Planning Your Migration to DB2 9 for z/OS

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Platform: DB2 for z/OS

This presentation will discuss migrating to DB2 9 and preparing to use it. We'll emphasize recommendations from many other customers and items that tend to be missed, with pointers to more information. The content of this session focuses on the tasks of the person who installs DB2. Systems programmers and database administrators generally perform this task.

At this point, the beta announcement for DB2 10 was made February 9, 2010. The general availability announcement has not been made, so this is not an available product. We have used the code name DB2 X for z/OS up to this point.

See the web for current information, the announcement, …

http://www.ibm.com/software/data/db2/zos/db2-10/

http://www.ibm.com/common/ssi/rep_ca/5/877/ENUSZP10-0015/ENUSZP10-0015.PDF

http://www.ibm.com/support/docview.wss?uid=swg27017960

http://it.toolbox.com/blogs/db2zos/db2-10-for-zos-beta-announced-today-36790

http://www.ibm.com/developerworks/spaces/db2zos

http://davebeulke.com/?p=625

Migration Staging

- Migration planning:
  - Education for planning, Plan to educate
  - Detailed project plan and communications
  - Install prerequisites
  - Find and fix incompatibilities
  - Plan virtual and real storage
  - Plan performance
- Migration: monitoring and tuning
- Implementation
  - Using new improvements to deliver value

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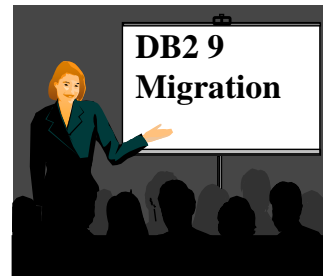
DB2 9 Migration

The primary stages of migration to a new version are planning, migration and implementation of the new improvements. This presentation will focus on the planning.

The key items are making sure that everyone is educated, with what they need to succeed. A detailed project plan and communication to all involved are crucial for success. Some of the preparation can occur very early, understanding, obtaining and installing the prerequisites. Applications can make needed changes over a longer period to make the process easier and less costly. Plans for monitoring virtual and real storage as well as performance are necessary. An early health check, communication of the needed changes and staging of the work will make the project more successful.

Why Migrate to DB2 9 for z/OS?

- Business needs to save money
  - Reduce CPU time & disk space
  - Improve business agility
  - Service Oriented Architecture
- Application developers need
  - PureXML for a powerful SQL and XML interface to XML data
  - Powerful new SQL enhancements
  - Portability with SQL and data definition compatibility
- Database Administrators need
  - Improve availability and performance
  - More flexible security and easier regulatory compliance
  - Better web application & data warehouse function and performance
  - LOB function, performance, usability

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DB2 9 has a lot for everyone. Here are just a few of the strategic highlights.

The business needs include CPU cycle reductions that deliver in most utilities, disk space reduction from index compression, improved query optimization, improved business agility via faster implementation cycles, and new pureXML™ that builds a strong foundation for SOA and XML initiatives. Kevin Campbell, an Application Architect at Univar USA said it better than I can, "This is not a bolt-on or band-aid approach, DB2 9 for z/OS is XML without compromise."

Database Administrators (DBAs) need improved database availability and performance including LOBs, reorganization, backup and recovery, and partitioning enhancements. DBAs also get more flexible trusted network context and role-based security to help with regulatory compliance. A wide range of enhancements improve ERP application and data warehouse functionality and performance. Large object (LOB) function is added with file reference variables and REORG, while performance is improved.

Application developers are most excited by PureXML, which adds a powerful SQL and XML interface to access XML data stored in a native format. Application developers need powerful new SQL enhancements including MERGE and TRUNCATE statements, INTERSECT and EXCEPT set operations, and spatial support for geographical data. Text handling is improved with the XML changes, many new built-in functions, and an upcoming text server. Improved SQL and data definition compatibility with other DB2 platforms makes porting much easier.

Common Challenges: DB2 for z/OS Migration

❑Code page check and correction (V8)

❑Current product and tool support

    ❑Old COBOL or PL/I or tools

❑Cleaning up incompatible change

❑Real and virtual storage

    ❑Commit intervals, Calls, …

❑Plan, monitor and manage performance

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. V8 does add some old compiler capability, but DB2 9 is not expected to handle obsolete products.

•Omegamon V4 is needed for DB2 9. See detail later.

❑Cleaning up 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.

- Migration process enhancements: ENFM shorter, CM*
- Much less performance regression:
  - Earlier improvements
  - Bind stability & tools for avoiding access path issues
- CCSIDs and old product issues resolved in V8
- Simpler virtual storage considerations
- Less impact from incompatible changes
- Earlier deliveries from vendors

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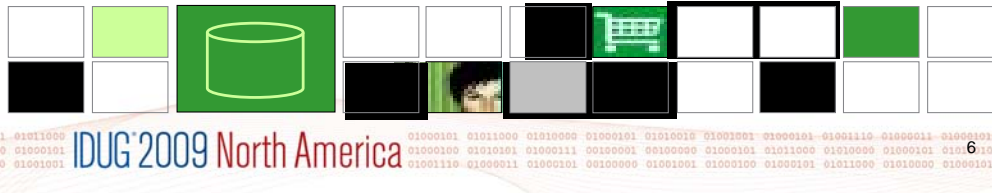
DB2 9 migration has been easier for many customers and tends to be faster than DB2 V8. Many customers note that the process and the quality are solid.

Migration process enhancements

ENFM is shorter (10 minutes versus an hour), as only two table spaces need to be reorganized in this phase (versus 18 in V8 including the largest ones).

Drop back to CM* if needed (no single steps without a drop back).

Much less performance regression

More consumable performance improvements

Utility CPU improvements in CM

Bind stability to reduce concern about access path regression.

CCSIDs and old product issues resolved in V8 migration, not a problem.

Simpler virtual storage considerations – incremental improvements.

Less impact from incompatible changes

Many vendors are ready today.

DB2 9 for z/OS climbing sharply

- Largest Customers are migrating
  - 50% of top 100   40% of top 200
- How's the quality (comparison to V8)?
  - Lower overall PMR volume
  - Less Severity 1 APARs
  - Lower PE rate
- V8:
  - 100% of the top 100 Customers
  - More than 99% of the top 200 Customers
  - Better quality than V7
  - Withdrawn from market Sept 8, 2009
- V7 out of service June 30, 2008   target is V8

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Now that DB2 9 has been generally available in the field for over two years, let's compare with V8 at the same point. For almost all of the key quality measures, DB2 9 is better. The most important issue for many customers is PTFs in Error (PEs), and the rate is lower on DB2 9. The PMR volume is lower and the number of field severity 1 problems is lower. V7 was widely regarded as a high quality version, and DB2 V8 total field experience is better than V7, with DB2 9 as the best of the three.

Some customers are still migrating to DB2 for z/OS Version 8. The largest DB2 customers have moved to Version 8. All of the largest 100 customers are running Version 8, and large customers are implementing DB2 9 development.

Part of the improvement in overall quality measures is due to more rigorous testing. Some of the improvement is due to the reduced amount of new function added in the service stream. Still these numbers represent the averages, and we know that our customers are not average. Individual customer results are highly skewed, so the average numbers might not reflect your individual experience.

DB2 V7 is now out of service after seven years of general availability. If you are still there, it is time to move now.

Best Practices/Recommendations

- **Start with latest RSU + Identified Hipers**
- **Leverage CST/RSU process**
  - Apply 2 to 3 preventative service drops annually
  - Exploit Enhanced HOLDDATA to be vigilant on HIPERs and PEs
- **Use the DB2 9 'Package Stability' function for static SQL**
  - Offers access path preserving option. Recovers to prior access path if regression is encountered
    - PK52523 - DB2 Access Path Stability
- **Minimize potential query performance issues**
  - Use Optimization Service Center to capture SQL statements
  - Run Stats Advisor to generate the recommendation for stats collection
  - Run RUNSTATS to ensure critical stats are collected as recommended by the advisor
- **Ensure a PMR is opened prior to migration start**

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As you migrate to DB2 9, some of the best practices and recommendations can help you have a better experience. The CST process is being used successfully by most customers. The current service level recommendation is to get to RSU0903 and some specific identified HIPER APARs as a minimum level.

The DB2 package stability or access path stability function has been very helpful with customers who have access path regression in getting back to the old access paths. This process is noted in John Campbell's presentation and many others.

The best techniques for minimizing potential access path issues are to

Use the Optimization Service Center (OSC) to capture the SQL statements and related information. You can start using OSC on V8 to get the needed information and to help tune your queries.

Run the statistics adviser to generate the recommended statistics to be collected.

Get current RUNSTATS data, so that the DB2 9 optimizer is using DB2 9 statistics. Get the statistics noted in the item above.

Work with your DB2 advisor to get current information and help. The Migration Project Workshop is a proven technique for transferring skill. Get other presentations from the web and from conferences to help with knowledge. Terry Purcell's presentations are among the best for access path information.

http://www.ibm.com/support/docview.wss?rs=865&context=SSEPEK&uid=swg27015988

DB2 9 – So where do I go from here?

- **No need to fear DB2 9 migration; but be cautious & thoughtful**
  - Ensure good planning, staying reasonably current on preventative service and application regression testing
  - Follow best practices/recommendations
  - PMR opened
  - Trends are improving!
- **Procedural upgrade easier**
- **Every customer experience is different**
- **Compared to V8?**
  - Lower overall PMR volume
  - Less Severity 1 APARs
  - Lower PE rate
  - Lower HIPER rate

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The majority of customers are current today, and use of the older versions is dropping sharply. Running on supported levels of software is less expensive and less risky. There is a high degree of geographic skew in the number. The majority of customers are running DB2 V8, but customers are moving to DB2 9 in substantial numbers. One third of the largest 100 customers are using DB2 9. About 27% of the largest 200 customers license DB2 9.

Some customers are still migrating to DB2 for z/OS Version 8. The largest DB2 customers have all moved to Version 8. All of the largest 100 customers are running Version 8, and large customers are implementing DB2 9 development.

DB2 V7 is now out of service after seven years of general availability. If you are still there, it is time to move now, and DB2 V8 should be the target.

If customers are interested in seeing experiences from other customers, one of the best opportunities is John Campbell's webcast. The slides and audio are on the web.

ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/migration/
  v9-early-migration-experience-iod-2008-campbell.pdf
  v9-early-migration-experience-iod-2008-campbell.mp3

Most consumable DB2 9 improvements

- CM very little to no action:
  - Optimization Service Center, Data Studio and Optim Query Tuner
  - Utility CPU reductions
  - Archive log striping, compression
  - Larger prefetch, write & preformat quantities
  - LOB performance
  - DDF VSCR
  - Index lookaside
  - Changed online REORG

- Package stability
- Improved RUNSTATS
- Optimization improvements, EDMPOOL VSCR, increased parallel & zIIP

NFM
- LOB lock avoidance
- Logging for data sharing
- Improved index leaf page split
- Reordered row format, native SQL
- Index: larger page sizes, compression, index on expression

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Here are some highlights for items that deliver the most quickly and easily:

Very little to no action is required for the utility CPU reductions, logging improvements, improved index page split, larger prefetch, write & preformat quantities, some LOB performance, DDF virtual storage constraint relief. The first group delivers in CM.

The next items require some work. Changed online REORG and other utility improvements require process changes and use of SHRLEVEL(CHANGE).

Improved RUNSTATS statistics needs some analysis to determine where the value is greater than the cost of gathering the new statistics.
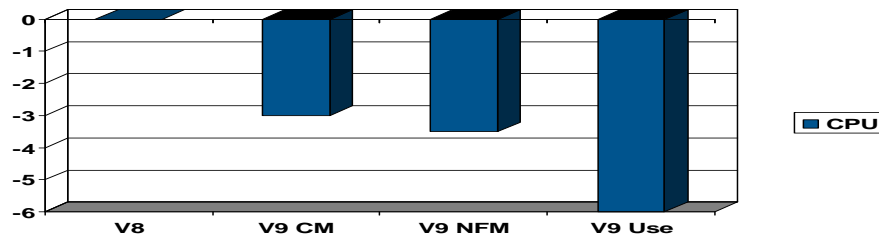
Optimization improvements are automatic for dynamic SQL, but require work to REBIND for static SQL. In both cases, we need baselines to check for regression. REOPT(AUTO) for dynamic SQL needs analysis to be sure the improvement is working. EDMPOOL virtual storage constraint relief also requires a REBIND.

Optimization Service Center takes some learning, but should be fast for those who have used Visual Explain in the past. See the new redbook, SG24-7421, DB2 9 for z/OS: New Tools for Query Optimization.

LOB lock avoidance requires a quiesce of all subsystems in NFM until APAR PK62027. Reordered row format requires a REORG in NFM and varying length columns, and use with small columns can reduce compression. See APARs.

Index improvements for larger page sizes, compression, index on expression require database design work to determine where they are applicable. ALTERs, REORGs and creation of new indexes are needed.

DB2 9 z10, z9, z890 & z990 performance scenario

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The Worldwide DB2 User Community

| CPU |

(chart axis: 0, -1, -2, -3, -4, -5, -6; categories: V8, V9 CM, V9 NFM, V9 Use)

Utilities   DB design adjustments
Histogram statistics   Index improvements
REBIND   application changes
DSNZPARMS   native SQL procedures
                                  SQL adjustments

Your situation will vary. Less CPU is better.
z800 and z900 expect +5% to +10% CPU

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If you have a z9, z990 or z890, this is expected to be a common shape for a DB2 9 performance plan, starting with zero for the V8 baseline. When you first move to DB2 9, total DB2 CPU time generally decreases from 0% to 5% for z9, z890 and z990 customers, shown here as a first step -3%. Utility CPU reductions help immediately. Some work will be about the same (+/-3%). Start with reorgs and collect improved histogram statistics when useful. The DB2 9 CM performance plan REBINDs the primary packages and adjusts DSNZPARMs. The REBINDs provide most of the improved access paths. On z800 or z900 the initial cpu expectation is +5 to +10% regression, more if there are many columns, so making adjustments is more important.

In moving to NFM, some additional DSNZPARMS are adjusted and all plans and packages are rebound. The DB2 9 use line takes wider advantage of DB2 9 performance improvements. Database designs start taking advantage of new indexing options, such as compression, index on expression and larger pages. After making the design changes, REORG the data and REORG or REBUILD the indexes, get the improved statistics and REBIND. Native SQL procedures, added use of zIIP, and improved SQL continue the improvements in this phase.

Scenario: Customer mix of DB2 CPU time is 30% in utilities, 70% in SQL access. With 10% improvement for the utilities, we get a -3% net, assuming that SQL is the same as before. With optimization improvements, another -½% improvement shows up in DB2 9 NFM. Then as design adjustments, reorgs and rebinds are performed, we get improvements from varchar improvements, native SQL procedures and improved SQL, another -3%.

DB2 10 for z/OS: Skip-Level Migration

May move from V8 to DB2 10…..
        but just because you can, doesn't mean you should….

 Key considerations:

• May not see large migration cost savings
  • Expect 20% to 25% cost savings versus two migrations
  • Larger migration project, longer migration timeline, more risk
  • Applications and ISVs may not be ready
• Typical customer timeline based on GA +3 years
  • Won't get DB2 9 or DB2 10 value until end of 2014+

If you are on V7 or earlier, go to V8

If you are on V8 for over 2 years, go to DB2 9

If you plan to migrate in 2010 or 2011, go to DB2 9

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DB2 10 supports migration from DB2 9 NFM or from V8 NFM. Customers not yet running V8 or DB2 9 should plan to migrate to DB2 for z/OS V8 NFM as preparation for a migration to DB2 10. DB2 10 is in beta now, not yet generally available.

Normal migration is moving one version at a time every three years. For customers who have gotten behind, the ability to skip a migration cycle will be attractive, but this ability is not "something for nothing". Customers need to consider the tradeoffs and challenges that we know about in skip version migration. Most customers who migrate to new versions by three years after GA are already on DB2 9.

The project for skipping is larger. While the testing and rollout are only a little larger than a single version migration, the education and remediation work is roughly double the normal size. Most project plans estimate 150%. Consider the timing carefully. Improvements in DB2 9 are delayed for 2 to 4 or more years with a skip plan.   You may need to have extended service on V8.

Customer migration paths:
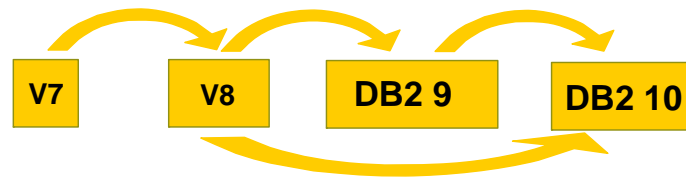
Skip DB2 9 is possible, but most customers will go to DB2 9

  Estimate save 20% to 25% vs 2 steps

  Reasonable timing to skip

  Value in DB2 9 deferred until then

  When will applications add support for 10?   Drop 8?

Skip versions V5 → 7, V8 → 10, not every version

Do you want to migrate from V8 to DB2 10? The first question is the objective in terms of time you expect to save. The next questions are timing and service. Do you want support? DB2 10 will probably become generally available in 2010. When can you migrate to it? DB2 V8 end of marketing is Sept 2009. Migrating to DB2 9 is faster, easier and smoother now.

We have experience with skip release migration. We did provide skip level migration from V5 to V7, but not for any other recent releases. The ability to skip helps some customers who have not installed recent versions, but this work tends to help a minority of the DB2 customer base. The key question for skipping DB2 9 is, "How long can you wait for that function?" If you are on DB2 V8 today, how long after GA do you wait before moving to a new version? Support for the new version in applications and tools can delay the process. Waiting for others to deliver success stories adds more time. If you wait three years after GA, then you could start moving to DB2 10 in 2014, and probably get there about a year later. I expect DB2 V8 to be out of support before that, so you would probably have additional expense for extended service.

The savings for skipping a version migration are less than 50%, since the education and needed application and administration changes are about the same. Customers who do skip migration reported that the project takes longer, taking about 50% more work than a normal migration path. Changing from DB2 V8 or before to DB2 10 would require a cultural shift that some describe as culture shock. If customers spend the bulk of their migration project time in testing, then savings could be up to 40%, but most customer plans should show 20% to 25% reduction over two migrations. The cost for skipping is primarily later delivery of DB2 9 improvements by two to four years. Do you need the improvements in DB2 9 before that? CPU savings, especially in utilities. Disk savings via compression for indexes. Improved insert and update rates. Improved SQL and pureXML for developer productivity. Better availability.
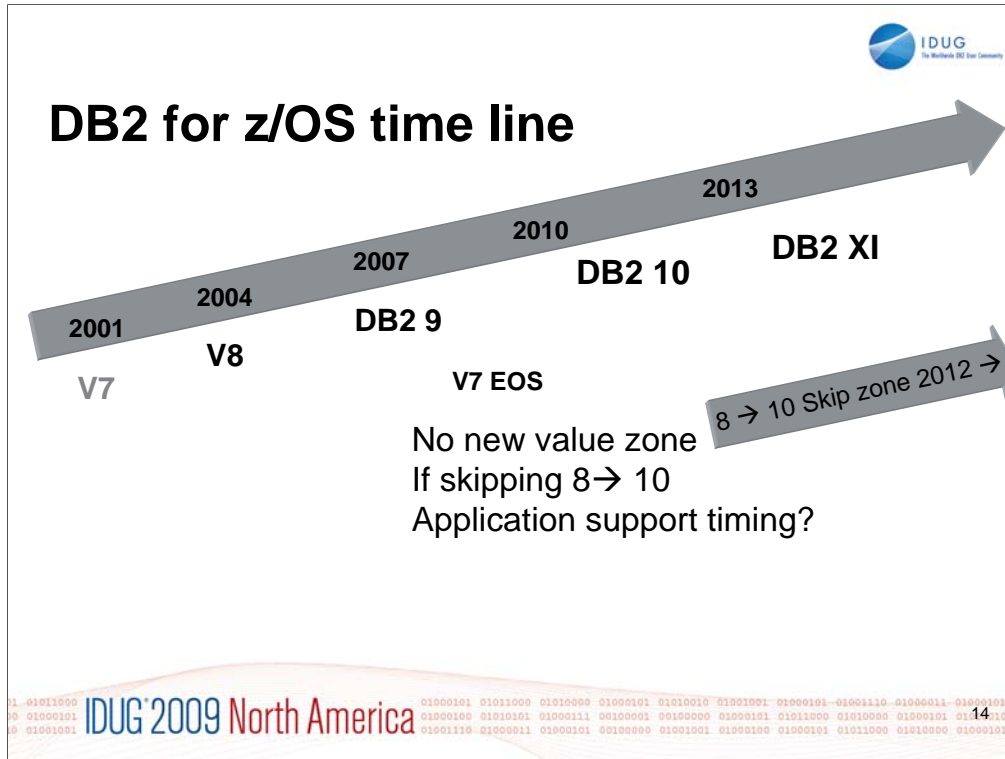
The key question for skipping DB2 9 is, "How long can you wait for that function?" If you are on DB2 V8 today, how long after GA do you wait before moving to a new version? Is it one year? Two? Or three? In those cases, you'll start moving to DB2 10 in 2011, 2012 or 2013, and probably get there about a year later.

The savings for skipping a version migration are less than 50%, since the education and needed changes are about the same. If customers spend the bulk of their time in testing, then savings could be up to 40%, but most customer plans should show 20% to 25% reduction over two migrations. The cost for skipping is primarily later delivery of DB2 9 improvements by three or four years.

Do you need the improvements in DB2 9 before that? CPU savings, especially in utilities. Disk savings via compression for indexes. Improved insert and update rates. Improved SQL and pureXML for developer productivity. Better availability.

For customers who are still running V7, the option to skip V8 → 10 is very attractive and makes the current path clear. Customers who have just migrated to V8 may like this alternative for the short term.

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Availability, Scale & Resiliency	More Online Schema Changes	➲	Business Flexibility
	Volume Level Backup & Recovery	➲	Faster, Cheaper, Granular Recovery
Compliance & Security	Database Roles & Trusted Context	➲	Efficient Auditing & Compliance
Easier Application Development	PureXML	➲	Streamlined Data Integration
OLTP & Warehousing	Query Optimization	➲	Highly Available, Secure Data
Reduce Cost of Ownership & Skills	Index Compression	➲	50% Disk Savings

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DB2 9 allows more online schema changes and utilities that allow concurrent access. The BACKUP SYSTEM and RESTORE SYSTEM capabilities are improved.

Improved granularity for security and better network security come in DB2 9.

XML has become pervasive, and delivery in DB2 improves productivity while it avoids more data integration projects for the future.

DB2 9 is the best warehouse delivery in DB2 for z/OS ever, with improved SQL, optimization and surrounding products.

Index compression can reduce the disk space for indexes by half.
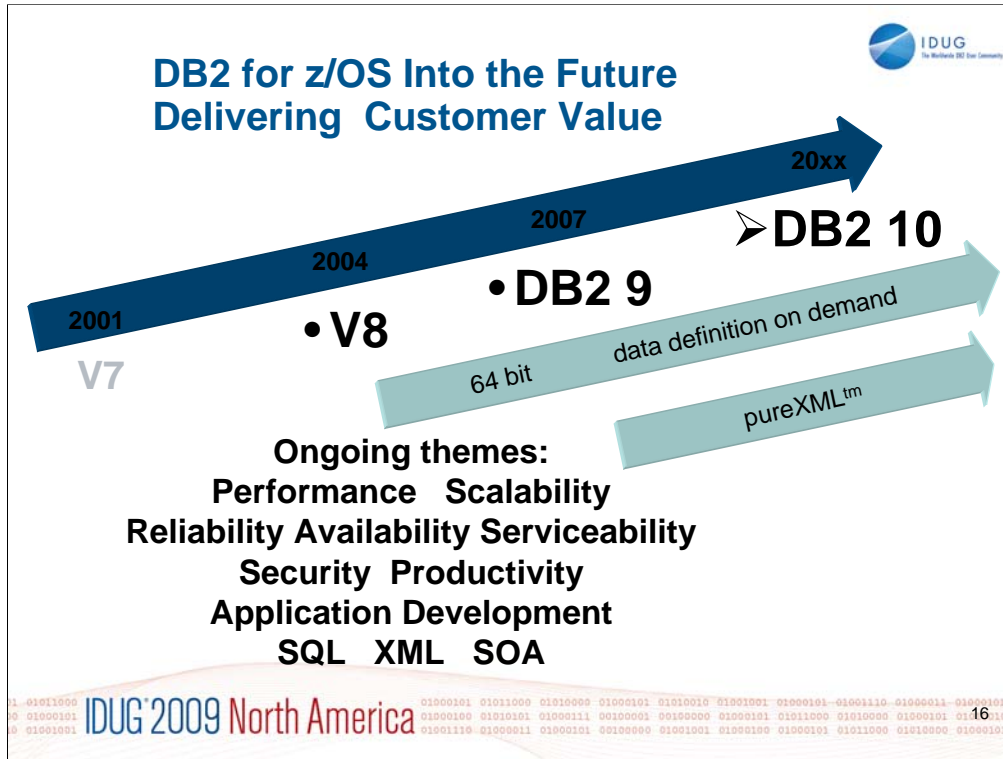
DB2 for z/OS V7 became generally available (GA) March 2001, and V8 delivered three years later, March 2004. DB2 9 became generally available in March 2007, three more years. We expect the DB2 10 to start beta three years after DB2 9 GA. The themes for future versions will continue to focus on core platform strengths of performance, scalability, reliability, stability, availability, resilience, and security. PureXML and Schema evolution or data definition on demand will be ongoing for a long time. In contrast, most of the 64 bit evolution should be completed in DB2 10..

The key interfaces for customers and vendors expand for both XML and for SQL. Information is a key leg of the SOA platform, and DB2 for z/OS provides many advantages for data management in SOA.

Standards, interoperability, portability and security along with secure access using the latest technologies are key touch points. Productivity improvements for application developers and for database administrators are very important as data grows in scale and complexity.
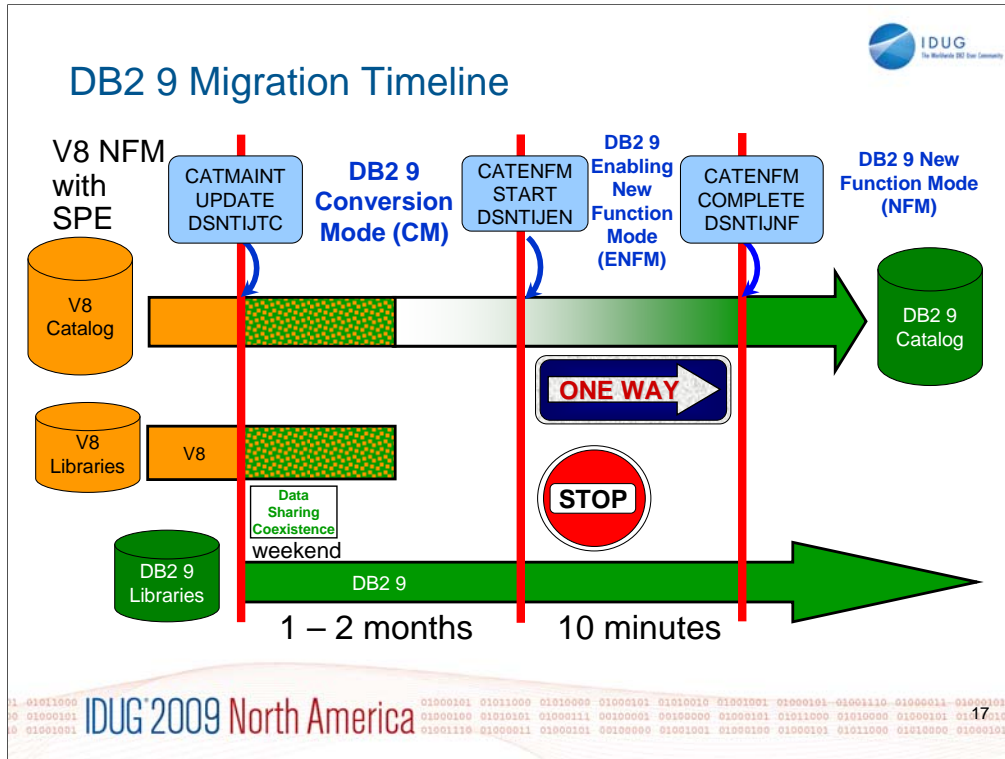
The time line is not to scale. Customers should spend only a few minutes in ENFM and then move immediately to NFM.

The ONE WAY situation is a bit more flexible, with more opportunity to drop back. There are two new modes to denote drop back processes. You can drop back from NFM to ENFM as before, but the label for the drop back mode is now ENFM*. It is also possible to drop back from ENFM or NFM to CM*, but not to V8 or to coexistence.

DB2 9 Migration Alternative →　SAP
Straight Through to NFM, No fallback
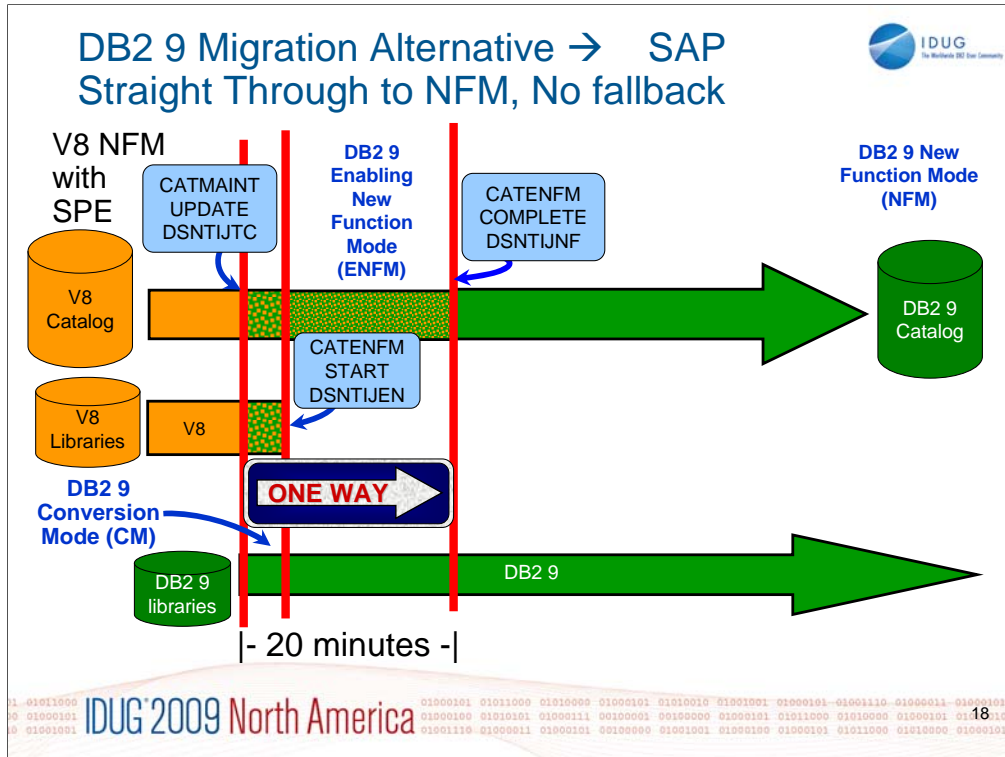
Some customers, such as those who use SAP, will use an alternative migration process, migrating immediately from V8 to DB2 9 NFM. This process means that fallback to V8 is not possible, so thorough testing is needed. The advantages are
• single window for the migration
• test in only one mode, NFM
• faster delivery of improved value in performance, function and availability
Some vendors, such as SAP, use this process. Customers who cannot allow multiple windows for migration need to consider this alternative and the work and controls needed to migrate while processing continues. This process is like cooking Chinese cooking, three minutes to cook, after three hours of preparation. If you do months of planning and testing, ensure that you don't need to fall back, then the steps can be compressed from two to one.

ENFM and NFM Considerations

Attention: You cannot return to the prior version once you enter ENFM.
Do NOT move to ENFM until you are certain that you will not need to return.

STOP!
THINK!

HOWEVER
The code base for DB2 9 ENFM and NFM is the same as for CM.
You can return to CM* from ENFM or NFM if necessary.

In DB2 V8, you cannot return to CM when you get to ENFM. In DB2 9, you can return to CM* from ENFM. We have heard a lot of concern about this step which does not have an easy reversal, but have never experienced a problem that could be resolved by this return. It still makes the process easier to explain as always being able to get back to the prior state or a reasonable facsimile thereof.

DB2 9 migration continues the best practice migration technique, with small, safe steps. Every step can be backed off. Customers move first to conversion mode, and can move back to V8 from there. The next step, ENFM, changes the catalog, and customers can go back to CM* from there. The * is our note that the subsystem has moved before. The customer can move to NFM and then can go back to ENFM* or even to CM*.   Most customers move directly to NFM at the end of the 10 minute ENFM, so there are two steps to the process.

CM Conversion Mode (previously called compatibility mode) - This is the DB2 mode DB2 9 migrated from V8 and is started for the first time. It will still be in CM when migration job DSNTIJTC has completed. Very little new function can be executed in CM. Data sharing systems can have V8 and DB2 9 members in this mode, called coexistence. Coexistence should be very short, such as a weekend or a week. DB2 can only migrate to CM from V8 NFM. This mode is not compatibility, but the ability to fall back. We try to move most (but not all) problems for migration from NFM to CM, so that fallback can be used, if necessary.
ENFM Enabling New Function Mode - This mode is entered when CATENFM START is executed (the first step of job DSNTIJEN). DB2 remains in this mode until all the enabling functions are completed. Data sharing systems can only have DB2 9 members in this mode.
NFM New Function Mode - This mode is entered when CATENFM COMPLETE is executed (the only step of job DSNTIJNF). This mode indicates that all catalog changes are complete and new function can be used.
ENFM* This is the same as ENFM but the * indicates that at one time DB2 was at NFM. Objects that were created when the system was at NFM can still be accessed but no new objects can be created. When the system is in ENFM* it can not fallback to V8 or coexist with a V8 system.
CM* This is the same as CM but the * indicates that at one time DB2 was at ENFM and possibly NFM. Objects that were created in NFM can still be accessed. When DB2 is in CM* it can not fallback to V8 or coexist with a V8 system. Functionally, CM* is very similar to ENFM.

DB2 9 builds upon the structure from V8 The modes are almost the same, but DB2 9 clarifies the situation if you drop back after moving to ENFM or NFM. There are two more modes with names CM* and ENFM*, and the restrictions are clarified a little more. The process is very similar to the best practice that successful customers have used for years. It is possible to move from NFM or ENFM to CM*.

While the first mode was labeled as "Compatibility Mode" or CM, it is not compatible. CM does help with the conversion, but the incompatibilities have been moved to this mode, where possible, since fallback is simple from this stage. This change removed problems in moving to ENFM and NFM.

I think of NFM as New Value Mode, the opportunity to deliver the value of the new version.

New functions are available only in new-function mode, unless explicitly stated otherwise in the product documentation. A few general exceptions exist for utilities and for optimization. The following specific improvements are available in conversion mode:

• Logging improvements

• DSN1COMP index compression estimate

• Larger prefetch, write and preformat quantities

• LOB performance other than LOB lock avoidance

• Commands: REFRESH, DISPLAY, START, STOP, & MODIFY TRACE qualifications and ACCESS DATABASE.

• Virtual storage use above the 2 GB bar DDF & EDMPOOL (when bound)

• Package BIND stability (PLANMGMT & EXCHANGE)

• Optimization improvements (when bound)

• Optimization Service Center & Optimization Expert (work with V8 if PTFs are applied)

• Utility CPU reductions and most other utility improvements that do not depend on SQL changes. See the following slide and web for detail.

• http://www.ibm.com/support/docview.wss?rs=64&uid=swg21307783

DB2 9 has many utility enhancements available in both Conversion Mode (CM, previously called Compatibility Mode) and New Function Mode (NFM), Some exceptions are only available for NFM, and not for CM.

Utility enhancements available in both CM and NFM are:
- Parallel unload, reload and log apply processing by the REORG utility
- Removal of the BUILD2 phase for REORG at the partition level
- Log Phase addition for REORG SHRLEVEL REFERENCE PART
- REORG SHRLEVEL REFERENCE for LOB table spaces
- CHECK INDEX SHRLEVEL REFERENCE with Parallelism
- Histogram Statistics for RUNSTATS
- CHECK LOB SHRLEVEL CHANGE
- CHECK DATA SHRLEVEL CHANGE
- REPAIR LOCATE SHRLEVEL CHANGE
- REBUILD INDEX SHRLEVEL CHANGE
- MODIFY RECOVERY support for the RETAIN option
- Object level recovery from a system-level backup by the RECOVER Utility
- BACKUP SYSTEM & RESTORE SYSTEM system-level backups to tape
- Skipping locked rows for transaction updates by the UNLOAD Utility
- TEMPLATE switching support based on size for image copy datasets

Other Utility enhancements are only available for DB2 9 NFM, such as...
- LBI (large Block Interface) support for sequential datasets on tape
- Recover to Point in Time (PIT) with consistency (defaults as new behavior)
- Clones effectively provide LOAD REPLACE SHRLEVEL CHANGE
- Online Load (LOAD RESUME YES SHRLEVEL CHANGE) without logging can be accomplished by altering the table space to NOT LOGGED, running the Online Load, altering the table space back to LOGGED, and taking an image copy.

Migration Planning Workshop

- **Understand breadth of features in DB2 for z/OS**
- **Bring together a toolbox of resources for your migration planning**
- **Explain the current migration process**
- **Bring a project focus to migration**
- **Remain relevant through GA life of the product**
  - **Updated with field experiences**

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What is the Migration Planning Workshop (MPW)? • This offering enables customers to understand the breadth of features delivered in DB2 for z/OS versions. • Many resources are brought together in a single offering. • The migration process is explained. • Leave the session with materials that you can use to start your installation / migration immediately, or in the future. • Your questions are given attention, typically in a small group setting. While most MPWs are small, multi-company events, they can be delivered for individual companies or even user groups.

Who should attend? An MPW contains content that is appropriate to: • Application Developers • Database Administrators • System Administrators • Architects • IT decision makers • Project Managers

The morning session provides information for all parties. The afternoon is more migration focused, and therefore a better fit for Database Administrators, System Administrators, and Project Managers. A typical agenda provides a DB2 9 for z/OS Overview in the morning and DB2 9 Migration (• Preparations • Planning • Process) in the afternoon.

What you can expect? • An understanding of the features delivered with DB2 9 and how they can benefit your enterprise. • Clarity of the migration process. • References for many subjects, including: Migration, Fallback, Prerequisites & preparations. You will leave with Presentation materials, Checklists, Project plan framework, Related documentation, Networking and Contacts.

- Short time for data sharing coexistence
- One to two months for conversion mode
  - ► Not able to use most new performance, function
- Minutes 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

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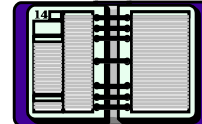
In the past we have recommended a short time for data sharing coexistence, and that is still true. A short period for ENFM is also recommended highly. Support from vendors may affect the migration staging. One concern for conversion mode is that most new performance improvements cannot be used, and some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

Premigration Activity **...**
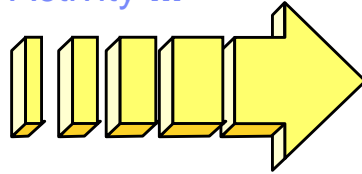
- Find problems with incompatibilities
  - ►It is important to look at these now because many have actions that you must address before migrating.
  - ►Get the complete list from the Installation Guide (Get the latest from the web).
  - ►Use V8 job DSNTIJP9   APAR PK31841, PK45981, PK61841, PK65772, PK73081
  - ►Use job DSNTIJPA   APAR PM04968

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.

Install Prerequisite Software

- Prerequisites and Functional Needs
  - ✓ All products need to be at proper maintenance level (prior DB2 release too)
    Migration & Fallback SPE APARs PK11129, PK33664, PK39850, PK38799, PK44884
  - ◆ Ensure that you apply all hiper APARS, PE fixes
  - ◆ Use the DB2 Program Directories, the Installation Guide, PSP (preventative service planning), web & Info APAR **II14401 II14464**
  - ◆Other software ...Talk to your Vendors
  - ◆z/OS R7 R8 R9 R10 R11 R12
  - ◆Job DSNTIJPM or DSNTIJP9 or DSNTIJPA
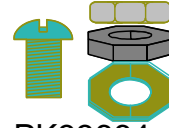
You need to know what functions will be used first. Many functions have additional prerequisites. Read the section of Release Guide carefully to see if you need to upgrade other software. The most successful policy is to keep software at similar levels. z/OS should be current & in service. Some functions need later releases. z/OS V1R7 is minimum for DB2 9 and the minimum in service today.

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 Directories:
http://www.ibm.com/software/data/db2/zos/library.html

http://www.ibm.com/software/data/db2/zos/v9books.html

For detailed product dependencies and incompatibility descriptions, see
•Application Programming and SQL Guide (APSG)
•Installation Guide
•Program Directories
•Web page for DB2 9 books:
http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656
•Release incompatibilities are divided into incompatibilities in conversion mode and incompatibilities in new-function mode and are documented in lists in two separate sections in the Installation Guide. Here are links to the two topics that contain these lists:

Parent topic for conversion mode incompatibilities:

Changes to DB2® that might impact your migration to DB2 9 conversion mode:

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.db29.doc.inst/dmigcn2.htm

Parent topic for new-function mode incompatibilities:

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.db29.doc.inst/dmigcn2.htm
Conversion considerations:
The Installation Guide section is about 18 pages long. Some of the items expected to be the most common are noted here, but your database administrators and application programmers should review the full list, as some practice might be common at your shop.
Application programmers should review the entire section in the APSG, about 9 pages long, with the primary changes that are anticipated to require changes. The following slides have the highlights.

DB2 9 removed function

- ➢ DB2-managed stored procedures → WLM-managed SPs
- ➢ Create simple table space → create segmented or partition by growth
- ➢ Temp databases & table spaces → work files
- ➢ Very old plans and packages (V3 and before) → REBIND
- ➢ AIV Extender → Content Management
- ➢ Text, Net Search Extenders → new text search
- ➢ Net.Data → WebSphere, REXX, command line proc., …
- ➢ DB2 Estimator → capacity planning products
- ➢ Visual Explain → Optimization Service Center, Data Studio
- ➢ Old JDBC / SQLJ driver → Current driver
- ➢ Java stored procedures → non-resettable JVMs
- ➢ Online help → Information Center
- ➢ Parameters removed RELCURHL, DBPROTCL, STORPROC, …

DB2 9 for z/OS supports migration only from V8 NFM. Customers not yet running V8 should plan to migrate to DB2 for z/OS, V8 as preparation for migration to DB2 9. IBM added many data server capabilities in DB2 9 for z/OS and reduced or removed support for some functions: AIV Extender is removed. Text Extender is removed. Net Search Extender is removed. Net.data, which was stabilized at the V7 level, is removed. WebSphere is the strategic IBM solution for delivering DB2 data to Web applications. For some situations a scripting language, such as REXX or the Command Line Processor which comes with DB2 9 can provide the needed function. DB2 Estimator, available via Web download for DB2 V8, will not be provided for DB2 9 for z/OS.
DB2-managed stored procedure support is removed. Workload Manager (WLM) managed stored procedure address spaces is the strategic solution for stored procedure support. Simple table space creation support is removed. DB2 9 for z/OS no longer implicitly creates simple table spaces nor allows customers to create simple table spaces. However, DB2 9 for z/OS continues to support simple table spaces created in previous versions.
The Online help facility is replaced, replaced by the Information Management Software for z/OS Solutions Information Center (Information Center).   JDBC/SQLJ Driver for OS/390 and z/OS support is removed. All Java application programs and Java routines that are currently written to work with the JDBC/SQLJ Driver for OS/390 and z/OS need to be modified to work with the IBM DB2 Driver for JDBC and SQLJ (formerly known as the DB2 Universal JDBC Driver). Java stored procedures no longer run in resettable JVMs.
Plans and packages must be rebound on DB2 9 to benefit from optimizer enhancements. Plans & packages DB2 V3 & before, will be automatically rebound when accessed by DB2 9. See the Installation Guide section "Functions that are no longer supported" for more information and additional items. Temporary databases move to work files, authorization needs to be permitted on the work files.

DB2 9 deprecated function

- Private protocol → DRDA (DSNTP2DP, PK92339, PK64045)
- Plans containing DBRMs → packages PK62876 PK79925
- ACQUIRE(ALLOCATE) → ACQUIRE(USE)
- DB2 catalog → DB2 managed, SMS managed, no links, more LOBs, more table spaces, no SPT01 compression
- XML Extender → XML type
- Old plan tables → V8 | 9 format (59 cols, Unicode) PK85068
- DB2 MQ XML user-defined functions and stored procedures → XML functions
- DB2 Management Clients feature (DB2 Administration Server, Control Center, & Development Center) → IBM Data Studio application & administration services
- msys for Setup DB2 Customization Center → install panels
- BookManager use for DB2 publications → Info Center, pdf
- Simple table spaces → segmented or partitioned by growth

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The above features are still included in DB2 9 and may be dropped from future versions. Note the direction indicated to the right of the arrows, as these are the functions provided to replace the existing function. If you are using any of these functions, you are advised to move to the new function. For plan table format upgrades, use the Optimization Service Center or see the ALTERs in edited sample member DSNTESC.

See the Installation Guide section, "Functions that are deprecated" and the announcement material for more information on these changes.
http://www.ibm.com/common/ssi/rep_ca/8/897/ENUS206-098/ENUS206-098.PDF

- Private protocol: Convert to DRDA.
- EXPLAIN tables prior to Version 8 format: Alter add cols.
- Plans containing DBRMs. Acquire allocate. Old packages.
- DB2 catalog tables are DB2-managed & SMS-managed. No links. More LOBs & table spaces. No SPT01 compress.
- REORG TABLESPACE SHRLEVEL NONE on LOB table spaces. Use SHRLEVEL CHANGE or REFERENCE.
- DB2 MQ XML functions: Use pureXML functions.
- DB2 XML Extender: Use pureXML.
- DB2 Management Clients feature, Control Center
- msys for Setup DB2 Customization Center
- Some subsystem parameters removed, many changed
- XDBDECOMPXML and XDBDECOMPXML100MB
- Accessories Suite parts Optimization Service Center, Developer Workbench, Visual Explain for DB2 → Data Studio

No longer supported, moving from DB2 9
Private protocol: Convert to DRDA.
EXPLAIN tables prior to Version 8 format: Alter tables to add the needed columns.
Plans containing DBRMs. Plans will contain packages, which have the DBRMs. Use the COLLID option of REBIND to make the needed changes. Acquire allocate is not a supported BIND option any longer. Use acquire use. Plans and packages should be rebound on current releases to benefit from optimizer enhancements. Packages from DB2 V5 or earlier will be automatically rebound when accessed by DB2 10.
DB2 catalog tables are DB2-managed and SMS-managed. Catalog and directory tables do not have links, but have more LOBs and more table spaces. Compression for table space SPT01 is not supported.
REORG TABLESPACE SHRLEVEL NONE on LOB table spaces. Use SHRLEVEL CHANGE or REFERENCE.
DB2 MQ XML functions: Use pureXML functions.
DB2 XML Extender: Use pureXML.
DB2 Management Clients feature is no longer available. Control Center does not support connections to DB2 10.
msys for Setup DB2 Customization Center no longer supported. Use installation panels instead. Several subsystem parameters
• Annotated XML schema decomposition using XDBDECOMPXML and XDBDECOMPXML100MB
• Accessories Suite will no longer include Optimization Service Center component and the Data Studio Workbench feature. Visual Explain for DB2 for z/OS is not available for DB2 10. The recommended query optimization and service tools for DB2 for z/OS are Optim Query Tuner and Optim Query Workload Tuner. The recommended no-charge query optimization and service tool for DB2 for z/OS is Data Studio (http://www.ibm.com/software/data/studio/). These tools are based and built on the foundation of Optimization Service Center and Optimization Expert.

• Private protocol: Convert to DRDA.
• EXPLAIN tables prior to Version 8 format: Alter add columns.
• Plans containing DBRMs. Acquire allocate. Old packages.
• DB2 catalog tables are DB2-managed & SMS-managed. No links. More LOBs & table spaces. No SPT01 compress.
• REORG TABLESPACE SHRLEVEL NONE on LOB table spaces. Use SHRLEVEL CHANGE or REFERENCE.
• DB2 MQ XML functions: Use pureXML functions.
• DB2 XML Extender: Use pureXML.
• DB2 Management Clients feature, Control Center
• msys for Setup DB2 Customization Center
• Some subsystem parameters removed, many changed
• …

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No longer supported. This list is about twice as long as the DB2 9 list.

Private protocol: Convert to DRDA.

EXPLAIN tables prior to Version 8 format: Alter tables to add the needed columns.

Plans containing DBRMs. Plans will contain packages, which have the DBRMs. Use the COLLID option of REBIND to make the needed changes. Acquire allocate is not a supported BIND option any longer. Use acquire use. Plans and packages should be rebound on current releases to benefit from optimizer enhancements. Packages from DB2 V5 or earlier will be automatically rebound when accessed by DB2 10.

DB2 catalog tables are DB2-managed and SMS-managed. Catalog and directory tables do not have links, but have more LOBs and more table spaces. Compression for table space SPT01 is not supported.

REORG TABLESPACE SHRLEVEL NONE on LOB table spaces. Use SHRLEVEL CHANGE or REFERENCE.

DB2 MQ XML functions: Use pureXML functions.

DB2 XML Extender: Use pureXML.

DB2 Management Clients feature is no longer available. Control Center does not support connections to DB2 10.

msys for Setup DB2 Customization Center no longer supported. Use installation panels instead.

Several subsystem parameters are removed, and many change default values.

No longer supported in DB2 10 from V8: …

- Net.Data
- DB2-established stored procedures
- Old JDBC driver
- Pascal L string data type from VAX
- Creating simple table spaces
- QMF Visionary Studio
- DB2 Estimator
- BookManager help
- DB2 Extenders: AIV, text, Net Search
- Java stored procedures in resettable JVMs
- …

No longer supported …:

•Net.Data is removed. WebSphere is the strategic IBM solution for delivering DB2 data to Web applications.

•DB2-established stored procedure address spaces are no longer supported. Workload Manager (WLM) managed stored procedure address spaces is the strategic solution for stored procedure support, and migration to WLM managed stored procedure spaces is required for use of stored procedures in DB2 10.

•JDBC/SQLJ Driver for OS/390 and z/OS is no longer supported. All Java application programs and Java routines that are currently written to work with the JDBC/SQLJ Driver for OS/390 and z/OS need to be modified to work with the IBM DB2 Driver for JDBC and SQLJ (formerly known as the DB2 Universal JDBC Driver). The steps for migrating JDBC and SQLJ applications from the legacy JDBC/SQLJ Driver for OS/390 and z/OS to the IBM DB2 Driver for JDBC and SQLJ can be found in the Application Programming Guide and Reference for Java (SES1-3023). In addition, all WLM-managed stored procedures address spaces that are set up to execute Java routines must be modified to reference the IBM DB2 Driver for JDBC and SQLJ.

•Connections from VAX machines and the PASCAL L string data type are no longer supported.

•Creation of simple table spaces is no longer supported. DB2 10 for z/OS no longer implicitly creates simple table spaces nor allows customers to create simple table spaces. However, DB2 10 for z/OS continues to support simple table spaces created in previous versions.

•DB2 QMF Visionary Studio program is removed from DB2 QMF Enterprise Edition.

•DB2 Estimator is not available for DB2 10.

•BookManager-based online help has been removed. The prior help support has been replaced by the Information Management Software for z/OS Solutions Information Center (Information Center). The web-based Information Center is updated periodically during the life of each DB2 version, thus ensuring reader access to the most up-to-date information.

•AIV Extender, Text Extender, and Net Search Extender are removed.

•Java stored procedures no longer run in resettable JVMs.

Deprecated, may be removed from later versions:

- Simple table spaces
- Partitioned table spaces other than universal table spaces
- DSNHDECP load
- NEWFUN(YES) and NEWFUN(NO)
- DSNHPC7 precompiler
- EXPLAIN stored procedures
- …

All of these lists are much longer, see book for details.

Deprecated and may be dropped from future versions: This list is for all customers on any version, but note items removed as well.

Simple and partitioned table spaces other than universal table spaces are deprecated. Use alter in new function mode to convert single-table table space to universal.

Some current use of DSNHDECP is deprecated. If you have code that loads DSNHDECP and maps it with macros, you should plan to change that code by using the new techniques. Customers who want to have one library for multiple DSNHDECP modules need to make this change.

SQL processing options NEWFUN(YES) and NEWFUN(NO) options are deprecated. Use NEWFUN(V10) rather than NEWFUN(YES). Use NEWFUN(V9) or NEWFUN(V8) rather than NEWFUN(YES).

The DSNHPC7 precompiler is deprecated. Use the current precompiler or coprocessor.

DB2 9 migration process changes, APARs

- ➤ Enterprise PL/I change JCL error DSNTEP2   PK63659
- ➤ Rebind required for V3 and earlier plans & packages
- ➤ Best process is rebind all in CM or NFM, top 10% in CM
  - ➤ Highly recommended to rebind all V8 and below
- ➤ PDSE is required for SDSNLOAD. PDSE service needed.
- ➤ Premigration job DSNTIJP9 APAR PK31841 ..PK61841
- ➤ SPE PK11129, PK33664, PK39850, PK38799, PK44884
- ➤ Info APARs: Install **II14401**, **II14464**, DDF **II14203**,
  XML **II14426**, Unicode II13048 & II13049, zIIP II14219,
  DFSORT II14047, II14213 & II13495, Performance II13579,
  Storage II10817,   Parallel II12836, LOBs **II14334**, DSNUTILS
  sec. id. II13133, Coprocessor II13782, PDSE II14067, II14255,
  II14403, Incorrout **II14441,** send dumps II11945, …

All DSNTEP2 programs on any version can be affected by a PL/I run time change, if the JCL does not reflect LRECL=133. This was being overridden by the DCB, but will be an error. A temporary bypass is available in PK63659, so the JCL problems need to be fixed.

Plans and packages must be rebound on DB2 9 to benefit from optimizer enhancements. DB2 V3 and earlier plans & packages will be automatically rebound when accessed by DB2 9. A much better process is to rebind all plans on the new version. If there is not adequate time to rebind in DB2 9 CM, see if you can rebind the most frequently accessed packages. If any plans have not been bound on V8, rebind them.

PDSE is documented as required on V8, but some customers noted that a PDS could be used (as long as the largest load module remained under 16MB). The PDSE is the only option for DB2 9, as there are program objects and larger load modules.

The premigration job DSNTIJPM on DB2 9 is shipped as DSNTIJP9 in APAR PK31841 for V8. Running this job on every subsystem helps find the work needed before migration. The SPE for DB2 9 is PK11129 and PK33664 on V8. Get all the service in this chain.

There are many useful information APARs. These are the ones I use the most. For secondary ids used with DSNUTILS, read II13133.

DB2 9 default and process changes

➢BIND ISOLATION defaults to CS.   Query catalog RR
  ➢ Not changed for distributed, REBIND
➢BIND CURRENTDATA defaults to NO.   Query Yes.
  ➢ Not changed for REBIND
➢DB2-managed data set secondary extent allocation default YES, even for migration
➢Work files → much more 32K space needed, avoid small files
➢Varying length data change row format PK78958, PK78959
➢DB2 disables DATA CAPTURE CHANGES for SYSROUTINES during migration (DSNTIJTC) and SYSPACKSTMT during ENFM (DSNTIJEN) PK72214
➢Need to find and complete or delete incomplete definitions
➢Online REORG processes change
➢Configure shared virtual storage (128 GB for each DB2)

The default value for bind option CURRENTDATA changes from YES to NO for the BIND PLAN and the BIND PACKAGE subcommands, as well as the CREATE TRIGGER for trigger packages, and the CREATE PROCEDURE and the ALTER PROCEDURE ADD VERSION SQL statements for SQL PL procedure packages. CURRENTDATA NO is the best option for performance. The default value for bind option ISOLATION is changed from RR to CS for the BIND PLAN and the remote BIND PACKAGE subcommands. For the BIND PACKAGE subcommand, the current default (plan value) stays. The default change does not apply to distributed. Although you can specify DBPROTOCOL(PRIVATE) for the DBPROTOCOL parameter of the BIND option, DB2 issues a new warning. All BIND statements for plans and packages that are bound during the installation or migration process specify the ISOLATION parameter explicitly, except for routines that do not fetch data. The current settings are maintained for compatibility.

DB2-managed data set secondary extent allocation default setting is YES and is changed by installation CLIST from NO to YES. In migration mode, the input migration value for this field is overridden to YES, so you need to reset it to NO if you want to continue to disable secondary extent optimization. Define much more 32K space, moving over from 4K.

REORG and LOAD REPLACE utilities automatically convert table spaces to a new reordered row format (RRF) if there is no VALIDPROC or EDITPROC. If you use the REORG SHRLEVEL CHANGE utility, you might need to change your operating procedures if you run concurrent REORG TABLESPACE SHRLEVEL CHANGE PART x on the same table space. Configure 128 GB of shared virtual storage for each DB2 subsystem on the MVS image for memory shared between DB2 DDF and DBM1.

Key details about DB2 10: getting ready

Prerequisites: migrate from DB2 9 for z/OS or DB2 for z/OS V8
- z/OS V1.10 SMS-managed DB2-managed DB2 catalog
- System z10, z9, z890, z990, and above (no z800, z900)
- DB2 Connect 9 FP1, 9.7 FP3 for many 10 functions, FP2 beta
- IMS 10 & 11 (not 9)   CICS   compilers   (See announcement)
- SPE PK56922 PK69411 PK61766 PK85956 PM04680 PK87280 PK87281
- Premigration check DSNTIJPA PM04968

Items deprecated in earlier versions eliminated: more for V8 mig.
- Private protocol → DRDA   (DSNTP2DP, PK92339, PK64045)
- Old plans and packages V5 or before → REBIND
- Plans containing DBRMs → packages   PK62876 PK79925 (V8)
-     ACQUIRE(ALLOCATE) → ACQUIRE(USE)
- Old plan table formats → DB2 V8 or 9, Unicode, 59 cols PK85068
- BookManager use for DB2 publications → Info Center, pdf

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Here are a couple of thoughts about what might be required in hardware and software to run DB2 10. Much will depend upon the timing of the deliveries and market acceptance. Moving forward as quickly as possible means that some of the past must be left behind. See the list of deprecated functions from prior versions.

The above functions are still included in DB2 9, but are generally deprecated and may be removed from future versions. Note the direction indicated to the right of the arrows, as these are the functions provided to replace the existing function. If you are using any of these functions, you are advised to move to the new function.

See the Installation Guide section, "Functions that are deprecated" and the announcement material for more information on these changes.

http://www.ibm.com/common/ssi/rep_ca/8/897/ENUS206-098/ENUS206-098.PDF

Convert plans with DBRMs to packages

- Convert from DBRMs in PLAN to packages
- Specify the collection id for the packages
- REBIND plan option: COLLID
- Default collection id
  DSN_DEFAULT_COLLID_planname
- Able to specify plan name, list of plans, *
- APAR PK62876 ptf UK43291 DB2 9
- APAR PK79925 ptf UK51238 V8
- See Packages Revisited book
  SG24-7688 chapter 4

DB2 9 for z/OS:
Packages Revisited

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PK62876 PK79925 (V8) BIND changes for eliminating acquire(allocate), plans with DBRMs
•New Rebind plan option: COLLID(collection_id|*): Trigger DBRM to Package conversion by specifying collection ID for the packages, which are converted from DBRMs.
•REBIND PLAN(X) COLLID(*). "*" is the default value as: DSN_DEFAULT_COLLID_X (X is the plan name)   This command will allow customer to convert DBRMs bound with plan X into packages under collection ID: DSN_DEFAULT_COLLID_X automatically.
• REBIND PLAN(x) COLLID(collection_id):   CollID option is used if user intends to convert DBRMs bound with plan x into packages. As shown in this example: users can specify collection id as y for the new packages converted from DBRMs. If there are both DBRMs and package list in plan x, newly converted package entries will be inserted into the front of the existing packagelist. Same behavior applies to *, but using DSN_DEFAULT_COLLID_X instead of letting user specify.
• REBIND PLAN (X1, X2, X3) COLLID (collection_id|*)   Rebind multiple plans which may contain DBRMs.   Bind all Plans specified here in SYSPLAN table, and do conversion, until no plans specified here have DBRMs bound within.
• REBIND PLAN (*) COLLID (collection_id|*)   All plans in SYSIBM.SYSPLAN table.
• REBIND PLAN (x) COLLID (collection_id|*) PKLIST(Z)   In this case: If plan has been bound with both DBRMs and package list, the DBRMs will be converted into packages, and the new entries will be inserted into the front of the existing package list.
• REBIND PLAN (x) COLLID (collection_id|*) NOPKLIST. Three cases :
•1. Plan x does not have DBRMs, then the existing pklist will be deleted. No other change required.
•2. Plan x only has DBRMs, DBRMs will be converted into packages accordingly, and NOPKLIST will be ignored.
•3. Plan x has both DBRMs and PKLIST, the existing pklist will be deleted, while the new pklist converted from the DBRMS will be bound into plan x.

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Convert private protocol to DRDA

- Trace to find use of private protocol
- Private protocol trace analysis program DSN1PPTP
- Use DRDA protocol REXX tool DSNTP2DP
- Private protocol statement checker DSNTPPCK
- Set PRIVATE_PROTOCOL parameter to NO
- Changes provided in base, PK92339, PK64045
- See Distributed book SG24-6952-01 chapter 5.2

DB2 9 for z/OS: Distributed Functions

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The changes to help remove private protocol deliver in the base for DB2 9 and in APARs PK92339 and PK64045 (open).

DB2 trace for IFCID 0157 provides the detailed information that you need. Programs are provided to analyze the traces, help convert and check.

When private protocol is removed, set the subsystem parameter PRIVATE_PROTOCOL to NO to prevent any future use of private protocol.

See the documentation updates in the APARs and the base as well as the new Distributed book, chapter 5.2 for information on using these facilities.

Old COBOL? Old programs? DSNHPC7

✓ Understand the options DB2 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 V4.2

→ Use old precompiler?

→ NEWFUN(V9 or V8)?

✓ Plan staging and Migrate

DB2 10 supports current Enterprise COBOL V3.4 and V4. Older 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, V3.3 was April 2007 so your target should be V4.2. For obsolete compilers, DSNHPC7 can help in some cases.

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/igy3mg40.pdf

Key questions and guidance are in the first chapter. Most customers will stage migration. Do you have Enterprise COBOL V4 or V3.4 now? Is that the release developers use? Old load modules are not a problem. 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 COBOL code that we expect to fail on the old compilers, although we have not tested. Programs that use the DB2 9 precompiler or coprocessor require current Enterprise COBOL V3.4 or V4.

http://www.ibm.com/support/docview.wss?rs=64&uid=swg21166881

Old PL/I?   Old programs? DSNHPC7

✓ Understand the options

➔ Compiler and Run-Time Migration Guide

➔ Run Old PL/I modules

✓ Set strategy & plan for Enterprise PL/I V3.9

✓ Support requires at least V3.7 now

➔ Use V8 precompiler?, NEWFUN(NO)?

✓ Plan staging and Migrate

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DB2 for z/OS supports only current PL/I compilers. Every compiler prior to V3.7 is out of service in 2010, including OS PL/I V2.3, IBM PL/I for MVS™ & VM V1R1.1, V2, and V3R1 to R6. For obsolete compilers, DSNHPC7 can help in some cases.

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

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

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

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 V3.8 or V3.9 now? Do developers use new ones? Old load modules are not a problem. 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&uid=swg21191789

DFSort and DB2 for z/OS Utilities Suite

➢V8 removed prerequisite for external sort product
➢V8 only uses DFSort: SORT, MERGE functions only
➢Sort 32K page & improve reliability & performance
➢DFSort is part of standard z/OS install
➢DB2 for z/OS Utilities Suite has license to use DFSort when invoked by Utilities
➢Must have access to DFSort R14 plus APAR PQ68263 applied. See Info APARs II14047, II14213 & II13495
➢DB2 9 requires APAR PQ92594
➢z/OS 1.10 DFSORT PARMLIB changes requires PK59399
➢Must update DB2 space statistics for sort space
➢DB2 DFSORT → zIIP needs z/OS 1.10 PK85856, V8 or 9 APAR PK85889

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The requirement for an external sort package was removed. You do not need a DFSORT license for use by DB2 for z/OS Utilities Suite V8. The base DB2 for z/OS has never used a sort product. 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. With 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. 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 open an ETR or PMR with DB2 Level 2 support, just as they do today for any other DB2 related issue. The DB2 V8 requirement for DFSORT R14 or above is described in the following places: URL for informational APAR II14047 describing DB2 use of DFSORT
DB2 Installation Guide (All manuals can be found at
http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656
DB2 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.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi?CTY=US&FNC=SRX&PBL=GI10-8566-03#

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Install Prerequisite Software

- **Functional Requirements for identified features and functions   e.g. DB2 Connect, clients**
  - ✓ See What's New in DB2?
  - ✓ Program Directories 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**
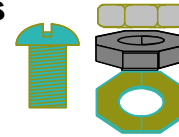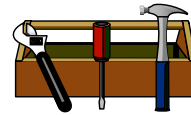
IBM and other vendor software must be checked for levels required and needed for the function you want. Some APARs require vendor changes. DB2 Connect: See next page and the web.
ibm.com/software/data/db2/db2connect/
Use IBM Consolidated Service Test levels to help provide a well tested set of products at a recommended service level.
ibm.com/servers/eserver/zseries/zos/servicetst/
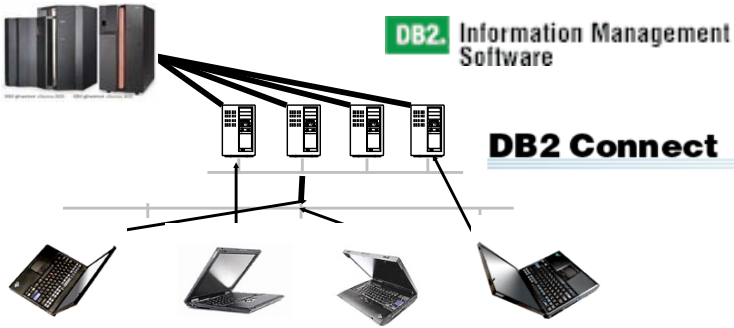
Customers who are relatively current on service encounter fewer problems overall. Refreshing the service level each quarter makes it easier to avoid encountering old problems.

DB2 9 and 10 require DB2 Connect 9 FP1
Recommended level is latest 9.7 fixpack 2 or 3

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

DB2 Connect V8.2
out of service
April 30, 2009

DB2. Information Management Software

DB2 Connect

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The recommended level for DB2 Connect is as current as possible to improve availability, resolve problems and deliver the changes needed in Java, stored procedure and web services environments. DB2 10 new function comes in 9.7 fixpack 2 and 3.

If you are moving to DB2 9 or DB2 10 for z/OS, then the minimum level is DB2 Connect 9 FP1.   If you are not at the minimum levels, then it's time to migrate to the most current level you can, DB2 9.7 fixpak 2 today. If you get current now, then migration to DB2 9 for z/OS will not encounter the same problem. So if a client is down level, then get it migrated to current.

If you have a specific set of problems, then you can check the fixpak levels to see where those problems are resolved. But then you still need to test to make sure that the problem is resolved without introducing any new ones. Later fixpaks generally resolve a lot more problems. If you are migrating, find a good one and move to that level. Running with code that is out of support or missing a few thousand fixes is problematical. DB2 Connect V7 and V8 are not supported, and generally do not work. We don't generally separate CM from NFM on our discussions of fixpaks.   Some new function comes in CM. See the web for fixpak information.

http://www.ibm.com/support/docview.wss?rs=56&uid=swg27007053
http://www.ibm.com/support/docview.wss?rs=71&uid=swg21255572
http://www.ibm.com/support/docview.wss?rs=71&uid=swg21256235

DB2 9 has been generally available for about 3 years now, and some new function has delivered in the service stream. Delivery in APARs is used when the need is urgent and the function can be delivered with a very small risk of disruption to existing customers. The delivery criteria become stronger as more customers move to the version. A text search server delivered in Accessories Suite 1.2 at the end of 2007. XML performance improvements and new XMLTABLE and XMLCAST functions are very important for early XML applications and consistency. Incremental FlashCopy makes use of the new z/OS capability. Trusted context enhancements are needed by early users. A new storage class parameter is needed when PPRC is used and is provided for online CHECK utilities.

ALTER TABLE ALTER COLUMN DROP DEFAULT extends the capability to ALTER a default. DB2 allows RESTORE SYSTEM recovery without requiring log truncation. Many new spatial functions deliver compatibility with the DB2 for LUW function. Changes come in DB2 to work with new fixpacks of OSC, OE and Data Studio. BIND stability changes deliver the capability to keep two or three versions of packages and the ability to switch from the current access paths to the older ones. This function can help you with regression from a REBIND.

Plans containing DBRMs, rather than using packages, are deprecated. That is to say we expect plans containing DBRMs to disappear some time in the future. To help with migration from DBRMs to packages, a change to BIND is shipped which can perform the conversion to packages.

The capability to copy a dictionary from one partition to another using the LOAD utility as added. APAR PK62027 avoids the need to quiesce the data sharing group to get the new LOB lock avoidance.

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- PK70060   work file separation for allocation, more to come
- PK92339 PK64045 BIND private protocol help
- PK87348 PK85881 … RRF parameter, utility keyword
- PK80925   -ACCESS command wildcards
- PK79228 PK79327 parameter group attach like V8
- PK72214   install stop change data capture
- PK49348   REOPT(AUTO) change
- PK85068   migrate plan tables to Unicode, current format
- PK80375   compress package directory table space SPT01
- PK81151   EAV for sequential data, requires z/OS V1.11
- PK85856 PK85889 utility sort use zIIP
- PK83072   64 bit ODBC
- PK75626   enable WLM bufferpool management
- PK91610   precompiler similar to V7
- PK83735   UTS performance

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DB2 9 has been generally available for about 3 years now, and some new function has delivered in the service stream. Delivery in APARs is used when the need is urgent and the function can be delivered with a very small risk of disruption to existing customers. The delivery criteria become stronger as more customers move to the version.

Rather than creating 60,000 databases implicitly, changes in PK62178 allow default to 10,000 and allow you to set the number.

If you want to pipe information to the LOAD utility, look at PK70269.

PK72214 changes install to stop changed data capture for catalog tables as needed, asking you to restart them after switching to DB2 9 and ENFM.

Changes are in process for the combination of compressed table spaces and RRF. Some customers with many short varchars, e.g. varchar(1) found that compression was not effective with RRF, so the default is changed to not convert to RRF.

-ACCESS only worked for specific names, but it's being changed to allow wild cards and ranges.

OPTIOWGT was generally recommended, and becomes the default with PK75643.

If you have multiple members of a data sharing group in a single LPAR and prefer the V8 group attach logic, parameters are added to control the random group logic.

Temporary Space
The DB2 V8 Picture

WORKFILE

Installation support (DSNTIJTM)

CREATE DATABASE xxx as WORKFILE … *

Define VSAM Dataset

CREATE TABLESPACE DSN4K01 IN xxx …

Work files

Created global temporary tables

TEMP

No installation support

CREATE DATABASE xxx as TEMP …

Declared temporary tables for SSC

Declared global temporary tables
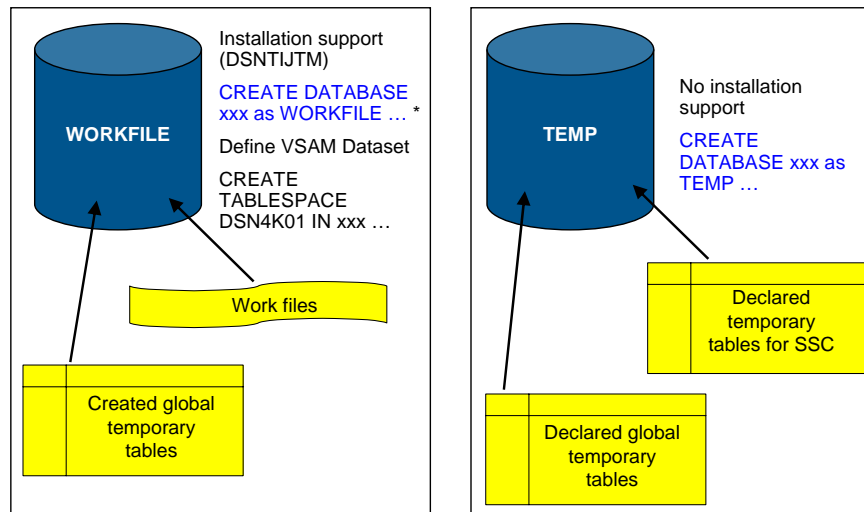
* Only in a data sharing environment – in non-data sharing syntax is CREATE DATABASE DSNDB07

The work file database is used by SQL statements that require working storage, includes statements that use:

GROUP BY or HAVING (without index)	IN (subselect)
ORDER BY (without index)	ANY (subselect)
DISTINCT (without index)	SOME (subselect)
UNION (except UNION ALL)	ALL (subselect)
EXISTS (subselect)	Some joins

Created Global Temp Tables

SORTs needed for processing SQL statements

Two databases for temporary files and temporary tables:

      WORKFILE database: created Global Temporary Tables

          Workfiles for SQL statements requiring sorts, view materialization, triggers, nested table expressions …

      TEMP database

          User-defined Declared Global Temporary Tables

          DB2-defined Declared Global Temporary Tables (for static scrollable cursors)

WORKFILE database

      Pseudo-segmented table space organisation (can't specify SEGSIZE)

      4KB and 32KB page size only

      Tables can span multiple table spaces (up to 254) with maximum size of 16TB (254 * 64GB)

      The number of tables used for DB2 sorts is limited only by buffer pool size.

TEMP database

      Segmented table spaces (user-defined SEGSIZE or default of 4)

      4KB, 8KB, 16KB and 32KB page sizes

      Tables cannot span multiple table spaces – maximum table size is 64GB

      Maximum number of tables per DB2 subsystem is limited to < 32K.

The number of work files that can be used for DB2 sorts is limited only by the buffer pool size. The WORKFILE database does not use global DBD management to assign and release table IDs. Each work file has its own local DBD, copied from the global DBD. ('Global' here means global within a single DB2 subsystem.) The global DBD has only the table space descriptor objects for each table space defined in the database. The work file's local DBD has the table space descriptors and the table descriptor for just that table which is associated with that work file. Since the DBD is not globally shared (within a DB2 subsystem), there is no limit to the number of tables in the WORKFILE database.

Temporary Space
The DB2 9 Picture

Created global temporary tables

WORKFILE

Declared global temporary tables

Work files

Declared temporary tables for SSC

Installation and migration support
(REXX program called by DSNTIJTM)

```
CREATE DATABASE xxx as WORKFILE;

DSNTWFG DB41 DB2ADM xxx +
        3 10 16 BP0 SYSDEFLT +
        1 20 16 BP32K SYSDEFLT
```

- Declared Global Temporary Tables and Static Scrollable Cursors now use the WORKFILE database instead of the TEMP database
- **Use DB2-managed (instead of user-managed) storage** in SYSDEFLT storage group
- Segmented table space organisation (user-defined SEGSIZE or default of 16)
- 4KB and 32KB page sizes only – no 8KB or 16KB, Much more 32KB
- Changes in PK70060, more coming

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DB2 9 for z/OS introduces the following enhancements to the management of temporary space:

The two temporary databases are converged, leaving a single database - the WORKFILE database – which is used as storage for all temporary files and tables, but preserving the current functionality of the temporary tables. This includes:

Discontinuing use of the TEMP database and switching the temporary tables that currently use the TEMP database to use the WORKFILE database.

Provide enhancements to the WORKFILE database to incorporate TEMP database features that are currently not in the WORKFILE database.

Provides control over temporary space utilization at the agent level, to prevent applications from monopolizing space usage at the expense of others.

Provides the ability to monitor temporary space utilization at the DB2 subsystem level, helping you to manage the space allocated to the work file database.

Provides support for in-memory work files for small sorts.

Cannot specify SEGSIZE in Compatibility Mode – preset value of 16 always used.

Tables can span multiple table spaces (up to 254) with maximum size of 16TB (254 * 64GB)

Created Global Temporary Tables can span table spaces (as before).

Declared Global Temporary Tables and Static Scrollable Cursor result tables cannot span table spaces (as before).

The number of work files that can be used for DB2 sorts is limited only by the buffer pool size. The WORKFILE database does not use global DBD management to assign and release table IDs. Each work file has its own local DBD, copied from the global DBD. ('Global' here means global within a single DB2 subsystem.) The global DBD has only the table space descriptor objects for each table space defined in the database. The work file's local DBD has the table space descriptors and the table descriptor for just that table which is associated with that work file. Since the DBD is not globally shared (within a DB2 subsystem), there is no limit to the number of tables in the WORKFILE database.

When migrating from DB2 V8, if you wish to reclaim the storage associated with your existing TEMP database, it is *YOUR* responsibility to drop the TEMP database and reallocate the storage for use by the WORKFILE database or something else. It is probably better not to DROP the TEMP database until you are sure that you will not be falling back to V8, to avoid having to recreate it after fallback.

Before DB2 9, the DB2 installation process defines user managed data sets for table spaces in the WORKFILE database. The Version 9 installation process generates the DDL to create table spaces in the WORKFILE database using DB2-managed storage in the SYSDEFLT storage group. If you want to allocate the WORKFILE table spaces on user managed data sets, then you need to provide your own AMS statements to define them, and modify the installation-generated DDL to specify the VCAT clause in place of the STOGROUP clause.

DSVCI ZPARM should be YES. This enables DB2 to create DB2-managed data sets with a VSAM control interval size that matches the page size for the table spaces. The fact that 8KB and 16KB page sizes are not supported means that Declared Global Temporary Tables and Static Scrollable Cursors require a table space with a page size of 32KB.

The syntax for the DECLARE GLOBAL TEMPORARY TABLE statement or for declaring a static scrollable cursor is not affected, but some messages are. Before defining a Declared Global Temporary Table, ensure that the WORKFILE database exists with at least one 32KB page size table space. DB2 does not create an implicit table space for Declared Global Temporary Table. If the workfile database does not exist, or if a table space of the required size does not exist, then the DECLARE GLOBAL TEMPORARY TABLE statement will fail SQLCODE -904 RC00E7009A – watch out for changed message text.

DB2 Developer Workbench → Data Studio → Optim Studio

before   *now*

IBM DB2 Developer Workbench V9.1
- SQL Query Editor
- SQLJ Editor
- SQL Builder
- XQuery Builder
- SQL Routine Debugger
- Java Routine Debugger
- XML Editor
- XML Schema Editor
- Data Management
- Visual Explain
- Project Management

Data Studio is a full replacement of DB2 Developer Workbench plus much more

- *DB2 for Linux, Unix, Windows v8.x, v9.1.x, v9.5*
- *DB2 for z/OS v7, v8, 9*
- *DB2 for i v5r2, v5r3, v5r4, v6*
- *Informix Dynamic Server (IDS) v9.x, v10.x, v11*

IBM Data Studio

- Integrated Query Editor – SQL + XQuery
- SQLJ Editor
- SQL Builder
- XQuery Builder
- SQL Routine Debugger
- Java Routine Debugger
- XML Editor
- XML Schema Editor
- Data Management
- Visual Explain
- Project Management

- ER Diagramming
- Data Distribution Viewer
- Object Management
- Browse & Update Statistics
- Security Access Control
- Connection Management integration with Kerberos and LDAP
- Data Web Services
- IDS Server Support
- Health Monitoring DB2 for LUW 9.5 and DB2 z/OS v9

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DB2 delivers many tools in the Developer Workbench. Now those tools and many more come with Data Studio, delivering with DB2 and Informix database management systems. The versions which come with Data Studio are generally the latest tools, with many improvements.

IBM Data Studio is for analysts, architects, designers, developers, and administrators who work across the entire data life cycle and across the full set of IBM relational DBMS: DB2 for LUW, DB2 for z/OS, DB2 for i and IDS. Rational provides support for the application life cycle, while the mission for Data Studio is the data life cycle. Almost every customer needs the Data Studio tools included with DB2, and many need the additional ones in the Data Studio portfolio.

DB2 is changing to deliver interfaces for this tooling, usually new stored procedures. See the IBM Data Studio web page for all the changes in IBM Data Studio. Watch closely, as this area is changing fast.

http://ibm.com/software/data/studio

Service Best Practice

Consolidated Service Test and the RSU

The Consolidated Service Test Mission

Our mission is to provide a consolidated, tested, and recommended set of service for z/OS and key subsystems on a quarterly basis with published results. This means that when you order your current service deliverable (ShopzSeries) you'll receive and install one recommended service package with a tested level of service for all these products.

How we do our testing

We test in a customer-like production sysplex environment in an IBM test lab and are continuously improving our CST test environment. We run batch and data-sharing applications that exploit and stress the latest functions with up to two levels of subsystems on three levels of z/OS systems. As we test, we observe how each product runs and how they interact in this environment. We report problems to the IBM Support Center. We have the following FMIDs installed on our systems. For more information about our environment, see our CST Quarterly Report.

We have a quarterly CST test cycle:

Use Consolidated Service Test

Recommended Service

Cross product tested levels Best practice for service: two or three per year

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

II14401 & II14464 install service

Consolidated Service Test provides a way to leverage more IBM testing and experience from many customers across a much broader set of products, including z/OS, IMS, CICS, DB2, WebSphere and many tools. This technique is working for very large, very small and in between customers. If you don't have an extensive test suite - like most customers, then this technique can help a lot in reducing research and finding a stable service level.

Effective June 15, 2007, the DB2 for z/OS Version 8 SUP tape is available world-wide for new customer orders. This SUP tape was built differently than prior SUPs, such that its build in May integrated PTFs COR-closed through December 2006, which had also completed a Consolidated Service Test (CST) cycle.   Once PTFs complete a CST cycle, they are assigned a Recommended Service Upgrade (RSU) status. Our DB2 for z/OS Version 8 SUP tape contains CST tested PTFs which were marked "RSU 0703" (they completed CST testing in March 2007). This SUP build integrated a total of 964 PTFs (the delta since our December 2005 SUP), which is nearly 1,000 fewer PTFs our new customers need to deal with during their DB2 V8 installation experience. For additional information on CST and RSU, please see: http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html

Installing two or three CST levels a year means more current service, but not too current. If you want a process that has proven track record for success and can reduce your work, then look at the CST. 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.

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**

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 dummy collection, 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.

To REBIND or not to REBIND

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

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To rebind or not to rebind, "When?" is the question: Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous access paths, Or to take arms against a sea of troubles, And by rebinding, end them? To die: to sleep; No more; and by a sleep to say we end the heart-ache and the thousand natural shocks that old plans are heir to. 'tis a consummation devoutly to be wished To die, to sleep. To sleep: perchance to dream: ay, there's the rub; For in that sleep of death what dreams may come when plans have shuffled off this mortal coil, must give us pause: There's the respect that makes calamity of so long life for old plans and packages; [Apologies to the Bard and to Hamlet 3.1.]

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 to the prior access 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. Use a tool or compare access paths 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 index use, joins, subquery transformations or UNION improvements. When you find a problem - errors or performance - the fix is often to REBIND. Best practice for migration is to test binds before migration & bind at migration time (comparing before and after). Use a tool for comparison and the task is simpler, but simple comparisons of cost estimates catch many problems.

http://www.ibm.com/support/docview.wss?rs=64&&uid=swg21078662

These APARs (PK52522 for preconditioning and PK52523) support the following function:

1. A new REBIND PACKAGE option called PLANMGMT that can be used to control whether REBIND PACKAGE saves old package copies. This option has three possible settings - OFF, BASIC and EXTENDED.

PLANMGMT(OFF) - No change to existing behavior. A package continues to have one active copy

PLANMGMT(BASIC) - A package has one active copy, and one additional old copy (PREVIOUS) is preserved.

PLANMGMT(EXTENDED) - A package has one active copy, and two additional old copies (PREVIOUS and ORIGINAL) are preserved.

Preserving old copies has no impact on query performance. However, using the PLANMGMT(BASIC) option can double the disk consumption in table space SPT01, and using the PLANMGMT(EXTENDED) option can triple it. The extra space is needed to maintain old copies. In addition, using the BASIC or EXTENDED option adds a 10-40% CPU overhead to the performance of the REBIND PACKAGE command.

2. A new system parameter called PLANMGMT for specifying the default setting of PLANMGMT option of REBIND PACKAGE. Possible settings are: OFF, BASIC and EXTENDED. The default value of this parameter is OFF. To use a setting other than OFF, update your DB2 9 subsystem parameter (DSNZPxxx) modules, then either use the SET SYSPARM command or stop and start DB2 for the change to take effect.

3. A new REBIND PACKAGE option called SWITCH to allow users to revert a package to an older copy, effectively undoing a prior REBIND invocation.

SWITCH(PREVIOUS) - The PREVIOUS copy is activated

SWITCH(ORIGINAL) - The ORIGINAL copy is activated

4. A new FREE PACKAGE option called PLANMGMTSCOPE to allow users to free older copies that are no longer necessary.

PLANMGMTSCOPE(ALL) - Free the entire package including all copies. This is the default.

PLANMGMTSCOPE(INACTIVE) - Free all old copies

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Package or BIND Stability PK52523

- At REBIND, save old copies of packages
  - Catalog tables
  - Directory (SPT01 table space)
- Two flavors
  - BASIC and EXTENDED
  - REBIND options
  - Default new DSNZPARM
- REBIND PACKAGE …
  - PLANMGMT (BASIC) 2 copies: Current & Previous
  - PLANMGMT (EXTENDED) 3: Current, Previous, & Original
- Most bind options can be changed at REBIND.

- REBIND PACKAGE …
  - SWITCH(PREVIOUS)
    Switch between current & previous
  - SWITCH(ORIGINAL)
    Switch between current & original
- FREE PACKAGE …
  - SCOPE(ALL) – Free package completely
  - SCOPE(INACTIVE) – Free old copies
- Each copy invalidated separately
- Cost of stability
  - 2-3 X size in SPT01 - PK80375 compression
  - 30% CPU overhead for REBIND
  - No impact on statement runtime processing, fast switch

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1. PK52523 has the main function. PK52522 is the pre-conditioning APAR. Both of these have PTFs now. The DB2 books and the online Information Center document this functionality so customers can already read about it online.

2. The old copies are primarily saved in the SPT01 table space and it will grow in size. For BASIC, the overhead is 2x. For extended, it is 3x.

3. We have a few solutions to mitigate this disk space increase:

   (a) Users could use FREE PACKAGE … PLANMGMTSCOPE to selectively free old copies of packages that they think are stable

   (b) In DB2 10, we expect to implement an 'access path comparison' function that will not save an old copy if it's the same as the new copy.

Package Stability - BASIC support

REBIND … PLANMGMT(BASIC)

Incoming copy

Current copy

move

previous copy

delete
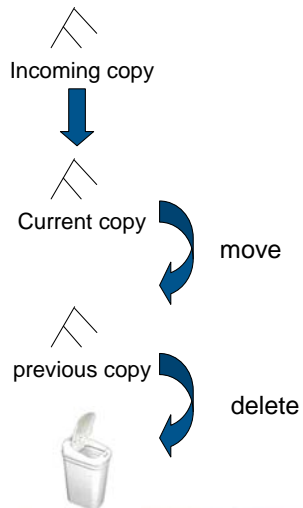
REBIND … SWITCH(PREVIOUS)

current copy

move   move
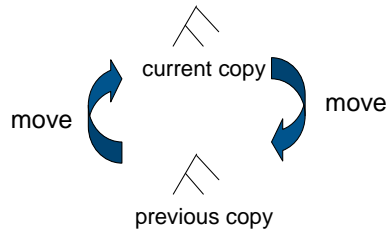
previous copy

Chart is to be read from bottom to top

•The diagram shows the scenario of BASIC support. It is to be read bottom up. At the left hand side, when you rebind using PLANMGMT(BASIC), we discard the previous copy, take the current copy and store it as the previous copy, and take the newly generated copy as the current copy.

•Then when you switch, you basically swap around the current copy and the previous copy.

Package Stability - EXTENDED support
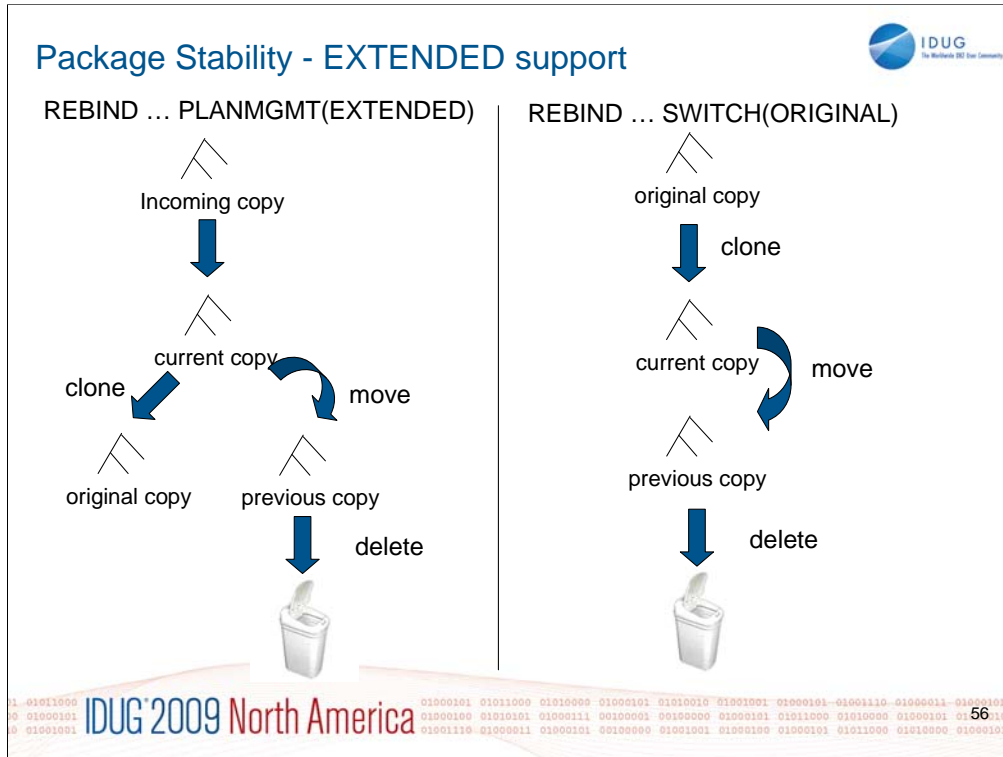
• This diagram shows the EXTENDED support. The previous copy is thrown to the trash can. The current copy becomes the precious copy. Only the first time you execute this, when we don't have the original copy stored, do we take the current copy and store it as the original copy. And the newly generated copy becomes the current.

• For rebind, we don't touch the original but swap around current and previous. But if you do rebind SWITCH(ORIGINAL), the previous goes to the trash, the current becomes the previous, and the original becomes the current. We don't throw the original copy, it stays where it was.

There is no overhead for PLANMGMT(OFF). The CPU overhead for binds using multiple

package copies is a fully justifiable 15-20% in these measurements. REBIND with SWITCH()

is very efficient with a 2 to 3 times reduction.

Note: The PTF for APAR PK80375 provides SPT01 compression.

How much room will you get in DBM1?

It depends.   For DB2 9,

　　　Estimate 10% to 15%

　　　5 EDM pools

　　　REBIND needed for savings

　　　DDF - shared memory

　　　Above the bar shared virtual storage required

　　You need to calculate, monitor and manage
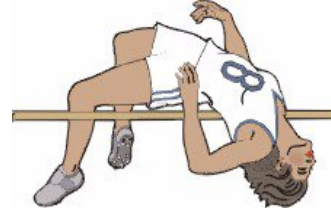
You still need to do the calculations, monitor and manage storage.

DB2 9 improvements are generally about 10% to 15% more storage moved out from below the bar, with two more parts of the EDMPOOL, some of dynamic statement cache, and use of 64 bit storage for the DDF address space, with some above-the-bar storage shared with the DBM1 address space. You need to configure the 128 GB virtual shared area above the 2 GB bar.

EDM virtual storage savings only occur if you rebind packages.

Note that plans containing DBRMs are deprecated. Watch for some improvements in migration techniques for plans containing DBRMs.

Virtual Storage Constraint is still an important issue for many DB2 customers.

- EDMPOOL Changes:
  - V8 – DBD storage moved above 2GB bar.
  - DB2 9 – SKCT, SKPT, some CT, PT storage moved above 2 GB bar.
  - DB2 9 approx. 60% reduction in EDMPOOL size observed for lab workloads
- Other changes:
  - Some storage acquired for distributed applications moved above 2GB bar.
  - Control blocks for table spaces and RTS move above the bar.
  - DSC statement text moved above the bar
    - SAP tests have shown almost 300 MB reduction in virtual storage below 2 GB bar

Skeleton Pool (EDM_SKELETON_POOL)
SKCT / SKPT
CT / PT

Global Stmt Pool (EDMSTMTC)

DBD Pool (EDMDBDC)

2GB

EDM Pool (EDMPOOL)

CT / PT
Others
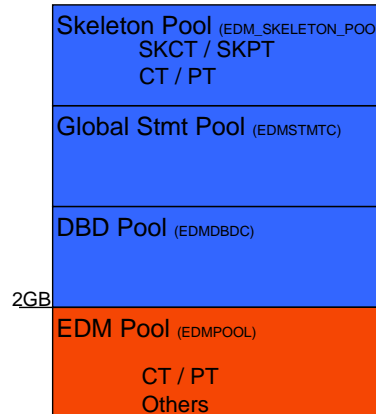
IFCID 217: detailed DBM1 virtual storage health

IFCID 225: consolidated DBM1 virtual storage health

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Objective was 10-15% relief. EDMPOOL – you can estimate DB2 9 EDM pool size from V8 stats as follows: (#pgs for SKCT/SKPT)*0 + (#pgs PT/CT)*70%. Rough ROT is V8 EDM pool size can be reduced by 60%. Extensive use of SQL SPs can drive up EDM pool usage since these pkgs are larger. General recommendation, keep this the same in DB2 9.   EDM_SKELETON_POOL – added in DB2 9.

For SAP SD transaction with 360 user threads, the total DBM1 virtual storage below 2GB was 1091MB in V8 and 819MB in DB2 9 for almost 300MB reduction. Most of that comes from local dynamic statement cache storage going down from 466MB to 172MB. Net of 1% real storage increase overall. For TPCE for example, 532 pages below 2GB were used for PT in V8. In DB2 9, 763 pages are used below 2GB and 316 pages are used above 2GB. So there is an increase in below 2GB virtual storage usage for PT in DB2 9. 1268 pages used for SKPT in V8 are all moved above 2GB in DB2 9 with a total of 1329 pages. EDM pool pages used below 2GB therefore dropped from 532+1268 to 763, or 58%.

EDM LRU latch contention relief (LC24). Previously one LRU chain in EDM pool with only one corresponding latch. Now split into three pools each with 3 latches: 1) SKCT/SKPT above 2GB 2) CT/PT above 2GB   3) CT/PT below 2GB

DBM1, the following are moved above the bar in DB2 9

•Parse trees peak below-the-bar storage for full prepare reduced 10%

•EDM fixed pools: V8 customer dumps show as much as 50m will be moved. Allows larger above the bar EDM pools

•SKPTs / SKCTs (primarily static SQL). Also part of the CTs/PTs; New EDM pool for skeletons; Savings in below the bar 10m to 300m

•Page set blocks, RTS blocks: up to 10's of MB savings

•Local SQL statement cache: rough ROT: about 60% moves above bar

•Thread-related storage: Certain Run Time Structures, space block   DMTR 10's of MB or more in savings

•Average V8 customer may see another 200 MB of relief: RID Pool, Sort Pool, compression dictionaries, castout buffers and others already above the bar (V8).

64-bit DDF – Shared Private with DBM1

- DDF address space runs in 64-bit addressing mode
  - Shared 64-bit memory object avoids cross memory moves between DBM1 and DDF and improves performance

z/OS Shared Private Storage

DBM1   2GB Bar   DIST
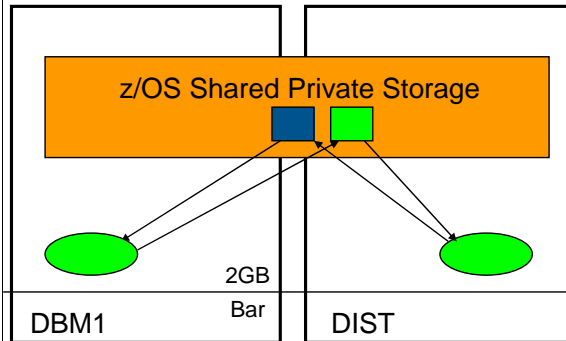
- Shared memory: new virtual storage type allowing multiple address spaces to share storage.
- Similar to ECSA – always addressable, avoids AR and XM moves.
- Different from ECSA – only available to those address spaces registering with z/OS to share this storage.
- Reduces data formatting and data movement
- Reduces virtual storage
  - It exists once, instead of in each address space

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Skeletons above the bar: For customers that use heavy package and plan activity such as banks, this is the most significant DBM1 below the bar storage relief in DB2 9. For customers that use very few or small packages, such as SAP environments, the savings is smaller.

LI702 – move spaceblk (SPA) above the bar. SPA to be split into 2, 1 above, 1 below. Only a few, non-complex RTs are being considered for DB2 9. Simple insert, delete Expected results will vary by SQL mix. (-5 to 30%)?

Has storage key & fetch protection

Defaults to 2TB size

DB2 requires a minimum of 128GB configured or DB2 9 will not run

    Even if not running DIST

Set by HVSHARE in Parmlib

Migration - data sharing group

- ►V8 and 9 CM members in group for 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
- ►Use Data Sharing book for migration
- ►Migrate all members before using new function
- ►Restrict execution of packages & plans bound on new version to migrated members
- ►Group quiesce in DB2 9 NFM for locking protocol 3 (LOBs)
- ►CFLEVEL 16, 15, 14, 13, 12 for best performance

Remember to work with new DB2 9 function only on a group that has migrated to 9 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 15, 14, 13 or 12. There is quite a bit of information about CFLEVEL on the web:

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

The need for a group quiesce is removed in APAR PQ62027.

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

Best practices for migration

- Get the right service level
- Get ready for performance and access path management
- Set up the work space
- Use new data format
- Watch for recent and upcoming changes
- Check the web for the latest

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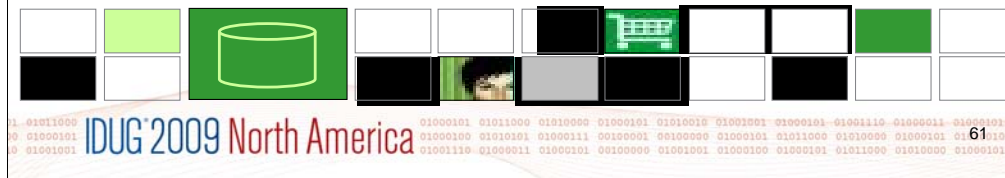
Best Practices in DB2 9 for z/OS Migration February 2010 Customers are migrating more quickly to DB2 9 this year. The DB2 9 value is helpful for most customers, and the migration experience has been positive with customer migrating for the value. DB2 9 has been generally available for two and a half years now. Migration is a broad topic, so I'll emphasize some keys to success, point to many resources, emphasize some important points and provide the latest information. In this article, I'd like to note current service level recommendations, note some of the key changes in access path management, note changes for work space, indicate recent changes in data format, and then point to the newest function changes.

Get the right service level   As you migrate to DB2 9, using the best practices and recommendations can help you have a better experience. The Consolidated Service Test or CST process is being used successfully by very large and small customers. The current service level recommendation is to get to the current quarterly CST level and some specific identified APARs as a minimum level. The August 2009 level is RSU0906, delivered in July 2009. RSU0906 includes all service through the end of March 2009 and PTF in error resolution, high impact, security, integrity, pervasive PTFs and their associated requisites and supersedes through the end of May 2009. Additional service is noted in the reports.

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

Check key information APARs. Check the areas which you use most. System z zIIP processors can make parallel processing less expensive than sequential access, but can cause problems in storage management and parallel processing, so check those areas if you use parallelism.

II14401 and II14464 note the key migration and fallback APARs.

II10817 indicates the key storage APARs.

II12836 notes the APARs for parallelism.

II14219 indicates the service for zIIPs.

II14334 shows the APARs for large objects or LOBs.

II14426 shows the XML APARs.

II14441 notes recent APARs for incorrect output.

II14203 shows the key APARs related to distributed processing or DDF.

Most DB2 for z/OS customers are large in some metrics, and unique in a number of ways. After getting all of the recommended service, you need to test with your unique workloads and options to find any other needed service. Staging DB2 service levels through development, QA, and production also helps find situations, applications and techniques that are unique.

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If applications use large Declared Global Temporary Tables (DGTTs), then some table spaces should be defined with non-zero secondary quantity in the WORKFILE data base. This will minimize contention for space between work files and DGTTs. DB2 allocation of space for DGTTs gives preference to table spaces that can grow beyond the primary space allocation (with SECQTY > 0), since DGTTs are limited to one table space and cannot span multiple table spaces as the work files can. If the subsystem has no DGTTs or only small DGTTs, then having all table spaces defined with zero secondary quantity works best.

Use new data format   Reordered row format occurs in NFM. A number of recent changes have adjusted the function to be more flexible. APAR PK78958 disables RRF conversion for table spaces which are compressed. The primary challenge was table spaces with many VARCHAR(1) columns, where the compression ratio was reduced significantly. APAR PK87348 will provide more extensive changes, externalizing a subsystem parameter and a utility keyword to keep basic row format. PK87348 also makes changes to avoid issues with the hidden parameter. The default and general recommendation are to use reordered row format.

Watch for recent and upcoming changes

Rather than creating 60,000 databases implicitly, changes in PK62178 default to 10,000 and allow you to change the number of databases to use. If you want to pipe information to the LOAD utility, look at PK70269. PK72214 changes the install process to stop changed data capture for catalog tables as needed, asking you to restart them after switching to DB2 9 and ENFM. If you have multiple members of a data sharing group in a single LPAR and prefer the V8 group attach logic, parameters are added to control the random group logic in APARs PK79228 and PK79327. The -ACCESS command only worked for specific names, but the command is being changed to allow wild cards and ranges in APAR PK80925.

DB2 and DFSORT have been changed to allow sort CPU to be eligible for zIIP in both V8 and DB2 9 in PK85889 with z/OS V1.10 and PK85856 or V1.11. Extended addressing was added for sequential data in z/OS V1.11 with PK81151.

This is the latest information today, but I'm certain that more is coming soon.

DB2 9 for z/OS: Distributed Functions, SG24-6952-01, is our latest IBM Redbooks publication. DB2 9 for z/OS: Resource Serialization and Concurrency Control, SG24-4725-01, is a new book that we expect to deliver soon. The next book will be about utilities. Watch for more updates to DB2 books and other information on the web.

http://www.ibm.com/software/db2/zos

http://www.redbooks.ibm.com/cgi-bin/searchsite.cgi?query=db2+AND+9+AND+for+AND+z/OS

Next phase: Use the new function, get the value

- Reduce CPU time
- Save disk space
- Service Oriented Architecture
- Productivity for applications & administrators
  - PureXML & Data Studio
  - SQL & LOBs
  - Portability via SQL & data definition compatibility

- Improve availability
- More flexible security
- Easier regulatory compliance
- Web applications
- Data warehouse function and performance

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This is the largest and most important phase of migration. You will spend more time in this phase than in all of the others combined. This is the phase where you deliver the largest improvements to your customers.

What are your most strategic and most pressing needs in the areas of business, applications and administration? That question and the efforts needed should determine the schedule and order for using the new function. Some of the simpler changes for performance are noted on slide 9.

Customer Experiences

- **Customer experiences say pay attention to:**
  - **Read the web, books, Info APARs, PSP**
  - **Have a plan that includes performance**
  - **Run premigration job DSNTIJPM**
    - **Use DSNTIJP9 & DSNTIJPA jobs**
    - **On every subsystem**
  - **Current maintenance for DB2, z/OS & CF**
  - **Get the latest books: library, red books, ...**

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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 jobs early and often. Check the CATMAINT and CATENFM 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. The books and Information Center are being updated more frequently.

Check other early customer experiences here.

ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/migration/

ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/customer-experience/
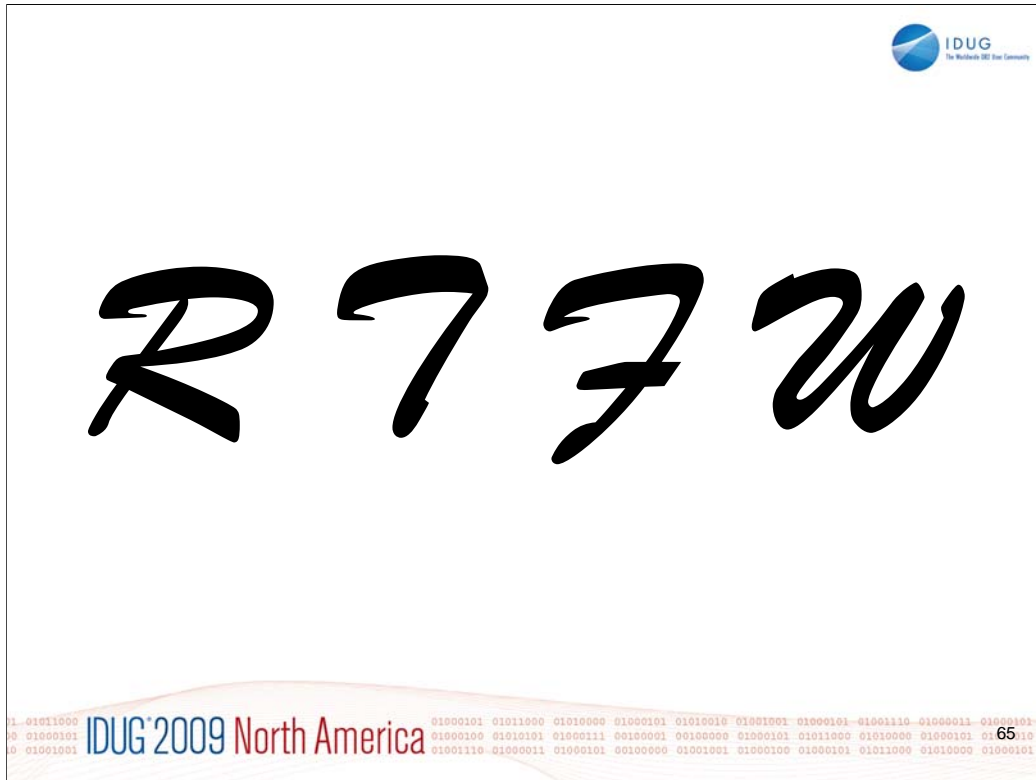
RTFW

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.

Get updated books   **December 2009**
http://publib.boulder.ibm.com/infocenter/imzic/

✓Administration Guide
✓Data Sharing: Planning and Administration
✓Performance Guide
✓Utility Guide and Reference
✓Application Programming Guide & Reference
✓Application Programming Guide & Reference for JAVA™
✓ODBC, Spatial, …
✓Redbooks
✓Installation Guide
✓RACF Access Control Module Guide
✓Messages
✓Codes

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You can get most of the books from the Information Center or from the DB2 Library web page. The books continue to be updated, so get the latest ones. Some of the IBM Redbooks publications will be helpful. You may need books from the z/OS Library as well.
http://publib.boulder.ibm.com/infocenter/imzic/

http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656

http://www.ibm.com/systems/z/os/zos/bkserv/r9pdf/

Be sure to use the latest information to save time and problems. Some of the IBM Redbooks publications have added lately or updated (next page).

DB2 library more information   http://www.ibm.com/software/data/db2/zos/library.html

Many IBM Redbooks publications, Redpapers and one cross-platform book on DB2 9 are published, in addition to the standard library, with more in the works. Check for updates.

http://www.redbooks.ibm.com/cgi-bin/searchsite.cgi?query=db2+AND+9+AND+for+AND+z/os

1.   DB2 9 Technical Overview, SG24-7330 http://www.redbooks.ibm.com/abstracts/SG247330.html
2.   DB2 9 Performance Topics, SG24-7473, http://www.redbooks.ibm.com/abstracts/SG247473.html
3.   DB2 9 Stored Procedures, SG24-7604, http://www.redbooks.ibm.com/abstracts/SG247604.html
4.   Index Compression DB2 9, REDP4345, http://www.redbooks.ibm.com/abstracts/redp4345.html
5.   Deploying SOA Solutions SG24-7663, http://www.redbooks.ibm.com/abstracts/SG247259.html
6.   Cross-Platform Development Version 3,
     http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html
     ftp://ftp.software.ibm.com/ps/products/db2/info/xplatsql/pdf/en_US/cpsqlrv3.pdf
7.   Enterprise Data Warehousing, SG24-7637, http://www.redbooks.ibm.com/abstracts/sg247637.html
8.   LOBs: Stronger & Faster SG24-7270, http://www.redbooks.ibm.com/abstracts/SG247270.html
9.   Securing DB2 & MLS z/OS, SG24-6480-01, http://www.redbooks.ibm.com/abstracts/sg246480.html
10. Enhancing SAP, SG24-7239, http://www.redbooks.ibm.com/abstracts/SG247239.html
11. Best practices SAP BI, SG24-6489-01, http://www.redbooks.ibm.com/abstracts/sg246489.html
12. New Tools for Query Optimization, SG24-7421, http://www.redbooks.ibm.com/abstracts/sg247421.html
13. Data Sharing in a Nutshell, SG24-7322, http://www.redbooks.ibm.com/abstracts/sg247421.html
14. DB2 9 for z/OS Data Sharing: Distributed Load Balancing and Fault Tolerant Configuration
     http://www.redbooks.ibm.com/abstracts/redp4449.html
15. Considerations on Small and Large Packages redp4424 http://www.redbooks.ibm.com/abstracts/redp4424.html
16. Backup and Recovery Considerations redp4452 http://www.redbooks.ibm.com/abstracts/redp4452.html
17. Powering SOA IBM Data Servers, SG24-7259   http://www.redbooks.ibm.com/abstracts/SG247259.html
18. Packages Revisited, SG24-7688 http://www.redbooks.ibm.com/abstracts/SG247688.html
19. 50 TB Data Warehouse Benchmark on IBM System z http://www.redbooks.ibm.com/abstracts/sg247674.html
20. SAP on DB2 9 for z/OS: Implementing Application Servers on Linux for System z
     http://www.redbooks.ibm.com/abstracts/sg246847.html
21. IBM Data Studio V2.1: Getting Started with Web Services on DB2 for z/OS
     http://www.redbooks.ibm.com/abstracts/redp4510.html
22. Ready to Access DB2 for z/OS Data on Solid-State Drives http://www.redbooks.ibm.com/abstracts/redp4537.html
23. Parallel Sysplex Operational Scenarios http://www.redbooks.ibm.com/abstracts/sg242079.html
24. Distributed Architecture http://www.redbooks.ibm.com/abstracts/sg246952.html
25. Buffer Pool Monitoring & Tuning http://www.redbooks.ibm.com/abstracts/redp4604.html
26. Securing and Auditing Data http://www.redbooks.ibm.com/abstracts/sg247720.html
27. Serialization & concurrency, SG24-4725-01 http://www.redbooks.ibm.com/abstracts/sg244725.html
28. Utilities SG24-6289-01 http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg246289.html

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

•Technical resources
•Events
•Support
•V8, DB2 9
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• Data serving with IBM's mainframe and DB2 for z/OS helps you reduce cost and complexity in your IT infrastructure, simplify compliance, and leverage your core asset - your data

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· Demo
· Demo

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This is the main DB2 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 or even 5. V6 and V5 are out of service. 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 DB2 9 or DB2 Version 8, click on the DB2 9 or the V8 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 System z9, z990 and z890 are on the System z page. Click DB2 and IMS Tools to see the wide range of help we provide.

DB2 for z/OS Lifecycle
http://www.ibm.com/software/data/db2/support/db2zos/

Customers can track product availability on their own from this site. Start on the main DB2 for z/OS support web page, then click on the Product Support Lifecycle.

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The Worldwide DB2 User Community

Software > Information Management > DB2 Product Family >

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News
How to buy
Events
Training and certification
Services
Support

Related software
· WebSphere
· CICS
· IMS
· DB2 Connect
· z/OS
· Linux on IBM System z

Functions available in conversion mode vs. new-function mode

Technote (FAQ)

This document applies only to the following language version(s):
English

Question
Which new functions work only in DB2 9 for z/OS new-function mode (NFM), and which new functions also work in conversion mode (CM, previously called compatibility mode)?

Answer
The short answer
New functions are available only in new-function mode, unless explicitly stated otherwise in the product documentation. A few general exceptions exist for utilities and for optimization.

Where is this information documented?
This general guidance is stated in the information center (http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.db29.doc.inst/db2z_relincompatassumptions, and in a statement at the beginning of each PDF book, with some specific exceptions. For most information, the guidance is that the function is not supported in conversion mode unless noted. For utilities and optimization, the function is available in conversion mode unless noted. The functions available in conversion mode (CM), conversion mode* (CM*), enabling-new-function mode (ENFM), and enabling-new-function mode* (ENFM*) are

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See this web page for more detail on what works in what mode.

Question: Which new functions work only in DB2 9 for z/OS new-function mode (NFM), and which new functions also work in conversion mode (CM, previously called compatibility mode)?

Short answer: New functions are available only in new-function mode, unless explicitly stated otherwise in the product documentation. A few general exceptions exist for utilities and for optimization.

Where is this information documented?

This general guidance is stated in the information center, and will be updated there.

http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656

http://publib.boulder.ibm.com/infocenter/imzic/

Info APARs II14401 II14464

http://www.ibm.com/support/docview.wss?rs=64&context
=SSEPEK&q1=ii14401&uid=isg1II14401

http://www.ibm.com/support/docview.wss?rs=64&context
=SSEPEK&q1=ii14464&uid=isg1II14464

These informational APARs describe the needed service
for successful migration from DB2 V8 to DB2 9.

DB2 9 Technical Resources page

ibm.com/support/docview.wss?rs=64&uid=swg27011656

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- Download 30 PDF books
- Access html books
- DB2 new ✓ June 2009
- Program Directories
- Information Center

DB2 for z/OS - Technical Resources

Support & downloads
DB2 for z/OS
Features and benefits
System requirements
Library
Technical resources
Success stories
News
How to buy
Events
Training and certification
Services
Support

Related software
· WebSphere
· CICS
· IMS
· DB2 Connect
· z/OS
· Linux on IBM System z

Related hardware
· IBM TotalStorage
· IBM System z

Related solutions
· DB2 and IMS Tools
· Java on OS390 and z/OS
· DB2 for Linux

Related services
· IBM Consolidated Service Test

Product documentation

Abstract
Here is your complete DB2 for z/OS information resource! Here you can find DB2 for z/OS technical information, information about related tools, and valuable technical tips.

Content
To support recent enhancements to the DB2 for z/OS Library page, the DB2 for z/OS technical information has a new address on the Web. **Please update your bookmarks!**

Information center topics

➔ Information Management Software for z/OS Solutions Information Center

Search topics across all information for DB2 for z/OS, IMS, and DB2 and IMS Tools, including QMF. The Information Management Software for z/OS Solutions Information Center is the primary source for the information about DB2 for z/OS.

Search the information center topics

[   ] [Search]

As part of IBM's ongoing effort to improve your information experience, we are optimizing the information delivered with the DB2 for z/OS product for viewing in the information center. Learn more.

Technical information by version

➔ DB2 Version 9.1 for z/OS

➔ DB2 for z/OS Version 8

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This is the Technical Resources page for DB2. I clicked Technical Resources to get here. There are about 40 PDF books and about the same number of books in html or BookManager format. Choose the style you want. I generally download the PDF books to my computer. From this page you can get books on DB2 and QMF, including both the library and program directories. If you need to look for some tools that can be downloaded, such as Estimator or Visual Explain, click on Downloads. You can also get to the Information Center from here.

Watch this web page and see the dates next to each book for the latest updates.

http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656

DB2 Connect makes your company's host data directly available to your personal computer and LAN-based workstations. It connects desktop and palm-top applications to your company's mainframe and minicomputer host databases for access to your enterprise information no matter where it is. **DB2 Connect** provides the application enablement and robust, highly scalable communication infrastructure for connecting Web, Windows, UNIX, Linux and mobile applications to z/OS and System i data. **DB2 Connect** is included in many of the DB2 products.

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

DB2 Cross-Platform SQL Reference
updated March 2009

ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html

V3.1 DB2 for LUW 9.5
DB2 for i V6.1
DB2 9 for z/OS

New SQL features now included
- DECFLOAT data type   Additional timestamp format
- ROW CHANGE expressions   New built-in functions
- order-by-clause and fetch-first-clause in a subselect
- SELECT FROM INSERT   Full outer join
- IMPLICITLY HIDDEN columns   row-change-timestamp columns
- RESTRICT on DROP of functions and procedures
- CURRENT DECFLOAT ROUNDING MODE special register & SET
- ALTER FUNCTION   Other portability enhancements

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This is the web page for the SQL Reference for Cross-Platform Development. It has four versions of the cross-platform SQL Reference and pointers to the base product SQL Reference books as well. If you want to write programs that work well across the DB2 family, then this is the book to download and use.

These books publish frequently, so you need to choose the one for the proper combination of DB2 platforms and versions. The latest book is Version 3.1 for platforms DB2 9 for z/OS, DB2 for I V6.1, and DB2 9.5 for Linux, UNIX and Windows. The addition of newer versions of the DB2 products means the following great SQL features are now included:
- DECFLOAT data type   Additional timestamp format
- ROW CHANGE expressions   New built-in functions
- order-by-clause and fetch-first-clause in a subselect
- SELECT FROM INSERT   Full outer join
- IMPLICITLY HIDDEN columns   row-change-timestamp columns
- RESTRICT on DROP of functions and procedures
- CURRENT DECFLOAT ROUNDING MODE special register & SET statement
- ALTER FUNCTION   Other portability enhancements

Other books are for DB2 for z/OS Version 7 and Version 8.
http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html
ftp://ftp.software.ibm.com/ps/products/db2/info/xplatsql/pdf/en_US/cpsqlrv31.pdf
ftp://ftp.software.ibm.com/ps/products/db2/info/xplatsql/pdf/en_US/cpsqlrv3.pdf
http://www.ibm.com/developerworks/data/library/techarticle/db2common/?S_TACT=105AGX11&S_CMP=LP

ibm.com/software/data/db2imstools/

Click Support For Compatibility Matrix → → → & V8 or DB2 9

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 for z/OS Version 8 or with DB2 9 for z/OS, then go to the Support page for the tools. You may find the item directly on the Support page. Or click Technotes (FAQs) and search for items that include DB2 9 or V8 and PTF. Select the item DB2 Data Management Tools and DB2 for z/OS V8.1 or DB2 9 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.

This is the resulting page today, looking for the Information Management Tools releases and service needed to work with DB2 9 for z/OS. Note that the matrix lists some levels of tools with an X in the NS or not supported column. See the later version, with an X under T for toleration or under E for exploit or the ability to use those new improvements.

Information Center: Installable option
http://www.ibm.com/support/docview.wss?rs=865&uid=pub1sk5t737700
http://publib.boulder.ibm.com/infocenter/imzic/

This is the Information Center, with a wide spectrum of information and access to books for DB2 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 latest change in this area is an installable Information Center, so that you can use the facility even when the internet is not accessible. http://www.ibm.com/support/docview.wss?rs=865&uid=pub1sk5t737700

The online version is

http://publib.boulder.ibm.com/infocenter/imzic/

DB2 for z/OS Information Center: Cool features

- Optimized for Google search: easily get to DB2 for z/OS information from Google
- Browser search plug-in available: search the information center from your browser's search box, anywhere on the web
- Integrated search for messages, APARs, PTFs, Redbooks
- Filter to see only the products you use
- RSS feeds for automatic notification of updates
- Three new Flash tours with tips for using the information center
- Links to related product information and community resources

Access information for all supported versions of DB2 of z/OS, most DB2 Tools, QMF, and many other IM on z/OS products

Locally installable information center now available

Wide customer adoption: 12.1M hits from 57K unique visitors in March 2009 (up 40% and 30% over March 2008)

Here's a link to the browser search plugin for the information center:

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.dzic.doc/additional_search.html

Install the browser search plugin by clicking the first link on the page.

Also included on the page is a Google search box for searching the information center using Google.

Tips for using the information center

Here are many hints and tips for using the Information Center. They are available on a pdf on the web. URL is on the next page.

DB2 for z/OS information center:
http://publib.boulder.ibm.com/infocenter/imzic

Launch page for the Flash tours:
http://publib.boulder.ibm.com/infocenter/imzic/topic/com.ibm.dzic.doc/dzicviewlet.htm

Search for APARs and PTFs from the information center:
http://publib.boulder.ibm.com/infocenter/imzic/topic/com.ibm.support.dzic.doc/html/search.html

Internal download for the installable information center:
http://ibmurl.hursley.ibm.com/9UP

Printable flyer (2-sided/color):
ftp://ftp.software.ibm.com/software/data/db2/zos/info/DZIC_2009.pdf

Browser search plugin for the information center:
http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.dzic.doc/additional_search.html

More information: hours of education

COBOL and DB2 V8 multirow fetch, insert
http://www.ibm.com/support/docview.wss?&uid=swg27012149
http://www.ibm.com/support/docview.wss?&uid=swg27012160
DB2 9 education from BetaWorks
XML   http://www.ibm.com/support/docview.wss?&uid=swg27012156
SQL   http://www.ibm.com/support/docview.wss?&uid=swg27012157
Clones http://www.ibm.com/support/docview.wss?&uid=swg27012150
Scalability http://www.ibm.com/support/docview.wss?&uid=swg27012151
Data sharing http://www.ibm.com/support/docview.wss?&uid=swg27012152
Availability http://www.ibm.com/support/docview.wss?&uid=swg27012153
Security   http://www.ibm.com/support/docview.wss?&uid=swg27012155
Data fmt   http://www.ibm.com/support/docview.wss?&uid=swg27012158
Install http://www.ibm.com/support/docview.wss?&uid=swg27012181
Log detail   http://www.ibm.com/support/docview.wss?&uid=swg27012154

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There is a lot of new information on the web, and the information has been reorganized.

The easiest way to see the information is from the events page, then clicking on presentations from previous conferences. See the performance presentations, a course on DB2 9 with slides and audio (very big downloads).

Here are the topics for the items, and the suffix of URL

XML 156   SQL   157   scalability 151 data sharing 152

Partitioning and clones 150   availability 153   log detail 154

Security 155   reordered row format & no log 158

Migration suffix 181, also
ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/migration

The ftp site (next slide) can also be used to access these

ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/

//ftp.software.ibm.com/software/data/db2/zos/presentations/v9-new-function/reordered-row-format-read-log-betaworks-2007.pdf

Thanks for coming.

Title – DB2 for z/OS technical evangelist, strategist, architect, designer, developer, writer, service, DB2 factotum (from the Latin for does everything or jack of all DB2 trades, master of several).

Current Projects - Roger is working to roll out DB2 9 for z/OS, to design the next improvements in DB2.

Technical accomplishments/education - Roger Miller is a DB2 for z/OS technical evangelist, architect and designer who worked on many facets of DB2, ranging from overall design issues to SQL, languages, install, security, audit, standards, performance, concurrency, and availability. He has worked for 30 years on DB2 development, product design and strategy. He often helps customers to use the product, answers many questions and presents frequently to user groups.

Fun facts - Roger likes hiking, bicycling, reading, Shakespeare, Yosemite and bears. He has learned to like working out with a personal trainer.