Planning for Sub-Capacity Pricing
Planning for Sub-Capacity Pricing
Contents

Figures .......................................................... vii

Tables ............................................................ ix

About this document ........................................... xi
Who should use this document? ............................. xi
Where to find more information ............................. xi
Information updates on the Web .............................. xii

Summary of changes ........................................... xiii

Chapter 1. Introduction to sub-capacity pricing on z/OS ................................................. 1
Terms to understand ............................................. 1
What is the System z and zSeries software pricing framework? .................................. 2
  Monthly license charge (MLC) software pricing ..................................................... 2
  International Product License Agreement (IPLA) software pricing .................................. 3
How does sub-capacity pricing work? ................................................................. 4
  LPAR utilization capacity ........................................... 5
  How the peak rolling four-hour average MSU value is determined ............................. 6
  Advantages of sub-capacity pricing ............................................................. 6
  Is sub-capacity pricing for everyone? .......................................................... 7
  Prerequisites for sub-capacity pricing ......................................................... 8
  Detailed pricing information ....................................................... 8

Chapter 2. Overview of planning and implementation tasks for sub-capacity pricing .......... 11
Sub-capacity pricing planning tasks ...................................................... 11
Sub-capacity pricing implementation tasks ........................................... 12

Chapter 3. Inventorying your software .............................................................. 15
Creating software inventories ...................................................... 15
  Sample software inventories for sub-capacity eligible MLC products .......................... 15
  Sub-capacity eligible IPLA products ..................................................... 17
  Products in other pricing categories .................................................. 17

Chapter 4. Understanding your configuration ...................................................... 19
What is the capacity of your current configuration? ............................................. 19
How much of your capacity are you using? .................................................... 19
  About the Sub-Capacity Planning Tool .................................................. 19
  Reviewing the output of the Sub-Capacity Planning Tool .................................. 20
What further growth do you anticipate? ..................................................... 22

Chapter 5. Analyzing your software costs ............................................................. 27
Requesting a pricing analysis from IBM .................................................... 27
Determining whether sub-capacity pricing is right for you ..................................... 29
  Technical requirements for sub-capacity pricing ......................................... 29
  Contractual requirements for sub-capacity pricing ...................................... 30
Contracts for sub-capacity pricing .................................................. 30
Scheduling monthly sub-capacity report reviews ........................................... 31

Chapter 6. Getting ready to use the Sub-Capacity Reporting Tool .......................... 33
About the Sub-Capacity Reporting Tool .................................................. 33
Overview of the SCRT process .................................................. 34
Contents

z/OS information .................................................. 73

Notices .............................................................. 75
Policy for unsupported hardware ............................. 76
Trademarks .......................................................... 76

Index ............................................................... 77
Figures

1. Sample configuration: Products and LPARs in CPC1 and CPC2 in Sysplex A .................. 5
2. Example of calculating the peak utilization based on the peak rolling four-hour average MSU value 6
3. Sample configuration: Sub-capacity eligible products in Sysplex A .......................... 15
4. Example of a software inventory of sub-capacity eligible monthly license charge products 16
5. Sample output from the Sub-Capacity Planning Tool ........................................ 21
6. Sample output from the Sub-Capacity Planning Tool showing LPAR combinations .......... 21
7. Example: Capacity and growth plan ............................................................... 24
8. Example of pricing analysis showing VWLC costs ........................................... 28
9. Example of pricing analysis showing PSLC costs ............................................ 29
10. Sample sub-capacity report: Customer information and tool information sections ........ 38
11. Sample sub-capacity report: Optional Special Conditions section containing one of several error messages ............................................................... 38
12. Sample sub-capacity report: Product Summary Information section ...................... 39
13. Sample sub-capacity report: Detail Data Collection section .................................. 39
14. Sample sub-capacity report: SMF / SCRT89 Input Data Statistics section and Detail LPAR Data section ................................................................. 40
15. Sample sub-capacity report: Product Max Contributors section ........................... 40
16. Sample sub-capacity report: Product Grid Snapshot, Defined Capacity Value Used, and Group Capacity LPARs sections ............................................... 41
17. Sample configuration: Products and LPARs in CPC 1 for Airweave, Inc. ................. 43
18. Product/location matrix for Airweave, Inc. ......................................................... 44
19. Sub-Capacity Planning Tool output for Airweave configuration ............................ 44
20. Capacity and growth plan for Airweave, Inc. .................................................... 45
21. PSLC cost for the Airweave configuration during the production cycle ................... 46
22. Full capacity WLC cost for the Airweave configuration during the production cycle ... 46
23. Sub-capacity WLC cost for the Airweave configuration during the production cycle .... 47
24. Sub-capacity WLC cost for the Airweave configuration during the planning cycle (summary, 75 MSUs) ................................................................. 47
25. WLC cost for the Airweave configuration during the system maintenance cycle (summary, 82 MSUs). ................................................................. 47
26. Sample configuration: Products and LPARs in SYSTEM1 and SYSTEM2 CPCs for AKZ Financials 48
27. Product/location matrix for AKZ ................................................................. 49
28. Sub-Capacity Planning Tool output for AKZ Financials: SYSTEM1 ......................... 49
29. Sub-Capacity Planning Tool output for AKZ Financials: SYSTEM2 ......................... 50
30. Capacity and growth plan for AKZ Financials .................................................. 50
31. PSLC cost for the current AKZ configuration .................................................... 51
32. Sub-capacity WLC cost for the current AKZ configuration .................................... 52
33. Sub-capacity WLC cost for the AKZ configuration one year from now ................. 52
34. Sub-capacity WLC cost for the AKZ configuration two years from now ............... 52
35. Sample sub-capacity report: product summary information for zNALC only ............... 58
36. Sample sub-capacity report: Product Summary Information section for a CPC with traditional z/OS and zNALC workloads .......................................... 59
37. Sample z/OS traditional configuration with group capping .................................... 61
38. MSUs for hour 51 in the sample z/OS traditional configuration ............................. 61
39. MSUs for hour 73 in the sample z/OS traditional configuration ............................. 62
40. Sample z/OS traditional and z/OS zNALC configuration with group capping ........... 63
41. MSUs for hour 73 in the sample z/OS traditional and z/OS zNALC configuration .......... 63
42. Peak utilization for separate systems (CPC 1 and CPC 2) before consolidation ........ 64
43. Peak utilization for equivalent LPARs (LPAR A and LPAR B) on a single system (CPC 3) after consolidation ................................................................. 64
## Tables

1. Information resources for sub-capacity pricing and related topics .......................... xi
2. Example: Airweave, Inc.'s seasonal business cycle .................................................. 43
3. Example: Yearly utilization for Airweave, Inc. ....................................................... 45
4. Sub-capacity planning checklist ............................................................................ 67
5. Sub-capacity implementation checklist .................................................................. 69
6. IBM System z software pricing Web pages ............................................................ 71
About this document

This document presents information about planning for and implementing sub-capacity pricing for IBM® products that run under the z/OS® operating system. It assists you in understanding your current software inventory, assessing your tactical and strategic software costs, making the decision to move to sub-capacity pricing, and using the Sub-Capacity Planning Tool and the Sub-Capacity Reporting Tool as aids in planning and managing your software costs.

For more information to help you understand how sub-capacity pricing applies to your particular configuration, you may need to refer to the resources listed under "Where to find more information."

Who should use this document?

This document is intended for technical and administrative personnel involved in managing software products for an enterprise. There are three broad categories of users:

- Software asset managers, who must do any of the following:
  - Perform software acquisition and software license management
  - Maintain software inventories
  - Project future software needs
  - Manage software costs
  - Understand software licensing terms and conditions
- z/OS system architects, who must do any of the following:
  - Project software needs, based on current software utilization
  - Request or specify new and additional software licenses and products for the enterprise
  - Download and run planning tools
  - Review software costs
- Capacity planners, who must:
  - Create and maintain capacity and growth plans for z/OS systems

Where to find more information

You can find more information about sub-capacity pricing and related topics at www.ibm.com/zseries/swprice/.


Table 1 lists additional resources for information about sub-capacity pricing and related topics.

Table 1. Information resources for sub-capacity pricing and related topics

<table>
<thead>
<tr>
<th>Resource title</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the Sub-Capacity Reporting Tool</td>
<td>SG24-6522</td>
</tr>
<tr>
<td>z/OS MVS Planning: Workload Management</td>
<td>SA22-7602</td>
</tr>
</tbody>
</table>
Table 1. Information resources for sub-capacity pricing and related topics (continued)

<table>
<thead>
<tr>
<th>Resource title</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS RMF User's Guide</td>
<td>SC33-7990</td>
</tr>
<tr>
<td>z/OS MVS System Management Facilities (SMF)</td>
<td>SA22-7630</td>
</tr>
<tr>
<td>z/OS Intelligent Resource Director, available from the IBM Redbooks Web site</td>
<td>SG24-5952</td>
</tr>
<tr>
<td>z/OS HCD User's Guide</td>
<td>SC33-7988</td>
</tr>
</tbody>
</table>

Information updates on the Web

For the latest information updates that have been provided in PTF cover letters and Documentation APARs for z/OS, go to publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/ZIDOCMST

This online document is updated weekly and lists documentation changes before they are incorporated into z/OS publications.
Summary of changes

Summary of changes for SA22-7999-05
z/OS Version 1 Release 11

This document contains information previously presented in Planning for Sub-Capacity Pricing, SA22-7999-04.

New and changed information

- References to the IBM System z10™ Business Class (z10 BC) platform have been added.
- The formal names of the sub-capacity pricing contract attachments and amendments have been updated in “Contracts for sub-capacity pricing” on page 30 to reflect the latest terminology.
- “Sending TSAD data” on page 35 has been updated with information about how you can e-mail the data to IBM.
- The sample sub-capacity report sections shown in “Analyzing the sub-capacity report” on page 37 and “More about zNALC pricing” on page 57 have been updated to reflect a more recent version of SCRT.

You may notice changes in the style and structure of some content in this document—for example, headings that use uppercase for the first letter of initial words only, and procedures that have a different look and format. The changes are ongoing improvements to the consistency and retrievability of information in our documents.

This document contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of changes for SA22-7999-04
z/OS Version 1 Release 10

This document contains information previously presented in Planning for Sub-Capacity Pricing, SA22-7999-03.

New and changed information

- References to the IBM System z10 product line and, specifically, the IBM System z10 Enterprise Class (z10 EC) platform have been added.
- IBM System z10 Integrated Information Processors and IBM System z9® Integrated Information Processors (zIIPs) have been added to the list of processor units (PUs) and the definition of IBM System z® Application Assist Processors (zAAPs) has been updated in “Terms to understand” on page 1.
- Information about a new pricing metric has been added in “Getting Started Sub-capacity Pricing for z/OS IPLA Software” on page 4.
- Information about submitting sub-capacity reports to the license management support (LMS) application has been added in Chapter 6, “Getting ready to use the Sub-Capacity Reporting Tool,” on page 33.
This document contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of changes
for SA22-7999-03
z/OS Version 1 Release 9

This document contains information previously presented in Planning for Sub-Capacity Pricing, SA22-7999-02.

New and changed information
- z/VSE™ has been added to the table of sub-capacity eligible products in Chapter 3, “Inventorying your software,” on page 15.
- “Collecting SCRT89 records” on page 36 describes where to find the instructions for generating SCRT89 records on z/TPF systems and for generating SCRT89 records for z/VSE.
- Information about Midrange Workload License Charge (MWLC), System z New Application License Charges (zNALC), and group capacity is added to “Appendix C. Advanced topics in sub-capacity pricing” on page 57.
- The sub-capacity report contains a large number of small changes to its format. Some changes have been made to simplify the reporting for new pricing options and additional operating system families. Other changes were made to make it easier to report SCRT errors and to restructure the sub-capacity report for future enhancements. The changes are all summarized in Using the Sub-Capacity Reporting Tool, SG24-6522, available at www.ibm.com/zseries/swprice/scrt.

Deleted information
- The z/OS.e configuration information in the sub-capacity report is removed. However, SCRT still supports z/OS.e for z/OS.e V1.8 and lower systems.

This document contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability.
Chapter 1. Introduction to sub-capacity pricing on z/OS

Sub-capacity pricing for z/OS systems offers pricing models that can provide more flexibility and improved cost of computing as you manage the volatility and growth of dynamic workloads on the IBM System z10 and IBM System z9 platforms and on IBM eServer™ zSeries® systems running in z/Architecture® (64-bit) mode. All System z10 and System z9 systems run in z/Architecture mode.

In addition to z/OS systems, sub-capacity pricing is also available for z/TPF and z/VSE systems and associated products. For details, see **Using the Sub-Capacity Reporting Tool** at [www.ibm.com/servers/resources/SCRT_user_guide.pdf](http://www.ibm.com/servers/resources/SCRT_user_guide.pdf).

Terms to understand

To understand sub-capacity pricing, you need to know a little bit about the processing units on which pricing is based.

**central processor (CP)**
The hardware unit that interprets and processes program instructions for the z/OS operating system and products that run under it.

**central processor complex (CPC)**
A System z10, System z9, zSeries, or S/390® server (or a plug-compatible manufacturer's server) that runs the S/390 or z/Architecture instruction set. A CPC contains one or more CPs.

**logical partition (LPAR)**
A logical subdivision of a CPC. The System z Processor Resource/Systems Manager™ (PR/SM™) facility creates logical partitions and assigns processing capacity to them.

**MSUs**
Millions of service units. In sub-capacity pricing documentation, MSUs refer to software pricing capacity units, not hardware capacity measurements.

**processor unit (PU)**
The hardware unit that interprets and processes program instructions. System z processors can have different types of processor units, including:

- **CPs**, as defined above
- **Integrated Facility for Linux® (IFL) engines**, which are dedicated to running Linux workloads
- **IBM System z Application Assist Processors (zAAPs)**, which support eligible application workloads, such as Java™ and XML, running on z/OS V1R6 and later releases
- **IBM System z10 Integrated Information Processors** and **IBM System z9 Integrated Information Processors (zIIPs)**, which support specific data and transaction processing workloads for business intelligence (BI), ERP, and CRM, and select network encryption workloads on z/OS V1R6 and later releases

**sysplex**
A collection of z/OS systems that cooperate, using certain hardware and software products, to process work. Just as a CPC contains one or more CPs, a sysplex contains one or more (usually more than one) CPCs.
What is the System z and zSeries software pricing framework?

The System z and zSeries software pricing framework refers to both the pricing and the licensing terms and conditions for IBM products that run in a mainframe environment. IBM mainframe software pricing is grouped into two categories:

- Monthly license charge (MLC) software
- International Product License Agreement (IPLA) software

Monthly license charge (MLC) software pricing

Monthly license charges apply to many System z software products, including z/OS, DB2®, CICS®, IMS™, MQSeries®, z/TPF, z/VSE and others. Pricing and terms and conditions for MLC products are based on the pricing metric you select. MLC pricing metrics can roughly be grouped into two categories: full capacity based pricing metrics and sub-capacity capable pricing metrics.

For complete descriptions of all System z software pricing metrics, go to www.ibm.com/zseries/swprice/.

Full capacity based MLC pricing metrics

Under a full capacity based pricing metric, all software charges are determined by the full IBM-rated capacity (MSUs) of the CPC in which the product runs. Examples of full capacity based pricing metrics are Parallel Sysplex® License Charges (PSLC) and zSeries Entry License Charges (zELC). More information about these full capacity pricing metrics is available on the System z software pricing Web site at www.ibm.com/zseries/swprice/.

Sub-capacity capable MLC pricing metrics

Under a sub-capacity pricing metric, software charges for certain products are based on the utilization capacity of the logical partition (LPAR) or LPARs in which the products run. Examples of sub-capacity capable pricing metrics are Workload License Charges (WLC), Entry Workload License Charges (EWLC), and Midrange Workload License Charges (MWLC), System z New Application License Charges (zNALC), and Select Application License Charges (SALC).

These MLC software pricing metrics can be implemented in either sub-capacity or full capacity mode. Sub-capacity pricing is available only on CPCs for which a sub-capacity report has been submitted and all other license terms and conditions have been met. If no sub-capacity report is submitted in a given month for a CPC for which sub-capacity pricing has been established, any sub-capacity eligible products on that CPC are charged based on the full capacity of the CPC for that month.

Workload License Charges (WLC): When you elect WLC pricing for a particular operating system on a CPC, all of that operating system family’s MLC products are licensed under WLC on that CPC. Sub-capacity eligible WLC products are called Variable Workload License Charges (VWLC) products. Non-sub-capacity eligible products are called Flat Workload License Charges products; their pricing is a fixed monthly charge regardless of the capacity of the CPC on which they run.


Entry Workload License Charges (EWLC): When you elect EWLC pricing for a particular operating system on a CPC, all of that operating system family’s MLC products that are sub-capacity eligible are licensed under EWLC on that CPC. The
MLC products for that operating system on that CPC that are not sub-capacity eligible are charged a capacity-based price using the zELC pricing metric (for z800 CPCs) or the EWLC Tiered pricing metric (for z10™ BC, z9® BC, and z890 CPCs).


**Midrange Workload License Charges (MWLC):** When you elect MWLC pricing for the z/VSE operating system on a CPC, those z/VSE MLC products that are sub-capacity eligible are licensed under MWLC on that CPC. MWLC pricing applies only to the z/VSE (Version 4 or higher) operating system and certain key z/VSE middleware programs. On System z10 BC or System z9 BC CPCs, all other z/VSE programs will be priced according to Tiered Entry Workload License Charges (TWLC). On System z10 EC or System z9 EC CPCs, all other z/VSE programs will be priced according to either Flat Workload License Charges, Graduated Monthly License Charges, or Extended License Charges.


**System z New Application License Charges (zNALC):** zNALC is a monthly license charge pricing metric available on IBM z/Architecture servers running z/OS and offers a reduced price for z/OS on LPARs where qualified applications are running. zNALC pricing applies to the z/OS base feature and z/OS priced features (with the exception of HCM and HLASM Toolkit, which have flat pricing). zNALC is available for z/OS on LPARs dedicated to qualified applications, among other requirements. Similar to Workload License Charges and Entry Workload License Charges, customers may implement zNALC in either full capacity or sub-capacity mode.

Any logical partition (LPAR) that is designated as a zNALC LPAR must follow the naming convention ZNALxxxx where xxxx is any letters or numbers. Alternatively, customers who prefer not to change LPAR names to qualify for zNALC pricing (and are running z/OS V1R6 or later) can specify the LICENSE=ZNALC IPL parameter in the active IEASYSysx parmlib member to indicate a zNALC system. The LICENSE=ZNALC IPL parameter will be available through APAR OA20314. However, the complete zNALC solution for the SMF data collected from a z/OS system initialized in this manner requires SCRT V14.1.0 or higher.

More information about zNALC pricing is available in “More about zNALC pricing” on page 57 and at www.ibm.com/zseries/swprice/znalc.html.

**Select Application License Charges (SALC):** SALC pricing is available solely for WebSphere® MQ for System z and only on CPCs with either WLC or EWLC pricing. It is designed to allow a WLC or EWLC customer to license MQ under product utilization rather than the sub-capacity pricing provided under WLC or EWLC. SCRT still reports MSU values for these products but the reported values are not used to calculate the license charges.

More information about SALC pricing is available at www.ibm.com/zseries/swprice/other.html.

**International Product License Agreement (IPLA) software pricing**

Some software products that run on the System z platform have an up-front license fee and an optional annual maintenance charge. These products are licensed under the International Program License Agreement (IPLA). System z IPLA products...
include some data management tools, CICS tools, IMS tools, application
development tools, WebSphere products, and Tivoli® products.

Many IPLA products that run on z/OS can be licensed at a sub-capacity level.
Sub-capacity charging for these products is available to customers who are already
using sub-capacity pricing on that CPC for their Entry Workload License Charges
(EWLC) or Workload License Charges (WLC) products.

This planning information helps you decide whether or not to use sub-capacity WLC
or EWLC pricing. Once you have decided to use WLC or EWLC, it is always
advantageous to use sub-capacity IPLA pricing for those products that offer it.

System z IPLA software products that are sub-capacity eligible are licensed
according to either execution-based terms, reference-based terms, or z/OS-based
terms.

**Execution-based licensing terms** apply to z/Architecture IPLA products whose
value is based on the processing power of the LPAR in which they run. These
products are priced based on the utilization capacity of the LPARs in which they
run. Execution-based IPLA products that are eligible for sub-capacity charging will
appear on the sub-capacity report if those products execute on a CPC where you
run SCRT. For a detailed example, see [Example of an execution-based
sub-capacity eligible IPLA product](#) on page 55. Further, [Getting Started
Sub-capacity Pricing for z/OS IPLA Software](#) describes a special case of
execution-based licensing.

**Reference-based licensing terms** apply to z/Architecture IPLA products whose
value is based on the value of another product, called the *parent product*. For
eexample, a reference-based DB2 tool would be priced based on the license
capacity of DB2. In this case, DB2 is the parent product of the DB2 tool. For a
detailed example, see [Example of a reference-based sub-capacity eligible IPLA
product](#) on page 56.

**z/OS-based licensing terms** apply to IPLA products that run under z/OS and
provide value to the particular machine where the product is used. These products
are priced based on the license capacity of z/OS on the CPC where the product is
used. For a detailed example, see [Example of a z/OS-based sub-capacity eligible
IPLA product](#) on page 56.

For a list of sub-capacity eligible IPLA products and how they are licensed, see

**Getting Started Sub-capacity Pricing for z/OS IPLA Software**

Getting Started Sub-capacity Pricing for z/OS IPLA Software is a special case of
execution-based licensing that applies to certain products subject to a specific set of
qualifying conditions. These conditions apply on a per product, per operating
system image, per hour basis. Products that qualify will be charged based upon a
percentage of the size of the LPAR in which they run. For more information,
including a detailed example, see [Using the Sub-Capacity Reporting Tool](#)

---

**How does sub-capacity pricing work?**

Sub-capacity pricing is based on the concept of the highest observed rolling
four-hour average utilization of the LPAR or LPARs where a sub-capacity product
runs.
Note: While the examples are for a z/OS system, they also apply to z/TPF and z/VSE systems under the conditions specified in the examples.

Suppose a z/Architecture CPC has a specific VWLC, EWLC, or execution-based IPLA product running concurrently in three LPARs. The simultaneous combined utilization of these three LPARs is determined for each hour in the reporting period and the highest observed combined utilization is used as the basis for pricing the product. For certain sub-capacity eligible IPLA programs, the basis for sub-capacity is based on the MSUs reported for their parent programs or for the z/OS operating system.

LPAR utilization capacity

The LPAR utilization capacity is the highest sum of measured rolling four-hour MSU averages for the LPARs in the CPC in which a sub-capacity eligible product runs concurrently during a given month. If a z/Architecture CPC has a specific sub-capacity eligible product running concurrently in two LPARs, the utilization of these two LPARs over a month is used to determine your cost for the product on that CPC in that month.

Figure 1 shows a configuration that is referred to throughout this documentation. For this first example, only CPC1 is described. CPC1 is a zSeries CPC rated at 184 MSUs and has two LPARs running concurrently. (For this example, we assume that all of the products are running in the hour where the peak utilization occurs.) The LPAR sizes (maximum potential capacities) are:

- 70 MSUs for LPAR1
- 100 MSUs for LPAR2

<table>
<thead>
<tr>
<th>CPC1 in Sysplex A</th>
<th>CPC2 in Sysplex A</th>
</tr>
</thead>
<tbody>
<tr>
<td>184 MSUs</td>
<td>52 MSUs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LPAR1</th>
<th>LPAR2</th>
<th>LPAR3</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td>z/OS</td>
<td>z/OS</td>
</tr>
<tr>
<td>MQSeries</td>
<td>CICS</td>
<td>MQSeries</td>
</tr>
<tr>
<td>IMS</td>
<td>DB2</td>
<td>IMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Sample configuration: Products and LPARs in CPC1 and CPC2 in Sysplex A

Using the configuration above, suppose the combined peak rolling four-hour average utilizations of these LPARs over a given period are:

- LPAR1: 60 MSUs
- LPAR1 plus LPAR 2: 135 MSUs
- LPAR2: 80 MSUs

These LPAR combined peak rolling four-hour average utilization values would result in the sub-capacity eligible products running in these LPARs being priced based on the following capacities:
z/OS is priced based on 135 MSUs—the peak rolling four-hour LPAR utilization of the LPARs where z/OS runs (LPAR1 plus LPAR2).

MQSeries and IMS are priced based on 60 MSUs—the peak rolling four-hour LPAR utilization of the LPAR where they run (LPAR1).

CICS and DB2 are priced based on 80 MSUs—the peak rolling four-hour LPAR utilization of the LPAR where they run (LPAR2).

Note that rolling four-hour averages are calculated for each hour for each LPAR for a month—the billing period. (This example assumes the sub-capacity eligible products contained in these LPARs are running for the entire month.)

How the peak rolling four-hour average MSU value is determined

Figure 2 shows an example of how the peak rolling four-hour average MSU value is calculated for the combination of products and LPARs shown in Figure 1 on page 5.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Hour 1</th>
<th>Hour 2</th>
<th>Hour 3</th>
<th>...</th>
<th>Hour 719</th>
<th>Hour 720</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR1: Rolling four-hour average utilization</td>
<td>60</td>
<td>55</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>LPAR2: Rolling four-hour average utilization</td>
<td>70</td>
<td>80</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>z/OS utilization (LPAR1 + LPAR2)</td>
<td>130</td>
<td>135</td>
<td>125</td>
<td>125</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>MQSeries and IMS utilization (in LPAR1 only)</td>
<td>60</td>
<td>55</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>CICS and DB2 utilization (in LPAR2 only)</td>
<td>70</td>
<td>80</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Example of calculating the peak utilization based on the peak rolling four-hour average MSU value

The peak interval is the highest utilization determined from the sum of the utilization for all LPARs in which a particular product ran in a given hour. It is not the sum of highest utilization for individual LPARs in which a particular product ran during different hours.

In this example, the peak interval for z/OS is in hour 2. The z/OS utilization value for the month is the sum of the z/OS utilizations in both LPARs during hour 2, or 135.

The peak interval for MQ Series and IMS is in hour 1. Since those products only run in LPAR 1, their utilization value for the month is the value for LPAR 1 in hour 1, or 60.

The peak interval for CICS and DB2 is in hour 2. Since those products only run in LPAR 2, their utilization value for the month is the value for LPAR 2 in hour 2, or 80.

Advantages of sub-capacity pricing

Sub-capacity pricing is designed to give customers several advantages over previous pricing methods:

- Your charges for products that use sub-capacity pricing are based on how much the LPARs in which the products run utilize system resources, rather than on the
full capacity of the CPC. This means you can purchase hardware capacity for future needs without incurring an immediate increase in your software bill.

• If your utilization decreases when business is slow, your software bill decreases with it. If your utilization is seasonal, your monthly software bills are lower during periods of lower utilization.

• You pay for capacity on a rolling four-hour average, not on maximum capacity reached. Short utilization spikes will be averaged out in calculating your utilization. Longer spikes will affect the rolling four-hour average utilization in proportion to their duration and magnitude.

• For z/OS systems, you can sometimes aggregate MSUs associated with a sub-capacity eligible product across a Parallel Sysplex. Aggregation means when you run the sub-capacity eligible product in multiple LPARs on CPCs which are all part of the same Parallel Sysplex, you pay the base charge for the product only once. The values shown on the sub-capacity report are not affected by aggregation, but IBM adds up all the MSUs for aggregated products across each CPC in the sysplex when calculating your charges for those products. For aggregation, the Parallel Sysplex must meet the following requirements:
  – All CPCs in the Parallel Sysplex must be physically attached via coupling links to a common coupling facility and via timer links to a common external time reference (such as the Sysplex Timer®).
  – Images in the sysplex must account for 50 percent of the total MVS™ workload on each machine during prime business hours. In other words, MVS-based LPARs participating in the sysplex must represent at least half of the CPC’s MVS-based processing capability.
  – All images in the sysplex must have at least one common systems enablement function activated to use the coupling facility. For a list of system enablement functions, see “z/OS systems enablement functions” on page 65.

Note: Sub-capacity pricing can, in some cases, lower your overall software bill while increasing some components of your bill. For example, you might find that some of your software products have higher costs with sub-capacity pricing, but the overall software bill is lower. Or, if you have a seasonal utilization pattern, your bill in some months might be higher with sub-capacity pricing, but your total annual bill for all eligible products is lower.

Is sub-capacity pricing for everyone?

For System z10 BC, System z9 BC, and z890 servers, EWLC pricing is the default for z/OS systems and sub-capacity pricing is always the best option.

For System z10 EC™ and System z9 EC environments and other zSeries servers, sub-capacity pricing is cost-effective for many, but not all, customers. You might even find that sub-capacity pricing is cost effective for some of your CPCs, but not others (although if you want pricing aggregation, you must always use the same pricing for all the CPCs in the same sysplex).

Once you decide to use sub-capacity pricing for a specific operating system family, you cannot return to the alternative pricing methods for that operating system family on that CPC. For example, once you select WLC you may not switch back to PSLC without prior IBM approval. (Sub-capacity IPLA pricing is always the same as or preferable to full capacity IPLA pricing, but you can only use it when you have contracted to use sub-capacity WLC or EWLC.)

This documentation will help you determine whether or not sub-capacity pricing is appropriate for your enterprise.
Prerequisites for sub-capacity pricing

The prerequisites for sub-capacity pricing and for using SCRT are:

- For a z/OS Version 1 Release 1 operating system or higher:
  - IBM System z10 Enterprise Class (z10 EC), System z10 Business Class (z10 BC), System z9 Enterprise Class (z9 EC), System z9 Business Class (z9 BC), or zSeries (z990, z900, z890, or z800, except for z800 Model 101 and z890 Model A01) CPCs, with at least one LPAR configured.
  - All instances of z/OS running on the CPC must be running in z/Architecture (64-bit) mode.
  - There cannot be any OS/390 or MVS systems licensed or executing on the CPC.
  - You must collect SMF type 70 and type 89 records from every LPAR on the machine that runs z/OS at any time.

- For a z/TPF Version 1 operating system or higher:
  - System z10 EC, System z10 BC, System z9 EC, System z9 BC, or zSeries (except for z800 Model 101 and z890 Model A01) CPCs, with at least one LPAR configured.
  - You must collect SCRT89 records from every LPAR on the machine that runs z/TPF at any time.

- For a z/VSE Version 4 operating system or higher:
  - System z10 EC, System z10 BC, System z9 EC, or System z9 BC (except for Model A01) CPCs.
  - There cannot be any z/VSE Version 3 or earlier versions of z/VSE licensed or executing on the CPC.
  - You must collect SCRT89 records from every LPAR on the machine that runs z/VSE at any time.
  - You must submit monthly sub-capacity reports from the SCRT for each CPC that uses sub-capacity pricing.

Detailed pricing information

For more information about pricing terms and conditions for specific products, see the following announcement letters:

- IBM Announces Workload License Charges
- Availability of zSeries Software Charges at Less than Machine Capacity
- Clarification of Parallel Sysplex Pricing Terms and Conditions Including Changes to the Parallel Sysplex License Charge Exhibit
- Changes to Workload License Charges Gives Customers Additional Pricing Options
- New and Clarified Terms and Conditions for S/390 and zSeries Software
- Software Pricing for IBM eServer zSeries z990 and Enhancements to Variable Workload License Charges.
- Subcapacity Pricing for zSeries IPLA Products.
- Entry Workload License Charges (EWLC) for z800 Servers
- EWLC Tiered Price Structure and zELC Pricing for z890
- Midrange Workload License Charges (MWLC) for z/VSE V4
- System z New Application License Charges (zNALC) for z/OS
You can find these announcement letters and any others that have been issued since this information was last revised at [www.ibm.com/zseries/swprice/announce.html](http://www.ibm.com/zseries/swprice/announce.html).
Chapter 2. Overview of planning and implementation tasks for sub-capacity pricing

You will need to perform certain tasks to plan for and decide whether to use sub-capacity pricing and to implement it in your environment.

Sub-capacity pricing planning tasks

The following steps briefly describe the tasks you must perform to plan for sub-capacity pricing:

Step 1. **Form a team.** Whether you are your organization’s software asset manager, z/OS architect, capacity planner, or all three in one person, you need organizational support to implement sub-capacity pricing. You will have to educate your management and your colleagues about what sub-capacity pricing is and what advantages it can have. It will take some time and effort to determine whether sub-capacity pricing is beneficial for the organization now or may become beneficial in the future.

Step 2. **Understand the prerequisites.** For example, you can only use sub-capacity pricing on System z processors that run z/OS in 64-bit mode. No OS/390 or MVS systems can be running on CPCs that use sub-capacity pricing.

Step 3. **Understand your timeline.** Are you migrating from S/390 servers or zSeries servers to the System z9 or System z10 platform? Or from OS/390 to z/OS? If so, then you need to know where you are in your hardware and software migration planning to decide at what point you qualify for sub-capacity pricing and when sub-capacity pricing is advantageous for you.

Step 4. **Create a software inventory.** You may already have one; if not, see Chapter 3, “Inventorying your software,” on page 15 to find out how to create one and what it should look like.

Step 5. **Create a capacity and growth plan.** Sub-capacity pricing is not right for every customer. However, even if it is not right for your organization now, it may be in the future. You will need this plan to find out.

Step 6. **Define a baseline.** You need to create a chart showing current capacity and utilization for each LPAR.

Step 7. **Prepare to run a planning tool.** Start creating and saving SMF type 70 records as input to one of the sub-capacity tools.

Note that the Sub-Capacity Planning Tool (SCPT) can be used as part of the sub-capacity planning process for z/TPF and z/VSE systems only when those systems are:

a. Running in LPARs with shared engines, and
b. Running on a CPC which contains at least one z/OS system from which the required SMF type 70 records can be collected.

If you meet the prerequisites for running the Sub-Capacity Reporting Tool (SCRT), as described in “Prerequisites for sub-capacity pricing” on page 8, then use that tool. If you do not meet the prerequisites,
then use the Sub-Capacity Planning Tool. For best results, you need to collect a month’s worth of SMF data before running either tool.

Step 8. **Download and run a planning tool.** The Sub-Capacity Planning Tool helps you analyze your processor and LPAR utilization in terms of the LPAR 4-hour rolling average that is used by the Sub-Capacity Reporting Tool to calculate utilization. It can be used on processors that are running OS/390 or z/OS to help in pre-migration software asset planning. It can be applied to EWLC products as well as WLC products. The Sub-Capacity Reporting Tool can give you more specific information on your sub-capacity products, but has more stringent prerequisites.

Step 9. **Create planning scenarios, as appropriate.** If your business conditions permit, IBM recommends creating three scenarios from the tool output: a current baseline, a scenario one year from now, and a scenario two years from now. If your system utilization is seasonal, you might create yearly or seasonal utilization plans.

Step 10. **Get a cost analysis from IBM.** After you create your scenarios, you must contact your IBM sales representative or IBM business partner to get a pricing analysis for each one.

Step 11. **Create a cost chart.** Use the pricing analysis and the information in Chapter 5, “Analyzing your software costs,” on page 27 to create this chart.

Step 12. **Determine whether WLC is cost-effective now or will be in the future.** The cost chart will help you do this.

Step 13. **Review the Terms and Conditions for the sub-capacity pricing options that apply to you.** If WLC, EWLC or MWLC is for you, contact your IBM representative to obtain these documents:
- **IBM Customer Agreement**
- For sub-capacity WLC:
  - Attachment for IBM System z Workload License Charges
- For sub-capacity EWLC:
  - Attachment for EWLC, TWLC, zELC and z/OS.e License Charges
- For sub-capacity MWLC:
  - Attachment for IBM System z Midrange Workload License Charges

Review IBM’s terms and conditions, and sign the appropriate documents for your configuration. This is necessary to inform IBM that you are implementing sub-capacity pricing.

Step 14. **Review and maintain plans.** The software inventory, capacity plan, baseline, and cost charts you’ve created have many uses—schedule regular reviews and updates of them.

As a handy reference, you can use the abbreviated form of these steps in “Appendix D. Sub-capacity pricing planning checklist” on page 67.

---

**Sub-capacity pricing implementation tasks**

The following steps briefly describe the tasks you must perform to implement sub-capacity pricing:
Step 1. **Schedule implementation of the Sub-Capacity Reporting Tool.**
There are administrative and technical tasks that you must perform before you can run SCRT. Read about them in [Using the Sub-Capacity Reporting Tool](#).

Step 2. **Run SCRT and analyze the sub-capacity report.** You should understand the sub-capacity report and add comments in those cases where comments are required.

Step 3. **Submit the sub-capacity report to IBM.** Submit the sub-capacity report to IBM by the ninth day of the month following the month reflected in the reporting period.

Step 4. **Review the bill from IBM.** When you receive the bill based on this submission of a sub-capacity report, review it to make sure you understand it.

Step 5. **Fine-tune, as needed.** Review your software licenses and plan for changes to them. The sub-capacity report helps you do this.

As a handy reference, you can use the abbreviated form of these steps in [Appendix E. Sub-capacity pricing implementation checklist](#) on page 69.
Chapter 3. Inventorizing your software

The task to create a software inventory for your sub-capacity eligible products is usually performed by the software asset manager.

Creating software inventories

The first step in deciding whether to use sub-capacity pricing or not is to create inventories of your sub-capacity eligible software products. You need to know what products you are using and in which LPARs they run. When you have that information, you can download and run the Sub-capacity Planning Tool. If you organize this information by CPC serial number, type, and model number, you will also have everything you need to run the Sub-Capacity Reporting Tool later.

You can ask IBM to send you a list of the products you are licensed for that are eligible for sub-capacity pricing, but to complete your inventory, you have to document where in your configuration these products are currently running or will run in the future.

The examples shown are for z/OS-based WLC eligible products. The inventory process is the same for EWLC and MWLC eligible products and sub-capacity IPLA eligible products.

The sub-capacity eligible MLC product inventory shown in Figure 4 on page 16 is based on the configuration shown in Figure 3.

### Sample software inventories for sub-capacity eligible MLC products

This topic shows you some sample sub-capacity eligible MLC software inventories. The products shown are the ones in the sample configuration shown in Figure 3.

#### Sub-capacity eligible product and location inventory

Figure 4 on page 16 shows a sub-capacity MLC product inventory. All the sub-capacity eligible MLC products are listed in this inventory, with the ones in use checked off. For the latest list of products that are eligible for sub-capacity pricing, be sure to check the list at [www.ibm.com/zseries/library/swpriceinfo](http://www.ibm.com/zseries/library/swpriceinfo).
### Customer survey

<table>
<thead>
<tr>
<th>Machine type/rating and MSUs</th>
<th>2064-2C4</th>
<th>2064-2C4</th>
<th>184</th>
<th>2064-2C1</th>
<th>52</th>
<th>236</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine serial</strong></td>
<td>CPC 1 12345</td>
<td>CPC 1 12345</td>
<td>CPC 2 67890</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LPARS</strong></td>
<td>LPAR1</td>
<td>LPAR2</td>
<td>MSUs</td>
<td>LPAR3</td>
<td>MSUs</td>
<td>Sysplex MSUs</td>
</tr>
<tr>
<td>z/OS V1</td>
<td>5694-A01</td>
<td>x</td>
<td>x</td>
<td>135</td>
<td>x</td>
<td>48</td>
</tr>
<tr>
<td>z/OS e V1 (EWLC only)</td>
<td>5655-G52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS TS for OS/390</td>
<td>5697-147</td>
<td>x</td>
<td>80</td>
<td>x</td>
<td>48</td>
<td>128</td>
</tr>
<tr>
<td>CICS TS for z/OS V2</td>
<td>5655-E93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS/ESA V4</td>
<td>5655-018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 for MVS/ESA V4</td>
<td>5695-DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 for OS/390 V5</td>
<td>5655-DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V6</td>
<td>5645-DB2</td>
<td>x</td>
<td>80</td>
<td>x</td>
<td>48</td>
<td>128</td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V7</td>
<td>5675-DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 UDB for z/OS V8</td>
<td>5625-DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS/ESA V5</td>
<td>5695-176</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS/ESA V6</td>
<td>5655-158</td>
<td>x</td>
<td>60</td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>IMS V7</td>
<td>5655-B01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS V8</td>
<td>5655-C56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS V9</td>
<td>5655-J38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries MVS/ESA</td>
<td>5695-137</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries for OS/390 V2</td>
<td>5655-A95</td>
<td>x</td>
<td>60</td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>MQSeries for OS/390 V5</td>
<td>5655-F10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBOL for OS/390 &amp; VM V2</td>
<td>5648-A25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise COBOL for z/OS and OS/390 V3R1</td>
<td>5655-G53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise PL/I for z/OS and OS/390 V3R1</td>
<td>5655-H31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM Tivoli NetView for z/OS</td>
<td>5697-ENV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lotus Domino for z/OS V6</td>
<td>5655-K36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lotus Domino for S/390 V5</td>
<td>5655-B86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Automation OS/390 V2</td>
<td>5645-006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Automation for OS/390</td>
<td>5645-005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli Workload Scheduler for z/OS</td>
<td>5697-WSZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView PM</td>
<td>5655-043</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView for OS/390</td>
<td>5697-B82</td>
<td>x</td>
<td>48</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli OPC</td>
<td>5697-OPC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VisualAge PL/I OS/390 V2</td>
<td>5655-B22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Query Management Facility V3</td>
<td>5706-254</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debug Tool for z/OS and OS/390</td>
<td>5655-H32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debug Tool for z/OS V4</td>
<td>5655-L24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airline Control System (ALCS) V2</td>
<td>5695-068</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z/TPF (see note)</td>
<td>5748-T15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z/TPFDF (see note)</td>
<td>5748-F15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z/VSE V4.1</td>
<td>5609-ZV4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 4. Example of a software inventory of sub-capacity eligible monthly license charge products**

**Note:** z/TPF, z/VSE and associated products are supported for sub-capacity pricing. For details, see [Using the Sub-Capacity Reporting Tool](Using%20the%20Sub-Capacity%20Reporting%20Tool). The Sub-Capacity Planning Tool can be used as part of the sub-capacity planning process for z/TPF and z/VSE systems only when those systems are:

1. Running in LPARs with shared engines, and
2. Running on a CPC which contains at least one z/OS system from which the required SMF 70 records can be collected.

**Sub-capacity eligible IPLA products**

Although sub-capacity IPLA pricing is always equal to or less than full capacity IPLA pricing, you should also create an inventory of your sub-capacity-eligible IPLA products and understand the pricing differences for them. These differences might affect your decision to adopt sub-capacity WLC or EWLC.

The latest list of IPLA products that are eligible for sub-capacity pricing is available at [www.ibm.com/zseries/library/swpriceinfo](http://www.ibm.com/zseries/library/swpriceinfo).

If you are adding a new sub-capacity IPLA product to your configuration, check your sub-capacity reports to decide how many value units to purchase. You can find a complete description of value units at [www.ibm.com/zseries/swprice/zipla](http://www.ibm.com/zseries/swprice/zipla).

Specifically, check:

- Maximum rolling four-hour average utilization by LPAR for execution-based sub-capacity IPLA products
- Parent product maximum rolling four-hour average utilization for reference-based sub-capacity IPLA products
- z/OS maximum rolling four-hour average utilization for z/OS-based sub-capacity IPLA products.

Be sure to consider month-to-month variations in making the decision. You must purchase enough value units to accommodate your maximum utilization of the product. If you use less entitlement than you purchased, you won’t get a refund. If you use more than you purchased, your utilization constitutes an order for the additional number of value units and you are charged for them. For further details and examples of how to choose the right number of value units, see “Appendix B. Capacity planning for sub-capacity IPLA products” on page 55.

**Products in other pricing categories**

In addition to the products you use that are eligible for sub-capacity pricing, you may have products in other pricing categories, such as Flat Workload License Charges (FWLC), Tiered Entry Workload License Charges (TWLC), and non-sub-capacity eligible International Product License Agreement (IPLA) products. You can find out more about these license types at [www.ibm.com/zseries/swprice](http://www.ibm.com/zseries/swprice).
Chapter 4. Understanding your configuration

You can create a capacity and growth plan to help you understand your current configuration and how that configuration is likely to change in the future. This task is usually performed by the whole planning team working together—the software asset manager, the z/OS system architect, and the capacity planner.

What is the capacity of your current configuration?

First, add up the capacity of all your System z9 and System z10 environments, zSeries servers, and S/390 servers. You can find a list of the software pricing MSU ratings for all applicable processors and model numbers at [www.ibm.com/zseries/library/swpriceinfo](http://www.ibm.com/zseries/library/swpriceinfo).

How much of your capacity are you using?

This topic helps you determine the rolling four-hour average utilization for each LPAR and each CPC.

To find out how much of your total z/Architecture and S/390 capacity you are using and what its current cost is, you will download and run the Sub-Capacity Planning Tool (or, if you meet the prerequisites, the Sub-Capacity Reporting Tool) and send the output of the tool to IBM for a pricing estimate.

For more information about running the Sub-Capacity Reporting Tool and interpreting the output, see Chapter 6, “Getting ready to use the Sub-Capacity Reporting Tool,” on page 33 and Chapter 7, “Using SCRT to manage software costs,” on page 37.

About the Sub-Capacity Planning Tool

The Sub-Capacity Planning Tool helps you analyze your CPC and LPAR utilization in terms of a rolling four-hour average utilization, in MSUs, which is the way your utilization is calculated for sub-capacity pricing. The output of the tool helps you determine whether sub-capacity pricing is appropriate for your enterprise at your current utilization. You can also project whether sub-capacity pricing will become appropriate for you in the future, given your anticipated growth.

The Sub-Capacity Planning Tool can analyze:

- IBM or non-IBM mainframes
- Mainframes running z/OS, OS/390, or MVS
- Mainframes running in basic mode or LPAR mode
- Mainframes running z/TPF and z/VSE, provided that the z/TPF and z/VSE systems are:
  1. Running in LPARs with shared engines, and
  2. Running on a CPC which contains at least one z/OS system from which the required SMF type 70 records can be collected.
- LPARs with shared processors or dedicated processors.

This means that even if you are not yet on z/Architecture hardware or z/OS, you can assess whether sub-capacity pricing would be appropriate for you, given your utilization, if you move to the appropriate hardware and software. The tool analyzes all the operating system images on a CPC. Its output can be used for all sub-capacity eligible products.
The Sub-Capacity Planning Tool takes data from SMF type 70 records, so you must be generating those records to run it. To get meaningful results, you should collect and analyze one month’s worth of SMF type 70 records. For more information on SMF type 70 records, see [z/OS RMF User’s Guide](#).

You do not need to sort the SMF records or have them all in the same data set. The Sub-Capacity Planning Tool accepts multiple data sets as input.

**Restrictions:**

- The Sub-Capacity Planning Tool cannot analyze utilization of z/OS systems that are running as guests of z/VM®.
- The Sub-Capacity Planning Tool report is not acceptable for purposes of sub-capacity reporting; only an SCRT sub-capacity report can be used for that.

The Sub-Capacity Planning Tool is available as a self-extracting zip file from [www.ibm.com/zseries/swprice/scpt](http://www.ibm.com/zseries/swprice/scpt), together with detailed instructions on how to use it.

**Reviewing the output of the Sub-Capacity Planning Tool**

The Sub-Capacity Planning Tool report describes the peak rolling four-hour average utilization of:

- Each individual LPAR
- All combinations of LPARs
- Combinations of LPARs and specific products in those LPARs that you specify
- The CPC as a whole

It also shows the date and time of each RMF™ interval, the LPAR utilization for each interval, and the rolling four-hour average utilization during that interval. These detailed fields are not shown in the samples in this documentation.

For example, our sample configuration has three LPARs in two CPCs. The Sub-Capacity Planning Tool must be run on each CPC and produces a separate report for each. The report for CPC 1 shows two individual LPAR values and one total CPC value. The report for CPC 2 lists one individual LPAR value which is also the CPC total. See Figure 5 on page 21 for a sample of the output.
If there are more than 50 LPAR combinations, the tool lists only the first 50 by default, but you can use a parameter on the input JCL to have the tool list all combinations. You can also specify a string (a product name or number) and a list of LPARs (the LPARs where that product runs or a subset of the LPARs where that product runs) and see the values for products running in just those LPARs.

For example, if you had a configuration with 20 LPARs, but all products run in either all 20 or in three of the 20, you could specify only those combinations and get output like this:

```
--------------------------- Sub-Capacity Planning Tool ---------------------------
Release Date          7/28/2005
Customer Name         Customer X
System Name           CPC1
Serial Number         123456
Machine Description   2064-2C4
CP Processors         4
Capacity (MSUs)       184

If you had a product only running in LPAR1, it would require 60 MSUs.
If you had a product only running in LPAR2, it would require 80 MSUs.
If you had a product running in ALL LPARs, it would require 135 MSUs.

--------------------------- Sub-Capacity Planning Tool ---------------------------
Release Date          7/28/2005
Customer Name         Customer X
System Name           CPC2
Serial Number         67890
Machine Description   2064-2C1
CP Processors         1
Capacity (MSUs)       52

If you had a product only running in LPAR3, it would require 46 MSUs.
If you had a product running in ALL LPARs, it would require 46 MSUs.
```

Figure 5. Sample output from the Sub-Capacity Planning Tool

If there are more than 50 LPAR combinations, the tool lists only the first 50 by default, but you can use a parameter on the input JCL to have the tool list all combinations. You can also specify a string (a product name or number) and a list of LPARs (the LPARs where that product runs or a subset of the LPARs where that product runs) and see the values for products running in just those LPARs.

For example, if you had a configuration with 20 LPARs, but all products run in either all 20 or in three of the 20, you could specify only those combinations and get output like this:

```
--------------------------- Sub-Capacity Planning Tool ---------------------------
Release Date          7/28/2005
Customer Name         Customer X
System Name           CPC1
Serial Number         123456
Machine Description   2064-2C4
CP Processors         10
Capacity (MSUs)       538

zos would require 110 MSUs (LA, LB, LC, LD, LE, LF, LG, LH, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU)
db2 would require 54 MSUs (LA, LO, LP)
```

Figure 6. Sample output from the Sub-Capacity Planning Tool showing LPAR combinations
What further growth do you anticipate?

Based on what workloads you have, the different LPARs on your CPCs, and your estimates of future needs, you can create a capacity growth plan that shows your future processing requirements in CPCs and MSUs.

In planning for the future, you need to think about changes in your business and changes in your technical configuration, some of which might result from business changes.

Business changes might include:
- Number of customers
- Number of employees
- Number of transactions
- Number of different products or services
- Kinds and amounts of data you need to track for accounting, regulatory, and tax purposes

Technical changes might include:
- Data storage and processing power required by improved applications
- Changes in your CPC machine type
- Changes to your operating system level
- Upgrades or additions of new software
- Upgrades or additions of new storage devices and other peripherals.

The baseline in your capacity growth plan needs to show:
- Your current number of CPCs
- How many LPARs each has
- What products are running in each LPAR
- What kind of utilization each LPAR has.

If your system utilization is seasonal, you might want to create a plan that shows the variations.

If you can, you should create plans at +1 year and +2 years that show:
- What LPARs will become fully utilized
- What CPCs will become fully utilized
- What capacity you may need to add
- How you will partition any additional CPCs
- What operating systems and software products will run in those new LPARs
- How fully utilized the new LPARs will be.

This plan will help you decide when to implement sub-capacity pricing.

Your plans should be on a CPC-by-CPC basis. If your CPCs participate in sysplexes that qualify for aggregation, you can determine this after the plans for each individual CPC have been created.
If you change machine types, your pricing will change, too. You will need to work with your IBM representative or IBM Business Partner representative to plan for this change. Your representative has access to a tool called CP2000 that can help you plan.

One important reason for creating plans at +1 and +2 year intervals is that the benefits of using sub-capacity pricing may change as your configuration changes. It is possible to see advantages for sub-capacity pricing over PSLC or zELC pricing with your current configuration and with some future configurations, while other future configurations would be priced more advantageously with PSLC or zELC. Since you cannot return to PSLC or zELC pricing once you have adopted sub-capacity pricing, it is important to understand these possibilities and be prepared for them.

Figure 7 on page 24 shows a sample capacity growth plan.
<table>
<thead>
<tr>
<th>Capacity and growth plan</th>
<th>current</th>
<th>changes +1 year</th>
<th>changes +2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine type-model and MSUs</td>
<td>2064-2C4</td>
<td>2064-2C4</td>
<td>184</td>
</tr>
<tr>
<td>Machine name and serial</td>
<td>CPC 1 12345</td>
<td>CPC 1 12345</td>
<td>CPC 2 67890</td>
</tr>
<tr>
<td>LPARS</td>
<td>LPAR1</td>
<td>LPAR2</td>
<td>MSUs</td>
</tr>
<tr>
<td>z/OS V1</td>
<td>5694-A01</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>z/OS.e Version 1</td>
<td>5655-G52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS TS for OS/390</td>
<td>5655-147</td>
<td>x</td>
<td>80 90 100</td>
</tr>
<tr>
<td>CICS TS for z/OS V2</td>
<td>5697-E93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS/ESA® V4</td>
<td>5655-018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 for MVS/ESA® V4</td>
<td>5695-DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 for OS/390 V5</td>
<td>5655-DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V6</td>
<td>5645-DB2</td>
<td>x</td>
<td>80 90 100</td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V7</td>
<td>5675-DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 UDB for z/OS V8</td>
<td>5625-DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS/ESA® Version 5</td>
<td>5695-176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS/ESA Version 6</td>
<td>5655-158</td>
<td>x</td>
<td>60 70 80</td>
</tr>
<tr>
<td>IMS V7</td>
<td>5655-B01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS V8</td>
<td>5655-C56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS V9</td>
<td>5655-J38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries MVS/ESA</td>
<td>5695-137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries for OS/390 V2</td>
<td>5655-A95</td>
<td>x</td>
<td>60 70 80</td>
</tr>
<tr>
<td>MQSeries for OS/390 V5</td>
<td>5655-F10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBOL for OS/390 &amp; VM V2</td>
<td>5648-A25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise COBOL for z/OS and OS/390</td>
<td>5655-G53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise PL/I for z/OS and OS/390</td>
<td>5655-H31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM Tivoli NetView® for z/OS</td>
<td>5697-ENV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lotus® Domino® for z/OS V6</td>
<td>5655-K36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lotus Domino for S/390 V5</td>
<td>5655-B86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Automation OS/390 V2</td>
<td>5645-006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Automation for OS/390</td>
<td>5645-005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 7. Example: Capacity and growth plan (Part 1 of 2)*
<table>
<thead>
<tr>
<th>Product</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tivoli Workload Scheduler for z/OS</td>
<td>5697-WSZ</td>
</tr>
<tr>
<td>Tivoli NetView PM</td>
<td>5655-043</td>
</tr>
<tr>
<td>Tivoli NetView for OS/390</td>
<td>5697-B82</td>
</tr>
<tr>
<td>Tivoli OPC</td>
<td>5697-OPC</td>
</tr>
<tr>
<td>Visual Age PL/I OS/390 V2</td>
<td>5655-B22</td>
</tr>
<tr>
<td>Query Management Facility V3</td>
<td>5706-254</td>
</tr>
<tr>
<td>Debug Tool for z/OS and OS/390</td>
<td>5655-H32</td>
</tr>
<tr>
<td>Debug Tool for z/OS V4</td>
<td>5655-L24</td>
</tr>
<tr>
<td>Airline Control System (ALCS) V2</td>
<td>5698-068</td>
</tr>
</tbody>
</table>

Figure 7. Example: Capacity and growth plan (Part 2 of 2)
Chapter 5. Analyzing your software costs

After you run the Sub-Capacity Planning Tool, you send the output to IBM and receive a cost analysis in return. If you have used the Sub-Capacity Planning Tool to create outputs for several months because you have seasonal variations in your system utilization, or for +1 year and +2 year plans, send all the output spreadsheets to IBM for cost analysis. The cost analysis shows your present software costs and what they would be if you used sub-capacity pricing. The cost analysis shows you whether sub-capacity pricing will save you money now or in the future.

If sub-capacity pricing has no present or projected future advantages for you, you may still want to repeat the process a year or 18 months later. But, for now, you are done.

If sub-capacity pricing has current or future advantages for you, you will need to review the IBM Terms and Conditions for your current or planned configuration.

Whether or not you decide to use sub-capacity pricing for your current configuration, you need to establish a regular review of your software inventories, capacity growth plan, and software pricing analysis. Most of these tasks are usually performed by the software asset manager but the regular reviews of your inventories and plan should be done by the whole planning team.

Requesting a pricing analysis from IBM

To request a cost analysis from IBM, you need:

- The software inventories you created in Chapter 3, “Inventorying your software,” on page 15
- The output of the Sub-Capacity Planning Tool, which you ran in Chapter 4, “Understanding your configuration,” on page 19
- Any seasonal or capacity growth scenarios you created in Chapter 4, “Understanding your configuration,” on page 19

Update your capacity growth plan with the MSUs from the Sub-Capacity Planning Tool. Estimate the MSUs for the +1 year and +2 year plan, if you were able to create the future plans, and add those to your spreadsheet, as shown in Figure 7 on page 24. The current year’s MSU values are from the Sub-Capacity Planning Tool output and the +1 year and +2 year values are estimates. Note that the planning team has added an additional software product to the configuration by the +2 year checkpoint.

Send your planning spreadsheet to your IBM sales representative or IBM business partner and ask that person to obtain a pricing analysis for you. Your sales representative or business partner can create this analysis using the Workload Pricer tool. This tool is only available to IBM employees and IBM business partners.

The results of your cost analysis will look something like Figure 8 on page 28 and Figure 9 on page 29. The example shows results for sub-capacity eligible MLC products but you can build similar worksheets for EWLC and sub-capacity IPLA products using the product lists at http://www.ibm.com/zseries/swprice/library.html.
**Note:** The pricing shown is an estimate and is shown in US dollars. Prices change over time and are subject to change without notice.

<table>
<thead>
<tr>
<th>Workload Pricer — Detailed Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>This tool is for estimation only. These stated prices are for your information only and are subject to change. Applicable taxes are not shown. Licensed programs are available only under the IBM Customer Agreement or any equivalent agreement in effect between the customer and IBM.</td>
</tr>
</tbody>
</table>

| Customer: | Sample |
| Location: | |
| Customer Number: | |
| Installation Type: | Uncoupled |

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM: 2064-2C4</td>
<td>PG: Group:</td>
<td>MSUs: 184</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN:</td>
<td>System01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5675DB2</td>
<td>DB2 UDB for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>80</td>
<td>14618</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655A95</td>
<td>MQSeries for OS/390 V2.1</td>
<td>VWLC</td>
<td>B</td>
<td>60</td>
<td>5689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655147</td>
<td>CICS TS for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>80</td>
<td>17076</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655158</td>
<td>IMS V6 Transaction Manager</td>
<td>VWLC</td>
<td>B</td>
<td>60</td>
<td>14132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Base</td>
<td>VWLC</td>
<td>B</td>
<td>140</td>
<td>46449</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**System Monthly Price**

97964

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM: 2064-2C1</td>
<td>PG: Group:</td>
<td>MSUs: 52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN:</td>
<td>System02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5675DB2</td>
<td>DB2 UDB for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>46</td>
<td>11626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655147</td>
<td>CICS TS for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>46</td>
<td>13812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Base</td>
<td>VWLC</td>
<td>B</td>
<td>46</td>
<td>18813</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5697B82</td>
<td>Tivoli NetView Ent</td>
<td>VWLC</td>
<td>B</td>
<td>46</td>
<td>4152</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**System Monthly Price**

48403

<table>
<thead>
<tr>
<th>Total Monthly Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>146367</td>
</tr>
</tbody>
</table>

*Figure 8. Example of pricing analysis showing VWLC costs*
Determining whether sub-capacity pricing is right for you

Your pricing analysis shows you whether sub-capacity pricing is cost-effective for you now or might be in the future. In order to use sub-capacity pricing, there are technical and contractual requirements that you must fulfill.

Technical requirements for sub-capacity pricing

The technical requirements for sub-capacity pricing include:

- For a z/OS operating system, Version 1 Release 1 or higher:
  - IBM System z10 Enterprise Class (z10 EC), System z10 Business Class (z10 BC), System z9 Enterprise Class (z9 EC), System z9 Business Class (z9 BC),
or zSeries (z990, z900, z890, or z800) CPCs with at least one LPAR configured, except for z890 Model 110, z9 BC Model A01, and z10 BC Model A01 CPCs.

- All instances of z/OS running on the CPC must be running in z/Architecture (64-bit) mode.
- There cannot be any OS/390 or MVS systems licensed or executing on the CPC.
- You must collect SMF type 70 and type 89 records from every LPAR on the machine that runs z/OS at any time.

**For a z/TPF operating system, Version 1 or higher:**
- System z10 EC, System z10 BC, System z9 EC, System z9 BC, or zSeries CPCs with at least one LPAR configured, except for z890 Model 110, z9 BC Model A01, and z10 BC Model A01 CPCs.
- You must collect SCRT89 records from every LPAR on the machine that runs z/TPF at any time.

**For a z/VSE operating system, Version 4 or higher:**
- System z10 EC, System z10 BC (except Model A01), System z9 EC, or System z9 BC (except Model A01) CPCs.
- There cannot be any z/VSE Version 3 or earlier versions of z/VSE licensed or executing on the CPC.
- You must collect SCRT89 records from every LPAR on the machine that runs z/VSE at any time.
- You must submit monthly sub-capacity reports from the Sub-Capacity Reporting Tool (SCRT) for each CPC that uses sub-capacity pricing
- Transmit System Availability Data (TSAD) configured on all CPCs where sub-capacity pricing is to be used. For more information, see Using the Sub-Capacity Reporting Tool.

**Contractual requirements for sub-capacity pricing**

The contractual requirements for sub-capacity pricing are:

- Signed contracts and agreements (as described in Contracts for sub-capacity pricing).
- Use of the Sub-Capacity Reporting Tool. You will need to download the tool and check its prerequisites.
- Submission of monthly Transmit System Availability Data (TSAD). See Chapter 6, “Getting ready to use the Sub-Capacity Reporting Tool,” on page 33 for details.
- Submission of sub-capacity reports from SCRT between the second and the ninth day of each month for the prior month's reporting period.

IBM strongly recommends that you revert to monthly billing from quarterly billing prior to adopting sub-capacity pricing. This can be accomplished by e-mailing your written request for monthly billing to the appropriate address for your country (see the Country tab at www.ibm.com/zseries/swprice/scrt).

**Contracts for sub-capacity pricing**

To implement sub-capacity pricing for software products on any of your CPCs, you must sign the Attachment for IBM System z Workload License Charges, which attaches to the IBM Customer Agreement (ICA) contract.
To implement sub-capacity EWLC pricing for software products on any of your CPCs, you must sign the *Attachment for EWLC, TWLC, zELC and z/OS.e License Charges*, which attaches to the ICA contract.

To implement sub-capacity MWLC pricing for software products on any of your CPCs, you must sign the *Attachment for IBM System z Midrange Workload License Charges*, which attaches to the ICA contract.

To implement sub-capacity pricing for IPLA software products on any of your CPCs, use the *Amendment for IBM System z Programs Sub-Capacity Pricing*, which amends the *IBM International Program License Agreement (IPLA)* contract.

You can get these documents from your IBM sales representative or IBM business partner.

---

**Scheduling monthly sub-capacity report reviews**

Now that you are ready to implement sub-capacity pricing, plan to monitor and analyze your monthly sub-capacity reports, working with the whole team—software asset manager, z/OS system architect, and capacity planner. Modify the plans you have just created according to the sub-capacity report output so that you have a good record of what your utilization is and a sound basis for planning future expansion. Chapter 6, “Getting ready to use the Sub-Capacity Reporting Tool,” on page 33 has more information about what to look for in these reviews.

As you begin to see cost savings from sub-capacity pricing, remember to communicate these results to your company management.
Chapter 6. Getting ready to use the Sub-Capacity Reporting Tool

This information helps you prepare to run the Sub-Capacity Reporting Tool, or SCRT. Monthly reports from SCRT are required for sub-capacity pricing. In addition, the sub-capacity report that the tool produces can be a useful cost management tool for you.

You may also wish to download and run SCRT as an additional planning tool before you sign up for sub-capacity pricing. You can do this at any time; IBM will not bill you according to sub-capacity pricing until you have signed the appropriate contract and submitted your sub-capacity report.

The tasks related to using SCRT are generally performed by the z/OS architect.

About the Sub-Capacity Reporting Tool

The Sub-Capacity Reporting Tool (Sub-Capacity Reporting Tool) is a no-charge IBM tool that reports required license capacity for sub-capacity eligible products that run on z/OS, z/OS.e, z/TPF, or z/VSE systems. SCRT analyzes a month's worth of utilization data for System z environments and zSeries central processor complexes (CPCs) and produces a sub-capacity report. The sub-capacity report indicates the required license capacity (in MSUs) of each sub-capacity eligible product running on the z/OS, z/OS.e, z/TPF, or z/VSE systems.

z/TPF and z/VSE support for sub-capacity differs from z/OS and z/OS.e support, for example by using SCRT89 records instead of SMF records. Unless specifically noted, the same concepts described for z/OS (and z/OS.e) also apply to z/TPF and z/VSE.

For details about z/TPF support and its unique considerations, see www.ibm.com/zseries/swprice/ztpf/

For details about z/VSE support and its unique considerations, see www.ibm.com/zseries/swprice/zvse.html

Sub-capacity products are charged based on the rolling four-hour average utilization of the LPARs in which the sub-capacity products execute. The sub-capacity report determines the required license capacity by examining, for each hour in the reporting period:

- The rolling four-hour average utilization, by LPAR
- Which eligible products were active in each LPAR

SCRT then cross-references LPAR utilization and product execution by LPAR to determine the maximum concurrent LPAR rolling four-hour average utilization—the highest combined utilization of LPARs where each product executes during the reporting period.

SCRT processes the following data:

- In z/OS and z/OS.e environments: System Management Facilities (SMF) data, specifically, SMF type 70, subtype 1 (CPU Activity) records and SMF type 89, subtypes 1 and 2 (Product Use) records
• In z/TPF and z/VSE environments: SCRT89 records

SCRT uses the data sets specified in the JCL as input, and has a single data set as output. To comply with WLC terms and conditions, the input data sets must contain one reporting period of SMF type 70 and type 89 records for all the z/OS images and SCRT89 records for all z/TPF images on a zArchitecture CPC. (For more information on the reporting period, see “Analyzing the sub-capacity report” on page 37.) The output can be:

• A partitioned data set (PDS) with one member for each CPC found in the input data stream. Each member is one sub-capacity report. The report is a text file in comma-separated value (.csv) format, which can most easily be read by a spreadsheet program. For more information, see [Using the Sub-Capacity Reporting Tool].

• A sequential data set that contains a single text file in comma-separated value (.csv) format. This file contains all the reports for the CPCs in the input stream to SCRT and can be used to submit reports to the license management support (LMS) application. For details on how to set this up, see the description of the OUTPUT DD statement in [Using the Sub-Capacity Reporting Tool].

SCRT also does the following:

• Provides a simple, non-intrusive means for you to generate sub-capacity reports that show required license capacity for all eligible sub-capacity products that execute on a CPC

• Allows IBM to receive, view and store sub-capacity reports received from customers

• Allows IBM to generate customer bills according to the sub-capacity reports received from customers

• Provides information to IBM about z/OS.e, if z/OS.e is active in your environment.

Overview of the SCRT process

To enable sub-capacity pricing for a qualifying System z CPC that is running z/OS, you must do the following:

1. Download SCRT from the Web site, [www.ibm.com/zseries/swprice/scrt](http://www.ibm.com/zseries/swprice/scrt). If you’ve already done this because you used SCRT for planning, check the Web site to make sure you have the most current version of the tool and its documentation. Only the most current version of SCRT can be used to submit reports for billing.

2. Check the SCRT support Web site at [www.ibm.com/zseries/swprice/scrt/scrt_support.html](http://www.ibm.com/zseries/swprice/scrt/scrt_support.html) for any service updates to z/OS, z/OS.e, or other sub-capacity products that might be required for SCRT to work properly. For service updates to z/TPF and z/VSE sub-capacity products, click the appropriate link from the SCRT support Web site.

3. Collect one reporting period’s worth of System Management Facility (SMF) data for z/OS systems and collect SCRT89 records for z/TPF and z/VSE systems running on your CPCs that use sub-capacity pricing.

4. Run SCRT to create sub-capacity reports for those CPCs.

5. Review and submit the report. If you have signed the Agreement and the report is being used for billing, submit the sub-capacity report to the license management support (LMS) application. You can use the LMS e-mail interface or the LMS Web interface to submit your report. If necessary, use the
appropriate tool to view and add comments to the sub-capacity report before completing the submission to IBM. Remember that LMS only accepts as input the comma-separated value format with a file extension of .csv.

6. The CPC must be configured to send weekly Transmit System Availability Data (TSAD, also known as Call Home). WLC requires System z CPCs to submit TSAD. This configuration is usually done when the processor is installed. For more information, see “Sending TSAD data.”

If you begin to collect data for SCRT in the month of January, you must submit the report by February 9th. Your submitted data will be reflected in the software charges for March.

---

**Sending TSAD data**

Sending weekly Transmit System Availability Data (TSAD) is part of the terms and conditions for sub-capacity pricing. The data is required for audit purposes. You can send TSAD by one of the following methods:

- Using IBM System z Remote Support Facility (RSF)
- Mailing a diskette, DVD, or USB flash memory drive to IBM
- E-mailing the data to IBM

Typically, an IBM service representative enables RSF for you when your CPC is installed; most customers will find they are already set up for RSF. If RSF is not enabled, contact your IBM service representative.

If you are mailing a diskette, DVD, or USB flash drive to IBM, or if you intend to e-mail the data to IBM, see the procedure described in the “Transmit Service Data” task for the Support Element (SE) in *Hardware Management Console Operations Guide*. When you perform this task, select the **System Availability Data** button. After you have copied the data to a diskette, DVD, or USB flash drive, submit it to IBM in one of the following ways:

- Label the media with the date, CPC type, model number, and serial number, and mail it to the following address:

  **Server Group zSeries RAS Engineering**
  **B64A/707-2B86 (MS P317)**
  **2445 South Road**
  **Poughkeepsie, NY 12601**

- Send an e-mail, including the date, CPC type, model number, and serial number, as well as the TSAD file as an attachment, to: tsadmail@us.ibm.com

---

**Generating and collecting SMF type 70 and type 89 records**

For z/OS systems your input to SCRT is one reporting period’s worth of SMF type 70 subtype 1 (CPU activity) and type 89 (product utilization) records.

To generate SMF type 70 records, you need a systems management product. You can use IBM’s Resource Management Facility (RMF) or an equivalent product that produces these records. For more information about RMF, see *z/OS RMF User’s Guide*.

Make sure that you are also collecting both SMF type 70 subtype 1 records and type 89 subtype 1 and 2 records. SMF record collecting is controlled by the...
SMFPRMxx PARMLIB member. For general information about SMF, see [z/OS MVS System Management Facilities (SMF)](https://www.ibm.com/support/knowledgecenter/STXKQF_11.4.0/com.ibm.mvs.doc/using/zos_system_management_facilities.html). For more information about collecting SMF type 89 records, see [z/OS MVS Product Management](https://www.ibm.com/support/knowledgecenter/STXKQF_11.4.0/com.ibm.mvs.doc/using/zos_mvs_product_management.html).

## Collecting SCRT89 records

z/TPF and z/VSE systems generate SCRT89 records, instead of the SMF records generated by z/OS systems. The instructions for generating SCRT89 records on z/TPF systems and for generating SCRT89 records for z/VSE systems are listed in [Using the Sub-Capacity Reporting Tool](https://www.ibm.com/support/knowledgecenter/STXKQF_11.4.0/com.ibm.mvs.doc/using/zos_sub_capacity_reporting.html).
Chapter 7. Using SCRT to manage software costs

You can and should analyze the output from SCRT—the sub-capacity report—and use it, supplemented by the Sub-Capacity Planning Tool output, to manage your software costs. The analysis task will refer to specific portions of the sub-capacity report. For a complete description of the sub-capacity report and all its fields, see [Using the Sub-Capacity Reporting Tool](#). Read the topic about viewing and submitting the sub-capacity report for billing purposes in that document before proceeding with the task of analyzing the sub-capacity report.

The tasks involved with using SCRT to manage software costs are usually performed by the whole planning team—the software asset manager, z/OS system architect, and capacity planner.

Analyzing the sub-capacity report

The sub-capacity report has two main sections, the billing-related section and the customer verification section.

- The **billing-related section** contains data that IBM needs to reconcile your company’s sub-capacity bills.
- The **customer verification section** contains information that is useful to you when verifying the information in the sub-capacity report. The customer verification section starts after the section titled “Detail Data Sections - For Customer Analysis Purposes Only.”

Each sub-capacity report covers one month, beginning on the second day of one month and ending on the first day of the following month. (SCRT discards duplicate records and records outside this reporting period.) For the examples shown here, the report covers the period from 00:00:01 on 2 October to 24:00:00 on 1 November.

Your team, the software asset manager, z/OS architect, and capacity planner, should meet every month to conduct this review.

Viewing the billing-related report section

The following examples show the billing-related section of a sub-capacity report. The billing-related section displays customer information, tool information, special conditions, product summary information, and data collection details. You can find complete information about the report sections and fields in [Using the Sub-Capacity Reporting Tool](#).
Run Date/Time | 03 Nov 2008 - 09:17  
Name of Person Submitting Report | John Customer  
E-mail Address of Report Submitter | customer@abc.com  
Phone Number of Report Submitter | 444-999-9999

Customer Name | ABC Corporation  
Customer Number | 8971234567  
Machine Serial Number | 02-12345  
Machine Type and Model | 2097-405  
Machine Rated Capacity (MSUs) | 118  
Purchase Order Number | (optional)  
Customer Comments (255 chars max) | (optional)

For recurring charge (MLC) products, the data supplied in this report will be used to adjust the billable MSUs in inventory for all MLC Products listed under the MLC Product Name column on this report. In accordance with our agreement, IBM will treat a change in product licensed capacity as an order. If the MSUs have changed since the last report, software billing based on inventory MSUs will increase or decrease accordingly.

For One Time Charge (IPLA) products, the data supplied in this report will be used to bill those IPLA products listed under the IPLA Product Name column in this report which exceed your entitled capacity. In accordance with our agreement, IBM will treat the use of a product in excess of its entitled capacity as an order and you will be billed for the amount in excess of your entitlement.

Note: This report is expected to provide a "% data collected" > 95% and data reporting period beginning on the 2nd of the previous month and ending on the 1st of the current month.

*********

TOOL INFORMATION

Tool Release | 17.1.0  
Reporting Period | 2 Oct, 2008 - 1 Nov, 2008 inclusive (31 days)

% Data Collected for z/OS | 93% (required)

Figure 10. Sample sub-capacity report: Customer information and tool information sections

*********

SPECIAL CONDITIONS

z/OS not eligible for subcapacity because z/OS running in ESA/390 Mode (31 bit)

Figure 11. Sample sub-capacity report: Optional Special Conditions section containing one of several error messages
Analyzing the customer verification report sections

The customer verification section of the sub-capacity report contains details that help you understand the billing-related section and can also help you understand your own configuration better and perhaps make your product utilization more efficient. The following figures show the customer verification sections of a sample sub-capacity report.

<table>
<thead>
<tr>
<th>PRODUCT SUMMARY INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MLC Product Name</strong></td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>z/OS V1</td>
</tr>
<tr>
<td>DB2 UDB for z/OS V8</td>
</tr>
<tr>
<td>CICS TS for z/OS V3</td>
</tr>
<tr>
<td>MQSeries for z/OS V6</td>
</tr>
<tr>
<td>IMS V8</td>
</tr>
<tr>
<td>IBM Enterprise Cobol for z/OS and OS/390 V3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IPLA Product Name</th>
<th><strong>IPLA Product ID</strong></th>
<th><strong>Tool MSUs</strong></th>
<th><strong>Customer MSUs</strong></th>
<th><strong>Customer Comments (255 chars max)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>File Manager for z/OS V6</td>
<td>5655-P17</td>
<td>60 (optional) (conditional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM WebSphere Application Server for z/OS V6</td>
<td>5655-N01</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM WebSphere MQ Workflow for z/OS V3</td>
<td>5655-BPM</td>
<td>71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 12. Sample sub-capacity report: Product Summary Information section**

<table>
<thead>
<tr>
<th>DETAIL DATA COLLECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SYSID</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>LPAR1</td>
</tr>
<tr>
<td>LPAR3</td>
</tr>
<tr>
<td>LPAR2</td>
</tr>
<tr>
<td>LPARVM1</td>
</tr>
<tr>
<td>LPARVM2</td>
</tr>
<tr>
<td>CPC</td>
</tr>
</tbody>
</table>

**Figure 13. Sample sub-capacity report: Detail Data Collection section**
Figure 14. Sample sub-capacity report: SMF / SCRT89 Input Data Statistics section and Detail LPAR Data section

Figure 15. Sample sub-capacity report: Product Max Contributors section
Questions to consider about the sub-capacity report

Consider the following questions when you analyze your sub-capacity report. Your answers to these questions can help you decide whether you can optimize your configuration.

- Does the report match your expectations for product and LPAR utilization?
- Is this report consistent with reports from previous months or does it show unusual product or LPAR utilization?
- In the Product Grid Snapshot, are any products shown as running for only a small percent of the time in some LPARs? If so, do you need that product to run in that LPAR?
- Do you have a low-utilization product running in a high-capacity LPAR? Could it run in a lower-capacity LPAR instead?
- How busy is each LPAR? Are some LPARs consistently at capacity and some consistently well under capacity?

**Actions you can take to optimize your configuration**

In some cases, it makes sense to modify your configuration to more efficiently use your sub-capacity eligible products. The following are some possible actions you can make to optimize your configuration:

- Move products between LPARs to better match product utilization with LPAR capacity.
- Isolate a single workload in an LPAR to control how much of the CPC capacity it can use.
- Use a WLM defined capacity to limit the amount of resource a workload gets. For more information, see [z/OS MVS Planning: Workload Management](#).
- Add LPARs of different capacities to your CPC.

However, be aware that fine-tuning your configuration solely to minimize software costs can cause other problems. For example, a more complex configuration can make performance problems harder to resolve or cause you to spend more time on configuration maintenance than is reasonable.

**Using the Sub-Capacity Planning Tool output with the sub-capacity report**

The Sub-Capacity Planning Tool report can help you understand the sub-capacity report. The Sub-Capacity Planning Tool gives you an hour-by-hour, LPAR-by-LPAR report on what each CPC in your configuration is doing during the month. Use the sub-capacity report to identify problems or areas you want to investigate, and then turn to the planning tool report for the details.

**Billing for sub-capacity capable software products**

Once you have signed up for sub-capacity pricing on your CPCs, in order to actually receive the sub-capacity pricing you must submit monthly sub-capacity reports for billing.

When you submit sub-capacity reports for billing, IBM bills you according to the information in those reports and you must pay the bill when it arrives. IBM does not retroactively adjust billing based on the month the sub-capacity data was collected; the sub-capacity pricing will appear on the invoice for the month that follows the submission of the sub-capacity report. For instance, you submit the sub-capacity report for your January utilization (billing period) by the ninth day of February and then receive the bill matching that utilization in March.

If you observe extremely unusual utilization on a sub-capacity report (for instance, because of disaster recovery testing), there is a procedure for reporting the unusual condition and modifying the sub-capacity report so that it shows your intended product utilization. For details, see [Using the Sub-Capacity Reporting Tool](#).
Appendix A. Sub-capacity pricing case studies

Case studies help illustrate how the planning process might look for two sample customers—one smaller and one large. The examples show two customers, Airweave, Inc. and AKZ Financials, who are considering moving to sub-capacity pricing for their sub-capacity eligible MLC products.

Case study 1: Airweave, Inc.

Airweave, Inc. is a Midwestern consumer air-conditioner manufacturer. The company has a single IBM eServer zSeries CPC, 2064-103, with a maximum capacity of 112 MSUs.

Their business is seasonal; the typical year at Airweave looks like this:

Table 2. Example: Airweave, Inc.'s seasonal business cycle

<table>
<thead>
<tr>
<th>Time period</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>March through July</td>
<td>Planning cycle</td>
</tr>
<tr>
<td>August</td>
<td>Software upgrades and maintenance</td>
</tr>
<tr>
<td>September through February</td>
<td>Manufacturing cycle</td>
</tr>
</tbody>
</table>

Airweave configuration

The Airweave configuration consists of three LPARs—one for production, one for installing system and product upgrades and one for testing system and product upgrades, as shown in Figure 17. The test and installation LPARs are defined at 10 MSUs, although they are expected to use less capacity than that. All three LPARs have the same software inventory, as described in “Airweave software inventory.”

Airweave software inventory

- The following software runs on all three LPARs, zPROD, zTEST, and zINSTL:
  - z/OS V1, including RMF and Security Server
  - DB2 UDB for OS/390 V7
  - QMF MVS V3
  - CICS TS for OS/390 V2
  - MQ Series for OS/390 V5.2
  - IMS V7
  - Enterprise PL/I for z/OS and OS/390 V3
Sub-Capacity Planning Tool output for Airweave

Figure 19 shows the output of the Sub-Capacity Planning Tool for one month during the manufacturing cycle of Airweave’s CPC utilization.

Note that zINSTL and zTEST are rarely, if ever, active at the same time.

Airweave capacity plan

Based on the current state of the economy and the expected rate of new household formations, Airweave is projecting no major changes in the market for air-conditioners for the next year, so their current capacity plan is flat.

However, Airweave shows seasonal variation in utilization, so a projection of their seasonal utilization pattern is essential to estimating the company’s software costs.
Table 3. Example: Yearly utilization for Airweave, Inc.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>zPROD</td>
<td>106</td>
<td>110</td>
<td>90</td>
<td>65</td>
<td>67</td>
<td>69</td>
<td>75</td>
<td>80</td>
<td>90</td>
<td>95</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>zTEST</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>zINSTL</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total (CPC)</td>
<td>108</td>
<td>110</td>
<td>96</td>
<td>69</td>
<td>75</td>
<td>73</td>
<td>72</td>
<td>78</td>
<td>90</td>
<td>95</td>
<td>97</td>
<td></td>
</tr>
</tbody>
</table>

Airweave software costs

The following figures show the results of the Workload Pricer tool for Airweave using PSLC pricing, using full-capacity WLC pricing, and using sub-capacity WLC pricing at three points in the company’s yearly cycle. Airweave's IBM representative used the tool to obtain this pricing analysis to help the Airweave team make the decision on using sub-capacity pricing.
<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM:</td>
<td>2064-103</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN:</td>
<td>System01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655B01</td>
<td>IMS V7 Database Manager</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>18240</td>
<td></td>
</tr>
<tr>
<td>5655B01</td>
<td>IMS V7 Transaction Manager</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>21582</td>
<td></td>
</tr>
<tr>
<td>5655F10</td>
<td>MQSeries for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>9536</td>
<td></td>
</tr>
<tr>
<td>5655H31</td>
<td>Full Function</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>3702</td>
<td></td>
</tr>
<tr>
<td>5675DB2</td>
<td>DB2 UDB for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>19195</td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Base</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>38217</td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 RMF</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>1623</td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Sec Svr</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>2368</td>
<td></td>
</tr>
<tr>
<td>5697E93</td>
<td>CICS TS for z/OS V2</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>23143</td>
<td></td>
</tr>
<tr>
<td>5706254</td>
<td>QMF MVS Version 3</td>
<td>VWLC</td>
<td>B</td>
<td></td>
<td>112</td>
<td>7733</td>
<td></td>
</tr>
</tbody>
</table>

System Monthly Price: 145339
Total Monthly Price: 145339

Figure 22. Full capacity WLC cost for the Airweave configuration during the production cycle
Airweave cost analysis

Notice that not every product is more expensive with PSLC than with either full capacity or sub-capacity WLC pricing, but the total system cost is less with sub-capacity WLC at all points in the yearly cycle. Although using sub-capacity WLC pricing requires the IT staff to learn the SCRT and use it on a monthly basis, once you determine that full capacity WLC pricing is less expensive for you than PSLC, sub-capacity WLC can only reduce your software cost further.

Case study 2: AKZ Financials

AKZ Financials is a growing financial services company, providing mortgages and consumer loans.

AKZ configuration

AKZ Financials runs two IBM eServer zSeries CPCs: SYSTEM1 and SYSTEM2.
- SYSTEM1 is a z900, 2064-116, with a capacity of 441 MSUs. It has one LPAR: FC20.
• SYSTEM2 is also a z900, 2064-116, with a capacity of 441 MSUs. It has two LPARs: FC09 and TPOF.

<table>
<thead>
<tr>
<th>SYSTEM1</th>
<th>441 MSUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC20</td>
<td></td>
</tr>
<tr>
<td>z/OS</td>
<td></td>
</tr>
<tr>
<td>DB2 UDB</td>
<td></td>
</tr>
<tr>
<td>MQSeries V2</td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView</td>
<td></td>
</tr>
<tr>
<td>IMS/ESA</td>
<td></td>
</tr>
<tr>
<td>NetView Perf Monitor</td>
<td></td>
</tr>
<tr>
<td>Tivoli OPC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYSTEM2</th>
<th>441 MSUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC09</td>
<td></td>
</tr>
<tr>
<td>z/OS</td>
<td></td>
</tr>
<tr>
<td>DB2 UDB</td>
<td></td>
</tr>
<tr>
<td>MQSeries V2</td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView</td>
<td></td>
</tr>
<tr>
<td>IMS/ESA</td>
<td></td>
</tr>
<tr>
<td>Tivoli OPC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TPOF</th>
<th>30 MSUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td></td>
</tr>
<tr>
<td>DB2 UDB</td>
<td></td>
</tr>
<tr>
<td>MQSeries V2</td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView</td>
<td></td>
</tr>
</tbody>
</table>

Figure 26. Sample configuration: Products and LPARs in SYSTEM1 and SYSTEM2 CPCs for AKZ Financials

AKZ software inventory

Software on SYSTEM1:
• z/OS V1 with RMF
• DB2 UDB for OS/390 V7
• MQSeries for OS/390 V5
• MQSeries for OS/390 V2
• IMS/ESA V6
• NetView Perf Monitor V2
• Tivoli NetView for OS/390
• OPC V2

Software on SYSTEM2:
• z/OS V1 with RMF
• DB2 UDB for OS/390 V7
• MQSeries for OS/390 V2
• IMS/ESA V6
• Tivoli NetView for OS/390

AKZ product/location matrix

Figure 27 on page 49 shows the sub-capacity eligible WLC software inventory for AKZ. In this chart, the MSUs shown are from the LPAR definitions. In Figure 28 on page 49 and Figure 29 on page 50, you see the MSUs from the rolling four-hour average utilization detected by the Sub-Capacity Planning Tool. The MSUs from the tool are the ones used in Figure 30 on page 50.
Sub-Capacity Planning Tool output for AKZ

Figure 28 and Figure 29 on page 50 show the output of the Sub-Capacity Planning tool for one month of AKZ’s SYSTEM1 and SYSTEM2 utilization.

Customer survey

<table>
<thead>
<tr>
<th>Machine type/rating and MSUs</th>
<th>2064-116</th>
<th>441</th>
<th>2064-116</th>
<th>441</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine serial</td>
<td>SYSTEM1</td>
<td>12345</td>
<td>SYSTEM2</td>
<td>67890</td>
</tr>
<tr>
<td></td>
<td>SYSTEM2</td>
<td>67890</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPARS FC20 MSUs FC09 TPOF MSUs Sysplex MSUs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z/OS V1 5694-A01 x 441 x x 441 882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V7 5675-DB2 x 441 x x 441 882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries for OS/390 V5.2 5655-F10 x 441 x 441</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQSeries for OS/390 V2.1 5655-A95 x 441 x x 441 882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS/ESA V6 5655-158 x 441 x 441 882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView Perf Mon 5655-043 x 441 x 441</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli NetView for OS/390 5697-B82 x 441 x x 441 882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tivoli OPC 5697-OPC x 441 x 441</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 27. Product/location matrix for AKZ

Figure 28. Sub-Capacity Planning Tool output for AKZ Financials: SYSTEM1
AKZ capacity and growth plan

Figure 30 shows AKZ Financials’ capacity for the current year and their growth plan for +1 year and +2 years out.

<table>
<thead>
<tr>
<th>Capacity and growth plan</th>
<th>Current</th>
<th>Changes +1 year</th>
<th>Changes +2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine type-model and MSUs</td>
<td>2064-116</td>
<td>340 370 400</td>
<td>2064-116 415 420 430</td>
</tr>
<tr>
<td>Machine name and serial</td>
<td>SYSTEM1</td>
<td>SYSTEM2</td>
<td>SYSTEM2</td>
</tr>
<tr>
<td>LPARS</td>
<td>FC20</td>
<td>MSUs</td>
<td>FC09</td>
</tr>
<tr>
<td>z/OS V1</td>
<td>5694-A01</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>z/OS V1 RMF</td>
<td>5694-A01</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>DB2 UDB for OS/390 V7</td>
<td>5675-DB2</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>MQSeries for OS/390 V5.2</td>
<td>5655-F10</td>
<td>x</td>
<td>260 300 400</td>
</tr>
<tr>
<td>MQSeries for OS/390 V2.1</td>
<td>5655-A95</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>IMS/ESA V6</td>
<td>5655-158</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>Tivoli NetView Perf Mon</td>
<td>5655-043</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>Tivoli NetView for OS/390</td>
<td>5697-B82</td>
<td>x</td>
<td>340 370 400</td>
</tr>
<tr>
<td>Tivoli OPC</td>
<td>5697-OPC</td>
<td>x</td>
<td>340 370 400</td>
</tr>
</tbody>
</table>

Figure 30. Capacity and growth plan for AKZ Financials
AKZ software costs

The following figures show the results of the Workload Pricer tool for AKZ Financials using PSLC pricing and using sub-capacity WLC pricing for the current year, one year from now, and two years from now. AKZ’s IBM representative used the tool to obtain this pricing analysis to help the AKZ team make the decision on using sub-capacity pricing.

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM:</td>
<td>2064-116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN:</td>
<td>System1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5655158 IMS V6 Database Manager PSLC B 441 30491
5655158 IMS V6 Transaction Manager PSLC B 441 36367
5655F10 MQSeries for OS/390 PSLC B 441 20347
5655A95 MQSeries for OS/390 V2.1 PSLC B 441 16946
5655043 NetView Perf Mon PSLC B 441 3268
5675DB2 DB2 UDB for OS/390 PSLC B 441 39676
5694A01 z/OS V1 Base PSLC B 441 115495
5694A01 z/OS V1 RMF PSLC B 441 4625
5697B82 Tivoli NetView Ent PSLC B 441 13112
5697OPC OPC 2.3 Tracker PSLC B 441 4524

System Monthly Price 284851

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM:</td>
<td>2064-116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN:</td>
<td>System2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5655A95 MQSeries for OS/390 V2.1 PSLC B 441 16946
5655158 IMS V6 Transaction Manager PSLC B 441 36367
5675DB2 DB2 UDB for OS/390 PSLC B 441 39676
5694A01 z/OS V1 Base PSLC B 441 115495
5694A01 z/OS V1 RMF PSLC B 441 4625
5697B82 Tivoli NetView Ent PSLC B 441 13112

System Monthly Price 226221

Total Monthly Price 511072

Figure 31. PSLC cost for the current AKZ configuration
<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM:</td>
<td>2064-116</td>
<td>PG:</td>
<td>Group:</td>
<td>LIC</td>
<td>LVL</td>
<td>QTY</td>
<td>MSUs</td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td>SN:</td>
<td>System1</td>
<td>LIC</td>
<td>LVL</td>
<td>QTY</td>
<td>MSUs</td>
</tr>
<tr>
<td>5655158</td>
<td>IMS V6 Database Manager</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>29451</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655158</td>
<td>IMS V6 Transaction Manager</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>35022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655F10</td>
<td>MQSeries for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>18882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655A95</td>
<td>MQSeries for OS/390 V2.1</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>15739</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655043</td>
<td>NetView Perf Mon</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>3134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5675DB2</td>
<td>DB2 UDB for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>36901</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Base</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>88609</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 RMF</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>3929</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5697B82</td>
<td>Tivoli NetView Ent</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>12115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5697OPC</td>
<td>OPC 2.3 Tracker</td>
<td>VWLC</td>
<td>B</td>
<td>340</td>
<td>4213</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System Monthly Price 247995

<table>
<thead>
<tr>
<th>PID</th>
<th>Program Name</th>
<th>Type</th>
<th>LIC</th>
<th>LVL</th>
<th>QTY</th>
<th>MSUs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM:</td>
<td>2064-116</td>
<td>PG:</td>
<td>Group:</td>
<td>LIC</td>
<td>LVL</td>
<td>QTY</td>
<td>MSUs</td>
</tr>
<tr>
<td>Name:</td>
<td>IBM zSeries 900</td>
<td>SN:</td>
<td>System2</td>
<td>LIC</td>
<td>LVL</td>
<td>QTY</td>
<td>MSUs</td>
</tr>
<tr>
<td>5655A95</td>
<td>MQSeries for OS/390 V2.1</td>
<td>VWLC</td>
<td>B</td>
<td>415</td>
<td>17614</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5655158</td>
<td>IMS V6 Transaction Manager</td>
<td>VWLC</td>
<td>B</td>
<td>398</td>
<td>37980</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5675DB2</td>
<td>DB2 UDB for OS/390</td>
<td>VWLC</td>
<td>B</td>
<td>415</td>
<td>41026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 Base</td>
<td>VWLC</td>
<td>B</td>
<td>415</td>
<td>96859</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5694A01</td>
<td>z/OS V1 RMF</td>
<td>VWLC</td>
<td>B</td>
<td>415</td>
<td>4379</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5697B82</td>
<td>Tivoli NetView Ent</td>
<td>VWLC</td>
<td>B</td>
<td>415</td>
<td>13540</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System Monthly Price 211398

Total Monthly Price 459393

Figure 32. Sub-capacity WLC cost for the current AKZ configuration

<table>
<thead>
<tr>
<th>System1 Monthly Price</th>
<th>258465</th>
</tr>
</thead>
<tbody>
<tr>
<td>System2 Monthly Price</td>
<td>212626</td>
</tr>
<tr>
<td>Total Monthly Price</td>
<td>471091</td>
</tr>
</tbody>
</table>

Figure 33. Sub-capacity WLC cost for the AKZ configuration one year from now

<table>
<thead>
<tr>
<th>System1 Monthly Price</th>
<th>268835</th>
</tr>
</thead>
<tbody>
<tr>
<td>System2 Monthly Price</td>
<td>215235</td>
</tr>
<tr>
<td>Total Monthly Price</td>
<td>484170</td>
</tr>
</tbody>
</table>

Figure 34. Sub-capacity WLC cost for the AKZ configuration two years from now
AKZ cost analysis

Since the sub-capacity VWLC costs for the anticipated changes in the AKZ configuration one year and two years from now continue to be below the PSLC cost for the current configuration, it clearly makes sense for AKZ to move to sub-capacity pricing now.

If AKZ qualifies for aggregation pricing on those products that run on both systems, the company would have total monthly software costs of $346,399 for the current configuration, for even more substantial savings.
Appendix B. Capacity planning for sub-capacity IPLA products

The following topics provide three examples of how to decide how much capacity to purchase for sub-capacity eligible IPLA products—for an execution-based sub-capacity IPLA product, a reference-based sub-capacity eligible IPLA product, and a z/OS-based sub-capacity eligible IPLA product.

Example of an execution-based sub-capacity eligible IPLA product

Customer A uses sub-capacity pricing and wants to acquire Fault Analyzer for z/OS. Customer A determines which category of sub-capacity eligible IPLA products Fault Analyzer belongs to by visiting the IBM Sub-Capacity System z IPLA Web site at www.ibm.com/zseries/library/swpriceinfo. The Web site shows that Fault Analyzer is a sub-capacity eligible System z IPLA product with execution-based terms. This means that Customer A must designate the LPARs in which Fault Analyzer will execute. Customer A's IT staff decide that they will run Fault Analyzer only in LPAR SYSA on the System z CPC named CPC12.

Customer A's IT planning staff (consisting of the software asset manager, the IT architect, and the capacity planner) can look at the Detail LPAR Data section in last month’s sub-capacity reports to figure out the current capacity of the designated LPARs. Since Customer A has designated only one LPAR, SYSA, they need only consider the sub-capacity report for CPC12, where LPAR SYSA exists. The Detail LPAR Data section of CPC12’s sub-capacity report will indicate the highest rolling four-hour average of each active LPAR and active combination of LPARs on CPC12. The highest rolling four-hour average utilization of SYSA equals the software-pricing related capacity of SYSA.

Customer A must assess whether last month’s sub-capacity report represents the expected capacity of the LPAR SYSA in the future. For example, if SYSA's capacity last month was 100 MSUs, the IT planning staff must consider whether that capacity is equal to or smaller than the expected future capacity of SYSA. If SYSA is expected to grow, Customer A's staff might decide to acquire a greater capacity of Fault Analyzer to ensure they have sufficient entitled license capacity in the future and avoid IBM-initiated billing for the product.

Other options Customer A's IT planning staff might want to consider include:

- Constricting LPAR SYSA to limit the required license capacity of Fault Analyzer. Some examples of available capping techniques are enforcing the logical weight (sometimes known as hard capping) or using defined capacity (soft capping). For more information about defined capacity, see “More about defined capacity” on page 59.

- Licensing Fault Analyzer based upon the maximum potential capacity of LPAR SYSA, to ensure that IBM-initiated billing does not occur. The simplest way to determine the maximum potential capacity of LPAR SYSA is by counting the number of logical engines assigned to it. If LPAR SYSA has four logical engines and CPC12 has 12 physical engines with an MSU rating of 372 MSUs, then LPAR SYSA's maximum potential capacity is approximately:

\[
(4 \div 12) \times 372 \text{ MSUs} = 124 \text{ MSUs}
\]
Example of a reference-based sub-capacity eligible IPLA product

Customer B uses sub-capacity pricing and wants to acquire DB2 Administration Tool for z/OS. Customer B’s IT planning staff determines which category of sub-capacity eligible IPLA products DB2 Administration Tool belongs to by visiting the IBM Sub-Capacity System Z IPLA Web site at [www.ibm.com/zseries/library/swpriceinfo](http://www.ibm.com/zseries/library/swpriceinfo). The Web site shows that DB2 Administration Tool is a sub-capacity eligible System z IPLA product with reference-based terms.

Customer B’s IT planning staff must now determine in which environments they want to use the DB2 Administration Tool to add value to the parent product, DB2 UDB for z/OS. Customer B’s staff decides that they want to use the DB2 Administration Tool to add value to DB2 in their New York qualified Parallel Sysplex and to add value to DB2 in their standalone CPC, CPCTX, in Dallas. They will not yet be using the DB2 Administration Tool to add value to DB2 in their European qualified Parallel Sysplex.

Once they have identified the environments where DB2 Administration Tool will add value to DB2, Customer B’s staff can look at the DB2 UDB for z/OS MSUs in the Product Summary Information section of last month’s sub-capacity reports to determine the required license capacity of DB2 Administration Tool. Customer B’s staff must look at the sub-capacity reports for all the CPCs running DB2 in the New York qualified parallel sysplex and the sub-capacity report for CPCTX in Dallas. The capacity of reference-based products is based on the capacity of the parent product across the entire environment; that is, for products that run in a sysplex, across the entire sysplex.

Customer B’s staff must assess whether last month’s sub-capacity reports represent the expected future DB2 MSUs. Last month’s DB2 MSUs might be smaller than the expected future capacity of the New York sysplex, the standalone Dallas machine, or both. If the DB2 MSUs are expected to grow in the future, Customer B might want to acquire a greater capacity of DB2 Administration Tool to ensure they have sufficient entitled license capacity in the future and avoid IBM-initiated billing.

Example of a z/OS-based sub-capacity eligible IPLA product

Customer C uses sub-capacity pricing and wants to acquire Session Manager for z/OS. Customer C’s IT planning staff determines which category of sub-capacity eligible IPLA products Session Manager belongs to by visiting the IBM Sub-Capacity System Z IPLA Web site at [www.ibm.com/zseries/library/swpriceinfo](http://www.ibm.com/zseries/library/swpriceinfo). The Web site shows that Session Manager is a sub-capacity eligible System z IPLA product with z/OS-based terms. Customer C’s staff must now decide which CPCs will use Session Manager. The staff decides that they will use Session Manager on three CPCs: CPCADM, CPCTST and CPCREG.

Customer C’s staff now looks at the z/OS MSUs in the Product Summary Information section of last month’s sub-capacity reports to determine the required license capacity of Session Manager. To make this calculation, the staff must look at the sub-capacity reports for CPCADM, CPCTST, and CPCREG.

Customer C’s staff must decide whether last month’s sub-capacity reports represent the expected future z/OS MSUs. Last month’s z/OS MSUs might be larger or smaller than the expected future MSUs. If z/OS MSUs on the three CPCs are expected to grow, Customer C might want to acquire a greater capacity of Session Manager to ensure sufficient entitled license capacity in the future and avoid IBM-initiated billing.
Appendix C. Advanced topics in sub-capacity pricing

The following topics provide further discussion of some advanced topics such as zNALC pricing, defined capacity, group capacity, consolidating systems, and z/OS systems enablement functions.

More about zNALC pricing

System z New Application License Charges (zNALC) pricing applies to the z/OS base feature and z/OS priced features, with the exception of HCM and HLASM Toolkit. zNALC is available for z/OS on LPARs dedicated to qualified applications, among other requirements. See “System z New Application License Charges (zNALC)” on page 3 for more details.

Although the planning tool does not support zNALC, the planning tool can be used to report MSU estimates for LPARs that would qualify for zNALC workloads. Such estimates can be generated by providing the planning tool with separate COMBIN DD control statements for z/OS, traditional z/OS and zNALC. The control statements would list the LPARs in which all z/OS systems are running, the LPARs in which z/OS is not running a zNALC workload (referred to as a traditional z/OS LPAR) and the LPARs in which z/OS is running a zNALC workload (referred to as a zNALC LPAR). For instance the following set of COMBIN control statements would be used to indicate that LPARs LPAR2 and LPAR3 were running zNALC workloads and LPAR5 and LPAR6 were running zNALC workloads which did not qualify for zNALC pricing.

z/OS=ALL
zNALC=LPAR2,LPAR3
z/OS-Traditional=LPAR5,LPAR6

The resulting z/OS, zNALC, z/OS-Traditional values are described after the sample sub-capacity report later in this topic.

Whenever SCRT encounters SMF data from zNALC LPARs (for example, LPARs whose names have the format ZNALxxxx), SCRT reports the z/OS MSUs in one of two formats. These zNALC formats are shown in the following sections of the sub-capacity report:

- Product Summary Information
- Product Max Contributors
- Product Grid Snapshot
- Defined Capacity Value Used

When the SMF data is from a CPC where all of the z/OS LPARs are zNALC LPARs, SCRT reports all of the z/OS values as zNALC values and lists z/OS (zNALC) as the name in the MLC Product Name column of the sub-capacity report. In this case, IBM charges zNALC pricing for all of the z/OS use on the CPC. See Figure 35 on page 58.
When the SMF data is from a CPC with both traditional z/OS LPARs (for example, LPARs whose names do not have the format ZNALxxxx), and zNALC LPARs, SCRT reports three values for z/OS:

- **z/OS** – this value represents the MSU values for z/OS running in all LPARs on the CPC. This value is used when assigning capacity to the z/OS based IPLA sub-capacity products running on this CPC.

- **z/OS (Traditional)** – this value represents the MSU value charged against traditional z/OS use.

- **z/OS (zNALC)** – this value is used to determine what MSU value is charged against zNALC use. IBM uses the zNALC value reported on the SCRT, whenever the zNALC value is smaller than the difference between the z/OS value and the z/OS (Traditional) value.

When the difference between the z/OS value and the z/OS (Traditional) value is smaller than the zNALC value, then the difference is used, unless the difference is less than three MSUs. See [www.ibm.com/zseries/swprice/znalc.html](http://www.ibm.com/zseries/swprice/znalc.html) for the rules that govern the case for when the resulting zNALC value is less than three MSUs.

### Sample sub-capacity report for traditional z/OS and zNALC

[Figure 36 on page 59](#) shows a sample Product Summary Information section for a CPC with both traditional z/OS and zNALC LPARs. The same zNALC formatting, as described in "More about zNALC pricing" on page 57, is also used in other sections of the sub-capacity report. Based on this sample report, IBM would use a value of 38 MSUs (the difference between the z/OS value (98) and the z/OS (Traditional) value (60)) when charging for zNALC on this CPC.
More about defined capacity

Defined capacity is the most sophisticated means of controlling an LPAR’s rolling four-hour average utilization in a sub-capacity software pricing environment. If you have established a defined capacity but the rolling four-hour average utilization of the LPAR does not reach the defined capacity, then the software charges will be based upon the highest observed rolling four-hour average utilization.

Implications of a defined capacity

Defined capacity is an LPAR setting available to LPARs that:

- Are in a System z10 or System z9 environment or on zSeries hardware
- Are running z/OS in 64-bit mode
- Use shared general purpose CPs
- Have relative weight not enforced (no PR/SM hard cap set)

In addition, the z/OS system must be running native on the LPAR. Defined capacity does not work for z/OS systems that are VM guests.

Defined capacity is an optional setting that can be changed dynamically. Use the Hardware Management Console (HMC) to establish or change a defined capacity. You can also establish a defined capacity in the LPAR Image Profile, which ensures that the desired defined capacity is used if the system is re-IPLed. The defined capacity setting is in terms of MSUs. In cases where there are different values for hardware MSUs and software pricing MSUs for a given CPC, the defined capacity should be established in terms of software pricing MSUs. If you establish a defined capacity for an LPAR that has a PR/SM hard cap (enforced relative weight) or dedicated CPs, the defined capacity is ignored.

If you establish a defined capacity in an LPAR, z/OS Workload Manager monitors the rolling four-hour average utilization of that LPAR. If the rolling four-hour average utilization of the LPAR exceeds the defined capacity, the LPAR is temporarily...
capped (this is called soft capping) until the rolling four-hour average drops back below the defined capacity. The LPAR rolling four-hour average utilization can exceed the defined capacity. However, if the rolling four-hour average does exceed the defined capacity and soft capping is applied, it is possible (while being soft-capped) for the rolling four-hour average to continue to rise and to exceed the defined capacity. In these cases, IBM charges customers at the defined capacity level rather than based upon the higher rolling four-hour average utilization.

More about group capacity

Group capacity allows soft capping across multiple LPARs defined in the same LPAR group. Group capacity is available to LPARs in a System z10 or System z9 environment that:

- Use Workload Manager on z/OS V1R8 and above
- Do not enforce relative weight (no PR/SM hard cap set)
- Use the Hardware Management Console to define the capacity group
- Use z/OS Workload Manager to monitor the rolling four-hour average utilization of all of the LPARs within the same group.

Notes:
1. The planning tool does not cap LPARs that are defined to an LPAR group. However, SCRT provides full capping support for the LPAR defined to a group, as explained in “How SCRT uses group capacity.”
2. Although PR/SM and WLM will enforce the group capacity for the environment described above, SCRT has an additional requirement that needs to be met before it can perform the SCRT-specific group capping and group reporting described in “How SCRT uses group capacity.” SCRT requires that the SMF type 70 records be generated by the RMX feature shipped with z/OS V1R8 (or higher) or that comparable SMF records be generated by a competitive ISV product. The SMF type 70 records for z/OS V1R8 (and higher) have additional fields which provide data for group capping.

How SCRT uses group capacity

For the first four hours after an IPL and for the hours immediately after adding LPARs to a group or changing the group’s capacity, the capacities of those LPARs may exceed either the LPAR’s defined capacity value (if set) or exceed the capacity of the LPAR group to which the LPAR has been defined (if part of a group), until WLM and PR/SM finally cap the LPARs to your provided capping values. Whenever SCRT finds SMF data that indicates that the LPARs within the same LPAR group have exceeded the capacity cap set for that group, SCRT assigns the capacity of the group to the products running in the LPARs in the group, instead of assigning the actual LPAR capacities. SCRT applies any defined capacity capping (when applicable) to individual LPARs before assessing group capping.

The Product Max Contributors section of the sub-capacity report has been extended to indicate when the peak hour for the product has been capped as the result of group capping. The Defined Capacity Value Used section of the sub-capacity report has also been extended to indicate the number of hours that group capping has occurred. A new Group Capacity LPARs section has been added to list the LPARs defined to each group during the reporting period.

Examples of MSU assessment by SCRT

Because group capping, with or without the capping of individual LPARs within a group, can be a complicated scenario, the following set of examples indicate how
SCRT assesses the MSU value for the products in a sample configuration. In this sample configuration, LPAR2 has a defined capacity set to 28 MSUs and LPAR2 and LPAR3 are part of an LPAR group that has been capped at 70 MSUs. The bottom of the configuration shows the MSU values for each LPAR for hours 51 and 73 of the sample reporting period.

**Group capping on a traditional z/OS configuration**

Figure 37 shows a sample traditional z/OS configuration with group capping.

### CPC: 2096-S04 (serial = 02-12345)

<table>
<thead>
<tr>
<th>LPAR1</th>
<th>Defined cap = 28 MSUs</th>
<th>Group = GRPA</th>
<th>LPAR2</th>
<th>Defined cap = 28 MSUs</th>
<th>Group = GRPA</th>
<th>LPAR3</th>
<th>Group = GRPA</th>
<th>LPAR4</th>
<th>Group = GRPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS V1R7 (SYS1)</td>
<td>z/OS V1R8 (SYS2)</td>
<td>z/OS V1R8 (SYS3)</td>
<td>z/VSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CICS TS V3</td>
<td>DB2 UDB V8</td>
<td>DB2 UDB V8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS V8</td>
<td>CICS TS V3</td>
<td>CICS TS V3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>File Manager V6</td>
<td>MQSeries V6</td>
<td>MQSeries V6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMS V8</td>
<td>IMS V8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>File Manager V6</td>
<td>WebSphere Application</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WebSphere Application Server V6</td>
<td>WebSphere MQ Workflow V3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WebSphere Application Server V6</td>
<td>WebSphere MQ Workflow V3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WebSphere MQ Workflow V3</td>
<td></td>
<td></td>
<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>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hour 51 = 27 MSUs</td>
<td>hour 51 = 32 MSUs</td>
<td>hour 51 = 39 MSUs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hour 73 = 25 MSUs</td>
<td>hour 73 = 30 MSUs</td>
<td>hour 73 = 45 MSUs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 37. Sample z/OS traditional configuration with group capping

Figure 38 shows the MSUs for hour 51 for the sample configuration shown in Figure 37

<table>
<thead>
<tr>
<th>Product</th>
<th>MSUs contributed by each LPAR for hour 51 (actual values shown at bottom of the configuration in Figure 37)</th>
<th>Reported MSUs for hour 51</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>94</td>
</tr>
<tr>
<td>DB2 UDB V8</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>67</td>
</tr>
<tr>
<td>CICS TS V3</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>94</td>
</tr>
<tr>
<td>MQSeries V6</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>67</td>
</tr>
<tr>
<td>IMS V8</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>94</td>
</tr>
<tr>
<td>Lotus Domino V7</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>94</td>
</tr>
<tr>
<td>File Manager V6</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>55</td>
</tr>
<tr>
<td>IBM WebSphere Application Server for z/OS V6</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>67</td>
</tr>
<tr>
<td>IBM WebSphere MQ Workflow for z/OS V3</td>
<td>LPAR1: 27, LPAR2: 28, LPAR3: 39</td>
<td>67</td>
</tr>
</tbody>
</table>

**Footnotes:**
1. This LPAR was capped to 28 MSUs by its Defined Capacity setting.
2. The total MSUs for the LPARs in this group was 67 MSUs, which is less than the group cap of 70 MSUs so no group capping took place.

Figure 38. MSUs for hour 51 in the sample z/OS traditional configuration

Summary analysis for hour 51 shown in Figure 38
LPAR1 and LPAR4 can not participate in group capping, even if LPAR1 and LPAR4 were defined to be part of the LPAR group on the LPAR definition panel, because z/OS V1R7 (running in LPAR1), does not support group capping and z/VSE (running in LPAR4) does not support LPAR capping. Group capping support was introduced in z/OS V1R8.

SCRT capped all products running in LPAR2 for hour 51, because LPAR2 exceeded its defined capacity.

SCRT did not apply group capping to the LPARs in this group because the MSUs for the LPARs in this group totaled 67 MSUs, which is less than the group cap of 70 MSUs.

Figure 39 shows the MSUs for hour 73 for the sample configuration shown in Figure 37 on page 61.

<table>
<thead>
<tr>
<th>Product</th>
<th>MSUs contributed by each LPAR for hour 73 (actual values shown at bottom of each LPAR as shown in Figure 37 on page 61)</th>
<th>Reported MSUs for hour 73</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td>25 28 1,2 45 2</td>
<td>95</td>
</tr>
<tr>
<td>DB2 UDB V8</td>
<td>28 1,2 45 7</td>
<td>70</td>
</tr>
<tr>
<td>CICS TS V6</td>
<td>25 28 1,2 45 2</td>
<td>95</td>
</tr>
<tr>
<td>MQSeries V6</td>
<td>28 1,2 45 7</td>
<td>70</td>
</tr>
<tr>
<td>IMS V8</td>
<td>25 28 1,2 45 7</td>
<td>95</td>
</tr>
<tr>
<td>Lotus Domino V7</td>
<td>45 7</td>
<td>45</td>
</tr>
<tr>
<td>File Manager V6</td>
<td>25 28 1</td>
<td>53</td>
</tr>
<tr>
<td>IBM WebSphere Application Server for z/OS V6</td>
<td>28 1,2 45 7</td>
<td>70</td>
</tr>
<tr>
<td>IBM WebSphere MQ Workflow for z/OS V3</td>
<td>28 1,2 45 7</td>
<td>70</td>
</tr>
</tbody>
</table>

Footnotes:
1. This LPAR was capped to 28 MSUs by its Defined Capacity setting.
2. The total MSUs for the LPARs in this group was 73 MSUs, which is more than the group cap of 70 MSUs so group capping took place.
3. Group capping did not apply to the product running in this LPAR because the LPAR did not exceed the group capacity.

Figure 39. MSUs for hour 73 in the sample z/OS traditional configuration

Summary analysis for hour 73 shown in Figure 39

• LPAR1 can not participate in group capping, even if LPAR1 was defined to be part of the LPAR group on the LPAR definition panel, because z/OS 1.7, which is running in LPAR1 does not support group capping. Group capping support was introduced by z/OS 1.8.

• SCRT capped all products running in LPAR2 for hour 73, because LPAR2 exceeded its defined capacity.

• Group capping was used for all products that were running in both of the LPARs in the group during hour 73, because the capacities of both LPARs in the group (73 MSUs) exceed the group cap.

• Group capping did not apply to any product that ran in only one of the LPARs in the group because neither LPAR alone exceeded the capacity of the group.

Group capping on a z/OS traditional and z/OS zNALC configuration

z/OS zNALC and z/OS traditional are treated the same way as any other product for group capping. This can be demonstrated by changing the configuration to
contain a zNALC LPAR. LPAR3 was replaced by ZNAL3, which is a zNALC LPAR. Note that some of the products were dropped from the zNALC LPAR because zNALC LPARs must be dedicated to zNALC workloads and the applications which support those zNALC workloads. See \[More about zNALC pricing\] on page 57 for a description of how SCRT reports on configurations with zNALC LPARs.

**Figure 40** shows a sample z/OS traditional and z/OS zNALC configuration with group capping.

<table>
<thead>
<tr>
<th>CPC: 2096-504 (serial = 02-12345)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LPAR1</strong></td>
</tr>
<tr>
<td>Defined cap = 28 MSUs</td>
</tr>
<tr>
<td>Group = GRPA</td>
</tr>
<tr>
<td>Group cap = 70 MSUs</td>
</tr>
<tr>
<td>z/OS V1R7 (SYS1)</td>
</tr>
<tr>
<td>CICS TS V3</td>
</tr>
<tr>
<td>IMS V8</td>
</tr>
<tr>
<td>File Manager V6</td>
</tr>
<tr>
<td>(hour 73 = 25 MSUs)</td>
</tr>
<tr>
<td>DB2 UDB V8</td>
</tr>
<tr>
<td>CICS TS V3</td>
</tr>
<tr>
<td>MQSeries V6</td>
</tr>
<tr>
<td>IMS V8</td>
</tr>
<tr>
<td>File Manager V6</td>
</tr>
<tr>
<td>(hour 73 = 25 MSUs)</td>
</tr>
<tr>
<td>Lotus Domino V7</td>
</tr>
<tr>
<td>File Manager V6</td>
</tr>
<tr>
<td>IBM WebSphere Application Server for z/OS V6</td>
</tr>
</tbody>
</table>

**Figure 41** shows the MSUs for hour 73 for the sample configuration shown in **Figure 40**

<table>
<thead>
<tr>
<th>Product</th>
<th>MSUs contributed by each LPAR for hour 73 (actual values shown at bottom of each LPAR as shown in the configuration in <strong>Figure 40)</strong></th>
<th>Reported MSUs for hour 73</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td>25 28(^1) 45(^2)</td>
<td>95</td>
</tr>
<tr>
<td>z/OS (Traditional)</td>
<td>25 28(^1)</td>
<td>53</td>
</tr>
<tr>
<td>z/OS (zNALC)</td>
<td>25 28(^1)</td>
<td>45(^1) 45(^2)</td>
</tr>
<tr>
<td>DB2 UDB V8</td>
<td>28(^1) 45(^2)</td>
<td>70</td>
</tr>
<tr>
<td>CICS TS V3</td>
<td>25 28(^1)</td>
<td>53</td>
</tr>
<tr>
<td>MQSeries V6</td>
<td>28(^1)</td>
<td>28</td>
</tr>
<tr>
<td>IMS V8</td>
<td>25 28(^1)</td>
<td>53</td>
</tr>
<tr>
<td>Lotus Domino V7</td>
<td>25 28(^1)</td>
<td>45(^2) 45(^1)</td>
</tr>
<tr>
<td>File Manager V6</td>
<td>25 28(^1)</td>
<td>53</td>
</tr>
<tr>
<td>IBM WebSphere Application Server for z/OS V6</td>
<td>28(^1)</td>
<td>28</td>
</tr>
<tr>
<td>IBM WebSphere MQ Workflow for z/OS V3</td>
<td>28(^1)</td>
<td>28</td>
</tr>
</tbody>
</table>

**Footnotes:**
1. This LPAR was capped to 28 MSUs by its Defined Capacity setting.
2. The total MSUs for the LPARs in this group was 73 MSUs, which is more than the group cap of 70 MSUs, so group capping took place.
3. Group capping did not apply to the product running in this LPAR because LPAR did not exceed the group capacity.

**Figure 41. MSUs for hour 73 in the sample z/OS traditional and z/OS zNALC configuration**

For more information, see the topics on:
• Defining group capacity in the chapter on “Workload Management Participants of WLM Planning” in *z/OS MVS Planning: Workload Management*.

## Consolidating systems

With sub-capacity workload license charges, it can be beneficial to consolidate workloads from two smaller CPCs onto one larger CPC. For example, if you had two separate 78 MSU CPCs running z/OS and one had a peak rolling four-hour average utilization for the month of 75 MSUs while the other had a peak of 65 MSUs, your z/OS bill for the two systems would be based on 140 MSUs for that month, as illustrated in Figure 42.

### Before consolidation (CPC 1 and CPC 2)

<table>
<thead>
<tr>
<th>Hour:</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>...</th>
<th>36</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>MSUs billed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC 1 peak value</td>
<td>64</td>
<td>66</td>
<td>70</td>
<td>73</td>
<td>72</td>
<td>66</td>
<td>69</td>
<td>72</td>
<td>75</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>CPC 2 peak value</td>
<td>65</td>
<td>62</td>
<td>60</td>
<td>59</td>
<td>58</td>
<td>65</td>
<td>64</td>
<td>63</td>
<td>60</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Total for CPC 1 and CPC 2</td>
<td></td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 42. Peak utilization for separate systems (CPC 1 and CPC 2) before consolidation*

If you consolidated those workloads onto two LPARs of a 143 MSU processor, then only if those two peaks occurred in the same hour would your z/OS bill be based on the sum of the two highest values. A more likely scenario is that the peaks would occur in different hours and your highest combined utilization would be less than 140 MSUs, such as the 135 MSUs illustrated in Figure 43.

### After consolidation (CPC 3)

<table>
<thead>
<tr>
<th>Hour:</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>...</th>
<th>36</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>MSUs billed</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR A (formerly CPC 1) peak value</td>
<td>64</td>
<td>66</td>
<td>70</td>
<td>73</td>
<td>72</td>
<td>66</td>
<td>69</td>
<td>72</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPAR B (formerly CPC 2) peak value</td>
<td>65</td>
<td>62</td>
<td>60</td>
<td>59</td>
<td>58</td>
<td>65</td>
<td>64</td>
<td>63</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total for CPC 3</td>
<td>129</td>
<td>128</td>
<td>130</td>
<td>132</td>
<td>120</td>
<td>131</td>
<td>133</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 43. Peak utilization for equivalent LPARs (LPAR A and LPAR B) on a single system (CPC 3) after consolidation*

### Consolidating onto a different machine type

The example in “Consolidating systems” shows consolidation within the same machine type (for example, two smaller z900 CPCs, machine type 2064, consolidating onto a larger z900 CPC). When the consolidation is to a different machine type (for example, from two z900 2064 CPC to a z990 2084 CPC or to a
System z9 or System z10 environment), special planning is necessary. You should work with your IBM representative or IBM Business Partner representative to plan for this kind of change. Your representative has access to a tool called CP2000 that can help you plan.

**z/OS systems enablement functions**

At least one of these common systems enablement functions must be activated on all images in a sysplex for the software on that sysplex to participate in a pricing aggregation.

- Application Data Sharing
- GRS Star Implementation
- JES2 Checkpoint in the Coupling Facility
- RACF® database caching
- SmartBatch multisystem processing
- VTAM® Generic Resources
- VTAM MULTINODE Persistent Sessions
- Automated tape sharing and switching
- System logger SYSLOG (OPERLOG)
- System logger LOGREC
- System logger Resource Recovery Services
Appendix D. Sub-capacity pricing planning checklist

Use the checklist in Table 4 to help you track your progress in planning for workload license charges. You can find more information about these tasks in “Sub-capacity pricing planning tasks” on page 11.

Table 4. Sub-capacity planning checklist

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Software asset manager</td>
</tr>
<tr>
<td>Form team</td>
<td>●</td>
</tr>
<tr>
<td>Create inventories of your sub-capacity eligible software</td>
<td>●</td>
</tr>
<tr>
<td>Create a capacity and growth plan</td>
<td>●</td>
</tr>
<tr>
<td>Build product/location matrices</td>
<td>●</td>
</tr>
<tr>
<td>Define a baseline</td>
<td>●</td>
</tr>
<tr>
<td>Download and run the Sub-Capacity Planning Tool</td>
<td>●</td>
</tr>
<tr>
<td>Review the Sub-Capacity Planning Tool output</td>
<td>●</td>
</tr>
<tr>
<td>Create three scenarios: now, + 1 year, + 2 years</td>
<td>●</td>
</tr>
<tr>
<td>Get cost analysis from IBM for the scenarios</td>
<td>●</td>
</tr>
<tr>
<td>Create three-year cost chart</td>
<td>●</td>
</tr>
<tr>
<td>Determine whether company saves now or will save in future with sub-capacity pricing</td>
<td>●</td>
</tr>
<tr>
<td>Review IBM Terms and Conditions</td>
<td>●</td>
</tr>
<tr>
<td>Put contracts in place (or plan them for future)</td>
<td>●</td>
</tr>
<tr>
<td>Maintain software inventories and product/location matrices</td>
<td>●</td>
</tr>
<tr>
<td>Maintain capacity and growth plan</td>
<td>●</td>
</tr>
<tr>
<td>Schedule regular reviews of cost charts</td>
<td>●</td>
</tr>
<tr>
<td>Participate in reviews of cost charts</td>
<td>●</td>
</tr>
</tbody>
</table>
Appendix E. Sub-capacity pricing implementation checklist

Use the checklist in Table 5 to help you track your progress in implementing workload license charges. You can find more information about these tasks in “Sub-capacity pricing implementation tasks” on page 12.

Table 5. Sub-capacity implementation checklist

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsibility</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong></td>
<td><strong>Responsibility</strong></td>
<td></td>
</tr>
<tr>
<td>Schedule sub-capacity reporting tool implementation</td>
<td>Software asset manager</td>
<td>●</td>
</tr>
<tr>
<td>Discontinue any OS/390 or MVS licenses on CPCs to use sub-capacity pricing</td>
<td>z/OS system architect</td>
<td>●</td>
</tr>
<tr>
<td>Install any prerequisites for running the SCRT</td>
<td>Capacity planner</td>
<td>●</td>
</tr>
<tr>
<td>Install SCRT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test SCRT execution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign terms and conditions for sub-capacity pricing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run SCRT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze sub-capacity report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify sub-capacity report, if required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submit sub-capacity report to IBM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receive bill from IBM (the month after sub-capacity report submission)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review bill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule monthly software license plan reviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use sub-capacity report to modify configuration and cost structure quarterly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Appendix F. System z software pricing information**

Table 6 lists some useful Web sites that contain information about IBM System z software pricing.

<table>
<thead>
<tr>
<th>Information about this topic...</th>
<th>Is available here...</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCRT (download)</td>
<td><a href="http://www.ibm.com/zseries/swprice/scrt">www.ibm.com/zseries/swprice/scrt</a></td>
</tr>
<tr>
<td>Products that do and do not produce SMF 89 records (see the various subcapacity eligible WLC, EWLC, and IPLA product lists at this site)</td>
<td><a href="http://www.ibm.com/zseries/swprice/library.html">www.ibm.com/zseries/swprice/library.html</a></td>
</tr>
</tbody>
</table>
Accessibility

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.

z/OS information

z/OS information is accessible using screen readers with the BookServer/Library Server versions of z/OS books in the Internet library at:

http://www.ibm.com/systems/z/os/zos/bkserv/
This information was developed for products and services offered in the USA.

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
USA

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, 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:

IBM Corporation  
Mail Station P300  
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.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

---

**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.

---

**Trademarks**

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (™ or ®), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml)

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.
Index

Special characters
.csv format
  reports in  34

A
accessibility  73
advantages of sub-capacity pricing  6
aggregation
  consideration in creating a growth plan  22
  requirements  7
analyzing software costs  27

B
billing
  contracts for  30
  timing of  42

C
capacity  19
  current  19
  growth in  22
  capacity growth plan  23
  capacity-based pricing metrics  2
capping an LPAR
  defined capacity  59
case studies
  planning for a larger customer  47
  planning for a smaller customer  43
central processor (CP), definition  1
central processor complex (CPC), definition  1
checklist
  implementation  69
  planning  67
collecting SCRT89 records  36
collecting SMF type 70 and type 89 records  35
comma-separated-value file format
  reports in  34
common systems enablement functions  65
conditions for sub-capacity pricing  29
configuration
  optimizing  42
  configuration changes  23
consolidating systems  64
contracts for sub-capacity pricing  30
contractual requirements for sub-capacity pricing  30
cost analysis
  requesting  27
csv format
  reports in  34

D
dedicated CPs
  in LPARs  59
defined capacity
  overview  59
  setting  59
definitions
  central processor (CP)  1
  central processor complex (CPC)  1
  IBM System z Application Assist Processor (zAAP)  1
  IBM System z10 Integrated Information Processor (zIIP)  1
  IBM System z9 Integrated Information Processor (zIIP)  1
  Integrated Facility for Linux (IFL)  1
  logical partition (LPAR)  1
  MSUs  1
  processor unit (PU)  1
  sysplex  1
  System z Application Assist Processor (zAAP)  1
  System z10 Integrated Information Processor (zIIP)  1
  System z9 Integrated Information Processor (zIIP)  1
disability  73
disaster recovery situations  42

E
enforced relative weights in LPARs  59
Entry Workload License Charges (EWLC)  2
example
  group capping  61
  z/OS and zNALC  58
examples
  case studies
    planning for a larger customer  47
    planning for a smaller customer  43
    choosing value units for execution-based IPLA products  55
    choosing value units for reference-based IPLA products  56
    choosing value units for z/OS-based IPLA products  56
    LPAR utilization capacity calculation  6
    of software inventories  15
    Sub-Capacity Planning Tool output  21
  execution-based IPLA products
    example  55
  execution-based IPLA terms  4
    Getting Started Sub-capacity Pricing for z/OS IPLA Software  4

F
Flat Workload License Charge (FWLC)  2
full capacity pricing  2
full capacity pricing (continued) Parallel Sysplex License Charges (PSLC) 2
zSeries Entry License Charges (zELC) 2
future capacity 22

G
Getting Started Sub-capacity Pricing for z/OS IPLA Software 4
group capacity LPARs
assigning capacity 60
availability 60
MSU assessment by SCRT 60
requirements 60
z/NALC example 62
z/OS example 61
growth
in value units for sub-capacity IPLA products 55
growth in capacity
planning for 22

H
handling sub-capacity reports for unusual situations 42

I
IBM Customer Agreement 30
IBM System z10 Integrated Information Processor (zIIP) definition 1
IBM System z9 Integrated Information Processor (zIIP) definition 1
IBM terms and conditions 30
implementation
task overview 12
implementation checklist 69
Integrated Facility for Linux
definition 1
International Product License Agreement (IPLA) software 3
execution-based terms 4
Getting Started Sub-capacity Pricing for z/OS IPLA Software 4
reference-based terms 4
z/OS-based terms 4
inventories of software 15
invoicing 42

K
keyboard 73

L
logical partition (LPAR)
calculation of utilization 6
definition 1
utilization capacity 5
LPAR utilization capacity definition 5

LPAR utilization capacity (continued)
example 6
rolling four-hour average 6
LPARs
defined capacity in 59

M
machine type changes
consolidation 64
planning for 23
managing costs 37
maximum concurrent LPAR utilization 33
Midrange Workload License Charges (MWLC) 3
millions of service units (MSUs), definition 1
monthly license charge (MLC) software 2

N
Notices 75

P
Parallel Sysplex License Charges (PSLC) 2, 7
parent product 4
planning
checklist 67
consolidation 64
for machine type changes 23
reviews 31
task overview 11
prerequisites
for sub-capacity pricing 29
Sub-Capacity Planning Tool 19
sub-capacity pricing 8
pricing
consolidation changes 64
IPLA software 3
MLC software 2
planning for machine type changes 23
PSLC 23
types 2
Web pages 71
pricing aggregation
consideration in creating a growth plan 22
requirements 7
Web pages 71
pricing analysis
requesting 27
problems
complex configurations 42
effects of configuration changes 23
machine type changes 23
unusual sub-capacity reports 42
processor unit (PU)
definition 1
product inventories 15
PSLC pricing 23
R
reference-based IPLA products 56
reference-based IPLA terms 4
relative weights in LPARS 59
Remote Support Facility (RSF) 34
reporting period 35, 37
requirements for sub-capacity pricing 8, 29
Resource Management Facility (RMF) 35
reviewing plans 31

S
SALC 3
sample output of Sub-Capacity Planning Tool 21
sample software inventories 15
Select Application License Charges (SALC) 3
sending TSAD to IBM 35
shortcut keys 73
SMF records
  collecting SCRT89 records 36
  collecting type 70 and 89 35
  type 70 19
SMF type 70 subtype 1 and type 89 records 33
soft capping
  overview 59
software costs
  analyzing 27
software inventories 15
software license
  contracts for 30
software pricing Web pages 71
Sub-Capacity corner Web page 71
Sub-Capacity Planning Tool
  example of output 21
  output 20
  overview 19
  prerequisites 19
  use with SCRT 42
  using the output 27
sub-capacity pricing 2
  advantages 6
  contracts for 30
  contractual requirements 30
Entry Workload License Charges (EWLC) 2
  future advantages and disadvantages 23
  introduction 1
IPLA software 3
Midrange Workload License Charges (MWLC) 3
  not for everyone 7
  prerequisites 8
Select Application License Charges (SALC) 3
System z New Application License Charges (zNALC) 3
  technical requirements 29
  terms and conditions 35
Workload License Charges (WLC) 2

sub-capacity report (continued)
  billing-related section 37
customer verification sections 39
defined capacity value used section 41
detail data collection section 39
detail data sections 40
detail LPAR data section 40
for managing costs 37
group capacity LPARs section 41
product grid snapshot section 41
product max contributors section 40
product summary information section 39
SMF/SCRT89 input data statistics section 40
special conditions section 38
tool information section 38
Sub-Capacity Reporting Tool (SCRT)
  analyzing output 37
  output 34
  overview 33
  preparing to use 33
  prerequisites for using 8
  use with Sub-Capacity Planning Tool 42
sysplex
  definition 1
sysplex pricing aggregation
    consideration in creating a growth plan 22
    requirements 7
Web pages 71
System Management Facility (SMF)
  input for Sub-Capacity Reporting Tool 33
  type 70 subtype 1 and type 89 records 33
System z Application Assist Processor (zAAP)
  definition 1
System z New Application License Charges (zNALC) 3
System z10 Integrated Information Processor (zIIP)
  definition 1
System z9 Integrated Information Processor (zIIP)
  definition 1

T
tasks
  implementation overview 12
  planning overview 11
technical requirements for sub-capacity pricing 29
terms and conditions
  contracts 30
  sending TSAD data 35
timing of bills 42
Transmit System Availability Data (TSAD) 35
type 70 and type 89 SMF records
  generating 19
type 70 subtype 1 and type 89 SMF records 33

U
unusual situations 42
URLs for software pricing Web pages 71
utilization capacity for LPARs
  calculation 6
definition 5
V
Value Unit Converter Tool Web site  71
value units
  choosing for sub-capacity eligible IPLA products  56
Variable Workload License Charge (VWLC)  2
VWLC software inventory  15

W
Workload License Charges (WLC)
  Flat Workload License Charge (FWLC)  2
    overview  2
    Variable Workload License Charge (VWLC)  2
Workload Manager (WLM)  34
Workload Pricer Web site  27

Z
z/NALC
  MSU value  58
z/OS systems enablement functions  65
z/OS-based IPLA products
  example  56
z/OS-based IPLA terms  4
zNALC  3
zNALC and traditional z/OS
  product summary information  58, 59
zNALC pricing
  understanding  57
zSeries Entry License Charges (zELC)  2
zSeries software pricing Web pages  71
Readers’ Comments — We’d Like to Hear from You

z/OS
Planning for Sub-Capacity Pricing

Publication No. SA22-7999-05

We appreciate your comments about this publication. Please comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. The comments you send should pertain to only the information in this manual or product and the way in which the information is presented.

For technical questions and information about products and prices, please contact your IBM branch office, your IBM business partner, or your authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you. IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you state on this form.

Comments:

Thank you for your support.
Submit your comments using one of these channels:
• Send your comments to the address on the reverse side of this form.
• Send your comments via e-mail to: mhvrdfs@us.ibm.com

If you would like a response from IBM, please fill in the following information:

Name
Address

Company or Organization

Phone No.
E-mail address