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C03

IDUG® 2006
North America

Planning Your Migration to Version 8

Improved planning for a smoother experience

Monday, May 8, 2006 • 04:00 p.m. – 05:10 p.m.

GoFurther



DB2® UDB for z/OS Version 8 (V8) has many new features. This presentation will discuss migrating to V8 and preparing to use the new functions. We assume that you know DB2 V8 function. Special thanks to Bob Perih, Citigroup and Joan Keemle, Deere and many others for their insights and presentations on migration.

We'll emphasize process and recommendations from many other customers, with pointers to more information. The content of this session will focus on the tasks of the person who installs DB2. Systems programmers and database administrators generally perform this task. The speaker has worked in DB2 development for the past quarter century, and continues working with the team building the install & migration process.

Session numbers (e.g. C12) in this presentation are from this conference or earlier conferences. Many are on the web (see slides 62 – 80).

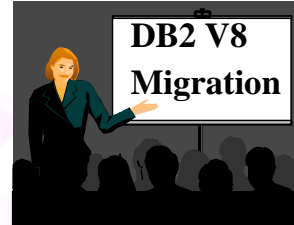
Presentation Topics

▪ **General Migration Considerations**

- ▶ Releases & Migration Paths
- ▶ Processes, Prerequisites, Keys

▪ **DB2 UDB for z/OS Version 8**

- ▶ New functions affecting migration
- ▶ Migration Specifics



▪ **Information Sources: Get latest from web**

- ▶ **Sessions ... B01, C01, B05, C06, B07, C10, C11, ...**
- ▶ **Web, Books, Redbooks, ...**

The primary audience for this presentation is the DBA or programmer who performs the migration to DB2 for z/OS V8. Coverage is at the parameter level and includes V8 parameters that affect implementation of new & improved function. These foils are adapted from the work of many others . Although this presentation touches upon the content of DB2 V8, it has a focus on the highlights and is not at all inclusive. The intent is to address those areas that have direct bearing on the task of migrating to DB2 V8.

This material is a compilation of information from the DB2 What's New? manual, the DB2 Installation Guide and the DB2 Program Directory, with usage & customer input added. It points out areas that have the most impact on the success of your migration. Please read manuals, the web & documentation, including the PSP bucket & information APARs for the latest information, plus sessions B01 on health checking, C10 & C11 on early experience.

To get the latest presentation, start at the Support page, click on Technical Presentations, put Miller in Additional Search terms and Sort by date – newest first.

Getting ready for V8:

Planning and Education

- ✓ Get needed education, books
 - ➔ Classes, conferences, web
 - ➔ Understand dates, V8 changes, Unicode, migration process, ...
- ✓ Resolve incompatible changes
- ✓ Determine new functions to be used
- ✓ Plan & Install prerequisite hardware & software
- ✓ Perform **Health check B01**:
availability, performance, storage, commit & copy frequency, BIND currency, ...



This is the outline of planning for a DB2 UDB for z/OS Version 8 migration. The most important step is being sure that you have all of the needed information. There are many good classes, ranging from a full transition class to conferences to specialized education for others at your site. There are many books, papers and presentations. Many of the presentations and books are on the web.

There are a substantial number of changes that can require changes in applications and databases. Get the information to the people who need it. Researching the prerequisite software for the function you will be using, then installing it can take time, especially if you are not current today.

Being ready to test and to manage the inevitable surprises is very important. This is an excellent time for a health check on availability, performance, storage, commit & copy frequency, BIND currency, ...

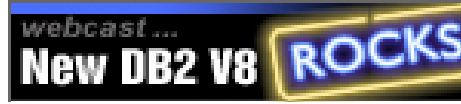
<ftp://ftp.software.ibm.com/software/data/db2zos/S1322rma.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/G11jc.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/G12jc.pdf>

Greatest Hits: DB2 UDB for z/OS V8 Migration

- ✓ High availability
- ✓ Scalability or very large database
- ✓ Java and the web
- ✓ Queries and data warehouses
- ✓ Migrating or porting applications
- ✓ Application packages



The greatest hits are the situations where I would recommend looking at V8 soon. For these situations, V8 offers significant improvements and without adding much effort. Some cases will reduce the work. Value and effort vary widely for different customers and most of the improvements fit more than one category, so this list is not ordered.

Greatest Hit 1: High availability

One of the biggest steps for database administrators in continuous availability is online schema evolution, with the ability to add partitions and make about 20 changes with ALTER. New backup and recovery utilities are useful for disaster recovery and will be the primary backup technique for some customers. Improvements in utilities include more online performance and better usability.

Greatest Hit 2: Scalability or very large databases

Separate partitioning and clustering allows two dimensional clustering with more effective IO. New index options provide more efficient access. The maximum number of partitions is raised to 4096. The availability and optimization improvements are critical for very large databases. The ability to use more memory, more effectively is key for scalability.

Greatest Hit 3: Java and the web

Improvements in the SQLJ and JDBC support, a new Java Universal Driver, enhanced Unicode support, integration with WebSphere and new XML functions make Java and web applications more robust and more productive.

Greatest Hit 4: Queries and data warehouses

Optimization changes provide the best performance improvement opportunities in V8. Faster response and reduced processing time come from improved optimization and better information for the optimizer. New database design options for indexes, clustering and materialized query tables provide more gains. Warehouses often need to have the new rotate partition capability.

Greatest Hit 5: Migrating or porting applications from other platforms

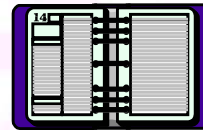
Many SQL enhancements provide better compatibility with the DB2 family and with the industry. If customers develop on Windows, Unix or Linux, and then move to z/OS, the process is much easier. Early customers reported success at porting applications.

Greatest Hit 6: Application packages: SAP, PeopleSoft, Siebel, etc. ...

About 50 improvements, including everything mentioned in the "Greatest Hits" section, are provided for most of the key vendor packages. SAP R/3 4.6 and PeopleSoft PeopleTools 8.45 are already certified for V8, less than four months after general availability, and more certifications are expected.

Have a Migration Plan

- Prepare to test & manage
- Migrate DB2 for System Programmer test
 - ▶ Check impacts & changes: incompatible changes, application programming, database administration, system administration, performance
- Migrate Test System to new version
 - ▶ Find problem areas, test
- Migrate Production Subsystems to V8
 - ▶ Manage the migration
 - ✓ Your short cut may be the longest way.



Information is on the web about DB2 for z/OS V8: manuals, Redbooks, presentations, papers, classes & conferences. Be sure to get Preventive Service Planning (PSP) information & review the applicable information. Get the complete list of APARs needed on V7. Plan to be more current on the new release.

Lots to learn: One step at a time is safer. It is also easier to tell what is causing an error or unexpected result if you limit the number of changes.

Use of some new programs or new features may require prerequisite levels of z/OS or other products. There is a Prerequisites section in the DB2 Program Directory that points these out by program / feature. Release migration is a good time to check the health of your system: copy & commit frequency, currency of BINDs, ...

References: <http://publib.boulder.ibm.com/epubs/pdf/dsnigj10.pdf>

<http://www.redbooks.ibm.com/redbooks/pdfs/sg246079.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/V8planmigrate.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/V8migrateprocess.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/S1322rma.pdf>

Common Challenges: DB2 for z/OS V8 Migration

- Code page check and correction
- Related product and tool support
 - Old COBOL or PL/I
- Cleaning up V8 incompatible changes
- Real and virtual storage
- Plan, monitor and manage performance

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These are the key items that every customer should check first, to see the most common items that slow down a migration to V8. We will discuss each of these points in detail on later slides:

- Checking and cleaning up code page issues, if present. DSNTIJP8 provides the information. Run it on every subsystem.
- Related product and tool support requires looking at the documentation, migrating from out-of-service products to the supported levels, and getting the correct releases and service installed. Talk with your vendors soon.
 - Old COBOL or PL/I is a common example of this situation. Compiles need to use current products.
- Cleaning up V8 incompatible changes takes time and a detailed understanding of your shop. Testing is needed.
- Real and virtual storage may improve a little or a lot. Planning is required.
- Plan and monitor performance, as yours can improve substantially or degrade on migration. Be ready to do the needed work.

Get the updated books

February 2006

- ✓ Program Directory
- ✓ Installation Guide
- ✓ Release Guide
- Data Sharing: Planning and Administration
- Application Programming Guide & Reference for JAVA™
- ✓ **Messages**
- ✓ **Codes**
- ✓ Internationalization Guide (Unicode)
- ✓ Administration Guide
- ✓ Utility Guide and Reference
- RACF Access Control Module Guide
- z/OS Managed System Infrastructure for Setup
- DB2 Customization Center User's Guide
- ...



For installation, you need many books. Some are optional, for example the data sharing book is not needed if you don't use data sharing. If you use data sharing, then part of the install process is in that book. The Java install process is in the Java book. If you use RACF access control, then you need the RACF Access Control Module Guide. If you use msys, then you need that book. You can get most of the books from the DB2 Library web page. The books were updated in April 2005, with some in August, so get the latest ones. Some of the Redbooks may be helpful. You may need books from the z/OS Library as well.

<http://www.ibm.com/software/data/db2/zos/v8books.html>

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/r6pdf/>

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/r6pdf/mvs.html>

DB2 for z/OS Version Availability Summary

Version	PID	Generally Available	Marketing Withdrawal	End of Service
V3	5685-DB2	Dec. 1993	February 2000	March 2001
V4	5695-DB2	Nov. 1995	Dec 1, 2000	Dec. 2001
V5	5655-DB2	June 1997	Dec. 31, 2001	Dec. 31, 2002
V6	5645-DB2	June 1999	June 30, 2002	June 30, 2005
V7	5675-DB2	Mar. 2001	1Q 2007 *	March 2008 *
V8	5625-DB2	Mar. 2004		
V9	5635-DB2	Beta 2006		

* Indicates projected date. Actual end of marketing or end of service date has not been announced yet. 8

All statements regarding the future direction and intent of IBM are subject to change or withdrawal without notice and represent goals and objectives only. This table summarizes the latest versions of DB2. As of March 2006, DB2 V7 has been generally available for five years. DB2 V8 has been generally available for two years. If you are currently running V7, then it's time to plan your migration to V8. I generally think of five years after general availability as the end of practical life for a DB2 release. Migration to V9 will be only from DB2 for z/OS V8. There will not be any ability to skip a version. There are a few customers still running older versions, but the end of service is past. In general, you can expect versions to be in service for five years and end of service to be announced a year in advance. There is also an extended service period of three years for an additional charge.

If you want to search for these products by version number, the PID number is useful. Most customers are currently running V7 in 1Q 2006, but the migration is running faster now. Our estimate or projection for end of marketing is 2Q 2006. End of service of Version 7 is projected as September 2007, consistent with end of service for all of the operating systems that support processors other than zSeries or System z9.

To see current DB2 availability notices, start at ibm.com/software/db2zos Click on Support, then on Product Life Cycle. ibm.com/software/data/db2/zos/support/plc/

z/OS Support Summary



	z9	z990	z890	z900	z800	G5/G6 Multiprise® 3000	End of Service	Coexists with	Ship Date
1.4	x	x	x	x	x	x	3/07	1.7	9/02
1.5	x	x	x	x	x	x	3/07	1.8	3/04
1.6	x	x	x	x	x		9/07*	1.8	9/04
1.7	x	x	x	x	x		9/08*	1.9	9/05*
1.8*	x	x	x	x	x		9/09*	1.10	9/06*

*Planned

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**z/OS.e - z800 and z890 only

z/OS 1.4 and 1.5 are no longer orderable

z/OS 1.4 exploitation remains orderable until December 2006

Only service-supported releases can coexist in the same sysplex

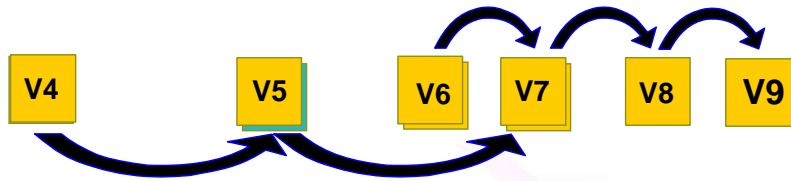
* All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

This chart notes the support for z/OS with various processors.

Note the z/OS end of service dates as well. End of service for z/OS 1.3 was March 2005. Check the latest information by going to the z/OS web page, then to Support and then to the z/OS, z/OS.e, and OS/390 marketing and service announce, availability, and withdrawal dates

http://www.ibm.com/servers/eserver/zseries/zos/support/zos_eos_dates.html

Migration Paths



Customers migrate directly to V7 now, then to V8

Includes fallback & Data Sharing Coexistence

V8 SPE PQ48486 required PK11129 for V9

What functions do you need? Where are you now?

When do you need it?

Migration, fallback and coexistence with the ability to skip a release from V5 to V7 allows many possibilities. Do not plan to skip other versions. V8 migration is only from V7. If you want to migrate from V5 or V6 to V8, then first migrate to V7 and stabilize there for three to six months, then take the next step. Plan to migrate to V9 only from V8 and to have z/OS V1.7 or later. Some items require z/OS 1.8.

For many customers, the decision is in the details and the timing. Consider where you are now for DB2 Version, z/OS and other software. What must migrate first?

Customers often need some specific functions. The timing of the need and the timing when a customer considers migration to a new release will often determine the choice.

Four step Migration process

- Test with New Install & Migrate
- Migrate to new release without new function (**COMPAT Mode**)
 - Apply Fallback SPE to all members, PQ48486
 - Start all members at SPE level
 - Start in V8 COMPAT
- **Enable New Function Mode**
- Then in **New Function Mode**



The process of migration will take four steps. Use a new install on a separate subsystem and practice migration on the separate subsystem. Test the function you want to use. This will ensure that you are ready to move forward.

Apply the fallback SPE PQ48486 on every member of each data sharing group and on all subsystems to migrate. Applying the SPE was required only for data sharing in prior versions, but is now required for all subsystems.

Migrate to the new release in Compatibility Mode (CM). You are using the new code but almost no new function.

The third step is Enabling New Function Mode (ENFM).

Finally, after all of the members of a data sharing group are running the new version, you can switch to New Function Mode (NFM).

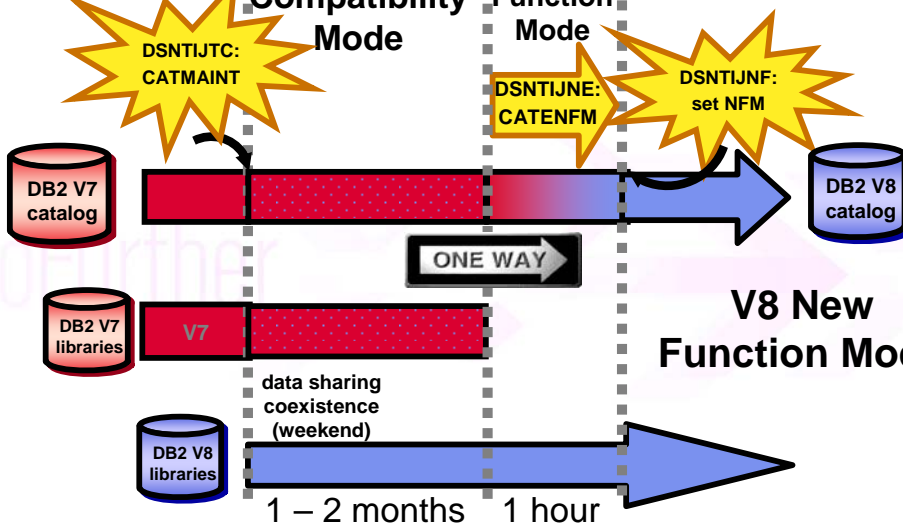
Overview of migration

V7 with
fallback SPE

V8
Compatibility
Mode

V8
Enabling
New
Function
Mode

V8 New
Function Mode

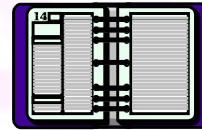


This is an overview of the migration process. There are two steps which modify the catalog, CATMAINT to change into Compatibility Mode (CM), and also CATENFM for Enabling New Function Mode (ENFM), which contains the major catalog changes to long names and Unicode, using a technique of an online (read only or shrlevel reference) reorg.

Keep the time for data sharing coexistence fairly short, such as over a weekend or one week. Compatibility mode will often be one or two months. Once you move to ENFM, you don't go back to CM or to V7. ENFM will generally be on the order of an hour (5 GB catalog size). Then you turn the switch and are taking advantage of New Function Mode, NFM.

Migration Strategy: Test and Production

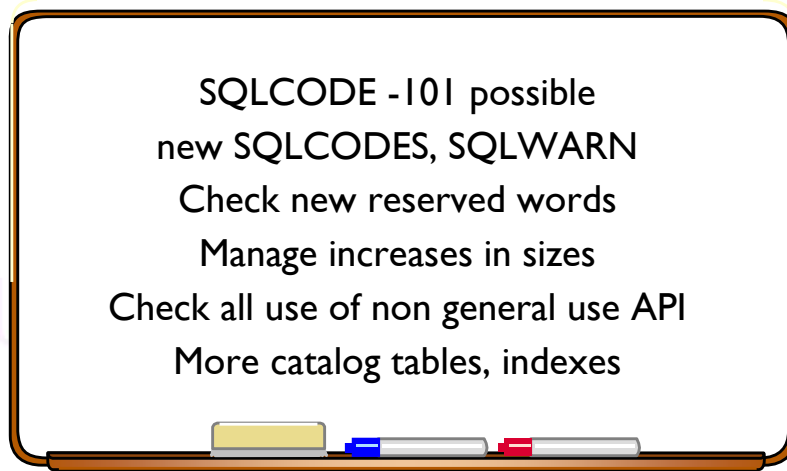
- Short time for data sharing coexistence
- One to two months for compatibility mode
 - ▶ Not able to use most new performance
- Short time for enabling new function mode
- Move to new function mode
 - ▶ Stage in new function
- Test to QA to Production
 - ▶ Better controls for not using new function
 - ▶ Still don't want long gap test to production
 - ▶ Vendor support may affect strategy, e.g. NFM certified
 - ▶ Improved granularity, stage by modes



In the past we have recommended a short time for data sharing coexistence, and that is still true. A short period for ENFM is also recommended highly. Support from vendors may affect the migration staging. One concern for compatibility mode is that most new performance improvements cannot be used, and some regression is possible, as always.

The timing for moving from test to QA to production has more options to consider. There are better controls for not using new function, but a long gap between test and production levels is not advisable. Now you have more granularity in the migration and can move mode by mode. Some customers are migrating both test and production to CM, then changing to NFM in a short time.

DB2 considerations for any migration



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Whenever you move from one release to another, there are some changes to manage. It is possible, but rare to find SQL which processed in the prior release that will not run on the new one. If you have users who test the boundaries, instead of reading the limits, then this is more common. Reserved words are handled in context when possible, but new reserved words can cause problems in SQL that worked on the prior release. Check for APARs.

There are always new SQLCODEs, and we still find a few applications that do not have tests for other cases. Additional complexity means that storage sizes increase in DB2 & application address spaces.

If you use an interface identified as a Product-Sensitive Programming Interface, it must be checked. If it's not in the books, then it's not an interface.

Unicode



C01 C02

- DB2 V7 has Unicode support. CCSIDs must be defined now (APAR PQ89018, PQ97373).
- DB2 V8 depends on Unicode support, parses in Unicode, even in compatibility mode. DB2 will not start without Unicode services.
- Check your SQL on catalog, instrumentation
- Some restrictions lifted, but incompatible order
 - ▶ Some range predicates may be affected
- Web & IDUG Solutions Journal

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Unicode support began with some Java use in V5, but was expanded a lot in V7. Making sure that CCSIDs are accurate became more important in V7, and APARs were added to require definition of EBCDIC and ASCII CCSIDs and to check emulator CCSIDs to provide a warning, PQ89018. PQ97373 allows multiple SPUFI plans and CCSIDs. In V8, the CCSIDs are crucial. Everyone uses Unicode. DB2 requires Unicode services and the needed conversions in order to start.

There are very substantial improvements to Unicode tables in V8, but there are some incompatible changes, such as the ordering of the rows. In some cases, the SQL will need to be changed, for example range predicates like `columna > 'A'` and `columna < '9'`.

<http://www.ibm.com/software/data/db2/zos/pdf/ccmstr.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/unicodep1.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/unicodep2.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/OA9.pdf>

Install Unicode



UNI=xx in IEASYSxx at IPL

SET UNI=xx after IPL DISPLAY UNI

See CUNISM6 in SYS1.SAMPLIB

DB2 Internationalization Guide

Support for Unicode: Using Conversion Services

Information APARs II13048 and II13049

Default creates 39 MB Unicode image

- Resolved in z/OS 1.7

The default with APAR OA04069, if you don't have a customized Unicode image, is very large, about 39 MB of fixed real storage, as reported by customers, so you need to configure the correct conversions. Then the storage is likely to be closer to 5 MB. Check the current status of the conversion environment. Enter DISPLAY UNI,ALL

To get information on the size of the active image loaded to the conversion environment, use the DISPLAY UNI command. Enter DISPLAY UNI,STORAGE

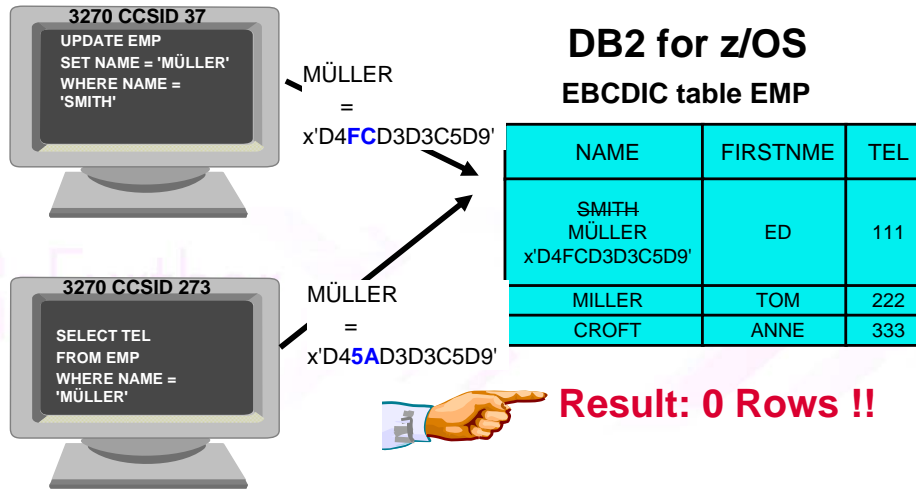
Support for Unicode: Using Conversion Services, SA22-7649.

<http://publibz.boulder.ibm.com/epubs/pdf/iea2un40.pdf>

For additional information on setup, read Information APARs II13048, and II13049, and go to:

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/r6pdf/>

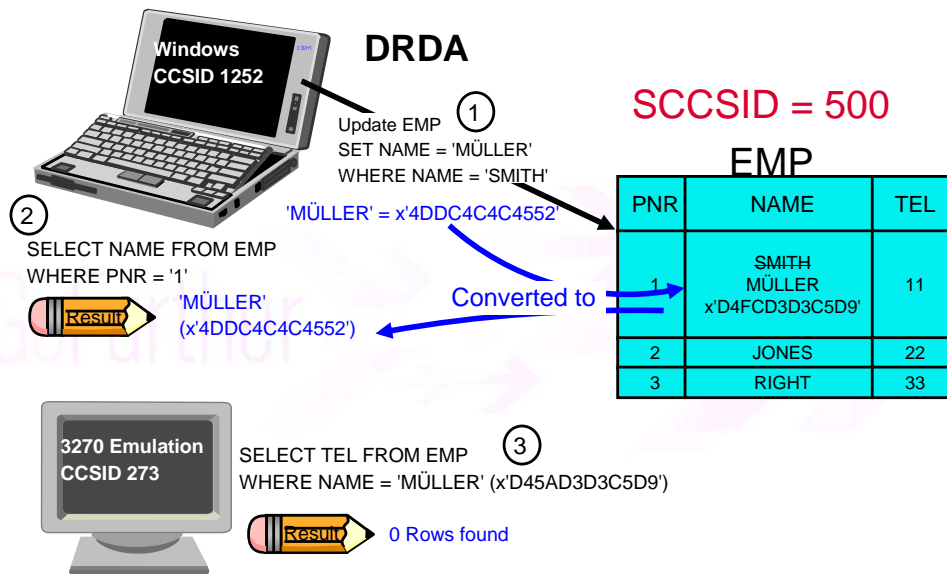
How characters are stored C01, C02



This page shows the type of problem that was possible long before DB2 existed. Two terminals with different encodings for the characters are used. One inserts or updates data into a file or table. An inquiry using the other terminal and searches for the name, but the information is not found, since the character has a different representation.

The characters that are usually problematical are the accented characters or special characters, such as brackets and braces.

When does conversion occur?

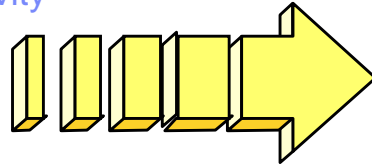


With distributed processing in DB2 V2.3, another option was provided, with customers specifying a CCSID for the DB2 subsystem. When the data came from a different encoding, such as the ASCII from Unix or Windows, then the characters were converted to the CCSID of the DB2 subsystem.

Additional options were added in DB2 V5, V7 and V8 for new encodings and specifications of characters. Languages added the ability to handle Unicode.

We also added several changes to be sure that CCSIDs are correct, with queries in the premigration jobs, install changes, and checking in SPUFI (PQ89018 and PQ97373).

Premigration Activity



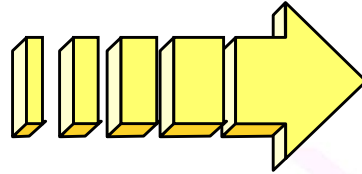
- ✓ Install prerequisite software & service
- ✓ Adjust for incompatibilities (DSNTIJPM)
- ✓ Identify unsupported objects
- ✓ Check new and changed parameters
- ✓ Save critical performance & access path info.
- ✓ Take backup copies

Before you start the SMP/E process you will want to look into the disk storage requirements.

Be sure you have installed all of the proper maintenance on DB2 V7 BEFORE you start to migrate, especially the APARs for migration and toleration of fallback from Version 8 (PQ48486). Get the list of APARs or PTFs from that APAR or from the Info APAR.

The following foils and notes address each one of these points in more detail. Allow for plenty of time in your schedule to address these items. Your migration will run much more smoothly if you do.

Premigration Activity ...

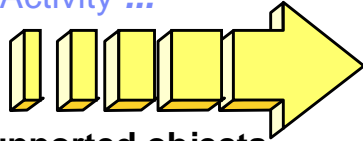


- Find problems with incompatibilities
 - ▶ It is important to look at these now because many have actions that you must address before migrating.
 - ▶ Get the complete list from the Installation Guide (Get the latest from the web).
 - ▶ Use new V7 job: DSNTIJP8 APAR PQ84421

Read these pages of the DB2 Installation Guide carefully. Many items need to be addressed before migration. Check the items several times, including just before running CATMAINT.

General REBIND advice: When to REBIND depends upon complexity of the SQL, how well tuned the statements are, and your experiences with improvements & regression. For simple cases, a rule of thumb is that the statistics need to change by 10% or 20% or cross a key threshold to make a difference in the access path.

Real Time Statistics address when to run REORG, RUNSTATS & COPY. Read Administration Guide. Some rules of thumb & threshold techniques discussed in the book may be useful for REBINDs. One of the best times for RUNSTATS & REBIND is after REORG. If you update statistics & the differences are large or cross a boundary, then REBIND is more likely to make a difference. Statistics history tables may help in the decision. After REBIND, check access path & processing estimates.



Jobs
DSNTIJPM
DSNTIJP8



▪ **Identify unsupported objects**

Adjust **before** migrating

- Check on CCSIDs: wrong or more than one
- Deprecated function: selective partition locking, private protocol function
- Data capture on DB2 catalog tables (turn back on after migration)
- If DSNWZPR used, switch to WLM-managed DSNWZP
- V7 sample programs used in V8 CM
- Truncated limit key in indexes
- Type 1 indexes (final call)

This page contains items with the highest impact to the success of your migration. Job DSNTIJPM is provided to help you identify unsupported objects. If you want to prepare early, then use job DSNTIJP8 on V7. It queries the catalog and identifies objects that will cause a migration failure. This job generates SQL ALTER statements and REBUILD index statements that you can use to modify the objects. You can also run your own catalog queries. Example queries are in the Install Guide, or in member DSNTESQ of your SDSNSAMP library.

Many of the key checks are performed for you by running the DSNTIJPM job. It includes checks for various CCSID problems, but there can be others, such as using code page 500 for DB2, but other code pages in emulators. Check on work stations and emulator software for other CCSIDs. There are checks for selective partition locking, data capture on DB2 catalog tables, other modules and samples. The job is also provided as DSNTIJP8 in Version 7 libraries, if you have the service (PQ84421). In Compatibility Mode, the V7 samples are used, since V8 new function will not work. DB2 still has a check for type 1 indexes, since V8 migration fails if any are found.

Primary Version 8 incompatible changes

- Parse SQL in Unicode, correct CCSIDs crucial
- Invalid host variable declaration for PREPARE
- No COMPJAVA, use JIT
- CREATE, ALTER PROCEDURE WLM ONLY
- Java Universal Client, SQLJ process
- Rebind of very old plans (pre V2.3 DBRMs)
- DB2 command authorization, RACF 1.6 DSNR change
- DSNHDECP & DSNHMCID in SDSNEXIT
- Index padding controlled by subsystem parameter
- REORG SORTDATA & SORTKEYS default
- REORG Implicit clustering index
- Packages required for all statements ...
- CICS dynamic plan exit gets Unicode program names

V8 migration process is changed substantially & tightened to remove holes that customers fall into. The migration SPE must be applied & started (on each member in data sharing) before migration. A process that allows the new release to run without most new function, called COMPAT or compatibility mode, can help control to allow fallback.

The new version has new incompatible changes:

Host variable declarations for PREPARE and EXECUTE IMMEDIATE must declare the correct length. V7 made this change, then removed it in PQ50494. Specify a valid length for host variables used with PREPARE.

Only Java JIT compiler will be supported. The Java book is the location of the installation information for Java.

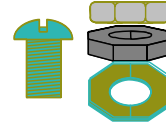
While stored procedures created earlier will run, creating or altering a stored procedure requires WLM environment.

DB2 command authorization is changed. GRANT or PERMIT access for signed on consoles or SDSF use of operator commands.

Install Prerequisite Software

- Prerequisites and Functional Needs

- ✓ All products need to be at proper maintenance level (prior DB2 release too)
 - ◆ Migration & Fallback SPE APAR PQ48486
 - ◆ Ensure that you apply all hiper APARS, PE fixes
 - ◆ Use the DB2 Program Directory, the Installation Guide, PSP (preventative service planning), web & Info APAR II13695

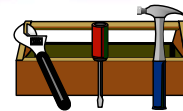


- ◆ Other software ...Talk to your Vendors



- ◆ z/OS R3 R4 R5 R6 R7 R8

- ◆ Unicode Check CCSIDs, emulators
- ◆ Job DSNTIJPM or DSNTIJP8



You need to know what functions will be used first. Many functions have additional prerequisites. Read the section of Release Guide carefully to see if you need to upgrade other software. The most successful policy is to keep software at similar levels. z/OS should be current & in service. Some functions need later releases. Note the need for Unicode services. Check Info APARs II13048 & II13049 for Unicode, plus the DB2 Internationalization Guide and z/OS Unicode Services book.

IBM & other vendor software must be checked for levels required & needed for the function you want. Some APARs require vendor changes. Contact your vendors.

Program Directory:

<http://publibfp.boulder.ibm.com/epubs/pdf/i1085663.pdf>

DB2 for z/OS V8 Recent Function

- **Cross loader with LOBs**
- **Built in functions ASCII, TIMESTAMPDIFF**
- **DSN1COPY with 1000 OBIDs**
- now { • **QMF with multirow fetch**
- **Online Check Index**
- **z/OS 1.7 up to 7257 extents**
- **LOAD, UNLOAD with LOBs**
- soon • **IBM System z9 Integrated Information Processor (IBM zIIP)**

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- **Cross loader with LOBs V7 V8: PQ90263**
- **Built in functions ASCII, TIMESTAMPDIFF V8: PQ95795**
- **DSN1COPY with 1000 OBIDs V7 V8: PK05758**
- **QMF with multirow fetch PQ99482**
- **Online Check Index V8: PQ92749 & PQ96956**
- **z/OS 1.7 up to 7257 extents V7 V8 PK07590 PK10594**
- **LOAD, UNLOAD with LOBs V7 V8: PK22910**
- **zIIP PK18454, PK19920, PK19921 open, ...**

IBM System z9 Integrated Information Processor (zIIP)

- New specialty engine for the System z9 mainframe designed to help:
 - **Customers integrate data across the enterprise**
 - **Improve resource optimization and lower the cost of ownership for eligible data serving workloads**
- z/OS manages & directs work between the general purpose processor and the zIIP
 - **Number of zIIPs per IBM System z9 not to exceed number of standard processors**
 - **No changes anticipated to DB2 applications**
 - **No IBM software charges on the zIIP – consistent with other specialty engines**
- DB2 for z/OS V8 first IBM exploiter of zIIP
 - **System z9 EC or z9 BC**
 - **z/OS 1.6 or later (with PTFs)**
 - **DB2 UDB for z/OS V8 (with APARs PK18454, PK19920, PK19921)**



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The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP. Not all of this work will be run on zIIP. z/OS will direct the work between the general processor and the zIIP. The zIIP is designed so a software program can work with z/OS to dispatch workloads to the zIIP with no anticipated changes to the application – only changes in z/OS and DB2.

IBM DB2 for z/OS version 8 will be the first IBM software able to take advantage of the zIIP. Initially, the following workloads can benefit:

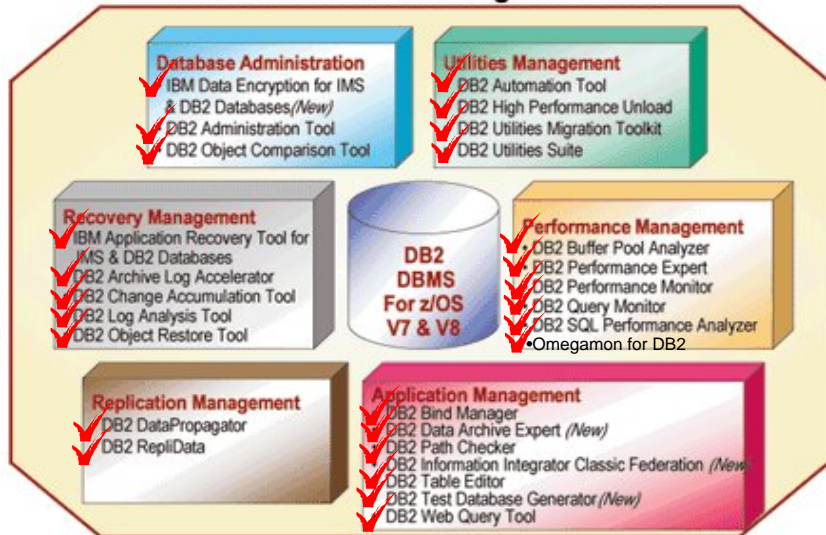
- SQL processing of DRDA network-connected applications over TCP/IP: These DRDA applications include ERP (e.g. SAP), CRM (Siebel), or business intelligence and are expected to provide the primary benefit to customers. Stored procedures and UDFs run under TCBs, so they are not generally eligible, except for the call, commit and result set processing. V9 remote native SQL Procedure Language is eligible for zIIP processing.
- BI application query processing utilizing DB2 star-schema parallel query capabilities; and functions of specified DB2 utilities that perform index maintenance structures.

For more, see <http://www.ibm.com/press/us/en/pressrelease/19157.wss>

IBM Tools for DB2

IBM z/OS DB2 Data Management Tools

✓ V8
Ready
June
2004



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The check marks indicate tools which were ready for DB2 UDB for z/OS by June 2004 – all of them. With the exception of DB2 RepliData, ALL of these tools exploit, don't just tolerate new DB2 V8 function. See the tools web site for details and planning information. Click on Support to see exactly which releases and PTFs are needed for V8.

<http://www.ibm.com/software/data/db2imstools/>

Fundamental to our tools strategy is to be able to extend and exploit the data base. To that end all of our tools exploit the features of DB2 V8 immediately at GA time. Our long term goal is to create tools that provide expert advice and automatic management features for DB2 to enable DB2 environments on all platforms to be easier to manage, require less administrative effort and less expertise to get outstanding performance and results.

Tools are a long term and strategic initiative for IBM. We have increased our investment every year since we started in 2000. This year is no exception and we will be releasing new tools, release, versions and features every quarter, even as the portfolio is broadened. Candle tools are ready for V8.

Getting ready for V8



- Migrate to DB2 for z/OS V7
- Migrate to z/OS 1.4 or later
 - WLM goal mode required
 - DB2 requires z/OS Unicode services
 - Some functions need z/OS V1R5, R6, R7
- zSeries, z/Architecture 64 bit mode
- Migrate to IBM COBOL V3.4 PL/I V3.4
- IMS V9, V8, V7, CICS TS V3, V2.3
- Details in Program Directory

Migration is only from DB2 V7, so migrate to DB2 V7.

When you migrate to z/OS 1.3 or later, WLM compatibility mode is not supported. Some of the function will require later versions, so moving to 1.4 will be better for many customers. End of service for 1.3 was March 2005, and you need to be current, so migrate to 1.4 or later, depending upon the functions you need.

This is a 64-bit virtual application, so the bi-modal accommodation that allows z/OS on zSeries to run in 31 bit mode will not be able to run DB2 for z/OS V8.

Old COBOL compilers (OS/VS COBOL & VS COBOL II) will not be able to be used with the precompiler. Migrate to current IBM Enterprise COBOL compilers. Old COBOL load modules continue to run (under LE for support). COBOL V2 is now out of support, as is Enterprise COBOL V3R1. End of support for Enterprise COBOL and PL/I V3R2 was October 2005.

Get current software for other products, including IMS and CICS. I recommend CICS V3.

Old COBOL?

- ✓ Understand the options DB2 V8 CICS V3
 - ➔ Compiler and Run-Time Migration Guide
 - ➔ No compiles OS/VS COBOL or VS COBOL II CICS V3 also
 - ➔ Run Old COBOL modules
- ✓ Set strategy & plan for Enterprise COBOL V3.4
 - ➔ Use V7 precompiler?, V8 NEWFUN(NO)?
- ✓ Plan staging and Migrate

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DB2 V8 supports Enterprise COBOL V3.2, V3.3, or later. Other compilers are no longer supported. OS/VS COBOL has been out of support since 1994. VS COBOL II support ended in 2001. Only LE runtime is supported. End of support for Enterprise COBOL V3.2 was October 2005, so your target should be V3.4

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/cobmvs.html>

The key resource is the COBOL Migration Guide, GC27-1409. Here is where to get it from the web:

<http://www.ibm.com/software/awdtools/cobol/zos/library/>

<http://publibfp.boulder.ibm.com/epubs/pdf/igy3mg10.pdf>

Key questions and guidance are in the first chapter. Most customers will stage migration. Do you have Enterprise COBOL V3.2 or V3.3 now? Is that the release developers use? Old load modules are not a problem with V8. Precompiling is the challenge, so if new development and changes to old programs switch to the new compiler, then that is a possible migration strategy.

DB2 generates some COBOL code that we expect to fail on the old compilers, although we have not tested. DB2 uses Unicode in V8, and the old compilers do not handle it, or some other constants. Programs that use the V8 precompiler require Enterprise COBOL V3.2 or V3.3. V8 DB2 coprocessor also requires APAR PQ83744 to allow new V8 function.

http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21166881&loc=en_US&cs=utf-8&lang=en

Language Environment

What's New

Release History

About Language Environment

Migration

Assistance Center

FAQ

Library

Announcements

Conferences

Links

Contact Language Environment

COBOL on the z/OS, OS/390®, MVS, and VM Platforms

Product Name	PID#	Withdrawn from Marketing	Withdrawn from Service
OS/VS COBOL V1.2.4	5740-CB1 5740-LM1	June 1992 June 1992	June 1994 June 1994
VS COBOL II V1.3.x	5668-958 5688-022 5688-023	March 1993 March 1993 March 1993	June 1996 June 1996 June 1996
VS COBOL II V1.4.0	5668-958 5688-022 5688-023	June 1997 June 1997 June 1997	March 2001 March 2001 March 2001
COBOL/370™ 1.1	5688-197	October 1995	September 1997
COBOL for MVS & VM V1R2	5688-197	September 2000	December 2001
COBOL for OS/390 & VM V2R1	5648-A25	September 2000	December 2004 (OS/390)
COBOL for OS/390 & VM V2R2	5648-A25	December 2002	December 2004 (OS/390)
Enterprise COBOL for z/OS & OS/390 V3R1	5655-G53	September 2002	April 2004
Enterprise COBOL for z/OS & OS/390 V3R2	5655-G53	-	October 2005
Enterprise COBOL for z/OS V3R3	5655-G53	-	-

This slide shows the history of COBOL compilers, with the dates they are withdrawn from service. See the following URL to get the current information.

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/cobmvs.html>

Note the number of different products, as a number of releases are skipped to fit on one page.

IBM Problem Determination Suite

- Set of tools: Fault Analyzer, File Manager, Debug, Application Monitor, Workload Simulator
 - Affordably priced
 - Flexible terms and conditions
 - Offer wide array of key features and functions
 - Can enhance the Application Development Lifecycle
 - Opportunity for increased user productivity
 - Utility to upgrade OS/VS COBOL to supported COBOL
 - Use latest IBM processor technology

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Fault Analyzer for z/OS (FA)

Helps you rapidly pinpoint cause of failed application (abends)

File Manager for z/OS (FM)

Data management tool supporting key file structures like VSAM, DB2, and IMS

Debug Tool for z/OS (DT)

Debug Tool Utilities & Advanced Functions for z/OS (DTU)

Source code debugging to improve development productivity

[Utility to upgrade old OS/VS COBOL to supported levels of COBOL](#)

Application Monitor for z/OS (AM)

Helps IT (application programmers) isolate the cause of online and batch application performance bottlenecks with ability to drill down to source

Workload Simulator for OS/390 and z/OS (WS)

Application stress and regression testing

For more information on **z/OS Problem Determination and Deployment Tools**

[**www.ibm.com/software/awdtools/deployment**](http://www.ibm.com/software/awdtools/deployment)

Old PL/I?

- ✓ Understand the options
 - ➔ Compiler and Run-Time Migration Guide
 - ➔ Run Old PL/I modules
- ✓ Set strategy & plan for Enterprise PL/I V3.4
 - ➔ Use V7 precompiler?, V8 NEWFUN(NO)?
- ✓ Plan staging and Migrate

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DB2 UDB for z/OS V8 supports only current PL/I compilers.

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/plimvs.html>

The Program Directory lists compilers you can use for **PL/I**:

- IBM® Enterprise PL/I for z/OS and OS/390® V3R2, R3 & R4 (5655-H31)
- IBM PL/I for MVS™ & VM V1R1.1 (5688-235) is in service, but very old (1995) and would not be a good choice to use for new function.
- Use of DB2 Precompiler Services requires the DB2 Coprocessor provided with IBM Enterprise PL/I for z/OS V3R2 and APAR PQ84513 or later releases.

Version 2 and V3R1 PL/I are out of service, as well as the older OS PL/I V2.3

The key resource is the Enterprise PL/I for z/OS Compiler and Run-Time

Migration Guide *Version 3 Release 3*, GC27-1458-02. Get it from the web:

<http://www.ibm.com/software/awdtools/pli/plimvs/support/>

<http://publibfp.boulder.ibm.com/epubs/pdf/ibm3m101.pdf>

There are some basic choices to make. Key questions and guidance are in the first chapter. Most customers will stage migration to new compilers to improve programmer productivity and avoid migration costs. Do you have Enterprise PL/I V3.2 or V3.3 now? Is that the release developers use? Old load modules are not a problem with V8. Precompiling is the challenge, so if new development and changes to old programs switch to the new compiler, this migration strategy improves costs and productivity.

http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21191789&loc=en_US&cs=utf-8&lang=en

Home Products Services & solutions Support & downloads My account				
Products > Servers > Mainframe Servers > z/OS >				
Language Environment				
PL/I on the z/OS, OS/390, MVS, and VM Platforms				
What's New				
Release History				
About Language Environment				
Migration				
Assistance Center				
FAQ				
Library				
Announcements				
Conferences				
Links				
Contact Language Environment				
	Product Name	PID#	Withdrawn from Marketing	Withdrawn from Service
	OS PL/I V1.5	5743-PL1 5734-LM4	December 1994 December 1994	December 1995 December 1995
	PL/I Transient Library	5734-LM5	March 1998	April 2004
	OS PL/I V2.3	5668-909 5668-910 5668-911	September 2000 September 2000 September 2000	December 2003 December 2003 December 2003
	PL/I for MVS & VM V1R1	5688-235	-	-
	VisualAge PL/I for OS/390 V2R2	5655-B22	March 2002	August 2003
	Enterprise PL/I for z/OS Version 3	5655-H31	-	-

This slide shows the history of PL/I compilers, with the dates they are withdrawn from service. See the following URL to get the current information.

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/plimvs.html>

Note the number of different products, as a number of releases are skipped to fit on one page.

DFSORT and DB2 UDB for z/OS Utilities Suite V8

- V8 removes prerequisite for external sort product
- V8 only uses DFSORT: SORT, MERGE functions only
- Improves reliability, performance and handles sort for 32K page
- DFSORT code is part of a standard z/OS install
- DB2 UDB for z/OS Utilities Suite has a license to use DFSORT when invoked by the utilities
- Must have access to DFSORT R14 plus APAR PQ68263 applied. See Info APAR II14047
- Must update DB2 space statistics for sort space

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The requirement for an external sort package has been removed. That is to say you do not need a DFSORT license for use by DB2 for z/OS Utilities Suite Version 8. The base DB2 for z/OS has never needed sort. If you use DFSORT for other purposes, then you do need a DFSORT license. You must update the DB2 space statistics to accurately reflect the data volumes in order for DFSORT to accurately allocate space. This support was delivered by [APAR PQ68263 \(PTF UQ90054\)](#) on RSU 0312. In fact, with the delivery of [APAR PK04076 \(UK03983\)](#), MSGDSNU1640I will be issued when the utility is unable to locate DFSORT code at APAR PQ68263 maintenance level. So DFSORT is mandatory and you have to use it for the utilities. However, there is good news. You already have DFSORT installed. You may not be using it, but it is there. DFSORT is always shipped and installed with z/OS. However, no license is required for the DB2 utilities to use DFSORT. The only action a customer must take is to add the DFSORT load libraries to link list after the OEM sort libraries or add a steplib/joblib to the DB2 utilities batch JCL. **DB2 for z/OS Version 8 has a license to use DFSORT** so the customer does not need a license for any external sort product. Again, MSGDSNU1640I will be issued when the utility is unable to locate DFSORT code. However, no non-DB2 task can use DFSORT without being licensed. Use of DFSORT other than by DB2 would require a license. Maintenance for DFSORT is shipped with z/OS. If a customer has problems with DB2's use of DFSORT, they would open an ETR with DB2 Level 2 Support no different that they would do today for any other DB2 related issue. The DB2 Version 8 requirement for DFSORT R14 or above is described in the following publications: [URL for informational APAR II14047 describing DB2's use of DFSORT](#)

DB2 Version 8 Installation Guide (GC18-7418) (All V8 manuals can be found at <http://www.ibm.com/software/data/db2/zos/v8books.html>)

DB2 UDB for z/OS Version 8: Everything You Wanted to Know... and More (SG24-6079) ([Download from IBM RedBook web site](#)) [DB2 v8 Program Directory](#)

<http://www.elink.ibmink.ibm.com/public/applications/publications/cgibin/pbi.cgi?CTY=US&FNC=SRX&PBL=GI10-8566-03#>

DFSORT and DB2 UDB for z/OS Utilities Suite V8 ...

- If DFSORT installed as primary sort package and multiple versions of DFSORT exist, place DFSORT R14 plus APAR PQ68263 first in system search order.
- If DFSORT NOT installed as primary sort package, DFSORT R14 plus APAR PQ68263 must be accessible via
 - DFSORT SORTLPA library added to LPALST and SICELINK library added to LNKLST
 - DFSORT libraries SICELINK and SORTLPA added to LNKLST
 - DFSORT libraries SICELINK and SORTLPA added to STEPLIB DD
 - DFSORT modules in private library equivalent to one of the above
- New users of DFSORT should not use defaults. Set global options SIZE=MAX, TMAXLIM=16M, DSA=32M up to 128M...
- Use following link for further tuning advice:
<http://www.storage.ibm.com/software/sort/mvs/tuning/online/srtmldi.html>

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If DFSORT installed as primary sort package and multiple versions of DFSORT exist, place DFSORT R14 plus APAR PQ68263 first in system search order.

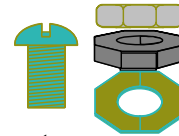
If DFSORT NOT installed as primary sort package, DFSORT R14 plus APAR PQ68263 must be accessible via

- DFSORT SORTLPA library is added to the LPALST and SICELINK library is added to the LNKLST, or
- DFSORT libraries SICELINK and SORTLPA, in that order, are added to the LNKLST, or
- DFSORT libraries SICELINK and SORTLPA, in that order, are added to the JOBLIB or STEPLIB DD statement, or
- DFSORT modules are in a private library that is equivalent to one of the above configurations.

New users of DFSORT should not run with defaults. Set global options like SIZE=MAX, TMAXLIM=16M and DSA=32M up to 128M... Use the following link for further tuning advice:

<http://www.storage.ibm.com/software/sort/mvs/tuning/online/srtmldi.html>

Install Prerequisite Software



- **Functional Requirements for identified features and functions e.g. DB2 Connect, clients**

- ✓ See What's New in DB2? And Release Guide
- ✓ Program Directory for Details

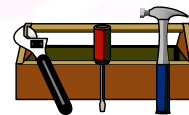
- **Service Level: IBM Consolidated Service Test**



- **Plan for more frequent service**

- ✓ More current releases = more frequent
- ✓ Refresh service level quarterly

- **Prepare to manage performance**



IBM and other vendor software must be checked for levels required and needed for the function you want. Some APARs require vendor changes. Plan to use V8.1.5 (fixpak 5) or later for DB2 Connect. If you want the DRDA encryption support, then you need V8.2 (fixpak 7A) or later. Version 7.2 end of service was September 2004 and then extended for customers moving to V8. While DB2 V8 works with DB2 Connect V7.2 (fixpak 10, 11 or 12), most of the improvements only deliver with V8.1.4 or fixpak 4 or later. I recommend adding the fixes from fixpak 5 at a minimum. Also see the web:

ibm.com/software/data/db2/db2connect/

<http://www.ibm.com/software/data/db2/udb/support/downloadv8.html>

Use IBM Consolidated Service Test levels to help provide a well tested set of products at a recommended service level.

ibm.com/servers/eserver/zseries/zos/servicetst/

Customers who are relatively current on service encounter fewer problems overall. Refreshing the service level each quarter makes it easier to avoid encountering old problems.

DB2 Connect Version 8.2 Fixpak 10 now

- ✓ Performance & Scalability
- ✓ Improved Application Availability
- ✓ Innovative manageability
- ✓ Programmer productivity



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DB2 Connect improvements are noted in announcements and in the What's New in DB2 UDB Version 8? book.

<http://www.ibm.com/software/data/db2/db2connect/whatsnewv8.html>

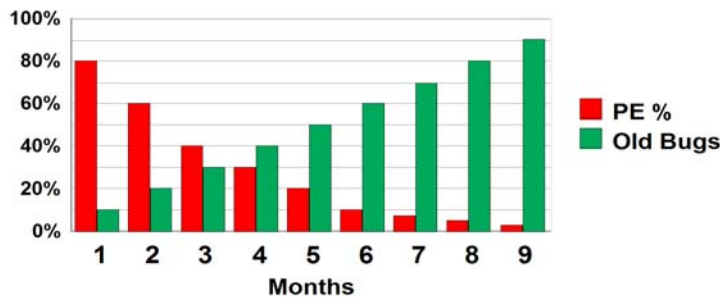
Plan to use V8.2 FP10 or later for DB2 Connect. If you want the DRDA encryption support, then you need V8.2 (fixpak 9 or 8 recommended, minimum 7A, or later). The minimum to have the performance and function changes matching DB2 UDB for z/OS V8 would be fixpak 4 (but 5 is better). Version 7.2 end of service was September 2004. While DB2 V8 works for some customers with DB2 Connect V7.2 (fixpak 11, 12, 13 or 14), the stored procedures, Java and most of the improvements only deliver with V8.1.4 or fixpak 4 or later. I recommend adding the fixes from fixpak 5 at an absolute minimum and recommend fixpak 10 if you are not there. Also see the web:

<http://www.ibm.com/software/data/db2/db2connect/>

<http://www.ibm.com/software/data/db2/udb/support/downloadv8.html>

How current should we be?

- Stay reasonably current with DB2 releases & fixes
 - V7 & V8 migration help improvements, APARs
- Balance for severities. Use Consolidated Service Test.
 - ▶ Potential PTF in Error or PE: Enhanced HoldData
 - ▶ Problems encountered instead of avoided
 - ▶ Business constraints and work load



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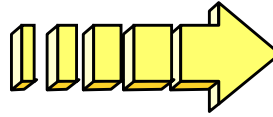
Choosing service timing requires judgement, not simple rules. The best practice for service means an understanding of your business drivers and constraints. These scales are not the same. Timing for moving preventive service into production is a careful balance between potential problems caused by PTFs containing an error (PEs) & potential problems avoided by applying the maintenance sooner. About 70% of PEs are found within four months after the PTF is closed. Currently, about 6 PEs are found every month across all versions. Green bars reflect the percentage of PEs yet to be found. Systems programming work load & availability of windows for installing service can affect timing.

I recommend upgrading service levels four times a year. Use current CST recommended service level, all service plus a two to four month later level for hipers & PE fixes. Stage that level through development systems & production. Match your levels with CST, across operating system & key subsystems. Enhanced HoldData provides a much faster way to discover missing hipers and PEs without fixes.

<http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>

<http://service.boulder.ibm.com/390holddata/390holddata.html>

I01, B02, G03, B07, B08,
I08, G09, G10, H10, J10,
J11, S08, S12, H13, web



**Prepare to
Manage
Performance**

- Save accounting reports
- Save critical access paths
 - ▶ Be sure you have **PLAN_TABLE** access paths & **DSN_STATEMNT_TABLE** & **DSN_FUNCTION_TABLE** for critical applications (or Visual Explain reports).
 - ▶ Run **EXPLAIN** on queries before migrating.
 - ▶ Add new columns to **PLAN_TABLE**
- Differentiate by plans & packages

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Save critical access paths & accounting data! Changes can cause unwanted access path changes. Identify important queries, plans & packages. Be sure plan tables contain access paths & costs. ALTER current plan tables to add new columns. EXPLAIN REBIND may change access paths, so extract plans & run EXPLAIN under a different application or program name.

Keep accounting reports for crucial queries & applications. If you have a problem & send in long accounting reports & explain data, we find the issue quickly. If you don't have data, then we guess.

Monitoring & managing are more difficult with few plans. Never ending threads & plan reuse accumulate EDMPOOL & working storage. Each COMMIT needs package accounting. Recycle threads. Finding unused packages & cleaning up mistakes are difficult unless ownership is known. Performance monitoring may require analyzing everything in a CICS region instead of just one plan. Plan is a required short name. Package name is optional, long, multipart and not always easy to find. Best practice is to differentiate by plan within a CICS region, having at least 5 to 20 plans within a region. You can work faster & make changes on a more granular basis.

Performance Regression

Expect some cpu performance regression

- ✓ 64 bit DBM1 virtual storage constraint relief
- ✓ Long names, long index keys
- ✓ Longer and more complex SQL statements
- ✓ Unicode catalog & SQL

No change in I/O time

→ Plan to take advantage of V8 improvements

Page fix, REBIND, multirow fetch & insert, ...

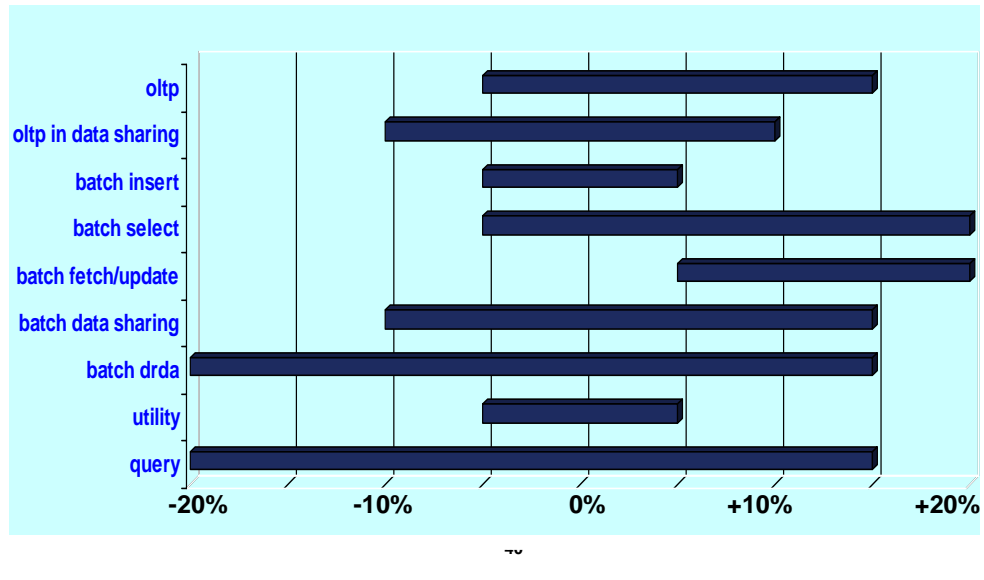
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For applications not taking any advantage of V8 performance enhancements, some CPU time increase is unavoidable to support a dramatic improvement in user productivity, availability, scalability, portability, family consistency.

Taking advantage of the V8 performance improvements is very important to avoid regressions and to offset them.

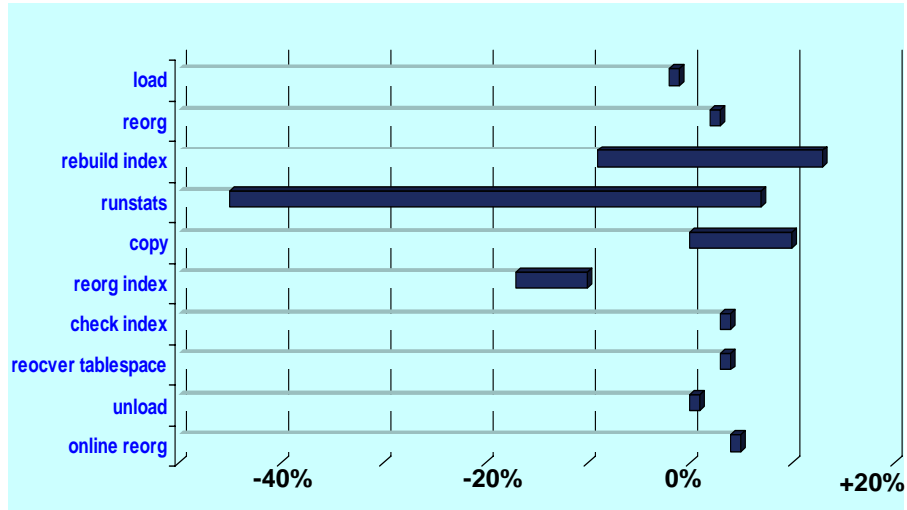
See the details in chapters 2 and 4 of SG24-6465, **DB2 UDB for z/OS Version 8 Performance Topics**.

CPU change - continued



This graph is how I would diagram the phrase, “It depends.” There is a huge variation between the best and worst cases, even within the specific categories. To see what it depends upon, see the details in the V8 Performance Topics redbook, SG24-6465 and in session B08 as well as session B07.

Utility CPU - continued



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This graph is the utility cpu measurements, which show much less variation. There can be a dramatic improvement in RUNSTATS cpu time. See the detail in the V8 Performance Topics redbook, SG24-6465 for details. Also check session B08.

CPU Performance Regression: Subject to change YMMV

- Performance objective: under 10% average
- Typical customer 5 to 10% higher average
- Work load variations
 - ▶ 0 to +15% online transaction
 - ▶ -5 to +10% transaction in data sharing
 - ▶ -5 to +20% batch
 - -5 to +5% insert
 - +5 to +20% fetch, select, update
 - ▶ -10 to +15% batch data sharing
 - ▶ -20 to +15% batch DRDA
 - ▶ -5 to +10% utility
 - ▶ -20 to +15% query

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Performance objective is less than 10% average regression.

Typical customer workload regression is expected to be 5 to 10% higher on average, differing by work load: Here are some examples:

- 0 to +15% online transaction
- 5 to +10% transaction in data sharing
- 5 to +20% batch
 - 5 to +5% insert
 - +5 to +20% fetch, select, update
- 10 to +15% batch data sharing
- 20 to +15% batch DRDA
- 5 to +10% utility
- 20 to +15% query

▪ Options with significant potential to offset an expected increase include multirow fetch, multirow insert, long term page fix and rebind.

CPU Performance Regression

Some workloads tend to have less regression:

- ✓ Virtual storage constrained
- ✓ Data space buffer pool or Hiperpool
- ✓ SMF89 active
- ✓ IRLM PC=YES
- ✓ CURRENTDATA NO
- ✓ BIND RELEASE COMMIT Data Sharing
- ✓ Update intensive batch processing Data Sharing
- ✓ I/O intensive workload

Measure all of CPU time

- ✓ Not just Accounting Class 2 CPU time
- ✓ Must factor in CPU time reduction from Statistics Trace

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The following types of workloads tend to have less regression in V8:

- Virtual storage constrained (MINSTOR=YES, CONTSTOR=YES)
- Data space buffer pool or Hiperpool in V7
- SMF89 active in V7
- IRLM PC=YES in V7
- CURRENTDATA NO in V7
- BIND RELEASE COMMIT option in V7 Data Sharing
- Update intensive batch processing in V7 Data Sharing
- I/O intensive workload

Measure all of the CPU time. Do not just take Accounting Class 2 CPU time to compare V7 to V8. You must factor in CPU time reduction from Statistics Trace (DB2 address spaces).

Parameter Default Changes

- Better defaults for install – consider improving yours
- Describe for static V8 set to yes
- Log apply storage in V8 is 100

Panel	Field	Parameter	Version 7 default value	Version 8 default value
DSNTIP7	USER LOB VALUE STORAGE	LOBVALA	2048	10240
DSNTIPE	MAX USERS	CTHREAD	70	200
	MAX REMOTE ACTIVE	MAXDBAT	64	200
	MAX REMOTE CONNECTED	CONDBAT	64	10000
	MAX TSO CONNECT	IDFORE	40	50
	MAX BATCH CONNECT	IDBACK	20	50
DSNTIPN	DDF/RRSAF ACCUM	ACCUMACC	NO	10
DSNTIP8	CACHE DYNAMIC SQL	CACHEDYN	NO	YES
DSNTIPP	PLAN AUTH CACHE	AUTHCACH	1024	3072
DSNTIPL	LOG APPLY STORAGE	LOGAPSTG	0	100
	CHECKPOINT FREQ	CHKPFREQ	50000	500000
DSNTIPA	BLOCK SIZE	BLKSIZE	28672	24576
DSNTIPR	DDF THREADS	CMTSTAT	ACTIVE	INACTIVE
	IDLE THREAD TIMEOUT	IDTHTOIN	0	120
	EXTENDED SECURITY	EXTSEC	NO	YES
DSNTIP5	TCP/IP KEEPALIVE	TCPKPALV	ENABLE	120
DSNTIPC	MAXIMUM OPEN DATA SETS	DSMAX	3000	10000
	EDMPOOL STORAGE SIZE	EDMPOOL	7312	32768 ¹

Note:
¹ The installation CLIST calculates the default value for the EDMPOOL parameter.

A number of defaults for DSNZPARM settings have changed in V8 because of 64-bit virtual storage constraint relief or to improve the default setting. See the topic Changed default values for subsystem parameters in the Installation Guide or Release Guide.

DESCRIBE WITH STATIC is now YES in V8. This can lead to increase DASD space requirement for SPT01 and increased EDM Pool resource consumption. It is difficult to provide a ballpark estimate of overhead. A guesstimate would be about 15% increase overall. This would be gradual, as you rebind your migrated packages. You can see the effect on an individual package by looking at the AVGSIZE field in SYSPACKAGE. Unfortunately, there is not a number-of-sections column. You could get that information by doing a query on SYSPACKSTMT, to determine the number of statements there for this package.

Log apply storage is often set to 10, which is too low. This is needed for fast log apply during recovery. Also, Backup/Restore System needs it for 4x better performance. Fast Log Apply storage can make a significant improvement in the elapsed time performed of DB2 log based forward recover, LPL/GRECP recovery and the new RESTORE SYSTEM utility. Up to 4x improvement has been observed. This storage is allocated in DBM1 address above the 16MB line and below the 2GB bar, but only as and when required and then freed.

Practice Three Rs of DB2

- **REORG**
 - ▶ Real time statistics
 - ▶ Performance, space
- **RUNSTATS**
 - ▶ After significant change
- **REBIND**
- **Recheck**
 - ▶ Explain and run time performance
 - ▶ **MODIFY, COPY**



This practice starts with the basics, but performing the three Rs effectively can avoid a wide range of problems. In other cases, they are the steps needed to resolve a problem. These steps are needed to keep clustering effective, maintain free space, avoid index splits, keep sequential prefetch performance high, ... Using real time statistics to drive the process is being used more and more.

After the REORG is completed or during the process, gather the updated statistics. Balance the cost of gathering the information with the improved information for optimization. Improved statistics can mean improved access paths – ones that were not available before.

Using the improved information means using dynamic SQL or rebinding. After the rebind, checking the explains and the run time performance for regression can avoid problems. Do you want to rebind only in NFM or do you rebind some packages in CM too. How long will you be in CM? The longer the period, the more you will want or need to rebind in CM.

To REBIND or not to REBIND

- **WHEN - WHEN is the question**
 - ▶ **When to take the chance of access path regression**
 - ▶ **For the potential benefits of improved performance**
- **When migrating? Test Before**
 - ▶ **Parallel individual binds**
 - ▶ **More disruptive, longer**
- **Incrementally or later**
 - ▶ **More potential for problem calls**
 - ▶ **Resolution could be more difficult**



To rebind or not to rebind, When is the Question: Whether 'tis Nobler in the minde to suffer The Slings and Arrowes of outrageous Access Pathes, Or to take Armes against a Sea of troubles, And by opposing, end them: The question is not whether to REBIND, but rather when to REBIND. Planned rebinds avoid surprises. A fix may need to rebind everything. Performance gains in a new version often occur at REBIND. When you rebind, performance is

1. Same: Most common case is plus or minus 5%, which is usually ignored
2. Worse: Least common, but usual regression causes are new access path or increased parallelism. If you compare prior plan, then you can find most problems easily. If you wait until a BIND occurs, analysis is more difficult; you are less likely to have all of the performance & plan data. Compare estimates in DSN_STATEMENT_TABLE PROCSU or PROCMS to find problems.
3. Better: Many of the V8 performance improvements only occur if you bind. Some SQL is likely to benefit from optimization improvements, such as outer joins, subquery transformations, star joins or UNION improvements. Some performance improvements occur at plan or package BIND. When you find a problem - errors or performance - the fix is often REBIND. Best practice for migration is to test binds before migration & bind at migration time (comparing before and after). If you have a tool for comparison, the task is simpler, but simple comparisons of the cost estimates can catch most problems.

How much room will you get in DBM1?

It depends.

Any virtual pools?

Buffer pool control blocks

Castout pool

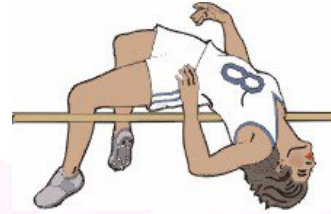
EDM DBDs pool, Sort Pool

RID Pool, compression dictionaries

Some growth in thread storage

You need to calculate, monitor and manage

See sessions C06 & C07



Some customers get big improvements in virtual storage, but others get very little. If you use little or no compression, have already minimized sort pools, RID pools, castout (no data sharing) and have moved the dynamic statement cache and buffers to data spaces, then the usable storage can shrink. With the new sizes and options in V8, some of the space grows.

On the other hand, in about 80% of the cases we looked at, there are some virtual buffer pools left or substantial savings are available from the buffer pool control blocks (estimate 5% of data space and hiperspace buffer pools), data sharing castout, DBDs, sort pool, RID pool (estimate 90%), and compression dictionaries. You need to do the calculations, monitor and manage storage in V8.

Adjust storage sizes It depends!

- ▶ **Need to understand & measure virtual and real storage**
- ▶ **Don't adjust MEMLIMIT 4 TB**
- ▶ **Opportunity if you have adequate real storage, danger if you don't**
 - **Potential for adding storage?**
 - **Variation in virtual constraint help**
- ▶ **Adjust storage pools**
 - **EDMPOOL --> DSC + DBD + EDM**
 - **Fit within real storage**
 - **Use long term page fix for high IO**

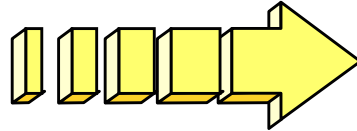


Some customers get lots of storage relief from V8, but others don't get much. It depends on your storage configuration. Do the calculations and keep those IFCID 0225 measurements. Many customers are close to 2 GB limits for real & virtual storage. In some cases, V8 will help, maybe a little, maybe a lot. If you are at all close, you should calculate. Using 2.01 GB of storage below the bar means S878 & S80A abends, & often a DB2 outage. With V8, the real storage becomes the primary concern for some customers. Do not overallocate real storage. Do not change MEMLIMIT.

V7 storage monitoring improvements help, but customers need to monitor IRLM storage. Monitor Info APARs II04309 and II10817 for fixes. Increased numbers of threads, more storage for new function & more parallelism increase storage needs.

Maximum number of open data sets has been raised to 64K for customers running z/OS V1R5 or later. Check virtual storage below the 16M line. See the Administration Guide, Redpaper V7 Selected Performance Topics, IDUG articles and presentations for more on storage monitoring.

Premigration Activity (*continued*)



Deprecated
Functions

- **Going, going, but not gone in V8 or V9**
- **Convert from private protocol to DRDA**
 - ▶ **Bind parameter - DBPROTOCOL**
 - ▶ **BIND packages at remote locations**
 - ▶ **Governor changes: plan to package**
 - ▶ **Install panel for default DBPROTOCOL**
- **Selective partition locking LOCKPART**
- **DB2-managed stored procedures**

DRDA support for three part names

Bind parameter DBPROTOCOL enables application programs that use three-part names for remote access to use DRDA protocol.

Private Protocol can no longer use type 2 inactive threads. Specify a non-zero value for MAXTYPE 1 to use type 1 inactive threads. DRDA is needed for V4 - V8 enhancements, TCP/IP and new data types. Rebind your applications with the DBPROTOCOL option set to DRDA.

Existing applications can be converted from private protocol to DRDA. BIND at remote sites instead of dynamic.

Rebind with the DBPROTOCOL parameter

Change the governing row in the RLST at the server, from a "governs by plan" to "governs by package".

Migration - data sharing group B07

- ▶ Supports V7 & V8 COMPAT members within a group for a short time (coexistence)
- ▶ MUST apply fallback SPE to all members first
- ▶ First member migrated must be successful before migrating other members
 - Run CATMAINT only for the first member
- ▶ Using Data Sharing book for migration
- ▶ Migrate all members before using new function
- ▶ Restrict execution of packages & plans bound on new version to migrated members
- ▶ Change all catalog bufferpools in group for ENFM
- ▶ Group quiesce in NFM for new locking protocol 2
- ▶ CFLEVEL 12, 13, 14 for best performance



Remember to work with new V8 function only on a group that has migrated to V8 NFM. Therefore, it is best to migrate all of your members and test with existing applications before implementing any new features or functions.

If you have multiple releases in a group for more than a week, then you need to have much better controls in place and be able to test your processes more thoroughly.

Persistent structure size changes, group attach improvements, restart light and enhanced constraint management are more complex if multiple releases are involved.

The minimum CFLEVEL is to have a level that is in service. Most data sharing customers will want to be at CFLEVEL 12 or 13 or perhaps even 14. There is quite a bit of information about CFLEVEL on the web:

<http://www.ibm.com/servers/eserver/zseries/pso/cftable.html>

Get the detailed steps from the Installation Guide & Data Sharing: Planning & Administration

Release Coexistence



- **IRLM service levels across members**
- **TSO, RRS & CAF logon procedures**
- **Utility and batch steplibs**
- **Distributed environment and DRDA**
- **All data sharing customers should check Coupling Facility microcode service level**



Statements about coexistence depend upon the migration SPE (set of APARs).

IRLM: Consider that some members of a data sharing group may run with newer service levels when you apply IRLM service.

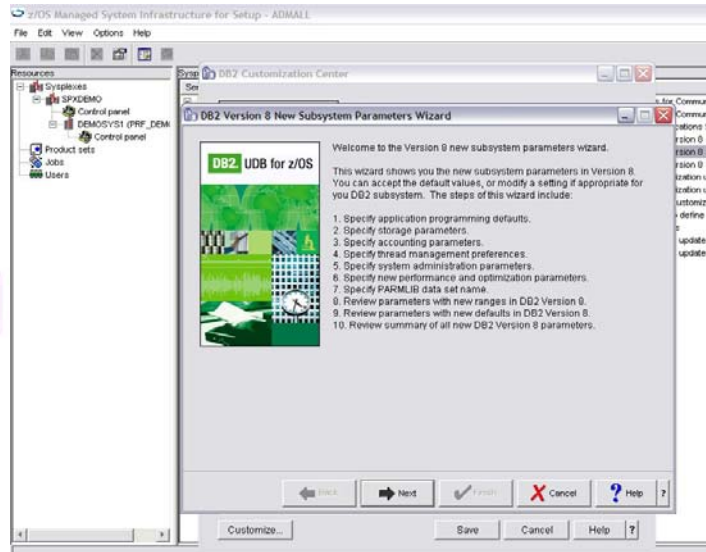
TSO, RRS, CAF & utilities can attach to either release with existing procedures. You must update those procedures before migrating to any subsequent release. Mixed steplibs are tolerated for batch and utility access in the same way. For V8 utilities, copy module DSNUT810.

DRDA: Most new distributed function introduced in V4, 5, 6, 7, 8... of DB2 can be used only when using DRDA access.

When you migrate to a new version, you can begin to use some new function which has prerequisite CF microcode levels. If you don't have the correct microcode level, you can lose data. See the red alerts.

DB2 msys for Setup

- ✓ GUI
- ✓ Wizards
- ✓ Clone
- ✓ z/OS
- ✓ Run check



A new option for installs and migrations is DB2 msys for Setup. Rather than the traditional green screen and clists to build jobs, this graphical interface has wizards to help with the definitions and drives the function. There are additional checks done in this process, such as the sizing for shadow data sets for ENFM.

Moving To Compatibility Mode

- Run clist in migrate mode.
- Subsystem (all members in the group) must have been started with migration & fallback SPE APAR PQ48486 PTF UQ81009 just before this.
- Start subsystem at V8 level
- Run DSNTIJTC (CATMAINT).
- Run Version 7 sample jobs.

Every subsystem (every member in a data sharing group) must have been run with the SPE before you begin the migration.

Then you start the subsystem with the Version 8 libraries and run the standard DSNTIJTC or CATMAINT job (once per data sharing group). Some changes are made to the catalog. Now you are running in CM.

For a simple test, run the Version 7 sample jobs. The Version 8 samples will not run now.

Running In Compatibility Mode

Minimal new functions are available but...

- Unicode is being used for parsing SQL, conversion, ...
- Some new optimization, new catalog objects
- 64-bit virtual addressing mode
 - All your bufferpools will now be private virtual pools – no more data space backed VP's or hiperpools.
- Consider PGFIX option of ALTER BUFFERPOOL
- Most new utility function is provided.
- Fallback to V7 is fully supported.
- Use precompiler option NEWFUN=NO
- Data sharing members can be running either V7 or V8 in CM, but all must have been run with V7 SPE.
 - Guidance: Keep coexistence short (weekend)

In compatibility mode there is very little new function, but you are using Unicode for parsing SQL and running in 64-bit virtual mode. The data spaces and hiperspaces are changed to be in the large above-the-bar address space. Be sure you have adequate real storage. You may want to use the new PGFIX option of ALTER BUFFERPOOL. Some new optimizations are used.

The CATMAINT added some new objects to the DB2 catalog. Fallback to Version 7 uses the same process as in prior versions. In fact, without new objects, fallback is generally simpler than in prior versions. The precompiler default is set to NEWFUN=NO, so that the prior syntax for SQL is enforced.

Preparing For Enable New Function Mode (ENFM)

- Define BP8K0, BP16K0 and BP32K. Data sharing users note: ENFM is group scope, so all members & GBPs are required too.
- No going back. – Restore of entire subsystem to point in time is only option. Did you back up?
- All data sharing members must be running V8 CM.
 - ENFM is a group wide event
 - Guidance: Keep ENFM short (under 1 hour typical)

The larger catalog change is ENFM, even though you do not have any new more new function available. There are more changes to the catalog in this step. You cannot fall back to Compatibility Mode or to V7. Before starting ENFM, all of the members of a data sharing group must be running V8 - no coexistence with V7. ENFM and NFM are a group-wide event in data sharing.

Preparing For Enable New Function Mode (ENFM) ...

- The catalog is getting a little bigger (under 10%)
 - Rebinds will increase catalog size more
 - Look at dataset sizes you will allocate as the shadow datasets as part of ENFM.
 - Reorg the catalog and directory first, if you can.
 - ◆ Check timing, check data in catalog
- Look for affected catalog queries (Unicode)
- Simpler to delete user-defined catalog indexes
- Deleted table spaces SYSPROCEDURES & SYSLINKS

The catalog does increase in size and in the numbers of objects, but most customers found relatively small increases, under 10%, and some customers had smaller catalogs.

If you would like an estimate of the time needed for this process, you could reorg the catalog and directory. This can also check data in your catalog. If you can't run the reorg, then there are some rules of thumb, and the catalog will be reorged when you finish the ENFM step.

Enable New Function Mode



- What is it?
 - The process to move from CM to NFM
 - A fully restartable job DSNTIJNE which converts catalog & directory to long names and Unicode
 - Reorganizes 18 table spaces (read only)
 - Marks its current progress in the catalog.
 - CATENFM START – On the initial run.
 - CATENFM CONVERT INPUT tname – To mark the currently converting tablespace.
 - Can be stopped
 - Does not allow new function

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ENFM is essentially a read-only or shrlevel(reference) reorg of the catalog & directory table spaces. This job runs in a prescribed order. If you stop and restart, do not change the job.

You can halt the process, which takes effect at the end of the current table space. Use the DSNTIJNH job, which issues CATENFM HALTENFM. Then the catalog is in read / write mode again. Submit the job to continue the process.

Enable New Function Mode

- When DSNTIJNE is finished, then
 - Run DSNTIJNF - CATENFM COMPLETE
 - Run job DSNTIJNG to rebuild DSNHDECP
 - DSNHDECM specify NEWFUN=YES
 - All V8 new functions are available.
 - Create user-defined indexes again.
- Can I go back to ENFM? Yes
 - Run job DSNTIJEN - CATENFM ENFMON
 - Run job DSNTIJNG to rebuild DSNHDECP
 - DSNHDECM specify NEWFUN=NO

When all of the steps are run, you are still in ENFM. You run one additional job to switch to NFM and change DSNHDECP to set the default to NEWFUN=YES. You can still override the setting for the precompiler. Now the new function of Version 8 is available.

If you encounter a severe problem with some of the new function and want to stop using any new function, then switching back to ENFM can accomplish the change.

Running In New-Function Mode

- What are the first things you should you do?
 - Run DSNJCNVB BSDS conversion/expansion utility:
 - Up to 93 active logs and 10,000 archive log datasets.
 - Run the V8 sample jobs.
 - Test some of your existing function again.
- Quiesce data sharing group for new locking
- Then start to look at the new functions....
- To check which mode you are running
 - display group detail

Now you are in new function mode, with a world of new function to explore. Many customers will want to take this opportunity to reformat the BSDS, so that they can take advantage of the ability to have more active and more archive logs.

The V8 sample jobs can provide a simple test that the new function is working.

The way to check which mode you are currently running is to issue -display group detail, even if you are not using data sharing.

Customer Experiences C10, C11, B05, C09



▪ **Customer experiences say pay attention to:**

- **Read the web, books, Info APARs, PSP**
- **Have a plan that includes performance**
- **Run premigration job DSNTIJP8**
 - **Run it early, Use V7 DSNTIJP8 job**
 - **Resolve CCSID use**
- **Understand Unicode parsing, catalog, instrumentation**
- **Current maintenance for DB2, z/OS & CF**
- **Get the latest books: library, red books, ...**



Most of these were mentioned before. They are mentioned again because other customers missed them. Many customer problems dealt with items on the foil titled Premigration Action. Run the premigration job. Check CATMAINT messages.

Programmers must add colons for all host variables. Make sure DBAs understand the new authorizations and meaning of schema names. Check for release dependent objects on fallback or coexistence.

Having current service & books saves time & avoids problems.

Check other early customer experiences here and later.

<ftp://ftp.software.ibm.com/software/data/db2zos/A01jc.pdf>

@business is the game. Play to win.

Plan to win. Work the web.

- ✓ **Education & reading**
 - ✓ **Testing**
 - ✓ **Performance & Storage Monitoring**
 - ✓ **Service Level: Stay reasonably current**
- = Successful migration**

How do you win at e-business?

For installing and migrating, the key points are taking the time to plan, being sure that you have the education, reading and research time so that all of the steps are covered.

Use the information on the web to get quick answers. Call us or e-mail when that's not enough.

Then be sure to test. Have your performance and storage monitoring plans in place.

The service levels make a big difference, and you need to find the right balance.

If you plan to win, e-business is a fun game.

R7Fw

RTFW is the acronym for Read the Friendly Web. Let's take a short walk on the wild, wild web. The problem with the web is not too little information, but rather too much information. The experience is a bit like trying to take a drink from a fire hose. So I'd like to help a bit by narrowing the search with the twenty five cent tour of a few of my favorite DB2 web sites. A lot more information has been added in the past month or two, with many new books and web pages.

Let's start with the DB2 family. I'll generally show the short form or alias of the URL, omitting http://

Here are some tips for avoiding the 404. You don't need www in front of ibm.com in most situations. There is often something after www, such as the -306 in www-306 when you get the URL back from the browser. Remove the hyphen and number when you save the URL, since that number changes more quickly than the rest of the URL.

Main DB2 for z/OS Web Page
ibm.com/software/db2zos

- Library (books)
- Events
- Education
- Services
- Support
- V8, V9
- Developer Domain
- DB2 Magazine
- Z9 zIIP
- Tools

This is the main DB2 UDB for z/OS web page. You can get to the other DB2 for z/OS pages from here, so I often call this my home page. This page changes frequently, so look at the highlighted NEW items. Do you want to look in a DB2 book? Click on Library to see books on DB2 and QMF Version 8 (about 40), Version 7, 6, 5 or even 4. You can check the latest changes by looking at the Information Updates or go to the Information Center. From this page, you can look for conferences (Events), specific classes (Education), or services. If you want to see the latest on Version 8, click on the Version 8 link. If your primary concern is application development, the Developer Domain is for you. DB2 Magazine covers a broad range of topics about DB2. The latest machines z9, z990 and z890 are on the zSeries page. Click DB2 and IMS Tools to see the wide range of help they provide.

DB2 for z/OS Roadmap Page

ibm.com/software/db2zos/roadmap.html

DB2 for z/OS

DB2 UDB for z/OS Version 8 information roadmap

DB2 Information Management Software

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Other roadmaps

- Content Manager
- IMS™
- SQL Replication Version 8.2

Related software

- WebSphere
- CICS
- IMS
- DB2 Connect
- z/OS
- Linux on z/Series

Related solutions

- DB2 & IMS Tools
- Java™ on z/OS and OS/390

This roadmap outlines the information resources that are available for installation, administration, and programming for DB2 Universal Database™ for z/OS®, Version 8.

Don't you wish you could find all of the different kinds of information about DB2 for z/OS in one place? I think you'll be happy to learn about a new Web page called the DB2 UDB for z/OS Information Roadmap. Information roadmaps are being developed by many IBM product teams in an effort to simplify the lives of users by providing a single place to find all sorts of useful information resources, such as: Product information from the official library IBM Redbooks Articles in a variety of different online publications, including the DB2 Magazine, presentations, support information like answers to frequently asked questions or technotes, web pages with high-level descriptions of different products that DB2 works with and more. We tried to provide a simple way to get to many of the best resources for various tasks. This will be a great resource to people just starting to use a DB2 capability that they haven't yet used.

The information roadmap is organized according to different tasks that you might perform, such as migrating, configuring, administering, and debugging. Although the information roadmap is available for Version 8, it is available to anyone with Web access, and many of the resources are relevant and useful to users who aren't yet on Version 8.

I encourage you to check out the new DB2 for z/OS Information Roadmap:
<http://www.ibm.com/software/data/db2/zos/roadmap.html>

You can also start from the main DB2 UDB for z/OS web page and click on the Information Roadmap news item or <http://www.ibm.com/software/db2zos>

Library V8 page

ibm.com/software/db2zos/library.html

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- DB2 update Feb 2006
- QMF
- Program Directories
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DB2 for z/OS and OS/390

Library

Here is your complete DB2 for z/OS and OS/390 information resource library! It includes product documentation, announcement letters, presentations, and important technical tips.

DB2 Information Management Software Information Center for z/OS Solutions

The [DB2 Information Management Software Information Center for z/OS Solutions](#) provides centralized, integrated product information for:

- DB2 UDB for z/OS Version 8 - updated!
- DB2 QMF Version 8
- IMS Version 9 **NEW**
- IMS Version 8
- Several DB2 and IMS Tools **NEW** and updated!

The information center also includes:

- Integrated LookAT functions for quick message search **NEW**
- Convenient troubleshooting and support information
- Common Glossary
- PDF versions of the product manuals
- Improved usability and information consistency

This information center includes all of the user documentation for the IBM products listed, except those items available to licensees only. Future releases of the information center will include additional DB2 and IMS Tools. Built upon the IBM WebSphere Help System, this information

Related software

- WebSphere
- CICS
- IMS
- DB2 Connect
- z/OS
- Linux on z/Series

Related solutions

- Data Management Tools
- Java™ on z/OS and OS/390
- DB2 for Linux

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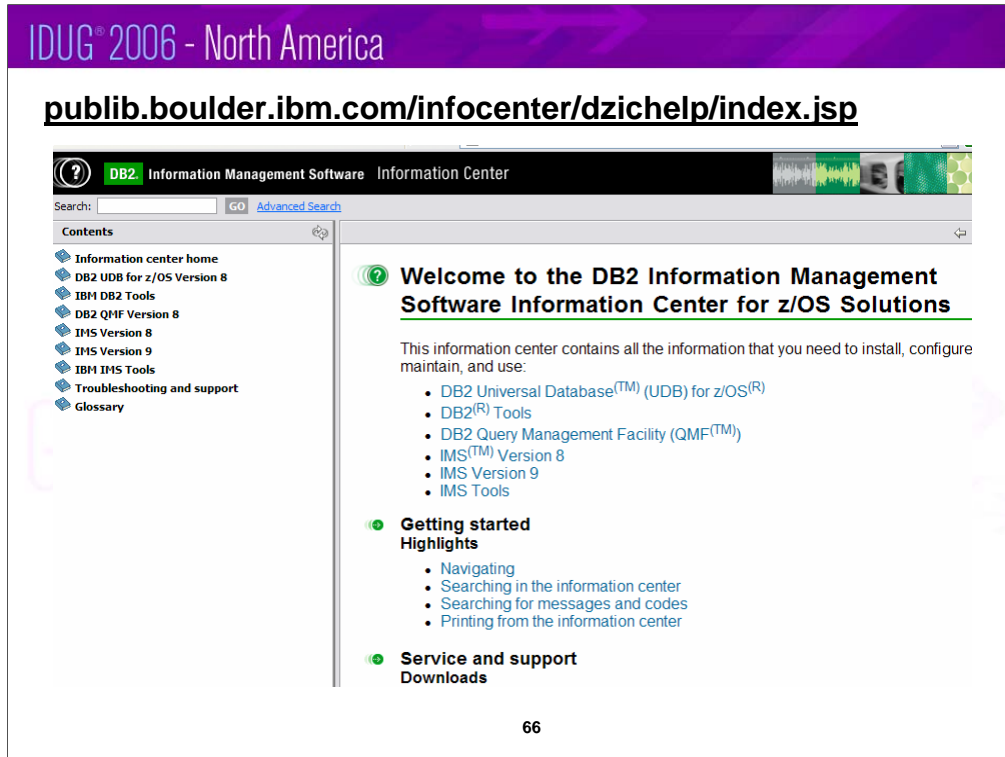
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Most of the DB2 V8 books were updated in early November 2004 and we expect to have the next update in April 2005. Watch this web page and see the dates next to each book for the latest updates.



This is the new Information Center, with a wide spectrum of information and access to books for DB2 UDB for z/OS, DB2 tools, QMF, IMS, IMS tools and more. You can get to this page from the Library page, by clicking Information Center. The Information Center provides information across the books and across multiple products.

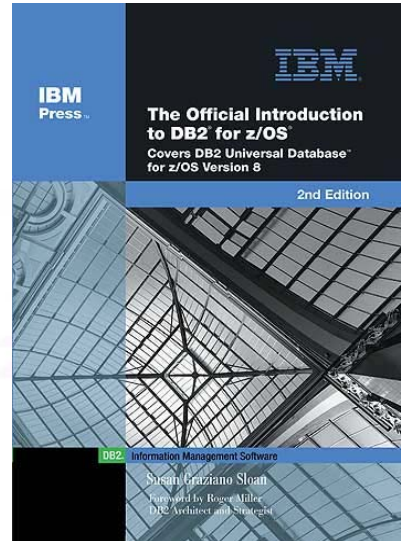
If you click “Troubleshooting and Support”, then expand under “Searching knowledge base” and click “Web search:...”, you’ll find a helpful Web search page. From this page, you can search IBM support, DeveloperWorks, or even the whole Internet using Google.

The Official Introduction to DB2 for z/OS

Covers DB2 Universal
Database for z/OS Version 8
2nd Edition

Susan Graziano Sloan

Certification
New to DB2 UDB for z/OS



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This is the second edition of the popular book that discusses certification, concepts and architecture. The main part of the book discusses design, SQL and applications in various languages. The special topics include DB2 and the Internet, distributed access and data sharing. Get this book if you are interested in being certified on DB2 UDB for z/OS. This book is excellent for someone who knows about relational database and wants to understand DB2 UDB for z/OS. It became available at the end of May 2004 and can be ordered now from your online retailer, such as Barnes and Noble or Amazon or from iSource

<http://www.ibm.com/isource/cgi-bin/goto?on=IMNL604B38>

<http://vig.prenhall.com/catalog/academic/product/0,4096,0131477501,00.html>

http://www.ibm.com/certify/certs/db_apd.shtml

New DB2 for z/OS V8 DBA Professional Certification Role and exam

<http://www.ibm.com/isource/cgi-bin/goto?on=naa5ed0351>

<http://www.ibm.com/developerworks/db2/library/techarticle/0207fosdick/0207fosdick.html>

<http://www.ibm.com/software/data/db2/os390/techdocs/s1310.pdf>

DB2 for z/OS Version 8 DBA Certification Guide

Susan Lawson

- Prepare for V8 DBA exam
- Good for all DBAs on the z/OS platform



68

Written by IBM Gold Consultant Susan Lawson, this new guide offers comprehensive preparation material for your IBM Certified Database Administrator-DB2 Universal Database V8 for z/OS certification. This guide presents hundreds of useful tips, practical techniques, and expert guidelines for every facet of DB2 UDB database administration, including database implementation, operation, recovery, security, auditing, performance, installation, migration, and much more.

<http://www.ibm.com/software/data/education/bookstore/>

DB2 Developer's Guide

**Covers DB2 Universal Database for z/OS Version 8
5th Edition**

Craig Mullins



69

This comprehensive guide to implementing applications with DB2 was released recently. The new edition adds information on Version 7 and Version 8 to Craig's excellent book. The book has been sold at several conferences lately and has sold out. Craig Mullins is a noted authority on DB2. He writes and presents frequently to many customers. This book is written for database administrators and application programmers who want a complete outline for implementing and optimizing applications. It discusses coding, SQL, database administration and utilities.

www.craigmullins.com

DB2 UDB Family SQL Reference

<http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html>

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SELECT FROM 1
Portable SQL

The SQL Reference for Cross-Platform Development

June 2002 (Updated September 22, 2004)

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Great news for people who want to write portable applications! This reference makes it easy for you to develop applications using SQL that is portable across the **DB2 Universal Database Family**, including **DB2 UDB for z/OS® Version 8**, **DB2 UDB for iSeries™ Version 5 Release 3**, and **DB2 UDB for Linux, UNIX®, and Windows® Version 8.1**.

New in Version 2!

The addition of DB2 UDB for z/OS V8 and DB2 UDB for iSeries V5R3 means the following great SQL features are now included:

- Support of sequences
- A new CURRENT SCHEMA special register
- Enhanced support for scalar subselect
- New built-in functions including encryption support
- Support for common table expressions
- Support for lateral correlation
- Support of grouping by expressions
- Support for materialized query tables
- Support for altering identity columns
- Support for ITERATE statement
- Increases in several SQL limits, and enhanced long string support
- Other portability enhancements

The SQL Reference for Cross-Platform Development uses the familiar format of the product SQL Reference manuals and includes information on the following topics:

- Database concepts
- Built-in functions
- Statements and queries
- SQL procedural language control statements
- Limits
- Programming in C, Java™, COBOL, REXX, and external routines in natural

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This is the web page for the SQL Reference for Cross-Platform Development. It has three versions of the cross-platform SQL Reference and pointers to the base product SQL Reference books as well.

These books publish frequently, so you need to choose the one for the proper combination of DB2 platforms and versions.

<http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html>

IDUG® 2006 - North America

DB2 Support Page
ibm.com/software/db2zos/support.html

Home | Products | Services & solutions | Support & downloads | My account

Software > Information Management > DB2 Product Family >

DB2 UDB for z/OS

DB2 Universal Database for z/OS
 Product support

Primary support resources

Flash 20 Apr, 2006: DB2 for z/OS Version 8 Information Roadmap is Now Available!

Flash 2 Sep, 2005: Messages and Codes now delivered as two separate books in Version 8
 [View all flashes]

Solve a problem

- Troubleshooting guide
- Forums and newsgroups
- Featured documents
- Technotes | APARs

Download

- Fixes by version
- PTF Listing and Ordering
- z/OS and z/OS.e Text Search prerequisite for DB2 UDB Text Extender
- DSNAMT, DSNAMTHT - Sample configuration files for MQSeries UDFs
 [View all downloads]

Learn

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Search Support (this product)

Enter terms, error code or APAR #

Limit results (optional):

- Solve a problem (Technotes, APARs)
- Download (Fixes, Utilities, APARs)
- Learn (Manuals, White Papers, etc.)

Search

→ Broaden or change scope

→ Tips for searching

Related links

- WebSphere
- CICS
- IMS
- DB2 Connect
- z/OS
- Linux on IBM System z™

Related solutions

- DB2 and IMS Tools
- Java™ on z/OS and OS/390
- DB2 for Linux

Technotes (FAQs)

Presentations

White papers

Redbooks

✓ new books

APARs, CST

Do you need Answers to Frequently Asked Questions? Product Information? Technical Presentations? Redbooks? White Papers? Support for all of these is on this web page. Click Support on DB2 web pages. From this page, you access roughly 900 Technotes or answers to Frequently Asked Questions, 150 technical presentations from recent conferences, a dozen white papers, and over 60 Redbooks. There are more than 50 presentations updated since May 2004 and 75 since April 2004. The Consolidated Service Test (CST) documents IBM recommended service level for a range of z/OS products. To search for the presentation you want, put a word or two into the Additional search terms or Order by date – newest first. There are new redbooks on Disaster Recovery, V8 Performance Topics and MLS.

ibm.com/software/db2zos/support.html

Web Resources: DB2 for z/OS Migration

- ibm.com/software/db2zos
Click on Support and then access the Technotes (Q&A), White Papers & Technical Presentations
- ibm.com/software/data/db2/zos/v8books.html
- ibm.com/servers/eserver/zseries/zos/bkserv/r6pdf/
- ftp sites for papers, presentations:
<ftp://ftp.software.ibm.com/software/data/db2zos/>
<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/>

See specific URLs in the notes below.

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consultant, customers why migrate <http://www.ibm.com/software/os/zseries/index.html>

<http://www.ibm.com/software/os/zseries/webcast/aug31/>

<http://www.ibm.com/software/os/zseries/ondemand/#dm>

paper on why migrate <ftp://ftp.software.ibm.com/software/data/db2zos/db2v8dbv.pdf>

value of migration <ftp://ftp.software.ibm.com/software/data/db2zos/Z05.pdf>

John Campbell presentations on health checking and on early customer experience.

<ftp://ftp.software.ibm.com/software/data/db2zos/A01jc.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/G11jc.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/G12jc.pdf>

migration planning <ftp://ftp.software.ibm.com/software/data/db2zos/S1322rma.pdf>

migration planning papers

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/V8planmigrate.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/V8migrateprocess.pdf>

Installation Guide, Program Directories and other books

<http://www.ibm.com/software/data/db2/zos/v8books.html>

Migration presentations

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/OF2.pdf>

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/OA2.pdf>

ftp://ftp.software.ibm.com/software/data/db2zos/Keemle_C3.pdf

What do customers say about DB2 V8?



What can you learn?

Gain their experiences.

At conferences, user groups, on the web

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Univar

<http://www.ibm.com/software/os/zseries/index.html#>

<ftp://ftp.software.ibm.com/software/data/db2zos/db2v8dbv.pdf>

<http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&uid=swg27005465>

GAD

<http://www.ibm.com/software/data/db2imstools/news.html>

<http://www.ibm.com/software/os/zseries/webcast/mar1/>

Deere, system backup / restore and migration process

<ftp://ftp.software.ibm.com//software/data/db2zos/PITR18.pdf>

ftp://ftp.software.ibm.com/software/data/db2zos/Keemle_C3.pdf

Hewitt Associates

<ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/OF2.pdf>

Summary of early customer experiences

<ftp://ftp.software.ibm.com/software/data/db2zos/DB2v8Migration.pdf>

Health checking

<ftp://ftp.software.ibm.com/software/data/db2zos/G11jc.pdf>

<ftp://ftp.software.ibm.com/software/data/db2zos/G12jc.pdf>

Check out Willie Favero's DB2 blog at: <http://blogs.ittoolbox.com/database/db2zos>

<ftp://ftp.software.ibm.com/software/data/db2zos/>

Name	Size	Type	Modified
DB2V9zOS.pdf	499 KB	Adobe Acrobat 7.0 ...	5/4/2006 11:07 AM
DB2V9zOS.ppt	5.25 MB	Microsoft PowerPo...	5/3/2006 11:07 AM
VNEXT.pdf	428 KB	Adobe Acrobat 7.0 ...	1/26/2006 2:07 PM
DB2VSTOR.zip	12.7 MB	pkzipfile	12/1/2005 4:06 PM
V8Migration.zip	14.2 MB	pkzipfile	12/1/2005 4:06 PM
DB2Futures.pdf	115 KB	Adobe Acrobat 7.0 ...	12/1/2005 4:05 PM
DB2Futures.zip	9.40 MB	pkzipfile	12/1/2005 4:05 PM
DB2V8Migration.pdf	229 KB	Adobe Acrobat 7.0 ...	12/1/2005 4:05 PM
DB2VSTORprez.pdf	1.67 MB	Adobe Acrobat 7.0 ...	12/1/2005 4:04 PM
HDzos.wmv	30.4 MB	Windows Media(TM)...	12/1/2005 3:07 PM
Keemle_C3.pdf	191 KB	Adobe Acrobat 7.0 ...	12/1/2005 3:07 PM
INAMillerC1.pdf	488 KB	Adobe Acrobat 7.0 ...	11/28/2005 5:04 PM
INAPurcellG7.pdf	496 KB	Adobe Acrobat 7.0 ...	11/22/2005 3:06 PM
OVSP.pdf	1.75 MB	Adobe Acrobat 7.0 ...	11/22/2005 3:06 PM
SmithRUNSTATS.pdf	899 KB	Adobe Acrobat 7.0 ...	11/22/2005 3:06 PM
S132rma.pdf	1.62 MB	Adobe Acrobat 7.0 ...	11/22/2005 3:05 PM
DMD13.pdf	171 KB	Adobe Acrobat 7.0 ...	10/7/2005 12:00 AM
dcrader.pdf	1.63 MB	Adobe Acrobat 7.0 ...	7/5/2005 12:00 AM
Z16.pdf	311 KB	Adobe Acrobat 7.0 ...	6/28/2005 12:00 AM
DB2Dasd.pdf	1.90 MB	Adobe Acrobat 7.0 ...	6/14/2005 12:00 AM
a12Eaton.pdf	732 KB	Adobe Acrobat 7.0 ...	6/13/2005 12:00 AM
INACampbellC6.pdf	431 KB	Adobe Acrobat 7.0 ...	6/8/2005 12:00 AM
INACampbellJ12.pdf	978 KB	Adobe Acrobat 7.0 ...	6/8/2005 12:00 AM
INALeeG12.pdf	789 KB	Adobe Acrobat 7.0 ...	6/8/2005 12:00 AM
dppd.pdf	791 KB	Adobe Acrobat 7.0 ...	6/3/2005 12:00 AM
INAZagelowG1.pdf	450 KB	Adobe Acrobat 7.0 ...	6/3/2005 12:00 AM
INAZagelowSL2.pdf	451 KB	Adobe Acrobat 7.0 ...	6/3/2005 12:00 AM
SmithAvailability.pdf	646 KB	Adobe Acrobat 7.0 ...	6/2/2005 12:00 AM
SmithUtilityUpdate.pdf	410 KB	Adobe Acrobat 7.0 ...	6/2/2005 12:00 AM
INATengC7.pdf	380 KB	Adobe Acrobat 7.0 ...	6/1/2005 12:00 AM
INATengC9.pdf	720 KB	Adobe Acrobat 7.0 ...	6/1/2005 12:00 AM

This is a snapshot of the ftp web page on May 8, 2006 , with the files sorted by date. There are many files dated within two months, reflecting updates from recent conferences. There will be more after this conference.

Using the ftp site directly does let you see the latest updated files easily, but provides only the file names, without descriptions. The Support page searches for white papers and technical presentations allows you to search by topic and date.

Events for more info ...

IDUG

IBM Tech Conferences

SHARE

Presentations

Software > Information Management > DB2 Product Family > DB2 Universal Database for z/OS

DB2 UDB for z/OS

Events

DB2 Conferences

Upcoming Conferences

- SHARE user events
5-10 Mar 2006
Seattle, Washington
- IDUG 2006 Australia Forum
23-24 Mar 2006
Sydney, Australia
- IDUG 2006 North America
7-11 May
Tampa, Florida
- IBM Information Management Technical Conference
15-19 May 2006
The Hague, Netherlands
- Technologico DB2 for z/OS
6-9 Jun 2006
Rome, Italy
- Share
13-18 Aug 2006
Baltimore, Maryland
- DB2 Aktuell 2006
27-28 Sep 2006
Dresden, Germany
- IDUG Europe
9-13 Oct 2006

Conference Sponsors

- IBM Learning Services: International Technical Conferences
- IBM DB2 Information Management Conferences
- IDUG (International DB2 Users Group)
- SHARE
- GSE (GUIDE SHARE Europe)

Online Support Library

- Presentations from Previous Conferences
A source for many technical presentations from IBM Developers

There are many excellent conferences coming up. Use the Events page to see which one you can attend:

<http://www.ibm.com/software/data/db2/zos/events.html>

If you missed a conference or two, then check for recent presentations from previous conferences. More than 100 presentations are on the web, some with audio as well.

<u>group / conference</u>	<u>dates</u>	<u>location</u>	<u>web location</u>
IDUG NA	May 7 - 11	Tampa, FL	www.idug.org
Share	Aug 13 - 18	Baltimore, MD	www.share.org
IDUG Europe	Oct 9 - 13	Rome, Italy	www.idug.org
IBM DM	Oct 15 - 20	Anaheim, CA	

<http://www.ibm.com/jct03001c/services/learning/ites.wss?pageType=page&c=a0000713>

ITES & Tech conferences

<http://www.ibm.com/services/learning/ites.wss?pageType=page&c=a0001438>

Click Support For Compatibility Matrix → → → & Other Support Then Techdocs, search for V8 and PTF

The screenshot shows the IBM website for DB2 and IMS Tools. The main navigation bar includes 'Home', 'Products', 'Services & solutions', 'Support & downloads', and 'My account'. The 'Support & downloads' menu is expanded, showing options like 'Library', 'News', 'How to buy', 'Events', 'Training and certification', 'Services', and 'Support'. The 'Support' option is selected. The main content area is titled 'IBM DB2 and IMS Tools' and contains a welcome message, a search bar, and several sections: 'Related software' (listing DB2, IMS, DB2 QMF, CICS Tools, WebSphere MQ Family, and WebSphere AD Tools), 'Related hardware' (listing zSeries, Storage Systems, and IBM eServer), and 'New / Enhanced DB2 z/OS Tools' (announcing March 2006 updates like DB2 SQL Performance Analyzer V3.1 and December 2005 updates like DB2 Change Accumulation Tool V1.4). A sidebar on the right features 'Information Management software', a 'Portfolio of DB2 & IMS Tools' graphic, and 'Highlights' including a registration notice for EMEA IM Tech Con in The Hague.

This is the primary web page for DB2 and IMS tools. If you want to know exactly which levels of each tool work with DB2 UDB for z/OS Version 8, then go to the Support page for the tools. Then click Technotes (FAQs) and search for items that include V8 and PTF. Select the item DB2 Data Management Tools and DB2 for z/OS V8.1 Compatibility. This table provides the minimum maintenance required for DB2 Tools to support DB2 for z/OS V8. The Support page has a wide range of other detail about these products.

New Redbooks:

✓ **Design Guidelines:
High Performance and
Availability SG24-7134**

✓ **Data Integrity
SG24-7111**

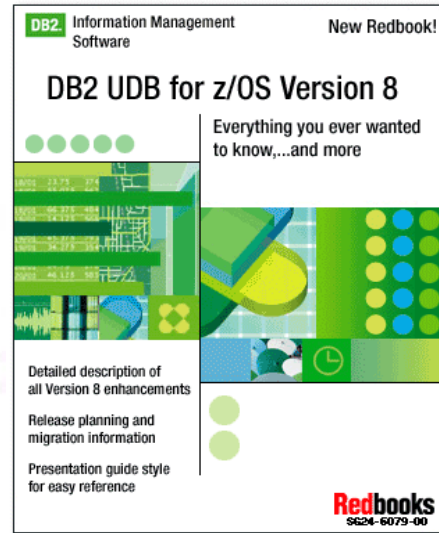
✓ **Business Value
SG24-6480**

✓ **MLS & DB2
SG24-6480**

✓ **Disaster Recovery,
SG24-6370**

✓ **Others updated**

ibm.com/redbooks



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These new IBM Redbooks are on the web. Check Redbooks and drafts. Here are the URLs for

DB2 UDB for z/OS: Design Guidelines for High Performance and Availability

<http://www.redbooks.ibm.com/abstracts/SG247134.html?Open>

Performance Topics:

<http://www.redbooks.ibm.com/abstracts/sg246465.html?Open>

Business Value

<http://www.redbooks.ibm.com/abstracts/SG246763.html?Open>

MLS and DB2:

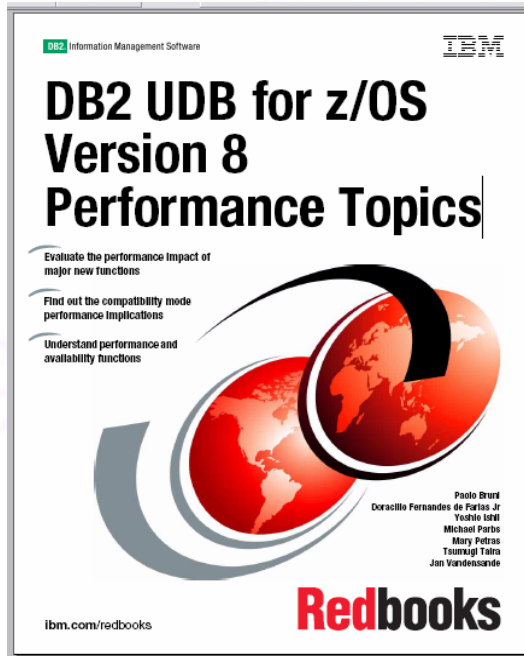
<http://www.redbooks.ibm.com/abstracts/SG246480.html?Open>

Disaster Recovery

<http://www.redbooks.ibm.com/abstracts/SG246370.html?Open>

For all recent updates, start on the Support page, click on Redbooks, sort by date – newest first

<http://www.ibm.com/software/data/db2/zos/support.html>



**Performance
Details**

Measurements

Service

472 pages

Updated Feb 2006

78

This new IBM Redbook is on the web now, with the detail about Version 8 performance. Check the web, Here are the URLs for Performance Topics:

<http://www.redbooks.ibm.com/abstracts/sg246465.html?Open>

<http://www.redbooks.ibm.com/redbooks/pdfs/sg246465.pdf>

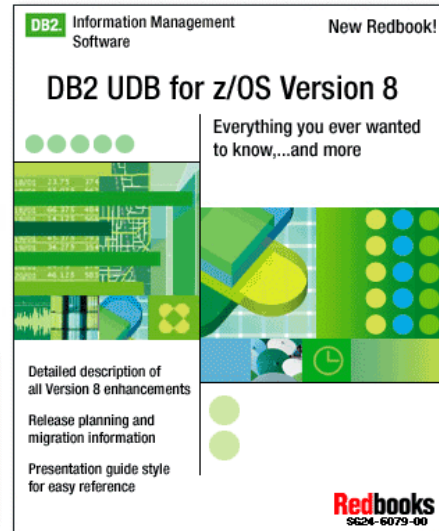
For all recent updates, start on the Support page, click on Redbooks, sort by date – newest first

<http://www.ibm.com/software/data/db2/zos/support.html>

www.redbooks.ibm.com/redbooks/pdfs/sg246079.pdf

New Redbooks

- ✓ Everything: Detailed descriptions, about 1100 pages, Presentation Guide style
- ✓ WebSphere SG24-6319



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This new IBM Redbook introduces the many enhancements made available with DB2 UDB for z/OS Version 8. It will help you understand the enhancements, and provides information to help you to evaluate the applicability to your environment. This book will help you plan for the installation of DB2 V8 or the migration from DB2 V7, with the Library. The pdf version of the book has already been updated several times, with the last on April 11, 2005. Watch for more updates.

<http://www.redbooks.ibm.com/redbooks/pdfs/sg246079.pdf>

<http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg246079.html?Open>

DB2 for z/OS and WebSphere: The Perfect Couple is SG24-6319.

<http://publib-b.boulder.ibm.com/abstracts/sg246319.html?Open>

<http://www.redbooks.ibm.com/redbooks/pdfs/sg246319.pdf>

www.ibm.com/developerworks/db2/zones/porting/

The screenshot shows the IBM DeveloperWorks website page for "Porting to DB2 UDB". The page includes a navigation menu on the left with categories like DB2, eServer, Lotus, Rational, and WebSphere. The main content area has a heading "Porting to DB2 UDB" and a sub-heading "Technical resources and roadmap". Below this, there are tabs for "Overview", "Porting steps", and "Resources". The "Overview" tab is selected, and the text describes the purpose of the site: to help users find information on porting applications and data from other database management systems to DB2 UDB. It mentions that porting and migration steps are described in the order they are commonly performed. A large graphic at the bottom of the main content area shows a red arrow pointing to "DB2 UDB" with the text "Porting to".

There is extensive help for porting to DB2 UDB on the web, with suggestions for the process and many resources, including a migration toolkit. The dramatically improved DB2 family compatibility in DB2 for z/OS V7 and V8 makes porting to DB2 UDB for z/OS from Unix or Windows platforms much easier.

<http://www.ibm.com/developerworks/db2/zones/porting/>

Here is the URL for the main DeveloperWorks page

<http://www.ibm.com/developerworks/db2/>

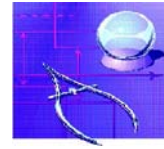
There is also a DeveloperWorks page on DB2 for z/OS.

<http://www.ibm.com/developerworks/db2/products/db2zos/>


For migration information for specific databases, try

<http://www.ibm.com/developerworks/ondemand/migrate/db.html>

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Compatibility Mode Optimization

- What are the optimization improvements in CM?
- Warnings: This might be wrong. It might change.
 - Indexable predicates
 - IS NOT NULL indexable
 - Most of star join
 - Cost formula improvements
 - Backward index scan
 - RUNSTATS improvements
 - In list

A customer asked whether to rebind in CM, NFM or both. Many of the optimization gains are provided in CM, but some are only available in NFM. My advice is to rebind some of the plans and packages in CM to get the performance improvements, but then to stage in a rebind of all plans and packages in V8 NFM. Note that this list of function has not been tested, so it very possible to be incorrect. It is also possible that later change add, subtract or qualify this list. For example, see APAR PK12389, which moved indexable predicates from NFM to CM.

New Function Mode Optimization

- What are the additional optimization improvements in NFM?
- Warnings: This might be wrong. It might change.
 - Materialized Query Table (MQT)
 - Informational Referential Integrity
 - New index options: DPSI, cluster, not padded
 - Star join in memory work file
 - IS NOT DISTINCT stage 1
 - REORGed DB2 catalog
 - Multirow fetch (not really optimization)

These are notes on the additional optimization improvements possible with new function mode (NFM). This information may not be correct and can change. It has not been specified in formal documentation and is not part of the testing.

New SQL is not supported in DB2 for z/OS V8 running in compatibility mode (CM). At least one optimization improvement is not provided in CM, the ability to use an in memory work file for star joins.

The biggest improvements for optimization are provided with materialized query tables and the new index options. Index only access depends upon the NOT PADDED option for indexes. The new IS NOT DISTINCT predicate is stage 1 and indexable, while the prior construct included OR logic, which made it stage 2. It is possible to REORG the DB2 catalog before moving to V8, but many customers have not done so.

CF Level	Function	G3	G4	G5	G6	z800	z900	z890/990
14	CFCC Dispatcher Restructure							x
13	DB2 castout processing performance enhancements					x	x	x
12	64-bit CFCC addressability Message Time Ordering DB2 Performance SM Duplexing support for zSeries CFs Toleration for LPAR id >15 on z9xx					x x x x x	x x x x x	x x x x x
11	SM Duplexing support for 9672 G5/G6/R06 Toleration for LPAR id >15 on z9xx			x x	x x			
10	z900 GA2 Level						x	x
9	Intelligent Resource Director IC3 / ISC3 / IC33 peer mode MQSeries Shared Queues WLM Multi-System Enclaves			x x x	x x x	x x x	x x x	x x x
8	Dynamic ICF Expansion into shared ICF pool Systems-Managed Rebuild	x	x	x x	x x	x x	x x	x x
7	Shared ICF partitions on server models DB2 Delete Name optimization	x	x	x x	x x	x x	x x	x x
6	ICB & IC TPF support	x	x	x x	x x	x x	x x	x x
5	DB2 cache structure duplexing DB2 castout performance improvement Dynamic ICF expansion into shared CP pool	x x x	x x x	x x x	x x x	x x x	x x x	x x x
4	Performance optimization for IMS & VSAM RLS Dynamic CF Dispatching Internal Coupling Facility IMS shared message queue extensions	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
3	IMS shared message queue base	x	x	x	x	x	x	x
2	DB2 performance VSAM RLS 255 Connectors / 1023 structures for IMS Batch DL1	x x x	x x x	x x x	x x x	x x x	x x x	x x x
1	Dynamic Alter support CICS temporary storage queues System logger	x x x	x x x	x x x	x x x	x x x	x x x	x x x

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See the web for more detail about Parallel Sysplex and Coupling Facility levels:

<http://www.ibm.com/servers/eserver/zseries/pso/>

<http://www.ibm.com/servers/eserver/zseries/pso/cftable.html>

Session C03

Planning Your Migration
to Version 8

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GoFurther

