

## **DB2 10 for z/OS – A Smarter Database for a Smarter Planet**

### *How to Have a Happy DB2 CM Day*

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## Introduction

A lot has been said, written and presented regarding the many benefits and enhancements offered by DB2 10 for z/OS. Many DB2 sites are in the process of building cost cases to get management approval for the upgrade, or working with the business to agree implementation dates to minimise application impact. Other customers are deliberately building a delay into their implementation plans in order to allow the DB2 10 codebase to further mature before committing themselves. Whatever the reason, many of you are looking at dates for the initial upgrade to DB2 10 Conversion Mode (CM) that are many months, perhaps even years, away. That delay can sometimes be frustrating from a technical perspective, but there is a significant amount of preparation work you can be doing well in advance of “CM Day” for any given DB2 environment.

This article outlines the major opportunities for preparation in advance of the move to DB2 10 Conversion Mode. Some of these changes require a full or partial outage, but if you are able to implement all or most of them as part of your routine maintenance activities, you will greatly reduce the risk and the elapsed time of the actual upgrade process - especially important if you are considering a skip-release upgrade from DB2 V8 to DB2 10.

## DB2 10 Advance Preparation Tasks

The following sections outline the major DB2 upgrade preparation tasks that you can undertake in advance, and are presented in no particular order. Please note that items apply equally to customers upgrading from DB2 V8 or DB2 9 unless otherwise indicated.

### *Remove DB2-Managed Stored Procedures (V8 Only)*

Support for DB2-managed stored procedures (which run in the old xxxxSPAS DB2 address space) was deprecated in V8 and withdrawn completely in DB2 9. Customers moving from V8 must therefore ensure that any remaining DB2-managed stored procedures are converted to WLM-managed stored procedures prior to the upgrade.

If you don't yet have any WLM-managed stored procedures running, you may need to do some work to set up the necessary RRS and RACF environment first, as well as defining the application environments to WLM. Once that has been done, you will need to re-prepare your stored procedures in order to pick up the correct Language Environment (LE) modules. If you're still using standard PDSs for your stored procedure load libraries, you may also want to take this opportunity to convert them to PDSEs (which are better at handling extents than traditional PDSs). The last step in the conversion process is to stop the procedure, ALTER it to use the relevant WLM application environment and re-start it.

Finally, don't forget that WLM-managed stored procedures support enclave TCBs and therefore give you valuable additional control over the service class/resource usage for each procedure invocation. Therefore, you may want to review your WLM classification rules to ensure they are being given a priority commensurate with their business importance.



### ***Remove DB2 Text / AIV Extenders (V8 Only)***

Support for the DB2 Text Extender and the DB2 Audio, Image and Video (AIV) Extender was removed in DB2 9. You must therefore ensure that any applications currently relying on this functionality are amended to use alternative functions prior to your DB2 10 upgrade. Currently IBM does not offer any direct replacements, so this may require additional program logic to be written and tested.

### ***Reformat BSDS (V8 Only)***

DB2 9 introduced a new BSDS format, able to support up to 93 active logs and 10,000 archive logs. The new format is also supported by DB2 V8, so if you're still using the old format this change can be made any time in advance of the DB2 10 migration by using the DSNJCNVB utility (note that this will require the DB2 subsystem to be stopped while the BSDS is upgraded to the new format).

### ***Remove Legacy Java Drivers (V8 Only)***

DB2 9 withdrew support for the old Java Legacy driver (or the "JDBC/SQLJ Driver for OS/390 and z/OS" to use its proper name). Any Java applications using this version of the driver will need to be amended to use IBM DB2 Driver for JDBC and SQLJ (formerly known as the DB2 Universal JDBC Driver). This may require some application code changes (and possibly re-running the program preparation process where SQLJ is being used).

Note that it is possible for both versions of the driver to co-exist under DB2 V8 to allow a gradual migration to take place – see the DB2 Application Programming Guide & Reference for further details.

### ***Convert to PDSEs for DB2 Load Libraries (V8 Only)***

Officially, you were required to convert your DB2 load libraries to PDSEs as part of the upgrade to DB2 V8. However, many sites unfamiliar with PDSEs realised that this was not really necessary and avoided making the change at that time.

DB2 9 had some load modules larger than 16MB, and therefore required the DB2 load libraries to be PDSEs (as does DB2 10). If you are considering skip-release migration you should check that your load libraries are all defined as PDSEs (check that Data Set Name Type = "Library" instead of "PDS" in ISPF 3.2 or 3.4 if you're not sure).

### ***Get to New Function Mode***

This might be stating the obvious, but whether you're upgrading from V8 or DB2 9 you need to be in New Function Mode (NFM) before you begin your DB2 10 upgrade. If you're one of the many sites that have been in Conversion Mode for a while, you need to ensure you're in NFM and completely stable before even considering the next step in your DB2 10 journey.

### ***Run Pre-Migration Jobs***

Most of the specific checks and potential inconsistencies listed throughout this section are covered by the DB2 10 pre-migration checker job, known as DSNTIUPM. This runs a series of



reports highlighting potential issues within your current environment, and is an essential sway of ensuring your system is in good shape prior to any migration attempt.

However, you don't need to wait until you have your DB2 10 libraries to run this job, as it's also possible to access it via APAR PM04968 which provides an identical job within your DB2 V8 or DB2 9 environment (except that it's then called DSNTIJPA). APAR PM33991/PM15965 makes a few corrections to the original jobs, and adds a further three reports making 28 in total.

Run DSNTIJPM/ DSNTIJPA early and often during your upgrade planning and preparation – you should aim to have a completely clean bill of health before attempting to go to CM (or at the very least be aware of any exceptions it is still reporting and have plans to address them).

### ***Convert Simple Tablespaces***

DB2 9 withdrew support for the creation of simple tablespaces, although its still possible to access existing simple tablespaces under DB2 9 and DB2 10. If you haven't already done so, you should put in place a firm plan for converting any remaining simple tablespaces to either segmented format or one of the new UTS formats.

Note that while the RECOVER utility supports recovery of simple tablespaces in DB2 9 and DB2 10, this won't protect you from an accidental DROP TABLESPACE. If you're unable to convert all simple tablespaces in advance of the upgrade (which is definitely the recommended approach), you may want to consider issuing an ALTER TABLE ... ADD RESTRICT ON DROP statement against simple tablespace tables to reduce the chance of accidental data loss.

### ***Remove DB2 XML Extender***

Support for the XML Extender is removed in DB2 10, with customers being encouraged to use the superior pureXML functionality delivered in DB2 9 and further enhanced within DB2 10.

If you're currently using the extender on DB2 9, you will be well positioned to plan a staged migration to pureXML as part of your pre-upgrade work. DB2 V8 customers do not have this luxury, and may need to consider a "big bang" application release using pureXML to coincide with the DB2 10 upgrade. Alternatively, although it is not officially supported, the XML extender has been shown to work against DB2 10 and you may chose to continue using it for a short time after your migration - you should speak to your IBM representative if this is the case.

### ***Remove Private Protocol***

For the past several releases IBM has continued to enhance the functionality of

DRDA, while the old "private protocol" method of DB2-to-DB2 communication has been functionally stabilised. DB2 10 finally removes support for private protocol, so you will need to identify any programs that use it in advance of your upgrade.



IBM has provided some tools to assist with this process. PK64045 (with applicable PTFs available for both V8 and DB2 9) delivered a number of very useful enhancements to reduce the effort required to move away from private protocol, including:

- Support for DRDA alias resolution processing. A new DSNZPARM called DRDA\_RESOLVE\_ALIAS allows DRDA packages to resolve aliases at the requesting site (rather than the remote site as previously), removing the need to create two-part name aliases at remote locations.
- A REXX tool called DSNTP2DP, to analyse the DB2 catalog and generate BIND commands for private protocol packages
- DSN1PPTP, a private protocol trace analysis program to help identify private protocol usage using IFCID 157.
- DSNTPPCK, a tool for analysing packages containing private-protocol-specific SQL syntax that will no longer be accepted under DB2 10.

PK92339 also introduced the ability to simulate DB2 10 behaviour, by setting another new DSNZPARM (PRIVATE\_PROTOCOL=NO). This is a great way of being certain that you've caught everything before you actually take the plunge and upgrade to DB2 10.

### ***Remove DBRMs Bound into Plans***

DB2 10 no longer supports DBRMs bound directly into plans, so you need to identify these and bind them into packages referenced by the plan. As a last resort, DB2 10 will do this automatically at runtime for any you might miss, but it will chose its own collection name and I guarantee that it won't meet your site naming standards!

PK79925 and PK62876 introduce a new COLLID option on REBIND plan for V8 and DB2 9 respectively to help with the conversion. This doesn't require the original DBRM library to be present, as it will rescan SYSIBM.SYSDBRM, bind individual packages within the specified collection ID and then bind the new package list into the original plan.

### ***Positive People Prepare Packages Pre-emptively***

Each new DB2 release typically brings with it a firm recommendation to rebind your plans/packages at some point in the implementation cycle, in order to take advantage of optimiser enhancements and avoid the overheads associated with "puffing" old package structures. Many sites do this as a matter of course, but others remain in the grip of "rebindaphobia": too concerned about the potential for access path regression to subject themselves to a mass rebind.

As a result, IBM is being asked to support an ever-larger array of old package structures, which can cause support issues and maintenance overhead. The last couple of releases have therefore been getting stricter in terms of the oldest packages supported and DB2 10 insists that any packages bound earlier than Version 6 are rebound (any older packages still in existence on entry to CM will be dynamically rebound at runtime if you specify YES or COEXIST for the ABIND DSNZPARM). You can expect this trend to continue in the future: in



fact I expect the next release of DB2 to get even more aggressive and support only DB2 9 and DB2 10 packages.

So, part of your DB2 10 preparation should include identifying any pre-Version 6 packages and rebinding them in advance to avoid any nasty surprises when DB2 does it for you on CM day. Note that the DSNTIIPA job includes a report to help you identify these (see section on Pre-Migration Jobs above).

If you're already on DB2 9 you have a powerful new facility to help combat the possibility of access path regression during a REBIND, in the shape of the "plan stability" capabilities introduced by APAR PK52523. When enabled, this allows you to keep either one or two previous copies of a package during the REBIND process. If you encounter any issues with the new package, simply use the SWITCH option to revert to the old copy. Unfortunately, customers upgrading from V8 will have to do things the old way (which typically involves binding packages into a different collection and comparing the old and new access paths).

As a final note, there are plenty of new goodies in this area in DB2 10 to overcome these issues for future release upgrades. These include the new APREUSE and APCOMPARE facilities, which greatly reduce the risk of access path regression on REBINDs. However, many of these new options require you to have packages that have been created in DB2 9 or later so you're going to want to deal with those old packages at some point in the near future.

### ***Create a DB2 Performance Baseline***

How well do you know the performance of your current critical transactions and batch processes? If there are any performance-related complaints or issues following the upgrade, how will you be able to really tell if there has been any regression?

Prior to any upgrade you should ensure you have a good picture of your current performance. Most DB2 performance monitors allow you to create and populate a "performance warehouse" that stores both detailed and summarised information about the performance of key processes. This data is critical to establish a "before" position for later comparison, but it's surprising how many large, well-established DB2 sites don't do this. If your site falls into this category, spend some time now to begin collecting the performance data so that you have a historical baseline to compare to after your entry to CM.

### ***Application Considerations***

DB2 10 introduces some changes that may require application changes, as new releases always do. You should research the full list documented in the DB2 Installation and Migration Guide, and plan to make any necessary changes well in advance of your implementation. If you're upgrading from DB2 V8, this list will be somewhat longer than the DB2 9 equivalent, as you're going to have to cope with two releases worth of changes.

For those of you that are still unable or unwilling to get off those old, unsupported compiler releases, IBM have relented yet again and provided support for the old DB2 V7 pre-compiler (DSNHPC7).



### ***Set Up SMS Environment for Catalog/Directory***

DB2 10 makes extensive changes to the DB2 Catalog and Directory tablespaces, most of which will be migrated to new Partition by Growth Universal Tablespaces (PBG UTS) in order to improve concurrency and manageability. Before beginning your upgrade, you must establish the necessary SMS definitions to allow the catalog and directory pagesets to move under SMS control during ENFM (Enabling New Function Mode). This involves setting up an SMS data class and amending your ACS routines to include the catalog and directory objects. IBM provides the DSNTIJSS sample job to assist with this task.

Note that there is no requirement to actually convert the catalog/directory datasets to be SMS managed in advance of your migration – you only need to establish the environment to allow them to become SMS managed when the catalog is reorganised – probably during the ENFM (Enabling New Function Mode) process. However, you should run the SMS CONVERTV tool with the TEST option to verify that the environment has been correctly defined.

### ***Health Check Your Catalog & Directory***

While we're on the subject of the catalog and directory, when was the last time you performed a hygiene check on them? A number of utilities exist to check these critical pagesets for internal consistency, and you're one of the many sites that don't run them on a regular basis you should certainly do so before attempting a version upgrade. These include DSN1CHKR, CHECK INDEX and DSN1COPY CHECK. If you can afford the outage, a reorg of the catalog is also worthwhile in order to speed up the catalog migration steps you're going to run later.

### ***Change EXPLAIN Table Format***

As usual, DB2 10 introduces some new columns to the explain tables. These are optional, but your explain tables must be at least at V8 format, as earlier releases are not supported and will generate a -20008 SQLCODE if an attempt is made to use them from DB2 10. In addition, DB2 10 no longer tolerates EBCDIC explain tables, so if you have any of these they will have to be converted to Unicode (the pre-migration jobs will check on this and report if you do).

You can of course make the necessary changes to your tables manually, but there's an APAR out there (APAR PK85068) that will help you to both migrate your EXPLAIN tables from EBCDIC to Unicode and add the necessary columns to make them DB2 10-compliant.

### ***Review Real Storage Requirements***

Each release of DB2 typically brings along with it an increased appetite for storage, and DB2 10 is no different. The very significant virtual storage constraint relief provided by DB2 10 will allow you to increase performance-critical parameters such as the size of the local dynamic statement cache (DSNZPARM MAXKEEPD) which will further increase storage usage.

As always, it is critical to overall performance that paging to auxiliary storage is minimised. Therefore, any increase in virtual storage must be backed by real storage in your LPAR. Most customers are being advised to plan for an additional 10-30% real storage under DB2 10. In addition, many customers are leaving insufficient real storage available to be able to quickly

and efficiently process dumps in the event of a system problem, which can hamper problem diagnosis.

If you have sufficient capacity within your current configuration you merely need to speak to your systems programmers/capacity planners to reserve some of this for your future use. Otherwise, you may need to wait until the next scheduled hardware upgrade. Either way, you need to plan for the increase and be aware of the implications.

### ***Clean Up Your ZPARMs***

How many DB2 systems programmers can place their hand on their heart and swear that the input members for the DB2 install CLIST are all up to date for all of their DB2 subsystems? It is common practice to directly update the DSNTIJUZ install job for DSNZPARM updates, which can cause problems when the install CLIST is executed during upgrades and picks up old parameter settings.

For several releases now, IBM has provided a handy utility to generate a new install CLIST input member based on your current DSNZPARM and bufferpool settings. Job DSNTIJXZ allows you to create a fresh CLIST input member incorporating all of the current settings, ready for you to use when you run the install CLIST in order to move to DB2 10 Conversion Mode.

### ***Apply the DB2 10 Fallback SPE***

The DB2 10 fallback SPE must be applied to **all** members of the data sharing group prior to any attempt to move to CM. The SPE can be applied one member at a time to maintain availability within a data sharing group, and each system needs to have been stopped and restarted at least once since the SPE was applied. You should plan to piggyback on a suitable change slot well in advance of your planned CM date.

### ***Check DB2 Tool Compatibility***

Most sites rely heavily on additional tools and utilities to supplement the functionality within the base DB2 product. These range from performance monitors to change administration tools and data utilities. As part of your preparation, you will need to work with the tool vendor to ensure that each one at least tolerates (and ideally fully exploits) DB2 10.

In most cases, DB2 9 customers are able to implement any necessary tool upgrades in advance of the DB2 10 upgrade, as the tools support both releases. Unfortunately some tools do not support Version 8 and DB2 10 within a single release so you may need to consider upgrading those as part of the DB2 10 implementation. As always, talk to your tools vendor(s) well in advance and plan accordingly.

Those of you that have grown fond of Visual Explain and/or the Optimization Service Center (OSC) will need to download the free IBM Data Studio

### ***Test, Test, Test***

Even if your first “real” DB2 10 upgrade is many months away, you can and should practice the entire upgrade/fallback process in a “sandpit” DB2 system, and then make it available to



allow developers, DBAs and systems programmers to become familiar with the new functions and features.

Remember that if you are conducting a skip-release upgrade from DB2 V8, it is even more vital that you conduct thorough regression testing using a realistic production-like workload, to ensure that you don't get any nasty surprises on CM day.

It may be possible to order a "trial" version of DB2 10 to ensure that the clock doesn't start ticking on your Single Version Charging (SVC) agreement, but you should work with your local IBM representative to see what is possible.

### ***Organise DB2 10 Education***

Take advantage of the time leading up the upgrade to get yourself and your colleagues fully educated on the many new facilities and features within DB2 10. This is especially important if you are planning a skip-release upgrade from DB2 V8, as you will have twice the amount of change and new function to understand and assimilate.

There is a wealth of technical information available on the Internet and at various DB2 conferences such as IDUG to provide this information. In addition, IBM offer free Migration Planning Workshops and third-parties such as Triton Consulting can provide courses or consultancy tailored to your specific requirements and issues.

## **Summary**

This article concentrated on the major tasks you can undertake in advance of your actual move to DB2 10 Conversion Mode. If you are able to complete all or most of these you can greatly reduce the elapsed time and risk associated with the actual upgrade, and make your "DB2 10 CM day" a happy one.

For a full list of the pre-requisites for DB2 10, please refer to the DB2 10 for z/OS Installation and Migration Guide. A couple of handy pre-migration checklists are also available online – see [here for the V8 to DB2 10 version](#) and [here for the DB2 9 DB2 10 version](#).

Good luck with your upgrade!



## Triton Consulting Company Profile

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OFFENDING COMMAND: ~

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