

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



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Agenda

- **Recommended reading and preparation**
- **Overview of the upgrade process**
- **Upgrading a data server**
 - Steps to take
 - Changes to consider
- **Considerations**
 - DB2 Connect
 - Clients
 - Applications and routines
- **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®
<p>For most recent detailed requirements see http://www-01.ibm.com/software/data/db2/linux-unix-windows/sysreqs.html and http://tinyurl.com/r4qcay</p>		

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
	<ul style="list-style-type: none"> • Solaris 10 Update 5 <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)
<p>For most recent detailed requirements see http://www-01.ibm.com/software/data/db2/linux-unix-windows/sysreqs.html and http://tinyurl.com/r4qcay</p>		

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.htm>
|

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)

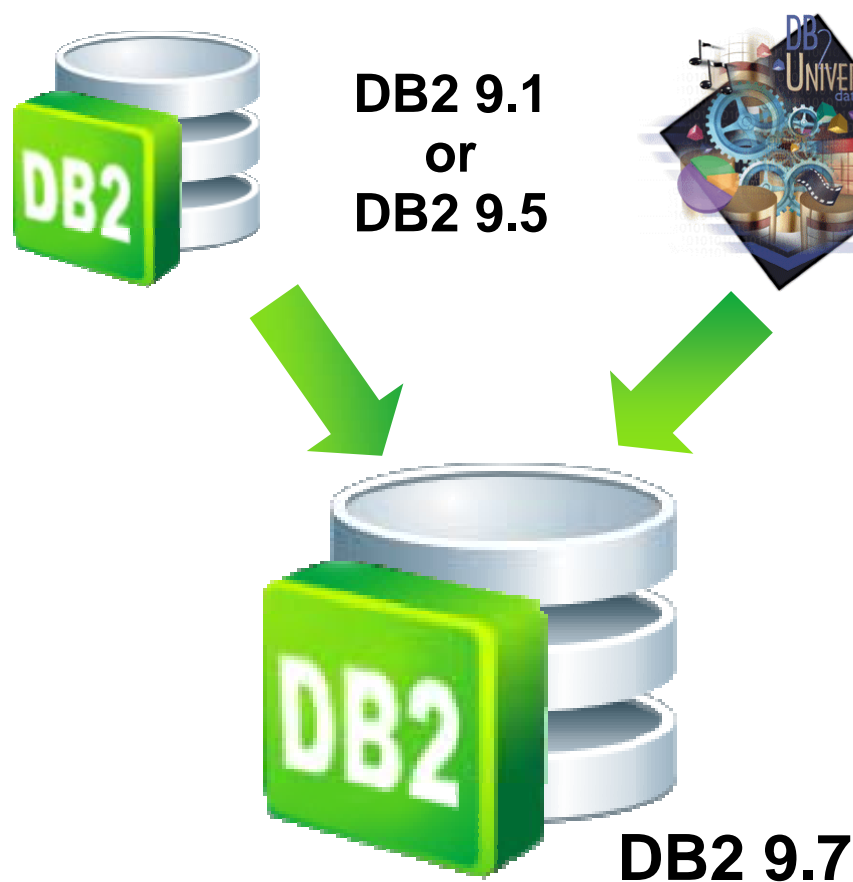
■ Windows

- 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 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_DELIM_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

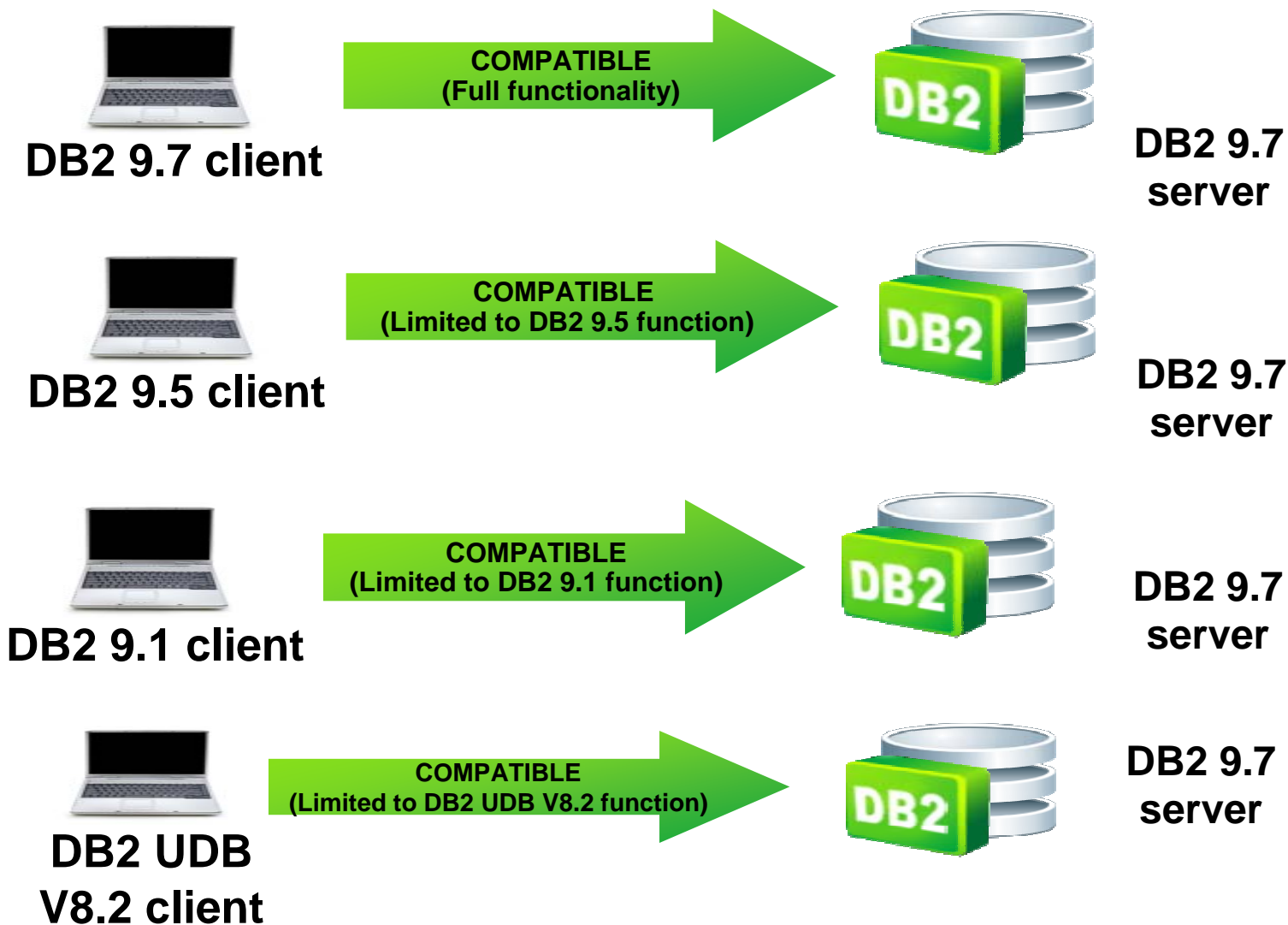
Upgrade plan	Details
Prerequisites	<p>Ensure that you:</p> <ul style="list-style-type: none"> ○ meet the installation requirements for DB2® database products. ○ resolve any support issues in upgrade essentials for clients including client and server connectivity. ○ meet all prerequisites for the upgrade task and subtasks, especially obtaining root or Local Administrator access and required DB2 authorization.
Pre-upgrade tasks	<p>Include the following tasks:</p> <ul style="list-style-type: none"> ○ Upgrade your DB2 servers ○ Back up your client configuration information <p>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.</p>
Upgrade task	<p>You must include these steps:</p> <ul style="list-style-type: none"> ○ Install Version 9.7 client ○ Upgrade client instance <p>Review the following upgrade tasks to determine the additional steps that are required to upgrade your environment:</p> <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	<p>Include the following tasks:</p> <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>

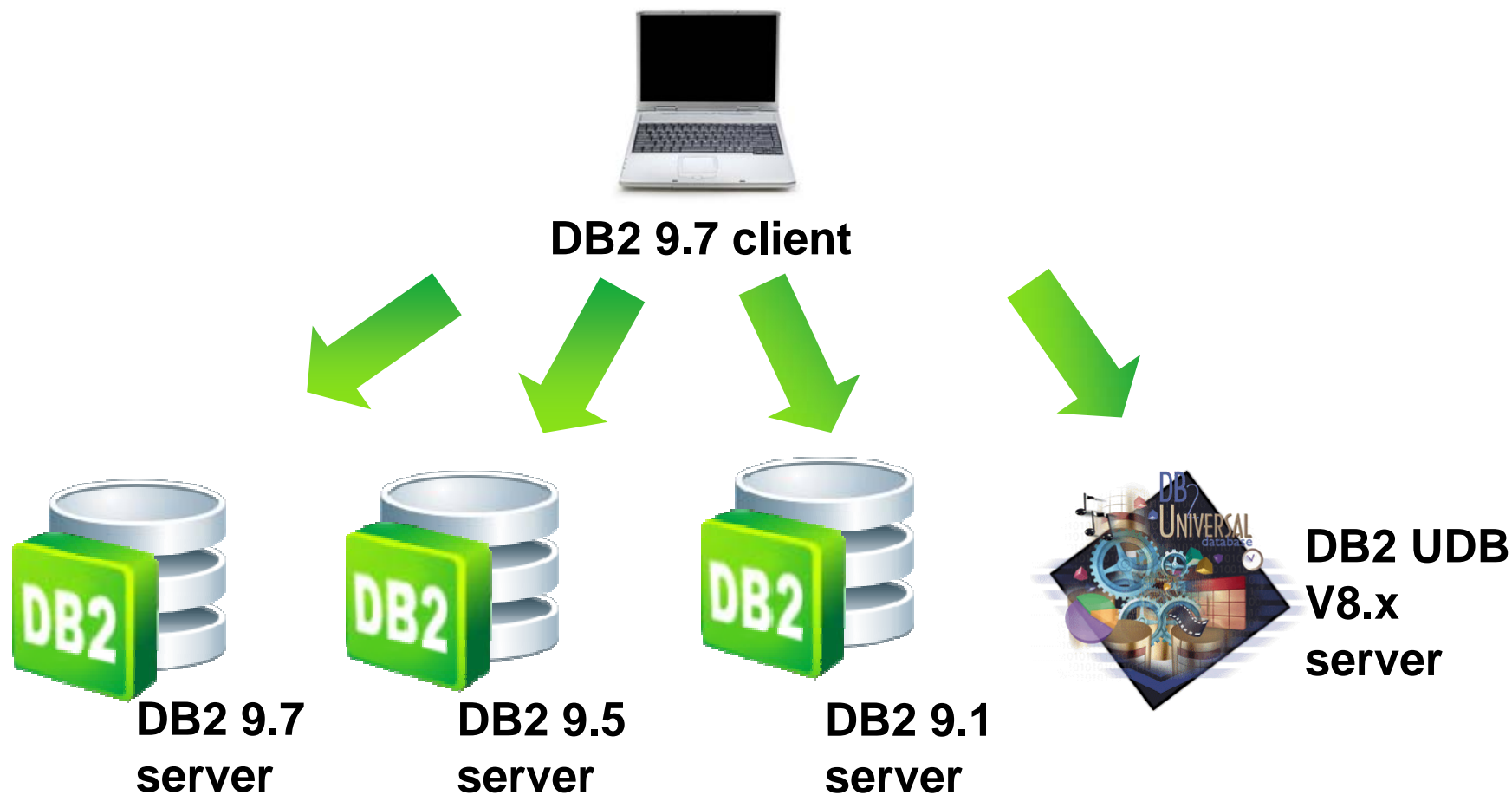
DB2 Client Upgrade Restrictions

- **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

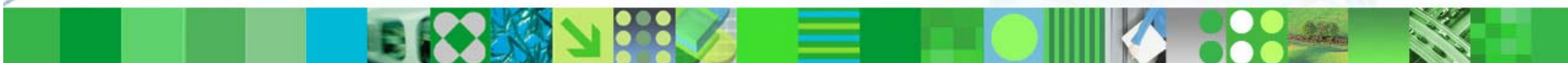


Connectivity Support for DB2 9.7 Clients



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

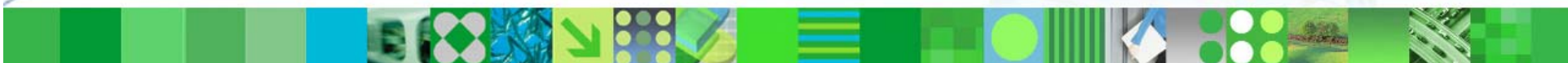
- Review changes in existing DB2 database product functionality
- Perform hardware and operating system upgrades prior to DB2 database product upgrade
- Benchmark DB2 server performance
- Devise a plan to reverse an upgrade
- Perform pre-upgrade tasks
- Upgrade 32-bit Linux operating systems to 64-bit
- 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