

Upgrading to DB2 V9.7 for Linux, UNIX, and Windows



Agenda

- **Recommended reading and preparation**
- **Overview of the upgrade process**
- **Upgrading a data server**
 - Steps to take
 - Changes to consider
- **Best practices**
- **Additional Material**

Recommended Reading

■ DB2 Upgrade Portal

- One-stop-shop for essential information

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

■ DB2 Upgrade Home Page

- Links to webcasts, videos, wikis, etc.

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

■ DB2 9.7 Upgrade Guide

- Comprehensive, step-by-step documentation
- Available in DB2 Information Center

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/c0023662.html>

- Downloadable PDF file (English language)

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg27015148>

■ DB2 9.7 Upgrade Roadmap

- Prerequisites, planning, upgrading, and education

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21313253>

Recommended Reading (cont.)

■ DB2 9.7 What's New

- Outlines new and changed functionality
- Available in the DB2 Information Center

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.wn.doc/doc/r0051514.html>

- Downloadable PDF

ftp://ftp.software.ibm.com/ps/products/db2/info/vr97/pdf/en_US/DB2WhatsNew-db2q0e970.pdf

■ Upgrading to DB2 9.7 FAQs

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21390438>

■ Upgrading to DB2 9.7 Technotes

<http://tinyurl.com/lc9a94>

■ Release Notes for DB2 9.7 for Linux, UNIX, and Windows

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.common.doc/doc/c0023859.html>

Upgrading to DB2 9.7

- **DB2 9.7 continues with IBM's next-generation hybrid data server**
 - Optimized management of XML and relational data

Component	Upgrade Required?
Data Server	Yes, instance & database
Client	Optional

- **Upgrading not required when installing fixpacks**
- **Applications and routines may require changes (rare)**

DB2 9.7 Simplifies Server and Client Upgrades

- **Coexistence supported on all DB2 Linux, UNIX, and Windows operating platforms**
 - Install multiple DB2 server and client versions
 - Upgrading is no longer forced onto Windows users

- **Windows install provides upgrade option**
 - Automatically upgrades existing instances and DB2 Administration Server (DAS)
 - Upgrade action shows for existing DB2 copies that can be upgraded during the installation of DB2 9.7
 - Automatically installs DB2 9.7 and upgrades all instances and your DAS
 - Uninstalls the previous DB2 copy and any add-on products installed
 - If you do not choose the upgrade action, you must manually upgrade your instances and your DAS after installation
 - Database upgrade still required

Benefits of Coexistence

- **Each installation can be serviced independently**
- **Enables the creation of upgrade test environment**
- **Provides fallback capability**
 - Instead of upgrading, do a backup and restore
 - Note: You can restore a backup of a 32-bit DB2 database into a 64-bit DB2 9.7 instance
 - Endianness (byte order) must match on Linux and UNIX

Operating System Support

OS	Software	Hardware
AIX	<ul style="list-style-type: none"> • AIX Version 5.3 TL 9 SP2 • AIX Version 6.1² TL 2 • (64-bit AIX kernel required) 	<ul style="list-style-type: none"> • 64-bit Common Hardware Reference Platform (CHRP) architecture¹ • All processors that are capable of running the supported AIX operating systems
HP-UX	<ul style="list-style-type: none"> • HP-UX 11iv2 (11.23.0505) with <ul style="list-style-type: none"> • May 2005 Base Quality (QPKBASE) bundle • May 2005 Applications Quality (QPKAPPS) bundle • HP-UX 11iv3 (11.31) 	<ul style="list-style-type: none"> • Itanium® based HP Integrity Series Systems
Linux	<ul style="list-style-type: none"> • Red Hat Enterprise Linux (RHEL) 5 Update 2 • SUSE Linux Enterprise Server (SLES) 10 SP 2 • SUSE Linux Enterprise Server (SLES) 11 • Ubuntu 8.0.4.1 	<ul style="list-style-type: none"> • x86 (Intel® Pentium®, Intel Xeon®, and AMD) 32-bit Intel and AMD processors • x64 (64-bit AMD64 and Intel EM64T processors) • POWER® (IBM® eServer™ OpenPower®, iSeries®, pSeries®, System i®, System p®, and POWER Systems that support Linux) • eServer System z®, or System z10®

For most recent detailed requirements see

<http://www-01.ibm.com/software/data/db2/linux-unix-windows/sysreqs.html>

and <http://tinyurl.com/r4qcay>

Specific OS patches are also in the requirements, review and apply these prior to installing new release!

Operating System Support (cont.)

OS	Software	Hardware
Solaris	<ul style="list-style-type: none"> • Solaris 9 <ul style="list-style-type: none"> • 64- bit kernel • Patches 111711-12 and 111712-12 • If raw devices are used, patch 122300-11 • 64-bit Fujitsu PRIMEPOWER and Solaris 9 Kernel Update Patch 112233-01 or later to get the fix for patch 912041-01 • Solaris 10 Update 5 <ul style="list-style-type: none"> • 64- bit kernel • If raw devices are used, patch 125100-07 	UltraSPARC or SPARC64 processors
	<p>Solaris 10 Update 5</p> <ul style="list-style-type: none"> • 64- bit kernel • Patch 127128-11 	Solaris x64 (Intel® 64 or AMD64)
Windows	<ul style="list-style-type: none"> • XP Professional (32/64-bit) • Vista Ultimate/Business/Enterprise • Windows 2003 (32/64-bit) • Standard/Enterprise/Datacenter • Windows Server 2008 • Standard/Enterprise/Datacenter (32/64-bit) 	All Intel® and AMD processors capable of running the supported Windows operating systems (32-bit and 64-bit based systems)

For most recent detailed requirements see

<http://www-01.ibm.com/software/data/db2/linux-unix-windows/sysreqs.html>

and <http://tinyurl.com/r4qcay>

Specific OS patches are also in the requirements, review and apply these prior to installing new release!

32-bit and 64-bit support available

Operating Systems	DB2 9.7 Support Available
<ul style="list-style-type: none"> • 32-bit Windows on x86 and x64 (Using DB2 9.7 32-bit product) 	<ul style="list-style-type: none"> • 32-bit instances only • 32-bit DB2 server, client, and GUI tools packages • 32-bit IBM® Software Development Kit (SDK) for Java™
<ul style="list-style-type: none"> • 64-bit kernels of AIX®, HP-UX, or Solaris • 64-bit Windows on x64 • 64-bit Linux kernel on x64, POWER®, and zSeries® 	<ul style="list-style-type: none"> • 64-bit instances • 32-bit and 64-bit DB2 libraries available • 64-bit DB2 server and client • 64-bit applications and routines • 32-bit client side application support • 32-bit fenced stored procedures/UDFs only (non- Java) • Java fenced Stored Procedures/UDFs • 64-bit IBM SDK for Java

Let's Upgrade to DB2 9.7



Server Upgrade Restrictions– What Is Supported

- **Upgrading supported from DB2 9.5, DB2 9.1, and DB2 UDB V8.x**
 - With DB2 UDB V7 or earlier, you must upgrade to DB2 UDB V8.2 before upgrading to DB2 9.7
- **Upgrading to a non-root installation is supported from a DB2 9.5 non-root installation**
 - Upgrading to non-root installation from pre-DB2 9.7 root installation is not supported
- **Upgrading from a system with multiple DB2 copies of DB2 9.5, DB2 9.1, DB2 UDB V8, or all levels, is supported**
- **Restoring full database offline backups from pre-DB2 9.7 copies is supported (DB2 UDB V8.x, DB2 9.1, DB2 9.5)**
 - Rolling forward of logs from a previous release is **not possible**

Server Upgrade Restrictions – What is Not Supported

- **Operating system (or operating system level) is not supported**
 - A 32-bit kernel is running on Linux and UNIX operating systems except for Linux on x86
 - A 64-bit kernel must be installed prior to installing DB2 9.7

- **The `db2iupgrade` command fails**
 - If the `db2ckupgrade` command fails, this causes the `db2iupgrade` command to fail
 - `db2iupgrade` is not supported for non-root installations
 - To upgrade a non-root instance, use the `db2nrupgrade` command

- **Attempting to upgrade from DB2 UDB V7 or earlier**

Pre-upgrade Tasks for DB2 9.7 Server Upgrade

1. Ensure no indoubt transactions
2. Convert Type-1 Indexes to Type-2
3. Verify database ready for upgrade by running `db2ckupgrade`
4. Optional: Stop HADR
 - primary and standby
5. Backup you database
6. Backup configuration and diagnostic information
7. Archive your various DB2 log files
8. Review disk space requirements
 - Increase table space and log file space
9. Windows only: If you obtained customized code page conversion tables from DB2 support, backup all of the files in the `DB2OLD\conv` directory where `DB2OLD` is the location of your existing pre-DB2 9.7 DB2 copy
10. Linux only: Change raw devices to block devices
11. Optional: Upgrade your DB2 server in a test environment
12. In DB2 9.7, significant upgrade events are logged in the `db2diag` log files when the `diaglevel` is set to 3 (default value) or higher. If this parameter is set to 2 or less, increase to 3 or higher before upgrade
13. Take the DB2 server offline for upgrade

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.upgrade.doc/doc/t0050541.html>

Data Server Upgrade (in 1 page)

- Perform full or delta **offline** backup of your current database
- Verify DB2 9.7 install requirements and review upgrade recommendations
- Perform pre-upgrade tasks
- Install DB2 9.7
- Verify databases ready for upgrade with `db2ckupgrade` command (run on all partitions in a partitioned-database environment)

In-Place Upgrade	Side-by-Side Upgrade
<ul style="list-style-type: none"> • Upgrade instance (<code>db2iupgrade</code>) • Optional: Upgrade DAS (<code>dasmigr</code>) • For Windows above can be done at install • Upgrade databases (<code>UPGRADE DATABASE</code> command) 	<ul style="list-style-type: none"> • Create DB2 9.7 instance (<code>db2icrt</code>) • Optional: Drop DAS and create a new DB2 9.7 DAS (<code>db2admin create</code>) • Restore database offline backup (full or deltas) (<code>RESTORE DATABASE</code> command)

- Perform post-upgrade tasks and verify upgrade was successful
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/t0050542.html>
- **Note: Database upgrade does not alter your data**
- For all details
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/c0011933.html>

Upgrading does Not Touch your Data

- **Upgrade explicitly using the `UPGRADE DATABASE` command, or implicitly using the `RESTORE DATABASE` command, the following database entities might be converted during database upgrade**
 - Database configuration file
 - Log file header
 - Table root page for all tables
 - Index root page for all tables
 - Catalog tables
 - Buffer pool files
 - History file
- **For recoverable databases, `UPGRADE DATABASE` renames all log files in the active log path with the extension `.MIG`**
 - After successful upgrade you can delete all the `S*.MIG` files
- **`UPGRADE DATABASE` upgrades `SQLSPCS.1`, `SQLSPCS.2`, `SQLSGF.1`, and `SQLSGF.2`**
 - To support new functionality on automatic storage table spaces such as removing storage paths from a database and rebalancing automatic storage table spaces after you add or drop storage paths from a database
- **`UPGRADE DATABASE` automatically collects statistics for all system catalog tables**

Rebinding Packages in Upgraded Databases

- **During database upgrade**
 - All packages for user applications and routines marked as invalid
 - Must rebind invalidated packages to take advantage of changes in the DB2 server and new statistics
- **Packages implicitly rebound the first time application uses them after upgrade**
 - Eliminate overhead by rebinding invalid packages (`REBIND` command or `db2rbind` command) after upgrade is complete
 - Must explicitly rebind inoperative packages

Data Server Upgrade (Operating System Specific)

■ Windows

- Upgrade action shows for existing DB2 copies that can be upgraded during installation of DB2 9.7
- Automatically installs DB2 9.7 and upgrades all of your instances and your DB2 Administration Server (DAS) running on the DB2 copy
- Uninstalls the DB2 copy and any add-on products installed in this copy
- If you do not choose the upgrade action, must manually upgrade your instances and DAS after installation

■ Linux and UNIX

- Upgrade action on current instance is not available
 - You install a new copy of DB2 9.7
- Manually upgrade your instances after installation
 - Can manually upgrade your existing DAS

Follow the Path for Your Upgrade



**DB2 9.1
or
DB2 9.5**



DB2 UDB V8.x



- Recommended to upgrade to latest available DB2 9.7 fixpack
- Upgrade from any level of DB2 UDB V8.x, DB2 9/1, or DB2 9.5
- Pre-DB2 UDB V8.1 must upgrade to DB2 UDB V8.2.2 first

Upgrade Hiccups

■ DB2 UDB V8 APAR IY85495

- Database configuration reports incorrect rollforward pending state (fixed in FP14)
 - `db2ckupgrade` will report an error

■ AIX DNS lookup may cause commands to hang

- DB2 supports IPv4 and IPv6 as of DB2 9
- `db2icrt`, `db2start`, `db2stop` commands appear to hang
- Double-check hosts setting in `/etc/netsvc.conf`
- Technote # 1258661, APAR # IZ09585

http://www-1.ibm.com/support/docview.wss?rs=0&q1=1258661&uid=swg21258661&loc=en_US&cs=utf-8&cc=us&lang=en

DB2 9.7 License Enforcement Policies List Updated

- **The list of license enforcement policies includes row level compression and index compression, and no longer includes the pureXML feature**
 - Policies are configured for your DB2 products using the `db2licm` command with the `-e` option
 - Can choose to use a hard-stop license enforcement policy for your DB2 database product
 - DB2 checks for licensing compliance when users attempt to use row level compression and index compression
 - If appropriate licenses have not been applied, a `SQL8029N` message will be returned and attempted action not allowed

DB2 9.7 – Changes in Administration

- Partitioned indexes created by default for partitioned tables
- Primary/Secondary log files use non-buffered I/O by default
- DESCRIBE statement lists information for additional index types
- NO FILE SYSTEM CACHING for table space containers is the default for General Parallel File System (GPFS)
- Control Centre and Database Administration Server (DAS) have been deprecated
- Refer to “What’s New” documentation in the online (or local) Information Centre

DB2 9.7 Registry Variables – Registry File Location

- **Registry files removed from the DB2 installation path**
 - Location of instance information, global registry information has changed
 - `profiles.reg` and `default.env` files are removed from the DB2 installation path
 - DB2 instance information and global registry information is stored in the global registry (`global.reg`)

DB2 9.7 Registry Variables – New

- **New DB2 9.7 registry variables**
 - DB2_ATS_ENABLE
 - DB2_DDL_SOFT_INVALID
 - DB2_FCM_SETTINGS
 - DB2_FORCE_OFFLINE_ADD_PARTITION
 - DB2_DEFERRED_OFFLINE_ADD_PARTITION
 - DB2_PMAP_COMPATIBILITY
 - DB2RESILIENCE
 - DB2_LIMIT_FENCED_GROUP

DB2 9.7 Registry Variables – Changed

- **Registry variables with new default values**
 - DB2_LOGGER_NON_BUFFERED_IO

- **Registry variables with new values**
 - DB2_EVMON_STMT_FILTER
 - DB2_SQLROUTINE_PREPOPTS
 - DB2_WORKLOAD

- **Registry variables with changed behaviours**
 - DB2_EVALUNCOMMITTED and DB2_SKIPDELETED
 - DB2_SERVER_ENCALG
 - DB2_SKIPINSERTED

DB2 9.7 Registry Variables Deprecated/Discontinued

- **Deprecated registry variables**
 - DB2_CAPTURE_LOCK_TIMEOUT
 - DB2_SERVER_ENCALG

- **Discontinued registry variables**
 - DB2_THREAD_SUSPENSION

DB2 9.7 Database Manager (Instance) Configuration

- **New database manager configuration parameters**
 - `alternate_auth_enc`
 - `diagsize`
 - `ssl_*` related parameters

- **Changed database manager configuration parameters**
 - `authentication`
 - `srvcon_auth`

- **Deprecated or discontinued**
 - No parameters have been deprecated or discontinued in this release
 - Upgrading from DB2 9.1 or earlier
 - Consider removing deprecated database manager configuration parameters in pre-DB2 9.7 releases
 - Functionality associated with the parameters is obsolete or has been replaced by new functionality
 - Remove discontinued database manager configuration parameters in pre-DB2 9.7 releases; **they do not have the intended effect**

DB2 9.7 Database Configuration – New Parameters

■ New database configuration parameters

- `auto_reval` automatic revalidation and invalidation
- `blocknonlogged` block non-logged activity
- `cur_commit` currently committed
- `date_compat` date compatibility
- `dec_to_char_fmt` decimal to character function configuration
- `mon_*` control the collection of metrics and event monitor data at the database level
- `stmt_conc` statement concentrator

DB2 9.7 Database Cfg Changed/Deprecated

- **Changed database configuration parameters**
 - logbufsz
 - applheapsz
 - dbheap
 - locklist
 - logbufsz
 - logfilsiz
 - logprimary
 - pckcachesz

- **Deprecated database configuration parameters**
 - dyn_query_mgmt

Deprecated or Discontinued Functionality Affecting DB2 Server Upgrades

- Control Center tools have been deprecated
- Netscape support has been **discontinued**
- Health Monitor has been deprecated
- Raw devices for database logging deprecated since DB2 9.1
- Type-1 indexes have been **discontinued**
- Partitioned databases **no longer supported** on Windows 32-bit
- **Discontinued and deprecated commands listed at**
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/r0052002.html>
- **Discontinued and deprecated products**
 - Certain Net Search Extender functions have been deprecated
 - DB2 Governor and Query Patroller deprecated
 - XML Extender discontinued
- **Details at**
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/c0022309.html>

Changes to Design Characteristics of Databases

- **Bufferpool**
 - Storing qualifying LOB data in table row instead of default storage objects can cause bufferpool usage to increase

- **LONG VARCHAR and LONG VARGRAPHIC data types**
 - Deprecated and might be removed in a future release

- **TIMESTAMP data type**
 - Supports optional fractional seconds
 - Specify the number of digits in the fractional seconds as an attribute

Changes to DB Physical Design Characteristics

■ XML data type

- New format for XML storage object to support new functionality
 - Type-1 XML record format in DB2 9.1 and DB2 9.5
 - Type-2 XML record format in DB2 9.7
 - A table cannot contain XML documents in both formats
 - Without data migration, in DB2 9.7, a table with XML documents in Type-1 record format will continue to store documents in Type-1 format
- Some DB2 9.7 features require Type-2 XML record format
 - XDA Compression
 - Redistribute
 - Etc.
- How to determine the record format of a table
 - ADMINTABINFO administrative view and ADMIN_GET_TAB_INFO_V97 table function
 - Column XML_RECORD_TYPE
 - > 1 if Type-1 XML record format
 - > 2 if Type-2 XML record format
 - > NULL if table has no XML columns

Changes to Authorities, Privileges, and Security

- **In upgraded databases with `RESTRICT_ACCESS` configuration parameter set to `YES`, you must grant the `USAGE` privilege to `non-DBADM` users on `SYSDEFAULTUSERWORKLOAD`**
 - Otherwise, these users are unable to submit any work to the database
- **New authorities and changes to the authorization required to run DB2 system commands, CLP commands, and SQL statements**
- **Authorization model updated to clearly separate the duties of system administrator, database administrator, and security administrator**
 - DBADM authority
 - Abilities given to the DBADM authority have changed
 - SECADM authority
 - Abilities given by the SECADM authority have been extended
 - SYSADM authority
 - Abilities given by the SYSADM authority have been reduced
 - SYSMON authority
 - SYSMON authority now enables a user to also run several LIST commands
 - EXECUTE privilege
 - `UPGRADE DATABASE` command revokes the EXECUTE privilege from PUBLIC on the audit routines, `AUDIT_LIST_LOGS`, `AUDIT_DELM_EXTRACT`, and `AUDIT_ARCHIVE`
 - No longer need to use the `SSLconfig.ini` and `SSLClientconfig.ini` configuration files to set up SSL support (replaced with database manager configuration parameters)

Changes to Authorities, Privileges, and Security

- **Security administrator (who holds SECADM authority) can grant the EXECUTE privilege on the audit stored procedures and table functions**
 - Only the security administrator has the ability to grant EXECUTE on these routines

- **Net Search Extender command authorizations have changed; DB2 Text Search command and stored procedure authorizations have changed**
 - Instance instance owner must hold both the DBADM and DATAACCESS authorities
 - Otherwise Net Search Extender commands will fail even if the user has the correct authorities and privileges
 - Authorities and privileges required for running the Net Search Extender commands have changed
 - Details at <http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.wn.doc/doc/i0055015.html> and <http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.wn.doc/doc/i0055016.html>

Upgrade Changes to DB2 Commands and SQL

- **Changes to DB2 command line processor (CLP) and system commands can affect existing applications and scripts**
 - New parameters, modifications to existing parameters, deprecated or discontinued parameters, and modifications to command output

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/r0052002.html>

- **Changes to SQL statements can affect existing applications and scripts**
 - New default behaviors and modifications to statement output. Some statements are discontinued

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/r0052003.html>

DB2 Connect 9.7 Considerations



DB2 Connect Upgrade Considerations

- **Upgrading is supported for DB2 UDB V8, DB2 9.1, DB2 9.5**
 - DB2 Connect instances
 - Existing transaction manager
 - DB2 Connect Federated databases
 - For DB2 Connect releases prior to DB2 Connect Version 8, need to upgrade first to DB2 Connect Version 8, then upgrade to DB2 Connect 9.7
 - Ensure all pre-upgrade tasks have been completed
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.dbconn.doc/doc/r0024480.html>

- **Roadmap**
<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21326544>

DB2 Connect Upgrade Essentials

■ Upgrade Essentials

- Authentication type specified in the database directory entry at the DB2 Connect Server (gateway) overrides the authentication type cataloged at the client
- DB2 Connect Server and DB2 Connect Personal Edition no longer supports SNA protocol
- New names and packaging of the DB2 components in DB2 Connect 9.7

■ Upgrade recommendations

- Upgrade DB2 Connect servers first and then clients
 - Last two client versions can connect to the latest version of DB2 Connect
 - New features are not available to clients from previous versions and releases
- If clients are upgraded first, there are known limitations about the support for connectivity from a current version or release of the client to DB2 Connect servers from two versions ago

DB2 Connect Upgrade Steps

■ On Linux and UNIX

- Manually upgrade your DB2 Connect instances after installing the latest version of DB2 Connect
 - All remote nodes and databases cataloged on the DB2 clients refer to these instances
 - Creating a new instance, you will have to catalog nodes, DCS databases, and databases on the DB2 clients that existed in the instances from the previous version

■ On Windows

- Option to automatically upgrade an existing, supported DB2 Connect copy during installation
 - DB2 Connect instances are automatically upgraded
- Alternatively, install a new copy of the latest version of DB2 Connect, then manually upgrade DB2 Connect instances

DB2 Connect Upgrade Considerations

- **If upgrading from pre-DB2 Connect V8.2.2**
 - Authentication type specified in the database directory at the DB2 Connect server overrides the authentication type catalogued at a client
 - If there is no authentication type specified at a client, the default authentication is `SERVER`

- **Review all considerations in Quick Beginnings for DB2 Connect Servers**

ftp://ftp.software.ibm.com/ps/products/db2/info/vr95/pdf/en_US/db2c6e950.pdf

IBM Data Server Client 9.5 Considerations



Client Upgrading

Upgrading from	Upgrading to	Upgrade support details
<ul style="list-style-type: none"> Version 8 DB2 Administration Client Version 8 DB2 Application Development Client Version 9.1 DB2 Client Version 9.5 Data Server Client (Windows®)	Version 9.7 Data Server Client(Windows)	You have two options: <ul style="list-style-type: none"> Install the Version 9.7 Data Server Client, and choose a pre-Version 9.7 client copy with the upgrade action in the Work with Existing window. The client instance is then automatically upgraded for you. Install a new copy of the Version 9.7 Data Server Client, and then manually upgrade existing client instances.
<ul style="list-style-type: none"> Version 8 DB2 Run-Time Client Version 8 DB2 Run-Time Client Lite Version 9.1 DB2 Runtime Client Version 9.5 Data Server Runtime Client (Windows)	Version 9.7 Data Server Runtime Client(Windows)	<ul style="list-style-type: none"> Install the Version 9.7 Data Server Runtime Client as a new copy, and then manually upgrade your existing client instance.
All Version 9.5, 9.1, or Version 8 clients (Linux® or UNIX®)	All Version 9.7 clients (Linux or UNIX)	<ul style="list-style-type: none"> Install a new copy of any Version 9.7 client, and then manually upgrade your existing client instance.

Planning Your Client Upgrade

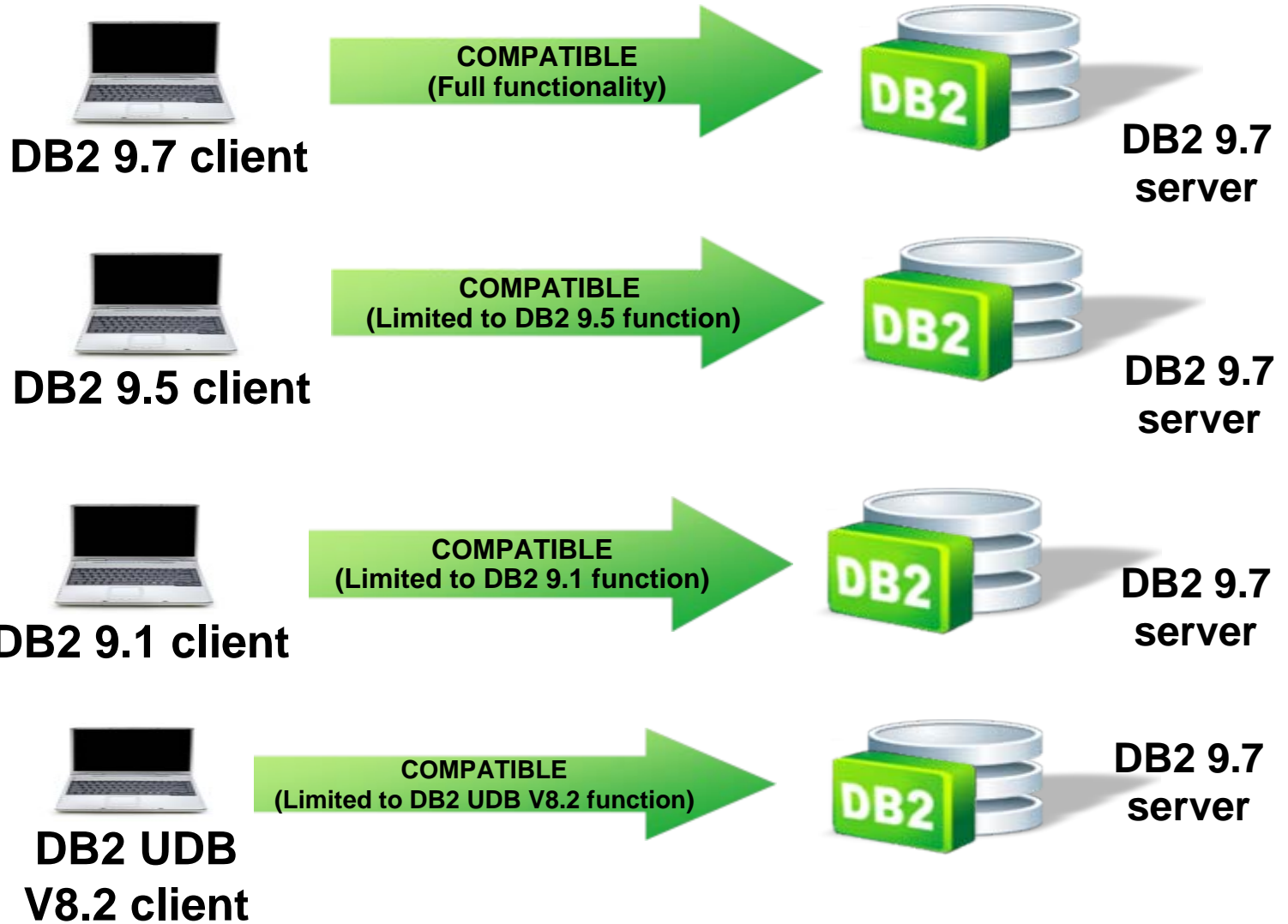
Upgrade plan	Details
Prerequisites	Ensure that you: <ul style="list-style-type: none"> ○ meet the installation requirements for DB2® database products. ○ resolve any support issues in upgrade essentials for clients including client and server connectivity. ○ meet all prerequisites for the upgrade task and subtasks, especially obtaining root or Local Administrator access and required DB2 authorization.
Pre-upgrade tasks	Include the following tasks: <ul style="list-style-type: none"> ○ Upgrade your DB2 servers ○ Back up your client configuration information In addition, check the list of pre-upgrade tasks for optional tasks that you might want to perform for your environment such as upgrading your clients in a test environment .
Upgrade task	You must include these steps: <ul style="list-style-type: none"> ○ Install Version 9.7 client ○ Upgrade client instance Review the following upgrade tasks to determine the additional steps that are required to upgrade your environment: <ul style="list-style-type: none"> ○ Upgrading to Data Server Client (Windows®) ○ Upgrading to Data Server Runtime Client (Windows) ○ Upgrading clients (Linux® and UNIX®)
Post-upgrade tasks	Include the following tasks: <ul style="list-style-type: none"> ○ Recatalog nodes and databases that use NetBIOS and SNA protocols ○ Review changes in DB2 server behavior ○ Verify that upgrade for clients was successful

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/t0023857.html>

DB2 Client Upgrade Restrictions

- **DB2 UDB V8 client installed on same system as DB2 9.7 server**
DB2 9.7 client installed on same system as DB2 UDB V8 server
 - Connections to databases on the DB2 server from client cataloged using a **local node** are not supported
 - Upgrade both the DB2 server and the client to DB2 9.7
 - If you do not upgrade the version 8 client or the DB2 UDB Version 8 server, you can only connect to the databases that are cataloged using TCP/IP nodes
- **Trusted context capability supports only the TCP/IP protocol**
 - Connections to upgraded databases cataloged using a local node are unable to use this capability unless re-cataloged using the TCP/IP protocol
- **Upgrading from DB2 9.1 or DB2 UDB V8.x clients**
 - Review additional upgrade support changes that can affect your upgrade
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.upgrade.doc/doc/t0050537.html>

Connectivity Support for Clients to DB2 9.7 Servers



Connectivity Support for DB2 9.7 Clients



DB2 9.7 client



DB2 9.7
server



DB2 9.5
server



DB2 9.1
server



DB2 UDB
V8.x
server

Multiple clients can be installed on a single machine

Application Considerations



Application Drivers

- **IBM Data Server Driver for JDBC and SQLJ**
 - Includes `db2jcc.jar` class file for applications that use JDBC 3.0 methods or earlier
 - Includes `db2jcc4.jar` class file for applications that use JDBC 4.0 methods or earlier
- **JDBC 4.0 `java.sql.DatabaseMetaData.getDriverName` method**
 - Returns the IBM Data Server Driver for JDBC and SQLJ name instead of the IBM DB2 JDBC Universal Driver Architecture name
- **DB2 JDBC Type 2 driver deprecated since DB2 9.1**
 - Modify Java applications and external routines to use IBM Data Server Driver for JDBC and SQLJ with type 2 connections
- **DB2 CLI applications, DB2 CLP interface, and .Net Data Provider clients support Secure Sockets Layer (SSL)**

SQL Procedures

- **SQL procedures created in DB2 UDB Version 8.1 run in DB2 9.7**
 - If you upgrade from a DB2 UDB Version 8 32-bit instance to a DB2 9.7 32-bit instance
 - Provided that they do not reference any unsupported functionality
 - Also applies for upgrade from a DB2 UDB Version 8 64-bit instance to a DB2 9.7 64-bit instance

- **Upgrade from a DB2 UDB Version 8.1 32-bit instance to a DB2 9.7 64-bit instance**
 - SQL procedures do not run because the 64-bit DB2 engine cannot load the 32-bit libraries associated to these procedures
 - Must drop and re-create these SQL procedures

- **SQL procedures created in DB2 UDB Version 8.2 or later and database upgraded to DB2 9.7**
 - SQL procedures will function successfully provided that they do not reference any unsupported functionality

Unfenced External Routines

- **External unfenced routines that have no dependency on the DB2 engine libraries (`libdb2e.a` or `libdb2apie.a`)**
 - Altered to `FENCED` and `NOT THREADSAFE`
 - Can safely run under the new multithreaded database manager
- **Running external routines defined as `NOT FENCED` and `THREADSAFE` that are not thread safe in the new multithreaded database manager**
 - Can yield incorrect results, database damage, or abnormal termination of the database manager

Refer to

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/t0023426.html> for details about how to manage this change

LOB and XML

■ LOB Inlining

- For upgraded databases, `INLINE LENGTH` default value is the maximum size of the LOB descriptor for the corresponding LOB column
- If LOB data length plus the overhead is less than the LOB descriptor size for the LOB column, LOB data is implicitly inlined in a table row after the database upgrade

■ XQuery expressions and XML data types

- After upgrade, XQuery string data type is used for values of elements or attributes that are not cast in an XQuery expression
 - Type annotations in existing XML documents that you validated are no longer used to do implicit casting
 - If you validate new XML documents to insert them in an XML data type column, these XML documents are stored without type annotations
- XQuery expressions that depend on data types based on type annotations from validated XML documents
 - Need to explicitly cast elements and attributes in all XQuery expressions from validated XML documents.
 - Without explicit type casting, XQuery expressions that used implicit casting or casting to other types will fail after the upgrade

LOB Locators

- **Implementation for LOB locators depends on DB2 database product installed**
- **Can use LOB locators only in unfenced routines**
- **Upgrade from a DB2 UDB Version 8 32-bit instance to a DB2 9.7 64-bit instance**
 - Must rebuild 32-bit external routines that use LOB locators as 64-bit unfenced routine libraries
- **Support for default function entry points in external routine libraries is deprecated in DB2 9.1**
 - If you upgraded from a DB2 UDB Version 8 32-bit instance on AIX or Windows operating systems,
 - Should specify an explicit entry point for your routine library

JAVA External Routines

- **DB2 9.7 installs the 32-bit IBM Software Developer's Kit (SDK) for Java 6 by default**
 - On Linux on x86 and Windows (when DB2 9.7 32-bit product is installed)
 - For all other supported operating systems, DB2 9.7 installs a 64-bit SDK for Java 6
- **Upgrade an instance to DB2 9.7, the `jdk_path` database manager configuration parameter is set to the installation path of SDK for Java 6**
- **In DB2 9.7 64-bit instances**
 - Java external routines require that the `jdk_path` parameter is set to a 64-bit SDK for Java installation path to run successfully
 - A DB2 9.7 64-bit instance cannot load a 32-bit JVM
- **IBM Software Developer's Kit (SDK) for Java 1.4.2 is deprecated and might be discontinued in a future release**
- **Starting with DB2 9.5, the default JDBC driver to run JDBC routines is the IBM Data Server Driver for JDBC and SQLJ**

SQL Administrative Views and Routines and Views

- **System catalog views under the SYSCAT schema remain compatible with catalog views defined in DB2 9.1**
 - There are new columns, increases in column length, or columns with changed data types in some of the system catalog views
- **SQL administrative routines include changes such as new parameters and new columns returned**
 - Some routines are replaced with system-defined administrative routines and view
 - All of the system-defined table functions with names that start with `SNAPSHOT_` have been deprecated since DB2 9.1

Optimizer and Query Execution Plans

- **In new databases, `cur_commit` configuration parameter is set to ON**
 - Currently committed semantics is enabled on cursor stability scans
- **Optimizer calculates execution plans for star join queries using different cardinality estimates than in previous releases**
- **MQT matching process considers additional situations**
 - Can result in the optimizer choosing a better execution plan for queries that match an MQT
- **Optimizer pushes down relational predicates (for filters and XPath extractions) into XQuery query blocks**
- **Scan sharing is introduced in DB2 9.7**
 - Allows a scan to read the buffer pool pages of another scan
- **Rebind statically bound packages after upgrade**
 - Take advantage of optimizer improvements

Database Packages

- **When you upgrade a database**
 - Packages for user applications and routines are placed into invalid state
 - Packages also placed into an invalid state if they depend on database objects that you dropped
 - Tables, views, aliases, indexes, triggers, referential constraints, and table check constraints
 - If you drop a UDF, your package is placed into an inoperative state

- **Invalid packages automatically rebound by the database manager the first time application needs to access them**
 - Rebind your database packages
 - Control when rebinding occurs and resolve possible issues
 - See optimizer enhancements for additional advantages of manually rebinding your database packages.

Upgrading ADO.NET Applications

- **Manage the changes between DB2 9.7 and previous releases**
 - Verify applications function as expected

- **Do not have to upgrade ADO.NET applications that use the OLE DB .NET Data Provider or the ODBC .NET Data Provider to run with DB2 9.7**
 - Upgrading these applications to the Data Server Provider for .NET can be beneficial
 - Data Server Provider for .NET has more extensive set of APIs than the OLE DB and ODBC .NET data providers
 - Access to the DB2 database development productivity tools integrated with Visual Studio
 - Use of the Data Server Provider for .NET can bring significant performance improvements

Upgrading .NET CLR Routines

- **Connect to the DB2 9.7 database in which you defined the .NET CLR routines**
 - If you created your .NET CLR routines with execution control mode `UNSAFE` and are upgrading from pre-DB2 9.7 32-bit instance to DB2 9.7 64-bit instance
 - Rebuild source code using the compile and link options specified in `bldrtn.bat` (DB2 sample script for building .NET CLR routines)
- **If you upgraded your .NET Framework, should also rebuild your .NET CLR routines**
- **Deploy routine assembly to the DB2 server in the same location specified by the `EXTERNAL` clause in the routine definition**
 - Routines should function successfully, with no differences in between previous releases and DB2 9.7

Upgrading Applications – Best Practices

- **If you identified changed DB2 commands, changed SQL statements, and changed system catalog views and built-in functions that impact your applications**
 - Edit your application code or scripts appropriately
- **If you identified changes specific to the development environment that impact your applications**
 - Modify them to support these changes
- **Rebuild changed database applications programmed in C/C++, COBOL, FORTRAN, and REXX,**
 - Using appropriate DB2 build file and specifying the appropriate DB2 shared library path
- **Test database applications to verify changes and ensure they run as expected**
<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.upgrade.doc/doc/t0023449.html>

Upgrading Applications - Adopting New Function

- **Use optimization guidelines or view MQTs to improve MQT matching**
- **Enable statement concentrator to improve performance for dynamic SQL statements that are similar**
- **If value of `pckcachesz` database configuration parameter is close to the upper limit in pre-DB2 97 releases running on 64-bit operating systems**
 - Tune this parameter or set to `AUTOMATIC` to enable self tuning
 - DB2 9.7 upper limit increased to 2,147,483,646
- **If you want to increase concurrency for the cursor stability isolation level or you are enabling Oracle applications**
 - Enable currently committed behavior
- **If your application requires a temporary table that remains defined after the end of a session or you are enabling Oracle applications**
 - Use created global temporary tables (CGTTs)

Upgrading IBM Tivoli System Automation for Multiplatforms (SA MP)



Upgrading IBM TSA for MP

- **IBM TSA MP integrated with IBM Data Server on AIX, Linux, and Solaris SPARC as part of the DB2 High Availability Feature**
 - Install, upgrade, or uninstall SA MP using either DB2 Installer or `installSAM` and `uninstallSAM` scripts (included in the IBM Data Server install media)
 - On Windows, SA MP bundled as part of the DB2 High Availability Feature
 - Not integrated with the DB2 installer
 - Support extended in DB2 9.7 to include Solaris SPARC 10

- **Verify basic prerequisites**

- **Restrictions**
 - Version 3.1 fixpack 1 of SA MP is on IBM Data Server install media
 - SA MP Version 3.1 fixpack 1 not supported on AIX system workload partitions (WPARs), Solaris 9, Solaris 10 non-global zones, or Solaris AMD64
 - If you have one or more IBM Reliable Scalable Cluster Technology (RSCT) peer domains defined on your system
 - Cannot upgrade SA MP using either DB2 Installer or `installSAM` install script included in the IBM Data Server install media

- **SA MP install log**
 - Diagnostic information about any warnings or errors returned

Best Practices



Stage 1 – Successful Planning

- Review Upgrade Guide and What's New
- Identify dependencies and requirements
- Create an inventory of impacted applications
- Draft a step-by-step upgrade plan
- Review with impacted stakeholders
- Receive approval to move forward

Stage 2 – Successful Validation

- **Establish user acceptance criteria and a test plan**
- **Setup a test environment**
- **Execute the upgrade plan**
 - Perform prerequisite upgrades (hardware, OS, etc.)
 - Upgrade the DB2 server and/or clients
 - Upgrade applications
- **Perform the validation testing**
- **Revise the upgrade plan as necessary**
- **Review and approve the final upgrade plan**

Stage 3 – Successful Deployment

- Define and execute a system “sanity” test
- Upgrade the production system (deploy)
- Execute sanity test

Best Practices for Upgrade

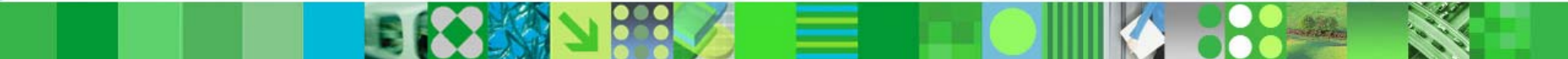
- Review changes in existing DB2 database product functionality
- Perform hardware and operating system upgrades prior to DB2 database product upgrade
- Benchmark DB2 server performance
- Devise a plan to reverse an upgrade
- Perform pre-upgrade tasks
- Upgrade 32-bit Linux operating systems to 64-bit
- Upgrade DB2 servers first
- Upgrade database applications and routines
- Upgrade DB2 High Availability Disaster Recovery (HADR) environments
- Upgrade SQL replication and Spatial Extender environments

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21313253>

Summary

- **DB2 9.7 provides a best of breed database solution**
- **Upgrading to DB2 9.7 is easier than ever**
- **3-stages of a successful upgrade**

Additional Material



Upgrade Related APARs



Upgrade Specific APARs

For the latest information on APARs relating to upgrading to DB2 9.1 from DB2 UDB V8.x please refer to

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21271974>

For the latest information on APARs relating to upgrading to DB2 9.5 from DB2 UDB V8.x or DB2 9.1, please refer to

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21287543>

For the latest information on APARs relating to upgrading to DB2 9.7

<http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21411187>

Enabling New DB2 9.7 Functionality



Enabling New Features

- **Enable automatic storage in existing databases**
- **Use new DMS table spaces created in DB2 9.7, or move existing DMS table spaces**
- **Control the total size of DB2 diagnostic and administration notification log files**
- **Use `SYSTEM` sampling to reduce the cost of collecting statistics on statistical views**
- **Use access plan reuse and statement optimization guidelines enhancements to influence the optimizer**
- **More efficient space reclamation in MDC tables**
- **pureXML in partitioned databases, partitioned tables, and MDC tables**

DB2 9.7 Automatic Storage

- **Enable existing database for automatic storage**
 - ALTER DATABASE database-name ADD STORAGE ON storage-location

- **Enable your existing DMS table spaces for automatic storage**
 - ALTER TABLESPACE table space name MANAGED BY AUTOMATIC STORAGE
 - Keep existing table space containers intact
 - Use automatic storage for future growth

- **Convert existing containers to use automatic storage**
 - Perform redirected restore to re-create existing DMS table spaces as automatic storage table spaces

- **View all regular and large automatic storage table spaces in your currently connected database**
 - SELECT TBSP_NAME FROM SYSIBMADM.SNAPTbsp WHERE
TBSP_USING_AUTO_STORAGE = 1 AND TBSP_CONTENT_TYPE IN
('ANY' , 'LARGE') ORDER BY TBSP_ID

Using New DB2 9.7 DMS Table Spaces

- **Newly created DMS table spaces have reclaimable storage enabled by default**
 - You can trigger the extent movement operation to relocate the maximum number of extents in them and reduce the high water mark
 - For automatic storage DMS table spaces
 - ALTER TABLESPACE statement with the REDUCE clause
 - For non-automatic storage DMS table spaces
 - ALTER TABLESPACE statement with LOWER HIGH WATER MARK clause
 - ALTER TABLESPACE statement with REDUCE clause to alter size of the containers

- **Existing pre-DB2 9.7 DMS table spaces have reclaimable storage disabled**
 - Can coexist with DMS table spaces that use reclaimable storage
 - To enable reclaimable storage in your existing DMS table spaces
 - Upgrade them using one of the following methods
 - Re-create the DMS table spaces
 - Use DB2 9.7 online table move to move data between the old and new table space types

Control Space Used by Diagnostic Log Files

- **Disk space limitations on the directory indicated by the `diagpath` configuration parameter?**
 - Control the total size of DB2 diagnostic (`db2diag`) and administration notification log files
 - Set the `diagsize` database manager configuration parameter to a value and restart the instance

- **After instance restart**
 - All messages written to `db2diag` rotating log files (`db2diag.N.log`) and rotating administration notification logs (`instance.N.nfy`) have total size is limited by the value in `diagsize`

- **Avoid losing information because of the log file rotation**
 - Specify an adequate value between 1GB and the amount of free space in the directory indicated by `diagpath` minus 5GB

Use **SYSTEM** Sampling on Statistical Views

- **Use **SYSTEM** sampling to reduce the cost of collecting statistics on statistical views**
 - `RUNSTATS ON TABLE view-name WITH DISTRIBUTION TABLESAMPLE SYSTEM (sampling-rate)`

Use Access Plan Reuse and Statement Optimization

- **Can now have query compiler attempt to reuse access plans for static SQL queries**
- **Use access plan reuse and statement optimization to influence optimizer and obtain consistent query execution plans for the same query**
- **For static statements**
 - Indicate to query compiler to reuse existing access plans for the statements in a package
 - ALTER PACKAGE schema-name.package-id ACCESS PLAN REUSE YES
 - Indicate to query compiler to reuse existing access plans for the statements in a package by issuing the BIND statement
 - BIND filename ACTION REPLACE APREUSE YES

More Efficient Space Reclamation for MDC Tables

- **Manually reclaim empty extents**
 - Offline table reorganization no longer required
 - REORG TABLE command with the RECLAIM EXTENTS ONLY option
 - Allows for concurrent table access while extents are being freed

- **Automatic support available to make freeing of extents**
 - Part of your automatic maintenance activities for the database
 - AUTO_MAINT, AUTO_TBL_MAINT, and AUTO_REORG database configuration parameters must all have a value of ON
 - Maintenance policy controls when automatic reorganization of an MDC table takes place to free unused extents
 - DB2 system stored procedures AUTOMAINT_SET_POLICY and AUTOMAINT_SET_POLICYFILE used to set this maintenance policy
 - XML is used to store the automated maintenance policy

Expanding pureXML Use in Your Database

- **Using pureXML in your partitioned database environments (hash partitioning)**
 - Create new tables with XML columns, add XML columns to existing hash-partitioned tables, or add a distribution key to existing tables with one or more XML columns
- **Enabling your partitioned tables (range partitioning) to use the pureXML feature**
 - Create new partitioned tables, add XML columns to existing partitioned tables, or upgrade a table with XML columns to a partitioned table
- **Take advantage of pureXML in your Multi-Dimensional Clustered (MDC) tables**
 - Create new MDC tables with XML columns, add XML columns to existing MDC tables, or upgrade an existing table with XML columns to an MDC table