Migration to Version 9.5 of IBM DB2 for Linux, UNIX, and Windows

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Documentation in the SAP Service Marketplace
You can find this documentation at the following Internet address:
http://service.sap.com/instguides → Other Documentation → Database Upgrades → DB2 UDB
## Typographic Conventions

<table>
<thead>
<tr>
<th>Type Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Text</td>
<td>Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Cross-references to other documentation.</td>
</tr>
<tr>
<td>Example text</td>
<td>Emphasized words or phrases in body text, graphic titles, and table titles.</td>
</tr>
<tr>
<td>EXAMPLE TEXT</td>
<td>Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.</td>
</tr>
<tr>
<td>Example text</td>
<td>Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.</td>
</tr>
<tr>
<td>Example text</td>
<td>Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.</td>
</tr>
<tr>
<td>&lt;Example text&gt;</td>
<td>Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.</td>
</tr>
<tr>
<td>EXAMPLE TEXT</td>
<td>Keys on the keyboard, for example, F2 or ENTER.</td>
</tr>
</tbody>
</table>

## Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠</td>
<td>Caution</td>
</tr>
<tr>
<td>💡</td>
<td>Example</td>
</tr>
<tr>
<td>📝</td>
<td>Note</td>
</tr>
<tr>
<td>🏛</td>
<td>Recommendation</td>
</tr>
<tr>
<td>☰</td>
<td>Syntax</td>
</tr>
</tbody>
</table>

Additional icons are used in SAP Library documentation to help you identify different types of information at a glance. For more information, see Help on Help → General Information Classes and Information Classes for Business Information Warehouse on the first page of any version of SAP Library.
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1 Introduction

Purpose

This document explains how to migrate to Version 9.5 of the DB2 database on Linux, UNIX, or Windows when your database is DB2 UDB for UNIX and Windows Version 8 or DB2 for Linux, UNIX, and Windows Version 9.1. It contains specific information and recommendations for SAP system environments.

For more information about the migration to Version 9.5 of DB2 for Linux, UNIX, and Windows, see the IBM DB2 migration guide in the IBM DB2 Information Center.

Before you start the migration, make sure that you read SAP Note 1079000. This SAP Note contains the most recent information about the migration, as well as corrections to this document.

Make sure that you always have the most recent version of each SAP Note. You can find the SAP Notes on SAP Service Marketplace at:

http://service.sap.com/notes

Naming Conventions

In this document the following naming conventions apply:

Database Terminology

- IBM DB2 Universal Database for UNIX and Windows Version 8 is referred to as DB2 Version 8
- Version 9.1 of IBM DB2 for Linux, UNIX, and Windows is referred to as DB2 9.1.
- Version 9.5 of IBM DB2 for Linux, UNIX, and Windows is referred to as DB2 9.5.

Variables

<table>
<thead>
<tr>
<th>Name of Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;SAPSID&gt;</td>
<td>SAP system ID in upper case</td>
</tr>
<tr>
<td>&lt;sapid&gt;</td>
<td>SAP system ID in lower case</td>
</tr>
<tr>
<td>&lt;DBSID&gt;</td>
<td>Database name in upper case</td>
</tr>
<tr>
<td>&lt;dbsid&gt;</td>
<td>Database name in lower case</td>
</tr>
</tbody>
</table>

The database name is not necessarily the same name as the SAP system ID. For example, the database name is not necessarily the same as the SAP system ID in an MCOD (Multiple Components in One Database) environment.
1.1 New Features

New Features of DB2 9.5

The following outlines new features of DB2 9.5:

None of these new features mentioned here requires changes to existing data. You do not have to reorganize or convert index or table data either.

New Workload Management

DB2 9.5 has a new workload manager (WLM) that allows in-depth control over resources and database performance by classifying the work. The WLM will be used in the CCMS of future SAP NetWeaver releases.

Automatic Dictionary Creation (ADC) for Row Compression

Row compression, which was introduced with DB2 9.1, uses a dictionary-based compression algorithm to compress data. So far, the creation of the compression dictionary has required a reorganization of the table. With DB2 9.5, the database automatically creates the compression dictionary while a table is being filled with data.

Multithreaded Architecture

Up to and including DB2 9.1, each DB2 agent on UNIX and Linux operating systems runs in its own process. With DB2 9.5, DB2 data servers use a multithreaded architecture on all platforms. One of the advantages of this model is that it allows a simplified memory configuration and further enhancements to Self Tuning Memory Manager (STMM).

New High Availability Option: Included Cluster Management Software

IBM Tivoli System Automation for Multi Platforms (SA MP) Version 2.2 is now bundled with DB2 on the Linux and AIX platform. IBM provides a free two node license of SA MP for SAP customers. Cluster configuration has been simplified with the new utility `db2haicu` (DB2 high availability instance configuration).

Enhancements to Automatic Storage Tablespaces

You can now reclaim unused space in automatic storage tablespaces using the new `REDUCE` option of the SQL statement `ALTER TABLESPACE`. In addition, the maximum size for automatic storage database containers can now be limited using the new registry variable `DB2_SET_MAX_CONTAINER_SIZE`.

Enhancements for Multi-Partition Databases

DB2 9.5 now provides a single view for the configuration of all database partitions. The `db2_all` command has become obsolete. In addition, you can back up multiple partitions by entering only one command using the new single system view (SSV) backup method.

More Information

For more information about new features of DB2 9.5 in your SAP system release, see SAP Note 1089578.
New Features of DB2 9.1

The features of DB2 9.1 that are mentioned here might be relevant to the migration process. For more information about new DB2 9.1 features in your SAP system release, see SAP Note 930487.

Multiple DB2 Copies on One Host

Up to DB2 UDB for UNIX and Windows Version 8, the installation path for the database software on each operating system was a fixed path. For example, on Linux the path was /opt/IBM/db2/V8.1.

As of DB2 9.1, you can have multiple DB2 copies on one physical machine. The database installations are independent of each other and can have different Fix Pack levels as well as different configuration settings and so on.

The following figure shows an example of the installation of the database software on UNIX:

![Database Software Installation Diagram](image)

Linux and UNIX

On Linux and UNIX, multiple DB2 copies - independent of your SAP system release - on one physical machine are supported with DB2 9.1.

For future SAP NetWeaver releases, SAPinst installs the database software for new SAP system installations by default in the home directory of the instance owner: /db2/db2<dbsid>/db2_v9

During the migration, you have to specify the installation path for the DB2 software. If you want to install multiple DB2 copies on one database host, consider installing the software in the home directory of the instance owner.

Otherwise, you can use the previous installation path:

- **Linux, Solaris, HP-UX**: /opt/IBM/db2
- **AIX**: /usr/opt/IBM/db2
Windows

On Windows, the installation of multiple instances on one host is not supported up to and including SAP NetWeaver 7.0 SR2. Although you can technically install a separate copy of DB2 9.1 and migrate your DB2 instance and database to that copy, SAP kernel releases lower than 7.00 are not able to run with multiple copies and thus will fail to start.

Running multiple DB2 copies on Windows in an SAP environment will be supported for future releases of SAP NetWeaver.

Large Record Identifiers (RIDs)

Up to Version 8 of DB2, there was a table size limit of 64 GB for each table in a 4 KB tablespace. This table size limit doubled for each supported tablespace page size up to 32 KB.

DB2 9.1 overcomes this limit by introducing larger record identifiers (RIDs). RIDs are used by databases to find data pages that contain the requested record. By extending these RIDs from 3 to 4 bytes, tables in a 4 KB tablespace can now grow up to 2 TB.

To enable this feature, you must convert all tablespaces to data type LARGE [page 49] as a post-migration step. All new tables that are created in these tablespaces will automatically use large RIDs.

As an optional step, you can upgrade existing tables to use large RIDs. This includes a reorganization of all indexes of the table or complete table reorganization. For more information, see Enabling the Use of Large Record Identifiers (Optional) [page 51]

1.2 Migration Steps

To migrate to DB2 9.5, you perform the following steps:

1. You plan the migration and check the requirements.
2. You install the DB2 9.5 database software.
3. You migrate the DB2 instance.
4. You migrate the DB2 database.
5. You perform post-migration activities.

These steps are described in detail for UNIX and Windows in the following sections.
2 Planning

2.1 Migration Restrictions

The following restrictions apply to the migration to DB2 9.5:

- You **cannot** migrate to DB2 9.5 from DB2 Version 8, FixPak 8 or lower.

- If you are running DB2 UDB for UNIX and Windows Version 7 or lower, you first have to migrate to DB2 UDB for UNIX and Windows Version 8. For more information, see SAP Service Marketplace at [http://service.sap.com/instguides](http://service.sap.com/instguides) → Other Documentation → Database Upgrades → DB2 UDB → Migration to Version 8 of the IBM DB2 Universal Database for UNIX and Windows.

- If you are running DB2 Version 8 with a FixPak level lower than 9, you first have to apply FixPak 9 (DB2 Version 8 with FixPak 9 is also referred to as DB2 Version 8.2.2).

If you migrate from DB2 UDB for UNIX and Windows Version 7 or lower to DB2 Version 8 as an interim step, you need to perform all steps as outlined in the migration guide to DB2 Version 8.

If you do **not** apply all steps, your system will **not** work correctly.

Once you have migrated to DB2 Version 8 with at least FixPak 9, you can migrate your SAP system to DB2 9.5.

- DB2 9.5 is **not** supported for SAP systems with releases lower than 4.6x.

- DB2 9.1 and DB2 9.5 **no longer** support 32-bit kernels on HP-UX, AIX and Solaris. On Linux, 32-bit kernels are only supported on the x86 processor family.

- The following operating system platforms are **no longer** supported by DB2 9.5:
  - HP-UX on PA-RISC
  - Linux on IA64
  - Windows on IA64

Migration on these operating systems is **not** possible.

- The SAP DB2 Admin tools for log file management are **not** supported with DB2 9.1 and DB2 9.5. If you start the migration from DB2 Version 8 and you are still using these tools, you must also migrate the `ADMIN<DBSID>` database that was used by these tools.

The migration of the Admin tools is **not** described in this document. For more information, see the document IBM DB2 Universal Database for UNIX and Windows: New Log File Management that is available at [http://service.sap.com/instguidesnw70](http://service.sap.com/instguidesnw70) → Operations → Database-Specific Guides.
• The use of raw devices for database logging is **not** recommended and will be removed in a future DB2 release. You need to change the setting of the database configuration parameter `NEWLOGPATH` to a disk device instead of a raw device.

• Address Windowing Extension (AWE) on Windows 32-bit is not supported.

**More Information**

For a complete list of migration restrictions, see the [Migration Restrictions for DB2 Servers](#) in the IBM DB2 Information Center.
2.2 Migration Requirements

Operating System Requirements

- Check that your operating system fulfills all prerequisites for the installation of DB2 9.5. For more information, see Installation Requirements for DB2 Database Products in the IBM DB2 Information Center.

- UNIX only:

  The following does not apply to 32-bit Linux on x86.

  You must convert 32-bit instances to 64-bit instances before the migration. To check that your system is running on a 64-bit DB2 instance, proceed as follows:

  a. Log on to the database server as user db2<dbsid>.
  b. Enter the following command:

     `db2level`

     For more information about the conversion, see SAP Note 356828.

- Linux only:

  DB2 no longer supports raw character devices on Linux. If you are using raw character devices as containers for tablespaces or log files, you must convert them to raw block devices before the migration.

  For more detailed information, see Changing Raw Devices to Block Devices (Linux) in the IBM DB2 Migration Guide in the IBM DB2 Information Center.

SAP System-Specific Requirements

- Make sure that you have applied the correct SAP kernel patch.

  For SAP systems with release 4.6x and higher, a specific DBSL (dbdb6slib) version is required. The following table shows the minimal DBSL version that is required for your SAP system release:

<table>
<thead>
<tr>
<th>SAP Kernel Release</th>
<th>DBSL Patch Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6D</td>
<td>2185</td>
</tr>
<tr>
<td>6.40</td>
<td>109</td>
</tr>
<tr>
<td>7.00</td>
<td>41</td>
</tr>
</tbody>
</table>

  To check the current patch level of your DBSL, proceed as follows:

  a. Log on to the database server as user <sapsid>adm.
  b. Enter the following command:

     `disp+work –v`

     You can find the DBSL patch information at the end of the output. For more information about how to download and apply the latest SAP kernel patch, see SAP Note 19466.
• The following SAP tools for DB2 require a specific patch level to be able to work with DB2 9.5:

<table>
<thead>
<tr>
<th>Tool</th>
<th>SAP Kernel Release 4.6D – 6.40: Patch Level</th>
<th>SAP Kernel Release 7.00: Patch Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>db6pmudf</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>dmdb6bkp</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>dmdb6rdi</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td>dmdb6srp</td>
<td>19</td>
<td>n/a</td>
</tr>
<tr>
<td>dmdb6rts</td>
<td>16</td>
<td>n/a</td>
</tr>
<tr>
<td>brdb6brt</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

For more information about how to download and apply the latest patch for these tools, see SAP Note 19466.

• If you are migrating from DB2 Version 8 and you want to use the SAP EXPLAIN function with DB2 9.5, your SAP system requires a specific support package level. For more information, see SAP Note 919763.

**Space Requirements**

• Before the migration, you have to check the size of the SYSCATSPACE tablespace. If SYSCATSPACE is not enabled for the automatic resize function (AUTORESIZE), you must make sure that at least 50 per cent of all pages are free. If AUTORESIZE is enabled or if you are using DB2’s automatic storage management (AUTOSTORAGE), you have to check if there is enough free space available in the file systems.

• The migration uses the temporary tablespace. In an SAP database, the temporary tablespace is an SMS tablespace with the name PSAPTEMP<pagesize>. The file system in which this tablespace is located must allow the temporary tablespace to grow to the double amount of space that is required by SYSCATSPACE.

• During the migration, logs are written. The size of the required log space is related to the size of SYSCATSPACE. To avoid log full situations, make sure that you have enough log space available.

As a rough guideline, make sure that your log space has at least the size of SYSCATSPACE.

If you followed the parameter recommendations for the database parameters LOGFILSIZ, LOGPRIMARY and LOGSECOND described in SAP Note 584952, the migration should run without problems.

In a partitioned database environment, you only need to check the size of the log space on the catalog partition.
To check the available log space, proceed as follows:

a. Log on to the database server as user `db2<dbsid>`.

b. Connect to the database using the following command:
   
   `db2 connect to <DBSID>`

   c. Check the available log space using the following command:
   
   `db2 get snapshot for all databases`

   The available log space is displayed in the following row of the output:
   
   `Log space available to the database (Bytes)`

- Because of new functions, for example, real time statistics that are delivered with DB2 9.5, each index on every table containing data requires an additional page. Make sure that you have enough free pages in the corresponding index tablespace to account for one additional page per index on tables that contain data.

For more information, see Disk Space Requirements for DB2 Server Migration in the IBMDB2 Information Center.

**Other Requirements**

- You **must** perform an offline backup before you start the migration.

- In an HADR environment, stop HADR on the primary and the standby database. The migration is **only** supported on the primary database. After the migration, you have to recreate your standby database and initialize HADR on the primary and the standby database again.

- For the latest additions and corrections to this migration guide, see SAP Note 1079000.
2.3 Migrating in Special Environments

This section provides information about a migration in the following special environments:

Migrating a Multi-Partition Database
Before you can migrate a multi-partition database, you have to install the DB2 9.5 software on all database partition servers.

You can migrate the instance and the database from any database partition server. For more information, see Migrating Partitioned Database Environments in the IBM migration guide.

Migrating the Database in an HADR environment
In an HADR environment, you can only migrate the primary database. You cannot migrate the standby database. Before the migration, you must execute the STOP HADR command on the primary and the standby database. After the migration, you have to recreate your standby database and initialize HADR again on the primary and the standby database.

Migrating the Database in a Microsoft Cluster (MSCS) Environment
To migrate your database to DB2 9.5 in a Microsoft Cluster environment, you have to install a new copy of DB2 9.5 on all cluster nodes and migrate the instance and the database manually. For more information, see Migrating DB2 Servers in Microsoft Cluster Server Environments in the IBM DB2 Information Center.

Migrating the Database in an IBM Tivoli System Automation for Multiplatforms (SA MP) Environment
To migrate a DB2 database that is part of an SA MP cluster, you must first take it out of control of the cluster management software. To do so, set the respective resource groups offline and switch SA MP into manual control mode using the command `samctrl –MT`.

For more information, see section Updating the Database Fix Paks in the document IBM DB2 High Availability Solution: IBM Tivoli System Automation for Multiplatforms.
3 Migration under Linux and UNIX

Purpose
This section describes the required steps for the database migration when your operating system is UNIX or Linux.

Process Flow
The migration of your database from DB2 Version 8 or DB2 9.1 to DB2 9.5 consists of the following procedures, which you must perform in the specified order:

- We recommend that you perform a full backup of your database before you install the DB2 9.5 software.

1. You install the DB2 software [page 16].
2. You migrate the instance and the database [page 26].

- After the migration, you must perform a full backup of your database.

3. You perform post-migration activities [page 44].

Performing all migration steps takes up to three hours plus the time required to back up your database.

3.1 Installation of the DB2 Software
The installation of DB2 9.5 consists of the following procedures, which you must perform in the specified order:

1. Install the DB2 server software on the database server [Page 17].
2. Update the Database Client Software [Page 21].
3.1.1 Installing the Database Software on the Database Server

⚠️ If you are running a partitioned DB2 database system, you **must** install the database software in exactly the same directory on each database host.

1. Log on to the database server as user `root` and make sure that the `DISPLAY` variable is set correctly.

2. Insert and mount the database DVD to `<DVD_mount>` and enter the following command depending on your operating system and processor architecture:
   - HP-UX (Itanium): `/cdrom/HPIA64/ESE/disk1/db2setup`
   - AIX: `/cdrom/AIX_64/ESE/disk1/db2setup`
   - Linux (x86 32-bit): `/cdrom/LINUX_32/ESE/disk1/db2setup`
   - Linux (PowerPC): `/cdrom/LINUXPPC64_64/ESE/disk1/db2setup`
   - Linux x86_64 (AMD64): `/cdrom/LINUXX86_64/ESE/disk1/db2setup`
   - Solaris: `/cdrom/SUNOS_64/ESE/disk1/db2setup`

   It might take a few minutes for the IBM DB2 Setup Launchpad to appear.

3. On the Welcome screen of the IBM DB2 Setup Launchpad, choose Installation Prerequisites and check if all operating system requirements are met.

⚠️ You **must** make sure that the operating systems requirements are met. Otherwise, the migration can fail.
4. Choose **Install a Product**.

The screen **Install a Product** appears:


The exact sequence of the installation steps that follow depends on various factors, for example, your operating system, already installed DB2 components, your installation choices and the DB2 Fix Pack level.

Therefore, we are not able to provide a detailed step-by-step procedure for the DB2 software installation in this document.

The following steps can appear, but not necessarily in the sequence shown below. They outline important points that you have to consider when installing DB2 in an SAP environment:

- On the **Introduction** part of the screen **DB2 Setup – DB2 Enterprise Server Edition Version 9.5**, choose **Next**.
- Accept the license agreement and choose **Next**.
- On the screen **Select the installation type**, choose **Typical** and choose **Next**.
- On the screen **Select installation, response file creation, or both**, choose **Install DB2 Enterprise Server Edition Version 9.5 on this computer** … and choose **Next**.
- On the screen **Select the installation directory**, enter the **Installation Directory** and choose **Next**.
The default installation paths for Linux and AIX are as follows:

- **Linux**: `/opt/ibm/db2/V9.5`

  Note that on Linux 'ibm' is now in lower case.

- **AIX, HP UX and Solaris**: `/opt/IBM/db2/V9.5`

Current versions of the SAP installation tool install a local copy of the DB2 software in a subdirectory of the home directory of the instance owning user, for example, `/db2/db2<dbsid>/db2_v95`. The advantage is that you can maintain the database software of the DB2 copies independently of each other for each SAP system on the same host.

To check the location of the currently installed DB2 version, log on as user `db2<dbsid>` and issue the `db2level` command.

**Do not** install DB2 9.5 into the current installation directory of your DB2 instance!

- **AIX and Linux platforms only:**

  Decide if you want to install the **System Automation for Multiplatforms (SA MP) base component Version 2.2.0.3** and choose Next.

SA MP is a cluster management software used in high availability (HA) environments. If you decide to install the SA MP base component, additional prerequisites will be checked.
To start the prerequisite check for SA MP before starting the DB2 installation, proceed as follows:

1. Change to the following directory:
   ```
   <DVD_mount>/cdrom/<platform>/ESE/disk1/db2/<OS>/tsamp
   ```

2. Run the check manually using the following command:
   ```
   ./prereqSAM
   ```

   - On the screen *Instance Setup*, choose *Do not create a DB2 instance* and choose *Next*.
   - On the screen *Summary*, review the installation summary and start the installation by choosing *Finish*.
   - When the installation is completed, choose *Finish* again.
3.1.2 Updating the Database Client Software

You can install SAP systems with two different versions of the DB2 client connectivity which mostly depends on the setup of your SAP system:

**SAP Releases Lower than SAP Basis 7.0**

All SAP systems that were installed with DB2 Version 8 and all SAP systems that were installed with an SAP basis release lower than 7.0, are deployed with a local DB2 client instance (the DB2 Runtime Client) on each standalone SAP application server. For these application servers, you have to update the DB2 Runtime Client separately.

If you only have one application server and it is running on the database host, the DB2 Runtime Client of the database instance is used and a separate update is not required.

**SAP Releases Based on SAP Basis 7.0**

All SAP systems that were installed with DB2 Version 8 run with the DB2 Runtime Client. All SAP systems that are installed with DB2 9.1 can either run with the DB2 Runtime Client or the DB2 CLI driver, which was introduced with DB2 9.1.

In general, the type of DB2 client used in your system landscape depends on whether you want to migrate the database of a newly installed system, an upgraded system or whether you have manually switched to the new DB2 client connectivity (according to [SAP Note 1091801](#)).

Therefore, before the migration, you must determine which type of DB2 client is available in your system and update it accordingly.

**SAP Releases based on SAP Basis 7.10 and Higher**

All SAP systems based on SAP basis 7.10 are always installed with the new DB2 client connectivity. You only have to update the DB2 CLI driver.

**Graphical Overview**

The following figures provide a graphical overview of the steps that you have to perform, for example, on an application server that contains an ABAP stack:
3.1.2.1 Determining the DB2 Client Type Used by the System

To explicitly determine which DB2 client type (DB2 Runtime Client or DB2 CLI driver) is used, you can use **R3trans**:

1. Log on to the application server where you want to check the DB2 client type as user `<sapsid>adm`.

2. Enter the following command:
   ```
   R3trans -x
   ```
   R3trans loads the DB2 library and connects to the database. A log file `trans.log` is created in the current directory.

3. Open an editor and search for the term `DB2 library` in the log file `trans.log`.

If the DB2 CLI driver is used, the output looks as follows:

```
4 ETW000 [dev trc ,00000] DB2 library successfully loaded DB2 library '/usr.sap/<SAPSID>/SYS/global/db6/<platform>/db6_clidriver/lib/libdb2.so' successfully loaded
```

If the DB2 Runtime Client is used, the output looks as follows:

```
4 ETW000 [dev trc ,00000] DB2 library successfully loaded DB2 library '/db2/db2<dbsid>/sqllib/lib/libdb2.so' successfully loaded
```

Even if **R3trans** loads the DB2 CLI driver libraries, an additional DB2 Runtime Client might be installed.

By default, the SAP kernel will use the DB2 CLI driver on all application servers of SAP Release 7.0 and higher that have a local DB2 Runtime Client installed as well as access to a DB2 CLI driver in directory `/usr.sap/<SAPSID>/SYS/global/db6`.

In this case, the DB2 Runtime Client is not used and we recommend that you deinstall it to avoid double maintenance.

To check if a DB2 Runtime Client is installed, enter the following command as user `<sapsid>adm`:

```
db2ilist
```
If no DB2 Runtime Client is installed, this command is unknown. If a DB2 Runtime Client exists, the name of the local DB2 instance db2<dbsid> is displayed.

If you want to keep your DB2 Runtime Client, we recommend that you update both DB2 clients (that is, the DB2 Runtime Client and the DB2 CLI driver).

Result
You know which type of DB2 client is used in your system landscape. Update it according to the instructions in one of the following sections:

- Updating the DB2 Runtime Client [page 23]
- Updating the DB2 CLI Driver Client [page 23]
- Updating the JDBC Driver [page 24]

3.1.2.2 Updating the DB2 Runtime Client

Use
For each SAP application server that uses a DB2 Runtime Client and that is not running on the database server, you must update the DB2 Runtime Client.

Procedure
1. Log on to your application server as user <sapsid>adm.
2. To update the DB2 Runtime Client, follow the procedure described in Installing the Database Server [Page 17], but make sure that you choose IBM Data Server Runtime Client Version 9.5 as the product to be installed in step 5.
3. Repeat these steps on each application server that is not running on the database host.

After the update, the DB2 Runtime Client instance must still be migrated [page 29].

3.1.2.3 Updating the DB2 CLI Driver Client

Use
For SAP systems that use the DB2 CLI driver, you only have to update the DB2 CLI driver once in the shared directory /usr/sap/<SAPSID>/SYS/global/db6.

Each application server can access this directory. Thus, after the DB2 CLI driver has been updated, /usr/sap/<SAPSID>/SYS/global/db6 can be used by all application servers.
Procedure

1. Log on to the database host as user <sapsid>adm.
2. Mount the DB2 9 LUW CLI/JDBC driver DVD.
3. Switch to the directory <mount_DVD_Dir>/CLIENT.
4. Start the db6_update_client.sh script using the following command:
   
   ```
   ./db6_update_client.sh -u
   ```
   
   The new version of the DB2 CLI driver is automatically used after the next SAP system restart and no further action is required.

3.1.2.4 Updating the JDBC Driver

⚠️

The following section only applies to standalone Java-only application servers (that is, the application server does not reside on the database host).

If you are migrating an ABAP+Java system or a Java-only central system (that is, the application server and the database reside on the same host), you do not have to perform any of the steps described in this section.

On application servers that only contain a Java stack, the location of the JDBC driver can vary and respectively the appropriate steps how to update it.

Procedure

Determining the Location of the JDBC Driver for SAP Releases Lower than SAP Basis 7.10

1. Log on to the respective application server as user <sapsid>adm.
2. Change to the directory ..../cluster/bootstrap of the Java instance using the following command:

   ```
   cd /usr/sap/<SAPSID>/DVEBMGS<instance-no>/j2ee/cluster/bootstrap
   ```

3. Determine the location of the JDBC driver using the following command:

   ```
   grep driver bootstrap.properties
   ```

   One line with the value of this property of the rdbms.driverLocation is returned. It contains the location of the currently used JDBC driver.

Determining the Location of the JDBC Driver for SAP Releases with SAP Basis 7.10 and Higher

1. Log on to the respective application server as user <sapsid>adm.
2. Change to the profile directory of the Java instance using, for example, the following command:

   ```
   cd /usr/sap/<SAPSID>/SYS/profile
   ```
3. Enter the following command:
   
   ```
   grep dbdriver <instance_profile>
   ```
   
   One line that contains the path to the JDBC driver is returned.

**Updating the JDBC Driver (If Necessary)**

Depending on the location, you have to update the JDBC driver according to one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Required Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The JDBC driver is taken from a DB2 Runtime Client instance. In this case, the directory retrieved using the procedure above is <code>/db2/db2&lt;dbsid&gt;/sqlllib/java</code>.</td>
<td>Update the DB2 Runtime Client as described in [Updating the DB2 Runtime Client](page 23).</td>
</tr>
<tr>
<td>The JDBC driver is taken from <code>../global/db6</code> or from a copy of this driver in the local instance <code>exe</code> directory <code>DIR_EXECUTABLE=/usr/sap/&lt;SAPSID&gt;/D[VEBMGS][nr]/exe</code>.</td>
<td>Run the script <code>db6_update_client.sh</code> as described in [Updating the DB2 CLI Driver Client](page 23).</td>
</tr>
</tbody>
</table>
| The JDBC driver is used from any other location.       | Update the JDBC driver files (db2jcc.jar and db2jcc_license_cu.jar) manually as follows:  
   1. Mount the `DB2 9.5 LUW CLI/JDBC-Driver DVD` to directory `<client_dvd_mount>`.  
   2. As user `<sapsid>adm`, copy the JDBC driver to the destination directory using the following command:  
      ```
      cp /<client_dvd_mount>/CLIENT/jdbc/* <rdbms.driverLocation_dir>
      ```  
   If the JDBC driver is not taken from the kernel `exe` directory, which is visible on all servers, you have to repeat this step on all application servers. |
3.2 Migrating the Instance and Database

Use
After the software update, you have to migrate the instance and database(s). Make sure that you perform all steps in the sequence given.

In the following procedures, replace variable `<DB2_SWDIR>` with your software installation directory of DB2 9.5.

Prerequisites
- Before the database migration to DB2 9.5, you must have performed a full backup of your database.
- Make sure that there is enough free disk space available. If there is not enough free space available, the migration of your DB2 database will fail. You need to check the following:
  - The system catalog tablespace SYSCATSPACE
    If SYSCATSPACE is not an AUTOEXTENT or an AUTOSTORAGE tablespace, you must ensure that at least half of the pages are free. To find out the number of used and free pages, use the following command:
    ```
    db2 "LIST TABLESPACES SHOW DETAIL"
    ```
  - The temporary tablespace
    SAP systems use SMS-based temporary tablespaces. Make sure that the temporary tablespaces can grow to at least twice the size of SYSCATSPACE.
  - The size of log space
    As a rough guideline, make sure that your log space has at least the size of the SYSCATSPACE. If you followed the parameter recommendations for the database parameters LOGFILSZ, LOGPRIMARY and LOGSECOND (see SAP Note 584952 for details), the migration should run without problems.
    In a partitioned database environment, you only need to check the size of the log space on the catalog partition.

For more information, see Increasing Tablespace and Log File Sizes Before Migration in the IBM migration guide.

Backing Up the DB2 Server Configuration (Recommended)
During the migration, DB2 configuration parameters are changed automatically. To keep track of the changes, we recommend that you back up the DB2 server configuration before and after the actual migration. By comparing the files that contain the DB2 configuration settings after the migration has finished, you can review the changes.

In general, DB2 is configured by setting the following:
- Environment variables
- DB2 profile registry variables
- DB2 database manager configuration parameter
- DB2 database configuration parameter
Procedure

1. Log on to the database server as user db2<dbsid>.
2. Create a directory <config_bkp> where you store the configuration using, for example, the following command:
   ```bash
   mkdir /db2/db2<dbsid>/<config_bkp>
   ```
3. Change to the newly created directory using the following command:
   ```bash
   cd /db2/db2<dbsid>/<config_bkp>
   ```
4. Back up the database server configuration using the following commands:
   ```bash
   set > env_before_mig.txt
   db2set -all > reg_before_mig.txt
   db2 get dbm cfg > dbm_before_mig.txt
   db2 get db cfg for <SAPSID> > db_before_mig.txt
   ```

After the migration, you back up the database configuration again and compare the files that contain the configuration before and after the migration. For more information, see Backing Up the DB2 Server Configuration After the Migration (Recommended) [page 49].

Running Program db2ckmig (Optional)

The db2ckmig program checks if certain prerequisites for the migration are met. This program is automatically called by db2imigr (see below). If it encounters problems, the migration does not start.

You can start db2ckmig manually before the migration.

💡 This is only a check and does not affect your database.

💡 In a partitioned database environment, you must run db2ckmig on all database partitions.

1. Log on to the database server as user <sapsid>adm.
2. Stop your SAP system and the DB2 instance using the following commands:
   ```bash
   stopsap
db2stop force
   ```
3. Log on to the database server as user db2<dbsid>.
4. Run the db2ckmig program using the following command:
   ```bash
   <DB2_SWDIR>/instance/db2ckmig -e -l migration.log
   ```
5. Check the file migration.log for possible errors. If no errors are found, the following message is displayed:

`db2ckmig was successful. Database(s) can be migrated.`

You can ignore the following warning:

"SQL1349W An external NOT FENCED routine was encountered by db2ckmig or during database migration..."

6. Start the database manager using the following command:

`db2start`

**Migrating the Instance**

In a partitioned database environment, migrate the instance on the database partition server that owns the home directory of the instance owner.

1. Log on to the database server as user `<sapsid>adm`.
2. Stop your SAP system and the DB2 instance using the following commands:
   
   `stopsap
db2stop force`

3. Log on to the database server as user `root`.
4. Migrate the instance using the following command:
   
   `<DB2_SWDIR>/instance/db2imigr -u db2<dbsid> db2<dbsid>`

To check if all requirements for a migration are met, `db2imigr` calls the program `db2ckmig` in the background. If `db2ckmig` finds problems, the DB2 instance is not migrated. Correct the problem and start `db2imigr` again.

If the instance was successfully migrated, the following message is displayed:

`Program db2imigr completed successfully.`

The migration command saves a backup copy of the instance directory `~db2<dbsid>/sql1ib` to one of the following directories:

- `~db2<dbsid>/sql1ib_v81`
- `~db2<dbsid>/sql1ib_v91`

The files are then adapted in the `~db2<dbsid>/sql1ib` directory.

During the instance migration, the database manager configuration of DB2 9.5 is merged with the settings of the database manager configuration of DB2 Version 8 or DB2 9.1.
Migrating the DB2 Administration Server (Optional)

The DB2 Administration Server (DAS) is used by the DB2 graphical client tools, for example the DB2 Control Center. If you are using these tools, you have to migrate the DAS as follows:

1. Log on to the database server as user root.
2. Migrate the DAS using the following command:
   
   `<DB2_SWDIR>/instance/dasmigr`

Migrating the DB2 Databases

Since the DB2 system catalog has been changed as of DB2 9.1, you have to migrate the database(s).

In a partitioned database environment, perform the database migration on the catalog database partition server.

1. Log on to the database server as user `db2<dbsid>`.
2. Migrate the database using the following commands:

   `db2start`
   `db2 migrate database <SAPSID>`

The time it takes to migrate the database depends on the size of the system catalog.

For a standard SAP NetWeaver 7.0 ABAP only, the migration will approximately take ten to thirty minutes. If the migration was completed successfully, the following message is displayed:

The MIGRATE DATABASE command completed successfully.

If the database migration fails, the error message SQL1704N is displayed describing the cause of the failure. Search for this SQL error code in the IBM manual Message Reference for a list of possible solutions for each reason code.

One of the most common causes of migration failure is that there is not enough log file space available. In this case, the following error is returned:

SQL1704N  Database migration failed. Reason code "3".

If the database migration returns the warning message SQL1243W, you need to drop or rename the table SYSTOOLS.DB2LOOK_INFO.

Otherwise, ALTER TABLE and COPY SCHEMA statements will fail to run. To drop the table, enter the following command on the command line:

`db2 DROP TABLE SYSTOOLS.DB2LOOK_INFO`

You can ignore the following warning:

"SQL1349W  An external NOT FENCED routine was encountered by db2ckmig or during database migration..."
Migrating the DB2 Runtime Client Instance for a Central and Dialog Instance

For every application server that is not running on the database server, you have to migrate the DB2 Runtime Client instance.

1. Log on to the application server as user root.
2. Migrate the DB2 Runtime Client using the following command:
   <DB2_SWDIR>/instance/db2imigr db2<sapsid>
   If the DB2 Runtime Client was successfully migrated, the following message is displayed:
   Program db2imigr completed successfully
4 Migration under Windows

Purpose
This section describes the steps required for the database migration when your operating system is Windows 2000 or Windows 2003.

Process Flow
The migration of your database from DB2 Version 8 or DB2 9.1 to DB2 9.5 consists of the following procedures, which you must perform in the specified order:

- We recommend that you perform a full backup of your database before you install the DB2 9.5 software.

1. You install the DB2 software [Page 31].
2. You migrate the database [Page 42].

   After the migration, you must perform a full backup of your database.

3. You perform post-migration activities [Page 44].

Performing all migration steps takes up to three hours plus the time required to back up your database.

4.1 Installation of the DB2 Software

The installation of DB2 9.5 consists of the following procedures, which you must perform in the specified order:

- Install the DB2 server software on the database server [Page 31].
- Update the database client software [Page 37].

4.1.1 Installing the Database Software on the Database Server

By installing DB2 9.5 on your Windows host, all existing instances of DB2 Version 8 or DB2 9.1 are automatically migrated to DB2 9.5.

Therefore, you have to migrate all your databases to DB2 9.5 after you have installed the DB2 9.5 software.

If you are running a partitioned DB2 database system, you must install the database software on each database host.
Prerequisites

- Make sure that you check all DB2 instances with the *db2ckmig* program before installing the DB2 9.5 software as described under *Running Program db2ckmig* later in this section.

- Check that there is enough free disk space available. If there is not enough free space available, the migration of your DB2 database will fail. You need to check the following:
  - The system catalog tablespace *SYSCATSPACE*
    
    If *SYSCATSPACE* is not an AUTOEXTENT or an AUTOSTORAGE tablespace, you must ensure that at least half of the pages are free. To find out the number of used and free pages, use the following command in a DB2 command window:
    ```
    db2 "LIST TABLESPACES SHOW DETAIL"
    ```
  - The temporary tablespace
    
    SAP systems use SMS-based temporary tablespaces. Make sure that the temporary tablespaces can grow to at least twice the size of *SYSCATSPACE*.
  - The size of log space
    
    As a rough guideline, make sure that your log space has at least the size of *SYSCATSPACE*. Also, if you followed the parameter recommendations for the database parameters *LOGFILSZ*, *LOGPRIMARY* and *LOGSECOND* (see SAP Note 584952 for more information), the migration should run without problems.

In a partitioned database environment, you only need to check the size of the log space on the catalog partition.

For more information, see *Increasing Tablespace and Log File Sizes before Migration* in the IBM migration guide.

Backing Up the DB2 Server Configuration (Recommended)

During the migration, DB2 configuration parameters are changed automatically. To keep track of the changes, we recommend that you back up the DB2 server configuration before and after the actual migration. By comparing the files that contain the DB2 configuration settings after the migration has finished, you can review the changes.

In general, DB2 is configured by setting the following:

- Environment variables
- DB2 profile registry variables
- DB2 database manager configuration
- DB2 database configuration

Procedure

1. Log on to the database server as user `db2<dbsid>` and open a DB2 command window.
2. Create a directory `<config_bkp>` where you store the configuration using, for example, the following command:
   ```
   mkdir \db2\db2<dbsid>\<config_bkp>
   ```
3. Change to the newly created directory using the following command:
   cd \db2\db2<dbsid>\<config_bkp>

4. Back up the database server configuration using the following commands:
   set > env_before_mig.txt
   db2set -all > reg_before_mig.txt
   db2 get dbm cfg > dbm_before_mig.txt
   db2 get db cfg for <SAPSID> > db_before_mig.txt

After the migration, you back up the database configuration again and compare the files that contain the configuration before and after the migration. For more information, see Backing Up the DB2 Server Configuration After the Migration (Recommended) [page 49].

Running Program db2ckmig

Before you install the DB2 9.5 software, run the program db2ckmig to make sure that you can migrate all instances without problems.

💡 This is only a check and does not affect any of your databases.

1. Stop the SAP system, for example, using the SAP plug-in for the Microsoft Management Console (MMC).

2. Log on to the database server the as user db2<dbsid>.

3. Stop the database manager using the following command:
   db2stop force

4. Change to the following directory as required:
   - Windows on i386:
     cd <CD_drive>\WINDOWS_I386\ESE\image\db2\Windows\utilities
   - Windows on x86_64 (AMD64):
     cd <CD_drive>\WINDOWS_AMD64\ESE\image\db2\Windows\utilities

5. Run the db2ckmig program using the following command:
   db2ckmig -e -l <A_WRITABLE_DIRECTORY>\migration.log

💡 <A_WRITABLE_DIRECTORY> can be any directory to which you have write access to, for example: db2ckmig -e -l c:\temp\migration.log.

6. Check the migration log for errors. If no errors are found, you will only find the version information in this file and the following message will be displayed:
   db2ckmig was successful. Database(s) can be migrated.

💡 You can ignore the following warning:

"SQL1349W  An external NOT FENCED routine was encountered by db2ckmig or during database migration...".
Run `db2ckmig` on your database server for all DB2 instances.

### Installing the Software

1. Log on to the database server as user `<sapsid>adm`.
2. Stop all your SAP systems and, if they are running, stop the DB2 services.

   Determine the software installation directory of the current DB2 instance by using the following command in a DB2 command window:
   
   ```
   db2level
   ```
   
   The output contains the following line, which indicates the installation directory of the DB2 software (`<INSTDIR>`):
   
   ```
   ...
   Product is installed at "<INSTDIR>"
   ```

3. Start the program for installing the DB2 database software using the following command as required:

   a. **Windows on i386:**
      ```
      <CD_drive>\WINDOWS_I386\ESE\image\setup
      ```
   b. **Windows on x86_64 (AMD64):**
      ```
      CD_drive>\WINDOWS_X86_64\ESE\image\setup
      ```

   The Welcome screen appears.

4. In the navigation frame of the DB2 Setup Launchpad, choose **Installation Prerequisites** and check if your system meets all the prerequisites.

5. In the navigation frame of the DB2 Setup Launchpad, choose **Install a Product** and **Work with Existing** for the DB2 Enterprise Server Edition Version 9.5.

   By choosing **Work with Existing**, you install the software and automatically migrate all DB2 instances. The existing DB2 software is updated.

   **Do not choose Install New.**

   In this document, it is only described how to migrate an existing DB2 copy. SAP kernel versions lower than 7.00 can only work properly with the DB2 default copy.

   For SAP systems with SAP kernel version 7.00 SR3 and higher, it is technically possible to install a new DB2 copy. However, you have to migrate the instance to the new copy afterwards. For more information, see Migrating Instances in the IBM DB2 Documentation Center.

   The screen **Select the DB2 copy to work with** appears.

6. Choose the DB2 copy with the installation path `<INSTDIR>` (see step 2) and choose **Launch DB2 Setup wizard**.

⚠️

The exact sequence of the installation steps that follow depends on various factors, for example, your operating system, already installed DB2 components, your installation choices and the DB2 Fix Pack level.

Therefore, we are not able to provide a detailed step-by-step procedure for the DB2 software installation in this document.

The following steps can appear, but not necessarily in the sequence shown below. They outline important points that you have to consider when installing DB2 in an SAP environment:

- If a warning appears that the existing product will be removed, confirm it and choose Next.

  🌟 If you get a warning that DB2 is currently running and locked by some processes, choose Yes to shut down these processes.

- Accept the license agreement.
- On the screen Select the installation type, choose Typical and choose Next.
- On the screen Select the installation, response file creation or both, choose Install DB2 Enterprise Server Edition on this computer and choose Next.
- On the screen Installation folder, confirm the installation directory by choosing Next.
• On the screen Set the DB2 copy name, accept the proposed copy name and choose Next.

• On the screen Set user information for the default DB2 instance, enter the password and user name for user \texttt{db2<dbsid>} and choose Next.

If \texttt{db2<dbsid>} is a domain user, enter the correct name of the domain. If it is a local user, keep the default setting \textit{None – use local user account}.

Do not enter the local host name as a domain.

• If the screen Enable operating system security for DB2 objects appears, choose Enable operating system security and then Next.

• On the screen Start copying files, start the installation by choosing Install.

• If the installation has successfully finished, the Setup is Complete screen appears. To continue, choose Next.
- On the screen **Install additional products**, complete the installation by choosing **Finish**. If required, reboot the system.
- If the DB2 First Steps application is started, leave the application by choosing **Exit**.

**Checking the Availability of the DB2 Service**

Check that the DB2 service is running under user `db2<dbsid>`:

1. Choose **Start** → **Run**.
2. Enter the following command:
   
   `services.msc /s`

3. Right-click `DB2-<DB2COPY>-<DB2INSTANCE>`.
4. Choose **Properties**.
5. Choose **Log on** and check that this service is running under user `db2<dbsid>`.

![Image of DB2 service properties](image)

---

**4.1.2 Updating the Database Client Software**

You can install SAP systems with two different versions of the DB2 client connectivity which mostly depends on the setup of your SAP system:

**SAP Releases Lower than SAP Basis 7.0**

All SAP systems that were installed with DB2 Version 8 and all SAP systems that were installed with an SAP basis release lower than 7.0 are deployed with a local DB2 client instance (the DB2 Runtime Client) on each standalone SAP application server. For these application servers, you have to update the DB2 Runtime Client separately.

⚠️ If you have only one application server and it is running on the database host, the DB2 client software of the database instance is used and a separate update is not required.
SAP Releases Based on SAP Basis 7.0

All SAP systems that were installed with DB2 Version 8 run with the DB2 Runtime Client. All SAP systems that are installed with DB2 9.1 can either run with the DB2 Runtime Client or the DB2 CLI driver, which was introduced with DB2 9.1.

In general, the type of DB2 client used in your system landscape depends on whether you want to migrate a newly installed system, an upgraded system or whether you have manually switched to the new DB2 client connectivity (according to SAP Note 1091801).

Therefore, before the migration, you must determine which type of DB2 client [page 38] is available in your system and update it following the instructions in the appropriate sections in this document.

SAP Releases Based on SAP Basis 7.10 and Higher

All SAP systems based on SAP basis 7.10 are always installed with the new DB2 client connectivity. You only have to update the DB2 CLI driver [page 40].

Graphical Overview

The following figures provide a graphical overview of the steps that you have to perform, for example, on an application server that contains an ABAP stack:

4.1.2.1 Determining the DB2 Client Type Used by the System

To explicitly determine which DB2 client type (DB2 Runtime Client or DB2 CLI driver) is used, you can use R3trans:

1. Log on to the application server where you want to check the DB2 client type as user <sapsid>adm.
2. Enter the following command:

```
R3trans -x
```

R3trans loads the DB2 library and connects to the database. A log file `trans.log` is created.

3. Open an editor and search for the term `DB2 library` in the log file `trans.log`.

If the DB2 CLI driver is used, the output looks as follows:

```
4 ETW000 [dev trc ,00000] DB2 library successfully loaded DB2 library '\\<host>\sapmnt\<SAPSID>\SYS\global\db6<platform>\db6_clidriver\bin\db2app64.dll' successfully loaded
...
4 ETW000 [dev trc ,00000] Running with CLI driver 87 3.036995
...
```

If the DB2 Runtime Client is used, the output looks as follows:

```
4 ETW000 [dev trc ,00000] DB2 library successfully loaded DB2 library 'C:\Program Files\IBM\SQLLIB\bin\db2app64.dll' successfully loaded
...
```

Even if R3trans loads the DB2 CLI driver libraries, an additional DB2 Runtime Client might be installed.

By default, the SAP kernel will use the DB2 CLI driver on all application servers of SAP Release 7.0 and higher that have a local DB2 Runtime Client installed as well as access to a DB2 CLI driver in directory `<drive>:\usr\sap\<SAPSID>\SYS\global\db6`.

In this case, the DB2 Runtime Client is not used and we recommend that you deinstall it to avoid double maintenance.

To check if a DB2 Runtime Client is installed, enter the following command as user `<sapsid>adm`:

```
db2ilist
```

If no DB2 Runtime Client is installed, this command is unknown. If a DB2 Runtime Client exists, the name of the local DB2 instance `db2<dbsid>` is displayed.

If you want to keep your DB2 Runtime Client, we recommend that you update both DB2 clients (that is, the DB2 Runtime Client and the DB2 CLI driver).
Result
You know which type of DB2 client is used in your system landscape. Update it according to the instructions in one of the following sections:

- [Updating the DB2 Runtime Client](#)
- [Updating the DB2 CLI Driver Client](#)
- [Updating the JDBC Driver](#)

### 4.1.2.2 Updating the DB2 Runtime Client

**Use**
For each SAP application server that uses a DB2 Runtime Client and that is **not** running on the database server, you must update the DB2 Runtime Client.

**Procedure**
1. Log on to your application server as user `<sapsid>adm`.
2. To update the DB2 Runtime Client, follow the procedure described in [Installing the Database Server](#), but you must make sure that you choose *IBM Data Server Client Version 9.5* as the product to be installed in step 6.
3. Repeat these steps on each application server that is **not** running on the database host.

### 4.1.2.2 Updating the DB2 CLI Driver Client

**Use**
For SAP systems that use the DB2 CLI driver, you only have to update the DB2 CLI driver once in directory `<drive>:\usr\sap\<SAPSID>\SYS\global\db6`.

Each application server can access this directory. Thus, after the DB2 CLI driver has been updated, `<drive>:\usr\sap\<SAPSID>\SYS\global\db6` can be used by all application servers.

**Procedure**
1. Log on to the database server as user `<sapsid>adm`.
2. Mount the *DB2 9 LUW CLI/JDBC driver DVD*.
3. Open the DB2 command window and switch to the directory `<drive>:<mount_DVD_Dir>\CLIENT`.
4. Start the `db6_update_client.bat` script using the following command:
   
   ```
   db6_update_client.bat -u
   ```

   The new DB2 CLI driver is automatically used after the next SAP system restart and no further action is required.
4.1.2.3 Updating the JDBC Driver

⚠️

The following section only applies to **standalone Java-only** application servers (that is, the application server does not reside on the database host).

If you are migrating an **ABAP+Java system** or a **Java-only central system** (that is, the application server and the database reside on the same host), you do not have to perform any of the steps described in this section.

On application servers that only contain a Java stack, the location of the JDBC driver can vary and respectively the appropriate steps how to update it.

**Procedure**

**Determining the Location of the JDBC Driver for SAP Releases Lower than SAP Basis 7.10**

1. Log on to the respective application server as user `<sapsid>adm`.
2. Open a command prompt and change to the directory `..\cluster\bootstrap` of the Java instance using the following command:
   ```
   cd <drive>:\usr\sap\<DBSID>\DVEBMGS<instance-nr>\j2ee\cluster\bootstrap
   ```
3. Determine the location of the JDBC driver using the following command:
   ```
   find "driver" bootstrap.properties
   ```
   One line with the value of this property of the `rdbms.driverLocation` is returned. It contains the location of the JDBC driver files that are currently used.

**Determining the Location of the JDBC Driver for SAP Releases with SAP Basis 7.10 and Higher**

1. Log on to the respective application server as user `<sapsid>adm`.
2. Change to the profile directory of the Java instance using, for example, the following command:
   ```
   cd /usr/sap/<SAPSID>/SYS/profile
   ```
3. Enter the following command:
   ```
   grep dbdriver <instance_profile>
   ```
   One line that contains the path to the JDBC driver files is returned.
Updating the JDBC Driver (If Necessary)

Depending on the location, you have to update the JDBC driver according to one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Required Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The JDBC driver is taken from a DB2 Runtime Client instance. In this case, the directory retrieved using the procedure above is <code>&lt;drive&gt;:\db2\db2&lt;bsid&gt;\sqllib\java</code>.</td>
<td>Update the DB2 Runtime Client as described in Updating the DB2 Runtime Client [page 40].</td>
</tr>
<tr>
<td>The JDBC driver is taken from either <code>&lt;drive&gt;:\usr\sap\&lt;SAPSID&gt;\SYS\global\db6</code> or from a copy of this driver in the local instance exe directory DIR_EXECUTABLE = <code>&lt;drive&gt;:\usr\sap\&lt;SAPSID&gt;\DVEBMGS00\exe</code>.</td>
<td>Run the script <code>db6_update_client.sh</code> as described in Updating the DB2 CLI Driver Client [page 40].</td>
</tr>
<tr>
<td>The JDBC driver is used from any other location.</td>
<td>Update the JDBC driver files (db2jcc.jar and db2jcc_license_cu.jar) manually as follows:</td>
</tr>
<tr>
<td></td>
<td>1. Mount the DB2 9.5 LUW CLI/JDBC-Driver DVD to directory&lt;br&gt;<code>&lt;drive&gt;:\client_dvd_mount&gt;</code>.</td>
</tr>
<tr>
<td></td>
<td>2. As user <code>&lt;sapsid&gt;adm</code>, copy the JDBC driver to the destination directory using the following command:</td>
</tr>
<tr>
<td></td>
<td><code>copy </code>&lt;client_dvd_drive&gt;<code>\CLIENT\jdbc\* </code>&lt;rdbms.driverLocation_dir&gt;`</td>
</tr>
<tr>
<td></td>
<td>If the JDBC driver is not taken from the kernel exe directory, which is visible on all servers, you have to repeat this step on all application servers.</td>
</tr>
</tbody>
</table>

4.2 Migrating the Database

Since the DB2 system catalog has been changed, you have to migrate the DB2 database(s). Make sure that you perform all steps in the given sequence.

⚠️ In a partitioned database environment, perform the database migration on the catalog database partition server.

💡 You need to migrate all DB2 databases that are located on your computer.
Migrating the DB2 Database

1. Log on to the database server as user **db2<dbsid>**.
2. Open a DB2 command window and enter the following commands:
   ```
db2stop force
   db2start
   db2 migrate db <SAPSID>
   ```

   The time it takes to migrate the database depends on the size of the system catalog. For a standard SAP NetWeaver ABAP 7.0, the migration will approximately take ten to thirty minutes.

   If the database migration fails, the error message **SQL1704N** is displayed describing the cause of the failure. Search for this SQL error code in the IBM manual **Message Reference** for a list of possible solutions for each reason code.

   One of the most common causes of migration failure is that there is not enough log file space available. In this case, the following error is returned:
   ```
   SQL1704N  Database migration failed. Reason code "3".
   ```

   If the database migration returns the warning message **SQL1243W**, you need to drop or rename the table **SYSTOOLS.DB2LOOK_INFO**. Otherwise, ALTER TABLE and COPY SCHEMA statements will fail to run. To drop the table, enter the following command on the command line:
   ```
   db2 DROP TABLE SYSTOOLS.DB2LOOK_INFO
   ```

   You can ignore the following warning:
   ```
   "SQL1349W  An external NOT FENCED routine was encountered by db2ckmig or during database migration..."
   ```

Migrating the DB2 Runtime Client Instance for a Central and Dialog Instance

All DB2 instances are automatically migrated during the installation of the DB2 9.5 software.

Migrating the DB2 Administration Server (Optional)

The DB2 Administration Server (DAS) is used by the DB2 graphical client tools, for example, the DB2 Control Center. If you are using these tools, you have to migrate the DAS as follows:

1. Log on as user **<sapsid>adm**.
2. Migrate the DAS using the following command:
   ```
   <DB2_SWDIR>\bin\dasmigr
   ```
5 Post-Migration Activities (Linux, UNIX and Windows)

Purpose
After migrating the instance and database(s), you must perform the following actions:

- Rebinding the DB2 Packages [page 44]
- Installing the DB2 License [page 45]
- Converting TYPE-1 Indexes to TYPE-2 Indexes [page 45]
- Running the db2_update_db Script [page 46]
- Adapting Configuration Settings [page 47]
- Granting Necessary Rights to Use CCMS [page 48]
- Backing Up the DB2 Server Configuration After the Migration [page 49]
- Converting Tablespaces to Data Type "Large" [page 49]

5.1 Rebinding DB2 Packages
After the database migration, you have to rebind all invalid DB2 packages.

Procedure
1. Log on to the database server as user db2<dbsid>.
2. To rebind invalid DB2 packages, enter the following command:
   ```
   db2rbind <DBSID> -l db2rbind.log all
   
   Check the log file db2rbind.log for errors.
   ```

   Now perform a database backup.

   If the operation was successful, the log file is deleted automatically. If the log file exists after execution of the `db2rbind` command, you must check it for error messages.

   The following two error messages can appear in the log file if the database, which was migrated, already existed with DB2 Version 5:

   **Error Message One**
   Package 'NULLID.SQLUCB1T.' of database '<SID>' did not succeed to
   rebind. sqlcode = -203; sqlerrmc = ROWTYPEN; sqlrrp = SQLN075ROWTYPEN
   SQL0203N A reference to column "ROWTYPENAME" is ambiguous.
   SQLSTATE=42702


Error Message Two
Package 'NULLID.SQLL6BW4.' of database '<SID' did not succeed to rebind. sqlcode = -206; sqlerrmc = SYSIBM.S; sqlrrp = SQLNQ075ROWTYFEN
   SQL0206N  "SYSIBM.SYSTABAUTH.UPDATE_BY_COLS" is not valid in the context where it is used.

You can ignore these error messages.

5.2 Installing the DB2 License

Use
After the migration, you have to install the DB2 license.

Procedure
If you are an SAP OEM customer, see SAP Note 816773 to install the license.

Multi-partitioned databases:
Install the license on each database host.

If you purchased DB2 directly from IBM, contact your IBM sales representative.

5.3 Converting TYPE-1 Indexes to TYPE-2 Indexes

Use
Since DB2 Version 8, SAP has required the use of TYPE-2 indexes. If you have not yet converted TYPE-1 indexes to TYPE-2 indexes, you must convert them now.

The use of TYPE-1 indexes is not supported on SAP systems with DB2 9.5.

Procedure
1. Log on to the database server as db2<dbsid>.
2. If the database manager has been stopped, start it using the following commands:
   db2start
db2 connect to <DBSID>
3. Check if TYPE-1 indexes exist in the database using the following SQL command:

   ```sql
   db2 "SELECT tabschema, tabname from SYSIBMADM.ADMINTABINFO
   where index_type <> 2"
   ```

   The statement can take a few minutes until it finishes.

   Tables that were selected by the SQL query above contain TYPE-1 indexes.

4. Convert TYPE-1 indexes to TYPE-2 indexes for a single table using the following command:

   ```sql
   db2 "reorg indexes all for table <schema>.<tabname> convert on all dbpartitionnums"
   ```

   DB2 Version 8 does not offer a tool to do this automatically for all indexes in the database. However, you can use the following command to create a DB2 script for all indexes in the database:

   ```sql
   db2 connect to <DBSID>
   db2 -x "select 'reorg indexes all for table ' || chr(34) ||
   rtrim(tabschema) || chr(34) || '.' || chr(34) || tabname ||
   chr(34) || ' convert on all dbpartitionnums;' from syscat.tables
   where type = 'T'" > convert.sql
   ```

5. Execute the generated `convert.sql` script as follows:

   ```sql
   db2 –tvf convert.sql
   ```

More Information

For more information about the conversion to TYPE-2 indexes, see Converting all Indexes to TYPE-2 Indexes in the document Migration to Version 8 of the IBM DB2 Universal Database for UNIX and Windows that is available on SAP Service Marketplace at http://service.sap.com/instguides → Other Documentation → Database Upgrades → DB2 UDB.

5.4 Running the db6_update_db Script

**Use**

The `db6_update_db` script checks various settings and enables some features, for example, the automatic resize function for the tablespaces. Also, it reorganizes the tables of the DB2 system catalog and updates the statistics for these tables.

There are the following versions of this script available:

- **Linux and UNIX**: `db6_update_db.sh`
- **Windows**: `db6_update_db.bat`
Procedure

1. Log on to the database server as user db2<dbsid>.

2. Copy the file db6_update_db.sh (UNIX and Linux) or db6_update_db.bat (Windows) from your respective operating system folder on the database DVD to a temporary directory (<temp_dir>).

3. Go to <temp_dir> and run the db6_update_db script using the following command:
   a. Windows:
      db6_update_db -m -d <DBSID>
   b. Linux and UNIX:
      ./db6_update_db.sh -m -d <DBSID>

   As a result, the script db6_update_db_out is created.

4. Review the content of db6_update_db_out and adjust it if necessary.

5. Run the script db6_update_db_out using the following command:
   a. Windows:
      db6_update_db_out
   b. Linux and UNIX:
      ./db6_update_db_out.sh

5.5 Adapting Configuration Settings

Use

Some database and database manager parameters have changed with DB2 9.5. They are set to new values by the db6_update_db script as described in the previous section. This section outlines additional steps that are required to check the configuration and to activate the parameter changes.

💡 With the changed DB2 memory model on Linux and UNIX, some parameters have changed their meaning. For more information, see DB2 Server Behavior Changes in the IBM migration guide.

Procedure

1. Log on as user db2<dbsid> and get the database manager configuration using the following command:
   db2 get dbm cfg

2. Only for SAP system on DB2 with STMM enabled:
   The meaning of the DBM configuration parameter INSTANCE_MEMORY has changed. It now specifies the maximum amount of memory that can be allocated for a database partition. You might consider setting INSTANCE_MEMORY to a specific value using the following command:
   db2 update dbm cfg using INSTANCE_MEMORY <specific_value>
Also, set the database configuration parameter `DATABASE_MEMORY` to `AUTOMATIC`:

```
db2 update db cfg for <DBSID> using DATABASE_MEMORY AUTOMATIC
```

For more information about memory settings, see SAP Note 1086130.

3. **Migration from DB2 Version 8 only:**
   Check if parameter `FCM_NUM_BUFFERS` is set to `AUTOMATIC`. If not, update the value using the following command:

```
db2 update dbm cfg using FCM_NUM_BUFFERS AUTOMATIC
```

4. Display the database configuration using the following command:

```
db2 get db cfg for <DBSID>
```

5. **Migration from DB2 Version 8 only - Linux 32-bit and HP-UX on PA RISC only:**
   The space required for each lock in the lock list has increased. To avoid lock escalations, increase the size of the lock list, too:
   a. Find out the value for the database configuration parameter `LOCKLIST`.
   b. Increase this value by 20 % for Linux 32-bit and by 25% for HP-UX on PA-RISC using the following command:

```
db2 update db cfg for <DBSID> using LOCKLIST <new_value>
```

6. Disconnect all applications from the database as follows:

```
db2stop force
db2start
```

   The changes will take effect with the next new database connection.

For more information about recommended parameter settings for DB2 9.5 and especially for parameter settings that employ the Self Tuning Memory Manager (STMM), see SAP Note 1086130.

### 5.6 Granting Necessary Rights to Use CCMS

**Use**

As of DB2 9.1 and higher, you need to grant additional rights. Otherwise, your CCMS will not function correctly.

**Procedure**

1. Log on to the database server as `db2<dbsid>.
2. Grant the right to create unfenced routines by using the following commands:

```
db2 connect to <dbsid>
db2 grant create_not_fenced_routine on database to user sap<sapsid>
```
5.7 Backing Up the DB2 Server Configuration After the Migration (Recommended)

If you created a backup of the DB2 server configuration before the migration, it is useful to create another backup of the configuration after the migration.

Procedure on UNIX

1. Log on to the database server as user `db2<dbsid>`.
2. Change to the previously created configuration backup directory `<config_bkp>`, for example, using the following command:
   ```bash
cd /db2/db2<dbsid>/<config_bkp>
```
3. Back up the database server configuration using the following commands:
   ```bash
   set > env_after_mig.txt
   db2set -all > reg_after_mig.txt
   db2 get dbm cfg > dbm_after_mig.txt
   db2 get db cfg for <SAPSID> > db_after_mig.txt
   ```

Procedure on Windows

4. Log on to the database server as user `db2<dbsid>` and open a DB2 command window.
5. Change to the previously created configuration backup directory `<config_bkp>`, for example, using the following command:
   ```bash
cd \db2\db2<dbsid>\<config_bkp>
```
6. Back up the database server configuration using the following commands:
   ```bash
   set > env_after_mig.txt
   db2set -all > reg_after_mig.txt
   db2 get dbm cfg > dbm_after_mig.txt
   db2 get db cfg for <SAPSID> > db_after_mig.txt
   ```

You can now compare the configuration settings before and after migration by comparing the respective `*-before_mig` and `*-after_mig` files by using appropriate operating system tools, for example, on UNIX, use `diff`.

5.8 Converting Tablespaces to Data Type “Large”

Use

As of DB2 9.1 and higher, DB2 supports larger record identifiers (RIDs) to extend the size limit of DB2 Version 8 tablespaces. To enable this feature, all tablespaces must first be declared as large. Afterwards, new tables that are created in these tablespaces will automatically use large RIDs. Reorganizing tables or indexes will have the same effect.
Indexes for tables that use large RIDs require more space. For an estimation of the additional required space, see *Space Considerations* in section Enabling Tables to Use Large Record Identifiers (Optional) [page 51].

**Procedure**

The following describes the steps on the DB2 command line. Alternatively, you can use the large RID tool which use is described in detail later in this document. For more information, see Enabling Large RIDs using the Large RID Tool [page 52].

1. Log on to the database server as user `db2<dbsid>` and connect to the database using the following command:
   
   ```
   db2 connect to <DBSID> user db2<dbsid>
   ```

2. Enter the password for user `db2<dbsid>`.

3. Convert tablespaces to data type large using the following SQL statement and redirecting the output to `<temp_file>`:
   
   ```
   db2 "SELECT 'ALTER TABLESPACE ' || tbspace || ' CONVERT TO LARGE; ' AS TABSPACE FROM syscat.tablespaces WHERE tbspacetype = 'D' AND datatype = 'A' AND tbspace NOT LIKE 'SYS%';"
   
   db2 "SELECT 'ALTER TABLESPACE ' || tbspace || ' CONVERT TO LARGE; ' AS TABSPACE FROM syscat.tablespaces WHERE tbspacetype = 'D' AND datatype = 'A' AND tbspace NOT LIKE 'SYS%';" >tbspconv.sql
   ```

4. Edit `<temp_file>` with an editor of your choice so that it contains only lines that start with `ALTER TABLESPACE`.

5. Execute the `<temp_file>` using the following command:
   
   ```
   db2 -tvf <temp_file>
   ```

   You can ignore the warning SQL1237W.

**Result**

All new tables that are created in these tablespaces will automatically use large RIDs.

**See also:**

For information about how to enable existing tables to use large RIDs either using the large RID tool or on the DB2 command line, see Enabling Tables to Use Large RIDs (Optional) [page 51].
6 Enabling Tables to Use Large Record Identifiers (Optional)

DB2 9 for Linux, UNIX, and Windows supports larger record identifiers (RIDs) than prior versions. As a result, the tablespace and table size limit has been significantly extended.

The following table shows the old and the new table size limits:

<table>
<thead>
<tr>
<th>Page Size of a Tablespace</th>
<th>Maximum Size of Table with DB2 Version 8</th>
<th>Maximum Size of a Table with DB2 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 KB</td>
<td>64 GB</td>
<td>2048 GB</td>
</tr>
<tr>
<td>8 KB</td>
<td>128 GB</td>
<td>4096 GB</td>
</tr>
<tr>
<td>16 KB</td>
<td>256 GB</td>
<td>8192 GB</td>
</tr>
<tr>
<td>32 KB</td>
<td>512 GB</td>
<td>16384 GB</td>
</tr>
</tbody>
</table>

A record identifier (RID) is a reference to the location of a row in a table. You can use RIDs to:

- Describe on which data page records are located
- Describe where in a data page records are located

RIDs are divided into a page number followed by a slot number. When the index is used to identify an RID, the RID is used to navigate to the correct data page and slot number within that page. RIDs are normally fixed, only changing when the table is reorganized. By extending the length of an RID, a table can consist of more data pages as the page number might be larger. In addition, a page can contain more records as the slot number might be larger.

Space Considerations

RIDs are used in indexes. If the size of an RID increases, the size of the index also will also increase. With DB2 9, the size of an RID increased by 2 bytes.

To estimate the index growth for all indexes of <LargeTable> in KB, proceed as follows:

1. Log on as user db2<dbsid> and connect to the database:
   
   
   
   db2 connect to <DBSID>

2. Enter the following SQL command:

   SELECT SUM(numrids)/512
   FROM syscat.indexes
   WHERE tabschema = '<schema>' and tabname = '<LargeTable>'

   where you replace <schema> with the database connect user (SAPR3 or SAP<SAPSID>) in upper case.

   The result of this statement must be interpreted as the lower limit of the index growth. Page splits often occur during conversion. This leads to additional growth. Also, the estimation is based on the fact that the table does not need to be reorganized.
Why All Tables in a Tablespace Should be Enabled for Large RIDs

Consider the following:

A tablespace was enabled for large RIDs. One or several tables in this tablespace actually use large RIDs after an index reorganization. These tables have become very large so that all pages addressed by tables with the old RID schema are now used by the tables with large RIDs.

If a table that does not use large RIDs tries to allocate a new page in this tablespace, the request can fail with the following SQL error:

SQL1236N

Table table-name cannot allocate a new page because the index with identifier index-id does not yet support large RIDs.

Even though the size of the table that uses the old RIDs is below the old table size limit, the error can occur because the free pages, which the table with the old RID schema could address, are used by the tables with large RIDs address.

To avoid this error situation, we recommend that you enable large RIDs for all tables in a tablespace.

6.1 Enabling Large RIDs Using the Large RID Tool

This section describes how you convert existing tablespaces to LARGE and perform an index or table reorganization using the large RID tool.

💡 This tool is ABAP-based and applies to SAP ABAP and SAP ABAP+Java systems only.

You can use it for any SAP system starting with SAP release 4.6 or higher.

Prerequisites

Make sure that you have installed the latest version of the large RID tool that is attached to SAP Note 1108956. This SAP Note also contains the installation procedure as well as a version history of the tool.

Process Flow

The process of enabling tables for large RIDs consists of the following steps:

1. Converting a tablespace to use large RIDs [page 53].
2. Reorganizing tables and indexes or indexes only that are contained in a converted tablespace [page 55].

See also:

For more information about large RIDs, see Large Record Identifiers in the SAP Developer Network.
6.1.1 Converting a Tablespace to Use Large RIDs

You cannot reverse the conversion of a tablespace to use large RIDs after it has finished.

1. In your SAP system, call transaction /n/ISIS/ZLARGERID.

   The tool retrieves information about which tables are using large RIDs and large slots from table /ISIS/ZLRGTTABINF.

   Table /ISIS/ZLRGTTABINF contains information about all the tables in the database - for example, which tables are using large RIDs and large slots.

   The screen Convert Existing Tablespaces and Tables to LARGE appears.

2. When you access the tool for the first time, no data is available. To retrieve the required information, choose Refresh Table Information.

   The dialog Schedule Job To Refresh Table Information appears.

3. Choose:
   - Start Immediately to refresh the catalog immediately
   - Schedule At and enter a date and time to refresh the catalog at a specified time

4. Choose Execute.

   If table /ISIS/ZLRGTTABINF already contains data and you choose Refresh Table Information, a message is displayed in the message line informing you that while the refresh job is running, the status icons on the table in the screen Convert Existing Tablespaces and Tables to LARGE are no longer up-to-date until the job has successfully finished.
The following information is displayed:

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>All tables in the tablespace are using large RIDs.</td>
</tr>
<tr>
<td>Yellow</td>
<td>At least 75% of the tables in the tablespace are using large RIDs.</td>
</tr>
<tr>
<td>Red</td>
<td>Less than 75% of the tables in the tablespace are using large RIDs</td>
</tr>
</tbody>
</table>
### Tablespace Name
- **Type**: Name of selected tablespace
- **Content Type**: 
  - **LARGE**: Tablespace can contain tables that are using large RIDs.
  - **ANY**: Tablespace contains only tables that are not yet using large RIDs.
- **# of Tables**: Number of tables in the tablespace
- **# of Indexes**: Number of indexes in the tablespace
- **Current Size (MB)**: Current size of tablespace in MB
- **Used Pages**: Amount of pages the tablespace is currently using
- **% of Max Pages**: Indicates the approximate percentage of used pages within the tablespace limit

For a large tablespace with pages beyond the tablespace limit of DB2 Version 8, the value can be higher than 100 %.

5. Choose a tablespace with content type **ANY** and choose **Convert to LARGE**.

The dialog **Convert Tablespace to Large** appears.

6. Choose **Execute**.

   ✨ Converting a tablespace does not include reorganization of the included tables. The tablespace and its content are locked during the conversion process.

7. Once the conversion job has finished successfully, you can display the new status by choosing **Refresh**.

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### 6.1.2 Reorganizing Tables and Indexes of a Converted Tablespace

1. On the screen **Convert Existing Tablespaces and Tables to LARGE** (transaction /n/ISIS/ZLARGERID), select a tablespace and choose **Reorganize Indexes/Tables**.

The following information is provided on the screen **Reorganize Tales or Indexes in Tablespace <tablespace_name>**:

#### Tablespace Information
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablespace</td>
<td>Name of tablespace</td>
</tr>
<tr>
<td>Total No. of Tables</td>
<td>Total number of pages</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>No. of Large RID (only) tables:</td>
<td>Total number of tables with large RIDs but that are not enabled for large slots</td>
</tr>
<tr>
<td>No. of Large RID and Large slot tables</td>
<td>Total number of tables with both large RIDs and slots</td>
</tr>
<tr>
<td>No. of Tables that need a Conversion</td>
<td>Number of tables that require reorganization to be enabled for large RIDs or slots</td>
</tr>
</tbody>
</table>

### Tables

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table Name</td>
<td>Name of table</td>
</tr>
<tr>
<td>Schema</td>
<td>Name of schema to which table belongs</td>
</tr>
</tbody>
</table>
| Large RIDs           | Indicates if a table has already been converted for the use of large RIDs. The following values are possible:  
  - **Y**  
    The tables are enabled for large RIDs.  
  - **N**  
    The tables have not yet been enabled for large RIDs.  
  - **P** (Pending)  
    If the table resides in a large tablespace, but at least one of the indexes for the table has not yet been reorganized or rebuilt yet, the table is still using four Byte RIDs. |
Large Slots

Indicates if a table has already been converted for the use of large slots. The following values are possible:
- **Y**
  The tables are enabled for large slots.
- **N**
  The tables have not yet been enabled for large slots.
- **P (Pending)**
  If the table supports large slots (that is, the table is in a large table space), but there has been no offline table reorganization or table truncation operation performed on the table yet, the table is still using a maximum of 255 rows per page.

Inplace Reorg Status

Current status of an inplace table reorganization

Data Objects Physical Size

Physical size of data objects in the table in KB

Index Physical Size

Physical size of index in KB

Index Tablespace

Name of index tablespace

If there is no information displayed about any of the tables, there is no data available in table /ISIS/ZLRGTABINF. To retrieve it, choose Schedule Refresh of Table Information.

Before you select the tables to be reorganized, we recommend that you sort the information displayed either by column Data Objects Physical Size or by column Index Physical Size. This lets you easily identify tables most in need of reorganization.

2. Select one or more tables that you want to reorganize and choose REORG Tables.

The dialog REORG Selected Tables appears.
3. Specify the REORG Options:
   - **Offline Table REORG**
     Enables the tables for large RIDs and large slots. The tool uses the `REORG TABLE <table> ALLOW NO ACCESS` command for reorganization.
   - **Offline Indexes REORG**
     Enables the tables for large RIDs only. The tool uses the `REORG INDEXES ALL FOR <table>` command for reorganization.
   - **Online Indexes REORG**
     Enables the tables for large RIDs only. The tool uses the `REORG INDEXES ALL FOR <table> ALLOW WRITE ACCESS` command for reorganization.

   For more information about the reorganization options, see the [REORG INDEXES/TABLE Command](http://ibm.com/db2) in the IBM DB2 Information Center.

4. Choose:
   - **Start Immediately** to schedule the table reorganization immediately
   - **Schedule At** and enter a date and time to schedule the table reorganization at a specified time

5. To start the table reorganization, choose **Execute**.

**Result**
The table reorganization is performed as a background job.

### 6.1.2.1 Monitoring the Reorganization

1. In your SAP system, call transaction `/n/ISIS/ZLARGERID`.
   The screen **Convert Existing Tablespaces and Tables to LARGE** appears.
2. In the **Schedule Jobs** field, choose **View Scheduled Jobs**.
   The screen **Display Scheduled or Running Job Logs** appears.
3. Select the required job and choose **Job Log**.

### 6.2 Enabling Large RIDs on the DB2 Command Line

**Use**
The following sections describe how to enable the use of large Record Identifiers (RIDs) for **existing** tables to extend the table size limit of DB2 UDB for UNIX and Windows Version 8.

**Usage Options**
To enable the use of large RIDs for existing tables, you can use one of the following options:

- **Reorganize indexes of a table** [page 59].

  As a result, page numbers can be larger and tables can grow beyond the size limit of DB2 UDB for UNIX and Windows Version 8. Slot numbers remain the same.
Reorganize the table itself and its indexes [page 60]

As a result, page and slot numbers can be larger. Tables can grow beyond the size limit of DB2 UDB for UNIX and Windows Version 8.

Reorganizing the indexes of a table, which you can optionally perform online without stopping the SAP system, requires approximately half the time necessary in comparison to a complete table reorganization because only the indexes are reorganized.

The advantage of a complete table reorganization is that after the reorganization every data page can hold more than 255 records if they fit in one page. The number of records that fit in one data page depends on the size of a single record and the page size.

6.2.1 Reorganizing Indexes Only

Use

You use the following procedures to enable the use of large RIDs for large tables `<LargeTable>` by reorganizing the indexes only. In addition, you check if large page numbers are now used. You can perform the steps online or offline.

Prerequisites

- You successfully migrated your DB2 database to Version 9.
- The table is located in a DMS tablespace or the tablespace is managed by DB2’s automatic storage management (AUTOSTORAGE).
- You have marked all table spaces as large as described in Converting Tablespaces to Data Type "Large" [page 49]

Reorganizing Indexes Online

1. Log on as user `db2<dbsid>` and connect to the database using the following command:
   
   `db2 connect to <DBSID>`

2. Reorganize all indexes by entering the following SQL statement:
   
   `db2 "REORG INDEXES ALL FOR TABLE <schema>.<LargeTable> ALLOW WRITE ACCESS"`

   For details and restrictions of the REORG command with the ALLOW WRITE ACCESS option, see the DB2 Command Reference.

3. Check if the table now uses large page numbers or large slot numbers by entering the following SQL statement:
   
   `db2 "SELECT large_rids, large_slots FROM TABLE (ADMIN_GET_TAB_INFO('<schema>', '<LargeTable>')) AS X"`

   `<LargeTable>` must be in upper case.
For the reorganization of the indexes of a table, the value for \textit{large\_rids} should be \textit{Y} (Yes) and the value for \textit{large\_slots} should be \textit{P} (Pending).

4. Repeat steps 2 and 3 for all tables that need to use large RIDs.

\textbf{Reorganizing Indexes Offline}

1. Log on as user <sapsid>adm and stop the SAP system using the following command:
   \texttt{stopsap}
2. Log on as user \texttt{db2<db2sid>} and start the database manager using the following command:
   \texttt{db2start}
3. Log on as user \texttt{db2<dbsid>} and connect to the database using the following command:
   \texttt{db2 connect to <DBSID>}
4. Reorganize all indexes by entering the following SQL statement:
   \texttt{db2 "REORG INDEXES ALL FOR TABLE <schema>.<LargeTable>"}
5. Check if the table now uses large page numbers or large slot numbers by entering the following SQL statement:
   \texttt{db2 "SELECT large\_rids, large\_slots FROM TABLE (ADMIN\_GET\_TAB\_INFO(''<schema>'', ''<LargeTable>'')) AS X"}

\texttt{<LargeTable>} must be in upper case.

For the reorganization of the indexes of a table, the value for \textit{large\_rids} should be \textit{Y} (Yes) and the value for \textit{large\_slots} should be \textit{P} (Pending).

6. Repeat steps 4 and 5 for all tables that need to use large RIDs.

\textbf{6.2.2 Reorganizing Tables and Indexes}

\textbf{Use}

You use the following procedures to enable the use of large RIDs for large tables \texttt{<LargeTable>} by reorganizing the tables and its indexes. In addition, you check if large page numbers are now used.

\textbf{Prerequisites}

- You successfully migrated your DB2 database to Version 9.
- The table is located in a DMS tablespace or the tablespace is managed by DB2’s automatic storage management (AUTOSTORAGE).
- You have marked all tablespaces as large as described in Converting Tablespaces to Data Type “Large” [page 48]
Procedure

1. Log on as user <sapsid>adm and stop the SAP system using the following command:
   stopsap

2. Log on as user db2<db2sid> and start the database manager using the following command:
   db2start

3. Connect to the database using the following command:
   db2 connect to <DBSID>

4. Reorganize the table and all its indexes by entering the following SQL statement:
   
   
   db2 "REORG TABLE <schema>.<LargeTable> USE <tempspace>"

   where <tempspace> is a suitable temporary tablespace that has the same page size as the tablespace where <LargeTable> is located.

5. Check if the table now uses large page numbers and large slot numbers by entering the following SQL statement:

   
   db2 "SELECT large_rids, large_slots
   FROM TABLE (ADMIN_GET_TAB_INFO('<schema>', '<LargeTable>')) AS X"

   <LargeTable> must be in upper case.

   After a complete table reorganization, the value for large_rids should be Y (Yes) and the value for large_slots should be Y (Yes).

6. Repeat steps 4 and 5 for all tables that need to use large RIDs.