In this issue...

XML Toolkit
64-bit
Migration
WebSphere
and much more!

Bringing the tools to you
## Table of contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Article</th>
<th>Title</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>FEATURED ARTICLES</td>
<td>XML Toolkit for z/OS: The right tools for the right job</td>
<td>BILL CAREY</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>DB2 RELOADED: DB2 V8 meets zSeries and z/OS</td>
<td>ROGER MILLER</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Database on demand</td>
<td>JIM PORELL</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Party on, WebSphere! What's new with WebSphere Application Server for z/OS V5?</td>
<td>ANDREA GREGGO</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>Bye the books… Welcome to the WebSphere Application Server for z/OS V5 InfoCenter</td>
<td>ANDREA GREGGO</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>On the up and up! System Automation for OS/390 offers a high availability solution for WebSphere for z/OS</td>
<td>ULRICH KETTNER</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>z/OS Library Center: Check it out!</td>
<td>GEOFF SMITH</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>LookAt me now!</td>
<td>MARY ELLEN COLEMAN</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td>Honey, I shrunk the messages!</td>
<td>GEOFF SMITH</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Wake up and smell the z/OS coffee</td>
<td>NORMAN AARONSON</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>All aboard! z/OS Communications Server networking for applications</td>
<td>KIM BAILEY</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>Security Planner, Version 2: Now with network security recommendations</td>
<td>WAYNE O’BRIEN</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>Scenes from a network: Keeping your network performance in focus</td>
<td>TRACY DEAN</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Are you highly available?</td>
<td>DAVID RAFTEN</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Changes keeping you up at night?</td>
<td>DAVID RAFTEN</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>One size doesn't fit all: System programming education and training</td>
<td>BERNICE CASEY, PETER PAGEREY, AND DON SPANGER</td>
</tr>
<tr>
<td>46</td>
<td></td>
<td>z/OS V1.4 Consoles Enhancements: Sysplex message routing gets a face-lift</td>
<td>SCOTT FAGEN</td>
</tr>
<tr>
<td>47</td>
<td></td>
<td>Throughout the issue</td>
<td>JOHN EELLS</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>Back cover</td>
<td>MAGDALEN LEUNG AND ELPIDA TZORTZATOS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DEPARTMENTS</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>A letter from the editors</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>z/Favorites CD</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>Our contributors</td>
<td></td>
</tr>
</tbody>
</table>
After nine issues of the Hot Topics Newsletter, we certainly like to think that we’ve seen it all and can read the pulse of the product well enough to predict exactly what people will submit. Yet, with the start of every campaign for articles, we’re always blown away by all the suggestions we receive—enough new, interesting, unexpected topics to easily fill two Newsletters!

Needless to say, with such a plethora of topics to choose from, it’s no easy task deciding which will lead the issue as the flagship topic du jour. In fact, we had such a hard time of it with this issue that we decided to bestow the honor on not one, but two separate themes.

Our first feature is tools, headed up by “XML Toolkit for z/OS: The right tools for the right job” by Bill Carey. Definitely delve into that for a healthy dose of what, when, where, why and how you can implement this extremely robust and indispensable toolkit. Along that line, don’t miss “Wake up and smell the z/OS coffee” by Norm Aaronson and “Party on, WebSphere! What’s new with WebSphere Application Server for z/OS V5?” by Andrea Greggo.

Continuing where we left off with Issue 8, we start this issue with a trio of system enhancement articles from zSeries gurus Marna Walle and Jim Becker. “Decisions, decisions... Which z990 software enhancements should you get?” “Getting what you want: Ordering and installing the new software enhancements,” and “Having it all: A closer look at how z/OS enhancements are delivered” will all help you better understand how to maintain and improve your system. They also offer a beckoning look at the fantastic new zSeries server z990—definitely worth the price of admission.

Running throughout the issue is our very own version of an after-dinner treat. “ServerPac hints and tips” provides you with helpful morsels from none other than our resident ServerPac expert and frequent IBM-MAIN newsgroup contributor, John Eells. Look for the fortune cookies and bask in their uncanny wisdom.

Aside from our dual focus, there is, as always, a whole issue full of other topics worth checking out. You’ll want to pay special attention to articles on DB2, availability, and 64-bit.

As we near our tenth anniversary issue, we wonder what we could do to better ourselves even further. We already performed a complete design overhaul in Issue 8, and we certainly don’t want to change the scope or caliber of the articles we publish. Hmmm... it seems that, short of shipping the issue with a huge sack of money, we’re doing just fine! As always, please continue to send us comments or suggestions that surprise and delight us to newslet@us.ibm.com. But, if you feel inclined to forever hold your peace, please enjoy the issue with our warmest regards!

-The Editors
Decisions, decisions…

Which z990 software enhancements should you get?

By Jim Becker

The IBM® @server™ zSeries® 990 (z990) is the newest and most powerful zSeries server. The z990 can provide almost three times the processing power, four times the memory, and twice the I/O capacity of its predecessor. To allow z/OS® V1.4 (and earlier releases) to run on the z990, IBM is delivering a number of software enhancements in a staged manner between June, 2003, and the end of the year. This article will help you decide which of the enhancements you need.

The z990 software enhancements come in two varieties: Some are optional features and others are Web deliverables. For information about these two delivery types, see the article “Having it all: A closer look at how z/OS enhancements are delivered” on page 11. After you have decided which enhancements you want, you have to obtain and install them. For help, see the article “Getting what you want: Ordering and installing the new software enhancements” on page 3.

This article discusses the following z990 software enhancements:

• z/OS V1.4 z990 Compatibility Support, available now. This optional feature allows z/OS V1.4 to run on a z990 and thus take advantage of the increased power of the server, but without exploiting any of the new z990 server functions. This feature also provides clear key cryptography and Secure Sockets Layer (SSL) and Transport Layer Security (TLS) performance acceleration, and can be required on coexisting z/OS V1.4 non-z990 systems, as explained later.

• z/OS V1.4 z990 Exploitation Support, planned for October, 2003. This optional feature will allow exploitation of several new z990 server functions, in particular up to two Logical Channel Subsystems and up to 30 logical partitions (LPARs). As with z/OS V1.4 z990 Compatibility Support, this feature also provides clear key cryptography with SSL and TLS performance acceleration, and can be required on coexisting z/OS V1.4 non-z990 systems, as explained later.

• z990 Compatibility for Selected Releases, available now. This Web deliverable enables lower-level releases (z/OS V1.3, z/OS V1.2, and OS/390 V2.10, but not z/OS V1.1) to run on a z990 server and make use of its increased power, but not to exploit the new z990 server functions (like the z/OS V1.4 z990 Compatibility Support feature). This deliverable also allows those lower-level releases running on a non-z990 server to coexist in a sysplex with a z990 system.

• z990 Cryptographic CP Assist Support for z/OS V1.3, available now. This Web deliverable provides clear key cryptography with SSL and TLS performance acceleration for z/OS V1.3 on a z990 server.

For your information, z/OS.e™ is supported by the last three enhancements above as well as by two other enhancements: z/OS.e V1.4 z990 Coexistence (available now) and z/OS.e V1.4 z990 Coexistence Update (planned for October, 2003). However, the z/OS.e enhancements are not discussed further in this article.

The following topics will help you decide which enhancements to get for each of the four software/hardware combinations.

Enhancements needed for a z/OS V1.4 system on a z990 server

If you want to run z/OS V1.4 on a z990 server, you need either the z/OS V1.4 z990 Compatibility Support feature or, when available, the z/OS V1.4 z990 Exploitation Support feature. As stated previously, the former enables z/OS V1.4 to run on the z990 server and therefore take advantage of its increased power, but the latter goes further by allowing z/OS V1.4 to exploit new functions in the z990 server. If you haven’t installed the z/OS V1.4 z990 Compatibility Support feature by October when the z/OS V1.4 z990 Exploitation Support feature becomes available, just install the z/OS V1.4 z990 Exploitation Support feature. At that point, the z/OS V1.4 z990 Exploitation Support feature will obsolete the z/OS V1.4 z990 Compatibility Support feature.

Both features also provide some cryptographic functions. The features support clear key data encryption and decryption through use of the CP Assist for Cryptographic Functions (CPACF) hardware feature of the z990 server, with SSL and TLS performance acceleration through use of the PCI Cryptographic Accelerator (PCICA) hardware feature of the z990 server. However, if you want secure key data encryption and decryption, it will be supported on the z990 server through use of the PCI Express Cryptographic Coprocessor (PCIXCC) hardware feature, beginning October, 2003. At that time you can download and install the z990 Cryptographic Support deliverable, which provides exploitation support for the PCIXCC hardware feature, and replaces the support provided in the z/OS V1.4 z990 Compatibility Support feature.

Enhancements needed for a z/OS V1.4 system on a non-z990 server

If you plan to run a z/OS V1.4 system on a non-z990 server in a sysplex where a z/OS V1.4 or coupling facility image is exploiting a z990 server, you will need either the z/OS V1.4 z990 Compatibility Support feature or the z/OS V1.4 z990 Exploitation Support feature on all of the z/OS V1.4 systems. (A non-z990 server is any of the other servers on which z/OS V1.4 is
Enrichments needed for lower-level releases on a z990 server

z/OS V1.3, z/OS V1.2, and OS/390 V2.10 (but not z/OS V1.1) can run on the z990 server and make use of its power, but these releases cannot exploit new functions in the z990. (Only z/OS V1.4 can exploit the new functions.) If you want to run any of these lower-level releases on a z990 server, you must install the z990 Compatibility for Selected Releases deliverable on the lower-level releases.

Another reason for having the z990 Compatibility for Selected Releases deliverable installed on lower-level systems is because of a sysplex requirement. This deliverable is required on all z/OS V1.3, z/OS V1.2, and OS/390 V2.10 z990 systems in a sysplex where a z/OS V1.4 or coupling facility image in the sysplex is exploiting the z990 server. Again, “exploiting” means that the z/OS V1.4 or coupling facility image that is running on the z990 server has an LPAR ID greater than 15.

If you require cryptography for a lower-level release:

- On z/OS V1.3, to obtain clear key data encryption and decryption through use of the CPACF hardware feature of the z990 server, with SSL and TLS performance acceleration through use of the PCICA hardware feature of the z990 server, download and install the z990 Cryptographic CP Assist Support for z/OS V1.3 deliverable.

- To obtain secure key data encryption and decryption through use of the PCIXCC hardware feature of the z990 server, download and install (when available in November, 2003) the z990 Cryptographic Support deliverable. This deliverable provides exploitation support for the PCIXCC hardware feature and replaces the support provided in the z990 Cryptographic CP Assist Support for z/OS V1.3 deliverable.

- On z/OS V1.2, download and install (when available in November, 2003) the z990 Cryptographic Support deliverable to obtain secure key data encryption and decryption through use of the PCIXCC hardware feature of the z990, clear key data encryption and decryption through use of the CPACF hardware feature of the z990, with SSL and TLS performance acceleration through use of the PCICA hardware feature of the z990.

- On OS/390 V2.10, download and install (when available in December, 2003) the z990 Cryptographic Support deliverable to obtain the same functions as described above for z/OS V1.2.

Enrichments needed for lower-level releases on a non-z990 server

If you plan to run any z/OS V1.3, z/OS V1.2, or OS/390 V2.10 systems on a non-z990 server in a sysplex where a z/OS V1.4 or coupling facility image is exploiting a z990 server, you will need the z990 Compatibility for Selected Releases deliverable on all of the z/OS V1.3, z/OS V1.2, and OS/390 V2.10 systems. (A non-z990 server is any of the other servers on which z/OS V1.3, z/OS V1.2, or OS/390 V2.10 are supported.) Again, “exploiting” means that the z/OS V1.4 or coupling facility image that is running on the z990 server has an LPAR ID greater than 15.

Tip on pubs

Two of my favorite z/OS publications each have two topics with lots of information to help you upgrade to a z990 server. One topic helps you decide whether to upgrade the operating system or processor first, and recommends steps to follow to achieve the upgrade. The other topic is 13 pages of detailed information about migrating to a z990 server. This information was provided by Greg Daynes, an experienced leader on the z/OS development team and well-known speaker at user conferences. Subtopics within the 13 pages include upgrading HMC microcode, defining the z990 server, installing z990 compatibility software on system images and disaster recovery images, installing z990 sysplex coexistence software, installing z990 CFCC coexistence microcode, installing cryptographic software, and changes to messages, commands, SMF records, and parmlib members.

- Favorite publication #1: z/OS V14 Migration, GA22-7499. If you’re migrating from OS/390 V2.10, see this publication for the two recommended topics. The first topic is in Chapter 2 and is titled “Decide whether to upgrade operating system or processor first when migrating to z/Architecture.” The second topic is in Chapter 3 and is titled “Migrate to the z990 server.”

- Favorite publication #2: z/OS V14 and z/OS.e V14 Planning for Instalation, GA22-7504. If you’re migrating from z/OS V1.1, z/OS V1.2, or z/OS V1.3, see this publication for the two recommended topics. The first topic is in Chapter 6 and is titled “Deciding which to migrate first -- software (to z/OS V1R4) or hardware (to z990, z900, or z800).” The second topic is also in Chapter 6 and is titled “Planning a migration to a z990 server.”

ServerPac hints and tips

Throughout the issue you will find ServerPac hints and tips presented as “fortune cookies.” Have fun!

ServerPac tip #1: Saved configurations are your friends.

Remember all the work you did the last time you installed a ServerPac order? Don’t do it over! Use a saved configuration from your last order when you create the configuration for your new order. Doing so will carry forward the same data set names, merges, volume assignments, space changes you made, and so on. If you did not save the configuration the last time you installed an order, it’s not too late. Just go back into the old order and save it. Then use it to create the new configuration. (Worried that you won’t know what’s new? Look at the New Data Set selection in Modify System Layout’s View and Change option.)
Getting what you want: Ordering and installing the new software enhancements

BY MARNA WALLE

With the May 13, 2003, announcement, there are many new enhancements available for OS/390 and z/OS. These include software support for the new zSeries 990 (z990) server, and other enhancements, such as DFSMStvs, Consoles Enhancements, Enterprise Identity Mapping, IBM Health Checker for z/OS and Sysplex, and DFSMSrmm. The enhancements are delivered to you in a variety of ways— as z/OS features, Web deliverables, downloadable executables, and SPEs. For information about how these deliverables install, see “Having it all: A closer look at how z/OS enhancements are delivered” on page 10.

This article focuses on three of the announced enhancements, which are delivered through z/OS features or as Web deliverables: z990 Support, DFSMStvs, and Consoles Enhancements. After you decide which of these enhancements you want (see “Decisions, decisions…Which z990 software enhancements you should get?” on page 5), getting them shouldn’t be a hassle, as long as you know where to get them! In this article, we sort these enhancements by the release on which they will run. This should help you know which ordering and installation paths are available to you.

### z/OS V1.4 enhancement

<table>
<thead>
<tr>
<th>When is it available?</th>
<th>Where to get it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS V1.4 z990 Compatibility Support</td>
<td>After October 28, 2003, order z/OS V1.4 z990 Exploitation Support.</td>
</tr>
<tr>
<td>• June 10, 2003 for CBPDO.</td>
<td>• CBPDO, if you already have z/OS V1.4. When ordered through ShopzSeries, electronic delivery of this feature in CBPDO is available in many geographies.</td>
</tr>
<tr>
<td>• June 24, 2003 for ServerPac.</td>
<td>• ServerPac, if you do not have z/OS V1.4.</td>
</tr>
<tr>
<td>z/OS V1 DFSMStvs</td>
<td>If you already have z/OS V1.4, you do not need a CBPDO or ServerPac. Instead:</td>
</tr>
<tr>
<td>• June 10, 2003 for CBPDO.</td>
<td>1. Install the PTF for APAR OA01929</td>
</tr>
<tr>
<td>• June 24, 2003 for ServerPac.</td>
<td>2. Contact IBM to obtain the DFSMStvs license</td>
</tr>
<tr>
<td>z/OS V1.4 z990 Exploitation Support</td>
<td>• CBPDO, if you already have z/OS V1.4. When ordered through ShopzSeries, electronic delivery of this feature in CBPDO is available in many geographies.</td>
</tr>
<tr>
<td>Planned for October 28, 2003, for both CBPDO and ServerPac.</td>
<td>• ServerPac, if you do not have z/OS V1.4.</td>
</tr>
<tr>
<td>Planned for October 31, 2003 from the Web.</td>
<td></td>
</tr>
<tr>
<td>z/OS V1.4 Consoles Enhancements</td>
<td>After general availability, use one of the following methods:</td>
</tr>
<tr>
<td>General availability is planned for 1Q2004. An early availability program is planned for November 14, 2003, which will include an appropriate delivery method.</td>
<td>• CBPDO, if you already have z/OS V1.4. When ordered through ShopzSeries, electronic delivery of this feature in CBPDO is available in many geographies.</td>
</tr>
<tr>
<td></td>
<td>• ServerPac, if you do not have z/OS V1.4.</td>
</tr>
</tbody>
</table>

Remember that after you’ve ordered and installed these new enhancements, you need to consider any special service notes that are applicable to those new enhancements.

### z/OS Version 1.4

If you don’t already have z/OS V1.4, but will be migrating to it soon, we recommend that you order any new features that you might want with your z/OS V1.4 order. Ordering a ServerPac is strongly encouraged since IBM packages the new features along with your z/OS V1.4 system. If you received both z/OS V1.4 and the z/OS features in a single CBPDO order, you would have to piece together the installation of z/OS V1.4 and the z/OS features yourself from two or more different program directories—not very pleasant! Check the ordering availability dates of the new enhancements.
on z/OS V1.4 in Figure 1 on page 7 to see which enhancements you can order at a particular time.

If you already have z/OS V1.4, and you want a new feature that you didn't get with your z/OS V1.4 order, we recommend that you order and install the feature with a CBPDO, if it installs through CBPDO. The features orderable in a CBPDO are smaller and easier to install than an entire z/OS ServerPac.

With the exception of z990 Cryptographic Support, the z/OS V1.4 enhancements discussed in this article are available only through Software Distribution and Fulfillment—not from the z/OS download Web page!

Service for your z/OS V1.4 enhancement
Service for your z/OS V1.4 enhancement will be provided through CBPDO or ServerPac (unlike the Web deliverables). If you received your z/OS V1.4 feature in a CBPDO after June 27, 2003, you received service for all of z/OS R4—not just service for the z/OS V1.4 FMIDs in the feature. The only exception is the z/OS V1.4 z990 Cryptographic Support Web deliverable, which does not include any service. (You can obtain service for this Web deliverable through your usual service channels.)

PTF service for all the z/OS V1.4 enhancements will be provided in your normal preventive service deliverable, regardless of whether you ordered the z/OS V1.4 enhancement. Note that PTFs are required for the z990. These PTFs are found in the z990 PSP bucket (upgrade 2084DEVICE, subset 2084/OS390).

**z/OS Version 1.3**

z/OS V1.3 is no longer orderable. Some enhancements are still available for that release (see Figure 2), but only from the z/OS download Web page.

Service for your z/OS V1.3 enhancement
Service for your z/OS V1.3 enhancement will not be provided with the Web deliverables. Obtain service for the enhancement through your usual service channels.

PTF service for the z/OS V1.3 enhancements is delivered with all preventive service orders for z/OS V1.3, regardless of whether you downloaded the enhancements. However, normal preventive service is not available for the System SSL Security Level 3 component of the z990 Cryptographic CP Assist Support for z/OS V1.3 and z990 Cryptographic Support for System SSL Security Level 3, which is in the cryptographic Web deliverables and is export controlled.

A special process is in place for this service, as follows:

1. You must register and subscribe to a special forum on IBM Resource Link. Details about this forum are provided in the program directory for this z/OS V1.3 enhancement. The subscription will notify you of any PTF service that becomes available.
2. You order the PTFs individually, or order them through the options in ShopzSeries or ServiceLink. The PTFs are not available in CBPDO or ESO. Note that PTFs are required for the z990. These PTFs are found in the z990 PSP bucket (upgrade 2084DEVICE, subset 2084/ZOS).

**z/OS Version 1.2**

z/OS V1.2 is no longer orderable. Some enhancements are still available for that release (see Figure 3), but only from the z/OS download Web page.

Service for your z/OS V1.2 enhancement
Service for your z/OS V1.2 enhancement will not be provided with the Web deliverables. Obtain service for the enhancement through your normal service channels.
PTF service for the z/OS V1.2 enhancements will be provided in your normal preventive service deliverable, regardless of whether you have downloaded the enhancement for z/OS V1.2. Note that there are PTFs required for the z990. These PTFs are found in the z990 PSP bucket (upgrade 2084DEVICE, subset 2084/ZOS).

**OS/390 Version 2.10**

OS/390 V2.10 is no longer orderable. Some enhancements are still available for that release (see Figure 4), but only from the z/OS download Web page.

**Service for your OS/390 V2.10 enhancement**

Service for your OS/390 V2.10 enhancement will not be provided with the Web deliverable. Obtain service for the enhancement through your usual service channels.

---

ServerPac tip #2: Use the Recommended System Layout option (even if you don’t use the recommended system layout).

The Recommended System Layout Option will quickly tell you how much DASD you need to install your order. If you use the NEW option, it will also tell you how much free space each volume in your saved layout will have with the new order’s data set sizes, and whether some volumes will become overallocated. To do this without changing anything else, just enter and exit the Variables and Zones options (don’t bother changing anything), select Modify System Layout, use the Recommended System Layout option to get the information you need, and then re-create the configuration.
Having it all: A closer look at how z/OS enhancements are delivered

BY MARNA WALLE

You might have noticed that we’re making the new z/OS V1.4 enhancements available through various types of deliverables that you can add to your OS/390 or z/OS system. Here is a summary of those deliverables and how they compare.

z/OS small programming enhancements
Small programming enhancements (SPEs) are product enhancements that IBM introduces through the service stream. SPEs have been around since the early days of MVS™, so you’re probably already familiar with them!

How do you receive an SPE?
You receive SPEs through your normal service deliverables. You install SPEs as ++PTFs using SMP/E; they should have the ++HOLD REASON(ENH) designation.

How is problem reporting done for an SPE?
To report a problem with an SPE, contact the IBM Support Center, just as you would do to request product support.

An example of an SPE
Enterprise Identity Mapping (EIM) was provided for z/OS V1.4 in PTF UW96037 in January, 2003. EIM provides a technology that allows you to map a user’s identity on one system to the user’s identity on another system.

z/OS orderable features
z/OS orderable features are enhancements that IBM makes available for any currently orderable release of z/OS. Orderable features contain SMP/E packaged FMIDs. Sometimes, orderable features become available after you have already received your z/OS release, and so they are “missing” from your system.

How do you receive an orderable feature?
If you are “missing” a feature that you want for your (still currently orderable) z/OS release, you can order just that feature through CBPDO. The CBPDO will contain the FMIDs in the feature, plus a small program directory for installing just that feature. To receive the “missing” feature, you must order it. (It is not automatically shipped to you.) You install the CBPDO through SMP/E.

If you order just the “missing” feature through a CBPDO with ShopzSeries, you can receive it electronically! To find ShopzSeries, go to: http://www.software.ibm.com/webapp/ShopzSeries/ShopzSeries.jsp

To install an electronic CBPDO from ShopzSeries, do the following:
1. In ShopzSeries, specify a package type of “CBPDO” and a delivery media type of “Internet” for your order. Order the desired z/OS features.
2. You will be notified by e-mail when your order is ready, or you can access the order directory through a link in the e-mail, or you can go to ShopzSeries, and click on “Download.”
3. ShopzSeries displays a customized Web page for your order, which contains several components. Read CBPDO Internet Delivery User’s Guide and the install instructions.
   • To perform the SMP/E RECEIVE FROMNETWORK for your electronic CBPDO package, you must use SMP/E V3R1 with PTF UR53536 on your OS/390 R10, z/OS, or z/OS.e system. ICSF is required for SHA-1 processing of the package to ensure integrity. See ICSF configuration requirements at http://www.s390.ibm.com/smp/e/ and click on “GIMUNZIP and GIMZIP Service Routines.” SMP/E RECEIVE FROMNETWORK is recommended.
   • If you do not want to perform SMP/E RECEIVE FROMNETWORK for your electronic CBPDO package, you can download the downloadable image to your workstation and upload it to your z/OS host system. Then perform SMP/E RECEIVE FROMNTS.
4. Perform the SMP/E RECEIVE FROMNETWORK (recommended) or SMP/E RECEIVE FROMNTS. Your order’s customized Web page provides a customized SMP/E RECEIVE FROMNETWORK job.
5. Process the non-SMP/E files delivered on your electronic order using GIMZIP. The non-SMP/E files are the DOCLIB, RIMLIB, and PGMDIR data sets that you usually receive in a physical CBPDO.
6. Continue with the installation, following the program directory that is available from the publications link of your order’s customized Web page, or from the PGMDIR data set.

If you haven’t already placed your order for the current z/OS release, order the feature you’d like with the current z/OS release. We recommend ordering a feature if there’s a chance you’ll need it. That’s because it’s easier to get the feature along with the entire release and include it in your deployment of that release than to get it later (especially if the z/OS feature is no longer orderable). Using ServerPac is strongly recommended. In a ServerPac order, IBM has already used SMP/E to install the products and features for you, and you use the ServerPac dialog to restore the system. Unlike a z/OS feature CBPDO, you cannot order a z/OS release electronically on ServerPac through ShopzSeries.

What about service for an orderable feature?
Service for the ordered feature will be included in your deliverable, for both CBPDO and ServerPac. Also, if you receive your CBPDO after June 27, 2003, and it contains only a “missing” z/OS V1.4 feature, all of the service for the rest of z/OS will also be included. Conversely, service for the features is included in preventive maintenance deliverables only if the features are ordered.

How is problem reporting done for an orderable feature?
To report a problem with an orderable
feature, contact the IBM Support Center, just as you would do to request product support.

An example of an orderable feature z/OS V1.4 z990 Compatibility Support became available for ordering on June 10, 2003, for CBPDO and June 24, 2003, for ServerPac. (z/OS V1.4 became generally available on September 27, 2002.) This orderable feature allows z/OS V1.4 to run on a z990 server.

z/OS Web deliverables

Web deliverables are enhancements to releases that may or may not be currently orderable. You can usually identify which Web deliverable installs on which z/OS release by the title of the Web deliverable. Web deliverables are available at no charge and are entitled under your existing license. You must, however, agree to the terms and conditions listed on the Web site. z/OS Web deliverables contain SMP/E packaged FMIDs.

How do you receive a Web deliverable?

Web deliverables are available only from the z/OS download Web page:


You cannot receive a Web deliverable as part of your ServerPac or CBPDO order. Before downloading, you must agree to the terms and conditions for the Web deliverable on the z/OS download Web page.

To install a Web deliverable, do the following:

1. Download the package to your workstation (through your Web browser) and upload it to your z/OS host (through FTP, for example) into an HFS directory. The package is composed of two files: a binary UNIX pax format and a text ReadMe file. The ReadMe file contains sample JCL to process the pax file. The pax file contains the actual FMIDs.
2. Follow the instructions in the ReadMe file to do the following: a. Invoke the UNIX pax utility to extract the component archive files into the same HFS directory. b. Invoke SMP/E to perform GIMUNZIP on the archive files. This produces SMP/E RELFILEs from the files in the HFS directory. The GIMUNZIP function is provided in SMP/E V3.1 (in z/OS V1.2 and higher), and rolled back to OS/390 R10 and z/OS V1.1 SMP/E in PTF UR52471. If you want to perform hash checking, ICSF must be configured. Hashing provides additional security and verification for the download file. See ICSF configuration requirements at http://www.s390.ibm.com/smpe/ and click on “GIMUNZIP and GIMZIP Service Routines”.
3. Obtain service for the Web deliverable from your regular preventive service deliverable. No service is provided on the Web deliverable.
4. Continue with the installation, following the program directory that is available from the z/OS download Web page in PDF, BookManager® book, or browse-able format.

What about service for a Web deliverable?

As mentioned previously, no service is included in the Web deliverable. Service is included in your regular preventive service deliverable for z/OS automatically, regardless of whether you downloaded the function.

How is problem reporting done for a Web deliverable?

To report a problem with a Web deliverable, contact the IBM Support Center, just as you would do to request product support.

An example of a Web deliverable

z/OS V1.3 Bimodal Migration Accommodation became available on September 27, 2002, from http://www.ibm.com/eserver/zseries/zos/downloads/. This deliverable allows you to IPL z/OS V1.3 on a zSeries processor in ESA/390 (31-bit) mode, within certain terms and conditions.

z/OS “as is” Internet downloads

“As is” Internet downloads are helpful executables for your OS/390 or z/OS system. You might also know these types of deliverables as “tools and toys” for z/OS. You install the executables by directly copying them to your system — you do not use SMP/E.

How do you receive an “as is” Internet download?

You obtain an “as is” Internet download from the z/OS download Web page:


Generally, to install one, you do the following:

1. Download the executables (along with ReadMe or other files) from your Web browser to your workstation.
2. Upload the files to your z/OS host (using FTP, for example).
3. Install the files following the directions provided.

How is problem reporting done for an “as is” Internet download?

“As is” Internet downloads may or may not be service supported. They are provided “as is”, although IBM might provide updates to the Internet download. Often, there are discussion forums or contact information for your questions and comments.

An example of an “as is” Internet download

IBM Health Checker for z/OS and Sysplex helps improve availability by reporting on active z/OS and Parallel Sysplex® settings that are different from best practices recommended by IBM or customer-defined settings. This download has been available since February, 2003, from: http://www.ibm.com/eserver/zseries/zos/downloads/. To report a problem with Health Checker, use the forum on Resource Link. IBM plans to provide updates to Health Checker.

Add more function to your z/OS release!

As you see, there are many ways for you to enhance your OS/390 or z/OS release with new functions! The majority of new functions, however, continue to be shipped as part of the z/OS releases. Here are some good ways to know when new enhancements become available:

• Keep an eye on recent z/OS announcements.
• Regularly visit the z/OS download Web page.
• Review PTFs with HOLDs for ENH.
• Visit ShopzSeries to view the features available on z/OS.
Need a check-up?
IBM Health Checker for z/OS and Sysplex helps improve availability by reporting on active z/OS and Parallel Sysplex settings that are different from best practices recommended by IBM.

For more information, visit:

ServerPac tip #3:
Use parmlib concatenation.
A ServerPac order includes up to three different parmlib data sets. Using them the right way can save you work. In particular, you should concatenate the SMP/E-managed z/OS parmlib and place it on a target volume so you don’t have to remember to copy the release-specific members to your production systems. (These are the xxxIPCSx, BLSCxxxx, CNLxxxxx, and default CTIxxxxx members, which you probably use unchanged.) After this is set up, you will never be able to forget to copy the members during migration again.

Tip # 4
ServerPac tip #4: Don’t like it? Change it with the CHange command!
You can override “required in master catalog” and “unrenameable” with CH MCAT and CH RENAME.

Tip # 3 & 5
ServerPac tip #5: Do things the easy way in Modify System Layout.
To avoid doing things over, do things in this order (just skip any you don’t plan to do):
1. Merge data sets
2. Change data set space
3. Specify Reserved Space on volumes
4. Specify Existing Data for volumes (only if existing online volumes will be used)
5. Do everything else.
This avoids volume overallocation problems when a data set merge operation “relocates” space assigned to one volume to a different volume, or when increasing data set space causes the space required to exceed a volume’s size, and other potential problems.
DB2 RELOADED: 
DB2 V8 meets zSeries and z/OS

BY ROGER MILLER

DB2® UDB for z/OS Version 8 (V8) is the twelfth and largest-ever release of DB2 for MVS, OS/390 or z/OS. It brings new synergy with the zSeries hardware and uses the zSeries and z/OS 64-bit virtual addressing capabilities. V8 improves data support, application development, and query enhancements for e-business. It also builds on the traditional zSeries and DB2 characteristics of availability, exceptional scalability, and performance for the enterprise DBMS of choice. DB2 V8 is the first major IBM product which requires zSeries and z/OS.

DB2 V8 has been re-engineered for e-business on demand™, with many fundamental changes in architecture and structure. Key improvements enhance resilience, integration, open standards, and virtual and autonomic capabilities. Management for very large databases is made much easier, while 64-bit virtual storage support makes management simpler and improves scalability and availability. This new version breaks through many old limitations in the definition of DB2 objects, including SQL improvements, online schema evolution, longer names for tables and columns, longer SQL statements, enhanced Java™ and Unicode support, enhanced utilities, more log data sets, more partitions, and many more advantages.

zSeries and z/OS synergy

DB2 has used the function of the zSeries and z/OS platform extensively for many years. DB2 benefits from zSeries large real memory support, faster processors, and better hardware compression. DB2 uses Parallel Access Volume and Multiple Alleligence features of the IBM Enterprise Storage Server® (ESS), ESS FlashCopy® is used for DB2 backup in combination with log suspend / resume. DB2 makes unique use of the z/Architecture™ instruction set, and a number of instructions provide improvement in reliability, performance and availability. DB2 continues to deliver synergy with hardware data compression, FICON™ (fiber connector) channels, disk storage, advanced networking function, and Workload Manager (WLM).

DB2 UDB for z/OS Version 8

With its new 64-bit virtual address spaces, DB2 UDB for z/OS V8 now requires a zSeries server, 64-bit z/Architecture, and z/OS V1.3 or higher. DB2 V8 also takes advantage of later z/OS releases, like z/OS V1.4 and Coupling Facility CFLEVEL 12 for improvements in data sharing batch. z/OS V1.5, DFSMSHsm™ Fast Replicate, DFSMSdsst™, FlashCopy Version 2 and DB2 Utilities Suite for z/OS V8 are required for the new system-level backup and restore function. Multilevel security is built upon z/OS V1.5 with Security Server RACF. V8 also provides additional uses for high performance cryptography, Unicode, Parallel Sysplex and data sharing.

zSeries 990

Running DB2 V8 on zSeries 990 provides additional advantages. In preliminary measurements running DB2 UDB for z/OS V7 and V8 at Silicon Valley Lab, IBM found the range of improvements in processing for DB2 generally to be in the expected range of 1.5 to 1.6 times faster than a z900. For example, two runs of the load utility in DB2 UCD for z/OS V8 improved 1.59 times and 1.6 times in processor time. We expect to have more complete measurements for the machine improvements and measurements for DB2 V8 provided at general availability.

The 990 also provides more memory—up to 256 GB. DB2 uses memory to allow scaling with large workloads. The additional memory means that you can add the needed memory to improve scalability, availability and ease of use. DB2 V8 64-bit virtual storage allows one large virtual space, rather than a number of hiperspaces and data spaces in addition to the address spaces. Limits for storage use are lifted. While using more than 2 gigabytes in one address space once meant an outage, now it only requires real storage tuning. Outages are avoided. Monitoring is simpler. Thus, DB2 scales farther using more memory, more effectively.

SQL enhancements

DB2 V8 is a breakthrough in SQL, with too many changes to list here. Some examples are: multirow insert, fetch and update, GET DIAGNOSTICS, INSERT within SELECT, identity column enhancements, sequences, CURRENT PACKAGE PATH, dynamic scrollable cursors, common table expressions, recursion, scalar fullselect, materialized query tables, Unicode SQL, XML publishing, and much more. You have probably encountered many limitations in these areas over the past 20 years. Lifting the limits required extensive DB2 reengineering for V8. Longer names for tables and columns mean that you can use more meaningful names, matching your standards. Longer SQL statements help with SQL that is generated or used in an SQL procedure.

These changes provide consistency across the DB2 family, and can improve your productivity when you port applications. If you want to design or write applications for the entire DB2 family, use the IBM DB2 Universal Database SQL Reference for Cross-Platform Development. It was updated in March 2003 and we intend to update it again this year to reflect V8. Download it from:


Online schema evolution

The most important change for many customers is the ability to use SQL ALTER in many places instead of needing to drop and redefine. We call this online schema evolution, and it can reduce outages by hours or days for a major database structure change. Database administrators can add a partition to an existing partitioned table space or rotate the partitions. Other changes in online schema evolution allow better partitioning and improved disk access, avoiding random access with more effective database design.

Other improvements allow improved scalability and availability, such as triple the number of active logs and ten times
the archive logs. The maximum number of partitions is now 4096, about sixteen times more than DB2 V7. The new maximum number of partitions allows a table to use one partition per day for eleven years!

**Enhanced Java and Unicode**

DB2 V8 Java support is more consistent across platforms now that we use a single code base across the DB2 family. Improved SQL consistency also adds new function to DB2 and improves integration with WebSphere® and Java. The Java Universal Driver is updated to support the JDBC/SQLJ 3.0 standard, including improvements like save points, connection pooling improvements, the ability to reuse prepared statements, multiple open result sets for a single stored procedure, WITH HOLD cursors, and improved large object support. Unicode storage and manipulation was a key part of DB2 V7. V8 adds the ability to handle SQL in Unicode and the ability to mix other character encoding with Unicode in a single SQL statement. That means we can now join a Unicode table to a table with another encoding, making a transition to Unicode easier. This new capability can make Unicode the character encoding that allows applications to expand from a few countries to the world!

**Primary enhancements in the utilities**

Many DB2 utility enhancements support long names, Unicode, 64-bit addressing, new index options, and schema evolution. We’ve added two new utilities for system point-in-time backup and recovery. The new REBALANCE option of REORG can balance the sizes of a partition range or of all partitions. REORG DISCARD can be performed with SHRLEVEL CHANGE. Data partitioned secondary indexes can be reorganized without a BUILD2 phase. All DB2 catalog tables can be reorganized in SHRLEVEL REFERENCE or read-only mode. Delimited files can be used as input to LOAD or output from UNLOAD. SCOPE PENDING makes the job easier for reorganizing only what’s needed. Improved statistics allow better optimization.

**Security**

Security has changed very substantially in DB2 V8 with new options for e-business and high security with multilevel security. Multilevel security with row level granularity addresses applications that need more granular security or mandatory access control. (See Jim Porell’s article “Database on demand” on page 15.) If you need more flexible security, use the new special registers and session variables to provide secure information to views, triggers, stored procedures and user-defined functions. V8 adds new encryption options too.

**General availability (GA)**

Our first commitment is to a quality deliverable, so planned GA is “when the product is ready,” not a date. V8 was shipped to many vendors and early customers at the end of January 2003 and they are now running it, providing feedback. From past history, our large versions have had nine-month early support programs. V8 is the largest version ever, by a wide margin, so the early ship interval is probably longer. We are talking with vendors and early customers as we go through the program, and the GA depends upon the success of those customers as well as lab test experience.

At your IT organization, there is plenty you can do right now to get ready. Get the needed education and planning. Migrate to DB2 for z/OS V7, zSeries, and z/OS V1.3 or higher. If you are running COBOL, PL/I, CICS®, or IMS™, upgrade to current releases. For some of you, the vendor timing will be important. We have been working with vendors in detail since November, 2001, and provided code to vendors months before the early customer shipment. We are working with more than 30 vendors now, and early customers are getting updated code from vendors.

**Interested in reading more?**


Database on demand

BY JIM PORELL

In a world of application servers that are shared across multiple customer constituencies, you want to make sure that data for each customer is protected from the others. Customers can get comfortable running the same applications that other customers are running across a pool of servers but they want their data to be isolated or compartmentalized from other customers' data for competitive, privacy, and integrity reasons.

Let’s look at a variety of business problems that lend themselves to this form of compartmentalization. Whenever you replicate or move data to provide a new security container or isolation point, it’s an opportunity to consider labeling the data and, in turn, saving on processor, network, storage, and administrative expenses. Suffice to say that the future is getting closer. The labeling of data and application identities provides the means for both the aggregation and compartmentalization of data.

One of the primary advantages of executing on zSeries software is your ability to host large databases on behalf of transaction programs or other application servers. Let’s take a closer look at how you can compartmentalize data using your operating system, security server, and database technology, and in doing so, facilitate some database aggregation that reduces execution costs. It is the strength of the security on z/OS and within DB2 that provides this functionality. In particular, DB2 UDB for z/OS® Version 8 provides row-level security and z/OS V1L5 with Security Server (RACF) provide the operating system and security services that make this database on demand capability whole.

Government data compartmentalization

Intelligence communities within many government agencies have adopted the concept of compartmentalization of data to ensure that one compartment protects the need-to-know aspect of a particular piece of information. Management procedures and technology are utilized to protect both the reads and writes of this compartmentalized data. Many times, the term “labeled data” is used to reflect the combination of the security hierarchy (such as Secret, Internal, and Unclassified) and a particular category of data (such as Tax Department or Law Enforcement). A relational database is built with a collection of columns and rows. You can apply security labels to the columns and rows and provide a level of privacy or protection that isolates elements of the database from users running with differing security labels. It is the same form of labeling used by several government agencies that you can leverage to provide a commercial version of database compartmentalization that meets the needs of on demand computing.

Telephone billing on demand

Let’s begin with a couple of examples. In the United States, a business or consumer has a choice of local and long distance telephone carriers. The local carrier is responsible for providing the connectivity to the long distance carrier. Each local carrier has customers with a wide variety of long distance carrier users. The local carrier captures information necessary for the long distance carrier to provide billing services to the consumer. When looking at the flow of data needed to provide long distance billing services, the data moves several times and consumes processing power with each move.

For example, the local provider must sort through all of its consumers by long distance carrier. Then the billing information for that long distance carrier must be aggregated and delivered to the long distance carrier. The long distance carrier receives the information, loads it into its own database, and then executes the billing application. In this flow, the data moves to the long distance billing application. Each month, a variable amount of data moves between the two telephone companies.

If the local telephone company provided an on demand billing service, the long distance companies’ billing application would move to the local phone company, rather than the billing information moving. The long distance company would learn the schema of the database, the specific rows and columns necessary to process their billing records. (See Figure 1.) The local phone company would recognize the identity of the billing application as having arrived from a specific long distance carrier. That identity would be used to associate a label to that long distance carrier’s billing application.

<table>
<thead>
<tr>
<th>DB2_SECURITY_LABEL_EXT</th>
<th>calling #</th>
<th>called#</th>
<th>duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long line 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long line 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 - Example using security labels for billing on demand
application cycles on the local phone company’s system at a fraction of the cost of hosting its own database. The data could then be available for other business analysis, again at a fraction of the cost. And throughout this database processing, the security labels associated with the long distance company applications would inhibit other long distance carriers from viewing their data.

**Application serving on demand**

Another example could be considered *wholesale on demand* computing. In this example, a services business acquires a collection of servers and hosts a specific application and its associated data on that server infrastructure. The services business then sells “subscriptions” for the application to other businesses or consumers. These application users, the “buyers”, want their data isolated from other buyers but they choose to subscribe to the application service because they can not afford or don’t have the skills to host their own version of the application’s computing infrastructure.

By associating labels with each subscriber, the database can be consolidated across multiple buyers while retaining the appropriate levels of compartmentalization. (See Figure 2) This allows the services business to save disk and management resources by consolidating the needs of multiple buyers into fewer databases. In addition, if a specific buyer asks for extensions to the database schema, this can be accomplished simply and easily—without migrating the data, taking down the application, or compromising the compartmentalization of the data. This can be accomplished with an online DB2 schema alteration and an online database reorg.

**Financial services on demand**

The final example addresses the large financial services corporation. Government regulations may inhibit one business unit from seeing personal, consumer information associated with another business unit. However, a subset of this information may be valuable for data mining, for example, identifying trends and developing new business services. By aggregating the data (see Figure 3) and labeling the columns of data, you can make a subset of the information more readily available without compromising the sensitive information that government regulators are attempting to protect.

In this way, your financial services business can save the server and network costs associated with replicating data across business units, while still providing the compartmentalization that the government regulations are mandating. This could be considered a *retail on demand* solution.

**Conclusion**

Security labeling of data and application identities provides the means for both the aggregation and compartmentalization of data. There are a variety of other business problems that lend themselves to this form of compartmentalization. Next time you need to replicate or move data to provide a new security container or isolation point, consider labeling and saving on processor, network, storage, and administrative expenses. Take a look at your database organization and flow of data between application servers. Maybe labeling your data can provide additional security and deployment savings to your business.
ServerPac tip #7: How to actually use the incredibly useful OFILE command.
You can save lists of data sets, the volumes on which they reside, and other information about data sets with the OFILE command for later use during migration. Particularly useful are lists of data sets that are new, require APF-authorization, are eligible for the link list, or are required in LPA. You can use these lists during migration as a guide for production system parmlib changes, or even to create the parmlib members.

To create a new data set with a data set list in it, you need to enter three OFILE commands. The first creates the data set, the second saves the list, and the last closes the data set, so that other applications can read it:
1. OFILE OPEN data set name NEW
2. OFILE
3. OFILE CLOSE

You can find the record format in ServerPac: Using the Installation Dialog.

ServerPac tip #8: Pick good qualifiers.
CustomPac Dialog data sets have two distinct kinds of qualifiers. One kind is the “master qualifier.” It’s for CustomPac Dialog data sets that are not related to a particular order. Pick qualifiers for these data sets that do not include any information about an individual ServerPac order. The other kind is for the CustomPac Dialog data sets that come with each order. Choose names for these data sets that include the order number as one qualifier. That way, the names will never conflict with either the master qualifier or the names of dialog data sets for other orders.

Check out some great Redbooks™ about XML at

http://www.ibm.com/redbooks

XML on z/OS and OS/390: Introduction to a Service-Oriented Architecture (SG24-6826)

HOT Using XML on z/OS and OS/390 for Application Integration (SG24-6285)
XML Toolkit for z/OS: The right tools for the right job

BY BILL CAREY

Introduced in May of 2000, XML Toolkit for z/OS is already in its fifth release and is becoming an increasingly important component in z/OS environments.

XML (Extensible Markup Language) is a character-oriented grammar for expressing data and, more importantly, data about the data (metadata). Use of XML has dramatically increased in the I/T industry over the last few years. The industry buzz has somewhat shifted from XML, which for a number of years held the preeminent spot on the I/T buzz-meter, to other technologies like Web services, grid, and on demand computing. However, underlying these newer technologies, there remains a fundamental reliance on XML as the language in which associated data, formats, and protocols are described. There are a myriad of ways in which XML is being used in middleware products, databases, applications, and enterprise information systems (EIS) solutions.

With all this focus comes an increasing need for tools to assist in the processing of this tidal wave of XML data heading our way. XML Toolkit is a vehicle for delivering components that help you address these needs.

What is XML Toolkit for z/OS?

While there are a number of XML parsing tools that exist in either stand-alone fashion or as part of other products, XML Toolkit for z/OS contains what might be the most commonly used technologies. Specifically, it contains the following components:

- A Java XML parser called XML4J
- A Java XSLT (XML Stylesheet Language Transformations) processor called LotusXSL-J
- A C++ XML parser called XMLAC
- A C++ XSLT processor called LotusXSL-C++

These components are based on Apache Software Foundation’s Xerces and Xalan open source software projects for parsers and XSLT processors, respectively. While XML standard from the World Wide Web Consortium (W3C®) is itself quite stable—there is only now a 1.1 draft XML standard coming into being—many of the surrounding technologies, such as namespaces, XPath, XSLT, schema support, and the Document Object Model (DOM) and SAX (Simple API for XML) application programming interfaces have been rapidly evolving. Thus, there is a need for correspondingly quick “turns of the crank” on the parser and XSLT technologies to support these changes. Consequently, these industry wide parsers and XSLT processors have been on a course of upgrades about every six months or so.

The route for the technology between Apache and XML Toolkit is a bit circuitous. The IBM XML team in Toronto is a major contributor to the Apache

<table>
<thead>
<tr>
<th>XML Toolkit for z/OS release</th>
<th>V1.3</th>
<th>V1.4</th>
<th>V1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>XML4J</td>
<td>3.1.1</td>
<td>4.0.2</td>
<td>4.1.3</td>
</tr>
<tr>
<td>Comparable Xerces-J</td>
<td>1.2.1</td>
<td>2.0.1</td>
<td>2.2.1</td>
</tr>
<tr>
<td>LotusXSL-J</td>
<td>2.2.0</td>
<td>2.3.1</td>
<td>2.4.3</td>
</tr>
<tr>
<td>Comparable Xalan-J</td>
<td>2.2.0</td>
<td>2.3.1</td>
<td>2.4.3</td>
</tr>
<tr>
<td>XML4C</td>
<td>3.5.1</td>
<td>4.0.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Comparable Xerces-C++</td>
<td>1.5.1</td>
<td>1.6.0</td>
<td>2.1.0</td>
</tr>
<tr>
<td>LotusXSL-C++</td>
<td>1.2.0</td>
<td>1.3.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Comparable Xalan-C++</td>
<td>1.2.0</td>
<td>1.3.0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note that because there was no LotusXML-C++ reference release during the development time frame for XML Toolkit for z/OS V1.5, LotusXML-C++ is not included in V1.5. If you need LotusXML-C++ during this time, you should rely on the support in the V1.4 XML Toolkit. A future Toolkit release will likely include an updated version of LotusXML-C++.

The Java components run on Java SDK 1.3 or later. The C++ components run under standard z/OS environments, including UNIX System Services, batch, TSO, and IMS, but do not run in CICS.
Transaction Server. If you need XML parsing capability in CICS, you might want to examine the native language parsing support now included in the Enterprise COBOL and Enterprise PL/I compiler products to see if it meets your needs.

**How much does it cost?**
The XML Toolkit is a hard-to-resist deal. It is an unpriced IPLA (International Program License Agreement) product, freely supported and serviced by IBM. The service life of each release is approximately two years.

**What is it used for?**
XML Toolkit has two major target audiences:
- Application developers
- IBM and vendor software developers whose products rely on the capabilities provided in XML Toolkit and therefore require Toolkit as a prerequisite for their product installations.

On any given system, one or both of these audiences might use one or more components of XML Toolkit. Application developers might build unique code to use on z/OS using Toolkit components or they might port an application from another platform where the corresponding parser or XSLT processor was already in use.

In the case of IBM or vendor products, use of XML Toolkit for z/OS provides a number of advantages. On platforms other than z/OS, most vendors imbed the Xerces and Xalan components as part of their own products. This results in multiple copies of the same program taking up space, and requires each product to support and service the components that they imbed. Using a common implementation of these components in XML Toolkit for z/OS frees these products from the additional memory and disk footprint, as well as relieving them of the burden of servicing the used XML technologies. This does introduce the dependency that XML Toolkit be obtained and installed; however, as its use expands, you might often find that the needed Toolkit level is already available on your system.

Among the IBM products on z/OS that currently rely on XML Toolkit are DB2 XML Extender, InfoPrint® XML Extender, and WebSphere DataInterchange.

**Compatibility considerations**
As mentioned previously, XML standard itself is quite stable, with only one revision (XML 1.1) occurring since XML entered the scene around 1997. Whether specific XML vocabularies or uses of XML—and there are thousands of such vocabularies already in existence—are stable or compatible over time is up to the owner of each particular vocabulary. In general, they tend to be compatible. By virtue of XML’s nature in terms of containing self-describing data, applications that process XML often gracefully accommodate certain levels of change.

More of a problem from a programming perspective is the fact that the related XML APIs from Apache and elsewhere are rapidly evolving, often due to changes in standards related to XML, such as namespaces, DOM, and XPath. Upward compatibility is often one of the casualties of this fast pace of change. In the case of the Apache Java interfaces, this has tended to be less of a problem, although there have been some incompatibilities introduced across releases. The Apache C++ interfaces have been more of an issue, despite efforts to minimize changes at the application source code level. In general, there is no binary compatibility in C++ from release to release. Hence, as a general rule, applications written to use a given release of the C++ XML parser or XSLT processor should be assumed to be tied to that particular release.

For example, consider an application using Xerces-C++ at the 1.6.0 level. You cannot just replace that Xerces-C++ level with the binaries for Xerces-C++ at the later 2.1.0 level. In addition, if you want to start using the later Xerces level, perhaps because of performance enhancements introduced in that level, you might be unable to simply recompile the application code. You might need to change how the application calls the parser because of interface changes made in that release.

This lack of upward compatibility is something that XML Toolkit inherits from the code it incorporates. While this situation might seem unnatural to z/OS installations who have come to assume upward compatibility of interfaces, these compatibility issues are more common occurrences on most other platforms, especially in newer, evolving technologies. The packaging of XML Toolkit is designed to mitigate issues concerning compatibility. Because of this, the packaging is somewhat unorthodox from a standard z/OS perspective and has been a source of some confusion. Let’s take a look at how XML Toolkit is packaged and understand the rationale for this packaging approach.

**How is XML Toolkit packaged?**
XML Toolkit is packaged in two different formats: one is a standard SMP/E installable format and the other is as a set of non-SMP/E tar files for independent installation of the individual components. The SMP/E package is of most interest when you install XML Toolkit on your test or production system because XML Toolkit is a prerequisite of another product. The non-SMP/E form of XML Toolkit is more of interest to application developers who want to quickly obtain a particular Toolkit component, perhaps to investigate future use on a more formal basis.

The SMP/E package is unusual when compared to most other z/OS platform products because the two prior in-service releases (also known as technology levels) of XML Toolkit are typically reshipped as part of each new release package. That is, the current release (Release N) of the SMP/E package will actually contain Release N, Release N-1, and Release N-2 (Release N-3 is likely at or approaching end of service and is not included). This is done to accommodate installations that might need to install an earlier release of XML Toolkit due to a prerequisite for another product. So, if you are looking to install the Release N-1 Toolkit to satisfy a particular product prereq, obtaining and installing the SMP/E Release N package (which will be the only SMP/E package available at that time) will accomplish that for you.

The installation procedure for the XML Toolkit package installs the earlier releases along with the new release, if they were not previously installed. Unlike most other installation procedures, the installation of a new Toolkit release will not by default remove previous releases, in case you have products dependent upon them.

**Obtaining XML Toolkit**
The SMP/E XML Toolkit package is available from IBM Software Delivery and Fulfillment using the normal ordering process, including ServerPac. The SMP/E package is also available as a download from the XML Toolkit Web site at [http://www.ibm.com/zseries/software/xml](http://www.ibm.com/zseries/software/xml).
Regardless of how you obtain it, at any given time, only a single Toolkit SMP/E package is available and it contains the most recent in-service Toolkit releases.

In its non-SMP/E form, each individual component for a specific Toolkit release is individually downloadable from the same Web site. For example, you could download just the tar file containing XML Toolkit V1.3 Java XML parser.

Before obtaining XML Toolkit, verify that your installation has not already installed the particular Toolkit release you need for some other purpose. If you decide to download the SMP/E Toolkit package, be aware that the package is large because it includes the three most recent releases. For example, the V1.5 Toolkit package is approximately 330 MB. Therefore, you might want to utilize the improved download capabilities of Download Director or use ShopSeries to obtain the product.

Figure 1 summarizes the packaging and download options for XML Toolkit.

**Conclusion**

The XML Toolkit for z/OS brings the latest in industry-standard XML parsing technologies to the z/OS platform for use by your own applications as well as by IBM and vendor products. Backed freely by IBM service and support, it contains tools that will prove very useful as you move into the increasingly XML-oriented future.

Party on, WebSphere!
What’s new with WebSphere Application Server for z/OS V5?
BY ANDREA GREGGO

Who says application servers aren’t exciting? Even if —you thought WebSphere for z/OS V4.x was exciting—then wait until you get a load of the new version 5! All bets are off on the transition from V4.x to V5. Expect the unexpected, from terminology differences to radical management console changes. All this adds up to make this product version consistent across the WebSphere Application Server product family, regardless of platform or edition. This article will take you through an overview of the V4.x transition to V5 and give you a small taste of what to expect.

Consistent terminology and functions across the board
For WebSphere Application Server for z/OS V5, we have welcomed some new terminology and shown some old terminology the door. In place of V4.x terms such as node and resource sharing group, we now have the V5 term cell. We exchanged control region and server region for controller and servant, respectively, and the old definition of server now belongs to cluster. Don’t worry—your daemon is still there. It’s just now called the location service daemon!

Why all these changes, you might ask? WebSphere for z/OS no longer has unique terms when compared to the product family, so what is a cluster on distributed WebSphere Application Server is a cluster on WebSphere Application Server for z/OS. This consistency within the product family makes things much easier for those who run more than one product, and it extends much farther than just terminology.

WebSphere Application Server for z/OS V5 absorbs all the function of the Network Deployment product plus packs the quality of service punch that only z/OS can deliver. You can expect to notice differences from your V4.x systems immediately.

Integrated customization and administration
In addition to software prerequisite changes, the ISPF Customization Dialog has changed. The dialog is now streamlined to perform four functions: generate a base application server node, generate a deployment manager node, customize Web Services, and, last but not least, generate the Integral JMS Provider (IJP). A note about the IJP, which is also commonly referred to as the embedded messaging feature: if you have the full function WebSphere MQ V5.3.1 or higher product already installed, the fenced-in abilities of the IJP will not be an issue, and you will continue to work with the full function MQ.

While the ISPF Customization Dialog remains a feature unique to WebSphere Application Server for z/OS, it does help generate the foundation for product family consistency on z/OS in the form of the Administrative Console. The ISPF Dialog assists by generating (you guessed it!) a common Application Server administrative interface for WebSphere Application Server for z/OS.

WebSphere Application Server for z/OS no longer supports a unique toolset, so say good-bye to the SMEUI. The Administrative Console for WebSphere Application Server for z/OS is the same console as for your distributed counterparts. It tightens the management processes for the application server as it consolidates into one location. From the Administrative Console, you are able to create and delete application servers, manage applications, define and implement security requirements, control J2EE resources, and manage environmental settings such as Web server plug-in updates. However, this does not mean that the MVS console administration that you know and love has gone away—both environments are supported, along with a common scripting API environment that is also supported across the WebSphere Application Server family. See Figure 1 for a screen shot of the Administrative Console.

J2EE 1.3 compliance
WebSphere Application Server for z/OS
V5 fully conforms to the WebSphere Application Server family programming model and is fully J2EE 1.3 compliant in terms of the Sun specification document available here: [http://java.sun.com/j2ee/1.3/download.html#platformspec](http://java.sun.com/j2ee/1.3/download.html#platformspec). Some of the more important features of this spec include:

- **J2EE Connector Architecture (JCA) 1.0 compliance**
  The JCA defines a standard architecture for connecting the J2EE platform to a variety of backend systems, some of which include mainframe transaction processing, database systems (DB2 and other database systems), and legacy applications not written in Java. No worries though—your z/OS favorite, RRS, is still supported in V5.

- **Messaging**
  The J2EE 1.3 specification requires a messaging component that is fulfilled for this release with the Integral JMS Provider (IJP).

- **EJB 2.0**
  EJB 2.0 is fully compatible with EJB 1.1 based applications, so have no fear regarding those older applications. In an effort to continue to embrace open standards, local objects have replaced our WebSphere Application Server for z/OS proprietary extensions for the enablement of co-located bean 'local' communication instead of outbound TCP/IP. For example, CMP persistence is functionally supported by the EJB persistence manager (which provides the 2.0 functionality). EJB Query Language is a portable object query specification language similar to SQL (which applies to CMP entity EJBs) and supports finder methods and select methods.

**Summary**

This is a very brief taste of what to expect from WebSphere Application Server for z/OS V5. To learn more, check out these two resources:

- WebSphere Application Server Information Center:
  Select the link for the HTML version of the Information Center. (For tips on using the Information Center, see “Bye the books... Welcome to the WebSphere Application Server for z/OS V5 Information Center” on page 2.)

  Take note of the WSDD fast paths zones, particularly the Application Server zone. This is a great repository for technical articles that features exploratory Information Roadmaps to guide you through the information available for your product.

---

**ServerPac tip #12: Living with PROFILE NOPREFIX.**

If you specify ISPF4X(Y), the dialog sets NOPREFIX in your TSO/E profile while it runs. In split screen mode, this can be inconvenient. But you can enter the TSO PROFILE PREFIX(your_normal_prefix) command from any ISPF command line to restore your prefix for use in other logical sessions. Just don’t forget to enter TSO PROFILE NOPREFIX before using the dialog again. (The dialog will reset your normal prefix when you exit.)

---

**ServerPac tip #13: Save the configuration before you are done with it. Take a checkpoint!** After you have selected all the prior options and have no configuration warnings, you can save the configuration with the Save option and use it to re-create the same configuration, even for the same order. You do not need to submit any jobs to enable the option and save the configuration. So, if there are things you are not sure you want to try, save the configuration and go ahead and try them! If they don’t work out, re-create the configuration using the saved one to get right back to where you were.
Bye the books... Welcome to the WebSphere Application Server for z/OS V5 InfoCenter
BY ANDREA GREGGO

As always, the WebSphere for z/OS information development team is looking to provide you with accurate, timely information to meet your day-to-day information needs. With all the sweeping improvements made across WebSphere Application Server for z/OS in the V5 time frame, we on the information development team opted to make some of our own. In addition to providing you with PDF files packed full of necessary information, we are now also providing our information in an online, searchable, topic-based format called an Information Center. "What's new with the Information Center?" you ask. Read on to find out!

Three available views
Instead of having only one way to view your WebSphere Application Server for z/OS V5 documentation and information, you can now dynamically sort it all to suit the way you prefer to access and organize your information. There are three choices, each of which offer a different perspective of the available information: "All topics by feature," "All topics by activity," and "Quick reference." Choose your desired view by selecting it in the left-hand navigation pane of the Information Center window. See Figure 1 for a screen shot of the Information Center.

• The "All topics by feature" view mimics the screen in the new V5 Administrative Console. It presents the information organized by product functionality.
• The "All topics by activity" view offers relevant support information for when you perform a task such as installing the Application Server, developing an application, or troubleshooting a problem. The information presented is the same as that in the "All topics by feature" view, but it is organized differently.
• The "Quick reference" view shows only reference-type material that is suitable for our more experienced customers. Information in this view consists of settings, examples, APIs, messages, and more.

Centrally located WebSphere Application Server information
In the past, WebSphere Application Server family documentation has resided in a variety of places, making it difficult and confusing for you that work in heterogeneous environments to organize their information. With our V5 release, that confusion can now cease!

The Information Center is designed to support installations running multiple versions of the product by including documentation for a large portion of the WebSphere Application Server family in one convenient place. With the click of a button and the selection of different "packages," you can dynamically organize the whole Information Center to give you the documentation you want, when you want it.

For example, if you desire support in your WebSphere for z/OS shop, be sure to select the z/OS package of information in the left-hand navigation pane of the Information Center window. If, instead, you desire information on any of the other WebSphere Application Server deliverables (Express, the base Application Server, Network Deployment, or Enterprise), just select the appropriate corresponding information package for your customized information. No longer do you need to search multiple Web sites for your WebSphere Application Server product documentation—just bookmark one and you're set.

Open source delivery vehicle for information
If the multiple views and the central repository of information doesn't grab your attention, then perhaps the Eclipse delivery vehicle will. Our Information Center will deploy using an online version of the Eclipse V2.x open source software. For those of you familiar with Eclipse, you know that you are able to download the software for free and use the extendable architecture to "plug in" function or information. For more on Eclipse, visit http://www.eclipse.org/.

We haven't changed our delivery URL, so access both our PDFs and the Information Center by visiting http://www.ibm.com/software/webservers/appserv/zos_os390/library.

As always, the WebSphere for z/OS information development team is most interested in hearing from our customers, so please contact us with any concerns, comments, or questions at wasdoc@us.ibm.com. We look forward to hearing from you!
On the up and up! System Automation for OS/390 offers a high availability solution for WebSphere for z/OS

BY ULRICH KETTNER

There are many advantages to using system automation. One is the reduction in operating costs you may see after you simplify your system management. You will want to do this when running a WebSphere Application Server on z/OS because:

- WebSphere for z/OS is based on proven components of z/OS and therefore interfaces with a considerable number of products.
- WebSphere for z/OS uses many z/OS address spaces to deliver scalable and high performance Web services.

This increased operational complexity makes it worth while to set up automation with the objective of simplifying operations.

Another advantage to using system automation is the increased application availability you get from setting your applications to restart automatically or move from a failing image to a healthy image within a sysplex. This makes good business sense because, when you run Internet applications, the availability of the hosting system is exposed to the public at all times. It is therefore essential to provide a high availability setup for systems that provide Internet services such as with WebSphere for z/OS.

IBM has developed a high availability solution for WebSphere Application Server V4.0.1 for z/OS and OS/390 (WebSphere for z/OS) based on System Automation for OS/390 V2.2 (SA for OS/390).

What's available?

With SA for OS/390 V2.2, IBM supports a fully automated operational environment for all components, prerequisites and related products of WebSphere Application Server V4.0.1 for z/OS and OS/390. APAR OA02375 for SA for OS/390 V2.2 provides:

- An enhanced message table including messages issued by WebSphere for z/OS and related products during startup and termination.
- A common routine used to clean up server address spaces that WebSphere for z/OS is unable to terminate during its end processing.

- A white paper you can use as a guideline.
- A sample policy database (PDB) that contains the definitions used to set up the environment described in the white paper. You can use this PDB as a sample to set up SA for OS/390 V2.2 for your WebSphere for z/OS installation.
- Sample tools for automating WebSphere for z/OS administration.

What's automated?

WebSphere for z/OS uses z/OS components that provide a stable platform with the following built-in recovery and security functions:

- TCP/IP as a communications vehicle
- UNIX System Services platform support with HFS for file support
- LDAP and DB2 for directory services and database support
- WLM for workload management
- RACF for security
- RRS for recovery.

These software components (or equivalent products) are prerequisites for WebSphere for z/OS. In addition, WebSphere for z/OS uses IBM HTTP Server for z/OS as the Web server.

The automation setup ensures that all basic system components, such as JES2, RRS, and TSO, and the WebSphere for z/OS prerequisites are brought up on all required systems in the right sequence. These components are monitored, brought down, restarted, and moved to alternate systems if required.

WebSphere Application Server V4.0.1 for z/OS and OS/390 consists of a base environment and application servers. The base environment consists of a daemon that in turn brings up everything else in the base environment:

- Systems Management Server (SMS) that controls the WebSphere for z/OS configuration
- Naming server that locates Java objects such as EJBs
- Interface Repository (IR) server, which manages CORBA business object interfaces

The application servers consist of the following:

- J2EE servers that provide run-time environments for J2EE components such as servlets or EJBs. They support only Java.
- CORBA (MOFW) servers (for CORBA business objects), which support various different languages.

Each of these servers (except the daemon) consists of a control region and multiple server regions that WLM starts as needed.

SA for OS/390 automatically brings up the WebSphere for z/OS base environment on all sysplex images and considers it part of the infrastructure. It also automates two J2EE servers. Instances of each server are started on two system images. SA for OS/390 knows about and controls the control regions only; server regions are not defined as SA for OS/390.

continued on page 29
There's going to be a new way to access z/OS and OS/390 product documentation. It's called the Library Center and uses BookServer technology, supporting all the functions that exist in BookServer today, including PDF download and handheld support. The Library Center will serve as a single repository for all product information you need for a release of z/OS.

Here's a peek at some of the key features, ones that should help you locate the information you want quickly. You will not need to “know” what bookshelf to search because you will be able to search the entire repository. The table of contents pane shown on the left in Figure 1 lets you see and expand all of the shelves in the repository. Or, you can choose an alternate task-oriented view that lets you search shelves of books arranged by type of information (commands, for example) or by task (installation or migration).

Know the book you want? Great! Just use the Find Books or Shelves link at the top of the Library Center. Enter a portion of the title and go directly to the book or bookshelf you want. The Find Book function will locate both the BookManager and corresponding Acrobat® PDF versions of the book.

New! Search by information type
The Library Center provides a new function that lets you search information that has been classified by type. Initially, we are working to classify our information to help you find messages, commands, examples, tasks, and concepts. Check out a command search.

The illustration below shows an advanced filtered search on the GREP command name.

Keep an eye out for a prototype sometime this fall on the IBM Web site. Links will appear on our Internet Library pages and the z/OS home page when it is ready. Give it a try and send your comments to libcent@us.ibm.com.

Figure 1 - Getting started with z/OS Library Center

Figure 2 - Advanced filtered search
You already know about LookAt, the tool that lets you look up IBM messages quickly and easily on Microsoft Windows, z/OS, OS/390, Palm™ VIIx, and the Web, without having to know their origins. (See z/OS Hot Topics Newsletter #5, August 2001, GA22-7501-01 and z/OS Hot Topics Newsletter #6, February 2002, GA22-7501-02.) But did you know that LookAt is now easier to install?

LookAt now includes an InstallShield® interface that installs the program files on your workstation and customizes your LookAt profile. It also keeps track of the files for you, and automatically replaces them when you install an updated version of LookAt. So, instead of copying and updating files by hand, the installation program does it for you in a fraction of the time.

The Windows version even checks to see whether you are running the IBM Object REXX for Windows Runtime Library, and can launch the REXX Runtime Library installation program for you.

You can install LookAt on your MVS system or on your workstation. In both cases, the installation program copies the LookAt program files to your workstation. There are three versions of the installation program: TSO, TSO XMIT and Windows. They are available on the disc containing the LookAt code in IBM's Online Library Collection for OS/390 for March 2003 or later, or z/OS for June 2003 or later. You can also find them on the LookAt FTP site: ftp://ftp.software.ibm.com/ps/products/ibmreader/tools/lookat/.

**MVS installation**

If you are able to upload and download LookAt or other products from your workstation to your mainframe, use the TSO version of the installation program. Find the LookAtTso.exe on either the CD or the FTP site. Launch this file either from the CD or from a temporary directory on your workstation. The installation program welcomes you and asks you where you want to install LookAt. It defaults to C:\Program Files\IBM\LookAt (TSO), but you can change that. When you click Install, the program copies the LookAt files to the directory you specified. Then it asks you to customize your LookAt profile through a panel where you fill in the data set names for the LookAt directory, index, and help, as shown in Figure 1.

A second panel prompts you for the name of the bookshelf data set to search, if you have one. The program gives you a chance to verify and change your answers before writing your profile. Finally, it opens the LookAt ReadMe so that you can finish your installation on MVS.

If you prefer the TSO/E XMIT command, use the TSO XMIT version of the installation program. Find LookAtTsoXmit.exe on either the CD or the FTP site. This installation requires some knowledge of the XMIT command. The installation program is similar to TSO, but it installs to a different default directory, C:\Program Files\IBM\LookAt (TSO XMIT), and does not customize your LookAt profile. To preserve the XMIT file format, you will need to do so on TSO/E.

**Windows installation**

To install LookAt on your workstation, use the Windows version of the installation program. Find the Windows subfolder in the LookAt directory on the CD or the FTP site. If you are using the FTP site, download all of the files to a temporary directory on your workstation. Then launch setup.exe. After the installation program welcomes you, it asks you what type of setup you prefer: compact or custom, as shown in Figure 2.

- The compact setup leaves the large index file in the installation directory. Select this option if you are installing from CD.
- The custom setup lets you choose the files you want to install. Select this option if you are installing from a temporary directory, or if you want to install all of the LookAt files on your hard drive.

The program asks you where you want to install LookAt. It defaults to C:\Program Files\IBM\LookAt (Windows), but you can change that. When you click Install, the program copies the LookAt files to the directory you specified. Then it asks you to customize

**continued on page 27**
To use the CD: Insert it in any standard CD-ROM and it should start automatically.

If it does not, click on the Start button, choose Run..., and then type \x\index.htm (where x is your CD-ROM drive letter) and press Enter.

**z/Favorites!**
It’s the zFavorites for zSeries credit card CD! You’re gonna love this. It has all sorts of helpful Web links, like for:

- Hardcopy
- Operating systems
- Software
- Language and tools
- ISV development and applications
- Product documentation
- Marketing information
- Education
- Support
- Links to FREE downloads
- Redbooks sampler
- WebSphere
- XML

Additional copies of zFavorites CD-ROM (GK3T-4331-03) are now separately orderable.

---

continued from page 26

your LookAt profile. If you selected the custom setup, you will see a panel where you fill in the paths for the LookAt directory, index, and help files. Both setup options present a panel that prompts you for the path of the IBM Softcopy Reader. The program gives you a chance to verify and change your answers before writing your profile. LookAt assumes your CD drive is D: \. If it isn’t, the program notifies you, and gives you instructions for updating the LookAt directory to compensate. Finally, the program opens the LookAt ReadMe and if necessary, the directory, so that you can finish your installation.

If you do not already have the IBM Object REXX for Windows Runtime Library installed on your workstation, the installation program asks you if you want to install it now. If you answer Yes, the installation program launches the REXXX Runtime Library installation program.

**Uninstalling LookAt**
We’ve also made removing LookAt easier to do, too! Each version of the LookAt installation has a corresponding uninstall program. To launch the LookAt uninstall program for any installation version, perform these steps:

1. Open the Add/Remove Programs panel in the Windows Control Panel folder.
2. Locate the LookAt icon in the list of currently installed programs.
3. Select it and click on the Change/Remove button.
4. Press Yes when the uninstall program asks if you want to remove the program and all of its components. It will erase the LookAt folder and all of its files, and remove LookAt from your Windows registry. Note that this does not uninstall the REXX Runtime Library, as this is a separate program.

**A final thought**
If you still haven’t installed LookAt on your workstation or MVS system, we’re hoping this new installation interface will encourage you to do so. Give it a try! As always, we welcome your comments and suggestions at [http://www.ibm.com/servers/z390/os390/bkserv/lookat/lookatfeed.html](http://www.ibm.com/servers/z390/os390/bkserv/lookat/lookatfeed.html). We’d like to hear from you!
Honey, I shrunk the messages!

BY GEOFF SMITH

Here’s a new member of the LookAt family, which you can take anywhere you go. LookAt Mobile Edition is a new handheld-friendly version of the popular LookAt tool, designed for users of wireless communicators, such as the Palm™-based Handspring™ Treo™ and the Microsoft Windows Powered Pocket PC Phone. Best of all, it’s FREE!

To use the LookAt Mobile Edition, open the Web browser on your handheld and enter the following URL:
(See Figure 1).

Once it loads, enter the IBM product message you are interested in (for example IEA2001), pick the release you are running, and tap GO. LookAt Mobile Edition locates the message for your IBM z/OS product and opens directly to the message explanation. (Check out Figure 2.) Now, you can look up message explanations without a PC! (Sorry, we cannot support independent software vendor (ISV) messages.)

Figure 1 - Pick your release

![Figure 2 - Message explanation](image)

**BookServer by:** IBM

IEA2001 memberxx - text

**Explanation:** During system initialization, the system could not use a data set member that was to contain an alternate version of the master scheduler JCL.

**Tip #14 & 15**

**ServerPac tip #14:** If it’s red, it’s a data entry field.

Data entry fields are always red. So if you are not sure where to type, look for the red! (If you have difficulty seeing red text on your terminal, redefine the colors in your ISPF settings.)

**ServerPac tip #15:** Reserving space with Recommended System Layout.

After you get to the Current Volume Configuration panel in the Recommended System Layout option, you can select each volume and reserve space as needed. You can also predefine volumes in Recommended System Layout and reserve space on them. (Any volumes that are not needed will "disappear" at the end of automatic assignment.)
objects. The sysplex consists of three systems. Figure 1 shows a possible layout.

What makes WebSphere for z/OS special?
Three aspects specific to WebSphere for z/OS impact the automation setup: the control region and server region architecture, the WebSphere for z/OS administration procedure, and the HTTP session concept.

The control region and server region architecture
SMS, Naming and IR control regions, as well as J2EE or CORBA control regions, all start server regions as needed to satisfy the service goals defined by WLM. Control regions are defined in and handled by SA for OS/390. Server regions are not monitored by SA for OS/390. All server regions started by a control region have the same jobname. To cancel them, you issue individual cancel commands that include the jobname and address space ID. This is done by the cleanup program shipped with APAR OA02373. SA for OS/390 calls the program during shutdown and pre-start of the WebSphere for z/OS base environment and J2EE servers.

The WebSphere for z/OS administration procedure
To change parameters, or install or modify applications, on a J2EE server, you use the WebSphere for z/OS Administration application running on a workstation. Follow these steps to initiate your change:
1. Create a new conversation.
2. Modify the conversation, as needed.
3. Validate the conversation.
4. Commit the conversation.
5. Activate the conversation.
Once you activate the conversation, the Administration application automatically shuts down and restarts all affected J2EE servers in order to implement their configuration changes.

Regarding automation, SA for OS/390 immediately restarts any servers it controls after the Administration application shuts them down during conversation activation. If the Administration application restart fails, the conversation is not successfully activated.

Activating conversations manually can lead to unscheduled down times or require the presence of an administrator during scheduled maintenance periods. This conflicts with the goal of reducing down times and operational costs through system automation.

You can, however, define service periods during which activation of a previously prepared WebSphere for z/OS conversation takes place automatically:
1. Change the configuration at any time, outside the service period, using the Administration application. To do this, go through all the steps except the last conversation activation step.
2. During the service period but before activating a conversation, stop all J2EE servers through SA for OS/390 or Tivoli® Workload Scheduler (TWS).
3. Through SA for OS/390 or TWS, start a job that activates the conversation using the WebSphere for z/OS System Management Scripting API. You won't trigger a server restart through the activation because no servers are running. (Samples for jobs and execs are supplied in the download zone along with a detailed description.)
4. After you complete activation, restart all J2EE servers through SA for OS/390 or TWS.

The HTTP session concept
State information associated with a series of HTTP requests is represented as an HTTP session object. WebSphere for z/OS is responsible for managing HTTP session objects, and it offers two options: session affinity and persistent sessions.

- With session affinity, session information is held in the memory of the J2EE server that started the session. All further requests must be directed to the same server.
- With persistent sessions, session information is stored in a shared DB2 database. Each J2EE server can access it. All the objects held by a session must implement java.io.Serializable.

The SA for OS/390 setup implements persistent sessions. This enables you to continue a session on a J2EE server running on a different image if the server on the first image fails. It is essential for increased application availability.

What’s in the sample policy database?
A policy database contains all objects managed by SA for OS/390, along with the automation rules for each object.

The main objects to consider are applications and application groups. The rules are primarily expressed through relationships. The sample PDB for WebSphere for z/OS automation defines several groups and their relationships. The main object relationships related to WebSphere for z/OS are the following:
• **BBO_J2EE**: The group used to stop and restart all J2EE servers. It joins together the J2EE server groups.

• **BBO_BANK and BBO_ASR2**: Groups that represent two J2EE servers. Instances of the J2EE servers can run on any of the three systems, and two instances of each are started. The groups contain applications that represent J2EE server instances on each sysplex image.

• **BBOBANK and BBOASR2**: J2EE server control region applications. They cannot start until the local daemon group is available. The daemon group cannot stop until the J2EE servers are unavailable. This is expressed by the HasParent relationship to the application group BBO_DAEMON.

• **BBO_DAEMON**: The group for the WebSphere for z/OS infrastructure that consists of applications for the daemon (BBODMN), System Management (BBOSMS), Naming (BBONM) and Interface Repository (BBOIR), BBOSMS, BBONM, and BBOIR cannot start until BBODMN is available, as defined through the HasParent relationships. These relationships include Satisfy Condition definitions of StartsMeAndStopsMe that take care of the fact that the daemon starts BBOSMS, BBONM, and BBOIR.

  The base environment can start only when the local DB2 and TCP are running, and it must stop if either fails. The HasParent and ForceDown/WhenObservedDown relationships express this.

  The base environment starts when the LDAP group is running (i.e., at least one LDAP in the sysplex is running), and must stop when the group is “hard down” (i.e., no LDAP is running). This is achieved with MakeAvailable/WhenRunning and ForceDown/WhenObservedDown relationships.

• **BBO_PLEX**: The WebSphere for z/OS base group that contains the BBO_DAEMON groups. Its availability target is 3, so it automatically starts on all three systems.

• **BBO_LDAP**: A group of LDAP servers that can run on any of the three systems. Two LDAP servers are started. The BBOLDAP applications have dependencies on the local DB2 and TCP/IP as expressed by the HasParent and the ForceDown/WhenObservedDown relationships.

• **WWW_WEBSRV**: A group of HTTP servers that can run on any of the three systems. Two servers are started. You don’t need a Web server if you’re not also running a J2EE server. Therefore, the WWW_WEBSRV group depends on the J2EE server group (MakeAvailable/WhenRunning). The WEBSRV applications depend on the local TCP/IP (HasParent and ForceDown/WhenObservedDown).

• **SGA_PLEX**: The group for DB2.

### What are your high availability considerations?

The main high availability contributors are TCP/IP with its automatic virtual IP address (VIPA) takeover, Sysplex Distributor, and SA for OS/390.

#### High availability with TCP/IP

With the automatic VIPA takeover function, you define the same VIPA address on multiple TCP/IP stacks in a sysplex. One stack is the primary stack and the others are secondary stacks for the VIPA. If the primary stack fails, one of the secondary stacks takes its place and assumes ownership of the VIPA. The Web user can access the sysplex and its Web applications without using a different URL.

#### High availability with Sysplex Distributor

Sysplex Distributor is built on Dynamic VIPAs. It sets up the LDAP servers, HTTP servers, J2EE servers, and WebSphere for z/OS base environment, making sure to specify virtual IP addresses and ports that it then monitors and distributes across the IP addresses of all three sysplex images. When a server on one image fails, its port is no longer selected by Sysplex Distributor. As long as the port is still listening on one of the IP addresses behind the VIPA, the request is served.

#### High availability with SA for OS/390

SA for OS/390 automates the restart of failing components on the same image. It takes dependencies into account and automatically restarts supporting resources if required. If restart on the same system fails, SA for OS/390 moves failed components to another image, again taking dependencies into account. So, if the LDAP server, HTTP server, J2EE server, and components fail on one system, SA for OS/390 reestablishes the environment on another image. When this is complete, Sysplex Distributor automatically includes the reestablished environment for workload distribution.

### Summary

Setting up SA for OS/390 for a WebSphere for z/OS environment helps you simplify system management by:

- Starting all prerequisites and components of WebSphere for z/OS in a sysplex in the right order
- Stopping all components of WebSphere for z/OS in a sysplex in the right order
- Showing the status of all prerequisites and components

SA for OS/390 reduces downtime by automatically:

- Monitoring prerequisites and components
- Restarting failing components
- Moving WebSphere for z/OS to another image when the restart of vital components fails
- Cleaning up failed components and systems
- Handling WebSphere for z/OS maintenance

All this ends up reducing your operational costs and increasing your Web application availability, which are always good things.

---

**Tip #16**

Creating new volumes the easy way. Use the CHPVOL command from a data set list containing the data sets you want to move, specifying a new volume serial, and exclude those you don’t want to move on the next panel. Then, use the Physical Volume Summary option to change the device type (if necessary) and specify the device number. Or, use the Recommended System Layout option to place new data sets (it will create volumes automatically if needed), and make the necessary changes in the Physical Volume Summary.
Wake up and smell the z/OS coffee

BY NORMAN AARONSON

Did you know that z/OS has two products that deliver Java™ virtual machines? In the fast moving world of Java Software Development Kits (SDKs), z/OS Java SDK products provide timely Java conformance, added z/OS benefits, and constant performance improvements. But before we discuss the details of the deliveries, some basic nomenclature would be in order.

**What are those Java SDK numbers anyhow?**

One of the intents of Java is to allow application programmers to write an application on one platform and, if the application has no system unique code in it, have that application run on a different platform. The application written in Java is compiled into Java bytecode and that bytecode is interpreted on the execution machine.

For this process to work, there must be standardized application programming interfaces (APIs) for the applications to use. And vendor execution environments must be able to execute the resulting Java bytecode. The overall APIs provided are called Java 2 Standard Edition (J2SE), but the levels have evolved. They are Software Development Kit levels, so most Java savvy people refer to SDK 1.3.1, SDK 1.4.1, and so on.

An important point to make is that these SDK levels are Sun Microsystems levels, not IBM product levels of version, release, modification! (The last digit refers to the Sun service level.) You’ll be pleased to know that because IBM services its own Java products, the bug fixes you need are often built before the corresponding SDK is even available.

**Which Java products run on z/OS?**

There are two z/OS Java products available. Both pass the Sun JCK (Java Compatibility Kit) tests for their corresponding SDK level and are fully compliant.

IBM Developer Kit for OS/390, Java 2 Technology Edition (5655-D35)

This one became generally available in July, 2000. Since November, 2001, it includes the Sun SDK 1.3.1 APIs and is periodically updated with cumulative service.

The Java 2 Technology Edition, SDK 1.3.1 requires either:
- OS/390 V2.8 or higher
- z/OS V1.1 or higher

IBM SDK for z/OS, Java 2 Technology Edition, Version 1.4 (5655-I56)

This one became generally available in September, 2002 for z/OS V1.4. As of the June, 2003 PTF, it includes the Sun SDK 1.4.1 APIs, is now supported on z/OS V1.2 and V1.3, and is periodically updated with cumulative service and improvements.

The Java 2 Technology Edition, Version 1.4 requires either:
- z/OS V1.2 or higher
- z/OS.c V1.3 or higher.

**How do I get these products?**

The z/OS Java products are available by Web download or through normal software ordering, particularly ShopzSeries and ServerPac. They are available in either non-SMP/E format (Web download only) or SMP/E format. Check the z/OS Java Web site for details and downloads.

The price? Zero. They are free.

You get a full Java SDK that has passed the same compatibility tests as any other Java product (in or out of IBM) and carry the Java compatible logo!

**What about function and documentation?**

The full Java SDK 1.3.1 or SDK 1.4.1 APIs are provided in the two products. The z/OS Java Web site links directly to the Sun API descriptions. (Most local bookstore have shelves of documentation for these APIs.) You can find security documentation on the z/OS Java Web site plus information about the following z/OS platform-unique functions.

Java Record I/O (JRIO)

JRIO lets Java applications access data in traditional z/OS file systems in addition to the hierarchical file systems (HFS). JRIO makes it easier for Java applications to access file systems, and records within files, using native methods when java.io APIs don’t support those file systems.

JRIO is a class library similar to java.io. While java.io provides byte-oriented or field-oriented access to files, JRIO provides record-oriented access. While java.io provides sequential and random access, JRIO applications read, append, and update records by providing the following types of access:
- sequential
- random
- keyed.

For more information on JRIO, see http://www.ibm.com/servers/eserver/zseries/software/java/jrio/overview.htm

Persistent reusable JVM

Used primarily by CICS and DB2, the persistent reusable function allows short, isolated transactions to be run without the need to bring up and down the full Java virtual machine. See http://www.ibm.com/servers/eserver/zseries/software/java/pdf/ct0a100.pdf for details.

**What about performance?**

For the best performance, the just-in-time (JIT) compiler that comes in each product must be enabled. (That’s the default when you get it.) If a Java method is invoked and interpreted a set number of times, the method will be compiled into machine code and, from then on, executed in binary. The improvement in performance is so significant that you must enable the JIT if you want performance!
Occasionally, for diagnostic purposes, you might be asked to disable the JIT. If you do, be sure to turn the JIT on prior to running in production or in an environment where performance is critical.

See the z/OS Java Web site for graphs that show the rise in performance with each IBM release! These graphs also show the scaling that you would expect. In other words, the performance peaks when the level of multiprogramming equals the number of available processors. The z/OS Java products also exploit z/OS and zSeries performance functions, such as XPLINK and the IEEE floating point support.

**What about service?**
Full support. Whether you are an OS/390 or z/OS operating system user, you are entitled to the same service. Most of the Java virtual machine support is common across IBM platforms so bug fixes for one platform are incorporated into the code base for the other. Approximately every three months, corrective service is accumulated into a preventative service PTF. Like the base product, each PTF is delivered in both SMP/E and non-SMP/E formats.

Java service is cumulative and each release is a complete product replacement. You can tell exactly what level of the code you have by executing the `JAVA -VERSION` command. Your result might look something like this:

```
Java version “1.3.1” Java
TM 2 Runtime Environment,
Standard Edition (build
1.3.1), JZRE 1.3.1 IBM
OS/390 Persistent Reusable
VM build hml3ls-20030418
(JIT enabled: jite)
```

This result indicates that the build date of the product was April 18, 2003, and that the JIT was enabled when the command was executed.

**Middleware support?**
The following IBM middleware is supported:
- WebSphere
- MQSeries
- CICS
- DB2
- IMS
- Connectors, including:
  - CICS Transaction Gateway
  - JDBC
  - IMS
  - JRIO

And middleware from many independent software vendors (ISVs) is also supported. See [http://www.ibm.com/servers/eserver/](http://www.ibm.com/servers/eserver/)zseries/software/java/related.html.

**Got users?**
Over 4000 SDK 1.3.1 and SDK 1.4 downloads so far!

**Additional Information?**

---

**ServerPac tip #17: Building a maintenance system?**
If you are building a maintenance system that you will clone to create production systems, consider doing these things to help avoid x37 abends when you install service:

- Increase all the primary space allocations by at least 15%, secondary allocations by 20%, and directory space by at least 50%. From a list of all target and DLIB data sets (in View and Change, select “Data Set Type” and then “DLIB” and “Target”), enter the `CH SP 15 20 50` command.
- Reserve space on target and DLIB volumes. From Option V in Modify System Layout, select each volume and change Reserved Space to 15% or more of each volume’s size. (For a 3390-3 volume, 15% is about 500 cylinders.)

**ServerPac tip #18: Moving a few data sets, or even just one.**
To move just a few data sets, do either of the following:

- Find a data set list view in View and Change that includes those data sets you want to move and as few others as possible. Use the `CH PVOL` command, excluding data sets you do not want to move from the candidate list; or,
- Change the logical volume for the data sets you want to move to a new logical volume, and assign it to the physical volume to which you want to move the data sets. (This way works best when you need to move only one data set or when you cannot find a list with a small number of data sets that includes the ones you want to move.)
All aboard!
z/OS Communications Server networking for applications

BY KIM BAILEY

z/OS V1.5 Communications Server includes lots of new functions for both VTAM® and TCP/IP. Let’s look at these new functions and the value that they provide for zSeries installations.

z/OS V1.5 Communications Server continues the effort started with z/OS V1.4 to add support for the next-generation Internet protocol IPv6. The journey to IPv6 is driven by the need to support a networking protocol that eliminates many of the current constraints of the IPv4 protocol. Analysts predict that growth in the use of the Internet will require network providers to migrate to IPv6 in the near future. In z/OS V1.4, Communications Server TCP/IP provided IPv6 support for the TCP/IP protocol layers, socket APIs, key z/OS UNIX System Services applications, and network interface support with OSA Express. This basic support allowed your application developers and system and network planners to begin migrating applications to IPv6 and making configuration changes to z/OS and the TCP/IP stack to integrate them into IPv6 networks. z/OS V1.5 extends the IPv6 support to several key areas:

Dynamic routing is provided with support of the next-generation Routing Information Protocol (RIPng) as part of the existing OMPROUTE routing daemon. This enhances the availability of network interfaces, especially static VIPA (virtual IP addressing).

Network connectivity is extended to include IPv6 support for multipath channel (MPC) point-to-point interfaces, including static and dynamic XCF (cross coupling facility), SAMEHOST, ESCON®, and FICON™.

SNMP network management is provided for many of the standard TCP/IP protocol MIBs (management information bases) that support management objects in a version-neutral fashion to allow your network management applications to retrieve data for both IPv4 and IPv6 from the same tables.

CICS socket APIs are enhanced to support IPv6 for the CICS C and callable APIs. In addition, the CICS listener is enhanced to support IPv6 communications. Now, CICS transactions that are based on sockets can be available to client applications over both IPv4 and IPv6 networks.

Note that the older CICS EZACICAL API will not be enhanced to support IPv6. So, if you use EZACICAL, you should migrate your applications to the C or callable APIs. Also, Workload Manager (WLM) support for the domain name server (DNS) and CICS DNS caching will not be enhanced to support IPv6. Therefore, your CICS administrators and system planners will need to work together to migrate any CICS applications that currently use load balancing over to sysplex distributor, and those that use DNS caching over to the BIND v9 DNS server for caching.

Access to z/OS and enterprise SNA applications is provided over IPv6 networks by adding IPv6 support to the CICS listener and the TN3270 server. Additional z/OS applications, such as sendmail 8.12.6, MVS remote execution servers and clients, sntpd, tftp, the Policy Agent (QoS), and SNMP-related applications, now support IPv6.

For a detailed review of IPv6 to help you enable IPv6 support on z/OS, refer to z/OS Communications Server: IPv6 Network and Application Design Guide.

New z990 hardware exploitation and OSA Express enhancements

z/OS V1.5 Communications Server cryptographic functions, such as IPSEC and VTAM session-level encryption, uses the new synchronous cryptographic-assist instructions and PCIX cryptographic coprocessor, when available, in conjunction with z/OS Integrated Cryptographic Services Facility (ICSF) for improved performance. Connectivity is expanded with an increase in the maximum number of hipersocket internal LANs to 16 (up from 4). IP broadcast support is also available for hipersocket interfaces. TCP/IP and OSA Express work together to save host cycles by offloading checksum processing for IPv4 packets to OSA Express and to provide full virtual LAN (VLAN) support so you can isolate IP packets to certain interfaces.

Sysplex enhancements

Sysplex functions are expanded with more dynamic VIPAs (DVIPAs) and more ports for sysplex distribution. The maximum number of dynamic VIPAs (DVIPA) is increased to 1024 per TCP/IP stack (up from 256), and the maximum number of ports you can distribute per DVIPA is increased to 64 (up from 4) when specified by configuration. For applications that bind ports to the DVIPA, there is no maximum number of ports. Until now, clients that required affinity to a specific server application were not a good match for using sysplex distributor. Client-server affinity is now supported for load-balanced applications in a sysplex, allowing client—
server functions that require affinity, such as TN3270 associated printer support and TN3270 session-recovery functions, to work with sysplex distributor. If you found it difficult to remember which was your DVIPA backup stack and which was your primary stack when bringing up your systems, you no longer need to dig in your profiles to find out. A backup DVIPA can now serve as the primary DVIPA until the system with the primary DVIPA is started, removing the dependency on system startup order.

**Security enhancements**

Multilevel security (MLS) has been extended to the z/OS Communications Server TCP/IP stack and several key applications. Systems and applications used by governmental or commercial organizations that provide access to classified information may require multilevel security. When you migrate to a multilevel-secure environment, you must classify applications (users) and resources (IP addresses and networks) with RACF security labels. On a multilevel-secure system, TCP/IP and RACF work together to enforce strict controls on applications that communicate over a stack using sockets by restricting those applications to IP addresses that have equivalent security labels. Specific MLS functions are also added to strictly control access to z/OS through FTP and TN3270 servers.

With or without MLS, you can protect the TCP/IP stack and determine if system resources are being wasted through misuse. Enhancements to the increasingly popular Intrusion Detection Services (IDS) provide the addition of interface flood detection to the existing IDS attack policy. Interface flood detection scrutinizes IP packets coming in and out of the network, applying algorithms to determine misuse. It can log events for later analysis. Also, your system administrators will be pleased to know that the problems using FTP when firewalls and NAT (network address translation) are present have been addressed. Similar problems with Enterprise Extender and NAT are also addressed.

**Application enhancements**

There is a new remote shell (rsh) client you can use from z/OS UNIX System Services, and an upgrade for sendmail from 8.8.7 to 8.12.6. Many sendmail enhancements are available, including IPv6 support, a mail filter API that you can use to create mail filter applications, transport layer security (TLS) and secure sockets layer (SSL) support when communicating with other mail applications, and security controls for the sendmail execution environment. The z/OS SMTPD mail application also has added function to forward mail by host name.

Many usability and serviceability improvements are added to the TN3270 server and FTP applications. New capability for the TN3270 server allows the client to reconnect during session recovery without supplying the logical unit (LU) name. New FTP function provides the automatic creation of MVS data sets during transfers between the z/OS Communications Server FTP client and server. Other new capability provided by a configured FTP server allows a TLS/SSL client with an authenticated X.509 certificate to log onto the server without specifying a password.

**SNA and Enterprise Extender (EE) enhancements**

EE enhancements provide new configuration options for connection networks so you can define multiple local and global virtual routing nodes. VTAM provides far too many SNA and EE improvements to list. New and enhanced display commands, additional messages, and new configuration options improve usability and help you diagnose problems in the SNA network. Performance improvements are provided for inbound High Performance Routing (HPR) traffic and outbound multipath channel (MPC) traffic.

**SNMP network management**

z/OS V1.5 Communications Server has many new additions to TCP/IP network management to please all of you application developers and the consumers of management information. In addition to providing the new IPv6 version-neutral standard TCP/IP MIBs, new SNMP MIBs are provided for service level agreements (SLAs) and TN3270 performance. Several new management objects are added to the IBM MVS TCP/IP enterprise-specific MIB, such as:

**SLAPM2 MIB:** A new SLA performance monitoring MIB, based on the experimental standard RFC 2758, is provided to replace the existing SLAPM MIB. You can use the new SLAPM MIB to monitor QoS (quality of service) policy rules and actions that may represent SLAs. Use the new policy agent API, PAPI (performance API), to define your rules and to programatically obtain policy performance data for your management applications.

**TN3270 enterprise-specific MIB:**

A new SNMP subagent and MIB are provided for the TN3270 server. The new IBM MVS enterprise-specific TN3270 MIB is strongly based upon the standard TN3270 performance MIB (RFC 2562). The IBM MVS enterprise-specific TN3270 MIB provides performance data that measures end-to-end TN3270 connection response times across TCP/IP and SNA. You can define groups of connections in the TN3270 profile that you want to be monitored. Given the importance of TN3270 servers in most z/OS shops, you will probably be very interested in creating management applications that gather and present this data to help you understand the performance of your TN3270 workloads.

**IBM MVS TCP/IP enterprise-specific MIB:** Updates to this MIB primarily include objects to support the new TCP/IP functions added in V1.5, and are relatively minor additions to existing MIB groups and tables. Additionally, your management applications can use and display information from a new packet trace table that contains packet trace information by interface. Two new system objects that describe the MVS system image name and the name of the sysplex where the TCP/IP stack is running can provide even more information for your TCP/IP sysplex data management applications. The TCP listener table is also updated to support IPv6 listeners.

There are many other new functions in z/OS V1.5 Communications Server and hopefully you now have a good idea of what they are. With each release, z/OS Communications Server is committed to deliver new and exciting technologies that prepare for the networks of the future while addressing your requirements for current networks that are easier to use, more secure, more reliable, and better performing.
Much of the work involved in securing a typical z/OS installation requires working across platforms and networks to ensure that security is carried out consistently throughout the enterprise. In today's vastly distributed, interconnected world, your business's security is determined not only by your mainframe operating system, but also by the other platforms in use, and by the various networks—secure and otherwise—that allow your users to interact with each other, and with the world beyond the firewall.

It's a big world out there. In your efforts to secure the host system, don't neglect the local network. Or your remote users. Or the Internet. While you're at it, remember to lock the back door, too!

Obviously, a security administrator's job is not getting any easier. As a first step to simplifying some of the security setup tasks that you perform across the @server™ platforms, IBM provided the @server Security Planner in 2002. This Web tool is helping new security administrators learn the system-level security considerations for each of the @server platforms: i-, p-, x- and zSeries, and Linux.

With the first release of the Security Planner earning high marks from customers, IBM is now unveiling the sequel. The new Security Planner expands on the original by adding recommendations for network security setup. Because the Security Planner is cross-platform in scope, the recommendations are not limited to z/OS; information is provided for the other @server platforms, too, including iSeries™ and Linux. By the way, did I mention it's free?

Here's a link to the @server Information Center, which will lead you to the Security Planner:

http://publib.boulder.ibm.com/eserver

Before we take a closer look at the new Security Planner, let's review some of the common questions you must consider when planning network security for your e-business:

- What are the components of my network?
- How can I prevent confidential data from being read by others as it moves through my network?
- How should I protect my network resources?
- Which local users should be allowed to access unsecured networks?
- Which remote users should be allowed to access resources on the host system?
- What type of traffic should be allowed through the firewall, and under what conditions?

How you answer these questions depends on your business objectives and your need for data security. In finding the answers, you will go a long way toward determining which security configuration tasks will be needed to protect your e-business.

**Establishing network security for z/OS**

In a networked configuration, the host system is at risk if the network is compromised. Beyond enabling the defenses of your z/OS system, you also must consider the network configuration, your business's communication partners, and the path to be taken by such communication. You must be able to configure firewalls and establish network security for the system through the network security controls provided in your security manager (such as RACF), z/OS UNIX System Services, and z/OS Communications Server, which includes TCP/IP and Intrusion Detection Services.

That's an impressive list of to-dos! Now imagine having an online assistant that provides a high-level overview of the major concepts involved in establishing network security. Or, how about a tool that creates recommendation reports customized for the particular combination of @server platforms in use at your business?

This is where the Security Planner can help you. As described in *Hot Topics Issue #7, August 2002, GA22-7501-03*, the Security Planner guides you through a series of questions about your business environment and security goals. Based on your answers to these questions, the Security Planner provides you with recommendations for enabling various security controls, such as setting password rules, controlling access to system resources, enabling logging and auditing, and other OS-specific, security-related activities.

Most often, the audience for the Security Planner is security administrators and auditors who are new to one or more of the @server platforms. For this audience, the Security Planner offers tips, tools, and pointers to related publications for more information.

However, there are some important limitations to be aware of. Running as an isolated Web-based tool, the Security Planner cannot scan your systems or interrogate them in any way. Nor can the Security Planner directly implement its recommendations on your systems. Rather, it provides you with guidelines to assist you with configuring security. For some platforms, the Security Planner also provides you with sample programs you can download to implement the recommendations.

Consider the Security Planner to be one part of the overall security plan for your business. The Security Planner can help you visualize the cross-platform implications of security when you plan your security setup.

**Getting started with the Security Planner**

*Hot Topics Issue #7* explained how to get started with the Security Planner and described each of the tool's panels. The new Security Planner includes all of the earlier functions, so this article will focus on only the new functions, which are related to your business's use of a network.

**Connecting to a network?**

On the Security Planner's “Server Use” panel, select the usage category that best reflects your environment's role: production, test, or both. Also, indicate a network use. (Figure 1 on page 36)

Here, you indicate whether any of your servers will be connected to an untrusted network, such as the Internet.

**Who will have access?**

Among the most important considerations for planning network security is “Who should have access to the corporate
resources?” Following the “Security Level” panel, the Security Planner now displays a new panel to prompt you for the types of users in your enterprise. (Figure 2).

How you answer this question will help you determine which security measures are needed to ensure sufficient protection for your company data and resources. Select the types of users who require access to data or other resources in your corporate network:

- Internal users
- Remote employees
- Business partners
- Public consumers.

Or some combination of these user groups. Whom do we mean by “user group?” Move your mouse cursor over the graphics to illuminate definitions of the groups.

**Using the z/OS recommendations**

If you specify z/OS as one of your platforms, the Security Planner includes recommendations for securing a z/OS system. Use these recommendations in several ways: As a “health check” of your current audit processes, as a preparatory step prior to an audit of your system’s security setup, or as an aid to training staff who are new to the platform.

Consider these recommendations to be a minimum set. The Security Planner simply provides a starting point for your work. As always, you must ensure that the recommended settings are workable in your environment and consistent with your installation’s security practices.

The Security Planner provides general recommendations for protecting your z/OS system’s network access and TCP/IP applications in short topics. Each topic ends with a list of publications for more information.

The following sections briefly summarize the new z/OS topics provided by the Security Planner.

**Setting up data encryption for a z/OS system.** The Security Planner provides recommendations for protecting data flowing in the network, including the use of encryption to protect your sensitive data. z/OS supports encryption protocols through z/OS Communications Server and functions available on S/390 and zSeries hardware, Integrated Cryptographic Service Facility/MVS (ICSF/MVS) and Open Cryptographic Service Facility.
(OCSF), which provides a framework for ICSF.

**Controlling access to network resources.** Securing your network-connected z/OS host system includes preventing unauthorized users from accessing the network resources, such as the TCP/IP stack. Fortunately, your z/OS system and associated products already include a powerful set of security controls. The Security Planner provides recommendations for protecting your network resources, including recommendations for using security features in z/OS Communications Server and z/OS Security Server (RACF), which allow you to require authorizations for the TCP/IP stack and for any z/OS-based network servers that run as started tasks.

**Controlling access to z/OS UNIX system services.** How should you protect applications from unauthorized network access? The security mechanisms in UNIX and the security practices at UNIX installations differ significantly from those in traditional MVS installations. One major difference is the practice of granting superuser access to a variety of operations and administrative staff. Superuser authority offers vast privileges in the traditional UNIX and HFS environment, and must be controlled. The Security Planner provides recommendations that can help you ensure that access to z/OS UNIX System Services is controlled as strictly as other z/OS resources.

**Protecting TCP/IP applications in a z/OS system.** How will you ensure that your TCP/IP applications are protected? The Security Planner provides information for controlling the use of the syslogd server, configuring the FTP server for anonymous logins, and restricting the use of TCP/IP services and applications.

**Establishing a firewall for z/OS.** A mainframe connected to the Internet requires the protection of a firewall to separate the secure network from non-secure networks. The Security Planner provides recommendations for setting up a firewall for your z/OS system, and using z/OS Firewall Technologies to block traffic that does not belong to the services you plan to offer.

**Help for the other eServer platforms, too**

Beyond z/OS, the Security Planner provides network security recommendations for the following platforms:

- **Linux:** The Security Planner supports Red Hat® 7.2 and 7.3, and the SuSE® 8.1 distribution. For configuring security for Linux, the Security Planner provides recommendations for using Bastille to secure your Linux servers. Bastille allows you to configure system and network security settings for Linux, including: boot configuration, login rules, password rules, file permissions, and other security-related settings.

- **pSeries™:** The Security Planner supports AIX® versions 4.3.3, 5.1, and 5.2. After you supply the Security Planner with your system’s security requirements, the Security Planner generates a korn shell script for you to download and run.

- **iSeries:** The Security Planner supports OS/400® versions 5.1 and 5.2. The Security Planner provides a CL program to assist you with applying the recommendations. You can download the program, edit it as necessary in your favorite text editor, and run it to invoke the new security settings. Besides the CL program, the Security Planner also provides definitions and values to input into Operations Navigator, the graphical interface to OS/400.

- **xSeries®:** For Microsoft Windows 2000, the Security Planner recommends BIOS settings, offers advice on adding Windows 2000 servers to your network, and prompts you to check Microsoft’s Web site for important security fixes and downloads.

**Bear in mind…**

The Security Planner is but one part of a comprehensive plan to simplify your security setup across platforms. Be aware that the Security Planner’s recommendations are just that—recommendations. Each environment has its own unique set of requirements for which no tool can entirely account.

**What’s next?**

That part is up to you! Try the new version of the Security Planner and let us know what you think. E-mail your comments, questions, and suggestions for the Security Planner to: secadv@us.ibm.com.

---

**ServerPac tip #19:** Install all the service for your old system at the same time.

If you use a production system to install your ServerPac orders, you should plan to install any PTFs you need to meet the driving system requirements at the same time as any PTFs you need for coexistence and fallback. Doing so can save change windows, and time.
Keeping it secure: IMS Connect with z/OS SSL and TLS protection

BY JACK YUAN AND STEVE KUO

IMS Connect for z/OS is a TCP/IP server that enables TCP/IP clients to exchange messages with IMS. IMS Connect receives transaction requests from remote socket clients and forwards them to an IMS control region. Then IMS processes the transactions, assembles the output segments in the IMS message queues, and forwards the output segments to IMS Connect which sends the output segments over the socket to the remote TCP/IP clients. Now, with both secure sockets layer (SSL) and transport layer security (TLS) protection enabled in IMS Connect V2.1, IMS Connect can provide confidentiality and integrity of data while it is transferred through your network.

SSL is a protocol that provides privacy between two communications applications (a client and a server). Using SSL, clients are optionally authenticated and servers are always authenticated. SSL requires an underlying transport protocol for data transmission and reception. The SSL protocol can be used to negotiate an encryption algorithm and session key before a client application transmits or receives data. All application data can then be transmitted in encrypted form to provide a higher level of security. Figure 1 shows the IMS Connect message flow in the SSL environment using various keys.

Transport Layer Security (TLS) is the successor to the SSL protocol. The benefits of using SSL and TLS are:

- Protection from eavesdropping, data theft, traffic analysis, data modification, and Trojan horse browsers and servers
- Use of public/private key and symmetric key to perform encryption/decryption tasks
- Support for a wide range of cryptographic algorithms
- Support on z/OS and all major platforms, for example, UNIX, Linux, and Windows.

IMS Connect V2.1 now supports SSL V2.0, V3.0, and TLS V1.0. It also supports data structures with SSL and TLS attributes, uses an SSL interface configuration file to customize the SSL and TLS socket attributes, and allows you to create secure sockets using the GSKSSL library for z/OS.

If you plan to use IMS Connect with SSL and TLS, you need z/OS V1.4 System SSL. For more information about IMS Connect with SSL and TLS support, see IMS Connect V2.1 User’s Guide. For information about z/OS encryption support using System SSL, see z/OS System Secure Socket Layer Programming Guide.

Tip #20: Pick unique zone names.

When you are in the Zones option of the dialog, choose SMP/E zone names that are unique for your entire installation, ones that are not used on any system you have. Doing so will give you the most information from the reports created by the SMPREP installation job.

---

Figure 1 - IMS Connect for z/OS with SSL and TLS
Scenes from a network: Keeping your network performance in focus
BY TRACY DEAN

Changes in applications, systems, and networks can often lead to performance problems when you roll them out into production environments. You can avoid these problems and better manage your production environment by projecting system and network performance during your development test phase. For example, when adding a new application workload, you might wonder whether the network will be able to handle the additional traffic and whether the application will have acceptable performance. If the application will use SSL, you might wonder what the impact will be on host cycles and on application performance. Will the network infrastructure be sufficient, or is an upgrade needed prior to deploying this new application?

You can use workload simulation tools, such as IBM Application Workload Modeler for z/OS and Linux on zSeries, to help answer these (and many other similar) questions prior to implementing these changes in production environments.

How these tools work
Workload simulation tools, like Application Workload Modeler (AWM), allow you to proactively plan the performance and capacity of your network infrastructure (such as routers and network adapter cards) and networked applications (such as FTP, TN3270, HTTP, and DNS). These tools can simulate a representative client or client/server workload, generate real network traffic between the two endpoints, capture measurement data, and plot graphs for you to analyze. You configure the type and size of the workload so that it best matches the scenario you want to study.

When you want to analyze the impact of new hardware on your network or determine the network impact of an application before the application is fully developed, simulate both the client and server application. In a client/server simulation, the focus is on network performance and capacity because the actual application is not involved in the test. This removes any possibility of tainting the network performance data with application-specific bottlenecks.

You can configure client/server workloads to simulate various workload types, such as:
- Interactive workloads that are connection intensive (connect request response)—similar to a Web server workload
- Interactive workloads that maintain a persistent connection (request response)—similar to a TN3270 workload
- Bulk data transfer workloads (streams)—similar to an FTP workload

To do this, install AWM on one or more client machines in your network, being sure to choose locations in your network that are “network-near” a representative sample of your end users, and install AWM on your z/OS server. Then configure the AWM client to communicate with the AWM server, specifying a workload using the type and amount of network communication activity you desire. Once the workload is configured, it can be run against your zSeries server using the old adapter and run again using the new adapter. The throughput and response time statistics captured by AWM can be used to analyze the performance benefits of the new adapter.

- Deploying secure sockets layer (SSL) or a virtual private network (VPN)
If you are considering deploying SSL for a specific TCP/IP application or a VPN for all applications, analyze the impact of this change on your network before the technology is deployed in production. As in the previous network connectivity scenario, install AWM on both the client and server, and configure them to simulate the workload you desire.

For SSL, the AWM client and server can be configured to not use SSL in the first run, then use SSL in the second run. When using SSL, AWM actually drives the operating system’s SSL layer for the encryption and decryption of the network traffic being generated. This allows you to measure the impact of using SSL not only on your network, but also on the OS/390 or z/OS host.

For VPN, the connection to your VPN is defined outside of AWM. So, run the workload without the VPN connection, then run it again with the VPN connection, and compare the results.
Converging SNA and IP traffic to an IP WAN backbone using Enterprise Extender

The Enterprise Extender function, first shipped in OS/390 V2.7, allows your IP network to handle both SNA and IP traffic without any change to your SNA applications. You can simulate a client/server workload to evaluate the potential impact of SNA traffic on your IP network:

- How will my SNA applications perform over the IP network?
- What’s the impact on my existing IP applications?
- Do I need additional IP bandwidth before removing my SNA network?

Using HiperSockets when consolidating servers on zSeries

HiperSockets is a high-speed, low-latency TCP/IP network within a zSeries server, such as the z900, that allows applications on virtual servers and logical partitions (LPARs) within the zSeries server to communicate, without going through the network adapter card and without changing the applications.

Use AWM to help you evaluate the response time and zSeries server impact of consolidating multiple distributed application servers (running UNIX or Linux) onto a zSeries server running multiple Linux virtual servers. Before consolidation, your distributed application servers access the data stored on zSeries via a traditional network connection. After consolidation, the application servers run on Linux on zSeries and use HiperSockets to access the data.

To model this, install an AWM client on a distributed application server, most likely Linux on Intel®, and install an AWM server on z/OS. Configure the client to generate the type and size of workload your application server normally generates to your backend z/OS system.

When you run this workload, AWM gathers response time, throughput, and other statistics to provide a baseline representing your existing environment.

Then, install an AWM client on a Linux partition on the same zSeries server. Using the same workload that was previously run on the distributed server, run the client workload against the same z/OS server. This represents your application server running on Linux on zSeries and communicating through HiperSockets with your backend z/OS system for data. Compare the results.

You can configure client/server workloads to simulate many other scenarios, such as:

- Deploying an IPv6 network, including tunneling IPv6 traffic over your existing IPv4 network
- Designing and deploying a new TCP/IP application on your existing network
- General changes to the network infrastructure, such as router upgrades or moving from token ring to gigabit Ethernet.

Client workload scenarios

- TN3270 server placement

Simulate client-only workloads to analyze the performance impact of running a TN3270 server on z/OS (or OS/390) versus running a TN3270 server on a distributed server in the network. In both cases, the TN3270 server needs access to the SNA-based application on the mainframe.

To compare the two solutions and their impact on the network and respective servers, install AWM on a client somewhere in the network, most likely a Linux on Intel, again “network-near” your end users.

Configure the AWM client, specifying the following:

- Desired number of TN3270 clients,
- Frequency of communication (think time), and
- Size of the data being transferred.

Run this workload when connected to the distributed TN3270 server and again when connected to the z/OS TN3270E server. AWM will capture data that you can use to analyze the performance of your network and each server.

- Exploitation of network quality of service (QoS)

As you consider implementing a network quality of service policy, you might need help determining the right QoS policy for the workload on your network. This is especially important when migrating from an SNA networking infrastructure to an IP infrastructure because you’ll want to map the SNA COS (class of service) to an appropriate IP QoS.

To do this, perform an AWM base run without any QoS settings. Then, outside of AWM, configure new QoS settings, and perform a second AWM run. You can then compare both runs and see the impact of using QoS not only on your network, but also on the OS/390 or z/OS host.


Other scenarios for client-only workload simulation include:

- Deploying load balancing solutions
- Evaluating resource and performance characteristics of various TCP/IP servers.

Summary

Workload simulation tools provide a powerful method for proactively managing your network and networked applications. They allow you to roll out changes with more predictable results and right-size both your network and your zSeries servers. For more information on IBM Application Workload Modeler, visit: [http://www.ibm.com/software/network/awm/index.html](http://www.ibm.com/software/network/awm/index.html).

ServerPac tip #21: “Software Upgrade” really does a software replacement.

If you have been avoiding the “Software Upgrade” installation path because it sounds like an SMP/E-based set of RECEIVE/APPLY/ACCEPT tasks, you should know that it really provides a complete replacement for the software and SMP/E zones in your ServerPac order.
Are you highly available?
BY DAVID RAFTEN

Many volumes have been written about how to achieve availability at the systems level. If you are like many people who read z/OS Hot Topics or attend user conferences, this is what you care about. But applications? Those things that actually run programs? Perhaps you don’t spend much time thinking about applications, possibly because your company already devotes a separate department to developing them. In reality, however, application availability—or the lack of it—can affect the entire enterprise.

Contrary to popular belief, applications and systems do depend on each other! Poorly written application code complicates (sub)system management and, in fact, can be a major factor in the unavailability time that can affict your business. When an application is not designed and written for high availability, obtaining systems level availability goals is made much more complicated in today’s dynamic business environment.

This article provides an overview of techniques for designing highly available applications.

High level requirements
When designing an application, you need to know the application’s availability requirements, such as the following:

- What is the availability service level agreement (SLA) for this application? Must the application be available 7x24x365, or can it be brought down on Sundays, for example?
- What is the structure of this application? For example, what major databases will be used, and what major processing activities will be performed by the application? The use of a single database manager such as DB2, IMS, or VSAM, is simpler to code and maintain than combinations of database managers.
- How many hardware platform tiers will be used?
  - More tiers add complexity to coding and problem determination
  - More tiers add points of failure that can impact end users.
- What is new or challenging about this application compared to others you have implemented in the past?

The harder an application is to code, the more likely it is that you will have problems when you migrate the code to your production environment. Also, problem determination is made that much more difficult.

Designing for fault avoidance
For an application to be highly available, it must include availability characteristics in its design. For example, if an application requires 24-hour availability, it cannot have a nightly backup window that requires the application’s database to be off-line.

Define the application’s function and structure to support the availability requirements. A state-of-the-art processor in a Parallel Sysplex data sharing environment has many redundant components that provide a consistent, highly available platform for applications, but if an application’s basic design does not contain equivalent availability components, the state-of-the-art environment is wasted.

Most application outages result from bugs. So, the main improvement to continuous availability results from designing error-free applications that meet very strong quality criteria. No matter how many backup applications are available in a Parallel Sysplex environment, it is important to produce as near error-free software as possible.

Important measures of availability in an application design are the following:

- **Correctness:** The ability of an application to perform its functions exactly according to its functional specifications. Correctness is the primary quality criteria to be addressed by a quality-control development process.

- **Robustness:** The ability of an application to continue functioning under conditions not explicitly covered by its functional specifications. Sufficient robustness helps so that, if an unspecified situation arises (such as a catastrophic event), it will not necessarily bring down the system. Instead, the current activity can end cleanly and then resume rapidly without data loss.

Achieving robustness requires an advanced testing process.

- **Extendibility:** The ease with which the application can be adapted to changes in the functional specification. Extendibility is a function of design simplicity and the degree of isolation of the modules that make up the application. The more autonomous the modules, the higher the probability that changes to one module can be localized to that module, or to only a small number of modules. Extendibility helps reduce the instability of an application following a change.

- **Reusability:** The ease with which software modules can be reused in new applications. Reusability helps reduce the amount of code to be written and can improve the reliability of new applications. When correct and robust modules are reused, new applications can be developed more rapidly, and more time can be devoted to improving the reliability criteria of the new modules.

Reusability and extendibility require architectural techniques to produce simple designs with distributed modules connected by a small number of well-defined interfaces. Both object-oriented programming and message queuing programming techniques can provide these traits. On the other hand, correctness and robustness can only be achieved with a quality-controlled development process, coupled with an advanced testing process.

Inter-application dependencies
The term “single point of failure” is often used in discussions of configuration issues. In application design, avoiding single points of failure means designing an...
application so that it can run in multiple locations on multiple logical partitions (LPARs) simultaneously. This technique has the additional benefit of providing workload balancing benefits. Serialization of resources across transactions, however, could affect your ability to do this, unless you can avoid using such serializations in the application. Avoiding single points of failure is extremely important to exploiting Parallel Sysplex.

**System or transactional affinities**

The term “affinity” is often used when referring to CICS transactions, which can use many different techniques to exchange data. Some of these techniques require transactions that exchange data to execute in the same CICS region. If so, restrictions can limit the dynamic routing of transactions. If transactions exchange data in ways that impose such restrictions, there is said to be an affinity between them.

There are two categories of affinities:

- **Inter-transactional affinity** can exist between two or more CICS transactions. This affinity occurs when transactions use techniques to exchange data or synchronize activities in a way that requires the transactions to execute in the same CICS region.

- **Transaction-system affinity** can exist between a transaction and a CICS region. This affinity occurs when a transaction interrogates or changes the properties of a particular CICS region. Transactions with affinity to a particular system are not eligible for dynamic transaction routing.

The restrictions on dynamic transaction routing caused by transaction affinities depend on the duration and scope of the affinities. Clearly, the ideal situation for dynamic transaction routing is for there to be no transaction affinities at all, which means there are no restrictions in the choice of available application owning regions (AORs) and no single points of failure.

These affinity concepts are just as applicable in the larger scope. You should avoid dependencies on user exits or programs or resources that are available on only some of your images. Programs should be dynamically routable and should have no explicit references to any other system by name or SYSSID. If such a reference is necessary, it should be obtained through a lookup.

**Restart and recovery**

Because no software engineering process produces defect-free code, how can the goal of continuous availability be achieved? One approach is to accept reality. Design, develop, and test software products with the assumption that failures will occur. Here, you assume that the next instruction in your module might abnormally end (abend). While the operating system itself provides robust error recovery services, your application must also be able to isolate errors, recover from errors, and describe errors with messages.

In code failure recovery, your application can either retry the failed operation, or it can redirect the operation to a redundant component. In both cases, from the user’s point of view, the application should preserve the maximum usability for all non-failing paths or functions. It is also important, in the case of a failure, that recovery actions provide a very fast restart, even by a fallback to an older level of code.

Recovery from data failure requires different considerations, depending on when (read or write) the problem was detected. When read operations are unsuccessful, evaluate the following possibilities:

- Are there any alternative sources of data?
- Are there any default values?
- Can a subset of the business process be satisfied without the data?
- Would an old copy of the data be satisfactory or useful?

For unsuccessful write operations, consider the following possibilities:

- Can an alternative or temporary database scheme be used?
- Can a temporary flat file or log be used to capture data for later database update?
- What part of a user’s request can be satisfied without the write?

**Operational recovery**

You cannot plan for every possible failure, but you can anticipate a variety of failures that might occur. When testing your code, make note of the possible types of code failures that can take place and record them in the operations guide.

**Versioning (n, n+1)**

Business demands force a continual effort to maintain software levels to add new function and increase performance and reliability. When multiple instances of a subsystem or operating system such as z/OS exist, an efficient change management process would not normally allow a simultaneous change to all copies. Instead, the process would specify an initial change to one z/OS image, followed by a scheduled roll-out to the remaining instances.

During this process, different versions of software must coexist. A transaction manager would have to provide support for such a version roll-out. Replication provides the opportunity to have different versions of the application coexist with each other. This enables a managed roll-out of changes across systems, supporting continuous application availability and speed of implementation.

For example, if three instances of an application exist in the Parallel Sysplex, one instance could be removed from the group, leaving the other two copies to handle the workload. The change could be applied to that copy and it could be inserted back into the group. To determine if the change was successful, the amount of work that is routed to the new copy could be controlled to a very low level by the system, and then increased gradually until confidence is gained in the change. The changes could be rippled across the other copies in the same manner.

After functional testing has been carried out on new or modified application code, the procedure just described for change roll-out can be used to provide a production performance or stress test environment. This process should use real transactions to test the code and its ability to maintain high levels of performance. The process should use the workload manager and the transaction managers to control the levels of transactions handled by the new code in a new application program library. This process can be done in addition to the normal test environment. Careful planning is required to handle new data format styles and reporting changes.

**Software testability**

Providing for recoverability of components of the system requires constant interaction between the test and development communities. Introducing “testability” or “ease of test” into the software that is being verified allows the tester to validate the software more efficiently and effectively. It is critical for the testers
Changes keeping you up at night?

BY DAVID RAFTEN

By its very nature, Change—with a capital C—adds instability to a system, yet is vital to a business’s survival. Therefore, it is important that you manage change carefully. Having a software change management process in place will help you to control the introduction of changes, reduce the unplanned impact of changes, and reduce the skill level needed to manage changes. This article provides a short primer on developing a change management process for your business.

Assign a risk assessment

Among other things, risk determines how much testing needs to be done. You might, for example, assign the following risk categories to each change request:

- **Low-risk:** The change has a minor impact on users and backing out of the change is easy. Your test plan should include the testing of all new function.
- **Moderate-risk:** The change has a significant impact on users, but backing out of the change is not an elongated process. Your test plan should include the testing of all new function (as above), plus regression testing to determine the impact to the existing infrastructure, and testing of the backout plan.
- **High-risk:** The change has the highest impact on users, and might affect the entire site. Backing out of the change is time consuming or difficult. Testing recommendations include the above, plus stress testing using a terminal simulator, performance impact testing, backout testing, and providing operations support documents. A design review prior to testing is recommended. Changes should be communicated to the user community. Identifying the risk level helps you to determine that the correct level of testing is undertaken prior to implementing the change.

Use your support staff

I/T support is not limited to system programmers, but also extends to the help desk and operations. When changes are required, consider having the operators help make the changes. Doing so frees up system support staff to do other activities, and keeps up the skill level of the operators.

Communicate

Communicate details of the change by setting expectations, aligning support resources, communicating operational requirements, and informing users. The risk level and potential impact to affected groups, as well as scheduled downtime as a result of the change, should dictate the communication requirements. Although it isn't always possible to notify all users of all changes, end users should be notified of any changes that might directly affect them.

Conduct a postmortem

After the change is made, hold a postmortem (or causal analysis) to review the experience. Collect metrics such as the following:

- Volume of changes processed by period, category, and risk level
- Number of changes that proved unsuccessful and were backed out, by category
- Number of changes that generated new problem incidents
- Number of emergency changes implemented.

Document what worked well and what did not. Use these findings to further improve your change management process.

Message suppression

When writing and debugging the applications, it is a common technique to insert messages that get displayed to the coder indicating where the code is running before it fails. By the time the program is ready for production, these messages are removed from transactions. Sometimes, however, messages are not removed from batch jobs. This causes difficulties for the Automation group that is needed to suppress them. If you must keep the messages, at a minimum, include a message prefix number so that they can be suppressed easily.

to work directly with the development and design teams to see where there are opportunities to improve the testability of the product code.
One size doesn’t fit all:
System programming education and training
BY BERNICE CASEY, PETER PAGEREY, AND DON SPANGLER

When it comes to attracting and retaining critical skills for your data center staff, one kind of education might not fit all of your needs. Consider the following examples:

- Students from colleges and universities who are considering careers as I/T professionals in the mainframe world need to learn zSeries basics and get hands-on experience with system management and application development. Opportunities to talk with experts in the I/T field are also important.
- Less experienced mainframe professionals need to grow their skills through a combination of continuing education and on-the-job training with more experienced mentors.
- Even experts need to keep their skills up to date, learning about new system features and system management techniques.

Let’s look at programs that are available to address these training and educational needs.

**Training the next generation**

Tomorrow’s zSeries I/T professionals are in high school and college today. How can we excite them about job opportunities managing the systems that are the backbone of the world economy? IBM offers two programs:

- IBM Scholars zSeries Program
  (See ad on page 45.)
- IBM I/T Skills Co-Op Program

The IBM Scholars zSeries Program (formerly known as the IBM S/390 University Program) establishes a process for educating the next generation of zSeries (S/390) specialists. Working together, IBM, zSeries customers, and select colleges and universities can provide a much-needed link between the academic environment and the work place. The goal is to create a comprehensive curriculum to enhance the zSeries skilled resource base—and ensure that students develop practical zSeries skills that enable them to find good jobs quickly upon graduation.

The IBM Scholars zSeries Program offers significant benefits to everyone who participates. Universities and students gain:

- Stronger relationship with businesses
- Access to industry technology experts
- Faculty training on latest zSeries facilities
- Comprehensive curriculum to meet market needs
- Experience and career opportunities.

zSeries customers gain:

- Access to qualified zSeries talent
- Strengthened collaboration with academia
- Development of targeted work-study programs.


The IBM I/T Skills Co-op Program is being introduced this year. Its goal is to develop a pool of university graduates with basic z/OS I/T skills and experience. Students will learn basic z/OS system management tasks while working side-by-side with area experts, gaining valuable hands-on experience. The impetus for this program grew out of a partnership with customers who also helped define the experiences included in the program.

The program teaches z/OS fundamentals using modules from z/OS introductory courses. Students receive three weeks of introductory education. Then they spend eight to ten weeks performing operating system installation and maintenance tasks, followed by eight to ten weeks performing operations and system configuration tasks, and three to four weeks gaining experience with diagnostic tools and customer feedback.

Finally, students spend three to four weeks in IBM Global Services seeing how it all comes together.

For more information about the program, contact David Hans of IBM at davehans@us.ibm.com.

**Growing your own skills**

Learning new skills and keeping your existing skills up to date makes good business sense.

**Professional Certification Program from IBM** is designed for skilled technical professionals seeking to demonstrate their expertise to the world. Internationally recognized certifications are available for people working in the fields of I/T sales, service and support, and application development. For the zSeries platform, three certifications are currently available:

- IBM Certified Specialist – S/390 Parallel Sysplex Systems Programmer
- IBM Certified Specialist – S/390 Parallel Sysplex Operator
- IBM Certified Specialist – S/390 Parallel Sysplex Operator – Data Sharing


**Marist College z/OS and zSeries Learning Center** provides z/OS classes leading to certification. The program uses a three-tier certification model in which students take only the courses they need to prepare them for the certification test. Courses are offered at the following certification levels:
IBM I/T Education Services programs provide courses using a variety of media:
- Public classes
- On-site private classes that can include customized course content
- e-Learning in the form of a digital video library, which brings expert instructors and world-class IBM training right to the desktop.

The I/T Education Services curriculum includes courses in the following areas:
- e-business for z/OS and OS/390
- FastPath (new hire training on z/OS and OS/390 basics)
- Linux for zSeries and S/390
- Parallel Sysplex
- SAP for OS/390
- WebSphere for z/OS and OS/390
- z/OS and OS/390 basics
- zSeries architecture and migration

For more information, visit:

Got a match?
IBM Scholars zSeries Program

Does your company work with any colleges or universities on zSeries related projects? Do you want to extend this interaction into their educational curriculum?

Would you like to partner with any particular colleges or universities to help provide zSeries education to their students, and possible co-ops, interns, and future new hires for your company?

If you think there could be a three-way match with your company, a college or university, and the IBM Scholar zSeries Program, send your ideas to univprg@us.ibm.com.

Nobody actually reads each of the messages on green-screen consoles anymore. Not when flexible operations tools, such as SDSF™, allow operators and system programmers to query the status of the system and take action. Usually, the only attention that the lonely 3270 receives is an occasional glance to see if the screen is rolling at a comfortable rate and that the color of the messages flying by remains mostly green. That is, until the software color of the messages flying by remains.

**History**

In the days of MVS before sysplex, each system managed its own console operator messages, affectionately known as “WTOs” (write-to-operator messages) across a set of up to 99 operator consoles. These consoles were distributed around the “glass house,” often seeing just a small subset of messages, such as tape mount messages, printer messages, or system and subsystem errors.

As the size of the systems grew, so did the number of messages generated by these systems. Installations began to use programs like NetView® to take automated actions for many of these events. To stem the burgeoning flow of message traffic to the consoles, installations employed aggressive message suppression schemes, both through the MPF (Message Processing Facility) built into the operating system, as well as outboard products.

With the advent of sysplex in MVS/ESA™ SP 4.1.0, operator messages could be produced by a number of different systems for presentation to consoles and automation programs across the sysplex, further multiplying the number of messages to be processed. The same release of MVS also introduced a new console interface called Extended MCS (Multiple Console Support). These mismnamed consoles (an EMCS console is really a set of software interfaces from which a program can obtain message traffic) were ‘grafted’ onto the same basic message infrastructure previously shared only by the operator consoles and hardcopy log processing.

So, when something goes wrong, everything goes wrong. Our studies of multisystem outages related to the consoles component show that around 40% of those outages were caused by a failure in the message queuing and delivery process.

**So, what's the problem?**

The software that controls the operator consoles, called DIDOCS (device independent display operator console support) was written back in the 1970s, when memory was addressed in 24 bits and high-order bytes contained useful, non-pointer, information.

The base design for WTO and DIDOCS can be summed up as follows:

1. A program issues a WTO (actually SVC 35).
2. The SVC 35 code dumps lines of the message into below-the-line buffers in the CONSOLE address space.
3. A task in the CONSOLE address space (called ‘Comm Task’) examines buffers and queues messages for display on consoles and writes them to the log.
4. As messages are completed (that is, displayed on all interested consoles and logged), the buffers are freed for use by newer messages.

So here we have the classic producer/consumer problem from “Computer Science 101.” As the system becomes larger, the number of messages issued per unit time continues to increase, making it easier for a spike of messages to overrun the below-the-line buffers in the CONSOLE address space, especially since the consoles themselves continue to roll at the same rate as they did 20 years ago. This problem is further worsened by the built-in design principle that ensures that DIDOCS processing will **absolutely, positively** deliver every deliverable message. This causes message buffers to be occupied longer, keeping the system from clearing buffers fast enough for new messages (see Figure 1).

To help alleviate this problem, we added code a few years back to allow the 24-bit buffer area to expand up above the 16 MB line in the console address space, when the buffer area begins to fill. Then, as the 24-bit buffers are cleared, the queuing code can bring messages down from the 31-bit area for processing. However, in a runaway situation, this really only keeps the mechanism from failing quite as quickly, seconds instead of tenths of seconds.

An additional problem that causes great problems with the current queuing scheme is the unended multi-line WTO. In the current queuing scheme, each of

![Figure 1 - Problem: message buffers not clearing fast enough](image-url)
the lines of the message is buffered and queued as they are received. If a console hits the last buffered line of a MLWTO, but it is not the 'end line' of the message, the console stops rolling and future messages back up behind it, potentially causing a backlog in the queuing mechanism. Previous fixes for this problem included the introduction of a timer that truncated an unended message after a period of inactivity.

**Now, what?**

So, what did we do to solve the problems? First of all, we decided that we were not going to try to make DIDOCS learn how to do 31-bit mode. The cost was too great, given that all the control structures contain 24-bit pointers, and nobody was particularly interested in performing the forensic pathology required to rebuild the support. So, we decided to put DIDOCS off in its own corner where it would still continue to function as today, but not cause a system outage when the buffer area was overrun.

Second, we wanted to ensure that console messaging could never take the system down. We needed to replace the absolutely, positively deliver every message philosophy with a new set of rules that says we try hard, but the health of the operating system is more important than the display of an individual message.

To get this done, we started by stating new fundamental principles for message delivery:

1. Get the message to as many program interfaces as possible (MPF exits, the subsystem interface).
2. Get the message into SYSLOG and OPERLOG as quickly as possible.
3. Build a delivery system that will shed messages if any of the consumers of messages is unable to keep up with the production of messages.
4. Don’t allow an unended MLWTO to interfere with message delivery.

Finally, we wanted to achieve independence of each of the EMCS queuers.

**The solution: z/OS V1.4 consoles enhancements**

To achieve these goals, we started by changing the way messages are transmitted from the SVC 35 front-end code to the back-end queuing code. Analysis has shown that, in a sysplex, a majority of the messages are delivered to more than one system. So, rather than analyzing the aggregate console state for each message, we decided to broadcast the message to every system, including the local one, and allow XCF to queue the message to the CONSOLE address space on every system in the sysplex. Unlike the current structure, where the messages are queued into local buffers before they are transmitted to the other systems, the transmission of the message is done from within the caller’s unit of work.

To further improve the reliability of getting a message to the log (SYSLOG, OPERLOG, or both), delivery to the log queues is done directly under the caller’s unit of work, rather than waiting for the message to be delivered. These queues exist within a dataspace and can easily buffer far more messages than the old 24-bit area in the CONSOLE address space (see Figure 2).

As the messages are received, they are added to a wraparound message cache, maintained in a new dataspace owned by the CONSOLE address space. Using a cache enables the system to lose messages if the arrival rate of messages exceeds the consumption of messages by any of the downstream message processes.

The EMCS queuers have been modified to obtain messages directly from the cache, rather than the 24-bit MCS buffer area. If any of the queuers falls behind the cache and the cache ‘wraps’ past the queue, a new message is issued to indicate what happened, and the queer will resume from the new front of the cache. It is important to note here that the messages will still be getting to the log for retrieval purposes.

To solve the unended MLWTO problem, multi-line messages will no longer be queued until the last line of the message is issued. Rather than queuing the individual lines of the message, MLWTOs will be ‘parked’ in a new dataspace, called the MLWTO parking lot. Messages will leave the parking lot under several conditions:

- The ‘endline’ of the message is issued
- The message is inactive for a period of time (that is, no new lines are added for a period)
- The task that originated the message ends.

We believe that these changes to operator message processing will greatly enhance the reliability of the console services component of z/OS.

**What do you have to do get ready?**

z/OS V1.4 Consoles Enhancements might require you to make several changes to your configuration, as follows:

- You must name your consoles. Check your CONSOLexxx members to ensure that each of the CONSOLE statements specifies a NAME parameter.
- Console switch ALTERNATE processing is no longer supported. Check your CONSOLexxx member to ensure that each of the CONSOLE statements specifies the

![Figure 2 - Solution: V1.4 Consoles Enhancements](image-url)
ALTGRP parameter, rather than the ALTERNATE parameter. For instructions on how to set up and use console groups, see z/OS MVS Planning: Operations.

- The UD keyword is no longer supported. You can remove the specification from CONSOlx. This keyword will not be honored on system commands.
- Hardcopy can now only be directed to SYSLOG, OPERLOG, or both.
- The DEVNUM parameter is no longer accepted on the HARDCOPY statement in CONSOlx.
- The hardcopy group (HCPYGRP) is no longer supported. You can no longer specify HCPYGRP on the HARDCOPY statement.
- The “Reroute” parameter (R=) has been removed from the CONTROL Q command. The command will remove a message backlog from the target console only. You cannot redirect messages to another console.

**How do I get z/OS V1.4 Consoles Enhancements?**

IBM plans to make z/OS V1.4 Consoles Enhancements generally available in the first quarter of 2004. Prior to GA, IBM will select a few customer installations to help test drive the new function. The early availability program, which is planned to run from November 14, 2003, until GA, will help IBM ensure the compatibility of the new function with OEM products and homegrown code that interfaces with the MVS console services component. If you are interested in participating in this program, visit: [http://www.ibm.com/servers/resourcelink](http://www.ibm.com/servers/resourcelink).

Select Planning on the left navigation bar, then select “z/OS V1.4 Console Restructure Customer Request Form” under Software.

If you are among the less adventurous, you can wait until GA and order it then.

continued from back cover

is a reasonable thing to do. Otherwise, proceed with caution when migrating your programs to AMODE64. In general, arbitrary use of 64-bit virtual might not produce any performance gain because of the possible increases in certain dynamic address translation (DAT) path lengths.

For information about modifying a program or writing a new program to exploit 64-bit virtual support, see a very good write-up on the subject in Chapter 4 of z/OS V1R30 MVS Programming: Extended Addressability Guide. Also, there was a very good presentation on writing 64-bit virtual programs at the February, 2003 SHARE in Dallas, Texas (Session 2826 - The Future z/OS Application: Virtually Endless Space).

**Some basic 64-bit virtual considerations**

If you are running z/OS V1.2 and want to exploit 64-bit virtual, make sure your system was IPLed in the ARCHLVL=2 z/Architecture mode. Use the SAM64 z/Architecture instruction to switch to AMODE64. (Basically, your programs still remain AMODE31 programs.) Before addressing 64-bit virtual storage, your program must issue the SYSSTATE macro with ARCHLVL=2, AMODE64=YES and SAM64 to switch to AMODE64. When 64-bit virtual processing is complete, switch back to AMODE31 using the SAM31 instruction.

If you are running z/OS V1.3 or higher, you can build an AMODE64 program without worrying about the SAM64 and SAM31 instructions. However, be aware that many system services still run in AMODE31. Some services can tolerate AMODE64 invocation and some cannot. If you need to invoke an AMODE31 system service that does not support AMODE64 invocation, you have to code the SAM31 and SAM64 instructions around the services and provide a below-2GB input parameter list. For system services that can be invoked in AMODE64, most still require that the parameters reside in below-2GB virtual storage. Therefore, it is important to remember to check the documentation for each system service to determine whether you need to obtain parameter list virtual storage in the below-2GB area.

Most system macros that are invoked using a stacking PC can be invoked in AMODE64 but all branch-entry system macros require that you have a below-2GB input parameter list.
services must still be invoked in AMODE31. Consult your system service publications to determine the AMODE64 capability for a particular system service or macro.

**Recovery routine considerations**

There is also some new recovery routine support in z/OS V1.2 and higher. In z/OS V1.2, ATTACHX was enhanced with the SDWALOC31 keyword. In z/OS V1.3, ESTAXE was enhanced to support AMODE64 invocation so that the recovery routine gets control in AMODE64 and SDWAPARM points to the 64-bit address of the ESTAXE parameter list. ATTACHX was enhanced to support AMODE64 invocation and also added two new keywords: PLIST4 and PLIST8. All this new recovery routine support is in addition to the OS/390 V2.10 and z/OS V1.1 enhancements that provided the new SDWA extension for 64-bit information (SDWARC4), the new SDWALOC31 keyword for ESTAE, and the SETRP RETRECS 64 enhancement.

If your 64-bit program is designed to run in z/OS V1.3 or higher, all of these recovery routine support functions are available for your use.

**Which system services are invocable in AMODE64?**

Table 1 lists the system services that can be invoked in AMODE64 in z/OS V1.3 or higher. Remember that your program must issue SYSSTATE AMODE64=YES prior to invoking these system services.

**Enjoy and relax**

We hope that these ideas have put you at ease with controlling your 64-bit virtual programs. For more information, visit [http://www.ibm.com/servers/eserver/zseries/ios/bkserv](http://www.ibm.com/servers/eserver/zseries/ios/bkserv) to read the following documents in the z/OS Internet library:

- **MVS Programming: Extended Addressability Guide** (SA22-7614)
- **MVS Programming: Authorized Assembler Services Reference, Volume 2 (ENFREQ-JXGWRITE)** (SA22-7610)
- **MVS Programming: Assembler Services Reference, Volume 2 (IARR21-XCTLX)** (SA22-7607)


<table>
<thead>
<tr>
<th>System services that can be invoked in AMODE64</th>
<th>Does it support 64-bit data?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABEND</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ATTACHX</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>CHAP</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>CALLDISP</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>CSR cell pool services</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>CSRC4xxx analogs of CSRFPxxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSVQUERY</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>DELETE</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>DEQ</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>DETACh</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>DOM</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>DSPSERV</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>DYNALLOC</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ENQ</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ESPIE</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ESTAXE</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>EXCP</td>
<td>No</td>
<td>Support 64-bit virtual IDAW</td>
</tr>
<tr>
<td>EXIT(SVC3)</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>FREEMAIN</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>GETMAIN</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>GTRACE</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>IARV64</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>IARVSEVR</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>IDENTIFY</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>LINKX</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>LOAD</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>MODESET</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>PGSER</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>POST</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>RESERVE</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SDUMPX</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>SETRP</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>STAX</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>STIMER</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>STIMERM</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>STORAGE</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SYNCHX</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SYSSTATE</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>TESTAUTH</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>TIME</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>TIMEUSED</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>TIMER</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>TTIMER</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>VRADATA</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>WAIT</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>WTO</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>WTOR</td>
<td>No</td>
<td>SVC entry only</td>
</tr>
<tr>
<td>XCTLX</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 - System services that can be invoked in AMODE64

---

August 2003  z/OS HOT TOPICS Newsletter, Issue 9  Page 49
Norm Aaronson is a Senior Development Engineer, currently the Release and Project Manager for Java on zSeries. He has worked for IBM for 29 years, involving work with VTAM, numerically intensive computing, SP, Cornell Supercomputing liaison, VM, RS/6000 SP, Open Software Foundation, and IEEE Standards.

Kim Bailey is a Senior Software Engineer in Enterprise Networking Solutions Architecture, Strategy and Design.

Jim Becker is an Advisory Software Engineer at the IBM Lab in Poughkeepsie, New York. He is author of the publications z/OS and z/OS.e Planning for Installation and z/OS Migration. Jim still has his “welcome to IBM” letter signed by Tom Watson Jr.

Bill Carey is a senior software engineer with 29 years of experience at IBM. He is in zSeries Software System Design group in Poughkeepsie and currently focuses on XML support on z/Series.

Bernice Casey is a member of the z/OS Ease of Use team. She has over 20 years experience doing user interface and information design for IBM products.

Mary Ellen Coleman is an advisory software engineer in the IBM @server Information Solutions group, focusing on using multimedia to instruct and to enhance usability. She has been with IBM for seventeen years.

Tracy Dean is the IBM Brand Manager for several products in the areas of networking products, office solutions, and application development tools. She’s been with IBM for more than 18 years, all of them spent in software development, test, support, and planning. Contact Tracy at ttd1@us.ibm.com.

John Eells is a former MVS and OS/390 system programmer, now a Senior Software Engineer in IBM Software Delivery and Fulfillment. SDF delivers all of IBM’s software and services packages, including ServerPac, CBPDO, ESO, and SUF. John’s current assignments include ServerPac design.

Scott Fagen is a Senior Technical Staff Member, working in the zSeries Software Design Center at IBM Poughkeepsie. His responsibilities include design and development projects in the Core Technologies of z/OS, including Parallel Sysplex. Currently, he is focused on improving availability in the console services areas and exploiting the coupling facility.

Andrea Greggo is a software engineer for the WebSphere for z/OS information development team working from Poughkeepsie, NY.

Ulrich Kettner joined IBM in 1974. After some years in software development and test his focus was for a long time on partner and customer support and services for database and middleware products. Now Ulrich works in SA OS/390 development at the IBM Lab in Boeblingen, Germany.

Steve Kuo is a senior software engineer for IMS Connect at IBM’s Silicon Valley Lab.

Magdalena Leung is a member of the z/OS system design team and the zSeries Software Design Council. She is the lead 64-bit virtual system designer and is very active in working with z/OS software vendors. Magdalena is also a member of the IBM @server Design Council and Advanced e-business Council focusing on the emerging technologies.

Roger Miller worked as a customer systems programmer before working on DB2 for the past 24 years. His job includes design, strategy, reviewing, building and teaching, and working with customers.

Wayne O’Brien is an Advisory Software Engineer at IBM Poughkeepsie. Since joining IBM in 1988, Wayne has developed user manuals and online help for a variety of software products. His current assignments include ServerPac and Linux on z/Series.

Peter Pagerey has worked for IBM for 24 years in a variety of assignments. He has worked on various hardware, software, and information projects with both his co-authors. He supported the RS/6000 SP for 6 years and most recently has been working on the usability of z/OS.

Jim Porell is a Senior Technical Staff Member and Chief Strategist for the zSeries Software Brand. His focus areas include matching IBM technology to customer business problems and prioritizing the investments made in software deployment. Jim is the chairman of the zSeries Software Design Council, which includes technical leaders across all IBM software deployed on zSeries. Jim has been with IBM in the Hudson Valley for 23 years.

David Raften joined IBM in 1982, working in the Performance Test organization. In 1993, David started looking at Parallel Sysplex and has been doing technical marketing support since its announcement in 1994. Recent focus areas also include availability analysis and z/OS product planning.

Geoff Smith is a senior level programmer, responsible for the technical documentation strategy (tools and technology) for z/OS Information. He is the tools team leader and team leader for LookAt, an initiative to improve information retrieval for z/OS reference information (messages, codes, and commands). He has been with IBM for over twenty years.

Don Spangler is a Human Factors engineer at IBM, Poughkeepsie, working in z/OS User Interface Design and Development. He completed a Ph.D. in Human Factors Psychology in 1999, with backgrounds in Experimental-Cognitive Psychology and Computer Science.

Elpida Tzortzatos is the z/OS RSM design/development team leader. With her in-depth knowledge in RSM and basic 64-bit virtual, she is instrumental in helping IBMers, software vendors, and customers in resolving RSM and basic 64-bit virtual questions and problems.

Marna Walle has been with the z/OS Build and Installation department for 14 years. She is familiar with z/OS (and OS/390), z/OS.e, and ServerPac, having worked on them since their inception. Her current responsibilities include the packaging and installation of z/OS elements. She is particularly interested in UNIX and HFS installation issues in z/OS.

Jack Yuan is a senior software engineer for IMS TM/OTMA at IBM’s Silicon Valley Lab.
To: Readers
From: Hot Topics Editors
Subject: Hot Topics Newsletter e-mail notification list

e-mail us now at newsletr@us.ibm.com to get your name on the list of people notified when a new issue of Hot Topics is available. Then, every six months, we’ll let you know right when the new issue hits the stands. All you have to do is nab a copy through the IBM Publications Center, and you’ll have the honor and bragging rights of being the first person on your block to be in-the-know about z/OS’s hottest topics!

ServerPac tip #23: Combining installation jobs.
You can use the block Select (SS) line command in the installation job list display to combine many of the ServerPac installation jobs. This can save time by letting more work run automatically when prior work was successful. For example, if there are a lot of jobs left to run late in the day, you can combine as many as possible and check the results in the morning.

ServerPac tip #24: Run GENSKEL.
It’s the easy way to get copies of all the jobs in a data set so you can save your changes, look at them later, or copy them if you need to repeat a task later (for example, on another system).

Tip # 23 & 24

Produced in the United States of America
8-2003
All Rights Reserved
The z/OS Hot Topics Newsletter is published twice yearly as a service to customers, providing articles of interest to the z/OS and OS/390 community.
The information in this Newsletter is presented as is and is based on the best knowledge of the authors. No warranty is provided (neither expressed nor implied).
IBM may not offer the products, features or services discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM representative for information on the products or services available in your area.
© AIX, BookManager, CICS, DB2, ESCON, IBM, Infoprint, Lotus, M Series, NetView, OS/390, OS/400, Parallel Sysplex, RACF, S/390, Tivoli, VTAM, WebSphere, xSeries, z/OS, and zSeries are registered trademarks of International Business Machines Corporation.
DB2 Universal Database, DFSMSdss, DFSMSShm, @server, e-business on demand, FICON, HiperSockets, IMS, Series, MVS, MVS/ESA, zSeries, Redbooks, SDSF, zArchitecture, and z/OS.e are trademarks of International Business Machines Corporation in the United States, other countries, or both.
Acrobat is a registered trademark of Adobe Systems Incorporated in the United States, other countries, or both.
Handspring and Treo are trademarks of Handspring, Inc.
InstallShield is a registered trademark and service mark of InstallShield Software Corporation in the United States, other countries, or both.
Intel is a trademark of Intel Corporation in the United States, other countries, or both.
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.
Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.
Palm is a trademark of Palm, Inc.
Red Hat is a registered trademark of Red Hat, Inc. in the United States, other countries, or both.
SuSE is a registered trademark of SuSE AG.
UNIX is a registered trademark of The Open Group in the United States and other countries.
W3C is a registered trademark of the Massachusetts Institute of Technology (MIT), European Research Consortium for Informatics and Mathematics (ERCIM), and Keio University (Keio).
Other company, product and service names may be trademarks or service marks of others.

OOPS! ISSUE 8
We spelled author Bob Rogers’ name incorrectly. Sorry, Bob!
64-bit virtual: Will you still need me, will you still feed me?
BY MAGDALEN LEUNG AND ELPIDA TZORTZATOS

Since z/OS V1.2, there has been a steady stream of basic 64-bit virtual exploitation by middleware and utility software programs that need large amounts of virtual storage for data processing. 64-bit virtual has unleashed the long-awaited need for virtual storage greater than 2GB. This is very good news for middleware and utility software because 64-bit virtual makes managing virtual storage a lot simpler when the application needs more than 2GB of virtual storage for its data. Sooner or later, there will be a 64-bit virtual program—middleware, utility software, or application—coming to a system near you! But don’t panic. You can handle it.

How much is too much?
With 64-bit virtual storage support, the maximum virtual addressability is up to 16 exabytes. With the evolution of hardware technology, newer machines are equipped with more and more real storage. But do you have a machine with 16 exabytes of real storage? Not likely! You can safely assume that real storage will continue to be managed by the operating system and monitored by utility software. (z/OS real and virtual storage management provides robust 64-bit virtual storage support and allows for much greater virtual storage addressability than the actual real storage size.) However, you still want to make sure that 64-bit virtual usage is not going overboard and impacting the rest of your operating system. It is only natural that new 64-bit virtual programs will want to use as much virtual storage as possible. This is where you can help.

How can you control 64-bit virtual usage?
There is a new SMFPRMxx parameter MEMLIMIT (64-bit virtual limit) that sets the system default limit of 64-bit virtual storage for each address space. The shipped default is zero. That is, no program can obtain 64-bit virtual storage. You can use the SETSMF command to change the system default MEMLIMIT dynamically. There is also the MEMLIMIT parameter on the JOB and EXEC JCL statements. But watch out! The JCL REGION parameter can dramatically affect virtual storage usage, even if you have set the MEMLIMIT system default. If REGION is set to zero, MEMLIMIT is interpreted as no limit. Now, that’s certainly something to examine carefully!

How do all these different ways of specifying MEMLIMIT work together to produce a final address space MEMLIMIT? Basically, the JOB statement MEMLIMIT value overrides the EXEC statement MEMLIMIT. If MEMLIMIT is not specified on JOB or EXEC statements, and REGION is zero, MEMLIMIT is interpreted as no limit. If REGION is not zero, the system uses the MEMLIMIT specified in SMFPRMxx. There is a final MEMLIMIT control point in the IEFUSI exit. You can use this exit to override the SMFPRMxx MEMLIMIT based on your overall system policy.

What is the right MEMLIMIT value for me?
This is one of those $64K questions with an expected answer of “It depends.” Before z/OS V1.2, you probably had plenty of opportunities to determine real storage utilization for key middleware like CICS, DB2 and others. You can probably assume that 64-bit virtual middleware and utility software programs will continue to manage virtual storage responsibly and provide customizable 64-bit virtual consumption limits or guidelines.

Depending on the middleware you run on a single z/OS image and your real storage configuration, you might want to start with a conservative MEMLIMIT value. Each individual system might have slightly different criteria on which to base a conservative MEMLIMIT value. If you set the system default MEMLIMIT too low, your users will let you know when one or more of their 64-bit virtual programs fail, either with return code 08 for IARV64 conditional GETSTOR request, or with a DC2 abend for IARV64 unconditional GETSTOR request. (Requests for IARV64 GETSTOR and CHANGEGUARD services fail when the operating system cannot obtain the requested 64-bit virtual storage because obtaining the storage would exceed the MEMLIMIT in effect for the address space.) However, 64-bit programs can use the JOB or EXEC statement to override the system default MEMLIMIT with their own best MEMLIMIT guesstimate.

Who’s your 64-bit runaway program?
What if every piece of 64-bit middleware treats itself to its heart’s desire of 64-bit virtual by specifying MEMLIMIT onits JOB and EXEC JCL statements? Use the IEFUSI exit to rein in those unruly offenders according to your system’s policies and guidelines. In addition, there are some utility software products that offer 64-bit virtual monitoring capability. The exact support might vary from product to product, but the expectation is that traditional monitoring products will show an address space using a large amount of 64-bit virtual. There is also a new SMF30MEM field in the SMF type 30 record to show the MEMLIMIT value used. You can use this in your postmortem analysis to pinpoint the 64-bit virtual culprit.

To be or not to be?
Before you plunge in and modify your programs to exploit 64-bit virtual, evaluate whether it makes sense to run them in AMODE64. For programs that need large data caches, migrating to AMODE64...