents the capacity of one CP.</td>
</tr>
<tr>
<td>Capacity Actual</td>
<td>Actual capacity, in unweighted CPU service units per second, as consumed within this resource group. The data presented is related to the specified service class.</td>
</tr>
</tbody>
</table>

### RLSLRU - VSAM LRU Overview Report

This report provides Local Buffer Manager LRU statistics for each system. The data in this report can help you in adjusting the goal and the limit for the local cache size.

In Parmlib member IGDSMSxx, there is a goal response limit for the local cache size, it defaults to 100 MB. You can specify a limit up to 1.5 GB (if a bigger value will be given, the report will display MAX as buffer size goal). Each LRU cycle, it is determined whether the system is over the goal and the buffer aging algorithms are accelerated. If the system is 5 times over the goal or reaches the 1.5 GB limit, the system starts clearing the buffers. If systems appear where BMF is over the goal (status Accelerated or Reclaimed), you could adapt the goal in Parmlib member IGDSMSxx by changing the RLS_MAX_POOL_SIZE value.

### How to request this report

To request the VSAM LRU Overview report, select S from the Primary Menu and then select 12 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

```
RLSLRU
```

In addition, you can navigate to this report with cursor-sensitive control from the VSAM RLS Activity report.
Contents of the report

Cursor-sensitive control on a system line displays a pop-up panel with buffer counts by pool for the selected system. There are sixteen storage pools (2K, 4K, ... 32K) available.

Field descriptions

Note: If applicable, the measurements in the RLSLRU Report are presented for storage addresses below and above the 2GB bar. Two lines of data are then displayed for each system and a label Above 2GB or Below 2GB precedes the corresponding line as shown in Figure 84. Also, all measurements in the Buffer Counts by Pool panel are presented for storage addresses below and above the 2GB bar. This is indicated by the corresponding column headings as shown in Figure 85.

Figure 84. RLSLRU Report

Figure 85. VSAM LRU Overview - Buffer Counts by Pool
Table 56. Fields in the RLSLRU Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVS System</td>
<td>System name.</td>
</tr>
<tr>
<td>Avg CPU Time</td>
<td>Average CPU time spent by BMF LRU processing during each report interval (milliseconds).</td>
</tr>
<tr>
<td>Buffer Size: Goal</td>
<td>Buffer size goal (MB). If no valid goal has been defined, MAX will be shown.</td>
</tr>
<tr>
<td>Buffer Size: High</td>
<td>Buffer size actual high value (MB).</td>
</tr>
<tr>
<td>Accel%</td>
<td>Percentage of Buffer Manager LRU intervals when BMF was over the goal and buffer aging algorithms were accelerated.</td>
</tr>
<tr>
<td>Reclaim%</td>
<td>Percentage of Buffer Manager LRU intervals when BMF was over the goal and buffer aging algorithms were bypassed to reclaim buffers.</td>
</tr>
<tr>
<td>Read</td>
<td><strong>BMF%</strong>  Percentage of READ requests that could be satisfied from local buffers being managed by SMSVSAM.</td>
</tr>
<tr>
<td></td>
<td><strong>CF%</strong>    Percentage of CF cache structure READ requests.</td>
</tr>
<tr>
<td></td>
<td><strong>DASD Read %</strong> Percentage of READ requests to DASD.</td>
</tr>
</tbody>
</table>

**Fields in the Buffer Counts by Pool panel:** There are 16 buffer pools with different buffer sizes between 2K and 32K incremented by 2K. For each pool, this panel presents a line with the high, low and average numbers of BMF buffers during this interval. These values are provided for storage pools allocated to addresses below and above the 2GB-bar. If values above 2GB are not available, ‘-‘ is displayed.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Storage</td>
<td>The amount of buffer pool storage that is specified to be fixed. If no value is available, a ‘-‘ is shown.</td>
</tr>
<tr>
<td>Real Storage %</td>
<td>The value specified by the RLSFIXEDPOOLSIZE parameter divided by the amount of real storage in the system (in percent). If no value is available, a ‘-‘ is shown.</td>
</tr>
<tr>
<td>Fixed Pages</td>
<td>Low, high and average actual number of fixed 4KB-pages. If no value is available, a ‘-‘ is shown.</td>
</tr>
</tbody>
</table>

**RLSSC/RLSDS - VSAM RLS Activity Report**

With VSAM RLS, GETs and PUTs are executed by SMSVSAM on behalf of the application. When the application’s data request can be satisfied from SMSVSAM’s local buffers, no I/O is necessary. If the data in the buffers is invalid, SMSVSAM accesses the VSAM RLS cache structures in the coupling facility in order to fulfill the request. If data in the cache structures is invalid, a DASD I/O is performed.

The report is providing VSAM RLS activity data regarding READ and WRITE requests accessing the local buffers, the CF cache structures and DASD. This data might help you in answering important questions like

- Are there problems with LRU (Least Recently Used algorithms) or buffer pool sizes?
- Are the CF cache structures too small?

**How to request this report**

The VSAM RLS Activity report has two different versions:

- VSAM RLS Activity by Storage Class
- VSAM RLS Activity by Data Set
Both versions of the report have a similar structure, but a different scope of data. From the initial Sysplex Total View for each version, you can navigate to a System/CF Structure View.

To request the VSAM RLS Activity report, select S from the Primary Menu and then select 10 (for storage class) or 11 (for data set) on the Sysplex Report menu (shown in Figure 5 on page 24), or enter one of the following commands:

```
RLSSC [storage_class]
RLSDS [data_set_name]
```

In addition, you can navigate between the two versions of the report with cursor-sensitive control.

Contents of the report

**VSAM RLS Activity by Storage Class**

This report provides a VSAM RLS activity view by storage class. For each storage class, sysplex wide totals will be displayed for direct and sequential access.

<table>
<thead>
<tr>
<th>RMF V2R1</th>
<th>VSAM RLS Activity - SYSPLEX</th>
<th>Line 1 of 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command ===&gt;</td>
<td>Scroll == &lt;&gt; HALF</td>
<td></td>
</tr>
<tr>
<td>Samples: 59</td>
<td>Systems: 2</td>
<td>Date: 09/28/13 Time: 13.16.00 Range: 60 sec</td>
</tr>
<tr>
<td>&lt; 2GB / &gt; 2GB</td>
<td>LRU Status : Good / Accel</td>
<td>Contention % : 0.0 / 0.0</td>
</tr>
<tr>
<td>False Cont % : 0.0 / 0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stor Class</td>
<td>Access Resp -------- Read -------------- Write</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Rate BMF%</td>
<td>CF% DASD% Valid% False Inv% Rate</td>
</tr>
<tr>
<td>RLS</td>
<td>Below 2GB DIR 0.004 665.6 88.2 0.5 11.3 100 0.01 0.00</td>
<td></td>
</tr>
<tr>
<td>Above 2GB DIR 0.004 665.6 88.2 0.5 11.3 100 0.01 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEQ 0.000 0.00 0.0 0.0 0.0 0.00 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLS1</td>
<td>Below 2GB DIR 0.005 200.0 90.5 0.0 9.5 100 0.00 0.00</td>
<td></td>
</tr>
<tr>
<td>Above 2GB SEQ 0.000 0.00 0.0 0.0 0.0 0.00 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLS2</td>
<td>Below 2GB DIR 0.003 213.3 90.5 0.0 9.5 100 0.00 0.00</td>
<td></td>
</tr>
<tr>
<td>Above 2GB SEQ 0.000 0.00 0.0 0.0 0.0 0.00 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLS3</td>
<td>Above 2GB DIR 0.004 665.6 88.2 0.5 11.3 100 0.01 0.00</td>
<td></td>
</tr>
<tr>
<td>SEQ 0.000 0.00 0.0 0.0 0.0 0.00 0.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 86. VSAM RLS Activity by Storage Class - Sysplex Total View*

Cursor-sensitive control on the LRU STATUS field displays the VSAM LRU Overview report (see Figure 84 on page 141) with the Local Buffer Manager LRU statistics for each system.

Cursor-sensitive control on a storage class name redisplays the report with a system and CF cache structure breakdown for the selected storage class.
At the top of the report, the sysplex wide totals for the storage class will be displayed (indicated by *ALL) followed by report lines per system and CF cache structure.

Cursor-sensitive control on a CF structure name displays the CF Activity report (see Figure 23 on page 43) for this structure.

### VSAM RLS Activity by Data Set

This report provides a VSAM RLS activity view by VSAM data sets. The information will be grouped by VSAM spheres. A sphere consists of components, i.e. data sets like BASE.DATA, BASE.INDEX, ALT.DATA and ALT.INDEX. For each data set, sysplex wide totals will be displayed for direct and sequential access. Only those VSAM spheres will be presented for which data collection has been requested.

---

#### Table: VSAM RLS Activity by Data Set

<table>
<thead>
<tr>
<th>System/CF</th>
<th>Access</th>
<th>Resp Time</th>
<th>Rate</th>
<th>BMF%</th>
<th>CF%</th>
<th>DASD%</th>
<th>Valid%</th>
<th>False Inv%</th>
<th>Write Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>*ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>14.98</td>
<td>83.0</td>
<td>0.0</td>
<td>17.0</td>
<td>100</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Above 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>14.98</td>
<td>83.0</td>
<td>0.0</td>
<td>17.0</td>
<td>100</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>SYS4</td>
<td>CACHE01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>7.49</td>
<td>83.0</td>
<td>0.0</td>
<td>17.0</td>
<td>100</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Above 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>7.49</td>
<td>83.0</td>
<td>0.0</td>
<td>17.0</td>
<td>100</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>CACHE02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>CACHE03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 2GB</td>
<td>DIR</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SEQ</td>
<td>0.000</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

---

Figure 87. VSAM RLS Activity by Storage Class - System/CF Structure View
Cursor-sensitive control on the LRU STATUS field displays the VSAM LRU Overview report (see Figure 84 on page 141) with the Local Buffer Manager LRU statistics for each system.

Cursor-sensitive control on a data set name redisplay the report with a system breakdown for the selected VSAM data set. At the top of the report, the sysplex wide totals for the data set will be displayed (indicated by *ALL) followed by report lines per system.

![Figure 88. VSAM RLS Activity by Data Set - Sysplex Total View](image-url)
Cursor-sensitive control on a CF structure name displays the CF Activity report (see Figure 23 on page 43) for this structure.

**Field descriptions**

Note: If applicable, all measurements in the VSAM RLS Activity reports are presented for storage addresses below and above the 2GB bar. This is either indicated by the heading *< 2GB / > 2GB* or by the labels *Above 2GB* or *Below 2GB*.

**Table 57. Fields in the VSAM RLS Activity report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LRU Status</strong></td>
<td>LRU status of local buffers under control of BMF (Buffer Management Facility).</td>
</tr>
<tr>
<td>Good</td>
<td>BMF is at or below its goal on all systems.</td>
</tr>
<tr>
<td>Accelerated</td>
<td>BMF is over the goal on at least one system, and the buffer aging algorithms were accelerated.</td>
</tr>
<tr>
<td>Reclaimed</td>
<td>BMF is over the goal on at least one system, and the buffer aging algorithms were bypassed to reclaim buffers.</td>
</tr>
<tr>
<td>Contention %</td>
<td>Percentage of true LOCK contentions: all external requests issued by connectors delayed due to contention on a lock. If the value above 2 GB is not available, ‘-’ is displayed.</td>
</tr>
<tr>
<td>False Cont %</td>
<td>Percentage of false LOCK contentions: All external requests issued by connectors that experience “hash contention”.</td>
</tr>
<tr>
<td>This occurs because a hashing algorithm is used to map a lock request to a lock table entry. When more than one lock request maps to a lock table entry, there is the potential for contention delay. You may need to increase the size of the lock table.</td>
<td></td>
</tr>
<tr>
<td>If the value above 2 GB is not available, ‘-’ is displayed.</td>
<td></td>
</tr>
<tr>
<td>Stor Class</td>
<td>Storage class name.</td>
</tr>
<tr>
<td>Cache Set</td>
<td>DFSMS cache set name.</td>
</tr>
<tr>
<td>Data Set</td>
<td>VSAM data set name.</td>
</tr>
</tbody>
</table>
### Table 57. Fields in the VSAM RLS Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock Set</td>
<td>Lock set name. Multiple Lock Structure support allows defining an additional Coupling Facility DFSMS lock structure to be associated with a single SMS storage class. Each lock set can contain a single lock structure name. If multiple lock structures are not supported, the line remains blank.</td>
</tr>
<tr>
<td>Lock Struct</td>
<td>Name of the lock structure associated with the lock set. If no lock structure is associated, IGWLOCK00 is used and reported. If multiple lock structures are not supported, IGWLOCK00 is also used, however, the line remains blank.</td>
</tr>
<tr>
<td>Stor Class</td>
<td>Storage class name (first column in the Sysplex Total View in the Storage Class flavour).</td>
</tr>
<tr>
<td>System/CF</td>
<td>System name (*ALL indicates a sysplex-wide view) and the CF cache structure name (first column in the System/CF Structure View in both flavours).</td>
</tr>
<tr>
<td>Sphere/DS</td>
<td>VSAM sphere name and the VSAM data set name (first column in the Sysplex Total View in the Data Set flavour).</td>
</tr>
<tr>
<td>Access</td>
<td>Indicates whether the values in this row are shown for direct access (DIR) or sequential access (SEQ). There may be up to two sets of data depending on whether buffers above or below 2 GB were accessed.</td>
</tr>
<tr>
<td>Resp Time</td>
<td>Average response time of all requests (seconds).</td>
</tr>
<tr>
<td>Read Rate</td>
<td>Total number of BMF READ requests per second. BMF READ requests is sum of BMF valid READ hits, CF READ hits and DASD READs. The value is reported as '&lt;0.01' if the rate is greater than 0 but below 0.01.</td>
</tr>
<tr>
<td>BMF Read%</td>
<td>Percentage of BMF valid READ hits that is the percentage of READ requests that were satisfied from local buffers being managed by SMSVSAM.</td>
</tr>
<tr>
<td>CF Read%</td>
<td>Percentage of READ requests that were satisfied by the CF cache structure.</td>
</tr>
<tr>
<td>DASD Read%</td>
<td>Percentage of READ requests to DASD.</td>
</tr>
</tbody>
</table>
| BMF Valid%    | Percentage of BMF READ hits that were valid. If a buffer is found in the local cache and is determined to be valid according to the information in local control blocks, this counts as a BMF valid READ hit. **Note:** A BMF READ hit is determined to be valid based on the IXLVECTR local vector service TestLocalCache. If it is invalid based on IXLVECTR, this counts as a BMF invalid READ hit. BMF READ hits is the sum of valid and invalid READ hits. If IXLVECTR indicates the buffer to be valid, it can be used. If invalid, the buffer can not be used. There are two reasons for indicating a buffer to be invalid:  
  * Another system has altered the data which has been locally buffered. Thus, the copy in the BMF local cache became out-of-date (BMF true invalid READ hits).  
  * The coupling facility has lost track of the integrity status of the buffer (BMF false invalid READ hits).  

To make use of BMF Valid%, following formulas are helpful:  
- BMF Invalid Read Hits = True + False Invalid Read Hits  
- BMF Read Hit% = BMF Read% / BMF Valid% * 100  
- BMF Invalid Read Hit% = BMF Read Hit% - BMF Read% |
| BMF False Inv%| Percentage of READ requests when the copy in the BMF local cache was invalid because the coupling facility has lost track of the integrity status of the buffer. |
| Write Rate    | Total number of BMF WRITE requests per second. The value is reported as '<0.01' if the rate is greater than 0 but below 0.01. |

### SPACED - Disk Space Report

The Disk Space Report displays capacity and disk space information for volumes. This report displays only those volumes that belong to storage groups specified with the Monitor III SCSPACE gatherer option. You can use this information to decide whether a certain volume provides sufficient free disk space for new allocation requests.
Together with the Storage Space Report, this report can help to make decisions for long-term disk space capacity planning.

Although the Disk Space Report is a single system report, the report combines the data collected from all systems within the sysplex. This allows you to gather the data for an SMS Storage Group only on one system of the sysplex so that the collection of redundant data can be avoided.

**How to request this report**

To request the Disk Space Report, select 1 from the Primary Menu, then select 11 from the Overview Report Selection Menu (shown in Figure 6 on page 25) or enter one of the following commands:

```
SPACED
SPD
```

In addition, you can invoke the Disk Space Report for all volumes of a selected storage group by using cursor-sensitive control from the Storage Space Report (SPACEG).

**Contents of the report**

```
<table>
<thead>
<tr>
<th>Volume</th>
<th>Total (MB)</th>
<th>Free (MB)</th>
<th>Free (%)</th>
<th>Largest Ext (MB)</th>
<th>Storage Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSSD1</td>
<td>8120</td>
<td>2922</td>
<td>36.0</td>
<td>2922</td>
<td>DB2</td>
</tr>
<tr>
<td>SYSSD3</td>
<td>8120</td>
<td>2291</td>
<td>28.2</td>
<td>2291</td>
<td>DB2</td>
</tr>
<tr>
<td>SYSSD2</td>
<td>8120</td>
<td>2074</td>
<td>25.5</td>
<td>2074</td>
<td>DB2</td>
</tr>
<tr>
<td>SYSOPE</td>
<td>8120</td>
<td>6326</td>
<td>77.9</td>
<td>6326</td>
<td>OMVSSYS</td>
</tr>
<tr>
<td>SYSSM5</td>
<td>8120</td>
<td>1164</td>
<td>14.3</td>
<td>40</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM3</td>
<td>8120</td>
<td>1034</td>
<td>12.7</td>
<td>233</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM6</td>
<td>8120</td>
<td>1017</td>
<td>12.5</td>
<td>294</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM2</td>
<td>8120</td>
<td>1004</td>
<td>12.4</td>
<td>198</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM5</td>
<td>8120</td>
<td>982</td>
<td>12.1</td>
<td>62</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM4</td>
<td>8120</td>
<td>947</td>
<td>11.7</td>
<td>34</td>
<td>SMS</td>
</tr>
<tr>
<td>SYSSM7</td>
<td>8120</td>
<td>728</td>
<td>9.0</td>
<td>139</td>
<td>SMS</td>
</tr>
</tbody>
</table>
```

**Field descriptions**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Name of the volume belonging to a monitored storage group.</td>
</tr>
<tr>
<td>Total (MB)</td>
<td>Total amount of disk space (in megabytes) on the volume.</td>
</tr>
<tr>
<td>Free (MB)</td>
<td>Total amount of free disk space (in megabytes) on the volume.</td>
</tr>
<tr>
<td>Free (%)</td>
<td>Percentage of free disk space on the volume.</td>
</tr>
<tr>
<td>Largest Ext (MB)</td>
<td>Largest block (extent) in megabytes of unallocated disk space available on the volume.</td>
</tr>
<tr>
<td>Storage Group</td>
<td>Name of the storage group to which the volume belongs.</td>
</tr>
</tbody>
</table>
A storage group is a collection of storage volumes and attributes, defined by the storage administrator and treated as a single object storage hierarchy. The Storage Space Report allows you to keep track of disk space consumption on a storage group level. This report displays only those volumes that belong to storage groups specified with the Monitor III SGSPACE gatherer option.

From this report, you can see whether the system can provide sufficient disk space for new allocation requests. This report may also be useful for making decisions in long-term disk space capacity planning.

Although the Storage Space Report is a single system report, the report combines the data collected from all systems within the sysplex. This allows you to gather the data for an SMS Storage Group only on one system of the sysplex so that the collection of redundant data can be avoided.

How to request this report

To request the Storage Space report, select 1 from the Primary Menu, then select 10 from the Overview Report Selection Menu (shown in Figure 6 on page 25) or enter one of the following commands:

SPACEG
SPG

Contents of the report

<table>
<thead>
<tr>
<th>SGroup</th>
<th>Total (MB)</th>
<th>Free (MB)</th>
<th>Free (%)</th>
<th>Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>*ALL</td>
<td>322116</td>
<td>165322</td>
<td>51.3</td>
<td>100 *</td>
</tr>
<tr>
<td>SGSMB</td>
<td>70382</td>
<td>35610</td>
<td>50.6</td>
<td>28 *</td>
</tr>
<tr>
<td>SGZFS</td>
<td>78503</td>
<td>39376</td>
<td>50.2</td>
<td>32 *</td>
</tr>
<tr>
<td>SMSCAT1</td>
<td>2707</td>
<td>398</td>
<td>14.7</td>
<td>1</td>
</tr>
<tr>
<td>SMS3390B</td>
<td>16240</td>
<td>8683</td>
<td>53.5</td>
<td>2</td>
</tr>
<tr>
<td>S1P01</td>
<td>18947</td>
<td>18802</td>
<td>99.2</td>
<td>3</td>
</tr>
<tr>
<td>S1P03</td>
<td>24360</td>
<td>23946</td>
<td>98.3</td>
<td>3</td>
</tr>
<tr>
<td>TSODA1</td>
<td>21654</td>
<td>1473</td>
<td>6.8</td>
<td>4</td>
</tr>
<tr>
<td>TSODA2</td>
<td>8120</td>
<td>411</td>
<td>5.1</td>
<td>1</td>
</tr>
<tr>
<td>TSODA3</td>
<td>5414</td>
<td>139</td>
<td>2.6</td>
<td>2</td>
</tr>
<tr>
<td>TSODA4</td>
<td>5414</td>
<td>86</td>
<td>1.6</td>
<td>2</td>
</tr>
<tr>
<td>USSFS</td>
<td>70375</td>
<td>36398</td>
<td>51.7</td>
<td>12</td>
</tr>
</tbody>
</table>

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGroup</td>
<td>Name of the storage group connected to the system. The line showing *ALL in this column presents the accumulated values or average percentage values for all storage groups.</td>
</tr>
</tbody>
</table>
## Mon III - SPACEG

Table 59. Fields in the Storage Space Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (MB)</td>
<td>Total amount of disk space (in megabytes) on all online volumes in the storage group.</td>
</tr>
<tr>
<td>Free (MB)</td>
<td>Total amount of free disk space (in megabytes) on all online volumes in the storage group.</td>
</tr>
<tr>
<td>Free (%)</td>
<td>Percentage of free disk space in the storage group.</td>
</tr>
<tr>
<td>Volumes</td>
<td>Number of volumes in the storage group. If at least one volume did not return any space information, the number is followed by an *.</td>
</tr>
</tbody>
</table>

## STOR - Storage Delays Report

The Storage Delays report is job-oriented. It displays storage delay information for all jobs.

### How to request this report

To request the Storage Delays report, select 3, from the Primary Menu, then select 6 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

```
STOR [job_class,service_class]
```

For example, to get a Storage Delays report for TSO service class TSOPRIME, enter:

```
STOR T, TSOPRIME
```

### Contents of the report

![Table showing storage delays](image)

The graphic form of this report shows the percentage of each user's time that COMM, LOCL, SWAP, OUTR, and OTHR contributed to the delay of the job for storage.
Field descriptions

Table 60. Fields in the STOR Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of a job that is delayed for storage. The STOR report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows:</td>
</tr>
<tr>
<td>A</td>
<td>ASCH</td>
</tr>
<tr>
<td>B</td>
<td>Batch</td>
</tr>
<tr>
<td>O</td>
<td>OMVS</td>
</tr>
<tr>
<td>S</td>
<td>Started task</td>
</tr>
<tr>
<td>T</td>
<td>TSO</td>
</tr>
<tr>
<td>?</td>
<td>Data is missing or invalid.</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td>DLY %</td>
<td>Delay the waiting job (address space) is experiencing because of contention for storage during the range period, expressed as a percentage.</td>
</tr>
<tr>
<td>% Delayed for</td>
<td>The percentage that COMM, LOCL, OTHR, SWAP, and OUTR contribute to the delay of the job for storage. If there is no overlap of the delay states, the percentages for all these resources add up to the DLY % value; if there is overlap, the percentages add up to more than the DLY % value.</td>
</tr>
<tr>
<td>Working Set</td>
<td>The working set value represents the average amount of storage (in frames) a user occupied while in central and expanded storage (not swapped), including dataspaces and hiperspaces. The second column is blank if the system is running in 64-bit mode.</td>
</tr>
</tbody>
</table>

Monitor III Utility fields

You can use the Monitor III Utility to customize the Storage Delays report. In addition to the delays shown above, you can use the Utility to have the delay percentages in Table 61 on page 152 shown in the Storage Delays report.
Table 61. Additional Fields in the STOR Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% delayed for VIO</td>
<td>The percentage of time a job was delayed because of virtual I/O.</td>
</tr>
<tr>
<td>% delayed for XMEM</td>
<td>The paging delays from cross memory address spaces.</td>
</tr>
<tr>
<td>% delayed for HIPR</td>
<td>The paging delays from standard hiperspaces (including waits during scroll wait), but not ESO hiperspaces.</td>
</tr>
<tr>
<td>Average ACTV frames</td>
<td>The average number of central storage frames held by the job while it was active.</td>
</tr>
<tr>
<td>Average fixed frames total</td>
<td>The average number of fixed frames the job was using during the report interval including frames both above and below the 16 megabyte line.</td>
</tr>
<tr>
<td>Average IDLE frames</td>
<td>The average number of frames held by the job while it was idle.</td>
</tr>
</tbody>
</table>

Report options

The STOR Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

STORC - Common Storage Report

This report provides information about the use of common storage (CSA, ECSA, SQA, and ESQA) within a system.

The top section of the report provides overall system information about the use of common storage. For more information about the fields in this section, see Table 62 on page 153.

The bottom section of the report provides job-related information about the use of common storage for jobs active during the specified report interval. The jobs are sorted by descending storage percentage; that is, for each job with the maximum of the four common storage percentages, the job with the highest maximum percentage is reported first. These fields are described in Table 63 on page 154.

Note:

1. The report can be incomplete for some jobs, this will be indicated by messages ERB617I, ERB618I, or ERB619I. They explain that CSA/ECSA or SQA/ESQA data needed for RMF reporting was not completely gathered. VSM common storage (CSA, ECSA, SQA, and ESQA) tracking was either not active or partially active since the job started.

The common storage data fields are reported in dark blue for those jobs that data was partially gathered.

If VSM common storage tracking was partially active, you can use the BREF command to select a range period when common storage data gathering was active.

If VSM common storage tracking was not active, contact your system programmer to activate VSM common storage tracking by issuing:

```bash
SET DIAG=01
```

The defaults in the SYS1.PARMLIB member DIAG01 are:

```bash
VSM TRACK CSA(ON) SQA(ON)
```

2. In the calculations used for this report, when CSA is converted to SQA but not allocated, the amount is still considered part of allocated CSA. Only when the converted CSA is allocated is it considered allocated SQA. Because CSA to SQA
conversion can increase SQA to a value larger than defined at IPL, percent values of SQA can be greater than 100%. This also applies for ECSA to ESQA conversions.

**How to request this report**

To request the Common Storage report, select 3, from the Primary Menu, then select 10 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

```
STORC [job_class,service_class]
```

For example, to get a Common Storage report for TSO service class TSOPRIME, enter:

```
STORC T, TSOPRIME
```

**Contents of the report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPL Definitions</td>
<td>The amount of common storage (CSA, ECSA, SQA, and ESQA) defined to the system at IPL. For the definition of CSA/SQA amounts and the description of the IEASYSxx member, see z/OS MVS Initialization and Tuning Reference.</td>
</tr>
</tbody>
</table>
### Table 62. Fields in the STORC Report - System Information Section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Allocation Values</td>
<td>The peak common storage (CSA, ECSA, SQA, and ESQA) values since IPL.</td>
</tr>
<tr>
<td></td>
<td>The peak allocation values include common storage used by:</td>
</tr>
<tr>
<td></td>
<td>• Active jobs</td>
</tr>
<tr>
<td></td>
<td>• System activity not related to a specific job</td>
</tr>
<tr>
<td></td>
<td>• Ended jobs that did not release all common storage</td>
</tr>
<tr>
<td></td>
<td>The percent values are calculated by dividing the peak allocation amount by the corresponding common storage IPL value.</td>
</tr>
<tr>
<td>Average CSA to SQA Conversion</td>
<td>The amount of CSA or ECSA converted to SQA or ESQA, respectively.</td>
</tr>
<tr>
<td></td>
<td>The percent value of CSA is calculated by dividing the amount of CSA converted to SQA by the amount of CSA defined at IPL.</td>
</tr>
<tr>
<td></td>
<td>The percent value of ECSA is calculated by dividing the amount of ECSA converted to ESQA by the amount of ECSA defined at IPL.</td>
</tr>
<tr>
<td></td>
<td>The percent and amount values for SQA and ESQA are blank.</td>
</tr>
<tr>
<td>Average Use Summary</td>
<td>The average common storage (CSA, ECSA, SQA, and ESQA) usage during the specified range.</td>
</tr>
<tr>
<td></td>
<td>The average use values include common storage used by:</td>
</tr>
<tr>
<td></td>
<td>• Active jobs</td>
</tr>
<tr>
<td></td>
<td>• System activity not related to a specific job</td>
</tr>
<tr>
<td></td>
<td>• Ended job that did not release all common storage</td>
</tr>
<tr>
<td>Available at End of Range</td>
<td>The amount and percentage of common storage (CSA, ECSA, SQA, and ESQA) available for allocation at the end of the specified range.</td>
</tr>
<tr>
<td>Unalloc Common Area</td>
<td>The amount of unallocated common area below 16M (CSA + SQA) available at the end of the specified range.</td>
</tr>
</tbody>
</table>

### Table 63. Fields in the STORC Report - Job Information Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of a job or job group (*SYSTEM, *TSO, *BATCH, *STC, *ASCH, or *OMVS) using common storage. The name can also be:</td>
</tr>
<tr>
<td></td>
<td>%MVS Summary information about common storage being requested with the GETMAIN parameter OWNER(SYSTEM).</td>
</tr>
<tr>
<td></td>
<td>%REMAIN Summary information about common storage that was not released by ended jobs.</td>
</tr>
<tr>
<td></td>
<td>*srvcls Summary information about this service class (*srvcls is replaced by the name of the service class).</td>
</tr>
<tr>
<td></td>
<td>The %MVS and %REMAIN summary lines cannot be excluded from this report.</td>
</tr>
<tr>
<td></td>
<td>Cursor-sensitive control is only active on the %REMAIN Name field. If you select %REMAIN, the STORCR (Common Storage Remaining) report will be shown.</td>
</tr>
<tr>
<td>Act</td>
<td>Job status at end of the specified report interval.</td>
</tr>
<tr>
<td>N</td>
<td>A job ended during the report interval and released all common storage.</td>
</tr>
<tr>
<td>H</td>
<td>A job ended during the report interval but is still holding some common storage</td>
</tr>
<tr>
<td></td>
<td>If the field is blank, the job was still active.</td>
</tr>
<tr>
<td></td>
<td>Cursor-sensitive control is only active on the 'H' ACT field. If you select H, the STORCR (Common Storage Remaining) report will be shown with the selected job reported first.</td>
</tr>
<tr>
<td>Note:</td>
<td>If VSM tracking is stopped during the report interval, the job status for all jobs, even those still holding common storage, will be N.</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows:</td>
</tr>
<tr>
<td>A</td>
<td>ASCH</td>
</tr>
<tr>
<td>B</td>
<td>Batch</td>
</tr>
<tr>
<td>O</td>
<td>OMVS</td>
</tr>
<tr>
<td>S</td>
<td>Started task</td>
</tr>
<tr>
<td>T</td>
<td>TSO</td>
</tr>
<tr>
<td>?</td>
<td>Data is missing or invalid.</td>
</tr>
</tbody>
</table>
### Field Heading | Meaning
---|---
Service Class | The name of the service class that a specified job has been running in.
ASID | The unique system-assigned identifier for the address space in which the job is running.
ELAP time | The time elapsed between a job's starting time and end of range time.
| If a job's ELAP time is greater than 999.9 days, RMF displays asterisks (***.*D) in this field instead of the elapsed time.
| The field is blank when the start time of a job is zero. For example, the field is blank for batch initiators.
| **Note:** The ELAP time value in the STORC report is not the same as the TET (transaction elapsed time) exception value in the WFEX report. The ELAP time is the time range from the start of the address space. TET is the transaction elapsed time for the last active transaction.
Percent Used | The average percentage of common storage (CSA, ECSA, SQA, and ESQA) used by a job during the specified report interval.
| If data gathering was stopped between IPL and end of range, the field is reported in dark blue.
Amount Used | The average amount of common storage (CSA, ECSA, SQA, and ESQA) used by a job during the specified report interval (specified as bytes).
| **Note:** You might notice a difference between the Amount Used reported in a summary line and the sum of Amount Used values for all corresponding jobs. The Amount Used value for an individual job is rounded to the nearest whole number. However, the Amount Used value for a summary line is calculated by adding the exact value for all corresponding jobs and then rounding the value.
| If data gathering was stopped between IPL and end of range, the field is reported in dark blue.

### Monitor III Utility fields
You can use the Monitor III Utility to customize the STORC report. In addition to the information shown above you can use the Utility to have the following values shown.

### Field Heading | Meaning
---|---
Termination date | The date the job ended.
Termination time | The time the job ended.
ID | The ID for the ended job. The ID can be used to identify the job in the system logs.

### Report options

![Figure 94. STORC Report Options Panel](image)
You can specify a threshold for common storage usage. If a selected job's use of CSA, ECSA, SQA, or ESQA is greater than or equal to the threshold value, that job will be displayed in the report.

If you select YES for Jobs on the Report Options panel, a Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

**STORCR - Common Storage Remaining Report**

The Common Storage Remaining report identifies jobs that have ended but have not released all of their allocated common storage (CSA, ECSA, SQA, and ESQA) since IPL.

The report is a snapshot of the system at the end of the specified report interval.

The jobs are sorted by descending storage percentage; that is, for each job with the maximum of the four common storage percentages, the job with the highest maximum percentage is reported first. Cursor-sensitive control is not active on the report.

**How to request this report**

To request the Common Storage Remaining report, select 3 from the Primary Menu, then select 11 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter following command:

```
STORCR
```

**Contents of the report**

<table>
<thead>
<tr>
<th>Jobname ID</th>
<th>Job Ended Date</th>
<th>Job Ended Time</th>
<th>CSA</th>
<th>ECSA</th>
<th>SQA</th>
<th>ESQA</th>
</tr>
</thead>
<tbody>
<tr>
<td>%REMAIN</td>
<td>09/28/13</td>
<td>15.59.39</td>
<td>0</td>
<td>1504</td>
<td>118</td>
<td>23952</td>
</tr>
<tr>
<td>CANFDSSST STC04642</td>
<td>09/28/13</td>
<td>15.59.39</td>
<td>0</td>
<td>513K</td>
<td>96</td>
<td>128</td>
</tr>
<tr>
<td>CANFDSSST STC04661</td>
<td>09/28/13</td>
<td>04.40.09</td>
<td>0</td>
<td>506K</td>
<td>0</td>
<td>128</td>
</tr>
<tr>
<td>CATALOG</td>
<td>09/28/13</td>
<td>15.01.02</td>
<td>0</td>
<td>0</td>
<td>768</td>
<td>8552</td>
</tr>
<tr>
<td>CATALOG</td>
<td>09/28/13</td>
<td>10.01.03</td>
<td>0</td>
<td>0</td>
<td>512</td>
<td>6624</td>
</tr>
<tr>
<td>IRRDPTAB STC04335</td>
<td>09/28/13</td>
<td>13.36.06</td>
<td>0</td>
<td>86632</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CATALOG</td>
<td>09/28/13</td>
<td>13.35.32</td>
<td>0</td>
<td>0</td>
<td>128</td>
<td>1360</td>
</tr>
<tr>
<td>STARTMVS</td>
<td>09/28/13</td>
<td>13.47.17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5336</td>
</tr>
<tr>
<td>SMF DUMP STC04334</td>
<td>09/28/13</td>
<td>13.36.36</td>
<td>0</td>
<td>2416</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BENK</td>
<td>09/28/13</td>
<td>16.15.44</td>
<td>0</td>
<td>2304</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TAGE</td>
<td>TSU04619</td>
<td>05.04.15</td>
<td>0</td>
<td>1024</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BPXAS</td>
<td>STC04881</td>
<td>09.33.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>96</td>
</tr>
<tr>
<td>BPXAS</td>
<td>STC04865</td>
<td>07.23.36</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>96</td>
</tr>
</tbody>
</table>

Figure 95. STORCR Report

There is no graphic version of this report available.

**Note:** If you request the STORCR report and VSM tracking was stopped between IPL and end of range, an empty STORCR report can be displayed with the message 'No ended jobs found'.
Field descriptions

Table 65. Fields in the STORCR Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of the job that ended but did not release all of its common storage (CSA, ECSA, SQA, or ESQA). The %REMAIN summary line is always the first reported line and cannot be excluded from the report.</td>
</tr>
<tr>
<td>ID</td>
<td>The ID for the ended job. The ID can be used to identify the job in the system logs. The ID field is blank for some system-related address spaces.</td>
</tr>
<tr>
<td>Job Ended Date</td>
<td>The date the job ended. You can use the language options panel to customize the date format.</td>
</tr>
<tr>
<td>Job Ended Time</td>
<td>The time the job ended. You can use the language options panel to customize the time format.</td>
</tr>
<tr>
<td>Amount of Common Storage Not Released at End of Job</td>
<td>The amount of allocated common storage (CSA, ECSA, SQA, and ESQA) that was not released when the job ended. If data gathering was stopped between IPL and end of range, the field can be reported in dark blue.</td>
</tr>
</tbody>
</table>

There are no report options to specify for the STORCR report.

STORF - Storage Frames Report

The Storage Frames report contains detailed frame counts, auxiliary slot count, and page-in rate for each address space.

How to request this report

To request the Storage Frames report, select 3 from the Primary Menu, then select 7 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

STORF [job_class,service_class]
Contents of the report

Table 66. Fields in the STORF Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of a job that is delayed for storage. The STORF delay report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows: &lt;br&gt; A = ASCH &lt;br&gt; B = Batch &lt;br&gt; O = OMVS &lt;br&gt; S = Started task &lt;br&gt; T = TSO &lt;br&gt; ? = Data is missing or invalid.</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td>Cr</td>
<td>An S in this column indicates that WLM managed the address space as storage critical during the reporting interval.</td>
</tr>
</tbody>
</table>
### Table 66. Fields in the STORF Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Occup.</td>
<td>This field shows the frame occupancy divided into three categories.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>The sum of the ACTV and IDLE frames. The shared page counts are not included in TOTAL.</td>
</tr>
<tr>
<td>ACTV</td>
<td>The average number of frames held by the job while it was active. This value represents the average number of active central storage frames the job used during the report interval.</td>
</tr>
<tr>
<td>IDLE</td>
<td>The average number of frames held by the job while it was idle. This value represents the average number of central storage frames the jobs used when it was idle during the report interval.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Active Frames</th>
<th>This field is broken into three categories.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSET</td>
<td>See Table 60 on page 151 for a description of this value. The shared page counts are not included in WSET.</td>
</tr>
<tr>
<td>FIXED</td>
<td>The average number of fixed frames the job was using during the report interval including frames both above and below the 16 megabyte line. While a user is swapped in, it is the number of fixed frames being used. While a user is swapped out, it is the number of fixed frames that will be used when the user is swapped back in.</td>
</tr>
<tr>
<td>DIV</td>
<td>The number of central storage frames used by DIV. This count is accumulated only for jobs, not for service classes. A service class displayed on the report may not be the same as where the job was running when the DIV sample was taken.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUX SLOTS</th>
<th>Number of auxiliary slots for each address space.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGIN RATE</td>
<td>The average number of page-ins per second for an address space.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitor III Utility fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can use the Monitor III Utility to customize the STORF report. The additional fields show the shared storage page measurements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 67. Additional Fields in the STORF Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Heading</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Shared Page-in rate</td>
</tr>
<tr>
<td>Shared page validations</td>
</tr>
</tbody>
</table>
### Table 67. Additional Fields in the STORF Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total valid shared pages</td>
<td>Total number of shared pages in central storage that are valid in this address space. Valid means that the page has been brought into central storage and has been made addressable for the address space.</td>
</tr>
<tr>
<td>Total number of shared pages</td>
<td>Total number of shared pages for the requested range. This is the number of pages owned by the address space that have been shared (whether they were referenced or not).</td>
</tr>
<tr>
<td>ES Rate</td>
<td>Rate at which pages are being read into central storage from expanded storage, including single and blocked pages, but excluding hiperspace or VIO pages.</td>
</tr>
<tr>
<td>Memory Objects Total</td>
<td>Number of memory objects allocated by this address space.</td>
</tr>
</tbody>
</table>

### Report options

The STORF Report Options panel is similar to the DEV Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

### STORM - Storage Memory Objects Report

This report provides information about the use of memory objects within the system. A memory object is a contiguous range of virtual addresses that is allocated by jobs in units of megabytes on a megabyte boundary.

The System Summary section of the report provides overall system information about memory objects. The bottom section provides job-related information about the use of memory objects for jobs active during the specified report interval.

### How to request this report

To request the Storage Memory Objects report, select a 3 from the Primary Menu, then select 7A from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

```
STORM [job_class,service_class]
```
Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MemObj</td>
<td><strong>Shared</strong> Average number of memory objects allocated in the high virtual shared storage of the system. <strong>Common</strong> Average total number of memory objects allocated in the high virtual common storage of the system. This value includes the memory objects that cannot be attributed to an address space.</td>
</tr>
<tr>
<td>Frames</td>
<td><strong>Shared</strong> Average number of high virtual shared storage pages backed in central storage (in units of 4 KB). <strong>Common</strong> Average number of high virtual common storage pages backed in central storage (in units of 4 KB). <strong>%Used</strong> Percentage of high virtual common storage used by the system.</td>
</tr>
<tr>
<td>1MB MemObj</td>
<td><strong>Total</strong> Average number of fixed memory objects that are allocated in the system and can be backed in 1 MB frames. <strong>Common</strong> Average number of fixed memory objects that are allocated in high virtual common storage and can be backed in 1 MB frames. This value includes the memory objects that cannot be attributed to an address space. <strong>These fields are only available with Enhanced DAT Architecture.</strong></td>
</tr>
</tbody>
</table>
### Table 68. Fields in the STORM Report - System Summary Section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1MB Fixed</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>%Used</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1MB Pgable</td>
<td>Initial</td>
</tr>
<tr>
<td></td>
<td>Dynamic</td>
</tr>
<tr>
<td></td>
<td>%Used</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These fields are only available with Enhanced DAT Architecture.

### Table 69. Fields in the STORM Report - Address Space Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>The name of a job using memory objects</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows:</td>
</tr>
<tr>
<td></td>
<td>A ASCH</td>
</tr>
<tr>
<td></td>
<td>B Batch</td>
</tr>
<tr>
<td></td>
<td>O OMVS</td>
</tr>
<tr>
<td></td>
<td>S Started task</td>
</tr>
<tr>
<td></td>
<td>T TSO</td>
</tr>
<tr>
<td></td>
<td>? Data is missing or invalid.</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
<tr>
<td>ASID</td>
<td>The decimal identifier of the address space in which the job is running.</td>
</tr>
<tr>
<td>Memory Objects</td>
<td>Total average number of memory objects allocated by this address space.</td>
</tr>
<tr>
<td></td>
<td>Comm average number of high virtual common memory objects allocated by this address space.</td>
</tr>
<tr>
<td></td>
<td>Shr average number of high virtual shared memory objects allocated by this address space.</td>
</tr>
<tr>
<td></td>
<td>1 MB average number of fixed memory objects allocated with this address space as the owner that can be backed in 1 MB frames. This field is only available with Enhanced DAT Architecture.</td>
</tr>
<tr>
<td>1 MB Frames</td>
<td>Fixed average number of 1 MB frames in the Large Frame Area owned by this address space. Frames that are used to satisfy 4 KB space requests on a constrained system are not included.</td>
</tr>
<tr>
<td></td>
<td>Pgable average number of 1 MB frames that are used by pageable and DREF memory objects owned by this address space. Pageable memory objects that have been fixed after allocation, are also included. Frames that are either used by common 1 MB pages or to satisfy 4 KB space requests on a constrained system are not included.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Bytes</td>
<td>Total average amount of storage allocated from high virtual memory in memory objects with this address space as the owner.</td>
</tr>
<tr>
<td></td>
<td>Comm average amount of high virtual common storage allocated with this address space as the owner.</td>
</tr>
<tr>
<td></td>
<td>Shr average amount of high virtual shared storage allocated with this address space as the owner.</td>
</tr>
</tbody>
</table>
Report options

The STORM Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 73 for an example. If you select YES for Jobs on the STORM Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

STORR - Storage Resource Delays Report

The Storage Resource Delays report (STORR) provides information about storage problems and paging space delay by volume serial.

How to request this report

To request the Storage Resource Delays report, select 3 from the Primary Menu, then select 8 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:

```
STORR
```

Contents of the report

<table>
<thead>
<tr>
<th>Command ===</th>
<th>Scroll ==&gt; PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samples: 9</td>
<td>System: SYSF</td>
</tr>
<tr>
<td>Date: 09/28/13</td>
<td>Time: 08.44.00</td>
</tr>
<tr>
<td>Total SQA + ESQA Overflow: 28K</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Frames System</td>
<td></td>
</tr>
<tr>
<td>NUC</td>
<td>SQA</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 98. STORR Report

The report has two sections.

Central Storage Summary

This section includes general information about the use of central storage.

Page/Swap Activity

This section includes information about page/swap activity and paging delays.

If RMF cannot provide data in the Page/Swap Activity section for ACT %, CON %, DSC %, and PND %, dashes appear in these fields.

If RMF is unable to obtain valid hardware data for a sub-channel, it prints dashes (---) instead of DLY DB% and DLY CU%.
The graphic form of this report shows the average number of active users connected (CON), disconnected (DSC), pending (PND), and delayed for LOCL, SWAP, and COMM.

Field descriptions

Table 70. Fields in the STORR Report - Central Storage Summary Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Frames</td>
<td>The percentage of storage being used for NUC, SQA, CSA, LPA, ACTV, IDLE, and available. All percentages are based on the total number of online central storage frames during the report interval. The categories are as follows: NUC: Percentage of central storage frames allocated to the nucleus (NUC). SQA: Percentage of central storage frames allocated to the system queue area (SQA). CSA: Percentage of central storage frames allocated to the common storage area (CSA). LPA: Percentage of central storage frames allocated to the link pack area (LPA). ACTV: Percentage of private frames allocated to jobs that are active. This value represents the number of central storage frames allocated to all active address spaces. It includes idle, using, and unknown time. IDLE: Percentage of private frames allocated to jobs that are idle. This value represents the number of central storage frames allocated to all idle address spaces. AVAIL: Percentage of available central frames. The number of free one megabyte (large) pages is included in the calculation of AVAIL %. SHR: Percentage of shared frames in central storage.</td>
</tr>
<tr>
<td>Frames Online</td>
<td>The number of central storage frames, excluding read-only frames. Nucleus frames are included in this value.</td>
</tr>
<tr>
<td>System UIC</td>
<td>The system’s unreferenced interval count indicates storage contention.</td>
</tr>
<tr>
<td>Total SQA + ESQA Overflow</td>
<td>The amount of CSA and ECSA storage used to hold SQA and ESQA data when SQA and ESQA are full. If there is no overflow, the field heading for Total SQA + ESQA overflow will not appear. Total SQA + ESQA Overflow = [ \frac{\text{Total Overflow}}{# \text{ Samples}} ] Total overflow above and below 16M</td>
</tr>
</tbody>
</table>

Table 71. Fields in the STORR Report - Page/Swap Activity Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Serial</td>
<td>Name the volume that contains a page data set.</td>
</tr>
<tr>
<td>DEV Type</td>
<td>The device type.</td>
</tr>
<tr>
<td>CU Type</td>
<td>The control unit type.</td>
</tr>
<tr>
<td>PAV</td>
<td>The number of parallel access volumes (base and alias) which were available at the end of the report interval. If the number has been changed during the report interval, it is followed by an ‘*’. If the device is a HyperPAV base device, the number is followed by an ‘H’. The value is the average number of HyperPAV volumes (base and alias) for that interval.</td>
</tr>
<tr>
<td>Accumulated # of HPAV devices = [ \frac{\text{Accumulated # of HPAV devices}}{# \text{ Samples}} ]</td>
<td></td>
</tr>
<tr>
<td>Average # of HPAV devices = [ \frac{\text{Average # of HPAV devices}}{# \text{ Samples}} ]</td>
<td></td>
</tr>
</tbody>
</table>

This field appears only for parallel access volumes.
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ACT % | The percentage of time during the report interval when the device was active. To derive this value, RMF computes the accumulated active time as follows: 
\[
\text{Active Time} = \text{PND Time} + \text{CON Time} + \text{DSC Time}
\]  
| PND Time | The time all I/O requests wait in the logical control unit (CU-HDR) queue before there is an available path. Pending time includes the time spent waiting for a channel, control unit, or head of string, or for the actual device (if it is a shared device that is reserved by another processor). |
| CON Time | The time the device was connected to a channel path to actually transfer data between the device and storage. |
| DSC Time | The time the device has an active channel program and is disconnected (not transferring data). Disconnect time includes seek time, normal rotation delay time, and extra rotation delay because the channel was busy when the device needed to reconnect. |
| CON % | The percent connect time: 
\[
\text{CON} \% = \frac{\text{Connect Time}}{\text{Range Time}} \times 100
\]  
| DSC % | The percent disconnect time: 
\[
\text{DSC} \% = \frac{\text{Disconnect Time}}{\text{Range Time}} \times 100
\]  
| PND % | The percent pending time: 
\[
\text{PND} \% = \frac{\text{Pending Time}}{\text{Range Time}} \times 100
\]  
| Note: | 1. The CON %, DSC %, and PND % values sum to the ACT % value. DB and CU delay are a subset of pending time and sum to PND % or less. 

2. IOS updates the data fields used to calculate CON %, DSC %, and PND % when the I/O operation completes. Therefore, some of the time from the previous report interval might be included in these values, while some of the time in the current range period might be absent from these values. This discrepancy is noticeable on paging devices because they have very long channel programs. |
| Pend Reasons | The reason for the delay and the percentage of delay. 
| DB | Device busy delay, which is the percentage of time during the report interval when the channel subsystem measured I/O request delay because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, a head of string busy condition caused the contention, or some combination of these conditions has occurred. 
\[
\text{Accumulated DB Delay Time}
\]
\[
\text{DLY DB} \% = \frac{\text{Accumulated DB Delay Time}}{\text{Range Time}} \times 100
\]  
| CMR | Command response time delay, which is the percentage of time during the report interval, when the first command of an I/O instruction of the channel program is sent to the device, until the device indicates it has accepted the command. 
\[
\text{Accumulated Command Response Delay Time}
\]
\[
\text{DLY CMR} \% = \frac{\text{Accumulated Command Response Delay Time}}{\text{Range Time}} \times 100
\]  
| Note: | If either hardware data or volume related percentages are not available, this field is blank. |
### Table 71. Fields in the STORR Report - Page/Swap Activity Section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACE TYPE</td>
<td>The space types for which the percentage of the volume's delay is reported. The types appear in the following order: LOCL, User private area, COMM, Common area, PLPA, Pageable link pack area</td>
</tr>
<tr>
<td>AVG Active Users</td>
<td>The average number of jobs waiting for the data set. ( \frac{\sum \text{Waiting Jobs}}{# \text{Samples}} )</td>
</tr>
<tr>
<td></td>
<td>Sum of all waiting jobs</td>
</tr>
<tr>
<td></td>
<td>Sum of all delay samples for all jobs waiting for the data set.</td>
</tr>
<tr>
<td></td>
<td>This category is divided into:</td>
</tr>
<tr>
<td>TOTL</td>
<td>The percentage COMM, LOCL, and SWAP contribute to the overall delay according to the SPACE TYPE specified. The percentages for all these resources add up to DLY % if there is no overlap of the delay states; if there is overlap, the percentages add up to more than DLY %.</td>
</tr>
<tr>
<td>LOCL</td>
<td>The percentage that local (private) storage paging contributes to the delay from the time of the page fault until I/O is completed.</td>
</tr>
<tr>
<td>SWAP</td>
<td>The percentage that swapping contributes to the delay from the time of swap initiation until the last swap page I/O is completed.</td>
</tr>
<tr>
<td>COMM</td>
<td>The percentage that common (CSA or LPA) storage paging contributes to the delay from the time of the page fault until I/O is completed.</td>
</tr>
<tr>
<td></td>
<td>For LOCL, SWAP, and COMM, RMF scans all ASM AIA chains. If the address space has one or more incomplete page input requests, RMF updates the counter in the appropriate category (LOCL, SWAP, or COMM) once per sample.</td>
</tr>
</tbody>
</table>

### Monitor III Utility fields

You can use the Monitor III Utility to customize the STORR report. In addition to the delays shown above you can use the Utility to have the following delay percentages shown.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of using</td>
<td>The percentage of time the device was found being used by an address space.</td>
</tr>
<tr>
<td>Percentage of DLY-DB</td>
<td>The percentage of time during the report interval when the channel subsystem measured I/O request delay because the device was busy.</td>
</tr>
<tr>
<td>Percentage of DLY-CUB</td>
<td>The percentage of time during the report interval when there is I/O request delay because the control unit was busy.</td>
</tr>
<tr>
<td>Percentage of DLY-DPB</td>
<td>The percentage of time during the report interval when there is I/O request delay because the ES/Connection Director port was busy.</td>
</tr>
<tr>
<td>Delay reason percentage</td>
<td>The percentage of time the device was delayed.</td>
</tr>
</tbody>
</table>

### STORS - Storage Delay Summary Report

This Storage Delay Summary (STORS) report provides you with an overview of storage usage by service classes, report classes, and workload groups.

#### How to request this report

To request the Storage Delay Summary report, select 3 from the Primary Menu, then select 9 from the Resource Report Selection Menu (shown in Figure 8 on page 27) or enter the following command:
Contents of the report

The top section on the report provides overall system information and is the same as the Central Storage Summary section of the STORR report. The bottom section of the report provides summary lines for service classes, report classes, and workload groups.

A graphic report shows the average number of users delayed for COMM, LOCL, SWAP, OUTR, and OTHR.

Field descriptions

Table 73. Fields in the STORS Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Storage Summary</td>
<td>Fields in this section are described in Table 70 on page 164</td>
</tr>
</tbody>
</table>
| Group | The name of the group, including:  
  • Workload group names  
  • Service class names  
  • Report class names |
| T | A one-character abbreviation for the type of workload manager group as follows:  
  W  Workload group name  
  S  Service class name  
  R  Report class name  
  n  Service/report class period |
| Users | The number of users within the group. This category includes the following headings:  
  TOTL  The total number of users equals the number of different users found in all address spaces for the group listed during the report interval.  
  ACTV  The average number of active users is a measure of system workload.  
  See “WFEX - Workflow/Exceptions Report” on page 202 for the definition of User/Active. |
### Table 73. Fields in the STORS Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number Delayed For</td>
<td>The average number of delayed users is summarized for the following categories:</td>
</tr>
<tr>
<td>ANY</td>
<td>Delay the group experienced because of contention for any of the following measured storage reasons during the report interval.</td>
</tr>
<tr>
<td>COMM — LOCL — SWAP — OUTR — OTHR</td>
<td>For descriptions of these delays, see the corresponding field in the STOR report                                                   [Table 60 on page 151].</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Frames</td>
<td>The average number of storage frames the group held during the report interval. This field reports on the following frame categories:</td>
</tr>
<tr>
<td>ACTV — IDLE</td>
<td>See <a href="#">Table 66 on page 158</a> for a description of these counts.</td>
</tr>
<tr>
<td>FIXED</td>
<td>The average number of fixed frames the job was using during the report interval including frames both above and below the 16 megabyte line.</td>
</tr>
<tr>
<td></td>
<td>![Math Equation](\sum_{\text{Fixed Frames}} \frac{\text{Avg Fixed Frames}} {# \text{ Samples}})</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>PGIN RATE</td>
<td>The rate at which pages are being read into central storage.</td>
</tr>
<tr>
<td></td>
<td>![Math Equation](\frac{\sum_{\text{All Page-in Counts for Group}}}{\text{Resident Time}})</td>
</tr>
<tr>
<td></td>
<td>The address-space related shared storage page-ins are included in the PGIN RATE.</td>
</tr>
</tbody>
</table>

### Monitor III Utility fields

You can use the Monitor III Utility to customize the Storage Delay Summary report. In addition to the delays shown above, you can use the Utility to have the delays in Table 74 shown in the Storage Delay Summary report.

### Table 74. Additional Fields in the STORS Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number delayed for</td>
<td>The average number of delayed users due to virtual I/O.</td>
</tr>
<tr>
<td>VIO</td>
<td></td>
</tr>
<tr>
<td>Delayed for XMEM</td>
<td>The average number of users delayed due to cross memory address space services.</td>
</tr>
<tr>
<td>Delayed for HPR</td>
<td>The average number of users delayed due to standard hiperspace services (including waits during scroll wait, but not ESO hiperspaces).</td>
</tr>
</tbody>
</table>
Report options

<table>
<thead>
<tr>
<th>Command</th>
<th>RMF STORS Report Options</th>
<th>Line 1 of 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scroll</td>
<td>HALF</td>
<td></td>
</tr>
</tbody>
</table>

Select (S), exclude (X) or fill-in groups for the STORS report. Press END. Selections made here also affect the System Information (SYSINFO) and the Sysplex Summary (SYSSUM) report.

Service class ===> YES Service class and period lines on the report (YES NO)
Report class ===> YES Report class and period lines on the report (YES NO)
Period ===> YES Active periods for listed service classes (YES NO)

<table>
<thead>
<tr>
<th>Sel</th>
<th>Group</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>*ALL</td>
<td></td>
</tr>
<tr>
<td>PRIMOMVS</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>NRPRIME</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>WLMPRIME</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>PRIMEAPP</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>PRIMEBAT</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>APPPRIME</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>OMVS</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>OMVSKERN</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>TSOPRIME</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>SYSTEM</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>SYSSTC</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>SYSOTHER</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

Figure 100. STORS Report Options Panel

The STORS report, the SYSINFO report, and the SYSSUM report use similar Report Options panels. Selections made for service classes, report classes, or workload groups on either options panel affect all reports.

**Service class**
- If you enter YES for Service Class, all service classes and service class periods (if you also specified YES for Period) are displayed below each workload group. Otherwise, no service classes are shown.
- You can also specify any of the available service classes listed in the scrollable section at the bottom of this panel.
- If the service class you want is not listed, it was not active during the current report interval. If you specify the service class, it will appear on the report when it is available.

**Report class**
- If you enter YES for Report Class, all report classes and report class periods (if you also specified YES for Period) are displayed. Otherwise, no report classes are shown.

**Period**
- Enter YES for Period to have all periods displayed below each class entry on the report.
- Enter NO to have only the service or report class entries displayed on the report.

**Sel**
- Allows you to select or exclude specific classes on your STORS report.

**Group**
- The columns headed by Group include all the service class names, workload group names, and report class names currently in the system and any names that you have previously selected, whether or not they are currently in the system.

To request a report for several groups with similar names, use an asterisk (*) as a "wild card" character. For example, to request a report for all groups starting with A, specify 's' under Sel, 'a*' under Group and ensure that there is an 'x' beside *ALL.
You can also specify multiple wild card entries, for example, to list all service classes starting with CICS® and all service classes starting with IMS™, specify:

```
Sel Group T Sel Group T
S  CICS*___ S  S  IMS*___ S
X  *ALL  
```

You can use the wild card to select by type, for example, to list service classes only, specify:

```
Sel Group T Sel Group T
S  *_______ S  ____  
X  *ALL  
```

**T - type**

Type can be:
- **W**  Workload group name
- **S**  Service class name
- **R**  Report class name

---

**SYSENQ - Sysplex Enqueue Delays Report**

The SYSENQ report is similar to the ENQR report (see “ENQR - Enqueue Resource Delays Report” on page 100), but the information presents contentions for serially reusable resources in the sysplex. This can help in understanding bottlenecks in the sysplex not being caused by the current system.

**Note:** The report shows sysplex-wide enqueue delays only, you find all other enqueue delays in the ENQR report.

**How to request this report**

To request the SYSENQ report, select **S** on the Primary Menu, and then select **4** on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

```
SYSENQ
```
Contents of the report

The graphic form of this report shows the average number of active users waiting for each resource.

Field descriptions

Table 75. Fields in the SYSENQ Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Name</td>
<td>The Major name and Minor name of the resource delaying the job. The major name is listed above the minor name. The major name is up to eight characters long and the minor name is up to 36 characters long. If the minor name contains unprintable characters, it will be up to 18 characters long (represented by 36 hexadecimal digits). If the minor name is longer than 26 characters, RMF only displays the first 26 characters. If there are two resources with the same major name and their minor names differ only after the first 36 characters, then RMF considers them as the same resource.</td>
</tr>
<tr>
<td>-- Delayed --</td>
<td>The delay percentage of the job for a specific enqueued resource.</td>
</tr>
<tr>
<td>%</td>
<td>Delayed % = # Delay Samples / # Samples * 100</td>
</tr>
<tr>
<td>Delay samples</td>
<td>The number of samples when the job was delayed for a specific enqueued resource.</td>
</tr>
<tr>
<td>-- Delayed --</td>
<td>Name of the job delayed for the resource. RMF lists all jobs delayed for the resource.</td>
</tr>
<tr>
<td>Jobname</td>
<td>If the catalog system address space is processing a catalog request on behalf of the delayed job, the jobname of the catalog address space (usually CATALOG) will appear below the jobname preceded by a +.</td>
</tr>
<tr>
<td>-- Delayed --</td>
<td>The z/OS system name where the job is running on.</td>
</tr>
<tr>
<td>Sys-Name</td>
<td>ST</td>
</tr>
</tbody>
</table>
### Table 75. Fields in the SYSENQ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>-- Holding --</td>
<td>The percent of the range that a specific job was holding the resource while the named job was delayed.</td>
</tr>
</tbody>
</table>
| % | \[
\text{Holding %} = \frac{\# \text{ Holding Samples}}{\# \text{ Samples}} \times 100
\]
| Holding samples | The number of samples when the holding job was holding the resource while the named job was delayed. |
| | Because more than one job can hold the resource at a time, these values can add up to more than 100%. |
| -- Holding -- | The name of the job that is holding the resource that the delayed job is waiting for. |
| Jobname | If the catalog system address space is processing a catalog request on behalf of the delayed job, the jobname of the catalog address space (usually CATALOG) will appear below the jobname preceded by a +. |
| -- Holding -- | The z/OS system name where the job is running on. |
| Sys-Name | The status indicates whether the holding job has exclusive (EO) or shared (SO) use of the resource. |

### SYSINFO - System Information Report

The System Information (SYSINFO) report presents an overview of the system, its workload, the average response time for a transaction in a specific service class, report class, or workload group, and the total number of jobs using resources or delayed for resources.

#### How to request this report

To request the System Information report, select 1 from the Primary Menu, then select 2 from the Overview Report menu (shown in Figure 6 on page 25) or enter the following command:

```
SYSINFO workload_group | service_class | report_class
```
## Contents of the report

<table>
<thead>
<tr>
<th>Command</th>
<th>RMF V2R1 System Information</th>
<th>Line 1 of 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samples: 100</td>
<td>System: MVS3</td>
<td>Date: 09/28/13</td>
</tr>
<tr>
<td>Partition: MVS1</td>
<td>9672 Model RX4</td>
<td>Appl%: 63</td>
</tr>
<tr>
<td>CPs Online: 4</td>
<td>Avg CPU Util%: 73</td>
<td>EAppl%: 65</td>
</tr>
<tr>
<td>AAPs Online: 0</td>
<td>Avg MVS Util%: 84</td>
<td>Appl% AAP: 0</td>
</tr>
<tr>
<td>IIPs Online: 0</td>
<td>Appl% IIP: 0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>T</th>
<th>WFL</th>
<th>--Users--</th>
<th>RESP</th>
<th>TRANS</th>
<th>-AVG USG-</th>
<th>-Average Number Delayed For -</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>TOT</td>
<td>ACT</td>
<td>Time</td>
<td>/SEC</td>
<td>PROC</td>
<td>DEV</td>
</tr>
<tr>
<td>*SYSTEM</td>
<td>31</td>
<td>669</td>
<td>26</td>
<td>13.95</td>
<td>5.3</td>
<td>5.0</td>
<td>5.6</td>
</tr>
<tr>
<td>*TSO</td>
<td>50</td>
<td>534</td>
<td>8</td>
<td>13.95</td>
<td>2.6</td>
<td>2.1</td>
<td>0.4</td>
</tr>
<tr>
<td>*BATCH</td>
<td>26</td>
<td>11</td>
<td>10</td>
<td>0.00</td>
<td>1.5</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>*STC</td>
<td>27</td>
<td>115</td>
<td>8</td>
<td>0.00</td>
<td>1.1</td>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>*ASCH</td>
<td>3</td>
<td>0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>*OMVS</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>*ENCLAVE</td>
<td>5</td>
<td>4</td>
<td>N/A</td>
<td>N/A</td>
<td>0.2</td>
<td>N/A</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Figure 102. SYSINFO Report

The SYSINFO report has two sections. The top section provides you with an overview of the system. It identifies the measured system, the policy name, the policy activation date and time. It also includes information about processor usage during the report interval. In an LPAR environment, the header contains an extra line showing the z/OS view of CPU utilization and the LPAR partition name in which the Monitor III data gatherer is running. For the different aspects of CPU utilization refer to "CPU - CPU Activity report" on page 329.

The bottom section summarizes information about the total system (*SYSTEM), job classes (*TSO, *BATCH, *STC, *ASCH, or *OMVS), enclaves (*ENCLAVE), workload groups, service classes, and report classes. The *SYSTEM summary line represents the system total values as summarized information from all other summary lines.

**Note:** It might be possible that there is enclave activity in your system (for example, indicated by EAppl% > Appl% in the SYSINFO report), but the ENCLAVE report issues the message 'Enclave data is not currently available'. The reason is that only those enclaves are shown in the report that have been sampled at least twice and that are active or inactive at the end of the Monitor III MINTIME. Therefore, short-running enclaves will not appear in the report.

When the report interval spans more than one Monitor III MINTIME, the above criteria must match for the last MINTIME in the report interval.
The proportion of the active users in each using or delay category indicates the proportion of the average response time that is spent in that category. The graphic form of this report shows the average number of active users for each type of delay.

**Note:**

1. Report class data lines contain information for the transaction response time (RESP Time) and transaction rate (TRANS/SEC) fields. The rest of the fields are blank.
2. The transaction response time (RESP Time) field in all summary data lines is also blank.
3. There is no graphic support for report class lines.

**Field descriptions**

*Table 76. Fields in the SYSINFO Report*

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partition</td>
<td>Partition name.</td>
</tr>
<tr>
<td>CPs Online</td>
<td>The number of general purpose processors (standard CPs) online during the range period.</td>
</tr>
<tr>
<td>AAPs Online</td>
<td>The number of zAAPs online during the range period. If the LOADxx PROCVIEW CORE parameter is in effect, the reported value designates the number of online threads.</td>
</tr>
<tr>
<td>IIPs Online</td>
<td>The number of zIIPs online during the range period. If the LOADxx PROCVIEW CORE parameter is in effect, the reported value designates the number of online threads.</td>
</tr>
<tr>
<td>Processor</td>
<td>Processor family and model (or N/A — if model information is not available). If the processor does not support the Concurrent Processor Upgrade function, the hexadecimal version number is displayed.</td>
</tr>
</tbody>
</table>
| Avg CPU Util% | The average utilization percentage for all general purpose processors (CPs) during the report interval (LPAR view of the CPU utilization):
  \[
  \text{Avg CPU Util\%} = \frac{\Sigma \text{LPAR CPU Times}}{\Sigma \text{Online Times}} \times 100
  \]
  The LPAR CPU Time for one general purpose processor is calculated depending on the status of the logical processor:
  - **Wait Completion NO**
    \[
    \text{LPAR CPU Time} = \text{PR/SM Dispatch Time}
    \]
  - **Wait Completion YES**
    \[
    \text{LPAR CPU Time} = \text{PR/SM Dispatch Time} - \text{Wait Time}
    \]
  - **Dedicated**
    \[
    \text{LPAR CPU Time} = \text{Online Time} - \text{Wait Time}
    \]
  ‘***’ indicates missing or invalid data. |
| Avg MVS Util% | z/OS view of CPU utilization which is the percentage of the time that the general purpose processors (CPs) were busy:
  \[
  \text{Avg MVS Util\%} = \frac{\text{Time Range} - \Sigma \text{Wait Times}}{\text{Time Range}} \times 100
  \]
  The time range is the sum of the times the general purpose processors were online. With HiperDispatch mode active, it is the sum of the times the processors were online but not parked. For more information about the z/OS view of CPU utilization refer to [CPU - CPU Activity report](#) on page 329. |
| Appl%         | Percentage of the maximum general purpose processor capacity used by all address spaces during the report interval. This value is divided by the number of logical processors or cores that have been active during this interval. |
| EAppl%        | Percentage of the maximum general purpose processor capacity used by all address spaces and enclaves during the report interval. This value is divided by the number of logical processors or cores that have been active during this interval. |
### Table 76. Fields in the SYSINFO Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appl% AAP</strong></td>
<td>Percentage of the maximum zAAP capacity used by all address spaces during the report interval. This value is divided by the number of logical zAAP processors or cores that have been active during this interval.</td>
</tr>
<tr>
<td><strong>Appl% IIP</strong></td>
<td>Percentage of the maximum zIIP capacity used by all address spaces during the report interval. This value is divided by the number of logical zIIP processors or cores that have been active during this interval.</td>
</tr>
<tr>
<td><strong>Policy Date Time</strong></td>
<td>The name and the activation date and time of the service policy in effect during collection of the reported data. This, however, does not imply that the complete policy definition is shown on this report.</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td>The name of a class (*SYSTEM, *TSO, *BATCH, *STC, *ASCH, or *OMVS), an enclave (*ENCLAVE), or a group, including:</td>
</tr>
<tr>
<td></td>
<td>• Workload group names</td>
</tr>
<tr>
<td></td>
<td>• Service class names</td>
</tr>
<tr>
<td></td>
<td>• Report class names</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>Type of workload manager group:</td>
</tr>
<tr>
<td></td>
<td>W Workload group name</td>
</tr>
<tr>
<td></td>
<td>S Service class name</td>
</tr>
<tr>
<td></td>
<td>R Report class name</td>
</tr>
<tr>
<td></td>
<td>n Service/report class period</td>
</tr>
<tr>
<td><strong>WFL %</strong></td>
<td>The workflow percentage of that particular group. A value of 100% indicates no workload contention, while a value of 0% indicates that all requests for system resources are delayed.</td>
</tr>
<tr>
<td><strong>Users</strong></td>
<td>The number of users within the group. This category includes the following headings:</td>
</tr>
<tr>
<td></td>
<td>TOT The total number of users.</td>
</tr>
<tr>
<td></td>
<td>ACT The average number of active users.</td>
</tr>
<tr>
<td></td>
<td>See the definition of Users/Active under <a href="#">WFEX - Workflow/Exceptions Report</a> on page 202 for more details.</td>
</tr>
<tr>
<td><strong>RESP Time</strong></td>
<td>The average response time (in seconds) for all transactions that ended during the report interval. The response time value is the sum of the queued time and the active time for an average ended transaction.</td>
</tr>
<tr>
<td></td>
<td>More than 999 seconds are shown with</td>
</tr>
<tr>
<td></td>
<td>• K - times one thousand seconds</td>
</tr>
<tr>
<td></td>
<td>• M - times one million seconds</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> If the RESP Time field is shown in dark blue, the data reported can be statistically insignificant. This can happen if the transaction rate is low or the response time is short compared to the value of the report interval. Use the GROUP Response Time report to get additional information related to ‘statistical error’ for a specific group.</td>
</tr>
<tr>
<td></td>
<td>To increase the accuracy of your data, try increasing the value of the report interval to a value higher than or equal to the response time.</td>
</tr>
<tr>
<td><strong>TRANS /SEC</strong></td>
<td>The number of transactions per second.</td>
</tr>
<tr>
<td></td>
<td>When used with the number of active users in the report, this field gives you an overview of how fast the system can handle the amount of work for a given group. The number of completed transactions between cycles is accumulated for each sample.</td>
</tr>
<tr>
<td></td>
<td>Completed Transaction Count</td>
</tr>
<tr>
<td></td>
<td>TRANS /SEC = ---------------------------</td>
</tr>
<tr>
<td></td>
<td>Range Time</td>
</tr>
<tr>
<td><strong>AVG USG</strong></td>
<td>The average number of users is summarized for each group. RMF takes the sum of using samples for the address space(s) associated with the group and divides by the number of samples.</td>
</tr>
<tr>
<td></td>
<td>The average number of users is reported for the following categories:</td>
</tr>
<tr>
<td></td>
<td>PROC Average number of users using the processor during the report interval.</td>
</tr>
<tr>
<td></td>
<td>DEV Average number of users using devices during the report interval.</td>
</tr>
</tbody>
</table>
Mon III - SYSINFO

Table 76. Fields in the SYSINFO Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number Delayed For</td>
<td>The average number of delayed users is summarized for each group. RMF takes the sum of delay samples for the address space(s) associated with the group and divides by the number of samples in the range. The average number delayed for is reported for the following categories:</td>
</tr>
<tr>
<td>Proc</td>
<td>Number of users experiencing delay because of contention for the processor during the report interval.</td>
</tr>
<tr>
<td>Dev</td>
<td>Number of users experiencing delay because of contention for the devices during the report interval.</td>
</tr>
<tr>
<td>Stor</td>
<td>Number of users experiencing delay because of contention for storage during the report interval.</td>
</tr>
<tr>
<td>Subs</td>
<td>Number of users experiencing delay because of contention for JES, HSM, or XCF during the report interval.</td>
</tr>
<tr>
<td>OPER</td>
<td>Number of users experiencing delay because of a message request, a mount request, or a quiesce during the report interval. Quiesce means that the operator has quiesced the address space.</td>
</tr>
<tr>
<td>ENQ</td>
<td>Number of users experiencing delay because of contention for an enqueued resource during the report interval.</td>
</tr>
</tbody>
</table>

Monitor III Utility fields
You can use the Monitor III Utility to customize the SYSINFO report. In addition to the information shown above, you can use the Utility to have the following values shown.

Table 77. Additional Fields in the SYSINFO Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSAFCVC</td>
<td>The percentage of central storage frames the job used during the report interval.</td>
</tr>
<tr>
<td>SYSADJVC</td>
<td>The average number of users experiencing delay when requesting service from JES.</td>
</tr>
<tr>
<td>SYSADHVC</td>
<td>The average number of users experiencing delay when requesting service from HSM.</td>
</tr>
<tr>
<td>SYSADXVC</td>
<td>The average number of users experiencing delay when requesting service from XCF.</td>
</tr>
<tr>
<td>SYSADNVC</td>
<td>The average number of users experiencing delay because of an operator mount request.</td>
</tr>
<tr>
<td>SYSADMVC</td>
<td>The average number of users experiencing delay because of an operator message request.</td>
</tr>
<tr>
<td>SYSCPUVC</td>
<td>Percentage of the maximum general purpose processor capacity spent on behalf of a class or group.</td>
</tr>
<tr>
<td>SYSEAPVC</td>
<td>Percentage of the maximum general purpose processor capacity consumed within a class or group (including enclave time).</td>
</tr>
<tr>
<td>SYSRRBVC</td>
<td>Percentage of the maximum general purpose processor capacity spent by SRB work on behalf of a class or group.</td>
</tr>
<tr>
<td>SYSTCBVC</td>
<td>Percentage of the maximum general purpose processor capacity spent by non-enclave TCB work that executed within a class or group.</td>
</tr>
<tr>
<td>SYSIFAVC</td>
<td>Percentage of the maximum zAAP processor capacity used within a class or group.</td>
</tr>
<tr>
<td>SYSSUPVC</td>
<td>Percentage of the maximum zIIP processor capacity used within a class or group.</td>
</tr>
<tr>
<td>SYSCPVC</td>
<td>Percentage of the maximum general purpose processor capacity used by non-enclave TCB work that executed within a class or group.</td>
</tr>
<tr>
<td>SYSIFCVC</td>
<td>Percentage of the maximum general purpose processor capacity used by zAAP eligible work that executed within a class or group.</td>
</tr>
<tr>
<td>SYSSUCVC</td>
<td>Percentage of the maximum general purpose processor capacity used by zIIP eligible work that executed within a class or group.</td>
</tr>
<tr>
<td>SYSVELVC</td>
<td>Execution velocity. This value is calculated as CPU using, divided by the sum of CPU using and total delays gathered by WLM. The delays gathered by WLM include CPU delay and storage delay only.</td>
</tr>
<tr>
<td>SYSPDPVC</td>
<td>CPU time, in seconds, that transactions of a class or group were running at a promoted dispatching priority during the report interval.</td>
</tr>
</tbody>
</table>
Report options

The Report Options panel is exactly the same as for the SYSSUM report and STORS report, shown in Figure 100 on page 169. Selections made on either options panel affect all three reports.

SYSRTD - Response Time Distribution Report

The Response Time Distribution (SYSRTD) report enables the service administrator and performance analyst to analyze the distribution of response time to see whether a response time goal was met and, if not, how close it came to failing. This report can also be used to "fine-tune" response time goals.

Use the bottom part of the report to see bottlenecks related to a specific system. Then you can use single-system reports for more detailed analysis.

How to request this report

To request the Response Time Distribution report, select S from the Primary Menu, then a 2 on the Sysplex Report menu, (shown in Figure 5 on page 24) or enter one of the following commands:

SYSRTD service_class, period

SYSRTD report_class, period

For example, to get a Response Time Distribution report for the service class POSMULTI and service class period 1, enter:

SYSRTD POSMULTI, 1

Contents of the report

```
RMF V2R1 Response Time - RMFPLEX1 Line 1 of 5
Scroll ==> HALF

WLM Samples: 100 Systems: 8 Date: 09/28/13 Time: 10.31.40 Range: 100 sec

Class : POSMULTI % 40
Period: 1 of TRX
Goal:
0.500 sec for 90% 20

<0.30 0.350 0.500 0.700 >0.75(sec)
--Avg. Resp. Time-- Trx --Subsystem Data-- --Exec Data--

System Data --Avg. Resp. Time-- Trx --Subsystem Data-- --Exec Data--
          WAIT EXECUT ACTUAL Rate Actv Ready Delay Ex Vel Delay
*ALL 0.208 0.379 0.587 124.7 9 4 54
MVS1 all 0.061 0.311 0.372 84.3 7 8 74
MVS2 all 0.149 0.984 1.134 40.4 2 0 42
MVS3 part 0.0 0.0 0.0 0.0 0 0 0
MVS5 none

Figure 103. SYSRTD Report - With Response Time Data
```
The SYSRTD report shows how the response time for a specific service or report class is distributed. Two levels of detail are shown:

- A character graphic shows the distribution of response time for all systems in a sysplex which have data available in the selected period.
- A table shows how each system contributed to the overall response time.

Depending on the goal of the period, different data may be available. A report for a service class period with a response time goal is shown in the previous figure. Here, the response time distribution is shown in the graph at the top of the screen.

A report for a service class period without response time goal is shown in the next figure. Here, no response time distribution graph is shown, and the top section of the report only shows the service class name and the service class period.

The response time distribution graph is not shown for heterogeneous report class periods. Please refer to “Performance data” on page 184 for an explanation of homogeneous and heterogeneous report class periods.

**How to read the graph**

The horizontal axis shows response time (in seconds) with the response time goal in the middle. The middle section of the graph surrounding the goal shows the distribution of transactions that met between 60% and 150% of the goal.

For example, if the goal is 0.50 seconds, the middle section would include all transactions that completed within 0.30 seconds and 0.75 seconds.

Transactions that completed in less than 60% of the goal are accumulated and shown to the left of the middle section, and transactions exceeding 150% of the goal are accumulated and shown to right of the middle section.
The vertical axis shows the percent of transactions. To provide the best resolution possible, the axis has a variable scale based on the maximum percentage to be shown. The upper limit of the scale can vary from a minimum of 10% to a maximum of 100% in increments of 10%.

The graphical display represents the transactions that completed within a particular time.

In general, the colors mean:

- Fields marked with in green indicates that transactions represented by this area completed within the response-time goal.
- Fields marked with in red indicates that the transactions represented by this area did not complete within the response-time goal.
- Fields marked with in blue represent the transactions that are not relevant for achieving the goal.
- A red, green, or blue '.' signifies that a small number of transactions took place.

The details of the graph depends on what kind of goal you have defined:

- **Average Response Time Goal**
  - The goal has been achieved: all columns in the display are shown in green.
  - The goal has not been achieved: all columns to the left of the average (representing transactions with a response time below the goal) are shown in green, the other columns are shown in red.

- **Response Time Goal with Percentile**
  - All columns to the left of the goal are shown in green, up to the goal percentile.
  - All columns to the right of the goal, representing values that did not achieve the goal, are shown in red up to the goal percentile.
  - All columns representing values that are not relevant for achieving the goal are shown in blue.

**Example**

Response time goal: 80% of all transactions have a response time less or equal to 1 second.

**Case 1:** 90% are below 1 second

- 80% are shown in green (relevant to achieve the goal)
- 20% are shown in blue (not relevant to achieve the goal)

**Case 2:** 70% are below 1 second

- 70% are shown in green (relevant to achieve the goal)
- 10% are shown in red (did not achieve the goal)
- 20% are shown in blue (not relevant to achieve the goal)

**Scrollable part of report**

The bottom section of this report is scrollable. It shows a list of all systems that have workload activity data gathered for the service class period during the report interval.
The first row in the scrollable area is a summary line. To indicate this, the System column displays the word *ALL. The Data column remains empty, and all other columns contain the respective time value or delay percentage for the sysplex. The Response time columns for example show the same values as the row on the Sysplex Summary report for that service class period.

For each system, a row is shown where important response time data is provided. This information is intended to assist in tracking possible bottlenecks down to a specific system, where the analysis can be continued using the detailed reports for single systems.

**Data reported**
The report is for one service class period. Depending on the type of service class, the different parts of the report may contain data or remain empty. Here is a list of what kind of data you can expect under which circumstances:

- **Response Time Distribution**
  - Available only if a response time goal was specified
- **Response Time Data**
  - Almost always available (possibly not for STC)
- **Subsystem Data**
  - Available only for a subsystem transaction class
- **Execution Data**
  - Available only if it is NOT a subsystem transaction class

**Cursor-sensitive control on the SYSRTD Report**
In the non-scrollable area on the top of the report, which may show the response time distribution chart or a message that the data for that chart are not available, cursor-sensitive control is not active.

Cursor-sensitive control on the scrollable area on the bottom part of the report showing the system breakdown works as follows:

- In the first row, with *ALL in the System column, cursor-sensitive control leads to a Response Time Components Data pop-up panel (see Figure 59 on page 104) which shows a detailed breakdown of the different wait reasons and their average duration.

In all other rows, you get the following:

- Cursor-sensitive control on column System leads to the SYSINFO report of the respective system.
- Cursor-sensitive control on column Data leads to the Data Index report of the respective system.
- Cursor-sensitive control on columns Response Time and TRX Rate leads to the GROUP report of the respective system.
- Cursor-sensitive control on any other column leads to the Delay report of the respective system.
### Field descriptions

**Table 78. Fields in the SYSRTD Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of TRX</td>
<td>The vertical axis represents the percentage of transactions that completed within a particular time. The axis has a variable scale in order to allow the best resolution possible. The scale can vary from 10% to 100% in increments of 10%. It is determined based on the maximum percentage to be shown on the graph.</td>
</tr>
<tr>
<td>Response time</td>
<td>Response time distribution. For a description, refer to “How to read the graph” on page 178.</td>
</tr>
<tr>
<td>System</td>
<td>The four-character SMF system identifier.</td>
</tr>
</tbody>
</table>
| Data          | This column indicates whether the system has data for the entire report interval, or only for part of it.  
|               | **all** Data could be retrieved that covers the report interval shown in the report header.  
|               | **part** Data was retrieved that contains at least one time gap within the report interval.  
|               | **none** No data could be retrieved for the report interval. |
| Avg. Resp. Time | The three columns under this header are the same as on the Sysplex Summary report except that the values here are calculated for a single system (except *ALL*). Refer to “SYSSUM - Sysplex Summary report” for a description. |
| Trx Rate      | The transaction rate is the number of transactions ended per second. It is the same as on the Sysplex Summary report except that the value here is calculated for a single system (except *ALL*). |
| Subsystem Data | The three subsystem states shown here are the same as on the Work Manager Delay report (Response Time Breakdown) except that the values here are only calculated for a single system (except *ALL*). Refer to “SYSWKM - Work Manager Delays Report” on page 194” for a description. The difference to the Work Manager Delay report is, that here the begin-to-end and the execution phase are combined within one row. |
| Execution Data | This is the same as the *Exec Vel - Actual* on the Sysplex Summary report with the only difference that the value here is only calculated for a single system (except *ALL*). Refer to “SYSSUM - Sysplex Summary report” for a description. |
| Ex Vel (=Execution Velocity) | This is the general execution delay used for the execution velocity calculation. Note that in a service class more than one transaction can be delayed at the same point of time. For example, if two transactions on average are delayed each time WLM takes a measurement sample, a value of 200 will be displayed. |

### Report options

The Report Options panel shows the RMF default options. It is the same as for the Group Response Time (GROUP) report, shown in **Figure 60 on page 110**, only the header line is different in showing the respective report name.

**Note:** The list of available service classes will be shown only if one of the sysplex reports SYSSUM, SYSRTD, or SYSWKM has been displayed at least once.

### SYSSUM - Sysplex Summary report

The Sysplex Summary (SYSSUM) report allows the service administrator and performance analyst to see at a glance whether service goals are being satisfied by:

- Showing a performance status line showing the performance status of the sysplex covering a time range of up to 80 refresh intervals.
- Showing the actual throughput being achieved by all workloads on one report
- Displaying goals not met in red or yellow
- Calculating the Performance Index for each service class period
The report provides an overview of workload groups, service classes, service class periods, report classes, and report class periods. It allows "summarizing" of actual values for every group using threshold values, and includes a goal versus actual comparison for each period. You can compare different goals by using the performance index.

Furthermore, the response time for all groups is calculated independently of any specified goals, and a transaction rate is provided to enable you to weight the importance of the figures shown.

To facilitate detection of goals that were not met, the line of that service class period, as well as the related workload group and service class, is displayed in red or yellow.

Finally, options are available to select specific groups, or limit the report to groups that have exceeded their goal by a certain amount.

**How to request this report**

To request the Sysplex Summary report, select S from the Primary Menu, then a 1 on the Sysplex Report menu (shown in Figure 5 on page 24), or enter the following command:

```
SYSSUM workload_group | service_class | report_class
```
Contents of the report

The report can be logically broken into three sections.

**The Performance Status line**

In GO mode, a colored status row at the top of the screen gives an overview over the sysplex during the last ranges. For every range, a one-character field will be added to the right-hand side of the performance status line. For each range that has been reported, the one-character field is marked in one of the following ways:

- **/SF580000** (green)
  - If all goals have been met during that interval (the performance index is less than, or equal to, 1 for all periods)

- **/SF590000** (yellow)
  - If a warning level was reached during that interval (the performance index was greater than 1 for periods with an importance equal to 3, 4, or 5)

- **/SF580000X/SF590000** (red)
  - If goals have been exceeded seriously during that interval (the performance index was greater than 1 for periods with an importance equal to 1 or 2)

- **Blank**
  - If you changed the mode from GO to STOP during some intervals

The **Refresh** value that you can specify on the Session Options panel will define the how often the status line will be updated.
If you define a refresh value that is less than the MINTIME, the refresh value will be reset to equal the MINTIME.

**Example**

For example, if you specify a Refresh value of 100 seconds and a Range of 200 seconds, the status line will be updated every 100 seconds, showing information from the latest 200 seconds.

```
Report Interval

Time = 12:00:00 :03:20 :06:40 :10:00 :13:20
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>---------</td>
<td>---</td>
<td>--</td>
<td>---------</td>
<td>---</td>
<td>--</td>
</tr>
<tr>
<td>---------</td>
<td>---</td>
<td>--</td>
<td>---------</td>
<td>---</td>
<td>--</td>
</tr>
<tr>
<td>---------</td>
<td>---</td>
<td>--</td>
<td>---------</td>
<td>---</td>
<td>--</td>
</tr>
</tbody>
</table>
```

(Refer to the figure for a visual representation of the report interval.

If you end GO mode, and do not change the Refresh or range values, historical data will be saved, so that when you start GO mode again, the status line will continue where it left off. If you do change the refresh or range value, the status line will start from the beginning again. See Figure 105 on page 183 for an example.

In STOP mode, the row is reduced to a single colored field in the center of the report that shows the overall status of the displayed range. For example:

```
RMF V2R1 Sysplex Summary - RMFPLEX1 Line 1 of 35
WLM Samples: 100 Systems: 8 Date: 09/28/13 Time: 10:26:40 Range: 100 Sec
```

**Figure 106. SYSSUM Report - STOP Mode**

**Service definition information**

Two sub-header lines show the name of the current service definition together with the installed date and time and the name of the active policy together with the activation date and time.

**Performance data**

The rest of the report shows the execution velocity goals and response time goals versus actual values for each service class period and for each homogeneous report class period. The report also shows the average transaction rate to give you an indication of how significant the actual values are.

**Report Class Periods:**

**Homogeneous report class period:** A report class period is called homogeneous if all its transactions are being assigned to the same service class period.

**Example:** You classify all TSO users to run in service class TSOPROD and distinguish the departments for reporting purposes in report classes TSODEPTA, TSODEPTB, and TSODEPTC. This definition done in the WLM application creates homogeneous report classes.
All other report class periods are called heterogeneous. Reporting for response time
distribution and subsystem delays is available only for homogeneous report class
periods.

**Heterogeneous report class period:** A report class period is called heterogeneous if
its transactions are being assigned to different service class periods.

*Example:* You classify all TSO users by accounting information and assign service
classes TSODEPTA and TSODEPTB. There is one common report class TSOREPCL.
This definition done in the WLM application creates a heterogeneous report class.

The average response time column shows the average time that a transaction spent
waiting in a queue and was active in the system. This gives you an indication of
where a possible response time bottleneck may be located.

A performance index is introduced to allow a better comparison between different
goals. See Table 79 on page 187 for information on how to calculate the
performance index.

The scrollable area is ordered by workload group. Each workload group is
followed by a list of its service classes. Every service class is followed by a detailed
comparison of actual values versus goals for each service class period. The
workload groups, and the service classes below each workload group, are sorted
alphabetically.

In detail, the rows show the following:

- For each workload group (indicated by the type W), one line is shown
  containing the actual values achieved for the whole group. This can be seen as a
  summary line for that group.
- For each service class (indicated by the type S), one line is shown containing the
  actual values achieved for the whole class. As for workload groups, it can be
  seen as a summary line for that class.
- For each service class period (indicated by the period number in the type
  column), one line is shown containing the defined goals accompanied by the
  values actually achieved. For a service class with one period, the data of that
  period is shown.

While the execution velocity goal is a percentage that can easily be compared with
an actual value, the WLM response time goals can be specified in two different
ways:

- A response time together with a percentile:
  In this case, the actual value is a percentage indicating the percentage of
  transactions that ended within the time specified in the response time goal.
- An average response time:
  In this case, the average response time value is shown as actual value that can
  be compared against the goal.

For each report class (indicated by the type R), one line is shown containing the
same data as for a service class, that means *Execution Velocity - Actual, Trans Ended
Rate*, and *Avg. Resp. Time*.

In the *Goal* columns, *N/A* will be shown, and the *Importance* column will remain
blank. Furthermore, a period breakdown does not exist, because periods cannot be
defined for a report class.
Cursor-sensitive control on the SYSSUM Report

Cursor-sensitive control on this report lets you navigate to detailed reports that offer a possibility to make single system selections.

Cursor-sensitive control of the sysplex field and of the Systems field in the report header leads to the Data Index screen.

Using cursor-sensitive control in the Type column:
- On a workload group abbreviation, the report is redisplayed containing only workload group entries.
- On service class or report class abbreviation, the processing is analogous to the workload group abbreviation.

Cursor-sensitive control on a field in the Importance column gives you a filtered report. What is displayed on the filtered report depends on the Type value that you can specify on the Report Options panel.
- If Type is ALL, a workload group and all its service classes are displayed if one service class period has the importance you selected using cursor-sensitive control
- If Type is W, a workload group is displayed if it contains a service class period with the importance you selected using cursor-sensitive control
- If Type is S, a service class is displayed if it contains a service class period with the importance you selected using cursor-sensitive control

Cursor-sensitive control in all other columns:
- If it is a service class period for which subsystem delay data are available, then the Work Manager Delay report is shown.
- Otherwise, the Response Time Distribution report is shown.

Filtering on workload groups and service classes is possible using cursor-sensitive control, and a single workload group or service class can be selected via report option or command parameter.

The default option will be filtering on workload groups. An example of this is shown in Figure 107 on page 187.
### Field descriptions

**Table 79. Fields in the SYSSUM Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refresh</td>
<td>The refresh value specified on the Session Options panel. The report will be updated according to this value.</td>
</tr>
<tr>
<td>Service Definition</td>
<td>Name of the service definition in effect during collection of the workload activity data.</td>
</tr>
<tr>
<td>Installed at</td>
<td>The date and time the active service definition was installed.</td>
</tr>
<tr>
<td>Active Policy</td>
<td>Name of the service policy in effect during collection of the workload activity data.</td>
</tr>
<tr>
<td>Activated at</td>
<td>The date and time the current service policy was activated.</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the group being reported on. This field can contain a workload group name, a service class name, or a report class name. For a line with a period, the field remains empty, because there will always be a summary line further up containing the name of the class to which the period belongs.</td>
</tr>
<tr>
<td>T</td>
<td>Type of group being reported on.</td>
</tr>
<tr>
<td>S</td>
<td>Service class</td>
</tr>
<tr>
<td>R</td>
<td>Report class</td>
</tr>
<tr>
<td>n</td>
<td>Service/report class period</td>
</tr>
<tr>
<td>I</td>
<td>Importance, describes the level of importance assigned to a service class period. Since workload groups, report classes, and system service classes do not have an importance, this column remains empty on those lines. For a service class with multiple periods, this column remains empty as well, whereas for a service class with one period, the importance of that period is shown in the service class row. If “discretionary” was specified as a goal, this is indicated by a D in this column, since an importance cannot be defined for a discretionary goal.</td>
</tr>
<tr>
<td>1</td>
<td>Highest - describes highest priority service class period for most important work</td>
</tr>
<tr>
<td>2</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>Lowest</td>
</tr>
<tr>
<td>D</td>
<td>Discretionary</td>
</tr>
</tbody>
</table>

Figure 107. SYSSUM Report for Workload Groups
Table 79. Fields in the SYSSUM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals versus Actuals</td>
<td>For a service or report class period, these columns show the goal, if specified, and the actual values corresponding to the goal. That means, if an execution velocity goal was specified, the Response Time goal and actual columns remain empty. If a response time goal with a percentile was specified, the Actual column shows a percentage which corresponds to the response time specified in the goal. The actual average response time can be found in the columns for Avg. Resp. Time. For a report class period, this data will be shown only if the period is homogeneous.</td>
</tr>
<tr>
<td>Execution Velocity</td>
<td>The target execution velocity for ended transactions that has been in effect for the period during the reported range. This field shows N/A for system service classes, since they do not have a user defined goal.</td>
</tr>
<tr>
<td>Goal</td>
<td>The execution velocity of the workload group, service or report class, or period being reported on. This value is calculated independent of a specified goal. A high value indicates little workload contention while a low value indicates that the requests for system resources are delayed. See &quot;Execution velocity&quot; on page 13 for details about the execution velocity. Whenever subsystem delays are available for that service class period, N/A is shown in this field. The Work Manager Delays report provides more information for these service class periods. Whenever the service class is a &quot;server&quot;, the velocity is calculated, but the field is shown in dark blue. A service class is a &quot;server&quot;, when the array of service classes served is not empty. In the Execution Velocity - Actual column, two exceptions may occur: • N/A appears for &quot;transaction&quot; service classes, that means, for classes served by &quot;server&quot; service classes. For these classes, the execution velocity cannot be defined meaningfully. • A velocity value in dark blue appears for &quot;server&quot; service classes, that means, for classes containing address spaces that give service to the &quot;transaction&quot; service classes. For those classes some goals may be specified, but they are not used. Instead they are managed based on the goals of the &quot;transaction&quot; service classes.</td>
</tr>
<tr>
<td>Actual</td>
<td>The time units shown in the columns Goal versus Actuals - Response Time and Avg. Resp. Time are all seconds, if no unit is marked. Time values bigger than one minute are marked with M, and time values bigger than one hour are marked with H.</td>
</tr>
<tr>
<td>Response Time Goal</td>
<td>This field shows two columns which together describe the goal that has been in effect for the service or report class period during the reported range: • The average target response time for all ended transactions. • The percentage of transactions that should terminate within the time specified in the goal. This percentage is specified together with the response time value. For a goal without percentage, AVG is shown in this field. This field shows N/A for system service classes, since they do not have a user defined goal, and it is empty for heterogeneous report class periods.</td>
</tr>
<tr>
<td>Response Time Actual</td>
<td>• Average response time goal: The value represents the average response time for all ended transactions, followed by AVG. • Response time goal with percentile: The percentage of transactions that actually ended within the time specified in the goal.</td>
</tr>
</tbody>
</table>
### Table 79. Fields in the SYSSUM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Performance Index | This index helps to compare goals. If, for example, several execution velocity goals with the same importance are not met, this index helps you decide which group was impacted the most. If RMF cannot calculate the performance index, this field contains N/A: • For a period with a response time goal: The sum of completed transactions is zero • For a period with an execution velocity goal: An actual value is not available (for example, a subsystem service class, for which no actual execution velocity is shown)

This field also shows N/A for report classes and system service classes, since they do not have a user defined goal.

The Performance Index field can also be shown in dark blue. This has the same reason as for the Execution Velocity - Actual column, described above.

RMF calculates the performance index depending on the type of goal:

- **Execution velocity goal**
  \[
  \text{Perf Indx} = \frac{-\text{Actual \%}}{\text{Goal \%}}
  \]

- **Average or percentile response time goal**
  \[
  \text{Perf Indx} = \frac{-\text{Actual (sec)}}{\text{Goal (sec)}}
  \]

"Actual" means the maximal response time that actually was reached for the percentage of the goal and is calculated by performing the following three steps:

1. Calculate the number of transactions \( N \) that correspond to the goal:
   \[
   N = \frac{\sum \text{Transactions} \times \text{Goal Percentage}}{100}
   \]

2. Add up all transactions until a bucket \( M \) is reached where the sum is greater than \( N \).
3. The "actual" response time in the formula for the performance index shown above is the response time value belonging to the bucket \( M \).

**Note:** Due to this methodology, the maximal value of the performance index for this goal type is 4. If the sum of all transactions belonging to buckets 1 to 13 is below the goal percentile, the performance index is shown as "****".

The following example shows how to calculate the performance index for a response time goal with a percentile.

### Example

Calculation of the performance index for a response time goal with percentile:

Example goal: Time = 2.0 sec Percent = 80%

The four lines below show:

- Number of buckets
- Response time distribution
- Number of transactions (within that bucket)
- Response time associated with that bucket

<table>
<thead>
<tr>
<th>Bucket</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distr</td>
<td>&lt;50%</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>100%</td>
<td>110%</td>
<td>120%</td>
<td>130%</td>
<td>140%</td>
<td>150%</td>
<td>200%</td>
<td>400%</td>
<td>&gt;400%</td>
</tr>
<tr>
<td>TRX</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Time</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
<td>2.6</td>
<td>2.8</td>
<td>3.0</td>
<td>4.0</td>
<td>8.0</td>
<td>&gt;8.0</td>
</tr>
</tbody>
</table>

The three steps of calculation:
1. The sum of all transactions is 160, so the number of transactions needed to fulfill the goal is:

\[
N = \frac{160 \times 80}{100} = 128
\]

2. Adding all transactions until sum is greater than N leads to bucket \( M = 8 \), because the sum of all transactions including bucket 8 is 130.

3. The response time belonging to bucket 8 is 2.4 seconds, so the result is:

\[
\text{Perf Indx} = \frac{2.4}{2} = 1.2
\]

**Field descriptions - continuation**

*Table 80. Fields in the SYSSUM Report - Continuation*

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans Ended Rate</td>
<td>The number of transactions ended per second.</td>
</tr>
<tr>
<td>Avg. Resp. Time</td>
<td>The average time (in seconds) that a transaction spent waiting because of one of these reasons:</td>
</tr>
<tr>
<td>WAIT Time</td>
<td>• Queued</td>
</tr>
<tr>
<td></td>
<td>Average time a job was delayed for reasons other than the ones mentioned below. This field therefore basically includes the time a job was delayed for initiation. For TSO users, this can be a portion of LOGON processing. For APPC, this is the time the transaction spent on an APPC queue.</td>
</tr>
<tr>
<td></td>
<td>• R/S Affinity - Resource affinity scheduling delay</td>
</tr>
<tr>
<td></td>
<td>Average time the job was delayed due to resource or system affinity scheduling. This means that resource(s) required for the job to run were not available at some point while the job was queued to JES2.</td>
</tr>
<tr>
<td></td>
<td>• Ineligible - Operational or JES scheduling delay</td>
</tr>
<tr>
<td></td>
<td>Average time a job was delayed due to operational delays or JES scheduling delays, examples are:</td>
</tr>
<tr>
<td></td>
<td>– Job held by operator</td>
</tr>
<tr>
<td></td>
<td>– Job class or job queue held</td>
</tr>
<tr>
<td></td>
<td>– Duplicate jobname serialization</td>
</tr>
<tr>
<td></td>
<td>– Job class execution limits</td>
</tr>
<tr>
<td></td>
<td>• Conversion - JCL conversion delay</td>
</tr>
<tr>
<td></td>
<td>Average time a job was delayed for JCL conversion.</td>
</tr>
<tr>
<td></td>
<td>Jobs held during conversion (due to affinity, HSM recall, or enqueue contention) contribute only to conversion time, not to ineligible or R/S affinity times.</td>
</tr>
<tr>
<td></td>
<td>Conversion time is not part of the total response time.</td>
</tr>
<tr>
<td></td>
<td>The time a job was delayed due to TYPRUN=HOLD or TYPRUN=JCLHOLD is NOT included in any of the transaction times.</td>
</tr>
<tr>
<td></td>
<td>In all other cases, this is the average time that transactions spent waiting on a JES or APPC queue. Also note that queue time may not always be meaningful, depending on how the customer schedules work. For example, if a customer submits jobs in hold status and leaves them until they are ready to be run, all of the held time counts as queued time. That time may or may not represent a delay to the job.</td>
</tr>
<tr>
<td></td>
<td>In the Avg. Resp. Time columns, zeros will show up for &quot;server&quot; service classes in most cases, because their &quot;transactions&quot; are address spaces, and response times are available only for ended transactions. So there are only numbers, when one of the address spaces in that service class ends, or is RESET via operator command.</td>
</tr>
</tbody>
</table>
### Mon III - SYSSUM

**Table 80. Fields in the SYSSUM Report - Continuation (continued)**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Resp. Time EXECUT</td>
<td>For CICS transactions, this includes execution time in AOR and following regions. For IMS transactions, this includes execution time within the MPR. For Batch, TSO, etc., this is the average time that transactions spent in execution. In the Avg. Resp. Time columns, zeros will show up for &quot;server&quot; service classes in most cases, because their &quot;transactions&quot; are address spaces, and response times are available only for ended transactions. So there are only numbers, when one of the address spaces in that service class ends, or is RESET via operator command.</td>
</tr>
<tr>
<td>Avg. Resp. Time ACTUAL Time</td>
<td>In general, this is the sum of the wait and execution times described above, but does not include ineligible time. For CICS transaction service classes, you may see the average EXECUT time greater than the average ACTUAL time, when you would normally expect EXECUT to be less than or equal to ACTUAL. This is because these two fields report on a different set of transactions. EXECUT time can include transactions which originated on a remote system as well as transactions originating locally. ACTUAL time includes response times for only transactions originating locally. If the remote transaction tends to be longer than the local transaction, EXECUT could be greater than ACTUAL. It should be noted that all of these response times are for ended transactions only. Thus, if there is a problem where transactions are completely locked out, either while queued or running, the problem will not be seen on this report until the locked out transactions end. In the Avg. Resp. Time columns, zeros will show up for &quot;server&quot; service classes in most cases, because their &quot;transactions&quot; are address spaces, and response times are available only for ended transactions. So there are only numbers, when one of the address spaces in that service class ends, or is RESET via operator command.</td>
</tr>
</tbody>
</table>

### Monitor III Utility fields

You can use the Monitor III Utility to customize the SYSSUM report. In addition to the values shown above you can use the Utility to have the following information shown.

**Table 81. Additional Fields in the SYSSUM Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal type</td>
<td>This goal type indication includes a list of all different types of goals. 1 Percentile response time goal 2 Average response time goal 3 Velocity goal 4 Discretionary goal</td>
</tr>
<tr>
<td>Duration</td>
<td>Service class period duration in unweighted CPU service units (that means, not multiplied with the service coefficients) per second. A duration is required in all but the last service class period. For single periods or for the last period of multiple periods this value is always zero.</td>
</tr>
<tr>
<td>Resource Group</td>
<td>Name of the resource group associated with the work in this service class.</td>
</tr>
<tr>
<td>Capacity Min</td>
<td>Minimum service rate, in unweighted CPU service units per second, as defined for that resource group. Note: The minimum and maximum values must not be specified by the user.</td>
</tr>
<tr>
<td>Capacity Max</td>
<td>Maximum service rate, in unweighted CPU service units per second, as defined for that resource group.</td>
</tr>
<tr>
<td>Capacity Actual</td>
<td>Actual service rate, in unweighted CPU service units per second, as consumed by that resource group.</td>
</tr>
</tbody>
</table>
Report options

The Report Options panel is exactly the same as for the SYSINFO report and STORS report, shown in Figure 100 on page 169. The only difference is, that the group names shown are accumulated from the whole sysplex and not only from a single system.

Note: The list of available service classes will be shown only if one of the sysplex reports SYSSUM, SYSRTD, or SYSWKM has been displayed at least once.

SYSTREND - System Trend Report

The System Trend (SYSTREND) report presents the last 20 reporting ranges for the system summary line (*SYSTEM) or any other selected workload line from the System Information (SYSINFO) report. It can be used:

- To analyze how delay situations develop in the system
- To analyze how long delay situations last in the system
- To understand the change in system utilization
- To identify peak utilization
- As a system summary report

You can also use this report as a starting point to analyze system or workload delay. For a more detailed analysis, select the SYSINFO or respective delay report for any reported range using cursor-sensitive control.

How to request this report

To request this report, select U from the Primary menu, then ST from the User menu.

You need to enter a system name on the User menu.

Note: If no workload or an invalid workload name is specified on the User Selection menu, the report is created for the *SYSTEM line as shown on the System Information (SYSINFO) report.

Contents of the report

The SYSTREND report has two parts.

- The top part provides information about the start date and time of the first and last reported range, the total reported range and the total and average number of samples used to create the report.
- The bottom part shows for each line the CPU utilization for the system and the respective SRB and TCB percentage, total and active users, and average number of jobs using resources or delayed because of resources for the selected workload.

This information is extracted from the SYSINFO reports for the displayed report interval and the meaning is the same as for the SYSINFO report.

The graphic form of the report shows the average number of active users for each type of delay for the selected workload.

Note: On the SYSTREND report, the RESP Time, TRANS/SEC and VEC Util columns (shown on the SYSINFO report) have been replaced by the TCB% and SRB% columns contained in the ISPF table of the SYSINFO report.
Field descriptions

Table 82. Fields in the SYSTREND Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latest:</td>
<td>Begin date and time of the first reported range on the report</td>
</tr>
<tr>
<td>Range/Line:</td>
<td>Reported range per displayed line on the report</td>
</tr>
<tr>
<td>Earliest:</td>
<td>Begin date and time of the last reported range on the report</td>
</tr>
<tr>
<td>Total Range:</td>
<td>Total reported range on the report, expressed in seconds and HH.MM.SS</td>
</tr>
<tr>
<td>Time</td>
<td>The begin time of the reported range</td>
</tr>
<tr>
<td>CPU %</td>
<td>The average CPU utilization percentage for all processors is also displayed on the SYSINFO report. See Table 76 on page 174 for the calculation.</td>
</tr>
<tr>
<td>SRB%</td>
<td>The average percentage of SRB time used by all address spaces per processor during the report interval.</td>
</tr>
<tr>
<td>TCB%</td>
<td>The average percentage of TCB time used by all address spaces per processor during the report interval.</td>
</tr>
</tbody>
</table>

All other fields in the SYSTREND report are the same as in the SYSINFO report (see Table 76 on page 174).

Cursor-sensitive control

Cursor-sensitive control allows you to navigate to the SYSINFO or a delay report for a selected reporting range.
Table 83. SYSTREND Report - Cursor-sensitive Control for Navigation

<table>
<thead>
<tr>
<th>Report Column where Cursor-sensitive Control is Used</th>
<th>Displayed Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>SYSTREND</td>
</tr>
<tr>
<td>CPU%, TCB%, SRB%, WFL%, Users</td>
<td>SYSINFO</td>
</tr>
<tr>
<td>-Avg. Act. Users Delayed For- STOR</td>
<td>STOR</td>
</tr>
<tr>
<td>-Avg. Act. Users Delayed For- SUBS</td>
<td>DELAY</td>
</tr>
<tr>
<td>-Avg. Act. Users Delayed For- OPER</td>
<td>DELAY</td>
</tr>
<tr>
<td>-Avg. Act. Users Delayed For- ENQ</td>
<td>ENQ</td>
</tr>
</tbody>
</table>

Note: If the SYSTREND report is recreated using cursor-sensitive control on the Time column, pressing PF3 on the new SYSTREND report will return you to the Primary Menu. In all other cases, pressing PF3 from the report you have selected will return you to the SYSTREND report.

SYSWKM - Work Manager Delays Report

The Work Manager Delays (SYSWKM) report shows details for resource-manager or work-manager oriented subsystems and is intended as a basis on which to start tuning. Using the real-time data, you can use this report to track problems as they happen.

The report shows the average transaction response time and how the various transaction states contribute to it. Furthermore it lists the address spaces that have been used by the transactions. Figure 109 on page 195 and Figure 110 on page 196 show sample reports for CICS and IMS data.

This report allows you to track subsystem problems.

When defining your service definition, you should try to separate short and long transactions into different service classes. This can help in providing more meaningful reports due to internal processing and measurement reasons.

A high value in one or more of the reported states (LOCK, I/O, CONV, DIST, SESS, TIME, PROD, LTCH, MISC, LOC, SYS, or REM) can indicate a problem.

The lower part of the report shows the address spaces serving the reported service class. A high delay value (Capp or Quies) can indicate the cause of a high response time value for the reported service class. This part is empty if you call the report for a report class.

The Proc-Usg and Veloc columns give an indication of how much work is actually being done, and should be as high as possible.

How to request this report

To request the Work Manager Delays report, select S from the Primary Menu, then a 3 on the Sysplex Report menu (shown in Figure 5 on page 24) or enter the following command using the format:

SYSWKM service_class,period
SYSWKM report_class,period
As this report is available for homogeneous report classes only, you cannot specify a heterogeneous report class with the reportclass parameter.

For example, to get a Work Manager Delays report for the service class POSMULTI and service class period 1, enter:

SYSWKMP POSMULTI,1

Contents of the report

<table>
<thead>
<tr>
<th>Command</th>
<th>RMF V2RI Work Manager Delays - RMFPLEX1</th>
<th>Scroll</th>
<th>HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLM Samples:</td>
<td>100</td>
<td>Systems: 2</td>
<td>Date: 09/28/13</td>
</tr>
<tr>
<td>Class:</td>
<td>POSMULTI</td>
<td>Period: 1</td>
<td>Avg. Resp. time: 0.587 sec for 12473 TRX.</td>
</tr>
<tr>
<td>Goal:</td>
<td>0.500 sec average</td>
<td>Avg. Exec. time: 0.379 sec for 12389 TRX.</td>
<td></td>
</tr>
<tr>
<td>Actual:</td>
<td>0.587 sec average</td>
<td>Abnormally ended:</td>
<td>0 TRX.</td>
</tr>
</tbody>
</table>

Sub P----------------Response time breakdown (in %)----------------Delayed by-----------Time (%)-------------------Switched--

<table>
<thead>
<tr>
<th>Type</th>
<th>Tot</th>
<th>Act</th>
<th>Rdy</th>
<th>Idle</th>
<th>Delayed by</th>
<th>Time (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONV I/O LOCK MISC PROD LOC SYS REM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS B</td>
<td>84</td>
<td>0</td>
<td>0</td>
<td>65</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>CICS X</td>
<td>43</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>IMS X</td>
<td>16</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

Address Spaces Serving this Service Class POSMULTI

| Jobname | M | ASID | System Serv-Class Service Proc-Usg I/O-Usg Veloc Capp Quies |
|---------|---|------|------------------------|------|--------|-------|
| CICSTOR1 | Y | 0102 | MVS1 | CICSTOR | 36 | 6 | 11 | 36 | 0 | 0 |
| CICSTOR2 | 0129 | MVS2 | CICSTOR | 64 | 11 | 2 | 54 | 0 | 0 |
| CICSAOR1 | 0258 | MVS2 | CICSAOR | 21 | 8 | 3 | 5 | 18 | 0 |
| IMSDBCTL | 0091 | MVS2 | SYSSTC | 48 | 7 | 1 | 73 | 0 | 0 |

Figure 109. SYSWKM Report for Subsystem CICS

The panel shows an example for a CICS system using IMS as database, where all measurement values that theoretically could be provided are actually available. However, in a CICS system with regions spread over several z/OS images and with different CICS releases installed, data may be available or missing in nearly every column, depending on how varied the installation is and how the CICS releases involved differ.
The report is for one service or report class period. The period number is included in the report because it is possible to define multiple periods, however, in most cases, you will only define one period with one goal for a transaction-oriented subsystem.

The report can be invoked for every service or report class, but data can only be shown when subsystem work manager delays have been gathered for that class in that period.

As mentioned above, such class must contain a group of CICS or IMS transactions. For example, a class can include:

- Transactions that have the same service level objectives, such as response time.
  In this case, possible service classes could be CICSFAST and CICSSLOW.
- Transactions that relate to one another. In this case, possible service classes could be CICSLOCL for all transactions of local CICS user, and CICSRMOT for all transactions routed from another CICS region.

The report contains three sections:

**Performance information**

The top section of the report shows the class name and period together with the goal and response time, execution time, and corresponding completion counts.

The goal shown is one of the following, depending on what was defined for the period:

- A response time goal (either percentage or average value)
- An execution velocity goal with a percentile
- Discretionary

If the goal is not met, it is shown in red.

The third sub-header line shows the actual value corresponding to the goal. It is calculated in the same way as for the Sysplex Summary report.
The **Average Response time** is shown, followed by the number of total transactions that completed normally during the report interval.

Below this, the **Average Execution time** is shown together with the number of transactions that completed their execution phase normally during the report interval.

Finally, the number of **Abnormally ended** transactions are included.

The response time shown is always the average of all transactions, so be careful when comparing this value with a percentile goal.

**Example**

Assume that 12434 transactions have an average response time of 0.4 seconds, but the remaining 39 have an response time of 1 minute each. The goal is a response time of 0.5 seconds for 80% of the transactions. Then we get the following:

- Avg. Resp. time: 0.586 sec for 12473 TRX.
- Goal: 0.500 sec for 80%
- Avg. Exec. time: 0.311 sec for 12389 TRX.

Here the goal is met, even though the average response time is 0.586 seconds.

**Response time breakdown**

In the middle section, a response time breakdown for the various transaction states is shown, split into total time and execution time.

The unit of the response time values shown can be switched between percentages and seconds using the Report Options panel or use cursor-sensitive control anywhere in the middle section of report.

If you select seconds and the value does not fit, then *** will be shown in that report field. In this case, changing to percentage will provide a better representation of the figures.

**Address spaces serving**

In the bottom section, the **Address Spaces Serving this Service Class** during the report interval are listed in a scrollable area.

- For each address space, the jobname (together with an indication about how WLM is managing a server region), address space id, and system id are shown to allow you to track the address space to the specific z/OS image.
- The service class shown is the class the serving address space belongs to. This helps you to relate this data to the Sysplex Summary report.
- The service percentage (**Service**) shows the percentage of service given to the reported service class. For example, if the address space serves only this class, then 100% is shown. If the address space gives equal service to three different service classes, then 33% is shown.
- Then, for each address space the execution velocity, the processor and I/O using percentage are shown. This gives you a hint of the “health” of the address space.
- Finally, for each address space a capping percentage and a quiesce percentage are shown. The capping column shows the WLM percentage for capping. If the address space was delayed for other reasons as well, the actual capping delay may be much smaller. The actual capping delay is added to the single system Processor Delays (PROC) report.

The quiesce percentage normally shows either 0 or 100, because the address space is either quiesced by the operator with the RESET command or not.
However, for a time range where the quiesce state was changed, a percentage between 0 and 100 is possible, indicating how long the address space was quiesced during the report interval.

This part of the report is empty if you call the report for a report class.

**Cursor-sensitive control on the SYSWKM Report**

Cursor-sensitive control used on the response time fields in the sub-header lines in the top portion of the report shows you the Response Time Distribution report for that service class period.

Cursor-sensitive control used on the response time breakdown fields in the middle portion of the report switches between the units that can be selected for the data. This "toggling" does not change the unit selected on the Report Options panel.

- If the current unit is *seconds*, cursor-sensitive control switches the unit to percentage.
- If the current unit is *percentage*, cursor-sensitive control switches the unit to seconds.

Cursor-sensitive control on the server address space section in the scrollable bottom portion of the report is active on the following fields:

- Cursor-sensitive control on column *Jobname* and *ASID* leads to the JOB Delay report of the respective system.
- Cursor-sensitive control on column *System* leads to the SYSINFO report of the respective system.
- Cursor-sensitive control on column *Service Class* and *Service* leads to the GROUP report of the respective system.
- Cursor-sensitive control on column *Proc-Usg* leads to the PROC report of the respective system.
- Cursor-sensitive control on column *I/O-Usg* leads to the DEV report of the respective system.
- Cursor-sensitive control on column *Velocity* leads to the Delay report of the respective system.

**Field descriptions**

All fields of the report are described in detail in the following field description table:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>The name of the service or report class.</td>
</tr>
<tr>
<td>Period</td>
<td>The period number.</td>
</tr>
<tr>
<td>Goal</td>
<td>The goal for the reported class as contained in the service policy. The goal can be average response time in seconds, minutes, or hours, the percentage of a response time goal, &quot;Discretionary&quot;, &quot;N/A&quot; (not applicable), or blank.</td>
</tr>
<tr>
<td>Actual</td>
<td>Depending on the type of goal, this field shows the actual response time, or the field is blank.</td>
</tr>
<tr>
<td>Average response time</td>
<td>The average response time of all ended transactions belonging to the period, possibly spread over several systems.</td>
</tr>
<tr>
<td>For <em>nnnn</em> TRX.</td>
<td><em>nnnn</em> is the total number of completed transactions.</td>
</tr>
<tr>
<td>Average execution time</td>
<td>The average execution time of all ended transactions belonging to that period, possibly spread over several systems.</td>
</tr>
<tr>
<td>For <em>nnnn</em> TRX.</td>
<td><em>nnnn</em> is the total number of transactions that completed their execution phase during this report interval.</td>
</tr>
</tbody>
</table>
### Table 84. Fields in the SYSWKM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormally ended</td>
<td>The number of abnormally ended transactions from all reported systems. This value is not included in the number of total completed transactions.</td>
</tr>
<tr>
<td>Subsystem Type</td>
<td>A 4-character identification for the subsystem for which the data was attributed to, as shown for example in the WLM administrative application.</td>
</tr>
<tr>
<td>Phase (P)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>This line represents states of the begin-to-end phase of the transactions.</td>
</tr>
<tr>
<td>X</td>
<td>This line represents states of the execution phase of the transactions.</td>
</tr>
<tr>
<td>Response time breakdown</td>
<td>Both begin-to-end phase (Phase = B) rows and execution phase (Phase = X) rows show a breakdown of the average response time (B) or average execution time (X). For consistency, all values (both B and X) are related to the average response time (Avg. Resp. Time). If several execution phases (X) are shown, it is not possible to sort them hierarchically. It is only possible to regard the sum of all execution phases as a breakdown of the average response time shown in the sub-header lines.</td>
</tr>
<tr>
<td>Tot</td>
<td>Total amount of time that the transactions spent in states that are shown in this report. These states are not a complete breakdown of the response time shown in the sub-header. There is always a gap due to states that are not reported. The value is a sum of all the figures shown in this row in the other &quot;Response time breakdown&quot; columns. <strong>Note:</strong> Because one transaction can be counted in more than one state during a report interval, this number can be larger than 100.</td>
</tr>
<tr>
<td>Act</td>
<td>Time spent in an active state.</td>
</tr>
<tr>
<td></td>
<td>Besides the time spent in an active subsystem state, this field also contains the time spent in an active application state, if provided by the subsystem (for example, Websphere). Active indicates that, from the work manager's perspective, there is a program executing on behalf of the work request. This does not mean that the program is active from the base control program's perspective.</td>
</tr>
<tr>
<td>Rdy</td>
<td>Time spent in a ready state.</td>
</tr>
<tr>
<td></td>
<td>Ready indicates that there is a program ready to execute on behalf of the work request described by the monitoring environment, but the work manager has given priority to another work request.</td>
</tr>
<tr>
<td>Idle</td>
<td>Time spent idle means that no work request (or transaction) is available to be run by the work manager.</td>
</tr>
</tbody>
</table>
### Table 84. Fields in the SYSWKM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time breakdown</td>
<td>The report will just present the eight highest non-zero values. These are determined by sorting the sum of the rows for each delay reason.</td>
</tr>
<tr>
<td>Delayed by</td>
<td></td>
</tr>
<tr>
<td>LOCK</td>
<td>Time spent waiting for a lock.</td>
</tr>
<tr>
<td>I/O</td>
<td>Time spent of waiting for I/O.</td>
</tr>
<tr>
<td></td>
<td>Waiting for I/O indicates that the work manager is waiting on an activity related to an I/O request. This may be an actual I/O operation or some other function associated with the I/O request.</td>
</tr>
<tr>
<td>CONV</td>
<td>Time spent waiting for conversation.</td>
</tr>
<tr>
<td>DIST</td>
<td>Time spent waiting for distributed request state samples.</td>
</tr>
<tr>
<td></td>
<td>Waiting for a distributed request indicates that some function or data must be routed prior to resumption of the work request. This is in contrast to ‘waiting on conversation’, which is a low level view of the precise resource that is needed. A distributed request could involve ‘waiting on conversation’ as part of its processing.</td>
</tr>
<tr>
<td>SESS</td>
<td>Time spent waiting for a session to be established.</td>
</tr>
<tr>
<td></td>
<td>This is a sum of the time spent waiting for sessions to be established locally (for example, on the current z/OS image), somewhere in the network, or somewhere in the sysplex.</td>
</tr>
<tr>
<td>TIME</td>
<td>Time spent waiting for a timer.</td>
</tr>
<tr>
<td>PROD</td>
<td>Time spent waiting for another product.</td>
</tr>
<tr>
<td>LTCH</td>
<td>Time spent waiting for a latch.</td>
</tr>
<tr>
<td>MISC</td>
<td>Time spent waiting for an unidentified resource.</td>
</tr>
<tr>
<td>SSLT</td>
<td>Time spent waiting for an SSL thread.</td>
</tr>
<tr>
<td>REGT</td>
<td>Time spent waiting for a regular thread.</td>
</tr>
<tr>
<td>WORK</td>
<td>Time spent waiting for registration to a work table.</td>
</tr>
<tr>
<td>BPMI</td>
<td>Time spent waiting for I/O resulting from a DB2 buffer pool miss.</td>
</tr>
<tr>
<td>Switched Time (%)</td>
<td>Percentage of time that transactions spent routed to another region for processing. This percentage also refers to the Average Response Time shown in the sub-header.</td>
</tr>
<tr>
<td></td>
<td>For a begin-to-end phase, the sum of these percentages should approximately equal the value shown in the CONV column.</td>
</tr>
<tr>
<td></td>
<td>For an execution phase, these percentages, as well as the figure in the CONV column, are expected to be zero.</td>
</tr>
<tr>
<td>LOC</td>
<td>Percentage of time that transactions spent switched on this z/OS image. Subsystems might set this state when they function ship a transaction to another component within the same z/OS image.</td>
</tr>
<tr>
<td>SYS</td>
<td>Percentage of time that transactions spent switched to another z/OS image in the sysplex. Subsystems might set this state when they function ship a transaction to another component on another z/OS image within the sysplex.</td>
</tr>
<tr>
<td>REM</td>
<td>Percentage of time that transactions spent switched to somewhere within the network. Subsystems might set this state when they function ship a transaction to another component within the network.</td>
</tr>
<tr>
<td>Address Spaces Serving</td>
<td>Srccls is the name of the Class at the top of the report.</td>
</tr>
<tr>
<td>this Service Class</td>
<td>The scrollable area below this sub-header line shows a list of address spaces within the sysplex that performed work for the reported service class during the report interval. This list is created for a service class, not for a service class period. If there are reports for several periods of one service class, this section is the same for all reports.</td>
</tr>
<tr>
<td>srccls</td>
<td></td>
</tr>
<tr>
<td>Jobname</td>
<td>Jobname of the server.</td>
</tr>
</tbody>
</table>
Table 84. Fields in the SYSWKM Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>A Y in this column indicates that WLM managed a server region according to the goals for the transactions being served by the region.</td>
</tr>
<tr>
<td>ASID</td>
<td>Address space ID of the server.</td>
</tr>
<tr>
<td>System</td>
<td>This is the four character SMF system identifier of the system the server is running on.</td>
</tr>
<tr>
<td>Serv-Class</td>
<td>Name of the service class associated with this address space.</td>
</tr>
<tr>
<td>Service</td>
<td>Percentage of service that the address space gives to this service class in relation to all of the other service classes it serviced during the report interval.</td>
</tr>
<tr>
<td>Proc-Usg</td>
<td>The TCB and SRB using percentage of the address space.</td>
</tr>
<tr>
<td>I/O-Usg</td>
<td>The device using percentage of the address space.</td>
</tr>
<tr>
<td>Veloc</td>
<td>Execution velocity of the address space.</td>
</tr>
<tr>
<td>Capp</td>
<td>The capping delay percentage of the address space.</td>
</tr>
</tbody>
</table>

Using WLM, the minimum and maximum capacity values for a resource group can be used to restrict the amount of processor capacity that a collection of address spaces is allowed to consume, or with discretionary management, if the work for which the job is running is overachieving its goal, this work may be capped in order to divert its resources to run discretionary work (see also section ‘Using Discretionary Goals’ in z/OS MVS Planning: Workload Management).

| Quies         | Percentage of time for which the server address space was quiesced during the report interval. |

Report options

The Report Options panel shows the RMF default options.

**Type**  Here you specify whether you want to select a service or report class.

**Class**  Specification of a service or report class name. If a class is entered for which there is no current data, an empty report is shown.

**Period**  Specification of a period number (value between 1 and 8).

**Unit**  Specify time unit:
S  The units shown are seconds.
P  The units shown are percentages.

Inactive
Specification about display of inactive classes:

YES  Include subsystem data lines in the report, even if the lines do not contain any data.
NO   Do not include subsystem data lines, if they do not contain any data.

Available Service and Report Classes
A scrollable area is provided containing a list of service and report class names. These names are obtained from the current data.

Note: The classes will be shown only if one of the sysplex reports SYSSUM, SYSRTD, or SYSWKM has been displayed at least once.

The RMF FIND command works on the scrollable area.

WFEX - Workflow/Exceptions Report
The Workflow/Exceptions (WFEX) report presents information about system activity and system resources.

The top part of the report shows you speedometers in graphic mode, or workflow indicators in tabular mode.

The color of a workflow indicator tells you how well the jobs are performing depending on the exception criteria specified. (Usually, red indicates a problem, yellow indicates caution, and turquoise indicates that a job or volume is missing from the system configuration.)

The speedometer needle points to the relative speed of the job or resource in the system. The shaded part to the left of the needle represents the proportion of a user’s time spent doing useful work. The part to the right of the needle represents the proportion of a user’s time spent delayed.

You can define the exception criteria on the Definition and Criteria panel.

A line in the Exceptions section of the report corresponds to each colored speedometer or workload indicator. The line has the same color and the same Name as the speedometer or workload indicator, and gives details about the exception.

Speed (Workflow)
Under Speed (Workflow), a high workflow percentage or speed indicates that a job has the resources it needs to process, and that it is moving through the system at a relatively high speed.

If the Criteria Set you defined for a workflow indicator is met, it will be displayed in the corresponding color.

A low value under Speed indicates that a job has few of the resources it needs and is contending with other jobs for system resources and may indicate a problem.
For resources (for example *PROC and *DEV), a high value under Speed indicates that jobs are moving through the system with little resource contention. A low Speed represents a large queue of work requests from users and may indicate a problem.

**Exceptions**

In the Exceptions section of the report, a line that is displayed in yellow or red indicates a job or resource exceeds the exception criteria derived from the IPS (if you have customization set to YES) or defined by you on the WFEX Report Options: Definition and Criteria panel. Use cursor-sensitive control to investigate exceptions further.

If Not avail appears on your report, the job you selected on the Definition panel was not running during the report interval. If No work appears, the job or group was idle (not requesting system resources) during the report interval.

**How to request this report**

To request the Workflow/Exceptions, select 1 from the Primary Menu, then select 1 from the Overview Report menu (shown in Figure 6 on page 25) or enter the following command:

WFEX

**Contents of the report**

<table>
<thead>
<tr>
<th>Name</th>
<th>Users Active</th>
<th>Speed</th>
<th>Name</th>
<th>Users Active</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>*SYSTEM</td>
<td>505</td>
<td>15</td>
<td>*DEV</td>
<td>117</td>
<td>29</td>
</tr>
<tr>
<td>TSO</td>
<td>433</td>
<td>10</td>
<td><em>MASTER</em></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ALL BATCH</td>
<td>2</td>
<td>0</td>
<td>TSOPRD</td>
<td>420</td>
<td>8</td>
</tr>
<tr>
<td>STC</td>
<td>70</td>
<td>2</td>
<td>BTCHPROD</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>OMVS</td>
<td>3</td>
<td>0</td>
<td>DATAPK</td>
<td>Not avail</td>
<td></td>
</tr>
<tr>
<td>PROC</td>
<td>129</td>
<td>14</td>
<td>BBUSER02</td>
<td>PINRT &gt; 2</td>
<td>3.410</td>
</tr>
</tbody>
</table>

**Figure 112. WFEX Report**

The report has two parts:

- On the top Speed section, RMF reports the workflow of jobs and resources as speed relative to the maximum speed with which they could move through the system.
On the bottom **Exceptions** section, RMF lists jobs, job groups, or system resources that meet exception criteria.

The workflow and exception lines are color coded according to severity. Usually, red indicates a problem, yellow indicates caution, and turquoise indicates that a job or volume is missing from the system configuration. You can specify exception criteria on the Workflow/Exceptions Report Options panels, or you can use automatic customization.

![Figure 112 on page 203](image-url) is an example of the Workflow/Exceptions report. For information about the WFEX Report Options panels, see "Report options" on page 209. For a Workflow/Exceptions report based on your installation’s requirements for workload, you can use automatic customization. For information about automatic customization, see "Automatic customization" on page 217.

**Workflow of jobs or job groups** is a measure of the speed at which jobs are moving through the system in relation to the maximum speed at which the jobs could move through the system. These workflow formulas are described in "Common Monitor III report measurements" on page 12.

A low workflow percentage indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow percentage indicates that a job has the resources it needs to execute, and that it is moving through the system at a relatively high speed.

For example, a job that could execute in one minute, if all the resources that it needed were available, would have a workflow of 25%, if it took four minutes to execute.

Workflow of resources (processors or devices) represents how well the system is serving users. The speed at which each resource performs the work of all user’s is expressed as a value from 0% to 100%. A low resource workflow percentage represents a large queue of work requests from users. A high workflow percentage represents little resource contention.

If **Not avail** appears on your report, the job that you selected on the Definition and Criteria panel was not running during the report interval. If **No work** appears, the job or job group was idle (not requesting system resources) during the report interval.

Exceptions are suppressed without notification when using criteria on historic RMF gatherer records that do not provide the corresponding data. However, if there is at least one valid criteria set defined, and the thresholds are met, the exception is displayed.

### Field descriptions — Speed Section

**Table 85. Fields in the Speed Section of the WFEX Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average CPU Util</td>
<td>The average utilization percentage for all general purpose processors (CPs) during the report interval. For details, see Table 76 on page 174.</td>
</tr>
<tr>
<td>Name</td>
<td>The one to ten character identifier of a workflow indicator. It can be a job, job group, or resource (processor or device). You can specify Name on the Label field of the Definition and Criteria panel or leave it blank and use the default name generated by RMF. If an indicator changes color, there is a corresponding line in the Exceptions section of the report with the same name and color giving more information about the exception.</td>
</tr>
</tbody>
</table>
Table 85. Fields in the Speed Section of the WFEX Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users/Active</td>
<td>The average number of users and the average number of active users in an address space or group of address spaces. The average number of active users is a measure of system workload. A user in a system is either ACTIVE, IDLE, or unknown during a report interval. An ACTIVE user is using a resource or is delayed by a resource. An IDLE user is in terminal wait, timer wait, or is waiting for JES job selection. A user that is not in either of these states is unknown.</td>
</tr>
<tr>
<td>Speed</td>
<td>For jobs and job groups, Speed is a measure of the speed at which jobs are moving through the system in relation to the maximum speed at which the jobs could move through the system. A low workflow percentage indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow percentage indicates that a job has the resources it needs to execute, and that it is moving through the system at a relatively high speed. For resources (processors or devices), Speed represents how well the system is serving the users. A low resource workflow percentage represents a large queue of work requests from users. A high resource workflow percentage represents little resource contention.</td>
</tr>
</tbody>
</table>

Field descriptions — Exceptions Section

The Exceptions section of the report shows the exceptional situations a job or job group encountered in relation to the hardware and software resources. The exceptions are those specified on the Workflow/Exceptions Report Options panels.

Table 86. Fields in the Exceptions Section of the WFEX Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The one to ten character identifier of a workflow indicator. It can be a job, job group, or resource (processor or device). You can specify Name on the Label field of the Definition and Criteria panel or leave it blank and use the default name generated by RMF. If a threshold from the Definition and Criteria options panel is exceeded, one or more lines in the Exceptions section are shown with a name from the Label field, a specific job name, or resource name.</td>
</tr>
</tbody>
</table>
### Table 86. Fields in the Exceptions Section of the WFEX Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reason</strong></td>
<td>Reason gives the explanation for the exception condition that was defined either on the WFEX Report Options panel or by automatic customization. The reason field can show:</td>
</tr>
<tr>
<td></td>
<td>• A resource contributing most to the delay of a job or job group (main delay)</td>
</tr>
<tr>
<td></td>
<td>A main delay is displayed when either an exception is met that includes a mixture of criteria, or a general using or delay exception is met (i.e. AAU, ADU, USG%, USGD%, USGP%, or WFL%).</td>
</tr>
<tr>
<td></td>
<td>• A reason meeting a specified exception criterion</td>
</tr>
<tr>
<td></td>
<td>A specific reason is displayed when a single delay exception is met, even if another resource contributed more to the overall delay.</td>
</tr>
<tr>
<td></td>
<td>For example -</td>
</tr>
<tr>
<td></td>
<td>If you specify ENQ% &gt; 10 for jobname xxx, then the Reason field displays <strong>ENQ-majorname</strong> where majorname is the name of the enqueue resource that is causing the delay.</td>
</tr>
<tr>
<td></td>
<td>If you specify COMM% &gt; 20 for jobname xxx, then the Reason field displays <strong>STOR-COMM</strong>.</td>
</tr>
<tr>
<td></td>
<td>• An exception</td>
</tr>
<tr>
<td></td>
<td>The exception statement is displayed when a STOR class exception or another type of single exception that is not delay-oriented is met.</td>
</tr>
<tr>
<td></td>
<td>For example -</td>
</tr>
<tr>
<td></td>
<td>If you specify CPUS% &gt; 60, then the Reason field displays <strong>CPUS% &gt; 60</strong>.</td>
</tr>
<tr>
<td></td>
<td>• SLIP PER TRAP</td>
</tr>
<tr>
<td></td>
<td>This exception is displayed if a SLIP PER trap is active on your system. The exception line is always reported first and is displayed in yellow. The yellow color is a warning that an active SLIP PER trap can cause performance degradation and should be removed. Note that you cannot exclude or change the color of the SLIP PER trap exception line.</td>
</tr>
<tr>
<td></td>
<td>If the <strong>Reason</strong> field displays an exception statement or the SLIP PER TRAP exception, the field is not split by a hyphen.</td>
</tr>
<tr>
<td></td>
<td>However, the <strong>Reason</strong> column is split into two at the hyphen when a main delay or a specific reason for the exception is displayed.</td>
</tr>
<tr>
<td></td>
<td>The left part of the column depicts the resource contributing to the exception condition.</td>
</tr>
<tr>
<td></td>
<td>The resource displayed is either the resource contributing most to the overall delay, or the resource that has been specifically defined (single exception).</td>
</tr>
</tbody>
</table>
Table 86. Fields in the Exceptions Section of the WFEX Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason (continued)</td>
<td>The right part of the column depicts the reason for the exception condition. The reason depends on which resource caused it.</td>
</tr>
<tr>
<td>If the resource under Reason is:</td>
<td></td>
</tr>
<tr>
<td>PROC</td>
<td>then the name of the job using the processor most often when the delayed job wanted to use it, appears to the right of the hyphen. If one or more enclaves contributed most to the processor delay, then &quot;ENCLAVE&quot; will be shown under Reason.</td>
</tr>
<tr>
<td>DEV</td>
<td>then the volume serial number of the device that the job was most often delayed for, appears to the right of the hyphen.</td>
</tr>
<tr>
<td>ENQ</td>
<td>then the major name of the serially reusable resource causing the greatest percentage of delay, appears to the right of the hyphen.</td>
</tr>
<tr>
<td>STOR</td>
<td>then either COMM, LOCL, VIO, SWAP, or OUTR appears to the right of the hyphen.</td>
</tr>
<tr>
<td>If you requested a COMM%, LOCL%, VIO%, SWAP%, or OUTR% single exception, the possible causes are:</td>
<td></td>
</tr>
<tr>
<td>COMM</td>
<td>Common storage paging</td>
</tr>
<tr>
<td>LOCL</td>
<td>Local storage paging</td>
</tr>
<tr>
<td>VIO</td>
<td>Virtual I/O paging</td>
</tr>
<tr>
<td>SWAP</td>
<td>Swap-in delay</td>
</tr>
<tr>
<td>OUTR</td>
<td>Swapped out and ready.</td>
</tr>
<tr>
<td>XMEM</td>
<td>Cross memory address space paging</td>
</tr>
<tr>
<td>HIPR</td>
<td>Standard hiperspace paging</td>
</tr>
<tr>
<td>If STOR is the main delay, or a single STOR% exception is met, only STOR appears under Reason. The storage delay reason appears as an informational message under Possible cause or action.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>The informational message can be overwritten by a user specified message.</td>
</tr>
<tr>
<td>For single jobs, 'Main reason SSSS causes xxx % delay' appears under Possible cause or action.</td>
<td></td>
</tr>
<tr>
<td>For job groups, 'Main reason SSSS delays xxx users' appears under Possible cause or action.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>In both cases, SSSS is either COMM, LOCL, VIO, SWAP, XMEM, HIPR, or OUTR.</td>
</tr>
<tr>
<td>OPER</td>
<td>then either Message or Mount or Quiesce appears to the right of the hyphen. Message indicates that the operator did not respond to a message. Mount indicates that the operator did not mount a tape. Quiesce indicates that the address space was quiesced by the operator.</td>
</tr>
<tr>
<td>SUBS</td>
<td>then either JES, HSM, or XCF appears to the right of the hyphen.</td>
</tr>
</tbody>
</table>

Cursor-sensitive control is split at the hyphen of the Reason column. If you press ENTER with the cursor positioned either under the left or under the right part of the hyphen, you can get more information about the exception condition.
### Table 86. Fields in the Exceptions Section of the WFEX Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical val.</td>
<td>The critical value that caused the exception condition. The following values can appear under Critical val:</td>
</tr>
<tr>
<td>% delay</td>
<td>Percentage of delay caused by the delay category in the Reason field.</td>
</tr>
<tr>
<td>users</td>
<td>Average number of delayed users for the group or resource, or maximum number of users.</td>
</tr>
<tr>
<td>%</td>
<td>Using percentage in the case of single STOR class exceptions, single common storage exceptions, device class exceptions, CPU% exceptions, or CPUS% exceptions.</td>
</tr>
<tr>
<td>frames</td>
<td>Number of frames online in the case of ONLF and ONLXF exceptions.</td>
</tr>
<tr>
<td>bytes</td>
<td>Number of bytes of storage used in the case of TSQAO exceptions.</td>
</tr>
<tr>
<td>/sec</td>
<td>Rate per second in the case of DAR, RATE, PINRT, ESMRT, or ESPRT exceptions.</td>
</tr>
<tr>
<td>sec</td>
<td>Amount of time in seconds in the case of time-related exceptions (i.e. AT, DRT, QT, RT, TET, and ESMAG).</td>
</tr>
<tr>
<td>replies</td>
<td>Number of outstanding replies.</td>
</tr>
<tr>
<td></td>
<td>If the exception resource or user is unavailable on the system, the Critical val. field remains blank.</td>
</tr>
<tr>
<td></td>
<td>For the formula used to calculate the delay of an address space or group of address spaces see &quot;Address space delay (%)&quot; on page 14.</td>
</tr>
<tr>
<td>Possible Cause or Action</td>
<td>Possible Cause or Action describes what might be causing the delay and what you can do about it. You can enter the text for Possible Cause or Action in the Text field on the Definition and Criteria panel of the Workflow/Exceptions Report Options panels, or you can let RMF fill in the text according to some analysis of what the problem was.</td>
</tr>
<tr>
<td></td>
<td>If the Possible Cause or Action field is blank, use cursor-sensitive control on the Name or Reason field for more information about the delay.</td>
</tr>
</tbody>
</table>
Report options

To set up your workflow indicators and exceptions, you can either use automatic customization, or you can use the Report Options panels. When the displayed value in the WFEX report meets the specified threshold value, the exception or workflow indicator is highlighted to your specifications.

Automatic customization sets up workflow and exception indicators, threshold values, and highlighting criteria based on your installation’s specifications for workload. To use automatic customization, see “Automatic customization” on page 217.

On the Report Options panels, you can specify workflow indicators, exception conditions, or a combination of both. However, on the Speed section of the report, a limit of 14 workflow indicators can be displayed. You can also specify the threshold values and color highlighting criteria for the indicators.

RMF displays the Action panel. The Action panel shows a list of the Report Options currently in effect. On the Action panel, you can enter codes in the Action column to change, add, and delete workflow and exception indicators, and vary where the indicators will appear in the report.

To add, view, or change criteria, enter the Add (AD) or Select (S) code in the Action column. RMF then displays the Definition and Criteria panel.

To reset the Report Options to those in the IPS, if customization is set to YES in your Session Options, or if not, to the RMF default values, enter the RESET command.
Table 87. Fields in the WFEX Action Panel

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>In the Action column, you can enter the following commands:</td>
</tr>
<tr>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>AD</td>
</tr>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>MM</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Class</td>
<td>Class is the class of resources for exception.</td>
</tr>
<tr>
<td>Qualifier</td>
<td>Qualifier further identifies the class and can be a service class name, job name, volume, or JES initiator class.</td>
</tr>
<tr>
<td>Indicator</td>
<td>Indicator is the type of indicator you want RMF to check for. There can be either workflow (WF) or exception (EX-ANY, EX-AVG, EX-GROUP, or EX-UNAVAIL) indicators. You can specify 14 workflow indicators for display in the Speed section of the report. If you specify more than 14, RMF checks only the exception condition specified together with the workflow indicator.</td>
</tr>
<tr>
<td>Label</td>
<td>Label is a 10 character identifier of a job or job group, or a resource that you want to appear as Name on the Workflow/Exceptions (WFEX) report. For an EX-ANY option, the Name field in the WFEX report always contains the name of the job being delayed, rather than the label specified on the option panel.</td>
</tr>
<tr>
<td>Row and Position</td>
<td>Row and Position identify the location of the workflow indicators on the Speed section of the Workflow/Exceptions report. Row and Position are arranged differently on the graphic and tabular WFEX reports. If Not Displayed appears under Row and Position, that workflow indicator will not appear in the Speed section of the report, but an exception condition that is specified together with the workflow indicator can appear in the Exceptions section of the report. Use the HELP key (PF1) for information about how to change where the workflow indicators appear on the WFEX report.</td>
</tr>
</tbody>
</table>

Definition and Criteria panel

Enter or edit information below. To view a list of criteria name values, place the cursor in a blank "Name" field and press ENTER. Exception will be displayed if all criteria of one color in a set are met.

- **Class**: For example: SYSTEM, BATCH, JOB, DEV, STC, SRVCLS
- **Qualifier**: For example: Jobname, volume serial, job class
- **Indicator**: WF, EX-ANY, EX-AVG, EX-GROUP or EX-UNAVAIL
- **Label**: Label for workflow monitor or exception line
- **Alert**: Alerting signal: BLINK, BEEP, BOTH, NONE

<table>
<thead>
<tr>
<th>Criteria set 1</th>
<th>Criteria set 2</th>
<th>Criteria set 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name &lt;&gt; Yel</td>
<td>Red</td>
<td>Name &lt;&gt; Yel</td>
</tr>
<tr>
<td>___ ___ ___ ___ or ___ ___ ___ ___ or ___ ___ ___ ___</td>
<td>___ ___ ___ ___ or ___ ___ ___ ___ or ___ ___ ___ ___</td>
<td>___ ___ ___ ___ or ___ ___ ___ ___ or ___ ___ ___ ___</td>
</tr>
</tbody>
</table>

Figure 114. WFEX Definition and Criteria Panel
On this panel, you modify the report by defining or changing workflow indicators and exception conditions.

In the top half of the panel, provide information about the job or job group, or resource.

In the bottom half of the panel, fill in exception values and highlighting criteria, or choose volumes or job names. You can use cursor-sensitive control on the Name field. The corresponding Criteria Names Selection panel is displayed.

To exit this panel, you must either:
- Specify a complete workflow indicator or exception condition
- Use the CANCEL command to cancel any input.

Table 88. Fields in the WFEX Definition and Criteria Panel

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>You specify the class of resources for exception in the Class field. Class can be:</td>
</tr>
<tr>
<td></td>
<td>SYSTEM</td>
</tr>
<tr>
<td></td>
<td>All jobs in the system</td>
</tr>
<tr>
<td></td>
<td>TSO</td>
</tr>
<tr>
<td></td>
<td>All TSO/E users</td>
</tr>
<tr>
<td></td>
<td>BATCH</td>
</tr>
<tr>
<td></td>
<td>All batch jobs</td>
</tr>
<tr>
<td></td>
<td>STC</td>
</tr>
<tr>
<td></td>
<td>All started tasks</td>
</tr>
<tr>
<td></td>
<td>JOB</td>
</tr>
<tr>
<td></td>
<td>Single job by name</td>
</tr>
<tr>
<td></td>
<td>PROC</td>
</tr>
<tr>
<td></td>
<td>Processor</td>
</tr>
<tr>
<td></td>
<td>DEV</td>
</tr>
<tr>
<td></td>
<td>Device</td>
</tr>
<tr>
<td></td>
<td>STOR</td>
</tr>
<tr>
<td></td>
<td>Storage</td>
</tr>
<tr>
<td></td>
<td>ASCH</td>
</tr>
<tr>
<td></td>
<td>ASCH address space</td>
</tr>
<tr>
<td></td>
<td>OMVS</td>
</tr>
<tr>
<td></td>
<td>OMVS address space</td>
</tr>
<tr>
<td></td>
<td>SRVCLS</td>
</tr>
<tr>
<td></td>
<td>Service class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualifier</th>
<th>In the Qualifier field, you specify qualifiers for the following exception classes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATCH</td>
<td>Batch jobs - specify the job class (JES initiator class). BATCH does not require a</td>
</tr>
<tr>
<td></td>
<td>qualifier, but if you leave Qualifier blank, RMF fills in the default ALL.</td>
</tr>
<tr>
<td>JOB</td>
<td>Single job by name - specify a jobname. If indicator EX-UNAVAIL is specified, no</td>
</tr>
<tr>
<td></td>
<td>qualifier is allowed.</td>
</tr>
<tr>
<td>DEV</td>
<td>Device - specify a device number. DEV does not require a qualifier, but if you leave</td>
</tr>
<tr>
<td></td>
<td>Qualifier blank, RMF fills in the default ALL. If indicator EX-UNAVAIL is specified, no</td>
</tr>
<tr>
<td></td>
<td>qualifier is allowed.</td>
</tr>
<tr>
<td>SRVCLS</td>
<td>Jobs grouped by service class - specify a valid service class name.</td>
</tr>
</tbody>
</table>

**Wildcard Support:** You can specify a wildcard character at the end of the input string for the qualifier of the classes JOB and DEV.

An asterisk "*" in the last position is not treated as part of the name, instead each name that matches the input string up to the position of the asterisk is treated as if it had been specified in that input field. This allows the specification of a WFEX exception that gives an exception line for each DASD, TAPE or JOB belonging to a group with names starting with identical characters.
Table 88. Fields in the WFEX Definition and Criteria Panel (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
<td>In the Indicator field, you specify the workflow or exception indicator type. For Indicator, you can define the following:</td>
</tr>
<tr>
<td></td>
<td><strong>WF</strong> Indicates a workflow indicator which is a permanent line or speedometer in the top part of the WFEX report. If you add exception conditions to indicator WF, they are treated as if the indicator was EX-AVG.</td>
</tr>
<tr>
<td></td>
<td><strong>EX-ANY</strong> Indicates that RMF reports one line per address space that meets the condition you specify under Criteria Set.</td>
</tr>
<tr>
<td></td>
<td><strong>EX-AVG</strong> Indicates that RMF reports an exception when the average value of the specified group fulfills the conditions you specify under Criteria Set.</td>
</tr>
<tr>
<td></td>
<td><strong>EX-GROUP</strong> Indicates that RMF checks for an exception for each job or resource in the specified group but reports only one line in the exception report containing the main delay reason and the number of users. If you need information about resource problems that are causing significant delays, but do not need to know exactly which users are affected, use GROUP.</td>
</tr>
<tr>
<td></td>
<td><strong>EX-UNAVAIL</strong> Indicates that RMF reports an exception when the volume or jobname is unavailable. When you specify EX-UNAVAIL, RMF displays the Definition of UNAVAIL panel. See <a href="#">Figure 115 on page 213</a> for a description of the panel.</td>
</tr>
<tr>
<td>Label</td>
<td>In the Label field, you specify a label for the workflow and exception indicators. Label is a 10-character identifier of a job or job group, or a resource that you want to appear as Name on the Workflow/Exceptions (WFEX) report. Label is optional. If you do not enter a Label, the field remains blank on the Definition and Criteria panel and on the Action Panel, but RMF dynamically fills it in on the report.</td>
</tr>
<tr>
<td>Alert</td>
<td>In the Alert field, you specify the warning signal for the workflow indicator or the exception line. When the threshold values you specified in the &lt;&gt;, Yel, and Red columns are met, RMF informs you through the alert signal. For Alert, you can specify:</td>
</tr>
<tr>
<td></td>
<td><strong>BLINK</strong> The workflow indicator on the tabular report or the exception line on both the tabular and graphic reports blinks</td>
</tr>
<tr>
<td></td>
<td><strong>BEEP</strong> Your workstation beeps</td>
</tr>
<tr>
<td></td>
<td><strong>BOTH</strong> Your workstation beeps, and the workflow indicator on the tabular report or exception line on both the graphic and tabular reports blinks</td>
</tr>
<tr>
<td></td>
<td><strong>NONE</strong> No alerting signal.</td>
</tr>
<tr>
<td>Text</td>
<td>In the Text field, you can specify the text for the Possible Cause or Action field of the Exceptions section of the Workflow/Exceptions report. Text is optional. If you leave it blank, RMF either:</td>
</tr>
<tr>
<td></td>
<td>• Dynamically fills it in with additional information or with a suggestion of what to do</td>
</tr>
<tr>
<td></td>
<td>• Leaves it blank when no information is available.</td>
</tr>
<tr>
<td>Criteria Set</td>
<td>Use the Criteria Set to specify the exception conditions and color highlighting that RMF should check. If you are defining a workflow indicator, the Criteria Sets are optional. If you are defining an exception (EX-ANY, EX-AVG, EX-GROUP), you must enter at least one Name, one comparison operand (&lt;&gt;, and one threshold value (Yel or Red) in one criteria set.</td>
</tr>
</tbody>
</table>
## Definition of UNAVAIL panel

**Table 88. Fields in the WFEX Definition and Criteria Panel (continued)**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Name          | You enter the conditions that RMF is to check for under Name. You can fill in Name or select the criteria names from a panel. To access the selection panel, use cursor-sensitive control on a blank Name field. To specify a criteria name, place an S in the column next to your choice and return to the Definition and Criteria panel. See “Criteria Names Selection panel” on page 214 for more information. You can specify or select up to seven criteria names for each criteria set. All of the conditions (Names) defined within a Criteria Set must be met in order for the color highlighting to appear on the Workflow/Exceptions report. To delete a criteria name, on the selection panel, you can either:  
  - Blank out the S next to the criteria name you want to delete on the Criteria Names Selection panel.  
  - Blank out the threshold values in the Yel and Red fields on the Definition and Criteria panel. When you press END, RMF removes the whole criteria line. |
| <>            | Specify a comparative operator in the <> field. You can specify one of the following: `< > <= => >= <> GT LT GE LE EQ NE NG NL` |
| Yel Red       | Specify a numeric threshold value in the Yel and Red fields. The values are color coded according to severity. The red value that you specify indicates a problem. The yellow value indicates caution (there may be a problem). If you define Yel and Red to be the same value, red has precedence. You can specify zero or any positive integer with or without a decimal point. For criteria names that represent a percentage, you must specify a value from 0 to 100. When the condition meets the value that you specify, exception lines appear in the Exceptions section of the report in the corresponding color. If the exception condition is also associated with a workflow indicator, the permanent line (in the tabular report) or the speedometer (in the graphic report) changes to the corresponding color in the Speed (Workflow) section. |

**RMF WFEX Report Options: Definition of UNAVAIL**

Edit information below. Use action characters to specify color of exception message. Exceptions are displayed when specified volumes are not available.

Action characters: Turquoise (T) Yellow (Y) Red (R)

<table>
<thead>
<tr>
<th>Class</th>
<th>DEV</th>
<th>Devices in the system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifier</td>
<td>Not allowed on this panel</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>EX-UNAVAIL</td>
<td>Exception when any selected volume not available</td>
</tr>
<tr>
<td>Label</td>
<td>====&gt; Comment for identification</td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td>====&gt; NONE_ Alerting signal: BLINK, BEEP, BOTH, NONE</td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>====&gt; Leave blank for default</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T DRV021</td>
<td>T D1310G</td>
<td>T D13MCP</td>
<td>T D94RM1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T PAGE08</td>
<td>T SPOOL1</td>
<td>T 410PRM</td>
<td>T 410SRO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 115. WFEX Definition of UNAVAIL Panel

On this panel you modify the report by defining or changing exception conditions. The above sample shows a panel for the class DEV.

Specify Label, Alert, and Text information on the top half of the panel.

**Note:** Class, Qualifier, and Indicator cannot be changed on this panel.
Select or type in the volume and color highlighting in the bottom half of the panel. Whenever the selected volume is not mounted, it will appear as an exception in the report highlighted in your chosen color.

To exit this panel, you must either:
- Select or type in at least one volume and press the END key
- Use the CANCEL command to cancel any volume selections.

On this panel, you can enter one of the following codes in the A column to color highlight exception lines.
- T Turquoise highlighting
- Y Yellow highlighting
- R Red highlighting

You can also type in any volume on a blank line at the top of the list of volumes.

If you want to remove a volume from this list, just specify a blank in column A.

**Criteria Names Selection panel**

On any of the six Criteria Names Selection panels you can modify the report by selecting or changing exception conditions.

Each selection panel shows a complete list of exceptions allowed for the specified Class, Qualifier, and Indicator. You can select up to 7 criteria names. The selected criteria names are shown in the corresponding criteria set when you return to the Definition and Criteria panel.

The six Criteria Names Selection panels are:
- Criteria selection panel for jobs
- Criteria selection panel for service classes, ASCH, and OMVS
- Criteria selection panel for processors
- Criteria selection panel for report performance groups
- Criteria selection panel for storage
- Criteria selection panel for devices

To get to the Criteria Names Selection panel, use cursor-sensitive control on a blank Name field on the Definition and Criteria panel.

All of the conditions (Names) defined within a Criteria Set must be met in order for the color highlighting to appear on the Workflow/Exceptions report. The following figures show sample Criteria Names Selection panels, all panels are scrollable.
Figure 116. WFEX Criteria Names for Class: Job
RMF WFEX Criteria Names for Class: SRVCLS

Select (S) a maximum of 7 items to use in a criteria set. Press END.

- AAU Average active users in group
- AAUS Avg active users in system
- ADU Average delayed users
- ASTO Active storage %
- KT Execute response time
- AVAIL Average users using
- ONLXF Online expanded storage frames
- OREPL Outstanding replies
- PINRT Page-in rate
- PROCS Processor delay %
- SQAO SQA overflow%
- STOR% Storage delay %
- TET Transaction elapsed time

RMF WFEX Criteria Names for Class: PROC

Select (S) a maximum of 7 items to use in a criteria set. Press END.

- AAU Average active users in group
- AAUS Avg active users in system
- ADU Average delayed users
- ASTO Active storage %
- AVAIL Number of CPUs
- CPU% TCB+SRB%
- CSA% CSA storage %
- DEV% Device delay %
- ESMRT Exp storage migration rate
- ESPRT Exp storage page movement rate
- ESPRT Exp storage page movement rate
- ESQO% ESQA overflow%
- JSQA% Job SQA use %
- MAXU% Maximum allowed user %
- MSG% Operator message delay %
- TSQAO Total SQA overflow

Figure 117. WFEX Criteria Names for Class: Service Class

Figure 118. WFEX Criteria Names for Class: Processor
To select a criterion name, type an S next to the Name(s) you want to use in a criteria set and press the END key.

Each Name represents a condition that RMF checks for as an exceptional value.

You can select a maximum of seven names for a criteria set.

To delete a criterion name, you can either:
- Blank out the S next to the criterion name you want to delete on the Criteria Names Selection panel.
- Blank out the threshold values in the Yel and Red fields on the Definition and Criteria panel. When you press END, RMF removes the whole criterion line.

### Automatic customization

To automatically customize RMF option sets, specify YES for Customization on the Session Options panel.

Automatic customization ensures that the option set used matches the service policy name and system ID that was in effect when the data was gathered. If the service policy name or the system ID changes between reports, an option set with
the same name is made active. The new option set is listed under Current Option Set on the Option Set Selection Menu (invoked via command OPTSET).

If no option set exists with the same name as the service policy name and system ID associated with the data, a new option set with that name is generated from the current option set and made active.

You may specify the data set containing the IPS information in the Input Data Set field. If nothing is specified in this field, the default SYS1.PARMLIB is used as the name of the Parmlib data set.

**Note:** You must be authorized for whichever data set is used.

Automatic customization is turned off if you enter NO in the Customization field on the Session Options panel or if you change the Current Option Set on the Option Set Selection menu to an option set that does not match the IPS member or service policy name and system ID of the data you are looking at.

Every time a new option set is selected or created, RMF saves all the changes from the old option set before making the new option set current.

### Workflow/Exceptions graphic Report

The Workflow/Exception graphic report illustrates workflow in speedometers. The speedometer needle points to the relative speed of the job or resource in the system. The solid/colored part to the left of the needle represents the proportion of a user’s time spent doing useful work. The part to the right of the needle represents the proportion of a user’s time spent delayed. If the part to the right of
the needle is colored either yellow or red, then one or more exception criteria were met. A line in the Exceptions section of the report corresponds to each yellow or red speedometer. The line has the same name and the same color as the speedometer, and gives details about the exception.

Field descriptions — Graphic WFEX Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The label for the speedometer appearing right above the speedometer. The one to ten character identifier of a workflow indicator. It can be a job, job group, or resource (processor or device). You can specify Name on the Label field of the Definition and Criteria panel or leave it blank and use the default name generated by RMF. If an indicator changes color, there is a corresponding line in the Exceptions section of the report with the same name and color giving more information about the exception.</td>
</tr>
<tr>
<td>Speedometer</td>
<td>How to read a speedometer:</td>
</tr>
<tr>
<td></td>
<td>In the upper left-hand corner of the Workflow/Exceptions graphic report is a sample speedometer with a scale showing how the workflow values are represented.</td>
</tr>
<tr>
<td></td>
<td>Each speedometer is made up of 2 parts, separated by the speedometer needle:</td>
</tr>
<tr>
<td></td>
<td>1. A left part, which is always solid.</td>
</tr>
<tr>
<td></td>
<td>The solid left part represents the proportion of a user's time spent doing useful work.</td>
</tr>
<tr>
<td></td>
<td>2. A right part, which is either hollow or solid (colored).</td>
</tr>
<tr>
<td></td>
<td>The right part, whether it is hollow or solid represents the proportion of a user's time spent delayed.</td>
</tr>
<tr>
<td></td>
<td>If the right part of the speedometer is solid (colored), one or more exception criteria were met. The solid part is colored according to the criteria set on the Definition and Criteria panel of the Workflow/Exceptions Report Options panels.</td>
</tr>
<tr>
<td></td>
<td>A line in the Exceptions section of the report corresponds to the speedometers with solid right parts and gives details about the exception.</td>
</tr>
<tr>
<td></td>
<td>The speedometer needle points to the relative speed of the job in the system, from 0 to 100.</td>
</tr>
</tbody>
</table>

XCF - Cross-System Coupling Facility Delays Report

The XCF Delays report lets you investigate situations where executing jobs are delayed when requesting service from XCF.

How to request this report

To request the XCF Delays report, select 4 from the Primary Menu, then select 3 from the Subsystem Report menu (shown in Figure 9 on page 27) or enter the following command:

XCF [job_class,service_class]
Contents of the report

The graphic form of this report shows the percentage of each user’s time spent waiting for XCF services.

RMF reports the overall delay (DLY %) and the four paths contributing most to delay (Main Delay Paths) due to XCF signalling traffic. RMF lists all delayed jobs by descending delay percentages.

None appears as the path number for pending jobs without an associated device number.

Possible causes for high XCF delay value might be caused by one or more of the following:

- Path capacity exceeded.
- Other applications are stressing the path.
- XCF delays on the receiving system.
- Some data paths are unavailable or offline.

Note: Any delay value shown in the report represents a delay of a message being sent. All messages are sent asynchronously. Whether the application can truly considered to be delayed will depend on the particular application and how it is implemented. Some applications send signals and go on to do other useful work, others may need to wait for a response to come back.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobname</td>
<td>Name of the job delayed when requesting service from XCF. The XCF delay report does not summarize data by job groups; all jobs within a job group are reported individually.</td>
</tr>
<tr>
<td>C</td>
<td>A one-character abbreviation for the job class as follows: S Started task, T TSO, B Batch, A ASCH, O OMVS</td>
</tr>
<tr>
<td>Service Class</td>
<td>The name of the service class that a specified job has been running in.</td>
</tr>
</tbody>
</table>
### Table 90. Fields in the XCF Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLY %</td>
<td>Delay the waiting job (address space) is experiencing because of delay for XCF during the report interval, expressed as a percentage.</td>
</tr>
<tr>
<td></td>
<td># Delay Samples</td>
</tr>
<tr>
<td></td>
<td>DLY % = ---------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Samples</td>
</tr>
<tr>
<td>Delay samples</td>
<td>The single state count of samples being delayed for XCF. RMF increments this count only once for each sample when one or more units of work (TCBs, SRBs, interrupted ready task or asynchronous exit) associated with the address space are delayed for XCF.</td>
</tr>
<tr>
<td>Note:</td>
<td>This DLY% value is also found in the XCF field on the Job Delay report.</td>
</tr>
<tr>
<td>Main Delay Path</td>
<td>The path number of the path contributing most to the delay due to XCF signalling traffic. The four paths with the highest percentages are displayed. If the job is pending and has no associated device number, NONE is displayed as the path number.</td>
</tr>
</tbody>
</table>

### Report options

The XCF Report Options panel is similar to the Device Report Options panel. See Figure 40 on page 75 for an example. If you select YES for Jobs on the Report Options panel, the Job Selection/Exclusion panel is displayed. See Figure 38 on page 70 for an example.

### ZFSACT - zFS Activity Report

The zFS Activity Report measures zFS activity on the basis of single file systems. With this information, you can monitor DASD performance to ensure that there are no volumes or channels working near the limit of their capacity (space and workload).

### How to request this report

To request the zFS Activity Report, select 1 from the Primary Menu, then select 9 from the Overview Report Selection Menu (shown in Figure 6 on page 25) or enter one of the following commands:

```
ZFSACT
ZFSA
```

In addition, you can navigate to this report through cursor-sensitive control from the ZFSSUM report to display zFS activity for a specific aggregate.
Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Name</td>
<td>Name of the aggregate selected by cursor-sensitive control from the ZFSSUM report. This column displays ALL if the report has been invoked with the ZFSACT command.</td>
</tr>
<tr>
<td>File System Name</td>
<td>z/OS Unix file system name.</td>
</tr>
<tr>
<td>Mount Point</td>
<td>Mount point of the file system.</td>
</tr>
<tr>
<td>Mode</td>
<td>Mounted mode of the file system. Possible values are: R/W mounted in read-write mode, R/O mounted in read-only mode, N/M not mounted, QSC not available because the aggregate is quiesced.</td>
</tr>
<tr>
<td>Quota</td>
<td>Size of the file system expressed by a logical number: Limit maximum logical size of the file system. When the quota is reached, this indicates that the file system is full, Usg% percentage of the quota currently used by the file system.</td>
</tr>
<tr>
<td>Operation Rate</td>
<td>Number of vnode operations per second on this file system.</td>
</tr>
</tbody>
</table>

**Table 91. Fields in the zFS Activity Report**

**Field descriptions**

**ZFSSUM - zFS Summary Report**

To use a zFS file system within a z/OS UNIX file system hierarchy to its full capacity, it is necessary to apply appropriate tuning options. The zFS performance especially depends on a suitable tailoring of its cache sizes to reduce I/O rates and path lengths. The performance can also be improved by adapting available disk space.

Therefore, this report provides a summary of zFS activity, response times and DASD statistics on the current system and thus helps to control and tune the zFS environment, for example, you can use the HIT% values in the Cache Activity section as indication whether the current cache sizes are sufficient.
How to request this report

To request the zFS Summary report, select 1 from the Primary Menu, then select 8 from the Overview Report Selection Menu (shown in Figure 6 on page 25) or enter one of the following commands:

ZFSSUM
ZFSS

Contents of the report

The zFS Summary Report contains the following sections:

- The Response Time section provides summary data for the overall response time for zFS requests and breaks down the response time into percentages for various delay reasons. This information can help to discover bottlenecks, for example with I/O operations.

- The Cache Activity section provides an overview of zFS cache activity of the four main cache types (user file, vnode, metadata and transaction caches).

- The Aggregate Name section provides measurements about zFS activity related to single zFS aggregates. With this information you can check if the disk space allocations for the aggregates are appropriate.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Time section</td>
<td></td>
</tr>
<tr>
<td>AVG</td>
<td>Average time in milliseconds required for the completion of the zFS requests during the report interval.</td>
</tr>
<tr>
<td>Wait%</td>
<td>The following Wait percentages are reported:</td>
</tr>
<tr>
<td>I/O</td>
<td>Percentage of time that zFS requests had to wait for I/O completion.</td>
</tr>
<tr>
<td>Lock</td>
<td>Percentage of time that zFS requests had to wait for locks.</td>
</tr>
<tr>
<td>Sleep</td>
<td>Percentage of time that zFS requests had to wait for events.</td>
</tr>
<tr>
<td>Cache Activity section</td>
<td></td>
</tr>
</tbody>
</table>
### Table 92. Fields in the zFS Summary Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User</strong></td>
<td>The user file cache is for caching regular user files that are larger than 7K. The measured statistics have the following meanings:</td>
</tr>
<tr>
<td>Rate</td>
<td>Total number of read and write requests per second made to the user file cache.</td>
</tr>
<tr>
<td>Hit%</td>
<td>Percentage of read and write requests to the user file cache that completed without accessing the DASDs.</td>
</tr>
<tr>
<td>Read%</td>
<td>Percentage of read requests, based on the sum of read and write requests.</td>
</tr>
<tr>
<td>Dly%</td>
<td>Percentage of delayed requests, with the following events counted as delays:</td>
</tr>
<tr>
<td>• Read wait: a read request must wait for a pending I/O operation.</td>
<td></td>
</tr>
<tr>
<td>• Write wait: a write request must wait because of a pending I/O operation.</td>
<td></td>
</tr>
<tr>
<td>• Write faulted: a write request to a file in the user file cache needs to perform a read operation from DASD before writing, because the required page of that file is currently not in the cache.</td>
<td></td>
</tr>
<tr>
<td><strong>Vnode</strong></td>
<td>The vnode cache is used to hold virtual inodes. An inode is a data structure related to a file in the file system, holding information about the file's user and group ownership, access mode and type.</td>
</tr>
<tr>
<td>Rate</td>
<td>Number of read and write requests per second made to the vnode cache.</td>
</tr>
<tr>
<td>Hit%</td>
<td>Percentage of read and write requests to the vnode cache that completed without accessing the DASDs.</td>
</tr>
<tr>
<td><strong>Metadata</strong></td>
<td>The metadata cache is used for file system metadata and for files smaller than 7K. It resides in the primary z/FS address space. An optional metadata backing cache, which resides in a data space, can be used as an extension to the metadata cache.</td>
</tr>
<tr>
<td>Rate</td>
<td>Number of read and write requests per second made to the metadata cache.</td>
</tr>
<tr>
<td>Hit%</td>
<td>Percentage of read and write requests to the metadata cache that completed without accessing the DASDs.</td>
</tr>
<tr>
<td><strong>Trx</strong></td>
<td>The transaction cache is used for caching data structures that change metadata.</td>
</tr>
<tr>
<td></td>
<td>There is one measured statistic:</td>
</tr>
<tr>
<td>Rate</td>
<td>Number of transactions per second that started in the transaction cache.</td>
</tr>
</tbody>
</table>

#### Aggregate Activity section

| Aggregate Name | Name of the zFS aggregate, that is, the name of the VSAM Linear Data Set (VSAM LDS) containing one or more file systems. |
| Size | Size of the aggregate. |
| Use% | Percentage of used space in the aggregate. |
| Mode | There are two types of aggregates: |
| • a compatibility mode aggregate contains a single zFS file system. |
| • a multi-file system aggregate contains more than one zFS file system. |
| R/O CP | Compatibility mode aggregate attached read-only. |
| R/W CP | Compatibility mode aggregate attached read-write. |
| R/O MS | Multi-file system aggregate attached read-only. All file systems in this aggregate are read-only and can only be mounted read-only. |
| R/W MS | Multi-file system aggregate attached read-write. The file systems in this aggregate can be mounted read-only and read-write. |
| FS | Number of file systems in the aggregate. |
Navigating to details in the zFS Summary Report

From the zFS Summary Report, you can navigate to a variety of detail information using cursor-sensitive control (see Figure 125 to Figure 129 on page 228). You reach these panels like follows:

- From any value in the Wait% -I/O field, you can reach the I/O Details by Type panel (Figure 125).
- From any value in the Cache Activity - User section, you can reach the User Cache Details panel (Figure 126 on page 226).
- From any value in the Cache Activity - Vnode section, you can reach the Vnode Cache Details panel (Figure 127 on page 227).
- From any value in the Cache Activity - Metadata section, you can reach the Metadata Cache Details panel (Figure 128 on page 228).
- From any value in the Cache Activity - Trx section, you can reach the Transaction Cache Details panel (Figure 129 on page 228).
- From any aggregate name in the Aggregate Name section, you can reach the zFS Activity Report specific for the selected aggregate (Figure 123 on page 222).

The zFS Summary - I/O Details by Type report displays a breakdown of I/O requests into the following types:

- I/O for file system metadata
- I/O for log data
- I/O for user file data

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Total number of I/O requests of the indicated type.</td>
</tr>
<tr>
<td>Waits</td>
<td>Number of zFS requests waiting for an I/O completion of the indicated I/O type.</td>
</tr>
<tr>
<td>Canc1</td>
<td>Number of cancelled zFS requests during an I/O request of the indicated type, for example, a user tried to delete a file during a pending I/O to this file’s metadata.</td>
</tr>
<tr>
<td>Merge</td>
<td>Number of merges of two I/O requests into a single request because of better performance.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of the I/O request (I/O for metadata, log data or user file data).</td>
</tr>
</tbody>
</table>

Figure 125. I/O Details by Type
The user file cache is for caching regular user files that are larger than 7K. The zFS Summary - User Cache Details report displays the following details of the user file cache activity:

### Table 94. Fields in the zFS Summary Report - User Cache Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read Rate</td>
<td>Number of read requests per second made to the user file cache.</td>
</tr>
<tr>
<td>Write Rate</td>
<td>Number of write requests per second made to the user file cache.</td>
</tr>
<tr>
<td>Read Hit (%)</td>
<td>Percentage of read requests to the user file cache that completed without accessing the DASD.</td>
</tr>
<tr>
<td>Write Hit (%)</td>
<td>Percentage of write requests to the user file cache that completed without accessing the DASD.</td>
</tr>
<tr>
<td>Read Delay (%)</td>
<td>Percentage of delayed read requests to the user file cache. A read request is delayed if it must wait for pending I/O, for example, because the file is in a pending read state due to asynchronous read ahead from DASD to the user file cache.</td>
</tr>
<tr>
<td>Write Delay (%)</td>
<td>Percentage of delayed write requests to the user file cache.</td>
</tr>
<tr>
<td>Async Read Rate</td>
<td>Number of read-aheads per second.</td>
</tr>
<tr>
<td>Scheduled Write Rate</td>
<td>Number of scheduled writes per second.</td>
</tr>
<tr>
<td>Page Reclaim Writes</td>
<td>Total number of page reclaim writes. A page reclaim write action writes one segment of a file from the user file cache to DASD. Page reclaim writes are performed to reclaim space in the user file cache. If page reclaim writes occur too often in relation to the write rate, then the user file cache may be too small.</td>
</tr>
<tr>
<td>Fsyncs</td>
<td>Total number of requests for file synchronization (fsync) between user file cache and DASD.</td>
</tr>
<tr>
<td>Size</td>
<td>Total size of the user file cache.</td>
</tr>
<tr>
<td>Total Pages</td>
<td>Total number of pages in the user file cache.</td>
</tr>
<tr>
<td>Free Pages</td>
<td>Total number of free pages in the user file cache.</td>
</tr>
<tr>
<td>Segments</td>
<td>Total number of allocated segments in the user file cache.</td>
</tr>
<tr>
<td>User Cache readahead</td>
<td>Shows if the zFS parameter user_cache_read is on or off. This parameter specifies whether zFS performs read-ahead for sequential access. For zFS data collected on z/OS V2.1 and above, N/A is shown.</td>
</tr>
</tbody>
</table>

![Figure 126. User Cache Details](image-url)
The vnode cache is used to hold virtual inodes. An inode is a data structure related to a file in the file system, holding information about the file's user and group ownership, access mode and type. The zFS Summary - Vnode Cache Details report displays the following details of the vnode cache activity:

The metadata cache is used for file system metadata and for files smaller than 7K. It resides in the primary z/FS address space. An optional metadata backing cache, which resides in a data space, can be used as an extension to the metadata cache. The backing cache increases the amount of metadata that can be kept in memory. It may improve the performance of workloads that require large amounts of metadata.

The zFS Summary - Metadata Cache Details report displays the following details of the metadata cache and, if available, of the metadata backing cache:
Table 96. Fields in the zFS Summary Report - Metadata Cache/Backing Cache Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Rate</td>
<td>Number of requests per second made to the metadata cache/backing cache.</td>
</tr>
<tr>
<td>Hit (%)</td>
<td>Percentage of requests to the metadata (backing) cache completing without accessing the DASD.</td>
</tr>
<tr>
<td>Size</td>
<td>Total size of the metadata (backing) cache.</td>
</tr>
<tr>
<td>Buffers</td>
<td>Total number of buffers in the metadata (backing) cache. The buffer size is 8K.</td>
</tr>
<tr>
<td>Storage fixed</td>
<td>Shows whether the size of the metadata (backing) cache storage is fixed. If the zFS parameters <code>meta_cache_size</code> and/or <code>metaback_cache_size</code> are set to 'fixed', then zFS reserves real storage for use by zFS only. The 'fixed option' helps to improve performance during data access and can be applied if you have enough real memory available.</td>
</tr>
</tbody>
</table>

The transaction cache is used for caching data structures that change metadata. The `zFS Summary - Transaction Cache Details` report displays the following details of the transaction cache:

Table 97. Fields in the zFS Summary Report - Transaction Cache Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Rate</td>
<td>Total number of transactions per second that started in the transaction cache.</td>
</tr>
<tr>
<td>EC Merge Rate</td>
<td>Number of transactions per second that are merged together into an equivalent class.</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
</tr>
<tr>
<td>Transactions</td>
<td>The following transaction details are measured:</td>
</tr>
<tr>
<td>Active</td>
<td>Number of active transactions.</td>
</tr>
<tr>
<td>Pending</td>
<td>Number of pending transactions. A transaction is pending if all its updates are written to the log file but other transactions related to this transaction have not yet ended.</td>
</tr>
<tr>
<td>Complete</td>
<td>Number of completed transactions. A transaction is completed if all its updates are written and the end transaction record is also written to the log. As soon as all the log file pages that contain information about this transaction are written to DASD, the transaction is committed and the transaction structure is freed for new transactions.</td>
</tr>
<tr>
<td>Free</td>
<td>Number of free transaction structures. These are used by new transactions.</td>
</tr>
<tr>
<td>Allocated</td>
<td>Total number of transaction structures allocated in the transaction cache.</td>
</tr>
</tbody>
</table>

The initial number of transaction structures allocated in the transaction cache is defined by the zFS parameter `tran_cache_size`. zFS dynamically increases the size of the cache if there are bottlenecks with free transaction structures.

\[ \text{Allocated} = \text{Active} + \text{Pending} + \text{Complete} + \text{Free} \]
Mon III - ZFSSUM
Chapter 3. Snapshot reporting with Monitor II

This information unit describes the format and contents of the following Monitor II reports:

- **ARD** Address Space Resource Data report
- **ASD** Address Space State Data report
- **ASRM** Address Space SRM Data report
- **CHANNEL** Channel Path Activity report
- **DEV** Device Activity report
- **HFS** HFS File System Statistics report
- **ILock** IRLM Long Lock Detection report
- **IOQUEUE** I/O Queuing Activity report
- **LLI** Library List report
- **OPT** OPT Settings report
- **PGSP** Page Data Set Activity report
- **SDS** Sysplex Data Server report
- **SENQ** System Enqueue Contention report
- **SENQR** System Enqueue Reserve report
- **SPAG** Paging Activity report
- **SRCS** Central Storage/Processor/SRM report

Monitor II sessions

You can **display** a Monitor II report during:

- **An ISPF display session**
  This session is started with the command
  `RMF`  
  This leads to the RMF Primary menu, then you select 2 to get the Monitor II ISPF session.

- **A TSO/E display session**
  This session is started with the TSO/E command
  `RMFMON`  

- **A background session**
  To start a Monitor II background session when all options are to be taken from the program defaults, issue the command:
  `MODIFY RMF,START AB`  

You can obtain a **printout** of a Monitor II session report:

- During or at the end of a background session
- During a display session

In all sessions, you can get the same reports. There is just a small difference in the syntax used to call them:

- **Display Session**
  The reports are called via **commands** according to TSO/E syntax rules:
Example: ASD T,A

- Background Session

  The reports are called via options according to option syntax rules:

  Example: ASD(T,A)

This chapter shows report examples from an ISPF session, the report format of a RMFMON session is very similar, and the meaning of all report fields is the same in all versions of a report.

**Structure of Monitor II reports**

This chapter presents sample reports and the meaning and contents of each field in each report. The sample reports show the display screen contents from an ISPF session for each report.

When the reports are printed, the contents are identical to the report contents shown on the screen with some differences in the layout of the printed output.

**Contents of the Monitor II report header**

A Monitor II report header looks different, depending on whether you use the ISPF interface or the TSO/E interface.

**If you are using an ISPF session**

Each report consists of

- A header line identifying the report
- A line for commands and scroll amount field
- A status line for CPU, UIC, and PR. This line also contains the SMF system ID and the current setting of the report mode (Total or Delta).
- A variable number of data lines.

**If you are using a TSO/E session**

Each report consists of

- A title line
- Two lines of heading information
- A variable number of data lines.

Figure 130 shows the different report areas for a TSO/E session. For a description of each area, see Table 98 on page 233.

![Figure 130. Header of a Monitor II TSO/E session report](image)

When you begin a session, the cursor appears in the input area. During the session you issue all display commands from this area. Other areas indicated in the figure are described in Table 98 on page 233.
Table 98. Monitor II Display Session Areas

<table>
<thead>
<tr>
<th>Area</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report title</td>
<td>The type of measurement data</td>
</tr>
<tr>
<td>F</td>
<td>Indicates more pages</td>
</tr>
<tr>
<td>Input Area</td>
<td>Issue all commands from here.</td>
</tr>
<tr>
<td>Status/Message Area</td>
<td>This area contains:</td>
</tr>
<tr>
<td>CPU</td>
<td>Current average processor utilization.</td>
</tr>
<tr>
<td></td>
<td>This information depends on the activity of Monitor I.</td>
</tr>
<tr>
<td></td>
<td>If Monitor I CPU gathering is <strong>active</strong>, the header line shows two</td>
</tr>
<tr>
<td></td>
<td>views separated by a slash (/):</td>
</tr>
<tr>
<td></td>
<td>• The MVS view of the CPU utilization</td>
</tr>
<tr>
<td></td>
<td>• The LPAR view of the CPU utilization</td>
</tr>
<tr>
<td></td>
<td>If Monitor I CPU gathering is <strong>not active</strong>, the header line shows:</td>
</tr>
<tr>
<td></td>
<td>• The SRM view of the CPU utilization.</td>
</tr>
<tr>
<td></td>
<td>• &quot;***&quot; due to missing CPU measurement data for the LPAR view</td>
</tr>
<tr>
<td></td>
<td>For more information about the different views of CPU utilization</td>
</tr>
<tr>
<td></td>
<td>refer to &quot;CPU - CPU Activity report&quot; on page 329.</td>
</tr>
<tr>
<td>UIC</td>
<td>The current system unreferenced interval count.</td>
</tr>
<tr>
<td></td>
<td>Values greater than 9999 are displayed as nnK to indicate a multiple of 1000. The maximum value is 65K.</td>
</tr>
<tr>
<td>PR</td>
<td>The rate of page-ins per second excluding swap-ins, VIO (virtual input/output), reclaim, and hiperspaces.</td>
</tr>
<tr>
<td>System</td>
<td>The SMF system ID of this system.</td>
</tr>
<tr>
<td>Report Name Area</td>
<td>The report name.</td>
</tr>
<tr>
<td>Mode Area</td>
<td>The current setting for the report mode (either D for delta or T for total) and hardcopy mode (either H for hardcopy, or blank)</td>
</tr>
<tr>
<td>Header Area</td>
<td>Consists of two lines of column headings that identify the data fields included in the report.</td>
</tr>
<tr>
<td>Output Area</td>
<td>Contains the report data.</td>
</tr>
</tbody>
</table>

**Different formats of Monitor II reports**

Monitor II offers two types of reports:
- **Table Reports** - Example: ASD Report
  Table reports have a variable number of data lines.
- **Row Reports** - Example: ASDJ Report
  Row reports have only one line of data. When you request a row report repeatedly, each request adds one line of data to the display. You can use the repetitive requests to build a table of information.

**Different modes of Monitor II reports**

Monitor II offers two modes for the session reports:
- **Total** mode
  A total mode report shows the cumulative total since the beginning of the Monitor I interval.
- **Delta** mode
Monitor II Reports

A delta report mode shows the change in the activity since the previous request for the report.

Monitor II display session reports

For a Monitor II display session, RMF creates a single output data set for each session. All printed output resulting from either hardcopy mode or the non-ISPF Print command is sent to the same output data set.

You need to allocate this data set before starting the display session:

ALLOC F(RMFDMTSO) DS(dsname) SHR

If you issue the ISPF Print command, the output is stored in data set userid.SPFX.LIST, this is the standard way as ISPF handles print output.

See the [z/OS RMF User’s Guide](#) for more details.

Each report printed when the session is in hardcopy mode is delimited by a line of plus signs (+). Each report printed as a result of the print display command is delimited by a line of asterisks (*).

Fields within the line of delimiters indicate the operands specified on the report request, whether the session is in delta or total mode, and the name of the report.

When there are repetitive requests for the same row report, headings appear for the first request; data lines appear for each subsequent request. A field within the line indicates the time of the report.

[Figure 131](#) shows an example of printed output from a display session.

![RMF Monitor II HARDCOPY LOG](#)

<table>
<thead>
<tr>
<th>z/OS V2R1</th>
<th>SESSION NAME TSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME CONN 10M 25 FF CSF M R ABS TIME TIME RATE RATE RT RT RT</td>
<td></td>
</tr>
<tr>
<td>MASTER 11432 0 493 1261 116 0.0 7973.9 17944</td>
<td></td>
</tr>
<tr>
<td>PCAUTH 0.000 0 92 2 30 X 0.0 0.04 0.05</td>
<td></td>
</tr>
<tr>
<td>RASP 0.000 --- 30 --- ----- X 0.0 0.02 27.48</td>
<td></td>
</tr>
<tr>
<td>TRACE 0.000 0 145 3 49 X 0.0 0.02 0.83</td>
<td></td>
</tr>
<tr>
<td>XCFAS 1470 0 2407 2457 2087 X 0.0 245.4 396.2</td>
<td></td>
</tr>
<tr>
<td>GRS 29514 17 17 38 33 X 0.0 2135.2 10346</td>
<td></td>
</tr>
<tr>
<td>SMF 0.000 0 47 2 20 X 0.0 44.81 51.38</td>
<td></td>
</tr>
<tr>
<td>SMFCF 0.000 0 13 5 19 X 0.0 0.01 0.02</td>
<td></td>
</tr>
<tr>
<td>DUMPRES 278.1 0 100 2 37 X 0.0 19.30 61.10</td>
<td></td>
</tr>
<tr>
<td>CONSOL 1140 0 42 2 31 X 0.0 1189.7 1365.2</td>
<td></td>
</tr>
<tr>
<td>ANTRMA 0.050 0 86 2 23 X 0.0 0.02 2.45</td>
<td></td>
</tr>
<tr>
<td>ALLOCAS 0.000 0 78 2 21 X 0.0 0.02 0.83</td>
<td></td>
</tr>
<tr>
<td>SMF 324.0 0 49 2 36 X 0.0 1.32 43.32</td>
<td></td>
</tr>
<tr>
<td>VLF 0.956 1 117 32 34 X 0.0 231.96 235.34</td>
<td></td>
</tr>
<tr>
<td>LLA 215.2 10 9 12 56 X 0.0 80.48 96.14</td>
<td></td>
</tr>
<tr>
<td>DFTSF 265.3 0 32 2 61 X 0.0 80.95 98.33</td>
<td></td>
</tr>
<tr>
<td>FTPSRV01 0.783 1 1 32 3 5 X 0.0 7.22 7.64</td>
<td></td>
</tr>
</tbody>
</table>

[Figure 131](#). Format of printed reports from a Monitor II display session

The report was printed as a result of a HARDCOPY ON or HARDCOPY command. This command puts the session in hardcopy mode and causes all reports to be displayed and a printable version to be sent to the output data set.
Monitor II background session reports

For a Monitor II background session, RMF creates a single output data set for each report requested. All interval reports for that measurement activity are written to a single output data set. Thus, if you request three measurements for a session with five reporting intervals, RMF creates three data sets and writes five reports to each data set.

The printed output generated for each table report requested is preceded by a line of plus signs (+). Fields within the line of plus signs indicate the option and any operands specified for the report and whether the report is in delta mode or total mode. Each iteration of the report is separated by a line of plus signs. A field within the line of plus signs indicates the time of the report. The column headings are repeated for each iteration of the report.

The printed output generated for each row report is preceded by a single line of plus signs (+). Fields within the line of plus signs indicate the option and any operands specified for the report and whether the session is in delta or total mode. Headings appear only once. There is no delimiter between successive iterations of a row report, and a field within the report line indicates the time of the report.

Figure 132 shows an example of printed output generated during a Monitor II background session.

```
SESSION NAME BB

14:35:46       N(274)  TOTAL MODE  ASO

14:35:46       S C R DP CS ESF ESF TAR WS TX WRK CPU  I/O STM

JOBNAME SRVCLASS P L LS PR F +CS WSS IN SC RV RV RV RV
+MASTER* SYSTEM 1 NS FF 133 0 133 0 0 0 0 +0 +0 +0 +0
PCAUTH SYSSSTC 1 NS 76 33 0 33 0 11 0 0 +0 +0 +0 +0
TRACE SYSSSTC 1 NS 77 176 0 176 0 11 0 0 +0 +0 +0 +0
GRS SYSTEM 1 NS FF 561 0 561 33K 11 0 0 +0 +0 +0 +0
CONSOLE SYSTEM 1 NS FF 174 0 174 0 11 1 0 +0 +0 +0 +0
ALLOCAS SYSTEM 1 NS 71 986 0 986 0 11 1 0 +0 +0 +0 +0
LFA SYSSSTC 1 NS 71 170 0 170 0 30 0 150 +0 +0 +0 +0
RMF33 SYSSSTC 1 NS 71 159 0 159 0 34 0 150 +0 +0 +0 +0

14:35:54       S C R DP CS ESF ESF TAR WS TX WRK CPU  I/O STM

JOBNAME SRVCLASS P L LS PR F +CS WSS IN SC RV RV RV RV
BOYLEMM BATCH 2 IN 78 85 0 133 0 0 4 101 +0 +0 +0 +0
MNF SYSTEM 1 NS FF 94 0 94 0 11 0 150 +0 +0 +0 +0
DFIHYM SYSSSTC 1 NS 74 610 0 610 0 15K 1 150 +0 +0 +0 +0
VTAM SYSSSTC 1 NS FD 678 0 678 0 34 0 0 +0 +0 +0 +0
SOS SYSSSTC 1 IN 79 76 0 567 0 0 11K 150 +0 +0 +0 +0
AMSAQFT SYSSSTC 1 NS 72 54 0 54 0 33 0 150 +0 +0 +0 +0
JESS SYSSSTC 1 NS FE 900 0 900 0 24 0 0 +0 +0 +0 +0
CATALOG SYSTEM 1 NS FF 1552 0 1552 0 11 0 150 +0 +0 +0 +0

14:36:02       S C R DP CS ESF ESF TAR WS TX WRK CPU  I/O STM

JOBNAME SRVCLASS P L LS PR F +CS WSS IN SC RV RV RV RV
HUBERF TSO 2 IN 78 498 0 597 0 0 3 0 +0 +0 +0 +0
ZAPPERD TSO 2 IN 72 110 0 121 0 0 1 150 +0 +0 +0 +0
P1TRACYB TSO 2 IN 78 174 0 229 0 0 1 0 +0 +0 +0 +0
IRLMPROC SYSSSTC 1 NS FC 61 0 61 0 33 0 0 +0 +0 +0 +0

Figure 132. Format of printed reports from a Monitor II background session
```
ARD/ARDJ - Address Space Resource Data report

The ARD and ARDJ reports gives information on the system resources that are used by each address space in the system or each address space that meets the selection criteria that you specify when you requested the report. The information provided in these reports includes, for example, information on processor time, paging, and central storage.

The ARD report enables you to determine which jobs are creating performance problems.

Once a problem job has been identified, you can request an ARDJ report for that particular job. This enables you to focus your reporting on a known problem area.

How to request this report

Different methods are used to request the ARD and ARDJ reports.

How to request an ARD report

- In ISPF, specify 1 on the Address Space Report Selection menu.
- In TSO/E, use PF1 to select the ARD report.
- Command interface:

  Display session
  ARD [class,status]

  Background session
  ARD [(class,status)]

How to request an ARDJ report

- In ISPF, specify 4 on the Address Space Report Selection menu.
- Command interface:

  Display session
  ARDJ jobname

  Background session
  ARDJ (jobname)

Contents of the report

The information shown in an ARD and an ARDJ report is identical, except the content of the first column which is:

  JOBNAME for the ARD report
  TIME for the ARDJ report

In the ARD report of Figure 133 on page 237, the number of data lines in the report depends on the number of address space identifiers in the system that meet your selection criteria. The shown report is a sample for a system running in z/Architecture.

In the ARDJ report of Figure 134 on page 237, the number of rows depends on your requests to build a table of information for a particular job.
Table 99. Fields in the ARD and ARDJ reports

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>The time the report was requested, and the one to eight character jobname associated with the address space.</td>
</tr>
<tr>
<td>JOBNAME (ARD report)</td>
<td></td>
</tr>
</tbody>
</table>

Mon II - ARD/ARDJ

Figure 133. ARD Report in z/Architecture

<table>
<thead>
<tr>
<th>Command ====&gt;</th>
<th>RMF - ARD Address Space Resource Data</th>
<th>Line 1 of 85</th>
<th>Scroll ====&gt; HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU= 9</td>
<td>UI= 255 PR= 13</td>
<td>System= SYS1 Total</td>
<td></td>
</tr>
<tr>
<td>14:51:59 DEV</td>
<td>FF FF PRIV LSQA X C SRM TCB CPU EXCP SWAP LPA CSA NVI V&amp;H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOBNAME CONN</td>
<td>16M 2G FF CSF M R ABS TIME TIME RATE RATE RT RT RT RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MASTER* 1476</td>
<td>0 493 1261 110</td>
<td>0.0 149.0 544.5 0.29 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>PCAUTH 0.000</td>
<td>0 94 0 122 X</td>
<td>0.0 0.00 0.00 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>RASP 0.000</td>
<td>0 30 207 44 X</td>
<td>0.0 0.00 1.90 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>TRACE 0.067</td>
<td>0 145 1 173 X</td>
<td>0.0 0.00 0.00 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>DUMPSRV 14.69</td>
<td>0 33 0 76</td>
<td>0.0 1.01 1.73 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>XCFAS 1470</td>
<td>0 2407 2457 2087 X</td>
<td>0.0 245.4 796.2 2.51 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>GRS 0.000</td>
<td>0 47 52 1047 X</td>
<td>0.0 235.0 339.8 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>SMXC 2.400</td>
<td>0 13 0 50</td>
<td>0.0 9.44 11.10 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>SYSBMAS 0.000</td>
<td>0 100 104 31</td>
<td>0.0 4.74 4.83 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>CONSOLE 25.23</td>
<td>0 44 19 101 X</td>
<td>0.0 61.85 66.37 0.07 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>WLM 0.493</td>
<td>0 86 52 503 X</td>
<td>0.0 2130 2241 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>ANTMAN 0.934</td>
<td>0 78 3 163 X</td>
<td>0.0 2.60 3.05 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>ANTAS 0.621</td>
<td>0 9 2 100 X</td>
<td>0.0 0.07 0.08 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>OMVS 168.5</td>
<td>0 137 85 647 X</td>
<td>0.0 22.57 26.50 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>IEFSCHAS 0.000</td>
<td>0 9 0 34 X</td>
<td>0.0 0.00 0.00 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>JESXCF 1.629</td>
<td>0 32 4 78 X</td>
<td>0.0 24.64 42.03 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 134. ARDJ Report for a system running in 31-bit mode

<table>
<thead>
<tr>
<th>Command ====&gt;</th>
<th>RMF - ARDJ Address Space Resource Data</th>
<th>Line 1 of 14</th>
<th>Scroll ====&gt; HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU= 37/35</td>
<td>UI= 2540 PR= 0</td>
<td>System= SYS1 Total</td>
<td></td>
</tr>
<tr>
<td>BGBO DEV</td>
<td>FF FF PRIV LSQA LSQA X C SRM TCB CPU EXCP SWAP LPA CSA NVI V&amp;H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME CONN</td>
<td>16M 2G FF CSF ESF M R ABS TIME TIME RATE RATE RT RT RT RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:33:17 10.02</td>
<td>39 4 38 0</td>
<td>--- 20.73 32.26 ----- ----- ----- ----- ----- -----</td>
<td></td>
</tr>
<tr>
<td>13:33:50 11.96</td>
<td>35 5 40 0</td>
<td>944 22.33 24.22 39.2 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:33:53 12.39</td>
<td>35 5 40 0</td>
<td>962 22.63 24.58 28.7 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:44 14.35</td>
<td>35 5 40 0</td>
<td>1K 24.71 27.00 38.5 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:47 14.79</td>
<td>35 5 40 0</td>
<td>1K 24.95 27.29 30.5 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:49 15.05</td>
<td>36 6 40 0</td>
<td>1K 25.22 27.62 24.3 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:52 15.31</td>
<td>36 6 40 0</td>
<td>1K 25.44 27.88 29.0 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:54 15.69</td>
<td>35 5 40 0</td>
<td>1K 25.74 28.23 23.7 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:34:57 16.08</td>
<td>36 6 40 0</td>
<td>1K 26.06 28.61 42.5 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td></td>
</tr>
<tr>
<td>13:36:17 19.01</td>
<td>4 48 0</td>
<td>--- 28.73 31.86 ----- ----- ----- ----- ----- -----</td>
<td></td>
</tr>
<tr>
<td>13:36:25 19.01</td>
<td>4 45 0</td>
<td>990 28.74 31.86 ----- ----- ----- ----- ----- -----</td>
<td></td>
</tr>
<tr>
<td>13:36:32 19.01</td>
<td>4 49 0</td>
<td>990 28.74 31.87 0.00 0.00 0.0 0.0 0.0 0.0 3.7 0.0 0.0 0.0</td>
<td></td>
</tr>
</tbody>
</table>

Field descriptions

Chapter 3. Snapshot reporting with Monitor II
### Table 99. Fields in the ARD and ARDJ reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>jobname</td>
<td>The name of the job you requested. This column contains the time the report was requested.</td>
</tr>
<tr>
<td>TIME</td>
<td>The device connect time (in seconds) used by the job. If it is greater than 99999 seconds, then it is expressed in hours (a four-digit number with a floating decimal point followed by H). If the device connect time exceeds 76.4 hours, three asterisks will appear in the field.</td>
</tr>
<tr>
<td>DEV</td>
<td>The number of fixed pages below 16 megabytes for the job. If the data gathered is not valid, dashes will appear in this and the following fields.</td>
</tr>
<tr>
<td>CONN</td>
<td>The number of fixed pages for the job between 16 megabytes and 2 gigabytes. <strong>Note:</strong> This field is only shown for systems running in z/Architecture mode.</td>
</tr>
<tr>
<td>FF</td>
<td>The number of private non-LSQA pages for the job.</td>
</tr>
<tr>
<td>16M</td>
<td>The number of private LSQA fixed pages for the job in central storage. This value includes fixed frames and private DREF pages.</td>
</tr>
<tr>
<td>LSQA</td>
<td>The cross memory address space indicator. When the field contains X, the line of data describes a cross memory address space; that is, an address space accessed primarily from other address spaces by means of cross memory functions. If it is not a cross memory address space, the field is blank.</td>
</tr>
<tr>
<td>CSF</td>
<td>An indication whether WLM managed the address space as storage critical and/or CPU critical during the reporting interval. S Storage critical C CPU critical X Both storage and CPU critical</td>
</tr>
<tr>
<td>X</td>
<td>The total SRM service absorption rate for the job. This field is reported only for address spaces that are currently in central storage. If no data is reported, dashes will appear in the field.</td>
</tr>
<tr>
<td>M</td>
<td>The number of seconds of TCB processor time used by the current job step.</td>
</tr>
<tr>
<td>CPU</td>
<td>The amount of processor (TCB + SRB) time, in seconds, for the current job step. When a valid delta value cannot be computed because the job has changed steps between requests for the report, this field contains dashes when delta mode is in effect.</td>
</tr>
<tr>
<td>TIME</td>
<td>The EXCP rate. This field always contains the rate since the last report request. The following fields always contain a value that reflects the change since the last report request. They are reported only for address spaces that are currently in central storage.</td>
</tr>
<tr>
<td>SWAP</td>
<td>The page rate (the sum of pages in and pages out) for the job.</td>
</tr>
<tr>
<td>RATE</td>
<td>The common LPA page-in rate for the current transaction.</td>
</tr>
<tr>
<td>LPA</td>
<td>The common CSA page-in rate for the current transaction.</td>
</tr>
<tr>
<td>CSA</td>
<td>The private non-VIO page rate (the sum of pages in and pages out) for the current transaction.</td>
</tr>
<tr>
<td>RT</td>
<td></td>
</tr>
</tbody>
</table>
Table 99. Fields in the ARD and ARDJ reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&amp;H RT</td>
<td>The hiperspace and private VIO page rate (the sum of pages in and pages out) for the current transaction.</td>
</tr>
</tbody>
</table>

Report options for ARD, ASD, and ASRM

![RMF Monitor II - Address Space Options](image)

Command ===>
Change or verify parameters. The input entered on this panel applies to ARD, ASD, and ASRM. To exit press END.

Class ===> T
Specify one of the following workloads:
A=All, B=Batch/STC, T=TSO, AS=ASCH, O=OMVS

Inactive ===> NO
Specify YES to include inactive address spaces.

You can specify the class, status, and domain you want the report for.

Class Allows you to specify the class. The default value is A.

Inactive Allows you to specify the status of the address spaces shown on the report. The default is NO to include only active address spaces. YES causes all address spaces to be shown.

You can use the following commands on the Report Options panel:

RESET
Sets the default options.

CANCEL
Ends the option dialog without saving your changes.

Pressing the ENTER key checks the options. If no valid value is found, a message is issued. To resolve the error, either correct the value, or enter the CANCEL command.

END
Ends the dialog saving your changes.

Report options for ARDJ, ASDJ, and ASRMJ

![RMF Monitor II - Address Space Options - Single Job](image)

Command ===>
The jobname entered here applies to ARDJ, ASDJ, and ASRMJ. To exit press END.

Jobname ===> ________
Specify a 1 to 8 character jobname.

You can specify a jobname for ARDJ, ASDJ, and ASRMJ.

Jobname
The jobname must:
- Be one to eight characters long
- Consist of the characters A-Z, 1-9, and the special characters @, #, and $
The exception to these rules is "MASTER", which is also a valid jobname.

**ASD/ASDJ - Address Space State Data report**

The ASD/ASDJ report gives an overview of the current state of each address space in the system or each address space that meets the selection criteria that you specify when you request the report. Basically, the report tells you where each address space is and what it is doing.

You can use the ASD report, for example, to determine which jobs are using large amounts of central storage or which jobs are being swapped excessively and why the swapping is occurring.

Once a problem job has been identified, you can request an ASDJ report for that particular job. This enables you to focus your reporting on a known problem area.

If you have a workload delaying your application, you can check the workloads dispatching priority (DP PR) on the ASD report, and change it if necessary.

**How to request this report**

Different methods are used to request the ASD and ASDJ reports.

**How to request an ASD report**

- In ISPF, specify 2 on the Address Space Report Selection menu.
- In TSO/E, use PF2 to select the ASD report.
- Command interface:

  **Display session**
  
  ASD [class,status]

  **Background session**
  
  ASD [[class,status]]

**How to request an ASDJ report**

- In ISPF, specify 4 on the Address Space Report Selection menu.
- Command interface:

  **Display session**
  
  ASDJ jobname

  **Background session**
  
  ASDJ (jobname)

**Contents of the report**

The information shown in an ASD and an ASDJ report is identical except the heading for the first column which is:

- JOBNAME for the ASD report
- TIME for the ASDJ report

In the ASD report of Figure 137 on page 241, the number of rows in the report depends on the number of address space identifiers that meet your selection criteria.

In the ASDJ report of Figure 138 on page 241, the number of rows depends on your requests to build a table of information for a particular job.
Note: Information about SRM service is available in the address space SRM data (ASRM) report.

Field descriptions

Table 100. Fields in the ASD and ASDJ Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss JOBNAME</td>
<td>The time the ASD report was requested, in the form hh:mm:ss, and the one to eight character jobname associated with the address space.</td>
</tr>
<tr>
<td>SRVCLASS</td>
<td>The service class name.</td>
</tr>
<tr>
<td>S</td>
<td>Service class period.</td>
</tr>
</tbody>
</table>
### Table 100. Fields in the ASD and ASDJ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>C L</td>
<td>The field showing the current location of the job. The possible contents and their meanings are:</td>
</tr>
<tr>
<td>IN</td>
<td>In storage</td>
</tr>
<tr>
<td>OT</td>
<td>Swapped out and ready</td>
</tr>
<tr>
<td>LO</td>
<td>Logically swapped out</td>
</tr>
<tr>
<td>NS</td>
<td>Non-swappable</td>
</tr>
<tr>
<td>WM</td>
<td>Waiting for a resource (for example, DB2 latch or HSM recall): job is swapped in, is eligible for dispatching, and has accumulated no CPU time after some seconds</td>
</tr>
<tr>
<td>WL</td>
<td>Wait queue: long wait as a result of either WAIT TYPE=LONG or of STIMER for more than 0.5 seconds</td>
</tr>
<tr>
<td>WT</td>
<td>Wait queue: terminal wait</td>
</tr>
<tr>
<td>WO</td>
<td>Wait queue: reasons other than WM, WL, or WT</td>
</tr>
<tr>
<td>DL</td>
<td>TSO user delayed by SRM to meet response time objective</td>
</tr>
<tr>
<td>PR</td>
<td>Privileged</td>
</tr>
<tr>
<td>&gt;&gt;</td>
<td>In the process of being swapped out of storage</td>
</tr>
<tr>
<td>&lt;&lt;</td>
<td>In the process of being swapped into storage</td>
</tr>
<tr>
<td>R LS</td>
<td>The field showing the reason for the last swap out associated with the job. This field is blank when the current location of the job is NS, IN, or PR. The possible contents and their meanings are:</td>
</tr>
<tr>
<td>TI</td>
<td>Terminal input wait</td>
</tr>
<tr>
<td>TO</td>
<td>Terminal output wait</td>
</tr>
<tr>
<td>LW</td>
<td>Long wait</td>
</tr>
<tr>
<td>XS</td>
<td>Auxiliary storage shortage</td>
</tr>
<tr>
<td>RS</td>
<td>Central storage shortage</td>
</tr>
<tr>
<td>DW</td>
<td>Detected wait</td>
</tr>
<tr>
<td>RQ</td>
<td>Requested swap</td>
</tr>
<tr>
<td>NQ</td>
<td>Enqueue exchange</td>
</tr>
<tr>
<td>EX</td>
<td>Exchange based on recommendation value</td>
</tr>
<tr>
<td>US</td>
<td>Unilateral</td>
</tr>
<tr>
<td>TS</td>
<td>Transition Swap</td>
</tr>
<tr>
<td>AW</td>
<td>APPC wait</td>
</tr>
<tr>
<td>IC</td>
<td>Improve central storage</td>
</tr>
<tr>
<td>IP</td>
<td>Improve system paging rate</td>
</tr>
<tr>
<td>MR</td>
<td>Make room to swap in an out-too-long user</td>
</tr>
<tr>
<td>IW</td>
<td>OMVS input wait</td>
</tr>
<tr>
<td>OW</td>
<td>OMVS output wait</td>
</tr>
<tr>
<td>SR</td>
<td>In-real swap</td>
</tr>
<tr>
<td>DP PR</td>
<td>The dispatching priority for the job.</td>
</tr>
<tr>
<td>CS F</td>
<td>The number of central storage frames assigned to the job. If a job is swapped out of central storage the number represents the number of central storage frames assigned to the job before the swap out occurred.</td>
</tr>
<tr>
<td>ESF</td>
<td>The number of expanded storage frames occupied by virtual storage pages associated with this address space. If no expanded storage is installed, this field is blank.</td>
</tr>
<tr>
<td>CS TAR</td>
<td>The SRM central storage target value. If no special monitoring is requested, this field is blank.</td>
</tr>
<tr>
<td>TAR WSS</td>
<td>The target working set size for the job (in number of pages).</td>
</tr>
<tr>
<td>XM</td>
<td>The cross memory address space indicator. When the field contains X, the line of data describes a cross memory address space; that is, an address space accessed primarily from other address spaces by means of cross memory functions. If it is not a cross memory address space, this field is blank.</td>
</tr>
</tbody>
</table>
Table 100. Fields in the ASD and ASDJ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN/RT</td>
<td>The page-in rate (PIN). RMF calculates the page-in rate in one of two ways:</td>
</tr>
<tr>
<td></td>
<td>• For cross-memory address spaces, the calculation is:</td>
</tr>
<tr>
<td></td>
<td># Page-ins</td>
</tr>
<tr>
<td></td>
<td>PIN = --------------------------</td>
</tr>
<tr>
<td></td>
<td>Transaction Residency Time</td>
</tr>
<tr>
<td></td>
<td>• For all other address spaces, the calculation is:</td>
</tr>
<tr>
<td></td>
<td># Page-ins</td>
</tr>
<tr>
<td></td>
<td>PIN = ------------------</td>
</tr>
<tr>
<td></td>
<td>Seconds of CPU Time</td>
</tr>
<tr>
<td></td>
<td>The number of page-ins is the sum of the following:</td>
</tr>
<tr>
<td></td>
<td>• Number of pages brought into central storage one at a time</td>
</tr>
<tr>
<td></td>
<td>• Number of pages brought into central storage in blocks</td>
</tr>
<tr>
<td></td>
<td>• Hiperspace™ read miss count</td>
</tr>
<tr>
<td></td>
<td>• Number of hiperspace pages brought into central storage.</td>
</tr>
<tr>
<td></td>
<td>• Number of shared storage page-ins</td>
</tr>
<tr>
<td></td>
<td>This field always contains the rate since the last report request. Dashes (---) in this field indicate that RMF is unable to calculate a value.</td>
</tr>
<tr>
<td></td>
<td>If the transaction requires storage isolation, the value reported can be used to establish initial threshold values and to evaluate the effectiveness of these values.</td>
</tr>
<tr>
<td>ES/RT</td>
<td>The rate of page movement from expanded storage due to demand paging (page faults). This includes both single and blocked pages but does not include hiperspace, VIO, or shared storage pages.</td>
</tr>
<tr>
<td>TX/SC</td>
<td>The swap count for the current transaction.</td>
</tr>
<tr>
<td>SWAP/RV</td>
<td>The workload manager recommendation value for the job. Note that only integer values are reported. Fractional values appear as zero. The range of possible values is -999 to +999, for details refer to the [z/OS MVS Initialization and Tuning Guide](<a href="https://publibz.boulder.ibm.com/ps">https://publibz.boulder.ibm.com/ps</a> IG.nsf/InfoCenter?openDocument&amp;docName=IUG.SYSMVS_82&amp;mode=0000M).</td>
</tr>
<tr>
<td>WSM/RV</td>
<td>The recommended value for address spaces that are being managed by Working Set Management (WSM). The range of possible values is -6000 to +6000. The larger the value, the sooner the address space is likely to be swapped in. If the address space is not managed by WSM, this field is blank.</td>
</tr>
</tbody>
</table>

Report options
The Report Options panel for the ASD report is the same as for the ARD report. See ["Report options for ARD, ASD, and ASRM" on page 239](#) for a description.

ASRM/ASRMJ - Address Space SRM Data report

The ASRM/ASRMJ report gives an overview of the system resources that are used by each address space in the system or each address space that meets the selection criteria that you specify when you request the report. The report gives, for example, information on processor service, storage service, and I/O service.

The report enables you to determine which jobs are using which services and whether certain jobs are creating performance problems by making excessive use of system services.

How to request this report
Different methods are used to request the ASRM and ASRMJ reports.

How to request an ASRM report
• In ISPF, specify 3 on the Address Space Report Selection menu.
• In TSO/E, use **PF3** to select the ASRM report.
Mon II - ASRM/ASRMJ

- Command interface:
  - Display session
    ASRM [class,status]
  - Background session
    ASRM [(class,status)]

How to request an ASRMJ report
- In ISPF, specify 6 on the Address Space Report Selection menu.
- Command interface:
  - Display session
    ASRMJ jobname
  - Background session
    ASRMJ (jobname)

Contents of the report
The information shown in an ASRM and an ASRMJ report is identical except the contents of the first column which is:
  - JOBNAME for the ASRM report
  - TIME for the ASRMJ report

In the ASRM report shown in Figure 139, the number of data lines depends on the number of address space identifiers in the system that meet your criteria.

| JOBNAME  | SRVCLASS | P | Active | CUR RES CT SC CPU MSO IOCS SRB | TOTAL |
|----------|----------|---|--------|------|------|-----|-----|-----|-----|------|
| MASTER*  | SYSTEM*  | 1 | 441:25 | 126 2M 723.9M 6.889M 720980 857.7M |
| PCAUTH   | PROG001  | 1 | 441:25 | 1 127 0 0 0 128 |
| RASP     | ADM005   | 1 | 441:25 | 1 82 0 16496 16579 |
| TRACE    | PROG001  | 1 | 441:25 | 1 42 0 0 0 43 |
| XCFAS    | ADM005   | 1 | 441:24 | 1 1.932M 4.424M 15 0 6.179M |
| GRS      | SYSTEM*  | 1 | 441:25 | 1 33.50M 168.4M 15 665060 202.5M |
| SMXC     | ADM005   | 1 | 441:25 | 1 11 0 0 12 |
| SYSBMS   | ADM005   | 1 | 441:25 | 1 54 0 0 55 |
| DUMPSRV  | SYSTEM*  | 1 | 441:24 | 1 229522 864212 713169 6330 1.813M |
| CONSOLE  | PROG001  | 1 | 441:25 | 1 12.60M 28.08M 549981 196 41.23M |
| ALLOCAS  | PROG001  | 1 | 441:25 | 1 132 358 15 0 505 |
| SMF      | SYSTEM*  | 1 | 441:24 | 1 18553 31601 2505 68 52724 |
| VLF      | ADM005   | 1 | 441:24 | 1 2.846M 74.74M 580 0 77.59M |
| LLA      | ADM005   | 1 | 441:24 | 1 1.157M 14.37M 767327 1023 16.30M |
| JES3     | PROG007  | 1 | 412:19 | 21.72M 702.7M 8.492M 12247 733.6M |

Figure 139. ASRM Report
Table 101. Fields in the ASRM and ASRMJ Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>The time the ASRM report was requested, in the form hh:mm:ss, and the one to eight character jobname associated with the address space.</td>
</tr>
<tr>
<td>JOBNAME</td>
<td>The job name for the ASRMJ report. This column contains the time the report was requested.</td>
</tr>
<tr>
<td>TIME</td>
<td>The service class name.</td>
</tr>
<tr>
<td>SRVCLASS</td>
<td>The service class period.</td>
</tr>
<tr>
<td>S</td>
<td>The service class period.</td>
</tr>
<tr>
<td>P</td>
<td>The service class period.</td>
</tr>
<tr>
<td>TRANS ACTIVE</td>
<td>The transaction elapsed time; that is, the time that has elapsed since the current transaction began, in the form hhhh:mm.</td>
</tr>
<tr>
<td>TRANS CUR RES</td>
<td>The transaction elapsed time; that is, the time that has elapsed since the current transaction became resident.</td>
</tr>
<tr>
<td>TX CT</td>
<td>The swap count for the current transaction. Asterisks indicate the number is too large to report.</td>
</tr>
<tr>
<td>TX SC</td>
<td>The processor service consumed by the current transaction.</td>
</tr>
<tr>
<td>TX CPU</td>
<td>The processor service consumed by the current transaction.</td>
</tr>
<tr>
<td>TX MSO</td>
<td>The MSO service consumed by the current transaction.</td>
</tr>
<tr>
<td>TX IOC</td>
<td>The I/O service consumed by the current transaction.</td>
</tr>
<tr>
<td>TX SRB</td>
<td>The SRB service consumed by the current transaction.</td>
</tr>
<tr>
<td>SESS TOTAL</td>
<td>The total SRM services consumed by the entire job.</td>
</tr>
</tbody>
</table>
Report options

The Report Options panel for the ASRM report is the same as for the ARD report. See "Report options for ARD, ASD, and ASRM" on page 239 for a description.

CHANNEL - Channel Path Activity report

In general, the CHANNEL report gives you information about channel path activity for all channel paths in the system. The report contains data for every channel path that is online at the time you request the report.

Information about channel path activity, I/O device activity, and I/O request queuing information can be used to identify performance bottlenecks associated with the channel paths.

For all channels that are managed by Dynamic Channel Path Management (DCM), additional information is available. DCM allows an installation to identify channels that they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. On top of the report, there is a consolidated data section for managed channels displaying the total number of channel paths for each type and the average activity data. The character M as suffix of the acronym for the channel path type is an indicator that the channel is managed by DCM.

How to request this report

- In ISPF, specify 1 on the I/O Report Selection Menu.
- In TSO/E, use PF4 to select the CHANNEL report.
- Command interface:

  Display session
  CHANNEL

  Background session
  CHANNEL

Special considerations of report output

You can obtain the report whether or not a Monitor I session measuring channel path activity is active. However, the channel path type appears only when RMF is active.

Data for total utilization and partition utilization is gathered independently. Because the internal interval used to gather this data is a few seconds, the total utilization and the sum of the partition's utilization sharing that channel might differ if a short RMF interval is specified. If the interval is too small and the appropriate data cannot be gathered, dashes (---) will be reported instead of data.
Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel ID</td>
<td>Hexadecimal channel path identifier (CHPID).</td>
</tr>
<tr>
<td>Channel No</td>
<td>For each channel type which is managed by DCM, a summary line is shown with the average values for all channels in this group. These summary lines are characterized by an * preceding the channel path type, and the number of channels of the group is displayed in column No.</td>
</tr>
<tr>
<td>Channel G</td>
<td>Generation. The generation is used to differentiate between channels of the same channel type, when one has significant differences from the other. Newer generations with significant differences (for example, the channel throughput) are indicated by a number (1, 2, ...). For example, for a FICON channel, a number 1 indicates that the channel has an auto-negotiated throughput of 1Gbit/sec, or a number 4 indicates a throughput of 2Gbit/sec on a FICON Express4 card or a FICON Express2 card.</td>
</tr>
</tbody>
</table>
### Table 102. Fields in the CHANNEL Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Channel Type</strong></td>
<td>Type of channel path. You may issue the console command D M=CHP(xx) to see an explanation of the channel path type. If RMF encounters an error while processing the type, this field is blank. RMF continues to measure channel path activity. Check the operator console for messages.</td>
</tr>
<tr>
<td><strong>Channel S</strong></td>
<td>The indication of whether a channel path is defined as shared between one or more logical partitions. Y indicates that the channel path is shared. A blank indicates it is not shared.</td>
</tr>
</tbody>
</table>

**Note:**

1. On a machine running in LPAR mode, but with only one LPAR defined, the Part columns for the Read, Write and Utilization fields display a zero value for channels of type FC (FICON).

2. When Channel Path Measurement Facility (CPMF) is not available, for example, on z/OS systems running as z/VM guests, RMF uses sampled data from SRM so that the reported channel utilization is only an approximate value. With increasing channel speed, the channel utilization value becomes more and more inaccurate. Therefore, in such cases, RMF does not provide accurate values of FICON channel utilization.

Beginning with z990 processors, the channel data from SRM is no longer available. As a result, the channel utilization data on a z/OS system running as z/VM guest, is reported as ‘------’

| Utilization (%) Part | The channel path utilization percentage for an individual logical partition. RMF uses the values provided by CPMF. The calculation is:  
Part Utilization (%) = \( \frac{\text{Channel Path Busy Time}}{\text{Channel Path Elapsed Time}} \) \times 100  
For channels like FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:  
Part Utilization (%) = \( \frac{\text{Part LPAR # of Channel Work Units}}{\text{Max # of Channel Work Units} \times \text{Channel Path Elapsed Time}} \) \times 100  
For OSAEGbE, the value reflects the microprocessor utilization. For hipersockets, this value is not available. |

| Utilization (%) Tot | The channel path utilization percentage for the CPC during an interval. For processors earlier than z990 and shared channels in LPAR mode, where CPMF is not available, the calculation is:  
Utilization (%) = \( \frac{\# \text{ SRM Observations of Channel Path Busy}}{\# \text{ Samples}} \) \times 100  
For unshared channels in LPAR mode, the value for total utilization is the same as partition utilization. For channels like FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:  
Utilization (%) = \( \frac{\text{Total # of Channel Work Units}}{\text{Max # of Channel Work Units} \times \text{Channel Path Elapsed Time}} \) \times 100  
For OSAEGbE, the value reflects the microprocessor utilization. For hipersockets, this value is not available. |

| Utilization (%) Bus | Percentage of bus cycles, the bus has been found busy for this channel in relation to the theoretical limit. For OSAEGbE, the value reflects the PCI bus utilization. For hipersockets, this value is not available. |
### Table 102. Fields in the CHANNEL Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read(B/s)</strong></td>
<td><strong>Part</strong> Data transfer rates from the control unit to the channel for this partition.</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong> Data transfer rates from the control unit to the channel for the CPC.</td>
</tr>
<tr>
<td></td>
<td>For hipersockets, this value is not available.</td>
</tr>
<tr>
<td><strong>Write(B/s)</strong></td>
<td><strong>Part</strong> Data transfer rates from the channel to the control unit for this partition.</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong> Data transfer rates from the channel to the control unit for the CPC.</td>
</tr>
<tr>
<td><strong>FICON OPS</strong></td>
<td><strong>Rate</strong> Number of native FICON operations per second.</td>
</tr>
<tr>
<td></td>
<td><strong>Actv</strong> The average number of native FICON operations that are concurrently active during the reporting interval.</td>
</tr>
<tr>
<td><strong>zHPF OPS</strong></td>
<td><strong>Rate</strong> Number of zHPF (High Performance FICON) operations per second.</td>
</tr>
<tr>
<td></td>
<td><strong>Actv</strong> The average number of zHPF operations that are concurrently active during the reporting interval.</td>
</tr>
</tbody>
</table>

### DEV/DEVV - Device Activity report

The Device Activity report gives information on I/O device use for all online devices you requested either by device class, by device number, or by volume serial number.

The Device Activity report, like the Monitor I session report, can help you to analyze device performance, to identify bottlenecks caused by a particular device, and to overcome obstacles that prevent efficient use of the resource.

Requesting the report during a display session enables you, for example, to track the device use on a real-time basis. You can get a timely picture of device use or track a specific critical device on a real-time basis, thus making it possible to take corrective action immediately.

To evaluate the data, you need to understand what a reporting period is and how it relates to the Monitor I interval.

#### Evaluating details of cumulative mode output

The I= field in the header of each report shows the percentage of the Monitor I interval that has elapsed when RMF generates the Monitor II session report.

\[
I = \frac{\text{# Samples Taken} \times \text{Cycle Time}}{\text{Monitor I Interval Length}}
\]

For a report that reflects the total device activity (delta mode is off), the reporting period is the time that has elapsed from the start of the Monitor I interval to the time when you requested the report. The maximum reporting period is one Monitor I interval. When a Monitor II report covers a complete Monitor I interval, the I= field contains an upper-case 'T' (I=T).

#### Evaluating details of delta mode output

The I= field in the header of the report equals the percentage of the interval that is represented by the data; thus, for your initial request, the I= field equals the percentage of the interval that expires between your initial request and the time
you press the ENTER key. For all subsequent requests, the I= field equals the percentage of the interval that expires.

**How to request this report**
Different methods are used to request the DEV and DEVV reports.

**How to request a DEV report**
- In ISPF, specify 3 on the I/O Report Selection Menu.
- In TSO/E, use PF6 to select the DEV report.
- Command interface:
  Display session
  ```plaintext
  DEV [type ]
  ```
  Background session
  ```plaintext
  DEV [(type)]
  ```

**How to request a DEVV report**
- In ISPF, specify 4 on the I/O Report Selection Menu.
- Command interface:
  Display session
  ```plaintext
  DEVV {VOLSER(volid) } 
  {NUMBER(device-number) }
  ```
  Background session
  ```plaintext
  DEVV {{VOLSER(volid) } } 
  {{NUMBER(device-number)}}
  ```

**Special considerations of report output**
The report is based on both hardware measurements and data collected during a Monitor I session. Therefore, a **Monitor I session must be active** when you issue your request.

If no data is available, RMF issues a descriptive message.

Because the data comes from both hardware measurements and Monitor I session measurements, the data required to report some or all of the fields might be invalid or unavailable. A field based on data that is unavailable or invalid contains dashes (---).

The fields that RMF might not be able to report and the possible reasons for the unavailable or invalid data are:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Not reported when</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTV RATE</td>
<td>The hardware measurements are not available either because there are not enough CMBs or because the channel measurement facility is disabled.</td>
</tr>
<tr>
<td>RESP TIME</td>
<td></td>
</tr>
<tr>
<td>IOSQ TIME</td>
<td></td>
</tr>
<tr>
<td>DB DELAY</td>
<td></td>
</tr>
<tr>
<td>PEND TIME</td>
<td></td>
</tr>
<tr>
<td>DISC TIME</td>
<td></td>
</tr>
<tr>
<td>CONN TIME</td>
<td></td>
</tr>
<tr>
<td>%DEV UTIL</td>
<td></td>
</tr>
</tbody>
</table>
If an * appears immediately to the right of a field, a hardware measurement timer overflow has occurred. See “DEVICE - Device Activity report” on page 355 for an explanation of this condition.

**Note:** Devices are sorted ascending by an internally composed combination of the subchannel set ID (SSID) the device resides in, (not visible in the report), followed by the four-digit device number.

### Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Not reported when</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESP TIME</td>
<td>The device is attached to a byte multiplexor channel. Byte multiplexor channels collect only activity rate data; that is, the only hardware measurement available is the start subchannel count (SSCH).</td>
</tr>
<tr>
<td>IOSQ TIME</td>
<td>RMF was unable to read the IOCDS.</td>
</tr>
<tr>
<td>PEND TIME</td>
<td>The device moved online or offline during the Monitor I interval and total mode was requested.</td>
</tr>
<tr>
<td>DISC TIME</td>
<td>Reported as &quot;<strong>CHGD</strong>&quot; when a device is added or deleted during the report interval.</td>
</tr>
<tr>
<td>CON TIME</td>
<td></td>
</tr>
<tr>
<td>%DEV UTIL</td>
<td></td>
</tr>
</tbody>
</table>

By default, the DEV report is sorted by LCU, unless you specify the storage group (SG) option. The SG option causes the DEV report to be sorted by device numbers within storage groups.

Type can be either a device class, or one or more volume serial numbers, device numbers, or storage group numbers.
When you request the report during a display session, the data line for any device that is more than 30% utilized is highlighted.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STG GRP</strong></td>
<td>The name that identifies the storage group to which the device belongs. For DEVV, this field is reported only when the volumes specified are members of a storage group. When a device is changed or deleted from a storage group during a report interval, RMF reports <strong>CHGD</strong> in this column.</td>
</tr>
</tbody>
</table>
| **I%** | The percentage of the Monitor I interval that has elapsed when RMF generates the Monitor II session report. 

\[
\frac{\text{# Samples Taken} \times \text{Cycle Time}}{\text{Monitor I Interval Length}}
\]

I% may contain values 0 through 99. When I% reaches 100, the field is set to contain an uppercase ‘T’. I% continues to be set based on the above calculation. 

See "Evaluating details of cumulative mode output" on page 249 and "Evaluating details of delta mode output" on page 249 for additional information about the relationship between a Monitor II report period and a Monitor I interval. |
| **VOLSER** | The volume serial number (for direct access and magnetic tape reports) of the volume mounted on the device at the end of the reporting interval. |
| **DEV NUM** | The hexadecimal device number that identifies a physical I/O device. |
| **PAV** | The number of parallel access volumes (base and alias) which were available at the end of the reporting interval. If the number has changed during the reporting interval, it is followed by an ‘*’. 

If the device is a HyperPAV base device, the number is followed by an ‘H’, for example, 5.4H. The value is the average number of HyperPAV volumes (base and alias) in that interval. 

\[
\text{Average } \# \text{ of HPAV devices} = \frac{\text{Accumulated } \# \text{ of HPAV devices}}{\text{Number of Samples}}
\]
### Table 103. Fields in the DEV and DEVV Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| LCU           | The hexadecimal identifier of the logical control unit (LCU) to which the device belongs. The set of devices associated with an LCU measurement are not the same on all processors because the definition of an LCU is model-dependent. An LCU is the set of devices attached to the same physical control unit (or group of control units that have one or more devices in common). Each device belongs to only one LCU, but the I/O processor (SAP - System Assist Processor), which is part of the channel subsystem, manages and schedules I/O work requests to the various devices within the LCU. There are two reasons that this field is blank:  
  - RMF encountered an error while gathering data, check the operator console for messages.  
  - This is a non-dedicated device in a z/VM guest system environment. |
| ACTV RATE     | The rate at which start subchannel (SSCH) instructions to the device completed successfully.  
  \[ \text{ACTV RATE} = \frac{\text{# Successful SSCH Instructions}}{\text{Interval}} \]  
  Total Device Active Time  
  \[ \text{ACT TIME} = \frac{\text{Measurement Event Count}}{\text{Total Device Active Time}} \]  
  RESP TIME = ACT TIME + IOSQ TIME  
  The active time is the sum of connect, disconnect, and pending time as described later. |
| RESP TIME     | The average number of milliseconds the device required to complete an I/O request. This value reflects the total hardware service time and the front end software queuing time involved for the average I/O request to the device. The channel measures active time, which starts at the acceptance of a SSCH instruction (indicated by a condition code 0) and ends at the acceptance of the channel end (primary status pending). It does not, however, include the time required to process the interruption. The IOS queue length is factored in to reflect the front end queuing time.  
  \[ \text{Total Device Active Time} = \frac{\text{Measurement Event Count}}{\text{Total Device Active Time}} \]  
  RESP TIME = ACT TIME + IOSQ TIME  
  The active time is the sum of connect, disconnect, and pending time as described later. |
| IOSQ TIME     | The average number of milliseconds an I/O request must wait on an IOS queue before a SSCH instruction can be issued.  
  \[ \text{IOSQ TIME} = \frac{\text{Measurement Event Count}}{\text{IOSQ Count}} \]  
  IOSQ TIME = Monitor I Samples  
  Device Activity Rate |
| DELAY CMR     | The average number of milliseconds that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device.  
  \[ \text{Initial Command Response Time} = \frac{\text{Measurement Event Count}}{\text{Initial Command Response Time}} \]  
  DELAY CMR = \text{Initial Command Response Time} |
| DELAY DB      | The average number of milliseconds of delay that I/O requests to this device encountered because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, head of string busy condition caused the contention, or some combination of these conditions has occurred.  
  A value is reported every 10 seconds.  
  In a PR/SM environment, this value is updated every 20 seconds.  
  \[ \text{Device Busy Delay Time} = \frac{\text{Measurement Event Count}}{\text{Device Busy Delay Time}} \]  
  DELAY DB = \text{Device Busy Delay Time}  
  If the data is not valid, a dash (-) will be displayed. |
Table 103. Fields in the DEV and DEVV Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PEND TIME</strong></td>
<td>The average number of milliseconds an I/O request remains queued in the channel. This value reflects the time between acceptance of the SSCH function at the subchannel (SSCH-function pending) and acceptance of the first command associated with the SSCH function at the device (subchannel active). This value includes the time waiting for an available channel path and control unit as well as the delay due to shared DASD contention. If the value is high, refer to the device LCU entry in the I/O Queuing Activity report for an indicator of the major cause of the delay.</td>
</tr>
<tr>
<td><strong>DISC TIME</strong></td>
<td>The average number of milliseconds the device was disconnected (not transferring data) while processing an SSCH instruction. Thus, this value reflects the time when the device was in use but not transferring data. It includes the overhead time when a device might disconnect to perform positioning functions such as SEEK/SET SECTOR as well as any reconnection delay.</td>
</tr>
<tr>
<td><strong>CONN TIME</strong></td>
<td>The average number of milliseconds the device was connected to a channel path and actually transferring data between the device and central storage. Typically, this value measures data transfer time but also includes the search time and the time needed to maintain channel path, control unit, and device connection.</td>
</tr>
<tr>
<td><strong>% D UT</strong></td>
<td>The percentage of time during the interval when the device was in use. This percentage includes both the time when the device was involved in I/O operations (connect and disconnect time) and the time when it was reserved but not involved in an I/O operation.</td>
</tr>
<tr>
<td><strong>% D RV</strong></td>
<td>The percentage of time during the interval when a shared device was reserved by the processor on which RMF was started. The range of %D RV is 0 through 99%. When the device has reserved 100% of the interval, a T is shown in this field.</td>
</tr>
</tbody>
</table>

**Device Pending Time**

\[
\text{PEND TIME} = \frac{\text{Device Pending Time}}{\text{Measurement Event Count}}
\]

**Device Disconnect Time**

\[
\text{DISC TIME} = \frac{\text{Device Disconnect Time}}{\text{Measurement Event Count}}
\]

RMF calculates the total disconnect time by adding the pending time and connect time for the device and subtracting the result from the active time.

**Device Connect Time**

\[
\text{CONN TIME} = \frac{\text{Device Connect Time}}{\text{Measurement Event Count}}
\]

**% DEV UTIL**

\[
\% \text{ D UT} = \left(\frac{\text{CONN} + \text{DISC} \times \text{RSV}}{\text{INT} \times \text{PAV} \times \text{N}}\right) \times 100
\]

**Device Connect time**

**Device disconnect time**

**Number of Monitor I samples when the device was reserved but not involved in an I/O operation**

**Monitor I interval time (seconds)**

**The number of parallel access volumes (or 1 for a non-PAV device)**

**Total number of Monitor I samples**

The % DEV UTIL field on a Device Activity report can exceed 100% for a device that is 100% utilized. This is because the device connect time from the channel measurement block is a longer time period than the RMF measurement interval. Therefore, it is possible that the value can be slightly higher than 100%.
Report options

On the Report Options panel of the DEV report, you can specify one of the four options: device class, volume, device number, or storage group.

**Device Class**
Allows you to measure all devices in a certain class.
If you leave the panel empty, the device class is the default, and the class DASD will be used.

**Volume**
If you want a report on a specific volume or volumes, you can specify volume numbers as a single number (aaaaaa), a range of numbers (aaaaaa:zzzzzz), or a list of numbers (aaaaaa,bbbbbb,ddddd).

**Device Number**
If you want a report on a specific device, you can specify a single number, a range of numbers, or a list of numbers.
Device numbers are hexadecimal and four characters long.

**Storage Group**
If you want a report on a specific storage group or storage groups, you can specify a single storage group, a range of storage groups, or a list of storage groups.
Storage group names are one to eight characters.

---

Figure 144. DEV Report Options Panel

On the Report Options panel of the DEV report, you can specify one of the four options: device class, volume, device number, or storage group.

**Device Class***
Specify one of the following classes:
DASD, TAPE, COMM, CHDR, UNITR or GRAPH

**Volume***
Ex: P500002:P50004,P50007

**Device Number***
Ex: 0580:0584

**Storage Group***
Ex: MANF13:MANF20
Specify SG to display all Storage Groups.
**Mon II - DEV/DEVV**

<table>
<thead>
<tr>
<th>RMF Monitor II - Device Activity Options - Single Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command ===&gt;</td>
</tr>
<tr>
<td>Specify one of the options below. To exit press END.</td>
</tr>
<tr>
<td>Volume ===&gt; _____ Specify a volume serial number.</td>
</tr>
<tr>
<td>Device Number ===&gt; ___ Specify a hexadecimal device number.</td>
</tr>
</tbody>
</table>

*Figure 145. DEVV Report Options Panel*

**Volume**

Allows you to specify specific DASD or tape devices in the form aaaaa.
You can specify a single volume, in the format aaaaa, a list of volumes in the format aaaaa,bbbbbb,cccccc,... or a range of volumes in the format aaaaa:zzzzzz, where aaaaa is the first volume and zzzzzz is the last. Your entry cannot exceed 32 characters, including commas and colons.

The name is restricted to the characters A-Z, 0-9, @, # and $.

**Device Number**

Allows you to specify a four-digit hexadecimal device number.

---

**HFS - Hierarchical File System Statistics report**

The HFS report provides data for capacity planning and for basic performance analysis and problem determination:

- A general understanding of the throughput recognized and achieved by HFS allows you to optimally use your resources.
- The ability to display performance statistics of HFS enables you to identify potential problems and bottlenecks within the HFS component and to take corrective actions.

**How to request this report**

- In ISPF, specify 5 on the I/O Report Selection Menu.
- Command interface:

  **Display session**

  HFS [hfsname]
Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Section</td>
<td></td>
</tr>
<tr>
<td>File System Name</td>
<td>The name of the file system which has been selected for reporting.</td>
</tr>
<tr>
<td>Mount Date</td>
<td>Date when the file system has been mounted (mm/dd/yyyy).</td>
</tr>
<tr>
<td>Time</td>
<td>Time when the file system has been mounted (hh:mm:ss).</td>
</tr>
<tr>
<td>Elapsed Time</td>
<td>Delta mode: Time between two consecutive clickings on Enter.</td>
</tr>
<tr>
<td></td>
<td>Total mode: Time since the file system has been mounted.</td>
</tr>
<tr>
<td></td>
<td>The format can be in days and hours (6d 19h) or in hh:mm:ss.</td>
</tr>
<tr>
<td>Allocation - All values in megabytes</td>
<td></td>
</tr>
<tr>
<td>System</td>
<td>Amount of storage allocated to this HFS.</td>
</tr>
<tr>
<td>Data</td>
<td>Amount of storage internally used within HFS for data files, directories and HFS internal structures like the attribute directory (AD).</td>
</tr>
</tbody>
</table>
| Attr. Dir            | Amount of storage used for the attribute directory (AD). This number is included in the “Data” field.  
|                     | The attribute directory is the internal HFS structure (index) which contains attribute information about individual file system objects as well as attributes of the file system itself. |
| Cached              | Amount of data buffer storage cached by this file system.               |
| Index Events        |                                                                         |
| New Level           | Number how often HFS added a new level to its index structure.          |
|                     | The index statistics are relative to all of the indices in the HFS data set. The attribute directory (AD) is one index (the largest) but each directory (including the root) is also an index. |
| Splits              | Number how often an index page was split into two pages because new records were inserted. This gives an idea of how much insertion activity there has been for the index structure. |
| Joins               | Number how often HFS was able to combine two index pages into one, because enough index records had been deleted in the two pages. |
| File I/O - all values are reported as Count and Rate (counts per second). |
| Cache               | Number of times the first page of a data file was requested and found in virtual storage (cache). |
Table 104. Fields in the HFS Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DASD</td>
<td>Number of times the first page of a data file was requested but was not found in the cache, therefore an I/O was necessary.</td>
</tr>
<tr>
<td>Hit Ratio</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
<tr>
<td>Sequential</td>
<td>Number of sequential I/O requests.</td>
</tr>
<tr>
<td></td>
<td>A sequential I/O is one of a series of I/Os to read or write a data file, where the first I/O started at the first byte of the file and each subsequent I/O was for the next sequential set of bytes.</td>
</tr>
<tr>
<td>Random</td>
<td>Number of random I/O requests.</td>
</tr>
<tr>
<td></td>
<td>A random I/O is an I/O that does not read or write the start of a file, and was not preceded by an I/O that read or wrote the immediately preceding set of bytes.</td>
</tr>
<tr>
<td>Metadata I/O</td>
<td>- all values are reported as <strong>Count</strong> and <strong>Rate</strong> (counts per second).</td>
</tr>
<tr>
<td>Cache</td>
<td>Number of times the metadata for a file was found in the cache during file lookup.</td>
</tr>
<tr>
<td>DASD</td>
<td>Number of times the metadata for a file was not found in the cache during file lookup and an index call was necessary.</td>
</tr>
<tr>
<td>Hit Ratio</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
<tr>
<td>Index I/O</td>
<td>- all values are reported as <strong>Count</strong> and <strong>Rate</strong> (counts per second).</td>
</tr>
<tr>
<td>Cache</td>
<td>Number of index page read or write hits.</td>
</tr>
<tr>
<td>DASD</td>
<td>Number of index page read or write misses.</td>
</tr>
<tr>
<td>Hit Ratio</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
</tbody>
</table>

Report options

```
Command ===>
RMF Monitor II - HFS Report Options    Line 1 of 19
Scroll ===>
HALF

Select (S) or fill-in a file system name. To exit press END.

Selected file system name: OMVS.SY5.S670CB1.BOOKSRV
Number of mounted file systems: 19    Display: YES (YES/NO)
You can use FIND to search for a specific HFS file system name.

Sel HFS File System Name
  - OMVS.SY5.ROOT
    - OMVS.SY5.S670CB1.ADSM
    - OMVS.SY5.S670CB1.BIN
    - OMVS.SY5.S670CB1.BOOKSRV
    - OMVS.SY5.S670CB1.DCEAS
    - OMVS.SY5.S670CB1.DCEBASE
    - OMVS.SY5.S670CB1.DCEDFS.GLOBAL
```

Figure 147. HFS Report Options Panel

Table 105. Fields in the HFS Report Options Panel

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected file system name</td>
<td>The currently selected file system name to be reported on (up to 44 characters). This field is an input field and can be overtyped. Any data set name which adheres to the MVS rules for data set names is accepted (fully-qualified without enclosing quotes).</td>
</tr>
<tr>
<td>Number of mounted file systems</td>
<td>The number shows how many file systems are currently mounted (including HFS and other file systems).</td>
</tr>
</tbody>
</table>
Table 105. Fields in the HFS Report Options Panel (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Yes/No specifies whether the names of the currently active file systems should be listed for selection. No is the default.</td>
</tr>
<tr>
<td>Note:</td>
<td>If the number of HFS file systems which are currently mounted is high it may take a while to provide the requested names.</td>
</tr>
<tr>
<td>Sel</td>
<td>An &quot;S&quot; can be placed in front of the file system name to be selected. Putting an &quot;S&quot; in this column results in replacing the file system name in the header field &quot;Selected file system name&quot;.</td>
</tr>
<tr>
<td>HFS File System Name</td>
<td>The name of a file system which was found active. The file system names are sorted in alphabetical order.</td>
</tr>
</tbody>
</table>

**ILOCK - IRLM Long Lock Detection report**

Services of the IMS/VS Resource Lock Manager (IRLM) are used by IMS to serialize application program requests for data base records to ensure that two programs do not access the same record for update at the same time.

The ILOCK report enables you to identify locking situations that are caused by serialization effects when sharing data among several IMS instances in a sysplex.

Excessive use of a resource on one instance can suspend the work on other systems. To avoid such locking situations or, in the worst case, a re-IPL, the report provides information for IMS operators to perform the necessary actions to eliminate the problem.

**How to request this report**

- In ISPF, specify 9 on the Resource Report Selection menu.
- Command interface:

  ```
  Display session
  ILOCK [ALL]
  ```

**Special considerations**

There is no data gathering component for this report. Instead, the retrieval of the IRLM data from the RMF SMF data buffer is done by the reporter. To have the data available in the SMF data buffer (SMF record type 79 subtype 15), it is necessary to specify this option explicitly, for example:

```
S RMF,,,(SMFBUF(RECTYPE(70:78,79(15))))
```

For details, please refer to the [z/OS RMF User's Guide](#).

Data collection is initiated by the operator who enters at the console the runtimeo-exit for one system in the sysplex:

```f irmid,F RUNTIMEO```

The command will be propagated automatically to all other systems.

When the SMF records are eventually written by the IRLMs in the data sharing group, the reporter can fetch these SMF records out of the RMF SMF data buffer.

As a consequence, you have to ask the operator to issue this command if you get informed that there is no data available for the report.
Mon II - ILOCK

Note: Access to the SMF data buffer requires appropriate security authorization. Please, refer to chapter Setting Up RMF - Access Definitions in the z/OS RMF User’s Guide for details.

Contents of the report

Field descriptions

Table 106. Fields in the ILOCK Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF Structure</td>
<td>The name of the coupling facility structure used by IRLM.</td>
</tr>
<tr>
<td></td>
<td>The date/time field shows the time when the SMF record for the first displayed lock entry was written.</td>
</tr>
<tr>
<td>Deadlock Cycle</td>
<td>The hexadecimal deadlock cycle number generated by IRLM and passed to IMS. As IMS requests longlock data for two cycles, this value is used to uniquely identify when the data was gathered.</td>
</tr>
<tr>
<td>State</td>
<td>State distinguishes between a blocker (holder) and a waiter:</td>
</tr>
<tr>
<td></td>
<td>BLOCKER Transaction holds a lock at the time the exit is driven.</td>
</tr>
<tr>
<td></td>
<td>TOP BLOCKER A blocker which holds a resource and has waiter(s) waiting on him, but is not found elsewhere as a waiter in another blocker's wait list. This might be the most likely transaction to kill to let everyone else run.</td>
</tr>
<tr>
<td></td>
<td>WAITER Transaction is waiting for a lock.</td>
</tr>
<tr>
<td></td>
<td>BLOCKER/WAITER The transaction was found as a blocker and waiter.</td>
</tr>
<tr>
<td></td>
<td>Note: To display all blocker and waiters, you have to call the ILOCK command with the parameter ALL, otherwise TOP BLOCKERs will be shown, only.</td>
</tr>
<tr>
<td>Type</td>
<td>Identifies the region type a transaction can execute in.</td>
</tr>
<tr>
<td></td>
<td>Types are DBCTL (DB control), BMP (batch message processing), IFP (fast path), MPP (message processing region), SYSPST (fast path system service ITASK), BATCH, and CICS.</td>
</tr>
<tr>
<td>IMS_ID</td>
<td>Name given to the IMS region at the time it is brought up.</td>
</tr>
</tbody>
</table>
Table 106. Fields in the ILOCK Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock_Name</td>
<td>The unique identifier used by IMS to obtain a lock on a resource. This name varies between 9-11 characters and contains the DMB#/DCB#/RBA of the resource (data) we are requesting a lock for.</td>
</tr>
<tr>
<td>Recovery_Token</td>
<td>Recovery Token - a 16-byte token used to uniquely identify a unit of work.</td>
</tr>
<tr>
<td>PST#</td>
<td>Partition Specification Table (PST) Number.</td>
</tr>
<tr>
<td></td>
<td>As the IMS region is initially brought up, several PSTs are initialized, and each is assigned a unique ID (or PST number).</td>
</tr>
<tr>
<td></td>
<td>The PST block is the primary block used to dispatch transactions in IMS, and the PST number is used to uniquely identify each transaction.</td>
</tr>
<tr>
<td>PSB_Name</td>
<td>Partition Specification Block Name - the name given to a PSB (Program Specification Block) at PSBGEN time. This block is used to define which segments a particular application can have access to.</td>
</tr>
<tr>
<td>Trx/Job</td>
<td>The name of the transaction in a BMP or MPP region, or the job name for all of the remaining region types.</td>
</tr>
<tr>
<td>Elap_Time</td>
<td>The field is available for blockers, it contains the elapsed time between the time the PST was scheduled, or the unit of work (UOW) was created, and the time the 79.15 record was created for this entry.</td>
</tr>
<tr>
<td>Wait_Time</td>
<td>The field is available for waiters, it contains the elapsed time between the time that IRLM processed the request for the resource and the time that the 79.15 record was created for this entry.</td>
</tr>
<tr>
<td>CICS_ID</td>
<td>CICS task identifier - an 8-digit ID generated by CICS and passed to IMS at the time a CICS application is scheduled.</td>
</tr>
<tr>
<td>DB/Area</td>
<td>A name given to a data base (IMS full-function) or an area (IMS fastpath) at DBDGEN time. It is used to uniquely identify the data base or area the lock is held on by this transaction.</td>
</tr>
</tbody>
</table>

IOQUEUE - I/O Queuing Activity report

The IOQUEUE report provides information, grouped by LCU (logical control unit), on the I/O configuration. The information includes contention rate, queue lengths, and percentages of time when one or more I/O components were busy.

Information about the LCU is useful because the LCU is the focus of I/O configuration and path management measurements for a related group of I/O devices.

For all channels that are managed by Dynamic Channel Path Management (DCM), additional information is available. DCM allows an installation to identify channels which they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. For each LCU with DCM managed channels, a summary line displays the minimum and maximum number of connected DCM managed channels, the number of defined DCM managed channels and accumulated activity data.

An LCU is the set of devices attached to the same physical control unit (or group of control units that have one or more devices in common). Each device belongs to only one LCU, but the I/O processor (SAP - System Assist Processor), which is part of the channel subsystem, manages and schedules I/O work requests to the various devices within the LCU.
Using the information given in the report

This report can tell you about the cause of performance problems associated with channel paths and devices. You could, for example, find the reason for an unusually long pending time reported on the device report. Check the relationship between the percentage of requests deferred for device busy and control unit busy for the LCU on the IOQUEUE report.

To help you determine the best way to fix a performance problem related to an LCU, you can request the report during a display session. This tracks the I/O queuing on a real-time basis.

Evaluating details of cumulative mode output

The I= field in the heading of each report shows the percentage of the Monitor I interval that has elapsed when RMF generates the Monitor II session report.

\[
I = \frac{\text{# Samples Taken} \times \text{Cycle Time}}{\text{Monitor I Interval Length}} \times 100
\]

For a report that reflects the total device activity (DELTA mode off), the reporting period is the time that has elapsed from the start of the Monitor I interval to the time when you requested the report. The maximum reporting period is one Monitor I interval. When a Monitor II report covers a complete Monitor I interval, the I= field contains an upper-case 'T' (I=T).

How to request this report

- In ISPF, specify 2 on the I/O Report Selection Menu.
- Command interface:
  
  Display session
  
  IOQUEUE [type]

  Background session
  
  IOQUEUE [(type)]

Special considerations of report output

The report depends on data that the Monitor I session collects. To get this report, the Monitor I I/O Queuing Activity report must be active. The Monitor I gatherer gets a new set of model dependent data every second or every cycle, whichever time period is greater.

If the hardware measurements are not available, the channel measurement facility is not available. If there is a failure in the diagnose interface, RMF does not provide model-dependent data generated by the hardware for the following fields:

- CONTENTION RATE
- DELAY Q LNGTH
- CHPID TAKEN
- %CU BUSY

If the data is not reliable (indicated by a successive invalid sample count greater than zero), RMF does not provide model-dependent data generated by the hardware for the following fields:

- ACTIV RATE
Data items that are not valid are marked by dashes (---) in the output display.

When an LCU has no activity during the interval, it is omitted from the report. If channel paths were brought online or taken offline during the interval, data is still formatted, but only for the channel paths and control units that were online and had some connection to a device or set of devices of the LCU at the time the report was requested appear in the report.

In a z/VM guest system environment, the report for an z/OS system that is authorized via the VM RMCHINFO directory option, shows static configuration data. Measurement data is not available.

### Contents of the report

**Table 107. Fields in the IOQUEUE Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path</td>
<td>The hexadecimal channel path identifier (CHPID) of the online channel path attached to the physical control units in the LCU. There can be up to eight channel paths in an LCU. Only channel paths identified in the Monitor I report as ONLINE to the system and having connection to a device or group of devices of the LCU appear in the Monitor II report.</td>
</tr>
</tbody>
</table>

If applicable, the path attribute is indicated with the CHPID:

- **PF** preferred path
- **NP** non-preferred path
- **NS** path attribute not specified

For devices residing in control units that do not support path attributes, only the CHPID is displayed.

<p>| DCM | If the channel path is under control of DCM, this is indicated by a Y in this column. The activities of all DCM channels belonging to the same LCU will be summarized in a separate line. |</p>
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTL Units</td>
<td>The hexadecimal identifier of each physical control unit associated with an online channel path in the LCU group.</td>
</tr>
<tr>
<td>DCM Group</td>
<td>The values in columns MIN MAX DEF report the minimum and maximum number of DCM managed channels for one LCU (in this interval) as well as the installation-specified definition for this LCU. The line with these values is available only for LCUs with DCM managed channels. It contains in addition the accumulated values of the I/O activity rate, the director port contention, and the control unit contention of all DCM managed channels. These values may include also measurements of managed channels which were partially online.</td>
</tr>
<tr>
<td>LCU</td>
<td>The hexadecimal identifier of the logical control unit (LCU). An LCU is the set of devices attached to the same physical control unit or a group of physical control units with one or more devices in common. Each physical control unit and each device can belong to only one LCU. They cannot be shared between LCUs.</td>
</tr>
<tr>
<td>Cont Rate</td>
<td>The rate at which the SAP places delayed I/O requests on the CU-HDR for this LCU. The SAP places an I/O request on the CU-HDR when all paths to the subchannel are busy and at least one path to the control unit is busy. For devices with only one path, or for devices where multiple paths exist and the busy condition is immediately resolved, the SAP does not count the condition.</td>
</tr>
<tr>
<td>Del Q Lngth</td>
<td>The average number of delayed requests on the control unit header (CU-HDR). Each time a request is enqueued from the CU-HDR, RMF counts the number of requests remaining on the queue and adds that number to the accumulator. At the end of the interval, RMF divides the total number of accumulated queued requests by the number of times a request was enqueued.</td>
</tr>
<tr>
<td>AVG CSS</td>
<td>The average number of milliseconds of delay that an I/O request encountered after the acceptance of the start or resume function at the subchannel for the LCU, until the channel subsystem's first attempt to initiate the operation.</td>
</tr>
<tr>
<td>CHPID Taken</td>
<td>The rate at which I/O requests to devices of this LCU are satisfied by each CHPID during the interval. By reviewing the rate at which each channel path of the LCU satisfies I/O requests, you can see how evenly the work requests are distributed among the available paths and how effectively those paths are arranged for the LCU.</td>
</tr>
<tr>
<td>% DP Busy</td>
<td>This field indicates director port contention. It is the number of times an I/O request was deferred because the director port was busy during the measurement interval.</td>
</tr>
<tr>
<td>% CU Busy</td>
<td>This field shows the relationship for each channel path of the LCU, between requests deferred due to control unit busy and total successful requests serviced by that path. Each CHPID of the LCU measures the distribution of control unit contention.</td>
</tr>
</tbody>
</table>
Table 107. Fields in the IOQUEUE Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG CUB</td>
<td>The average number of milliseconds of delay that an I/O request encountered for the channel path because the control unit was busy. Control Unit Busy Time</td>
</tr>
<tr>
<td></td>
<td>AVG CUB = -------------------------------------- # I/O Operations Accepted on that Path</td>
</tr>
<tr>
<td>AVG CMR</td>
<td>The average number of milliseconds of delay that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device. It allows to distinguish between real H/W errors versus workload spikes (contention in the fabric and at the destination port). Initial Command Response Time</td>
</tr>
<tr>
<td></td>
<td>AVG CMR = -------------------------------------- # I/O Operations Accepted on that Path</td>
</tr>
</tbody>
</table>

Report options

```
RMF Monitor II - I/O Queuing Activity Options

Command ===>

Specify one of the options below. For LCU number, a single number, a list of numbers, and a range of numbers is valid. To exit press END.

Device Class === DASD_ Specify one of the following classes:
                  DASD, TAPE, COMM, CHRDR, UNITR OR GRAPH

LCU Number === __________________________ Ex: D:F,4E,55
```

Figure 150. IOQUEUE Report Options Panel

You can specify either a class or a device number.

**Device Class**

Allows you to specify the device class. If you leave this field empty, RMF uses DASD.

**LCU Number**

Allows you to request specific logical control unit numbers. The numbers must be in three-digit hexadecimal format. You can specify any combination of a single number, a list of numbers, or a range of numbers. Your entry must not exceed 32 characters, including commas and colons.

**LLI - Library List report**

The information shown in the LLI report provides the status of the key system libraries that are defined in the following lists:

- Load module link list
- Pageable link pack area list
- List of authorized libraries (APF list)

This information can help you to check whether the status of these libraries is correct for your current environment.

**How to request this report**

- In ISPF, specify L on the Monitor II Primary Menu. This leads you to the Library List and OPT Settings Selection Menu. Here you can select:
  - **1 Link list**
    - LNKLISTxx - Link Library List
2 LPA list
   LPALSTxx - LPA Library List

3 APF list
   IEAAPFx - Authorized Program Library List

   In the command interface of an ISPF or TSO/E display session, specify:
   LLI for the Link Library List
   LLI LPA
       for the LPA Library List
   LLI APF
       for the Authorized Program List

   In addition, an optional parameter A can be specified to create a report with
   more details. Table 108 on page 267 lists the values that are available with this
   parameter only. Due to performance reasons, the default for each command is
   just to collect basic information.

Contents of the report - Link Library List

<table>
<thead>
<tr>
<th>DevNum</th>
<th>DevType</th>
<th>Volser</th>
<th>APF</th>
<th>Ext</th>
<th>Data Set Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>020F</td>
<td>33903</td>
<td>630D14</td>
<td>Y</td>
<td>3</td>
<td>SYS1.LINKLIB</td>
</tr>
<tr>
<td>020F</td>
<td>33903</td>
<td>630D14</td>
<td>Y</td>
<td>2</td>
<td>SYS1.MIGLIB</td>
</tr>
<tr>
<td>020F</td>
<td>33903</td>
<td>630D14</td>
<td>Y</td>
<td>3</td>
<td>SYS1.CSSLIB</td>
</tr>
<tr>
<td>0975</td>
<td>33903</td>
<td>SMSRMF</td>
<td>Y</td>
<td>1</td>
<td>RMF530.GRSREP.LINKLIB</td>
</tr>
<tr>
<td>020F</td>
<td>33903</td>
<td>630D14</td>
<td>Y</td>
<td>1</td>
<td>SYS1.SHASLINK</td>
</tr>
<tr>
<td>020F</td>
<td>33903</td>
<td>630D14</td>
<td>Y</td>
<td>1</td>
<td>SYS1.SHASMIG</td>
</tr>
<tr>
<td>020E</td>
<td>33903</td>
<td>MVSRTG</td>
<td>Y</td>
<td>1</td>
<td>SYS1.RMF.V630.D05.LINKLIB</td>
</tr>
<tr>
<td>031A</td>
<td>9345-2</td>
<td>RMFUSR</td>
<td>Y</td>
<td>1</td>
<td>DRIVER.SYS1.LINKLIB</td>
</tr>
</tbody>
</table>

Figure 151. LLI Report - Link Library List

The link library list is determined by Parmlib members LNKLSTxx or PROCxx. It
represents the current active link list set. The list contains the names of all link
libraries as well as an indication whether the library is authorized (APF) or not.

The header line Link Library List contains the indication about the status of the
link list:

   IPL   The system is currently running with the link list set that has been selected
during IPL.
   name  Name of the current link list set.
Contents of the report - LPA Library List

The pageable link pack area list is determined by Parmlib members LPALSTxx. It is a fixed-size list which is pointed to from the CVT. The list contains the names of all link libraries that reside in the PLPA. These modules are authorized (APF) by default.

Contents of the report - APF Library List

The list of authorized programs is determined by Parmlib members IEAAPFx or PROGxx. Link libraries can be authorized by the option LNKAUTH=LNKLST, LPA libraries are always authorized libraries.

Field descriptions

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DevNum</td>
<td>Device number of the device on which the library is located. &quot;????&quot; is shown if Monitor I is not active, or volume is not mounted.</td>
</tr>
</tbody>
</table>
Table 108. Fields in the LLI Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DevType</td>
<td>Device type, for example, 3390. &quot;????????&quot; is shown if Monitor I is not active, or volume is not mounted. Shown only if option 'A' has been provided, otherwise blank.</td>
</tr>
<tr>
<td>Volser</td>
<td>Volume serial. For the LPA Library List report, this value is shown only if option 'A' has been provided, otherwise blank.</td>
</tr>
<tr>
<td>Data set name</td>
<td>Name of the library</td>
</tr>
<tr>
<td>APF</td>
<td>Y The link library is APF-authorized. N The link library is not APF-authorized.</td>
</tr>
<tr>
<td>Ext</td>
<td>Number of extents allocated for the link library. Shown only if option 'A' has been provided, otherwise blank.</td>
</tr>
<tr>
<td>Format</td>
<td>APF list format: STATIC IEALPAxx is used, or STATIC has been selected in PROGxx. DYNAMIC DYNAMIC has been selected in PROGxx.</td>
</tr>
<tr>
<td>SMS</td>
<td>Y The library is SMS-managed. N The library is not SMS-managed.</td>
</tr>
<tr>
<td>RACF®</td>
<td>Y The library is defined to RACF. N The library is not defined to RACF. Sec=? RACF-indication is not known, this could be an indicator that the library might not be secured correctly. Shown only if option 'A' has been provided, otherwise blank.</td>
</tr>
</tbody>
</table>

OPT - OPT Settings report

The OPT Settings report displays information about the currently active OPT member in the PARMLIB and the current settings of OPT parameters.

How to request this report

- In ISPF, specify L on the Monitor II Primary Menu. This leads you to the Library List and OPT Settings Selection Menu. Here you can select:
  4 IEAOPTxx - OPT Settings
- In the command interface of an ISPF or TSO/E display session, type the command OPT.
Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPT</strong></td>
<td>Suffix <code>xx</code> in the name of the active option member <code>IEAOPTxx</code>. The option member contains parameters that affect system resource manager (SRM) decisions.</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>Timestamp when the <code>IEAOPTxx</code> member was activated. If the system programmer did not change the active <code>IEAOPTxx</code> member of <code>SYS1.PARMLIB</code> since the last IPL, then ‘N/A’ is shown.</td>
</tr>
<tr>
<td><strong>Parameter</strong></td>
<td>Name of the WLM OPT parameter.</td>
</tr>
<tr>
<td><strong>Default</strong></td>
<td>Default value(s) of the parameter. If more than one default exists, the values are separated by a vertical bar (</td>
</tr>
</tbody>
</table>
Table 109. Fields in the OPT Settings report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Current value(s) of the parameter. This value may differ from the value originally specified. With two values displayed, separated by ‘/’, the second value is provided by SRM. Also parameters that are not set in the IEAOPTxx member are shown with the default value, if not changed otherwise. For information on how SRM handles the settings of OPT parameters, refer to the <a href="#">z/OS MVS Initialization and Tuning Reference</a>. When RMF cannot obtain any data for a parameter, ‘No Data’ is shown.</td>
</tr>
<tr>
<td>Unit</td>
<td>Unit in which the parameter value is measured.</td>
</tr>
<tr>
<td>Description</td>
<td>Basic description of the purpose of the parameter. For detailed information refer to the <a href="#">z/OS MVS Initialization and Tuning Reference</a>.</td>
</tr>
</tbody>
</table>

PGSP - Page Data Set Activity report

The PGSP report provides information on page data set activity. The reporting interval is the period between any two consecutive Monitor II requests.

The PGSP report can help you to determine whether the optimum size has been allocated for each page data set.

**How to request this report**

- In ISPF, specify 3 on the Resource Report Selection menu.
- In TSO/E, use PF7 to select the PGSP report.
- Command interface:
  
  **Display session**
  
  PGSP PAGE
  
  **Background session**
  
  PGSP (PAGE)

**Special considerations of report output**

A Monitor I session measuring page data set activity must be active when you request the report.

Dashes (---) in the data fields indicate that RMF could not provide a value because the page device has been varied online during the reporting interval, or a Monitor I interval ended.
**Contents of the report**

```
<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>The one-letter identifier of the type of paging space. The identifiers are:</td>
</tr>
<tr>
<td>T</td>
<td>The one-letter identifier of the type of paging space. The identifiers are:</td>
</tr>
<tr>
<td>P</td>
<td>PLPA</td>
</tr>
<tr>
<td>C</td>
<td>Common</td>
</tr>
<tr>
<td>L</td>
<td>Local</td>
</tr>
<tr>
<td>S</td>
<td>SCM (Storage Class Memory)</td>
</tr>
<tr>
<td>VOLUME</td>
<td>The volume serial number of the volume on which the data set resides. N/A for SCM.</td>
</tr>
<tr>
<td>DEV SERIAL</td>
<td>The device number. N/A for SCM.</td>
</tr>
<tr>
<td>NUM</td>
<td>The device type. N/A for SCM.</td>
</tr>
<tr>
<td>% SLOTS IN USE</td>
<td>The percentage of the slots in the page data set that are in use. When you request the report, RMF calculates the percentage from the Monitor I sampling values.</td>
</tr>
<tr>
<td>PAGE TRAN TIME</td>
<td>The page transfer time in seconds. When you request the report, RMF calculates the value from the current Monitor I sampling values.</td>
</tr>
<tr>
<td>I/O REQ RATE</td>
<td>The number of I/O requests per second for the data set made between the beginning of the interval and the time you request the report.</td>
</tr>
<tr>
<td>AVG PAGES PER I/O</td>
<td>The average number of pages that were transferred to or from the page data set.</td>
</tr>
</tbody>
</table>
```

**Field descriptions**

Table 110. Fields in the PGSP Report

```
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>S T</td>
<td>The one-letter identifier of the type of paging space. The identifiers are:</td>
</tr>
<tr>
<td>P</td>
<td>PLPA</td>
</tr>
<tr>
<td>C</td>
<td>Common</td>
</tr>
<tr>
<td>L</td>
<td>Local</td>
</tr>
<tr>
<td>S</td>
<td>SCM (Storage Class Memory)</td>
</tr>
<tr>
<td>VOLUME SERIAL</td>
<td>The volume serial number of the volume on which the data set resides. N/A for SCM.</td>
</tr>
<tr>
<td>DEV SERIAL NUM</td>
<td>The device number. N/A for SCM.</td>
</tr>
<tr>
<td>DEV TYPE</td>
<td>The device type. N/A for SCM.</td>
</tr>
<tr>
<td>% SLOTS IN USE</td>
<td>The percentage of the slots in the page data set that are in use. When you request the report, RMF calculates the percentage from the Monitor I sampling values.</td>
</tr>
<tr>
<td>PAGE TRAN TIME</td>
<td>The page transfer time in seconds. When you request the report, RMF calculates the value from the current Monitor I sampling values.</td>
</tr>
<tr>
<td>I/O REQ RATE</td>
<td>The number of I/O requests per second for the data set made between the beginning of the interval and the time you request the report.</td>
</tr>
<tr>
<td>AVG PAGES PER I/O</td>
<td>The average number of pages that were transferred to or from the page data set.</td>
</tr>
</tbody>
</table>
```

Figure 155. PGSP Report

Chapter 3. Snapshot reporting with Monitor II 271
### Mon II - PGSP

**Table 110. Fields in the PGSP Report (continued)**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>This field indicates whether or not the local paging data set accepts VIO pages. The symbols are:</td>
</tr>
<tr>
<td></td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>DATA SET NAME</td>
<td>The name of the page data set being monitored. N/A for SCM.</td>
</tr>
<tr>
<td></td>
<td>If a page data set name is longer than 23 characters, it is truncated in the report to 22 characters followed by an asterisk (*).</td>
</tr>
<tr>
<td></td>
<td>If a data set has bad slots, the data set name is preceded by an asterisk (*).</td>
</tr>
<tr>
<td></td>
<td>When the operating system detects errors in a data set that prevent its further use, RMF can no longer monitor the data set. RMF indicates that monitoring is terminated by preceding the data set name with two asterisks (**).</td>
</tr>
</tbody>
</table>

### Report options

Due to the fact that swap data sets are no longer supported, the Report Options panel may not be used because report option SWAP leads to an empty report.

### SDS - Sysplex Data Server report

The report provides statistics about the usage of the SMF Data Buffer, and the usage of the Sysplex Data Services.

The numbers presented in the first section aid in finding the optimal size of the SMF buffer to hold as many SMF records as an installation might want to keep for immediate sysplex reporting. The second section contains statistics about the exploitation of the callable services. You can use these numbers to optimize the usage of the callable services within other applications than RMF.

The SDS report requires that the RMF address space has been started. Otherwise, no statistics can be provided, neither from the reporting system, nor from any remote system in the sysplex.

### How to request this report

- In ISPF, specify 8 on the Resource Report Selection menu.
- Command interface:

  Display session
  
  SDS
Contents of the report

Table 111. Fields in the SDS Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMF Ssysplex Data Server Statistics</td>
<td></td>
</tr>
<tr>
<td>Report Start</td>
<td>Start and end time of data collection, duration of data collection.</td>
</tr>
<tr>
<td>End</td>
<td>The format for duration can be in days and hours (6d 19h) or in hh:mm:ss.</td>
</tr>
<tr>
<td>Duration</td>
<td></td>
</tr>
<tr>
<td>SMF Buffer Statistics</td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>Start time for SMF buffer statistics, duration of SMF buffer statistics.</td>
</tr>
<tr>
<td>Duration</td>
<td>These values might have been reset during the report duration by a MODIFY command.</td>
</tr>
<tr>
<td>Buffer size</td>
<td>Size in bytes as specified in the SPACE subparameter of the SMFBUF parameter for the RMF address space.</td>
</tr>
<tr>
<td>Records Arrived</td>
<td>Number of records that arrived during the buffer statistics duration.</td>
</tr>
<tr>
<td>Record Rate (/h)</td>
<td>SMF data arrival rate in records per hour.</td>
</tr>
<tr>
<td>Avg Queue Time (ms)</td>
<td>Data server internal processing time for SMF data in milliseconds.</td>
</tr>
<tr>
<td>Avg Rec Length</td>
<td>Average record length for the buffer statistics duration in bytes.</td>
</tr>
<tr>
<td>Records in Buffer</td>
<td>Number of records currently in the SMF data buffer.</td>
</tr>
<tr>
<td>Buffer Wrap Time</td>
<td>Wrap-around time for the SMF data buffer (data residency time); this time is estimated before the second wrap and measured afterwards. The format can be in days and hours (6d 19h) or in hh:mm:ss.</td>
</tr>
</tbody>
</table>

Callable Services Statistics

<table>
<thead>
<tr>
<th>Service Name</th>
<th>Name of the sysplex data service module:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERBDSQRY</td>
<td>RMF Query Available Sysplex SMF Data Service</td>
</tr>
<tr>
<td>ERBDSREC</td>
<td>RMF Request Sysplex SMF Record Data Service</td>
</tr>
<tr>
<td>ERB2XDG5</td>
<td>RMF Monitor II Sysplex Data Gathering Service</td>
</tr>
<tr>
<td>ERB3XDRS</td>
<td>RMF Monitor III Sysplex Data Retrieval Service</td>
</tr>
<tr>
<td>Requests Arrived</td>
<td>Number of calls to the data service.</td>
</tr>
</tbody>
</table>

Figure 156. SDS Report
Table 11. Fields in the SDS Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Rate (/h)</td>
<td>Data services call rate in calls per hour.</td>
</tr>
<tr>
<td>Avg Srv Time (ms)</td>
<td>Average response time (in milliseconds) for data services.</td>
</tr>
<tr>
<td>Avg Sys /Req</td>
<td>Average number of systems a request was propagated to.</td>
</tr>
<tr>
<td>Avg Amnt Data /Req</td>
<td>Average amount of data returned by a request in bytes.</td>
</tr>
</tbody>
</table>

SENQ - System Enqueue Contention report

The report is a “snapshot” report that describes the contention or ownership at the time RMF processes the request for the report. The SENQ report tracks contention for or ownership of serially-reusable resources. SENQ reports only the contention caused by ENQ and DEQ macro instructions.

**Note:** For information about the contention caused by the RESERVE macro instruction, use the reserve activity report.

Especially when invoked during a display session, the report can help you to determine, on a real-time basis, which resources and jobs are contributing to any bottlenecks caused by resource contention.

For a detailed description of the different parameters see the [z/OS RMF User’s Guide](#).

**How to request this report**
- In ISPF, specify 1 on the Resource Report Selection menu.
  - By default, you get the summary report, other reports can be selected via the Report Options panel.
- In TSO/E, use **PF8** to select the SENQ report.
- Command interface:
  **Display session**
  - SENQ {S} {D} {A,sysname} {E,sysname} {majorname[,minormame]}
  **Background session**
  - SENQ {(S)}{(D)}{(A,sysname)}{(E,sysname)}{(majorname[,minormame])}

**Different types of SENQ reports**
You can request the SENQ report as:
- Summary report for all resources that had contention
- Detail report for all resources that had contention or for a specific resource identified by name
- Report of resources held by a specific system, whether or not there is a contention
Summary report
The summary report includes all resources that had a contention. It describes the number of tasks that own each resource and the number of tasks waiting for the resource. Figure 157 shows a sample summary report.

To request a summary report, specify S with the SENQ command.

Detail report
The detail report also includes all resources for which there is contention. In addition, it identifies by jobname, system, and address space identifier the jobs that own the resource, and the jobs that are waiting for the resource. When you request the report for a specific resource by major name or major and minor name, the report includes detail data for the resource or group of resources requested. Figure 159 on page 276 shows a sample detail report.

To request a detail report, specify D with the SENQ command.

Report on resources held by a specific system
The report on resources held by a specific system in a global resource serialization complex identifies either all the resources held or just the exclusively-held resources.

To request all the resources held, specify A, sysname with the SENQ command.

To request just the exclusively-held resources, specify E, sysname with the SENQ command.

This report is useful when attempting to recover an inactive system in a global resource serialization complex.

You can request this report from an active system in the complex and determine from the report the resources that the inactive system held.

Figure 158 on page 276 shows a sample resource report for a specific system.

Contents of the report

```
RMF - SENQ System Enqueue Contention
Command ===> Scroll ===> HALF

CPU= 37/ 35 UIC=2540 PR= 0 System= SYS1 Total
14:52:05 TSK TSK TSK MAJOR NAME
OWN WTE WTS MINOR NAME

CLRSHARE
1 0 1 CLRVSAM.HBB4420.ILOG7 (SYSS)
SYSdsn
1 0 1 KEYES.MYSLM.MACLIB (SYSS)
```

Figure 157. SENQ Summary Report
Table 112. Fields in the SENQ Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSK OWN</td>
<td>The number of tasks that currently own the resource.</td>
</tr>
<tr>
<td>TSK WTE</td>
<td>The number of tasks that currently are waiting for exclusive use of the resource.</td>
</tr>
<tr>
<td>TSK WTS</td>
<td>The number of tasks that currently are waiting for shared use of the resource.</td>
</tr>
</tbody>
</table>

Summary report only.
Table 112. Fields in the SENQ Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME</td>
<td>The name of the job that has requested use of the resource.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>The identifier of the system on which the job that owns or requests the resource is running.</td>
</tr>
<tr>
<td>ASID</td>
<td>The address space identifier of the job that has requested use of the resource.</td>
</tr>
<tr>
<td>REQ</td>
<td>A two-character field that describes the request.</td>
</tr>
<tr>
<td></td>
<td>The first character indicates the type of the request:</td>
</tr>
<tr>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>The second character indicates the status of the request:</td>
</tr>
<tr>
<td></td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>W</td>
</tr>
<tr>
<td>MAJORNAME</td>
<td>The name and scope of the resource. The major name, which corresponds to the qname field in the ENQ and DEQ macro instructions, is one to eight characters in length; it is aligned under the MAJORNAME heading. The minor name, which corresponds to the rname field in the ENQ and DEQ macro instructions, can be from 1 to 255 characters in length. However, only 44 characters can appear in the report. When a minor name exceeds 44 characters, it is truncated in the report, and an asterisk (*) following the scope indicates that the name has been truncated. If the minor name contains unprintable characters, RMF reports in the form 'name', where name appears as up to 44 hexadecimal digits. Each minor name is aligned under the MINORNAME heading. RMF recognizes only 44 characters. Therefore if two minor names (both with the same major name) are longer than 44 characters and differ only beyond the forty-fourth character, RMF cannot distinguish between them.</td>
</tr>
<tr>
<td>MINORNAME</td>
<td>The scope of the resource follows the minor name. A resource with a scope of 'SYSTEMS' is followed by (SYSS). A resource with a scope of 'SYSTEM' is followed by (STEP).</td>
</tr>
<tr>
<td></td>
<td>When the major and minor names are blank on the report, the last non-blank values (above) are valid.</td>
</tr>
</tbody>
</table>

Report options

```
RMF Monitor II - System Enqueue Options

Command ===> 

Specify one of the options below. To exit press END.

Enqueue contention report:
Summary ===> YES Specify YES for a summary or NO for a detailed report.

Enqueue report by system:
All ===> ___ Specify YES for all owned resources or NO for exclusively owned resources only.
System ID ===> ______ Specify the system holding the resources.

Enqueue report by major-/minorname:
Majornma ===> ______
Minorname ===> ______
```

Figure 160. SENQ Report Options Panel

You can specify either a summary report, a report by system, or a report by major-/minorname.
Summary
Allows you to specify a summary report.

YES Is the default value. A summary report includes the scope of the resource, the number of tasks waiting for exclusive use of the resource, and the number of tasks waiting for shared use of the resource.

NO Causes a detailed report to be generated.

All Allows you to specify a report that includes all resources that a system holds in a global serialization complex.

System ID
The system for which the enqueue report is requested.

To create a report that includes all resources owned by the system, also specify YES for All.

Majorname, minorname
Allows you to specify a detailed report for a specific resource that had contention. The majorname is a 1 to 8 character major name of a serially-reusable resource. If you specify only a major name, RMF lists all resources grouped under the major name. The optional minorname contains the minor name of the resource. The minor name can be 1 to 30 characters.

If you specify S or D as majorname, you need to specify a minorname.

A and E cannot be used as majornames.

SENQR - System Enqueue Reserve report
The report is a ‘snapshot’ report that describes the status of all RESERVE requests outstanding at the time RMF processes the request for the report.

The SENQR report enables you to track RESERVE macro instructions issued to reserve a shared direct access device (shared DASD) for use by a particular system. Figure 161 on page 279 shows a sample SENQR report requested for all devices.

How to request this report
- In ISPF, specify 2 on the Resource Report Selection menu.
  By default, you get all volumes, a specific volume can be selected via the Report Options panel.
- In TSO/E, use PF9 to select the SENQR report.
- Command interface:

  Display session
  SENQR {ALLVSER}
  {volser }

  Background session
  SENQR {((ALLVSER))}
  {((volser))}
Contents of the report

Table 113. Fields in the SENQR Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME</td>
<td>The name of the job that issued the RESERVE macro instruction for the device identified under DEV.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>The identifier of the system on which the job that owns or requests the resource is running.</td>
</tr>
<tr>
<td>ASID</td>
<td>The address space identifier of the job that issued the RESERVE macro instruction for the device identified under DEV.</td>
</tr>
<tr>
<td>REQ</td>
<td>The two-character field that describes the request. The first character indicates the type of the request: E - The request was for exclusive use of the device, S - The request was for shared use of the device. The second character indicates the status of the request: O - The requestor owns the device, W - The requestor is waiting for the device.</td>
</tr>
<tr>
<td>VOLUME</td>
<td>The volume serial of the volume mounted on the device identified under DEV. If reserves are issued on systems other than the one on which you request the report, the field is blank.</td>
</tr>
<tr>
<td>DEV</td>
<td>The address of the device for which the RESERVE macro instruction was issued. If reserves are issued on systems other than the one on which you request the report, the field is blank.</td>
</tr>
<tr>
<td>RSV</td>
<td>The indicator of the reserve status of the device. ON - The device is reserved by the processor on which RMF is running, OFF - The device is being serialized via RESERVE macro instructions, but is currently not reserved, CNV - The device has been converted to a GRS ENQ.</td>
</tr>
<tr>
<td>MAJOR</td>
<td>The name used to control access to the device by means of RESERVE macro instructions. The major name, which corresponds to the qname field in the RESERVE macro instruction, is one to eight characters in length. It is aligned under the MAJOR heading.</td>
</tr>
<tr>
<td>MINOR</td>
<td>The minor name, which corresponds to the rname field in the RESERVE macro instruction, can be from 1 to 255 characters in length. However, only 32 characters can appear in the report. When a minor name exceeds 32 characters, it is truncated in the report, and an asterisk (*) indicates the name has been truncated. If the minor name contains unprintable characters, RMF reports it in the form ‘name’, where name is shown in hexadecimal digits and is only 29 digits in length. Each minor name is aligned under the MINOR heading. RMF recognizes only 44 characters. Therefore if two minor names (both with the same major name) are longer than 44 characters and differ only beyond the forty-fourth character, RMF cannot distinguish between them.</td>
</tr>
</tbody>
</table>

Figure 161. SENQR Report

RMF - SENQR System Enqueue Reserve

<table>
<thead>
<tr>
<th>Command ===</th>
<th>Scroll ===</th>
<th>HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMF - SENQR System Enqueue Reserve Line 1 of 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU= 37/ 35 UIC=2540 PR= 0</td>
<td>System= SYS1 Total</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14:52:57</th>
<th>SYSTEM ENQUEUE RESERVE REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME</td>
<td>ASID</td>
</tr>
<tr>
<td>CATALOG</td>
<td>34 APTS</td>
</tr>
<tr>
<td>BMORRISP</td>
<td>70 APTS</td>
</tr>
<tr>
<td>JES2</td>
<td>31 APTS</td>
</tr>
<tr>
<td>CATALOG</td>
<td>34 APTS</td>
</tr>
</tbody>
</table>

Chapter 3. Snapshot reporting with Monitor II  279
Report options

RMF Monitor II - System Enqueue Reserve Options

Command ===>  
Specify a volume serial number or ALLSERV. To exit press END.
Volume ===> ALLSERV  Reports reserve requests for a particular volume.
            Specify ALLSERV for all requests.

Figure 162. SENQR Report Options Panel

Enter the reserved volume name. For a report of all reserved volumes enter ALLVSER.

SPAG - Paging Activity report

The Paging Activity report presents overview information on system paging activity.

This report enables you to see the paging activity of your system more clearly. This is due to the fact that most of the report fields reflect rates that show the activity since the last request for the report. Exceptions are the following fields: TIME, AFC (length of the available frame queue), HI UIC (highest UIC), and ESF AVL (number of available expanded storage frames).

Each report consists of one line of data that gives a “snapshot” view of system paging activity at the time the report was requested. When you invoke the report repetitively, you can build a table showing the differences over a period of time. [Figure 163 on page 281] shows how you can repeat requests for the report to build a table of system paging activity.

How to request this report

- In ISPF, specify 4 on the Resource Report Selection menu.
- In TSO/E, use PF10 to select the SPAG report.
- Command interface:
  Display session  
  SPAG
  Background session  
  SPAG
### Contents of the report

#### Table 114. Fields in the SPAG Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>The time the report was requested.</td>
</tr>
<tr>
<td>LPA IN</td>
<td>The rate of LPA pages paged in. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>CSA IN</td>
<td>The rate of CSA pages paged in. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>SWP OUT</td>
<td>The rate of successful swap-outs.</td>
</tr>
<tr>
<td>PGS-SWPD IN</td>
<td>The rate of pages swapped in. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>PGS-SWPD OUT</td>
<td>The rate of pages swapped out. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>PRIV_IN BLK</td>
<td>The rate of private area (VIO + non-VIO) pages paged in, in blocks, not including the first page. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>PRIV_IN NBK</td>
<td>The rate of private area (VIO + non-VIO) pages paged in. After the initial request, this field represents the rate since the previous report. This rate includes single pages plus the first page of each block.</td>
</tr>
<tr>
<td>PRV OUT</td>
<td>The rate of private area (VIO + non-VIO) pages paged out. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>V&amp;H 1+O</td>
<td>The rate of hiperspace and VIO pages paged in and paged out. After the initial request, this field represents the rate since the previous report.</td>
</tr>
<tr>
<td>TAR CWS</td>
<td>The target working set size for the common area.</td>
</tr>
</tbody>
</table>
Table 114. Fields in the SPAG Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFC</td>
<td>The total number of frames currently on all available frame queues.</td>
</tr>
<tr>
<td>HI UIC</td>
<td>The highest unreferenced interval count (UIC). Values greater than 9999 are displayed as nnK to indicate a multiple of 1000. The maximum value is 65K.</td>
</tr>
<tr>
<td>ES RTE</td>
<td>The rate of pages sent to expanded storage. After the initial request, this field represents the rate since the previous report. In a system without expanded storage, the field heading appears in the report, but the field is blank.</td>
</tr>
</tbody>
</table>
| MIG AGE       | The length of time a page resides on expanded storage before it migrates to auxiliary storage. This field provides a snapshot of the migration age taken at the last sample. In a system without expanded storage, the field heading appears in the report, but the field is blank. If there is no unit specified for MIG AGE, the value is in migration hours. Other values are indicated as follows:  
  M Migration minutes  
  S Migration seconds  
  1.5 migration seconds are equivalent to 1 real second, this means that the displayed value has to be divided by 1.5 to get real seconds, minutes or hours. |
| ES AVL        | The number of expanded storage frames currently available and not in use. In a system without expanded storage, the field heading appears in the report, but the field is blank. |
| MIG RTE       | The rate of page migration from expanded storage to auxiliary storage. After the initial request, this field represents the rate since the previous report. In a system without expanded storage, the field heading appears in the report, but the field is blank. |

SRCS - Central Storage/Processor/SRM report

The SRCS report is a one-line summary of the current utilization of central storage, the processor, and SRM facilities. When you repeat the requests for the report, you can build a table showing the differences over a period of time. Figure 164 on page 283 is an example of repeated requests.

This report detects abnormal situations when they occur so you can request a more detailed report to further analyze the situation.

How to request this report

- In ISPF, specify 5 on the Resource Report Selection menu.
- In TSO/E, use PF11 to select the SRCS report.
- Command interface:
  
  **Display session**

  SRC$  

  **Background session**

  SRC$
### Contents of the report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>The time the report was requested.</td>
</tr>
<tr>
<td>AFC</td>
<td>The average length of the available frame queue.</td>
</tr>
<tr>
<td>HI UIC</td>
<td>The highest unreferenced interval count (UIC).</td>
</tr>
<tr>
<td>Values greater than 9999 are displayed as nK to indicate a multiple of 1000. The maximum value is 65K.</td>
<td></td>
</tr>
<tr>
<td>SQA F</td>
<td>The total number of SQA frames, including frames in central storage.</td>
</tr>
<tr>
<td>LPA F</td>
<td>The total number of LPA frames.</td>
</tr>
<tr>
<td>LPA FF</td>
<td>The total number of LPA fixed frames.</td>
</tr>
<tr>
<td>CSA F</td>
<td>The total number of CSA frames.</td>
</tr>
<tr>
<td>L+C FF</td>
<td>The total number of fixed LPA and CSA frames.</td>
</tr>
<tr>
<td>PRI FF</td>
<td>The total number of private non-LSQA fixed frames. If the number of fixed frames is greater than 9999, asterisks (****) appear in this field.</td>
</tr>
<tr>
<td>LSQA CSF</td>
<td>The total number of private LSQA frames in central storage.</td>
</tr>
<tr>
<td>LSQA ESF</td>
<td>The total number of private LSQA frames in expanded storage. This column is blank if the system is running in z/Architecture.</td>
</tr>
</tbody>
</table>

### Table 115. Fields in the SRCS Report

<table>
<thead>
<tr>
<th>TIME</th>
<th>AFC</th>
<th>HI</th>
<th>UIC</th>
<th>LPA</th>
<th>LPA CSA</th>
<th>L+C</th>
<th>PRI</th>
<th>LSQA</th>
<th>LSQA</th>
<th>CPU</th>
<th>IN</th>
<th>OUT</th>
<th>OUT</th>
<th>OUT</th>
<th>CSF</th>
<th>ESF</th>
<th>UTL</th>
<th>Q</th>
<th>LOG</th>
<th>RQ</th>
<th>WQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:44:56</td>
<td>185K</td>
<td>65K</td>
<td>0.0M</td>
<td>5.3K</td>
<td>82</td>
<td>5.3K</td>
<td>388</td>
<td>7687</td>
<td>26K</td>
<td>4</td>
<td>53</td>
<td>45</td>
<td>0</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:44:59</td>
<td>185K</td>
<td>65K</td>
<td>0.0M</td>
<td>5.3K</td>
<td>82</td>
<td>5.3K</td>
<td>388</td>
<td>7708</td>
<td>26K</td>
<td>4</td>
<td>52</td>
<td>46</td>
<td>0</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:45:00</td>
<td>185K</td>
<td>65K</td>
<td>0.0M</td>
<td>5.3K</td>
<td>82</td>
<td>5.3K</td>
<td>388</td>
<td>7789</td>
<td>26K</td>
<td>3</td>
<td>52</td>
<td>46</td>
<td>0</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:45:00</td>
<td>185K</td>
<td>65K</td>
<td>0.0M</td>
<td>5.3K</td>
<td>82</td>
<td>5.3K</td>
<td>388</td>
<td>7769</td>
<td>26K</td>
<td>3</td>
<td>52</td>
<td>46</td>
<td>0</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:45:01</td>
<td>185K</td>
<td>65K</td>
<td>0.0M</td>
<td>5.3K</td>
<td>82</td>
<td>5.3K</td>
<td>388</td>
<td>7769</td>
<td>26K</td>
<td>14</td>
<td>52</td>
<td>46</td>
<td>0</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 164. SRCS Report**

Chapter 3. Snapshot reporting with Monitor II  283
### Table 115. Fields in the SRCS Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| CPU UTL       | The average processor utilization percentage for all general purpose processors (CPs) currently online. If Monitor I CPU gathering is active, it is the MVS view of CPU utilization which is the percentage of the time that the general purpose processors were busy:  
  \[
  CPU\ UT\!L = \frac{\text{Sum of Wait Times}}{\text{Time Range}} * 100
  \]
  
  The time range is the sum of the times the processors were online. With HiperDispatch mode active, it is the sum of the times the processors were online but not parked.  
  
  If Monitor I CPU gathering is not active, CPU UTL is the SRM view of CPU utilization (CCVTUTILP).  
  Note: The CPU UTL value is a snapshot of CPU usage over a short period of time and is identical to the first value in the CPU= field in the header. For details, please refer to Table 98 on page 233. |
| IN Q          | The current length of the SRM in queue. |
| OUT LOG       | The current number of address spaces that are logically swapped out. |
| OUT RQ        | The current length of the SRM out ready queue. |
| OUT WQ        | The current length of the SRM out wait queue. |
Chapter 4. Real-time reporting with Monitor I

Monitor I produces interval reports that are created at the end of a measurement interval, for example, 30 minutes.

You can obtain Monitor I session interval reports during or at the end of RMF processing, or they can be generated at a later time by the Postprocessor.

- **CHAN** Channel Path Activity Report
- **CPU** CPU Activity Report
- **CRYPTO** Crypto Hardware Activity Report
- **DEVICE** Device Activity Report
- **ENQ** Enqueue Activity Report
- **FCD** FICON Director Activity Report
- **IOQ** I/O Queuing Activity Report
- **PAGESP** Page Data Set Activity Report
- **PAGING** Paging Activity Report
- **TRACE** Trace Activity Report
- **VSTOR** Virtual Storage Activity Report

See Chapter 5, “Long-term overview reporting with the Postprocessor,” on page 287 for a description of these reports.
Chapter 5. Long-term overview reporting with the Postprocessor

Postprocessor reports are based on data gathered as SMF records by RMF (Monitor I, Monitor II, and Monitor III), by web servers, and by Lotus® Domino® servers.

This information unit describes the following report types:

- **Interval and Duration reports**
  Reports are available as single-system and sysplex reports

- **Exception report**
  Presents a summary of values that exceeded installation-defined thresholds.

- **Overview report**
  Provides an improved version of the Exception and Summary report and offers data for further processing in spreadsheet or other applications.

- **Summary report**
  Presents an overview of system activity.

Postprocessor reports are available as either textual reports or XML reports, or both. You can use the XML output format of a report for further processing, for example, with an XML parser.

The [How to work with Postprocessor XML reports](#) in the z/OS RMF User’s Guide provides or navigates to all required information on how to produce and view XML reports.

Table 116 presents an overview of available formats for all Postprocessor reports.

<table>
<thead>
<tr>
<th>Report</th>
<th>Text</th>
<th>XML produced by Postprocessor job</th>
<th>XML available in Spreadsheet Reporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACHE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>CF</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>CHAN</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>CPU</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>CRYPTO</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>DEVICE</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>DOMINO</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENQ</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>ESS</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>FCD</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>HFS</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>HTTP</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOQ</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>OMVS</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
Postprocessor reports

Table 116. Available formats for Postprocessor reports (continued)

<table>
<thead>
<tr>
<th>Report</th>
<th>Text</th>
<th>XML produced by Postprocessor job</th>
<th>XML available in Spreadsheet Reporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAGESP</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>PAGING</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>PCIE</td>
<td></td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>SDEVICE</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>SDELAY</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>TRACE</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>VSTOR</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>WLMGL</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>XCF</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Exception report</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Overview report</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Summary report</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

Interval and duration reports

The Postprocessor can generate interval reports based on data gathered as SMF records by RMF (Monitor I, Monitor II, and Monitor III), by web servers, and by Lotus Domino servers.

Interval reports can be created either as single-system reports using the report option:

```
REPORTS(option)
```

or as sysplex reports with the report option:

```
SYSRPTS(option)
```

The Postprocessor can either get its input from data sets with SMF records from all systems in the sysplex, or it can access all current SMF records in the sysplex automatically using the RMF Sysplex Data Server.

For details on how to call the Postprocessor with the different options and capabilities, refer to the [z/OS RMF User’s Guide](#).

All Monitor I interval reports can be produced as real-time reports during the Monitor I gatherer session. The table of available reports can be found in chapter 4, “Real-time reporting with Monitor I,” on page 285.

Samples of the interval reports printed during a Monitor II session appear in Chapter 3, “Snapshot reporting with Monitor II,” on page 231.

In addition to interval reports, the Postprocessor can create duration reports. You can get the reports using the following command:

Duration report:

```
DINTV(hhmm)
```
PP - Interval and duration reports

A duration report is similar to the interval report for the same system activities. However, it summarizes activities of all the RMF measurement intervals that fall within the duration interval. The duration interval is the period of time covered in the duration report.

Duration reports allow you to measure your system’s performance over long periods of time with a minimal amount of system overhead and a minimal volume of printed output.

The fields in the duration report are similar to those in the corresponding interval report. The differences are described in the sections for each report.

Table 117. Interval and Duration Reports

<table>
<thead>
<tr>
<th>Report Option</th>
<th>Report Name</th>
<th>Gathered by</th>
<th>SMF Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPORTS(CACHE)</td>
<td>Cache subsystem activity</td>
<td>Monitor I</td>
<td>74.5</td>
</tr>
<tr>
<td>SYSRPTS(CF)</td>
<td>Coupling facility activity</td>
<td>Monitor III</td>
<td>74.4</td>
</tr>
<tr>
<td>REPORTS(CHAN)</td>
<td>Channel path activity</td>
<td>Monitor I</td>
<td>73</td>
</tr>
<tr>
<td>REPORTS(CPU)</td>
<td>CPU activity</td>
<td>Monitor I</td>
<td>70.1</td>
</tr>
<tr>
<td>REPORTS(CRYPTO)</td>
<td>Crypto hardware activity</td>
<td>Monitor I</td>
<td>70.2</td>
</tr>
<tr>
<td>REPORTS(DEVICE)</td>
<td>Device activity</td>
<td>Monitor I</td>
<td>74.1</td>
</tr>
<tr>
<td>REPORTS(DOMINO)</td>
<td>Lotus Domino server activity</td>
<td>Lotus Domino server</td>
<td>108.1, 108.3</td>
</tr>
<tr>
<td>REPORTS(ENQ)</td>
<td>Enqueue activity</td>
<td>Monitor I</td>
<td>77</td>
</tr>
<tr>
<td>REPORTS(ESS)</td>
<td>Enterprise Disk Systems activity</td>
<td>Monitor I</td>
<td>74.5, 74.8</td>
</tr>
<tr>
<td>REPORTS(FCD)</td>
<td>FICON director activity</td>
<td>Monitor I</td>
<td>74.7</td>
</tr>
<tr>
<td>REPORTS(HFS)</td>
<td>HFS statistics</td>
<td>Monitor III</td>
<td>74.6</td>
</tr>
<tr>
<td>REPORTS(HTTP)</td>
<td>HTTP server activity</td>
<td>HTTP server</td>
<td>103.1, 103.2</td>
</tr>
<tr>
<td>REPORTS(IOQ)</td>
<td>I/O queuing activity</td>
<td>Monitor I</td>
<td>78.3</td>
</tr>
<tr>
<td>REPORTS(OMVS)</td>
<td>OMVS kernel activity</td>
<td>Monitor III</td>
<td>74.3</td>
</tr>
<tr>
<td>REPORTS(PAGESP)</td>
<td>Page data set activity</td>
<td>Monitor I</td>
<td>75</td>
</tr>
<tr>
<td>REPORTS(PAGING)</td>
<td>Paging activity</td>
<td>Monitor I</td>
<td>71</td>
</tr>
<tr>
<td>REPORTS(PCIE)</td>
<td>PCIE activity</td>
<td>Monitor III</td>
<td>74.9</td>
</tr>
<tr>
<td>REPORTS(SDELAY)</td>
<td>Serialization delay</td>
<td>Monitor III</td>
<td>72.5</td>
</tr>
<tr>
<td>SYSRPTS(DEVICE)</td>
<td>Shared device activity</td>
<td>Monitor I</td>
<td>74.1</td>
</tr>
<tr>
<td>REPORTS(TRACE)</td>
<td>Trace activity</td>
<td>Monitor I</td>
<td>76</td>
</tr>
<tr>
<td>REPORTS(VSTOR)</td>
<td>Virtual storage activity</td>
<td>Monitor I</td>
<td>78.2</td>
</tr>
<tr>
<td>SYSRPTS(WLMGL)</td>
<td>Workload activity</td>
<td>Monitor I</td>
<td>72.3</td>
</tr>
<tr>
<td>REPORTS(XCF)</td>
<td>XCF activity</td>
<td>Monitor III</td>
<td>74.2</td>
</tr>
</tbody>
</table>

Note: The ENQ, SDELAY, and TRACE report are only available as interval reports.

In addition, the Postprocessor can create the following interval reports based on data collected during a Monitor II background session. Duration reports are not available. You can find a description of these reports in Chapter 3, “Snapshot reporting with Monitor II,” on page 231.
## PP - Interval and duration reports

### Table 118. Monitor II Interval Reports

<table>
<thead>
<tr>
<th>Report Option</th>
<th>Report Name</th>
<th>SMF Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPORTS(ARD/ARDJ)</td>
<td>Address space resource data</td>
<td>79.2</td>
</tr>
<tr>
<td>REPORTS(ASD/ASDJ)</td>
<td>Address space state data</td>
<td>79.1</td>
</tr>
<tr>
<td>REPORTS(ASRM/ASRMJ)</td>
<td>Address space SRM data</td>
<td>79.5</td>
</tr>
<tr>
<td>REPORTS(CHANNEL)</td>
<td>Channel path activity</td>
<td>79.12</td>
</tr>
<tr>
<td>REPORTS(DEV/DEVV)</td>
<td>Device activity</td>
<td>79.9</td>
</tr>
<tr>
<td>REPORTS(IOQUEUE)</td>
<td>I/O queuing activity</td>
<td>79.14</td>
</tr>
<tr>
<td>REPORTS(PGSP)</td>
<td>Page data set activity</td>
<td>79.11</td>
</tr>
<tr>
<td>REPORTS(SENQ)</td>
<td>System enqueue contention</td>
<td>79.7</td>
</tr>
<tr>
<td>REPORTS(SENQR)</td>
<td>System enqueue reserve</td>
<td>79.6</td>
</tr>
<tr>
<td>REPORTS(SPAG)</td>
<td>Paging activity</td>
<td>79.4</td>
</tr>
<tr>
<td>REPORTS(SRCS)</td>
<td>Central storage/Processor/SRM</td>
<td>79.3</td>
</tr>
</tbody>
</table>

### Single-system report header

All reports contain the following information:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report title</td>
<td>The type of measurement data.</td>
</tr>
<tr>
<td>z/OS V2R1</td>
<td>The version of the operating system.</td>
</tr>
<tr>
<td>SYSTEM ID cccc</td>
<td>The SMF system ID of this system.</td>
</tr>
<tr>
<td>RPT VERSION V2R1 RMF</td>
<td>The version of the RMF Postprocessor.</td>
</tr>
<tr>
<td>DATE mm/dd/yyyy</td>
<td>The starting date of the measurement interval where mm is the month, dd is the day, and yyyy is the year.</td>
</tr>
<tr>
<td>INTERVAL mm.ss.ttt</td>
<td>The length of the measurement interval during which input is gathered for the report generators, where mm is the minutes, ss is seconds, and ttt is thousandths of seconds.</td>
</tr>
<tr>
<td>TIME hh.mm.ss</td>
<td>The time the interval began, where hh is hours, mm is the minutes, and ss is seconds.</td>
</tr>
<tr>
<td>CYCLE s.ttt</td>
<td>The length of the cycle at which data is sampled, where s is seconds and ttt is thousandths of seconds. This field appears in the heading for each report that includes sampled data.</td>
</tr>
<tr>
<td>PAGE nnnn</td>
<td>The page number of the report (generated by the report program), where nnnn is the page number.</td>
</tr>
</tbody>
</table>

All calculated numeric values in the reports are rounded to the nearest printable value, unless otherwise noted in the report descriptions. All data fields in the reports are obtained from the corresponding SMF record image unless otherwise indicated. Those data fields that are not obtained directly are calculated from fields in the SMF record image.
Sysplex report header

The difference in this header compared to the single-system report is that the sysplex name is shown instead of the SMF system ID.

Duration report header

In the heading area of a duration report, the START field shows when the first measurement interval within the duration interval began. The END field shows the date and time when the last interval ended.

Overview condition names

Data displayed in most Postprocessor interval reports can be used to determine when an Exception or Overview report should be taken, as described in the z/OS RMF User's Guide. The overview condition names (also shortly called overview names or overview conditions) that refer to single fields in a report are shown in the rightmost column of the table of spreadsheet range names for the report, so that you can correlate them with a field heading.

For full details of the algorithms used to determine the overview condition, and the SMF record fields they apply to, see the z/OS RMF User’s Guide.

CACHE - Cache Subsystem Activity report

The Cache Subsystem Activity report provides cache statistics on a subsystem basis as well as on a detailed device-level basis.

With the help of cache control units, access time to data that resides on a DASD can be reduced to the minimum allowed by the speed of the channels, providing significant I/O response time improvements. Important questions for performance analysts are:

- How many control units do I need?
- What is the optimum size of the cache?
- How much non-volatile storage (NVS) do I need?
- Which devices should or should not be cached?
- Is the cache performing effectively?

The Cache Subsystem Activity report provides answers to these questions.
**How to request this report**

Monitor I gathers data for this report with the default option CACHE as SMF record type 74.5. If you want to suppress gathering, you have to specify option NOCACHE.

To produce this report, specify

```
REPORTS(CACHE(options))
```

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](#) in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

**Example URLs for the DDS API:**


**Different report levels**

The contents of the report depends on the reporting options:

**Cache Summary reporting** - `REPORTS(CACHE(SUMMARY))` (see "Cache Summary reporting" on page 293)

This generates a report with three sections:
- Cache Subsystem Summary
- Top-20 Device List by DASD I/O Rate
- Top-20 Device List by total I/O Rate

The Summary report provides an overview on all subsystems with the most relevant data. The two device lists contain the 20 devices which show the highest DASD I/O rates (devices that should be investigated for potential cache hit improvements) or that show the highest I/O rates (hopefully with the best cache hit rates).

**Subsystem-level reporting** - `REPORTS(CACHE(SUBSYS))` (see "Subsystem-level reporting" on page 294)

This generates a report with these sections:
- Cache Subsystem Status
- Cache Subsystem Overview
- Cache Subsystem Device Overview
- RAID Rank Activity

The subsystem-level report gives an overall view of the storage controller, that is the amount of cache storage and non-volatile storage installed, as well as the current status of the cache. In addition, the performance analyst finds the number of I/O requests sent to the control unit and their resolution in the cache (hits). Furthermore, a list of all volumes attached to the subsystem is part of the report, showing their specific utilization of the cache.

The suboptions SSID/EXSSID can be used to select or exclude specific control units.

**Device-level reporting** - `REPORTS(CACHE(DEVICE))` (see "Device-level reporting" on page 301)
This generates, in addition to the report described above, a report with two sections:
- Cache Device Status
- Cache Device Activity

The device-level report provides detailed information for each single device attached to the selected control unit. The status section shows whether caching and DASD FAST WRITE are active, or whether the current device is part of a duplex pair. The report is intended to help analyze cache usage in detail on the basis of the information about the applications that access these volumes.

**Note:** When comparing I/O rates in the DASD Activity report and in the Cache Subsystem Activity report, you may see differences due to different ways how I/Os are counted:
- In the DASD Activity report, one I/O is counted for one SSCH or RSCH instruction. There can be record chaining, for example for paging I/O, which is not reflected in the SSCH count.
- In the Cache Subsystem Activity report, one I/O is counted for each cache request, and one I/O chain may cause several cache requests.

This different I/O counting can lead to higher or lower I/O rates in the Cache Subsystem Activity report than in the DASD Activity report.

**Cache Summary reporting**

**Cache Subsystem Summary**

The report offers you a top-down approach to analyze the storage subsystems in your configuration because you can see at a glance the most important data. Looking at this report, the storage subsystems causing problems can be easily identified and analyzed in a second Postprocessor run requesting more details.

**Top-20 device lists**

In addition to the subsystem summary, the report consists of two top-20 lists of devices, sorted in descending order by DASD I/O rate and by total I/O rate. These two lists allow you to identify the volumes with the highest I/O rates to the lower interface of a subsystem as well as the volumes with the highest I/O rates in total. Solving a possible problem, one of the listed devices would probably be of most benefit to the overall subsystem.
Table 119. Fields in the Cache Subsystem Summary Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACHE</td>
<td>Amount of physical storage that is configured in this storage subsystem (in megabytes unless otherwise noted).</td>
</tr>
<tr>
<td>NVS</td>
<td>Amount of physical non-volatile storage (NVS) that is configured in this storage subsystem (in megabytes unless otherwise noted).</td>
</tr>
<tr>
<td>OFF RATE</td>
<td>Rate of I/O requests to non-cached devices during the reporting interval.</td>
</tr>
<tr>
<td>% I/O</td>
<td>Percentage of I/O requests to this volume, compared to the total number of I/O requests sent to the subsystem it is attached to. This is not the percentage of all I/O requests in the system.</td>
</tr>
</tbody>
</table>

**Subsystem-level reporting**

**Cache subsystem status and overview**

The first section shows the configuration of the selected storage subsystem. This includes the amount of cache configured (installed) and available for use, and how much storage, if any, is pinned because of a DASD failure. It also includes the amount of non-volatile storage needed for the DASD FAST WRITE function. Finally, the overall subsystem status is shown in terms of whether caching is active, or, for example, CACHE FAST WRITE is activated.

The second section provides details of the cache usage of the subsystem. Here, the analyst can see at a glance all the I/O requests to the subsystem, divided into the categories NORMAL, SEQUENTIAL, and CACHE FAST WRITE. READ and WRITE requests are shown separately as totals, rates, or ratios.

**Note:** All values shown as RATE are calculated on the basis of seconds that are shown in the CINT value in the report header.
Table 120. Fields in the Cache Subsystem Activity Report - Header

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM</td>
<td>Storage subsystem type (as configured).</td>
</tr>
<tr>
<td>CU-ID</td>
<td>Physical control unit number of the caching subsystem. This is equal to the lowest device number, or to the device that has been turned online first, respectively.</td>
</tr>
<tr>
<td>SSID</td>
<td>Subsystem identifier: a number assigned during installation of the subsystem that uniquely identifies the storage subsystem.</td>
</tr>
</tbody>
</table>

**Note:** Device reserve activity can cause a data gatherer interface to wait until a reserve has been released. This in turn can cause the cache interval to be much longer than a regular RMF interval.

Therefore, CDATE, CTIME and CINT have been introduced to show the actual point in time to which the cache interval start is related, and the actual cache interval length. All rates shown in the report are based on CINT, not on INTERVAL.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDATE</td>
<td>Date when the cache interval started.</td>
</tr>
<tr>
<td>CTime</td>
<td>Time when the cache interval started.</td>
</tr>
<tr>
<td>CINT</td>
<td>Cache interval time.</td>
</tr>
<tr>
<td>TYPE-MODEL</td>
<td>Device type and model.</td>
</tr>
<tr>
<td>TYPE MODEL</td>
<td>Device type and model.</td>
</tr>
<tr>
<td>MANUF PLANT</td>
<td>The hardware description of the disk system.</td>
</tr>
<tr>
<td>SERIAL</td>
<td>Volume serial number of the reported DASD device (only for device-level reporting).</td>
</tr>
<tr>
<td>NUM</td>
<td>Device number of the reported DASD device (only for device-level reporting).</td>
</tr>
</tbody>
</table>
### Table 121. Fields in the Cache Subsystem Activity Report - Subsystem Status

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBSYSTEM STORAGE</strong></td>
<td>Physical capacity of random access cache (in megabytes).</td>
</tr>
<tr>
<td><strong>CONFIGURED</strong></td>
<td>Amount of storage that is installed in this storage subsystem.</td>
</tr>
<tr>
<td><strong>AVAILABLE</strong></td>
<td>Amount of storage that is available for caching. This is the total cache size minus the amount used by the subsystem for the cache directory, minus the amount pinned and offline storage.</td>
</tr>
<tr>
<td><strong>PINNED</strong></td>
<td>Amount of storage that is unavailable because a DASD failure is preventing the subsystem from destaging the data. The data is pinned in cache.</td>
</tr>
<tr>
<td><strong>OFFLINE</strong></td>
<td>Amount of storage that is offline because of a host or subsystem error.</td>
</tr>
<tr>
<td><strong>NON-VOLATILE STORAGE (NVS)</strong></td>
<td>Physical capacity of random access storage with a backup battery power source (in megabytes).</td>
</tr>
<tr>
<td><strong>CONFIGURED</strong></td>
<td>Amount of NVS that is installed in this storage subsystem.</td>
</tr>
<tr>
<td><strong>PINNED</strong></td>
<td>Amount of NVS that is unavailable because a DASD failure is preventing the subsystem from destaging the data. The data is pinned in NVS.</td>
</tr>
<tr>
<td><strong>STATUS</strong></td>
<td>The caching status of the entire subsystem.</td>
</tr>
<tr>
<td><strong>CACHING</strong></td>
<td>Overall caching status of the subsystem.</td>
</tr>
<tr>
<td><strong>ACTIVE</strong></td>
<td>Caching is active (online and usable).</td>
</tr>
<tr>
<td><strong>DISABLED FOR MAINTENANCE</strong></td>
<td>Cache has been disabled for maintenance.</td>
</tr>
<tr>
<td><strong>PENDING ACTIVE STATE</strong></td>
<td>Caching is pending active, that is, cache is in the process of being brought online.</td>
</tr>
<tr>
<td><strong>INTERNAL ERROR TERMINATION</strong></td>
<td>An internal error stopped cache (cache is offline).</td>
</tr>
<tr>
<td><strong>EXPLICIT HOST TERMINATION</strong></td>
<td>Cache has been deactivated by request from host system or support facility.</td>
</tr>
<tr>
<td><strong>DEACTIVATION IN PROCESS</strong></td>
<td>A command requesting deactivation of cache has been received, and destaging from cache to DASD is still in progress.</td>
</tr>
<tr>
<td><strong>DEACTIVATION FAILED</strong></td>
<td>A command requesting deactivation of cache has been received, but destaging to DASD has failed.</td>
</tr>
</tbody>
</table>
### Table 121. Fields in the Cache Subsystem Activity Report - Subsystem Status (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-VOLATILE STORAGE</td>
<td>Overall status of the non-volatile storage (NVS).</td>
</tr>
<tr>
<td></td>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td></td>
<td>NVS is online and usable.</td>
</tr>
<tr>
<td></td>
<td><strong>PENDING DUE TO ERROR</strong></td>
</tr>
<tr>
<td></td>
<td>A command requesting deactivation of NVS has been received but transfer</td>
</tr>
<tr>
<td></td>
<td>from NVS to DASD has failed.</td>
</tr>
<tr>
<td></td>
<td><strong>DEACTIVATION IN PROCESS</strong></td>
</tr>
<tr>
<td></td>
<td>A command requesting deactivation of NVS has been received, and</td>
</tr>
<tr>
<td></td>
<td>destaging to DASD is still in progress.</td>
</tr>
<tr>
<td></td>
<td><strong>DISABLED FOR MAINTENANCE</strong></td>
</tr>
<tr>
<td></td>
<td>NVS has been disabled for maintenance by the support facility.</td>
</tr>
<tr>
<td></td>
<td><strong>INTERNAL ERROR TERMINATION</strong></td>
</tr>
<tr>
<td></td>
<td>An internal error caused termination of NVS.</td>
</tr>
<tr>
<td></td>
<td><strong>EXPLICIT HOST TERMINATION</strong></td>
</tr>
<tr>
<td></td>
<td>NVS has been deactivated by request from host system or support facility.</td>
</tr>
<tr>
<td></td>
<td><strong>DASD FAST WRITE INHIBITED</strong></td>
</tr>
<tr>
<td></td>
<td>DASD FAST WRITE is inhibited because the battery is defective.</td>
</tr>
<tr>
<td>CACHE FAST WRITE</td>
<td>Status of the CACHE FAST WRITE (CFW) option.</td>
</tr>
<tr>
<td></td>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td></td>
<td>CFW is active.</td>
</tr>
<tr>
<td></td>
<td><strong>DEACTIVATED</strong></td>
</tr>
<tr>
<td></td>
<td>CWF is deactivated.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> CFW does not use NVS.</td>
</tr>
<tr>
<td>IML DEVICE AVAILABLE</td>
<td>Status of the IML device.</td>
</tr>
<tr>
<td></td>
<td><strong>NO</strong></td>
</tr>
<tr>
<td></td>
<td>Device containing a diskette drive for loading the microcode is not</td>
</tr>
<tr>
<td></td>
<td>available.</td>
</tr>
<tr>
<td></td>
<td><strong>YES</strong></td>
</tr>
<tr>
<td></td>
<td>Device is operational.</td>
</tr>
</tbody>
</table>

### Table 122. Fields in the Cache Subsystem Activity Report - Subsystem Overview

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL I/O</td>
<td>Total number of I/O requests to cached devices in the storage subsystem.</td>
</tr>
<tr>
<td>TOTAL H/R</td>
<td>Ratio of I/Os that were processed within the cache (cache hits) based on the total number of I/Os.</td>
</tr>
<tr>
<td>CACHE I/O</td>
<td>Total number of cacheable I/O requests to cached devices in the storage subsystem. This value excludes INHIBIT CACHE LOAD and CACHE BYPASS I/O requests.</td>
</tr>
<tr>
<td>CACHE H/R</td>
<td>Ratio of I/Os that were processed within the cache (cache hits) based on the total number of cacheable I/O requests.</td>
</tr>
<tr>
<td>CACHE OFFLINE</td>
<td>Total number of I/O requests to non-cached devices in the storage subsystem.</td>
</tr>
<tr>
<td>CACHE I/O REQUEST - The channel command DEFINE EXTENT specifies the way the cache will be used. There are three categories (NORMAL, SEQUENTIAL, CFW DATA) and a TOTAL value:</td>
<td></td>
</tr>
<tr>
<td>NORMAL</td>
<td>Cache will be managed by <em>least-recently-used</em> (LRU) algorithm for making cache space available.</td>
</tr>
<tr>
<td>SEQUENTIAL</td>
<td>Tracks following the track assigned in the current CCW chain are promoted. They will be transferred from DASD to cache in anticipation of a short-term requirement.</td>
</tr>
<tr>
<td>CFW DATA</td>
<td>WRITE and READ-AFTER-WRITE requests are processed in cache. The data might not be written to DASD. Because CFW does not use the NVS, the application is responsible for restoring the data after a cache or subsystem failure.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>This is either the sum of I/O requests, the total I/O rate, or the average hit ratio for the three categories described above.</td>
</tr>
</tbody>
</table>
Table 122. Fields in the Cache Subsystem Activity Report - Subsystem Overview (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>READ I/O REQUESTS</strong></td>
<td>Cache I/O requests that searched or read data from DASD. This is the number of channel operations that had at least one SEARCH or READ command but no WRITE commands. This is counted for cached devices only.</td>
</tr>
<tr>
<td>COUNT</td>
<td>Total number of SEARCH/READ requests.</td>
</tr>
<tr>
<td>HITS</td>
<td>Number of SEARCH/READ requests that completed without accessing the DASD.</td>
</tr>
<tr>
<td>H/R</td>
<td>Hit Ratio - number of SEARCH/READ hits compared to the total number of SEARCH/READ requests.</td>
</tr>
<tr>
<td><strong>WRITE I/O REQUESTS</strong></td>
<td>Cache I/O requests that wrote data to DASD. This is the number of channel commands that had at least one WRITE command. It is counted for cached devices only.</td>
</tr>
<tr>
<td>COUNT</td>
<td>Total number of WRITE requests.</td>
</tr>
<tr>
<td>FAST</td>
<td>Total number of DASD/CACHE FAST WRITE requests.</td>
</tr>
<tr>
<td>HITS</td>
<td>Number of DASD/CACHE FAST WRITE requests that completed without accessing the DASD (fast write hit).</td>
</tr>
<tr>
<td>H/R</td>
<td>Number of DASD/CACHE FAST WRITE hits compared to the sum of all READ and WRITE requests (excluding ICL and BYPASS).</td>
</tr>
<tr>
<td>%READ</td>
<td>Percentage of READ requests compared to the sum of all READ and WRITE requests (excluding ICL and BYPASS).</td>
</tr>
<tr>
<td><strong>CACHE MISSES</strong></td>
<td>Cache misses are calculated as the difference between total I/O requests and the number of cache hits. They are shown for normal, sequential, and CFW requests.</td>
</tr>
<tr>
<td>READ</td>
<td>Number of SEARCH/READ requests that needed access to DASD because the data could not be found in the cache.</td>
</tr>
<tr>
<td>WRITE</td>
<td>Number of WRITE requests that needed access to DASD because the data could not be found in the cache.</td>
</tr>
<tr>
<td>TRACKS</td>
<td>Number of tracks transferred from DASD to cache.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Total number of I/O requests that needed access to DASD because the data could not be found in the cache.</td>
</tr>
<tr>
<td><strong>MISC</strong> - Miscellaneous cache activities</td>
<td></td>
</tr>
<tr>
<td>DFW BYPASS</td>
<td>Number of DASD FAST WRITE requests that would have resulted in a DFW hit; however, NVS was overutilized causing writes to be sent directly to DASD. This value is also known as DFW RETRY.</td>
</tr>
<tr>
<td>CFW BYPASS</td>
<td>Number of operations that did not transfer a track from DASD into cache because no free segments were available. If no free segments are available in cache, there is no destaging in favor of I/O requests with the CACHE FAST WRITE attribute. The I/O goes directly to the DASD.</td>
</tr>
<tr>
<td>DFW INHIBIT</td>
<td>If DASD FAST WRITE is active, this is the number of WRITE requests that inhibited DASD FAST WRITE. If DASD FAST WRITE is inactive, this is the number of WRITE requests that directly accessed the DASD, even with DASD FAST WRITE turned on.</td>
</tr>
<tr>
<td>ASYNC</td>
<td>Number of tracks transferred from cache to DASD asynchronously to transfer from the channel to release space in the cache and the NVS. For a duplex pair, this is the count of transfers from the cache to the secondary device of a duplex pair. Transfers from the cache to the primary device of a duplex pair are not counted. A high number of ASYNC I/Os is an indicator for an over-committed cache or NVS.</td>
</tr>
<tr>
<td>NON-CACHE I/O - READ requests that switched off cache processing.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 122. Fields in the Cache Subsystem Activity Report - Subsystem Overview (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICL</strong></td>
<td>Inhibit cache load. Number of I/O requests that inhibited load of data into cache although the data was not found in the cache. <strong>Note:</strong> If the data had been in the cache, it would have been counted as cache hit. Therefore, this is actually the number of ICL misses.</td>
</tr>
<tr>
<td><strong>BYPASS</strong></td>
<td>Number of I/O requests that explicitly bypassed the cache, irrespective of whether the data is in the cache or not.</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>Total number of I/O requests that bypassed the cache.</td>
</tr>
</tbody>
</table>

**CKD STATISTICS** - CKD (Count-Key-Data) is a format used to store data on DASD. The counts shown in this section are contained in the total write count.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WRITES</strong></td>
<td>Number of write I/O requests in CKD format.</td>
</tr>
<tr>
<td><strong>WRITE HITS</strong></td>
<td>Number of write I/O requests in CKD format that could be resolved in the cache.</td>
</tr>
</tbody>
</table>

**RECORD CACHING** - Record caching is done dynamically upon a decision made by DCME or the microcode. It may improve overall cache performance if caching of whole tracks would waste cache storage. The decision is based on the number of I/Os, the hit ratio, and the locality of reference of a certain entity of data.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>READ MISSES</strong></td>
<td>Number of instances in which a record requested for READ was not found in the cache, and access to DASD was required.</td>
</tr>
<tr>
<td><strong>WRITE PROM</strong></td>
<td>Number of instances in which a record requested for WRITE was found in the cache, and access to DASD was not required.</td>
</tr>
</tbody>
</table>

**HOST ADAPTER ACTIVITY**[^1] - I/O activity of normal, sequential and CFW read and write requests.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BYTES/REQ</strong></td>
<td>The average number of transferred bytes per read and write request.</td>
</tr>
<tr>
<td><strong>BYTES/SEC</strong></td>
<td>The average number of transferred bytes per second for read and write requests.</td>
</tr>
</tbody>
</table>

**DISK ACTIVITY**[^1] - Transfer activity from hard disk to cache and vice versa.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESP TIME</strong></td>
<td>Response time in milliseconds per read and write request.</td>
</tr>
<tr>
<td><strong>BYTES/REQ</strong></td>
<td>The average number of transferred bytes per read and write request.</td>
</tr>
<tr>
<td><strong>BYTES/SEC</strong></td>
<td>The average number of transferred bytes per second for read and write requests.</td>
</tr>
</tbody>
</table>

[^1]: available for the IBM TotalStorage DS family

**Duration reports**: An asterisk behind a status field or the field VOLUME SERIAL indicates that the contents of the field has changed during the duration interval.

### Cache subsystem device overview and RAID rank activity

The first section lists all the devices in the subsystem. Each line shows the most important statistics for the device it represents. The I/O rate is divided into two groups (cache hits and DASD I/O), showing the different types of I/O activity in each group.

A RAID rank is a set of physical volumes. Several logical volumes as well as parallel access volumes are associated with a single RAID rank. Such a subsystem consists of multiple RAID ranks. If several higher utilized logical volumes are mapped to the same RAID rank, DASD skew is likely to appear. Knowing which logical volumes are associated to a certain RAID rank allows the storage administrator to move logical volumes from one RAID rank to another and thus optimally balance the load on the RAID ranks.

The RAID Rank Activity section in this report only appears for each 2105 subsystem. For 2107 subsystems, RAID rank activity is measured in the ESS Statistics report. The RAID Rank Activity section provides information about each RAID rank belonging to the subsystem. It shows the physical characteristics of a RAID rank, the details for READ and WRITE requests, and lists the volumes with the highest activity.
### Table 123. Fields in the Cache Subsystem Activity Report - Device Overview

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLUME SERIAL</td>
<td>*ALL: All volumes belonging to the reported storage subsystem. *CACHE-OFF: All non-cached volumes. *CACHE: All cached volumes. For all other lines: Volume serial number.</td>
</tr>
<tr>
<td>DEV NUM</td>
<td>Device number.</td>
</tr>
<tr>
<td>RRID or XTNT POOL</td>
<td>RRID is displayed for 2105 subsystems and is the RAID rank identifier. XTNT POOL is displayed for 2107 subsystems and is the extent pool identifier.</td>
</tr>
<tr>
<td>% I/O</td>
<td>Percentage of I/O requests to this volume or category, compared to the total number of I/O requests sent to the subsystem.</td>
</tr>
<tr>
<td>I/O RATE</td>
<td>Number of I/O requests per second during the reporting interval.</td>
</tr>
<tr>
<td>CACHE HIT RATE - I/O rate</td>
<td>Rate of all cache hits.</td>
</tr>
<tr>
<td>READ</td>
<td>Rate of SEARCH/READ requests that completed without accessing the DASD.</td>
</tr>
<tr>
<td>DFW</td>
<td>Rate of DFW requests.</td>
</tr>
<tr>
<td>CFW</td>
<td>Rate of WRITE and READ-AFTER-WRITE requests that are processed in cache.</td>
</tr>
<tr>
<td>DASD I/O RATE - I/O rate of all requests that accessed DASD.</td>
<td></td>
</tr>
<tr>
<td>STAGE</td>
<td>Rate of normal or sequential I/O requests that accessed DASD.</td>
</tr>
<tr>
<td>DFWBP</td>
<td>Rate of requests that caused DFW BYPASS.</td>
</tr>
<tr>
<td>ICL</td>
<td>Rate of Inhibit cache load requests.</td>
</tr>
</tbody>
</table>
Table 123. Fields in the Cache Subsystem Activity Report - Device Overview (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYP</td>
<td>Rate of requests that explicitly bypassed the cache, irrespective of whether the data was in the cache or not.</td>
</tr>
<tr>
<td>OTHER</td>
<td>Rate of CFW BYPASS and DFW INHIBIT requests.</td>
</tr>
<tr>
<td>ASYNC RATE</td>
<td>Number of I/Os per second that caused asynchronous transfer from cache to DASD (destaging).</td>
</tr>
<tr>
<td>TOTAL H/R</td>
<td>Ratio of I/O requests that were processed within the cache (cache hits) to the total number of I/Os.</td>
</tr>
<tr>
<td>READ H/R</td>
<td>Number of READ request hits compared to all READ requests (excluding ICL and BYPASS).</td>
</tr>
<tr>
<td>WRITE H/R</td>
<td>Number of WRITE request hits compared to all WRITE requests (excluding ICL and BYPASS).</td>
</tr>
<tr>
<td>% READ</td>
<td>Percentage of READ requests compared to all READ and WRITE requests.</td>
</tr>
</tbody>
</table>

Table 124. Fields in the Cache Subsystem Activity Report - RAID Rank Activity

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>RAID rank ID. *ALL is shown for the summary of all RAID ranks.</td>
</tr>
<tr>
<td>RAID TYPE</td>
<td>RAID rank type.</td>
</tr>
<tr>
<td>DA</td>
<td>Device adapter ID.</td>
</tr>
<tr>
<td>HDD</td>
<td>Number of hard disk drives in the RAID rank.</td>
</tr>
<tr>
<td>READ and WRITE Requests</td>
<td></td>
</tr>
<tr>
<td>RATE</td>
<td>Number of I/O requests per second.</td>
</tr>
<tr>
<td>AVG MB</td>
<td>Average number of megabytes transferred per I/O request.</td>
</tr>
<tr>
<td>MB/S</td>
<td>Bandwidth of the I/O requests.</td>
</tr>
<tr>
<td>RTIME</td>
<td>Average response time of an HDD I/O request (milliseconds). These HDD requests could be I/Os due to READ misses, sequential prestages, destages, and copy services.</td>
</tr>
</tbody>
</table>

Device-level reporting

**Cache device status**

This section of the report presents the cache status of the device and the duplex pair.

**Cache device activity**

The second section of the report contains the same type of information as the Cache Subsystem Overview section, but for only one device. The field contents are explained in Table 122 on page 297.
**Note**: In the header of the Cache Device Activity Report, RRID shown for 2105 subsystems is the RAID rank identifier. EXTENT POOL shown for 2107 subsystems is the extent pool identifier.

**Table 125. Fields in the Cache Subsystem Activity Report - Cache Device Status**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACHE STATUS</td>
<td>Status of the cache from the perspective of the device being reported.</td>
</tr>
<tr>
<td>CACHING</td>
<td>Caching status of the device.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Caching is active; requests to the reported device can be processed without DASD access.</td>
</tr>
<tr>
<td>DEACTIVATE PENDING</td>
<td>Cache has been deactivated on request from host system or support facility, but transfer of modified data to DASD has failed.</td>
</tr>
<tr>
<td>DEACTIVATED</td>
<td>Caching has been deactivated for the reported device.</td>
</tr>
</tbody>
</table>
### Table 125. Fields in the Cache Subsystem Activity Report - Cache Device Status (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DASD FAST WRITE</td>
<td>Status of the DASD FAST WRITE option.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>DASD FAST WRITE requests can be processed for this device.</td>
</tr>
<tr>
<td>DEACTIVATION PENDING</td>
<td>DASD FAST WRITE has been terminated on request by host system or support facility, but transfer of modified data to DASD is in progress or has failed.</td>
</tr>
<tr>
<td>DEACTIVATED</td>
<td>DASD FAST WRITE requests are ignored for this device.</td>
</tr>
<tr>
<td>PINNED DATA</td>
<td>A device has failed, and data that has not yet been written to DASD is pinned in cache or NVS for later recovery.</td>
</tr>
<tr>
<td>NONE</td>
<td>No data is pinned for the reported device.</td>
</tr>
<tr>
<td>EXISTS, DFW NOT SUSPENDED</td>
<td>Pinned data exists, but DASD FAST WRITE has not been suspended.</td>
</tr>
<tr>
<td>EXISTS, DFW SUSPENDED</td>
<td>Pinned data exists, and DASD FAST WRITE has been suspended.</td>
</tr>
<tr>
<td>DUPLEX PAIR STATUS - A duplex pair of devices can be established, to ensure a maximum of data security. During normal processing, all I/O requests are made on behalf of the primary device. Data is written to the primary device, either directly or via cache. In either case, the control unit ensures that the data is copied to the secondary device. This happens asynchronously to the transfer from the channel.</td>
<td></td>
</tr>
<tr>
<td>DUPLEX PAIR</td>
<td>Overall dual copy status.</td>
</tr>
<tr>
<td>NOT ESTABLISHED</td>
<td>The device is configured as a simplex device.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>The device reported is either the primary or the secondary device of a duplex pair.</td>
</tr>
<tr>
<td>PENDING</td>
<td>The control unit copies data to establish the duplex pair to which the reported device belongs.</td>
</tr>
<tr>
<td>SUSPENDED</td>
<td>An error in one device of the duplex pair caused the duplex pair to be suspended.</td>
</tr>
<tr>
<td>STATUS</td>
<td>The status of this device as part of a duplex pair.</td>
</tr>
<tr>
<td>PRIMARY</td>
<td>The device is the primary device of the duplex pair. All channel operations are associated with this device.</td>
</tr>
<tr>
<td>SECONDARY</td>
<td>The device is the secondary device of the duplex pair. No regular I/O is possible to this device. I/O operations to the primary device are duplexed to this device by the control unit.</td>
</tr>
<tr>
<td>N/A</td>
<td>The device has not been established as part of a duplex pair.</td>
</tr>
<tr>
<td>DUAL COPY VOLUME</td>
<td>Identification of the other device of a duplex pair.</td>
</tr>
<tr>
<td>nnnn</td>
<td>Device address of the other device of the duplex pair, if a duplex pair is established.</td>
</tr>
<tr>
<td>N/A</td>
<td>The device has not been established as part of a duplex pair.</td>
</tr>
</tbody>
</table>

The report contains less information for devices which had the cache offline at the end of the interval.
Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following table shows the overview condition names for the Overview report.

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Subsystem Report</th>
<th>Device Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsystem Status / Device Status.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CACHING</td>
<td>CASSC</td>
<td>CADSC</td>
</tr>
<tr>
<td>NON-VOLATILE STORAGE</td>
<td>CASSNVS</td>
<td></td>
</tr>
<tr>
<td>Subsystem Overview / Device Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL I/O</td>
<td>CASTOT</td>
<td>CADTOT</td>
</tr>
<tr>
<td>CACHE I/O</td>
<td>CASCTOT</td>
<td>CADCTOT</td>
</tr>
<tr>
<td>CACHE OFFLINE</td>
<td>CASCOFF</td>
<td></td>
</tr>
<tr>
<td>TOTAL H/R</td>
<td>CASHRT</td>
<td>CADHRT</td>
</tr>
<tr>
<td>CACHE H/R</td>
<td>CASHR</td>
<td>CADHR</td>
</tr>
<tr>
<td>READ I/O REQUESTS RATE NORMAL</td>
<td>CASRN</td>
<td>CADRN</td>
</tr>
<tr>
<td>READ I/O REQUESTS RATE SEQUENTIAL</td>
<td>CASRS</td>
<td>CADRS</td>
</tr>
<tr>
<td>READ I/O REQUESTS RATE CFW DATA</td>
<td>CASRC</td>
<td>CADRC</td>
</tr>
<tr>
<td>READ I/O REQUESTS RATE TOTAL</td>
<td>CASRT</td>
<td>CADRT</td>
</tr>
<tr>
<td>READ I/O REQUESTS HITS RATE NORMAL</td>
<td>CASRHN</td>
<td>CADRHN</td>
</tr>
<tr>
<td>READ I/O REQUESTS HITS RATE SEQUENTIAL</td>
<td>CASRHS</td>
<td>CADRHS</td>
</tr>
<tr>
<td>READ I/O REQUESTS HITS RATE CFW DATA</td>
<td>CASRHC</td>
<td>CADRHC</td>
</tr>
<tr>
<td>READ I/O REQUESTS HITS RATE TOTAL</td>
<td>CASRHT</td>
<td>CADRHT</td>
</tr>
<tr>
<td>READ I/O REQUESTS H/R NORMAL</td>
<td>CASRHRN</td>
<td>CADRHRN</td>
</tr>
<tr>
<td>READ I/O REQUESTS H/R SEQUENTIAL</td>
<td>CASRHRS</td>
<td>CADRHRHS</td>
</tr>
<tr>
<td>READ I/O REQUESTS H/R CFW DATA</td>
<td>CASRHRHC</td>
<td>CADRHRHC</td>
</tr>
</tbody>
</table>
Table 126. Overview names in the Cache Subsystem Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Subsystem Report</th>
<th>Device Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>READ I/O REQUESTS H/R TOTAL</td>
<td>CASRHRRT</td>
<td>CADRHRRT</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS H/R NORMAL</td>
<td>CASWN</td>
<td>CADWN</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS RATE SEQUENTIAL</td>
<td>CASWS</td>
<td>CADWS</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS RATE CFW DATA</td>
<td>CASWC</td>
<td>CADWC</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS RATE TOTAL</td>
<td>CASWT</td>
<td>CADWT</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS FAST WRITE RATE NORMAL</td>
<td>CASWFN</td>
<td>CADWFN</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS FAST WRITE RATE SEQUENTIAL</td>
<td>CASWFS</td>
<td>CADWFS</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS FAST WRITE RATE CFW DATA</td>
<td>CASWFC</td>
<td>CADWFC</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS FAST WRITE RATE TOTAL</td>
<td>CASWFT</td>
<td>CADWFT</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS HITS RATE NORMAL</td>
<td>CASWHN</td>
<td>CADWHN</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS HITS RATE SEQUENTIAL</td>
<td>CASWHS</td>
<td>CADWHS</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS HITS RATE CFW DATA</td>
<td>CASWHC</td>
<td>CADWHC</td>
</tr>
<tr>
<td>WRITE I/O REQUESTS HITS RATE TOTAL</td>
<td>CASWHT</td>
<td>CADWHT</td>
</tr>
<tr>
<td>% READ NORMAL</td>
<td>CASRWN</td>
<td>CADRWN</td>
</tr>
<tr>
<td>% READ SEQUENTIAL</td>
<td>CASRWS</td>
<td>CADRWS</td>
</tr>
<tr>
<td>% READ CFW DATA</td>
<td>CASRWC</td>
<td>CADRWC</td>
</tr>
<tr>
<td>% READ TOTAL</td>
<td>CASRWT</td>
<td>CADRWT</td>
</tr>
<tr>
<td>CACHE MISSES READ RATE NORMAL</td>
<td>CASMRN</td>
<td>CADMRN</td>
</tr>
<tr>
<td>CACHE MISSES READ RATE SEQUENTIAL</td>
<td>CASMRS</td>
<td>CADMRS</td>
</tr>
<tr>
<td>CACHE MISSES READ RATE CFW DATA</td>
<td>CASMRC</td>
<td>CADMRC</td>
</tr>
<tr>
<td>CACHE MISSES WRITE RATE NORMAL</td>
<td>CASMWN</td>
<td>CADMWN</td>
</tr>
<tr>
<td>CACHE MISSES WRITE RATE SEQUENTIAL</td>
<td>CASMWS</td>
<td>CADMWS</td>
</tr>
<tr>
<td>CACHE MISSES WRITE RATE CFW DATA</td>
<td>CASMWC</td>
<td>CADMWC</td>
</tr>
<tr>
<td>CACHE MISSES TRACKS RATE NORMAL</td>
<td>CASMTN</td>
<td>CADMTN</td>
</tr>
<tr>
<td>CACHE MISSES TRACKS RATE SEQUENTIAL</td>
<td>CASMTS</td>
<td>CADMTS</td>
</tr>
<tr>
<td>CACHE MISSES RATE TOTAL</td>
<td>CASMT</td>
<td>CADMT</td>
</tr>
<tr>
<td>MISC (Miscellaneous) DFW BYPASS RATE</td>
<td>CASDFWB</td>
<td>CADDFFWB</td>
</tr>
<tr>
<td>MISC (Miscellaneous) CFW BYPASS RATE</td>
<td>CASCFWB</td>
<td>CADCFFWB</td>
</tr>
<tr>
<td>MISC (Miscellaneous) DFW INHIBIT RATE</td>
<td>CASDFWI</td>
<td>CADDFFWI</td>
</tr>
<tr>
<td>MISC (Miscellaneous) ASYNC(TRKS) RATE</td>
<td>CASASYNC</td>
<td>CADDASYNC</td>
</tr>
<tr>
<td>NON CACHE I/O ICL RATE</td>
<td>CASNCICL</td>
<td>CADNCICL</td>
</tr>
<tr>
<td>NON CACHE I/O BYPASS RATE</td>
<td>CASNCB</td>
<td>CADNCB</td>
</tr>
<tr>
<td>NON CACHE I/O TOTAL RATE</td>
<td>CASNCT</td>
<td>CADNCT</td>
</tr>
<tr>
<td>HOST ADAPTER ACTIVITY BYTES/REQ READ</td>
<td>CASBRR</td>
<td>CADBRR</td>
</tr>
</tbody>
</table>
Table 126. Overview names in the Cache Subsystem Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Subsystem Report</th>
<th>Device Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOST ADAPTER ACTIVITY BYTES/SEC READ</td>
<td>CASBRS</td>
<td>CADBRS</td>
</tr>
<tr>
<td>HOST ADAPTER ACTIVITY BYTES/REQ WRITE</td>
<td>CASBWR</td>
<td>CADBWR</td>
</tr>
<tr>
<td>HOST ADAPTER ACTIVITY BYTES/SEC WRITE</td>
<td>CASBWS</td>
<td>CADBWS</td>
</tr>
<tr>
<td>DISK ACTIVITY RESP TIME READ</td>
<td>CASDRRT</td>
<td>CADDRT</td>
</tr>
<tr>
<td>DISK ACTIVITY BYTES/REQ READ</td>
<td>CASDRBR</td>
<td>CADDDBR</td>
</tr>
<tr>
<td>DISK ACTIVITY BYTES/SEC READ</td>
<td>CASDRTS</td>
<td>CADDRTS</td>
</tr>
<tr>
<td>DISK ACTIVITY RESP TIME WRITE</td>
<td>CASDWRT</td>
<td>CADDWRT</td>
</tr>
<tr>
<td>DISK ACTIVITY BYTES/REQ WRITE</td>
<td>CASDWBR</td>
<td>CADDWBR</td>
</tr>
<tr>
<td>DISK ACTIVITY BYTES/SEC WRITE</td>
<td>CASDWBS</td>
<td>CADDWBS</td>
</tr>
</tbody>
</table>

Subsystem Device Overview

| I/O RATE (volser)                                     | CADT             |
| I/O RATE (*ALL)                                        | CASAT            |
| I/O RATE (*CACHE)                                      | CASCT            |
| I/O RATE (*CACHE-OFF)                                  | CASOT            |
| DASD I/O RATE STAGE (volser)                           | CADSTG           |
| DASD I/O RATE STAGE (*ALL)                             | CASASTG          |
| DASD I/O RATE STAGE (*CACHE)                            | CASCSTG          |
| % I/O (*CACHE-OFF)                                     | CASCOIO          |
| RAID RANK READ REQ RATE                                | CARRRT           |
| RAID RANK READ REQ AVG MB                              | CARRMB           |
| RAID RANK READ REQ MB/S                                | CARRMBBS         |
| RAID RANK READ REQ RTE TIME                            | CARRRTIM         |
| RAID RANK WRITE REQ RATE                               | CARWRT           |
| RAID RANK WRITE REQ AVG MB                              | CARWMB           |
| RAID RANK WRITE REQ MB/S                                | CARWMBS          |
| RAID RANK WRITE REQ RTE TIME                            | CARWRTIM         |

**CF - Coupling Facility Activity report**

A Coupling Facility Activity report is produced for each coupling facility attached to the sysplex. It provides the following information:
- Coupling Facility usage summary
- Coupling Facility structure activity
- Subchannel activity
- CF to CF activity

**How to request this report**

Monitor III gathers data for this report automatically. If you want to suppress gathering, you have to disable writing SMF record type 74.4.

To produce this report, specify

SYSRPTS(CF)
How to work with Postprocessor XML reports in the z/OS RMF User's Guide provides all required information on how to produce and view XML reports.

Example URL for the DDS API:

Contents of the report
A Coupling Facility Activity report is produced for each coupling facility attached to the sysplex. Figure 174 on page 308 gives an example of the overall structure of the Coupling Facility Activity report. It shows the sequencing of the report sections:
• Coupling Facility Usage Summary
• Coupling Facility Structure Activity
• Subchannel Activity
• CF to CF Activity

For a complete Coupling Facility Activity report, it is recommended to combine data from all of the systems in the sysplex. If data from one or more systems is missing, the Structure and Subchannel Activity sections of the report are incomplete. In addition, the PRIM (primary) and SEC (secondary) indicators of duplexed structures might be missing in the Usage Summary section because this information is gathered only on one member of the sysplex (sysplex master gathering).
Coupling Facility Usage Summary section
This section of the Coupling Facility Activity report gives a snapshot of coupling facility storage usage at the end of the reporting interval. It lists all the structures occupying space either in the coupling facility real storage or in storage class memory (SCM), including those with no currently active connections. All structure summary data is grouped in the report by structure type (LIST, LOCK, CACHE and UNKN in that order). Within the structure type, the report lines are in alphanumeric order by structure name. This ordering puts the structure data in the same relative position across interval reports.
The report summarizes request activity for active structures. This activity is described in more detail in the Coupling Facility Structure Activity section of the report. It is included in this report to give the customer a quick view of the relative amount of activity among the structures in a coupling facility.

The following table explains the field headings in the Coupling Facility Usage Summary section.
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL SAMPLES (AVG), (MAX), (MIN)</td>
<td>Average (AVG), the maximum (MAX) and minimum (MIN) sample count for all systems connected to this coupling facility.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Indicates whether the structure is a list, lock, or cache structure. The structures being reported are grouped by structure type. UNKN indicates a structure for which there was no activity during the interval but that is still allocated in the coupling facility. There are no structure activity details for UNKN structures.</td>
</tr>
<tr>
<td>STRUCTURE NAME</td>
<td>The name given to the structure by the coupling facility policy specification in the Function Couple Data Set. It is up to 16 characters and is unique within a sysplex.</td>
</tr>
<tr>
<td>STATUS</td>
<td>Indicates status of the structure at the end of the interval: ACTIVE At least one system is connected to the structure. If a structure became active during this interval, the report gives the partial interval activity data. In the unlikely event a structure becomes active several times during an interval, only the last activation is reported. ACTIVE PRIM The structure is the rebuilt-old (primary) structure in a duplexing rebuild process. ACTIVE SEC The structure is the rebuilt-new (secondary) structure in a duplexing rebuild process. INACTV No system is connected to the structure but it still occupies storage in the coupling facility. The structure will not show any request activity because RMF was unable to gather end-of-interval data for calculating delta values. A structure is inactive while it is undergoing recovery operations or being moved to another coupling facility, or it was specified by the owning subsystem as a persistent structure. There are no structure activity details for an inactive structure. UNALLOC No system is connected to the structure and it no longer occupies storage in the coupling facility. The structure was active earlier in the interval but no activity data is shown because RMF was unable to collect end-of-interval data for calculating delta values. There are no structure activity details reported for an unallocated structure. Note: The PRIM and SEC indicators of duplexed structures might not appear if data from one or more systems in the sysplex is missing.</td>
</tr>
<tr>
<td>CHG</td>
<td>X indicates that the status of this structure changed during the reporting interval.</td>
</tr>
<tr>
<td>ALLOC SIZE</td>
<td>The number of bytes set aside in the coupling facility for this structure by the coupling facility policy in the Function Couple Data Set. Storage is allocated in increments of 4K bytes. This storage consists of both control and data storage.</td>
</tr>
<tr>
<td>% OF CF STOR</td>
<td>The percentage of the total coupling facility storage allocated to this structure.</td>
</tr>
<tr>
<td># REQ</td>
<td>The number of requests processed by the coupling facility against this structure. This is the same number as appears in the TOTAL line of the Coupling Facility Structure Activity report.</td>
</tr>
<tr>
<td>% OF ALL REQ</td>
<td>The percentage of all requests attributable to this structure. Use this field for a quick idea of where the activity occurred during the interval.</td>
</tr>
<tr>
<td>% OF CF UTIL</td>
<td>The percentage of CF processor time used by the structure. The structure execution time is related to the total CF-wide processor busy time. The sum of the values in this column is less than 100%, because not all CF processor time is attributable to structures. 4/4 is shown in this field if the CF level is lower than 15.</td>
</tr>
<tr>
<td>AVG REQ/SEC</td>
<td>The average number of requests per second for this structure.</td>
</tr>
</tbody>
</table>

Table 127. Fields in the Coupling Facility Activity Report - Usage Summary
Table 127. Fields in the Coupling Facility Activity Report - Usage Summary (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>LST/DIR ENTRIES</td>
<td></td>
</tr>
<tr>
<td>TOT</td>
<td>Maximum number of list or directory entries that can reside in coupling facility real storage for the structure.</td>
</tr>
<tr>
<td>CUR</td>
<td>Number of structure list or directory entries which are currently in use and reside in coupling facility real storage.</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A in this and the following fields indicates that the information is not applicable.</td>
</tr>
<tr>
<td>DATA ELEMENTS</td>
<td></td>
</tr>
<tr>
<td>TOT</td>
<td>Maximum number of list elements that can reside in coupling facility real storage.</td>
</tr>
<tr>
<td>CUR</td>
<td>Number of structure list elements which are currently in use and reside in coupling facility real storage.</td>
</tr>
<tr>
<td>LOCK ENTRIES</td>
<td></td>
</tr>
<tr>
<td>TOT</td>
<td>The total number of lock table entries.</td>
</tr>
<tr>
<td>CUR</td>
<td>The non-zero lock table count found.</td>
</tr>
<tr>
<td>DIR REC/DIR REC XS</td>
<td>Number of Cache directory reclaims.</td>
</tr>
<tr>
<td>Directory reclaims occur when the total number of used unique entities exceeds the total number of directories. Whenever this shortage of directory entries occurs, the coupling facility will reclaim in-use directory entries associated with unchanged data. All users of that data must be notified that their copy of the data is invalid. As a consequence, it may happen that this data must be re-read from DASD and registered to the coupling facility again. Directory reclaim activity can be avoided by increasing the directory entries for a particular structure. The second value is the number of reclaims that caused an XI (see XI field in the Structure Activity section). A high value is an indicator for a performance problem in this structure.</td>
<td></td>
</tr>
<tr>
<td>SCM STRUCTURE SUMMARY^2</td>
<td></td>
</tr>
<tr>
<td>TYPE</td>
<td>Indicates whether the structure is a list, lock or cache structure. The structures being reported are grouped by structure type.</td>
</tr>
<tr>
<td>STRUCTURE NAME</td>
<td>The name given to the structure by the coupling facility policy specification in the Function Couple Data Set. It is up to 16 characters long and is unique within the sysplex.</td>
</tr>
<tr>
<td>ALG</td>
<td>Type of algorithm that is used by the coupling facility to control the movement of structure objects between coupling facility real storage and storage class memory:</td>
</tr>
<tr>
<td>KPI</td>
<td>KeyPriority1</td>
</tr>
<tr>
<td>UNK</td>
<td>Unknown</td>
</tr>
<tr>
<td>SCM SPACE</td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum amount of storage class memory that this structure can use (in bytes).</td>
</tr>
<tr>
<td>%USED</td>
<td>Percentage of maximum amount of storage class memory that is in use by this structure.</td>
</tr>
<tr>
<td>AUGMENTED</td>
<td></td>
</tr>
<tr>
<td>EST.MAX</td>
<td>Estimated maximum amount of CF space that may be assigned as augmented space for this structure (in bytes).</td>
</tr>
<tr>
<td>%USED</td>
<td>Percentage of maximum augmented space that is in use by this structure.</td>
</tr>
<tr>
<td>LST ENTRY</td>
<td></td>
</tr>
<tr>
<td>EST.MAX</td>
<td>Estimated maximum number of list entries that may reside in storage class memory for this structure.</td>
</tr>
<tr>
<td>CUR</td>
<td>Number of existing structure list entries that reside in storage class memory.</td>
</tr>
</tbody>
</table>
### Table 127. Fields in the Coupling Facility Activity Report - Usage Summary (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **LST ELEM**  | EST.MAX  
Estimated maximum number of list elements that may reside in storage class memory for this structure.  
CUR  
Number of existing structure list elements that reside in storage class memory. |
| **SCM READ**  | CNT  
The number of read operations against storage class memory that were either initiated  
- by a reference to list structure objects residing in storage class memory, or  
- as a prefetch operation in order to retrieve list structure objects in storage class memory that are expected to be referenced.  
BYTE XFERRED  
SCM read bytes transferred. This is the number of bytes transferred from storage class memory to CF.  
AVG ST  
Average service time per SCM read operation to storage class memory in microseconds.  
STD_DEV  
Standard deviation of the service time for SCM read operations to storage class memory in microseconds. |
| **SCM WRITE** | CNT  
The number of list write operations performed to storage class memory.  
BYTE XFERRED  
SCM write bytes transferred. This is the number of bytes transferred from CF storage to storage class memory.  
AVG ST  
Average service time per SCM write operation to storage class memory in microseconds.  
STD_DEV  
Standard deviation of the service time for SCM write operations to storage class memory in microseconds. |
| **SCM AUX ENABLED** | CMD  
SCM auxiliary enabled command count. This is the number of commands that required the use of CF auxiliary frames.  
%ALL  
Percentage of the SCM auxiliary enabled command count in relation to all requests for this structure. |
| **DELAYED FAULTS** | CNT  
The number of commands and for multiple list-entry commands, the number of list item references that were delayed due to a fault condition resulting in a required access to storage class memory.  
%ALL  
Percentage of delayed faults in relation to all requests for the structure. |
| **STORAGE SUMMARY** | The total amount of coupling facility storage that is used by structures and the percentage of the total coupling facility storage allocated to these structures.  
These totals do not necessarily represent 100% of the facility activity for the interval. There is some amount of storage and request activity overhead that is not attributable to individual structures. For example, the total for # REQ will usually be less than the sum of the TOTAL REQ from the Subchannel Activity Report because the subchannel numbers include facility management command counts whereas the structure numbers do not.  
TOTAL CF DUMP STORAGE  
Amount and percentage of coupling facility space allocated as dump space. |
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUMP SPACE</strong></td>
<td><strong>% IN USE</strong>&lt;br&gt;The percentage of dump space in use at end of the interval. This amount is a sampled value so it is intended to show trends, not instantaneous peaks.</td>
</tr>
<tr>
<td></td>
<td><strong>MAX % REQUESTED</strong>&lt;br&gt;The maximum percentage of dump space requested since the coupling facility dump storage was allocated.</td>
</tr>
<tr>
<td></td>
<td>This high water mark is maintained by the coupling facility hardware so is reset only when dump space is reinitialized. If this percentage is over 100, it means at least one dump has been lost or truncated since the most recent allocation of dump space. If the percentage is close to or over 100, you should increase the dump space allocation by modifying the coupling facility policy for dump space and activating the modified policy.</td>
</tr>
<tr>
<td><strong>TOTAL CF AUGMENTED SPACE</strong></td>
<td><strong>ALLOC SIZE</strong>&lt;br&gt;Total amount of CF storage used by all structures as augmented space (in bytes).</td>
</tr>
<tr>
<td></td>
<td><strong>% OF CF STORAGE</strong>&lt;br&gt;Percentage of CF storage used by all structures as augmented space.</td>
</tr>
<tr>
<td><strong>TOTAL CF STORAGE AVAILABLE</strong></td>
<td>The amount and percentage of coupling facility space that is not allocated to any structure, not allocated as dump space, and not allocated as augmented space.</td>
</tr>
<tr>
<td><strong>TOTAL CF STORAGE SIZE</strong></td>
<td>The total amount of storage in the coupling facility, including both allocated and available space. This value does not include the storage required by the coupling facility code itself, so that it differs from the storage assigned to the coupling facility on the HMC.</td>
</tr>
<tr>
<td><strong>TOTAL CONTROL STORAGE DEFINED, TOTAL DATA STORAGE DEFINED, % ALLOCATED</strong></td>
<td>The amount of coupling facility storage that is allowed to be occupied by control information (CONTROL STORAGE) or data (DATA STORAGE). For each structure, plus the dump area, a certain amount of control and data storage is allocated. The coupling facility defines an area called control storage; structure control information is restricted to that area. The remaining storage is called data storage and is used for structure data. If the data storage area becomes full, structure data can then be allocated from the control storage area. If TOTAL DATA STORAGE DEFINED is zero, it means control information can reside anywhere on the coupling facility and there are no allocation restrictions. If the % ALLOCATED field for control storage shows a percentage approaching 100, it means the control storage is close to being completely allocated even though the CF SPACE AVAILABLE field may still show an amount of total free space. Possible customer actions include: • Changing structure preference lists in the coupling facility policy specification to direct some structures away from this facility. • Adding another coupling facility to the sysplex.</td>
</tr>
<tr>
<td><strong>TOTAL CF STORAGE CLASS MEMORY</strong></td>
<td><strong>ASSIGNED</strong>&lt;br&gt;Total CF storage class memory. This is the amount of storage class memory that may be concurrently used as structure extensions. Storage is assigned in increments of 4K bytes.</td>
</tr>
<tr>
<td></td>
<td><strong>% IN USE</strong>&lt;br&gt;Percentage of storage class memory that is in use by all structures of the coupling facility.</td>
</tr>
<tr>
<td></td>
<td><strong>SUM MAX SCM</strong>&lt;br&gt;Sum of the storage class memory maxima defined for all structures of the coupling facility.</td>
</tr>
<tr>
<td><strong>PROCESSOR SUMMARY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>COUPLING FACILITY</strong></td>
<td>Coupling facility processor type.</td>
</tr>
<tr>
<td><strong>MODEL</strong></td>
<td>Coupling facility processor model.</td>
</tr>
<tr>
<td><strong>CFLEVEL</strong></td>
<td>Coupling facility architected function level.</td>
</tr>
</tbody>
</table>
### Table 127. Fields in the Coupling Facility Activity Report - Usage Summary (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DYNDISP</strong>1)</td>
<td>The dynamic CF dispatching status (ON, OFF, or THIN). THIN indicates that coupling thin interrupts are enabled for the coupling facility (only for CFLEVEL 19 or higher).</td>
</tr>
<tr>
<td><strong>AVERAGE CF UTILIZATION (% BUSY)</strong></td>
<td>Average value of CPU utilizations within the coupling facility. The utilization of the individual CPs in the coupling facility is recorded in the SMF 74, Subtype 4, Processor Data Section. In case of a stand-alone coupling facility, the utilization of the individual CPs should be approximately the same. In a PR/SM environment where this CP is shared with other partitions the utilization is the logical utilization of the CP (that is, only the utilization by the coupling facility). The CPU Activity report can be used to determine the total utilization of the CP. If the average utilization is high, you can take the following actions: 1. In a PR/SM environment, you can dedicate the CP to the integrated coupling facility or assign additional CPs to the partition. 2. Move structures to a coupling facility with lower utilization. 3. Consider additional or larger coupling facilities.</td>
</tr>
<tr>
<td><strong>LOGICAL PROCESSORS DEFINED</strong></td>
<td>Number of logical processors defined for the coupling facility.</td>
</tr>
<tr>
<td><strong>LOGICAL PROCESSORS EFFECTIVE</strong></td>
<td>Number of effective available logical processors in a shared environment. This value is only useful in CFCC environment. CFCC measures the time of real command execution as well as the time waiting for work. The reported value shows the ratio of the LPAR dispatch time (CFCC execute and wait time) to the RMF interval length. For example, if a CFCC CEC contains 6 LPs, and the measured CF LPAR has two logical processors and is limited at 5 % the number of effective LPs is 0.3 Please, refer to the CPU Activity report in case of an ICMF LPAR.</td>
</tr>
<tr>
<td><strong>LOGICAL PROCESSORS SHARED</strong>1)</td>
<td>The number of shared processors defined for the coupling facility.</td>
</tr>
<tr>
<td><strong>LOGICAL PROCESSORS AVG WEIGHT</strong>1)</td>
<td>The average weight of shared processors, which is the sum of shared processor weights related to the number of shared processors.</td>
</tr>
</tbody>
</table>

1) For CFLEVEL lower than 15 this field is not displayed. 2) SCM statistics are only included in the SCM Structure Summary for those structures that can make use of the SCM storage extension and have set a non-zero maximum SCM size. If none of the structures is configured to exploit SCM, the SCM Structure Summary displays message: No storage class memory data available.

### Coupling Facility Structure Activity section

This section of the Coupling Facility Activity report has detail for each active structure in the coupling facility, including activity data for each system connected to the structure during the reporting interval.
The following table explains the field headings in the Structure Activity section.

### Table 128. Fields in the Coupling Facility Activity Report - Structure Activity

<table>
<thead>
<tr>
<th>FieldHeading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRUCTURE NAME</td>
<td>The name given to the structure by the coupling facility policy specification in the Function Couple Data Set. It is up to 16 characters and is unique within a sysplex.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Indicates whether the structure is a list, lock, or cache structure. If it is a lock structure, then the contention counts are included in the report.</td>
</tr>
<tr>
<td>STATUS</td>
<td>Indicates status of the structure at the end of the interval. For the description of possible values refer to Table 127 on page 310</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
</tr>
<tr>
<td>SYSTEM NAME</td>
<td>The system name for the system connected to the structure (from IEASYxx Parmlib member, SYSNAME parameter)</td>
</tr>
<tr>
<td></td>
<td>The name is preceded by an &quot;*&quot; if the data for this system is incomplete for this interval, for example because the gatherer has been stopped.</td>
</tr>
<tr>
<td># REQ TOTAL</td>
<td>The sum of all requests (internal and external) that utilize the subchannel. Specifically:</td>
</tr>
<tr>
<td></td>
<td>- External requests to send/receive data on behalf of a structure. The sum of synchronous and asynchronous requests completed against any structure within this coupling facility per second. This includes requests that changed from synchronous to asynchronous.</td>
</tr>
<tr>
<td></td>
<td>- Internal requests that utilize the subchannels (but are not aggregated by the structure).</td>
</tr>
<tr>
<td># REQ AVG/SEC</td>
<td>TOTAL</td>
</tr>
<tr>
<td></td>
<td>Average number of requests per second for this structure</td>
</tr>
<tr>
<td></td>
<td>This field offers a quick way of determining which systems are generating the most activity for a given structure, and indicates where to focus tuning or load balancing efforts.</td>
</tr>
<tr>
<td>REQUESTS -</td>
<td>The requests are shown in four categories described hereafter: SYNC, ASYNC, CHNGD, and SUPPR</td>
</tr>
<tr>
<td>SYNC</td>
<td>Total number of hardware operations that started and completed synchronously to the coupling facility on behalf of connectors to the structure.</td>
</tr>
<tr>
<td>ASYNC</td>
<td>Total number of hardware operations that started and completed asynchronously to the coupling facility on behalf of connectors to the structure.</td>
</tr>
<tr>
<td></td>
<td>The service time is the time for all ASYNC requests (ASYNC and CHNGD).</td>
</tr>
<tr>
<td>CHNGD</td>
<td>Total number of hardware operations that changed from synchronous to asynchronous because the operation could not be serviced as synchronous operation.</td>
</tr>
<tr>
<td></td>
<td>This field reports only those operations which were changed due to a subchannel busy condition and can be used as an indicator of a shortage of subchannel resources.</td>
</tr>
<tr>
<td></td>
<td>Conversions caused by heuristic sync/async algorithms used to optimize the coupling efficiency of workloads using the CF are not included.</td>
</tr>
<tr>
<td>SUPPR</td>
<td>Number of requests whose execution was suppressed by the coupling facility in order to avoid a potential serialization deadlock condition across a duplexed pair of structures.</td>
</tr>
<tr>
<td># REQ % OF ALL</td>
<td>The number of requests for this structure, and the percentage this represents of all requests for this structure from any system.</td>
</tr>
<tr>
<td>(valid for</td>
<td>SERVICE TIME - AVG</td>
</tr>
<tr>
<td>SYNC, ASYNC,</td>
<td>The average time in microseconds required to satisfy a coupling facility request for this structure.</td>
</tr>
<tr>
<td>CHNGD, and</td>
<td>SERVICE TIME - STD_DEV</td>
</tr>
<tr>
<td>SUPPR)</td>
<td>The standard deviation of service time for this structure.</td>
</tr>
<tr>
<td></td>
<td>Even though the average time looks acceptable, the standard deviation could be high, indicating that there is a wide fluctuation in service times for requests. In this case, analyze the coupling facility configuration for possible path or coupling facility bottlenecks in the Subchannel Activity section.</td>
</tr>
<tr>
<td>DELAYED REQUESTS -</td>
<td>These columns list possible contention reasons for requests sent to the coupling facility.</td>
</tr>
</tbody>
</table>
Table 128. Fields in the Coupling Facility Activity Report - Structure Activity (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASON</td>
<td>The reason for a delayed request can be either a subchannel contention (NO SCH) or a dump serialization (DUMP). For duplexed requests, also peer subchannel wait time (PR WT) and waiting-for-peer-completion time (PR CMP) is reported. A duplexed request requires two subchannels. PR WT is the time (in microseconds) between the moment when the request was sent to the other duplexed structure instance and when it is sent to this one - this is usually a small value. PR CMP is the time (in microseconds) between the moment when this structure responded to z/OS and when the other structure instance responded. Both subchannels are busy until the responses from both structure instances are processed by z/OS.</td>
</tr>
<tr>
<td># REQ</td>
<td>The total number and the percentage of requests delayed in the interval.</td>
</tr>
<tr>
<td>% of REQ</td>
<td></td>
</tr>
<tr>
<td>AVG TIME - /DEL</td>
<td>The average delay time in microseconds over all delayed requests.</td>
</tr>
<tr>
<td>AVG TIME - STD_DEV</td>
<td>The standard deviation to the average delay time.</td>
</tr>
<tr>
<td>AVG TIME - /ALL</td>
<td>The average delay time in microseconds over all requests, whether delayed or not.</td>
</tr>
<tr>
<td>EXTERNAL REQUEST CONTENTIONS</td>
<td>These values are available for all serialized list structures.</td>
</tr>
<tr>
<td>REQ TOTAL</td>
<td>The number of requests against this structure.</td>
</tr>
<tr>
<td>REQ DEFERRED</td>
<td>The number of requests running into a lock contention.</td>
</tr>
<tr>
<td>EXTERNAL REQUEST CONTENTIONS</td>
<td>These values are available for all lock structures.</td>
</tr>
<tr>
<td>REQ</td>
<td>Total requests issued for the lock structure.</td>
</tr>
<tr>
<td>REQ DEFERRED</td>
<td>Subset of the above field indicating the number of requests that were unable to complete within the request issuer's thread. That is, any request that needed additional processing to complete.</td>
</tr>
<tr>
<td>-CONT</td>
<td>A subset of the REQ DELAYED field. It presents the number of requests delayed due to contention on a lock. <strong>Example:</strong> A lock is held by an EXCLUSIVE request, and another request is made for the same lock with EXCLUSIVE or SHARE specified. If this number is high it could indicate an impact to the end user of the application or subsystem owning the lock structure. Refer to that application's traces or reports for more detail on what locks caused the heavy contention.</td>
</tr>
<tr>
<td>-FALSE CONT</td>
<td>A subset of the CONT field showing the number of requests that experience &quot;hash contention&quot;. This occurs because a hashing algorithm is used to map a lock request to a lock table entry. When more than one lock request maps to the same entry, there is the potential for contention delay. You may need to increase the size of the lock table. <strong>Note:</strong> It is possible for an application to have unusual lock reference patterns that cause storage contention regardless of the size of the lock structure.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>This row of data gives totals (or overall averages and percentages) for all the systems connected to the structure.</td>
</tr>
<tr>
<td>DATA ACCESS</td>
<td>This information is shown for cache structures.</td>
</tr>
<tr>
<td>READS</td>
<td>The number of occurrences the coupling facility returned data on a read request by any connector (read hit). Directory only caches will always have a zero value reported since there are no data to be returned.</td>
</tr>
<tr>
<td>WRITES</td>
<td>The number of occurrences data has been written to the cache structure. Directory only caches will always have a zero value reported since there are no data writes possible.</td>
</tr>
</tbody>
</table>
Table 128. Fields in the Coupling Facility Activity Report - Structure Activity (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASTOUTS</td>
<td>The number of times CASTOUT processing occurs. This is the process of writing changed cache data to permanent storage. This counter is of interest for store-in cache structures (for example, DB2 global buffer pool structures) in determining the volume of changed data being removed from the structure.</td>
</tr>
<tr>
<td>XI'S</td>
<td>The number of times a data item residing in a local buffer pool was marked invalid by the coupling facility. XI's count values are seen for directory, store-in and store-thru caches. This count reflects the amount of data sharing among the users of the cache and the amount of write or update activity against the data bases.</td>
</tr>
</tbody>
</table>

**Subchannel Activity section**

This section contains a summary line for each system attached to the coupling facility. MVS treats the set of available subchannels for a coupling facility as a pool of resources for any request to that facility. Therefore, the subchannel activity data is not reported by individual subchannel. MVS handles the load balancing across the subchannels automatically.

Figure 177. Coupling Facility Activity Report - Subchannel Activity

Table 129. Fields in the Coupling Facility Activity Report - Subchannel Activity

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM NAME</td>
<td>The name of the system attached to the coupling facility (from IEASYSxx Parmlib member, SYSNAME parameter). The name is preceded by an '*' if the data for this system is incomplete for this interval, for example because the gatherer has been stopped.</td>
</tr>
</tbody>
</table>
### Table 129. Fields in the Coupling Facility Activity Report - Subchannel Activity (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td># REQ TOTAL</td>
<td>TOTAL</td>
</tr>
<tr>
<td># REQ AVG/SEC</td>
<td>AVG/SEC</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **TOTAL**: Total number of requests to this facility. This number will usually be greater than the sum of the individual structure values from the previous report section because it includes global coupling facility commands that are not attributable to any structure.
- **AVG/SEC**: Average number of requests per second for this facility.

This field can be used as a quick way of determining which systems are generating the most activity for a given facility which in turn indicates where to focus tuning or load balancing efforts.

### CF LINKS

- **TYPE**: Channel path type.
- **GEN**: Number of subchannels that are defined.
- **USE**: Number of subchannels MVS is currently using for coupling facility requests.

### PTH BUSY

Path busy - the number of times a coupling facility request was rejected because all paths to the coupling facility were busy.

A high count combined with elongated service times for requests indicates a capacity constraint in the coupling facility. If coupling facility channels are being shared among PR/SM partitions, the contention could be coming from a remote partition.

Identifying path contention: There can be path contention even when this count is low. In fact, in a non-PR/SM environment where the subchannels are properly configured, the total number of delayed requests, and not PTH BUSY, is the indicator for path contention. If this value is high, it means MVS is delaying the coupling facility requests and in effect gating the workload before it reaches the physical paths. Before concluding you have a capacity problem, however, be sure to check that the correct number of subchannels are defined in the I/O gen.

PR/SM environment only: If coupling facility channels are being shared among PR/SM partitions, PTH BUSY behaves differently. You potentially have many MVS subchannels mapped to only a few coupling facility command buffers. You could have a case where the subchannels were properly configured (or even under-configured), subchannel busy is low, but path busy is high. This means the contention is due to activity from a remote partition.

### REQUESTS - The requests are shown in four categories.

- **# REQ SYNC**: Number of requests from this system to the coupling facility that started as synchronous requests which are completed (synchronously or asynchronously).
- **# REQ ASYNC**: Number of completed requests which have been started as asynchronous requests.
- **# REQ CHANGED**: Number of requests changed from synchronous to asynchronous because the requests could not be serviced as synchronous request.
- **# REQ UNSUCC**: Number of requests which could not be completed due to hardware problems. This number should normally be zero. If it is non-zero, there is a hardware problem that needs to be investigated. The reason it is reported here is to judge to what impact extent hardware problem(s) impact coupling facility performance.

### SERVICE TIME - AVG

The average service time in microseconds and the standard deviation of the service time spent for requests to the coupling facility. The average service time in conjunction with its standard deviation can be used to determine potential impacts to the end user. Even though the average service time is low the standard deviation can be high indicating a wide fluctuation. This category is for the request types SYNC, ASYNC, and UNSUCC, the fields are not applicable for column CHANGED.

### DELAYED REQUESTS - These columns lists possible contention reasons for requests sent to the coupling facility.

- **# REQ LIST/CACHE**: Number of delayed requests across all LIST and CACHE structures.
- **# REQ LOCK**: Number of delayed requests across all LOCK structures.
- **# REQ TOTAL**: Number of delayed requests across all structures.
- **% OF REQ**: The percentage of requests delayed, related to the number of List/Cache requests, Lock requests and total requests.
- **AVG TIME - */DEL**: The average delay time in microseconds over all delayed requests.
### Table 129. Fields in the Coupling Facility Activity Report - Subchannel Activity (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG TIME - STD_DEV</td>
<td>The standard deviation to the average delay time.</td>
</tr>
<tr>
<td>AVG TIME - /ALL</td>
<td>The average delay time in microseconds over all requests, whether delayed or not.</td>
</tr>
</tbody>
</table>

### Table 130. Fields in the Coupling Facility Activity Report - Subchannel Activity - Channel Path Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM NAME</td>
<td>The name of the system attached to the coupling facility (from IEASYSxx Parmlib member, SYSNAME parameter).</td>
</tr>
<tr>
<td>ID</td>
<td>The hexadecimal identifier of a channel path (CHPID) that is connected to the coupling facility.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Channel path type.</td>
</tr>
<tr>
<td>OPERATION MODE</td>
<td>Channel path operation mode. It describes the data rate, bandwidth, protocol, and adapter type of the channel path.</td>
</tr>
<tr>
<td></td>
<td>Data rates for CFP channel paths:</td>
</tr>
<tr>
<td></td>
<td>• 1GBIT — 1.0625 Gbit/sec</td>
</tr>
<tr>
<td></td>
<td>• 2GBIT — 2.125 Gbit/sec</td>
</tr>
<tr>
<td></td>
<td>Bandwidth for CIB channel paths:</td>
</tr>
<tr>
<td></td>
<td>• 1X — single bandwidth</td>
</tr>
<tr>
<td></td>
<td>• 12X — twelve-fold bandwidth</td>
</tr>
<tr>
<td></td>
<td>Bandwidth for CS5 channel paths:</td>
</tr>
<tr>
<td></td>
<td>• 8x — eight-fold bandwidth</td>
</tr>
<tr>
<td></td>
<td>Protocol for CIB channel paths:</td>
</tr>
<tr>
<td></td>
<td>• IFB</td>
</tr>
<tr>
<td></td>
<td>• IFB3</td>
</tr>
<tr>
<td></td>
<td>Protocol for CS5 channel paths:</td>
</tr>
<tr>
<td></td>
<td>• GEN3 PCIe third generation protocol</td>
</tr>
<tr>
<td></td>
<td>Adapter types for CIB channel paths:</td>
</tr>
<tr>
<td></td>
<td>• HCA-O</td>
</tr>
<tr>
<td></td>
<td>• HCA-O LR</td>
</tr>
<tr>
<td></td>
<td>• HCA3-O</td>
</tr>
<tr>
<td></td>
<td>• HCA3-O LR</td>
</tr>
<tr>
<td></td>
<td>Adapter type for CS5 channel paths:</td>
</tr>
<tr>
<td></td>
<td>• PCIe-O SR</td>
</tr>
<tr>
<td></td>
<td>Unknown operation mode:</td>
</tr>
<tr>
<td></td>
<td>• UNKNOWN</td>
</tr>
<tr>
<td>DEGRADED</td>
<td>Character ‘Y’ in this column indicates that the channel path is operating at reduced capacity (degraded) or not operating at all.</td>
</tr>
<tr>
<td>DISTANCE</td>
<td>Estimated distance in kilometers. The value is calculated as follows:</td>
</tr>
<tr>
<td></td>
<td>Average round-trip path time in microseconds</td>
</tr>
<tr>
<td></td>
<td>10 microseconds / kilometer</td>
</tr>
<tr>
<td></td>
<td>A value of zero means that the time was not measured.</td>
</tr>
<tr>
<td>PCHID</td>
<td>Physical channel identifier.</td>
</tr>
<tr>
<td>AID</td>
<td>The hexadecimal adapter ID. For CIB channels it describes the host channel adapter (HCA) ID and for CS5 channels it describes the PCIe adapter ID.</td>
</tr>
<tr>
<td>PORT</td>
<td>The hexadecimal port number. For CIB channels it describes the host channel adapter port number and for CS5 channels it describes the PCIe adapter port number.</td>
</tr>
<tr>
<td>IOP IDS</td>
<td>The hexadecimal identifiers of I/O processors (System Assist Processors) to which the channel path is accessible.</td>
</tr>
</tbody>
</table>
CF to CF Activity section

Table 131. Fields in the CF to CF Activity Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEER CF</td>
<td>Name of the remote coupling facility.</td>
</tr>
<tr>
<td># REQ TOTAL</td>
<td>The total number of requests delayed in the interval. This is the sum of the following signals which have been sent from the subject CF to this remote CF:</td>
</tr>
<tr>
<td></td>
<td>• Number of halt execution signals</td>
</tr>
<tr>
<td></td>
<td>• Number of ready to complete signals</td>
</tr>
<tr>
<td></td>
<td>• Number of ready to execute signals</td>
</tr>
<tr>
<td></td>
<td>• Number of request for suppression signals</td>
</tr>
<tr>
<td></td>
<td>• Number of request for suppression accepted signals</td>
</tr>
<tr>
<td>#REQ AVG/SEC</td>
<td>Average number of requests per second.</td>
</tr>
<tr>
<td>CF LINKS TYPE</td>
<td>CF to CF link type.</td>
</tr>
<tr>
<td>CF LINKS USE</td>
<td>The number of links used for coupling facility communication.</td>
</tr>
<tr>
<td>REQUESTS - The requests are synchronous (SYNC). # REQ</td>
<td>The number of requests for this coupling facility.</td>
</tr>
<tr>
<td>SERVICE TIME - AVG</td>
<td>The average service time in microseconds (based on the difference between the sum of signal delay time and sum of signal service time).</td>
</tr>
<tr>
<td>SERVICE TIME - STD_DEV</td>
<td>The standard deviation to the average service time.</td>
</tr>
<tr>
<td>DELAYED REQUESTS - The delayed requests are synchronous (SYNC). # REQ</td>
<td>The number of signals of all types which have experienced a delay in being sent from the subject CF to this remote CF.</td>
</tr>
<tr>
<td>% OF REQ</td>
<td>The percentage of requests delayed.</td>
</tr>
</tbody>
</table>
Table 131. Fields in the CF to CF Activity Section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG TIME - /DEL</td>
<td>The average delay time in microseconds over all delayed requests.</td>
</tr>
<tr>
<td>AVG TIME - STD_DEV</td>
<td>The standard deviation to the average delay time.</td>
</tr>
<tr>
<td>AVG TIME - /ALL</td>
<td>The average delay time in microseconds over all requests, whether delayed or not.</td>
</tr>
</tbody>
</table>

Table 132. Fields in the Coupling Facility Activity Report - CF to CF Activity - Channel Path Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: If the hardware cannot provide values for a measurement, the field remains blank.</td>
<td></td>
</tr>
<tr>
<td>PEER CF</td>
<td>Name of the remote coupling facility.</td>
</tr>
<tr>
<td>ID</td>
<td>The hexadecimal identifier of a channel path (CHPID) that is connecting both coupling facilities with each other.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Channel path type.</td>
</tr>
<tr>
<td>OPERATION MODE</td>
<td>Channel path operation mode. It describes the data rate, bandwidth, protocol, and adapter type of the channel path. For more information about displayed values, refer to Table 130 on page 320.</td>
</tr>
<tr>
<td>DEGRADED</td>
<td>Character Y in this column indicates that the channel path is operating at reduced capacity (degraded) or not operating at all.</td>
</tr>
<tr>
<td>DISTANCE</td>
<td>Estimated distance in kilometers. For more information, refer to Table 130 on page 320.</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference

You can make this report available through Overview records in a spreadsheet, using the Spreadsheet Reporter. The following table shows all criteria and the corresponding Overview names for creating Overview records. For details, see the z/OS RMF User’s Guide.

Table 133. Overview names in the Coupling Facility Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average service time of SYNC operations</td>
<td>SYNCST</td>
</tr>
<tr>
<td>SYNC operation rate</td>
<td>SYNCRT</td>
</tr>
<tr>
<td>Average service time of ASYNC operations</td>
<td>ASYN CST</td>
</tr>
<tr>
<td>Ended ASYNC operation rate</td>
<td>ASYN CRT</td>
</tr>
<tr>
<td>Percentage of changed operations</td>
<td>CHNGD P</td>
</tr>
<tr>
<td>Changed operation rate</td>
<td>CHNGDRT</td>
</tr>
<tr>
<td>Path busy rate</td>
<td>PBSY</td>
</tr>
<tr>
<td>Percent delayed requests</td>
<td>DREQP</td>
</tr>
<tr>
<td>CF processor utilization</td>
<td>CFUTIL</td>
</tr>
<tr>
<td>Directory reclaims</td>
<td>DIRRCLM</td>
</tr>
<tr>
<td>List/directory entries: current to total ratio</td>
<td>LDECTR</td>
</tr>
<tr>
<td>Data elements: current to total ratio</td>
<td>DECTR</td>
</tr>
<tr>
<td>Lock entries: current to total ratio</td>
<td>LECTR</td>
</tr>
<tr>
<td>Cache read request rate</td>
<td>CREADRT</td>
</tr>
<tr>
<td>Cache write request rate</td>
<td>CWRITERT</td>
</tr>
<tr>
<td>Cache castout rate</td>
<td>CCOUTRT</td>
</tr>
</tbody>
</table>
Table 133. Overview names in the Coupling Facility Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache cross invalidation rate</td>
<td>CXIRT</td>
</tr>
<tr>
<td>Total requests to lock structure or serialized list structure</td>
<td>LCKREQ</td>
</tr>
<tr>
<td>Contention on lock structure</td>
<td>LCKCONT</td>
</tr>
<tr>
<td>False contention on lock structure</td>
<td>LCKFCONT</td>
</tr>
<tr>
<td>Percentage of CF utilization</td>
<td>STUTILP</td>
</tr>
<tr>
<td>Percentage of subchannel busy</td>
<td>SUBCHBP</td>
</tr>
<tr>
<td>Percentage of storage class memory in use</td>
<td>SCMIUP</td>
</tr>
<tr>
<td>Percentage of augmented space in use</td>
<td>AUGMIUP</td>
</tr>
<tr>
<td>SCM list entry current to total ratio</td>
<td>SCMLCTR</td>
</tr>
<tr>
<td>SCM list element current to total ratio</td>
<td>SCMLECTR</td>
</tr>
<tr>
<td>Average service time per SCM read operation</td>
<td>SCMRST</td>
</tr>
<tr>
<td>Average service time per SCM write operation</td>
<td>SCMWST</td>
</tr>
<tr>
<td>SCM auxiliary enabled commands to total request ratio</td>
<td>SCMAUXR</td>
</tr>
<tr>
<td>SCM delayed faults to total request ratio</td>
<td>SCMDFR</td>
</tr>
</tbody>
</table>

CHAN - Channel Path Activity report

The Channel Path Activity report provides information about channel path use.

The report identifies each channel path by identifier and channel path type, and reports both the total channel utilization by the central processing complex (CPC) and the channel utilization of the individual system image (partition).

Data for total utilization and partition utilization is gathered independently. Because the internal interval used to gather this data is a few seconds, the total utilization and the sum of the partition's utilization sharing that channel might differ if a short RMF interval is specified. If the interval is too small or the appropriate data cannot be gathered, dashes (---) are displayed instead of data. Please refer to the information APAR II05151 for a list of channel types for which channel utilization data is not gathered.

The report includes data for each valid online channel path. Data, however, does not appear for any channel path that was offline at the end of the interval or that was brought online during the interval. Instead, one of the following messages appears in the data field:

NOW ONLINE  
Brought online during the interval and still online at the end of the interval

NOW OFFLINE  
Taken offline during the interval and still offline at the end of the interval

OFFLINE  
Offline for the entire interval

DELETED  
Deleted during the interval
During the interval

Installed during the interval

For all channels that are managed by dynamic channel path management (DCM), additional information is available. DCM allows an installation to identify channels that they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. On top of the report, there is a consolidated data section for managed channels displaying the total number of channel paths for each type and the average activity data. The character M as suffix of the acronym for the channel path type is an indicator that the channel is managed by DCM.

**Duration report**

Any channel that moved online or offline during the duration interval is indicated by an asterisk following the channel identifier.

In this report, the mode of the central processing complex (CPC) can be the following:

**BASIC**

The report shows all channels configured in the system. Only data for total utilization is reported. The partition utilization column is blank.

**NOW BASIC**

The report shows the last active mode. If you combine the SMF records from before and after a power-on-reset (POR) and changed the mode, two modes appear in the SMF records. By combining the intervals of the SMF records into one duration report, RMF displays the last active mode in the mode field. The partition utilization column is blank.

**LPAR**

The report shows the individual PR/SM logical partition's utilization and the total utilization of the shared ESCON channels, and the partition’s and total utilization of the unshared channels.

**NOW LPAR**

The report shows the last active mode. If you combine the SMF records from before and after a POR and changed the mode, two modes appear in the SMF records. By combining the intervals of the SMF records into one duration report, RMF displays the last active mode in the mode field. The partition utilization column is blank.

You can use channel path activity information together with I/O device activity and I/O queuing activity information to identify performance bottlenecks associated with channel paths. To find out which logical control unit is using the channel, look in the I/O Queuing Activity report. From there you can go to check device response times. For example, if a channel path to a device shows excessive use, you could define additional paths to the device or introduce a different job mix to produce better performance.

**How to request this report**

Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify NOCHAN.
To produce this report, specify
REPORUS (CHAN)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports in the z/OS RMF User’s Guide](https://example.com) provides all required information on how to produce and view XML reports.

**Example URL for the DDS API:**

### Contents of the report

<table>
<thead>
<tr>
<th>CHANNEL PATH ACTIVITY</th>
<th>PAGE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IODF = xx</strong></td>
<td>09/14/2013</td>
</tr>
<tr>
<td><strong>CR-DATE:</strong> mm/dd/yyyy</td>
<td>09/14/2013</td>
</tr>
<tr>
<td><strong>CR-TIME:</strong> hh.mm.ss</td>
<td>16.47.03</td>
</tr>
<tr>
<td><strong>ACT:</strong> POR</td>
<td>14.59.999</td>
</tr>
<tr>
<td><strong>MODE:</strong> LPAR</td>
<td>RMF</td>
</tr>
<tr>
<td><strong>CPMF:</strong> EXTENDED MODE</td>
<td>CYCLE 1.000 SECONDS</td>
</tr>
<tr>
<td><strong>CSSID:</strong> 2</td>
<td>8E</td>
</tr>
</tbody>
</table>

**Table 134. Fields in the Channel Path Activity report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IODF = xx</td>
<td>The IODF number where xx is the suffix of the IODF data set name.</td>
</tr>
<tr>
<td>CR-DATE: mm/dd/yyyy</td>
<td>The creation date of the IODF.</td>
</tr>
<tr>
<td>CR-TIME: hh.mm.ss</td>
<td>The creation time of the IODF.</td>
</tr>
<tr>
<td>ACT: text</td>
<td>The configuration state where text indicates how the IODF was activated.</td>
</tr>
</tbody>
</table>
Table 134. Fields in the Channel Path Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>The mode of the central processing complex (CPC):</td>
</tr>
<tr>
<td><strong>BASIC</strong></td>
<td>The report shows all channels configured in the system.</td>
</tr>
<tr>
<td><strong>LPAR</strong></td>
<td>The report shows both the total utilization and the individual partition's utilization of all channels configured to the logical partition.</td>
</tr>
<tr>
<td>CPMF</td>
<td>The availability of the Channel Path Measurement Facility (CPMF). CPMF allows RMF to report channel utilization information for individual partitions. The value can be:</td>
</tr>
<tr>
<td><strong>COMPATIBILITY MODE</strong></td>
<td>CPMF is running in compatibility mode.</td>
</tr>
<tr>
<td><strong>EXTENDED MODE</strong></td>
<td>CPMF is running in extended mode.</td>
</tr>
<tr>
<td><strong>NOT AVAILABLE</strong></td>
<td>CPMF is not available on the system.</td>
</tr>
<tr>
<td></td>
<td>The indication (CHANGED) will be shown if the CPMF mode has changed during the reporting interval. In that case, only TOTAL values will be reported.</td>
</tr>
<tr>
<td></td>
<td>For more information about CPMF, see the data area IRACPMB in MVS Data Areas Volume 2 available from the <a href="https://www.ibm.com/support/knowledgecenter/SSEPGG_2.2.0/">z/OS Internet Library</a>.</td>
</tr>
<tr>
<td>CSSID</td>
<td>This field is shown only for z990 processors or follow-on processors and denotes the ID of the monitored logical channel subsystem.</td>
</tr>
<tr>
<td>CHANNEL GROUP G NO</td>
<td>For each channel type which is managed by DCM, a summary line is shown with the average values for all channels in this group.</td>
</tr>
<tr>
<td>G indicates the generation and is used to differentiate between channels of the same channel type, when one has significant differences from the other. Newer generations with significant differences (for example, the channel throughput) are indicated by a number (1, 2, ...). For example, for a FICON channel, a number 1 indicates that the channel has an auto-negotiated throughput of 1 Gbit/sec, or a number 2 indicates a throughput of 2 Gbit/sec.</td>
<td></td>
</tr>
<tr>
<td>The number of channels of the group is given in column NO.</td>
<td></td>
</tr>
<tr>
<td>CHANNEL PATH ID</td>
<td>The hexadecimal channel path identifier (CHPID).</td>
</tr>
<tr>
<td>CHANNEL PATH TYPE</td>
<td>Type of channel path.</td>
</tr>
<tr>
<td>You may issue the console command D M=CHP(xx) to see an explanation of the channel path type.</td>
<td></td>
</tr>
<tr>
<td>If RMF encounters an error while processing the TYPE data, this field is blank. RMF continues to measure channel path activity. Check the operator console for messages.</td>
<td></td>
</tr>
<tr>
<td>CHANNEL PATH G</td>
<td>This column indicates the generation and is used to differentiate between channels of the same channel type, when one has significant differences from the other. Newer generations with significant differences are indicated by a number (1, 2, ...). For example, for z/OS, a number 2 indicates that a FICON channel has auto negotiated to a link speed of 2 GB/sec.</td>
</tr>
<tr>
<td>CHANNEL PATH SPEED</td>
<td>The channel path speed in bits per second at the end of the interval.</td>
</tr>
<tr>
<td>CHANNEL PATH SHR</td>
<td>The indication of whether the channel path is defined as shared between one or more logical partitions. Y indicates that the channel path is shared. A blank indicates it is not shared.</td>
</tr>
</tbody>
</table>

**Note:**

1. On a machine running in LPAR mode, but with only one LPAR defined, the PART columns for the READ, WRITE and UTILIZATION fields display a zero value for channels of type FC (FICON).
2. When Channel Path Measurement Facility (CPMF) is not available, for example, on z/OS systems running as z/VM guests, RMF uses sampled data from SRM so that the reported channel utilization is only an approximate value. With increasing channel speed, the channel utilization value becomes more and more inaccurate. Therefore, in such cases, RMF does not provide accurate values of FICON channel utilization.

Beginning with z990 processors, the channel data from SRM is no longer available. As a result, the channel utilization data on a z/OS system running as z/VM guest, is reported as ------.
### Table 134. Fields in the Channel Path Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **UTILIZATION (%) PART** | The channel path utilization percentage for an individual logical partition. RMF uses the values provided by CPMF.  

In LPAR mode, the calculation is:  
PART Channel Path Busy Time  
**UTILIZATION (%)** = \( \frac{\text{PART Channel Path Busy Time}}{\text{Channel Path Elapsed Time}} \) * 100  
For channels like FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:  
Part LPAR # of Channel Work Units  
Utilization (%) = \( \frac{\text{Part LPAR # of Channel Work Units}}{\text{Max # of Channel Work Units} \times \text{Channel Path Elapsed Time}} \) * 100  
For some channels like OSAEGbE, FICON EXPRESS/EXPRESS2, this value reflects the microprocessor utilization.  
For hipersockets, this value is not available. |
|               |         |
| **UTILIZATION (%) TOTAL** | The channel path utilization percentage for the CPC during an interval.  
For processors earlier than z990 and shared channels in LPAR mode, where CPMF is not available, or for all channels in BASIC mode with CPMF not available, the calculation is:  
# SRM Observations of  
Total Channel Path Busy  
Utilization (%) = \( \frac{\text{Total Channel Path Busy}}{\text{# Samples}} \) * 100  
For unshared channels in LPAR mode, the value for total utilization is the same as partition utilization.  
For channels like FICON, OSA Express, or OSA Direct Express, which are running in extended CPMF mode, the calculation is as follows:  
Total Total # of Channel Work Units  
Utilization (%) = \( \frac{\text{Total # of Channel Work Units}}{\text{Max # of Channel Work Units} \times \text{Channel Path Elapsed Time}} \) * 100  
For some channels like OSAEGbE, FICON EXPRESS/EXPRESS2, this value reflects the microprocessor utilization.  
For hipersockets, this value is not available. |
| **UTILIZATION (%) BUS** | Percentage of bus cycles, the bus has been found busy for this channel in relation to the theoretical limit.  
For OSAEGbE, the value reflects the PCI bus utilization.  
For hipersockets, this value is not available. |
| **READ(MB/SEC)** | PART Data transfer rates from the control unit to the channel for this partition.  
TOTAL Data transfer rates from the control unit to the channel for the CPC.  
For hipersockets, this value is not available. |
| **WRITE(MB/SEC)** | PART Data transfer rates from the channel to the control unit for this partition.  
TOTAL Data transfer rates from the channel to the control unit for the CPC. |

The following fields are reported for the CPC:
Table 134. Fields in the Channel Path Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FICON OPERATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>RATE</td>
<td>Number of native FICON operations per second.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>The average number of native FICON operations that are concurrently active during the reporting interval.</td>
</tr>
<tr>
<td>DEFER</td>
<td>Number of deferred native FICON operations per second that could not be initiated by the channel due to the lack of available resources.</td>
</tr>
</tbody>
</table>

| **ZHPF OPERATIONS** | |
| RATE | Number of zHPF (High Performance FICON) operations per second. |
| ACTIVE | The average number of zHPF operations that are concurrently active during the reporting interval. |
| DEFER | Number of deferred zHPF operations per second that could not be initiated by the channel due to the lack of available resources. |

The following fields are for HiperSockets:

| WRITE(B/SEC) | PART | Data transfer rates from the channel to the control unit for this partition. |
| TOTAL | Data transfer rates from the channel to the control unit for the CPC. |
| The values are shown in bytes/second. |

| MESSAGE RATE | PART | Rate of messages sent by this partition. |
| TOTAL | Rate of messages sent by the CPC. |

| MESSAGE SIZE | PART | Average size of messages sent by this partition. |
| TOTAL | Average size of messages sent by the CPC. |

| SEND FAIL PART | PART | Rate of messages (sent by this partition) that failed. |
| TOTAL | Rate of messages (received by the CPC) that failed due to unavailable buffers. |
| The value could indicate that more receive buffers are required. |

| RECEIVE FAIL | PART | Rate of messages (received by this partition) that failed due to unavailable buffers. |

**Spreadsheet and Overview reference**

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](https://www.ibm.com). The following table shows the overview condition names for the Overview report.

Table 135. Overview names in the Channel Path Activity report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the following overview condition if CPMF is not available or for CPMF compatibility mode:</td>
<td></td>
</tr>
<tr>
<td>TOTAL UTILIZATION (%)</td>
<td>CHPBSY, CHGPBSY</td>
</tr>
<tr>
<td>Use the following overview conditions for CPMF extended mode:</td>
<td></td>
</tr>
<tr>
<td>UTILIZATION (%) PART</td>
<td>CHLBSY, CHGLBSY</td>
</tr>
<tr>
<td>UTILIZATION (%) TOTAL</td>
<td>CHTBSY, CHGTBSY</td>
</tr>
<tr>
<td>UTILIZATION (%) BUS</td>
<td>CHBTOT, CHGBTOT</td>
</tr>
<tr>
<td>PART READ RATE</td>
<td>CHLREAD, CHGLREAD</td>
</tr>
<tr>
<td>TOTAL READ RATE</td>
<td>CHTREAD, CHGTREAD</td>
</tr>
<tr>
<td>PART WRITE RATE</td>
<td>CHLWRITE, CHGLWRITE</td>
</tr>
<tr>
<td>TOTAL WRITE RATE</td>
<td>CHTWRITE, CHGTWRITE</td>
</tr>
<tr>
<td>FICON OPERATIONS RATE</td>
<td>CHFRATE</td>
</tr>
</tbody>
</table>
Table 135. Overview names in the Channel Path Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICON OPERATIONS ACTIVE</td>
<td>CHFACTIV</td>
</tr>
<tr>
<td>FICON OPERATIONS DEFER</td>
<td>CHFDEFER</td>
</tr>
<tr>
<td>ZHPF OPERATIONS RATE</td>
<td>CHFXRATE</td>
</tr>
<tr>
<td>ZHPF OPERATIONS ACTIVE</td>
<td>CHFXACTIV</td>
</tr>
<tr>
<td>ZHPF OPERATIONS DEFER</td>
<td>CHFXDFER</td>
</tr>
<tr>
<td>MESSAGE RATE PART</td>
<td>CHLMSGST</td>
</tr>
<tr>
<td>MESSAGE RATE TOTAL</td>
<td>CHTMSGST</td>
</tr>
<tr>
<td>MESSAGE SIZE PART</td>
<td>CHLMSGSZ</td>
</tr>
<tr>
<td>MESSAGE SIZE TOTAL</td>
<td>CHTMSGSZ</td>
</tr>
<tr>
<td>SEND FAIL PART</td>
<td>CHLMSGF</td>
</tr>
<tr>
<td>RECEIVE FAIL PART</td>
<td>CHLRECF</td>
</tr>
<tr>
<td>RECEIVE FAIL TOTAL</td>
<td>CHTRECF</td>
</tr>
</tbody>
</table>

CPU - CPU Activity report

The report is divided into the following sections:

**CPU Activity**
Provides information on the active processors. For further information, see “CPU Activity” on page 330.

**System Address Space and Work Unit Analysis**
Provides overall information about address spaces and running or waiting work units. For further information, see “System Address Space and Work Unit Analysis” on page 332.

**Blocked Workload Analysis**
Provides information about blocked workloads. For further information, see “Blocked Workload Analysis” on page 332.

**Partition Data Report**
If the z/OS system is running in a PR/SM environment in LPAR mode, this section provides data about all configured partitions. If the z/OS system is running as guest under z/VM, and the Monitor I data gatherer option VMGUEST has been set, this section provides data about the z/OS guest system. Otherwise, this section is not available.

This section is described in “Using the information in the Partition Data Report” on page 339.

**LPAR Cluster Report**
Provides data about each LPAR cluster. This section is described in “Using the information in the LPAR Cluster Report” on page 344.

**Group Capacity Report**
Provides data about the capacity limit of each defined capacity group and about the MSU consumption and actual capping of each partition within these groups. This section is described in “Using the information in the Group Capacity Report” on page 346.

**Note:** The **LPAR Cluster Report** and **Group Capacity Report** sections are not available if the system is running in a z/VM guest environment.
How to request this report

Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify N0CPU.

To produce this report, specify
REPORTS(CPU)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports in the z/OS RMF User's Guide](#) provides all required information on how to produce and view XML reports.

Example URL for the DDS API:

Contents of the report

The contents of the CPU Activity Report includes the following parts:

- “CPU Activity”
- “System Address Space and Work Unit Analysis” on page 332
- “Blocked Workload Analysis” on page 332

CPU Activity

The CPU Activity section reports on logical core and logical processor activity. For each processor, the report provides a set of calculations that are provided at a particular granularity that depends on whether multithreading is disabled (LOADxx PROCVIEW CPU parameter is in effect) or enabled (LOADxx PROCVIEW CORE parameter is in effect).

If multithreading is disabled for a processor type, all calculations are at logical processor granularity.

If multithreading is enabled for a processor type, some calculations are provided at logical core granularity and some are provided at logical processor (thread) granularity. The CPU Activity section displays exactly one report line per thread showing all calculations at logical processor granularity. Those calculations that are provided at core granularity are only shown in the same report line that shows the core id in the CPU NUM field and which is representing the first thread of a core.

The following calculations are on a per logical processor basis when multithreading is disabled and on a per logical core basis when multithreading is enabled:
- Percentage of the interval time the processor was online
- LPAR view of the processor utilization (LPAR Busy time percentage)
- Percentage of a physical processor the logical processor is entitled to use
- Multithreading core productivity (only reported when multithreading is enabled)
- Multithreading core utilization (only reported when multithreading is enabled)

The following calculations are on a per logical processor basis regardless whether multithreading is enabled or disabled:
- MVS view of the processor utilization (MVS Busy time percentage)
- Percentage of the online time the processor was parked (in HiperDispatch mode only)
- I/O interrupts rate (general purpose processors only)
Percentage of I/O interrupts handled by the I/O supervisor without re-enabling (general purpose processors only)

If RMF is running as a guest under z/VM® and Monitor I Session option NOVMGUEST is active, it only reports the MVS busy time percentage. If you want to measure partition utilization (as well as the individual CPU utilization of the single guests, namely LPAR busy time percentage), you need to use a z/VM monitor. Performance analysts need both views of CPU utilization. The MVS view is a direct indicator to see a CPU bottleneck, while the LPAR view is important with respect to capacity aspects.

The LPAR view of the CPU utilization takes the different states that are possible into account:
- WAIT state
- NON WAIT state being dispatched by PR/SM
- NON WAIT state not being dispatched by PR/SM
- WAIT state being dispatched when the LPAR has dedicated processors

The LPAR Busy time is calculated depending on the status of the logical processor:
- Dedicated and LOADxx PROCVIEW CPU is in effect or hardware does not support multithreading
  CPU time = Online time - Wait time
- Dedicated and LOADxx PROCVIEW CORE is in effect on hardware that supports multithreading
  CPU time = MT Core LPAR Busy time
- Wait completion = YES (requires multithreading disabled)
  CPU time = Dispatch time - Wait time
- Wait completion = NO
  CPU time = Dispatch time

The LPAR view of CPU utilization is calculated as:

\[
\text{LPAR Busy Time(\%)} = \frac{\text{CPU time}}{\text{Online time}} \times 100
\]

The MVS view of the CPU utilization considers the following states:
- CPU wait state
- CPU busy state (which means NON WAIT state)

In HiperDispatch mode, logical processors can be parked and are not dispatched by z/OS. The MVS BUSY fields in the RMF report reflect the effective used capacity for the logical processors and the entire logical partition. The values are based on the difference between online time and MVS wait time to provide an operating system perspective of busy time. Parked processors in HiperDispatch mode generally reflect unavailable capacity at high physical processor utilizations. The formula for MVS Busy has been changed with HiperDispatch mode to exclude the parked time to show how busy the logical processor was when not parked.

- HiperDispatch = NO
  Time range = Online time
- HiperDispatch = YES
  Time range = Online time - Parked time

Note: In HiperDispatch mode, the Total/Average MVS BUSY TIME % does not consider parked processors. Therefore, do not use Total/Average LPAR BUSY TIME % and Total/Average MVS BUSY TIME % to calculate the MVS to LPAR busy ratio.
The MVS view of CPU utilization is:

\[
\frac{\text{MVS Busy Time(\%)} \times 100}{\text{Time range - Wait time}}
\]

If multithreading is enabled for at least one processor type, you can use the multithreading core productivity and multithreading core utilization metrics to determine the effectiveness of the configured logical cores.

When the multithreading core productivity (MT % PROD) equals 100% in multithreading mode, all threads on the core are executing work and all core resources are being used. If MT % PROD is less than 100%, the core resources were dispatched to physical hardware but one or more threads on a core were in a wait because they had no work to run.

If multithreading is enabled, the available core capacity can be calculated using the multithreading core utilization and LOG PROC SHARE %:

\[
\text{Available Core Capacity} = \text{LOG PROC SHARE \%} - \text{MT \% UTIL}
\]

System Address Space and Work Unit Analysis

The System Address Space and Work Unit Analysis section of the CPU activity report provides overall address space and work unit information and also provides the minimum, maximum, and average numbers of running or ready to run work units.

The data in this section analyzes the following types of address spaces:

- In storage and ready to execute
- In storage
- Out of storage and ready to execute
- Out of storage and waiting to execute
- Logically out of storage and ready to execute
- Logically out of storage and waiting to execute.

Data is also presented on the number of address spaces used by batch users, started tasks (STC), TSO/E users, APPC/MVS transaction schedulers (ASCH), and z/OS UNIX (OMVS). Examining this data can indicate when a backlog of address spaces are waiting to use the processor.

The work unit statistics (MIN, MAX, AVG) are provided per processor type, that is, per standard CPs, zAAPs, and zIIPs.

The graphical and numeric presentation of the In-Ready work unit queue distribution provides a detailed view on how many work units are running or waiting for a processor. The distribution does not distinguish between the processor types (CPs, zAAPs, and zIIPs).

Blocked Workload Analysis

If the CPU utilization of a system is at 100%, workloads with low importance (low dispatch priority) might not get dispatched anymore. This could cause problems if the work holds a resource and by that holds up more important workloads. Therefore, any address space or enclave which has ready-to-run work units (TCBs or SRBs), but does not get CPU service within a certain time interval due to its low dispatch priority, will be temporarily promoted by WLM to a higher dispatch priority. This helps to complete low priority work in a finite time period, without permanently delaying high priority work.
The **Blocked Workload Analysis** section lists the number of dispatchable work units that are considered to be blocked and eligible for priority promotion. This section also displays the OPT parameters which define the workload promotion. It also displays the average exploitation of the defined promotion rate during the measurement interval. This information helps you to adjust these OPT parameters. To assess the amount of workload still being blocked, the average and peak number of address spaces and enclaves found blocked and waiting for promotion is also listed.

**Using the information in the CPU Activity report**

High LPAR/MVS BUSY TIME PERC values could indicate contention for CPU. To check this, add the N+1, ... N+150 percentages in the DISTRIBUTION OF IN-READY WORK UNIT QUEUE (where N is the number of online processors). This sum is the percentage of time when at least one task could not be dispatched. A value higher than 60% implies contention for CPU.

Low LPAR/MVS BUSY TIME PERC values can indicate that other bottlenecks in the system are preventing work from being processed.

An OUT READY average value of more than 1 could reflect processor storage constraints.
### Table 136. Fields in the CPU Activity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Activity</strong></td>
<td>If multithreading is disabled for the reporting interval (that is, the LOADxx PROCVIEW CPU parameter is in effect), the term logical core refers to a logical processor.</td>
</tr>
<tr>
<td><strong>CPU MODEL</strong></td>
<td>The hardware description of the CPU.</td>
</tr>
<tr>
<td><strong>H/W MODEL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SEQUENCE CODE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CPC CAPACITY</strong></td>
<td>Effective processor capacity available to the central processor complex (CPC), measured in MSU/h.</td>
</tr>
</tbody>
</table>
### Table 136. Fields in the CPU Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHANGE REASON</strong></td>
<td>Reason of the capacity change:</td>
</tr>
<tr>
<td>NONE</td>
<td>CPC is running at normal capacity (100 % effective capacity). No capacity change occurred.</td>
</tr>
<tr>
<td>POWERSAVE</td>
<td>CPC is running in power-save mode. Capacity change was initiated by the user.</td>
</tr>
<tr>
<td>MACHINE</td>
<td>CPC is running in cycle-steering mode. Capacity change was initiated by the machine.</td>
</tr>
<tr>
<td>N/A</td>
<td>No capacity change reason is reported by the machine.</td>
</tr>
<tr>
<td><strong>HIPERDISPATCH</strong></td>
<td>HiperDispatch mode:</td>
</tr>
<tr>
<td>YES</td>
<td>Active</td>
</tr>
<tr>
<td>NO</td>
<td>Not active</td>
</tr>
<tr>
<td>N/A</td>
<td>Not supported by the hardware</td>
</tr>
<tr>
<td></td>
<td>If the mode changed during the reporting interval, an ‘<em>’ is appended (for example: NO</em> indicates a switch from YES to NO).</td>
</tr>
<tr>
<td><strong>CPU NUM/TYP</strong></td>
<td>The logical core identification and the processor type.</td>
</tr>
<tr>
<td><strong>TIME % ONLINE</strong></td>
<td>The percentage of time the logical core was online.</td>
</tr>
<tr>
<td><strong>TIME % LPAR BUSY</strong></td>
<td>The percentage of the online time that the logical core was dispatched by LPAR.</td>
</tr>
<tr>
<td></td>
<td>• For a dedicated partition:</td>
</tr>
<tr>
<td></td>
<td>When LOADxx PROCVIEW CORE is in effect on hardware that supports multithreading:</td>
</tr>
<tr>
<td></td>
<td>MT Core LPAR Busy Time</td>
</tr>
<tr>
<td></td>
<td>LPAR BUSY TIME % = ---------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Online Time</td>
</tr>
<tr>
<td></td>
<td>Otherwise:</td>
</tr>
<tr>
<td></td>
<td>Online Time - Wait Time</td>
</tr>
<tr>
<td></td>
<td>LPAR BUSY TIME % = ---------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Online Time</td>
</tr>
<tr>
<td></td>
<td>• For a non-dedicated partition when Wait Completion is NO:</td>
</tr>
<tr>
<td></td>
<td>Partition Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>LPAR BUSY TIME % = ---------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Online Time</td>
</tr>
<tr>
<td></td>
<td>The partition dispatch time is the elapsed time that PR/SM dispatched this logical core during the interval.</td>
</tr>
<tr>
<td></td>
<td>• For a non-dedicated partition when Wait Completion is YES:</td>
</tr>
<tr>
<td></td>
<td>Partition Dispatch Time - Wait Time</td>
</tr>
<tr>
<td></td>
<td>LPAR BUSY TIME % = ---------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Online Time</td>
</tr>
<tr>
<td><strong>TIME % MVS BUSY</strong></td>
<td>The percentage of the online time that the logical processor was busy.</td>
</tr>
<tr>
<td></td>
<td>Online Time - (Wait Time + Parked Time)</td>
</tr>
<tr>
<td></td>
<td>MVS BUSY TIME % = ---------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>Online Time - Parked Time</td>
</tr>
<tr>
<td></td>
<td>The MVS view of CPU time is not meaningful if the logical processor is parked during the entire reporting interval. In this case, ‘----’ is shown.</td>
</tr>
<tr>
<td><strong>TIME % PARKED</strong></td>
<td>The percentage of time that the logical processor was parked.</td>
</tr>
<tr>
<td></td>
<td>In HiperDispatch mode, processors with a low amount of physical processor share can be parked. That is, they are not dispatched by z/OS and do not attempt to run work. Without HiperDispatch, processors are not parked and ‘----’ is shown.</td>
</tr>
</tbody>
</table>
## Table 136. Fields in the CPU Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT % PROD</td>
<td>The percentage of the maximum core capacity that was used in the reporting interval while the logical core was dispatched to physical hardware. When MT % PROD equals 100% and the LOADxx PROCVIEW CORE parameter is in effect, all threads on the core are executing work and all core resources are being used. If MT % PROD is less than 100%, the core resources were dispatched to physical hardware but one or more threads on a logical core were in a wait because they had no work to run. If a core was reconfigured offline/online during the reporting interval, no multithreading core productivity is calculated and ‘------’ is shown. If the LOADxx PROCVIEW CPU parameter is in effect, this field is not displayed.</td>
</tr>
<tr>
<td>MT % UTIL</td>
<td>The percentage of the maximum core capacity that was used in the reporting interval. MT % UTIL = MT Core Productivity * TIME % LPAR BUSY If a core was reconfigured offline/online during the reporting interval, no multithreading core utilization is calculated and ‘------’ is shown. If the LOADxx PROCVIEW CPU parameter is in effect, this field is not displayed.</td>
</tr>
<tr>
<td>LOG PROC SHARE %</td>
<td>Percentage of the physical processor that the logical processor is entitled to use. Without HiperDispatch, the processing weight is equally divided between the online logical processors. In HiperDispatch mode, logical processors have a high, medium or low share of the physical processor. The share percentage is the average value for the reporting interval, whereas HIGH, MED or LOW indicates the HiperDispatch priority at the end of the reporting interval. When the priority changed during the interval, an ‘*’ is appended. N/A is displayed if the HiperDispatch priority is not indicated by the hardware at the end of the reporting interval.</td>
</tr>
</tbody>
</table>
| I/O INTERRUPTS RATE | The total rate per second that this processor handled I/O interrupts. The rate reflects the processing for the entire interval. This might include periods of time when the SRM enabled or disabled this processor for I/O interrupts. The rate includes interrupts handled by the second level interrupt handler (SLIH), as well as those handled by the Test Pending Interrupt (TPI) instruction.  
\[
\text{SLIH + TPI} \\
\text{RATE} = \frac{\text{INT}}{\text{INTERVAL time (seconds)}} \\
\text{SLIH} \quad \text{Interruptions that the second level interrupt handler handled} \\
\text{TPI} \quad \text{Interruptions that the Test Pending Interrupt instruction handled} \\
\text{INT} \quad \text{Interval time (seconds)} \\
\]  
I/O INTERRUPTS % VIA TPI | The percentage of the total interrupts for this processor during the RMF interval that are handled by the I/O supervisor without re-enabling.  
\[
\% \text{ VIA TPI} = \frac{\text{TPI}}{\text{SLIH + TPI}} \times 100 \\
\text{TPI} \quad \text{Interruptions that the Test Pending Interrupt instruction handled} \\
\text{SLIH} \quad \text{Interruptions that the second level interrupt handler handled} \\
\]  
For the following three TOTAL/AVERAGE values, the logical processors that are parked during the entire interval are not considered in the calculation of the average TIME % MVS BUSY.  
| TOTAL/AVERAGE (CP) | The average or total value for general purpose processors (standard CPs). |
| TOTAL/AVERAGE (zAAP) | The average value for zAAPs. Only visible if zAAPs are configured online. |
| TOTAL/AVERAGE (zIIP) | The average value for zIIPs. Only visible if zIIPs are configured online. |

Multi-Threading Analysis: This information is only displayed when the LOADxx PROCVIEW CORE parameter is in effect. Multithreading information is only shown for those processor types for which at least one logical core was configured online for the complete interval.  
<p>| CPU TYPE | Processor type CP, IIP, or AAP. |</p>
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>The multithreading mode of a processor type designates the number of active threads for each online logical core of this type. If MT MODE is greater than 1, multithreading becomes effective for this processor type.</td>
</tr>
<tr>
<td>MAX CF</td>
<td>Multithreading maximum capacity factor for a processor type. The multithreading maximum capacity factor represents the ratio of the maximum amount of work that can be accomplished using all active threads to the amount of work that would have been accomplished within this reporting interval when multithreading was disabled. ‘------’ is shown when the multithreading maximum capacity factor cannot be calculated.</td>
</tr>
<tr>
<td>CF</td>
<td>Multithreading capacity factor for a processor type. The multithreading capacity factor represents the ratio of the amount of work that has been accomplished within this reporting interval to the amount of work that would have been accomplished with multithreading disabled. ‘------’ is shown when the multithreading capacity factor cannot be calculated.</td>
</tr>
<tr>
<td>AVG TD</td>
<td>Average thread density for a processor type. This value represents the average number of active threads for those cores that were dispatched to physical hardware. ‘------’ is shown when the average thread density cannot be calculated.</td>
</tr>
</tbody>
</table>

**System Address Space and Work Unit Analysis:** contains information about the NUMBER OF ADDRESS SPACES categorized by the QUEUE TYPES, in which they have been waiting, and categorized by the ADDRESS SPACE TYPES. Furthermore, the MIN, MAX, and AVG numbers of work units are categorized by the CPU TYPES for which they have been dispatched (that is, for standard CPs, zAAPs and zIIPs). This section also shows how many work units have been waiting in the IN-READY queue (DISTRIBUTION OF IN-READY WORK UNIT QUEUE).

**QUEUE TYPES**

- **IN READY**
  - Address spaces that are in central storage and ready to execute or currently in execution.
- **IN**
  - Address spaces that are in central storage (corresponds to SRM in queue).
  - This count includes the IN READY count.
- **OUT READY**
  - Address spaces on the SRM out queue that are physically swapped out of central storage and ready to execute.
  - **Note:** Some address spaces on the SRM out queue might represent those TSO/E users that the SRM intentionally delayed to meet an installation’s response time objective. Because these address spaces do not represent a potential performance problem, they are not included in the value reported for OUT READY.
- **OUT WAIT**
  - Address spaces on the SRM wait queue that are physically swapped out of central storage and not ready to execute.
- **LOGICAL OUT RDY**
  - Address spaces on the SRM out queue that are physically in central storage but logically swapped out of central storage and ready to execute.
- **LOGICAL OUT WAIT**
  - Address spaces on the SRM wait queue that are physically in central storage but logically swapped out of central storage and not ready to execute.

**ADDRESS SPACE TYPES**

- **BATCH**
  - Address spaces used for batch jobs.
- **STC**
  - Address spaces used for started task controls.
- **TSO**
  - Address spaces used for TSO/E users.
- **ASCH**
  - APPC/MVS transaction scheduler (ASCH) address spaces.
- **OMVS**
  - Address spaces for z/OS UNIX System Services.
### Table 136. Fields in the CPU Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISTRIBUTION OF IN-READY WORK UNIT QUEUE</td>
<td>The percentaged and graphical distribution of SRM samples when the number of work units on the IN-READY queue is within a certain range. The correlation is based on N, which is the number of online logical processors when the sample is taken. In HiperDispatch mode, N is the number of online logical processors that are not parked. For example, NUMBER OF WORK UNITS = N + 10 with a percentage of 4.3 (see Figure 180 on page 334) indicates that in 4.3% of the samples ten work units were waiting for a logical processor.</td>
</tr>
<tr>
<td>NUMBER OF WORK UNITS by CPU type</td>
<td>The minimum, maximum and average numbers of running and waiting work units categorized by CPU type (standard CPs, zAAPs and zIIPs).</td>
</tr>
</tbody>
</table>

**Blocked Workload Analysis:** provides information about blocked address spaces and enclaves.

#### OPT PARAMETERS

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| BLWLTRPCT (%) | Specifies how much of the CPU capacity is to be used to promote blocked workloads. This parameter does not influence the amount of CPU service that a single blocked address space or enclave is given. Instead, this parameter influences how many different address spaces or enclaves can be promoted at the same point in time. If the value specified with this parameter is not large enough, blocked workloads might need to wait longer than the time interval defined by BLWLINTHD. This value is specified as a number between 0 and 200 where 200 accounts for 20.0%.
| BLWLINTHD | Specifies the threshold time interval in seconds for which a swapped-in address space or enclave must wait before being considered to be blocked and eligible for promotion. If the parameters have been changed during the reporting interval, the values are followed by an “*”. |

#### PROMOTE RATE

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF DISPATCHABLE WORK UNITS WHICH MAY GET PROMOTED IN THEIR DISPATCHING PRIORITY PER SECOND</td>
<td>The utilization of the defined promote rate during the reporting interval.</td>
</tr>
</tbody>
</table>

#### WAITERS FOR PROMOTE

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF ADDRESS SPACES AND ENCLAVES FOUND BLOCKED ACCORDING TO OPT PARAMETER BLWLINTHD: AVG</td>
<td>Average number found blocked during the report interval.</td>
</tr>
<tr>
<td>PEAK</td>
<td>Highest number found blocked during the report interval.</td>
</tr>
</tbody>
</table>

### Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](#). The following table shows the overview condition names for the Overview report.

#### Table 137. Overview names in the CPU Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC CAPACITY</td>
<td>NOMCAPAC, EFFCAPAC</td>
</tr>
<tr>
<td>ONLINE TIME PERC for general purpose processors</td>
<td>CONTPER</td>
</tr>
<tr>
<td>LPAR BUSY TIME PERC</td>
<td>CPUBSY (LPAR mode only)</td>
</tr>
<tr>
<td>LPAR BUSY TIME PERC for zAAPs</td>
<td>AAPBSY</td>
</tr>
<tr>
<td>LPAR BUSY TIME PERC for zIIPs</td>
<td>IIPBSY</td>
</tr>
<tr>
<td>MVS BUSY TIME PERC</td>
<td>MVSBSY, CPUBSY</td>
</tr>
</tbody>
</table>
Using the information in the Partition Data Report

When RMF is running in a Processor Resource/Systems Manager (PR/SM) environment in LPAR mode, the Partition Data Report section of the CPU Activity report provides data about all configured partitions active at the end of the reporting interval, independent of the operating system running in each partition.

When RMF is running on a z/OS guest in a z/VM guest environment, and the Monitor I data gatherer option VMGUEST has been set when the SMF record was
collected, then the report section provides data about the z/OS guest system. If you want information about another z/OS guest system, you can run RMF separately on that guest system.

The report contains the following information:
- Header information
- Partition data
- Logical partition processor data
- Average processor utilization percentages

The header information gives an overview of the LPAR mode characteristics:
- MVS partition name
- Image capacity — information related to software pricing
- Number of configured partitions
- Number of physical processors in total and per type
- Wait completion indicator
- Dispatch interval
- If a group of LPARs on the same CEC is managed towards a combined capacity limit, the name of the group and the common capacity limit is displayed

The section PARTITION DATA is grouped by general purpose and special purpose processor types and provides the following information:
- Name
- Status
- Weighting share of resources
- Defined and consumed service units
- Capping information

The section LOGICAL PARTITION PROCESSOR DATA provides the following information about the partition's processors:
- Number and type of processors assigned to this partition
- The partition's effective dispatch time
- The partition's total dispatch time

The section AVERAGE PROCESSOR UTILIZATION PERCENTAGES provides the following information about the partition's processors:
- Logical constraint percentages. If multithreading is enabled, the percentages shown for logical processor resources can be applied to logical core resources.
  - The partition's average effective utilization of the logical processor resource
  - The partition's average total utilization of the logical processor resource
- Physical constraint percentages. If multithreading is enabled, the percentages shown for physical processor resources can be applied to physical core resources.
  - The average LPAR Management utilization of the physical processor resource on behalf of the partition
  - The partition's average effective utilization of the physical processor resource
  - The partition's average total utilization of the physical processor resource
Note: An asterisk (*) next to any value indicates a change to this value during the measurement interval.

Table 138. Fields in the Partition Data Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Header Information</strong></td>
<td></td>
</tr>
<tr>
<td>MVS PARTITION NAME</td>
<td>The partition running the z/OS system which requested this report. VMSYSTEM is displayed if the report was requested by a z/OS system running in a z/VM guest environment.</td>
</tr>
</tbody>
</table>
| IMAGE CAPACITY                | CPU capacity available to the MVS image measured in MSUs (millions of service units) per hour. The field is calculated as minimum of the following capacities:  
  * the capacity based on the partition's logical CP configuration  
  * the defined capacity limit of the partition, if available (image softcap)  
  * the capacity limit of the related WLM capacity group, if the partition belongs to a capacity group  
  * the absolute physical hardware capacity limit.  
For z/OS systems running as z/VM guests, the field displays the CPU capacity available to the z/VM partition. |
<p>| NUMBER OF CONFIGURED PARTITIONS | The total number of activated and deactivated configured partitions. This number does not include the partition reported by the name &quot;PHYSICAL&quot;. |</p>
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF PHYSICAL PROCESSORS</td>
<td>Number of physical processors in total and per processor type. Starting with IBM System z9 processors, IFLs and zAAPs are reported separately, and no longer as ICFs. If the data is reported for a z/OS system running as a z/VM guest, the field presents the number of processors that are assigned to the z/VM partition.</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>NUMBER OF VMSystem PROCESSORS</td>
<td></td>
</tr>
<tr>
<td>WAIT COMPLETION</td>
<td>The wait completion option of the partition: YES, NO, or MIX.</td>
</tr>
<tr>
<td>YES</td>
<td>Implies that the processors assigned to each partition will remain dispatched to the partition until the time slice period has ended.</td>
</tr>
<tr>
<td>NO</td>
<td>Implies that the processors assigned to each partition become available to other partitions when the work for this partition is completed. The time slice period might or might not have ended. This field has no meaning for a dedicated partition.</td>
</tr>
<tr>
<td>MIX</td>
<td>Indicates that a mix of YES and NO is used for processors in the partition where RMF is running.</td>
</tr>
<tr>
<td>DISPATCH INTERVAL</td>
<td>Time (in milliseconds) a processor can be used when dispatched. This value is specified on the Logical Partition Control (LPCTO) frame on the Processor Controller Element (PCE).</td>
</tr>
<tr>
<td></td>
<td>DYNAMIC appears in this field if a value is not specified and implies that the length of time a processor is assigned to a partition is dynamically allocated. See PR/SM Planning Guide for more information.</td>
</tr>
<tr>
<td>GROUP NAME</td>
<td>Name of the capacity group to which the partition belongs, if it is managed towards a common group capacity limit.</td>
</tr>
<tr>
<td>LIMIT</td>
<td>Capacity limit (in MSUs) defined for the partition's capacity group.</td>
</tr>
<tr>
<td></td>
<td>An * following the limit value indicates that this partition started to be a member of this capacity group less than four hours ago. This partition will have a different view of unused group capacity and, therefore, may cap differently than existing group members.</td>
</tr>
<tr>
<td>AVAILABLE</td>
<td>Long-term average of CPU service in MSUs/h which would be allowed by the limit of the capacity group but is not used by its members. If the value is negative, the group is capped.</td>
</tr>
<tr>
<td>Partition Data</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>The name that identifies a partition D</td>
</tr>
<tr>
<td>Note:</td>
<td>1. The partition identified by the name &quot;PHYSICAL* is not a configured partition. Data reported for &quot;PHYSICAL* is shown only in columns DISPATCH TIME DATA - TOTAL, PHYSICAL PROCESSORS - LPAR MGMT, and PHYSICAL PROCESSORS - TOTAL.</td>
</tr>
<tr>
<td></td>
<td>2. When data about a z/OS system in a z/VM guest environment is reported, the &quot;VMSystem&quot; line reports the time used by z/VM itself.</td>
</tr>
<tr>
<td>S</td>
<td>The current status of the partition:</td>
</tr>
<tr>
<td>A</td>
<td>Activated</td>
</tr>
<tr>
<td>D</td>
<td>Deactivated. The LPAR is configured but there are currently no logical CPUs online for this partition.</td>
</tr>
<tr>
<td>If a partition is deactivated, the rest of the report line is blank.</td>
<td></td>
</tr>
<tr>
<td>WGT</td>
<td>Either the partition’s current weighting of the shared processor resources or one of the following indicators:</td>
</tr>
<tr>
<td>DED</td>
<td>Indicates that the partition is dedicated.</td>
</tr>
<tr>
<td>DMX</td>
<td>Indicates that a mix of dedicated and non-dedicated processors is used in this partition.</td>
</tr>
<tr>
<td>WMX</td>
<td>Indicates that different share values are assigned to processors used in this partition.</td>
</tr>
<tr>
<td>MSU</td>
<td>Shows capacity information for a partition in terms of MSUs per hour. This information is shown for general purpose processors only. For the partition which is gathering the RMF data, this value is equal to the image capacity which is shown in the header of the report.</td>
</tr>
<tr>
<td>ACT</td>
<td>Actual consumption.</td>
</tr>
</tbody>
</table>
### Field Heading | Meaning
--- | ---
CAPPING | Shows capping information for a partition. This field indicates whether the operator has applied any hardware capping mechanism in the logical partition controls of the Hardware Management Console (HMC) for the partition. The value 'YES' identifies that either 'Initial Capping ON' or an absolute physical hardware capacity limit (maximal number of CPUs) has been defined. The field is only useful to logical partitions with shared processors. Dedicated partitions can be thought of as automatically capped. Percentage of time when WLM capped the partition. This information is shown for general purpose processors only.
DEF | The hardware capping option of the partition: YES or NO
WLM% | The number of physical processors assigned to this partition and its processor type.
EFFECTIVE DISPATCH TIME | The sum of all processors' effective dispatch times for this partition during the measurement interval; expressed in the form HH.MM.SS.TTT. Partition effective dispatch time is the time, excluding LPAR management time, that a processor was assigned to this partition during the measurement interval.
TOTAL DISPATCH TIME | The sum of all processors' dispatch times for this partition during the measurement interval, including LPAR management time. It is possible that the total dispatch time is smaller than the effective dispatch time. This situation occurs when partitions get ‘overruns’ in their dispatch intervals caused by machine delays. The most typical form of this is caused by an MVS partition trying to talk to a coupling facility but getting significant delays or time-outs. It is sometimes symptomatic of recovery problems on the machine. For 'PHYSICAL', this value includes the time during which a physical CPU was busy, but the time could not be attributed to a specific logical partition. This time includes the time PR/SM was controlling the physical processor (LPAR management time), as well as any other time the processor was busy for any reason such as managing coupling facility traffic.
Logical Partition Processor Data
PROCESSOR | The number of physical processors assigned to this partition and its processor type.
NUM TYPE | The sum of processors' effective dispatch times for this partition during the measurement interval; expressed in the form HH.MM.SS.TTT. Partition effective dispatch time is the time, excluding LPAR management time, that a processor was assigned to this partition during the measurement interval.
Effective Dispatch Time | The average partition effective dispatch time percentage.
\[ \text{Effective Dispatch Time} = \frac{\sum \text{Online Times}}{\sum \text{Online Times}} \times 100 \]
Total Dispatch Time | The average partition total dispatch time percentage.
\[ \text{Total Dispatch Time} = \frac{\sum \text{Online Times}}{\sum \text{Online Times}} \times 100 \]
### Table 138. Fields in the Partition Data Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL PROCESSORS - LPAR MGMT</td>
<td>The average LPAR management time on behalf of the partition reported as a percentage of the measurement interval.</td>
</tr>
<tr>
<td></td>
<td>Total Dispatch Time - Effective Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>-------------------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Physical Processors * Interval Time</td>
</tr>
<tr>
<td></td>
<td>If the total dispatch time is smaller than the effective dispatch time, *** is shown in this column.</td>
</tr>
<tr>
<td></td>
<td>The calculation for the &quot;PHYSICAL&quot; partition is:</td>
</tr>
<tr>
<td></td>
<td>Total Time <em>PHYSICAL</em></td>
</tr>
<tr>
<td></td>
<td>----------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Physical Processors * Interval Time</td>
</tr>
<tr>
<td></td>
<td>Time &quot;PHYSICAL&quot; is the time that could not be attributed to a specific logical partition, but was used by PR/SM to control the physical processor (LPAR management time).</td>
</tr>
<tr>
<td></td>
<td>Note: # Physical Processors denotes the number of physical processors of a certain processor group, either general purpose processors or special purpose processors.</td>
</tr>
<tr>
<td>PHYSICAL PROCESSORS - EFFECTIVE</td>
<td>The effective utilization of the physical processor resource by the partition.</td>
</tr>
<tr>
<td></td>
<td>Effective Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>---------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Physical Processors * Interval Time</td>
</tr>
<tr>
<td>PHYSICAL PROCESSORS - TOTAL</td>
<td>The total utilization of the physical processor resource by the partition.</td>
</tr>
<tr>
<td></td>
<td>Total Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>----------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td># Physical Processors * Interval Time</td>
</tr>
<tr>
<td>TOTAL</td>
<td>The total amount of time the physical processor resource was assigned to a configured partition and to partition &quot;PHYSICAL&quot;.</td>
</tr>
<tr>
<td></td>
<td>The sum of the AVERAGE PHYSICAL PROCESSOR UTILIZATION - LPAR MGMT field represents the total utilization of PR/SM physical processor resource by PR/SM.</td>
</tr>
<tr>
<td></td>
<td>The sum of the AVERAGE PHYSICAL PROCESSOR UTILIZATION - EFFECTIVE field represents the total utilization of PR/SM physical processor resource by the operating systems running in each active partition.</td>
</tr>
<tr>
<td></td>
<td>The sum of the AVERAGE PHYSICAL PROCESSOR UTILIZATION - TOTAL field represents the total utilization of the PR/SM physical processor resource by all configured partitions and by partition &quot;PHYSICAL&quot;.</td>
</tr>
</tbody>
</table>

**Spreadsheet and Overview reference**

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User's Guide](#). The following table shows the overview condition names for the Overview report.

**Table 139. Overview names in the Partition Data Report**

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTITION DATA - MSU DEF</td>
<td>LDEFMSU</td>
</tr>
<tr>
<td>PARTITION DATA - MSU ACT</td>
<td>LACTMSU</td>
</tr>
<tr>
<td>PARTITION DATA - CAPPING DEF</td>
<td>INICAP, LIMCPU</td>
</tr>
<tr>
<td>PARTITION DATA - CAPPING WLM%</td>
<td>WCAPPER</td>
</tr>
</tbody>
</table>

**Using the information in the LPAR Cluster Report**

Starting with zSeries 900 (z900) servers, the Workload Manager is extended to work with PR/SM to dynamically expand resources that are available across LPARs.
An LPAR cluster is the subset of the systems that are running as LPARs on the same CEC. Based on business goals, WLM can direct PR/SM to enable or disable CP capacity for an LPAR, without human intervention.

**LPAR CPU Management**

Based on workload resource demand, the Workload Manager is able to dynamically adjust the number of logical processors and the weight of a logical partition. This allows the system to distribute the CPU resource in an LPAR cluster to partitions where the CPU demand is high. An LPAR cluster is defined as the set of logical partitions in a single CEC that belong to the same parallel sysplex.

The dynamic adjustment of processor resources within the partitions is reflected in the LPAR Cluster report, which provides LPAR views as well as aggregated views on LPAR cluster level.

### Table 140. Fields in the LPAR Cluster Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLUSTER</td>
<td>This field identifies a sysplex name associated with the partition. All partitions that have the same cluster name are grouped together.</td>
</tr>
<tr>
<td>PARTITION</td>
<td>Name of the logical partition.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>z/OS system name.</td>
</tr>
</tbody>
</table>

**Weighting Statistics**

All MIN/MAX-related fields are blank for partitions which are not under control of LPAR CPU management.

**DEFINED INIT / MIN / MAX**

Defined initial, minimum, and maximum weighting of the shared processor resources. A value of zero in fields MIN/MAX indicates that the partition is under control of LPAR CPU management, but no MIN/MAX values have been specified.

**ACTUAL AVG**

Actual weighting of the shared processor resources. The contents of this field is equal to field WGT in the Partition Data report.

**ACTUAL MIN% / MAX%**

Percentage of time when the partition was within a bandwidth of 10% above the defined minimum weighting, or 10% below the defined maximum weighting.

**Processor Statistics**

**NUMBER DEFINED / ACTUAL**

Defined and average actual number of general purpose processors assigned to this partition. The actual number might be different from the defined number because of WLM goal achievement reasons.
Table 140. Fields in the LPAR Cluster Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL % LBUSY</td>
<td>Total dispatch time reported as a percentage of the logical processor online time:</td>
</tr>
<tr>
<td></td>
<td>Partition Total Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>----------------------------------------------- * 100</td>
</tr>
<tr>
<td></td>
<td>∑ Logical Processor Online Times</td>
</tr>
<tr>
<td></td>
<td>The contents of this field is equal to the LOGICAL PROCESSOR UTILIZATION - TOTAL column in the Partition Data report.</td>
</tr>
<tr>
<td>TOTAL % PBUSY</td>
<td>Total utilization of the physical processor resource by the partition:</td>
</tr>
<tr>
<td></td>
<td>Partition Total Dispatch Time</td>
</tr>
<tr>
<td></td>
<td>------------------------------------------------------ * 100</td>
</tr>
<tr>
<td></td>
<td># Physical Processors * Interval Time</td>
</tr>
<tr>
<td></td>
<td>The contents of this field is equal to the PHYSICAL PROCESSOR UTILIZATION - TOTAL column in the Partition Data report.</td>
</tr>
</tbody>
</table>

Storage Statistics

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL</td>
<td>The defined size of central storage (in MB) for this partition.</td>
</tr>
<tr>
<td>EXPANDED</td>
<td>The defined size of expanded storage (in MB) for this partition.</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User's Guide](#). The following table shows the overview condition names for the Overview report.

Table 141. Overview names in the LPAR Cluster Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEIGHTING - DEFINED INIT (Cluster)</td>
<td>WDEFC</td>
</tr>
<tr>
<td>WEIGHTING - DEFINED INIT (general purpose processors)</td>
<td>WDEFL</td>
</tr>
<tr>
<td>WEIGHTING - DEFINED MIN</td>
<td>WMINL</td>
</tr>
<tr>
<td>WEIGHTING - DEFINED MAX</td>
<td>WMAXL</td>
</tr>
<tr>
<td>WEIGHTING - ACTUAL AVG</td>
<td>WACTL</td>
</tr>
<tr>
<td>WEIGHTING - ACTUAL MIN%</td>
<td>WMIPL</td>
</tr>
<tr>
<td>WEIGHTING - ACTUAL MAX%</td>
<td>WMAPL</td>
</tr>
<tr>
<td>PROCESSOR - NUMBER DEFINED (Cluster)</td>
<td>NLDEFC</td>
</tr>
<tr>
<td>PROCESSOR - NUMBER DEFINED (Partition)</td>
<td>NLDEFL</td>
</tr>
<tr>
<td>PROCESSOR - NUMBER ACTUAL</td>
<td>NLACTL</td>
</tr>
<tr>
<td>PROCESSOR - TOTAL% LBUSY (Cluster)</td>
<td>LBUSYC</td>
</tr>
<tr>
<td>PROCESSOR - TOTAL% LBUSY (Partition)</td>
<td>LBUSYL</td>
</tr>
<tr>
<td>PROCESSOR - TOTAL% PBUSY (Cluster)</td>
<td>PBUSYC</td>
</tr>
<tr>
<td>PROCESSOR - TOTAL% PBUSY (general purpose processors)</td>
<td>PBUSYL</td>
</tr>
</tbody>
</table>

Using the information in the Group Capacity Report

You can apply a defined capacity limit not only to one logical partition, but to a group of LPARs on the same CEC and manage this group considering the combined defined capacities of all members of the group.

With the group capacity limit, a third restriction to an LPAR is added. Even when an LPAR is not limited by its weight or its defined capacity, it can be limited by the group capacity. The minimum of the three limitations is applied to any partition:

1. Defined capacity
2. LPAR weights
3. Group capacity limit

The Group Capacity Report monitors the available capacity of each defined capacity group and the MSU consumption and actual capping of these groups and of each partition within such a group. It helps you to exploit the flexibility to use as much CPU as needed for short periods of time until the 4 hour rolling MSU average exceeds the defined capacity limit for the whole group.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP-CAPACITY NAME</td>
<td>Name of the capacity group.</td>
</tr>
<tr>
<td>GROUP-CAPACITY LIMIT</td>
<td>MSU limit defined for the capacity group.</td>
</tr>
<tr>
<td>PARTITION</td>
<td>Name of the logical partition.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>Name of the z/OS system.</td>
</tr>
<tr>
<td>MSU DEF</td>
<td>User defined capacity limit.</td>
</tr>
<tr>
<td>MSU ACT</td>
<td>Actual MSU consumption of this partition.</td>
</tr>
<tr>
<td>WGT</td>
<td>The partition’s weighting of the shared processor resources which is used for WLM Group Capacity decisions. In case of hard capped partitions (see field CAPPING DEF), dashes (---) are displayed.</td>
</tr>
<tr>
<td>CAPPING DEF</td>
<td>The initial capping option of the partition: YES/NO</td>
</tr>
<tr>
<td>CAPPING WLM%</td>
<td>Percentage of time when WLM considers to cap the partition.</td>
</tr>
<tr>
<td>CAPPING ACT%</td>
<td>Percentage of time when capping actually limited the usage of processor resources for the partition.</td>
</tr>
<tr>
<td>MINIMUM ENTITLEMENT</td>
<td>The minimum share of the MSU limit defined for the capacity group that the partition receives, even if all other partitions within the capacity group are running high workload. N/A is displayed for hard capped partitions.</td>
</tr>
<tr>
<td>MAXIMUM ENTITLEMENT</td>
<td>The maximum share of the MSU limit defined for the capacity group that a partition can receive if all other partitions within the capacity group are running without workload. N/A is displayed for hard capped partitions.</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference
You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following table shows the overview condition names for the Overview report.
Table 143. Overview names in the Group Capacity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSU - ACT</td>
<td>GCMSUACT</td>
</tr>
<tr>
<td>WGT</td>
<td>GCWEIGHT</td>
</tr>
<tr>
<td>MINIMUM ENTITLEMENT</td>
<td>MINENT</td>
</tr>
<tr>
<td>MAXIMUM ENTITLEMENT</td>
<td>MAXENT</td>
</tr>
</tbody>
</table>

Duration report
The following aspects have to be considered for a duration report.

The Postprocessor accumulates only similar SMF record types when the CPU activity report is requested. The first record determines the type of records to be accumulated. For example, if the first SMF record RMF encounters is a PR/SM SMF record, RMF accumulates only PR/SM SMF records. Non-PR/SM SMF records are skipped.

The following hierarchy exists when the Postprocessor encounters SMF records that RMF writes while running in different PR/SM environments:
1. If the SMF records contain different system identifiers then the records are processed separately.
   For example, if SMF records written in partition 1 and partition 2 have different system identifiers, and the SYSID control statement is not used, then two separate reports will be generated. If the SYSID control statement is specified, only the system identified in the statement will be reported. See z/OS RMF User’s Guide for more information on this processing.
2. If the SMF records contain the same system identifiers, but differs in MVS partition name, number of configured partitions or partition name, the records are processed selectively.
   The first SMF record encountered defines the type of records to be accumulated. Any subsequent records that do not have the same characteristics are skipped.
3. If the SMF records contain the same system identifier but differs in number of physical processors, status, wait completion or number of logical processors, the records are processed as if they were from the same system. All records are processed. When a new value is encountered, an asterisk (*) appears next to the changed value on the report. The new value is reported.

CRYPTO - Crypto Hardware Activity report
The Crypto Hardware Activity report provides information about the activities in the various cryptographic hardware functions. Most cryptographic hardware functions can only be used through Cryptographic Support for z/OS (ICSF). ICSF is a standard component of z/OS. It provides cryptographic services in the z/OS environment. The report provides the following sections:

- **Cryptographic CCA coprocessors**
  This section provides measurements about secure cryptographic functions executed on Common Cryptographic Architecture (CCA) coprocessors, use of secure encrypted key values, clear key and secure PKA operations, and special user cryptographic functions (using the user defined extension (UDX) capability of the card). For cryptographic CCA coprocessors, special attention should be given to RSA key-generation operations because these operations require a high
amount of cryptographic processing capacity. Therefore, they are reported in addition to the total number of operations.

- **Cryptographic PKCS11 coprocessors**
  This section provides measurements about secure public-key operations executed by cryptographic symmetric- and asymmetric-key functions.

- **Cryptographic accelerators**
  This section provides measurements about public key operations (RSA cryptography operations) used with Secure Sockets Layer (SSL) or Transport Layer Security (TLS) protocols which are widely used to help secure e-business applications. The data for cryptographic accelerators is showing details for the two available algorithms, modular exponentiation (ME) and Chinese Remainder Theorem (CRT) for available key lengths (1024, 2048, and 4096 bit). This provides information how the usage of these algorithms affects the utilization of the accelerator.

- **ICSF Services**
  The Crypto Hardware Activity report provides performance measurements on selected ICSF activities:
  - Using the single and triple Data Encryption Standard (DES) and the Advanced Encryption Standard (AES) to encipher and decipher data.
  - Generating and verifying message authentication codes (MAC). The MAC is a value calculated from the message according to a secret shared DES key or AES key and sent to the receiver together with the message. The receiver can recalculate the MAC and compare it with the MAC received. If the MAC values are identical, the message has not been altered during transmission.
  - Using public hash functions. A hash is calculated from the transmission data according to a public key or function in cases where it is impossible to share a secret key. If the recalculated hash is identical to the one calculated before transmission, data integrity is ensured.
  - Translating and verifying PINs.
  - Digital signature generation and verification. A digital signature is created using the data to be signed and a private key, either using the ECC (Elliptic Curve Cryptography) or the RSA (Ron Rivest, Adi Shamir and Leonard Adleman) algorithm. The digitally signed data is sent to the receiver. The receiver can verify that the signature is valid, using the signer's public key.
  - Format preserving encryption (FPE) to encipher, decipher, and translate data while preserving the original formatting of the data.

**How to request this report**
Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify NOCRYPTO.

To produce this report, specify
REPORTS(CRYPTO)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](http://ddshost:8803/gpm/rmfpp.xml?reports=CRYPTO) in the [z/OS RMF User’s Guide](http://ddshost:8803/gpm/rmfpp.xml?reports=CRYPTO) provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**

Contents of the report

The data shown for cryptographic coprocessors and accelerators always reflects the total activity in your CPC, while the data shown for ICSF services is for the partition. If measurement data for one of the cryptographic features is not available, the corresponding report section is omitted.

Table 144. Fields in the CRYPTO Hardware Activity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptographic CCA Coprocessor</td>
<td>Type that defines the cryptographic CCA coprocessor:</td>
</tr>
<tr>
<td>TYPE</td>
<td>Meaning</td>
</tr>
<tr>
<td>PCICC</td>
<td>PCI Cryptographic Coprocessor</td>
</tr>
<tr>
<td>PCIXCC</td>
<td>PCI-X Cryptographic Coprocessor</td>
</tr>
<tr>
<td>CEX2C</td>
<td>Crypto Express2 Coprocessor</td>
</tr>
<tr>
<td>CEX3C</td>
<td>Crypto Express3 Coprocessor</td>
</tr>
<tr>
<td>CEX4C</td>
<td>Crypto Express4S Coprocessor</td>
</tr>
<tr>
<td>CEX5C</td>
<td>Crypto Express5S Coprocessor</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ID</td>
<td>Index that specifies the cryptographic CCA coprocessor.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>RATE Rate of all operations on this cryptographic coprocessor.</td>
</tr>
<tr>
<td></td>
<td>EXEC TIME Average execution time (milliseconds) of all operations on this cryptographic coprocessor.</td>
</tr>
<tr>
<td></td>
<td>UTIL% Total utilization percentage of this coprocessor.</td>
</tr>
<tr>
<td>KEY-GEN RATE</td>
<td>Rate for RSA-key-generation operations.</td>
</tr>
</tbody>
</table>

**Cryptographic PKCS11 Coprocessor**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Meaning</td>
</tr>
<tr>
<td>CEX4P</td>
<td>Crypto Express4S PKCS11 Coprocessor</td>
</tr>
<tr>
<td>CEX5P</td>
<td>Crypto Express5S PKCS11 Coprocessor</td>
</tr>
<tr>
<td>ID</td>
<td>Index that specifies the cryptographic PKCS11 coprocessor.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Rate, average execution time (in milliseconds) and utilization percentage for all operations executed on this cryptographic PKCS11 coprocessor.</td>
</tr>
</tbody>
</table>

**OPERATIONS DETAILS**

Rate, average execution time (in milliseconds) and utilization percentage for executed operations, categorized by cryptographic function type:

<table>
<thead>
<tr>
<th>Type</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASYM FAST</td>
<td>Fast asymmetric-key function</td>
</tr>
<tr>
<td>ASYM GEN</td>
<td>Asymmetric-key generation function</td>
</tr>
<tr>
<td>ASYM SLOW</td>
<td>Slow asymmetric-key function</td>
</tr>
<tr>
<td>SYMM COMPLETE</td>
<td>Symmetric-key function that returns a complete or final result</td>
</tr>
<tr>
<td>SYMM PARTIAL</td>
<td>Symmetric-key function that returns partial or incremental results</td>
</tr>
</tbody>
</table>

**Cryptographic Accelerator**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Meaning</td>
</tr>
<tr>
<td>PCICA</td>
<td>PCI Cryptographic Accelerator</td>
</tr>
<tr>
<td>CEX2A</td>
<td>Crypto Express2 Accelerator</td>
</tr>
<tr>
<td>CEX3A</td>
<td>Crypto Express3 Accelerator</td>
</tr>
<tr>
<td>CEX4A</td>
<td>Crypto Express4S Accelerator</td>
</tr>
<tr>
<td>CEX5A</td>
<td>Crypto Express5S Accelerator</td>
</tr>
<tr>
<td>ID</td>
<td>Index that specifies the cryptographic accelerator.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Rate, average execution time (in milliseconds) and utilization for all operations on this cryptographic accelerator.</td>
</tr>
<tr>
<td>KEY</td>
<td>Used RSA key length for each cryptographic accelerator and for each available RSA operation format (ME or CRT).</td>
</tr>
<tr>
<td>ME-FORMAT RSA OPERATIONS</td>
<td>Rate, average execution time (in milliseconds) and utilization for all operations in ME-format (one line for each used RSA key length).</td>
</tr>
<tr>
<td>CRT-FORMAT RSA OPERATIONS</td>
<td>Rate, average execution time (in milliseconds) and utilization for all operations in CRT-format (one line for each used RSA key length).</td>
</tr>
</tbody>
</table>

**ICSF services**
Table 144. Fields in the CRYPTO Hardware Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENCRYPTION</strong></td>
<td></td>
</tr>
<tr>
<td>SDES RATE</td>
<td>Rate of encipher service calls using single DES.</td>
</tr>
<tr>
<td>SDES SIZE</td>
<td>Average number of bytes per service call that have been enciphered using single DES.</td>
</tr>
<tr>
<td>TDES RATE</td>
<td>Rate of encipher service calls using double and triple DES.</td>
</tr>
<tr>
<td>TDES SIZE</td>
<td>Average number of bytes per service call that have been enciphered using double and triple DES.</td>
</tr>
<tr>
<td>AES RATE</td>
<td>Rate of encipher service calls using AES.</td>
</tr>
<tr>
<td>AES SIZE</td>
<td>Average number of bytes per service call that have been enciphered using AES.</td>
</tr>
<tr>
<td><strong>DECRYPTION</strong></td>
<td></td>
</tr>
<tr>
<td>SDES RATE</td>
<td>Rate of decipher service calls using single DES.</td>
</tr>
<tr>
<td>SDES SIZE</td>
<td>Average number of bytes per service call that have been deciphered using single DES.</td>
</tr>
<tr>
<td>TDES RATE</td>
<td>Rate of decipher service calls using double and triple DES.</td>
</tr>
<tr>
<td>TDES SIZE</td>
<td>Average number of bytes per service call that have been deciphered using double and triple DES.</td>
</tr>
<tr>
<td>AES RATE</td>
<td>Rate of decipher service calls using AES.</td>
</tr>
<tr>
<td>AES SIZE</td>
<td>Average number of bytes per service call that have been deciphered using AES.</td>
</tr>
<tr>
<td><strong>MAC</strong></td>
<td></td>
</tr>
<tr>
<td>GENERATE RATE</td>
<td>Rate of requests to generate MACs.</td>
</tr>
<tr>
<td>GENERATE SIZE</td>
<td>Average number of bytes per request for which MAC has been generated.</td>
</tr>
<tr>
<td>VERIFY RATE</td>
<td>Rate of requests to verify MACs.</td>
</tr>
<tr>
<td>VERIFY SIZE</td>
<td>Average number of bytes per request for which MAC has been verified.</td>
</tr>
</tbody>
</table>

**Note:** For AES, only service calls and bytes sent to a coprocessor are reported.
### Table 144. Fields in the CRYPTO Hardware Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HASH</strong></td>
<td></td>
</tr>
<tr>
<td>SHA-1 RATE</td>
<td>Rate of requests to hash using the SHA-1 hash algorithm.</td>
</tr>
<tr>
<td>SHA-1 SIZE</td>
<td>Average number of bytes to be hashed per request using the SHA-1 hash algorithm.</td>
</tr>
<tr>
<td>SHA-256 RATE</td>
<td>Rate of requests to hash using the SHA-224 or the SHA-256 hash algorithm.</td>
</tr>
<tr>
<td>SHA-256 SIZE</td>
<td>Average number of bytes to be hashed per request using the SHA-224 or the SHA-256 hash algorithm.</td>
</tr>
<tr>
<td>SHA-512 RATE</td>
<td>Rate of requests to hash using the SHA-384 or the SHA-512 hash algorithm.</td>
</tr>
<tr>
<td>SHA-512 SIZE</td>
<td>Average number of bytes to be hashed per request using the SHA-384 or the SHA-512 hash algorithm.</td>
</tr>
<tr>
<td><strong>PIN</strong></td>
<td></td>
</tr>
<tr>
<td>TRANSLATE RATE</td>
<td>Rate of requests to translate PIN.</td>
</tr>
<tr>
<td>VERIFY RATE</td>
<td>Rate of requests to verify PIN.</td>
</tr>
<tr>
<td><strong>AES MAC</strong></td>
<td></td>
</tr>
<tr>
<td>GENERATE RATE</td>
<td>Rate of requests to generate AES MACs</td>
</tr>
<tr>
<td>GENERATE SIZE</td>
<td>Average number of bytes per request for which AES MACs have been generated.</td>
</tr>
<tr>
<td>VERIFY RATE</td>
<td>Rate of requests to verify AES MACs.</td>
</tr>
<tr>
<td>VERIFY SIZE</td>
<td>Average number of bytes per request for which AES MACs have been verified.</td>
</tr>
<tr>
<td><strong>RSA DSIG</strong></td>
<td></td>
</tr>
<tr>
<td>GENERATE RATE</td>
<td>Rate of requests to generate RSA digital signatures.</td>
</tr>
<tr>
<td>VERIFY RATE</td>
<td>Rate of requests to verify RSA digital signatures.</td>
</tr>
<tr>
<td><strong>ECC DSIG</strong></td>
<td></td>
</tr>
<tr>
<td>GENERATE RATE</td>
<td>Rate of requests to generate ECC digital signatures.</td>
</tr>
<tr>
<td>VERIFY RATE</td>
<td>Rate of requests to verify ECC digital signatures.</td>
</tr>
<tr>
<td><strong>FORMAT PRESERVING ENCRYPTION</strong></td>
<td></td>
</tr>
<tr>
<td>ENCIPHER RATE</td>
<td>Rate of requests to encipher data using FPE.</td>
</tr>
<tr>
<td>ENCIPHER SIZE</td>
<td>Average number of bytes per request that have been enciphered using FPE</td>
</tr>
<tr>
<td>DECIPHER RATE</td>
<td>Rate of requests to decipher data using FPE</td>
</tr>
<tr>
<td>DECIPHER SIZE</td>
<td>Average number of bytes per request that have been deciphered using FPE</td>
</tr>
<tr>
<td>TRANSLATE RATE</td>
<td>Rate of requests to translate data using FPE</td>
</tr>
<tr>
<td>TRANSLATE SIZE</td>
<td>Average number of bytes per request that have been translated using FPE</td>
</tr>
</tbody>
</table>
Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User's Guide. The following table shows the overview condition names for the Overview report.

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptographic coprocessor TOTAL RATE</td>
<td>CRYCTR</td>
</tr>
<tr>
<td>Cryptographic coprocessor TOTAL EXEC TIME</td>
<td>CRYCTE</td>
</tr>
<tr>
<td>Cryptographic coprocessor TOTAL UTIL%</td>
<td>CRYCTU</td>
</tr>
<tr>
<td>Cryptographic coprocessor KEY-GENERATION RATE</td>
<td>CRYCKER</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(1024) RATE</td>
<td>CRYAM1R</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(1024) EXEC TIME</td>
<td>CRYAM1E</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(1024) UTIL%</td>
<td>CRYAM1U</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(2048) RATE</td>
<td>CRYAM2R</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(2048) EXEC TIME</td>
<td>CRYAM2E</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(2048) UTIL%</td>
<td>CRYAM2U</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(4096) RATE</td>
<td>CRYAM3R</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(4096) EXEC TIME</td>
<td>CRYAM3E</td>
</tr>
<tr>
<td>Cryptographic accelerator ME(4096) UTIL%</td>
<td>CRYAM3U</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(1024) RATE</td>
<td>CRYAC1R</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(1024) EXEC TIME</td>
<td>CRYAC1E</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(1024) UTIL%</td>
<td>CRYAC1U</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(2048) RATE</td>
<td>CRYAC2R</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(2048) EXEC TIME</td>
<td>CRYAC2E</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(2048) UTIL%</td>
<td>CRYAC2U</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(4096) RATE</td>
<td>CRYAC3R</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(4096) EXEC TIME</td>
<td>CRYAC3E</td>
</tr>
<tr>
<td>Cryptographic accelerator CRT(4096) UTIL%</td>
<td>CRYAC3U</td>
</tr>
<tr>
<td>ENCRYPTION SDES RATE</td>
<td>CRYISDER</td>
</tr>
<tr>
<td>ENCRYPTION SDES SIZE</td>
<td>CRYISDES</td>
</tr>
<tr>
<td>ENCRYPTION TDES RATE</td>
<td>CRYITDER</td>
</tr>
<tr>
<td>ENCRYPTION TDES SIZE</td>
<td>CRYITDES</td>
</tr>
<tr>
<td>ENCRYPTION AES RATE</td>
<td>CRYIAER</td>
</tr>
<tr>
<td>ENCRYPTION AES SIZE</td>
<td>CRYIAES</td>
</tr>
<tr>
<td>Average number of coprocessor calls for AES encipher services</td>
<td>CRYIAEO</td>
</tr>
<tr>
<td>DECRYPTION SDES RATE</td>
<td>CRYISDDR</td>
</tr>
<tr>
<td>DECRYPTION SDES SIZE</td>
<td>CRYISDDS</td>
</tr>
<tr>
<td>DECRYPTION TDES RATE</td>
<td>CRYITDDR</td>
</tr>
<tr>
<td>DECRYPTION TDES SIZE</td>
<td>CRYITDDS</td>
</tr>
<tr>
<td>DECRYPTION AES RATE</td>
<td>CRYIADR</td>
</tr>
<tr>
<td>DECRYPTION AES SIZE</td>
<td>CRYIADS</td>
</tr>
<tr>
<td>Average number of coprocessor calls for AES decipher services</td>
<td>CRYIADO</td>
</tr>
<tr>
<td>MAC GENERATE RATE</td>
<td>CRYIMGR</td>
</tr>
<tr>
<td>MAC GENERATE SIZE</td>
<td>CRYIMGS</td>
</tr>
<tr>
<td>MAC VERIFY RATE</td>
<td>CRYIMVR</td>
</tr>
<tr>
<td>MAC VERIFY SIZE</td>
<td>CRYIMVS</td>
</tr>
<tr>
<td>HASH SHA-1 RATE</td>
<td>CRYIHAR</td>
</tr>
</tbody>
</table>
### Table 145. Overview names in the CRYPTO Hardware Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>HASH SHA-1 SIZE</td>
<td>CRYIHAS</td>
</tr>
<tr>
<td>HASH SHA-256 RATE</td>
<td>CRYIH2R</td>
</tr>
<tr>
<td>HASH SHA-256 SIZE</td>
<td>CRYIH2S</td>
</tr>
<tr>
<td>PIN TRANSLATE RATE</td>
<td>CRYIPTR</td>
</tr>
<tr>
<td>PIN VERIFY RATE</td>
<td>CRYIPVR</td>
</tr>
<tr>
<td>AES MAC GENERATE RATE</td>
<td>CRYIAMGR</td>
</tr>
<tr>
<td>AES MAC GENERATE SIZE</td>
<td>CRYIAMGS</td>
</tr>
<tr>
<td>AES MAC VERIFY RATE</td>
<td>CRYIAMVR</td>
</tr>
<tr>
<td>AES MAC VERIFY SIZE</td>
<td>CRYIAMVS</td>
</tr>
<tr>
<td>RSA DIGITALE SIGNATURE GENERATE RATE</td>
<td>CRYIDRGR</td>
</tr>
<tr>
<td>RSA DIGITALE SIGNATURE VERIFY RATE</td>
<td>CRYIDRVR</td>
</tr>
<tr>
<td>ECC DIGITALE SIGNATURE GENERATE RATE</td>
<td>CRYIDEGR</td>
</tr>
<tr>
<td>ECC DIGITALE SIGNATURE VERIFY RATE</td>
<td>CRYIDEVR</td>
</tr>
<tr>
<td>FPE ENCRYPTION RATE</td>
<td>CRYIFPER</td>
</tr>
<tr>
<td>FPE ENCRYPTION SIZE</td>
<td>CRYIFPES</td>
</tr>
<tr>
<td>FPE DECRYPTION RATE</td>
<td>CRYIFPDR</td>
</tr>
<tr>
<td>FPE DECRYPTION SIZE</td>
<td>CRYIFPDS</td>
</tr>
<tr>
<td>FPE TRANSLATION RATE</td>
<td>CRYIFPTR</td>
</tr>
<tr>
<td>FPE TRANSLATION SIZE</td>
<td>CRYIFPTS</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor TOTAL RATE</td>
<td>CRYPTR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor TOTAL UTIL%</td>
<td>CRYPTU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor TOTAL EXEC TIME</td>
<td>CRYPTE</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SLOW ASYM RATE</td>
<td>CRYPSAR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SLOW ASYM UTIL%</td>
<td>CRYPSAU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SLOW ASYM EXEC TIME</td>
<td>CRYPSAE</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor FAST ASYM RATE</td>
<td>CRYPTFAR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor FAST ASYM UTIL%</td>
<td>CRYPTFAU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor FAST ASYM EXEC TIME</td>
<td>CRYPTFAE</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM PART RATE</td>
<td>CRYPSPR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM PART UTIL%</td>
<td>CRYPSPU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM PART EXEC TIME</td>
<td>CRYPSPE</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM COMPL RATE</td>
<td>CRYPSCR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM COMPL UTIL%</td>
<td>CRYPSCU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor SYMM COMPL EXEC TIME</td>
<td>CRYPTSC</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor ASYM GEN RATE</td>
<td>CRYPTAGR</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor ASYM GEN UTIL%</td>
<td>CRYPTAGU</td>
</tr>
<tr>
<td>Cryptographic PKCS11 coprocessor ASYM GEN EXEC TIME</td>
<td>CRYPTAGE</td>
</tr>
</tbody>
</table>

**DEVICE - Device Activity report**

The Device Activity report provides information for all devices in one or more device classes (such as TAPE or DASD) or for those devices you specify on the DEVICE option.
When used with the Channel Path Activity and I/O Queuing Activity reports, this report can help you analyze the I/O activity at your installation and identify bottlenecks caused by a particular device.

How to request this report

Monitor I gathers data for this report automatically with the default option DEVICE(DASD). If you want to suppress gathering, you need to specify NODEVICE.

To produce this report, specify

REPORTS(DEVICE(type))

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports in the z/OS RMF User's Guide](#) provides all required information on how to produce and view XML reports.

Example URL for the DDS API:


Contents of the report

Each Device Activity report begins on a new page, and the class of devices included in the report is indicated by one of the following titles:

<table>
<thead>
<tr>
<th>Report Title</th>
<th>What you specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARACTER READER DEVICE ACTIVITY</td>
<td>DEVICE(CHRDR)</td>
</tr>
<tr>
<td>COMMUNICATION EQUIPMENT ACTIVITY</td>
<td>DEVICE(COMM)</td>
</tr>
<tr>
<td>DIRECT ACCESS DEVICE ACTIVITY</td>
<td>DEVICE(DASD)</td>
</tr>
<tr>
<td>GRAPHICS DEVICE ACTIVITY</td>
<td>DEVICE(GRAPH)</td>
</tr>
<tr>
<td>MAGNETIC TAPE DEVICE ACTIVITY</td>
<td>DEVICE(TAPE)</td>
</tr>
<tr>
<td>UNIT RECORD DEVICE ACTIVITY</td>
<td>DEVICE(UNITR)</td>
</tr>
</tbody>
</table>

The devices included in the report are grouped by logical control unit. The logical control unit provides a way to identifying a related set of devices. Moreover, this organization makes it easier to compare the data in the Device Activity report with the data in the I/O Queuing Activity report.

RMF follows the individual device data lines in each group with a summary line that provides a weighted average or total values for the entire logical control unit.

NMBR and SG suboptions

If the NMBR and SG suboptions are specified together, the device report is divided into two parts.

- The first part of the report contains the devices specified by the NMBR suboption. The devices are sorted by LCU and device number.
- The second part of the report contains the devices specified for the SG suboption. The devices are sorted by storage group and by device numbers within the group.

Note: Some devices might be reported twice, since you can specify a device on the NMBR suboption that is part of a storage group specified on the SG suboption.

Byte-multiplexor-channel-attached device

For any device attached to a byte multiplexor channel, the only measurement data available is the start subchannel (SSCH) + resume subchannel (RSCH) instruction count.
Direct Access Device Activity report

For the DASD Activity report, the information can be sorted by LCU, or storage group, or both. When the storage group (SG) option is specified, the DASD Activity report is sorted by device number within each storage group. The storage group name that a volume is assigned to is always reported, even when the SG option was not selected. If a volume does not belong to a storage group, the STORAGE GROUP field for that volume is blank.

RMF follows the individual device data lines in each group with a summary line that provides average or total values for the entire storage group.

**Note:** When comparing I/O rates in the DASD Activity report and in the Cache Subsystem Activity report, you may see differences due to different ways how I/Os are counted:

- In the DASD Activity report, one I/O is counted for one SSCH or RSCH instruction. There can be record chaining, for example for paging I/O, which is not reflected in the SSCH count.
- In the Cache Subsystem Activity report, one I/O is counted for each cache request, and one I/O chain may cause several cache requests.

These two ways can lead to higher I/O rates in the Cache Subsystem Activity report than in the DASD Activity report.

Figure 185 on page 360 shows a DASD Activity report.

Device data incomplete or missing

Device data can be incomplete or missing because:

- Device not available during entire interval
- Device changed or deleted
- Hardware data not available
- Required data not available
- Device in use
- Average cannot be calculated

**Device not available during entire interval:** Data lines are included for each device that has been online at least once since Monitor I session initialization. However, data is not reported for devices that were offline at the end of the reporting interval, that came online during the interval, or that were affected by dynamic device reconfiguration during the interval. One of the following messages will appear in the data line indicating the reason why data was not presented:

- **NOW ONLINE**
  - Brought online during this interval and still online at the end of the interval
- **NOW OFFLINE**
  - Taken offline during this interval and still offline at the end of the interval
- **OFFLINE**
  - Offline for the entire interval.
- **DEVICE DYNAMICALLY DELETED**
  - Device dynamically deleted during the interval.
- **DEVICE DYNAMICALLY CHANGED**
  - A device changed from static to dynamic during the interval, or a device deleted and a new device added with the same device number during the interval.
These messages indicate that the device data is incomplete and may present an inaccurate picture of device activity. If the hardware measurement data for the device is not available, the device data might be incomplete, even when a device has been online for the entire interval.

**Device changed or deleted:** If devices are changed or deleted from a storage group during the interval, RMF replaces the name of the storage group by **CHGD** in the STORAGE GROUP name column of the direct access device activity report. RMF does not provide summary lines for a storage group with **CHGD** in the STORAGE GROUP name column. Storage group names are still reported when devices are varied on or offline during the interval.

**Hardware data not available:** When hardware measurement data is not available, RMF can report values only for fields based on sampled data. It cannot report values for the fields based on hardware measurements; these fields are:

- DEVICE ACTIVITY RATE
- AVG RESP TIME
- AVG DB DELAY
- AVG IOSQ TIME
- AVG PEND TIME
- AVG DISC TIME
- AVG CONN TIME
- %DEV CONN
- %DEV UTIL

**Required data not available:** When it cannot obtain the required data, RMF prints the status message HARDWARE DATA UNAVAILABLE in place of the data. Even if the channel measurement facility and the measurement block update facility are active and the device is online for the entire interval, valid hardware data might not be available. If RMF is unable to obtain valid hardware data, it prints the status message NO H/W DATA.

**Device in use:** RMF prints the status message NO H/W DATA, DEVICE IN USE BY SYSTEM when it cannot initialize the channel subsystem interface needed in order to gather the measurement data from the channel subsystem. This may occur for CTC devices that are being used by applications using protocols with never ending channel programs.

**Average cannot be calculated:** When RMF cannot calculate an average because a division by zero or a division overflow has occurred, four asterisks (****) appear in the field in place of the data.

**Overflow condition occurred**
Depending on the processor model you have, the hardware measurement data might be incomplete because of an overflow in the measurement timer. Any I/O request that exceeds that maximum time limit causes overflow. For example, chain scheduling, which the system uses when accessing page data sets or printing a SYSOUT data set, results in long channel programs and can cause timer overflow.

For shared DASD, pending times in excess of 8.3 seconds can occur due to RESERVE activity on the sharing system. Overflow conditions in pending time, however, are not detected.

**Overflow in non-Monitor II reports:** In Monitor II reports, the overflow counts are not reported. A value affected by overflow, however, is marked by an asterisk (*). In exception reports and summary reports, overflows are neither detected nor
identified, because Monitor II device activity reports, as well as some exception reports and some fields in the summary report, are based on data the Monitor I session collects. The same inaccuracies apply to these reports.

**Connect/Disconnect time overflow:** Overflow conditions in connect time and disconnect time are detected by the hardware, counted by z/OS, and reported by RMF.

When a connect or disconnect time overflow occurs, RMF prints “HARDWARE DATA INCOMPLETE” on the line following the requests that caused the overflow. The data presented for those requests is most likely inaccurate because the values shown for connect time and disconnect time per request represent what remained after all the long-running requests were discarded. Those values, along with percent device connected, percent device utilized, and average response time, represent the lower bounds of what the actual values might be. Because at least one request was discarded, all values must be larger than reported; how much larger, however, cannot be exactly determined.

On the same line with “HARDWARE DATA INCOMPLETE”, RMF records the values of two counters: total requests that had timer overflow (in either or both timers); and total requests that had connect time overflow. The difference between timer overflow and connect time overflow gives the number of requests that had only disconnect time overflow. If the difference is large, it might indicate that difficulty in reconnecting to the channel is causing delays. Total requests with timer overflow is the difference between the start subchannel count and the measurement event count. RMF records connect time overflow separately.

The counts of requests that had overflow are intended to indicate how much data was lost. For example, if 1000 requests occurred in an hour and only one had overflow, the actual values are probably not much larger than the reported values. However, if the 999 requests measured were all short and all occurred within a short span of time, whereas the one long request lasted for 95% of the hour, the reported data is highly inaccurate. The values reported in the two counters do not take into account how many times a single request had an overflow.

The report of overflows for paging devices does not necessarily indicate a problem. Consult the Page Data Set Activity report and the Workload Activity report to determine whether or not paging delays are a problem. If they are, the device data can be used in conjunction with the two reports to analyze the problem.

**Pending time overflow:** Because all overflows for pending time are lost, RMF does not accurately report certain shared DASD delays. For example, a request delayed for 18 seconds overflows twice; 16.6 seconds are lost. To RMF, the delay appears to be only 1.4 seconds. Therefore, the AVERAGE PENDING TIME and the AVERAGE RESPONSE TIME values are extremely inaccurate.

For requests with extremely long delays, the missing interrupt handler (MIH) halts the request and reschedules it periodically. MIH estimates the amount of pending time, based on the MIH interval, and adds it to the value RMF reports. Therefore, pending time is lost only for requests that take longer than 8.3 seconds and less than 1.5 times the MIH interval. To increase the accuracy of AVERAGE PENDING TIME and AVERAGE RESPONSE TIME, decrease the MIH interval. An interval of four seconds will ensure that no pending time is lost. However, some performance penalty does occur because of the four-second interval.
The reports for communication equipment, character reader devices, graphic devices, and unit record devices have the same format. The Communication Equipment Activity report is shown as example in Figure 186.

The following figure shows the Magnetic Tape Device Activity report.

The following figure shows the Magnetic Tape Device Activity report.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IODF = xx</td>
<td>The IODF number where xx is the suffix of the IODF data set name.</td>
</tr>
<tr>
<td>CR-DATE: mm/dd/yyyy</td>
<td>The creation date of the IODF.</td>
</tr>
<tr>
<td>CR-TIME: hh.mm.ss</td>
<td>The creation time of the IODF.</td>
</tr>
<tr>
<td>ACT: text</td>
<td>The configuration state where text indicates how the IODF was activated.</td>
</tr>
<tr>
<td>STORAGE GROUP</td>
<td>The name of the storage group to which the device belongs. Your storage administrator assigns the names. These names are available on the direct access device report only.</td>
</tr>
<tr>
<td>DEV NUM</td>
<td>The four-digit hexadecimal device number of a physical I/O device.</td>
</tr>
<tr>
<td>DEVICE TYPE</td>
<td>The device type on which the data set resides.</td>
</tr>
</tbody>
</table>
### Table 146. Fields in the Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CYL</td>
<td>The DASD volume capacity (in cylinders).</td>
</tr>
<tr>
<td>VOLUME SERIAL</td>
<td>The volume serial number (for direct access and magnetic tape reports) of the volume mounted on the device at the end of the reporting interval.</td>
</tr>
<tr>
<td>PAV</td>
<td>The number of parallel access volumes (base and alias) which were available at the end of the reporting interval. If the number has changed during the reporting interval, it is followed by a ‘*’. If the device is a HyperPAV base device, the number is followed by a ‘H’, for example, 5.4H. The value is the average number of HyperPAV volumes (base and alias) in that interval.</td>
</tr>
</tbody>
</table>
| LCU             | The number of the logical control unit (LCU) to which the device belongs. An LCU is a set of devices attached to the same physical control unit (or a group of physical control units with one or more devices in common.) The IOP, which is part of the channel subsystem, manages and schedules I/O work requests. There are two reasons that this field is blank:  
  - RMF encountered an error while gathering data, check the operator console for messages.  
  - This is a non-dedicated device in a z/VM guest system environment. |
| DEVICE ACTIVITY RATE | The rate at which start subchannel (SSCH) instructions to the device completed successfully.  
  
  \[
  \text{ACTV RATE} = \frac{\text{# Successful SSCH Instructions}}{\text{Interval Time}}
  \]
  
  For devices using suspended channel programs, resume I/O requests are included in the SSCH counts. In the LCU summary line, this field contains the sum of the rates for each individual device. If the device has been deleted during the last interval, DEVICE DYNAMICALLY DELETED appears in the field instead of the measurement data. If the device has changed from static to dynamic, or was deleted and a new device added with the same device number, DEVICE DYNAMICALLY CHANGED appears in the field instead of the measurement data. |
| AVG RESP TIME   | The average number of milliseconds the device required to complete an I/O request. This value reflects the total hardware service time and the front end software queuing time involved for the average I/O request to the device. The channel measures active time, which starts at the acceptance of a SSCH instruction (indicated by a condition code 0) and ends at the acceptance of the channel end (primary status pending). It does not, however, include the time required to process the interruption. The IOS queue length is factored in to reflect the front end queuing time.  
  
  \[
  \text{AVG ACT TIME} = \frac{\text{Device Active Time}}{\text{Measurement Event Count}}
  \]
  
  \[
  \text{AVG RESP TIME} = \text{AVG ACT TIME} + \text{AVG IOSQ TIME}
  \]
  
  The active time is the sum of connect, disconnect, and pending time as described later. In the LCU summary line, this field contains the weighted average of the individual average response times for each device. |
| AVG IOSQ TIME   | The average number of milliseconds an I/O request must wait on an IOS queue before a SSCH instruction can be issued.  
  
  \[
  \text{AVG IOSQ TIME} = \frac{\text{IOSQ Count / # Samples}}{\text{Device Activity Rate}}
  \]
### Table 146. Fields in the Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **AVG CMR DLY** | The average number of milliseconds of delay that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device. It allows to distinguish between real H/W errors versus workload spikes (contention in the fabric and at the destination port).  

\[
\text{AVG CMR DLY} = \frac{\text{Initial Command Response Time}}{\text{# I/O Operations Accepted on that Path}}
\] |
| **AVG DB DLY** | The average number of milliseconds of delay that I/O requests to this device encountered because the device was busy. Device busy might mean:  
• Another system is using the volume  
• Another system reserved the device  
• Head of string busy conditions caused contention  
• Some combination of these three conditions has occurred.  

\[
\text{AVG DB DLY} = \frac{\text{Device Busy Delay Time}}{\text{Measurement Event Count}}
\] |
| **AVG INT DLY** | The average interrupt delay time in units of milliseconds encountered for I/O requests to this device. For each I/O request, the time is measured from when the I/O operation is complete to when the operating system begins to process the status.  

\[
\text{AVG INT DLY} = \frac{\text{Device Interrupt Delay Time}}{\text{Measurement Event Count}}
\] |
| **AVG PEND TIME** | The average number of milliseconds an I/O request must wait in the hardware. This value reflects the time between acceptance of the SSCH function by the channel subsystem (SSCH-function pending) and acceptance of the first command associated with the SSCH function at the device (subchannel active). This value also includes the time waiting for an available channel path and control unit as well as the delay due to shared DASD contention.  

If the value is high, refer to the device’s LCU entry in the I/O queuing activity report for an indicator of the major cause of the delay.  

\[
\text{PEND TIME} = \frac{\text{Device Pending Time}}{\text{Measurement Event Count}}
\] |
| **AVG DISC TIME** | The average number of milliseconds the device was disconnected while processing an SSCH instruction. This value reflects the time when the device was in use but not transferring data. It includes the overhead time when a device might disconnect to perform positioning functions such as SEEK/SET SECTOR, as well as any reconnection delay.  

\[
\text{AVG DISC TIME} = \frac{\text{Device Disconnect Time}}{\text{Measurement Event Count}}
\] |
| **AVG CONN TIME** | The average number of milliseconds the device was connected to a channel path and actually transferring data between the device and central storage. Typically, this value, measures data transfer time but also includes the search time needed to maintain channel path, control unit, and device connection.  

\[
\text{AVG CONN TIME} = \frac{\text{Device Connect Time}}{\text{Measurement Event Count}}
\] |
| **% DEV CONN** | The percentage of time during the interval when the device was connected to a channel path.  

\[
% \text{DEV CONN} = \frac{\text{Device Connect Time}}{\text{Interval Time}} \times 100
\] |
Table 146. Fields in the Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% DEV UTIL</td>
<td>The percentage of time during the interval when the device was in use. This percentage includes both the time when the device was involved in I/O operations (connect and disconnect time) and the time when it was reserved but not involved in an I/O operation. The percentage reported represents the time during the interval when the device is “tied up” when it could not be used to service a request from another system. Some small portion of device busy (reserved) time is missed when the device is reserved but the I/O request is pending in the channel.</td>
</tr>
</tbody>
</table>
|               | \[
| \% \text{DEV UTIL} = \frac{(\text{CON} + \text{DISC})/\text{PAV} \times \text{RSV}}{\text{INT} \times \text{N}} \times 100
|\] |
| CON           | Device connect time |
| DISC          | Device disconnect time |
| PAV           | Number of parallel access volumes (base and alias); in case of non-PAV devices, PAV is set to 1 |
| RSV           | Number of samples when the device was reserved but not involved in an I/O operation |
| INT           | Interval time (seconds) |
| N             | Total number of samples |
| % DEV RESV    | The percentage of time during the interval when a shared device was reserved by the processor on which RMF was started. At each RMF cycle, RMF checks to see if a device is reserved, and a counter is kept of all such samples. At the end of the interval, the percentage is computed. |
|               | \[
| \% \text{DEV RESV} = \frac{\# \text{Device-reserved Samples}}{\# \text{Samples}} \times 100
|\] |
| AVG NUMBER ALLOC | The average number of data control blocks (DCBs) and access method control blocks (ACBs) concurrently allocated for each volume. This field is reported only for direct access storage devices. At each RMF cycle, a counter is increased to reflect the number of data sets concurrently allocated. At the end of the interval, the average is calculated by dividing the total number of allocated data sets for all samples by the total number of samples. |
| % ANY ALLOC   | The percentage of time during the reporting interval when the device was allocated to one or more data sets. Permanently mounted direct access devices show a 100% allocation, regardless of whether or not a data set was actually allocated. To determine the value, RMF keeps a count of whether or not the device was allocated or permanently resident at each cycle. At the end of the interval, the percentage is computed. |
|               | \[
| \% \text{ANY ALLOC} = \frac{\# \text{Samples when the Device was Allocated}}{\# \text{Samples}} \times 100
|\] |
| % MT PEND     | The percentage of time during the interval when a mount was pending for the device. This field is reported only for direct access devices and magnetic tape devices. At each cycle, RMF updates a counter when it detects a mount pending condition. At the end of the interval, the percentage is computed. |
|               | \[
| \% \text{MT PEND} = \frac{\text{Counter for Mount-Pending Condition}}{\# \text{Samples}} \times 100
|\] |
| % NOT RDY     | The percentage of time during the reporting interval when the device was not ready for use. For example, when a tape has just been mounted but is not yet ready to be used by the system. This field is not reported for direct access devices. However, the value is recorded in the corresponding field of the SMF record, should your installation need the information. At each RMF cycle, a counter is updated when the status of the device indicates that it is not ready. At the end of the interval, the percentage is computed. |
|               | \[
| \% \text{NOT RDY} = \frac{\# \text{Samples when the Device was not Ready}}{\# \text{Samples}} \times 100
|\] |
### Table 146. Fields in the Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUMBER OF MOUNTS</strong></td>
<td>The number of tape mounts, shown as an integer value, detected by RMF. If the tape mount was pending at the first cycle of the interval, an asterisk is placed before the numerical value of the tape mount. If the tape mount was pending at the last cycle of the interval, an asterisk is placed immediately following the numerical value of the tape mount. If a mount-pending condition is detected at the first cycle of the interval, the mount count for the interval increments by one. In the LCU summary line, this field contains the sum of all mount counts. This field is reported only for magnetic tape devices.</td>
</tr>
</tbody>
</table>
| **AVG MOUNT TIME**        | The average mount time pending for every device, expressed in the form of HH:MM:SS.  

\[
\text{AVG MOUNT TIME} = \frac{\sum \text{# Samples Tape Mount was Pending} \times \text{Interval}}{\sum \text{# Samples}}  
\]

If the mount count or the sample count is zero, the result is zero. This field is reported only for magnetic tape devices. |
| **TIME DEVICE ALLOC**     | The total time the device was allocated during the interval, expressed in the form of HH:MM:SS.  

\[
\text{TIME DEVICE ALLOC} = \frac{\sum \text{# Samples Tape Device was Allocated} \times \text{Interval}}{\sum \text{# Samples}}  
\]

If the sample count is zero, the result is zero. This field is reported only for magnetic tape devices. |

### Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](http://www.ibm.com/support/knowledgcenter/SSSUGT_2.2.0/com.ibm.zos.kc010/kc010_01.htm). The following table shows the overview condition names for the Overview report.

### Table 147. Overview names in the DASD Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CYL</td>
<td>DVCAP</td>
</tr>
<tr>
<td>DEVICE ACTIVITY RATE</td>
<td>DART</td>
</tr>
<tr>
<td>AVG RESP TIME</td>
<td>DRTAVG</td>
</tr>
<tr>
<td>AVG IOSQ TIME</td>
<td>DQTAVG</td>
</tr>
<tr>
<td>AVG CMR DLY</td>
<td>CMRDL</td>
</tr>
<tr>
<td>AVG INT DLY</td>
<td>INTDL</td>
</tr>
<tr>
<td>AVG DB DLY</td>
<td>DBDL</td>
</tr>
<tr>
<td>AVG PEND TIME</td>
<td>DPTAVG</td>
</tr>
<tr>
<td>AVG DISC TIME</td>
<td>DDTAVG</td>
</tr>
<tr>
<td>AVG CONN TIME</td>
<td>DCTAVG</td>
</tr>
<tr>
<td>% DEV UTIL</td>
<td>DVUTL</td>
</tr>
<tr>
<td>% DEV RESV</td>
<td>DR</td>
</tr>
<tr>
<td>% MT PEND</td>
<td>DMTPEND</td>
</tr>
</tbody>
</table>

![Image](image.png)
Data inaccuracies in duration report

When you request a duration report for I/O device activity, the identifier of each I/O device that had any VARY activity during the duration interval is followed by a single asterisk (*). The data recorded for such a device is partial; that is, no data was collected during one or more of the measurement intervals included in the duration report because the device was varied during a measurement interval. The calculations the Postprocessor performs to generate a duration report make no adjustments for RMF measurement intervals when no data was collected for a device. Thus, the data for a device that moved online or offline might appear to be inconsistent. For example, the percentages reported for the QLENGTH DISTRIBUTION field do not equal 100% when data for the device is partial.

At the beginning of a Monitor I session, all devices that are online are known to RMF; thus, RMF creates an entry in the type 74 SMF record for each online device that the user requested RMF to monitor. In contrast, any device that is offline at the beginning of the session is unknown to RMF, and no entry in the SMF record is built. When an unknown device is brought online, it becomes known to RMF, and an entry in the SMF record is then built for the device.

When a duration report combines data collected during two or more separate Monitor I sessions, the status of a device can change (for example, from offline to online or from unknown to online). Thus, the following conditions can occur:

- A device was known to RMF but offline during the first Monitor I session and online during subsequent Monitor I sessions but did not change during a measurement interval included in the duration report. In this case, the data is partial and the device identifier is followed by an asterisk.
- A device was offline for one or more measurement intervals and unknown to RMF during all other measurement intervals included in the duration report. In this case, the device identifier is followed by an asterisk, OFFLINE appears in the first data field, and no data is formatted for the device.
- A device was unknown to RMF during a Monitor I session and online for subsequent Monitor I sessions but did not change during a measurement interval included in the duration report. In this case, the data is partial and the device identifier is followed by an asterisk.

The following conditions can occur for storage group reporting:

- The STORAGE GROUP field shows **CHGD** for the volume if the storage group name changes in an SMF record for the duration period.
- The STORAGE GROUP field shows **CHGD** and the device identifier is followed by an asterisk if a volume is not reported in all SMF records of the duration and has changed the storage group name at least once.
- STORAGE GROUP DATA NOT AVAILABLE is reported between the TOTAL SAMPLES field and the report headings if the storage management subsystem is not available in one of the reports during the duration period.
- SMS INTERFACE ERROR, NEW STORAGE GROUP INFORMATION CANNOT BE OBTAINED is reported between the TOTAL SAMPLES = field and the report headings if a system-managed storage interface error occurs in one of the reports during the duration period.

DOMINO - Lotus Domino Server report

The Domino Server family is an integrated messaging and Web application software platform. The Domino Server enables Web clients to communicate with Notes® servers.
The Lotus Domino Server report provides information about the activities of a server. The information can be used to analyze the activities of the server in case of problems.

**How to request this report**

The Postprocessor is using SMF records type 108 as input for the Lotus Domino Server report. These records are not gathered by an RMF monitor, but are written by Domino servers. See the [z/OS RMF User’s Guide](#) for details.

To produce this report, specify

```
REPORTS(DOMINO)
```

**Contents of the report**

The report consists of two parts:

- Lotus Domino Server Summary
  
  The summary contains one line for each server which is part of the report.

- Lotus Domino Server Details
  
  This part consists of the following sections:
  - Definition data (provided by record type 108-3)
  - Performance data (provided by record type 108-3)
  - Load data (provided by record type 108-1)

---

**LOTUS DOMINO SERVER SUMMARY**

<table>
<thead>
<tr>
<th>SERVER NAME</th>
<th>AVAILABLE</th>
<th>USERS</th>
<th>TASKS</th>
<th>TRANSACTION</th>
<th>ASYNC I/O RATE</th>
<th>MAIL RATE</th>
<th>SMTP RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUT1/COCPOK</td>
<td>000.30.00</td>
<td>2036</td>
<td>18</td>
<td>2136</td>
<td>62.50</td>
<td>137.0</td>
<td>101.9</td>
</tr>
<tr>
<td>BLUED1/BIGBLUE</td>
<td>000.30.00</td>
<td>5034</td>
<td>32</td>
<td>3532</td>
<td>119.31</td>
<td>207.4</td>
<td>199.3</td>
</tr>
</tbody>
</table>

Figure 188. Lotus Domino Server Report - Summary
**Table 148. Fields in the Domino Server Summary Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER NAME</td>
<td>Server name.</td>
</tr>
<tr>
<td>AVAILABLE</td>
<td>Total time (hh:mm:ss) the server was available during the interval.</td>
</tr>
<tr>
<td>USERS CONNECTED</td>
<td>Average number of currently connected users.</td>
</tr>
<tr>
<td>USERS ACTIVE</td>
<td>Average number of currently active users.</td>
</tr>
<tr>
<td>TASKS</td>
<td>Average number of tasks currently in use.</td>
</tr>
<tr>
<td>TRANSACTION RATE</td>
<td>Rate of all transactions processed during the interval.</td>
</tr>
<tr>
<td>ASYNC I/O RATE - READS</td>
<td>Rate of asynchronous reads.</td>
</tr>
<tr>
<td>ASYNC I/O RATE - WRITES</td>
<td>Rate of asynchronous writes.</td>
</tr>
<tr>
<td>MAIL RATE - DELIVERED</td>
<td>Rate of Domino mail messages delivered to local users.</td>
</tr>
<tr>
<td>MAIL RATE - SENT</td>
<td>Rate of Domino mail messages sent to other servers.</td>
</tr>
<tr>
<td>SMTP RATE - READS</td>
<td>Rate of SMTP messages received from other servers.</td>
</tr>
<tr>
<td>SMTP RATE - WRITES</td>
<td>Rate of SMTP messages sent to other servers.</td>
</tr>
</tbody>
</table>

Figure 189. Lotus Domino Server Report - Details

**Table 149. Lotus Domino Server Summary Report - Details**
### Table 149. Fields in the Domino Server Details Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAME</strong></td>
<td>Server name</td>
</tr>
<tr>
<td><strong>User Activity</strong></td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum number of users that are allowed to access the server. The value 0 means that there is no limit.</td>
</tr>
<tr>
<td>CONNECTED</td>
<td>Number of current users (connections).</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Number of active users.</td>
</tr>
<tr>
<td>WITHIN n MIN</td>
<td>Number of currently connected users that have been active within the last 1, 3, 5, 15, and 30 minutes.</td>
</tr>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum number of tasks in use.</td>
</tr>
<tr>
<td>CURRENT</td>
<td>Number of tasks currently in use.</td>
</tr>
<tr>
<td>MAX UPDATES</td>
<td>Maximum number of concurrent update tasks.</td>
</tr>
<tr>
<td>MAX REPLICS</td>
<td>Maximum number of concurrent replicator tasks.</td>
</tr>
<tr>
<td>COUNT REPLICS</td>
<td>Number of replications initiated by this server.</td>
</tr>
<tr>
<td><strong>Messages</strong></td>
<td></td>
</tr>
<tr>
<td>MAILBOXES</td>
<td>Number of mail boxes.</td>
</tr>
<tr>
<td>MAIL DELIVERED</td>
<td>The number, rate and average size of Domino mail messages delivered to local users.</td>
</tr>
<tr>
<td>MAIL SENT</td>
<td>Domino mail messages sent to other servers.</td>
</tr>
<tr>
<td>SMTP RECEIVED</td>
<td>SMTP messages received from other servers.</td>
</tr>
<tr>
<td>SMTP SENT</td>
<td>SMTP messages sent to other servers.</td>
</tr>
<tr>
<td><strong>Access Rates</strong></td>
<td></td>
</tr>
<tr>
<td>AS I/O READ</td>
<td>Rate of asynchronous I/O reads.</td>
</tr>
<tr>
<td>AS I/O WRITE</td>
<td>Rate of asynchronous I/O writes.</td>
</tr>
<tr>
<td>POP3 READ</td>
<td>Rate of POP3 reads.</td>
</tr>
<tr>
<td>IMAP READ</td>
<td>Rate of IMAP reads.</td>
</tr>
<tr>
<td>DOMINO READ</td>
<td>Rate of Domino reads.</td>
</tr>
<tr>
<td>DOMINO WRITE</td>
<td>Rate of Domino writes.</td>
</tr>
<tr>
<td><strong>Database Cache</strong></td>
<td></td>
</tr>
<tr>
<td>STATUS</td>
<td>Status of the database cache: either OK or ? (=undefined).</td>
</tr>
<tr>
<td>MAX ENTRIES</td>
<td>Maximum number of database entries allowed in cache at any one time.</td>
</tr>
<tr>
<td>CURRENT ENTRIES</td>
<td>Number of current entries.</td>
</tr>
<tr>
<td>HIGH WATER MARK</td>
<td>High water mark.</td>
</tr>
<tr>
<td>INITIAL DB OPENS</td>
<td>Number of initial database opens.</td>
</tr>
<tr>
<td>REJECTIONS</td>
<td>Number of overcrowding rejections.</td>
</tr>
<tr>
<td>HITS</td>
<td>Hits in database cache.</td>
</tr>
<tr>
<td><strong>Virtual Threads</strong></td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum number of virtual thread pool threads.</td>
</tr>
<tr>
<td>CURRENT</td>
<td>Number of virtual thread pool threads currently in use.</td>
</tr>
<tr>
<td><strong>Physical Threads</strong></td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum number of physical thread pool threads in use.</td>
</tr>
<tr>
<td>CURRENT</td>
<td>Number of physical thread pool threads currently in use.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Total number of physical thread pool threads.</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td></td>
</tr>
<tr>
<td>THRESHOLD</td>
<td>Server availability threshold.</td>
</tr>
<tr>
<td>INDEX</td>
<td>Server availability index.</td>
</tr>
</tbody>
</table>
Table 149. Fields in the Domino Server Details Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Buffer Pool</td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum size (in bytes) of the NSF (Notes Storage Facility) buffer pool.</td>
</tr>
<tr>
<td>CURRENT</td>
<td>Number of bytes of the NSF buffer pool currently in use.</td>
</tr>
<tr>
<td>Transaction Activity</td>
<td></td>
</tr>
<tr>
<td>MAXIMAL CONCURRENT</td>
<td>Limit for number of concurrent transactions on a server.</td>
</tr>
<tr>
<td>Top-10 List of Transaction Types</td>
<td>Sorted by COUNT and by R/T TOTAL.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Transaction type.</td>
</tr>
<tr>
<td>NAME</td>
<td>Transaction name.</td>
</tr>
<tr>
<td>COUNT</td>
<td>Number of transactions processed during interval.</td>
</tr>
<tr>
<td>%TOTAL</td>
<td>%Percentage based on all transactions.</td>
</tr>
<tr>
<td>RATE</td>
<td>Rate of processed transactions.</td>
</tr>
<tr>
<td>R/T AVG</td>
<td>Average response time (milliseconds).</td>
</tr>
<tr>
<td>R/T TOTAL</td>
<td>Total response time (milliseconds) of all transactions that completed during the interval.</td>
</tr>
<tr>
<td>Port Activity</td>
<td></td>
</tr>
<tr>
<td>MAX CONCURRENT SESSIONS</td>
<td>Maximum number of sessions that can run concurrently on the server.</td>
</tr>
<tr>
<td>SESSION TIMEOUT</td>
<td>Time limit (minutes) after which idle connections are terminated.</td>
</tr>
<tr>
<td>NAME</td>
<td>Port name.</td>
</tr>
<tr>
<td>SESSIONS IN</td>
<td>Count and rate of incoming sessions (from clients to the server) established during the interval.</td>
</tr>
<tr>
<td>SESSIONS OUT</td>
<td>Count and rate of outgoing sessions established during the interval.</td>
</tr>
<tr>
<td>SENT (KB)</td>
<td>Number of K bytes sent to the network.</td>
</tr>
<tr>
<td>RECEIVED (KB)</td>
<td>Number of K bytes received from the network.</td>
</tr>
</tbody>
</table>

**ENQ - Enqueue Activity report**

The Enqueue Activity report provides information about resources that periodically build up queues of one or more requestors waiting to use the resource. Contention is reported for those resources where access is controlled by jobs that issue ENQ and DEQ macro instructions.

**Using the information given in the report**

Because the amount of time that a requestor must spend waiting for a resource can seriously affect system throughput, the information in this report can be very helpful in locating resources that consistently cause bottlenecks.

Once you have defined a critical resource, such as a serially-reusable resource that can be requested on either an exclusive or shared basis, your installation can improve the situation in a variety of ways. You could change the hardware configuration to release device bottlenecks, change data set placement, or reschedule jobs to improve throughput, or re-specify the installation tuning parameter ERV (enqueue residence value) to give more processor time to the holder of the resource.

The information in the detail report can help you to balance your workload to minimize resource contention.
**How to request this report**

To gather data for this report, specify as a Monitor I gatherer option

```
ENQ(SUMMARY | DETAIL[,majorname,[minorname]])
```

To produce this report, specify

```
REPORTS(ENQ)
```

**Note:** The ENQ report is only available as an interval report, not as a duration report.

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](/z/OS RMF User's Guide) provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**


**Different report levels**

The contents of the report depends on the gathering options:

- Summary report - ENQ(SUMMARY)
- Detail report - ENQ(DETAIL) or ENQ(DETAIL,majorname [,minorname])

The **Summary Activity report** includes:

- All resources for which contention has occurred during the reporting interval
- A description of the contention time for each resource
- A queue length distribution and average queue length for each resource
- Information on the type of requests made (either exclusive or shared)
- The total number of enqueue contention events that occurred.

An enqueue contention event is defined as the period from the time when the resource first has contention until the resource no longer has contention.

A resource for which contention is still occurring at the end of the interval will be indicated by an asterisk following the TOT field, which is under the CONTENTION TIME field.

The **Detail Activity report** shows several lines of data for all resources for which contention occurs.

- The total number of jobs that own the resource and the names of one or two jobs that own the resource
- The total number of jobs that are waiting for the resource and the names of one or two jobs that are waiting for the resource.
- The identifier of the system on which the job is running following each job name
- An E if the request is exclusive or an S if the request is shared

RMF selects the job names shown in the detail report during the period of maximum contention in the interval by determining the longest contention event in the interval. For that event RMF reports the owners and waiters at the point when the event queue is the longest.
When there are several occurrences of the same length queue, the latest queue is reported. RMF reports the job names that were active at maximum contention even though those jobs might have been processed and flushed from the system by the time the contention no longer exists.

You can request data for a specific resource by specifying a major name, with or without a minor name. Various combinations of the reporting options can give you a complete picture of both critical resources and the jobs that are impacting system throughput by monopolizing a specific resource.

Contents of the report

The data fields for the summary and detail reports are identical, with one exception: the job names causing maximum contention are printed only when the detail level is requested. Therefore, the fields are discussed only once, and the field that is provided only at the detail level is noted. The data fields are preceded by ENQUEUE SUMMARY ACTIVITY for a summary report or ENQUEUE DETAIL ACTIVITY for a detail report.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRS MODE</td>
<td>Shows the GRS mode in which the system is running.</td>
</tr>
<tr>
<td>NAME (MAJOR MINOR)</td>
<td>The name of a resource that has one or more requestors waiting. The major name is one to eight characters in length; the minor name can be from 1 to 255 characters, but only 44 characters will be printed. When the name exceeds 44 characters, it is truncated in the report. An asterisk (*) following the resource name indicates that it has been truncated. A resource with a scope of “SYSTEMS” will be followed by (SYSTEMS); a resource with a scope of “SYSTEM” will have no indication; and a resource with a scope of “STEP” will not be included in the report.</td>
</tr>
</tbody>
</table>
### Table 150. Fields in the Enqueue Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| CONTENTION TIME (MIN MAX TOT AVG) | The contention time observed for the resource during the RMF reporting interval. The maximum, minimum, total, and average contention times are reported in seconds. The time reported can be 0.000; this indicates a contention time of less than one-thousandth of a second and is most likely to appear as a minimum value. The content time is calculated by subtracting the time the delay began (when the first ENQHOLD was issued) from the time the contention was ended (when the last ENQRLSE was issued) by freeing the resource. An asterisk(*) following the total contention time indicates that the contention extended beyond the end of the measurement interval. The calculation used to determine the average contention time is: 
\[
\text{Contention Time for the Resource} \\
\frac{\text{AVG CONT TIME}}{\# \text{ Contention Events}}
\]
| JOBS AT MAXIMUM CONTENTION | The total number of resource owners and the total number of jobs waiting to use the resource. In addition, the names of one or two owners and one or two names of waiting jobs are reported. The reported counts refer to the period of maximum contention for a resource in the RMF reporting interval. RMF selects the names during the period of maximum contention for each resource. Within this period of maximum contention, RMF determines the point when the queue of waiting jobs was longest and reports the names of the first two jobs on the queue. Each name is followed by an (E) if that job requested exclusive use of the resource or an (S) if that job requested shared use of the resource. Under SYSNAME, RMF reports the name of the system on which the job is executing in a global resource serialization complex. This information can help you to determine which jobs were contributing most heavily to the contention for the resource. The field is reported only when the enqueue activity detail report is requested. |
| % QLEN DISTRIBUTION (1 2 3 4+) | The percentage of contention events during the interval when the number of requestors queued to the resource was one, two, three, four or more. The samples are taken for each contention status change. Examples for a contention status change event are the change of the contention owner or the number of waiters. At each such sample, an accumulator for the observed length is updated. At the end of the measurement interval, the percentage for each queue length is computed. The calculation used for each queue length is: 
\[
\frac{\text{Accumulator for that Queue Length}}{\# \text{ Contention Status Change Events}} \times 100
\]
| AVG Q LNGTH | The average length of the queue of requestors that is waiting for the resource over the duration of the reporting interval. A consistently high number here indicates that the use of the resource is seriously out of balance. 
\[
\frac{\# \text{ Requestors Waiting}}{\# \text{ Contention Status Change Events}}
\]
| REQUEST TYPE--EXCL--SHARE - (MIN MAX MIN MAX) | The type of the requests, either exclusive or shared that is waiting for use of the resource. The requestor would require exclusive use of the resource if the job expects to modify the resource or if the resource is by nature only serially reusable. Other requests would be for shared use of the resource. Both the minimum number and maximum number of waiting shared requests and waiting exclusive requests are reported. |
| TOTAL EVENT | The total number of resource contention events that occur during the measurement interval. |

**Spreadsheet and Overview reference**

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](https://www.ibm.com/support/knowledgecenter/STQAPR_2.2.1/tafa/pa418005.htm). The following table shows the overview condition names for the Overview report.
Table 151. Overview names in the Enqueue Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENTION TIME - TOT ENQT</td>
<td>ENQT</td>
</tr>
<tr>
<td>CONTENTION TIME - AVG ENQAVG</td>
<td>ENQAVG</td>
</tr>
<tr>
<td>CONTENTION TIME - MAX ENQMAX</td>
<td>ENQMAX</td>
</tr>
<tr>
<td>TOTAL EVENT</td>
<td>ENQNE</td>
</tr>
</tbody>
</table>

Messages

During the measurement of enqueue activity, RMF can encounter situations when no reporting can be done. When such a situation occurs, RMF replaces the report with a message describing the reason no report could be formatted. The messages are:

**NO CONTENTION OCCURRED**

Explanation: During the interval, no contention activity occurred for the resource or resources being measured. Enqueue activity measurement and reporting continue as specified. This message would appear most frequently when you are requesting the enqueue activity report for a specific resource.

**TABLE FULL - USE SPECIFIC NAME OR SHORT INTERVAL**

Explanation: During the RMF interval, a period of such high contention activity occurred that the internal working table was filled. As a result, no further enqueue reporting could be done for the interval. The interval report contains the data gathered before the internal table was filled and followed by the message. Subsequent interval reports might not include complete data. Enqueue activity measurement and reporting resume at the start of the next interval.

When the message occurs, you could reduce the length of the RMF interval, or, if you want to ensure that the contention activity for a specific resource is reported, you can request enqueue activity reporting for the specific critical resource.

**TERMINATE DUE TO DATA EVENT ERROR - TRY RERUN**

Explanation: During the interval, the enqueue measurement routines encountered invalid data while processing a contention event. All enqueue measurement activity is terminated for the session; that is, the recovery from the error includes modifying the enqueue activity option to NOENQ. Because the error encountered might not be a permanent error, you can modify the session options to re-specify enqueue measurement and reporting. If the message occurs again and there are no other indicators of a system problem, report the message to the RMF license holder at your installation.

**BAD CPU CLOCK OCCURRED - FIX CPU CLOCK AND RERUN**

Explanation: During an interval, the enqueue activity measurement routines detected an error in the CPU clock function. All enqueue measurement activity for the session is terminated; that is, the recovery from the error includes modifying the enqueue activity option to NOENQ. Note that this message is probably one of many indicators that there is a problem with the CPU clock. After the clock has been fixed, re-IPL the system and run the session again, specifying the enqueue activity measurements that you require.
ESS - Enterprise Disk Systems report

How to request this report

The default option for Monitor I data gathering is NOESS. Therefore, you must specify the ESS Monitor I gatherer option if you want to get data for this report.

To produce this report, specify

REPORTS(ESS)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports in the z/OS RMF User’s Guide](#) provides all required information on how to produce and view XML reports.

Example URL for the DDS API:


Contents of the report

Depending on your Monitor I gatherer options and/or available data, this report consists of up to three sections. The following fields are common for all sections:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERIAL NUMBER</td>
<td>Serial number of the primary control unit.</td>
</tr>
<tr>
<td>TYPE-MODEL</td>
<td>ESS type and model.</td>
</tr>
<tr>
<td>CDATE</td>
<td>Date when the cache interval started.</td>
</tr>
<tr>
<td>CTIME</td>
<td>Time when the cache interval started.</td>
</tr>
<tr>
<td>CINT</td>
<td>Cache interval time.</td>
</tr>
<tr>
<td></td>
<td>In interval reports, the format is mm.ss, while in duration reports the format is hh.mm.ss.</td>
</tr>
</tbody>
</table>

Note: Device reserve activity can cause a data gatherer interface to wait until a reserve has been released. This in turn can cause the cache interval to be much longer than a regular RMF interval.

Therefore, CDATE, CTIME and CINT have been introduced to show the actual point in time to which the cache interval start is related, and the actual cache interval length. All rates shown in the report are based on CINT, not on INTERVAL.
RMF issues the informational message 'NO DATA TO REPORT OR ZERO' if the counters for all link types (both read or write) return 'zero'. This happens in the following cases: either there was no ESS activity in the report interval or the ESS did not deliver any data.

Table 153. Fields in the ESS Link Statistics

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADAPTER</td>
<td>Specifies the channel adapter:</td>
</tr>
<tr>
<td>SAID</td>
<td>system adapter identifier</td>
</tr>
<tr>
<td>TYPE</td>
<td>adapter type, for example, FIBRE 2Gb; &quot;Undefined&quot;, if RMF could not determine the type.</td>
</tr>
<tr>
<td>LINK TYPE</td>
<td>Type of I/O operation performed by the adapter, which can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• ECKD READ or ECKD WRITE: designates extended count key data I/O</td>
</tr>
<tr>
<td></td>
<td>• SCSI READ or SCSI WRITE: designates small computer system interface I/O</td>
</tr>
<tr>
<td></td>
<td>• PPRC SEND or PPRC RECEIVE: designates peer-to-peer remote copy traffic</td>
</tr>
<tr>
<td>OPERATIONS /SEC</td>
<td>The average number of operations of the indicated link type per second during the reporting interval.</td>
</tr>
<tr>
<td>RESPONSE TIME /OPERATION</td>
<td>The average response time of operations of the indicated link type during the report interval. This is the entire time from sending out a data block until the notice of receipt from the receiver arrives. This value is measured in milliseconds.</td>
</tr>
<tr>
<td>I/O INTENSITY</td>
<td>The portion of the reporting interval during which an adapter was active. It is the product of OPERATIONS/SEC times RESPONSE TIME/OPERATION. The I/O intensity is provided as a total for each adapter as well as for each link type. It is measured in milliseconds/second. That is, a value of 1000 for a link type indicates that this link was busy all the time during the report interval. On a Fiber Channel, multiple data blocks can be sent concurrently without waiting for the notices of receipt. Therefore, an I/O intensity greater than 1000 ms per second for an adapter may occur if such concurrent operations had been active.</td>
</tr>
</tbody>
</table>

Table 153. Fields in the ESS Link Statistics

<table>
<thead>
<tr>
<th>ADAPTER</th>
<th>LINK TYPE</th>
<th>BYTES /SEC</th>
<th>BYTES /OPERATION</th>
<th>OPERATIONS /SEC</th>
<th>RESPONSE TIME /OPERATION</th>
<th>I/O INTENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0004</td>
<td>FIBRE 2Gb</td>
<td>ECKD READ</td>
<td>162.1K</td>
<td>13.7K</td>
<td>11.8</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECKD WRITE</td>
<td>2.4M</td>
<td>26.5K</td>
<td>92.5</td>
<td>0.8</td>
</tr>
<tr>
<td>0004</td>
<td>FIBRE 2Gb</td>
<td>ECKD WRITE</td>
<td>2.4M</td>
<td>26.5K</td>
<td>92.5</td>
<td>0.8</td>
</tr>
<tr>
<td>0011</td>
<td>FIBRE 1Gb</td>
<td>NO DATA TO REPORT OR ZERO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0024</td>
<td>FIBRE 2Gb</td>
<td>SCSI READ</td>
<td>156.0K</td>
<td>13.9K</td>
<td>11.2</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCSI WRITE</td>
<td>2.5M</td>
<td>26.5K</td>
<td>93.2</td>
<td>0.8</td>
</tr>
<tr>
<td>0088</td>
<td>FIBRE 2Gb</td>
<td>PPRC SEND</td>
<td>8.5M</td>
<td>50.4K</td>
<td>169.2</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PPRC RECEIVE</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0088</td>
<td>FIBRE 2Gb</td>
<td>PPRC RECEIVE</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
The ESS Extent Pool Statistics section presents overview information on the defined disk capacity of extent pools.

**Table 154. Fields in the ESS Extent Pool Statistics**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTENT POOL</td>
<td>Pool of allocation units for logical volumes.</td>
</tr>
<tr>
<td>ID</td>
<td>extent pool identifier</td>
</tr>
<tr>
<td>TYPE</td>
<td>extent type, for example, FIBRE 1Gb or CKD 1Gb.</td>
</tr>
<tr>
<td>REAL CAPACITY</td>
<td>The capacity of physical storage in gigabytes for real extents in an extent pool. This is available capacity for the operating system.</td>
</tr>
<tr>
<td>REAL EXTENTS</td>
<td>Number of real extents in an extent pool. A discrete number of extents can be used to create volumes.</td>
</tr>
</tbody>
</table>

**Table 155. Fields in the ESS Rank Statistics**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTENT POOL</td>
<td>Pool of allocation units for logical volumes.</td>
</tr>
<tr>
<td>ID</td>
<td>extent pool identifier</td>
</tr>
<tr>
<td>TYPE</td>
<td>extent type, for example, FIBRE 1Gb or CKD 1Gb.</td>
</tr>
<tr>
<td>RRID</td>
<td>RAID rank identifiers in the extent pool. Note: The line where RRID = POOL contains the average for all rank values of the entire extent pool.</td>
</tr>
<tr>
<td>READ OPERATIONS</td>
<td>Number of read operations per second.</td>
</tr>
</tbody>
</table>

---

**Figure 192. ESS Extent Pool Statistics**

**Figure 193. ESS Rank Statistics**
Table 155. Fields in the ESS Rank Statistics (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>READ OPERATIONS</td>
<td></td>
</tr>
<tr>
<td>BYTES/OP</td>
<td>Average number of bytes per read operation.</td>
</tr>
<tr>
<td>BYTES/SEC</td>
<td>Average bandwidth of a read operation.</td>
</tr>
<tr>
<td>RTIME/OP</td>
<td>Average response time of read operations in milliseconds.</td>
</tr>
<tr>
<td>WRITE OPERATIONS</td>
<td></td>
</tr>
<tr>
<td>OPS/SEC</td>
<td>Number of write operations per second.</td>
</tr>
<tr>
<td>BYTES/OP</td>
<td>Average number of bytes per write operation.</td>
</tr>
<tr>
<td>BYTES/SEC</td>
<td>Average bandwidth of a write operation.</td>
</tr>
<tr>
<td>RTIME/OP</td>
<td>Average response time of write operations in milliseconds.</td>
</tr>
<tr>
<td>ARRAY</td>
<td></td>
</tr>
<tr>
<td>SSD</td>
<td>If a Y is displayed, then there is at least one solid state drive in the rank array.</td>
</tr>
<tr>
<td>NUM</td>
<td>Number of arrays on the rank.</td>
</tr>
<tr>
<td>WDTH</td>
<td>Sum of DDMs (disk drive modules) of a rank excluding spares of the rank. For example, if you have a RAID-5 array with 6 data disks and 1 parity disk, ARRAY WDTH is 7, or for a RAID-10 with 3 mirrored disks, ARRAY WDTH is 6.</td>
</tr>
<tr>
<td>MIN RPM</td>
<td>The slowest drive of the rank in units of 1000 RPM (rounds per minute).</td>
</tr>
<tr>
<td>RANK CAP</td>
<td>The sum of bytes of a rank.</td>
</tr>
<tr>
<td>RAID TYPE</td>
<td></td>
</tr>
<tr>
<td>RAID type found for the rank, for example,</td>
<td></td>
</tr>
<tr>
<td>• RAID-5</td>
<td></td>
</tr>
<tr>
<td>• RAID-10</td>
<td></td>
</tr>
<tr>
<td>In the line displaying the average values for the entire extent pool (where RRID = POOL), ‘MIXED’ is shown if different RAID types have been encountered for the individual ranks in the extent pool.</td>
<td></td>
</tr>
</tbody>
</table>

Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following tables show the overview condition names for the Overview report, divided according to the sections of the enterprise disk systems report.

Table 156. Overview names in the ESS Link Statistics section

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTES/SEC for SCSI READ</td>
<td>ESTRSRD</td>
</tr>
<tr>
<td>BYTES/SEC for SCSI WRITE</td>
<td>ESTRSWR</td>
</tr>
<tr>
<td>BYTES/OPERATION for SCSI READ</td>
<td>ESPSSRD</td>
</tr>
<tr>
<td>BYTES/OPERATION for SCSI WRITE</td>
<td>ESPSSWR</td>
</tr>
<tr>
<td>OPERATIONS/SEC for SCSI READ</td>
<td>ESARSRD</td>
</tr>
<tr>
<td>OPERATIONS/SEC for SCSI WRITE</td>
<td>ESARSWR</td>
</tr>
</tbody>
</table>
Table 156. Overview names in the ESS Link Statistics section

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESP TIME/OPERATION for SCSI READ</td>
<td>ESRTSRD</td>
</tr>
<tr>
<td>RESP TIME/OPERATION for SCSI WRITE</td>
<td>ESRTSWR</td>
</tr>
<tr>
<td>I/O INTENSITY for SCSI READ</td>
<td>ESIOISRD</td>
</tr>
<tr>
<td>I/O INTENSITY for SCSI WRITE</td>
<td>ESIOISWR</td>
</tr>
<tr>
<td>I/O INTENSITY for SCSI TOTAL</td>
<td>ESIOIST</td>
</tr>
<tr>
<td>BYTES/SEC for ECKD READ</td>
<td>ESTRERD</td>
</tr>
<tr>
<td>BYTES/SEC for ECKD WRITE</td>
<td>ESTRERW</td>
</tr>
<tr>
<td>BYTES/OPERATION for ECKD READ</td>
<td>ESPSERD</td>
</tr>
<tr>
<td>BYTE/OPERATION for ECKD WRITE</td>
<td>ESPSEWR</td>
</tr>
<tr>
<td>OPERATIONS/SEC for ECKD READ</td>
<td>ESARERD</td>
</tr>
<tr>
<td>OPERATIONS/SEC for ECKD WRITE</td>
<td>ESAREWR</td>
</tr>
<tr>
<td>RESP TIME/OPERATION for ECKD READ</td>
<td>ESRTIEWR</td>
</tr>
<tr>
<td>RESP TIME/OPERATION for ECKD WRITE</td>
<td>ESRTIEWR</td>
</tr>
<tr>
<td>I/O INTENSITY for ECKD READ</td>
<td>ESIOIERD</td>
</tr>
<tr>
<td>I/O INTENSITY for ECKD WRITE</td>
<td>ESIOIEWR</td>
</tr>
<tr>
<td>I/O INTENSITY for ECKD TOTAL</td>
<td>ESIOIET</td>
</tr>
<tr>
<td>BYTES/SEC for PPRC SEND</td>
<td>ESTRPSD</td>
</tr>
<tr>
<td>BYTES/SEC for PPRC RECEIVE</td>
<td>ESTRPRV</td>
</tr>
<tr>
<td>BYTE/OPERATION for PPRC SEND</td>
<td>ESPSPSD</td>
</tr>
<tr>
<td>BYTE/OPERATION for PPRC RECEIVE</td>
<td>ESPSPRV</td>
</tr>
<tr>
<td>OPERATIONS/SEC for PPRC SEND</td>
<td>ESARPSD</td>
</tr>
<tr>
<td>OPERATIONS/SEC for PPRC RECEIVE</td>
<td>ESARPV</td>
</tr>
<tr>
<td>RESP TIME/OPERATION for PPRC SEND</td>
<td>ESRTPSD</td>
</tr>
<tr>
<td>RESP TIME/OPERATION for PPRC RECEIVE</td>
<td>ESRTPRV</td>
</tr>
<tr>
<td>I/O INTENSITY for PPRC SEND</td>
<td>ESIOIPSD</td>
</tr>
<tr>
<td>I/O INTENSITY for PPRC RECEIVE</td>
<td>ESIOIPRV</td>
</tr>
<tr>
<td>I/O INTENSITY for PPRC TOTAL</td>
<td>ESIOIPT</td>
</tr>
</tbody>
</table>

Table 157. Overview names in the ESS Extent Pool Statistics section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>REAL CAPACITY</td>
<td>ESXRCAP</td>
</tr>
<tr>
<td>REAL EXTENTS</td>
<td>ESXRNSG</td>
</tr>
</tbody>
</table>

Table 158. Overview names in the ESS Rank Statistics section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>READ OPERATIONS OPS/SEC</td>
<td>ESRROP</td>
</tr>
<tr>
<td>READ OPERATIONS BYTES(OP</td>
<td>ESRRBOP</td>
</tr>
<tr>
<td>READ OPERATIONS BYTES(SEC</td>
<td>ESRRBD</td>
</tr>
<tr>
<td>READ OPERATIONS RTIME/OP</td>
<td>ESRRT</td>
</tr>
<tr>
<td>WRITE OPERATIONS OPS/SEC</td>
<td>ESRWOP</td>
</tr>
<tr>
<td>WRITE OPERATIONS BYTES(OP</td>
<td>ESRWBOP</td>
</tr>
<tr>
<td>WRITE OPERATIONS BYTES(SEC</td>
<td>ESRWBD</td>
</tr>
<tr>
<td>WRITE OPERATIONS RTIME/OP</td>
<td>ESRWRT</td>
</tr>
</tbody>
</table>
FCD - FICON Director Activity report

With the Fibre Channel architecture and Fibre Channel switches (referred to in the following as FICON directors), link busy conditions are not returned. Instead, the FICON director queues the frames internally and sends them through when the port becomes available. This switch latency can grow as contention for ports increases. Therefore, it is important to report this switch latency (per port), this helps for the following tasks:

- Capacity planning
- Analysis of performance problems and bottlenecks
- Identification of contributors to device pending and disconnect times
- Understanding the contention for reconnection status

How to request this report

The default option for Monitor I data gathering is NOFCD. Therefore, it is required that you specify FCD if you want to get this report.

To produce this report, specify

REPORTS(FCD(option))

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](#) in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

Example URL for the DDS API


Contents of the report

The measurements provided for a port in the FCD report do not only comprise the I/O for the system on which the report is taken, but include all I/O that is directed through this port, regardless of which LPAR requests the I/O.
### Table 159. Fields in the FICON Director Activity Report.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IODF = xx</td>
<td>The IODF number where xx is the suffix of the IODF data set name.</td>
</tr>
<tr>
<td>CR-DATE: mm/dd/yyyy</td>
<td>The creation date of the IODF.</td>
</tr>
<tr>
<td>CR-TIME: hh.mm.ss</td>
<td>The creation time of the IODF.</td>
</tr>
<tr>
<td>ACT: text</td>
<td>The configuration state where text indicates how the IODF was activated.</td>
</tr>
<tr>
<td>SWITCH DEVICE</td>
<td>The hexadecimal number of the switch device of the FICON director for which measurements are being reported.</td>
</tr>
<tr>
<td>SWITCH ID</td>
<td>The hexadecimal switch identifier of the FICON director which is associated with this switch device. In case of cascaded switches, &quot;**&quot; may be shown.</td>
</tr>
<tr>
<td>TYPE, MODEL, MAN, PLANT, SERIAL</td>
<td>The hardware description of the switch device.</td>
</tr>
<tr>
<td>PORT ADDR</td>
<td>The hexadecimal address of the port.</td>
</tr>
<tr>
<td>CONNECTION</td>
<td>Provides information about the connected unit.</td>
</tr>
</tbody>
</table>
| UNIT          | • CHP: denotes a channel path  
|               | • CHP-H: denotes a channel path of the system which requested this report  
|               | • CU: denotes a control unit  
|               | • SWITCH: denotes a switch  
|               | If the unit is not unique, dashes are displayed. For example, for CTC channels, there might be a CU and a CHP connected to the same port. |
| ID            | The hexadecimal identifier of the connector.  
|               | For connection unit SWITCH, dashes are provided.  
|               | Dashes are also displayed in this field for UNIT = CU, if the system with the FCD data gathering option ON is not connected to that control unit. |
| SERIAL NUMBER | The serial number of the connected unit. |
| AVG FRAME PACING | The average time (in microseconds) a frame had to wait before it could be transmitted. |
| AVG FRAME SIZE READ | The average frame size (in bytes) used to receive data during the interval. |
| AVG FRAME SIZE WRITE | The average frame size (in bytes) used to transmit data during the interval. |
| PORT BANDWIDTH READ | The rate (in MB/sec) of data which was received during the interval. |
| PORT BANDWIDTH WRITE | The rate (in MB/sec) of data which was transmitted during the interval. |
| ERROR COUNT   | The number of errors which were encountered during the interval. |

### Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](https://www.ibm.com/support/docview.wss?uid=swg21379622). The following table shows the overview condition names for the Overview report.

### Table 160. Overview names in the FICON Director Activity Report.

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG FRAME PACING</td>
<td>FDAFPT</td>
</tr>
<tr>
<td>PORT BANDWIDTH (READ - MB/SEC)</td>
<td>FDMBREAD</td>
</tr>
<tr>
<td>PORT BANDWIDTH (WRITE - MB/SEC)</td>
<td>FDMBWRT</td>
</tr>
<tr>
<td>ERROR COUNT</td>
<td>FDNERR</td>
</tr>
</tbody>
</table>
HFS - Hierarchical File System Statistics report

The Hierarchical File System Statistics report provides information about activities and storage usage within your z/OS UNIX environment. This data can be used to analyze whether storage and buffer pool definitions are correct, or whether some adjustments should be performed to improve the performance of I/O activities for HFS files.

How to request this report

Monitor III gathers global data for this report as SMF record type 74.6. If you want to get information about specific hierarchical file systems, you have to activate the Monitor III gatherer option HFSNAME(ADD(hfsname)).

To produce this report, specify
REPORTS(HFS)

This report is also available in XML output format. Topic How to work with Postprocessor XML reports in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

Example URL for the DDS API

Contents of the report

The report consists of two parts.

HFS Global Statistics Report

The first part of the HFS report provides overall data about I/O activities of HSF files and gives statistics about the various buffer pools which have been defined.

The report can be used as an entry point for performance investigation and capacity planning.

HFS File System Statistics Report

The second part of the report is based on data gathering for specific file systems. You get data about I/O activities and about the internal structure (index) of the HFS files.

Both parts of the report can help you
• in getting a general understanding of the throughput recognized and achieved by HFS to optimally use your resources,
• in identifying potential problems and bottlenecks within HFS and taking corrective actions.
Table 161. Fields in HFS Global Statistics Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage Limits</strong></td>
<td>- All fields are given in megabytes and show the values at interval end.</td>
</tr>
<tr>
<td>VIRTUAL MAX</td>
<td>Value of VIRTUAL(MAX) parameter.</td>
</tr>
<tr>
<td>VIRTUAL USE</td>
<td>Total amount of virtual storage assigned to I/O buffers.</td>
</tr>
<tr>
<td>FIXED MIN</td>
<td>Value of FIXED(MIN) parameter.</td>
</tr>
<tr>
<td>FIXED USE</td>
<td>Total amount of permanently fixed storage assigned to I/O buffers. This number is included in the VIRTUAL USE field.</td>
</tr>
<tr>
<td><strong>File I/O</strong></td>
<td>The fields are given as COUNT and RATE (count per second).</td>
</tr>
<tr>
<td>CACHE</td>
<td>The first page of a data file was requested and found in virtual storage (cache).</td>
</tr>
<tr>
<td>DASD</td>
<td>The first page of a data file was requested and not found in virtual storage, and an I/O was necessary.</td>
</tr>
<tr>
<td>HIT RATIO</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
<tr>
<td><strong>Metadata I/O</strong></td>
<td>The fields are given as COUNT and RATE (count per second).</td>
</tr>
<tr>
<td>CACHE</td>
<td>The metadata for a file was found in virtual storage during file lookup.</td>
</tr>
<tr>
<td>DASD</td>
<td>The metadata for a file was not found in virtual storage during file lookup, and an index call was necessary which may result in an I/O.</td>
</tr>
<tr>
<td>HIT RATIO</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
<tr>
<td><strong>Buffer Pool Statistics</strong></td>
<td>HFS defines up to four buffer pools for processing. This number is used to refer to one of these pools.</td>
</tr>
<tr>
<td>POOL NUMBER</td>
<td>Number of buffers in this buffer pool currently residing in virtual storage.</td>
</tr>
<tr>
<td>NUMBER BUFFERS</td>
<td>Size of each buffer in this pool (in pages).</td>
</tr>
<tr>
<td>BUFFER SIZE</td>
<td>Size of this buffer pool currently in virtual storage (in pages).</td>
</tr>
<tr>
<td>POOL SIZE - %FIXED</td>
<td>Percentage of the size of the buffers which are permanently fixed.</td>
</tr>
<tr>
<td>DATA SPACES</td>
<td>Number of data spaces comprising this buffer pool.</td>
</tr>
<tr>
<td>I/O ACTIVITY - TOTAL</td>
<td>Total number of buffers in this buffer pool for which I/Os were issued. This is not necessarily the number of actual I/Os issued since multiple buffers can be written in a single I/O request.</td>
</tr>
<tr>
<td>I/O ACTIVITY - FIXED</td>
<td>Number of times a buffer was already fixed prior to an I/O request in this buffer pool.</td>
</tr>
<tr>
<td>I/O ACTIVITY - %FIXED</td>
<td>Percentage of fixed I/Os.</td>
</tr>
</tbody>
</table>
HFS File System Statistics

Table 162. Fields in the HFS File System Statistics Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILE SYSTEM NAME</td>
<td>The name of the HFS file system which has been selected for reporting.</td>
</tr>
<tr>
<td>MOUNT DATE and TIME</td>
<td>Date and time when the selected file system was mounted.</td>
</tr>
</tbody>
</table>

Allocation - All fields are given in megabytes.

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>Amount of storage allocated to this file system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>Amount of storage internally used within HFS for data files, directories and HFS internal structures like the attribute directory (AD).</td>
</tr>
<tr>
<td>ATTR. DIR</td>
<td>Amount of storage used for the attribute directory (AD). This number is included in the DATA field.</td>
</tr>
<tr>
<td></td>
<td>The attribute directory is the internal HFS structure (index) which contains attribute information about individual file system objects as well as attributes of the file system itself.</td>
</tr>
<tr>
<td>CACHED</td>
<td>Amount of data buffer storage cached by this file system.</td>
</tr>
</tbody>
</table>

File I/O - The fields are given as COUNT and RATE (count per second).

| CACHE             | The first page of a data file was requested and found in virtual storage (cache). |
| DASD              | The first page of a data file was requested but was not found in virtual storage (cache) and an I/O was necessary. |
| HIT RATIO         | Percentage of cache-found requests based on total number of requests. |
| SEQUENTIAL        | Sequential file data I/O requests. |
| RANDOM            | Random file data I/O requests. |

A random I/O is an I/O that does not read or write the start of a file, and was not preceded by an I/O that read or wrote the immediately preceding set of bytes.

Metadata I/O - The fields are given as COUNT and RATE (count per second).

| CACHE             | The metadata for a file was found in virtual storage (cache) during file lookup. |
| DASD              | The metadata for a file was not found in virtual storage during file lookup and an index call was necessary which may result in an I/O. |
Table 162. Fields in the HFS File System Statistics Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT RATIO</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
<tr>
<td>Index I/O</td>
<td>The fields are given as COUNT and RATE (count per second).</td>
</tr>
<tr>
<td>CACHE</td>
<td>Index page read/write hits.</td>
</tr>
<tr>
<td>DASD</td>
<td>Index page read/write misses.</td>
</tr>
<tr>
<td>HIT RATIO</td>
<td>Percentage of cache-found requests based on total number of requests.</td>
</tr>
</tbody>
</table>

Index Events

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW LEVEL</td>
<td>Number how often HFS added a new level to its index structure.</td>
</tr>
<tr>
<td></td>
<td>The index statistics are relative to all of the indices in the HFS data set. The attribute directory (AD) is one index (the largest), but each directory (including the root) is also an index.</td>
</tr>
<tr>
<td>SPLITS</td>
<td>Number how often an index page was split into two pages because new records were inserted. This gives an idea of how much insertion activity there has been for the index structure.</td>
</tr>
<tr>
<td>JOINS</td>
<td>Number how often HFS was able to combine two index pages into one, because enough index records had been deleted in the two pages.</td>
</tr>
</tbody>
</table>

Special considerations

It might be possible that some data is not available during data gathering. This will result in an incomplete report containing one of the following error messages:

- OMVS KERNEL NOT READY
- BUFFER LIMIT DATA IS NOT AVAILABLE. BPX1PCT RC= rc, RS= rs.
- GLOBAL HFS DATA IS NOT AVAILABLE. BPX1PCT RC= rc, RS= rs.
- GLOBAL HFS DATA IS PARTIALLY AVAILABLE.
- FILE SYSTEM DATA IS NOT AVAILABLE. BPX1PCT RC= rc, RS= rs.
- MOUNT TIME CHANGED DURING INTERVAL.
- FILE SYSTEM NOW MOUNTED.

Please, refer to [z/OS UNIX System Services Messages and Codes](#) for an explanation of the return and reason code.

HTTP - HTTP Server report

The HTTP Server is the Web server for the family of WebSphere® application servers which provide the run-time environment for e-business applications.

The HTTP Server report provides information about the activities of a server. The information can be used to analyze the activities of the server in case of problems.

How to request this report

The Postprocessor is using SMF records type 103 as input for the HTTP Server report. These records are not gathered by an RMF monitor but are written by HTTP servers. See the [z/OS RMF User’s Guide](#) for details.

to produce this report, specify

REPORTS(HTTP)
Contents of the report

The report consists of two parts:

- **HTTP Server Summary**
  The summary contains one line for each server which is part of the report.

- **HTTP Server Details**
  This part consists of two sections:
  - Configuration data (provided by record type 103-1)
  - Performance data (provided by record type 103-2)

Configuration data is reported together with performance data. Configuration data is not reported, if there is not at least one corresponding performance data record.

If there is no configuration data available, the line

*** NO CONFIGURATION DATA AVAILABLE WITHIN GIVEN RECORD INTERVAL ***

is shown.

![HTTP Server Summary Table](image)

**Figure 197. HTTP Server Report - Summary**
Table 163. Fields in the HTTP Server Summary Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER NAME</td>
<td>Server name. If the server name is longer than 32 characters, the line is broken after the name and the value are displayed in the line below, as shown in Figure 197 on page 385.</td>
</tr>
<tr>
<td>SERVER TOKEN</td>
<td>When running multiple HTTP servers or operating in scalable server mode, multiple instances of the HTTP server have the same server name. The server token provides a unique identification of each server instance. If a server is restarted, it keeps its token. Thus, identical tokens may appear in the summary and detail section. If the token cannot be built from SMF record type 103, N/A is shown instead.</td>
</tr>
<tr>
<td>AVAILABLE</td>
<td>Total time (hh:mm:ss) the server was available during the interval.</td>
</tr>
<tr>
<td>REQUEST RATE</td>
<td>Number of requests that the HTTP server has successfully served per second.</td>
</tr>
<tr>
<td>RESPONSE RATE</td>
<td>Number of successful responses sent per second.</td>
</tr>
<tr>
<td>THROUGHPUT RATE</td>
<td>Number of bytes received or sent by this server per second.</td>
</tr>
<tr>
<td>THREADS</td>
<td>Maximum number of threads the server can have in the thread pool (or NO if no limit has been specified).</td>
</tr>
<tr>
<td></td>
<td>Number of currently active threads of the server.</td>
</tr>
<tr>
<td>CACHE SIZE</td>
<td>Maximum cache size (KB) for this server.</td>
</tr>
<tr>
<td>CACHE FILES</td>
<td>Maximum number of files to be in the cache of this server.</td>
</tr>
<tr>
<td>TIMEOUTS</td>
<td>Number of timeouts on the server.</td>
</tr>
</tbody>
</table>
Table 164. Fields in the HTTP Server Details Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Server Characteristics</strong> - Configuration Data</td>
<td></td>
</tr>
<tr>
<td>SERVER NAME</td>
<td>Server name</td>
</tr>
<tr>
<td>IP-ADDR</td>
<td>IP address of the host this HTTP server runs on.</td>
</tr>
<tr>
<td>PORT</td>
<td>Port number this HTTP server listens to.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Server role.</td>
</tr>
<tr>
<td>HTTP</td>
<td>Simple or normal HTTP server</td>
</tr>
<tr>
<td>PROXY</td>
<td>Proxy server</td>
</tr>
<tr>
<td>CACHING</td>
<td>Caching server</td>
</tr>
<tr>
<td>CACHING PROXY</td>
<td>Caching proxy</td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>Unknown server role</td>
</tr>
<tr>
<td>APPL-LVL</td>
<td>Version of software the server is running.</td>
</tr>
<tr>
<td>SERVER ROOT IN HFS</td>
<td>Directory for server_root.</td>
</tr>
<tr>
<td>STARTUP</td>
<td>Server startup date/time.</td>
</tr>
<tr>
<td>SECURITY TYPE</td>
<td>Security type.</td>
</tr>
<tr>
<td>SSL-PORT</td>
<td>Security port.</td>
</tr>
<tr>
<td><strong>Server Characteristics</strong> - Flags</td>
<td></td>
</tr>
<tr>
<td>DNS LOOKUP</td>
<td>DNS lookup flag.</td>
</tr>
<tr>
<td>ACL SETTINGS</td>
<td>ACL settings.</td>
</tr>
<tr>
<td>META FILE</td>
<td>Meta file flag.</td>
</tr>
<tr>
<td>DIRECTORY ACCESS</td>
<td>Directory access flag.</td>
</tr>
<tr>
<td>SERVER IMBEDS HTML</td>
<td>Server imbeds HTML flag.</td>
</tr>
<tr>
<td>NORMAL MODE</td>
<td>Normal mode flag.</td>
</tr>
<tr>
<td>GMT</td>
<td>GMT flag.</td>
</tr>
<tr>
<td>PROXY</td>
<td>Proxy flag.</td>
</tr>
<tr>
<td><strong>Server Characteristics</strong> - Resources</td>
<td></td>
</tr>
<tr>
<td>MAX BUFFER</td>
<td>Maximum size of content buffer.</td>
</tr>
<tr>
<td>MAX THREADS</td>
<td>Maximum number of threads the server can have in the thread pool.</td>
</tr>
<tr>
<td><strong>Server Characteristics</strong> - Garbage Collection</td>
<td></td>
</tr>
<tr>
<td>ENABLED</td>
<td>Indication whether garbage collection is enabled.</td>
</tr>
<tr>
<td>INTERVAL</td>
<td>Garbage collection interval in seconds.</td>
</tr>
<tr>
<td>MEMORY USE</td>
<td>Garbage collection memory usage.</td>
</tr>
<tr>
<td><strong>Server Characteristics</strong> - Cache</td>
<td></td>
</tr>
<tr>
<td>CACHE</td>
<td>Cache flag.</td>
</tr>
<tr>
<td>MAX SIZE</td>
<td>Maximal cache size (KB).</td>
</tr>
<tr>
<td>MAX FILES</td>
<td>Maximal number of files in cache. NO is indicating that there is no maximum defined.</td>
</tr>
<tr>
<td>LIMIT 1</td>
<td>Cache limit 1.</td>
</tr>
<tr>
<td>LIMIT 2</td>
<td>Cache limit 2.</td>
</tr>
<tr>
<td>TIME MARGIN</td>
<td>Cache time margin (seconds).</td>
</tr>
<tr>
<td>KEEP EXPIRED</td>
<td>Keep expired flag.</td>
</tr>
<tr>
<td>CONNECT</td>
<td>Cache connect flag.</td>
</tr>
<tr>
<td><strong>Server Characteristics</strong> - Timeout Thresholds (in seconds)</td>
<td></td>
</tr>
<tr>
<td>INPUT</td>
<td>Input timeout.</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>Output timeout.</td>
</tr>
<tr>
<td>SCRIPT</td>
<td>Script timeout.</td>
</tr>
</tbody>
</table>
## Table 164. Fields in the HTTP Server Details Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLE THREADS</td>
<td>Timeout for idle threads.</td>
</tr>
<tr>
<td>CACHE LOCK</td>
<td>Cache lock timeout.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td></td>
</tr>
<tr>
<td>REQUESTS</td>
<td>Requests that the HTTP server has successfully served.</td>
</tr>
<tr>
<td>REQUESTS DISCARDED</td>
<td>Requests sent to the HTTP server that are not valid.</td>
</tr>
<tr>
<td>REQUESTS IN ERROR</td>
<td>Requests that the HTTP server responded to with an error.</td>
</tr>
<tr>
<td>RESPONSES</td>
<td>Number of responses successfully sent.</td>
</tr>
<tr>
<td>RESPONSES DISCARDED</td>
<td>Responses the HTTP server was not able to send back to the client.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Request Types</td>
</tr>
<tr>
<td>GET</td>
<td>Number of GET requests received by this server.</td>
</tr>
<tr>
<td>POST</td>
<td>Number of POST requests received by this server.</td>
</tr>
<tr>
<td>CGI</td>
<td>Number of CGI requests received by this server.</td>
</tr>
<tr>
<td>GWAPI</td>
<td>Number of GWAPI requests received by this server.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Threads</td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum number of threads as specified in the HTTP server configuration file on the MaxActiveThreads directive.</td>
</tr>
<tr>
<td>USED</td>
<td>Number of threads currently used.</td>
</tr>
<tr>
<td>NON-SSL WAITING</td>
<td>Number of non-Secure Sockets Layer (SSL) threads available for use. If this value is 0, all non-SSL threads are allocated.</td>
</tr>
<tr>
<td>SSL WAITING</td>
<td>Number of Secure Sockets Layer (SSL) threads available for use. If this value is 0, all SSL threads are allocated.</td>
</tr>
<tr>
<td>ASYNC I/O WAITING</td>
<td>If the HTTP server is running in Scalable Server mode, number of asynchronous I/O threads available for use. If this value is 0, all asynchronous I/O threads are allocated.</td>
</tr>
<tr>
<td>MSG QUEUE WAITING</td>
<td>If the HTTP server is running in Scalable Server mode, number of message queue threads available for use. If this value is 0, all message queue threads are allocated.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Cache Usage</td>
</tr>
<tr>
<td>KBYTES READ</td>
<td>Number of kilobytes read from the cache of this server.</td>
</tr>
<tr>
<td>HITS</td>
<td>Number of requests for files stored in the cache of this server.</td>
</tr>
<tr>
<td>IN USE</td>
<td>Number of kilobytes of RAM used by the cache of this server.</td>
</tr>
<tr>
<td>FILES</td>
<td>Average number of files in the cache of this server.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>TIMEOUTS</td>
<td>Number of timeouts on the server. This value is not affected by any changes to the configuration of the server.</td>
</tr>
<tr>
<td>CONNECTIONS</td>
<td>Number of connections this server has provided.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Throughput - The fields are given as BYTES and RATE (BYTES per second).</td>
</tr>
<tr>
<td>IN</td>
<td>Number of bytes sent to the HTTP server in requests.</td>
</tr>
<tr>
<td>OUT</td>
<td>Number of bytes sent by the HTTP server in responses.</td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>Bytes that are not identified as part of a request.</td>
</tr>
<tr>
<td><strong>Server Activity</strong></td>
<td>Response Times - The values are given as minimum, maximum and average response time (in seconds).</td>
</tr>
</tbody>
</table>

**Note:** These values refer to the complete server run time, not only to the current interval.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNS LOOKUP</td>
<td>Time it takes to complete the search for a domain name in the Domain Name Server (DNS).</td>
</tr>
<tr>
<td>SERVICE PLUGINS</td>
<td>Time it takes to complete customized application functions.</td>
</tr>
<tr>
<td>CGI</td>
<td>Time it takes to complete Common Gateway Interface (CGI) programs.</td>
</tr>
<tr>
<td>SSL HANDSHAKE</td>
<td>Time it takes to complete the exchange of security information between the HTTP server and browser.</td>
</tr>
<tr>
<td>PROXY RESPONSE</td>
<td>If configured as a Proxy Web server: time it takes to complete a transaction between a browser, this proxy server, and the destination server.</td>
</tr>
</tbody>
</table>
Table 164. Fields in the HTTP Server Details Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Activity - Error Statistics - The number of responses with a specific error code.</td>
<td></td>
</tr>
<tr>
<td>ERROR Code</td>
<td>Meaning</td>
</tr>
<tr>
<td>200</td>
<td>OK</td>
</tr>
<tr>
<td>302</td>
<td>Moved temporarily</td>
</tr>
<tr>
<td>401</td>
<td>Unauthorized</td>
</tr>
<tr>
<td>403</td>
<td>Forbidden</td>
</tr>
<tr>
<td>404</td>
<td>Not found</td>
</tr>
<tr>
<td>407</td>
<td>Proxy unauthorized</td>
</tr>
<tr>
<td>500</td>
<td>Internal server error</td>
</tr>
</tbody>
</table>

IOQ - I/O Queuing Activity report

The I/O Queuing Activity report provides information on the I/O configuration and activity rate, queue lengths, and percentages when one or more I/O components, grouped by a logical control unit (LCU), were busy.

For all channels that are managed by Dynamic Channel Path Management (DCM), additional information is available. DCM allows an installation to identify channels which they wish to be managed dynamically. These channels are not assigned permanently to a specific control unit, but belong to a pool of channels. Based on workload requirements in the system, these channels will be assigned dynamically by DCM. For each LCU with DCM managed channels, a summary line displays the minimum and maximum number of connected DCM managed channels, the number of defined DCM managed channels and accumulated activity data.

An LCU is the set of devices attached to the same physical control unit (or group of control units that have one or more devices in common). Each device belongs to only one LCU, but the I/O processor (SAP - System Assist Processor), which is part of the channel subsystem, manages and schedules I/O work requests to the various devices within the LCU. If an I/O request is unsuccessful because the control unit is busy, the request is queued on the control unit header (CU-HDR) queue. Once the busy condition is resolved, the CU-HDR is then placed in the initiative queue.

Your installation defines your I/O configuration as input to the input/output configuration program (IOCP). The IOCP uses the information you supply to define the relationship between channel paths, control units, and I/O devices. The IOCP generates and assigns LCU identifiers to these groups of channel paths, control units and I/O devices. The IOCP then places this configuration definition in a configuration data set (IOCDS). RMF uses the configuration definition as well as measurement data gathered during the interval to generate the I/O Queuing Activity report.

How to request this report

To gather data for this report, specify as a Monitor I gatherer option:

10Q(option)

To produce this report, specify

REPORTS(10Q)
This report is also available in XML output format. To learn more about how to work with Postprocessor XML reports, see the z/OS RMF User's Guide.

Example URL for the DDS API

Using the information given in the report
If the Channel Path Activity and I/O Device Activity reports have shown that a problem exists, you can use the information in the I/O Queuing Activity report to pinpoint the reason for contention delays associated with channel paths, control units, and devices. For example, if the I/O Device Activity report shows an unusually large pending time for one or more devices in an LCU, the I/O Queuing Activity report indicates what proportion of the delay is caused by control unit busy and device busy. This proportion indicates which part of the configuration might need adjustment.

You can also use the I/O Device Activity report and I/O Queuing Activity report to analyze the current I/O configuration. The I/O Device Activity report shows which devices belong to each logical control unit. The I/O Queuing Activity report shows which physical control units are part of each logical control unit and which channel paths are connected to each physical control unit.

Data gathering considerations
The report depends on information in the I/O configuration data set (IOCDS). If RMF cannot read the IOCDS, or if the IOCDS has been updated so that the data might not apply to the present configuration, no report is available. For example, when the operator partitions the system in such a way that RMF cannot read the IOCDS because it appears in another partition of a multi-processing system, RMF terminates the I/O Queuing Activity report and issues a message to the operator, I/O QUEUING ACTIVITY RMF REPORT TERMINATED.

Missing data in report fields
When a LCU has no activity during the interval, RMF omits that LCU from the report for that interval. If no activity has occurred during the interval for all selected LCUs, the message NO ACTIVITY FOR SELECTED LCUs appears instead of the data after the headings of the report.

If a channel path was brought online or taken offline during the interval, data is formatted and an additional line in the report describes its status. If an installed channel path was offline during the whole interval, the additional line identifies the channel path as OFFLINE. If a channel path was taken offline or brought online during an interval, the additional line identifies the channel path as either NOW OFFLINE or NOW ONLINE.

When RMF cannot obtain valid hardware data for CONTENTION RATE and DELAY Q LNGTH, it prints the message NO H/W DATA under those headings.

If the channel measurement facility is inactive or has been interrupted during the interval, CHANNEL MEASUREMENT FACILITY NOT ACTIVE OR INTERRUPTED appears after the headings where the data normally appears in the report.
If the diagnosis interface fails during the interval, DIAGNOSIS INTERFACE FAILURE appears after the headings in the report.

Messages
During the measurement of I/O Queuing activity, you may see one of the following messages in the data line:

LCU DYNAMICALLY CHANGED
A LCU was dynamically changed during the interval.

LCU DYNAMICALLY ADDED
A LCU was dynamically created during the interval.

LCU CHANGE ATTEMPTED
A configuration change was attempted, but did not complete successfully.

Contents of the report
In a PR/SM environment, the top section of the report measures PR/SM system activity. The rest of the report applies to I/O activity for z/OS being measured by RMF.

In a z/VM guest system environment, the report for an z/OS system that is authorized via the VM RMCHINFO directory option, shows static configuration data. Measurement data is not available.

Figure 199. I/O Queuing Activity Report
Table 165. Fields in the I/O Queuing Activity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IODF = xx</td>
<td>The IODF number where xx is the suffix of the IODF data set name.</td>
</tr>
<tr>
<td>CR-DATE: mm/dd/yyyy</td>
<td>The creation date of the IODF.</td>
</tr>
<tr>
<td>CR-TIME: hh.mm.ss</td>
<td>The creation time of the IODF.</td>
</tr>
<tr>
<td>ACT: text</td>
<td>The configuration state where text indicates how the IODF was activated.</td>
</tr>
<tr>
<td>IOP</td>
<td>The two digit hexadecimal identifier of the I/O processor (IOP). The IOP data sections are sorted according ascending IOP numbers. A summary line which summarizes the measurement data of the individual IOPs is added following the last IOP data line. This summary line starts with the character string SYS, indicating that it contains system wide information.</td>
</tr>
</tbody>
</table>

**Initiative Queue**

**ACTIVITY RATE**

The rate at which I/O requests are placed on the IOP initiative queue. There is one initiative queue for each IOP, and this value reflects the load of I/O requests on each IOP. This rate may be greater than the actual I/O rate due to potential re-queues.

\[
\text{ACTIVITY RATE} = \frac{\text{\# I/O Requests on the IOP Queue}}{\text{Interval}}
\]

**AVG Q LENGTH**

The average number of entries on the initiative queue for this IOP. Each time a request is added to the initiative queue, the new queue length is added to an accumulator.

\[
\text{AVG Q LENGTH} = \frac{\text{Accumulated Queue Length}}{\text{\# I/O Requests on the IOP Queue}} - 1
\]
Table 165. Fields in the I/O Queuing Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>% IOP BUSY</td>
<td>The ratio of the number of times the IOP was found busy to the total number of I/O processor samples.</td>
</tr>
<tr>
<td></td>
<td>% IOP BUSY = \frac{# Busy samples}{# Busy samples + # Idle samples} * 100</td>
</tr>
<tr>
<td></td>
<td>A high IOP utilization might be caused by a high level of activity in terms of SSCH, I/O or sysplex operations per second or by contention in the I/O configuration. If contention is caused by CP BUSY or CU BUSY conditions, the request is placed on the IOP queue. This is indicated by an AVG Q LENGTH value greater than zero. If contention is caused by DP BUSY conditions, this is not indicated by the AVG Q LENGTH value, because the requests are kept internally. When the IOP is idle, these requests are processed which is reflected by the %IOP BUSY field.</td>
</tr>
<tr>
<td>I/O START RATE</td>
<td>The rate at which I/O functions are initially started on this IOP. The value reflects the load of I/O requests on each IOP. It can be compared with the I/O rate in the device activity, or, the CHPID taken rate in the I/O queuing activity reports.</td>
</tr>
<tr>
<td></td>
<td>I/O START RATE = \frac{# I/O functions started}{Interval}</td>
</tr>
<tr>
<td>INTERRUPT RATE</td>
<td>The rate at which I/O interrupts have been processed on this IOP. This value may be greater than the I/O start rate because it includes also the PCI interrupts.</td>
</tr>
<tr>
<td></td>
<td>INTERRUPT RATE = \frac{# Processed I/O interrupts}{Interval}</td>
</tr>
<tr>
<td>% I/O Requests Retried</td>
<td>The ratio of the number of retries to the number of I/O functions initially started plus the total number of retries.</td>
</tr>
<tr>
<td>ALL</td>
<td>%ALL = \frac{# Retries}{# I/O functions started + # Retries} * 100</td>
</tr>
<tr>
<td>CP BUSY</td>
<td>The ratio of the number of I/O operations retried on the I/O processor because the selected channel path was busy, to the number of I/O functions initially started plus the total number of retries.</td>
</tr>
<tr>
<td></td>
<td>%CP BUSY = \frac{# Retries due to channel path busy}{# I/O functions started + # Retries} * 100</td>
</tr>
<tr>
<td>DP BUSY</td>
<td>The ratio of the number of times an I/O operation to a device was retried on the I/O processor because a director port on the path to that device was busy to the number of I/O functions initially started plus the total number of retries.</td>
</tr>
<tr>
<td></td>
<td>%DP BUSY = \frac{# Retries due to director port busy}{# I/O functions started + # Retries} * 100</td>
</tr>
<tr>
<td>CU BUSY</td>
<td>The ratio of the number of times an I/O operation was retried on the I/O processor because the control unit of the targeted device was busy to the number of I/O functions initially started plus the total number of retries.</td>
</tr>
<tr>
<td></td>
<td>%CU BUSY = \frac{# Retries due to control unit busy}{# I/O functions started + # Retries} * 100</td>
</tr>
<tr>
<td>DV BUSY</td>
<td>The ratio of the number of times an I/O operation was retried on the I/O processor because the targeted device was busy to the number of I/O functions initially started plus the total number of retries.</td>
</tr>
<tr>
<td></td>
<td>%DV BUSY = \frac{# Retries due to device busy}{# I/O functions started + # Retries} * 100</td>
</tr>
</tbody>
</table>

Retries / SSCH
Table 165. Fields in the I/O Queuing Activity Report  (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>The ratio of the number of retries on the I/O processor to the number of I/O functions initially started.</td>
</tr>
<tr>
<td></td>
<td>ALL = ( \frac{# \text{ Retries}}{# \text{ I/O functions started}} )</td>
</tr>
<tr>
<td>CP BUSY</td>
<td>The ratio of the number of retries on the I/O processor because the selected channel path was busy to the number of I/O functions initially started.</td>
</tr>
<tr>
<td></td>
<td>CP BUSY = ( \frac{# \text{ Retries due to channel path busy}}{# \text{ I/O functions started}} )</td>
</tr>
<tr>
<td>DP BUSY</td>
<td>The ratio of the number of retries on the I/O processor because a director port on the path to that device was busy to the number of I/O functions initially started.</td>
</tr>
<tr>
<td></td>
<td>DP BUSY = ( \frac{# \text{ Retries due to director port busy}}{# \text{ I/O functions started}} )</td>
</tr>
<tr>
<td>CU BUSY</td>
<td>The ratio of the number of retries on the I/O processor because the control unit of the targeted device was busy to the number of I/O functions initially started.</td>
</tr>
<tr>
<td></td>
<td>CU BUSY = ( \frac{# \text{ Retries due to control unit busy}}{# \text{ I/O functions started}} )</td>
</tr>
<tr>
<td>DV BUSY</td>
<td>The ratio of the number of retries on the I/O processor because the targeted device was busy to the number of I/O functions initially started.</td>
</tr>
<tr>
<td></td>
<td>DV BUSY = ( \frac{# \text{ Retries due to device busy}}{# \text{ I/O functions started}} )</td>
</tr>
<tr>
<td>LCU</td>
<td>The four-digit hexadecimal identifier of the logical control unit (LCU).</td>
</tr>
<tr>
<td></td>
<td>An LCU is the logical representation of a physical control unit or a group of physical control units with one or more devices in common. Each physical control unit and each device can belong to only one LCU; they cannot be shared between LCUs.</td>
</tr>
<tr>
<td></td>
<td>To find the LCU number, RMF must access the I/O configuration data set (IOCDS). If RMF cannot read it, or if it has been updated so that the data might not apply to the present configuration, RMF ends the I/O Queuing Activity report. If no activity has occurred during the interval for all selected LCUs, the message NO ACTIVITY FOR SELECTED LCUs appears instead of the data after the headings of the report.</td>
</tr>
<tr>
<td>CONTROL UNITS</td>
<td>The four-digit hexadecimal identifier of each physical control unit contained in the logical control unit.</td>
</tr>
<tr>
<td>DCM GROUP MIN - MAX - DEF</td>
<td>The values in columns MIN MAX DEF report the minimum and maximum number of DCM managed channels for one LCU (in this interval) as well as the installation-specified definition for this LCU.</td>
</tr>
<tr>
<td></td>
<td>The line with these values is available only for LCUs with DCM managed channels. It contains in addition the accumulated values of the I/O activity rate, the director port contention, and the control unit contention of all DCM managed channels. These values may include also measurements of managed channels which were partially online.</td>
</tr>
</tbody>
</table>
### Table 165. Fields in the I/O Queuing Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHAN PATHS</strong></td>
<td>The two-digit hexadecimal channel path identifiers (CHPIDs) of the channel paths that are attached to the physical control units contained in the logical control unit. There can be up to eight channel paths in a logical control unit. The channel paths that are offline or moved online or offline during the interval are indicated as follows:</td>
</tr>
<tr>
<td></td>
<td>OFFLINE</td>
</tr>
<tr>
<td></td>
<td>NOW OFFLINE</td>
</tr>
<tr>
<td></td>
<td>NOW ONLINE</td>
</tr>
<tr>
<td></td>
<td>Channel paths that are online to the system but that might or might not be connected during the interval to any device in an LCU are indicated as follows:</td>
</tr>
<tr>
<td></td>
<td>PATH OFFLINE</td>
</tr>
<tr>
<td></td>
<td>PATH NOW OFFLINE</td>
</tr>
<tr>
<td></td>
<td>PATH NOW ONLINE</td>
</tr>
<tr>
<td></td>
<td>An ‘*’ in this column indicates a summary line for all channel paths connected to the same LCU.</td>
</tr>
<tr>
<td></td>
<td>If the control unit supports channel path attributes, RMF displays them together with the channel path:</td>
</tr>
<tr>
<td></td>
<td>PF preferred path</td>
</tr>
<tr>
<td></td>
<td>NP non-preferred path</td>
</tr>
<tr>
<td></td>
<td>NS path not specified</td>
</tr>
<tr>
<td></td>
<td>In the following cases, RMF cannot find channel path attributes and therefore only displays the CHPID:</td>
</tr>
<tr>
<td></td>
<td>• for devices residing in control units that do not support path attributes</td>
</tr>
<tr>
<td></td>
<td>• for offline channels</td>
</tr>
<tr>
<td></td>
<td>• for summary lines.</td>
</tr>
<tr>
<td><strong>CHPID TAKEN</strong></td>
<td>The rate at which I/O requests to devices of this LCU are satisfied by each CHPID during the interval. By reviewing the rate at which each channel path of the LCU satisfies I/O requests, you can see how evenly the work requests are distributed among the available paths and how effectively those paths are arranged for the LCU.</td>
</tr>
<tr>
<td><strong>% DP BUSY</strong></td>
<td>The ratio of the number of times an I/O request was deferred because the director port was busy to the number of attempts to service I/O requests during the measurement interval. This field indicates director port contention.</td>
</tr>
<tr>
<td></td>
<td>DPB Number of deferred I/O requests due to director port busy</td>
</tr>
<tr>
<td></td>
<td>CUB Number of deferred I/O requests due to control unit busy</td>
</tr>
<tr>
<td></td>
<td>SUC Number of successful I/O requests on that path</td>
</tr>
<tr>
<td></td>
<td>Note: If vary activity has occurred during the interval, this field is blank.</td>
</tr>
<tr>
<td><strong>% CU BUSY</strong></td>
<td>The ratio of the number of requests deferred due to control unit busy to the number of attempts to service I/O requests during the measurement interval. This field indicates control unit contention and is reported for each path within the logical control unit.</td>
</tr>
<tr>
<td></td>
<td>CUB Number of deferred I/O requests due to control unit busy</td>
</tr>
<tr>
<td></td>
<td>SUC Number of successful I/O requests on that path</td>
</tr>
<tr>
<td></td>
<td>RMF reports a value even if the channel path changes status during the interval.</td>
</tr>
</tbody>
</table>
### Table 165. Fields in the I/O Queuing Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG CUB DLY</td>
<td>The average number of milliseconds of delay that an I/O request encountered because the control unit was busy.</td>
</tr>
<tr>
<td></td>
<td>Control Unit Busy Time</td>
</tr>
<tr>
<td></td>
<td>AVG CUB DLY = ----------</td>
</tr>
<tr>
<td></td>
<td># I/O Operations Accepted on that Path</td>
</tr>
<tr>
<td>AVG CMR DLY</td>
<td>The average number of milliseconds of delay that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device. It allows to distinguish between real H/W errors versus workload spikes (contention in the fabric and at the destination port).</td>
</tr>
<tr>
<td></td>
<td>Initial Command Response Time</td>
</tr>
<tr>
<td></td>
<td>AVG CMR DLY = -----------</td>
</tr>
<tr>
<td></td>
<td># I/O Operations Accepted on that Path</td>
</tr>
<tr>
<td>CONTENTION RATE</td>
<td>The rate at which the I/O processor places delayed I/O requests on the CU-HDR for this LCU. The IOP places an I/O request on the CU-HDR when all paths to the subchannel are busy and at least one path to the control unit is busy. For devices with only one path or for devices where multiple paths exist and the busy condition is resolved immediately via an alternate path, the IOP does not count the condition.</td>
</tr>
<tr>
<td></td>
<td># Enqueued Requests</td>
</tr>
<tr>
<td></td>
<td>CONTENTION RATE = ----------</td>
</tr>
<tr>
<td></td>
<td>Interval</td>
</tr>
<tr>
<td>DELAY Q LNGTH</td>
<td>The average number of delayed requests on the control unit header (CU-HDR). Each time a request is enqueued on the CU-HDR, RMF counts the number of requests on the queue and adds that number to the accumulator.</td>
</tr>
<tr>
<td></td>
<td>Accumulated Queue Length</td>
</tr>
<tr>
<td></td>
<td>DELAY Q LNGTH = -----------</td>
</tr>
<tr>
<td></td>
<td># Enqueued Requests</td>
</tr>
<tr>
<td>AVG CSS DLY</td>
<td>The average number of milliseconds of delay that an I/O request encountered after the acceptance of the start or resume function at the subchannel for the LCU, until the channel subsystem first attempts to initiate the operation.</td>
</tr>
<tr>
<td></td>
<td>Channel Subsystem Time</td>
</tr>
<tr>
<td></td>
<td>AVG CSS DLY = -----------</td>
</tr>
<tr>
<td></td>
<td># I/O Operations Accepted</td>
</tr>
<tr>
<td>HPAV WAIT</td>
<td>The ratio of the number of I/O requests that could not start because no HyperPAV aliases were available, to the total number of I/O requests for an LCU:</td>
</tr>
<tr>
<td></td>
<td>I/Os that could not start</td>
</tr>
<tr>
<td></td>
<td>HPAV Wait = -----------</td>
</tr>
<tr>
<td></td>
<td>Total I/Os</td>
</tr>
<tr>
<td>HPAV MAX</td>
<td>The maximum number of concurrently used HyperPAV alias devices for that LCU during the interval.</td>
</tr>
<tr>
<td>AVG OPEN EXCH</td>
<td>The estimated average number of concurrently active I/O operations is provided in the LCU summary line if at least one FICON channel is connected to the LCU.</td>
</tr>
<tr>
<td></td>
<td>CMR+CONN+DISC</td>
</tr>
<tr>
<td></td>
<td>AVG OPEN EXCH = -----------</td>
</tr>
<tr>
<td></td>
<td>RMF interval</td>
</tr>
<tr>
<td></td>
<td>CMR  initial command response time</td>
</tr>
<tr>
<td></td>
<td>CONN connect time</td>
</tr>
<tr>
<td></td>
<td>DISC disconnect time</td>
</tr>
<tr>
<td>DATA XFER CONC</td>
<td>The data transfer concurrency is provided in the LCU summary line if at least one FICON channel is connected to the LCU.</td>
</tr>
<tr>
<td></td>
<td>CONN</td>
</tr>
<tr>
<td></td>
<td>DATA XFER CONC = -----------</td>
</tr>
<tr>
<td></td>
<td>RMF interval</td>
</tr>
</tbody>
</table>

---

**Spreadsheet and Overview reference**

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User's Guide](https://www.ibm.com/support/docview.wss?uid=swg21409825). The following table shows the overview condition names for the Overview report.
Table 166. Overview names in the I/O Queuing Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVITY RATE</td>
<td>IOPAC</td>
</tr>
<tr>
<td>AVG Q LGTH</td>
<td>IOPQL</td>
</tr>
<tr>
<td>% IOP BUSY</td>
<td>IOPIPB</td>
</tr>
<tr>
<td>Percent I/O processor idle</td>
<td>IOPIPI</td>
</tr>
<tr>
<td>I/O START RATE</td>
<td>IORIFS</td>
</tr>
<tr>
<td>INTERRUPT RATE</td>
<td>IORPHI</td>
</tr>
<tr>
<td>% I/O REQU RETRIED (ALL)</td>
<td>IOPALB</td>
</tr>
<tr>
<td>% I/O REQU RETRIED (CP BUSY)</td>
<td>IOPCHB</td>
</tr>
<tr>
<td>% I/O REQU RETRIED (DP BUSY)</td>
<td>IOPDPB</td>
</tr>
<tr>
<td>% I/O REQU RETRIED (CU BUSY)</td>
<td>IOPCUB</td>
</tr>
<tr>
<td>% I/O REQU RETRIED (DV BUSY)</td>
<td>IOPDVB</td>
</tr>
<tr>
<td>RETRIES / SSCH (ALL)</td>
<td>IONALB</td>
</tr>
<tr>
<td>RETRIES / SSCH (CP BUSY)</td>
<td>IONCHB</td>
</tr>
<tr>
<td>RETRIES / SSCH (DP BUSY)</td>
<td>IONDDB</td>
</tr>
<tr>
<td>RETRIES / SSCH (CU BUSY)</td>
<td>IONCUB</td>
</tr>
<tr>
<td>RETRIES / SSCH (DV BUSY)</td>
<td>IONDVB</td>
</tr>
<tr>
<td>CHPID TAKEN</td>
<td>IOART</td>
</tr>
<tr>
<td>% DP BUSY</td>
<td>IODPB</td>
</tr>
<tr>
<td>% CU BUSY</td>
<td>IOCUB</td>
</tr>
<tr>
<td>CONTENTION RATE</td>
<td>IOCRR</td>
</tr>
<tr>
<td>DELAY Q LGTH</td>
<td>IODLQ</td>
</tr>
<tr>
<td>AVG CUB DLY</td>
<td>IOCBT</td>
</tr>
<tr>
<td>AVG CMR DLY</td>
<td>IOCMR</td>
</tr>
<tr>
<td>AVG CSS DLY</td>
<td>IOCSS</td>
</tr>
<tr>
<td>HPAV WAIT</td>
<td>IOHWAIT</td>
</tr>
<tr>
<td>HPAV MAX</td>
<td>IOHMAX</td>
</tr>
</tbody>
</table>

OMVS - OMVS Kernel Activity report

The OMVS Kernel Activity report provides information about:
- OMVS System Call Activity
- OMVS Process Activity
- OMVS Inter-Process Communication
- OMVS Memory Map - Shared Library Regions - Queued Signals

How to request this report

Monitor III gathers data for this report automatically. If you want to suppress gathering, you have to disable writing SMF record type 74.3.

To produce this report, specify

REPORTS(OMVS)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](#) in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.
Example URL for the DDS API

Contents of the report
The OMVS Kernel Activity report has these parts:
- OMVS System Call Activity
- OMVS Process Activity
- OMVS Inter-Process Communication
- OMVS Memory Map - Shared Library Regions - Queued Signals

Table 167. Fields in the OMVS Kernel Activity Report

<table>
<thead>
<tr>
<th>Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMVS SYSTEM CALL ACTIVITY</td>
<td></td>
</tr>
<tr>
<td>SYSCALLS (N/S)</td>
<td>Number of system calls per second processed by the OMVS kernel address space in this interval.</td>
</tr>
<tr>
<td>CPU TIME (H/S)</td>
<td>Time spent to process system calls in hundredths of seconds per second.</td>
</tr>
<tr>
<td>OMVS PROCESS ACTIVITY</td>
<td></td>
</tr>
</tbody>
</table>
### Table 167. Fields in the OMVS Kernel Activity Report (continued)

<table>
<thead>
<tr>
<th>Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM PROCESSES USERS PROCESSES PER USER</strong></td>
<td>Maximum number of processes, users, and processes per user defined by OMVS kernel address space initialization parameters (in Parmlib member BPXPRMxx). If one of these values has changed (due to an OMVS restart), it will be reported as ‘****’.</td>
</tr>
<tr>
<td><strong>CURRENT PROCESSES</strong></td>
<td>Number of OMVS processes controlled by OMVS during this interval.</td>
</tr>
<tr>
<td><strong>CURRENT USERS</strong></td>
<td>Number of OMVS users controlled by OMVS.</td>
</tr>
<tr>
<td><strong>OVERRUNS PROCESSES</strong></td>
<td>Rate of processes that could not be created by OMVS because the maximum number of processes would have been exceeded.</td>
</tr>
<tr>
<td><strong>OVERRUNS USERS</strong></td>
<td>Rate of OMVS users that could not be created by OMVS because the maximum number of users would have been exceeded.</td>
</tr>
<tr>
<td><strong>OVERRUNS PROCESSES PER USER</strong></td>
<td>Rate of processes per user that could not be created by OMVS because the maximum number of processes per user would have been exceeded.</td>
</tr>
</tbody>
</table>

**OMVS INTER-PROCESS COMMUNICATION**

| **MAXIMUM MESSAGE QUEUE IDS SEMAPHORE IDS SHARED MEMORY IDS SHARED MEMORY PAGES** | Maximum number of message queue IDs, semaphore IDs, shared memory IDs, and shared memory pages defined by OMVS kernel address space initialization parameters (in Parmlib member BPXPRMxx). |
| **CURRENT MESSAGE QUEUE IDS** | Number of message queue IDs during this interval. |
| **CURRENT SEMAPHORE IDS** | Number of semaphore IDs during this interval. |
| **CURRENT SHARED MEMORY IDS** | Number of shared memory IDs during this interval. |
| **CURRENT SHARED MEMORY PAGES** | Number of shared memory pages during this interval. |
| **OVERRUNS MESSAGE QUEUE IDS** | Rate of message queue IDs that could not be created by OMVS because the maximum number of message queue IDs would have been exceeded. |
| **OVERRUNS SEMAPHORE IDS** | Rate of semaphore IDs that could not be created by OMVS because the maximum number of semaphore IDs would have been exceeded. |
| **OVERRUNS SHARED MEMORY IDS** | Rate of shared memory IDs that could not be created by OMVS because the maximum number of shared memory IDs would have been exceeded. |
| **OVERRUNS SHARED MEMORY PAGES** | Rate of shared memory pages that could not be created by OMVS because the maximum number of shared memory pages would have been exceeded. |

**OMVS MEMORY MAP**

| **MAXIMUM MEMORY MAP STORAGE PAGES SHARED STORAGE PAGES** | Maximum number of memory map storage pages and shared storage pages defined by OMVS kernel address space initialization parameters (in Parmlib member BPXPRMxx). |
| **CURRENT MEMORY MAP STORAGE PAGES** | Number of memory map storage pages during this interval. |
| **CURRENT SHARED STORAGE PAGES** | Number of shared storage pages during this interval. |
| **OVERRUNS MEMORY MAP STORAGE PAGES** | Rate of memory map storage pages that could not be created by OMVS because the maximum number of memory map storage pages would have been exceeded. |
| **OVERRUNS SHARED STORAGE PAGES** | Rate of shared storage pages that could not be created by OMVS because the maximum number of shared storage pages would have been exceeded. |

**SHARED LIBRARY REGION**

| **MAX SHARED LIBRARY REGION** | Maximum amount of storage available for shared library region as specified by Parmlib statement SHRLIBRGNSIZE. The values are provided in units of megabytes. |
| **CURRENT SHARED LIBRARY REGION** | The current amount of storage in Megabytes available for shared library region. |
| **OVERRUNS SHARED LIBRARY REGION** | Rate of attempts to exceed the maximum storage amount for shared library region. |
### Table 167. Fields in the OMVS Kernel Activity Report  (continued)

<table>
<thead>
<tr>
<th>Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUEUED SIGNALS</td>
<td>Maximum amount of queued signals allowed per process as specified by Parmlib statement MAXQUEUEDSIGS</td>
</tr>
<tr>
<td>MAX QUEUED SIGNALS</td>
<td>Rate of attempts to exceed the maximum number of queued signals.</td>
</tr>
<tr>
<td>OVERRUNS QUEUED SIGNALS</td>
<td></td>
</tr>
</tbody>
</table>

### PAGESP - Page Data Set Activity report

The Page Data Set Activity report provides information about page data set usage for each individual data set. The information about the number of slots used is reported as minimum, maximum, and average values for the interval. Also, the time is provided when the Auxiliary Storage Manager (ASM) considered the data set to be busy, the number of start I/O requests initiated by ASM for the data set, the average page transfer time for each I/O request, and the number of pages transferred to and from the page data set.

The report contains only page data sets that:
- are in use at the end of that RMF measurement interval
- have been deleted during that RMF measurement interval

#### How to request this report

Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify `NOPAGESP`.

To produce this report, specify

```
REPORTS(PAGESP)
```

This report is also available in XML output format. Topic [Postprocessor XML reports](z/OS RMF User's Guide) provides all required information on how to produce and view XML reports.

#### Example URL for the DDS API


#### Using the information given in the report

You can use the information in the page data set report, for example, to determine whether the optimum size has been allocated for each data set. If the maximum number of slots used is consistently below the number of slots allocated, you might consider reducing the size of the data set to conserve space on the device. However, use caution when reducing the size of the PLPA and common data sets because overflow cannot occur from these data sets to the local data sets.

The % IN USE field shows how busy the data set is. If this is above 30% you might see increases in response time. You might then:
- dedicate volumes to page data sets.
- make the sum of all the page space two to four times the number of slots used.
- limit use of VIO=YES
Contents of the report

**Data Not Available:** When a page data set comes online during a report interval, an asterisk is placed next to its name and the following message appears instead of measurement data: NOW AVAILABLE FOR SYSTEM USE.

When a page data set has been deleted during a report interval, an asterisk is placed next to its name and the following message appears instead of measurement data: DATA SET DELETED.

**Duration Report:** If you have specified a duration report, certain fields (DEV NUM, VOLUME SERIAL, DEVICE TYPE and SLOTS ALLOC) might be distorted due to a lengthy duration interval. When such a change occurs, it is not reflected in the duration report; these fields are set according to the contents of the first type 75 SMF record encountered.

<table>
<thead>
<tr>
<th>Table 168. Fields in the Page Data Set Activity report</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field Heading</strong></td>
</tr>
<tr>
<td>PAGE SPACE TYPE</td>
</tr>
<tr>
<td>VOLUME SERIAL</td>
</tr>
<tr>
<td>DEV NUM</td>
</tr>
<tr>
<td>DEVICE TYPE</td>
</tr>
<tr>
<td>SLOTS ALLOC</td>
</tr>
<tr>
<td>SLOTS USED</td>
</tr>
<tr>
<td>BAD SLOTS</td>
</tr>
<tr>
<td>% IN USE</td>
</tr>
</tbody>
</table>

At each cycle, RMF tests each data set, and at the end of the interval, the percentage is calculated.

\[
\% \text{ BUSY} = \frac{\# \text{ BUSY SAMPLES}}{\# \text{ SAMPLES}} \times 100
\]
Table 168. Fields in the Page Data Set Activity report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAGE TRANS TIME</td>
<td>Average number of seconds required to complete a page transfer.</td>
</tr>
<tr>
<td></td>
<td>[(USE+INT)/N]</td>
</tr>
<tr>
<td></td>
<td>[XFER]</td>
</tr>
<tr>
<td></td>
<td>USE: Number of samples when the data set was in use</td>
</tr>
<tr>
<td></td>
<td>XFER: Total number of pages transferred</td>
</tr>
<tr>
<td></td>
<td>N: Number of samples</td>
</tr>
<tr>
<td></td>
<td>INT: Interval time (seconds)</td>
</tr>
<tr>
<td>NUMBER IO REQ</td>
<td>Total number of I/O requests for the data set made during the interval.</td>
</tr>
<tr>
<td>PAGES XFER'D</td>
<td>Number of pages that were transferred to or from the page data set or SCM in units of 4K pages/second.</td>
</tr>
<tr>
<td>VIO</td>
<td>Indication of whether the local paging data set accepts VIO pages. The symbols are:</td>
</tr>
<tr>
<td></td>
<td>Y: VIO pages are accepted</td>
</tr>
<tr>
<td></td>
<td>N: VIO pages are not accepted</td>
</tr>
<tr>
<td>DATA SET NAME</td>
<td>Name of the page data set being monitored. A page data set name longer than 35 characters will be truncated to 35 characters in the report. The entire data set name appears in the SMF record.</td>
</tr>
<tr>
<td></td>
<td>Note:</td>
</tr>
<tr>
<td></td>
<td>1. If a data set was dynamically introduced during the interval, its data set name is preceded by an asterisk (*).</td>
</tr>
<tr>
<td></td>
<td>2. When the operating system has detected errors in a data set that prevents its further use, the name of the data set is preceded by two asterisks (**). ASM continues to access the data set in read-only mode, and RMF reports this activity.</td>
</tr>
<tr>
<td></td>
<td>3. N/A for page space type SCM.</td>
</tr>
</tbody>
</table>

Overview reference

Table 169. Overview names in the Page Data Set Activity report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOTS USED - AVG</td>
<td>PSAVGSL</td>
</tr>
<tr>
<td>BAD SLOTS</td>
<td>PSBADSL</td>
</tr>
<tr>
<td>% IN USE</td>
<td>PSBSY</td>
</tr>
<tr>
<td>PAGE TRANS TIME</td>
<td>PSPTT</td>
</tr>
<tr>
<td>NUMBER IO REQ</td>
<td>PSART</td>
</tr>
<tr>
<td>PAGES XFER'D</td>
<td>PSPT</td>
</tr>
</tbody>
</table>

PAGING - Paging Activity report

The Paging Activity report provides information about the demands made on the system paging facilities and the use of central storage and external page storage during the interval.

How to request this report

Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify NOPAGING.

To produce this report, specify REPORTS(PAGING)

This report is also available in XML output format. Topic How to work with Postprocessor XML reports in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.
Example URL for the DDS API

Using the information given in the report
If the non-swap, non-VIO page fault rate (page-ins) is excessively high, it could be the result of over-commitment of central storage.

Other problems to look for are high pageable system area non-swap page-in rates, which could be caused by a poor pack list or a large number of fixed LPA modules. A period of high VIO slot use could be a sign that a specific job is making excessive use of VIO. Always be alert for bad slots because they can cause executing jobs to end abnormally.

Contents of the report
The Paging Activity report is formatted into the following sections:
- CENTRAL STORAGE PAGING RATES
- CENTRAL STORAGE MOVEMENT AND REQUEST RATES
- FRAME AND SLOT COUNTS
- MEMORY OBJECTS AND HIGH VIRTUAL STORAGE FRAMES

The headers of the sections include the following information:
- The OPT field shows the name of the active option member IEAOPTxx. The option member contains parameters that affect system resource manager (SRM) decisions.
- The LAREA SIZE field shows the size of the Large Frame Area in bytes (only available with Enhanced DAT architecture).

Note: The FRAME AND SLOT COUNTS section is displayed on one report page together with the CENTRAL STORAGE MOVEMENT AND REQUEST RATES section, and therefore does not include the OPT or LAREA SIZE fields.

Central Storage Paging Rates
This section of the Paging Activity report monitors paging rates in central storage below the 2 GB bar. The paging rates monitored are organized into two major groups:
- Page-in rates
- Page-out rates.

The page-in and page-out groups are further divided into:
- Swap
- Non-swap (for the page-in group additionally divided into: Block, Non-Block)
- Total (rate and percentage)

All of the above paging data rates appear for one or more of the following:
- Pageable system areas used for non-VIO data, broken down into LPA and CSA
- Address space pages used, broken down into hiperspace data, VIO data and non-VIO data

The rate of page movement within central storage below the 2 GB bar is shown in the bottom left corner of the page.
Table 170. Fields in the Paging Activity report - Central Storage Paging Rates

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| CATEGORY | The component parts of paging rates identifying these basic components:  
| | • Pageable system area, non-VIO data  
| | • Address space data  
| | • Total system data. |
| PAGEABLE SYSTEM AREAS (NON-VIO) | The areas of central storage that are not associated with a single address space. This section consists of:  
| | • LPA All values are reported except for swaps  
| | • CSA All values are reported except for swaps  
| | • SUM Sum of LPA and CSA. |
| ADDRESS SPACES | The areas of central storage that are associated with individual address spaces. This section consists of:  
| | • HIPERSPACE All values are reported except for swaps  
| | • VIO All values are reported except for swaps  
| | • NON-VIO All values are reported  
| | • SUM Sum of address space hiperspace, VIO and non-VIO. |
| TOTAL SYSTEM | The sum of system pageable areas and address space values and the following:  
| | • HIPERSPACE Consists of address space hiperspace values  
| | • VIO Consists only of address space VIO values  
| | • NON-VIO Sum of system pageable areas non-VIO and memory non-VIO values  
| | • SUM Sum of system pageable areas sum and address space sum. (The computer system total for paging rates.)  
| | • SHARED Number of shared page group page-ins and page-outs in central storage. The page-in/out rate is included in the SUM values. |
### Table 170. Fields in the Paging Activity report - Central Storage Paging Rates (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAGE IN</td>
<td>The rate of pages read into central storage.</td>
</tr>
<tr>
<td>SWAP</td>
<td>The rate of pages read into central storage as a result of address space swap-ins.</td>
</tr>
<tr>
<td></td>
<td>There is no PAGE IN for shared storage due to SWAP.</td>
</tr>
<tr>
<td>NON SWAP/BLOCK</td>
<td>The rate of pages read into central storage from auxiliary storage exclusive of address space swap-ins.</td>
</tr>
<tr>
<td></td>
<td>Non-VIO paging occurs as a result of a page fault, PGLOAD, or PGFIX. When there are concurrent requests for the same page, only the first generates a page-in because all the requests will be satisfied by the same page.</td>
</tr>
<tr>
<td></td>
<td>A hiperspace page-in occurs when referencing a standard hiperspace page residing in auxiliary storage. VIO paging occurs as a result of a page fault or PGLOAD on a VIO window (logical GETs).</td>
</tr>
<tr>
<td></td>
<td>VIO pages that are swapped in are not included.</td>
</tr>
<tr>
<td></td>
<td>There is no BLOCK for shared storage.</td>
</tr>
<tr>
<td>NON SWAP/NON BLOCK</td>
<td>The rate of pages read into central storage from auxiliary storage exclusive of address space swap-ins.</td>
</tr>
<tr>
<td></td>
<td>Non-VIO paging occurs as a result of a page fault, PGLOAD, or PGFIX. When there are concurrent requests for the same page, only the first generates a page-in because all the requests will be satisfied by the same page.</td>
</tr>
<tr>
<td></td>
<td>A hiperspace page-in occurs when referencing a standard hiperspace page residing in auxiliary storage. VIO paging occurs as a result of a page fault or PGLOAD on a VIO window (logical GETs).</td>
</tr>
<tr>
<td></td>
<td>VIO pages that are swapped in are not included.</td>
</tr>
<tr>
<td>TOTAL RATE</td>
<td>The rate of the total system pages read into central storage. The rate is the sum of the non-swap page-in rate and the swap page-in rate.</td>
</tr>
<tr>
<td>TOTAL %</td>
<td>The percentage of the total page-in rate for each part of the total.</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PAGE OUT</td>
<td>The rate of pages written to auxiliary storage.</td>
</tr>
<tr>
<td>SWAP</td>
<td>The rate of pages written to auxiliary storage as a result of address space swap outs.</td>
</tr>
<tr>
<td></td>
<td>There is no PAGE OUT for shared storage due to SWAP.</td>
</tr>
<tr>
<td>NON SWAP</td>
<td>The rate of pages written to auxiliary storage (forced out) independent of address space swap outs. Non-VIO paging results from a PGOUT (including page stealing and other RSM-generated page-outs). VIO paging results from a PGOUT (including stealing and other RSM-generated page-outs) on a VIO window page (logical PUs).</td>
</tr>
<tr>
<td></td>
<td>Included also are the pages trimmed at swap out for logical swap out and from address spaces protected by central storage isolation by means of the IPS minimum working set size specification.</td>
</tr>
<tr>
<td></td>
<td>A hyperspace page out occurs when a standard hyperspace page is no longer needed in central storage and is written to auxiliary storage.</td>
</tr>
<tr>
<td>VIO pages transferred as a result of a swap-out are not included.</td>
<td></td>
</tr>
<tr>
<td>TOTAL RATE</td>
<td>The rate of total system pages written to auxiliary storage. The rate is the sum of the non-swap page-out rate and the swap page-out rate.</td>
</tr>
<tr>
<td>TOTAL %</td>
<td>The percentage of the total page-out rate for each part of the total.</td>
</tr>
<tr>
<td>PAGE MOVEMENT WITHIN CENTRAL STORAGE</td>
<td>The rate of page movement within central storage. This includes each page movement from one frame to another frame independent of the location of the frame.</td>
</tr>
<tr>
<td>PAGE MOVEMENT TIME %</td>
<td>The percentage of general purpose processor time, including normalized AAP and IIP times, spent on page movement to obtain or free a particular type of frame for a page to be fixed (that is, a frame below the 16 megabyte line in central processor storage). The calculation is the amount of processor time needed to steal the page (including the time to move the contents of the frames, but not the time to move the new contents into the frames) divided by the length of the interval.</td>
</tr>
<tr>
<td>AVERAGE NUMBER OF PAGES PER BLOCK</td>
<td>The average size of address space non-VIO blocks that were paged-in during the interval. It does not include swap or hyperspace pages.</td>
</tr>
<tr>
<td>BLOCKS PER SECOND</td>
<td>The rate of page faults for pages that were part of a block.</td>
</tr>
<tr>
<td>PAGE-IN EVENTS (PAGE FAULT RATE)</td>
<td>The rate of page faults for all pages in events per second, excluding VIO and Hiperspace. The rate includes pages read from DASD only, not from expanded storage.</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference: You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User's Guide. The following table shows the overview condition names for the Overview report.

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAGE MOVEMENT WITHIN CENTRAL STORAGE</td>
<td>PGMVRT</td>
</tr>
</tbody>
</table>

Central Storage Movement and Request Rates
The Central Storage Movement and Request Rates section provides paging information about hyperspace and VIO pages and about various types of storage requests.
Table 172. Fields in the Paging Activity report - Central Storage Movement and Request Rates

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM UIC (MIN, MAX, AVG)</td>
<td>The minimum, maximum and average system high unreferenced interval count. The maximum SYSTEM UIC value can indicate contention for central storage frames. When the SYSTEM UIC is relatively low, contention for central storage is high. Although total paging rates might vary with the type and level of workload, the unreferenced interval count is the best indicator of actual storage contention.</td>
</tr>
<tr>
<td>PAGE WRITE RATE</td>
<td><strong>HIPERSPACE</strong> Rate of hiperspace pages written to central storage.</td>
</tr>
<tr>
<td></td>
<td><strong>VIO</strong> Rate of VIO pages written to central storage.</td>
</tr>
<tr>
<td>PAGE READ RATE</td>
<td><strong>HIPERSPACE</strong> Rate of hiperspace pages read from central storage.</td>
</tr>
<tr>
<td></td>
<td><strong>VIO</strong> Rate of VIO pages read from central storage.</td>
</tr>
<tr>
<td>FRAME COUNTS</td>
<td><strong>MIN, MAX, and AVG</strong> of allocated frame counts.</td>
</tr>
<tr>
<td></td>
<td><strong>HIPERSPACE</strong> Storage frame counts allocated to hiperspace.</td>
</tr>
<tr>
<td></td>
<td><strong>VIO</strong> Storage frame counts allocated to VIO address space.</td>
</tr>
<tr>
<td>GETMAIN</td>
<td><strong>REQUESTS</strong> GETMAIN request rate</td>
</tr>
<tr>
<td></td>
<td><strong>FRAMES BACKED</strong> Rate of pages backed during GETMAIN requests.</td>
</tr>
</tbody>
</table>
Table 172. Fields in the Paging Activity report - Central Storage Movement and Request Rates (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXED</td>
<td></td>
</tr>
<tr>
<td>REQ &lt; 2 GB</td>
<td>Rate of fix requests issued for storage below 2 GB (address space only).</td>
</tr>
<tr>
<td>FRAMES &lt; 2 GB</td>
<td>Rate of pages requested to be fixed for storage below 2 GB (address space only).</td>
</tr>
<tr>
<td>REF FAULTS</td>
<td></td>
</tr>
<tr>
<td>1ST</td>
<td>First page reference faults rate.</td>
</tr>
<tr>
<td>NON-1ST</td>
<td>Non-first page reference faults rate.</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference: You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following table shows the overview condition names for the Overview report.

Table 173. Overview names in the Paging Activity report - Central Storage Movement and Request Rates

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM UIC - MAX</td>
<td>MXHUIC</td>
</tr>
<tr>
<td>SYSTEM UIC - AVG</td>
<td>AVGHUIC</td>
</tr>
<tr>
<td>Overview names in the CENTRAL STORAGE category:</td>
<td></td>
</tr>
<tr>
<td>PAGE WRITE RATE - HIPERSPACE</td>
<td>RSHSPW</td>
</tr>
<tr>
<td>PAGE WRITE RATE - VIO</td>
<td>RSVIOW</td>
</tr>
<tr>
<td>PAGE READ RATE - HIPERSPACE</td>
<td>RSHSPR</td>
</tr>
<tr>
<td>PAGE READ RATE - VIO</td>
<td>RSVIOR</td>
</tr>
<tr>
<td>FRAME COUNTS - HIPERSPACE - MIN</td>
<td>RSHSPM</td>
</tr>
<tr>
<td>FRAME COUNTS - HIPERSPACE - MAX</td>
<td>RSHSPX</td>
</tr>
<tr>
<td>FRAME COUNTS - HIPERSPACE - AVG</td>
<td>RSHSPA</td>
</tr>
<tr>
<td>FRAME COUNTS - VIO- MIN</td>
<td>RSVIOM</td>
</tr>
<tr>
<td>FRAME COUNTS - VIO- MAX</td>
<td>RSVIOX</td>
</tr>
<tr>
<td>FRAME COUNTS - VIO- AVG</td>
<td>RSVIOA</td>
</tr>
</tbody>
</table>

Frame and Slot Counts

This section of the Paging Activity report (included in Figure 204 on page 407) shows information about the following storage related categories:

- CENTRAL STORAGE FRAMES
- FIXED FRAMES
- SHARED FRAMES
- LOCAL PAGE DATA SET SLOTS
- SCM PAGING BLOCKS

All values are presented as MIN (minimum), MAX (maximum), and AVG (average).
### Table 174. Fields in the Paging Activity report - Frame and Slot Counts

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **SAMPLES**    | The number of valid samples taken in this interval is shown in the upper left corner of this report section in various formats:  
• as (nn SAMPLES) if all samples are valid  
• as  
  \[ \text{SAMPLES} = xx \text{ VALID SAMPLES} = yy \text{ VALID SAMPLES} \text{ CSA/REGION} = zz \]  
if there are invalid samples and therefore the number of valid samples is less than the number of samples. In this case, the number of valid samples, and the number of valid samples for CSA and REGION+SWA values is also displayed to indicate that some of the CENTRAL STORAGE and FIXED FRAMES counts are based on less data. |
| **CENTRAL STORAGE FRAMES** | TOTAL: The total number of central storage frames in the system.  
AVAILABLE: The number of central storage frames that are not in-use by the system.  
**SQA, LPA, CSA, LSQA, REGIONS+SWA, HV SHARED, HV COMMON**: These columns show the number of central storage frames that are in-use by each of these areas. The REGIONS+SWA value also includes the number of frames used by high virtual private storage.  
The value of the TOTAL count is not a summation of the AVAILABLE, SQA, LPA, CSA, LSQA, REGIONS+SWA, HV SHARED (high virtual SHARED), and HV COMMON (high virtual COMMON) counts at the end of the interval, but is derived by adding these counts from each valid sample and then reporting the MIN sum, MAX sum, and AVG sum for the complete set of samples.  
If data is not available for any of the SQA, LPA, CSA, LSQA, or REGIONS+SWA counts, the following text appears across these columns:  
*** NO COUNTS AVAILABLE ***  
If there are no valid samples for CSA and REGION+SWA values, 'NO DATA' is displayed in these columns.  
**Note:** The actual maximum or minimum value of a field might occur at a time when RMF is not sampling. |
| **FIXED FRAMES** | TOTAL: The total number of central storage frames in the system that are in-use by fixed pages.  
**NUCLEUS, SQA, LPA, CSA, LSQA, REGIONS+SWA, <16MB, 16MB-2GB**: These columns show the number of central storage frames that are in-use by fixed pages allocated in each of these areas.  
The CSA value also includes frames used by fixed pages allocated in High Virtual Common (HV COMMON). The REGIONS+SWA value also includes the number of frames used by high virtual private storage.  
The SQA value also includes fixed CSA pages. However, pageable CSA pages that have been fixed after allocation are reported in the CSA category.  
If data is not available for any of the SQA, LPA, CSA, LSQA, or REGIONS+SWA counts, the following text appears across these columns:  
*** NO COUNTS AVAILABLE ***  
If there are no valid valid samples for CSA and REGION+SWA values, 'NO DATA' is displayed in these columns. |
### Table 174. Fields in the Paging Activity report - Frame and Slot Counts (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHARED FRAMES</strong></td>
<td><strong>TOTAL</strong> The total number of central storage frames and auxiliary slots that are in-use by shared pages.</td>
</tr>
<tr>
<td></td>
<td><strong>CENTRAL STORAGE</strong> The total number of central storage frames that are in-use by shared pages.</td>
</tr>
<tr>
<td></td>
<td><strong>FIXED TOT</strong> The number of central storage frames that are in-use by shared fixed pages.</td>
</tr>
<tr>
<td></td>
<td><strong>FIXED BEL</strong> The number of central storage frames that are in-use by shared fixed pages allocated below 16 megabytes.</td>
</tr>
<tr>
<td></td>
<td><strong>AUX DASD</strong> The number of shared pages backed on DASD.</td>
</tr>
<tr>
<td></td>
<td><strong>AUX SCM</strong> The number of shared pages backed on Storage Class Memory (SCM).</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> AUX DASD and AUX SCM are also called auxiliary storage slots.</td>
</tr>
<tr>
<td><strong>LOCAL PAGE DATA SET SLOTS</strong></td>
<td><strong>TOTAL</strong> Total number of page data set slots.</td>
</tr>
<tr>
<td></td>
<td><strong>AVAILABLE</strong> Number of page data set slots that do not contain any data pages and that are available for use.</td>
</tr>
<tr>
<td></td>
<td><strong>BAD</strong> Number of local page data set slots that do not contain any data pages and are unavailable for use because of permanent I/O errors.</td>
</tr>
<tr>
<td></td>
<td><strong>NON-VIO</strong> Number of local page data set slots that contain pages belonging to address-space virtual storage.</td>
</tr>
<tr>
<td></td>
<td><strong>VIO</strong> Number of local page data set slots that contain pages for VIO data sets.</td>
</tr>
<tr>
<td><strong>SCM PAGING BLOCKS</strong></td>
<td><strong>TOTAL</strong> The total number of 4K SCM paging blocks.</td>
</tr>
<tr>
<td></td>
<td><strong>AVAILABLE</strong> The number of SCM blocks that do not contain any data and are available to ASM.</td>
</tr>
<tr>
<td></td>
<td><strong>BAD</strong> The number of SCM blocks that do not contain any data and are unavailable for use.</td>
</tr>
<tr>
<td></td>
<td><strong>IN-USE</strong> The number of SCM blocks that are in-use by ASM.</td>
</tr>
</tbody>
</table>

**Spreadsheet and Overview reference:** You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](https://www.ibm.com/support/knowledgecenter/SSEPGU_1.13.0/com.ibm.zos.v1r13.speech.doc/rmfurm/rmfurm_ref_spread.htm). The following table shows the overview condition names for the Overview report.

### Table 175. Overview names in the Paging Activity report - Frame and Slot Counts

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL STORAGE FRAMES - CSA - MAX</td>
<td>MXCSAT</td>
</tr>
<tr>
<td>CENTRAL STORAGE FRAMES - CSA - AVG</td>
<td>AVGCSAT</td>
</tr>
<tr>
<td>FIXED FRAMES - SQA - MAX</td>
<td>MXSQA</td>
</tr>
<tr>
<td>FIXED FRAMES - SQA - AVG</td>
<td>AVG SQA</td>
</tr>
<tr>
<td>FIXED FRAMES - CSA - MAX</td>
<td>MXCSAF</td>
</tr>
<tr>
<td>FIXED FRAMES - CSA - AVG</td>
<td>AVGCSAF</td>
</tr>
<tr>
<td>LOCAL PAGE DATA SET SLOTS - VIO - MAX</td>
<td>MAXVIOF</td>
</tr>
<tr>
<td>LOCAL PAGE DATA SET SLOTS - VIO - AVG</td>
<td>AVG VIOF</td>
</tr>
<tr>
<td>FIXED FRAMES - 16MB-2GB - MIN</td>
<td>FXBETWM</td>
</tr>
<tr>
<td>FIXED FRAMES - 16MB-2GB - MAX</td>
<td>FXBETWX</td>
</tr>
<tr>
<td>FIXED FRAMES - 16MB-2GB - AVG</td>
<td>FXBETWA</td>
</tr>
<tr>
<td>SHARED FRAMES/SLOTS - TOTAL - AVG</td>
<td>SHRPT</td>
</tr>
<tr>
<td>SHARED FRAMES/SLOTS - CENTRAL STORAGE - AVG</td>
<td>SHRPC</td>
</tr>
<tr>
<td>SHARED FRAMES/SLOTS - FIXED TOT - AVG</td>
<td>SHRPF</td>
</tr>
<tr>
<td>SHARED FRAMES/SLOTS - FIXED BEL - AVG</td>
<td>SHR PB</td>
</tr>
</tbody>
</table>
### Table 175. Overview names in the Paging Activity report - Frame and Slot Counts (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARED FRAMES/SLOTS - AUX DASD - AVG</td>
<td>SHRPA</td>
</tr>
<tr>
<td>SHARED FRAMES/SLOTS - AUX SCM - AVG</td>
<td>SHRPASCN</td>
</tr>
</tbody>
</table>

### Memory Objects and High Virtual Storage Frames

Figure 205 shows a sample of the MEMORY OBJECTS AND HIGH VIRTUAL STORAGE FRAMES section if Enhanced DAT architecture is available. If Enhanced DAT architecture is not installed, no information about memory objects that can be backed in 1 MB frames is available. Also, no information about 1 MB frames is available and any fields in this section related to such memory objects or frames are not displayed.

All values in this section of the Paging Activity report are presented as MIN, MAX, and AVG values.

#### Table 176. Fields in the Paging Activity report - Memory Objects and High Virtual Storage Frames

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY OBJECTS</td>
<td></td>
</tr>
<tr>
<td>COMMON</td>
<td>Number of memory objects allocated in the high virtual common storage of the system.</td>
</tr>
<tr>
<td>SHARED</td>
<td>Number of memory objects allocated in the high virtual shared storage of the system.</td>
</tr>
<tr>
<td>1 MB</td>
<td>Number of fixed memory objects that are allocated in the system and can be backed in 1 MB frames.</td>
</tr>
</tbody>
</table>
### PP - PAGING

**Table 176. Fields in the Paging Activity report - Memory Objects and High Virtual Storage Frames (continued)**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| 1 MB FRAMES - FIXED | **TOTAL**  
Total number of 1 MB frames, that can be used by fixed memory objects. This value is equal to the size of the Large Frame Area in megabytes.  
**AVAILABLE**  
Number of 1 MB frames in the Large Frame Area that are not in-use.  
**IN-USE**  
Number of 1 MB frames in the Large Frame Area that are in-use by fixed memory objects. |
| 1 MB FRAMES - PAGEABLE | **TOTAL**  
Total number of 1 MB frames that can be used by pageable and DREF memory objects.  
**AVAILABLE**  
Number of 1 MB frames that are not in-use by pageable and DREF memory objects.  
**IN-USE**  
Number of 1 MB frames that are in-use by pageable and DREF memory objects regardless of whether the frames are actually used for 1 MB pages or used to satisfy 4 KB space requests on a constrained system. |
| HIGH SHARED FRAMES | **TOTAL**  
Size of high virtual shared area in units of 4 KB pages.  
**CENTRAL STORAGE**  
Number of pages from high virtual shared storage that are backed in central storage (in units of 4 KB).  
**AUX DASD**  
Number of auxiliary storage slots used for high virtual shared pages that are backed on DASD.  
**AUX SCM**  
Number of auxiliary storage slots used for high virtual shared pages that are backed on SCM storage. |
| HIGH COMMON FRAMES | **TOTAL**  
Size of high virtual common area in units of 4 KB pages.  
**CENTRAL STORAGE**  
Number of pages from high virtual common storage that are backed in central storage (in units of 4 KB).  
**FIXED 4K**  
Number of pages from high virtual common storage that are fixed in central storage (in units of 4 KB).  
**AUX DASD**  
Number of auxiliary storage slots used for high virtual common pages that are backed on DASD.  
**AUX SCM**  
Number of auxiliary storage slots used for high virtual common pages that are backed on SCM storage. |

**Spreadsheet and Overview reference:** You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following table shows the overview condition names for the Overview report.

**Table 177. Overview names in the Paging Activity report - Memory Objects and High Virtual Storage Frames**

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY OBJECTS - COMMON AVG</td>
<td>CMOA</td>
</tr>
<tr>
<td>MEMORY OBJECTS - SHARED AVG</td>
<td>SMOA</td>
</tr>
<tr>
<td>MEMORY OBJECTS - 1 MB AVG</td>
<td>LMOA</td>
</tr>
</tbody>
</table>
Table 177. Overview names in the Paging Activity report - Memory Objects and High Virtual Storage Frames (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAMES - 1 MB AVG</td>
<td>LFRA</td>
</tr>
<tr>
<td>1 MB FRAMES - FIXED TOTAL AVG</td>
<td>LFFRTA</td>
</tr>
<tr>
<td>1 MB FRAMES - FIXED IN-USE AVG</td>
<td>LFFRUA</td>
</tr>
<tr>
<td>1 MB FRAMES - PAGEABLE TOTAL AVG</td>
<td>LPFRTA</td>
</tr>
<tr>
<td>1 MB FRAMES - PAGEABLE AVAILABLE AVG</td>
<td>LPFRAA</td>
</tr>
<tr>
<td>1 MB FRAMES - PAGEABLE IN-USE AVG</td>
<td>LPFRUA</td>
</tr>
<tr>
<td>HIGH SHARED FRAMES - TOTAL AVG</td>
<td>SFRTA</td>
</tr>
<tr>
<td>HIGH SHARED FRAMES - CENTRAL STORAGE AVG</td>
<td>SFRA</td>
</tr>
<tr>
<td>HIGH SHARED FRAMES - AUX DASD AVG</td>
<td>SAUXSA</td>
</tr>
<tr>
<td>HIGH SHARED FRAMES - AUX SCM AVG</td>
<td>SAUXSSA</td>
</tr>
<tr>
<td>HIGH COMMON FRAMES - TOTAL AVG</td>
<td>CFRTA</td>
</tr>
<tr>
<td>HIGH COMMON FRAMES - CENTRAL STORAGE AVG</td>
<td>CFRA</td>
</tr>
<tr>
<td>HIGH COMMON FRAMES - FIXED 4K AVG</td>
<td>CFFRA</td>
</tr>
<tr>
<td>HIGH COMMON FRAMES - AUX DASD AVG</td>
<td>CAUXSA</td>
</tr>
<tr>
<td>HIGH COMMON FRAMES - AUX SCM AVG</td>
<td>CAUXSSA</td>
</tr>
</tbody>
</table>

PCIE - PCIE Activity Report

The PCIE Activity Report provides statistics and performance measurements on PCI Express based functions (PCIE functions) allocated by at least one z/OS address space for a period of time within the reporting interval. A PCIE function is captured by the report if one of the following hardware feature activities has been detected:
- RDMA (Remote Direct Memory Access) over Converged Enhanced Ethernet
- zEnterprise Data Compression (zEDC) capability using zEDC Express

How to request this report

If the currently active SMFPRMxx parameter settings indicate that SMF record type 74 subtype 9 is to be collected, then RMF Monitor III gathers the data required for the PCIE Activity Report into this SMF record.

To produce this report, specify

REPORTS(PCIE)

This single-system report is only available in XML output format. Therefore, you need to specify the XPRPTS ddbname in your Postprocessor job. Topic [How to work with Postprocessor XML reports](https://www.ibm.com) in the [z/OS RMF User's Guide](https://www.ibm.com) provides all required information on how to produce and view XML reports.

Example URL for the DDS API


Contents of the report

The **PCIE Activity Report** is divided into three sections:
- General PCIE Activity
- Hardware Accelerator Activity
- Hardware Accelerator Compression Activity
The **General PCIE Activity** section shows measurements for all PCIE functions independent from the type of the exploited hardware feature. The measurements reflect the activity of the z/OS system on which RMF data collection took place. They comprise data rates about the communication of z/OS programs with PCIE functions by means of PCI operations that are transferring data blocks from z/OS to the PCIE function (PCI LOAD, PCI STORE, PCI STORE BLOCK, and REFRESH PCI TRANSLATIONS) as well as Read/Write Transfer data rates.

The **Hardware Accelerator Activity** section and the **Hardware Accelerator Compression Activity** section have single system scope and are leveraging the measurements displayed in the **General PCIE Activity** section. They are only displayed if the hardware feature zEnterprise Data Compression (zEDC) is used for compression acceleration. In this case, they display:

- common accelerator metrics, like for example, total request execution time, or the amount of transferred data
- compression specific metrics, like for example the amount of compressed data and the number and throughput of compression requests
- device driver buffer statistics.

### Table 178. Fields in the PCIE Activity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General PCIE Activity</strong></td>
<td></td>
</tr>
<tr>
<td>Function ID</td>
<td>Identifier of the monitored PCIE function. This field also identifies applicable PCIE functions in the <strong>Hardware Accelerator Activity</strong> and <strong>Hardware Accelerator Compression Activity</strong> sections.</td>
</tr>
<tr>
<td>Function PCHID</td>
<td>Physical channel identifier for the PCIE function.</td>
</tr>
<tr>
<td>Function Name</td>
<td>Device name for the PCIE function.</td>
</tr>
<tr>
<td>Function Type</td>
<td>Device type for the PCIE function.</td>
</tr>
</tbody>
</table>
Table 178. Fields in the PCIE Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function Status</td>
<td>The PCIE function status can be one of the following:</td>
</tr>
<tr>
<td></td>
<td><strong>Allocated</strong></td>
</tr>
<tr>
<td></td>
<td>The function is allocated and in use at the end of the reporting interval.</td>
</tr>
<tr>
<td></td>
<td><strong>Re-Allocated</strong></td>
</tr>
<tr>
<td></td>
<td>The function was de-allocated during the interval but has been re-allocated again. It is in use at the end of the reporting interval.</td>
</tr>
<tr>
<td></td>
<td><strong>De-Allocated</strong></td>
</tr>
<tr>
<td></td>
<td>The function was de-allocated during the interval and is unused at the end of the reporting interval.</td>
</tr>
<tr>
<td></td>
<td><strong>De-Allocate-Pending</strong></td>
</tr>
<tr>
<td></td>
<td>The function is in the process of de-allocation.</td>
</tr>
<tr>
<td></td>
<td><strong>Error</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Unknown</strong></td>
</tr>
<tr>
<td>Owner Job Name</td>
<td>Job name of the owner who allocated the PCIE function.</td>
</tr>
<tr>
<td>Owner Address Space ID</td>
<td>Address space ID of the owner who allocated the PCIE function.</td>
</tr>
<tr>
<td>Function Allocation Time</td>
<td>Time in seconds for which the PCIE function was allocated or de-allocate-pending during this interval.</td>
</tr>
<tr>
<td>PCI Load Operations Rate</td>
<td>Rate of PCI Load operations executed during the reporting interval.</td>
</tr>
<tr>
<td>PCI Store Operations Rate</td>
<td>Rate of PCI Store operations executed during the reporting interval.</td>
</tr>
<tr>
<td>PCI Store Block Operations Rate</td>
<td>Rate of PCI Store Block operations executed during the reporting interval.</td>
</tr>
<tr>
<td>Refresh PCI Translations Operations Rate</td>
<td>Rate of Refresh PCI Translations operations executed during the reporting interval.</td>
</tr>
<tr>
<td>DMA Address Space Count</td>
<td>Number of defined DMA address spaces.</td>
</tr>
<tr>
<td>Read Transfer Rate</td>
<td>The meaning of this field depends on whether the PCIE function is configured on zEC12 or zBC12 or on a newer machine. On zEC12 or zBC12, this field designates the number of megabytes per second that were transferred by DMA reads from all defined DMA address spaces to the PCIE function. Otherwise, this value reflects the number of megabytes per second that were received on the external Ethernet interface.</td>
</tr>
<tr>
<td>Write Transfer Rate</td>
<td>The meaning of this field depends on whether the PCIE function is configured on zEC12 or zBC12 or on a newer machine. On zEC12 or zBC12, this field designates the number of megabytes per second that were transmitted by DMA writes from the PCIE function to all defined DMA address spaces. Otherwise, this value reflects the number of megabytes per second that were transmitted on the external Ethernet interface.</td>
</tr>
<tr>
<td>Packets Received Rate</td>
<td>Number of packets per second that were received on the external Ethernet interface of the RoCE device. This value is not reported on zEC12 and zBC12 hardware.</td>
</tr>
<tr>
<td>Packets Transmitted Rate</td>
<td>Number of packets per second that were transmitted on the external Ethernet interface of the RoCE device. This value is not reported on zEC12 and zBC12 hardware.</td>
</tr>
<tr>
<td>Work Units Processed Rate</td>
<td>Number of work units per second that were processed by the zEDC device. This value is not reported on zEC12 and zBC12 hardware.</td>
</tr>
<tr>
<td>Adapter Utilization</td>
<td>Utilization of the zEDC device. This value is not reported on zEC12 and zBC12 hardware.</td>
</tr>
<tr>
<td>Hardware Accelerator Activity</td>
<td></td>
</tr>
<tr>
<td>Time Busy %</td>
<td>The percentage of time that this partition kept the hardware accelerator busy.</td>
</tr>
<tr>
<td>Request Execution Time</td>
<td>The average time in microseconds the hardware accelerator used to process a request.</td>
</tr>
<tr>
<td>Std Dev for Request Execution Time</td>
<td>The standard deviation of the request execution time.</td>
</tr>
<tr>
<td>Request Queue Time</td>
<td>The average queue time in microseconds that was spent for a request. This value has single system scope but is affected by activity from other partitions sharing the hardware accelerator.</td>
</tr>
<tr>
<td>Std Dev for Request Queue Time</td>
<td>The standard deviation of the request queue time.</td>
</tr>
</tbody>
</table>
Table 178. Fields in the PCIE Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Size</td>
<td>The average number of kilobytes transferred per request.</td>
</tr>
<tr>
<td>Transfer Rate Total</td>
<td>The number of megabytes per second transferred by DMA operations.</td>
</tr>
</tbody>
</table>

**Hardware Accelerator Compression Activity**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression Request Rate</td>
<td>The number of compression requests per second.</td>
</tr>
<tr>
<td>Compression Throughput</td>
<td>The number of megabytes compressed per second.</td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>The ratio between input and output bytes compressed within this interval.</td>
</tr>
<tr>
<td>Decompression Request Rate</td>
<td>The number of decompression requests per second.</td>
</tr>
<tr>
<td>Decompression Throughput</td>
<td>The number of megabytes decompressed per second.</td>
</tr>
<tr>
<td>Decompression Ratio</td>
<td>The ratio between input and output bytes decompressed within this interval.</td>
</tr>
<tr>
<td>Buffer Pool Size</td>
<td>The total size of memory in megabytes that is allocated to the buffer pool.</td>
</tr>
<tr>
<td>Buffer Pool Utilization</td>
<td>The average utilization of the buffer pool that z/OS kept for in-use buffers.</td>
</tr>
</tbody>
</table>

**Spreadsheet and Overview reference**

You can make this report available in a spreadsheet using the Spreadsheet Reporter. For details, see the z/OS RMF User’s Guide. The following table shows the overview condition names for the Overview report.

Table 179. Overview conditions in the PCIE Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI Load Operations Rate</td>
<td>PCILOAD</td>
</tr>
<tr>
<td>PCI Store Operations Rate</td>
<td>PCISTOR</td>
</tr>
<tr>
<td>PCI Store Block Operations Rate</td>
<td>PCISTBL</td>
</tr>
<tr>
<td>Refresh PCI Translations Operations Rate</td>
<td>PCIRPTR</td>
</tr>
<tr>
<td>DMA Read Rate (on zEC12 or zBC12 hardware only)</td>
<td>PCIDMAR</td>
</tr>
<tr>
<td>DMA Write Rate (on zEC12 or zBC12 hardware only)</td>
<td>PCIDMAW</td>
</tr>
<tr>
<td>Number of megabytes received per second (RoCE on z13 only)</td>
<td>PCIBYTR</td>
</tr>
<tr>
<td>Number of megabytes transmitted per second (RoCE on z13 only)</td>
<td>PCIBYTT</td>
</tr>
<tr>
<td>Number of packets received per second (RoCE on z13 only)</td>
<td>PCIPAKR</td>
</tr>
<tr>
<td>Number of packets transmitted per second (RoCE on z13 only)</td>
<td>PCIPAKT</td>
</tr>
<tr>
<td>Number of work units processed per second (zEDC on z13 only)</td>
<td>PCIWUP</td>
</tr>
<tr>
<td>PCI Function Utilization (zEDC on z13 only)</td>
<td>PCIUTIL</td>
</tr>
</tbody>
</table>

**Hardware Accelerator Activity**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Busy %</td>
<td>FPGBUSY</td>
</tr>
<tr>
<td>Request Execution Time</td>
<td>FPGRTIM</td>
</tr>
<tr>
<td>Request Queue Time</td>
<td>FPGQTIM</td>
</tr>
<tr>
<td>Request Size</td>
<td>FPGBYTR</td>
</tr>
<tr>
<td>Transfer Rate Total</td>
<td>FPGBYTS</td>
</tr>
</tbody>
</table>

**Hardware Accelerator Compression Activity**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression Request Rate</td>
<td>FPGCORS</td>
</tr>
<tr>
<td>Compression Throughput</td>
<td>FPGCOBS</td>
</tr>
</tbody>
</table>
Table 179. Overview conditions in the PCIE Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression Ratio</td>
<td>FPGCORT</td>
</tr>
<tr>
<td>Decompression Request Rate</td>
<td>FPGDCRS</td>
</tr>
<tr>
<td>Decompression Throughput</td>
<td>FPGDCBS</td>
</tr>
<tr>
<td>Decompression Ratio</td>
<td>FPGDCRT</td>
</tr>
<tr>
<td>Buffer Pool Size</td>
<td>FPGBPSZ</td>
</tr>
<tr>
<td>Buffer Pool Utilization</td>
<td>FPGBPRT</td>
</tr>
</tbody>
</table>

**SDELAY - Serialization Delay report**

In large systems, it may be difficult to detect and debug performance problems due to resource contention. System dumps or traditional performance reports may not be adequate tools to identify the address space that is causing a contention.

For this purpose, RMF provides global resource serialization (GRS) enqueue and latch performance statistics, as well as system suspend lock contention information to help users in analyzing serialization-related performance problems.

**How to request this report**

RMF Monitor III gathers the data required for the Serialization Delay report by default in SMF record type 72 subtype 5.

To produce this report, specify

REPORTS(SDELAY)

**Note:** The SDELAY report is only available as an interval report, not as a duration report.

If you do not want to use this report, you should suppress the associated SMF data collection for record type 72-5. Methods how to achieve this are listed in the z/OS RMF User’s Guide in section Defining SMF record writing.

This single-system report is only available in XML output format. Therefore, you need to specify the XPRPTS ddname in your Postprocessor job. Topic How to work with Postprocessor XML reports in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**


**Contents of the report**

The Serialization Delay report provides contention information on system and address space level for different types of suspend locks, GRS latches, and GRS ENQs. Reported suspend lock types (with their abbreviations used in the report in parentheses) are: CMS lock (CMŚ), CMS Enqueue/Dequeue lock (CMSEQDQ), CMS Latch lock (CMSLatch), CMS SMF lock (CMSSMF), LOCAL lock (Local), and CML lock (CML).

The Serialization Delay Report consists of two sections:

- the Serialization Delay Summary (see “Serialization Delay Summary” on page 418)
the Serialization Delay Details (see “Serialization Delay Details” on page 419)

Serialization Delay Summary

The Serialization Delay Summary section contains system-wide summary data for all address spaces and is divided into three subsections:

- The System Locks subsection displays summary data for system suspend locks.
- The GRS Latch Set Creator subsection displays summary data about GRS latches.
- The GRS Enqueue subsection displays summary data about GRS enqueue requests.

---

**Table 180. Fields in the Serialization Delay Summary section**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| GRS Mode           | The operation mode of GRS:  
|                    | • NONE  
|                    | • RING  
|                    | • STAR  

**System Locks** – contains system-wide summary data on system suspend locks for all address spaces.
### Table 180. Fields in the Serialization Delay Summary section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock Type</td>
<td>Displays the system suspend lock type:</td>
</tr>
<tr>
<td>CMS</td>
<td>CMS lock</td>
</tr>
<tr>
<td>CMSEQDQ</td>
<td>CMS Enqueue/Dequeue lock</td>
</tr>
<tr>
<td>CMSLatch</td>
<td>CMS Latch lock</td>
</tr>
<tr>
<td>CMSSMF</td>
<td>CMS SMF lock</td>
</tr>
<tr>
<td>Local</td>
<td>LOCAL lock</td>
</tr>
<tr>
<td>CML Owner</td>
<td>CML lock owner</td>
</tr>
<tr>
<td>Total Contention Time</td>
<td>The total amount of time in milliseconds that a unit of work was suspended by a lock of the indicated type.</td>
</tr>
<tr>
<td>Avg Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work was suspended by a lock of the indicated type.</td>
</tr>
<tr>
<td>Total Contention Count</td>
<td>The total number of times that a unit of work was suspended by a lock of the indicated type.</td>
</tr>
<tr>
<td>Contention Count with QLen&gt;1</td>
<td>The total number of times that a unit of work was suspended by a lock of the indicated type when there was already at least one other unit of work suspended for the lock (that is, queue length &gt; 1).</td>
</tr>
</tbody>
</table>

**GRS Latch Set Creator** – contains summary data about GRS latches for all address spaces.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Contention Time</td>
<td>The total amount of time in milliseconds that latch obtain requests were suspended.</td>
</tr>
<tr>
<td>Avg Contention Time</td>
<td>The average amount of time in milliseconds that latch obtain requests were suspended.</td>
</tr>
<tr>
<td>Std Dev of Contention Time</td>
<td>The standard deviation of the total contention time in milliseconds.</td>
</tr>
<tr>
<td>Total Contention Count</td>
<td>The total number of suspended latch obtain requests.</td>
</tr>
</tbody>
</table>

**GRS Enqueue** – contains summary data about GRS enqueue requests for all address spaces.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>The scope of an GRS enqueue request:</td>
</tr>
<tr>
<td>• STEP</td>
<td>• SYSTEM</td>
</tr>
<tr>
<td>• SYSTEMS</td>
<td>One line is displayed for requests of a certain scope.</td>
</tr>
<tr>
<td>Total Contention Time</td>
<td>The total amount of time in milliseconds that the GRS ENQ requests with the specified Scope were suspended.</td>
</tr>
<tr>
<td>Avg Contention Time</td>
<td>The average amount of time in milliseconds that the GRS ENQ requests with the specified Scope were suspended.</td>
</tr>
<tr>
<td>Std Dev of Contention Time</td>
<td>The standard deviation of the Total Contention Time in milliseconds.</td>
</tr>
<tr>
<td>Total Request Count</td>
<td>The total number of GRS ENQ requests with the specified Scope.</td>
</tr>
<tr>
<td>Total Contention Count</td>
<td>The total number of GRS ENQ requests with the specified Scope that were suspended.</td>
</tr>
</tbody>
</table>

### Serialization Delay Details

The **Serialization Delay Details** section provides the following information in four subsections:

- The **CMS Lock Details** subsection contains detail data about CMS/CMSEQDQ/CMSSLatch/CMSSMF locks per address space (see Figure 208 on page 420).
- The **CML and Local Lock Details** subsection contains detail data about CML and LOCAL locks per address space (see Figure 209 on page 421).
- The **GRS Latch Details** subsection contains detail data about GRS latches (see Figure 210 on page 422).
- The **GRS Enqueue Details** subsection contains detail data about GRS enqueue requests (see Figure 211 on page 423).
Note: For each lock type, a maximum of the top twenty address spaces with the longest contention times are reported.

**Table 181. Fields in the Serialization Delay Details section - CMS Lock Details**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CMS Lock Details</strong></td>
<td>contains detail data about CMS/CMSEQDQ/CMSLatch/CMSMMF locks per address space.</td>
</tr>
<tr>
<td>Address Space ID</td>
<td>The hexadecimal address space identifier (ASID) of the job for which lock data was collected.</td>
</tr>
<tr>
<td>Job Name</td>
<td>The name of the job.</td>
</tr>
<tr>
<td>Service Class Name</td>
<td>The name of the service class that the job has been running in.</td>
</tr>
<tr>
<td>Service Class Period</td>
<td>The service class period that the job has been running in.</td>
</tr>
<tr>
<td>CMS - Total Contention Time</td>
<td>The total amount of time in milliseconds that a unit of work of the indicated address space was suspended on the respective lock type.</td>
</tr>
<tr>
<td>CMSEQDQ - Total Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMSLatch - Total Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMSMMF - Total Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMS - Avg Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work of the indicated address space was suspended on the respective lock type.</td>
</tr>
<tr>
<td>CMSEQDQ - Avg Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMSLatch - Avg Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMSMMF - Avg Contention Time</td>
<td></td>
</tr>
<tr>
<td>CMS - Total Contention Count</td>
<td>The number of times that a unit of work of the indicated address space was suspended on the respective lock type.</td>
</tr>
<tr>
<td>CMSEQDQ - Total Contention Count</td>
<td></td>
</tr>
<tr>
<td>CMSLatch - Total Contention Count</td>
<td></td>
</tr>
<tr>
<td>CMSMMF - Total Contention Count</td>
<td></td>
</tr>
</tbody>
</table>
### Table 181. Fields in the Serialization Delay Details section - CMS Lock Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMS - Contention Count with QLen&gt;1</td>
<td>The number of times that a unit of work of the indicated address space was suspended on the respective lock type when there was already at least one other unit of work suspended for the lock.</td>
</tr>
<tr>
<td>CMSSEQDQ - Contention Count with QLen&gt;1</td>
<td></td>
</tr>
<tr>
<td>CMSLatch - Contention Count with QLen&gt;1</td>
<td></td>
</tr>
<tr>
<td>CMSSMF - Contention Count with QLen&gt;1</td>
<td></td>
</tr>
</tbody>
</table>

#### Table 182. Fields in the Serialization Delay Details section - CML and Local Lock Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Space ID</td>
<td>The hexadecimal address space identifier (ASID) of the job for which lock data was collected.</td>
</tr>
<tr>
<td>Jobname</td>
<td>The name of the job.</td>
</tr>
<tr>
<td>Service Class Name</td>
<td>The name of the service class that the job has been running in.</td>
</tr>
<tr>
<td>Service Class Period</td>
<td>The service class period that the job has been running in.</td>
</tr>
<tr>
<td>CML Lock Owner - Total Contention Time</td>
<td>The total amount of time in milliseconds that a unit of work from another address space was suspended when requesting the LOCAL lock of the indicated address space.</td>
</tr>
<tr>
<td>CML Lock Owner - Avg Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work from another address space was suspended when requesting the LOCAL lock of the indicated address space.</td>
</tr>
<tr>
<td>CML Lock Owner - Total Contention Count</td>
<td>The number of times that a unit of work from another address space was suspended when requesting the LOCAL lock of the indicated address space.</td>
</tr>
<tr>
<td>CML Lock Owner - Contention Count with QLen&gt;1</td>
<td>The number of times that a unit of work from another address space was suspended when requesting the LOCAL lock of the indicated address space and there was already at least one other unit of work waiting for this lock.</td>
</tr>
<tr>
<td>Local Lock - Total Contention Time</td>
<td>The total amount of time in milliseconds that a unit of work of the indicated address space was suspended on a LOCAL lock.</td>
</tr>
<tr>
<td>Local Lock - Avg Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work of the indicated address space was suspended on a LOCAL lock.</td>
</tr>
</tbody>
</table>

#### Figure 209. SDELAY Report - Serialization Delay Details - CML and Local Lock Details

![Table 182. Fields in the Serialization Delay Details section - CML and Local Lock Details](image)

### Chapter 5. Long-term overview reporting with the Postprocessor 421
Table 182. Fields in the Serialization Delay Details section - CML and Local Lock Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Lock - Total Contention Count</td>
<td>The number of times that a unit of work of the indicated address space was suspended on a LOCAL lock.</td>
</tr>
<tr>
<td>Local Lock - Contention Count with QLen&gt;1</td>
<td>The number of times that a unit of work of the indicated address space was suspended on a LOCAL lock when there was already at least one other unit of work suspended.</td>
</tr>
<tr>
<td>CML Lock Requestor - Total Contention Time</td>
<td>The total amount of time in milliseconds that a unit of work of the indicated address space was suspended when requesting the LOCAL lock of another address space.</td>
</tr>
<tr>
<td>CML Lock Requestor - Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work of the indicated address space was suspended when requesting the LOCAL lock of another address space.</td>
</tr>
<tr>
<td>CML Lock Requestor - Total Contention Count</td>
<td>The number of times that a unit of work from this address space was suspended when requesting the LOCAL lock of another address space.</td>
</tr>
<tr>
<td>CML Lock Requestor - Contention Count with QLen&gt;1</td>
<td>The number of times that a unit of work from this address space was suspended when requesting the LOCAL lock of another address space and there was already at least one other unit of work waiting for that lock.</td>
</tr>
</tbody>
</table>

Figure 210. SDELAY Report - Serialization Delay Details - GRS Latch Details

Table 183. Fields in the Serialization Delay Details section - GRS Latch Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Space ID</td>
<td>The hexadecimal address space identifier (ASID) of the job for which lock data was collected.</td>
</tr>
<tr>
<td>Job Name</td>
<td>The name of the job.</td>
</tr>
<tr>
<td>Service Class Name</td>
<td>The name of the service class that the job has been running in.</td>
</tr>
<tr>
<td>Service Class Period</td>
<td>The service class period that the job has been running in.</td>
</tr>
<tr>
<td>Latch Set Creator Total Contention Count</td>
<td>The amount of contention time in milliseconds that was caused by latch obtain requests against latch sets created by this address space.</td>
</tr>
<tr>
<td>Latch Set Creator Avg Contention Time</td>
<td>The average amount of contention time in milliseconds that was caused by latch obtain requests against latch sets created by this address space.</td>
</tr>
<tr>
<td>Latch Requestor Total Contention Count</td>
<td>The number of times that a unit of work from this address space was suspended when requesting the LOCAL lock of another address space.</td>
</tr>
<tr>
<td>Latch Requestor Avg Contention Time</td>
<td>The average amount of time in milliseconds that a unit of work from this address space was suspended when requesting the LOCAL lock of another address space.</td>
</tr>
</tbody>
</table>

In the following field descriptions, the term **Latch Set Creator** denotes statistics for latch obtain requests against latch sets created by this address space and **Latch Requestor** denotes statistics for latch obtain requests issued from this address space.
Table 183. Fields in the Serialization Delay Details section - GRS Latch Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latch Set Creator - Std Dev of Contention Time</td>
<td>The standard deviation of the total contention time.</td>
</tr>
<tr>
<td>Latch Requestor - Std Dev of Contention Time</td>
<td></td>
</tr>
<tr>
<td>Latch Set Creator - Total Contention Count</td>
<td>The number of times a latch obtain request was suspended.</td>
</tr>
<tr>
<td>Latch Requestor - Total Contention Count</td>
<td></td>
</tr>
</tbody>
</table>

Table 184. Fields in the Serialization Delay Details section - GRS Enqueue Details

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Space ID</td>
<td>The hexadecimal address space identifier (ASID) of the job for which lock data was collected.</td>
</tr>
<tr>
<td>Jobname</td>
<td>The name of the job.</td>
</tr>
<tr>
<td>Service Class Name</td>
<td>The name of the service class that the job has been running in.</td>
</tr>
<tr>
<td>Service Class Period</td>
<td>The service class period that the job has been running in.</td>
</tr>
<tr>
<td>ENQ STEP - Total Contention Time</td>
<td>The total amount of contention time in milliseconds that was caused by GRS ENQ requests of the indicated scope for this address space.</td>
</tr>
<tr>
<td>ENQ SYSTEM - Total Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ SYSTEMS - Total Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ STEP - Avg Contention Time</td>
<td>The average amount of contention time in milliseconds that was caused by GRS ENQ requests of the indicated scope for this address space.</td>
</tr>
<tr>
<td>ENQ SYSTEM - Avg Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ SYSTEMS - Avg Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ STEP - Std Dev of Contention Time</td>
<td>The standard deviation of the total contention time in milliseconds for GRS ENQ requests of the indicated scope for this address space.</td>
</tr>
<tr>
<td>ENQ SYSTEM - Std Dev of Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ SYSTEMS - Std Dev of Contention Time</td>
<td></td>
</tr>
<tr>
<td>ENQ STEP - Request Count</td>
<td>The total number of GRS ENQ requests of the indicated scope for this address space.</td>
</tr>
<tr>
<td>ENQ SYSTEM - Request Count</td>
<td></td>
</tr>
<tr>
<td>ENQ SYSTEMS - Request Count</td>
<td></td>
</tr>
</tbody>
</table>
### Table 184. Fields in the Serialization Delay Details section - GRS Enqueue Details (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENQ STEP - Contention Count</td>
<td>The total number of GRS ENQ requests of the indicated scope that were suspended for this address space.</td>
</tr>
<tr>
<td>ENQ SYSTEM - Contention Count</td>
<td></td>
</tr>
<tr>
<td>ENQ SYSTEMS - Contention Count</td>
<td></td>
</tr>
</tbody>
</table>

### SDEVICE - Shared Device Activity report

This section describes the Shared Device report. There are two types:
- The Shared Direct Access Device Activity Report
- The Shared Magnetic Tape Device Report

The report gives you an overall performance picture of DASD and TAPE devices that are shared between z/OS systems in a sysplex.

For each shared DASD or tape device the report contains one line for each system that has access to it. The additional system line shows the device activity contributed by all systems in the sysplex.

#### How to request this report

Monitor I gathers data for the DASD Activity report automatically with the default option `DEVICE(DASD)`. If you want to suppress gathering, you need to specify `DEVICE(NODASD)`.

To gather data for the TAPE Activity report, specify `DEVICE(TAPE)`.

To produce this report, specify `SYSRPTS(SDEVICE(options))`

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](http://ddshost:8803/gpm/rmfpp.xml?reports=SDEVICE(NMBR(2000:2200))) in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

**Note:** The report requires matching device numbers (the physical device must have the same device number on all systems), or self-defining devices to give meaningful results.

#### Example URL for the DDS API


#### Using the information given in the report

The summary line allows you to identify a bottleneck caused by device delay in the sysplex. Furthermore, it allows you to see each systems share in the bottleneck.

The summary device activity rate and the device utilization show the total load on the device. The single-system values show the share of each system.

#### Shared Direct Access Device Activity report

The following example reports about a sysplex consisting of two systems (SYSD and SYSE). Only two devices are shown.
Both devices have the same device number on both systems.

**Field descriptions**

The table Table 185 contains all report fields and the description how the values shown are calculated.

**Table 185. Fields in the Shared Device Activity Reports**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSPLEX</td>
<td>Sysplex name</td>
</tr>
<tr>
<td>DATE</td>
<td>This is the earliest date found in all records used to process this report</td>
</tr>
</tbody>
</table>
### Table 185. Fields in the Shared Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **INTERVAL** | This is the longest interval which can be built by using integer multiple interval lengths of all SMF record interval lengths.  
Note: This value is referenced below as the “Common Interval Length” (abbreviated as CIL).  
The interval length of each system is referenced as the “System Interval Length” (abbreviated as SIL).  
If the SMF or RMF interval options and/or SYNCH option do not match it might not be possible to find such a matching interval. In this case an interval of 1 hour (the maximum possible interval length ) will be taken. |
| **CYCLE** | This is the cycle value found in the first SMF record used to process this report.  
Note: If the CYCLE values of all SMF records used to build the report do not match, no report is generated. |
| **TOTAL SAMPLES** | This field shows the total number of samples used to build this report.  
Note: This “Single System Total Samples” (abbreviated as STS) might differ for each system. Therefore, the MIN/MAX/AVG value of all system total sample values is shown. If these value differ strongly, the system summary line values might not be very meaningful. |
| **DEV NUM** | The four-digit hexadecimal device number of a physical I/O device.  
Note: The device number is printed only on the summary line if it is equal for all systems. Otherwise, the device number is printed on each system line. The summary line contains the same device number as the first system line in this case. |
| **DEVICE TYPE** | The device type of the volume. |
| **VOLUME SERIAL** | The volume serial number of the volume mounted on the device at the end of the reporting interval.  
Note: In the Shared Direct Access Device report, this field is printed only on the summary line. The system line field is blank.  
In the Shared Magnetic Tape Device report, this field is printed on the summary line and on that system line which had this volume mounted at end of interval. If no volume was mounted in any system on that device at end of interval, this field is blank on the summary line and on the system lines. |
| **PAV** | The number of parallel access volumes (base and alias) which were active at the end of the reporting interval.  
If the number has changed during the reporting interval, it is followed by an “*”.  
If the device is is a HyperPAV base device, the number is followed by an ‘H’, for example, 5.4H.  
The value is the average number of HyperPAV volumes (base and alias) in that interval.  
\[
\text{Average \# of HPAV devices} = \frac{\text{Accumulated \# of HPAV devices}}{\text{Number of Samples}}
\] |
| **SMF SYS ID** | The SMF System IDs of the systems found sharing this device. The summary line contains the text string *ALL*. The system ID is followed by an asterisk, if for any reason neither data, or only partial data could be presented.  
Note: Data is also considered to be partial, if the interval length of that system differs from the interval shown in the report header. |
| **IODF SUFF** | The IODF suffix in effect for this system  
Note: In the single-system Device Activity report, the header contains the complete IODF name and suffix. Here, only the suffix is presented. |
| **LCU** | The number of the logical control unit to which the device belongs.  
On the system summary line, this field is blank.  
Note: The LCU number for the same device can differ between the different systems even if the device is being shared. |
### Table 185. Fields in the Shared Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVICE ACTIVITY RATE</td>
<td>The rate at which start subchannel (SSCH) instructions to the device completed successfully. The calculation for the single system line is:</td>
</tr>
</tbody>
</table>
|                   | \[
|                   | \quad SSCH Count \] |
|                   | \[
| DEVICE ACTIVITY RATE | = \frac{\text{SSCH Count}}{\text{CIL}} \] |
|                   | In the summary line, this field contains the sum of the rates for each single system. Note: For multi-exposure devices the field reflects the value of the entire device. This is true also in all following fields. |
| AVG RESP TIME     | The average number of milliseconds the device required to complete an I/O request. The average response time consist of two parts, the average service time and the average IOS queue time. For the single system line this is: |
|                   | \[
|                   | \quad \text{AVG RESP TIME} = \text{Avg IOSQT} + \text{AVG PEND TIME} + \text{AVG DISC TIME} + \text{AVG CONN TIME} \] |
|                   | In the summary line, the same formula is used using the corresponding summary line fields. |
| AVG IOSQ TIME     | The average number of milliseconds an I/O request must wait on an IOS queue before a SSCH instruction can be issued. Using the abbreviation for "Device Activity Rate (DAR)", the calculation for the single system line is: |
|                   | \[
|                   | \quad \text{AVG IOSQ TIME} = \frac{\text{IOS Queue Count}}{\text{STS} \times \text{DAR}} \] |
|                   | In the summary line, this field contains the weighted average IOS queue times of the single systems. The weighting factor used is the Measurement Event Count (MEC). The weighting factor for System SYSi is therefore, assuming we have n systems: |
|                   | \[
|                   | \quad W_i = \frac{\text{MEC(SYSi)}}{\text{MEC(SYSi)} + \text{MEC(SYS2)} + ... + \text{MEC(SYSn)}} \] |
|                   | The weighted AVG IOS queue time is therefore calculated as: |
|                   | \[
|                   | \quad \text{WEIGHTED AVG IOS QT} = (\text{AVG IOS QT(SYS1)}) \times W_1 + (\text{AVG IOS QT(SYS2)}) \times W_2 + ... + (\text{AVG IOS QT(SYSn)}) \times W_n \] |
|                   | Note: This weighting algorithm is different to the LCU summary line algorithm used in the single-system Device Activity report. The measurement event count (MEC) is the same as the number of start subchannel instructions (SSCH), unless there has been a timer overflow error in the channel. |
| AVG CMR DLY       | The average number of milliseconds that a successfully initiated start or resume function needs until the first command is indicated as accepted by the device. |
|                   | \[
|                   | \quad \text{Initial Command Response Time} \] |
|                   | \[
|                   | \quad \text{AVG CMR DLY} = \frac{\text{Initial Command Response Time}}{\text{MEC}} \] |
Table 185. Fields in the Shared Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AVG DB DLY</strong></td>
<td>The average number of milliseconds of delay that I/O requests to this device encountered because the device was busy.</td>
</tr>
<tr>
<td></td>
<td>The calculation for the single system line is:</td>
</tr>
</tbody>
</table>
|               | \[
|               | \text{Total DB DLY Time} |
|               | \text{AVG DB DLY} = \frac{\text{Total DB DLY Time}}{\text{MEC}} |
|               | In the summary line, this field contains the weighted average of the individual system AVG DB DELAY times. The weighting algorithm used is the same as described in AVG IOSQ TIME. |
| **AVG INT DLY** | The average interrupt delay time in units of milliseconds encountered for I/O requests to this device. For each I/O request, the time is measured from when the I/O operation is complete to when the operating system begins to process the status. |
|               | \[
|               | \text{Device Interrupt Delay Time} |
|               | \text{AVG INT DLY} = \frac{\text{Device Interrupt Delay Time}}{\text{MEC}} |
| **AVG PEND TIME** | The average number of milliseconds an I/O request must wait in the hardware. |
|               | The calculation for the single system line is: |
|               | \[
|               | \text{Total Pending Time} |
|               | \text{AVG PEND TIME} = \frac{\text{Total Pending Time}}{\text{MEC}} |
|               | In the summary line, this field contains the weighted average of the individual systems AVG PEND times. The weighting algorithm used is the same as described in AVG IOSQ TIME. |
| **AVG DISC TIME** | The average number of milliseconds the device was disconnected while processing an SSCH instruction. |
|               | The calculation for the single system line is: |
|               | \[
|               | \text{Total Disconnect Time} |
|               | \text{AVG DISC TIME} = \frac{\text{Total Disconnect Time}}{\text{MEC}} |
|               | In the summary line, this field contains the weighted average of the individual systems AVG DISC TIME times. The weighting algorithm used is the same as described in AVG IOSQ TIME. |
| **AVG CONN TIME** | The average number of milliseconds the device was connected to a channel path and actually transferring data between the device and central storage. |
|               | The calculation for the single system line is: |
|               | \[
|               | \text{Total Connect Time} |
|               | \text{AVG CONN TIME} = \frac{\text{Total Connect Time}}{\text{MEC}} |
|               | In the summary line, this field contains the weighted average of the individual systems AVG CONN TIME times. The weighting algorithm used is the same as described in AVG IOSQ TIME. |
| **% DEV CONN** | The percentage of time during the interval when the device was connected to a channel path. |
|               | The calculation for the single system line is: |
|               | \[
<p>|               | \text{Device Connect Time} |
|               | % DEV CONN = 100 \times \frac{\text{Device Connect Time}}{\text{CIL}} |
|               | In the summary line, this field contains the sum of the single system % DEV CONN values. |</p>
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| % DEV UTIL    | The percentage of time during the interval when the device was in use. This percentage includes both the time when the device was involved in I/O operations (connect and disconnect time) and the time when it was reserved but not involved in an I/O operation. Using the abbreviations for “reserved but not involved in an I/O operation (UTL)”, “single system total samples (STS)”, the single system value is calculated as: \[
\% \text{ DEV UTIL} = 100 \times \frac{(\text{Device Connect Time} + \text{Disconnect Time}) \times \text{UTL} \times \text{SIL}}{\text{CIL} \times \text{STS} \times \text{CIL}} + 100 \times \frac{\text{UTL} \times \text{SIL}}{\text{CIL} \times \text{STS} \times \text{CIL}}
\]
In the summary line, this field contains the sum of the single system % DEV UTIL values. |
| % DEV RESV    | The percentage of time during the interval when a shared device was reserved by the system on which RMF was started. Using the abbreviations for “number reserved samples (DRP)”, and “system total samples (STS)”, the calculation used for the single system line is: \[
\% \text{ DEV RESV} = 100 \times \frac{\text{DRP} \times \text{SIL}}{\text{STS} \times \text{CIL}}
\]
This is the percent of the common interval length time which this system holds an reserve on this device. In the summary line, this field contains the sum of the single system % DEV RESV values. |
| AVG NUMBER ALLOC | The average number of data control blocks (DCBs) and access method control blocks (ACBs) concurrently allocated for each volume. This field is reported only for the shared direct access storage devices. The calculation used for the single system line is: \[
\text{AVG} \text{ Num Alloc} \times \frac{\text{System Interval Length}}{\text{NUMBER} \times \text{ALLOC}} \times \frac{\text{System Interval Length}}{\text{Common Interval Length}}
\]
In the summary line, this field contains the sum of the single system AVG NUMBER ALLOC values. |
| NUMBER OF MOUNTS | The number of tape mounts, shown as an integer value, detected by RMF. This field is reported only for magnetic tape devices. If the tape mount was pending at the first cycle of the interval, an asterisk is placed before the numerical value of the tape mount. If the tape mount was pending at the last cycle of the interval, an asterisk is placed immediately following the numerical value of the tape mount. If a mount-pending condition is detected at the first cycle of the interval, the mount count for the interval increments by one. At the single system line the value is displayed as a integer value allowing a range between 0 and 9999. In the summary line, the mount count for the tape device is shown as the sum of the system line values. No indications, however, are displayed to show the mount pending status at the begin or end of the reporting interval. |
### Table 185. Fields in the Shared Device Activity Reports (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AVG MOUNT TIME</strong></td>
<td>The average mount time pending for every device, expressed in the form of HH:MM:SS.</td>
</tr>
<tr>
<td></td>
<td>Using the abbreviations “Mount Pending Samples (MTP),” and “Mount Total Count (MTC),” the calculation used for the single system line is:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AVG</strong></td>
<td><strong>MTP</strong> * <strong>SIL</strong></td>
</tr>
<tr>
<td><strong>MOUNT</strong></td>
<td><strong>TIME</strong> * <strong>STS</strong> * <strong>MTC</strong></td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>The mount time value has units of full seconds, while the interval length usually is shown in units of milliseconds.</td>
</tr>
<tr>
<td></td>
<td>If the mount count or the sample count is zero, the result is zero.</td>
</tr>
<tr>
<td></td>
<td>In the summary line, the average mount time is calculated as:</td>
</tr>
<tr>
<td></td>
<td><strong>AVG</strong> <strong>Mount Time</strong>(SYS1)* <strong>MTC</strong>(SYS1) + ...</td>
</tr>
<tr>
<td><strong>MOUNT</strong></td>
<td><strong>TIME</strong> <strong>∑</strong> All System MTC Counts</td>
</tr>
<tr>
<td></td>
<td>This field is reported only for magnetic tape devices.</td>
</tr>
</tbody>
</table>

| **TIME DEVICE ALLOC**  | The total time the device was allocated during the interval, expressed in the form of HH:MM:SS.                                                                                                             |
|                        | This field is reported only for magnetic tape devices.                                                                                                                                                     |
|                        | **ALC** * **SIL**                                                                                                                                                                                        |
| **TIME DEVICE ALLOC**  | **TIME** **ST** * **SIL**                                                                                                                                                                                 |
|                        | If the system total sample count is zero, the result is zero.                                                                                                                                             |
|                        | In the summary line, the field contains the sum of the system line values.                                                                                                                                  |
| **Note:**              | The mount time value has units of full seconds, while the interval length in the report header is shown in units of milliseconds.                                                                       |

### Spreadsheet and Overview reference

You can make this report available through Overview records in a spreadsheet, using the Spreadsheet Reporter.

The following table shows all criteria and the corresponding Overview criterion names for creating Overview records. For details, see the [z/OS RMF User's Guide](#).

#### Table 186. Overview names in the Shared DASD Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent reserved</td>
<td>DR</td>
</tr>
<tr>
<td>Percent mount pending</td>
<td>DMTPEND</td>
</tr>
<tr>
<td>Percent device utilization</td>
<td>DVUTL</td>
</tr>
<tr>
<td>Device activity rate</td>
<td>DART</td>
</tr>
<tr>
<td>Average connect time</td>
<td>DCTAVG</td>
</tr>
<tr>
<td>Average disconnect time</td>
<td>DDTAVG</td>
</tr>
<tr>
<td>Average pending time</td>
<td>DPTAVG</td>
</tr>
<tr>
<td>Average IOS queue time</td>
<td>DQTAVG</td>
</tr>
<tr>
<td>Average response time</td>
<td>DRRTAVG</td>
</tr>
<tr>
<td>Average device busy delay time</td>
<td>DBDL</td>
</tr>
<tr>
<td>Average initial command response delay time</td>
<td>CMRDL</td>
</tr>
<tr>
<td>Average interrupt delay time</td>
<td>INTDL</td>
</tr>
</tbody>
</table>
TRACE - Trace Activity report

The Trace Activity report provides information from various trace variables.

The report shows snapshots of each of the specified variables along with timing information. RMF trace treats values collected as unsigned binary integers. See z/OS RMF User’s Guide for a description of how to specify the TRACE options. A description of the trace variables is in Table 188 on page 432.

Note: Monitor I gathers and reports all trace variables the way they are provided by the system. Monitor I cannot influence the format, and does not perform any calculation.

How to request this report

To gather data for this report, specify as a Monitor I gatherer option

\texttt{TRACE(variable [,options list])}

To produce this report, specify

\texttt{REPORTS(TRACE)}

Note: The TRACE report is only available as an interval report, not as a duration report.

Using the information given in the report

You can use the Trace report to monitor the SRM multiprogramming level (MPL) adjustment or monitor the contention detected and handled by the system. You can see how the system handles contention by tracing the following variables: RCVUICA, RCVCPUA and RCVPTR.

In addition, you can monitor the use of expanded storage by tracing the variables RCEESINU, RCEESWRT,RCENWSF and RCEWSDNE, MCVMGAGE and MCVSTCRI.

Contents of the report

RMF reports all trace variables that contain invalid data on a separate report page.

The number of lines in the report is based on the cycle and interval values specified when the session is started. For example, if you specify CYCLE(250) and INTERVAL(60M), RMF will take approximately 14,400 samples. Based on a constant 60 samples/set and 1 line/set, the report contains 240 lines of data for each field.

The number of samples per set is determined by a constant located in the first halfword of CSECT ERBMFTTB in load module ERBMFMFC (in SYS1.LINKLIB). Any value in the range 1 to 32,767 is valid and can be changed by the system programmer. If changed to zero, RMF overrides it with 1. If changed to a value less than 0 (a negative number), RMF defaults to 32,767 (X'7FFF'). If the values specified for cycle, interval, and samples per set would result in the number of sets exceeding this limit, RMF suspends trace sampling for the remainder of the interval.
Table 187. Fields in the Trace Activity Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECONDS/SET</td>
<td>The amount of elapsed time covered by one line of output.</td>
</tr>
<tr>
<td>CYCLES/SAMPLE</td>
<td>The number of cycles in a sample.</td>
</tr>
<tr>
<td>NUMBER OF SAMPLES</td>
<td>The total number of samples taken over the interval.</td>
</tr>
<tr>
<td>SAMPLES/SET</td>
<td>The number of samples taken for each line of output except the last line; it can contain fewer samples.</td>
</tr>
<tr>
<td>NUMBER OF SETS</td>
<td>The number of output lines.</td>
</tr>
<tr>
<td>TIME / MM.SS.TT</td>
<td>The approximate calculated time when the sampling for that line of data ended (minutes, seconds and thousandths of a second).</td>
</tr>
<tr>
<td>MINIMUM</td>
<td>The smallest value sampled for the period covered by that output line.</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>The average of the values collected for the period covered by that output line.</td>
</tr>
<tr>
<td>MAXIMUM</td>
<td>The largest value sampled for the period covered by that output line.</td>
</tr>
<tr>
<td>END</td>
<td>The last value sampled for the period covered by that output line.</td>
</tr>
<tr>
<td>STD. DEV.</td>
<td>The standard deviation of the values collected for the period covered by that line of output.</td>
</tr>
</tbody>
</table>

Table 188. Variables in the Trace Activity Report

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASMERRS</td>
<td>Bad slots on local page data sets</td>
</tr>
<tr>
<td>ASMIORQC</td>
<td>Count of I/O requests completed and returned to RSM</td>
</tr>
<tr>
<td>ASMIORQR</td>
<td>Count of I/O requests received by I/O control</td>
</tr>
<tr>
<td>ASMNVSC</td>
<td>Total local slots allocated for non-VIO private area pages</td>
</tr>
<tr>
<td>AMSLOTS</td>
<td>Total local slots (sum of slots in open local page data sets)</td>
</tr>
<tr>
<td>ASMVCSC</td>
<td>Total local slots allocated for VIO private area pages</td>
</tr>
<tr>
<td>CCVCPUCT</td>
<td>Number of online logical processors (threads)</td>
</tr>
<tr>
<td>CCVENQCT</td>
<td>Number of users non-swappable for enqueue reasons</td>
</tr>
<tr>
<td>CCVRBSTD</td>
<td>Recent base time of day</td>
</tr>
<tr>
<td>CCVRBSWT</td>
<td>Recent base system wait time</td>
</tr>
<tr>
<td>CCVUTILP</td>
<td>System CPU utilization</td>
</tr>
<tr>
<td>LSCTCNT</td>
<td>Current number of logically swapped users for terminal wait</td>
</tr>
<tr>
<td>LSCTMTE</td>
<td>Maximum think time allowed for logical swap candidate</td>
</tr>
<tr>
<td>Variable</td>
<td>Value</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>MCVFRCNT</td>
<td>Number of pages needed to be stolen by force steal routine</td>
</tr>
<tr>
<td>MCVMGAGE</td>
<td>Expanded storage migration age</td>
</tr>
<tr>
<td>MCVSBLTF</td>
<td>Long term percentage of eligible storage that is actually fixed</td>
</tr>
<tr>
<td>MCVSPIR</td>
<td>Common page-in rate</td>
</tr>
<tr>
<td>MCVSTCRI</td>
<td>Highest system UIC</td>
</tr>
<tr>
<td>MCVTWSS</td>
<td>Common target working set size</td>
</tr>
<tr>
<td>OMDGAMRE</td>
<td>Maximum number of messages on the action message retention facility (AMRF) queue. If a large number of action messages are retained on the AMRF queue for a particular period, it may mean more operators are needed for that period.</td>
</tr>
<tr>
<td>OMDGCMDI</td>
<td>Number of commands issued per second.</td>
</tr>
<tr>
<td>OMDGOREB</td>
<td>Maximum number of operator reply entries (OREs) on the system reply queue. To eliminate thrashing, use this number to monitor and adjust the ORE buffer limit set at IPL time. To dynamically adjust this limit, use the CONTROL M command.</td>
</tr>
<tr>
<td>OMDGWQEB</td>
<td>Maximum number of WTO queue elements (WQEs) on the system output queue. To eliminate thrashing (excessive data movement which confines system to doing little useful work), use this number to monitor and adjust the WTO buffer time limit set at IPL time. To dynamically adjust this limit, use the CONTROL M command.</td>
</tr>
<tr>
<td>OMDGWTLI</td>
<td>Number of write-to-logs (WTLs) issued per second indicating the number of records going to SYSLOG within a time period. To control the number of data sets produced during the day, vary the number of records per SYSLOG data set.</td>
</tr>
<tr>
<td>OMDGWTOI</td>
<td>Total number of lines of messages, write-to-operators (WTOs) issued per second. Use it to determine the peak message rate period and the average message rate.</td>
</tr>
<tr>
<td>RAXESCT</td>
<td>Number of common storage pages on expanded storage</td>
</tr>
<tr>
<td>RAXFMCT</td>
<td>Number of frames allocated to common storage</td>
</tr>
<tr>
<td>RCEAEBC</td>
<td>Total number of expanded storage E frames currently on the ESTE queue</td>
</tr>
<tr>
<td>RCEAECLLO</td>
<td>Available expanded storage low threshold</td>
</tr>
<tr>
<td>RCEAECKOK</td>
<td>Available expanded storage satisfactory threshold</td>
</tr>
<tr>
<td>RCEAFCLLO</td>
<td>Available central storage low threshold</td>
</tr>
<tr>
<td>RCEAFCKOK</td>
<td>Available central storage satisfactory threshold</td>
</tr>
<tr>
<td>RCEBELFX</td>
<td>Total number of fixed pages below the 16M line in central storage, which is the sum of page-fixed LSQA, SQA (excluding reserved SQA), and V=R allocated pages</td>
</tr>
<tr>
<td>RCECOMPI</td>
<td>Number of common area pages paged-in</td>
</tr>
<tr>
<td>RCECOMPO</td>
<td>Number of common area pages paged-out</td>
</tr>
<tr>
<td>RCEDFRS</td>
<td>Number of times a deferred frame allocation has been satisfied</td>
</tr>
<tr>
<td>RCEESINU</td>
<td>Number of in-use expanded storage frames</td>
</tr>
<tr>
<td>RCEESREA</td>
<td>Number of non-VIO pages allocated to expanded storage</td>
</tr>
<tr>
<td>RCEESWRT</td>
<td>Number of pages written to expanded storage frames</td>
</tr>
<tr>
<td>RCEHSPREM</td>
<td>Total number of hiperspace pages migrated from expanded storage to auxiliary storage</td>
</tr>
<tr>
<td>RCEHSPER</td>
<td>Total number of hiperspace pages in the system read from expanded storage to central storage</td>
</tr>
<tr>
<td>RCEHSPEW</td>
<td>Total number of hiperspace pages written from central storage to expanded storage</td>
</tr>
<tr>
<td>RCEHSPP1</td>
<td>Total number of hiperspace pages paged in from auxiliary storage</td>
</tr>
<tr>
<td>RCEHSPOPO</td>
<td>Total number of hiperspace pages paged out to auxiliary storage</td>
</tr>
<tr>
<td>RCELPAPI</td>
<td>Number of PLPA and PLPA directory pages paged-in</td>
</tr>
<tr>
<td>RCMVBEL</td>
<td>Number of pages moved from below 16 megabytes in central storage</td>
</tr>
<tr>
<td>RCENWSF</td>
<td>Total number of secondary and non-working set pages migrated to auxiliary storage.</td>
</tr>
<tr>
<td>RCEPAGMV</td>
<td>Number of times a frame was moved from one frame to another</td>
</tr>
</tbody>
</table>
### Table 188. Variables in the Trace Activity Report (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCEPOOL</td>
<td>Number of frames currently available to the system. Frames that are backing permanent storage (nucleus frames, hardware storage area frames, FLPA frames or fixed BLDL frames), bad frames and offline frames are excluded.</td>
</tr>
<tr>
<td>RCESPFR</td>
<td>Number of frames available by swap-out without requiring I/O</td>
</tr>
<tr>
<td>RCESWPPI</td>
<td>Total number of pages requiring I/O to swap-in</td>
</tr>
<tr>
<td>RCESWPPO</td>
<td>Total number of pages requiring I/O to swap-out</td>
</tr>
<tr>
<td>RCETOTFX</td>
<td>Total number of pages currently fixed, the sum of page-fixed LSQA, SQA (excluding reserved SQA), and V=R allocated pages</td>
</tr>
<tr>
<td>RCETOTPI</td>
<td>Total number of pages paged-in excluding swap-in and VIO page-in</td>
</tr>
<tr>
<td>RCETOTPO</td>
<td>Total number of pages paged-out, excluding swap-out, move-out of VIO pages, and page-out of VIO pages</td>
</tr>
<tr>
<td>RCEVIOME</td>
<td>Number of VIO pages written to expanded storage</td>
</tr>
<tr>
<td>RCEVIOMG</td>
<td>Number of VIO pages migrated from expanded storage to paging data sets</td>
</tr>
<tr>
<td>RCEVIOP</td>
<td>Total number of VIO pages paged-in, excluding swap-in</td>
</tr>
<tr>
<td>RCEVIOPRO</td>
<td>Total number of VIO pages, excluding swap-out, moved out, or paged-out</td>
</tr>
<tr>
<td>RCEVIERE</td>
<td>Number of VIO reads from extended storage</td>
</tr>
<tr>
<td>RCEWSDNE</td>
<td>Total number of primary working set pages migrated to auxiliary storage</td>
</tr>
<tr>
<td>RCVAFQA</td>
<td>Average available frame count</td>
</tr>
<tr>
<td>RCVAVQC</td>
<td>AVQ low count</td>
</tr>
<tr>
<td>RCVCPUA</td>
<td>CPU usage average * 16</td>
</tr>
<tr>
<td>RCVFXIOP</td>
<td>Percentage of central storage that is fixed or allocated for paging</td>
</tr>
<tr>
<td>RCVMFXA</td>
<td>Average number of fixed frames for the system</td>
</tr>
<tr>
<td>RCVPAGRT</td>
<td>Total paging rate</td>
</tr>
<tr>
<td>RCVPTR</td>
<td>Paging rate</td>
</tr>
<tr>
<td>RCVSWPTM</td>
<td>Time (in milliseconds) used by ASM to process a request to transfer a group of pages to or from a data set</td>
</tr>
<tr>
<td>RCVUICA</td>
<td>UIC average</td>
</tr>
<tr>
<td>RMCAAWSC</td>
<td>APPC/MVS transaction scheduler (ASCH) wait swap count</td>
</tr>
<tr>
<td>RMCADWSC</td>
<td>Detected wait physical swap count</td>
</tr>
<tr>
<td>RMCAEXSC</td>
<td>Exchange on recommendation value swap count</td>
</tr>
<tr>
<td>RMCAFHLD</td>
<td>Number of swaps failed because of an outstanding HOLD SYSEVENT</td>
</tr>
<tr>
<td>RMCAICSC</td>
<td>Improve central storage use</td>
</tr>
<tr>
<td>RMCAIPSC</td>
<td>Improve system paging rate</td>
</tr>
<tr>
<td>RMCAIWSC</td>
<td>Long wait physical swap count</td>
</tr>
<tr>
<td>RMCAIMRSC</td>
<td>Make room to swap in a user who was swapped out too long.</td>
</tr>
<tr>
<td>RMCAINQSC</td>
<td>CPU enqueue exchange swap count</td>
</tr>
<tr>
<td>RMCASOISSC</td>
<td>OMVS input wait</td>
</tr>
<tr>
<td>RMCAOOOSSC</td>
<td>OMVS output wait</td>
</tr>
<tr>
<td>RMCARSSSC</td>
<td>Central storage shortage swap count</td>
</tr>
<tr>
<td>RMCATISC</td>
<td>Terminal input swap count</td>
</tr>
<tr>
<td>RMCATOSSC</td>
<td>Terminal output swap count</td>
</tr>
<tr>
<td>RMCATSSSC</td>
<td>Count of transition swaps</td>
</tr>
<tr>
<td>RMCAUSSSC</td>
<td>Unilateral swap out count</td>
</tr>
<tr>
<td>RMCAXSSC</td>
<td>Auxiliary storage shortage swap count</td>
</tr>
<tr>
<td>RMCTTRPC</td>
<td>Number of pages used for transaction elements</td>
</tr>
<tr>
<td>SMCABFLS</td>
<td>Number of records lost because of a shortage of buffers</td>
</tr>
</tbody>
</table>
Table 188. Variables in the Trace Activity Report (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMCABFWT</td>
<td>Number of buffers written</td>
</tr>
<tr>
<td>SMCACNBF</td>
<td>Current number of buffers</td>
</tr>
<tr>
<td>SMCADSCT</td>
<td>Number of records lost because of a full data set</td>
</tr>
<tr>
<td>SMCANMFL</td>
<td>Current number of full buffers</td>
</tr>
<tr>
<td>SMCARCWT</td>
<td>Number of records written</td>
</tr>
</tbody>
</table>

**Standard deviation output**
The Trace Activity report gives an account of standard deviation as an exponential (E-format) number. This number expresses the standard deviation for a set (sub-interval) as a number between 0.000 and 9.999, raised to a power of ten.

**Example**
1.123E+01 is the same as 1.123 X 10.1 or 11.23

**Note:** The signed number following the E represents a power of 10 and indicates that the decimal point should be shifted either to the left or right. In this example, the decimal point is moved one place to the right.

**VSTOR - Virtual Storage Activity report**
The Virtual Storage Activity report provides information about the use of virtual storage that can help your installation manage its use of virtual storage.

The report is formatted into the following four sections, each with a separate subheading:

- COMMON STORAGE SUMMARY (see “Common Storage Summary section” on page 437)
- COMMON STORAGE DETAIL (see “Common Storage Detail section” on page 439)
- PRIVATE AREA SUMMARY (see “Private Area Summary section” on page 440)
- PRIVATE AREA DETAIL (see “Private Area Detail section” on page 443)

Most of the information you need to begin managing virtual storage appears in the common storage summary report. When this report indicates a problem, you can request one of the three more comprehensive reports for additional information.

The structure and fields of the different reports are described in “Contents of the report” on page 436.

**Free and allocated storage**
All of the four report sections define virtual storage space as either free storage or allocated storage. **Free storage** is any block of at least 4K (4096 bytes) that contains no storage obtained via the GETMAIN macro instruction. **Allocated storage** is any block of at least 4K that contains any storage obtained with the GETMAIN macro instruction. Thus, for the purposes of the report, free storage within a 4K block assigned to a subpool is allocated storage. Both free storage and allocated storage are reported as a multiple of 4K on the reports.

**Using the information given in the report**
Information on virtual storage use is particularly helpful in the process of long-term measurements. It helps you, for example, understand your current use of virtual storage, see the relationship between increased use of your system and
increased demands on virtual storage, and predict future constraints before they occur. This ability to predict a future constraint is useful for the virtual storage resource because actions that can relieve a virtual storage constraint generally require significant time to plan and implement. The report can also help you determine the effect of any actions, such as moving a large application above the 16-megabyte line or installing products that take advantage of expanded addressing.

The information in the report can help you identify any expansion of SQA into CSA and set appropriate size values for CSA and SQA at IPL time. You can use the report to verify the cost (in increased PLPA inter-module space) of any pack lists your installation uses to reduce PLPA paging.

How to request this report

Monitor I gathers data for this report automatically with the default option VSTOR(S). See the z/OS RMF User’s Guide for details. If you want to suppress gathering, you need to specify NOVSTOR.

To produce this report, specify

REPORTS(VSTOR(S))
REPORTS(VSTOR(D))
REPORTS(VSTOR(D[,jobname1,jobname2,...]))
REPORTS(VSTOR(jobname1[,jobname2,...]))

This report is also available in XML output format. Topic How to work with Postprocessor XML reports in the z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

Example URLs for the DDS API


Contents of the report

All size data values are reported in bytes. The size is followed by a K (indicating the number of kilobytes the value represents) unless the size is greater than 9999K. When the size is greater than 9999K, the size is followed by an M (indicating the number of megabytes the value represents). Because peak values are especially important when analyzing virtual storage use, the minimum, maximum, and average values are reported whenever useful, and the minimum and maximum values are time-stamped.

Data gathering considerations

To minimize overhead, RMF does not sample virtual storage data at every cycle. RMF takes one sample of virtual storage data for every ten RMF cycles. For example, if the RMF cycle is one second, RMF samples virtual storage data every ten seconds. In this case, RMF provides time stamps (accurate to within a ten-second range) for each minimum and maximum value on the report. The time stamp shows the time when RMF first observed the minimum or maximum value in the sample.
Changing the sample to cycles ratio

Programming interface information

Your installation can change the default 1:10 ratio. Decreasing the 1:10 ratio - for example, to 1:5 - increases the accuracy of the virtual storage data RMF collects, in the sense that RMF is more likely to capture such data as a peak value when it samples more frequently. Decreasing the ratio, however, does increase RMF overhead.

Increasing the 1:10 ratio - for example, to 1:15 - decreases the accuracy of the virtual storage data RMF collects, in the sense that RMF is less likely to capture such data as a peak value when it samples less frequently. Increasing the ratio, however, does decrease RMF overhead. It is recommended to increase the ratio when measuring virtual storage activity of system address spaces like CATALOG, VTAM, DB2, IMS or other. This reduces the impact to the measured address space. Due to this impact, virtual storage activity of system address spaces should only be measured for a short period of time when diagnosing a special situation.

Example:

To change the ratio, use the AMASPZAP program. For example, to change the ratio from 1:10 to 1:15 -- so that RMF takes one virtual storage sample for every fifteen cycles -- use the following JCL and control statements:

```
//ZAP JOB
//STEP EXEC PGM=IMASPZAP
//SYSPRINT DD SYSOUT=A
//SYSLIB DD DSN=SYS1.SERBLPA,DISP=SHR
//SYSIN DD *
/*
NAME ERBMFEVS NUMCYCLE
VERIFY 00 0000000A
REPL 00 0000000F
/*
```

Note that the change does not take effect until after the operator performs the next cold start (IPL with CLPA) of the system.

For more information on the use of AMASPZAP, see z/OS MVS Diagnosis: Tools and Service Aids.

Common Storage Summary section

The common storage summary section enables you to measure the use of virtual storage with minimal overhead. It contains the information you need to understand your current use of virtual storage. If you archive the data, you can use differences over time to predict a problem or constraint before it becomes critical. It also helps you to verify the size values set for CSA and SQA at IPL time and determine if you are using common storage effectively. Because RMF does not sample virtual storage data at every cycle, the value reported for NUMBER OF SAMPLES is less than the number of cycles.
### Table 189. Fields in the Virtual Storage Activity Report - Common Storage Summary

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATIC STORAGE MAP</td>
<td>The major storage areas above and below the 16-megabyte line. It includes the name of each area, the address of its lower boundary, and its size, reported in bytes.</td>
</tr>
<tr>
<td>ALLOCATED CSA/SQA</td>
<td>The MIN, MAX, and AVG values for allocated CSA and SQA, both below and above the 16-megabyte line. RMF calculates each size by adding the number of bytes assigned to each SQA or CSA subpool. The report also breaks down allocated CSA by key.</td>
</tr>
<tr>
<td>SQA EXPANSION INTO CSA</td>
<td>The MIN, MAX, and AVG size of any expansion of SQA into CSA.</td>
</tr>
<tr>
<td>PLPA INTERMODULE SPACE</td>
<td>The amount of unused space between the modules in both the PLPA and the EPLPA. If your installation uses a pack list (in the IEAPAK00 Parmlib member), the values reported can help you determine the cost of your packing algorithm in relation to its benefit, a reduction in LPA paging rates, as shown in the paging report.</td>
</tr>
<tr>
<td>PLPA SPACE REDUNDANT WITH MLPA/FLPA</td>
<td>The amount of space for PLPA occupied by modules that also exist in (E)MLPA and/or (E)FLPA. For EPLPA, reports the amount of space occupied by modules that also exist in (E)MLPA or (E)FLPA.</td>
</tr>
<tr>
<td>FREE PAGES (BYTES)</td>
<td>The MIN, MAX, and AVG values, in bytes, for the amount of free storage.</td>
</tr>
<tr>
<td>LARGEST FREE BLOCK</td>
<td>The MIN, MAX, and AVG values, in bytes, for the size of the largest free block. The size of the largest free block, when compared to the total amount of free storage, is a measure of fragmentation within the common storage area. For example, when the size of the largest free block is close to the size of free storage, there is little fragmentation. The size of the largest free block is also the size of the largest GETMAIN that the system can currently satisfy within CSA or SQA.</td>
</tr>
</tbody>
</table>
Table 189. Fields in the Virtual Storage Activity Report - Common Storage Summary (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOCATED AREA SIZE</td>
<td>The MIN, MAX, and AVG values, in bytes, for the size of the allocated area. RMF calculates this value as the difference between the highest and lowest address occupied by allocated storage. This includes all free blocks that lie between allocated blocks. Because free blocks between allocated blocks cause an increase in the virtual address range needed to hold the allocated blocks, consider this value when determining the size of CSA (and ECSA) and SQA (and ESQA). Significant fragmentation causes this number to be much larger than the amount of storage actually used. Note: Because the system allocates storage in the ESQA area for both ends of the address range, the allocated area size is always the same as the total size.</td>
</tr>
<tr>
<td>MAXIMUM POSSIBLE USER REGION</td>
<td>The largest size specified on the REGION= JCL parameter that this system can satisfy (assuming a minimal number of DD statements). RMF determines this value, reported for below and above the 16-megabyte line, by examining its own private area; it calculates the size by finding the difference between the bottom of its allocated area at RMF initialization and the start of the user region. There is no guarantee that a particular job can obtain a region of the reported size. For a job that runs under an initiator (as opposed to a job that runs as a started task), the storage that the initiator obtains, reduces the size of the region that the job can obtain. The number of DD statements in the JCL can also reduce the size of the region. The reported region size, however, can indicate whether a job with a known region requirement is likely to obtain the region it requires under the system conditions reflected in the report.</td>
</tr>
</tbody>
</table>

Overview reference

Table 190. Overview names in the Virtual Storage Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQA EXPANSION INTO CSA</td>
<td>SQAE</td>
</tr>
<tr>
<td>LARGEST FREE BLOCK - MIN, CSA</td>
<td>CSAFB</td>
</tr>
<tr>
<td>LARGEST FREE BLOCK - MIN, SQA</td>
<td>SQAFB</td>
</tr>
</tbody>
</table>

Common Storage Detail section

The optional common storage detail section contains additional information about the use of CSA and SQA below the 16-megabyte line.
### Table 191. Fields in the Virtual Storage Activity Report - Common Storage Detail Section

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOCATED CSA BY SUBPOOL BY KEY</td>
<td>The matrix that presents MINIMUM, MAXIMUM, and AVERAGE use of CSA by subpools 227, 228, 231, and 241 broken down by storage key and summed for ALL keys.</td>
</tr>
<tr>
<td>ALLOCATED SQA BY SUBPOOL</td>
<td>The MIN, MAX, and AVG values for subpools 226, 239, and 245.</td>
</tr>
</tbody>
</table>

### Private Area Summary section

The optional private area summary section presents information about how a specific address space is using its private virtual storage. RMF uses the job name you specify when you request the report to identify the address space. In choosing a job, note that gathering data for a specific address space requires additional RMF overhead. Note that RMF can gather private area data only when a job is active at the beginning of the interval, and various conditions can limit RMF’s ability to report complete private area data. These conditions, and the actions RMF takes, are described later in this section under "Partial private area data" on page 442.

In general, RMF can gather meaningful data only for jobs that run for a relatively long period of time. Note that you cannot monitor the master scheduler address space.

**Note:** Measuring virtual storage activity for a specific job may have significant impact on the performance of the job. When requesting a VSTOR report, system address spaces like CATALOG, VTAM, DB2, IMS or other, should be specified as *jobname* only for a short period of time when diagnosing a special performance
situation.

Table 192. Fields in the Virtual Storage Activity Report - Private Area Summary

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME and PROGRAM NAME</td>
<td>The job analyzed in the report. RMF takes the program name from the PGM= parameter on the exec statement.</td>
</tr>
<tr>
<td>NUMBER OF SAMPLES</td>
<td>The number of samples RMF used to generate the data in the report. If the job was swapped out at a time when RMF tried to sample virtual storage data, this number will be less than the number of samples reported for the common storage summary report.</td>
</tr>
<tr>
<td>REGION REQUESTED</td>
<td>The values specified for the REGION= parameter on the JOB or EXEC JCL statement for the job step or the system default used for the job step.</td>
</tr>
<tr>
<td>REGION ASSIGNED</td>
<td>The region assigned to the job by installation control for virtual storage below and above the 16-megabyte line. This value limits the amount of storage that a job can obtain by issuing a variable length GETMAIN. (When a job issues a variable length GETMAIN, the amount of storage obtained is the difference between REGION ASSIGNED and the top of the allocated area, assuming that the largest free block is there.)</td>
</tr>
</tbody>
</table>

**Private Storage Map**

The information reported under Private Storage Map defines significant boundaries within the private area and shows the space between them. There is a separate map for storage below the 16-megabyte line and for expanded storage (above the 16-megabyte line). Each map identifies:
PP - VSTOR

Table 193. Fields in the Virtual Storage Activity Report - Private Storage Map

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOTTOM OF ALLOCATED AREA</td>
<td>The lowest address of allocated storage for LSQA, SWA, and subpools 229 and 230, all of which are allocated down from the top of the private area. RMF reports the lowest value it found during the RMF interval. The time stamp reflects the time when RMF first observed the value reported.</td>
</tr>
<tr>
<td>GETMAIN LIMIT</td>
<td>The installation limit on the total amount of storage a job can obtain via GETMAIN macro instructions for virtual storage below and above the 16-megabyte line. The values reported are set by your installation (using the IEFUSI installation exit or IEALIMIT) or the system defaults. If a job requests storage that the system would have to obtain from storage above either of these limits, the job terminates abnormally.</td>
</tr>
<tr>
<td>TOP OF ALLOCATED AREA</td>
<td>The highest address of user region storage allocated up from the bottom of the private area, including subpools 251 and 252 as well as user subpools 1 through 127. RMF reports the highest value it found during the RMF interval. The time stamp reflects the time when RMF first observed the value reported.</td>
</tr>
</tbody>
</table>

It is possible for the top and bottom of the allocated area to cross. When RMF detects this situation, it reports a negative value for the area between the marks; it does not reverse the labels.

Bottom half of Private Storage Map

The bottom half of the report contains information about free and allocated storage within the private area, both below and above the 16-megabyte line. For LSQA/SWA/229/230 and for USER REGION, RMF reports the following information:

Table 194. Fields in the Virtual Storage Activity Report - Bottom Half

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREE PAGES (BYTES)</td>
<td>The MIN, MAX, and AVG values, in bytes, for the amount of free storage.</td>
</tr>
<tr>
<td>LARGEST FREE BLOCK</td>
<td>The MIN, MAX, and AVG values, in bytes, for the size of the largest free block in the available amount of free storage.</td>
</tr>
<tr>
<td>PAGES ALLOCATED (IN BYTES)</td>
<td>The MIN, MAX, and AVG values for the amount of allocated storage. <strong>Note:</strong> The MAX value for PAGES_ALLOCATED has the same meaning as fields in SMF record type 30. For LSQA, these fields are SMF30ARB and SMF30EAR. For the user region, these fields are SMF30URB and SMF30EUR. However, RMF might report a smaller number than SMF does. RMF reports the highest value that it sampled while SMF reports the highest value that occurred. If the highest value occurred when RMF was not taking a sample, RMF misses the actual peak value.</td>
</tr>
</tbody>
</table>

For USER REGION and LSQA, RMF determines FREE PAGES and LARGEST FREE BLOCK in relation to the GETMAIN limit.

It is possible that LSQA/SWA can become so large that it extends below the GETMAIN limit. Thus, a GETMAIN macro instruction for user region storage would fail even though the storage requested does not exceed the GETMAIN limit. In this case, RMF makes the appropriate adjustments to the values it reports for FREE PAGES and LARGEST FREE BLOCK.

Partial private area data

Private area reporting works best for jobs that are running at least one interval. You can, of course, monitor other jobs, but there are some conditions that mean RMF can collect little or no data. These conditions, which are related to the way virtual storage reporting works, are:

1. RMF searches for any requested jobs at the beginning of each interval. If it does not find a job, it does not monitor the job during the interval. In this case, RMF
issues a message to the operator and produces a report. The report, however, contains no data; instead, the following message appears:

JOB WAS NOT ACTIVE AT THE BEGINNING OF THIS INTERVAL

RMF continues to search for the job at the beginning of each interval. When it finds the job, it deletes the message, monitors the job, and produces a report.

If a job begins and ends within a single RMF interval, RMF cannot monitor its use of virtual storage.

2. If a job that RMF is monitoring terminates and is then restarted, the report for the interval in which it terminated includes data only up to the point when the job terminated. RMF resumes its monitoring of the restarted job at the beginning of the interval following the interval during which the job was restarted.

3. If a job RMF is monitoring is swapped out at the time RMF takes a sample of virtual storage data, RMF does not cause a swap-in; it skips the sample for that job. Thus, the number of samples for a swappable job may be less than expected. If a job is swapped out every time RMF tries to take a sample during an interval, RMF reports no data for that interval.

Private Area Detail section

The optional Private Area Detail section provides information about the number of bytes of allocated blocks by area below the 16-megabyte line and also provides information about the high virtual memory usage above the 2-gigabyte line. In the header, the job name and the memory limit in bytes for this address space is displayed.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOB NAME</td>
<td>The job analyzed in the report.</td>
</tr>
<tr>
<td>MEMORY LIMIT</td>
<td>The memory limit in bytes for this address space.</td>
</tr>
<tr>
<td>NUMBER OF BYTES OF ALLOCATED BLOCKS BY AREA (BELOW 16 MEG)</td>
<td></td>
</tr>
</tbody>
</table>
Table 195. Fields in the Virtual Storage Activity - Private Area Detail section (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBPOOL (AREA) / USER REGION</td>
<td>The MIN, MAX, and AVG values for the number of bytes of allocated blocks during the report interval, broken down by subpool and by area (LSQA, SWA).</td>
</tr>
<tr>
<td>HIGH VIRTUAL MEMORY USAGE (ABOVE 2GB)</td>
<td>The MIN, MAX, and AVG values for the number of bytes in PRIVATE, SHARED, and COMMON memory objects allocated with the indicated job as the owner. In addition, the PEAK useable storage since the start of the job are shown. Unlike MIN, MAX and AVG, the PEAK values report usable storage only. Hidden storage, like guard areas, are not included so that the reported PEAK value may be smaller than the MIN, MAX or AVG values.</td>
</tr>
<tr>
<td>MEMORY OBJECTS</td>
<td>The MIN, MAX, and AVG values for the number of PRIVATE, SHARED, and COMMON memory objects allocated with the indicated job. Fixed memory objects that are backed in 1 MB frames are also reported if the Enhanced DAT Architecture is supported.</td>
</tr>
<tr>
<td>1 MB FRAMES</td>
<td>The MIN, MAX, and AVG values for the number of 1 MB frames that are used by FIXED and PAGEABLE memory objects with the indicated job as the owner (only available with Enhanced DAT Architecture). The PAGEABLE value also includes 1 MB frames that are used by DREF memory objects. Frames that are used to satisfy 4 KB space requests on a constrained system are not included.</td>
</tr>
</tbody>
</table>

**WLMGL - Workload Activity report**

The Workload Activity report (WLMGL) can be used to request a variety of reports, as shown in "The WLMGL option list."

**How to request this report**

Monitor I gathers data for this report automatically. If you want to suppress gathering, you need to specify NOWKLD.

To produce this report, specify

SYSRPTS(WLMGL(options))

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports in the z/OS RMF User’s Guide](http://ddshost:8803/gpm/rmfpp.xml?reports=WLMGL(SCLASS(BATCH))) provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**


For more information, see the [z/OS RMF User’s Guide](http://ddshost:8803/gpm/rmfpp.xml?reports=WLMGL(SCLASS(BATCH)))

**The WLMGL option list**

You can select among various types of WLMGL reports by specifying the SYSRPTS WLMGL options:

**SCPER**

All service class periods found for a service class.

This report contains detailed information about:

- Subsystem delays
- Response time goals vs actuals
- General execution delays
- Response time distribution.
SCLASS
Summary of data for all service class periods defined for a service class.

WGROUPO
Summary of data for all service classes defined in a workload definition.

POLICY
Summary of data for all workloads defined in the active service policy.

WGPER
All service classes, including one line for each service class period, defined in a workload definition.

RCLASS
All report classes defined in a service policy.

RCPER
All periods found for a report class. The report has the same structure and information as the Service Class Period report.

RTD
Response Time Distribution is displayed in WLMGL Service/Report Class Period reports (RTD is default, NORTD otherwise). This suboption can only be specified together with suboptions SCPER or RCPER; otherwise, it is ignored.

In addition, you have the SYSNAM option to select systems to be included in the report. All systems must belong to the same sysplex.

Contents of the report
The following sections describe the various WLMGL report types as introduced in “The WLMGL option list” on page 444. “Field descriptions for all reports” on page 452 describes the report headers and explains all of the fields displayed by these reports.

Note that for all report types, the reporting interval is finished in case of a policy change or a policy refresh. A policy refresh is initiated either by the operator or by the Workload Manager component itself when a processor speed change or a IEAOPTrxx parameter change occurs.

Service Class Period report
To request a Service Class Period report, specify:
SYSRPTS(WLMGL(SCPER(service_class)))

For example, to produce a report for all service class periods of service class STCLOW, specify:
SYSRPTS(WLMGL(SCPER(STCLOW)))

Figure 219 on page 446 shows a report for service class STCLOW where the first service class period (PERIOD=1) is defined with an execution velocity goal. For service class periods with an execution velocity goal, the WLMGL report displays one tabular response time distribution for each system in the sysplex. The example depicted contains two response time distributions for systems TRX1 and TRX2.
Figure 219 on page 447 shows a report for service class TSOHIGH where the first service class period is defined with a percentile response time goal. For service class periods with an average or percentile response time goal, the WLMGL report displays a tabular and graphical response time distribution with merged response times from all systems in the sysplex.
Figure 221 on page 448 shows a report for service class CICSL0W with subsystem delay data included, where the first period is defined with a percentile response time goal.

Note: For transaction service classes of subsystem work managers, like CICS or IMS, no service consumption and execution delays are reported. This data is reported with the service classes for the regions.
Service Class report

To request this report, specify:

SYSRPTS(WLMGL(SCLASS(service_class)))

For example, to produce the report shown in Figure 222 on page 449 specify:

SYSRPTS(WLMGL(SCLASS(STCLOW)))

The report can contain an additional part SERVICE CLASSES BEING SERVED if address spaces in the service class in this report are doing work for transactions that were classified to a another service class.
**Workload Group report**

To request this report, specify:

```plaintext
SYSRPTS(WLMGL(WGROUP(workload_group)))
```

For example, to produce the report for a workload group called OMVS_WLD, specify:

```plaintext
SYSRPTS(WLMGL(WGROUP(OMVS_WLD)))
```

The report has the same layout as a Service Class report, but all service classes associated with the workload OMVS_WLD are combined in a workload summary.

**Workload Group and Service Class Period report**

To request this report, specify:

```plaintext
SYSRPTS(WLMGL(WGPER(workload_group)))
```

Each service class associated with the specified workload group is listed with its service class periods and the defined and achieved GOALS for the periods.

For example, to produce the report for a workload group called STC_WLD with its associated service classes STCHIGH and STCLOW, specify:

```plaintext
SYSRPTS(WLMGL(WGPER(STC_WLD)))
```
### Policy Summary report

To request this report, specify:
```
SYSRPTS(WLMGL(POLICY(policy)))
```

For example, to produce a report for a policy named HOLIDAY, specify:
```
SYSRPTS(WLMGL(POLICY(HOLIDAY)))
```

Except for the separation line, a Policy Summary report has the same layout as the Workload Group report, and combines all workload groups associated to the policy.

### Report Class report

To request this report, specify:
```
SYSRPTS(WLMGL(RCLASS(report_class)))
```

For example, to produce a report for a report class called BATCH, specify:
```
SYSRPTS(WLMGL(RCLASS(BATCH)))
```
Optionally, classification rules can assign incoming work to a report class. Report classes are for additional reporting data, across service classes, or for monitoring special work.

The report has nearly the same contents as the Service Class report, just the workload group name cannot be associated to a report class and is therefore not reported.

**Report Class Period report**

To request this report, specify:

```
SYSRPTS(WLMGL(RCPER(report_class))
```

The report has nearly the same contents as the Service Class Period report, but reporting of subsystem delays and response time distribution data is possible only for homogeneous report class periods.

All goal-related data in the report is based on the corresponding service class period.

A report class period is called **homogeneous** if all its transactions are being assigned to the same service class period.

**Example:** You classify all TSO users to run in service class TSOPROD and distinguish the departments for reporting purposes in report classes TSODEPTA, TSODEPTB, and TSODEPTC. This definition done in the WLM application creates homogeneous report classes.

All other report class periods are called **heterogeneous**.

**Service Policy page**

The Service Policy page is created automatically for each interval. This page contains the following information:

- Information about the installation of the service definition
- Service definition coefficients and normalization factors for special purpose processors
- Information about each system, including the system ID, parmlib member suffix, service units/second, effective capacity percentage, and the interval start time and length
- Resource group definitions
- Resource group actuals for each service class

This page is always included at the end of an interval.
### Field descriptions for all reports

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRITICAL</td>
<td>This indication reports on the specification in the service policy, not whether SRM is using or ignoring it. This information can be found in Monitor II (ARD report) and in Monitor III (for example, DELAY report).</td>
</tr>
<tr>
<td></td>
<td>CPU</td>
</tr>
<tr>
<td></td>
<td>STORAGE</td>
</tr>
<tr>
<td></td>
<td>STORAGE + CPU</td>
</tr>
<tr>
<td></td>
<td>NONE</td>
</tr>
<tr>
<td>I/O PRIORITY GROUP=HIGH</td>
<td>This indication is reported for service classes assigned to I/O priority group HIGH in the active service policy.</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Meaning</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
</tr>
<tr>
<td>TRANSACTIONS</td>
<td>Number of transactions.</td>
</tr>
<tr>
<td>AVG</td>
<td>The average number of active transactions during the interval including independent enclaves. On a period level, this is the transaction active time for the single period, divided by the RMF interval time. Otherwise, it is the sum of the transaction active time for all summarized periods, divided by the RMF interval time. To get the average number of transactions related to active address spaces, subtract AVG ENC from AVG.</td>
</tr>
<tr>
<td>MPL</td>
<td>The average number of transactions resident in central storage during the interval. On a period level, it is the transaction residency time for a single period, divided by the RMF interval time. Otherwise, it is the sum of the transaction residency time for all summarized periods, divided by the RMF interval time. To get the average number of transactions related to resident address spaces, subtract AVG ENC from MPL.</td>
</tr>
<tr>
<td>ENDED</td>
<td>The number of transactions that ended during the interval. On a period level, this is the number of transactions that ended during that period. Otherwise, it is the total number of transactions that ended for all the summarized periods.</td>
</tr>
<tr>
<td>END/S</td>
<td>The number of transactions that ended per second.</td>
</tr>
<tr>
<td>#SWAPS</td>
<td>The total number of swaps. On a period level it is the number of swaps occurred during the single period. Otherwise, it is the sum of the number of SWAPS that occurred during all summarized periods.</td>
</tr>
<tr>
<td>EXCTD</td>
<td>Count of times a subsystem work manager reported that an execution phase has completed. A single transaction could have zero or more execution phases.</td>
</tr>
<tr>
<td>AVG ENC</td>
<td>The average number of independent enclaves during the interval. From a sysplex scope, this is the sum of active time for enclaves that originated on the respective system either for the single period or for all summarized periods divided by the RMF interval time.</td>
</tr>
<tr>
<td>REM ENC</td>
<td>The average number of foreign enclaves during the interval. From a sysplex scope, this is the sum of active time for enclaves that originated on a remote system in the sysplex, but are executing on the respective system either for the single period or for all summarized periods divided by the RMF interval time.</td>
</tr>
<tr>
<td>MS ENC</td>
<td>Average number of multi-system enclaves during the interval. From a sysplex scope, this is the sum of active time for enclaves that originated on the respective system and are executing on one or more remote systems in the sysplex in parallel either for the single period or for all summarized periods divided by the RMF interval time.</td>
</tr>
</tbody>
</table>
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANS.-TIME</td>
<td>Transaction time in HHH.MM.SS.TTT units. All times are reported in the period the transaction ended. The time a job was delayed due to TYPRUN=HOLD or TYPRUN=JCLHOLD is NOT included in any of the transaction times.</td>
</tr>
<tr>
<td>ACTUAL</td>
<td>The actual amount of time required to complete the work submitted under the service class. This is the total response time including EXECUTION, QUEUED, R/S AFFIN, and INELIGIBLE.</td>
</tr>
<tr>
<td>EXECUTION</td>
<td>The average execution time of ended transactions.</td>
</tr>
<tr>
<td>QUEUED</td>
<td>Average time a job was delayed for reasons other than the ones mentioned below. This field therefore basically includes the time a job was delayed for initiation. For TSO users, this can be a portion of LOGON processing. For APPC this is the time the transaction spent on an APPC queue.</td>
</tr>
<tr>
<td>R/S AFFIN</td>
<td>Average time the job was delayed due to resource or system affinity scheduling delay. This means that resource(s) required for the job to run were not available at some point while the job was queued to JES2.</td>
</tr>
<tr>
<td>INELIGIBLE</td>
<td>Average time the job was delayed due to operational delays or JES scheduling delays, examples are:</td>
</tr>
<tr>
<td></td>
<td>• Job held by operator</td>
</tr>
<tr>
<td></td>
<td>• Job class or job queue held</td>
</tr>
<tr>
<td></td>
<td>• Duplicate jobname serialization</td>
</tr>
<tr>
<td></td>
<td>• Job class execution limits</td>
</tr>
<tr>
<td>CONVERSION</td>
<td>Average time the job was delayed due to JCL conversion. Jobs held during conversion (due to affinity, HSM recall, or enqueue contention) contribute only to conversion time, not to ineligible or R/S affinity times.</td>
</tr>
<tr>
<td>STD DEV</td>
<td>Standard deviation of ACTUAL.</td>
</tr>
<tr>
<td></td>
<td>Standard deviation is a measure of variability of the data in the sample. The higher the standard deviation, the more spread out it looks on a graph.</td>
</tr>
<tr>
<td>DASD I/O</td>
<td>Information about DASD I/O activities.</td>
</tr>
<tr>
<td>SSCHRT</td>
<td>Number of start subchannels SSCH per second in the reported interval.</td>
</tr>
<tr>
<td>RESP</td>
<td>Average DASD response time (in milliseconds) of the transactions in this group. This is the sum of the average connect time (CONN), the average disconnect time (DISC), the average wait time (Q+PEND), and the IOS queue time (IOSQ).</td>
</tr>
<tr>
<td>CONN</td>
<td>Average DASD connection time of the transactions in this group, as reported by the channel measurement subsystem.</td>
</tr>
<tr>
<td>DISC</td>
<td>Average DASD disconnect time of the transactions in this group, as reported by the channel measurement subsystem.</td>
</tr>
<tr>
<td>Q+PEND</td>
<td>Average DASD wait time (queue time + pending time) of the transactions in this group. This does not include IOSQ time, as reported by the channel measurement subsystem.</td>
</tr>
<tr>
<td>IOSQ</td>
<td>Average time the transactions in this group spent on the IOS queue, based on sampled delays.</td>
</tr>
</tbody>
</table>
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SERVICE</strong></td>
<td>The service is calculated by multiplying the received service units with the appropriate service definition coefficient.</td>
</tr>
<tr>
<td>IOC</td>
<td>Total amount of input/output service received.</td>
</tr>
<tr>
<td>CPU</td>
<td>Total amount of task and preemptible-class SRB processor service received.</td>
</tr>
<tr>
<td>MSO</td>
<td>Total amount of main storage occupancy service received.</td>
</tr>
<tr>
<td>SRB</td>
<td>Total amount of non-preemptible SRB service received.</td>
</tr>
<tr>
<td>TOT</td>
<td>Sum of CPU, SRB, IOC, and MSO service.</td>
</tr>
<tr>
<td>/SEC</td>
<td>Rate at which service is provided in service units per second.</td>
</tr>
<tr>
<td><strong>ABSRPTN</strong></td>
<td>Absorption rate at which service is used while transactions are resident in main storage. This is the total service divided by the transaction residency time.</td>
</tr>
<tr>
<td><strong>TRX SERV</strong></td>
<td>Rate at which service is used by transactions that are active, but not necessarily in storage. This is the total service divided by the transaction active time.</td>
</tr>
</tbody>
</table>

**SERVICE TIME**

This category is made up of the following:

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Task and preemptible-class SRB (enclave) time in seconds consumed on general purpose and special purpose processors.</td>
</tr>
<tr>
<td>SRB</td>
<td>Service request block time in seconds.</td>
</tr>
<tr>
<td>RCT</td>
<td>Region control task time in seconds.</td>
</tr>
<tr>
<td>IIT</td>
<td>I/O interrupt time in seconds.</td>
</tr>
<tr>
<td>HST</td>
<td>Hiperspace service time in seconds.</td>
</tr>
<tr>
<td>AAP</td>
<td>zAAP service time in seconds.</td>
</tr>
<tr>
<td>IIP</td>
<td>zIIP service time in seconds.</td>
</tr>
</tbody>
</table>

**Note:**

1. If special purpose processors are running faster than general purpose processors, AAP and IIP times are not normalized.
2. Normalized AAP and IIP times are included in CPU time.
### Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>APPL%</strong></td>
<td>Percentage of the processor time used by transactions running on the different processor types. The calculation is:</td>
</tr>
</tbody>
</table>
|               | \[
|               | \quad \text{Processor time used} \]  
|               | \[
|               | \quad \text{APPL\%} = \frac{\text{Processor time used}}{\text{Interval length} \times \text{Multithreading maximum capacity factor}} \times 100  
|               | The calculation of the processor time is based on the time values displayed under field heading SERVICE TIME. |
|               | Processor time used = CPU + SRB + RCT + IIT + HST - (AAPNF * AAP) - (IIPNF * IIP)  
|               | The AAP and IIP times may be normalized to general purpose processor time from a faster zAAP or zIIP where AAPNF and IIPNF are the zAAP and zIIP normalization factors. They can be found under field heading NORM FACTORS on the POLICY page of the Workload Activity report. |
| **CP**        | Percentage of the processor time used by transactions running on general purpose processors in the service or report class period. The calculation of the processor time is based on the time values displayed under field heading SERVICE TIME. |
|               | Processor time used = CPU + SRB + RCT + IIT + HST - (AAPNF * AAP) - (IIPNF * IIP) |
|               | The AAP and IIP times may be normalized to general purpose processor time from a faster zAAP or zIIP where AAPNF and IIPNF are the zAAP and zIIP normalization factors. They can be found under field heading NORM FACTORS on the POLICY page of the Workload Activity report. |
| **AAPCP**     | Percentage of the processor time used by zAAP eligible transactions running on general purpose processors. This is a subset of APPL\% CP. |
| **IIPCP**     | Percentage of the processor time used by zIIP eligible transactions running on general purpose processors. This is a subset of APPL\% CP. |
| **AAP**       | Percentage of the processor time used by transactions executed on zAAPs in the service or report class period. |
| **IIP**       | Percentage of the processor time used by transactions executed on zIIPs in the service or report class period. |

**Notes:**

1. APPL\% shows processor utilization based on uniprocessor capacity. This means that the values can exceed 100% in systems with more than one processor.
2. If the multithreading mode is set to 1, a multithreading maximum capacity factor of 1 is used for the APPL\% calculation.
3. The interval length in a sysplex is the common interval length.
4. In a sysplex, the values for seconds and CPU time percentages are meaningful only if all processors have the same speed and the multithreading mode is the same on all systems. You can use the SYSRPTS WLMGL SYSNAM option to select only a subset of the systems to be included in the report.
5. AAPCP or IIPCP may report values greater than zero even if no special purpose processors are configured or if they are varied offline, because the PROJECTCPU option is specified in the active IEAOPT Parmlib member. This information can be used to understand the benefit of adding special purpose processors to your system.

<table>
<thead>
<tr>
<th><strong>PROMOTED</strong></th>
<th>CPU time in seconds that transactions in this group were running at a promoted dispatching priority, separated by the reason for the promotion:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BLK</strong></td>
<td>CPU time in seconds consumed while the dispatching priority of work with low importance was temporarily raised to help blocked workloads</td>
</tr>
<tr>
<td><strong>ENQ</strong></td>
<td>CPU time in seconds consumed while the dispatching priority was temporarily raised by enqueue management because the work held a resource that other work needed.</td>
</tr>
<tr>
<td><strong>CRM</strong></td>
<td>CPU time in seconds consumed while the dispatching priority was temporarily raised by chronic resource contention management because the work held a resource that other work needed.</td>
</tr>
<tr>
<td><strong>LCK</strong></td>
<td>In HiperDispatch mode, the CPU time in seconds consumed while the dispatching priority was temporarily raised to shorten the lock hold time of a local suspend lock held by the work unit.</td>
</tr>
<tr>
<td><strong>SUP</strong></td>
<td>CPU time in seconds consumed while the dispatching priority for a work unit was temporarily raised by the z/OS supervisor to a higher dispatching priority than assigned by WLM.</td>
</tr>
</tbody>
</table>
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE</td>
<td>Amount of storage frames.</td>
</tr>
<tr>
<td>AVG</td>
<td>Weighted average number of central and expanded storage frames allocated to active ASIDs. This value is the sum of the number of central and expanded frames weighted by the transaction residency time for each active ASID, divided by the total transaction residency time. Note: Enclave transaction residency or active time is not included in the calculation of this value.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Total number of central and expanded storage frames allocated to resident ASIDs. This value is the sum of the total number of central and expanded frames weighted by the transaction residency time for each active ASID, divided by the RMF interval time.</td>
</tr>
<tr>
<td>SHARED</td>
<td>Total number of shared storage pages allocated to resident ASIDs.</td>
</tr>
</tbody>
</table>

**PAGE-IN RATES**

| SINGLE          | The average rate at which pages are read into central storage while transactions are resident in central storage. On a single period level this is the total number of page-ins during the period, divided by transaction residency time. For all other levels it is the sum of the total number of page-ins for all periods summarized, divided by the sum of the transaction residency time for all periods being summarized. |
| BLOCK           | Rate of demand page-ins from DASD for blocked pages, expressed in pages per seconds.                                                |
| SHARED          | Rate of shared storage page-ins                                                                                                       |
| HSP             | Rate of standard hiperspace pages read into central storage from auxiliary storage. Note: Enclave transaction residency time is not included in the calculation of these values because there is no paging on behalf of enclaves. |

**Service Classes being Served**

<table>
<thead>
<tr>
<th>SERVICE CLASSES BEING SERVED</th>
<th>This section is only available if address spaces are doing work for transactions that were classified to another service class. The name of each service class being served by the reported service class (see name in the separation line) is displayed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUB TYPE</td>
<td>The name (for example CICS or IMS) represents the subsystem type (4 characters) as used in the classification rules in the WLM administration application. The subsystem’s documentation should explain the meaning that product attributes to the specific states.</td>
</tr>
<tr>
<td>P</td>
<td>The phase identified as <strong>BTE</strong> indicates the representation of the states incurred in the begin-to-end phase of a transaction <strong>EXE</strong> indicates the representation of the states incurred in the execution phase of a transaction.</td>
</tr>
<tr>
<td>RESP TIME (%)</td>
<td>The transaction response time percentage in either the <strong>BEGIN-TO-END</strong> phase, or the <strong>EXECUTION</strong> phase.</td>
</tr>
<tr>
<td>STATE SAMPLES BREAKDOWN (%)</td>
<td>Identifies the percentages of samples that a transaction has been detected in the reported states.</td>
</tr>
<tr>
<td>ACTIVE SUB</td>
<td>The active subsystem state sample percentage. Active indicates that there is a program executing on behalf of the work request from the perspective of the work manager. This does not mean that the program is active from the BCP’s perspective.</td>
</tr>
<tr>
<td>ACTIVE APPL</td>
<td>The active application state sample percentage in contrast to the active subsystem state sample percentage. This allows a subsystem to differentiate between work requests processed by the subsystem itself (ACTIVE SUB) and work requests processed by an application invoked by the subsystem.</td>
</tr>
<tr>
<td>READY</td>
<td>The ready state sample percentage. Ready indicates that there is a program ready to execute on behalf of the work request described by the monitoring environment, but the work manager has given priority to another work request.</td>
</tr>
<tr>
<td>IDLE</td>
<td>The idle state sample percentage. Idle indicates that no work request (or transaction) is allowed to run.</td>
</tr>
</tbody>
</table>
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| STATE SAMPLES BREAKDOWN (%) - WAITING FOR | STATE SAMPLES BREAKDOWN (%) - continued.  
This category presents up to fifteen named delay reason states having the highest non-zero values. These are sorted by the sum of the BTE and EXE rows in each column. The values of the remaining less important states will be accumulated, if applicable, and presented as delay reason OTHR.  
Here is a list explaining the delay reasons.  
LOCK waiting for lock.  
I/O waiting for I/O indicates that the work manager is waiting on an activity related to an I/O request. This may either be an actual I/O operation or some function associated with an I/O request.  
CONV waiting for conversation could have been used in conjunction with IWMMSWCH to identify where the target is located.  
DIST waiting for distributed request indicates at a high level that some function or data must be routed prior to resumption of the work request. This is to be contrasted with ‘waiting on conversation’, which is a low level view of the precise resource that is needed. A distributed request could involve ‘waiting on conversation’ as part of its processing.  
LOCL waiting for a session to be established locally, for example, on the current MVS image.  
SYSP waiting for a session to be established somewhere in the sysplex.  
REMT waiting for a session to be established somewhere in the network.  
TIME waiting for timer.  
LTCH waiting for a latch.  
PROD waiting for another product.  
MISC waiting for unidentified resource, possibly among another specific category, but which may not be readily determined.  
SSLT waiting for an SSL thread.  
REGT waiting for a regular thread.  
WORK waiting for registration to a work table.  
BPMI waiting for I/O resulting from a DB2 buffer pool miss.  
TYPn/TYnn The generic delay state defined by the subsystem (possible values: TYP1 - TYP9 and TY10 - TY15). If the subsystem uses the WLM service IWM4MGDD (Define Descriptions for Generic Delay States) to provide a description for a generic delay state, RMF displays a legend with the delay state description. If the subsystem did not use the IWM4MGDD service, the legend is omitted. For further explanation of the generic delay state types please refer to the subsystem documentation. |
| STATE SWITCHED SAMPL(%)                | Subsystem state samples - continued  
LOCAL State representing transactions for which there are logical continuations on this MVS image. Subsystems might set this state when they function ship a transaction to another component within the same MVS image.  
SYSP State representing transactions for which there are logical continuations on another MVS image in the sysplex. Subsystems might set this state when they function ship a transaction to another component on another image in the sysplex.  
REMT State representing transactions for which there are logical continuations somewhere within the network. Subsystems might set this state when they function ship a transaction to another component within the network. |

Service or Report Class period: goal and actual values

If measurement data for systems in a sysplex is available, this section starts with an *ALL line showing the average or cumulated values for the sysplex. The *ALL line is followed by one line for each system.
### Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOAL</td>
<td>This line shows the goal specified in the WLM service policy for a service class period. For information about available goal types refer to <a href="https://www.ibm.com/support/knowledgecenter/S55GUH_6.1.0/com.ibm.zos.doc/rf_wlmsvcpln.htm">z/OS MVS Planning: Workload Management</a>. In a report for a homogeneous report class period, the goal of the corresponding service class period is printed. For heterogeneous report class periods, N/A is printed.</td>
</tr>
<tr>
<td>VEL MIGRATION</td>
<td>The following two values are only provided for periods with an execution velocity goal:</td>
</tr>
<tr>
<td>I/O MGMT</td>
<td>I/O Priority Management</td>
</tr>
<tr>
<td></td>
<td>Value of achieved execution velocity including I/O using and delay samples. If WLM I/O delay management is enabled in the service definition, this value matches EX VEL%. Otherwise, this is the value that would be observed if WLM I/O management were enabled and no other changes that would affect the execution velocity calculation were made. You see your current definition in the Service Policy page (see Figure 224 on page 452).</td>
</tr>
<tr>
<td>INIT MGMT</td>
<td>Initiator Management</td>
</tr>
<tr>
<td></td>
<td>Value of achieved execution velocity including batch initiator delay samples. If WLM batch initiator management is enabled in the service definition, this value matches EX VEL%. Otherwise, this is the value that would be observed if WLM batch initiator management were enabled and no other changes that would affect the execution velocity calculation were made. You find a description of these delays in this table for the field TRANS.-TIME.</td>
</tr>
<tr>
<td>RESPONSE TIME</td>
<td>This column either shows:</td>
</tr>
<tr>
<td></td>
<td>• for an AVG response time goal: the measured average response times</td>
</tr>
<tr>
<td></td>
<td>• for a percentile response time goal: the percentages of the transactions that met the response time goal</td>
</tr>
<tr>
<td></td>
<td>• for an execution velocity goal, a system or a discretionary goal: N/A</td>
</tr>
<tr>
<td></td>
<td>• for heterogeneous report class periods: N/A</td>
</tr>
<tr>
<td>EX VEL %</td>
<td>The execution velocity measures the portion of the acceptable processor and storage delays relative to the total execution time. For details about the execution velocity, see &quot;Common Monitor III report measurements&quot; on page 12.</td>
</tr>
<tr>
<td>PERF INDX</td>
<td>The performance index for a period represents how close a period came to reaching the goal (PI is 1.0 if goal is reached), and how much this period suffered versus its goal. See Table 79 on page 187 for more details about the performance index.</td>
</tr>
<tr>
<td>AVG ADRSP</td>
<td>Average number of address spaces and enclaves that contributed delay and using samples to this class.</td>
</tr>
<tr>
<td>EXEC USING%</td>
<td>The following using samples are measured as percentages of the total samples:</td>
</tr>
<tr>
<td>CPU</td>
<td>Standard CP using samples. This value includes using samples of zAAP and zIIP work executing on general purpose processors (standard CPs).</td>
</tr>
<tr>
<td>AAP</td>
<td>zAAP using samples.</td>
</tr>
<tr>
<td>IIP</td>
<td>zIIP using samples.</td>
</tr>
<tr>
<td>I/O</td>
<td>I/O using samples.</td>
</tr>
<tr>
<td>Note:</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Use the APCUSGP (AAP on CP Using%) overview condition to retrieve the using samples of zAAP work executing on general purpose processors (standard CPs).</td>
</tr>
<tr>
<td>2.</td>
<td>Use the IPCUSGP (IIP on CP Using%) overview condition to retrieve the using samples of zIIP work executing on standard CPs.</td>
</tr>
</tbody>
</table>
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXEC DELAYS %</td>
<td>General execution delays included in TOT (total). Each dispatchable unit sampled can increase one of the CPU or paging delay samples. Besides the TOT value, only the seven highest values contributing to TOT will be shown. The remaining less important values will be accumulated and presented as OTH.</td>
</tr>
<tr>
<td>TOT</td>
<td>Total delay used by SRM in its execution velocity calculation.</td>
</tr>
<tr>
<td>CPU</td>
<td>CPU delay. A TCB or SRB is waiting to be dispatched (other than the first in-line behind sampler), or a TCB is waiting for a LOCAL lock.</td>
</tr>
<tr>
<td>AAP</td>
<td>zAAP-eligible work is delayed because it is waiting for a processor that can run zAAP work.</td>
</tr>
<tr>
<td>IIP</td>
<td>zIIP-eligible work is delayed because it is waiting for a processor that can run zIIP work.</td>
</tr>
<tr>
<td>I/O</td>
<td>I/O delay. A TCB or SRB has initiated an I/O request that is delayed obtaining a path to the device. This includes IOSQ and Q+PEND components (see “CONN” on page 454 for a description). Note: It depends on the definition in WLM whether this value is part of the TOTAL value or not, by default it is not contained in TOTAL.</td>
</tr>
<tr>
<td>CAP</td>
<td>CPU capping delay. A TCB or SRB is marked non-dispatchable because</td>
</tr>
<tr>
<td></td>
<td>• a resource group maximum is being enforced</td>
</tr>
<tr>
<td></td>
<td>• or because of discretionary goal management. That is, if certain types of work are overachieving their goals, that work may be capped so that the resources may be diverted to run discretionary work (see also section ‘Using Discretionary Goals’ in z/OS MVS Planning: Workload Management).</td>
</tr>
<tr>
<td></td>
<td>This value is NOT part of the CPU delay.</td>
</tr>
<tr>
<td>SIN</td>
<td>Swap-In delay. Swap-In has started but not completed.</td>
</tr>
<tr>
<td>MPL</td>
<td>MPL delay. Ready but swap-in has not started.</td>
</tr>
<tr>
<td>Q MPL</td>
<td>Queue MPL - work is waiting for a server address space or batch initiator.</td>
</tr>
<tr>
<td>SRV PRV</td>
<td>Private area paging delay for a server address space.</td>
</tr>
<tr>
<td>SRV VIO</td>
<td>VIO paging delay for a server address space.</td>
</tr>
<tr>
<td>SRV SHS</td>
<td>Hiperspace paging delay for a server address space.</td>
</tr>
<tr>
<td>SRV SIN</td>
<td>Swap-in delay for a server address space.</td>
</tr>
<tr>
<td>SRV MPL</td>
<td>MPL delay for a server address space.</td>
</tr>
<tr>
<td>AUX PRV</td>
<td>Auxiliary paging from private.</td>
</tr>
<tr>
<td>AUX COM</td>
<td>Auxiliary paging from common.</td>
</tr>
<tr>
<td>AUX XME</td>
<td>Auxiliary paging from cross memory.</td>
</tr>
<tr>
<td>AUX VIO</td>
<td>Auxiliary paging from VIO.</td>
</tr>
<tr>
<td>AUX SHS</td>
<td>Auxiliary paging from standard hiperspaces.</td>
</tr>
<tr>
<td>AUX EHS</td>
<td>Auxiliary paging from ESO hiperspaces (a page being read was not in the ESO hiperspace, it has to be read from DASD by the program managing the hiperspace).</td>
</tr>
<tr>
<td>USING%</td>
<td>Percentage of using states:</td>
</tr>
<tr>
<td>CRY</td>
<td>Crypto using state — a TCB or SRB was found to be using a cryptographic asynchronous message processor (CAP) or an adjunct processor (AP).</td>
</tr>
<tr>
<td>CNT</td>
<td>Contention using state - work is holding resources.</td>
</tr>
</tbody>
</table>
### Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DELAY %</strong></td>
<td>The following states are NOT included in the TOTAL EXECUTION DELAYS.</td>
</tr>
<tr>
<td><strong>UNK</strong></td>
<td>State is unknown. The address space or enclave was not found to be using or delayed for any sampled resource, but z/OS has not been notified that it is idle.</td>
</tr>
<tr>
<td><strong>IDL</strong></td>
<td>Idle state. Work is in STIMER wait, TSO terminal wait, APPC wait, OMVS input or output wait, or an initiator is waiting for work.</td>
</tr>
<tr>
<td><strong>CRY</strong></td>
<td>Crypto delay state — a TCB or SRB was found to be waiting for a CAP, an AP or a processor feature queue.</td>
</tr>
<tr>
<td><strong>CNT</strong></td>
<td>Contention delay state - work is waiting for resources.</td>
</tr>
<tr>
<td><strong>% QUI</strong></td>
<td>Quiesce state. Some work in this period has been RESET with the QUIESCE keyword. This is the percentage of address spaces and enclaves quiesced during the reporting interval.</td>
</tr>
</tbody>
</table>

**RESPONSE TIME DISTRIBUTION (for service/report class periods with a response time goal only)**

WLM maintains counts of how many transactions were completed within a particular time.

The response time goal defined for each service class period is split into 14 response time buckets where:

- bucket 1 covers the gap from 0 to half the goal
- buckets 2 to 11 cover the gap between half the goal to 1.5 times the goal evenly divided
- bucket 12 covers two times the goal
- bucket 13 covers four times the goal
- bucket 14 covers the gap from four times the goal to infinity

The chart presents the sysplex-wide view on the:

- number of total (ended) transactions,
- response time,
- number of total (ended) transactions in percent,
- and a graphical illustration of the percentage.

**TIME**

Response time associated to this bucket.

**NUMBER OF TRANSACTIONS**

Number of transactions that completed for this period.

- **CUM TOTAL** Cumulative number of transactions so far
- **IN BUCKET** Number of transactions in this bucket

**PERCENT**

Percentage

- **CUM TOTAL** Cumulative percentage of transactions so far
- **IN BUCKET** Percentage of transactions associated to the bucket

**Percent Scale**

Graphical presentation of each bucket
Table 196. Fields in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| RESPONSE TIME DISTRIBUTIONS (for service/report class periods with an execution velocity goal only) | WLM maintains counts of how many transactions were completed within a particular time. The average of all response times (midpoint) measured for each service/report class period is split into 14 response time buckets where:  
  - bucket 1 covers the gap from 0 to half the midpoint  
  - buckets 2 to 11 cover the gap between half to 1.5 times the midpoint evenly divided  
  - bucket 12 covers two times the midpoint  
  - bucket 13 covers four times the midpoint  
  - bucket 14 covers the gap from four times the midpoint to infinity  
For each system in the sysplex, the report presents a tabular representation of:  
  - the number of total (ended) transactions  
  - the response time  
  - the number of total (ended) transactions in percent. |
| SYSTEM | System Name |
| INTERVAL | Measurement interval (Time since last midpoint change) |
| MRT CHANGES | Number of midpoint changes during the SMF interval |
| TIME | Response time associated to this bucket |
| NUMBER OF TRANSACTIONS | Number of transactions that completed for this period |
| CUM TOTAL | Cumulative number of transactions so far |
| IN BUCKET | Number of transactions in this bucket |
| PERCENT | Percentage |
| CUM TOTAL | Cumulative percentage of transactions so far |
| IN BUCKET | Percentage of transactions associated to the bucket |

Table 197. Fields in the WLMGL Report - POLICY

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVICE DEFINITION</td>
<td>Service definition name and description. The service definition includes defined goals for each of the service classes in the workload.</td>
</tr>
<tr>
<td>INSTALL DATE</td>
<td>Service definition installation date and time.</td>
</tr>
<tr>
<td>INSTALLED BY</td>
<td>Userid and system name that last installed this service definition.</td>
</tr>
</tbody>
</table>
| SERVICE DEFINITION COEFFICIENTS | Service definitions coefficients as defined in the service policy to determine the:  
  - IOC: Number of countable EXCP instructions.  
  - CPU: Task processor time.  
  - SRB: SRB processor time.  
  - MSO: Approximate storage use for each service class period. |
| NORM FACTORS | Normalization factors for special purpose processors:  
  - AAP: Normalization factor for zAAP. Multiply zAAP service times or service units with this value to calculate the CP equivalent value.  
  - IIP: Normalization factor for zIIP. Multiply zIIP service times or service units with this value to calculate the CP equivalent value. |
| POLICY | Policy name and description. |
Table 197. Fields in the WLMGL Report - POLICY (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O PRIORITY MANAGEMENT</td>
<td><strong>YES</strong> Workload management dynamically manages I/O priorities based on service class goals and importance. Workload management also includes I/O delays in the calculation of execution velocity. I/O priorities are the same as dispatching priorities. <strong>NO</strong> I/O priorities are the same as dispatching priorities.</td>
</tr>
<tr>
<td>DYNAMIC ALIAS MANAGEMENT</td>
<td><strong>YES</strong> if WLM dynamic management of parallel access volumes is active, otherwise <strong>NO</strong>.</td>
</tr>
<tr>
<td>SYSTEMS</td>
<td>The system names contributing to the sysplex report.</td>
</tr>
<tr>
<td>ID</td>
<td>System name.</td>
</tr>
<tr>
<td>OPT</td>
<td>IEAOPTxx Parmlib member suffix (parameter description that control resource and workload management algorithms in the system resources manager).</td>
</tr>
<tr>
<td>SU/SEC</td>
<td>Nominal capacity rating in service units per second per online CPU.</td>
</tr>
<tr>
<td>CAP%</td>
<td>Percentage of effective capacity available to the CPU. The value is 100, if the machine is working at its full nominal capacity. If the machine is working in power-save mode or cycle-steering mode, the value is less than 100. If the nominal or effective processor capacity cannot be determined, <strong>N/A</strong> is reported.</td>
</tr>
<tr>
<td>TIME</td>
<td>Begin time of the interval for this system.</td>
</tr>
<tr>
<td>INTERVAL</td>
<td>Interval length for this system in HH.MM.SS.</td>
</tr>
<tr>
<td>RESOURCE GROUPS</td>
<td>A resource group is an amount of processor capacity across one or more MVS systems. The report includes resource group name and description as:</td>
</tr>
<tr>
<td>NAME</td>
<td>Resource group name.</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Resource group name description.</td>
</tr>
<tr>
<td>SERVICE CLASS</td>
<td>Service class name associated with this RESOURCE GROUP.</td>
</tr>
<tr>
<td>ACTUAL SUs CONSUMED</td>
<td>Unweighted CPU and SRB service units consumed per second by all service classes in the resource group.</td>
</tr>
<tr>
<td></td>
<td>Unweighted CPU and SRB service units consumed per second by each service class.</td>
</tr>
<tr>
<td>Note:</td>
<td>The reported service units do not include service units consumed on zAAPs or zIIPs.</td>
</tr>
<tr>
<td>CAPACITY</td>
<td>Resource group capacity limits.</td>
</tr>
<tr>
<td>MIN</td>
<td>Minimum amount of service that the resource group should receive if demand exists.</td>
</tr>
<tr>
<td>MAX</td>
<td>Maximum amount of service that the resource group should be allowed to consume.</td>
</tr>
<tr>
<td>DEFINED AS</td>
<td>The method how the resource group’s capacity is defined:</td>
</tr>
<tr>
<td></td>
<td>• SERVICE UNITS: in unweighted CPU and SRB service units across the sysplex</td>
</tr>
<tr>
<td></td>
<td>• % LPAR SHARE: as percentage of the LPAR share (scope of the resource group is system-wide)</td>
</tr>
<tr>
<td></td>
<td>• NUMBER OF CPs: as number of CPs (scope of the resource group is system-wide).</td>
</tr>
</tbody>
</table>

Spreadsheet and Overview reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the [z/OS RMF User’s Guide](#). The following table shows the exception and overview condition names for the Overview report.

Chapter 5. Long-term overview reporting with the Postprocessor 463
### Table 198: Exception and Overview names in the Workload Activity Report

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRANSACTIONS</strong> -</td>
<td></td>
</tr>
<tr>
<td>- AVG</td>
<td>TRANSAVG</td>
</tr>
<tr>
<td>- MPL</td>
<td>TRANSMPL</td>
</tr>
<tr>
<td>- ENDED</td>
<td>TRANSTOT</td>
</tr>
<tr>
<td>- END/S</td>
<td>TRANS</td>
</tr>
<tr>
<td>- #SWAPS</td>
<td>SPERTRA</td>
</tr>
<tr>
<td>- AVG ENC</td>
<td>ENCAVG</td>
</tr>
<tr>
<td>- REM ENC</td>
<td>ENCREM</td>
</tr>
<tr>
<td>- MS ENC</td>
<td>ENCMS</td>
</tr>
<tr>
<td><strong>TRANSACTION TIME</strong> -</td>
<td></td>
</tr>
<tr>
<td>- ACTUAL</td>
<td>RTIMETOT</td>
</tr>
<tr>
<td>- EXECUTION</td>
<td>RTIME</td>
</tr>
<tr>
<td>- QUEUED</td>
<td>RTIMEQUE</td>
</tr>
<tr>
<td>- R/S AFFIN</td>
<td>TRANSADT</td>
</tr>
<tr>
<td>- INELIGIBLE</td>
<td>TRANSIQT</td>
</tr>
<tr>
<td>- CONVERSION</td>
<td>TRANSCVT</td>
</tr>
<tr>
<td><strong>DASD I/O</strong> -</td>
<td></td>
</tr>
<tr>
<td>- SSCHRT</td>
<td>SSCHRT</td>
</tr>
<tr>
<td>- RESP</td>
<td>RESP</td>
</tr>
<tr>
<td>- CONN</td>
<td>CONN</td>
</tr>
<tr>
<td>- DISC</td>
<td>DISC</td>
</tr>
<tr>
<td>- Q+PEND</td>
<td>QPEND</td>
</tr>
<tr>
<td>- IOSQ</td>
<td>IOSQ</td>
</tr>
<tr>
<td><strong>SERVICE</strong> -</td>
<td></td>
</tr>
<tr>
<td>- IOC</td>
<td>IOSRV</td>
</tr>
<tr>
<td>- CPU</td>
<td>CPUSRV</td>
</tr>
<tr>
<td>- MSO</td>
<td>MSOSRV</td>
</tr>
<tr>
<td>- SRB</td>
<td>SRBSRV</td>
</tr>
<tr>
<td>- TOT</td>
<td>TOTSRV</td>
</tr>
<tr>
<td>- ABSRPTN</td>
<td>ABSRPTN</td>
</tr>
<tr>
<td>- TRX SERV</td>
<td>TRXSERV</td>
</tr>
<tr>
<td><strong>SERVICE TIME</strong> -</td>
<td></td>
</tr>
<tr>
<td>- CPU</td>
<td>TCBSEC/TCBPER</td>
</tr>
<tr>
<td>- SRB</td>
<td>SRBSEC/SRBPER</td>
</tr>
<tr>
<td>- RCT</td>
<td>RCTSEC</td>
</tr>
<tr>
<td>- IIT</td>
<td>IITSEC</td>
</tr>
<tr>
<td>- HST</td>
<td>HSTSEC</td>
</tr>
<tr>
<td>- AAP</td>
<td>AAPSEC/AAPNSEC</td>
</tr>
<tr>
<td>- IIP</td>
<td>IIPSEC/IIPNSEC</td>
</tr>
<tr>
<td><strong>PROMOTED</strong> -</td>
<td></td>
</tr>
<tr>
<td>- BLK</td>
<td>PROMSEC/PROMPER</td>
</tr>
<tr>
<td>- ENQ</td>
<td>EPROMSEC/EPROMPER</td>
</tr>
<tr>
<td>- CRM</td>
<td>CPROMSEC/CPROMPER</td>
</tr>
<tr>
<td>- LCK</td>
<td>LPROMSEC/LPROMPER</td>
</tr>
</tbody>
</table>
Table 198. Exception and Overview names in the Workload Activity Report (continued)

<table>
<thead>
<tr>
<th>Field Heading or Meaning</th>
<th>Overview Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>- SUP</td>
<td>SPROMSEC/SPROMPER</td>
</tr>
<tr>
<td>APPL %</td>
<td></td>
</tr>
<tr>
<td>- CP</td>
<td>APPLSEC/APPLPER</td>
</tr>
<tr>
<td>- AAPCP</td>
<td>APPLIFCP/APPLAPCP</td>
</tr>
<tr>
<td>- IIPCP</td>
<td>APPLIPCP</td>
</tr>
<tr>
<td>- AAP</td>
<td>APPLAAP</td>
</tr>
<tr>
<td>- IIP</td>
<td>APPLIIP</td>
</tr>
<tr>
<td>- AAP time on general purpose processors</td>
<td>AAPCPSEC</td>
</tr>
<tr>
<td>- Total number of EXCPs</td>
<td>EXCP</td>
</tr>
<tr>
<td>- EXCP rate</td>
<td>EXCPRT</td>
</tr>
<tr>
<td>STORAGE -</td>
<td></td>
</tr>
<tr>
<td>- TOTAL</td>
<td>STOTOT</td>
</tr>
<tr>
<td>- CENTRAL</td>
<td>STOCEN</td>
</tr>
<tr>
<td>- SHARED</td>
<td>STOSHR</td>
</tr>
<tr>
<td>PAGE-IN RATES -</td>
<td></td>
</tr>
<tr>
<td>- SINGLE</td>
<td>SINGLE</td>
</tr>
<tr>
<td>- BLOCK</td>
<td>BLOCK</td>
</tr>
<tr>
<td>- SHARED</td>
<td>SHARED</td>
</tr>
<tr>
<td>- HSP</td>
<td>HSP</td>
</tr>
<tr>
<td>EX VEL %</td>
<td>EXVEL</td>
</tr>
<tr>
<td>PERF INDEX</td>
<td>PI</td>
</tr>
<tr>
<td>USING% -</td>
<td></td>
</tr>
<tr>
<td>- CPU</td>
<td>CPUUSGP</td>
</tr>
<tr>
<td>- AAP</td>
<td>AAPUSGP</td>
</tr>
<tr>
<td>- IIP</td>
<td>IIPUSGP</td>
</tr>
<tr>
<td>- I/O</td>
<td>IOUSGP</td>
</tr>
<tr>
<td>- AAP on CP</td>
<td>APCUSGP</td>
</tr>
<tr>
<td>- IIP on CP</td>
<td>IPCUSGP</td>
</tr>
<tr>
<td>EXECUTION DELAYS % -</td>
<td></td>
</tr>
<tr>
<td>- CPU</td>
<td>CPUDLYP</td>
</tr>
<tr>
<td>- AAP</td>
<td>AAPDLYP</td>
</tr>
<tr>
<td>- IIP</td>
<td>IIPDLYP</td>
</tr>
<tr>
<td>- I/O</td>
<td>IODLYP</td>
</tr>
<tr>
<td>- CAPP</td>
<td>CAPP</td>
</tr>
<tr>
<td>- SWIN</td>
<td>SWINP</td>
</tr>
<tr>
<td>- MPL</td>
<td>MPLP</td>
</tr>
<tr>
<td>- QMPL</td>
<td>QUEUEP</td>
</tr>
<tr>
<td>- Total Server Delays</td>
<td>SERVP</td>
</tr>
<tr>
<td>- Total Storage Delays</td>
<td>STOP</td>
</tr>
<tr>
<td>DLY% -</td>
<td></td>
</tr>
<tr>
<td>- UNKN</td>
<td>UNKP</td>
</tr>
<tr>
<td>- IDLE</td>
<td>IDLEP</td>
</tr>
<tr>
<td>CRYPTO% -</td>
<td></td>
</tr>
<tr>
<td>- DLY</td>
<td>CRYDLYP, CAPDLYP, APDLYP, FQDLYP</td>
</tr>
</tbody>
</table>
XCF - Cross-System Coupling Facility Activity report

The Cross-System Coupling Facility Activity report shows the XCF data from one system's processing in a sysplex. To better understand the traffic on corresponding outbound and inbound signalling paths, you might have to run RMF reports on two or more systems.

How to request this report

Monitor III gathers data for this report automatically. If you want to suppress gathering, you have to disable writing SMF record type 74.2.

To produce this report, specify

REPORTS(XCF)

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](#) in the [z/OS RMF User's Guide](#) provides all required information on how to produce and view XML reports.

Example URL for the DDS API


Contents of the report

The XCF Activity report is divided into three sections:

- XCF Usage by System
- XCF Usage by Member
- XCF Path Statistics

The **Usage by System** section gives information about messages sent to and received from each remote system in the sysplex, broken down by transport class. Use this section to check the class lengths and message buffer space parameters. For a sample of the XCF Activity Usage by System section, see [Figure 225 on page 467](#).

The **Usage by Member** section gives information about messages sent to and from each remote system, broken down by remote group and member, and summarizes messages sent and received by the local system (the local system is the system on which the data was collected) broken down by local group and member. Use this section to check message traffic loads associated with groups and members, and check for groups that are candidates to be put in their own transport classes. For a sample of the XCF Activity Usage by Member section, see [Figure 226 on page 468](#).

The **Path Statistics** section describes messages sent to and from each remote system, broken down by signalling path. Use this report to determine whether the number of XCF signalling paths are sufficient for the message traffic. For a sample of the XCF Activity Path Statistics section, see [Figure 227 on page 469](#).

**Note:** If the XCF system, path, or member becomes inactive during the RMF interval, the appropriate counters will be reinitialized. This is indicated in the report by the message *COUNTS RESET.*
Table 199. Fields in the XCF Activity Report - Usage by System

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO SYSTEM</td>
<td>The name of the system to which the messages were sent.</td>
</tr>
<tr>
<td>TRANSPORT CLASS</td>
<td>The name of the transport class used by XCF for the message transfer. There is one line in the report for each transport class for each target system. Note: If you request the XCF Activity report as a duration report, the Postprocessor inserts an * into this column, if the transport class has not been active during the complete duration interval.</td>
</tr>
<tr>
<td>BUFFER LENGTH</td>
<td>The internally defined message buffer size XCF uses for the transport class. The buffer size is the maximum length of the messages which can be contained in the buffers currently being used for this transport class.</td>
</tr>
<tr>
<td>REQ OUT</td>
<td>The total number of messages that XCF accepted for delivery to the system in the indicated transport class.</td>
</tr>
<tr>
<td>% SML</td>
<td>The percentage of messages sent that could have used a smaller BUFFER LENGTH than their defined BUFFER LENGTH.</td>
</tr>
<tr>
<td>% FIT</td>
<td>The percentage of messages sent that fit the defined BUFFER LENGTH.</td>
</tr>
<tr>
<td>% BIG</td>
<td>The percentage of messages sent that needed a BUFFER LENGTH larger than the defined BUFFER LENGTH. The value is reported as ‘&lt;1’ if the percentage is greater than 0 but rounded to 0.</td>
</tr>
<tr>
<td>% OVR</td>
<td>The percentage of BIG messages sent that suffered performance degradation. If the messages are bigger than the defined transport class BUFFER LENGTH, XCF must find a buffer large enough to contain the BIG message, thus causing overhead. If enough BIG messages are sent, XCF dynamically adjusts the BUFFER LENGTH to avoid this overhead.</td>
</tr>
<tr>
<td>ALL PATHS UNAVAIL</td>
<td>The number of messages that XCF had to migrate to a signalling path in an alternate transport class because there was no operational signalling path connected to the target system and assigned to the indicated transport class.</td>
</tr>
<tr>
<td>REQ REJECT</td>
<td>The number of requests for a message buffer that could not be satisfied due to constraints on the amount of message buffer space. This field appears under the INBOUND TO, the OUTBOUND FROM, and the LOCAL headings in the Usage by System section of the report. Under OUTBOUND FROM, it indicates the number of requests to send a message to a particular remote system that were rejected in a particular transport class. Under INBOUND TO, it indicates the number of time XCF could not get an inbound message buffer in anticipation of receiving a new message. Under LOCAL, it indicates the number of requests to send a message within the local system that were rejected in a particular transport class.</td>
</tr>
</tbody>
</table>
Table 199. Fields in the XCF Activity Report - Usage by System (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM SYSTEM</td>
<td>The name of system sending the message. There is one line in the report</td>
</tr>
<tr>
<td>REQ IN</td>
<td>For each system, the total number of messages that were received from</td>
</tr>
<tr>
<td>TRANSPORT CLASS</td>
<td>The name of the transport class that XCF uses for the message transfer.</td>
</tr>
</tbody>
</table>

Table 200. Fields in the XCF Activity Report - Usage by Member

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP</td>
<td>The group name to which this member belongs.</td>
</tr>
<tr>
<td>MEMBER</td>
<td>The member name which was sent or received.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>The system name which this member resides on.</td>
</tr>
<tr>
<td>REQ FROM</td>
<td>The number of messages sent from the local system to the indicated</td>
</tr>
<tr>
<td>REQ TO</td>
<td>The number of messages that the local system received from the indicated</td>
</tr>
<tr>
<td>REQ OUT</td>
<td>The number of messages sent by the member on the local system.</td>
</tr>
<tr>
<td>REQ IN</td>
<td>The number of messages received by the member on the local system.</td>
</tr>
</tbody>
</table>

Figure 226. XCF Activity Report - Usage by Member
<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO SYSTEM</td>
<td>The name of the system to which the messages are sent.</td>
</tr>
<tr>
<td>TYP</td>
<td>Path type</td>
</tr>
<tr>
<td>FROM/TO DEVICE, OR STRUCTURE</td>
<td>CTC: The device number of the outbound signalling path on the local system and the device number of the inbound signalling path on the remote system that could not get message buffers (for example, 1862 TO 1C62 in Figure 227).</td>
</tr>
<tr>
<td>TRANSPORT CLASS</td>
<td>The name of the transport class XCF uses for the message transfer. There is one line in the report for each transport class for each target system.</td>
</tr>
<tr>
<td>REQ OUT</td>
<td>The number of attempts made to send a message over the indicated outbound signalling path.</td>
</tr>
</tbody>
</table>
| AVG Q LNGTH    | The average number of messages queued for data transfer over each outbound signalling path. The calculation is: 
\[
\text{AVG Q LNGTH} = \frac{\text{# Message Entries for this Device}}{\text{# Samples}}
\] |
| AVAIL          | The number of times the signalling path was selected while available to immediately transfer a message. |
| BUSY           | The number of times XCF selected a signalling path while a message was already in the process of being transferred. |
| RETRY          | The number of times XCF initialized the signalling path.                |
| FROM SYSTEM    | The name of the system from which the messages are sent.                |
| FROM/TO DEVICE, OR STRUCTURE | CTC: The device number of the remote outbound signalling path whose messages may not have been transmitted in a timely manner, and the device number of the inbound path for the system collecting the data to which the outbound device is connected. |
| Req IN         | The number of requests received from the system on a path basis for each system. |
| BUFFERS UNAVAIL | The number of times that XCF was not able to get an inbound message buffer for the signalling path in anticipation of receiving a new message. |
Table 201. Fields in the XCF Activity Report - XCF Path Statistics  (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSFER TIME</td>
<td>The average I/O transfer time in milliseconds for the most recently received signals. This metric is only available for inbound paths.</td>
</tr>
</tbody>
</table>

### Exception report

An Exception report presents a summary of the values that exceeded installation-defined thresholds over a specific period of time.

### How to request this report

Exception reports are generated from data contained in SMF records built during a Monitor I or a Monitor III data gatherer session. RMF compares the threshold values specified in the exception control statements with the computed value in the appropriate SMF record field. If the threshold is exceeded, RMF writes a line in the exception report.

You define the contents by one or more EXCEPT statements (see the IBM z/OS RMF User's Guide for details), as follows:

```
EXCEPT(option)
```

### How to request this report

The scope of data that can be reported in the Overview report depends on the data being gathered by Monitor I gatherer sessions.

You define the contents by one or more OVW statements (see the IBM z/OS RMF User's Guide for details), as follows:

```
OVW(option)
```

**Note:** For records based on single-system reports, the option `EXCEPT` is still valid, but it is recommended to use `OVW` in general.

To produce the report, specify

```
OVERVIEW(REPORT)
```

To create data records either for spreadsheet processing or other applications, specify:

```
OVERVIEW(RECORD)
```

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](https://www.ibm.com/support/knowledgecenter/SSS8K7_5.2.0/com.ibm.zos.rmf.user.doc/v2r1.0/gem5p74.xml) in the IBM z/OS RMF User’s Guide provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**

http://ddshost:8803/gpm/rmfpp.xml?overview=(DATA01(CADSTG(SSID(0600), DEVN(06F3))), (DB2PRD(CADRT(DENV(0722), SSID(0700)))), (RHT0050(CASRHT(SSID(0050)))))

**Contents of the report**

Figure 228 on page 471 and Figure 229 on page 472 show sample exception reports.

Example:
If you want to produce an Exception report to display all intervals between midnight and 8 a.m. (off-shift) when the utilization of one processor was equal to or below 3%, you can use the following report option statements:

```
ETOD(0000,0800)
EXCEPT(CPU(CPUBSY,LE,3))
EXCEPT(CPU0(CPUBSY(0),LE,3))
EXCEPT(CPU1(CPUBSY(1),LE,3))
EXCEPT(CPU2(CPUBSY(2),LE,3))
EXCEPT(CPU3(CPUBSY(3),LE,3))
EXCEPT(CPU4(CPUBSY(4),LE,3))
EXCEPT(CPU5(CPUBSY(5),LE,3))
```

**Note:** The sample report assumes a 6-way processor. The first EXCEPT statement reflects the average utilization for all processors. The other EXCEPT statements reflect the average utilization for the specified processor.

### Example:

If you want to produce an Exception report to display all intervals between 3 a.m. and 6 a.m., when the utilization of one processor was greater or equal 10%, you can use the following report option statements:

```
ETOD(0300,0600)
EXCEPT(CPU0(CPUBSY(0),GE,10))
```
**Heading fields**

The heading fields for an Exception report identify the type of operating system, the release number and level of the operating system, the four-character SMF system ID of the system at system generation, and the RMF report level. The START field shows the date and time when the first interval in the reporting period began. The END field shows the date and time when the last interval ended. The date is in the form mm/dd/yy, and the time is in the form hh.mm.ss. The INTERVAL field shows the average length of the RMF measurement interval during the reporting period, in the form hh.mm.ss. The CYCLE field shows the length of the sampling cycle during the reporting period. When all SMF records have the same cycle length, that value is reported. When different cycle lengths are encountered, the Postprocessor sets the CYCLE field equal to the average of all cycle lengths encountered.

**Note:** When an Exception report consists of more than one page, the heading fields are repeated for each page. The START, END, CYCLE, and INTERVAL fields reflect the contents of the data in the entire report.

**Data fields**

Two fields precede the data fields. NUMBER OF INTERVALS indicates the number of RMF measurement intervals included in the reporting period. TOTAL LENGTH OF INTERVALS indicates (in the form hh:mm:ss) the total of the reporting period.

When an Exception report consists of more than one page, the NUMBER OF INTERVALS field and the TOTAL LENGTH OF INTERVALS field reflect the contents of the entire report.

The meaning of each field in the report is described in the following text.

### Table 202. Fields in the Exception Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL STMT NAME</td>
<td>The control statement name, if one was specified, that the Postprocessor uses to group control statements.</td>
</tr>
<tr>
<td>DATE MM/DD</td>
<td>The date, in the form of mm/dd, when the interval during which the exception occurred began.</td>
</tr>
<tr>
<td>TIME HH.MM:SS</td>
<td>The start time for the interval, during which the exception occurred, in the form hh:mm:ss.</td>
</tr>
<tr>
<td>INT MM:SS</td>
<td>The actual length of the interval during which the exception occurred, in the form mm:ss.</td>
</tr>
<tr>
<td>EXCEPTION THRESHOLD</td>
<td>The threshold value and the relational operator specified in the EXCEPT statement.</td>
</tr>
</tbody>
</table>
Table 202. Fields in the Exception Report (continued)

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ACTUAL VALUE      | The actual value derived from the data contained in the SMF record. If RMF searches more than one resource for a value that exceeded the specified threshold level, the value is not printed. In addition, the field is not printed if all or part of a qualifier is omitted, or if a device qualified by class is specified. This also applies to Overview reports and records.  
  Note: Because RMF processes the values differently, the actual values in this report may differ slightly from those in corresponding interval reports. |
| EXCEPTION DESCRIPTION | A short description of the exception. This is the condition name as specified in the EXCEPT control statement.                                                                                           |
| NAME VALUE        | The condition-name qualifier as specified in the EXCEPT control statement.                                                                                                                               |

**Improved exception reporting**

The Exception report shows each exception that you have requested by an EXCEPT statement on one line. This can result in several lines being shown for each interval. Using the OVERVIEW(REPORT) statement in addition, you can create an Overview report that shows the data in a comprehensive format, similar to the Summary report. You get a listing of all exceptions for one interval on one line. This allows you to more easily analyze the performance of your system for a longer period.

**Example:**

Assume that TSO001, TSO002, TSO004, TSO009, and TSO013 are your key volumes on the TSO system, and you are interested in getting all exceptions for the prime shift that you have defined either as a I/O activity rate of greater than 3 or as DASD response time greater than 25 milliseconds.

You specify the following control statements:

```
OVERVIEW(REPORT)
ETO0(0800,1800)
```

The exception-condition name DART specifies the device activity rate:

```
EXCEPT(TSO001IO(DART('TSO001'),GE,3))
EXCEPT(TSO002IO(DART('TSO002'),GE,3))
EXCEPT(TSO004IO(DART('TSO004'),GE,3))
EXCEPT(TSO009IO(DART('TSO009'),GE,3))
EXCEPT(TSO013IO(DART('TSO013'),GE,3))
```

The exception-condition name DRTAVG specifies the average response time:

```
EXCEPT(TSO001RT(DRTAVG('TSO001'),GE,25))
EXCEPT(TSO002RT(DRTAVG('TSO002'),GE,25))
EXCEPT(TSO004RT(DRTAVG('TSO004'),GE,25))
EXCEPT(TSO009RT(DRTAVG('TSO009'),GE,25))
EXCEPT(TSO013RT(DRTAVG('TSO013'),GE,25))
```

**Note:** You can get exceptions related to DASD only if you explicitly specify either device addresses or volume serial numbers. You will not get a meaningful Overview report if you just specify a generic class as DASD, because exception values will be reported only for single devices.

The exception version of the Overview report looks like this:
The reporting range covers 20 intervals, but you see in Figure 230 that only intervals with at least one exception value are listed in the report.

### Table 203. Fields in the Overview Report

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF INTERVALS</td>
<td>The number of intervals that are being reported on.</td>
</tr>
<tr>
<td>TOTAL LENGTH OF INTERVALS</td>
<td>The sum of the intervals in the form HH.MM.SS, where HH is hours, MM is minutes, and SS is seconds.</td>
</tr>
<tr>
<td>DATE MM/DD</td>
<td>The date in the form MM/DD, where MM is the month and DD is the day.</td>
</tr>
<tr>
<td>TIME HH.MM.SS</td>
<td>The starting time of the interval.</td>
</tr>
<tr>
<td>INT MM.SS</td>
<td>The length of the interval.</td>
</tr>
<tr>
<td>FFFFFFFFF</td>
<td>The field name is the exception-condition name of the corresponding EXCEPT statement. All columns appear in the report in the same order as the EXCEPT statements are given as Postprocessor input.</td>
</tr>
</tbody>
</table>

### Overview report

You can use the Overview report for:

- Improved summary reporting - you can tailor the report according to your requirements
- Creating overview records - you can use the records as input for the RMF Spreadsheet Reporter or any other spreadsheet application

### How to request this report

The scope of data that can be reported in the Overview report depends on the data being gathered by Monitor I gatherer sessions.

You define the contents by one or more OVW statements (see the z/OS RMF User’s Guide for details), as follows:

OVW(option)

**Note:** For records based on single-system reports, the option EXCEPT is still valid, but it is recommended to use OVW in general.

To produce the report, specify

OVERVIEW(REPORT)
To create data records either for spreadsheet processing or other applications, specify:

```
OVERVIEW(RECORD)
```

This report is also available in XML output format. Topic [How to work with Postprocessor XML reports](#) in the [z/OS RMF User’s Guide](#) provides all required information on how to produce and view XML reports.

**Example URL for the DDS API**

http://ddshost:8803/gpm/rmfp.xml?overview=(DATA01(CADSTG(SSID(0600),
DEVN(06F3))))),(DB2PRD(CADRT(DEVN(0722),SSID(0700))),(RHT0050(CASRHT(SSID(0050))))

**Report description**

Internally, the Overview report and the Exception report use the same technology. Therefore, the scope of data that can be reported is the same in both reports. You find a list of all possible values in chapter [Postprocessor Exception and Overview Conditions](#) in the [z/OS RMF User’s Guide](#) based on the SMF records that are the source of the data. Furthermore, you might refer to the tables that are part of the description of all Postprocessor reports, for example [Table 198 on page 464](#).

You cannot specify generic exception classes such as DASD without a qualifier. This is valid for exception reporting, but not for overview reporting. Here, you have to specify explicitly a qualifier, which for DASD could be either a device address or a volume serial number.

Due to the above described technology, you have to use the ETOD statement if you want to specify explicitly the time range for the Overview report.

**Improved summary reporting**

The Summary report provides performance data that summarize system activity for each interval within the reporting period (see “Summary report” on page 479). The contents of the report cannot be modified.

The Overview report allows you to select the performance data you want to have shown according to your own requirements. With the suboptions NOSYSTEMS/SYSTEMS, you can select between sysplex reporting and reporting for each system that is known in the SMF records.

**Example:**

You want to get an overview of the TSO activity in your sysplex for all intervals between 10am and 2pm. The following control statements assume that all TSO users run in service class TSOSERV and that you have defined three service class periods.

You specify the following control statements:

```
OVERVIEW(REPORT)
ETOD(1000,1400)
```

The exception-condition name TOTSRV specifies the total service units, the qualifier S.TSOSERV refers to service class TSOSERV, and suboption NOSYSTEMS defines sysplex reporting:

```
OVW(SERVUNIT(TOTSRV(S.TSOSERV)),NOSYSTEMS)
```
The exception-condition name RTIMETOT specifies the average response time:

- \( \text{OVW}(	ext{RTIMEP1(RTIMETOT(S.TSOSERV.1)),NOSYSTEMS}) \)
- \( \text{OVW}(	ext{RTIMEP2(RTIMETOT(S.TSOSERV.2)),NOSYSTEMS}) \)
- \( \text{OVW}(	ext{RTIMEP3(RTIMETOT(S.TSOSERV.3)),NOSYSTEMS}) \)

With the exception-condition name PI, you specify the performance index:

- \( \text{OVW}(	ext{PIP1(PI(S.TSOSERV.1)),NOSYSTEMS}) \)
- \( \text{OVW}(	ext{PIP2(PI(S.TSOSERV.2)),NOSYSTEMS}) \)

The exception-condition name TRANS specifies the transaction rate:

- \( \text{OVW}(	ext{TRXP1(TRANS(S.TSOSERV.1)),NOSYSTEMS}) \)
- \( \text{OVW}(	ext{TRXP2(TRANS(S.TSOSERV.2)),NOSYSTEMS}) \)
- \( \text{OVW}(	ext{TRXP3(TRANS(S.TSOSERV.3)),NOSYSTEMS}) \)

The summary version of the Overview report looks like this:

```
<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>INT</th>
<th>SERUNIT</th>
<th>RTIMEP1</th>
<th>RTIMEP2</th>
<th>RTIMEP3</th>
<th>PIP1</th>
<th>PIP2</th>
<th>TRXP1</th>
<th>TRXP2</th>
<th>TRXP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/28</td>
<td>10.00</td>
<td>00.10</td>
<td>28406</td>
<td>14.491</td>
<td>18.916</td>
<td>2.415</td>
<td>12.40</td>
<td>0.763</td>
<td>2.415</td>
<td>15.52</td>
<td>15.03</td>
</tr>
<tr>
<td>09/28</td>
<td>10.10</td>
<td>00.10</td>
<td>32696</td>
<td>0.229</td>
<td>6.071</td>
<td>19.504</td>
<td>0.880</td>
<td>0.738</td>
<td>0.880</td>
<td>15.03</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>10.20</td>
<td>00.10</td>
<td>34943</td>
<td>0.769</td>
<td>5.495</td>
<td>19.504</td>
<td>0.900</td>
<td>0.949</td>
<td>0.900</td>
<td>15.03</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>10.30</td>
<td>00.10</td>
<td>3830</td>
<td>0.313</td>
<td>12.344</td>
<td>28.806</td>
<td>1.043</td>
<td>2.057</td>
<td>2.057</td>
<td>15.29</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>10.40</td>
<td>00.10</td>
<td>18360</td>
<td>0.373</td>
<td>6.619</td>
<td>23.352</td>
<td>1.243</td>
<td>1.103</td>
<td>1.103</td>
<td>9.34</td>
<td>0.54</td>
</tr>
<tr>
<td>09/28</td>
<td>11.00</td>
<td>00.10</td>
<td>29893</td>
<td>0.252</td>
<td>8.943</td>
<td>15.304</td>
<td>0.837</td>
<td>1.491</td>
<td>1.491</td>
<td>15.48</td>
<td>1.00</td>
</tr>
<tr>
<td>09/28</td>
<td>11.10</td>
<td>00.10</td>
<td>35164</td>
<td>0.251</td>
<td>8.943</td>
<td>15.304</td>
<td>0.837</td>
<td>1.491</td>
<td>1.491</td>
<td>15.48</td>
<td>1.00</td>
</tr>
<tr>
<td>09/28</td>
<td>11.20</td>
<td>00.10</td>
<td>33544</td>
<td>0.236</td>
<td>4.563</td>
<td>17.671</td>
<td>0.787</td>
<td>0.761</td>
<td>0.761</td>
<td>15.50</td>
<td>1.03</td>
</tr>
<tr>
<td>09/28</td>
<td>11.30</td>
<td>00.10</td>
<td>39637</td>
<td>0.257</td>
<td>5.829</td>
<td>13.389</td>
<td>0.857</td>
<td>0.972</td>
<td>0.972</td>
<td>15.73</td>
<td>1.01</td>
</tr>
<tr>
<td>09/28</td>
<td>11.40</td>
<td>00.10</td>
<td>35811</td>
<td>0.252</td>
<td>10.049</td>
<td>15.257</td>
<td>0.840</td>
<td>1.675</td>
<td>1.675</td>
<td>15.40</td>
<td>1.07</td>
</tr>
<tr>
<td>09/28</td>
<td>11.50</td>
<td>00.10</td>
<td>35419</td>
<td>0.248</td>
<td>4.567</td>
<td>17.461</td>
<td>0.827</td>
<td>0.751</td>
<td>0.751</td>
<td>15.24</td>
<td>1.03</td>
</tr>
<tr>
<td>09/28</td>
<td>12.00</td>
<td>00.10</td>
<td>35902</td>
<td>0.437</td>
<td>6.883</td>
<td>18.944</td>
<td>1.457</td>
<td>1.147</td>
<td>1.147</td>
<td>15.12</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>12.10</td>
<td>00.10</td>
<td>36967</td>
<td>0.247</td>
<td>9.635</td>
<td>16.407</td>
<td>0.823</td>
<td>1.606</td>
<td>1.606</td>
<td>16.10</td>
<td>1.06</td>
</tr>
<tr>
<td>09/28</td>
<td>12.20</td>
<td>00.10</td>
<td>36024</td>
<td>0.256</td>
<td>4.552</td>
<td>18.229</td>
<td>0.867</td>
<td>0.759</td>
<td>0.759</td>
<td>15.15</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>12.30</td>
<td>00.10</td>
<td>36296</td>
<td>0.263</td>
<td>5.072</td>
<td>20.555</td>
<td>0.877</td>
<td>0.845</td>
<td>0.845</td>
<td>15.29</td>
<td>1.06</td>
</tr>
<tr>
<td>09/28</td>
<td>12.40</td>
<td>00.10</td>
<td>35129</td>
<td>0.262</td>
<td>10.237</td>
<td>16.135</td>
<td>0.873</td>
<td>1.796</td>
<td>1.796</td>
<td>15.37</td>
<td>1.02</td>
</tr>
<tr>
<td>09/28</td>
<td>12.50</td>
<td>00.10</td>
<td>35355</td>
<td>0.274</td>
<td>8.098</td>
<td>15.106</td>
<td>0.933</td>
<td>1.350</td>
<td>1.350</td>
<td>15.31</td>
<td>1.06</td>
</tr>
<tr>
<td>09/28</td>
<td>13.00</td>
<td>00.10</td>
<td>36936</td>
<td>0.213</td>
<td>3.833</td>
<td>10.036</td>
<td>0.710</td>
<td>0.639</td>
<td>0.639</td>
<td>16.00</td>
<td>1.09</td>
</tr>
<tr>
<td>09/28</td>
<td>13.10</td>
<td>00.10</td>
<td>36919</td>
<td>0.182</td>
<td>5.205</td>
<td>9.323</td>
<td>0.607</td>
<td>0.866</td>
<td>0.866</td>
<td>16.17</td>
<td>1.08</td>
</tr>
<tr>
<td>09/28</td>
<td>13.20</td>
<td>00.10</td>
<td>31098</td>
<td>0.208</td>
<td>5.420</td>
<td>9.599</td>
<td>0.693</td>
<td>0.903</td>
<td>0.903</td>
<td>14.14</td>
<td>0.87</td>
</tr>
<tr>
<td>09/28</td>
<td>13.29</td>
<td>59.10</td>
<td>34909</td>
<td>1.184</td>
<td>13.976</td>
<td>25.991</td>
<td>3.947</td>
<td>2.329</td>
<td>2.329</td>
<td>14.20</td>
<td>1.00</td>
</tr>
<tr>
<td>09/28</td>
<td>13.45</td>
<td>00.10</td>
<td>34897</td>
<td>0.234</td>
<td>3.865</td>
<td>11.235</td>
<td>0.780</td>
<td>0.644</td>
<td>0.644</td>
<td>15.75</td>
<td>1.03</td>
</tr>
<tr>
<td>09/28</td>
<td>13.50</td>
<td>00.10</td>
<td>31773</td>
<td>0.227</td>
<td>3.372</td>
<td>12.955</td>
<td>0.757</td>
<td>1.395</td>
<td>1.395</td>
<td>14.00</td>
<td>0.93</td>
</tr>
</tbody>
</table>
```

Figure 231. Overview Report - Summary Version

Creating Overview records

You can also create records for further processing with the Spreadsheet Reporter or other applications either on the host system or on your workstation.

The Spreadsheet Reporter provides full support for converting SMF dump data, Postprocessor listings and Overview records into spreadsheets. You can use it to create and submit Postprocessor jobs directly on the workstation without a logon to the host system, and you will receive the data in the correct format back to the workstation. In addition, it provides sample spreadsheets to help you in presenting and analyzing performance data at a glance. You find a detailed description in the z/OS RMF User’s Guide.

You get one record for each reported interval with the same information as in the printed logical line (this can be several physical lines on several pages if you define more than 11 exceptions) by specifying OVERVIEW(RECORD).

A record can contain a maximum of 253 exceptions.
If you want to get both the report and the records, you can combine both control statements into \texttt{OVERVIEW(REPORT,RECORD)}.

It is recommended to use this version of the OVERVIEW statement, it provides the capability to check whether you really get the data that you expect.

For each report, the Postprocessor creates one Overview Header record and several (one for each interval) Overview Data records. If the input data for the Postprocessor consists of records for several systems, you get a set of records for each system.

The record mapping macro for all Overview records is ERBOVREC.

**Overview header record**

*Table 204. Overview Header Record - Prefix Section.* This section is available only if you process the records in an MVS system.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>binary</td>
<td>2</td>
<td>AMLEN</td>
<td>Record length (for records in the MVS system)</td>
</tr>
<tr>
<td>-2</td>
<td>binary</td>
<td>2</td>
<td>AMSGTM</td>
<td></td>
</tr>
</tbody>
</table>

*Table 205. Overview Header Record - Header Section.* One per record.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>2</td>
<td>OVRLEN</td>
<td>Record length (for records on the workstation)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>OVRSGMT</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRTYPE</td>
<td>RMFOVREC (eye catcher)</td>
</tr>
<tr>
<td>12</td>
<td>EBCDIC</td>
<td>1</td>
<td>OVRLVL</td>
<td>Record level change number</td>
</tr>
<tr>
<td>13</td>
<td>binary</td>
<td>1</td>
<td>OVRFLG</td>
<td>Flags.</td>
</tr>
<tr>
<td>14</td>
<td>*</td>
<td>2</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>16</td>
<td>EBCDIC</td>
<td>3</td>
<td>OVRRMFV</td>
<td>RMF version number from SMF Record</td>
</tr>
<tr>
<td>19</td>
<td>*</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>20</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRMVS</td>
<td>Version: \texttt{ZVvrrmm} (z/OS)</td>
</tr>
<tr>
<td>28</td>
<td>EBCDIC</td>
<td>4</td>
<td>OVRSID</td>
<td>System identification</td>
</tr>
<tr>
<td>32</td>
<td>EBCDIC</td>
<td>6</td>
<td>OVRIITIME</td>
<td>TOD monitor interval start: hhmmss</td>
</tr>
<tr>
<td>38</td>
<td>EBCDIC</td>
<td>2</td>
<td>OVRICENT</td>
<td>DATE monitor interval start: yy = high-order digits of century</td>
</tr>
<tr>
<td>40</td>
<td>EBCDIC</td>
<td>5</td>
<td>OVRIDTYD</td>
<td>DATE monitor interval start: yyyddd</td>
</tr>
<tr>
<td>45</td>
<td>*</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>46</td>
<td>EBCDIC</td>
<td>4</td>
<td>OVRCYC</td>
<td>Sampling CYCLE length: tttt</td>
</tr>
<tr>
<td>50</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRINT</td>
<td>Interval length: hh.mm.ss</td>
</tr>
<tr>
<td>58</td>
<td>EBCDIC</td>
<td>2</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>60</td>
<td>binary</td>
<td>4</td>
<td>OVRECLGT</td>
<td>Total length for one SYSID: length of header record + (length of data records * number of data records)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This length does not include the prefix section of the records.</td>
</tr>
<tr>
<td>64</td>
<td>binary</td>
<td>4</td>
<td>OVRCOLO</td>
<td>Offset to first report column names section</td>
</tr>
<tr>
<td>68</td>
<td>binary</td>
<td>4</td>
<td>OVRCOLN</td>
<td>Number of report column names sections</td>
</tr>
<tr>
<td>72</td>
<td>binary</td>
<td>4</td>
<td>OVRCOLL</td>
<td>Length of one report column names section</td>
</tr>
</tbody>
</table>
**PP - Overview report**

Table 205. Overview Header Record - Header Section (continued). One per record.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>4C</td>
<td>4</td>
<td>OVRHDRN</td>
<td>Overview header record counter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>First header record in data set has highest number, numbers will be in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>decreasing order.</td>
</tr>
<tr>
<td>80</td>
<td>50</td>
<td>4</td>
<td>OVRDATRN</td>
<td>Number of data records</td>
</tr>
<tr>
<td>84</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRSPLID</td>
<td>Sysplex Id (for sysplex records)</td>
</tr>
</tbody>
</table>

Table 206. Overview Header Record - Report Column Names Section. One per interval.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRRNAME</td>
<td>Report column name</td>
</tr>
<tr>
<td>8</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRCOND</td>
<td>OVERVIEW condition name</td>
</tr>
<tr>
<td>16</td>
<td>EBCDIC</td>
<td>53</td>
<td>OVRQUAL</td>
<td>OVERVIEW condition qualifier</td>
</tr>
<tr>
<td>69</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>70</td>
<td>EBCDIC</td>
<td>2</td>
<td>OVROPER</td>
<td>Exception operator</td>
</tr>
<tr>
<td>72</td>
<td>EBCDIC</td>
<td>9</td>
<td>OVRTHV</td>
<td>Exception threshold value</td>
</tr>
<tr>
<td>81</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

**Overview data record**

Table 207. Overview Data Record - Prefix Section. This section is available only if you process the records in an MVS system.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>binary</td>
<td>2</td>
<td>AMDLEN</td>
<td>Record length (for records in the MVS system)</td>
</tr>
<tr>
<td>-2</td>
<td>binary</td>
<td>2</td>
<td>AMDSGMT</td>
<td>Zero</td>
</tr>
</tbody>
</table>

Table 208. Overview Data Record - Data Section. One per record.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>binary</td>
<td>2</td>
<td>OVRDLEN</td>
<td>Record length (for records on the workstation)</td>
</tr>
<tr>
<td>2</td>
<td>binary</td>
<td>2</td>
<td>OVRDSGMT</td>
<td>Zero</td>
</tr>
<tr>
<td>4</td>
<td>binary</td>
<td>4</td>
<td>OVRDATO</td>
<td>Offset to first report data section</td>
</tr>
<tr>
<td>8</td>
<td>binary</td>
<td>4</td>
<td>OVRDATN</td>
<td>Number of report data sections</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>4</td>
<td>OVRDATL</td>
<td>Length of one report data section</td>
</tr>
<tr>
<td>16</td>
<td>EBCDIC</td>
<td>5</td>
<td>OVRRIDAT</td>
<td>Reporting interval date: MM/DD</td>
</tr>
<tr>
<td>21</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>22</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRRITME</td>
<td>Reporting interval time hh.mm.ss</td>
</tr>
<tr>
<td>30</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>31</td>
<td>EBCDIC</td>
<td>8</td>
<td>OVRRINT</td>
<td>Reporting interval length: hh.mm.ss</td>
</tr>
<tr>
<td>39</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Table 209. Overview Data Record - Report Data Section. One per exception.

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Format</th>
<th>Length</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>EBCDIC</td>
<td>1</td>
<td>*</td>
<td>Reserved</td>
</tr>
<tr>
<td>1</td>
<td>EBCDIC</td>
<td>9</td>
<td>OVRRVAL</td>
<td>Report actual data</td>
</tr>
</tbody>
</table>
Summary report

Summary reports provide a high-level view of system activity. A summary report can consist of one line of data that summarizes system activity for each interval within the reporting period, a single line of data giving summary totals for all RMF intervals within the reporting period, or both interval summary data lines and a total summary data line. Figure 232 on page 480 shows a sample summary report, including both an interval summary line for each RMF measurement interval and a total summary line for all of the intervals.

How to request this report

To produce this report, specify

```
SUMMARY(INT | TOT)
```

Generating a report

The data shown in a Summary report is derived from the SMF records created by any Monitor I sessions that ran during the reporting period. You specify the type of reporting required on Postprocessor control statements. For a description of Postprocessor control statements, see the z/OS RMF User’s Guide.

Special considerations of report output

The heading fields for a summary report are similar to the headings on an duration report. The START field shows when the first measurement interval began. The END field shows the date and time when the last interval ended. When a summary report consists of more than one page, the heading fields are repeated for each page. See “Single-system report header” on page 290 for more information on the heading fields.

The START, END, CYCLE, and INTERVAL fields reflect the contents of the page on which they appear. When total summary data is requested, a total summary line is generated for the intervals covered on each page, and the last page of the report shows values for START, END, CYCLE, and INTERVAL that reflect the contents of all pages in the report.

When a particular system activity is not measured during the reporting period, the columns describing that activity are omitted. For example, if a Monitor I session did not measure paging activity, the columns in the summary report that describe paging activity (SWAP RATE and DEMAND PAGING) are omitted.

The columns for JOB, TSO, STC, ASCH, and OMVS are available only if CPU activity was measured.
RMF omits a field (other than date, starting time, and interval time) if all values within the column are zero during the reporting period.

**Table 210. Fields in the Summary Report**

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Meaning</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF INTERVALS</td>
<td>The number of RMF measurement intervals included in the reporting period.</td>
<td>When the report is more than one page, this field reflects the contents of the page on which it appears.</td>
</tr>
<tr>
<td>TOTAL LENGTH OF INTERVALS</td>
<td>The total length of the reporting period in the form hh.mm.ss.</td>
<td></td>
</tr>
<tr>
<td>DATE MM/DD</td>
<td>The date when each interval included in the summary report began.</td>
<td>This field is reported when you specify interval summary data. It does not appear in the total summary data line.</td>
</tr>
<tr>
<td>TIME HHMMSS</td>
<td>The start time for each interval included in the summary report.</td>
<td></td>
</tr>
<tr>
<td>INT MMSSS</td>
<td>The actual length of each interval included in the summary report.</td>
<td></td>
</tr>
<tr>
<td>CPU BUSY</td>
<td>The average busy percentage during the reporting period for all general purpose processors. Special purpose processors are not included in the calculation.</td>
<td>For systems running in a PR/SM environment, this value is the LPAR busy percentage.</td>
</tr>
<tr>
<td>DASD RESP</td>
<td>The average number of milliseconds required to complete an I/O request on all direct access storage devices included in the report.</td>
<td></td>
</tr>
<tr>
<td>DASD RATE</td>
<td>The activity per second for all direct access storage devices included in the report. The value reported corresponds to an accumulation of each DEVICE ACTIVITY RATE field in the Direct Access Device Activity report.</td>
<td></td>
</tr>
<tr>
<td>TAPE RATE</td>
<td>The activity per second for all magnetic tape devices included in the report. The value reported corresponds to an accumulation of each DEVICE ACTIVITY RATE field in the Magnetic Tape Device Activity report.</td>
<td></td>
</tr>
<tr>
<td>JOB MAX/AVE</td>
<td>The maximum and average number of batch jobs that were active during each measurement interval. The values reported correspond to the MAX/AVE number of BATCH address spaces in the CPU Activity report.</td>
<td></td>
</tr>
<tr>
<td>TSO MAX/AVE</td>
<td>The maximum and average number of TSO/E sessions that were active during each measurement interval. The values reported correspond to the MAX/AVE number of TSO/E address spaces in the CPU Activity report.</td>
<td></td>
</tr>
<tr>
<td>STC MAX/AVE</td>
<td>The maximum and average number of started tasks and mount tasks that were active during each measurement interval. The value reported corresponds to the MAX/AVE number of STC address spaces in the CPU Activity report.</td>
<td></td>
</tr>
<tr>
<td>ASCH MAX/AVE</td>
<td>The maximum/average number of APPC/MVS transaction scheduler (ASCH) address spaces that were active during each measurement interval. The value reported corresponds to the MAX/AVE number of ASCH address spaces in the CPU Activity report.</td>
<td></td>
</tr>
<tr>
<td>OMVS MAX/AVE</td>
<td>The maximum/average number of OMVS address spaces that were active during each measurement interval. The value reported corresponds to the MAX/AVE number of OMVS address spaces in the CPU Activity report.</td>
<td></td>
</tr>
<tr>
<td>SWAP RATE</td>
<td>The number of swaps per second for each interval. The value reported corresponds to the sum of the AUX STOR TOTAL and the EXP STOR TOTAL fields in the SWAP PLACEMENT ACTIVITY section of the Monitor I Paging Activity report.</td>
<td></td>
</tr>
<tr>
<td>DEMAND PAGING</td>
<td>The number of demand paging requests per second for each interval. This is the demand paging rate from DASD (page fault rate).</td>
<td></td>
</tr>
<tr>
<td>TOTAL/AVERAGE</td>
<td>The single line that reports total summary data. The line contains either the average rate of events over the reporting period (or page), or the maximum number of events during any of the measurement intervals included in the reporting period (or page).</td>
<td></td>
</tr>
</tbody>
</table>
Spreadsheet reference

You can make this report available in a spreadsheet, using the Spreadsheet Reporter. For details, see the z/OS RMF User's Guide.
Appendix. Accessibility

Accessible publications for this product are offered through the z/OS Information Center.

If you experience difficulty with the accessibility of any z/OS information, please send a detailed message to mhvrcfs@us.ibm.com or to the following mailing address:

IBM® Corporation
Attention: MHVRCFS Reader Comments
Department H6MA, Building 707
2455 South Road
Poughkeepsie, NY 12601-5400
USA

Accessibility features

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size.

Using assistive technologies

Assistive technology products, such as screen readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using such products to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to z/OS TSO/E Primer, z/OS TSO/E User’s Guide, and z/OS ISPF User’s Guide Vol I for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users accessing the z/OS Information Center using a screen reader. In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line, because they can be considered as a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that your screen reader is set to read out punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1) are mutually
exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, you
know that your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a
syntax element with dotted decimal number 3 is followed by a series of syntax
elements with dotted decimal number 3.1, all the syntax elements numbered 3.1
are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add
information about the syntax elements. Occasionally, these words and symbols
might occur at the beginning of the element itself. For ease of identification, if the
word or symbol is a part of the syntax element, it is preceded by the backslash (\)
character. The * symbol can be used next to a dotted decimal number to indicate
that the syntax element repeats. For example, syntax element *FILE with dotted
decimal number 3 is given the format 3 * FILE. Format 3* FILE indicates that
syntax element FILE repeats. Format 3* * FILE indicates that syntax element *
FILE repeats.

Characters such as commas, which are used to separate a string of syntax
elements, are shown in the syntax just before the items they separate. These
characters can appear on the same line as each item, or on a separate line with the
same dotted decimal number as the relevant items. The line can also show another
symbol giving information about the syntax elements. For example, the lines 5.1*,
5.1 LASTRUN, and 5.1 DELETE mean that if you use more than one of the
LASTRUN and DELETE syntax elements, the elements must be separated by a
comma. If no separator is given, assume that you use a blank to separate each
syntax element.

If a syntax element is preceded by the % symbol, this indicates a reference that is
defined elsewhere. The string following the % symbol is the name of a syntax
fragment rather than a literal. For example, the line 2.1 %OP1 means that you
should refer to separate syntax fragment OP1.

The following words and symbols are used next to the dotted decimal numbers:
• ? means an optional syntax element. A dotted decimal number followed by the ?
symbol indicates that all the syntax elements with a corresponding dotted
decimal number, and any subordinate syntax elements, are optional. If there is
only one syntax element with a dotted decimal number, the ? symbol is
displayed on the same line as the syntax element, (for example 5? NOTIFY). If
there is more than one syntax element with a dotted decimal number, the ?
symbol is displayed on a line by itself, followed by the syntax elements that are
optional. For example, if you hear the lines 5 ?, 5 NOTIFY, and 5 UPDATE, you
know that syntax elements NOTIFY and UPDATE are optional; that is, you can
choose one or none of them. The ? symbol is equivalent to a bypass line in a
railroad diagram.
• ! means a default syntax element. A dotted decimal number followed by the !
symbol and a syntax element indicates that the syntax element is the default
option for all syntax elements that share the same dotted decimal number. Only
one of the syntax elements that share the same dotted decimal number can
specify a ! symbol. For example, if you hear the lines 2? FILE, 2.1! (KEEP), and
2.1 (DELETE), you know that (KEEP) is the default option for the FILE keyword.
In this example, if you include the FILE keyword but do not specify an option,
default option KEEP will be applied. A default option also applies to the next
higher dotted decimal number. In this example, if the FILE keyword is omitted,
default FILE(KEEP) is used. However, if you hear the lines 2? FILE, 2.1, 2.1.1!
(KEEP), and 2.1.1 (DELETE), the default option KEEP only applies to the next higher dotted decimal number, 2.1 (which does not have an associated keyword), and does not apply to 2? FILE. Nothing is used if the keyword FILE is omitted.

* means a syntax element that can be repeated 0 or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line 5.1* data area, you know that you can include one data area, more than one data area, or no data area. If you hear the lines 3*, 3 HOST, and 3 STATE, you know that you can include HOST, STATE, both together, or nothing.

Note:
1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.
2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you could write HOST STATE, but you could not write HOST HOST.
3. The * symbol is equivalent to a loop-back line in a railroad syntax diagram.

+ means a syntax element that must be included one or more times. A dotted decimal number followed by the + symbol indicates that this syntax element must be included one or more times; that is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can only repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loop-back line in a railroad syntax diagram.
Notices

This information was developed for products and services offered in the U.S.A. or elsewhere.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan, Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.
IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

Site Counsel
IBM Corporation
2455 South Road
Poughkeepsie, NY 12601-5400
USA

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

COPYRIGHT LICENSE:

This information might contain sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Policy for unsupported hardware

Various z/OS elements, such as DFSMS, HCD, JES2, JES3, and MVS™, contain code that supports specific hardware servers or devices. In some cases, this device-related element support remains in the product even after the hardware devices pass their announced End of Service date. z/OS may continue to service element code; however, it will not provide service related to unsupported hardware devices. Software problems related to these devices will not be accepted.
for service, and current service activity will cease if a problem is determined to be associated with out-of-support devices. In such cases, fixes will not be issued.

**Minimum supported hardware**

The minimum supported hardware for z/OS releases identified in z/OS announcements can subsequently change when service for particular servers or devices is withdrawn. Likewise, the levels of other software products supported on a particular release of z/OS are subject to the service support lifecycle of those products. Therefore, z/OS and its product publications (for example, panels, samples, messages, and product documentation) can include references to hardware and software that is no longer supported.

- For information about software support lifecycle, see: [IBM Lifecycle Support for z/OS](http://www.ibm.com/software/support/systemsz/lifecycle/)
- For information about currently-supported IBM hardware, contact your IBM representative.

**Programming interface information**

This book is intended to help the customer to use RMF reports, and contains a detailed description of all reports.

This book documents intended Programming Interfaces that allow the customer to write programs to obtain the services of RMF. This information is identified where it occurs, either by an introductory statement to a topic or section or by this marking:

```
Programming interface information
```

```
End of programming interface information
```

**Trademarks**

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml).

Java™ is a trademark of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States and/or other countries.

Other company, product, and service names may be trademarks or service marks of others.
Glossary

This glossary contains chiefly definitions of terms used in this book, but some more general RMF and MVS terms are also defined.

Words that are set in *italics* in the definitions are terms that are themselves defined in the glossary.

**APPC/MVS**
Advanced program-to-program communication

**ASCH address space**
APPC transaction scheduler address space

**AS**
*Address space*

**address space**
That part of MVS main storage that is allocated to a job.

**auxiliary storage (AUX)**
All addressable storage, other than main storage, that can be accessed by means of an I/O channel; for example storage on direct access devices.

**background session**
In RMF, a monitor session that is started and controlled from the operator console. Contrast with *interactive session*

**balanced systems**
To avoid bottlenecks, the system resources (CP, I/O, storage) need to be balanced.

**basic mode**
A central processor mode that does not use logical partitioning. Contrast with *logically partitioned (LPAR) mode*.

**bottleneck**
A system resource that is unable to process work at the rate it comes in, thus creating a queue.

**callable services**
Parts of a program product that have a published external interface and can be used by application programs to interact with the product.

**captured storage**
See shared page group.

**capture ratio**
The ratio of reported CPU time to total used CPU time.

**central processor (CP)**
The part of the computer that contains the sequencing and processing facilities for instruction execution, initial program load, and other machine operations.

**central processor complex (CPC)**
A physical collection of hardware that consists of central storage, one or more central processors, timers, and channels.

**channel path**
The channel path is the physical interface that connects control units and devices to the CPU.

**CICS**
Customer Information Control System

**CIM provider**
A CIM provider is the link between the CIM server and the system interfaces. It allows the CIM server to access and manage the resources. Each CIM provider exposes the resources it represents in a standard way, using a small number of classes from the CIM schema or derived from the CIM schema. RMF monitoring providers are CIM providers implemented by RMF.

**contention**
Two or more incompatible requests for the same resource. For example, contention occurs if a user requests a resource and specifies exclusive use, and another user requests the same resource, but specifies shared use.

**coupling facility**
See *Cross-system Extended Services/Coupling Facility*.

**CP**
*Central processor*

**criteria**
Performance criteria set in the WFEX report options. You can set criteria for all report classes (PROC, SYSTEM, TSO, and so on).

**CPU speed**
Measurement of how much work your CPU can do in a certain amount of time.

**cross-system coupling facility (XCF)**
A component of MVS that provides
functions to support cooperation between authorized programs running within a sysplex.

**Cross-system Extended Services/Coupling Facility (XES/CF)**

Provides services for MVS systems in a sysplex to share data on a coupling facility (CF).

**CS** Central storage

**Customer Information Control System (CICS)**

An IBM licensed program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs. It includes facilities for building, using, and maintaining data bases.

cycle In RMF, the time at the end of which one sample is taken. Varies between 50 ms and 9999 ms. See also *sample*.

data sample

See *sample*

**DCM** See *Dynamic Channel Path Management*

delay The delay of an address space represents a job that needs one or more resources but that must wait because it is contending for the resource(s) with other users in the system.

direct access storage device (DASD)

A device in which the access time is effectively independent of the location of the data. Usually: a magnetic disk device.

**DLY** Delay

**DP** Dispatching priority

dynamic channel path management

Dynamic channel path management provides the capability to dynamically assign channels to control units in order to respond to peaks in demand for I/O channel bandwidth. This is possible by allowing you to define pools of so-called floating channels that are not related to a specific control unit. With the help of the Workload Manager, channels can float between control units to best service the work according to their goals and their importance.

**EMIF** ESCON multiple image facility

enclave

An enclave is a group of associated dispatchable units. More specifically, an enclave is a group of SRB routines that are to be managed and reported on as an entity.

**EPDM** Enterprise Performance Data Manager/MVS

**ES** Expanded storage

**ESCON multiple image facility (EMIF)**

A facility that allows channels to be shared among PR/SM logical partitions in an ESCON environment.

execution velocity

A measure of how fast work should run when ready, without being delayed for processor or storage access.

exception reporting

In RMF, the reporting of performance measurements that do not meet user-defined criteria. Shows potential performance problems explicitly, thus avoiding the need for constant monitoring.

expanded storage (ES)

An extension of processor storage.

Optional high-speed storage that transfers 4KB pages to and from central storage.

generalized trace facility (GTF)

A service program that records significant system events, such as supervisor calls and start I/O operations, for the purpose of problem determination.

**GO mode**

In RMF, the Monitor III mode in which the screen is updated with the interval you specified in your session options. The terminal cannot be used for anything else when it is in GO mode. See also *mode*.

**graphic mode**

In RMF Monitor III, the mode which presents the performance data from the system in graphic format using the GDDM product. Contrast with tabular mode.

**GTF** generalized trace facility

**high-speed buffer (HSB)**

A cache or a set of logically partitioned blocks that provides significantly faster access to instructions and data than provided by central storage.
HS  hiperspace
HSB  High-speed buffer
HSM  Hierarchical Storage Manager
IBM System z Application Assist Processor (zAAP)
A special purpose processor configured for running Java programming on selected zSeries machines.
IBM System z Integrated Information Processor (zIIP)
A special purpose processor designed to help free-up general computing capacity and lower overall total cost of computing for selected data and transaction processing workloads for business intelligence (BI), ERP and CRM, and selected network encryption workloads on the mainframe.
IMS  Information Management System
Information Management System (IMS)
A database/data communication (DB/DC) system that can manage complex databases and networks. Synonymous with IMS/VS.
interactive session
In RMF, a monitor display-session that is controlled from the display terminal. Contrast with background session.
JES  Job Entry Subsystem
LCU  Logical control unit. Logical control units are also called 'Control Unit Headers' (CUH). For details about LCU/CUH please refer to the applicable System z Input/Output Configuration Program User's Guide for ICP IOCP (SB10-7037).
logically partitioned (LPAR) mode
A central processor mode that is available on the Configuration frame when using the PR/SM feature. It allows an operator to allocate processor unit hardware resources among logical partitions. Contrast with basic mode.
logical partition (LP)
A subset of the processor hardware that is defined to support an operating system. See also logically partitioned (LPAR) mode.
LP  Logical partition
LPAR  Logically partitioned (mode)
LPAR cluster
An LPAR cluster is the subset of the systems that are running as LPARs on the same CEC. Based on business goals, WLM can direct PR/SM to enable or disable CP capacity for an LPAR, without human intervention.
migration rate
The rate (pages/second) of pages being moved from expanded storage through central storage to auxiliary storage.
mintime
The smallest unit of sampling in Monitor III. Specifies a time interval during which the system is sampled. The data gatherer combines all samples gathered into a set of samples. The set of samples can be summarized and reported by the reporter.
mode
Monitor III can run in various modes: GO mode (see GO mode) and STOP mode, which is the default mode. See also graphic mode and tabular mode.
MPL  Multiprogramming level
OMVS  Reference to z/OS UNIX System Services
partitioned data set (PDS)
A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data.
PDS  partitioned data set
performance management
The activity which monitors and allocates data processing resources to applications according to goals defined in a service level agreement or other objectives.
The discipline that encompasses collection of performance data and tuning of resources.
PR/SM  Processor Resource/Systems Manager
Processor Resource/Systems Manager (PR/SM)
The feature that allows the processor to run several operating systems environments simultaneously and provides logical partitioning capability. See also LPAR.
range
The time interval you choose for your report.
Resident time
The time the address space was swapped in, in units of seconds.

RMF monitoring provider
see CIM provider

sample
Once in every cycle, the number of jobs waiting for a resource, and what job is using the resource at that moment, are gathered for all resources of a system by Monitor III. These numbers constitute one sample.

SCP System control program

seek The DASD arm movement to a cylinder. A seek can range from the minimum to the maximum seek time of a device. In addition, some I/O operations involve multiple imbedded seeks where the total seek time can be more than the maximum device seek time.

service class
In Workload Manager, a subdivision of a workload. Performance goals and capacity boundaries are assigned to service classes.

service level agreement (SLA)
A written agreement of the information systems (I/S) service to be provided to the users of a computing installation.

Service Level Reporter (SLR)
An IBM licensed program that provides the user with a coordinated set of tools and techniques and consistent information to help manage the data processing installation. For example, SLR extracts information from SMF, IMS, and CICS logs, formats selected information into tabular or graphic reports, and gives assistance in maintaining database tables.

service rate
In the system resources manager, a measure of the rate at which system resources (services) are provided to individual jobs. It is used by the installation to specify performance objectives, and used by the workload manager to track the progress of individual jobs. Service is a linear combination of processing unit, I/O, and main storage measures that can be adjusted by the installation.

shared page groups
An address space can decide to share its storage with other address spaces using a function of RSM. As soon as other address spaces use these storage areas, they can no longer be tied to only one address space. These storage areas then reside as shared page groups in the system. The pages of shared page groups can reside in central, expanded, or auxiliary storage.

SLA service level agreement
SLIP serviceability level indication processing
SLR Service Level Reporter
SMF System management facility
SMF buffer A wrap-around buffer area in storage, to which RMF data gatherers write performance data, and from which the Postprocessor extracts data for reports.

speed See workflow
SRB Service request block
SRM System resource manager
SSCH Start subchannel
system control program (SCP)
Programming that is fundamental to the operation of the system. SCPs include MVS, VM, and VSE operating systems and any other programming that is used to operate and maintain the system. Synonymous with operating system.

sysplex A complex consisting of a number of coupled MVS systems.

tabular mode
In RMF, the mode in which Monitor III displays performance data in the form of lists. Contrast with graphic mode.

TCB Task control block

threshold The exception criteria defined on the report options screen.

throughput A measure of the amount of work performed by a computer system over a period of time, for example, number of jobs per day.

TPNS Teleprocessing network simulator
**TSO**  Time Sharing Option, see *Time Sharing Option/Extensions*

**Time Sharing Option Extensions (TSO/E)**
In MVS, a time-sharing system accessed from a terminal that allows user access to MVS system services and interactive facilities.

**UIC**  Unreferenced interval count

**uncaptured time**
CPU time not allocated to a specific address space.

**using**
Jobs getting service from hardware resources (PROC or DEV) are using these resources.

**velocity**
A measure of how fast work should run when ready, without being delayed for processor or storage access. See also *execution velocity*.

**VTOC**  Volume table of contents

**workflow**
The workflow of an address space represents how a job uses system resources and the speed at which the job moves through the system in relation to the maximum average speed at which the job could move through the system.

The workflow of resources indicates how efficiently users are being served.

**workload**
A logical group of work to be tracked, managed, and reported as a unit. Also, a logical group of service classes.

**WLM**  Workload Manager

**XCF**  Cross-system coupling facility

**XES/CF**
See *Cross-system Extended Services/Coupling Facility*.

**zAAP**  see IBM System z Application Assist Processor.

**zIIP**  see IBM System z Integrated Information Processor.
Index

Special characters
% CU BUSY (control unit busy %) field
  in Monitor III IOQUEUE report 115
% Delayed for (percent delayed for) field
  in Monitor III DELAY report 66
% DP BUSY (director port busy %) field
  in Monitor III IOQUEUE report 115
% Frames (percentage frames) field
  in Monitor III STORR report 164
% of TRX (percentage of transactions)
  field
  in Monitor III SYSRTD report 181

Numerics
1 MB memory objects 411

A
abnormally ended transactions field
  in Monitor III SYSWKM report 199
accessibility 483
  contact IBM 483
  features 483
action field
  in Monitor III WFEX report options
  action panel 210
activated at field
  in Monitor III SYSSUM report 187
active frames field
  in Monitor III STORF report 159
active percentage field
  in Monitor III DEVJ report
  (Active) 120
active policy field
  in Monitor III SYSSUM report 187
activity rate field
  in the Monitor III DEVN report
  (Rate) 75
actual field
  in Monitor III SYSWKM report 198
address space identifier (ASID) field
  in Monitor III STORC report 155
Address Space State Data (ASD/ASDJ)
  Monitor II report
    command 240
    contents of 240
    how to request 240
    purpose of 240
  address spaces serving this service class
    field
    in Monitor III SYSWKM report 200
Advanced Encryption Standard (AES) 348, 350, 352
AES (Advanced Encryption Standard) 348, 350, 352
alert field
  in Monitor III WFEX report definition
  and criteria panel 212
amount of common storage not released
  field
  in Monitor III STORCR report 157
amount used field
  in Monitor III STORC report 155
  AP 461
  APPL% 456
Application Assist Processor
  See IBM System z Application Assist Processor (zAAP)
ARD/ARDJ (Address Space Resource Data)
  Monitor II report
    command 236
    contents of 236
    field descriptions 237
    how to request 236
    purpose of 236
ASD/ASDJ (Address Space State Data)
  Monitor II report
    command 240
    contents of 240
    how to request 240
    purpose of 240
ASID (address space identifier) field
  in Monitor III STORC report 155
  in Monitor III SYSWKM report 201
ASM 400
ASRM/ASRMJ (Address Space SRM Data)
  Monitor II report
    command 243
    contents of 244
    how to request 243
    purpose of 243
average active users field
  in Monitor III STORR report 166
average CPU utilization field
  in Monitor III SYSINFO report
    (average CPU UTIL) 174
  in Monitor III WFEX report (Average CPU Util) 204
average CPU Utilization field
  in the Monitor III SYSTREND report
    (CPU %) 193
average CSA to SQA conversion field
  in Monitor III STORC report 154
average execution time (Avg. Exec. Time)
  field
  in Monitor III SYSWKM report 198
average number delayed for field
  in Monitor III STORS report 168
  in Monitor III SYSINFO report 176
average response time (Avg. Resp. Time)
  field
  in Monitor III SYSRTD report 181
  in Monitor III SYSSUM report (active time) 191
  in Monitor III SYSSUM report (queue time) 190
  in Monitor III SYSSUM report (total time) 191
  in Monitor III SYSWKM report 198
average SRB time field
  in the Monitor III SYSTREND report 193
average TCB time field
  in the Monitor III SYSTREND report 193
average use summary field
  in Monitor III STORC report 154
average users delayed field
  in Monitor III DEVJ report 121

B
blocked workload 332
  threshold for promotion 338
buffer counts by pool 142

C
C (class) field
  in Monitor III STOR report 151
  in Monitor III STORF report 158
  in Monitor III WFEX report options
  action panel 210
CACHDET (cache activity details)
  how to request 35
  Monitor III report
    field descriptions 37
CACHDET (Cache Detail)
  Monitor III report
    command abbreviation 21
    purpose of 35
Common Storage Remaining (STORCR) (continued)
Data Set Delays (DSND)
- Monitor III report
  - command 84
  - command abbreviations 21
  - how to request 84
  - purpose of 83

DCM
- Monitor II
  - IOQUEUE report 261
- Monitor III
  - IOQUEUE report 112

DCM (dynamic channel path management)
- in Monitor II Channel Path Activity report 246
- in Monitor III Channel Path Activity report 56
- in Postprocessor Channel Path Activity report 323
- in Postprocessor I/O Queuing Activity report 389

DDNAME
- in Monitor III DI report 31

DEL Q LENGTH (delayed queue length) field
- in Monitor III IOQUEUE report 114

DELAY
- Monitor III report
  - command 63
  - command abbreviation 21
  - how to request 63
  - job selection panel 70
  - purpose of 63
  - sample 64

Delay DB% (device busy delay percentage) field
- in Monitor III DEVJ report 120
- delay monitoring 4

- delay percentage field
  - in Monitor III DELAY report (DLY %) 65
  - in Monitor III DEV report (DLY %) 72
  - in Monitor III EVR report (DLY %) 78
  - in Monitor III ENQ report (DLY %) 97
  - in Monitor III ENQR report (DLY %) 101
  - in Monitor III HSM report (DLY %) 111
  - in Monitor III HSMJ report 122
  - in Monitor III JESJ report 122
  - in Monitor III STOR report (DLY %) 151
  - in Monitor III XCF report (DLY %) 221
  - in Monitor III XCFJ report 125

- delayed name field
  - in Monitor III ENQR report 101

- DELAY (Job Delay)
  - Monitor III report
    - command abbreviations 21

- delta mode 234

DES (Data Encryption Standard) 348, 350, 352

Device Activity (DEVICE)
- Postprocessor report
  - average cannot be calculated 358
d
- Device Activity (DEV) (continued)
  - Postprocessor report (continued)

Device Activity (DEV) (continued)
- Postprocessor report (continued)
  - byte-multiplexor-channel-attached device 356
  - command 356
  - contents of 356, 357, 358, 364, 365
data inaccuracies in duration report 365
device changed or deleted 358
device data incomplete or missing 357
device in use 358
device not available during entire interval 357

Device Activity Trend (DEVT)
- Monitor III report
  - command 80, 82
  - description 82
  - how to request 80, 82
  - purpose of 80, 82

Device Activity Trend (DEVT)
- in Postprocessor report 357

Device Activity Trend (DEVT)
- in Monitor III report 357

Device Activity Trend (DEVT)
- in Monitor III report
  - command abbreviations 21
  - how to request 119
  - purpose of 73

Device Delays (DEV)
- Monitor III report
  - command abbreviations 21
  - purpose of 71
**Device Resource Delays (DEVR)**

Monitor III report (continued)

- Command abbreviations: 21
- How to request: 76
- Purpose of: 76

**Device Type Field**

- In Monitor III DEVR report: 164
- Using percentage field: 123
  - In Monitor III DEVJ report: 78

**DEVJ (Device Delays - Job)**

- Monitor III report
  - Command abbreviations: 21
  - How to request: 76
  - Purpose of: 76

**DLY % (delay percentage) Field**

- In Monitor III DEVR report: 78
- In Monitor III ENQ report: 97
- In Monitor III HSM report: 111
- In Monitor III STOR report: 151
- In Monitor III XCF report: 221

**DOMINO (Lotus Domino Server)**

- Postprocessor report
  - Command: 366
  - Contents of: 366
  - How to request: 366
  - Purpose of: 365

**DSND (Data Set Delays)**

- Monitor III report
  - Command: 84
  - How to request: 83

**DSNV (Data Set Delays - Volume)**

- Monitor III report
  - Command: 87
  - How to request: 88

**DSO (Device Activity)**

- Monitor III report
  - Command: 73
  - How to request: 73
  - Purpose of: 73

**ECKD**

- 375

**Disco (disconnect time percentage) Field**

- In Monitor III STOR report: 165

**Dynamic Channel Path Management (DCM)**

(continued)

- In Postprocessor I/O Queuing Activity report: 389

**Enclave Classification Attributes Pop-up**

- 92

**Enclave Details Pop-up**

- 92

**Enclave Support**

- Delay report (Monitor III): 68
- ENCLAVE report (Monitor III): 90
- PROC report (Monitor III): 136
- SYSINFO report (Monitor III): 173

**Encryption**

- 352

**Enhanced DAT Architecture**

- 403

**ENQ (Enqueue Activity)**

- Postprocessor report
  - Command: 370
  - How to request: 370
  - Purpose of: 369

**ENQ (Enqueue Delays)**

- Monitor III report
  - Command: 96

**ENQ (Enqueue Delays Job)**

- Monitor III report
  - Command: 96
  - How to request: 96
  - Purpose of: 96

**ENQI (Enqueue delays job)**

- 21

**ENQR (enqueue resource delays)**

- Monitor III report
  - Field descriptions: 101
  - Sample: 100

**ENQR (Enqueue Resource Delays)**

- Monitor III report
  - Command: 100
  - How to request: 100
  - Purpose of: 100

**Direct Memory Access (DMA)**

- 413

**Director Port Busy Field**

- In Monitor III IOQUEUE report: 115

**Disconnect Time Field**

- In Monitor III DEVJ report: 120
- In Monitor III STOR report (DSC %): 165

**Disk Space (SPACED)**

- Monitor III report
  - Command: 147, 148
  - How to request: 148
  - Purpose of: 147

**DLY % (delay percentage) Field**

- In Monitor III DELAY report: 65
- In Monitor III DEV report: 72

**Dynamic Channel Path Management (DCM)**

(continued)

- In Postprocessor I/O Queuing Activity report: 389
Enqueue Activity (ENQ) (continued)
Postprocessor report (continued)
how to request 370
purpose of 369
enqueue delays
Monitor III report (ENQ)
sample 96
Monitor III report (SYSENQ)
field descriptions 171
Enqueue Delays (ENQ)
Monitor III report
command 96
how to request 96
purpose of 96
enqueue resource delays (ENQR)
Monitor III report
field descriptions 101
sample 100
Enqueue Resource Delays (ENQR)
Monitor III report
command 100
how to request 100
purpose of 100
Enterprise Disk Systems (ESS)
Postprocessor report
command 374
how to request 374
ESS (Enterprise Disk Systems)
Postprocessor report
command 374
how to request 374
ESS rank statistics
solid state drive 377
EXCEPT (Exception)
Postprocessor report
command 470
contents of 470, 472
data fields 472
heading fields 472
how to request 470
improved exception reporting 473
purpose of 470
Exception (EXCEPT)
Postprocessor report
command 470
contents of 470, 472
data fields 472
heading fields 472
how to request 470
improved exception reporting 473
purpose of 470
Exceptions
in WFEX (Workflow/Exceptions)
Monitor III report 202
EXCP rate field
in Monitor III GROUP report 105
execution velocity (actual) field
in Monitor III SYSSUM report 188
execution velocity (goal) field
in Monitor III SYSSUM report 188
extended count key data 375
Hierarchical File System Statistics (HFS)
(continued)
Monitor II report (continued)
field descriptions 257
how to request 256
purpose of 256
report options 258
Postprocessor report
command 381
how to request 381
purpose of 381
hierarchical storage manager delays (HSM)
Monitor III report
report options panel 112
sample 111
Hierarchical Storage Manager Delays (HSM)
Monitor III report
command 110
how to request 110
High Performance FICON for System z 328
Monitor III 59, 249, 328
HiperDispatch
parked time 335
holding field
in Monitor III ENQJ report 121
in Monitor III PROCJ report 123
holding name field
in Monitor III ENQJ report 101
holding name/SYS field
in Monitor III ENQ report 99
holding percentage field
in Monitor III ENQ report 99
holding status field
in Monitor III ENQ report 99
in Monitor III ENQ report 101
homogeneous report class period 184
homogeneous report class periods 451
HSM (Hierarchical Storage Manager delays) 21
Monitor III report
report options panel 112
sample 111
HSM (Hierarchical Storage Manager Delays)
Monitor III report
command 110
how to request 110
purpose of 110
HSMJ (Hierarchical Storage Manager delays job) 22
HTTP (HTTP server activity)
Postprocessor report
summary 384
HTTP (HTTP Server)
Postprocessor report
command 384
how to request 384
HTTP Server (HTTP)
Postprocessor report
command 384
how to request 384
Library List (LLI) (continued)
Monitor II report (continued)
how to request 265
purpose of 265
LLI (Library List)
Monitor II report
command 265
contents of the report - APF
Library List 267
contents of the report - Link
Library List 266
contents of the report - LPA
Library List 267
field descriptions 267
how to request 265
purpose of 265

LLI (link library list)
Monitor II report
field descriptions 267
local page data set slots 408
LOCKSP (Spin Lock)
Monitor III report
command 127
how to request 127
purpose of 127
LOCKSU (Suspend locks) 22
LONG-TERM OVERVIEW
with the Postprocessor 287
long-term performance analysis
RMF XP
long-term performance analysis 4
with RMF XP 4
Lotus Domino Server (DOMINO)
Postprocessor report
command 366
how to request 366
Postprocessor report
contents of 366
purpose of 365
LPAR cluster
description 344
Postprocessor report 344
LPAR mode
CPU utilization 331

M
main delay path field
in Monitor III XCF report 221
main delay volume(s) field
in Monitor III DEV report 72
memory object 160
memory objects
1 MB 411
MNTJ (operator mount job delays) 22
model number field
in Monitor III SYSINFO report 174
Monitor I
Real-time reporting with 285
Monitor I
session
system activity measured 3
Monitor II background session
system activity measured 3
Monitor II display session
system activity measured 3
Monitor III
shortened intervals, reason for 16
sysplex support in different time zones 17
Monitor III data gatherer session
delay information 4
system activity measured 3
Monitor III report commands
header for single-system reports 23
header for sysplex reports 23
overview 20
Monitor III reporter session
commands 23
delay information 4
starting 18
system activity measured 3
Monitor III Utility
customizing CHANNEL report
with 59
MSCJ (operator message job delays) 22
MSU/h 60, 61
Multiple Lock Structure 147
MVS view
CPU utilization 233
OMVS
address spaces 130
OPD report 130
OMVS (OMVS Kernel Activity)
Postprocessor report
command 397
contents of 398
field descriptions 398
how to request 397
purpose of 397
OMVS Kernel Activity (OMVS)
Postprocessor report
command 397
contents of 398
field descriptions 398
N
name field
in Monitor III SYSINFO report 175
in Monitor III SYSSUM report 187
in Monitor III WFEX report 204, 205, 219
in Monitor III WFEX report definition
and criteria panel 213
navigation
keyboard 483
No. of completed transactions (For nnnn TRX) field
in Monitor III SYSWKM report 198
Notices 487
number field
in Monitor III DEVJ report 120
OVERVIEW
Postprocessor report
command 470, 474
creating Overview records 476
description of 475
how to request 470, 474
improved summary reporting 475
Overview data record 478
Overview header record 477
purpose of 474
overview condition names 291
overview conditions 291
overview names 291
P
Page Data Set Activity (PAGESP)
Postprocessor report
command 400
contents of 401
OPD report 130
OMVS (OMVS Kernel Activity) (continued)
Postprocessor report
command 397
contents of 398
field descriptions 398
how to request 397
purpose of 397
OPD (OMVS process data) 22
OPD (OMVS Process Data)
Monitor III report
command 130
contents of 131
how to request 130
purpose of 130
report options 133
OPT (OPT Settings)
Monitor II report
command 268
contents of 269
field descriptions 269
how to request 268
purpose of 268
OPT Settings (OPT)
Monitor II report
command 268
contents of 269
field descriptions 269
how to request 268
purpose of 268
Page Data Set Activity (PDS) (continued)
Monitor II report (continued)
special considerations 270
PAGESP (Page Data Set Activity)
Postprocessor report
command 400
contents of 401
how to request 400
overview names in 402
purpose of 400
using information in the report 400
PAGING (Paging Activity)
Postprocessor report
1 MB memory objects 411
Central Storage Movement Rates 406
central storage paging rates 403
Central Storage Request Rates 406
command 402
contents of 403
frame counts 408
high virtual storage frames 411
how to request 402
local page data set slots 408
memory objects 411
purpose of 402
SCM paging blocks 408
shared frames 408
slot counts 408
spreadsheet and overview reference 406, 408, 410, 412
Paging Activity (PAGING)
Postprocessor report
1 MB memory objects 411
Central Storage Movement Rates 406
central storage paging rates 403
Central Storage Request Rates 406
command 402
contents of 403
frame counts 408
high virtual storage frames 411
how to request 402
local page data set slots 408
memory objects 411
purpose of 402
SCM paging blocks 408
shared frames 408
slot counts 408
spreadsheet and overview reference 406, 408, 410, 412
Paging Activity (SPAG)
Monitor II report
command 280
contents of 281
field descriptions 281
how to request 280
purpose of 280
Paging Activity report
request rates and frames 407
parked time 335
Partition Data Report
z/VM guest 329
path attributes 114, 263
path number field
in Monitor III XCFJ report 125
PAV (parallel access volume)
in Monitor I DEVICE report 361
PCI functions 413
PCIE Activity (PCIE Activity)
Postprocessor report
command 413
contents of 413
how to request 413
purpose of 413
spreadsheet and overview 416
PCIE Activity (PCIE)
Postprocessor report
command 413
contents of 413
how to request 413
purpose of 413
spreadsheet and overview 416
peak allocation values field
in Monitor III STORC report 155
peer-to-peer remote copy 375
pend time percentage field
in Monitor III DEVI report 120
in Monitor III DEVR report (PND % Reasons) 78
in Monitor III STORR report (PND % Reasons) 78
in the Monitor III DEVI report 120
in the Monitor III DEVR report (PND % Reasons) 75
Pending (pend time percentage) field
in the Monitor III DEVR report 164
percent delayed for field
in Monitor III DELAY report (% Delayed for) 66
in Monitor III STOR report 151
percent used field
in Monitor III STORC report 155
percentage frames (% Frames) field
in Monitor III STOR report 164
performance index 189
period field
in Monitor III GROUP report 104
in Monitor III SYSWKM report 198
Peripheral-component-interconnect (PCI) devices 413
PGSP (Page Data Set Activity)
Monitor II report
command 270
contents of 271
field descriptions 271
how to request 270
purpose of 270
report options 272
special considerations 270
phase (P) field
in Monitor III SYSWKM report 199
PND % (pend time percentage) field
in Monitor III DEVR report 78
in Monitor III STORR report 165
possible cause or action field
in Monitor III WFEX report 208
Postprocessor
long-term overview reporting with 287
PPRC 375
Preallocated datasets
in DSINDEX report 29
preferred path 114, 263
primary delay category field
in Monitor III HSMJ report 122
in Monitor III JESJ report 122
primary delay reason field
in Monitor III HSMJ report 122
in Monitor III JESJ report 122
primary reason field
in Monitor III DELAY report 67
primary response time component field
in Monitor III GROUP report 104
possible cause field
in Monitor III DEVJ report 119
PROC (processor delays) 22
PROC (Processor Delays)
Monitor III report
command 134
contents of 134
field descriptions 134
how to request 134
report options 136
utility fields 136
Processor Delays (PROC)
Monitor III report
command 134
contents of 134
field descriptions 134
how to request 134
report options 136
utility fields 136
Processor Usage (PROCU)
Monitor III report
command 137
contents of 137
field descriptions 137
how to request 137
report options 138
utility fields 138
Processor using percentage field
in Monitor III PROCJ report 123
in Monitor III SYSWKM report 201
PROCJ (processor job delays) 22
PROCU (processor usage) 22
PROCU (Processor Usage)
Monitor III report
command 137
contents of 137
field descriptions 137
how to request 137
report options 138
utility fields 138
Programming interface information 489
promotion threshold 338
Q
QSCJ (quiescent jobs) 22
qualifier field
in Monitor III WFEX report options
action panel 210
Index 505
quiesce delay (Quies) field
  in Monitor III SYSWKM report 201

Range field
  in the Monitor III DEVTR report 81
  in the Monitor III SYSTREND report 193
Real-time reporting
  with Monitor I 285
Reason field
  in Monitor III WFEX report 206
Reasons field
  in Monitor III DEVR report 78
  in the Monitor III DEVN report 75
Refresh field
  in Monitor III SYSSUM report 187
report class periods
  heterogeneous 185
  homogeneous 184
report class periods
  heterogeneous 451
  homogeneous 451
refresh field
  in Monitor III SYSSUM report 191
Resource Group Data (RG)
  Monitor III report
  command 139
  how to request 139
  purpose of 139
resource group field
  in Monitor III SYSSUM report 191
resource name field
  in Monitor III ENQR report 100
resource waiting percentage field
  in Monitor III ENQ report 97
resource waiting status field
  in Monitor III ENQ report 97
response time
  average 462
  midpoint 462
response time (actual) field
  in Monitor III SYSSUM report 188
response time (goal) field
  in Monitor III SYSSUM report 188
response time breakdown field (delayed by)
  in Monitor III SYSWKM report 200
response time distribution (SYSRTD)
  Monitor III report
  option panel 181
  sample 178
Response Time Distribution (SYSRTD)
  Monitor III report
  command 177
  how to request 177
  purpose of 177
response time field
  in Monitor III SYSINFO report (RESP Time) 175
  in Monitor III SYSRTD report 181
  in the Monitor III DEVN report (Rpt) 75
RG (Resource Group Data)
  Monitor III report
  command 139
  how to request 139
  purpose of 139
RLS DS (VSAM RLS activity by data set) 22
RLSLRU (VSAM LRU Overview)
  Monitor III report
  command 140
  how to request 140
  purpose of 140
RLSLRU (VSAM RLS activity LRU statistics) 22
RLSLRU report
  buffer counts by pool 142
RLSSC (VSAM RLS activity by storage class) 22
RLSSC/RLS DS (VSAM RLS Activity)
  Monitor III report
  command 142
  how to request 142
  purpose of 142
  RLS DS command 142
  RLSSC command 142
RMF (Resource Measurement Facility)
  help panels 19
  tutorial 19
RMF command 18
row and position field
  in Monitor III WFEX report options action panel 210
SAID 375
sample to cycles ratio
  changing 437
SCM
  in Postprocessor PAGESP report 401
  Storage Class Memory 401
SCM (storage class memory) 308
SCM paging blocks 408
SCSI 375
Serialization Delay (SDELAY)
  XML Postprocessor report
    command 417
    contents of 417
    how to request 417
    purpose of 417
    serialization delay details 419
    serialization delay summary 418
server field
  in Monitor III ENQJ report 121
Service class field
  in Monitor III SYSWKM report 201
Service class field
  in Monitor III SYSSUM report 187
Service field
  in Monitor III SYSWKM report 201
Service Policy page 451
Service Time 455
session options xvii
SHA-1 hash algorithm 353
SHA-256 hash algorithm 353
Shared Device Activity (SDEVICE)
  Postprocessor report
    command 424
    field descriptions 425
    how to request 424
    purpose of 424
    Shared Direct Access Device
      Activity report 424
    Shared Magnetic Tape Device
      Activity report 425
    spreadsheet and overview
      reference 430
      using information in the
        report 424
shared field
  in Monitor III DEVJ report 120
shared frames, PAGING report 408
shortcut keys 483
shortened intervals, reason for 16
SHR field
  in Monitor III CHANNEL report 58
slot counts
  available slots, PAGING report 410
  bad slots, PAGING report 410
  NON-VIO slots, PAGING report 410
  total slots, PAGING report 410
  VIO slots, PAGING report 410
slots
  PAGING report 408
small computer system interface 375
software pricing
  Postprocessor CPU report 339
  solid state drive 377
sort criteria
  in the Monitor III DEVN report 75
SPACED (disk space) 22
SPACED (Disk Space)
  Monitor III report
    command 147, 148
    how to request 148
    purpose of 147
SPACED (storage group space) 22
SPACED (Storage Space)
  Monitor III report
    command 149
    how to request 149
    purpose of 149
SPAG (Paging Activity)
  Monitor II report
    command 280
    contents of 281
    field descriptions 281
    how to request 280
    purpose of 280
Speed (Workflow)
  in WFEX (Workflow/Exceptions)
    Monitor III report 202
  speed field
    in Monitor III WFEX report 205
speedometer
  in Monitor III WFEX report 219
Spin Lock (LOCKSP)
  Monitor III report
    command 127
    how to request 127
    purpose of 127
Spin Lock Report
  commands 127
SQA + ESQA (system queue area)
  overflow field
    in Monitor III STORR report 164
SRB field
  in the Monitor III SYSTREND report 193
SRCS (Central Storage/Processor/SRM)
  Monitor II report
    command 282
    contents of 283
    field descriptions 283
    how to request 282
    purpose of 282
starting and ending an RMF reporter session 18
status field
  in Monitor III ENQJ report 121
STOR (storage delays) 22
  Monitor III report
    report options panel 152
STOR (Storage Delays)
  Monitor IIR report
    command 150
    how to request 150
    purpose of 150
storage class memory (SCM) 308
Storage Class Memory (SCM) 401
storage delay summary
  Monitor III report
    STORS command 150
    options panel 169
    sample 167
Storage Delay Summary (STORS)
  Monitor III report
    command 166
    how to request 166
    purpose of 166
Storage Delays (STOR)
  Monitor III report
    STORS command 150
    how to request 150
    purpose of 150
storage frames
  Monitor III report
    STORS command 160
    purpose of 160
Storage Frames (STORS)
  Monitor III report
    command 157
    how to request 157
    purpose of 157
Storage Frame Report
  contents 157
  field descriptions 168
  options panel 169
  sample 167
Storage Memory Objects (STORM)
  Monitor III report
    command 160
    how to request 160
    purpose of 160
Storage Memory Objects (STORM)
  Monitor III report
    field descriptions 161
Storage Memory Objects (STORM)
  Monitor III report
    contents of 163
    field descriptions 164
    how to request 163
    purpose of 163
storage delay summary
  Monitor III report
    STORS command 166
    sample 167
STORS (storage delays summary) 22
STORS (storage delay summary)
  Monitor III report
    command 166
    sample 167
STORS (storage delays summary) 22
STORS (storage delays summary)
  Monitor III report
    subsystem data field
      in Monitor III SYSRTD report 181
    subsystem menu 27
    subsystem reports 27
    subsystem type field
      in Monitor III SYSWKM report 199
STORC (common storage remaining) 22
STORC (common storage)
  Monitor III report
    field descriptions - system information 154
STORC (Common Storage)
  Monitor III report
    command 152, 153
    how to request 153
    purpose of 152
STORC report
  unallocated common area 154
Suspend Lock (LOCKSU) (continued)
Monitor III report (continued)
contents of 129
how to request 129
purpose of 129
Suspend Lock Report
commands 129
switched time field
in Monitor III SYSWKM report 200
SYSENQ (sysplex enqueue delays) 22
Monitor III report
field descriptions 171
SYSENQ (Sysplex Enqueue Delays)
Monitor III report
command 170
how to request 170
purpose of 170
SYSINFO (system information) 22
Monitor III report
sample 174
SYSINFO (System Information)
Monitor III report
command 172
field descriptions 174
how to request 172
purpose of 172
utility fields 176
Sysplex Data Server (SDS)
Monitor II report
command 272
contents of 273
field descriptions 273
how to request 272
purpose of 272
Sysplex Enqueue Delays (SYSENQ)
Monitor III report
command 170
how to request 170
purpose of 170
Sysplex Report Selection Menu 24
syscall summary
Monitor III report (SYSSUM)
sample 186
Sysplex Summary (SYSSUM)
Monitor III report
command 181, 182
how to request 182
purpose of 181
SYSRTD (response time distribution) 22
Monitor III report
option panel 181
sample 178
SYSRTD (Response Time Distribution)
Monitor III report
command 177
how to request 177
purpose of 177
SYSSUM (sysplex summary) 22
Monitor III report
sample 186
SYSSUM (Sysplex Summary)
Monitor III report
command 181, 182
how to request 182
purpose of 181
system activities measured
Monitor I session 3
system activities measured (continued)
Monitor II session 3
Monitor III session 3
Postprocessor 3
System Enqueue Contention (SENQ)
Monitor II report
command 274
contents of 275
field descriptions 276
how to request 274
purpose of 274
report options 277
types of 274
System Enqueue Reserve (SENQR)
Monitor II report
command 278
contents of 279
field descriptions 279
how to request 278
purpose of 278
report options 280
system field
in Monitor III ENQJ report 121
in Monitor III SYSWKM report 181
system information
Monitor III report (SYSINFO)
sample 174
Monitor III report (YSTREND)
field descriptions 193
System Information (SYSINFO)
Monitor III report
command 172
field descriptions 174
how to request 172
purpose of 172
utility fields 176
system name field
in Monitor III SYSWKM report 201
system queue area (SQA + ESQA)
overflow field
in Monitor III STORR report 164
system suspend locks 418
system information
in Monitor III SYSTREND report
(System Trend) 193
T
TCB field
in the Monitor III SYSTREND report 193
text field
in Monitor III WFEX report definition
and criteria panel 212
time field
in Monitor III SYSSUM report 188
Time field
in the Monitor III DEVT report
(Time) 81
in the Monitor III SYSTREND report
(Time) 193
Time Stamp field
in the Monitor III DEVT report
(Time) 81
in the Monitor III SYSTREND report
(Time) 193
time zones
Monitor III sysplex support 17
total utilization field
in Monitor II channel path activity
(CHANNEL) report 59
TRACE (Trace Activity)
Postprocessor report
command 431
contents of 431
how to request 431
purpose of 431
standard deviation output 435
using information in the
report 431
Trace Activity (TRACE)
Postprocessor report
command 431
contents of 431
how to request 431
purpose of 431
standard deviation output 435
using information in the
report 431
trademarks 489
TRANS/SEC (transactions per second)
field
in Monitor III SYSTREND report
(System Trend) 175
Transaction ended rate field
in Monitor III GROUP report 105
transaction rate (Trx Rate) field
in Monitor III SYSRTD report 181
transaction response time field
in Monitor III SYSTREND report
(Transaction) 175
transactions per second (TRANS/SEC)
field
in Monitor III SYSTINFO report 175
tutorial 19
type (T) field
in Monitor III SYSSUM report 187
Type field
  in the Monitor III DEVT report  81

U
  UKN % (unknown percentage) field
    in Monitor III DELAY report 65
  unallocated common area 154
  unknown percentage (UKN %) field
    in Monitor III DELAY report 65
  user interface
    ISPF  483
    TSO/E  483
  user menu 27
  user reports 27
  users field
    in Monitor III SYSINFO report 175
  users/active field
    in Monitor III WFEX report 205
  using percentage field
    in Monitor III DELAY report (USG %) 65
    in Monitor III DEV report (USG %) 72
    in Monitor III HSMJ report 122
    in Monitor III JESJ report 122
    in Monitor III PROC report (USG %) 135

V
  vector utilization field
    in Monitor III GROUP report (Vector UTIL) 105
  velocity field
    in Monitor III SYSWKM report 201
  Virtual Storage Activity (VSTOR)
    Postprocessor report
      allocated storage 435
      changing sample to cycles ratio 437
      command 436
    Common Storage Detail
      section 439
    Common Storage Summary
      section 437
      contents of 436
      data gathering considerations 436
      free storage 435
      how to request 436
      overview reference 439
      partial private area data 442
      Private Area Detail section 443
    Private Area Summary
      section 440
    Private Storage Map 441, 442
    purpose of 435
    using information in 435
  VMGUEST Monitor I gatherer
    option 329
  VolSer field
    in the Monitor III DEVT report 81
  volume serial field
    in Monitor III STORR report 164

W
  VSAM LRU Overview (RLSLRU)
    Monitor III report
      command 140
      how to request 140
      purpose of 140
  VSAM RLS Activity (RLSSC/RLSDS)
    Monitor III report
      command 142
      how to request 142
      purpose of 142
    RLSD command 142
    RLSSC command 142
  VSTOR (Virtual Storage Activity)
    Postprocessor report
      allocated storage 435
      changing sample to cycles ratio 437
      command 436
    Common Storage Detail
      section 439
    Common Storage Summary
      section 437
      contents of 436
      data gathering considerations 436
      free storage 435
      how to request 436
      overview reference 439
      partial private area data 442
      Private Area Detail section 443
    Private Area Summary
      section 440
    Private Storage Map 441, 442
    purpose of 435
    using information in 435
  WLMGL (Workload Activity) (continued)
    Postprocessor report (continued)
      WLMGL option list 444
      Workload Group and Service Class Period report 449
      Workload Group report 449
  workflow manager delays (SYSWKM)
    Monitor III report
      field descriptions 198
      report options panel 201
      sample 195
  Work Manager Delays (SYSWKM)
    Monitor III report
      command 194
      how to request 194
      purpose of 194
  workflow/exceptions (WFEX)
    Monitor III report
      allocated storage 435
      changed sample to cycles ratio 437
      command 436
      overview reference 439
      partial private area data 442
      Private Area Detail section 443
      Private Area Summary
      section 440
      Private Storage Map 441, 442
      purpose of 435
      using information in 435
    Workflow/Exceptions (WFEX)
      Monitor III report
        command 202, 203
        how to request 203
        purpose of 202
  Workflow Activity (WLMGL)
    Postprocessor report
      command 444
      contents of 445, 448, 449, 450, 451
      field descriptions 452
      how to request 444
      option list 444
      Policy Summary report 450
      purpose of 444
      Report Class Period report 451
      Report Class report 450
      Service Class Period report 445
      Service Class report 448
      spreadsheet and overview reference 463
    WLMGL option list 444
    Workload Group and Service Class Period report 449
    Workload Group report 449

X
  XCF (Cross-System Coupling Facility Activity)
    Postprocessor report
      command 466
      contents of 466
      how to request 466
      purpose of 466
XCF (Cross-System Coupling Facility Delays)
Monitor III report
  command 219
  command abbreviations 23
  contents of 220
  field descriptions 220
  how to request 219
  purpose of 219
  report options 221
XCFJ (cross system coupling facility job delays) 23
  Monitor III report
    field descriptions 125

Y
yellow and red (Yel Red) fields
in Monitor III WFEX report definition
  and criteria panel 213

Z
z/OS Unix
  address spaces 130
  OPD report 130
z/VM guest
  Partition Data Report 329
zAAP
  See IBM System z Application Assist Processor (zAAP)
zFS activity 221
zFS Activity (ZFSACT)
  Monitor III report
    command 221
    how to request 221
    purpose of 221
zFS Summary (ZFSSUM)
  Monitor III report
    command 223
    how to request 223
    navigating to details in 225
    purpose of 222
ZFSACT (zFS activity) 23
ZFSACT (zFS Activity)
  Monitor III report
    command 221
    how to request 221
    purpose of 221
ZFSSUM (zFS file system summary) 23
ZFSSUM (zFS Summary)
  Monitor III report
    command 223
    how to request 223
    navigating to details in 225
    purpose of 222
zHPF 328
  Monitor III 59, 249, 328
zIIP
  See IBM System z Integrated Information Processor (zIIP)

510 z/OS V2R1.0 RMF Report Analysis