DB2 Version 7 - Migration Considerations from V5 or V6

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e = DB2

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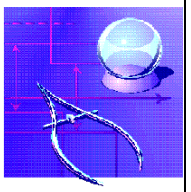

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- Earlier this year, IBM announced DB2 for OS/390 Version 7. This new version includes a migration path directly to V7 from V5 or V6. In addition to many new functions and enhancements, DB2 V7 will have a new DB2 Warehouse Manager feature, several new utilities and new tools in the areas of performance tuning, administration, application development and recovery.
- Come and join IBM and Lightyear Consulting to hear a brief recap of DB2 V6, the new V6 refresh and preview the upcoming Version 7 release.
- The focus of the tele-conference will not be on features and functions, but on the migration issues, for both V5 and V6 customers. At the end of the call you should have a firm understanding of issues such as:
  - How to migrate to V7
  - Is V7 the right version to migrate to from V5?
  - Is it worth waiting for V7, even if I need some V6 functionality, or shall we install V6 first, and then V7 after it stabilizes?

- Some parts of this presentation are more like looking into a crystal ball than at measurements. This crystal ball is cloudy, and gets fuzzier the farther we look into the future. Our plans include much more change and much more risk than ever before.
- The only near certainty is that there will be changes. My best guess is that fewer than 10% of the items will change their delivery time. I would expect some new items to come in, some to come early, and others to deliver in stages. More will have major changes in their design.

Presentation Topics

- **Who's Lightyear**
- **What's new in DB2 UDB V6 and V7 - Brief Overview**
- **General Considerations**
  - Releases & Migration Paths
  - Helpful Hints
- **IBM DB2 for OS/390 Version 7**
  - New functions affecting migration
  - Migration Specifics
- **Information Sources**

Lightyear and IBM TechTalk

Who is LIGHTYEAR

- **Services we offer**
  - Technical Education
    - E-Business on OS/390
    - DB2 V5+ / V6 / V7
    - IMS / CICS / MQ / OS/390
  - Teleconference Series
    - DB2 Tools
    - IMS Tools
    - DB2 V5+, V6, V7
    - DB2 Stored Procedures
    - WebSphere / VA JAVA
    - DB2 and JAVA, DB2 Connect, ...
  - Onsite Install Services
  - Remote (Telephone) Consulting
  - Certified by IBM in OS/390, CICS, IMS, DB2 (both MVS and NT/UNIX) and JAVA / Host-on-Demand
  - Application / Web / JAVA Development
  - Web Enabling Legacy Applications
  - Most for FREE !!
  - More complex ones for a fee ...
- **Where do we work**
  - W-Canada - Office in Calgary
  - W-US (WA, OR, CA, CO, AZ) - Office in Berkeley, Los Angeles and Phoenix
  - Mid-West - Office near Chicago

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- **Sample Projects**
  - Web Enable State Courts Scheduling System
  - Insurance - Agent Access System from the Web - to replace manual procedure and re-use legacy applications
  - Web Enable a large City's Legacy System
  - Insurance - Claim Management System - Web Front End for IMS Legacy System
  - Telephone Company: Yellow Page Sub-System in JAVA
  - Credit Card Corp. - Y2K Database Assessment / Replacement
  - Research Institute - Clinical Research Center Record System (DB2 UDB+ Web + JAVA)
  - Datawarehouse Project at large trucking manufacturer, incl. web and DB2, IMS access

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- The primary target audience for this presentation is the programmer who must do the actual migration from DB2 V5 or V6 to DB2 for OS/390 V7. Coverage will be at the parameter level and will include V7 parameters that affect implementation of new or improved function. These foils are adapted from the work of Kathy Devine, with help from Paolo Bruni, John Kelly and many others . Although this presentation touches upon the content of DB2 for OS/390 V7, it has a focus on the highlights and is not at all inclusive. The intent is to address those areas that have direct bearing on the task of migrating to DB2 V7.
- This material is a compilation of information from the DB2 What's New? manual, the DB2 Installation Guide and the DB2 Program Directory, with usage and customer input added. It is intended to point out areas that have the most impact on the success of your migration. Please look to the manuals and documentation, including the PSP bucket and information APARs for the latest information.

DB2 UDB for OS/390 Strategic Direction

Continue to Evolve as The Enterprise Server for Network Computing Solutions
- Centralized Processing of Massive Quantities of Data
- DB2 Family Compatibility
- Business Intelligence, Enterprise Resource Planning and e-business
- Vendor Enabling and Portability

Premier Use of Parallel Technology and System/390 Integration
- Data Sharing
- Continuous Availability
- Incremental Growth
- Work Load Balancing

Improved Application Enablement Through Extensive SQL Functionality
- Object-Oriented Extensions
- Rules Driven Integrity

Continual Performance Improvement
- Optimizer Technology
- Transaction, Query, Batch, Utility Concurrency
- Utilities and Tools Focus

DB2 Universal Database for OS/390 Version 6

- **Universal application: e-business**
  - SAP, PeopleSoft, Business Intelligence, QMF, DataPropagator
  - Stored Procedure Builder, Language and Definitions
- **Universal scalability:**
  - 16 terabyte tables, Faster, more parallel utilities and SQL
  - Data spaces for buffers, more page sizes
- **Universal availability:**
  - ALTER partition range and varchar length
  - Group Buffer Pool duplexing
  - Faster, more consistent restart and recovery
- **Universal management: more integrated**
  - Enhanced visual tools, more features, Control Center
  - Predictive governor
- **Universal access:**
  - Java static SQL (SQLJ), DRDA 3 part names, Net.Data
- **Universal extensibility:**
  - Triggers, User-defined functions & types, Large Objects

GA June 1999

- DB2 UDB for OS/390 Strategic Direction
- Here are themes we keep in mind as DB2 delivers new functions and releases. We do not exist on an isolated platform and long gone are the days of mainframe only solutions with "green screens". So we must be the trusted and open enterprise server for network computing solutions, those with large amounts of data and users, and continue to make mainframe DB2 more compatible with the DB2 family. DB2 enhancements make it more viable to handle BI, ERP and e-business. We work closely with vendors to ensure their DB2-based products are enabled to our platform and can port to other DB2 platforms. More parallel operations will be added to insure greater availability and improved incremental growth, and we will continue to closely integrate with S/390 and OS/390. We will continue to enhance the DB2 data model - adding new data types, functions and the ability to define and enforce business rules in DB2. New capabilities for developing applications are being added. The hallmark of DB2, and a great track record of improvement with each new release, is performance. Primarily obtained via optimization improvements - all types of DB2 processing continue to get faster, especially with mixed workloads of OLTP, BI and batch. DB2 utilities have seen substantial new function, improved performance and usability.

Version 6 Function Refresh

DB2 Version 6 New Function added in APARs

- SQL Procedures Language & Builder
- REXX Language and Stored Procedures
- Java Enhancements: SQLJ & Java Stored Procedures
- Star join optimization enhancements
- Declared Temporary Tables
- External Savepoints
- Identity Columns
- Defer define
- Select as source of UPDATE SET
- IFI consolidation for Data Sharing
- DDF suspend / resume
- Log suspend / resume for external copy
- Cancel thread outside of DB2

Get the DB2 Version 6 Technical Update, SG24-6108

- from www.lightyr.com website

Available now on Linux for S/390 !

- DB2 UDB V7 Enterprise Edition ("the other DB2")
- DB2 Connect Enterprise Edition V7

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- If you migrate to Version 6 now, you should have all of this function. Customers should generally start a migration with a very current level, being sure to check for hipers and PE fixes.
- DB2 added many new capabilities into DB2 for OS/390 V6 through APARs, allowing more power, performance, availability and flexibility. Some are also in V5. Here are some other examples:
- Support for defining identity columns - column attribute that enables DB2 to automatically generate a unique numeric value for each row inserted into the table.
- Better optimization for complex queries - new star join method, provides better optimization and execution performance for queries that join tables together in a star schema.
- See ibm.com/software/db2os390/v6apar.html and the red book for details.

DB2 for OS/390 Version 7 Highlights

- ✔ **Application: Scrollable cursors, Union everywhere, Row Expressions, Limited Fetch, Unicode, XML**
- ✔ **Scalability: Unload utility, Improved optimization & parallelism**
- ✔ **Availability: Online utility improvements, Online parameters, more consistent restart, data sharing enhancements**
- ✔ **Management: Utility lists, patterns & dynamic allocation, Skip release migration**
- ✔ **Access: Improved DB2 Connect, JDBC & ODBC, stored procedure COMMIT & ROLLBACK**

GA unannounced - expected for 3/2001 (an opinion by Lightyear not necessarily by IBM !)

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- DB2 UDB for OS/380 Version 7
- Here are the new V7 enhancements shown in the context of the DB2 Universals that are the themes from prior DB2 for OS/390 versions as well as the entire DB2 family. These themes are:
- - Improving the power of SQL, DB2 family compatibility and standards
- - more performance and parallel processing for SQL and DB2 utilities
- - continuous availability, ease of use and enhanced data access
- The biggest business drivers for our work continue to be e-business, ERP, CRM and BI. This new version will allow you to migrate to it from either V5 or V6 and this ability to skip a version may help your work load.

IBM @server zSeries

What's improved for DB2 Customers?

- ✓64 bit real memory
- ✓Performance: scalability, parallel, compression, connectivity
- ✓Application flexibility
- ✓Availability & automation

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- This is not about V7, but is likely to be useful for many customers.
- The most important change for DB2 customers is the increased memory in a single image. One LPAR or z/OS image can have more than 2GB of central memory. More memory can help every large DB2 customer. DB2 V6 data spaces were designed for the zSeries and z/OS memory or z/Architecture. You can have larger buffer pools and more space for dynamic statement cache, with much more room in the address space.
- The new zSeries processors have more powerful processors and more processors. The increased power will translate directly into faster processor and more capacity. When this power is used for parallel processing, the elapsed times will be reduced. The compression on this machine is about 2x faster than the prior generation, so customers will be able to use compression more. The OSA Express connections have much higher performance.
- There are many new options for applications and interfaces in z/OS and Linux on this machine. I'll talk about this on a foil later.
- The substantial improvements in continuous availability and in automation help with productivity for managing the complex. For example, there are some recent GDPS changes which provide better availability.

DB2 for OS/390 Version Availability Summary

Version	PID	Generally Available	Marketing Withdrawal	End of Service
V3	5685-DB2	December 1993	February 2000	March 2001
V4	5695-DB2	November 1995	December 1, 2000	December 2001
V5	5655-DB2	June 1997		
V6	5645-DB2	June 1999		
V7	5675-DB2	To be announced		

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- This table summarizes the versions of DB2 which are currently available or announced. There are a few customers still running Version 3, but the end of service is approaching. You can't order Version 4 now, and end of service is apporaching.
- If you want to search for these products by version number, the product number is often useful.
- Most customers are currently running Version 5 or 6.

DB2 for OS/390 Messages

Version	Message
V3	Too late to order V4, move ASAP.
V4	Move to V5 soon.
V5	Decide on V6 or V7.
V6	You are current, if you have refresh level. 34% US, 24% WW Oct.
V7	Early customers now.

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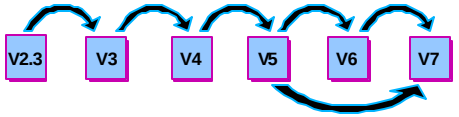
- Version 3 users needed to order Version 4 before December 1, 2000. If you have V3, start migrating to Version 4 ASAP, then start the next migration.
- Version 4 customers should plan to move to more current DB2 releases quickly, starting with Version 5. Version 4 is five years old, so customers are missing a wide range of improvements in Version 5, Version 6 and Version 7.
- Version 5 customers have an option for migration, but I expect the majority to move to V6.

Migration Paths



Most customers expected to go to V6
Migration direct from V5 to V7 possible
  Primarily for later migrations (e.g. 2002)
  Includes fallback & Data Sharing Coexistence
    Maximum of two releases
  V7 SPE PQ34467 required for fallback, data sharing, and strongly recommended for all
What function do you need?
  When do you need it?
  When can you consider migration?
  How much can you test?
  IDUG Solutions Journal www.idug.org

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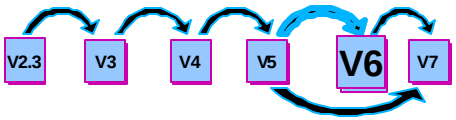
- Migration, fallback and coexistence with the ability to skip a release allows many possibilities.
- Some customers need the capabilities of Version 6 as soon as possible. They will want to go to Version 6.
- Other customers may be running on Version 3 or 4 now. They can plan their Version 5 migration in 2001, then skip over Version 6 to Version 7 in 2002.
- For many customers, the decision is in the details and the timing. If your objective is to save time, then be sure to factor in the items that are harder for skipping releases, the items that are the same, and increased migration work if you migrate earlier than your usual timing.
- Some specific functions are often needed. The timing of the need and the timing when a customer considers migration to a new release will often determine the choice. If you have unique use or migrate to a new version soon after release, you will have more work to do. See the IDUG Solutions Journal article for more: www.idug.org, then click Solutions Journal, Summer 2000, then Developer's Corner.

Migration to V6



Most of the considerations are similar to V5 to V7 migration

Very few, minor function changes since May 2000

Service level recommendation

- Start as current as possible
- Apply all PE fixes and hipers available
- Test with your workloads
- Plan to stay current

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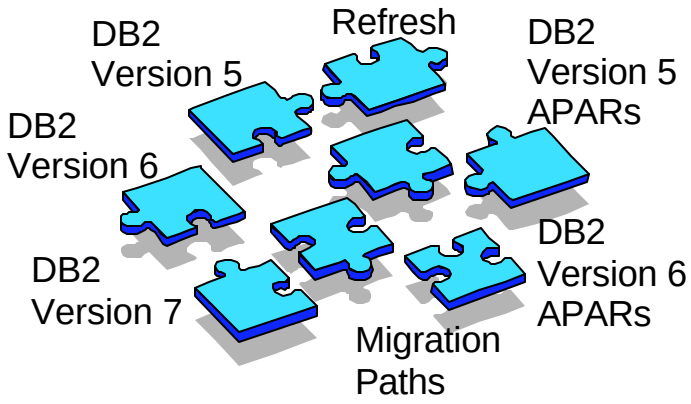
- Migration to Version 6 has many similarities to migration from V5 to V7. The largest changes are in the V6 migration, so getting to V6 involves most of the changes.
- Moving to V7 is a comparatively small jump.
- Migration to V6 has been done by more than 2000 licenses, with the vast majority in the past year, so customer experience is substantial.
- The major functional changes were provided in the refresh tape in May 2000, but that level of service is not the current recommended level. It is too old.
- If you are migrating to V6 now, start with a service level that is as current as possible. Be sure to apply all of the available PE fixes and hiper APARs. Then test with your work loads, especially if they are unique. Then plan to have regular updates to service, avoiding problems.

Helpful Hints

Here is some information to help fit the pieces together



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- With all of the changes, many customers will need to see what improvements they need and where those improvements are provided.
- In many cases, the changes are provided in multiple places, often at different times.
- The key resources are the What's New? and Release Guide books, the new function APAR lists on the web, and red books V5 Recent Enhancements and V6 Technical Update.

Danger Signs for Migration

- ✓1. I don't have time ... Skipping saves half the time (One or two months from receipt to production)
- ✓2. Our DBAs & programmers want to use everything now. We have no test suite.
- ✓3. I know how to do this. I don't need education. I don't need to read the book.
- ✓4. What is a good month to use as a level?
  Plan to be very current with hipers & PE fixes. Test your environment. Apply more PTFs.
- ✓5. I can't put all the service on. Skip the SPE.
- ✓6. I've never done this before and must do it right the first time (e.g. first migration within x months of general availability).

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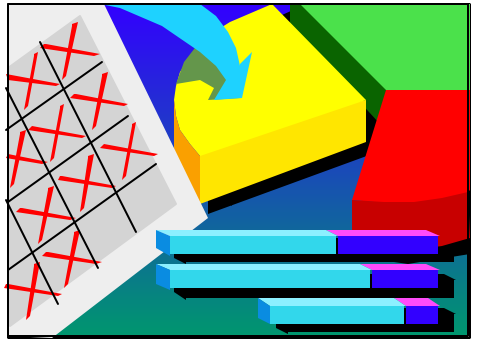
- I've been working with customer migrations for the past fifteen years, and I am seeing some patterns.
- Having inadequate time to do the job has shown a very high correlation with problems. You need to have an adequate time and budget to get the work done correctly.
- Using the most important five features first, then expanding makes the job much simpler for installing & testing.
- RTFM or RTFW. When we don't have enough time to read, then we get to make time for undoing and redoing.
- DB2 hipers (highly pervasive) generally means that we expect you to fall into this hole. Getting the information APARs, being current on fixes and preventing problems are practices that make the experience more pleasant.
- Not getting current on service for the prior release and not applying the SPE make the entire process much more difficult.
- I'm not perfect. Are you?

DB2 V7 - Features
What does DB2 Version 7 have to offer?



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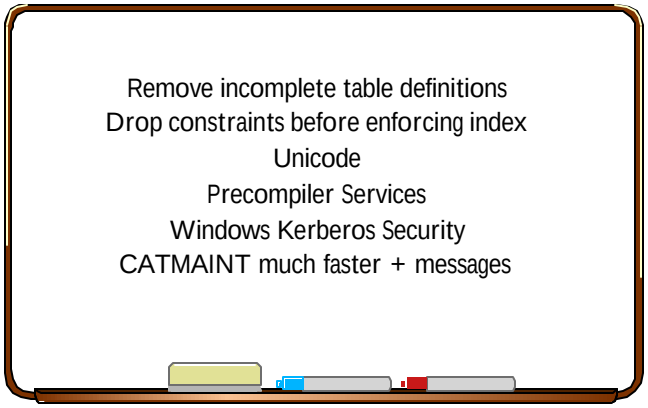
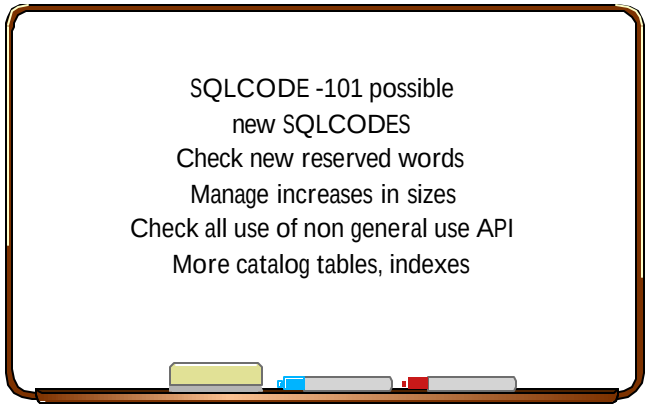
- Before you can start to plan your migration from DB2 Version 5 or Version 6 to Version 7, you need to understand what new features and functions Version 7 has.
- You will want to discuss with your application developers what new features they need or want. From there you can schedule your migration actions.
- We will briefly go over the content of DB2 V7 so you have an idea of what is now available. The biggest themes are e-business and utility enhancements. More information is available in the What's New? book on the web now. The other books will be provided at general availability.

DB2 V6 to V7 - Functions with migration considerations



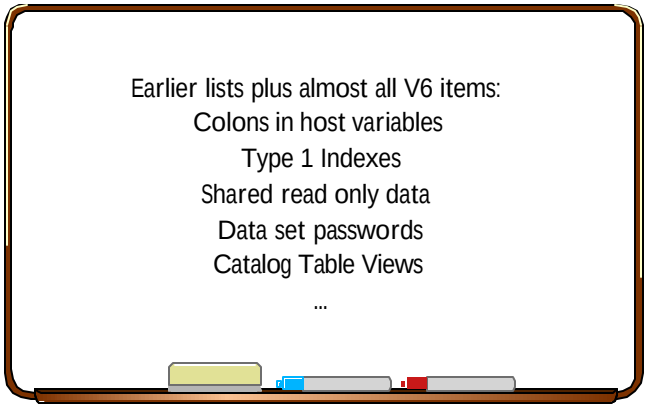
- Moving from V6 to V7 is fairly simple, when compared with moving from V5 to V6 or V5 to V7. There are some incompatibilities, but they are expected to be much less common and have smaller impact than moving to or through V6.
- The complete list is in the Installation Guide, and you should be sure to read the entire section carefully, getting the needed information to the appropriate people.
- Unicode requires OS/390 V2R8 and service.
- Using precompiler services will require the new IBM COBOL V2R2.
- Windows Kerberos security requires OS/390 V2R10 Security Server and DB2 Connect V7.

DB2 considerations for any migration



- Whenever you move from one release to another, there are some changes to expect.
- It is possible, but rare to find that SQL which processed in the prior release will not run on the new one. If you have users who test the boundaries, then this is more common.
- There are always new SQLCODEs, and we still find a few applications that do not have tests for other cases.
- Reserved words are handled in context when possible, but new reserved words can cause problems in SQL that worked on the prior release.
- The additional complexity means that storage sizes increase in the DB2 address spaces and in the application address spaces.
- If you use an interface identified as a Product-Sensitive Programming Interface, it must be checked.

DB2 V5 to V7 - Functions with migration considerations



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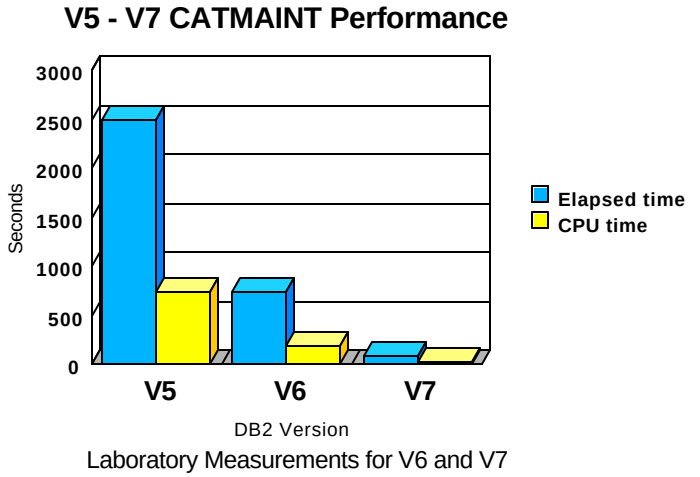
- Moving from V6 to V7 is fairly simple, when compared with moving from V5 to V6 or V5 to V7. If you move to or through Version 6, then the list of changes to manage is much longer.
- On the following foils I have highlighted a number of changes with V5 when they apply for migration from V5 to V7 only or V6 when they apply for migration from V6 to V7 only.

Migration performance enhancements



Laboratory Measurements for V6 and V7

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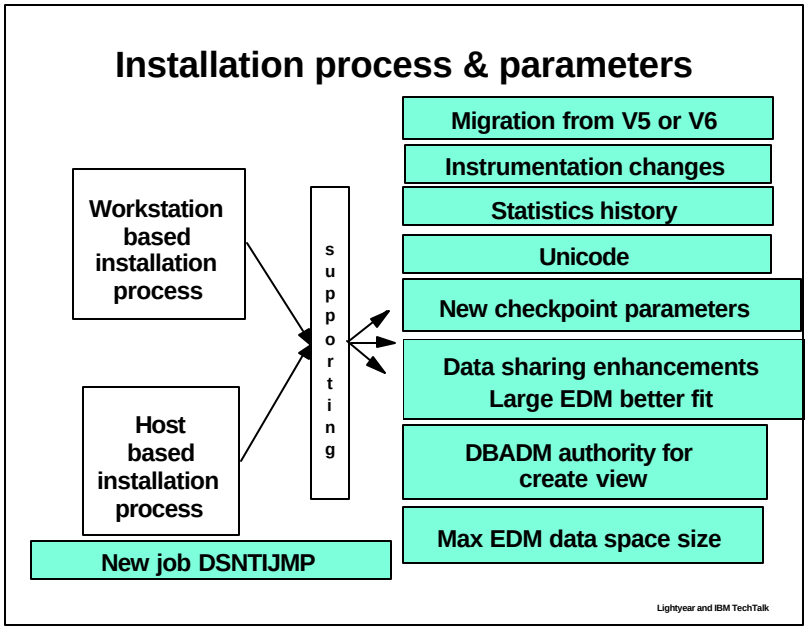
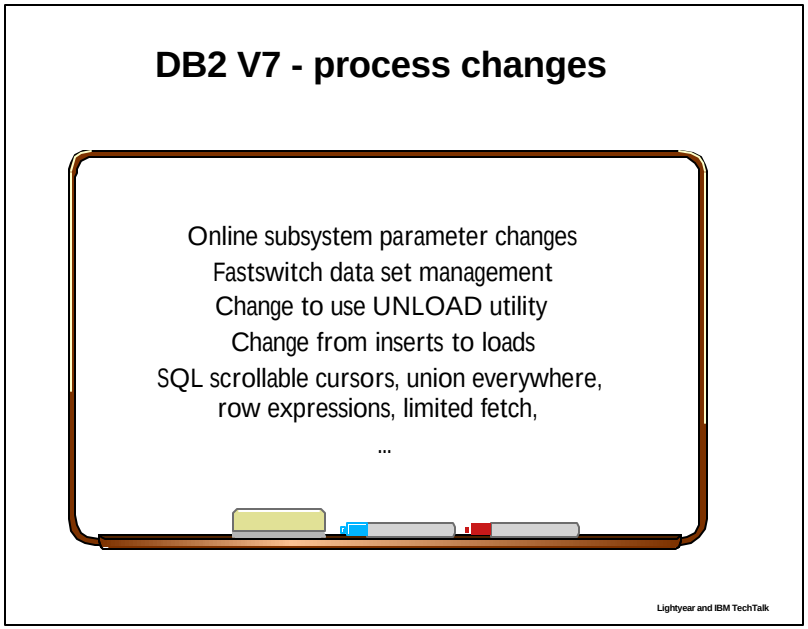
- In this chart the V6 and V7 migration elapsed/CPU times are based on actual performance measurements on migrations using a very large DB2 catalog. The V5 numbers are guesses based on V5 migration experiences and are shown to illustrate the known post V5 migration performance improvements.



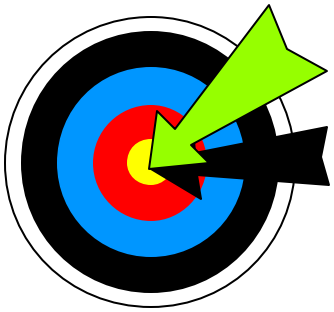


- There are some significant DB2 Installer changes, including the ability to get parameters from a running subsystem. I recommend DB2 Installer to save some time. The ISPF tailoring is also there, but requires you to get the values when someone edits DSNTIJUZ.
- The parameters at the right are new for the V7 DB2 install process. If you are migrating from V5, there are many more new parameters, basically the same list as V5 to V6 migration.

- When you use the new facilities, there may be some changes needed in your current processes and programming.
- If you get a set of subsystem parameters at the start of a process, they can change.
- Names and allocation of data sets changes with the FASTSWITCH parameter.
- Many customers can improve processing speed and flexibility by changing to use the UNLOAD utility, instead of the current technique.
- Some customers can change from using insert or LOAD to being able to LOAD while the data is online.
- There is a wide range of new SQL available for application programmers and query users.

DB2 V7 - Migration

Now let's talk about specifics of migrating to DB2 Version 7



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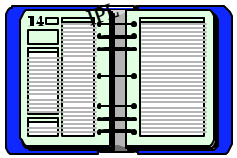
Have a Migration Plan!

- Get education on DB2 Version 7 (and V6 if migrating from V5)
- Determine new functions to be used
- Install prerequisite hardware and software
- Convert, eliminate incompatibilities
- Migrate DB2 for System Programmer test
  - Check incompatible change impact
  - Application programming changes
  - Database administration changes
  - System administration changes
  - Performance changes



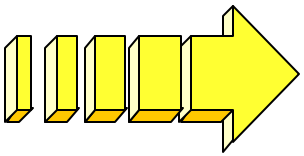
- Migrate Test System to new version
  - Test new and existing applications, test new DB2 functions
- Migrate Production System to new version
  - Run Version 7 code for some time before using new functions

Your short cut may be the longest way.

Lightyear and IBM TechTalk

- We have briefly gone over :
  - DB2 for OS/390 V7
  - And reviewed what is new in DB2 Version 7.
- Now let's concentrate on what it is going to take for you to get from Version 5 or Version 6 of DB2 for OS/390 to Version 7.
- The V7 Installation Guide has one chapter for migration from V5 to V7 and another chapter for migration from V6 to V7. There are two Information APARs for migration to V7, one for V5 to V7 and one for V6 to V7.
- Gain Experience with new features: You will also want to collect performance information for comparison with the new release. Do this before migration. The same is true for any explain information on your applications. Be sure to collect these on the system where they run, not a test system.
- There is now a little information out on the web regarding DB2 for OS/390 V7, but the volume will increase dramatically in the next few months, ranging from manuals that you can download, to IBM education classes and conferences. Be sure to get the Preventive Service Planning (PSP) information from service and review the applicable V7 migration Info APAR II12653 (V6 to V7) or II12652 (V5 to V7). Get the complete list of APARs needed on V5 or V6 and plan to be current on the new release.
- Lots to learn: One step at a time is safer. It is also easier to tell what is causing an error or unexpected result if you limit the number of things you change.
- You can migrate to DB2 V7 from DB2 V6 or V5. Use of some new programs or new features may require prerequisite levels of OS/390 or other products. There is a section in the DB2 V7 Release Guide that points all of these out by program/feature.

Premigration Activity



- Install prerequisite software
- Adjust for release incompatibilities
- Identify unsupported objects
- Save critical access paths
- Consider DRDA three-part names

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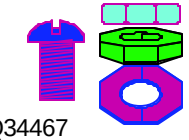
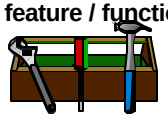
- Before you start the SMP/E process you will want to look into the disk storage requirements.
- Be sure you have installed all of the proper maintenance on DB2 Version 5 or Version 6 BEFORE you start to migrate, especially the APARs for migration and toleration of fallback from Version 7 (PQ34467). Get the list of APARs or PTFs from that APAR or from the Info APAR.
- The following foils and notes address each one of these points in more detail. Allow for plenty of time in your schedule to address these items. Your migration will run much more smoothly if you do.

Install Prerequisite Software



- **Prerequisites and Functional Needs**
  - ✔ All related products need to be at proper maintenance level (prior DB2 release too)
    - All fallback and preconditioning PTFs PQ34467
    - Ensure that you apply all the hiper APARS and recommended maintenance levels
    - Obtain PSP (preventative service planning) Buckets
    - Use the DB2 Program Directory, the Installation Guide and Info APARs **II06683 is index II11442 is V5 ==> V6 II12653 is V6 ==> V7 II12652 is V5 ==> V7**
    - Other software ... Vendor OS/390 V2R7 CICS V4
- **Functional Requirements for identified feature / functions**
  - ✔ See What's New in DB2? and
  - ✔ Release Guide for Details
- **Plan for more frequent service**
  - ✔ More current releases = more frequent



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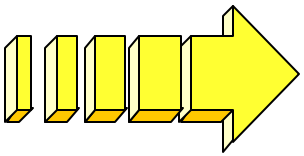
- This process requires research into the available service. You need to know what functions will be used first. Many of the functions have additional prerequisites. Read the section of What's New? and the Release Guide carefully to see if you need to upgrade other software. The most successful policy is to keep software at similar levels. DB2 V7 requires OS/390 V2R7 and CICS V4 at a minimum.
- Software from IBM and other vendors needs to be checked for the levels required and needed for the function you want. Some functions delivered as APARs require vendor changes.
- Customer who moves to a new release need to take time to apply service. Customers who are relatively current on service encounter fewer problems. I must admit that your mileage may vary, but we have a name for customers who are back level on service, "unhappy". For DB2 V6 or V7 now, applying PTFs every two to six months with hipers each month is good practice. For V5, three to eight months with hipers every month or two is ok.

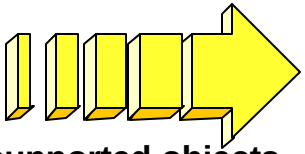
Premigration Activity *(continued)*



- Release 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).

- This list is covered in five pages of the DB2 Installation Guide. Many items need to be addressed before migration. Check the items several times, including just before running CATMAINT. Communication is key.
- We will have more detail on the most common issues on the next few pages.

Premigration Activity *(continued)*



- **Identify unsupported objects & adjust <u>before</u> migrating**

V5 ► Type 2 indexes **<u>required</u>**
V5 ► Data set password protection is **<u>removed</u>**
V5 ► Shared read-only data is **<u>removed</u>**
V5 ► Host variables **<u>require</u>** a colon (" : ")
V5 ► May need to **<u>remove</u>** two catalog table views
► Private protocol function **<u>not enhanced</u>**
► **V7 requires no incomplete** table definitions

- This page contains the items with the highest impact to the success of your migration. Job DSNTIJPM has been provided to help you identify unsupported objects. It queries the catalog and identifies objects that will cause a migration failure. This job generates SQL ALTER statements and REBUILD index statements that you can use to modify the objects. You can also run your own catalog queries. Example queries are in the Install Guide, or in member DSNTESQ of your prefix.SDSNSAMP library.
- Type 2 indexes required: Determine if you need to increase your data set size. Delete and redefine your index space as needed. See the DB2 Administration Guide for calculations or use DB2 Estimator. To convert your indexes to type 2, you can use CONVERT TO TYPE 2 option on ALTER INDEX SQL statement (does not apply to directory indexes). Then run REBUILD INDEX after ALTER INDEX, because the index is stopped until it is rebuilt.
- Data set password protection is removed: Use the ALTER statement to change the data set password to a blank. Alter statements are created for you if you run DSNTIJPM
- Shared read-only data is removed: Use the DROP DATABASE SQL statement on ROSHARE READ databases. Use ALTER DATABASE with the ROSHARE NONE option on databases defined as ROSHARE OWNER.
- Private Protocol function not enhanced: See later foil.

Other Version 7 Incompatible Changes

- Must drop constraints before enforcing index
- Remove incomplete table definitions for migration

V6
- Create function default is no final call

V6
- Changed default for identity column start value
- Fastswitch means different data set names
- Changing encoding affects applications
- DCE Security is removed
- Many more details, read book carefully
- After Version 7: tighter migration process? migration and fallback SPE required?

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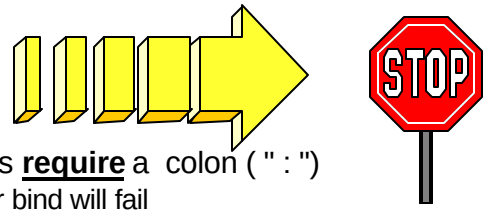
- There are additional incompatibilities for Version 7.
- Version 7 does not permit an index to be dropped if it enforces a constraint. You will need to drop the constraint first.
- Constraints must be completed or the tables must be dropped for migration.
- The default for CREATE FUNCTION is NO FINAL CALL.
- The default starting value for the IDENTITY column is the minumum value, rather than 1.
- After Version 7, the migration process may be tightened to remove some holes that customers fall into. We may require applying the migration SPE and a process that allows the new release to run without most new function.

Premigration Activity *(continued)*

V5



- Host variables **require** a colon (" : ")
  - Precompile or bind will fail
    - DSNH315I warning message becomes an error
  - BIND and REBIND fail for DBRMs prior to V2.3
    - V2.3 & later DBRMs have colon, even if source doesn't
  - Running precompiler on source is best.
  - Precompile with V5 is bypass technique.
  - Best practice is to set standard, remove in applications.
  - See red book SG24-6108

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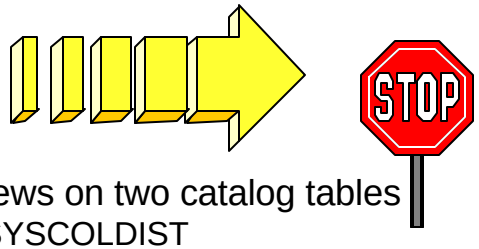
- Applications that contain a host variable reference that do not have the leading colon will fail with an error instead of an Informational warning (DSNH315I). How can you tell if you have host variables that are not preceded with a colon? If you have the source program, you can just precompile it again in V5 and you will get the warning (DSNH315I). If you have applications that are already bound, and you don't have the source, the choices are limited. Please see the red book description.
- If you still have a host variable without a preceding colon and you have migrated to V7, under what conditions will you receive the error? This depends on when the application was originally precompiled. If it was precompiled with the V2.2 or earlier precompiler, you get an error when you rebind or when an automatic rebind occurs. If you bind using the DBRM from the V2.2 precompiler, you will get a failure as well. If you re-precompile at V7, you will get a syntax error from the precompiler. If the application was bound on release V2.3 or later, you should have no problems with rebind, automatic rebind or a bind using the DBRM.

Premigration Activity *(continued)*

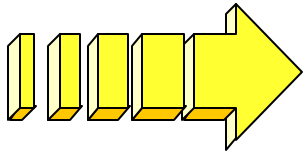
V5



- Remove views on two catalog tables
  - SYSIBM.SYSCOLDIST
  - SYSIBM.SYSCOLDISTSTATS
  - Recreate the views after migration
  - If you already have 255 character columns in the catalog, then this is not necessary

Premigration Activity *(continued)*

ALL



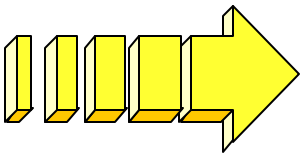
- Save critical access paths
  - Ensure you have a PLAN_TABLE that contains the access paths for critical queries and programs.
  - Run EXPLAIN on your queries before migrating.
  - Add new columns to PLAN_TABLE
- Also save accounting reports

- Remove views on two catalog tables
- Remove all views on catalog tables SYSIBM.SYSCOLDIST and SYSIBM.SYSCOLDISTSTATS before running DSNTIJTC or catalog migration will fail.
- Redefine the views after migration
- Check the most recent maintenance -
  - If you have put on PQ22051 and the value in COLVALUE on both tables; SYSIBM.SYSCOLDIST and SYSIBM.SYSCOLDISTSTATS has 255 in it, then you do not need to remove the views.
  - If you have put on PQ29582 (which makes PQ22051 optional) be sure to check COLVALUE of SYSIBM.SYSCOLDIST and SYSIBM.SYSCOLDISTSTATS. If it is not 255 then remove the views on these tables.

- Save critical access paths
- Changes between releases can cause unwanted access path changes. Identify which queries, plans and packages are especially critical and ensure that a PLAN_TABLE exists that contains the desired access path.
- Run EXPLAIN on your queries before migrating. EXPLAIN requires a rebind and may change your access paths. To avoid this, extract the needed queries and run EXPLAIN on them under a different application or program name. After the access path is validated, update APPLNAME or PROGNAME columns of the PLAN_TABLE.
- Use ALTER TABLE to add new Version 6 (V5 migration) and Version 7 columns to the existing PLAN_TABLE so you don't lose any existing rows.
- Keep accounting reports for the crucial queries and applications.

Premigration Activity *(continued)*

ALL



- Consider DRDA three-part names
  - New bind parameter - DBPROTOCOL
  - Convert existing applications from private protocol to DRDA

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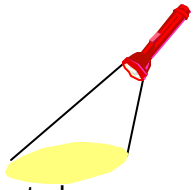
- DRDA support for three part names
- The new bind parameter DBPROTOCOL enables application programs that use three-part names for remote access to use DRDA protocol.
- Private Protocol can no longer use type 2 inactive threads. Specify a non-zero value for MAXTYPE 1 to use type 1 inactive threads. DRDA is needed for V6 enhancements to stored procedures, TCP/IP and new data types. Rebind your applications with the DBPROTOCOL option set to DRDA.
- Existing applications can be converted from private protocol to DRDA.
  - Rebind with the DBPROTOCOL parameter
  - Change the governing row in the RLST at the server, from a "governs by plan" to "governs by package".

Migration Considerations

- These may affect your migration:
  - More than 32K databases supported
  - Log buffer size increased
  - Consider enlarging BSDS
  - Larger generated code & SQLDA
  - Customized DB2I defaults can be migrated
  - Very long SQL statements can get -101 (rare, but possible)
  - Increase maximum number of data sets open
  - Calculate real and virtual storage sizes
    - Are you getting close to 2 GB?
    - See Spring 2000 IDUG Solutions Journal, p. 11



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- Number of logs: If you have over 31 active logs, DB2 will remove the oldest from the BSDS. See panel DSNTIPL & job DSNTIJIN. Over 32k databases: This means that the database identifier column SYSIBM.SYSDATABASE may contain negative numbers to indicate that there are more than 32K databases. Maximum Log output buffer size increased to 100,000 4k buffers. Input read buffer size increased to 60 KB .
- Consider enlarging BSDS to accommodate additional buffer pools. Avoid secondary extents, change the record size of the primary allocation to 180 records. See steps on how to reallocate in the DB2 Installation Guide.
- DB2I values specified during a previous release will be used to initialize DB2I default panels DSNEOP01 & DSNEOP02. Any DSNEPROF members will be migrated from Version 5 to Version 6. Be sure to check for new or changed default values to ensure your customized values are still valid.
- SQL -101 is possible on migration, but is very rare. If you have customers who stretch the limits, try their statements.
- Maximum number of open data sets has been raised to 20 - 25 thousand for customers running OS/390 V2R6. Check virtual storage below the 16M line. Some customers are getting close to 2 GB limits for real and virtual storage. If you are at all close, you should be calculating.

Migration Considerations

- **These may affect your migration:**
  - Stored Procedures (V5)
  - Alter Table changes
  - Work file database size calculations
    - Increase for migration?
  - REORG data set sizes
  - New reserved words
  - Larger size for generated code

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- Stored Procedures in earlier releases used columns AUTHID and LUNAME in SYSIBM.SYSPROCEDURES as a unique identifier for multiple instances. After migration to V7 from V5, the SCHEMA column in the SYSIBM.SYSROUTINES catalog table along with the CURRENT PATH special register and the PATH bind option are used to identify multiple instances of a procedure. See the Installation Guide for more information.
- ALTER TABLE has a new clause ALTER COLUMN, which allows an existing varchar column to be extended up to the maximum length for the varchar data type. See SQL Reference.
- Work file database size is important during job DSNTIJTC. This job updates indexes on catalog tables. The work files are used for sorting each index. DB2 needs enough work file storage to sort the largest index. See the table of added or updated indexes in the DB2 Installation Guide under Migration Considerations.
- Utility enhancements: Online REORG performance has been enhanced. It uses new calculations for the sort and unload data sets. You may need to increase the size of your unload and sort data sets. See the DB2 Utility Guide and Reference.
- Be sure to check as you move for use of new reserved words and larger memory size needed.

Migration - data sharing

- Migrating a data sharing group
  - Supports (V5 and V7) OR (V6 and V7) members within a group for a short time
  - MUST apply the fallback SPE to all members first
  - The first member migrated must be successful before migrating other members
  - Migrate one member at a time
  - Migrate all members before implementing new functions
  - Restrict execution of packages & plans bound on V7 to migrated members

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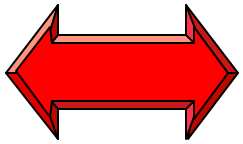
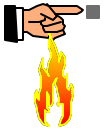
- The key here is to remember that you should only work with new Version 7 function on a member that has migrated to Version 7. Therefore, it is best to migrate all of your members and test with existing applications before implementing any new features or functions.
- If you have multiple releases in 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, restart light and enhanced constraint management are more complex if multiple releases are involved.

Release Coexistence



- IRLM service levels across members
- TSO and CAF logon procedures
- Distributed environment and DRDA
- All data sharing customers should check Coupling Facility microcode service level



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- IRLM
- Consider that some members of a data sharing group may run with newer service levels when you apply IRLM service
- TSO and CAF
  - Can attach to either release with existing procedures
  - You MUST update those procedures before migrating to any release subsequent to V7
- DRDA: New distributed functions introduced in V6 of DB2 for OS/390 can be used only when using DRDA access.
- When you migrate to Version 7, you can begin to use some new function which has prerequisite CF microcode levels. If you don't have the correct microcode level, you can lose data. See the red alerts.

Customer Experiences

- Based on the experiences of early customers, pay attention to:
  - Read the web, book, Info APARs, PSP
  - Run the premigration job DSNTIJPM
  - Check for incomplete table definitions
  - Convert Type 1 indexes that still exist (V5)
  - Drop Views on catalog tables if needed (V5)
  - Eliminate host variables with missing colons (V5)
  - Eliminate passwords: on samples, for example (V5)
  - Check migration of stored procedures (V5)
  - Be aware of new zparm DBPROTOCOL
  - Set up proper authorization for schema (V5)
- **Current maintenance for DB2, OS/390 & Coupling Facility**

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- Remember a previous foil titled Premigration Action with the stop sign on it? Many early customer problems dealt with items there. Sometimes a new one was created after the first check.
- Convert every index to a type 2 index. Check again.
- Check for views on SYSCOLDIST & SYSCOLDISTSTATS
- SQL errors on stored procedures may hinder migration. Application programmers must add colons for all host variables. Make sure DBAs understand the new authorizations and meaning of schema names. DBPROTOCOL default changed and changed back. Check for release dependent objects on fallback or coexistence.
- Customers who ran sample jobs did not realize that they had password protection on some of the sample data sets. If you ran samples and have not deleted passwords, you may want to delete the sample database.
- Because we are continually updating, it is important that you have the latest maintenance applied.

Sources

- **Newest DB2 Information: On the Web**
  - V5, V6 and V7 What's New for overviews (Library)
  - V6 Release Guide and other books, articles
  - V5 & V6 new function APARs
  - Customer application briefs (case studies)
  - News, Downloads, Events, Education, Service ...
  - Information APARs: index: II06683, V6 migration: II11442 & II12343, V5->V7: II12652, V6->V7 II12653
  - V7 Migration and Fallback APAR PQ34467 & 12 others
  - V6 migration process like V7 process PQ38035

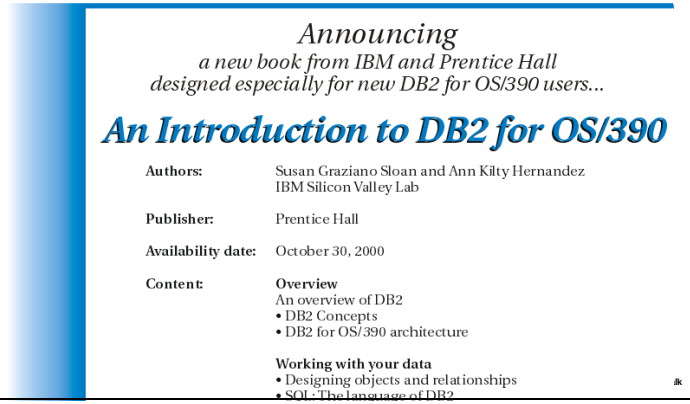
ibm.com/software/db2os390

useful redbooks also on: www.lightyr.com

See second pdf file for pages.

DB2 V7 Books & Resources:

- DB2 Version 7 Presentation Guide, SG24-6121 Coming Soon to Web
- Introduction to DB2 for OS/390



- Notes: Sources - On the web
- You will find the most up to date information on the DB2 for OS/390 web site. From this site you can access downloads, education, publications, demos, presentations, conferences, etc.
- In addition - here are some links that deal with some OS/390 and DB2 family topics:
- DB2 Family
- ibm.com/software/db2
- DB2 for OS/390
- ibm.com/software/db2os390
- DB2 Family Performance
- ibm.com/software/db2/performance

- This foil and the next two provide an outline of the key changes that deliver in about the Version 7 time frame. I have taken some license - showing some items that are delivered in service in earlier releases.
- Version 7 makes a substantial improvement in our DB2 family consistency, especially for the key --business applications.

Latest Red Books

- DB2 for OS/390 V7 Presentation Guide, SG24-6121
- DB2 for OS/390 V6 Technical Update, SG24-6108
- DB2 for OS/390 V6 Management Tools Package, SG24-5759
- DB2 Version 6 Performance Topics, SG24-5351
- DB2 Version 5 Recent Enhancements, SG24-5421
- Storage Management with DB2 for OS/390, SG24-5462
- Developing Cross-Platform DB2 Stored Procedures: SQL Procedures & DB2 Stored Procedure Builder, SG24-5485
- Getting Started with DB2 OLAP Server OS/390, SG24-5665
- DB2 Enterprise Query - QMF For Windows, SG24-5746
- Converting from Oracle AIX to DB2 for OS/390, SG24-5478
- DB2 for OS/390 Continuous Availability, SG24-5486
- How to Build Java Stored Procedures, SG24-5945
- SAP on OS/390: Information Warehouse, SG24-5681

- Here are some of the most recent red books. To find the latest ones, use the web.
- ibm.com/redbooks
- Put DB2 in the search criteria.
- Click Go.
- The books are shown, including residencies for new books to be written, red papers, red pieces or draft books, and then the red books, with the latest books at the top.

Sources

- **IBM Service Information** ibm.com/isource
  - IBM iSource (email subscription service for IBM SW)
- **Education** ibm.com/services/learning
- **DB2 Family Performance**
  - ibm.com/software/db2/performance
- **Red Books from International Technical Support**
  - ibm.com/redbooks
- **DB2 Magazine** www.db2mag.com
- **DB2 Users Groups**
  - www.idug.org
  - www.share.org
- **Lightyear Website with useful DB2 information / redbooks**
  - www.lightyr.com
- **DeveloperWorks**
  - ibm.com/developer

- These are the primary web pages for DB2 information. Just think of them as e-pointers.