System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX
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### Document History

**i Note**
Before you start reading, make sure you have the latest version of this system copy guide, which is available at [https://support.sap.com/sltoolset](https://support.sap.com/sltoolset) > System Provisioning > Copy a System using Software Provisioning Manager > System Copy Option of Software Provisioning Manager 1.0 SP.

The following table provides an overview on the most important document changes:

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<td>• <code>LOADTOOLS.SAR</code> archive in Software Provisioning Manager enabled for NUC, documented in: New Features, Constraints, Downloading and Extracting the Software Provisioning Manager Archive</td>
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<td>• Load tools are now available as <code>LOADTOOLS.SAR</code> in the Software Provisioning Manager archive, documented in: New Features, Constraints, Downloading and Extracting the Software Provisioning Manager Archive, System Copy and Migration Optimization, Database Independent System Copy, R3load Procedures Using the Migration Monitor</td>
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- **New Features:**
  - Software Provisioning Manager Log Files Improvements, documented in: New Features, Useful Information about the Software Provisioning Manager, Troubleshooting with the Software Provisioning Manager.

- **New Features** section restructured: As of SP22, a dedicated subsection for each new SP has been created. New features below SP22 remain in a common table.

- The Java SDT GUI - which was in the SP21 version still available in parallel to the SL-UI - has been deprecated with SP22. As of SP22, SL-UI is the only available GUI of the software provisioning manager.

- The following sections which were explicitly related to Java SDT GUI were completely removed from this documentation: Performing a Remote Installation Remote Processing of the Software Provisioning Manager (Java SDT GUI only), Starting the Java SDT GUI Separately, Running the Software Provisioning Manager in Accessibility Mode (general accessibility information was moved to Useful Information About the Software Provisioning Manager).

- The Java SDT GUI-specific information was removed from the common software provisioning manager sections: Running the Software Provisioning Manager, Useful Infor-
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<td>• Support of Oracle Database Vault, documented in: <a href="#">New Features</a></td>
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1 Introduction

1.1 Homogeneous and Heterogeneous System Copy

This document describes how to perform a homogeneous or heterogeneous system copy of an SAP system based on SAP NetWeaver 7.0 (including Enhancement Packages) ABAP with source operating system UNIX, using the software provisioning manager 1.0 SP39, which is part of SL Toolset 1.0 SP39.

The system copy procedures described in this guide consist of two phases:

1. Export of the source system's database content.
2. Installation of the target system using the source system's database content exported in the previous step. The target system installation consists of both the target database and target instance/application server installations.

**Note**

SAP NetWeaver 7.0x Application Server Java reached end of maintenance by the end of 2017. SAP recommends upgrading to a more recent version. For more information, see SAP Notes [1648480](http://support.sap.com/notes) and [2595196](http://support.sap.com/notes). Therefore, the last published version of the Java and dual-stack guides for the last software provisioning manager 1.0 SP22 tool release are no longer available via the common access pages. You can access them via SAP Note [2595196](http://support.sap.com/notes).

The following target databases are supported:

- IBM Db2 for Linux, UNIX, and Windows
- IBM Db2 for z/OS
- SAP MaxDB
- Oracle
- MS SQL Server
- SAP ASE

You can use either database-specific methods or database-independent methods.

For information about Software Provisioning Manager 1.0, see About Software Provisioning Manager 1.0 [page 15].

For information about SAP system products and releases covered by this guide, see SAP Products Based on SAP NetWeaver 7.0 to 7.0 EHP3 Supported for System Copy Using Software Provisioning Manager 1.0 [page 16].

For information about supported operating system and database platforms, see the Product Availability Matrix at [http://support.sap.com/pam](http://support.sap.com/pam).

**Note**

As an alternative to using Software Provisioning Manager, you can copy or refresh your system with a completely automated end-to-end framework available using SAP Landscape.
1.1.1 About Software Provisioning Manager 1.0

The software provisioning manager 1.0 is the successor of the product- and release-specific delivery of provisioning tools, such as “SAPinst”. We strongly recommend that you always download the latest version of the software provisioning manager 1.0. The software provisioning manager 1.0 is part of the Software Logistics Toolset 1.0 (“SL Toolset” for short). This way, you automatically get the latest fixes and supported processes. For more information about the software provisioning manager as well as products and releases supported by it, see SAP Note 1680045 and http://scn.sap.com/docs/DOC-30236.

“SAPinst” has been renamed to “software provisioning manager” in this documentation, but the terms “SAPinst” and “sapinst” are still used in:

- The name of the technical framework of the software provisioning manager. For more information about the SAPinst Framework, see SAP Note 2393060.
- Texts and screen elements in the software provisioning manager GUI (SL Common GUI)
- Names of executables, for example sapinst
- Names of command line parameters, for example SAPINST_HTTPS_PORT
- Names of operating system user groups, such as the additional group sapinst.

In the following, we generally refer to the software provisioning manager 1.0 as the "software provisioning manager". We only use the term "software provisioning manager 1.0" if this is required for technical reasons.

Related Information

Preparing the Media Required for Performing the Export [page 45]
Here you can find a list of SAP products based on SAP NetWeaver 7.0 to 7.0 EHP3 ABAP that are supported for system copy using Software Provisioning Manager 1.0.

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<td>- Enhancement Package 6 for SAP ERP 6.0</td>
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<td>- Enhancement Package 2 for SAP SRM 7.0</td>
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<td>- Enhancement Package 1 for SAP SRM 7.0</td>
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System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX

Introduction
1.1.3 Naming Conventions

- **Software Provisioning Manager 1.0**
  Software provisioning manager is the successor of the product- and release-specific delivery of provisioning tools, such as SAPinst. Before you perform an installation or system copy, we recommend that you always download the latest version of the software provisioning manager, which is part of the Software Logistics Toolset (“SL Toolset” for short). This way, you automatically get the latest SAPinst version including latest fixes in the tool and supported processes. For more information about software provisioning manager as well as products and releases supported by it, see [SAP Note 1680045](#). SAPinst has therefore been renamed to software provisioning manager 1.0 in this documentation. However, the term “SAPinst” is still used in:
  - Texts and screen elements in the software provisioning manager GUI
  - Naming of executables, for example `sapinst`
  - Naming of command line parameters, for example `SAPINST_USE_HOSTNAME`
  - Operating system user groups, for example additional group `sapinst`

- **System Copy**
  Duplication of an SAP system. The SAP system ID and certain other SAP parameters might be changed in a copy. When you perform a system copy, the tool installs all the instances again, but it uses a copy of the source system database to set up the database.
  The following use cases are possible:
  - **Initial System Copy**
    The tool newly installs all the instances of a source system, but it uses a copy of the source system database to set up the database in the target system.
  - **Refresh**
    Overwriting of an already existing target system with the database content from a source system. The refresh use case is not supported using the software provisioning manager.

- **Homogeneous System Copy**
  During the system copy, you use the same operating system and database platform as the original system.

- **Heterogeneous System Copy**
  During the system copy, you change either the operating system or the database system, or both. Heterogeneous system copy is a synonym for migration.

- **Source System and Target System**
  The SAP system containing the original database is called the **source system** and the system to which the database copy is to be imported is called the **target system**. Their SAP system names are abbreviated to `SOURCE_SAPSID` and `TARGET_SAPSID`. The terms source database and target database are also used in this description.

- **Database Copy**
  Database-dependent part of the system copy.

- **Placeholders**
Placeholders such as `<SAPSID>` are used in commands. They are used in the same way as in the SAP system installation documentation. You must replace them with the values valid for your site. The following additional placeholders are used:

<table>
<thead>
<tr>
<th>Placeholder</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;SAPSID&gt;</code></td>
<td>SAP system ID</td>
</tr>
<tr>
<td><code>&lt;S_HOST&gt;</code></td>
<td>System name of the source host (command hostname)</td>
</tr>
<tr>
<td><code>&lt;T_HOST&gt;</code></td>
<td>System name of the target host (command hostname)</td>
</tr>
<tr>
<td><code>&lt;S_SAPSID&gt;</code></td>
<td>SAP system ID <code>&lt;SAPSID&gt;</code> of the source system</td>
</tr>
<tr>
<td><code>&lt;T_SAPSID&gt;</code></td>
<td>SAP system ID <code>&lt;SAPSID&gt;</code> of the target system</td>
</tr>
<tr>
<td><code>&lt;S_DBSID&gt;</code></td>
<td>Database ID <code>&lt;DBSID&gt;</code> of the source system</td>
</tr>
<tr>
<td><code>&lt;T_DBSID&gt;</code></td>
<td>Database ID <code>&lt;DBSID&gt;</code> of the target system</td>
</tr>
<tr>
<td><code>&lt;OS&gt;</code></td>
<td>Operating system name within a path</td>
</tr>
<tr>
<td><code>&lt;DB&gt;</code></td>
<td>Database name within a path</td>
</tr>
<tr>
<td><code>&lt;Technology&gt;</code></td>
<td>ABAP, Java, or ABAP+Java</td>
</tr>
</tbody>
</table>

**i Note**

Database ID `<DBSID>` identifies the database instance. The software provisioning manager prompts you for the `<DBSID>` when you are installing the database instance. The `<DBSID>` can be the same as the `<SAPSID>`.

- “SAP liveCache” refers to “SAP MaxDB liveCache”.
- “SAP liveCache client” refers to “SAP MaxDB liveCache client”.

### 1.1.4 New Features

This section provides an overview of the new features in the software provisioning manager 1.0.

## Feature Description

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 for Linux, UNIX, and Windows only: Enhanced support for range partitioning and inline LOB size</td>
<td>The software provisioning manager now creates partition-specific tablespaces that are listed in the file <code>DB6_PART_TABLESPACES.LST</code>. This file is created by the ABAP program <code>SMIGR_CREATE_DDL</code> along with other SQL files for range-partitioned tables. For more information, see SAP Note <a href="https://support.sap.com/pam">3208238</a>.</td>
<td>software provisioning manager 1.0 SP36 (SL Toolset 1.0 SP36)</td>
</tr>
<tr>
<td>New SAPinst Framework Version 753</td>
<td>The SAPinst framework patch level has been upgraded from version 749 (SAP Note <a href="https://support.sap.com/pam">2393060</a> SAPinst Framework 749 Central Note) to 753. For more information, see SAP Note <a href="https://support.sap.com/pam">3207613</a> SAPinst Framework 753 Central Note.</td>
<td>Software Provisioning Manager 1.0 SP34 (SL Toolset 1.0 SP34)</td>
</tr>
<tr>
<td>Support of AIX 7.3</td>
<td>AIX 7.3 is now supported for all software lifecycle management options from Software Provisioning Manager. For more information, see SAP Note <a href="https://support.sap.com/pam">3104875</a>.</td>
<td>Software Provisioning Manager 1.0 SP32 (SL Toolset 1.0 SP32)</td>
</tr>
<tr>
<td>LOADTOOLS.SAR archive in Software Provisioning Manager</td>
<td>An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive contained in a LOADTOOLS.SAR archive. For more information, see SAP Note <a href="https://support.sap.com/pam">2472835</a>. For a system copy using Unicode kernel version 7.40 or higher, the load tools from the 70SWPM10SP&lt;Support_Package_Number&gt;_&lt;Version_Number&gt;.SAR are used automatically. The LOADTOOLS.SAR archive in Software Provisioning Manager is also enabled for non-Unicode (NUC) SAP kernel version 7.40 or higher. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 46]. If the SAP kernel version of the source system is 7.40 or higher, the SAPuptool which is contained in LOADTOOLS.SAR is used for table splitting instead of R3ta. For more information, see Preparing the Table Split [page 55]. For restrictions, see Constraints [page 22].</td>
<td>Software Provisioning Manager 1.0 SP32 (SL Toolset 1.0 SP32)</td>
</tr>
<tr>
<td>Switch from 7.21_EXT Kernel to 7.22_EXT Kernel</td>
<td>Kernel 7.21 has reached end of maintenance. In addition, some issues have been fixed with the new 7.22_EXT kernel media.</td>
<td>Software Provisioning Manager 1.0 SP31 (SL Toolset 1.0 SP31)</td>
</tr>
<tr>
<td>Support of Oracle 19</td>
<td>You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 19 database. For more information, see and <a href="https://support.sap.com/pam">https://support.sap.com/pam</a>.</td>
<td>Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28)</td>
</tr>
<tr>
<td>Oracle 18 c or higher: Support of Transparent Data Encryption (TDE)</td>
<td>Software Provisioning Manager 1.0 supports Oracle Transparent Data Encryption (TDE) for SAP NetWeaver-based systems. For more information, see Support of Oracle Transparent Data Encryption (Oracle TDE) [page 189].</td>
<td>Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Support of Oracle 18</td>
<td>You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 18 database. For more information, see and <a href="https://support.sap.com/pam">https://support.sap.com/pam</a>.</td>
<td>Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
</tr>
<tr>
<td>New Look and Feel of SL-UI</td>
<td>As of version 1.0 SP24 Patch Level (PL) 5, the software provisioning manager comes with a new look and feel of the SL-UI. For more information, see <a href="https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/">https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/</a>.</td>
<td>Software Provisioning Manager 1.0 SP24, PL05 (SL Toolset 1.0 SP24)</td>
</tr>
<tr>
<td>IBM Db2 for Linux, UNIX, and Windows: Dropping the database schema automatically while running the software provisioning manager to refresh the database content</td>
<td>You can now drop the database schema automatically while running the Refresh Database Content option by choosing to drop the schema on screen <a href="https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/">IBM Db2 for Linux, UNIX, and Windows - Drop Existing Schemas</a>. For more information, see Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows [page 124].</td>
<td>Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
<tr>
<td>Software Provisioning Manager Log Files Improvements</td>
<td>The software provisioning manager log files are now available immediately after the software provisioning manager has been started, that is before a product has been selected on the Welcome screen. For more information, see Useful Information About Software Provisioning Manager [page 67] and Troubleshooting with Software Provisioning Manager [page 77].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Media Signature Check</td>
<td>The digital signature of media is checked automatically by the software provisioning manager during the Define Parameters phase while processing the Media Browser screens. The software provisioning manager only accepts media whose digital signature has been checked. For more information, see Preparing the Media Required for Performing the Export [page 45] and Running Software Provisioning Manager [page 62].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Support of Oracle Database Vault</td>
<td>Oracle Database Vault 12c has been certified for SAP products that are based on SAP NetWeaver technology. You can now copy an SAP system with Oracle Database 12c and configure Oracle Database Vault in the database of the target system. Oracle Database Vault is supported for all system copy methods [page 27] described in this documentation. For more information, see SAP Note 2218115.</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Support of Oracle 12.2</td>
<td>The software provisioning manager now supports system copy for SAP systems with Oracle 12.2.</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>SL-UI with SAPINST 749</td>
<td>With the new software provisioning manager framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) “SL-UI”. For more information, see Useful Information About Software Provisioning Manager [page 67], Running Software Provisioning Manager [page 62].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Cleanup of Operating System Users</td>
<td>You can now specify during the Define Parameters phase that the operating system users are to be removed from group sapinst after the execution of the software provisioning manager has completed.</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Refresh Database Content for all Databases</td>
<td>For all databases you can now refresh the content of an existing database using a database backup. For more information, see Copying the Database Only - Refresh Database Content [page 120].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Verification of Integrity of Data Units in Software Provisioning Manager</td>
<td>The integrity of data units extracted from the Software Provisioning Manager archive is verified. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 46]. In addition, check SAP Note 1680045 whether additional information is available.</td>
<td>Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>Diagnostics Agent</td>
<td>The Diagnostics Agent is no longer installed automatically with the SAP system. The Install Diagnostics Agent check box on the Install Diagnostics Agent screen is no longer available. You now have to install the Diagnostics Agent always separately. We recommend that you install it prior to the installation of your SAP system(s). For more information, see the Diagnostics Agent Installation Strategy attached to SAP Note 1365123, to SAP Note 1833501, and to SAP Note 1858920 and the attached Diagnostics Agent Setup Guide.</td>
<td>Software Provisioning Manager 1.0 SP10 (SL Toolset 1.0 SP16)</td>
</tr>
<tr>
<td>Executing R3szchk in Parallel Oracle, IBM Db2 for z/OS:</td>
<td>You can now execute R3szchk in parallel. Using this feature you can improve the runtime of the export.</td>
<td>Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
</tr>
<tr>
<td>Support of Oracle 12 database</td>
<td>You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename, dual-stack split) for SAP systems with the Oracle 12 database. For more information, see <a href="http://support.sap.com/pam">http://support.sap.com/pam</a>.</td>
<td>Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
</tr>
<tr>
<td>Feedback Evaluation Form available in the Software Provisioning Manager:</td>
<td>SAP SE’s aim is to provide fast and efficient procedures. To evaluate the procedure you just carried out, we need information generated by the tool during process execution and your experience with the tool itself. A new evaluation form contains a simple questionnaire and XML data generated during the procedure. Port 4239 is used for displaying the feedback evaluation form. For more information, see the Prerequisites section in Running Software Provisioning Manager [page 62].</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
</tbody>
</table>
### 1.1.5 Constraints

- Only perform a system copy if you have experience in copying systems and thorough knowledge of the operating system, the database, and the ABAP Dictionary. Only perform a heterogeneous system copy (of a production, development, or test (QA) system) if you are a certified system support consultant or a certified SAP Technical Consultant. For more information and guidance see the System Copy and Migration page.

- Effective immediately, the software provisioning manager no longer supports the deprecated CPU architectures and/or operating system versions listed in SAP Note 2998013.

**i Note**

- If your current operating system is listed as deprecated in SAP Note 2998013, we strongly recommend that you migrate to a supported platform.

- If you continue to run Software Provisioning Manager on the deprecated CPU architectures and/or operating system versions listed in SAP Note 2998013, you do so at your own risk and without support from SAP. The software provisioning manager 1.0 SP36 and higher will still run on the deprecated CPU architectures and/or operating system versions listed in SAP Note 2998013 but it may run into an error. When you start the software provisioning manager, you will see a warning like the following: “Platform Support : Support for SAP JVM on PPC64 big endian for Linux ends June 30 th, 2022. See SAP note 2998013.” If you run into an issue, you must use the “frozen” software provisioning manager 1.0 SP35 software and the related system copy guide. For more information, see SAP Note 3220901.

- **Oracle Database:** Refresh Database Instance [page 120] and Refresh Database Content [page 129] are not supported for Database Instance Installation on Oracle Automatic Storage Management [page 199] and Installing Oracle Real Application Clusters on your Target System [page 200].

- Target system installation with new LOADTOOLS (see New Features [page 18]) on Oracle database only works smoothly as of Oracle 11g and Oracle client 12.1. For more information, see SAP Note 1622837.

- **IBM Db2 for Linux, UNIX, and Windows only:**
  - The option Deferred Table Creation is not supported for load-based system copies for SAP systems that are not based on SAP NetWeaver 7.0 EHP 1 or higher.
  - The option Deferred Table Creation is not supported for load-based system copies for SAP systems that are not based on SAP NetWeaver 7.0 EHP 1 or higher.

- System copy is not supported for the Diagnostics Agent. Diagnostics Agent Maintenance Procedures article at http://wiki.scn.sap.com/wiki/x/n4efFg.
When you perform a system copy, all software units or usage types in the source system are copied to the target system. This means that none of the usage types in the target system can be excluded from the system copy, nor can you select usage types.

**SAP Solution Manager only:** As of Support Release 4, your SAP Solution Manager 7.0 system must be a dual-stack system if you want to perform a system copy. If required, install a Java Add-In to your existing ABAP system before you start the export.

SAP does **not** support client transport as a system copy method. Transporting production clients is not supported at all. You can use client transport for the initial setup of an SAP system infrastructure. This documentation does **not** cover the client copy procedure.

This documentation does **not** describe the following:

- How to export and import a database with the installation tools for reorganization purposes. Use the appropriate tools for database reorganization, as SAP does not support this installation option.
- How to copy data from non-SAP systems to SAP systems based on SAP Netweaver Application Server. This documentation only describes how to copy data from one SAP system to another SAP system.
- How to perform a duplication of a SAP system on the same host without changing the SAP system ID.
- How to perform a system refresh using the tool.

If you have made modifications in your development system and want to copy your quality assurance or production system onto the development system, see SAP Note 130906.

If you want to convert a non-Unicode system to a Unicode system or perform the system copy of a Unicode system, see SAP Note 551344.

**i Note**

A Unicode Conversion is done as part of a standard system copy. Therefore, you must perform a homogeneous or heterogeneous system copy if you want to convert a system to Unicode. The Refresh Database Content [page 120] option does **not** support Unicode Conversion.

SAP does not support all data archiving operations after a system copy. If you used data archiving in the source or target system, access to the created archive files from the target system may not always be possible. For more information, see SAP Note 153433 and Data Management Landscape & Transformation Solutions https://support.sap.com/dm&lt. Access to archived files from the target system without a dedicated archive migration project is only supported in the following cases:

- The system copy is done to provide a source system for nonproductive purposes, for read-only access to the previously archived data from the target system (no reloading), and you do not store archive files using ArchiveLink/CMS. You can either copy all archive files to file systems that are not shared between the source and the target system, or you arrange network access for appropriate archive file sharing.
- The system copy is done to replace a productive system with a new productive system (for example, hardware migration), assuming that the target system did not exist before and the operation of the source system is discontinued after the system copy. You **must not** change the system ID during system copy, but arrange for file access and/or ArchiveLink/CMS connectivity.

**i Note**

Only valid for SAP Business Warehouse:

If you use ADK-based archiving of request administration data in SAP Business Warehouse, you have to copy all archive files related to archiving object BWREQARCH to the file system of the target system.
Only then write access (like deletion of requests, deletion of the complete data target content, further upload of data to other targets, changing the quality status of requests or InfoProvider rebuild) to requests with archived administration data is possible in the target system of the copy.

In all other cases, contact Data Management Landscape & Transformation Solutions at https://support.sap.com/dm or sap_dmlt_gce@sap.com.

- Dos and Don'ts for system copy:
  - **Do:**
    - Follow the Open SQL standard.
    - Make sure that all communication runs through the database pool.
  - **Don't:**
    - Save any system and infrastructure-specific data in business objects. Use a pointer to the central storage of such information, for example:
      - SAP SystemID and SID (SAPSID=SID=system name)
      - Host name
      - IP addresses
      - Services and ports
      - Logical destinations and logical system names
      - Other technical infrastructure names
    - Use file system persistency.
    - Set up dependencies between Java and ABAP.

### 1.1.6 Accessing the Installation Guides

The references to the “installation guide” in this system copy guide always refer to the following location on the SAP Support Portal, where you can access or download the installation guide for your operating system platform, database, and technical stack:

http://support.sap.com/sitoolset System Provisioning Install a System using Software Provisioning Manager Installation Option of Software Provisioning Manager 1.0 SP<Current Number> Installation Guides - Application Server Systems Installation Guides - Application Server Systems - Software Provisioning Manager 1.0 SAP Application Server Systems Based on SAP NetWeaver

In the table, filter for the following: **Database = Your Target Database**, **Product Release = SAP NetWeaver 7.0X**, **Operating System Platform = Your Target OS Platform**, **Technical Stack = Your Technical Stack**.
1.1.7 Accessing the SAP Library

The references to the SAP NetWeaver Library documentation in this guide always refer to the following on the SAP Help Portal:

- SAP NetWeaver 7.0:

- SAP NetWeaver 7.0 including Enhancement Package 1:

- SAP NetWeaver 7.0 including Enhancement Package 2:

- SAP NetWeaver 7.0 including Enhancement Package 3:
2 Planning

This section describes how to plan your system copy.

2.1 Before You Start

- The SAP OS/DB Migration Check prepares you in an optimal way for a successful migration and supports smooth continued operations on the new platform. The OS/DB Migration Check is mandatory, if you are going to migrate a productive system. For more information, see https://support.sap.com/support-programs-services/services/os-db-migration.html. In addition to the information contained on this page, check the SAP OS/DB Migration Planning Guide that is available in the Media Library.

- Before you start the system copy, you must read the documentation that is referenced in the following:
  - Read the following SAP Notes for up-to-date information on system copy and corrections to the system copy documentation:
    - SAP Note 1680045 – Release Note for Software Provisioning Manager 1.0
    - SAP Note 1738258 – System Copy of Systems Based on SAP NetWeaver
  Make sure that you have the most recent version of the SAP Notes, which you can find at: https://support.sap.com/notes.

- Guides for the target system installation
  This system copy guide describes only the source system export in full detail. As for the installation of the target system, this system copy guide describes only the system copy-specific steps in section Setting Up the Target System [page 82], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 24].


- SAP system landscape copy:
  - Best Practice document SAP System Landscape Copy for SAP NetWeaver and SAP Solutions at: https://support.sap.com/esacademy.
  - SAP Note 885343 – SAP System Landscape Copy
  - SAP Note 1990240 – Support of mixed landscapes (Unicode and Non-Unicode)
  - SAP Note 82478 – SAP System OS/DB Migration
  - If you encounter problems during the system copy, create a customer message using the application area BC-INS-MIG.
2.2 Use Cases for System Copy

You can apply the system copy for the following:

- Setting up system landscapes (where the SAP systems have different SAPSIDs).
- Providing systems for testing, demonstration, training, and standby.

To create these systems you can either perform an initial system copy or use a database export to overwrite the database of an already existing target system (refresh use case).

Depending on the purpose of the system, it might be advisable to use the same SAP system ID, even though this prevents you from including the system in a system group for transports.

**Note**

- *Oracle only*: You cannot create standby systems with a system copy.
- You should perform system copy in a test system first. This way you can identify customer-specific problems that might result from modifications.

- Changing the operating system, the database, or both.

You can use different operating system releases or database releases for the source and target systems, but the SAP system release of the source and target systems must be the same.

- Changing the hardware.
- Disaster recovery from an existing database backup

**Note**

You can set up the SAP system infrastructure (development, quality assurance, and production system) **without** making a system copy as follows:

1. Install all SAP systems, starting with the development system. Customize the development system as described in the implementation documentation.
2. Transport the client-dependent and client-independent data to the quality assurance and production systems.

However, if you do not follow this concept, you can also install a system, customize it, and then perform a system copy.

2.3 System Copy Methods

You can choose between the following system copy methods:

**Note**

Before making your decision, read the documentation SAP System Copy and Migration at [https://wiki.scn.sap.com/wiki/display/SL/System+Copy+and+Migration](https://wiki.scn.sap.com/wiki/display/SL/System+Copy+and+Migration) in order to make yourself familiar with the available system copy and migration procedures.

- The database-independent procedure using SAP tools.
Use this method if database-specific methods are either not available or not suitable. For more information, see Database-Independent System Copy [page 48].

- The database-specific procedure using tools provided by the database vendor
  Some database vendors offer specific tools for copying a database. These tools allow you to:
  - Restore a backup of one database (source database) in another one (target database) (backup method)
  - Unload the source database and load the data into the target database
  For more information, see Database-Specific System Copy [page 87].

These methods are not supported for all database systems. Refer to the following table to check which copy methods are available for your database system:

<table>
<thead>
<tr>
<th>Database</th>
<th>Available Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP MaxDB</td>
<td>Use one of the following:</td>
</tr>
<tr>
<td></td>
<td>• System copy procedure on UNIX using R3load</td>
</tr>
<tr>
<td></td>
<td>For more information, see System Copy Procedure [page 49].</td>
</tr>
<tr>
<td></td>
<td>• System copy procedure for a homogeneous system copy only</td>
</tr>
<tr>
<td></td>
<td>For more information, see SAP MaxDB-specific procedure [page 104].</td>
</tr>
<tr>
<td>IBM Db2 for Linux, UNIX, and Windows</td>
<td>Use one of the following:</td>
</tr>
<tr>
<td></td>
<td>• System copy procedure using R3load</td>
</tr>
<tr>
<td></td>
<td>For more information, see System Copy Procedure [page 49].</td>
</tr>
<tr>
<td></td>
<td>• Backup of IBM Db2 for Linux, UNIX, and Windows</td>
</tr>
<tr>
<td></td>
<td>For more information, see IBM Db2 for Linux, UNIX, and Windows Specific Procedures [page 106].</td>
</tr>
<tr>
<td>IBM Db2 for z/OS</td>
<td>Use one of the following:</td>
</tr>
<tr>
<td></td>
<td>• System copy procedure on UNIX using R3load</td>
</tr>
<tr>
<td></td>
<td>For more information, see System Copy Procedure [page 49].</td>
</tr>
<tr>
<td></td>
<td>• Additional Information:</td>
</tr>
<tr>
<td></td>
<td>• For more information about the IBM Db2 for z/OS specific procedure for a homogeneous system copy only, see the .PDF attachment to SAP Note 680746.</td>
</tr>
<tr>
<td></td>
<td>• When R3ta is used to split tables, DELETE with WHERE is not performed if import errors occur in the target system.</td>
</tr>
<tr>
<td></td>
<td>For more information, see SAP Note 778729.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Use one of the following:</td>
</tr>
<tr>
<td></td>
<td>• System copy procedure on UNIX using R3load</td>
</tr>
<tr>
<td></td>
<td>For more information, see System Copy Procedure [page 49].</td>
</tr>
<tr>
<td></td>
<td>• R3load method with Export/Import Monitors</td>
</tr>
<tr>
<td></td>
<td>For more information, see R3load Procedures Using the Migration Monitor [page 151].</td>
</tr>
<tr>
<td></td>
<td>• Oracle-specific procedure for a homogeneous system copy only</td>
</tr>
<tr>
<td></td>
<td>For more information, see Oracle-Specific Procedure [page 89].</td>
</tr>
</tbody>
</table>
**Available Methods**

**SAP ASE**

Use one of the following:

- System copy procedure on UNIX using R3load
  For more information, see System Copy Procedure [page 49].
- R3load method with Export/Import Monitors
  For more information, see R3load Procedures Using the Migration Monitor [page 151].
- Homogeneous system copy only: Backup/Restore or Detach/Attach method
  For more information, see SAP ASE Server-Specific Procedure [page 118].

**Note**

Before you start the system copy procedure, implement SAP Note 1612437.

**Copy single instances only**

- You can refresh the content of an existing database without having to copy the primary application server instance and to reinstall additional applications servers.

**Recommendation**

We recommend that you use option Refresh Database Content if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

For more information, see Copying the Database Only - Refresh Database Content [page 120].

**Changing the system variant**

If you want to change your system variant (for example, if you want to make your standard system a distributed or high-availability system), proceed as follows:

1. Perform the export [page 58].
2. For the import, choose the relevant system copy options as described in the process flows of the system copy procedure [page 49].

### 2.4 Creating a System Copy Plan

Create a plan to perform the system copy.

**Procedure**

1. When copying a system that contains production data, choose the moment for the copy carefully. This could be a month-end or year-end closing.
2. Consider the downtime of the source system (for preparations and copying) when planning the system copy.
3. Consider a test run.

Perform a test run of the system copy. You can use the time taken by the test run to calculate the system downtime:

- If you want your target system to replace your source system, try to perform a complete test run. This means that the entire database is exported from the source system, transferred to the target system, and imported there. System downtime is approximately equal to the total test time (that is, time for export, transport, and import).
- If you do not want to replace your source system, a partial test run (export of the entire database or parts of it) can be sufficient to calculate the system downtime. The source system is only down for the time of the export.

Calculating the system downtime is particularly important for very large databases (VLDB) or when tapes are being used. The test run is also to determine the amount of export data. Choose the best data transfer method (for example, FTP or tape). We recommend that you only perform read/write actions on local file systems.

4. Define a schedule for the test migration and the final migration.

2.5 Basic Planning Aspects and Parameters

Support of Mixed Landscapes (Unicode and Non-Unicode)

If your system landscape is mixed with Unicode and Non-Unicode systems, or if you have third party software in your system landscape which does not support Unicode at all, check SAP Note 1990240 for potential support restrictions.

Using NFS-Mounted File Systems

Note that the overall performance of the system copy depends on all links in the chain, starting from the performance of the source database to the following:

- Performance of the server on which the export is executed
- File system to which the export data is written
- Target side that reads from the export medium and imports it into the target database

You have to make sure that all aspects are configured for optimal performance. For recommendations on NFS configuration, see SAP Note 2093132.

i Note

If you want to use NFS for the system copy export, make sure that you create secure file share permissions. Be aware that the communication protocol for NFS needs to be a safe one, for example SSFS.
SAP System Copy on Oracle Solaris with Oracle Database

For more information about copying SAP Systems on Oracle Solaris with Oracle database, see SAP Note 1848918.

Configuration Analysis and Hardware Configuration

- In the event of a major change in hardware configuration (for example, new machine type, new hard disk configuration, new file system type), consult your SAP-authorized hardware partner.
- You need to determine the following:
  - Number of application servers
  - Expected size of the database
  - Additional disks or other hardware required
  - Required memory

  **i Note**
  Refer to the section on hardware and software requirements in the SAP system installation documentation to determine the system requirements.

Choosing an SAP system ID

You can choose the new SAP system ID `<TARGET_SAPSID>` freely during a new installation.

Make sure that your SAP system ID:

- Is unique throughout your organization
  Do not use an existing `<SAPSID>` when installing a new SAP system.
- Consists of exactly three alphanumeric characters
- Contains only uppercase letters
- Has a letter for the first character
- Does not include any of the reserved IDs listed in SAP Note 1979280.
- If you want to install an additional application server instance, make sure that no Gateway instance with the same SAP System ID (SAPSID) exists in your SAP system landscape.

  **Caution**
  To meet the requirements of the Workbench Organizer, you must choose different SAP system IDs for different SAP systems.
SAP License

Once the installation is completed and the SAP system copy has been imported, you will require a new license key for the target system. The license key of the source system is not valid for this system. For more information about ordering and installing the SAP license, see the SAP Library for your release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
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<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="http://help.sap.com/nw70">http://help.sap.com/nw70</a> Application Help</td>
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<td>Function-Oriented View &lt;Language&gt; Solution Life Cycle Management by Key Capability SAP Licenses</td>
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<tr>
<td>SAP NetWeaver 7.0 including EHP1</td>
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<td>Function-Oriented View &lt;Language&gt; Solution Life Cycle Management by Key Capability SAP Licenses</td>
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<tr>
<td>SAP NetWeaver 7.0 including EHP2</td>
<td><a href="http://help.sap.com/nw702">http://help.sap.com/nw702</a> Application Help</td>
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<td>Function-Oriented View &lt;Language&gt; Solution Life Cycle Management by Key Capability SAP Licenses</td>
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<tr>
<td>SAP NetWeaver 7.0 including EHP3</td>
<td><a href="http://help.sap.com/nw703">http://help.sap.com/nw703</a> Application Help</td>
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<tr>
<td></td>
<td>Function-Oriented View &lt;Language&gt; Solution Life Cycle Management by Key Capability SAP Licenses</td>
</tr>
</tbody>
</table>

For more information about SAP license keys, see http://support.sap.com/licensekey or SAP Note 94998.

Archiving files

Data that has been archived in the source system (data that does not reside in the database but was moved to a different storage location using SAP Archive Management) must be made accessible in the target system. Adapt the file residence information in the target system. For more information, see the SAP Library for your release at:

<table>
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<tr>
<th>SAP NetWeaver Release</th>
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<tr>
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<td>Function-Oriented View &lt;Language&gt; Solution Life Cycle Management by Key Capability Data Archiving</td>
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</table>
### SAP NetWeaver Release

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<tr>
<td></td>
<td>➤ Function-Oriented View ➤ Solution Life Cycle Management by Key Capability ➤ Data Archiving</td>
</tr>
</tbody>
</table>

Access to archive files is platform-independent.

### Special Prerequisites for SAP Business Warehouse (SAP BW) and IBM Db2 for Linux, UNIX, and Windows (IBM Db2) 10.5 and higher

For special prerequisites and required procedures for SAP BW and IBM Db2, including the implementation of DB2 BLU acceleration, see the appendix of the database administration guide SAP Business Warehouse on IBM DB2 for Linux, UNIX, and Windows: Administration Tasks. To access this guide, use the SAP NetWeaver Guide Finder: In the I want to column select Operate my system, in the My Database column, select IBM Db2 for Linux, UNIX, and Windows.

### When Using SAP Landscape Transformation Replication Server

If you use SAP Landscape Transformation Replication Server in your system landscape, we recommend that you stop replication and remove existing database triggers before you start the system copy. For more information about SAP Landscape Transformation Replication Server and its dependencies, see SAP Note 1605140.

### 2.6 System Copy and Migration Optimization

This section lists several methods that you can use to optimize the standard system copy procedure. More information about system copy optimizations can be found in the document System Copy and Migration - Optimization at [https://archive.sap.com/documents/docs/DOC-14257](https://archive.sap.com/documents/docs/DOC-14257) and in SAP Note 1875778.

Database Tuning [page 34]
Sorted Versus Unsorted Unload [page 36]
Package Splitting [page 36]
Table Splitting [page 37]
R3load Options [page 39]
    This section provides information about available R3load options.
Migration Monitor [page 39]
    The migration monitor is a tool which helps you to perform and control the unload and load process during the system copy procedure. The migration monitor is integrated into the Software Provisioning Manager (the “software provisioning manager” for short), but it is also possible to use the monitor for copying older releases by starting it manually.
Defining the Unload/Load Order [page 40]
Database-Specific Central Notes [page 41]
    For some databases there are central SAP Notes where you can find information about how to optimize system copy and migration.

2.6.1 Database Tuning

This is just a list of database parameters which could help you to tune your database. This list is not meant to give you detailed recommendations about the parameter settings.

Database Tuning Measures – IBM Db2 for z/OS

Create indexes deferred.

Database Tuning Measures – IBM Db2 for Linux, UNIX, and Windows

Refer to the documentation DB2 Optimization Techniques for SAP Database Migration And Unicode Conversion available at: http://www.redbooks.ibm.com/abstracts/sg247774.html

Database Tuning Measures – Oracle

- Refer to SAP Note 936441 regarding Oracle settings for R3load based system copy.
- Enlarge the number and size of redo logs experiences from other pilot projects by adding 4 additional redo logs of 100 MB each.
- Enlarge the number of db writers.
- Enlarge temporary tablespace PSAPTEMP (~20-30 GB).
• Increase `sort_area_size` or use `pga_*` parameters.
• Increase `PSAPROLL` (~20 GB).

Database Tuning Measures – SAP MaxDB

• You can find general documentation about tuning measures of the current SAP MaxDB release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
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<tr>
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<td>Concepts of the Database System</td>
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<td>Function Oriented View</td>
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<tr>
<td></td>
<td>Concepts of the Database System</td>
</tr>
</tbody>
</table>

• Increase the parameter `CACHE_SIZE` to the maximum available size of main memory. Add the unused main memory of non-running Application Server components to the database cache.
• Increase the parameter `MAXCPU` to the maximum available number of processors to which the database system can distribute user tasks.
**Database Tuning Measures – SAP ASE**

Refer to SAP Note 1722359 for recommendations on how to size and tune the SAP ASE database in an SAP NetWeaver or SAP Business Suite environment.

### 2.6.2 Sorted Versus Unsorted Unload

During a system copy, you can perform the data export either “sorted” or “unsorted”.

The default setting is *Use Unsorted Unload*, unless your target database is SAP MaxDB. SAP recommends that you stick to this default value. Only if your target database is MaxDB, make sure that the *Use Unsorted Unload* option is deselected.

If the *Use Unsorted Unload* option is chosen, R3load makes use of the unsorted export feature as much as possible.

### 2.6.3 Package Splitting

It might be possible that some packages take long time to be exported due to the fact they contain much data. In such situations it is worth to split the package by using the Package Splitter. An example of the improvement when performing a split can be seen in the figure below:

The software provisioning manager by default applies *Package/STR Splitting*. The software provisioning manager prepares and runs the Package Splitter.
2.6.4 Table Splitting

It might be possible that specific tables take long time to be exported due to the fact they contain much data. In such situations it is worth to split the table by using the Table Splitter. An example of the improvement when performing a split can be seen in the figure below:

For copying large ABAP tables, the tool R3ta or - depending on the kernel version - SAPuptool has been developed to automatically generate WHERE conditions, with which a subset of table data can be accessed. These WHERE conditions are integrated into the R3load TSK files. Using WHERE conditions may not be optimal for every database management system and therefore has to be considered carefully.

Availability

You can use table splitting for ABAP systems with SAP kernel 6.40 or higher.

SAPuptool is available for table splitting with SAP kernel version 7.40 or higher. It is supported for both Unicode and non-Unicode source system and for both Unicode and non-Unicode target systems.

The software provisioning manager automatically selects the corresponding tool depending on the kernel version.
Advantages

- Large tables are processed in many small packages. If the export or import of a table aborts with an error, only the processing of the package with the error has to be repeated instead of (un)loading the complete table once again.
- The export and import of one table can be performed in parallel by starting several R3load processes to work on some packages in parallel.

Disadvantages

- If the parallel processing is not optimal or if the single packages are processed serial, the complete processing time for one table may increase when using WHERE conditions.
- The creation and evaluation of WHERE conditions is an iterating process which requires some experience and some detailed database knowledge. Many manual steps have to be performed.
- Under certain conditions it is recommended to create additional temporary indexes on the column used in the WHERE condition. Depending on the database, this may not be feasible during productive operation (time consuming, table locking, ...).

Known Problems

The sorting order may be different on non-Unicode source system and Unicode target system. This may lead to problems when deleting parts of table data during restart. If the import of one package aborted with an error, you therefore have to delete all data from this table and reload them all again.

Attention

- As the usage of WHERE conditions requires a lot of experience and many manual steps and because there are still some problems not yet solved, we cannot release this feature generally.
- You may use the feature WHERE conditions and the R3ta or - depending on the kernel version - the SAPuptool and in many cases it will work without problems, but if you run into problems, you cannot claim for support or an immediate fix of the problem. Nevertheless, we welcome any feedback which helps us to improve the tools.
- The generated WHERE conditions should not cover more than one column. If R3ta calculated conditions with more columns, run the tool again with different row-count parameters.
- If you decide to create WHERE conditions manually (without the R3ta or - depending on the kernel version - the SAPuptool), you must be aware of the fact, that a badly chosen WHERE condition can increase the total table processing time a lot. In addition, the consultant takes over the responsibility for the completeness of the data!
- You can often reduce the export time of a table which is processed with WHERE conditions if you create a (temporary) additional index on the column used within the WHERE condition.
Caution
This may not be possible on databases that need exclusive access on the table when creating an index.

Database-Specific Information about Table Splitting

Oracle: SAP Note 1043380 (Efficient Table Splitting for Oracle Databases)

2.6.5 R3load Options

This section provides information about available R3load options.

Note
An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPuptool - which were available so far only in the SAPEXEDB_<...>.SAR archive of the kernel media, has now been made available in the software provisioning manager archive (70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB_<...>.SAR archive of the kernel media. There is no action required from your side, the software provisioning manager uses the relevant loadtools automatically once you run it from the extracted 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive. For more information, see SAP Note 2472835.

You can use the following R3load options:

- **R3load option** -fast or -loadprocedure fast.
- **R3load socket option:**
  You can use the socket option, if your R3load has at least patch level 73 (compile date: 12.01.2008)
- **Several R3load processes can be launched in parallel to export the packages. However, at a certain point, increasing the number of processes will not help with the performance and has the opposite effect. There is no direct way to determine the optimal number of processes. A rule of thumb though is to use 3 times the number of available CPUs. If you want to find the optimal value, you can perform tests in similar environments, such as in a DEV system.**
- **IBM Db2 for Linux, UNIX, and Windows:** For more information, see SAP Note 1058437 – DB6: R3load options for compact installation
- **Oracle:** For more information, see SAP Note 1045847 – Oracle Direct Path Load Support in R3load

2.6.6 Migration Monitor

The migration monitor is a tool which helps you to perform and control the unload and load process during the system copy procedure. The migration monitor is integrated into the Software Provisioning Manager (the
“software provisioning manager” for short), but it is also possible to use the monitor for copying older releases by starting it manually.

### Note

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPuptool - which were available so far only in the SAPEXEDB_<...>.SAR archive of the kernel media, has now been made available in the software provisioning manager archive (70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB_<...>.SAR archive of the kernel media. There is no action required from your side, the software provisioning manager uses the relevant loadtools automatically once you run it from the extracted 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive. For more information, see SAP Note 2472835.

The migration monitor
- creates R3load command files
- triggers the creation of R3load task files if required
- starts the R3load processes to unload the data
- transfers packages from the source to the target host if required
- starts the R3load processes to load the data as soon as a package is available
- informs the person performing the system copy in case of errors

### More Information

For more information, see:
- R3load Procedures Using the Migration Monitor [page 151]
- SAP Note 784118 (System Copy Tools for ABAP Systems)

## 2.6.7 Defining the Unload/Load Order

If you select the checkbox Define Special Package Unload Order on the software provisioning manager screen SAP System Database Export, a dialog opens on which you can choose among the following options how to process the packages:
- In alphabetical order
- In custom order
- According to their size (largest first, for import and export)

The migration monitor has a property orderBy to specify the order of processing packages.
2.6.8 Database-Specific Central Notes

For some databases there are central SAP Notes where you can find information about how to optimize system copy and migration.

- For more information about MS SQL Server-specific migration optimization options, see SAP Note 1054852 (Recommendations for migration to MS SQL Server).
- For more information about SAP ASE-specific migration optimization options, see SAP Note 1680803 (Migration to SAP Sybase ASE - Best Practice).

Related Information

System Copy and Migration Optimization [page 33]
3  Preparations

Before you start the system copy, you must perform the following preparation steps.

3.1  General Technical Preparations

To make a consistent copy of the database, you need to prepare the source system and perform some subsequent actions on the target system, before you start a system copy. This is not necessary when performing a test run.

Context

The following describes the required preparations.

For more information about SAP system administration, see the SAP Library for your release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
</tr>
</thead>
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<tr>
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<td><a href="http://help.sap.com/nw701">http://help.sap.com/nw701</a>  System Administration and Maintenance Information  Technical Operations for SAP NetWeaver &lt;Language&gt;</td>
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<tr>
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</tr>
</tbody>
</table>
Procedure

1. Check the minimum kernel patch level required by the support package level of the source system. It might be necessary to replace the SAP kernel delivered with the installation kit and installed during the installation of the target system with a newer kernel patch level before starting the target system. If you have to replace the delivered SAP kernel, you can do this after the installation of the central instance.

2. No canceled or pending update requests should be in the system. Check this by choosing Tools > Administration > Monitor > Update (transaction SM13).

If canceled or pending updates exist, you must update these again or delete them from all clients. You can find out whether canceled or pending updates exist by checking if table VBDATA contains any entries.

Find the canceled or open updates as follows:
   b. Delete the default values for the client, user, and time.
   c. Choose all update requests.

If canceled or pending records exist, you must update these again or delete them. Check whether this action was successful using transaction SE16 for table VBDATA.

3. Stop scheduling of all released jobs.

Go to transaction SE38 and run report BTCTRNS1.

For more information, see SAP Note 37425.

4. Adapt the operation mode timetable to make sure that no switching of operating modes takes place while a system is being copied as follows:
   Tools > CCMS > Configuration > Operation mode calendar (transaction SM63)

5. Write down the logical system names of all clients:
   a. If you plan to overwrite an existing system with a system copy, make sure you write down the logical system names of all clients in the system that will be overwritten (transaction SCC4).

Since the logical system names will be overwritten, in the event of differences, you must change them back to their original names (as they existed in the system that is overwritten) in the follow-on actions after the system copy.

b. If you create a new system with a system copy (for example, create an upgrade test system), make sure that the logical naming strategy for this new system is consistent with your existing logical system naming convention. If you are still planning your BI (formerly BW) system landscape, see SAP Note 184447.

c. If your system copy is used to replace hardware for the DB server, migrate to a different database system or operating system (that is, source system for the copy is the same as the copy target), no changes to logical system names are required.

6. Before performing the source system export, make sure that you do the following:
   a. Delete QCM tables from your source system:
      1. Before you delete the QCM tables, ensure the following:
         • The tables are consistent – no restart log or conversion procedure termination must be displayed.
         • The data of the original table can be read.
         • The application programs that use the affected original table run correctly.
      2. Call transaction SE14.
3. Choose Extras > Invalid temp. table.
All QCM tables that can be deleted are displayed.

4. Mark the tables and delete them.

b. Run report RS_SCRP_D020S_CLEAN to check if there are invalid entries in tables D020S and DYNPSOURCE. If invalid entries are detected, remove them before running the export. See also SAP Note 870601.

7. If your source system is not a new installation but is an upgrade from an SAP system with a release level earlier than SAP NetWeaver 2004s, you must adjust the directory structure before you start the export. To do so, apply SAP Note 1104735.

8. **Oracle Database only:** If your source system has Oracle Database Vault (DV) enabled, and you want to enable DV on the target system as well, you need the password of user `secadmin/c##secadmin` during the software provisioning manager import procedure [page 83]. For more information, see SAP Note 2218115.

9. **Oracle Database only:** Before performing System Copy from any database to Oracle, check the contents of the TAORA and IAORA database tables and ensure that the entries are consistent.
You can use the upgrade-specific SAP Note 541542 as a reference to check for the correct entries of the table. If there are any inconsistencies, they must be corrected on the source system before performing the export.
If there are inconsistent entries, system copy import fails with an error due to wrong tablespace names for TABARTs USER and USER1 in the Oracle specific tables TAORA and IAORA on the source system. These tables are not checked for consistency on the source system if the source database is not Oracle. This inconsistency in the source system is caused due to the usage of both old and new tablespace layout on the source system.

10. **FI customers:** You can perform an additional consistency check by running the job SAPFI90 before copying the source system, as well as after copying the target system, and then compare the results. Make sure that no customer data is changed in the meantime.
You can do this as follows: Accounting > Financial Accounting > General ledger > Periodic Processing > Closing > Check/count > Comparison

11. **FI customers:** You can further check consistency by running the jobs listed below before copying the source system, as well as after copying the target system, and then compare the results.

   - Caution
Make sure that no customer data is changed in the meantime.

   - RFUMSV00 (tax on sales/purchases)
   - RAGITI01 (asset history sheet)
   - RAZUGA01 (asset acquisitions)
   - RAABGA01 (fixed asset retirements)

12. **BI customers:** If you want to perform a system landscape copy for SAP BW, apply SAP Note 886102.

13. **CO customers:** You can perform an additional consistency check by running the report group 1SIP before copying the source system, as well as after copying the target system, and then compare the results. Make sure that no customer data is changed in the meantime.
Caution

Prerequisites for an export:

Before performing an export, make sure that no incremental conversion is in progress.

To test if an incremental conversion is in progress, run transaction ICNV. If there are any table entries in table TICNV, an incremental conversion is in progress. In this case, you have the following options:

1. Defer the migration until the incremental conversion has finished.
2. Try to finish the incremental conversion by performing the following steps:

   • If the tables are in state For conversion or in state Done, delete the entries by choosing Control Delete Entry.
   • If the tables are in any other state, you have to finish the incremental conversion. Choose Assistant and proceed according to the online documentation.

Caution

Heterogeneous System Copy only:

Before you start the export of your source system, make sure that the tables TATGPC and TATGPCA are empty. To do so, use your database utility and delete the contents of these tables with the following statements:

DELETE from TATGPC
DELETE from TATGPCA

Normally both tables are empty. If you do not delete the contents of these tables, you will encounter problems while importing the data to your target system because of non NULL capable fields in these tables.

14. Make sure that you update the CIM data model in the system landscape directory (SLD) of the source system as described in SAP Note 669669. Otherwise you might get an error during the target system installation (see SAP Note 1840394).

15. Check SAP Note 1410736 to avoid session timeout during the export or import procedure.

3.2 Preparing the Media Required for Performing the Export

For performing the export on the source system, you only need to download and extract the Software Provisioning Manager 1.0 archive which contains the software provisioning manager as such.

For the media required for performing the target system installation, refer to section Preparing the installation Media in the installation guide [page 24] for your operating system platform and database (see also Installing the Target System [page 83]).
The digital signature of media is checked automatically by the software provisioning manager during the Define Parameters phase while processing the Media Browser screens. The software provisioning manager only accepts media whose digital signature has been checked.

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 46]

3.2.1 Downloading and Extracting the Software Provisioning Manager 1.0 Archive

You must always download and extract the Software Provisioning Manager 1.0 archive from the SAP Software Download Center because you must use the latest version.

Prerequisites

- Make sure that you are logged on as a user with root authorizations, and that the download directory has at least the permissions 755.
- Make sure that you use the latest version of the SAPCAR tool when manually extracting the software provisioning manager archive. You need the SAPCAR tool to be able to unpack and verify software component archives (*.SAR files). *.SAR is the format of software lifecycle media and tools that you can download from the SAP Software Download Center.

An older SAPCAR version might extract archive files in a wrong way and this could prevent the software provisioning manager from working consistently.

Proceed as follows to get the latest version of the SAPCAR tool:

1. Go to https://launchpad.support.sap.com/#/softwarecenter SUPPORT PACKAGES & PATCHES By Category SAP TECHNOLOGY COMPONENTS SAPCAR.
2. Select the SAPCAR for your operating system and download it to an empty directory.
3. Even if you have the latest SAPCAR already available, we strongly recommend that you verify its digital signature anyway, unless you downloaded it directly from https://launchpad.support.sap.com/#/softwarecenter/ yourself. You can do this by verifying the checksum of the downloaded SAPCAR tool:
   1. Depending on what operating system you are using, compute a hash of the downloaded SAPCAR tool, using the SHA-256 algorithm used by SAP.
2. Now verify the digital signature of the downloaded SAPCAR tool by comparing the hash with the checksum (generated by SAP using the SHA-256 algorithm) from the Content Info button in the Related Info column on the right-hand side of the place where you downloaded the SAPCAR tool.

4. To improve usability, we recommend that you rename the executable to sapcar.

For more information about SAPCAR, see SAP Note 212876.

- You require the SAPCAR tool to be able to unpack and verify software component archives (*.SAR files).
- *.SAR is the format of software lifecycle media and tools that you can download from the SAP Software Download Center. For more information about how to get this tool, see the Procedure section below.

Context

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPupptool - which were available so far only in the SAPEXEDB_<...>.SAR archive of the kernel media, has now been made available in the software provisioning manager archive (70SWPM10SP<Support Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the 70SWPM10SP<Support Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB_<...>.SAR archive of the kernel media. There is no action required from your side, the software provisioning manager uses the relevant loadtools automatically once you run it from the extracted 70SWPM10SP<Support Package_Number>_<Version_Number>.SAR archive. For more information, see SAP Note 2472835.

Procedure

1. Download the latest version of the Software Provisioning Manager 1.0 archive 70SWPM10SP<Support Package_Number>_<Version_Number>.SAR from:

   https://support.sap.com/sitoolset > System Provisioning > Download Software Provisioning Manager

2. Unpack the Software Provisioning Manager archive to a local directory using the following command:

   <Path to SAPCAR>/sapcar -xvf <Path to Download Directory>/70SWPM10SP<Support Package_Number>_<Version_Number>.SAR <Path to Unpack Directory>

   **Note**

   Make sure that all users have at least read permissions for the directory to which you unpack the software provisioning manager.

   **Caution**

   Make sure that you unpack the Software Provisioning Manager archive to a dedicated folder. Do not unpack it to the same folder as other installation media.
4 Database Independent System Copy

With the software provisioning manager, you can export and import your database in a database-independent format. It uses the **R3load** tool.

**R3load** generates a database export of all SAP objects that are defined in the ABAP Dictionary, including the configuration and components in the file system.

---

**i Note**

Make sure that you have the most recent version of the R3load tool, which you can download from [https://launchpad.support.sap.com/#/softwarecenter/](https://launchpad.support.sap.com/#/softwarecenter/).

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPuptool - which were available so far only in the SAPEXEDB_<...>.SAR archive of the kernel media, has now been made available in the software provisioning manager archive (70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB_<...>.SAR archive of the kernel media. **There is no action required from your side**, the software provisioning manager uses the relevant loadtools automatically once you run it from the extracted 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive. For more information, see SAP Note 2472835.

---

**i Note**

When performing the export, the software provisioning manager creates a migration export medium which contains the data of the exported system, and which you use to install the target system.

---

**Constraints**

**R3load Restrictions**

- The software provisioning manager generates a database dump of all SAP objects that are defined in the ABAP Dictionary (R3load). Other objects are not exported by the software provisioning manager.
- For a consistent database export, no transactions on export-relevant database objects are allowed during the export. Otherwise, the export has to be restarted. Therefore, we recommend that you shut down the SAP system (excluding the database!) for the export. The database must still be running.
- Changes to database objects that cannot be maintained in the ABAP Dictionary (transaction SE14), such as the distribution of tables over several tablespaces or dbspaces, are lost after the system copy.
- Indexes longer than 18 characters are not allowed on the database to be exported.

**Splitting STR Files**

- During the standard system copy process, all tables of the SAP system are grouped into packages, whereby all tables with the same data class belong to the same package. The processing unit for one
unload/load process is a package. The packages usually differ in the number and size of contained tables, resulting in varying unload/load runtimes. The overall runtime can be reduced by creating packages of the same size, that is, creating packages with a similar processing time. You can achieve this by splitting the default packages (one package per data class) into more smaller pieces.

- There are several ways to split packages. For a detailed description of the options, refer to the [F1] help about the parameters prompted on the Split STR Files screen while running the software provisioning manager to export the database. The options can be used separately or – when using the new Java based splitting tool – together.
- “Splitting of STR Files” is part of the “Advanced Export Parameters” and is enabled by default. Using the splitting tool parameters selected by the software provisioning manager is a good starting point if you select the splitting option and you have not performed any tests yet.

⚠️ Caution

If you want to split STR files by the size based option, you must first create the EXT files for the target database system. You can find the EXT files in your export dump directory, subdirectory `DB/<DBTYPE>`, for example `DB/ORACLE`.

If you do not have EXT files, then you can only split by providing tables via input file.

Process Flow

Proceed as described in System Copy Procedure [page 49].

4.1 System Copy Procedure

This section describes the system copy procedure using R3load.

Prerequisites

Specify an empty directory with sufficient disk space for the export dump on the host where you want to perform the export. Make sure that this directory does not contain any files from any previous system copy exports. If you cancelled a system copy export and want to perform the export again, make sure that you remove all files from the previously cancelled export before you start the export from scratch.

Process Flow on the Source System (Export)

When performing the export, the software provisioning manager creates a migration export media which contains the data of the exported system, and which you use to install the target system.

The following figure shows exemplary the export options and their resulting output files.
Overview of Export Options

Follow the sequence of steps described in the process flows below for a:

- Central system
  - Central system – Performing the Export on the Source System
  - Central system – Setting Up the Target System
- Distributed system or high-availability system
  - Distributed system or high-availability system – Performing the Export on the Source System
  - Distributed system or high-availability system – Setting Up the Target System

Central System – Performing the Export on the Source System

To perform the export for a central system, you need to proceed as follows on the central system host:

1. **Heterogeneous system copy:** Generate the migration key at https://support.sap.com/migrationkey. Enter the installation number of your source system when prompted.
2. Perform the export on the **central system host**:
   1. Make sure that the QCM tables are deleted from your system. For more information, see General Technical Preparations [page 42].
   2. Generate DDL statements. For more information, see Generating DDL Statements [page 54].
   3. Prepare the system for table splitting (optional). For more information, see Preparing the Table Split [page 55].
4. You run the software provisioning manager [page 62] to prepare the source system for the export. On the Welcome screen, choose the Export Preparation option.

   **Note**
   You must run this option if you want to perform export processes in parallel with import processes during the system copy. Otherwise this step is optional.

5. You run the software provisioning manager [page 62] to export the database instance and the central instance. On the Welcome screen, choose the option Database Instance Export.

   **Note**
   If R3load processes fail due to an error, solve the problem and perform a restart.

   For more information, see Restarting R3load Processes [page 80].

6. If you want to perform Table Comparison with Software Update Manager (SUM) [page 177] table comparison with the Software Update Manager (SUM), proceed as follows:
   1. Stop all instances of the source system once the export has completed.
   2. Run table comparison [page 179] for the source system.
   3. You can restart the instances of the source system.

**Central System – Setting Up the Target System**

Use the software provisioning manager to set up the target system and import the database files that you have exported from the source system.

   **Note**
   This system copy guide describes only the source system export in full detail. As for the installation of the target system, this system copy guide describes only the system copy-specific steps in section Setting Up the Target System [page 82], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 24].

   In the following, we refer to this guide as “installation guide”.

Perform the following steps on the central system host:

1. Prepare the central system host for the installation of your target system as described in the installation guide [page 24].

2. If you have already prepared the export (for more information, see Preparing Parallel Export and Import [page 57]) on the source system because you want to perform export processes in parallel to import processes, and if you use the FTP Exchange option during the export (transfer type FTP on the SAP System > Data Transfer Parameters for Export screen and communication type Exchange Directory on the SAP System > Communication Parameters for Export screen), make sure that you have transferred the files, which were generated in the preparation step for parallel export and import on the source system.

3. Transfer the export files [page 82] to the central system target host.
4. Install the target system [page 83].

5. If required install additional dialog instances on dialog instance hosts as described in the installation guide [page 24].

**Distributed System or High-Availability System – Performing the Export on the Source System**

To perform the export for a distributed system or a high-availability-system, you need to proceed as follows:

1. **Heterogeneous system copy only**: Generate the migration key at https://support.sap.com/migrationkey. Enter the installation number of your source system when prompted.

2. Perform the export on the database instance host:
   1. Make sure that the QCM tables are deleted from your system. For more information, see General Technical Preparations [page 42].
   2. Generate DDL statements. For more information, see Generating DDL statements [page 54].
   3. You run the software provisioning manager [page 62] to prepare the source system for the export. On the Welcome screen, choose the Export Preparation option.

   **Note**
   
   You must run this option if you want to perform export processes in parallel with import processes during the system copy. Otherwise this step is optional.

4. Prepare the system for table splitting (optional). For more information, see Preparing the Table Split [page 55].

5. You run the software provisioning manager [page 62] to export the database instance. On the Welcome screen, choose the option Database Instance Export. For more information, see Running Software Provisioning Manager [page 62].

   **Note**
   
   If R3load processes fail due to an error, solve the problem and perform a restart. For more information, see Restarting R3load Processes [page 80].

   **Caution**
   
   If your database instance is running on HP PA-Risc, you must proceed as described in SAP Note 884452.

3. If you want to perform Table Comparison with Software Update Manager (SUM) [page 177] table comparison with the Software Update Manager (SUM), proceed as follows:
   1. Stop all instances of the source system once the export has completed.
   2. Run table comparison [page 179] for the source system.
   3. You can restart the instances of the source system.
Distributed System or High-Availability System – Setting Up the Target System

Use the software provisioning manager to set up the target system and import the database files that you have exported from the source system.

**Note**

This system copy guide describes only the source system export in full detail. As for the installation of the target system, this system copy guide describes only the system copy-specific steps in section Setting Up the Target System [page 82], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 24].

In the following, we refer to this guide as “installation guide”.

Perform the following steps on the relevant installation hosts of your target system:

1. Prepare the ASCS instance host, the central instance host and the database instance host for the installation of the corresponding instances of your target system as described in the installation guide [page 24].
2. Install the ASCS instance for the target system as described in the installation guide [page 24].
3. Perform the following steps on the database instance host:
   - If you have already prepared the export (for more information, see Preparing Parallel Export and Import [page 57]) on the source system because you want to perform export processes in parallel to import processes, and if you use the FTP Exchange option during the export (transfer type FTP on the SAP System > Data Transfer Parameters for Export screen and communication type Exchange Directory on the SAP System > Communication Parameters for Export screen), make sure that you have transferred the files, which were generated in the preparation step for parallel export and import on the source system.
   - Transfer the export files [page 82] to the central instance target host.
   - Install the database instance of the target system. For more information, see Installing the Target System [page 83].

**Caution**

Note that after completing the <Product> <Database> System Copy Target System Based on AS ABAP Database Instance option, you must subsequently run the <Product> <Database> System Copy Target System <System_Variant> Based on AS ABAP Central Instance option as well. Otherwise you run the risk that the installed system is in an inconsistent state, because if you do not run the <Product> <Database> System Copy Target System <System_Variant> Based on AS ABAP Central Instance option, some mandatory ABAP reports that are integrated in this option have not been executed in the central instance.

4. On the central instance host, install the central instance of the target system.
5. If required, install additional dialog instances on the dialog instance hosts as described in the installation guide [page 24].
4.1.1 Generating DDL Statements

To migrate nonstandard database objects, you need to generate DDL statements using the ABAP report SMIGR_CREATE_DDL.

Context

You must perform this procedure before starting the software provisioning manager.

⚠️ Caution

**BI Java only:** You must ensure that no further changes (such as, activations, data loads to cubes, or field changes) are executed in the SAP NetWeaver Business Intelligence system after you have called the SMIGR_CREATE_DDL report and before you export the data.

For additional database-specific information, see SAP Note 888210.

Procedure

1. Log on to the system as a system administrator in a productive client.
2. Call transaction SE38 and run the program SMIGR_CREATE_DDL.
3. Select the target database. Depending on the database manufacturer, you might need to select the database version. The value help supports you in selecting the database version. You should only enter a database version that is available in the value help.
4. Select **Unicode Migration** if you also wish to perform a Unicode system copy (from Unicode to Unicode) or a Unicode conversion (from non-Unidec to Unicode).
5. Specify an empty working directory to which the files generated by the report are to be written.
6. If required, you can restrict the generation of DDL statements to specific table types or individual tables.
7. Execute the program.

The DDL statements are generated and written to the specified directory. From there, the software provisioning manager copies them to the `<Export_Dump_Directory>/ABAP/DB` export directory.

If you copy the SQL files directly to the export directory, make sure that they have read access.

⚠️ Caution

If no database-specific objects exist in the database, no SQL files will be generated. As long as the report terminates with status successfully, this is not an error.

ℹ️ Note

Ensure that the user `<sapid>adm` of the **source system** has write access and the user `<sapid>adm` of the **target system** has read access to the directory with the generated SQL files.
4.1.2 Preparing the Table Split

The R3ta or - if the SAP kernel version of the source system is 7.40 or higher - SAPuptool processes large tables. Instead of exporting/importing one table with one R3load process, the table is processed in, for example, 10 entities.

Prerequisites

Context

Each entity can be processed by different R3load processes. The advantages of splitting the tables are:

- Large tables are processed in smaller packages. If the export or import of a table aborts with an error, only the processing of the package where the error occurred has to be repeated and not for the complete table.
- The export and import of one table can be performed in parallel by starting several R3load processes to work on some packages in parallel.
- The export and import has to be performed with the migration monitor when the table splitting feature is used. For more information about the migration monitor, see R3load Procedures Using the migration monitor [page 151].

Restrictions

- Only tables that are described in the SAP dictionary can be split.
- The following tables cannot be split:
  - DDNTF
  - DDNTF_CONV_UC
  - DDNTT
  - DDNTT_CONV_UC
  - DDLOG (is never copied, but created empty in the target system)
  - DDXTT
  - DDXTF
  - DDXTT_CONV_UC
  - DDXTF_CONV_UC
- Parallel data export of a table is supported by all database platforms but not parallel data import. When the target database platform does not support the parallel data import, the migration monitor has to be configured in the way that the data import processes the packages are sequentially. For more information, see Processing Split Tables.
**Procedure**

1. Create a file that contains lines of the form `<table>%<nr_of_splits>` for all tables to be split.

   **Oracle PL/SQL splitter only:** Use the following form:
   `<table>%<nr_of_splits>;<rowid_or_column>`. For more information about the Oracle PL/SQL splitter, see SAP Note 1043380.

2. Start the software provisioning manager as described in Running Software Provisioning Manager [page 62].

3. On the Welcome screen, choose `<Product> <Database> System Copy Source System Based on <Technical_Stack> Table Splitting Preparation`.

4. Follow the instructions on the software provisioning manager screens and enter the requested parameters, including the `<SAPSID>`, the file that contains the split information, the export directory, and the number of parallel R3ta or - if the SAP kernel version of the source system is 7.40 or higher - SAPuptool jobs.

   \[Caution\]
   The specified path to the export directory must not contain blanks!

5. After you have entered all requested input parameters, the software provisioning manager displays the Parameter Summary screen. This screen shows both the parameters that you entered and those that the software provisioning manager set by default. If required, you can revise the parameters before starting the table split.

6. To start the table split, choose **Start**.

   Now the *.WHR files and the whr.txt file are created in the ABAP/DATA subdirectories of the export directory.

   \[Caution\]
   When doing a code page conversion (non-Unicode → Unicode; 4102 ↔ 4103), make sure not to use a `WHERE` condition with the `PAGENO` column included. If the `PAGENO` column is included in the `WHERE` condition, repeat the table splitting – either with different splitting parameters or by defining a suitable column for this table using the R3ta_hints.txt.

7. Check in the export directory `<Export_Dump_Directory>/ABAP/DATA` if*.WHR files and a whr.txt file have been created for all tables that are to be split.

   - If no *.WHR files and no whr.txt file could be produced for some of these tables, create fewer packages for these tables:
     1. Create a new, empty installation directory.
     3. Run the Prepare Table Splitting service again and provide an input file that contains only the missing tables with a lower number of packages for each defined table.

   - If the *.WHR files and an entry in the whr.txt file have been created for the missing tables, merge these results with the results from the first Prepare Table Splitting run:
When using the SAPuptool, you might have a \texttt{NUMBER+1} number of split packages in the end. Therefore, pay attention if special options are used in the \texttt{orderBYP.txt} file for the affected packages. In that case, you have to insert the missing entries in \texttt{orderBYP.txt}.

8. If required, create the temporary index on the tables of the source system to be split.

\textbf{Oracle only}: This is not required if you perform a database export using the Oracle-specific method with the Oracle PL/SQL splitter.

For more information, see paragraph \textit{Creating a Temporary Index}.

\section*{Related Information}

\textit{Processing Split Tables} [page 168]

\subsection*{4.1.3 Preparing Parallel Export and Import}

If you want to perform export processes in parallel to import processes, you have to prepare the source system for the export.

\section*{Context}

The preparation includes the following steps that are required to set up the target database:

\begin{itemize}
  \item Creating the export directory structure
  \item Calculating the size of the target database
  \item Creating database size file \texttt{DBSIZE.XML}
\end{itemize}

\begin{itemize}
  \item Caution
\end{itemize}

Parallel export and import without \textit{Export Preparation} is not supported. If you do not prepare the export, you have to wait for the export results before you can start with the target system setup.

\section*{Procedure}

1. Run the software provisioning manager to perform the \textit{Export Preparation}.

   This step calculates the size of the target system and generates the \texttt{DBSIZE.XML} that is required to set up the target system.

   For more information, see \textit{Exporting the Source System} [page 58].

2. Share or transfer the complete export directory with its structure and the generated \texttt{DBSIZE.XML} file to the target host.
If you transfer the export directory instead of sharing it, make sure that you transfer it while you are processing the Database Instance Export option, after you have stopped the source system and before you proceed with the export procedure.

For more information, see Exporting the Source System [page 58] and Transferring the Export Files to the Target Host [page 82].

Related Information

About the Migration Monitor [page 151]

4.1.4 Exporting the Source System

Here you can find information about how to run the software provisioning manager to perform the export on the source system.

For more information about the overall sequence of steps required for exporting the source system, see System Copy Procedure [page 49].

Related Information

Prerequisites for Running Software Provisioning Manager [page 58]
Running Software Provisioning Manager [page 62]

4.1.4.1 Prerequisites for Running Software Provisioning Manager

Make sure you fulfil the following prerequisites before running the software provisioning manager.

• For the SL-UI, make sure that the following web browser requirements are met:
  • You have one of the following supported browsers on the device where you want to run the SL-UI:
    • Google Chrome (recommended)
    • Mozilla Firefox
    • Microsoft Edge
    • Microsoft Internet Explorer 11 or higher.
    Always use the latest version of these web browsers.
  • If you copy the SL-UI URL manually in the browser window, make sure that you open a new Web browser window in private browsing mode (Internet Explorer), incognito mode (Chrome) or private browsing mode (Firefox). This is to prevent Web browser plugins and settings from interfering with the SL-UI.
### Caution

The software provisioning manager uses a self-signed certificate, which is used temporarily only while the software provisioning manager is running. This certificate is not trusted by the browser unless it is imported manually by the user running the software provisioning manager. This behavior is intentionally designed in this way because - unlike ordinary public web servers - the software provisioning manager has different usage patterns. You must configure your browser to trust the self-issued certificate of the software provisioning manager after carefully performing the “thumbprint” verification described in Running Software Provisioning Manager [page 62]. For more information about adding trusted certificates, see the documentation of your browser.

For more information about the SL-UI, see Useful Information About Software Provisioning Manager [page 67].

- The software provisioning manager uses shell scripts to obtain the environment for user `<sapsid>adm`.
  - If user `<sapsid>adm` does not yet exist, a working `/bin/csh` must be available on the host where you run the software provisioning manager. For more information about recommended login shells, see SAP Note 202227.
  - If `<sapsid>` already exists and uses `csh`, before you start the software provisioning manager, execute the following command as user `<sapsid>` to make sure that the `csh` scripts are up-to-date, depending on your UNIX OS platform:
    ```
    /bin/csh -c "source /home/<sapsid>/adm/.cshrc;env" or /bin/csh -c "source /home/<sapsid>/adm/.login;env"
    ```
- Check the value of the environment variable `TEMP`, `TMP`, or `TMPDIR`:

<table>
<thead>
<tr>
<th>Shell Used</th>
<th>Command</th>
</tr>
</thead>
</table>
| Bourne shell (sh) | `TEMP=<Directory>
                   export TEMP`             |
| C shell (csh)   | `setenv TEMP <Directory>       `                                      |
| Korn shell (ksh)| `export TEMP=<Directory>      `                                      |

- Make sure that your operating system does not delete the contents of the temporary directory `/tmp` or the contents of the directories to which the variable `TEMP`, `TMP`, or `TMPDIR` points – for example, by using a `crontab` entry.
- Make sure that you have at least 700 MB of free space in the installation directory for each installation option. In addition, you need 700 MB free space for the software provisioning manager executables. If you cannot provide 700 MB free space in the temporary directory, you can set one of the environment variables `TEMP`, `TMP`, or `TMPDIR` to another directory with 700 MB free space for the software provisioning manager executables.

You can set values for the `TEMP`, `TMP`, or `TMPDIR` environment variable to an alternative installation directory as described in section Useful Information About Software Provisioning Manager [page 67].
Some tools such as jsplitter may create files while the software provisioning manager is running. The required free space in the /tmp directory depends on the amount of databases which you intend to unload.

• Make sure that the temporary directory has the permissions 755.

• Make sure that umask is set to 022 for the user with root permissions that you want to use for running the software provisioning manager.

As this user, enter the following command: `umask 022`

• Only valid for ‘Platform’: AIX

  AIX: Make sure that you have set the limits for operating system users as described in SAP Note 323816.

End of ‘Platform’: AIX

• Only valid for ‘Platform’: HP-UX, Linux, Oracle Solaris

  Linux: On Linux, starting with SLES 15, RHEL 8 and Oracle Linux 8, and respective recent SAP kernel patch levels, there’s native integration into systemd. In this case, limits for operating system users root, <sapsid>adm, and your database-specific operating system users do not need to be set any longer. Make sure that polkit is installed. systemd requires polkit for authorization checks for the <sapsid>adm user. For older Linux versions and SAP kernel patch levels, however, you must still set these limits. For more information about how to proceed for older Linux versions, see the following instructions. For more information about Linux with systemd and the relevant SAP kernel patch levels, see SAP Note 3139184.

  HP-UX, Oracle-Solaris, Linux (versions lower than SLES 15, RHEL 8 and Oracle Linux 8 or lower SAP kernel patch levels): Make sure that you have set the limits for operating system users root, <sapsid>adm, and your database-specific operating system users.

⚠️ Caution

Caution: the limit mechanism supports hard- and soft-limits. The soft-limit cannot be bigger than the hard-limit. The hard-limit can be set/increased by the root user like: `limit -h <limit> <new_value>`, for example `limit -h datasize unlimited`.

• Using csh shell, the output of command `limit` needs to be at least as follows:

<table>
<thead>
<tr>
<th>Output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cputime</td>
<td>unlimited</td>
</tr>
<tr>
<td>filesize</td>
<td>unlimited</td>
</tr>
<tr>
<td>datasize</td>
<td>unlimited</td>
</tr>
<tr>
<td>stacksize</td>
<td>8192 KB</td>
</tr>
<tr>
<td>coredumpsize</td>
<td>unlimited</td>
</tr>
</tbody>
</table>
Using `sh` or `ksh` shell, the output of command `ulimit -a` needs to be at least as follows:

**Example**

The following table lists example output taken from SUSE Linux Enterprise Server 15 (x86_64).

<table>
<thead>
<tr>
<th>Output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>descriptors</td>
<td>8192</td>
</tr>
<tr>
<td>memoryuse</td>
<td>unlimited</td>
</tr>
</tbody>
</table>

- Make sure that the following ports are not used by other processes:
  - Port 4237 is used by default as HTTPS port for communication between the software provisioning manager and the SL-UI. If this port cannot be used, you can assign a free port number by executing `sapinst` with the following command line parameter:
    
    ```
    SAPINST_HTTPS_PORT=<Free Port Number>
    ```
  
  - Port 4239 is used by default for displaying the feedback evaluation form at the end of the software provisioning manager processing. The filled-out evaluation form is then sent to SAP using HTTPS. If this port cannot be used, you can assign a free port number by executing `sapinst` with the following command line parameter:
    
    ```
    SAPINST_HTTP_PORT=<Free Port Number>
    ```

- If you want to perform the export in unattended mode, see System Provisioning Using an Input Parameter File [page 69] which describes an improved procedure using `inifile.params`.

- Specify an empty directory with sufficient disk space for the export dump on the host where you want to perform the export. Make sure that this directory does not contain any files from any previous system copy exports. If you cancelled a system copy export and want to perform the export again, make sure that you remove all files from the previously cancelled export before you start the export from scratch.
• Make sure that you shut down all SAP Application Servers before the export. The database must still be running. Otherwise, the target system might be inconsistent.

4.1.4.2 Running Software Provisioning Manager

This section describes how to run the software provisioning manager to perform the export for system copy.

Prerequisites

For more information, see Prerequisites for Running Software Provisioning Manager [page 58].

Context

The software provisioning manager has a web browser-based GUI named “SL-UI of the software provisioning manager” - “SL-UI” for short.

This procedure describes an installation where you run the software provisioning manager and use the SL-UI, that is you can control the processing of the software provisioning manager from a browser running on any device.

For more information about the SL-UI, see Useful Information About Software Provisioning Manager [page 67].

Procedure

1. Log on to the host where you want to run the software provisioning manager.

   Make sure that you log on as a user with root permissions.

   △ Caution
   Make sure that this user has not set any environment variables for a different SAP system or database.

   △ Caution
   Do not use an existing <sapsid>adm user or built-in administrator.

   If your security policy requires that the person running the software provisioning manager is not allowed to know the credentials of a user with root permissions on the host where the software provisioning manager is to perform the export, you can specify another operating system user for authentication purposes. You do this using the SAPINST_REMOTE_ACCESS_USER parameter when starting the sapinst executable from the command line. You have to confirm that the user is a trusted one. For more information, see SAP Note 1745524.
2. Make the required media available.

For more information, see Preparing the Media Required for Performing the Export [page 45].

→ Recommendation

Make the installation media available locally. For example, if you use Network File System (NFS), reading from media mounted with NFS might fail.

Only valid for ‘Platform’: Oracle Solaris

i Note
If you mount installation media, make sure that you do this with option nomapcase.

End of ‘Platform’: Oracle Solaris

3. Start the software provisioning manager as follows:

Open a command prompt and enter the following command:

```bash
/<Path_To_Unpack_Directory>/sapinst
```

The software provisioning manager GUI starts automatically by displaying the Welcome screen.

i Note
If you want to use a virtual host name, start the software provisioning manager with the software provisioning manager property SAPINST_USE_HOSTNAME as follows:

```bash
/<Path_To_Unpack_Directory>/sapinst SAPINST_USE_HOSTNAME=<Virtual_Host_Name>
```

△ Caution

Make sure that the installation directory is not mounted with NFS, or there might be problems when starting the Java Virtual Machine.

4. The software provisioning manager now starts and waits for the connection with the SL-UI.

You can find the URL you require to access the SL-UI at the bottom of the shell from which you are running the software provisioning manager.

```
...    
  ************************************************************
  Open your browser and paste the following URL address to access the GUI
  https://[<hostname>]:4237/sapinst/docs/index.html
  Logon users: [<users>]
  ************************************************************
  ...
```

i Note
If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:

1. Terminate the software provisioning manager as described in Useful Information About Software Provisioning Manager [page 67].
2. Restart the software provisioning manager from the command line with the SAPINST_GUI_HOSTNAME=<hostname> property.
You can use a fully-qualified host name.

If you have a supported web browser (see Prerequisites for Running Software Provisioning Manager [page 58]) installed on the host where you run the software provisioning manager, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

⚠️ Caution

After opening the browser URL, make sure that the URL in the browser starts with “https://” to avoid security risks such as SSL stripping.

Before you reach the Welcome screen, your browser warns you that the certificate of the sapinst process on this computer could not be verified.

Proceed as follows to avoid security risks such as a man-in-the-middle attack:

1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the software provisioning manager.

Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the software provisioning manager console:

1. Go to the sapinst_exe.xxxxxx.xxxx directory in the temporary directory to which the software provisioning manager has extracted itself:
   `<User_Home>/sapinst/

2. In the sapinst_exe.xxxxxx.xxxx directory, execute the sapgenpse tool with the command line option get_my_name -p.
As a result, you get the server fingerprint or thumbprint from the server certificate.
3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

The SL-UI opens in the browser by displaying the Welcome screen.

5. On the Welcome screen, choose <Product> Software Life-cycle Options > System Copy
   <Database> Source System Export > <Distribution Option> Based on AS ABAP

Select the corresponding system copy option from the tree structure according to the sequence of the process flow for the database-independent system copy procedure [page 48].

ℹ️ Note

Do not perform these steps if you use a database-specific method (see Database-Specific System Copy [page 87]).

ℹ️ Note

Products with the addition “SAP internal only” are only for SAP internal purposes and may not be used outside of this purpose.

6. Choose Next.
If there are errors during the self-extraction process of the software provisioning manager, you can find the log file `dev_selfex.out` in the temporary directory.

7. Follow the instructions in the software provisioning manager input screens and enter the required parameters.

To find more information on each parameter during the Define Parameters phase, position the cursor on the required parameter input field, and choose either F1 or the HELP tab. Then the available help text is displayed in the HELP tab.

IBM Db2 for Linux, UNIX, and Windows only: When you are asked for the security administrator, enter a user that has `DB2 SECADM` authorities. By default, `db2<dbsid source>` has these authorities.

Caution

The digital signature of media is checked automatically during the Define Parameters phase while processing the Media Browser screens.

Keep in mind that this automatic check is only committed once and not repeated if you modify artefacts such as SAR archives or files on the media after the initial check has been done. This means that - if you modify artefacts later on either during the remaining Define Parameters phase or later on during the Execute Service phase - the digital signature is not checked again.

See also the description of this new security feature in SAP Note 2393060.

8. After you have entered all requested input parameters, the software provisioning manager displays the Parameter Summary screen. This screen shows both the parameters that you entered and those that the software provisioning manager set by default.

If required, you can revise the parameters before starting the export procedure.

9. To start the execution, choose Next.

The software provisioning manager starts the export and displays its progress of the system copy export during the processing phase.

10. If required, delete directories with the name `sapinst_exe.xxxxxx.xxxx` after the software provisioning manager has finished. Sometimes these remain in the temporary directory.

If there are errors with the software provisioning manager extraction process, you can find the log file `dev_selfex.out` in the temporary directory.

Recommendation

Keep all software provisioning manager directories until you are sure that the system, including all instances, is completely and correctly installed. Once the system is completely and correctly installed, make a copy of the software provisioning manager directories with all their contents. Save the copy to
11. If you copied installation media to your hard disk, you can delete these files when the software provisioning manager has successfully completed.

12. For security reasons, we recommend that you delete the .sapinst directory within the home directory of the user with which you ran the software provisioning manager:

<User_Home>/sapinst/

13. For security reasons, we recommend that you remove the operating system users from the group sapinst after you have completed the installation.

\[\text{Note}\]

This step is only required, if you did not specify during the Define Parameters phase that the operating system users are to be removed from the group sapinst after the execution of the software provisioning manager has completed.

14. The software provisioning manager log files contain IP addresses and User IDs such as the ID of your S-User. For security, data protection, and privacy-related reasons we strongly recommend that you delete these log files once you do not need them any longer.

You find the software provisioning manager log files in the sapinst_instdir directory. For more information, see Useful Information About Software Provisioning Manager [page 67].

Related Information

Useful Information About Software Provisioning Manager [page 67]
Restarting Interrupted Processing of Software Provisioning Manager [page 74]
Troubleshooting with Software Provisioning Manager [page 77]

4.1.4.3 Additional Information about Software Provisioning Manager

The following sections provide additional information about the software provisioning manager.

Useful Information About Software Provisioning Manager [page 67]
This section contains some useful technical background information about the software provisioning manager and the software provisioning manager’s SL-UI.

System Provisioning Using an Input Parameter File [page 69]
Provisioning with software provisioning manager, for example installation, of SAP systems in unattended mode with an input parameter file.
Restarting Interrupted Processing of Software Provisioning Manager [page 74]
Here you find information about how to restart the software provisioning manager if its processing has been interrupted.

Troubleshooting with Software Provisioning Manager [page 77]
This section tells you how to proceed when errors occur while the software provisioning manager is running.

Troubleshooting during the Export Process [page 78]
If the export process aborts during the Execute Service phase (for example, due to a hardware failure, such as power outage, operating system crash, file system full), you have to repeat the export of the complete package.

Using the Step State Editor (SAP Support Experts Only) [page 79]
This section describes how to use the Step State Editor available in the software provisioning manager.

4.1.4.3.1 Useful Information About Software Provisioning Manager

This section contains some useful technical background information about the software provisioning manager and the software provisioning manager’s SL-UI.

- The software provisioning manager has a framework named “SAPinst”. For more information about the current SAPinst Framework version and its features, see SAP Note 3207613 (SAPinst Framework 753 Central Note).

- The software provisioning manager has the web browser-based “SL-UI of the software provisioning manager” - “SL-UI” for short. The SL-UI uses the SAP UI Development Toolkit for HTML5 - also known as SAPUI5 - a client-side HTML5 rendering library based on JavaScript. The benefits of this new user interface technology for the user are:
  - Zero footprint, since only a web browser is required on the client
  - New controls and functionality, for example, view logs in web browser.
As of version 1.0 SP24 Patch Level (PL) 5, the software provisioning manager comes with a new look and feel of the SL-UI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/.

The SL-UI connects the web browser on a client with the sapinst executable - which is part of software provisioning manager - running on the installation host using the standard protocol HTTPS. For the SL-UI the software provisioning manager provides a pre-generated URL at the bottom of the shell from which you are running the software provisioning manager. If you have a supported web browser installed on the host where you run the software provisioning manager, you can start the SL-UI directly from this URL. Otherwise, open a web browser supported by the SL-UI on any device and run the URL from there.

For more information about supported web browsers see Prerequisites for Running Software Provisioning Manager [page 58].

If you need to run the SL-UI in accessibility mode, apply the standard accessibility functions of your web browser.
As soon as you have started the sapinst executable, the software provisioning manager creates a .sapinst directory underneath the /home/<User> directory where it keeps its log files. <User> is the user with which you have started the software provisioning manager.

After you have reached the Welcome screen and selected the relevant software provisioning manager option for the SAP system to be exported, the software provisioning manager creates a directory sapinst_instdir where it keeps its log files, and which is located directly below the temporary directory. The software provisioning manager finds the temporary directory by checking the value of the TEMP, TMP, or TMPDIR environment variable. If no value is set for these variables, the software provisioning manager uses /tmp by default.

All log files which have been stored so far in the .sapinst folder are moved to the sapinst_instdir directory as soon as the latter has been created.

If you want the sapinst_instdir directory to be created in another directory than /tmp, set the environment variable TEMP, TMP, OR TMPDIR to this directory before you start the software provisioning manager.

<table>
<thead>
<tr>
<th>Shell Used</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bourne shell (sh)</td>
<td>TEMP=&lt;Directory&gt;</td>
</tr>
<tr>
<td></td>
<td>export TEMP</td>
</tr>
<tr>
<td>C shell (csh)</td>
<td>setenv TEMP &lt;Directory&gt;</td>
</tr>
<tr>
<td>Korn shell (ksh)</td>
<td>export TEMP=&lt;Directory&gt;</td>
</tr>
</tbody>
</table>

⚠️ Caution

Make sure that the installation directory is not mounted with NFS, or there might be problems when the Java Virtual Machine is started.

The software provisioning manager records its progress in the keydb.xml file located in the sapinst_instdir directory. Therefore, if required, you can continue with the software provisioning manager from any point of failure, without having to repeat the already completed steps and without having to reenter the already processed input parameters. For security reasons, a variable encryption key is generated as soon as the sapinst_instdir directory is created by the software provisioning manager. This key is used to encrypt the values written to the keydb.xml file.

➡️ Recommendation

We recommend that you keep all installation directories until the system is completely and correctly installed.

• The software provisioning manager extracts itself to a temporary directory called sapinst_exe.xxxxxx.xxxx, which is located in the environment variables TEMP, TMP, OR TMPDIR. These files are deleted after the software provisioning manager has stopped running.

The temporary directory sapinst_exe.xxxxxx.xxxx sometimes remains undeleted. You can safely delete it.

The temporary directory also contains the log file dev_selfex.out from the self-extraction process of the software provisioning manager, which might be useful if an error occurs.
Caution

If the software provisioning manager cannot find a temporary directory, the installation terminates with the error FCO-00058.

- To see a list of all available software provisioning manager properties (command line options) and related documentation, start the software provisioning manager with command line parameter `-p`:
  ```bash
  ./sapinst -p
  ```
- If you want to perform the export in unattended mode, see System Provisioning Using an Input Parameter File [page 69] which describes an improved procedure using inifile.params.
- Before starting the export, make sure that you have at least the same amount of disk space available in `/sapmnt/<SAPSID>/<Instance_Name>/<SAPSID>/program` as is used in `/sapmnt/<SAPSID>/<Instance_Name>/<SAPSID>/root/origin`. During the export, some archives are written to the program subdirectories and the tool aborts if there is not enough space.
- If required, stop the software provisioning manager by choosing the Cancel button.

Note

If you need to terminate the software provisioning manager, press `Ctrl + C`.

4.1.4.3.2 System Provisioning Using an Input Parameter File

Provisioning with software provisioning manager, for example installation, of SAP systems in unattended mode with an input parameter file.

Prerequisites

Provisioning of SAP systems can also be done in unattended mode without the user interface of software provisioning manager. This means that, after inserting the required parameters into a parameter-file and running the sapinst executable by providing the path to this parameter-file, the installation will run in the background and no further user interaction is required.

Context

This section describes the steps that you need to execute in addition to the procedure described in this guide, when running software provisioning manager in unattended mode using an input parameter file.

Since the new Web-based SL-UI (see Useful Information About Software Provisioning Manager [page 67]) was introduced in 2017 there are two ways to run the unattended mode: “observer mode” and “non-observer mode”.
Observer Mode

If you are running an installation in unattended mode but you are sitting in front of the screen, you might want to check the progress from time to time. In this case the “observer mode” makes sense.

Start the installation as described below in the Solution section, using the following parameters:

```
SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
SAPINST_SKIP_DIALOGS=true
```

The software provisioning manager will start the installation in the background AND start a Web Dispatcher and provide an URL to access the SL-UI. The user who has started the installation can now connect to the URL and observe the progress of the installation, for example to look at the logfiles in the Web browser. However, all parameters will be taken from the input parameter file and can not be changed in the Web browser.

Non-Observer Mode

Choose that mode if you want to run a “scripted” or by other means automated scenario, for example overnight. In that case it is crucial that the process is started without a Web Dispatcher and therefore without the software provisioning manager’s SL-UI. Otherwise, the automation could be stuck if software provisioning manager encounters a situation that requires user interaction.

Start the installation as described below in the Solution section, using the following parameters (use the same parameters like for Observer Mode, but provide `SAPINST_START_GUISERVER=false` in addition):

```
SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
SAPINST_SKIP_DIALOGS=true
SAPINST_START_GUISERVER=false
```

This will start the installation but this time NO Web Dispatcher will be started and no URL to access the SL-UI will be provided either. So the user can not follow the processing of the installation in a Web browser and the installation will run completely in the background.

If the process runs into an error, the software provisioning manager will abort and you have to check for the reason in the log files.

Restrictions

In exceptional cases, parameters prompted or displayed in the Software Provisioning Manager UI are not maintainable in the input parameter file. If one of those parameters, that are only available in the UI mode of the Software Provisioning Manager, is needed for your unattended installations, you should create a ticket in the best fitting component below BC-INS to get the issue analyzed.

Must Know about the Input Parameter File

- The input parameter file only contains values that you entered in the software provisioning manager’s SL-UI.
- With the SAPinst 749.0.69 or by other means patch we provide a better encryption of passwords in software provisioning manager files:

  If the input parameter file has parameters which are encrypted with Des25 encryption, the `instkey.pkey` file available in the installation directory contains the key for the encryption. The `instkey.pkey` file must be always located in the same directory as the input parameter file and is used to decrypt the values of the encrypted parameters. If you need to copy an input parameter file to another directory, you must also copy the `instkey.pkey` file to this directory.
• Not explicitly set parameters are documented as comments in the generated input parameter file.
• Each parameter has got a documentation assigned as a comment on top.

Example

Example for a parameter that is not used and therefore commented out:

```java
# Specify whether software provisioning manager is to drop the schema if it exists. <= Documentation
# HDB_Schema_Check_Dialogs.dropSchema = false
```

Example

Example for a parameter that is used:

```java
# The name of the database schema. <= Documentation
HDB_Schema_Check_Dialogs.schemaName = SAPABAP2
```

• You have to manually provide the media information, using the following convention:

```java
SAPINST.CD.PACKAGE.<unique_media_name>=<location>
```

• For each media location you must manually insert a dedicated line in your input parameter file. The software provisioning manager does not automatically take over the media locations you entered while processing the Media Browser dialog.
• For `<media_name>` you can choose any value, but the `<location>` must be unique.
• To find out the required media entries, open the summary.html file which you can find in the installation directory and go to the Dialog "Media" section.
• Make sure that you enter the full paths to all required media, relative paths are not sufficient.

Example

Example on UNIX:

```java
SAPINST.CD.PACKAGE.KERNEL = /mnt/KERNEL
SAPINST.CD.PACKAGE.LOAD = /mnt/LOAD
SAPINST.CD.PACKAGE.RDBMS = /mnt/RDBMS
```

Example

Example on Windows:

```java
SAPINST.CD.PACKAGE.KERNEL = C:\sapdvds\KERNEL
SAPINST.CD.PACKAGE.LOAD = C:\sapdvds\LOAD
SAPINST.CD.PACKAGE.RDBMS = C:\sapdvds\RDBMS
```

• If one media contains several subfolders, you can specify it in one of the following ways:

Example

The SAP Export DVDs/media:

```java
Installation Master /usr/local/TESI/SWPM/slinst_d_stream/
IM_OS400_PPC64
Installation Export NW73 (folder EXP1) /sapmnt/mediaserver2/arch04_6/51042309/DATA_UNITS/EXP1
```
• By specifying each subfolder:

SAPINST.CD.PACKAGE.ExportNW73EXP1=/sapmnt/mediaserver2/arch04_6/51042309/DATA_UNITS/EXP1
SAPINST.CD.PACKAGE.ExportNW73EXP2=/sapmnt/mediaserver2/arch04_6/51042309/DATA_UNITS/EXP3
SAPINST.CD.PACKAGE.ExportNW73EXP3=/sapmnt/mediaserver2/arch04_6/51042309/DATA_UNITS/EXP3

• By specifying only the root-folder:

SAPINST.CD.PACKAGE.ExportNW73=/sapmnt/mediaserver2/arch04_6/51042309

• **Restriction:** Currently you can only specify complete media, not paths to single files like *.SAR archives.

• When performing a system copy, you need to add one additional media path:

SAPINST.CD.PACKAGE.MIGRATION1 = <full path to ABAP Export media>

• **Caution:**

If you want to use archives for your installation, you must copy all files that are to be used to a single directory. In the input parameter file you must specify this directory as a download basket, using the archives.downloadBasket parameter. Make sure that there is only one version of the same archive in the directory, for example SAPEXE_<Version>.SAR

### Procedure

1. You plan and prepare the run as described in Planning [page 26] and Preparations [page 42].
2. Create your input parameter file as follows:
   1. Start software provisioning manager as described in Running Software Provisioning Manager [page 62].
   2. Choose the option you want to run, and follow the instructions on the screens by entering all parameter values.
   3. Stop after the **Parameter Summary** screen has been displayed.
   4. Find the input parameter file named “inifile.params” in the installation directory.
      • In the same directory, you will also find the instkey.pkey file with the keys for the encrypted parameters. For more information, see Must Know about the Input Parameter File above.
      • In the same directory, you will also find the summary.html file with the required media locations. For more information, see Must Know about the Input Parameter File above.
3. If required, you can rename the “inifile.params” file as you wish.
4. Adjust the values of the input parameter file as follows:
   1. Edit your input parameter file and modify the parameters according to your needs.
2. Add required media or archives information line by line.

4. Identify the Product-ID:
   • To start in unattended mode, you need to know the component ID for the option that are required for your provisioning scenario.
     Proceed as follows:
     1. Open the sapinst_dev.log in the installation directory.
     2. Check for the “product-id”

   [Example]
   ```
   product-id=NW_ABAP_ASCS:NW750.ADA.ABAP
   ```

   • Alternatively, you can check the header of the generated input parameter file.

   [Example]
   ```
   product id 'NW_ABAP_ASCS:NW750.ADA.ABAP'
   ```

5. Run the software provisioning manager [page 62] with the parameters required for unattended mode:
   • Make sure that the instkey.pkey file with the keys for the encrypted parameters is available in the same directory as the input parameter file. Otherwise the encrypted parameters cannot be decrypted.
     For more information, see Must Know about the Input Parameter File above.

   • In observer mode: Start the sapinst executable from an empty directory with the following parameters:

     ```
     SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
     SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
     SAPINST_SKIP_DIALOGS=true
     ```

   • In non-observer mode: Start the sapinst executable from an empty directory with the following parameters:

     ```
     SAPINST_INPUT_PARAMETERS_URL=<path_to_your_parameterfile>
     SAPINST_EXECUTE_PRODUCT_ID=<product-id for the installation>
     SAPINST_SKIP_DIALOGS=true
     SAPINST_START_GUISERVER=false
     ```

6. After software provisioning manager has completed, perform follow-up activities as described in Follow-Up Activities [page 135].

**Related Information**

SAP Note 2230669 Provisioning with software provisioning manager - for example installation - of SAP systems in unattended mode with an input parameter file.
SAP Note 2849054 Software Update Manager Automation with software provisioning manager.
SAP Note 2742212 Unattended installation fails with "Empty directory name is not allowed." message.
SAP Note 2626837 'isUnicode': Radio group contains an invalid value ''. Valid values are: false|true.
SAP Note 2669183 ASCS installation failure with Software Provisioning Manager unattended mode (Non-Observer mode).
4.1.4.3.3 Restarting Interrupted Processing of Software Provisioning Manager

Here you find information about how to restart the software provisioning manager if its processing has been interrupted.

Context

The processing of the software provisioning manager might be interrupted for one of the following reasons:

- An error occurred during the Define Parameters or Execute phase:
  The software provisioning manager does not abort the installation in error situations. If an error occurs, the installation pauses and a dialog box appears. The dialog box contains a short description of the choices listed in the table below as well as a path to a log file that contains detailed information about the error.

- You interrupted the processing of the software provisioning manager by choosing Cancel in the SL-UI.

⚠️ Caution

If you stop an option in the Execute phase, any system or component installed by this option is incomplete and not ready to be used. Any system or component uninstalled by this option is not completely uninstalled.

The following table describes the options in the dialog box:

<table>
<thead>
<tr>
<th>Option</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Retry  | The software provisioning manager retries the installation from the point of failure without repeating any of the previous steps.  
This is possible because the software provisioning manager records its progress in the keydb.xml file.  
We recommend that you view the entries in the log files, try to solve the problem, and then choose Retry.  
If the same or a different error occurs, the software provisioning manager displays the same dialog box again. |
| Stop   | The software provisioning manager stops the installation, closing the dialog box and the software provisioning manager’s SL-UI.  
The software provisioning manager records its progress in the keydb.xml file.  
Therefore, you can continue with the software provisioning manager from the point of failure without repeating any of the previous steps. See the procedure below. |
| Continue | The software provisioning manager continues the installation from the current point. |
| View Log | Access installation log files. |
The following procedure describes the steps to restart an installation, which you stopped by choosing Stop, or to continue an interrupted installation after an error situation.

**Procedure**

1. Log on to the installation host as a user with the required permissions as described in Running Software Provisioning Manager [page 62].
2. Make sure that the media required for the export are still available.
   
   For more information, see Preparing the Media Required for Performing the Export [page 45].

   **Recommendation**
   
   Make the installation media available **locally**. For example, if you use remote file shares on other Windows hosts, CIFS shares on third-party SMB-servers, or Network File System (NFS), reading from media mounted with NFS might fail.

   **Note**
   
   Oracle Solaris: If you mount installation media, make sure that you do this with option nomapcase.

3. Restart the software provisioning manager from the directory to which you unpacked the Software Provisioning Manager archive by executing the following command:

   `<Path_To_Unpack_Directory>/sapinst`

4. The software provisioning manager is restarting.

   You can find the URL you require to access the SL-UI at the bottom of the shell from which you are running the software provisioning manager.

   ```
   ************************************************************************
   Open your browser and paste the following URL address to access the GUI
   https://[<hostname>]:4237/sapinst/docs/index.html
   Logon users: [<users>]
   ************************************************************************
   ```

   **Note**
   
   If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:
   
   1. Terminate the software provisioning manager as described in Useful Information About Software Provisioning Manager [page 67].
   2. Restart the software provisioning manager from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
      
      You can use a fully-qualified host name.
If you have a supported web browser (see Prerequisites for Running Software Provisioning Manager [page 58]) installed on the host where you run the software provisioning manager, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

⚠️ Caution

After opening the browser URL, make sure that the URL in the browser starts with "https://" to avoid security risks such as SSL stripping.

Before you reach the Welcome screen, your browser warns you that the certificate of the sapinst process on this computer could not be verified.

Proceed as follows to avoid security risks such as a man-in-the-middle attack:

1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the software provisioning manager.

Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the software provisioning manager console:

1. Go to the sapinst.exe.xxxxxx.xxxx directory in the temporary directory to which the software provisioning manager has extracted itself:
   `<User_Home>/sapinst/

2. In the sapinst.exe.xxxxxx.xxxx directory, execute the sapgenpse tool with the command line option `get_my_name -p`.

As a result, you get the server fingerprint or thumbprint from the server certificate.

3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

The SL-UI opens in the browser by displaying the Welcome screen.

5. From the tree structure on the Welcome screen, select the installation option that you want to continue and choose Next.

The What do you want to do? screen appears.

6. On the What do you want to do? screen, decide between the following alternatives and continue with Next:
### Alternative Behavior

**Perform a new run**

The software provisioning manager does not continue the interrupted export for system copy option. Instead, it moves the content of the old software provisioning manager directory and all software provisioning manager-specific files to a backup directory. Afterwards, you can no longer continue the old option.

The following naming convention is used for the backup directory:

$log_{<Day>}_{<Month>}_{<Year>}_{<Hours>}_{<Minutes>}_{<Seconds>}$

#### Example

$log_{01\_Oct\_2016\_13\_47\_56}$

#### Note

All actions taken by the export for system copy before you stopped it (such as creating directories or users) are not revoked.

#### Caution

The software provisioning manager moves all the files and folders to a new log directory, even if these files and folders are owned by other users. If there are any processes currently running on these files and folders, they might no longer function properly.

**Continue with the existing one**

The software provisioning manager continues the interrupted export for system copy from the point of failure.

### 4.1.4.3.4 Troubleshooting with Software Provisioning Manager

This section tells you how to proceed when errors occur while the software provisioning manager is running.

#### Context

If an error occurs, the software provisioning manager:

- Stops processing
- Displays a dialog informing you about the error
Procedure

1. Check SAP Note 3207613 (SAPinst Framework 753 Central Note) for known software provisioning manager issues.

2. If an error occurs during the Define Parameters or the Execute Service phase, do one of the following:
   - Try to solve the problem:
     - To check the software provisioning manager log files (sapinst.log and sapinst_dev.log) for errors, choose the LOG FILES tab.
     - Note: The LOG FILES tab is only available if you have selected on the Welcome screen the relevant software provisioning manager option for the SAP system to be exported. If you need to access the log files before you have done this selection, you can find them in the .sapinst directory underneath the /home/<User> directory, where <User> is the user that you used to start the software provisioning manager. For more information, see Useful Information About Software Provisioning Manager [page 67].
     - To check the log and trace files of the software provisioning manager’s SL-UI for errors, go to the directory <User_Home>/.sapinst/
     - Then continue by choosing Retry.
     - If required, abort the software provisioning manager by choosing Cancel in the tool menu and restart the software provisioning manager. For more information, see Restarting Interrupted Processing of Software Provisioning Manager [page 74].
   - If you cannot resolve the problem, report an incident using the appropriate subcomponent of BC-INS*.
     - For more information about using subcomponents of BC-INS*, see SAP Note 1669327.

3. If the export process aborts during the Execute Service phase (for example, due to a hardware failure, such as power outage, operating system crash, file system full), you have to repeat the export of the complete package.

4.1.4.3.5 Troubleshooting during the Export Process

If the export process aborts during the Execute Service phase (for example, due to a hardware failure, such as power outage, operating system crash, file system full), you have to repeat the export of the complete package.

Procedure

- System Copy – export (common issues)
  a. Remove the <Package>.<nnn> dump files, the <Package>.TOC file, and the <Package>.log file.
  b. Make sure that all tables in the <Package>*.TSK* file have the status flag xeq or err set.
  c. Repeat the export of the complete package.

- System Copy – export on UNIX (especially for upgraded systems)
Symptom:
Processes started under the OS users `<sapsid>adm` or `<oradb)dbsid>` cannot create or open files in the software provisioning manager directory.

Reason:
Only members of the `sapinst` UNIX group can access the software provisioning manager directory. This group is created by the software provisioning manager as of SAP NetWeaver 7.1.

Solution:
a. Manually associate `<sapsid>adm` and `<oradb)dbsid` OS users with `sapinst` group if this association is missing.
b. Verify the `/etc/group` file and check if the `sapinst` group exists and OS users are members of this group.
c. If the `sapinst` group does not exist yet, start the software provisioning manager. The software provisioning manager creates this group during startup before the product catalog list is displayed.
d. Edit `/etc/group` file and associate OS users with `sapinst` group.
e. Continue with the export.

4.1.4.3.6 Using the Step State Editor (SAP Support Experts Only)

This section describes how to use the Step State Editor available in the software provisioning manager.

Note
Only use the Step State Editor if the SAP Support requests you to do so, for example to resolve a customer incident.

Prerequisites

- SAP Support requests you to use the Step State Editor.
- Make sure that the host where you run the software provisioning manager meets the requirements listed in Prerequisites for Running Software Provisioning Manager [page 58].

Procedure

1. Start the software provisioning manager from the command line as described in Running Software Provisioning Manager [page 62] with the additional command line parameter `SAPINST_SET_STEPSTATE=true`
2. Follow the instructions on the software provisioning manager screens and fill in the parameters prompted during the Define Parameters phase until you reach the Parameter Summary screen.
3. Choose Next.

The Step State Editor opens as an additional dialog. Within this dialog you see a list of all steps to be executed by the software provisioning manager during the Execute Service phase. By default all steps are in an initial state. Underneath each step, you see the assigned software provisioning manager component. For each step you have a Skip and a Break option.

- Mark the checkbox in front of the Break option of the steps where you want the software provisioning manager to pause.
- Mark the checkbox in front of the Skip option of the steps which you want the software provisioning manager to skip.

4. After you have marked all required steps with either the Break or the Skip option, choose OK on the Step State Editor dialog.

The software provisioning manager starts processing the Execute Service phase and pauses one after another when reaching each step whose Break option you have marked. You can now choose one of the following:

- Choose OK to continue with this step.
- Choose Step State Editor to return to the Step State Editor and make changes, for example you can repeat the step by marking the checkbox in front of the Repeat option.
- Choose Cancel to abort the software provisioning manager.

5. Continue until you have run through all the steps of the Execute Service phase of the software provisioning manager.

4.1.4.4 Restarting R3load Processes

You can restart failed or canceled R3load processes while the migration monitor is still running.

Context

The state files export_state.properties and import_state.properties (see Output Files [page 175]) allow package states to be manually updated to restart failed R3load processes.

Example

If package processing failed and the package state has the value “–”, the state can be set to “0” and processing of the package is restarted.

If you want to restart failed or canceled R3load processes that are using the socket option, R3load processes that process the same package must not be running.
Procedure

- **Restarting R3load Processes Without Using the Socket Option**
  a. To restart package processing, set the package state from “–” to “0”.
  b. To skip package processing, set the package state from “0” or “–” to “+”. (This is not recommended, because it can cause inconsistent data files or database content.)
  c. If the package is currently being processed (the package state is “?”), then any manual modifications to the package state are ignored.

- **Restarting R3load Processes Using the Socket Option**
  a. Make sure that no related R3load processes (export or import) are running. For example, if you want to restart an R3load export process and the corresponding import process that processes the same package is still running, cancel it or wait until it has finished.
  b. There are four possible situations where an R3load restart may be required. Proceed as required:
    - If both the **import** and the **export** are **completed successfully**, there is nothing to do.
    - If the **export** was **completed successfully**, but the **import** is **canceled** with errors, proceed as follows:
      - If the export was successful but the import was canceled when creating the index or the primary key, set the status for `export_state.properties` from “+” to “0”.
      - If the export was completed successfully but the import was canceled when loading the table content, set the status for `export_state.properties` from “+” to “0” and for the export TSK file from “ok” to “err”.
    - If both the **export** and the **import** are **canceled** with errors, proceed as follows:
      - If the errors in export and import relate to the same table, there is nothing to do.
      - If the errors relate to different tables, set the status of the first object with errors in both the export and the import TSK file to “err” and in the `export_state.properties` and `import_state.properties` files to “–”.

---

**Example**

<table>
<thead>
<tr>
<th>Export TSK File</th>
<th>Import TSK File</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table Name</strong></td>
<td><strong>Status</strong></td>
</tr>
<tr>
<td>TAB_1</td>
<td>ok</td>
</tr>
<tr>
<td>TAB_2</td>
<td>err</td>
</tr>
<tr>
<td>TAB_3</td>
<td>xeq</td>
</tr>
<tr>
<td>TAB_4</td>
<td>xeq</td>
</tr>
</tbody>
</table>

The first object with errors here is **TAB_2** (export). This means that in the import TSK file the status for **TAB_2** must be set from “ok” to “err”. The entry in the `export_state.properties` and `import_state.properties` files also must be set from “+” to “0”.

---

System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX

**Database Independent System Copy**
If the import is completed successfully but the export was canceled with errors, you can set the status in the export_state.properties from “–” to “+.”

c. Restart the software provisioning manager or the migration monitor to proceed with the system copy.

4.1.5 Setting Up the Target System

Related Information

Transferring the Export Files to the Target Host [page 82]
Installing the Target System [page 83]

4.1.5.1 Transferring the Export Files to the Target Host

This section describes how to transfer the complete export directory with its structure and the generated DBSIZE.XML file to the target host.

Context

As an alternative, you can also share the complete export directory so that it can be accessed from the target host.

Procedure

1. On the target host, create a directory `<EXPDIR>` with sufficient space for the database export files available.

⚠️ Caution

Do not create this directory under the installation directory or another directory that contains installation information (such as the installation media or other export files).

Otherwise, the software provisioning manager does not ask you to specify the export directory and automatically chooses one that you may not want to use. In this case, the software provisioning manager does not display the export directory and you cannot change it.
2. Transfer all files and directories (recursively) that are located on the source host in the migration export directory `<EXPDIR>` from the source host to the target host.

You can choose one of the following methods:

- Use the migration monitor with the file transfer protocol (FTP) copy option.
  
  **Note**
  Make sure that you use binary mode for transferring the files.

- Copy the export dump directory manually to the target host.
- The export dump directory can be shared and thus made accessible on the target host (network share).

3. Check the permissions of the transferred files on the target host. All files have to be accessible for user `<sapsid>adm` of the target system.

### 4.1.5.2 Installing the Target System

This section describes how to set up the target system using the software provisioning manager.

**Prerequisites**

- There is enough free space on the target system for the database load. To find out the size of the export and the sizes of the tablespaces or dbspaces that will be created, look at the file `DBSIZE.XML`, which is located in the following directory:
  
  **Windows:** `<DRIVE>:<EXPDIR>\DB\<DATABASE>`
  
  **UNIX, IBM i:** `<EXPDIR>/DB/<DATABASE>`
  
  **SAP MaxDB only:** If the database platform of your target system is SAP MaxDB, you must reserve at least two times the amount of space specified in the `DBSIZE.XML` file. During the import, monitor the remaining free space in the database using the SAP MaxDB administration tools `Database Manager` or `Database Studio` and increase it if required.

  **Note**
  If the database software has already been unpacked or installed, or if the database already exists, the software provisioning manager recognizes this automatically and skips the related steps.

- As a post-step during the refresh database content scenario (see **Copying the Database Only - Refresh Database Content [page 120]**) the software provisioning manager connects to the target SAP system via remote function call (RFC). Since the certificates are from the source system, make sure that secure network communications (SNC) is turned off for the RFC, or at least that the insecure RFC connection is allowed. This is only necessary during the short time of the post-processing steps, and after they are completed, you can turn SNC back on.
Procedure

1. Prepare the target system host as described in the installation guide [page 24] for the operating system and database platform intended for the target system.

   **Note**
   
   IBM DB2 for Linux, UNIX and Windows only:
   
   Make sure that you read the information provided in section Setup of Database Layout in the installation documentation.

2. Start the software provisioning manager as described in the installation guide [page 24] for the operating system and database platform intended for the target system.

   **Caution**
   
   If you plan to use Advanced Configuration options during the SAP System Database Import, make sure you have installed the most current version of the software provisioning manager to avoid performance problems during the dialog phase. You can find the latest version of the software provisioning manager on the SAP Service Marketplace.

3. On the Welcome screen, navigate to the following folder according to the requirements of your target system:

   ![Folder Path]

   4. Run the installation options required for your target system in the sequence they are listed in the specific folder and according to process flow in System Copy Procedure [page 49]

   **Caution**
   
   Note that after completing the System Copy Target System based on AS ABAP Database Instance option, you must subsequently run the System Copy Target System Based on AS ABAP Central Instance option as well. Otherwise you run the risk that the installed system is in an inconsistent state, because if you do not run the System Copy Target System Based on AS ABAP Central Instance option, some mandatory ABAP reports that are integrated in this option have not been executed in the central instance.

   To install the target system, follow the instructions in the software provisioning manager input screens (Define Parameters phase) and enter the required parameters.

   If you need to perform some follow-up activities in the target system [page 139] before it is started by the software provisioning manager, make sure that on the Parameters Settings screen you choose parameter mode Custom. Then the software provisioning manager will display the SAP System > Actions Before SAP System Start screen, where you can choose Interrupt before starting the SAP system.

   **Caution**
   
   Heterogeneous system copy: When installing the database instance, you either have to choose parameter mode Custom or have to check the SAP System > Database Import dialog on the summary.
screen and then revise this dialog. Only then appears the dialog screen where you can enter the migration key, which is required for a heterogeneous system copy. If you forget to revise this dialog setting during the dialog phase, the software provisioning manager will abort in the processing phase when checking the migration key and will ask you for a valid migration key.

- If you want to perform export processes in parallel to import processes and you have prepared the export, you must choose Custom on the Parameter Mode > Default Settings screen.
- On the SAP System > General Parameters screen, as default, the Unicode System option is selected. You can only deselect this option if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current SAP NetWeaver release.
- On the SAP System > Database screen, choose the option Standard System Copy/Migration (load-based):
  The SAP data dump from the migration export media that was created during the export is loaded into the newly installed SAP system database.
- When the software provisioning manager prompts for the migration export, enter the path to the export directory <EXPDIR>.
- If you perform a heterogeneous system copy, enter the migration key on the SAP System > Database Import screen.
- If you want to perform export processes in parallel to import processes and you have prepared the export, you must select Parallel Export and Import on the SAP System > Database Import screen.

⚠️ Caution

IBM DB2 for Linux, UNIX and Windows only:

- Make sure that you take the information about automatic storage that is provided in the Running Software Provisioning Manager section in the installation guide [page 24] into consideration.
- The option Deferred Table Creation is not supported for load-based system copies for SAP systems that are not based on SAP NetWeaver 7.0 or higher.
- Do not create the installation directory (for example, sapinst_instdir) under the following directories:
  - UNIX, IBM i: /usr/sap/<SAPSID>
    Windows: \usr\sap\<SAPSID>
  - UNIX, IBM i: /sapmnt/<SAPSID>
    Windows: \sapmnt\<SAPSID>
- If you perform a Unicode conversion, the data import into the target system might abort because of missing space in the database tablespace or dbspace. Enlarge the database or database container, in which the DYNSOURCE table will be created in the target database. The required size for the table will be 15 times larger than in the non-Unicode source system.

5. Complete the installation as described in the installation documentation for your SAP component.

- If you have to restart failed R3load processes, see Restarting R3load Processes [page 80].
- You can use the Migration Checker tools to ensure that the import has been performed successfully. The package checker and the object checker automatically check that the import has started and that all objects have been imported. In addition, you can use the table checker tool to verify that the number of rows that have been exported is equal to the number of rows in the database by using the table of content (TOC) files. For more information about the table checker, see SAP Note 2009651. For more information about all these checks see the Migration Checker.
User Guide. It is contained in the MIGCHECK.SAR archive as MigrationChecker.pdf and is available in the following directory of the software provisioning manager:

UNIX, IBM i only: <Path_To_Unpack_Directory>/COMMON/INSTALL/MIGCHECK.SAR
Windows only: <Path_To_Unpack_Directory>\COMMON\INSTALL\MIGCHECK.SAR

- As an alternative to the table checker, you can perform Table Comparison with Software Update Manager (SUM) [page 177].
  Proceed as follows:
  1. Make sure that the central instance is not started after the import has finished successfully.
  2. Run table comparison [page 179] for the target system.
  3. Start the instances of the target system.
The following sections describe the database-specific methods for the system copy.

**Process**

Follow the sequence of steps described in the process flows below for a:

- Central System
- Distributed System
- High Availability System

**Central System**

**Process Flow on the Source System (Export)**

| Note | When performing a system copy using a database-specific method, it is **not** required to run the software provisioning manager in the source system to export it. You only have to run the software provisioning manager on the target host to install the target system. |

1. Create a database backup with database-specific tools as described in the section for your database:
   - **SAP MaxDB-Specific Procedure [page 104]**
   - **IBM Db2 for Linux, UNIX, and Windows-Specific Procedures [page 106]**
   - **IBM Db2 for z/OS Specific Procedures [page 111]**
   - **SAP ASE Server-Specific Procedure [page 118]**

2. **Oracle only**: Generate the control file structure for the target database [page 93].

3. **Oracle only**: If required, create an offline backup of the source database [page 102].

**Process Flow on the Target System**

| Note | For the target system installation, you use the **installation guide [page 24]** for your target operating system and database. In the following we refer to this documentation as “installation guide”. |

1. **Oracle only**: You prepare the target system [page 97]:
   1. Follow the instructions on the software provisioning manager screens until the software provisioning manager requests you to install the database software and to perform the database backup/restore.
   2. Create the database file system (if it does not yet exist).
3. Install the database software.

2. To complete the system copy, you perform the follow-up activities [page 135].

Distributed System or High Availability System

Process Flow on the Source System (Export)

**i Note**

When performing a system copy using a database-specific method, it is **not** required to run the software provisioning manager in the source system to export it. You only have to run the software provisioning manager on the target host to install the target system.

1. Create a database backup with database-specific tools as described in the section for your database:
   - SAP MaxDB-Specific Procedure [page 104]
   - IBM Db2 for Linux, UNIX, and Windows-Specific Procedures [page 106]
   - IBM Db2 for z/OS Specific Procedures [page 111]
   - SAP ASE Server-Specific Procedure [page 118]

2. **Oracle only**: On the database instance host of the source system, generate the control file structure for the target database [page 93].

3. **Oracle only**: If required, on the database instance host, create an offline backup of the source database [page 102].

Process Flow on the Target System

**i Note**

For the target system installation, you use the installation guide [page 24] for your target operating system and database. In the following we refer to this documentation as “installation guide”.

1. **Oracle only**: You prepare the target system [page 97]:
   1. On the database instance host, start the software provisioning manager as described in the installation guide [page 24] and follow the instructions on the software provisioning manager screens until the software provisioning manager requests you to install the database software and to perform the database backup/restore.
   2. On the database instance host, create the database file system (if not yet existing).
   3. On the database instance host, install the database software.

2. To complete the system copy, you perform the follow-up activities [page 135].
5.1 Oracle-Specific Procedure

Purpose

In an SAP system environment, you can create a homogeneous copy of an Oracle database by copying database files. This method is suitable for creating an exact copy of an existing database. The source of the copy can be an online or offline backup, or the file system of your source host.

You use the software provisioning manager for the installation on the target system host as described in the installation documentation for your SAP component. Only the software provisioning manager steps for setting up and loading the database steps are different.

Advantages

• You can use existing offline backups (provided that redo logs were cleaned up with forced log switches).
• This method is faster than the R3load method.

Disadvantages

• Offline backup/copy of database files in a heterogeneous environment is not possible because the hardware of the source and target systems must be binary-compatible.
• Source system host and target system host must be different.
• You must shut down the SAP system and the database during offline backup/copy of database files.
• You cannot change the database schema and the tablespace names.

Prerequisites

• You must use the same Oracle release and patch level for your database in the source and target system.
• The source and target systems must run on different hosts for security reasons.
• The source and target systems must be binary compatible.

i Note

You can also perform a system copy from 32-bit systems to 64-bit systems and the other way around (same operating system assumed) even if source and target system are not binary compatible.

• If your source system uses the US7ASCII character set, you must choose this character set when installing the target system. The software provisioning manager prompts for the character set during the installation (key: Database Character Set). The installation default is WE8DEC or UTF8 for Unicode systems. To find out the character set used by the source system, connect to the source database as user sap<schemaid> or sapr3 with sqlplus and enter: SELECT * FROM V$NLS_PARAMETERS;
• If your source system has Oracle Database Vault (DV) enabled, and you want to enable DV on the target system as well, you need the password of user secadmin/c##secadmin during the software provisioning manager import procedure [page 83]. For more information, see SAP Note 2218115.

Oracle Storage-Based System Copy Methods Available in the Software Provisioning Manager

You can choose between the following methods:

• Database already recovered, continue with database-specific post activities
  You have already performed backup/restore with Oracle-specific methods. In this case, the software provisioning manager does not need to perform the backup/restore. You just have to ensure that the restored Oracle database on your target system is up and running.

• Performing Online or Offline Recovery with saphostctrl [page 90]

• Using a CONTROL.SQL File Created by the ORABRCOPY Tool [page 93]

Related Information

Database-Specific System Copy [page 87]

5.1.1 Performing Online or Offline Recovery with "saphostctrl"

This section describes how to perform a recovery using saphostctrl.

For the offline recovery method, we recommend that you shut down the database. Alternatively, the software provisioning manager can also make an instance recovery of the database if it has not been shut down before the copy process.

For the online recovery method, you have to set the database to a backup mode and the backup control files and the Oracle archives will be copied to an existing shared directory.

A “shared directory” can be any directory path which the source system and the target system can access. The archives and also the init<SID>.ora files from the source system will be saved in this directory

Restrictions

You cannot change the database schemas SAP<SchemaId> and SAP<SchemaId>DB. There is no “move” schema.

The <DBSID> can be changed because the rename process is able to create new control files with a new <DBSID>. 
The `<SAPSID>` can be also changed.

**Related Information**

Performing Online Recovery [page 91]
Performing Offline Recovery [page 92]

### 5.1.1.1 Performing Online Recovery

For the *online* recovery method, you have to proceed as follows.

**Procedure**

1. You can set the source database to a backup mode using the following command:
   
   ```
   saphostctrl -user sapadmsaphostctrl -function PrepareDatabaseCopy -dbname <DBSID> -dbtype ora -dbconfdir <shared_directory> -copymethod Online -timeout -1
   ```

2. Back up the data files, for example using image copy or snapshot technology.

3. After the database backup has finished, you have to set the database back to a normal mode using the following command:
   
   ```
   saphostctrl -function FinalizeDatabaseCopy -dbname <DBSID> -dbtype ora -dbconfdir <shared_directory> -copymethod Online -timeout -1
   ```

4. Start the target system installation and follow the instructions on the software provisioning manager screens.

   Start the target system installation as described in the *Installation Guide - Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: Oracle* (see *Accessing the Installation Guides* [page 24]).

5. On the *Performing Oracle Storage Based System Copy* screen, select option *Online or Offline Recovery Method with saphostctrl*
5.1.1.2 Performing Offline Recovery

For the offline recovery method, you have to proceed as follows.

**Procedure**

1. Shut down the source database.
2. Back up the data files, for example using image copy or snapshot technology.
3. Start the target system installation and follow the instructions on the software provisioning manager screens.
   
   Start the target system installation as described in the *Installation Guide - Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: Oracle* (see *Accessing the Installation Guides* [page 24]).
4. On the Performing Oracle Storage Based System Copy screen, select option *Online or Offline Recovery Method with saphostctrl*.
5. Leave the dialog field of the `<shared_directory>` empty while performing an offline recovery while no additional files from the source system are needed.
6. When the software provisioning manager stops for database restore, copy all saved files to the target System.

   Make sure that you also copy either the source `spfile<DBSID>.ora` file - which must contain parameters and not only the entry `spfile=...` - or the source `spfile<DBSID>.ora` file.

5.1.2 Using a CONTROL.SQL File Created by the ORABRCOPY Tool

**Related Information**

- Generating the Control File Structure [page 93]
- Preparing the Target System (Oracle) [page 97]
- Restoring Database Files on the Target System [page 98]
- Restoring the Database Files on the Target System with BR*Tools [page 99]
5.1.2.1 Generating the Control File Structure

Use

The OraBRCopy Java tool writes a file CONTROL.SQL to the current working directory, which can be used without further adaptations on the target system.

For more information about command line options and output files of the OraBRCopy tool, see Additional Information about the OraBRCopy Tool [page 203].

Prerequisites

→ Recommendation

We recommend that you shut down the SAP system before you perform the following steps. The database must still be running.

Procedure

1. Create an installation directory <INSTDIR> with permissions 777 on the source system.
2. Copy the ORABRCOPY.SAR archive from the directory to which you unpacked the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR file and extract it using SAPCAR.
   You can find the archive in the following directory:
   <Path_To_Unpack_Directory>/COMMON/INSTALL/ORA/ORABRCOPY.SAR
3. Make sure that all redo log groups are archived
4. Start the OraBRCopy tool as an OS user with Oracle DBA privileges:
   • user ora<dbsid>
   • user <sapsid>adm
5. Execute the ora_br_copy.sh script in one of the following ways:
   • If you perform an offline manual copy, enter the following commands:
     ./ora_br_copy.sh -generateFiles -forceLogSwitches -targetSid <TARGET_DBSID> -password <system_password> -listenerPort <listener_port>
     The tool creates the files CONTROL.SQL, CONTROL.TRC and init<targetSID>.ora in your installation directory, shuts down and restarts the database and performs the required log switches.
   • If you perform an offline or online backup using BR*Tools, enter the following commands:
     ./ora_br_copy.sh -generateFiles -targetSid <TARGET_DBSID> -password <system_password> -listenerPort <listener_port>

i Note

During the online backup, the database must be up and running. To ensure this, this command must not contain the parameter -forceLogSwitches.
The tool creates the files `CONTROL.SQL`, `CONTROL.TRC` and `init<targetSID>.ora` in your installation directory, and performs the required log switches.

**Note**

If an error occurs, check the log file:

```
<INSTDIR>/ora.brcopy.log
```

6. Verify and, if necessary, update the `CONTROL.SQL` control file using the `CONTROL.TRC` trace file as follows.

**Example**

In the following example, entries of `CONTROL.SQL` written in bold should be compared and changed according to the trace file:

```sql
REM
====================================================================
REM CONTROL.SQL
REM
REM SAP AG Walldorf
REM Systeme, Anwendungen und Produkte in der Datenverarbeitung
REM
REM (C) Copyright SAP AG 2004
REM
====================================================================
REM Generated at:
REM Fri Sep 17 08:33:25 CEST 2005
REM for target system NEW
REM on
REM Windows 2000 5.0 x86
CONNECT / AS SYSDBA
STARTUP NOMOUNT
CREATE CONTROLFILE REUSE
SET DATABASE "NEW"
RESETLOGS
ARCHIVELOG
MAXLOGFILES 255
MAXLOGMEMBERS 3
MAXDATAFILES 1022
```
MAXINSTANCES 50
MAXLOGHISTORY 1134

LOGFILE

GROUP 1 (
    '/oracle/NEW/origlogA/log_g11m1.dbf',
    '/oracle/NEW/mirrlogA/log_g11m2.dbf'
) SIZE 50M,

GROUP 2 (
    '/oracle/NEW/origlogB/log_g12m1.dbf',
    '/oracle/NEW/mirrlogB/log_g12m2.dbf'
) SIZE 50M,

GROUP 3 (
    '/oracle/NEW/origlogA/log_g13m1.dbf',
    '/oracle/NEW/mirrlogA/log_g13m2.dbf'
) SIZE 50M,

GROUP 4 (
    '/oracle/NEW/origlogB/log_g14m1.dbf',
    '/oracle/NEW/mirrlogB/log_g14m2.dbf'
) SIZE 50M

DATAFILE

'/oracle/NEW/sapdata1/system_1/system.data1',
'/oracle/NEW/sapdata3/ims_1/ims.data1',
'/oracle/NEW/sapdata3/ims_2/ims.data2',
'/oracle/NEW/sapdata3/ims_3/ims.data3',
'/oracle/NEW/sapdata3/ims_4/ims.data4',
'/oracle/NEW/sapdata3/ims_5/ims.data5',
'/oracle/NEW/sapdata3/ims_6/ims.data6',
'/oracle/NEW/sapdata3/ims_7/ims.data7',
'/oracle/NEW/sapdata3/ims_8/ims.data8',
'/oracle/NEW/sapdata3/ims_9/ims.data9',
'/oracle/NEW/sapdata1/ims700_1/ims700.data1',
'/oracle/NEW/sapdata1/ims700_2/ims700.data2',
'/oracle/NEW/sapdata1/ims700_3/ims700.data3',
ALTER DATABASE OPEN RESETLOGS;
ALTER TABLESPACE PSAPTEMP ADD TEMPFILE
'/oracle/NEW/sapdata3/temp_1/temp.data1'
SIZE 350M REUSE AUTOEXTEND OFF;

iNote
In the above example, entries and values of CONTROL.SQL written in bold should be compared to the trace file.

Changes to be made

1. If you want to migrate your database from 32-bit to 64-bit or vice versa, add the following lines at the bottom of the CONTROL.SQL file:
   
   shutdown immediate
   startup upgrade
   spool utlrp.log
   @?/rdbms/admin/utlrp.sql
   spool off
   shutdown immediate
   startup
   spool utlrp.log
   @?/rdbms/admin/utlrp.sql
   spool off
   exit

2. MAXLOGFILES 255
   
   The numbers must be greater than or equal to the corresponding numbers in the trace file.

3. GROUP 1 {
   '/oracle/NEW/origlogA/LOG_G11M1.DBF',
   '/oracle/NEW/MIRRLOGA/LOG_G11M2.DBF'
} SIZE 50M,
Group 2 {
The sizes of the respective groups must be equal to the sizes of the corresponding groups in the trace file.

4. 

'/oracle/NEW/sapdata1/SYSTEM_1/\texttt{SYSTEM\_DATA1}',

'/oracle/NEW/sapdata3/ims_1/\texttt{ims\_DATA1}',

... 

'/oracle/NEW/sapdata1/ims700_1/\texttt{ims700\_DATA1}'

... 

The count of the data files must be equal to the count of the corresponding data files in the trace file.

5. 

\texttt{ALTER TABLESPACE PSAPTEMP ADD TEMPFILE}

    \texttt{'/oracle/NEW/sapdata3/temp_1/temp\_DATA1'}

    \texttt{SIZE 350M REUSE AUTOEXTEND OFF};

... 

The size must be equal to the corresponding size in the trace file.

6. The number of rows with \texttt{ALTER TABLESPACE} must be equal to the number of corresponding rows in the trace file.

5.1.2.2 Preparing the Target System (Oracle)

This section describes how to prepare the target system for Oracle-specific system copy.

Prerequisites

Make sure that \texttt{sapdata<n>} file systems on the target system host are large enough.

Procedure

1. Install the target SAP system with the software provisioning manager as described in the installation documentation for your SAP solution.

\begin{itemize}
    \item \textbf{Caution} \\
    When you perform a system copy with the Oracle backup/restore method, you cannot change the database schema and the tablespace names of the new target system. When installing the target central instance, the target database instance, or the target dialog instance make sure that you enter the correct database schema names (which are the database schema names of the source system). The schema names of the source and target system must be identical.
\end{itemize}

a. On the Welcome screen, choose \texttt{<Your Product> <Your Database> System Copy Target System <System Variant> <Technical Stack> System Copy (Backup/Restore)}.

b. When the software provisioning manager prompts for the database copy method, choose \texttt{Homogeneous System Copy (Backup/Restore)}.

c. Proceed until the software provisioning manager stops to restore the database files on the target system.
The following message is displayed:

SAPInst now stops the installation. Proceed as follows:

2. If necessary, extract the Oracle stage archives manually and install the Oracle software as described in the installation documentation for your SAP solution.

3. Restore the database files on the target system.

4. If they do not exist, create the following directories on the target system:

- /oracle/<TARGET_DBSID>/mirrlog<x>
- /oracle/<TARGET_DBSID>/origlog<x>
- /oracle/<TARGET_DBSID>/sapdata<x>
- /oracle/<TARGET_DBSID>/sapreorg
- /oracle/<TARGET_DBSID>/saparch
- /oracle/<TARGET_DBSID>/oraarch
- /oracle/<TARGET_DBSID>/saptrace
- /oracle/<TARGET_DBSID>/saptrace/background
- /oracle/<TARGET_DBSID>/saptrace/usertrace
- /oracle/<TARGET_DBSID>/origlogA/cntrl
- /oracle/<TARGET_DBSID>/saparch/cntrl
- /oracle/<TARGET_DBSID>/oraarch/cntrl
- /oracle/<TARGET_DBSID>/sapcheck

- If Oracle TDE is enabled, make sure that you also copy the Oracle wallet key file to the target system. The wallet file is located under /oracle/<DBSID>/orawallet/tde/*.

5. Make sure that the following directories are empty (except the subdirectory saparch/cntrl):

- /oracle/<TARGET_DBSID>/saparch
- /oracle/<TARGET_DBSID>/oraarch

6. All directories must be owned by the software owner oracle:oinstall (default for Oracle 12c) of the target database or ora<target_dbsid>:dba (default for Oracle 11g).

To do this, enter the following command:

Oracle 12c: chown -R oracle:oinstall <directory>

Oracle 11g: chown -R ora<target_dbsid>:dba <directory>

### 5.1.2.3 Restoring Database Files on the Target System

**Use**

⚠️ **Caution**

If you do not use an offline backup, but copy the database files directly from the source to the target system host, make sure that you shut down the database on the source system before you copy the listed files from the source to the target directories.
Procedure

1. Copy the following files from the source to the target system host by copying the listed files from the source directories to the target directories. For more information, see Creating an Offline Backup Manually [page 102].

Directories on UNIX

<table>
<thead>
<tr>
<th>Source and Target Directory</th>
<th>Files</th>
</tr>
</thead>
<tbody>
<tr>
<td>/oracle/&lt;DBSID&gt;/sapdata&lt;x&gt;</td>
<td>All files</td>
</tr>
<tr>
<td>/oracle/&lt;DBSID&gt;/origlog&lt;x&gt;</td>
<td>All files</td>
</tr>
<tr>
<td>/oracle/&lt;DBSID&gt;/mirrlog&lt;x&gt;</td>
<td>All files</td>
</tr>
</tbody>
</table>

Source: <INSTDIR>

Target: <SAPINST_INSTDIR>

Source: <INSTDIR>

Target: /oracle/<DBSID>/ <DB_VERSION>_<BIT>/dbs

CONTROL.SQL

init<TARGET_DBSID>.ora

2. After you have copied the database files, make sure that the files on the source and target system are not located in different directories or drives. If required, make the corresponding changes in the files control.sql and the init<TARGET_DBSID>.ora.

3. Verify that the created directories and copied files have the owner ora<target_dbsid>, belong to the group dba, and have the permissions 740.

4. Make sure that the control files are not restored. If necessary, remove them.

The file names are specified by the control_files parameter of the init<TARGET_DBSID>.ora file.

5.1.2.4 Restoring the Database Files on the Target System with BR*Tools

Procedure

1. Copy the following files from the source system host to the target system host by copying manually the listed files from the source directories to the target directories.

<table>
<thead>
<tr>
<th>Source and Target Directory</th>
<th>Files</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: &lt;INSTDIR&gt;</td>
<td>CONTROL.SQL</td>
</tr>
<tr>
<td>Target: &lt;SAPINST_INSTDIR&gt;</td>
<td></td>
</tr>
</tbody>
</table>
2. Call the restore and recovery function of BR*Tools.

If you follow these instructions, the prerequisites are fulfilled. The main prerequisite is that the corresponding BR*Tools logs (BRBACKUP detailed and summary log, BRARCHIVE summary log) are copied from the source to the target system. In addition, the postprocessing steps mentioned in the SAP Note 1003028 are covered during the standard system copy procedure.

**i Note**

If Oracle TDE [page 189] is enabled when using BR recovery, you need to provide your wallet password.

You can specify the wallet password with the BRRECOVER option `-pw <wallet password>`.

Example:

`brrecover -u / -t reset -b last -f <DB_SID> -pw <wallet password> -c force`

For more information about the execution of restore and recovery under the control of BRRECOVER and the exact syntax of BRRECOVER, see the section *Homogeneous Database Copy* in SAP Note 1003028.

For more information about BR*Tools, see the SAP Library [page 25] for your release at:

**i Note**

Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 25], and then continue the navigation as described below.

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="http://help.sap.com/nw70">http://help.sap.com/nw70</a> Application Help</td>
</tr>
<tr>
<td></td>
<td>Function-Oriented View &lt;Language&gt; Solution Life</td>
</tr>
<tr>
<td></td>
<td>Cycle Management by Key Capability General Administration Tasks Database Administration</td>
</tr>
<tr>
<td></td>
<td>Database Administration for Oracle SAP Database Guide: Oracle BR*Tools for Oracle DBA</td>
</tr>
</tbody>
</table>

System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX

Database-Specific System Copy
3. Shut down the Oracle database instance as follows:

```sql
sqlplus /nolog
shutdown immediate
exit
```

### 5.1.3 Creating a Backup

Create a backup if required. Choose between the following possibilities: Performing an offline backup manually or an offline or online backup with BR*Tools.

**Related Information**

- Creating an Offline Backup Manually [page 102]
- Creating an Offline or Online Backup with BR*Tools [page 102]
5.1.3.1 Creating an Offline Backup Manually

There are different possibilities to prepare the actual transfer of the database files:

• If you have an up-to-date offline backup, you can use it (provided that redo logs were cleaned up with forced log switches).

• If you want to transport the database file (for example, on tape) or if you have to perform the database shutdown at a certain time, stop the database (normal shutdown) and perform a complete offline backup. You can use the trace file CONTROL.TRC created by OraBrCOPY to determine the file system trees that have to be saved.

• You stop the database (normal shutdown) and copy the database files when the actual transfer to the target system takes place. You do not have to perform any preparations for the actual transfer now. Proceed with the next step.

i Note
If you choose this manual offline backup method, you also have to restore the database files on the target system manually. For more information, see Restoring Database Files on the Target System Manually [page 98].

5.1.3.2 Creating an Offline or Online Backup with BR*Tools

Use

You can use any backup strategy supported by BR*Tools as the basis for a system copy: offline or online, with or without BACKINT, with or without RMAN, complete or incremental, and so on. The backup strategy must simply be valid for restore and recovery. This means that a complete restore and recovery of the source database must be possible. In addition for BACKINT and RMAN, the external backup tools must be configured so that a restore is possible on the target host.
**Procedure**

Proceed as described in the *SAP Library* for your release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
</tr>
</thead>
</table>
| SAP NetWeaver 7.0                          | http://help.sap.com/nw70
  *Function-Oriented View* <Language>  
  *Solution Life Cycle Management by Key Capability*  
  *Database Administration for Oracle*  
  *SAP Database Guide: Oracle*  
  *BR*T ools for Oracle DBA*  
  *BR*T ools in Action*  
  *Backup and Database Copy with BR*T ools* |
| SAP NetWeaver 7.0 including EHP1           | http://help.sap.com/nw701
  *Function-Oriented View* <Language>  
  *Solution Life Cycle Management by Key Capability*  
  *Database Administration for Oracle*  
  *SAP Database Guide: Oracle*  
  *BR*T ools for Oracle DBA*  
  *BR*T ools in Action*  
  *Backup and Database Copy with BR*T ools* |
| SAP NetWeaver 7.0 including EHP2           | http://help.sap.com/nw702
  *Function-Oriented View* <Language>  
  *Solution Life Cycle Management by Key Capability*  
  *Database Administration for Oracle*  
  *SAP Database Guide: Oracle*  
  *BR*T ools for Oracle DBA*  
  *BR*T ools in Action*  
  *Backup and Database Copy with BR*T ools* |
| SAP NetWeaver 7.0 including EHP3           | http://help.sap.com/nw703
  *Function-Oriented View* <Language>  
  *Solution Life Cycle Management by Key Capability*  
  *Database Administration for Oracle*  
  *SAP Database Guide: Oracle*  
  *BR*T ools for Oracle DBA*  
  *BR*T ools in Action*  
  *Backup and Database Copy with BR*T ools* |

**i Note**

If you choose a backup method with BR*T ools, you also have to restore the database files on the target system with BR*T ools. For more information, see *Restoring the Database Files on the Target System with BR*T ools* [page 99].
5.2 SAP MaxDB-Specific Procedure

In an SAP system environment, you can create a homogeneous copy of an SAP MaxDB database by using the backup and restore method. This method is suitable for creating an exact copy of an existing database. The source of the copy is a complete data backup of your source database.

Prerequisites

- **Byte order – little-endian or big-endian**
  You can use the backup and restore method to copy systems with the same byte order. That is, you can copy a system based on little-endian to another system based on little-endian. You can also copy a system based on big-endian to another system based on big-endian. Check [SAP Note 552464](https://support.sap.com/notes) to find out which processor and operating system combination uses which byte order.

- **Data backup**
  You perform the complete data backup of your source database.

- **Recovery tool (manual restore)**

- **Database Software**
  The database software on the target host must have the same version as the software on the source host. The build number of the software version on the target host must be greater than or equal to the version on the source host.

- **Size of the data on the target system**
  The size of the target system must be greater than the used space on the source system. You can find the size of the used pages on the source system as follows:
  ```
  dbmcli --d <database_name> --u <dbm_user>,<password> --n <database_server> --u SQL sap<sid>,<password> sql_execute 'SELECT USEDPERM FROM SERVERDBSTATISTICS'
  ```
  The result of this query is the amount of used space, expressed as the number of 8 KB pages. To get the used space in MB, divide this value by 128. When the software provisioning manager prompts you, configure the database data volumes according to this value.

Context

The software provisioning manager is used for installation on the target system host as described in the installation documentation for your SAP solution at [http://support.sap.com/sltoolset](http://support.sap.com/sltoolset) ➤ [System Provisioning](http://support.sap.com/sltoolset) ➤ [Installation Option](http://support.sap.com/sltoolset). In the software provisioning manager, you select the backup and restore method as the database installation method.

This description is **not** valid for the liveCache system copy.
⚠️ Caution

Make sure that you know the password of the database system administrator (SUPERDBA) from the source system before you start the procedure below. Otherwise, you cannot access the database contents on the target system.

You must also know the name of the SQL database schema on the source system, SAP\textless\textit{SAPSID}\textgreater{} – for example, SAPR3.

You can perform this procedure in the following ways:

- **Manual restore**
  The software provisioning manager stops before the database instance initialization and asks you to perform the restore on the target database. After you have performed restore and post-restore activities, you can continue the installation in the software provisioning manager.

- **Automatic restore**
  The software provisioning manager performs the restore to import the data into the target system. In this scenario, you have to use a single file as the backup medium for the whole backup. The restore can use any SAP MaxDB backup, as long as it is a single file.

ℹ️ Note

The minimum size of the database is calculated from the size of the backup file.

**Advantages**

- You can use existing offline backups.
- This method is faster than the database-independent method using R3load or Jload [page 48].

**Disadvantage**

You can only copy between systems with the same byte order.

Perform the following steps on the target system:

**Procedure**

1. To import the target system, start the software provisioning manager as follows and then follow the prompts:
   
   \textless\textit{Product}\textgreater{} \textgreater{} Software Life-Cycle Options \textgreater{} System Copy \textgreater{} Target System Installation \textgreater{} \textlt;\textit{System Variant}\textgreater{}
   
2. In the Select the database copy method screen, select Homogeneous System Copy.
3. In the MaxDB Backup Template screen, choose one of the following, Manual Restore, or Restore by Software Provisioning Manager:
   
   - **Manual restore**
     In the execution phase, you are prompted to do the following:
     
     Follow the restore procedure as described in the SAP Library [page 25] at:
     
     Database Administration \ Database Administration for SAP MaxDB \ SAP MaxDB \ SAP MaxDB Tools \ SAP MaxDB Database Studio \ Restoring Databases: Overview \ Restoring Databases
• *Restore by the Software Provisioning Manager*
  Enter the following information:
  • *Template name*
  • *Device/file*
  • *Wait for backup*

4. After installation is completed, maintain the database connection for CCMS.
   For more information, see SAP Note 588515.

### 5.3 IBM Db2 for Linux, UNIX, and Windows-Specific Procedures

The database-specific procedure for the creation of a system copy is based on a restore of an existing online or offline backup. Therefore, this method is also referred to as *backup/restore procedure*. Since you can use a Db2 backup cross-platform within certain limitations (see below), this method is not limited to the homogenous system copy only.

**i Note**

This backup/restore procedure described here only works using the software provisioning manager. System copy using native Db2 backup/restore procedures **without** the software provisioning manager are **not** supported for SAP systems.

**Prerequisites**

• It must be possible to restore the backup of the source system on the platform of the target system.

**i Note**


• If errors occur when restoring the backup on the target system, the complete restore must be repeated.

• If you restore from an encrypted Db2 database backup, you need to make sure that your Db2 instance is set up for encryption in order to access the data from the backup image.
  The software provisioning manager will configure the Db2 instance for encryption and create a keystore file in which you must provide the master key of the backup. For details, see the procedure below.
You can also create an SAP system copy with a Db2 database if more advanced techniques like file system snapshots are available. The necessary procedure in this case is called database relocation. The database relocation procedure differs significantly from the backup/restore procedure and is not described in this guide.

For more information, see the Database Administration Guide: SAP on IBM Db2 for Linux, UNIX, and Windows, section db2inidb Option: as snapshot.

The software provisioning manager is used for the installation on the target system host as described in the installation documentation for your SAP component. Before you start the software provisioning manager on the target system make sure that all prerequisites for the SAP system installation are met. Especially, make sure that the relevant file systems are available. For more information, see the installation guide [page 24].

In the ABAP system, only the software provisioning manager steps for setting up and loading the database are replaced by a database restore.

Advantages of the Backup Method

- You can use existing online and offline backups.
- Using the backup method is faster than the database-independent method [page 48].

Disadvantages of the Backup Method

- You cannot change the name of the database schema. The name of the database schema is the same as that of the source system.
  However, you can change the name of the connect user during the Define Parameters phase of the target system installation.
- You cannot copy an individual MCOD component to another system. You can only copy the complete system.

Procedure

1. You perform an online or offline backup.
   If you use an online backup to copy your system, a roll forward of your database is required after the database restore on the target system. As a prerequisite, the respective database logs must be accessible. We, therefore, recommend that you include the necessary log files in the backup image. Logs are included in the online backup image as long as the option EXCLUDE LOGS is not specified.

2. To create a target system, run the software provisioning manager on the target system host by choosing the following on the Welcome screen: <Product> <Database> System Copy Target System <System_Variant> <Technical_Stack>

   Perform the installation options in the given sequence and follow the instructions on the software provisioning manager dialogs. When the software provisioning manager prompts for the database copy method, choose Homogeneous System Copy.
Note

If you restore from an encrypted database or you want to encrypt your new database from an unencrypted backup, you must select Use Db2 native encryption in the Define Parameters phase. The Db2 instance will be configured to allow usage of Db2 native encryption, and a keystore file and a new master key will be created.

Caution

Be aware of the following constraints when using the backup method for a homogeneous system copy:

- You cannot change the name of the database schema, during the dialog phase make sure that you enter the database schema exactly as on your source system.
- The tablespace names remain the same during the database restore. However, you can change them after the installation.
- If you want to change the name or the location of the Db2 container on the target system, you have to adapt the Db2 container paths or names in the redirected restore script and then perform a redirected restore. For more information, see the documentation Database Administration Guide: SAP on IBM Db2 for Linux, UNIX, and Windows, section Usage of Tool brdb6birt.

3. Multi-Partition Database Environments only: Add database partitions

If you copy a system with multiple database partitions, the target system must have the same number of partitions as the source system. For more information, see Setting up partitioned database environments in the IBM Db2 Information Center at: http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.server.doc/doc/t0023605.html

4. If you restore from an encrypted backup image, you must provide the master key used with the backup image.
   a. Log on as db2<dbsid> to your database host.
   b. Run the following command:

   ```
   setenv PATH ${PATH}:/db2/db2<dbsid>/sqllib/gskit/bin
   ```
   c. Depending on your platform, run the following:

   AIX: `setenv LIBPATH ${LIBPATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
   HP: `setenv SHLIB_PATH ${SHLIB_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
   Linux and Solaris: `setenv LD_LIBRARY_PATH ${LD_LIBRARY_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`

d. Import the master key from your source system. Make sure the file permissions allow access to the source keystore file. You can choose to import all master keys from the source system or only the one used with the backup image by adding `-label <labelname>` to the following command:

   ```
   gsk8capicmd_64 -cert -import -db <source_keystorefile>.p12 -target /db2/db2<dbsid>/keystore/sapdb2<dbsid>_db_encr.p12
   ```

e. Make sure that you add encryption options to your restore command.

   - If your target database is encrypted, insert the following:

   ```
   encrypt cipher <cipher type> key length <key_length> master key label sap_db2<dbsid>_<hostname>_dbencr_000
   ```

   where `<cipher type>` is either AES or 3DES.

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Database-Specific System Copy
Recommendation

We recommend that you use the master key label of your target system. This was generated by the software provisioning manager before the exit step.

- If your target database is unencrypted, insert the following:
  
  `no encrypt`

  For more information, see the IBM documentation for the database restore command.

5. Restore your database.

To restore your database, you can choose between one of the following options:

- Simple database restore
  
  To perform a database restore, use the Db2 `RESTORE` command. For more information, see the IBM manual `Db2 Command Reference`.

  **Note**

  With a simple restore, you can neither change the name nor the location of Db2 containers.

- Redirected restore
  
  This is the recommended method.

  A redirected restore allows you to change the name or the location of the Db2 container. To perform a redirected restore, you use the Db2 `RESTORE DATABASE` command with the `REDIRECT GENERATE SCRIPT` option. For more information, see `RESTORE DATABASE command` in the IBM Db2 Information Center at:
  

  Alternatively, you can use the tool `brdb6brt` that retrieves a database backup and creates a CLP script to restore this backup image. Since `brdb6brt` needs to connect to the source system, the source system must be available. For more information about how to use the tool `brdb6brt`, see `Redirected Restore Using brdb6brt` in the Database Administration Guide: SAP on IBM Db2 for Linux, UNIX, and Windows.

  If you have used an online backup, you have to make sure that you have access to the log files that were created during the online backup. You also have to perform a rollforward operation to bring the database into a consistent state.

  If you have chosen to use Db2 native encryption for your target database, verify that your restored database is encrypted by checking the database configuration with `db2 get db config for <DBSID>` and search for “Encrypted database = YES” in the output.

  You can now continue with the installation.

Next Steps

After the installation on the target system, do the following:

- To adhere to the SAP standard naming conventions for tablespaces, we recommend that you consider renaming the tablespaces after the installation to reflect the new system name. Each tablespace must be renamed individually. To rename a tablespace, enter the following command:

  `db2 rename tablespace <old_name> to <new_name>`
Example

```
db2 rename tablespace <SAPSID_SOURCE>#DIMD to <SAPSID_TARGET>#DIMD
```

If you use the **deferred table creation** function and you renamed your tablespaces, you also have to execute the following command using the `db6util` tool:

```
db6util -rtvt <SAPSID_SOURCE>%% <SAPSID_TARGET>%%
```

For more information, see SAP Note 1227165.

⚠️ Caution

Make sure that you use an up-to-date version of the `db6util` tool. You require at least a version that supports the option `--rtvt`. To check the command options of the `db6util` tool, enter the following command:

```
db6util -h
```

In addition, you have to update the `tablespace` names in tables `TSDB6`, `IADB6`, and `TADB6`. To rename all tablespaces in the respective tables according to the standard naming conventions, use the following commands:

- For table `TSDB6`, enter the following SQL command:
  ```sql
  update <source_database_schema>.tsdb6 set tabspace = '<SAPSID_TARGET>#'||
  substr(tabspace, 5, length(tabspace)-4), indspace='<SAPSID_TARGET>#'||
  substr(indspace, 5, length(indspace)-4)
  ```

- For table `IADB6`, enter the following SQL command:
  ```sql
  update <source_database_schema>.iadb6 set tabspace = '<SAPSID_TARGET>#'||
  substr(tabspace, 5, length(tabspace)-4)
  ```

- For table `TADB6`, enter the following SQL command:
  ```sql
  update <source_database_schema>.tabdb6 set tabspace = '<SAPSID_TARGET>#'||
  substr(tabspace, 5, length(tabspace)-4)
  ```

- If you performed a redirected restore, check all settings of the database manager and database configuration parameters. Specifically, make sure that the following configuration parameters point to the correct path:

  - `DIAGPATH` (DBM)
  - `DFTDBPATH` (DBM)
  - Path to log files (DB)
  - If set, `NEWLOGPATH` (DB), `OVERFLOWLOGPATH` (DB), `FAILARCHPATH` (DB) and `MIRRORLOGPATH` (DB)

More Information

5.4 IBM Db2 for z/OS Specific Procedures

In an SAP system environment, you can create a homogeneous system copy of a DB2 database using the offline system copy method.

Prerequisites

The following prerequisites must be fulfilled to use this method:

- The permissions of the source and target systems must be completely separate. The source system must not be able to use the resources of the target system, and the target system must not be able to use the resources of the source system.
- RACF authorization for the target DB2 subsystem is complete.
- Source and target systems must work with DB2 managed objects.
- Procedures of the source and the target system are defined in the DB2 PROCLIB.
- Source and target systems have appropriate entries in the APF list.
- Volumes of the source and target systems are managed by SMS.
- At first source and target systems run with the same DB2 service level. After copying the source system to a target system, you can migrate or upgrade both systems to a higher service level.

Context

This document assumes that the database schema of your SAP system is SAPR3. If you employ a different schema, adapt the references to SAPR3 in the following SQL statements and jobs to reflect the actual schema name.

The following section describes an offline system copy method for SAP systems on IBM Db2 for z/OS.

Advantage of the Offline System Copy Method

This method is faster than the database-independent method [page 48].

Restriction of the Offline System Copy Method

At the moment, you cannot copy an individual MCOD component to another system. You can only copy the complete system.

Note

The offline system copy must be performed by an experienced database administrator.

You can find an adapted procedure for an online system copy in the IBM documentation High Availability for SAP on zSeries Using Autonomic Computing Technologies.
Process Flow of the Main Steps in this Procedure

The following sections contain the detailed steps involved in the homogeneous system copy procedure for Db2 for z/OS.

The offline system copy can be divided into the following steps:

Procedure

1. Step 1: Check the Source System and Stop it after Successful Check [page 112]
2. Step 2: Consider DB2 Procedures of the Target System [page 114]
3. Step 3: Delete All Obsolete Objects of the Target System [page 114]
4. Step 4: Copy All Objects of the Source System into the Target System [page 114]
5. Step 5: Add All DB2 Subsystem Libraries to a PARMLIB Containing Definitions Required for APF [page 114]
6. Step 6: Alter the BSDS of the Target System [page 115]
7. Step 7: Change Entries of logcopy Data Sets in the BSDS of the Target System [page 115]
8. Step 8: Customize DB2 Modules Using DSNTIJUZ [page 115]
9. Step 9: Configure the Distributed Data Facility (DDF) [page 116]
10. Step 10: Start the Target System Using ACCESS(MAINT) [page 116]
11. Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 116]
12. Step 12: Stop and Restart the Target System [page 116]
13. Step 13: Create DSNTEP2 and DSNTEP4 Load Modules for the Target System [page 117]
14. Step 14: Alter All WLM Environments of Stored Procedures [page 117]
15. Step 15: Perform Post-Offline System Copy Actions (Optional) [page 117]

5.4.1 Step 1: Check the Source System and Stop it after Successful Check

Procedure

1. Check the source system for active threads using the following DB2 command: **DIS THD(*)**
   If there are active threads, stop all applications running against the source system.
2. Check the source system for authorized utilities using the following DB2 command: **DIS UTIL(*)**
   The command shows the status of all utility jobs known to DB2. You should get the following message: **NO AUTHORIZED UTILITY FOUND FOR UTILID = ***
   If there are utilities, wait for their successful completion or terminate them.
3. Ensure that all DB2 objects of the source system are started in RW mode.
   You can check this using the following DB2 command: **DISPLAY DATABASE(*) SPACENAM(*) RES**
   The command displays all databases, table spaces, or indexes in a restricted status.
   You should get the following message: **NO DATABASES FOUND**
In all other cases do not proceed. We recommend that you repair all databases, table spaces, or indexes identified as restricted. For more information, see the command reference of Db2 for z/OS.

4. The source system must be stopped and restarted now in ACCESS (MAINT).

ACCESS (MAINT) prohibits access to any authorization IDs other than SYSADM, SYSOPR, and SECDATA.

5. Later in this workflow all WLM ENvironments of DB2 procedures must be altered in the target system.

Identify all created procedures and WLM ENVironments with the following SQL statement:

```sql
SELECT 'ALTER PROCEDURE ' CONCAT SCHEMA CONCAT '."' CONCAT NAME CONCAT '"' CONCAT ' WLM ENVIRONMENT ' CONCAT STRIP(WLM_ENVIRONMENT) CONCAT ';' FROM SYSIBM.SYSROUTINES WHERE ROUTINETYPE='P';
```

```sql
SELECT 'ALTER SPECIFIC FUNCTION ' CONCAT SCHEMA CONCAT '."' CONCAT SPECIFICNAME CONCAT '"' CONCAT ' WLM ENVIRONMENT ' CONCAT STRIP(WLM_ENVIRONMENT) CONCAT ';' FROM SYSIBM.SYSROUTINES WHERE ROUTINETYPE='F' AND FENCED = 'Y';
```

The result of this query should look like the following:

```sql
ALTER PROCEDURE DSNADM."ADMIN_TASK_LIST" WLM ENVIRONMENT D990_GENERAL;
ALTER PROCEDURE DSNADM."ADMIN_TASK_OUTPUT" WLM ENVIRONMENT D990_GENERAL;
ALTER PROCEDURE DSNADM."ADMIN_TASK_STATUS" WLM ENVIRONMENT D990_GENERAL;
ALTER PROCEDURE DSNADM."ADMIN_TASK_STATUS" WLM ENVIRONMENT D990_GENERAL;
ALTER PROCEDURE SYSPROC."DSNACICS" WLM ENVIRONMENT D128_GENERAL;
```

Keep the results of this query in a safe place.

6. Stop the source system again.

7. After the source system has completely terminated, print the contents of all source system bootstrap datasets using utility DSNJU004.

Carefully save the output. The values of START RBA and END RBA of all logcopy datasets are needed later in this workflow.

⚠️ Caution

Do not start the source system until all objects (bootstrap datasets, logcopy, VSAM clusters and so on) are copied into the target system. Otherwise the target system might be highly inconsistent. Therefore it is strongly recommended to prevent the source system from being started until step 4 [page 114] of this process flow has been completed successfully.
5.4.2 Step 2: Consider DB2 Procedures of the Target System

Consider the following cases:

- Homogeneous system copy of the source system is provided in an existing target system. In this case you can skip step 2.
- Homogeneous system copy of the source system is provided in a nonexistent target system. In this case customize and run a private copy of DSNTIJMV to update the DB2 PROCLIB.

5.4.3 Step 3: Delete All Obsolete Objects of the Target System

Consider the following cases:

- Homogeneous system copy of the source system is provided in a target system that already exists. In this case delete all obsolete bootstrap datasets, logcopy datasets, archives, VSAM clusters. Ensure that all obsolete objects of the target system are deleted.
- Homogeneous system copy of the source system is provided in a non-existing target system. In this case you can skip step 3. All necessary datasets are copied from the source system in step 4 [page 114] of this process flow.

5.4.4 Step 4: Copy All Objects of the Source System into the Target System

1. Ensure that the source system is still stopped. Otherwise bootstrap datasets, logcopy datasets, VSAM clusters are allocated by the source system and cannot be copied.
2. Customize and run a job using, for example, program ADRDSSU.
   Use ADRSSU parameter RENUNC to rename all objects to reflect the high-level qualifiers of the target system.
3. Now you can restart the source system without any risk of inconsistency in the target system.

5.4.5 Step 5: Add All DB2 Subsystem Libraries to a PARMLIB Containing Definitions Required for APF

Consider the following cases:

- The target system was already up and running in the past, so that all definitions required for authorized program facility (APF) already exist. In this case you can skip step 5.
- The target system was never up and running.
In this case add all definitions required for APF to an appropriate PARMLIB and set APF. Otherwise the target system cannot be started.

5.4.6 Step 6: Alter the BSDS of the Target System

Change VSAMCAT in the bootstrap data sets (BSDS) of the target system. Use the DSNU003 utility in DB2 with parameter NEWCAT VSAMCAT to reflect the new VSAMCAT high-level qualifier.

Repeat this step for each data sharing member BSDS of data sharing systems.

5.4.7 Step 7: Change Entries of logcopy Data Sets in the BSDS of the Target System

Use DB2 utility DSNU003 to delete obsolete and invalid DSNAME entries using the DELETE DSNAME parameter. In the same job you can define the name of the new logcopy data sets with the NEWLOG DSNAME parameter. Carefully customize the STARTRBA and ENDRBA parameters using the values of the source system.

Repeat this step for each data sharing member BSDS of data sharing systems.

5.4.8 Step 8: Customize DB2 Modules Using DSNTIJUZ

For the target system you have to customize the DB2 data-only load module DSNHMCID, the application defaults load module (DSNIEDECP), and the subsystem parameter module using DSNTIJUZ.

At least change the following parameters:

- The name of the libraries identified in STEPLIB, SYSLIB
- SYSLMOD DD statements
- The ADMITPROC parameter, if the administrative task scheduler is used
- The CATALOG parameter
- The FCCOPYDDN parameter
- The IRLMPRC parameter
- The IRLMSID parameter
- The ARCPFX1 and ARCPFX2 parameters, if the target system is to run with archiving.
  If the target system is to run without archiving, identified by parameter OFFLOAD=NO, the ARCPFX2 / ARCPFX2 parameters must not be changed. However, for security reasons it is recommended to run the target system with archiving.

Other parameters of the target system can be modified as requested by the owner of the subsystem.

Repeat this step for each data sharing member BSDS of data sharing systems.
5.4.9 Step 9: Configure the Distributed Data Facility (DDF)

Use the DSNJU003 stand-alone utility to change the bootstrap data sets (BSDS). Adjust LOCATION, LUNAME, PORT, and RESPORT considering the new Distributed Data Facility (DDF) environment.

Repeat this step for each data sharing member BSDS of data sharing systems.

5.4.10 Step 10: Start the Target System Using ACCESS(MAINT)

You must be able to start the target system with ACCESS(MAINT), otherwise the CATMAINT utility fails in the next step [page 116] of this process flow.

If the target system does not start successfully, do not proceed with Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 116].

For data sharing systems, start the first member and continue with Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 116].

5.4.11 Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH

Use the CATMAINT utility with option VCAT SWITCH to provide the new high-level qualifier of the target system in the DB2 catalog.

For data sharing systems, run this step with the first started member.

5.4.12 Step 12: Stop and Restart the Target System

Stop and restart the target system.

When the target system is restarted, you have to check the SYSLOG carefully for normal completion.

⚠️ Caution

Do not proceed with the next step [page 117] if problems occur while the target system is being stopped or restarted.
5.4.13 Step 13: Create DSNTEP2 and DSNTEP4 Load Modules for the Target System

Create, test, and run the DSNTEP2 and DSNTEP4 load modules. To be able to do this, you have to customize and run DSNTEJ1L.

5.4.14 Step 14: Alter All WLM Environments of Stored Procedures

Use

In step 1 [page 112] of this process flow, you ran a query to prepare all ALTER PROCEDURE statements for the target system.

Now you have to customize the result of the query by changing the WLM_ENVIRONMENT value for the WLM ENVIRONMENT names of the target system.

Procedure

1. Ensure that the APPLICATION_ENVIRONMENT_NAMES and the appropriate PROCEDURE_NAMES exist in the DB2_PROCLIB and that the APPLICATION_ENVIRONMENTS are activated.
2. Run all ALTER_PROCEDURE commands in the target system using the DSNTEP2 program.

5.4.15 Step 15: Perform Post-Offline System Copy Actions (Optional)

1. As all GRANTS of the source system are still valid, check them using SPUFI by executing the following command: SELECT * FROM SYSIBM.SYSUERAUTH;
   Maintain this table according to your needs.
2. Grant new users or revoke obsolete users.
3. If required, change the user authorizations of the target system.
   The IBM Db2 catalog still contains the authorizations of the source system.
5.5 SAP ASE Server-Specific Procedure

This section describes how to perform a homogeneous system copy of a SAP ASE database by using the load database dump method, or the attach database device method in an SAP environment. The software provisioning manager supports both methods.

Prerequisites

Before you start the system copy procedure, implement SAP Note 1612437.

Context

The load database dump method and the attach database device method have the following advantages compared to the R3load method:

- You can use an existing full database dump and optionally also transaction dumps.
- You can copy the complete database software and database devices (all files below /sybase/<DBSID>) to the target system and use this copy to create the target system.
- These methods are faster than the database-independent method [page 48].

For more information about system copy with SAP ASE as target database, see SAP Note 1697542.

Procedure

1. Provide the database files required for the target system setup using one of the following ways:
   - Suspend write operations to the database devices of the source system database together with the creation of a database manifest file (using SAP ASE command `quiesce database <DBSID>_tag hold <DBSID> for external dump to <manifest_file>`), copy all necessary files to the target system, and enable the write operation again (using SAP ASE command `quiesce database <DBSID>_tag release`).
   - Create a backup (SAP ASE command `dump database`).
2. Copy the files to the target system.
3. Run the software provisioning manager to install the target system by choosing the following on the Welcome screen:
   - Choose the installation services in exactly the order they appear. For more information, see the installation guide [page 24] for your SAP NetWeaver-based system on SAP ASE.
• On the software provisioning manager screen SAP SystemDatabase, make sure that you select Homogeneous System Copy (SAP ASE-specific: Attach database device or Load database dump).

• The software provisioning manager asks you if you want to use either an already existing SAP ASE installation on the target system or the database software from the installation media.

• Depending on the method chosen, you have to enter either the path to the database dump files or the location of the database manifest file. The software provisioning manager tries to find the database devices mentioned in the manifest file automatically, otherwise it asks for the files during the software provisioning manager execution phase.
Using the *Refresh Database Content* option in the software provisioning manager you can refresh the content of an existing database using a database backup without having to copy the primary application server instance, and to reinstall additional applications servers. No new database instance is installed. The sections below describe how to use the *Refresh Database Content* option for your database.

As a post-step during the refresh database content, the software provisioning manager connects to the target SAP system via remote function call (RFC). Since the certificates are from the source system, make sure that secure network communications (SNC) is turned off for the RFC, or at least that the insecure RFC connection is allowed. This is only necessary during the short time of the post-processing steps, and after they are completed, you can turn SNC back on.

⚠️ Caution

Use Software Provisioning Manager de-clustering only when you perform a system copy of the entire system.

→ Recommendation

We recommend that you use option *Refresh Database Content* if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

ℹ️ Note

System copy option *Refresh Database Content* is currently not released for SAP SCM.

### 6.1 Copying the Database Only - Refresh Database Content on SAP ASE

Using the *Refresh Database Content* option in the software provisioning manager, you can refresh the content of an existing database using a database backup without having to copy the primary application server instance and to reinstall additional applications servers. No new database instance is installed. The refresh can be done using either database-specific methods or the SAP standard method based on `R3load`.
Prerequisites

- Your SAP system must be based on SAP NetWeaver 7.0 EHP2 or higher.
- The source system and the target system already exist.
- Prerequisite for using a database-specific method is that source and target database version match. It is not possible to use a target database version that is lower than the source database version. To refresh the content of an existing database you can use database and transaction dumps or a copy of the database device files of the SAP database. For more information about creating database and transaction dumps, and handling of database device files, see the SAP ASE Administration Guide at https://help.sap.comviewer/product/SAP_ASE Operate System Administration Guide: Volume 2.
- If the source database is using the full database encryption feature, your target database must use the encryption details of the source system to be able to load and mount the database content. The software provisioning manager prompts for the database encryption details of the source systems. For more information, see SAP Note 2224138.
- Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The software provisioning manager will prompt you for this password during the Refresh Database Content procedure.

Context

We recommend that you use option Refresh Database Content if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

Using the SAP Standard Method

1. On the source system, proceed as follows:
   1. Stop the SAP system.
   2. Perform the database instance export as follows:
      1. Start the software provisioning manager on the database host (preferred) or on any other host of the SAP system as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option <Product> Software Life-cycle Options System Copy <Database> Source System Export <Distribution Option> Based on AS ABAP Database Instance Export

2. On the target system, proceed as follows:
   1. Stop all SAP application server instances, but leave the ASCS instance and the database instance running
   2. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
2. On the Welcome screen, run option ➔ Generic Options ➔ Refresh Database Content ➔

**Using the Database-specific Method**

**Procedure Using database and transaction dumps**

“Database dumps” contain the entire database, including both the data and the transaction log.

“Transactions dumps” contain a record of any database changes made since the last transaction log dump or database dump.

1. On the database host of the source system, create a full database backup.
   In the following examples, replace `<SAPSID>` with the name of your SAP System and `<dump_file>` with a full path name of the file to which the database server can write the database content:
   1. Open a command shell for OS user `syb<dbsid>` and connect to the database server using the following command line: `isql -X -Usapsa -S <SAPSID>`
   2. Enter the following commands to create a full database dump:
      ```
      use master
go
dump database <SAPSID> to '<dump_file>'
go
quit
      ```
   3. Enter the following commands to create a transaction dump:
      ```
      use master
go
dump transaction <SAPSID> to '<trans_file>'
go
quit
      ```
2. On the database host of the target system, proceed as follows:
   1. Stop all SAP application server instances, but leave the ASCS instance and the database instance running
   2. Transfer the database dump file from the database host of the source system to the database host of the target host.
   3. Verify that the OS user `syb<dbsid>` is able to read the dump file.
   4. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option ➔ Generic Options ➔ Refresh Database Content ➔
      3. When the software provisioning manager asks for the database dump details, enter the location of the database and transaction dump files.
         The tool creates the necessary SQL statements to load the database content with that information.
      4. Optionally the database content can be refreshed with a two-step approach if the database dump should be loaded now and transaction files at a later point in time.
         1. Enter the location of the database dump files.
         2. Enable the check box After loading the database dump, keep the database offline and terminate the Software Provisioning Manager.
3. The software provisioning manager will perform the database load and terminate.
4. The database will be offline and cannot be used at that point in time.
5. When the last transaction dump is ready, start the software provisioning manager once more.
6. Enter the location of the transaction files.
7. The software provisioning manager will load the transactions and proceed with the remaining steps of the refresh procedure.

**Procedure With Copying of the database device files of the SAP database**

1. On the database host of the source system, do the following:
   1. Stop the SAP system
   2. Create a database manifest file
      In the following example, replace `<SAPSID>` with the name of your SAP system and `<manifest_file>` with a full path name of the file to which the database server can write the database manifest:
      1. Open a command shell for OS user syb<dbsid> and connect to the database server using the following command line: `isql -X -Usapsa -S <SAPSID>`
      2. Enter the following commands:
         ```
         use master
         go
         create manifest file
         <SAPSID> to '<manifest_file>'
         go
         quit
         ```
   3. Stop the database server
2. On the database host of the target system, do the following:
   1. Stop all SAP application server instances, but leave the ASCS instance and the database instance running.
   2. Create new folders for the device files (for example like `/sybase/<SAPSID>/sapdata_2` and `/sybase/<SAPSID>/saplog_2`).
   3. Transfer the database devices files from the database host of the source system that belong to the SAP database (normally the files in folder `/sybase/<SAPSID>/sapdata_1` and `/sybase/<SAPSID>/saplog_1`) to the newly created `sapdata` and `saplog` folders.
   4. Also transfer the manifest file created on the source system to target system.
   5. Verify that the OS user `syb<dbsid>` is able to read both the database device files and the manifest file.
   6. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option »Generic Options »Refresh Database Content»

**Next Steps**

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 135].
6.2 Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows

Using the Refresh Database Content option in the software provisioning manager, you can refresh the content of an existing database using a database backup without having to copy the primary application server instance and to reinstall additional applications servers. No new database instance is installed. You can do the refresh using either database-specific methods or the SAP standard method based on R3load.

Prerequisites

• The source system and the target system already exist.
• For the database-specific method, you can use either an online or an offline backup of the database. The following restrictions apply:
  • Source and target database versions must match.
  • This backup must be written to disk if you want the software provisioning manager to refresh the content automatically (the default mode).
  • The database version must be 10.1 or higher.
  • The database must only use automatic storage for its tablespaces.
  • Database setups with multiple servers cannot use the database-specific method. This includes:
    • Partitioned databases using the DB2 Database Partitioning Feature (DPF)
    • IBM Db2 databases using the Db2 pureScale Feature
    • IBM Db2 High Availability Disaster Recovery (HADR) setups
  • Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The software provisioning manager will prompt you for this password during the Refresh Database Content procedure.
  • If you refresh your database content from an encrypted Db2 database backup, you need to make sure that your Db2 instance is set up for encryption in order to access the data from the backup image. You must provide the master key of the backup in a keystore file. For details, see the procedure below.

Context

We recommend that you use option Refresh Database Content if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with...
“template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

**Using the SAP Standard Method**

1. On the source system, do the following:
   1. Stop the SAP system.
   2. Perform the database instance export as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].

2. On the target system, do the following:
   1. Stop all SAP application server instances but leave the database instance running.
   2. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      If you receive a message that the schema already exists, you must delete the existing database schema. You can do this in one of the following ways:
      - Automatically while running the Refresh Database Content option by choosing to drop the schema on screen IBM Db2 for Linux, UNIX, and Windows - Drop Existing Schemas
      - Manually before you run the Refresh Database Content option, as described in Deleting a Database Schema Manually [page 193].

**Using the Database-Specific Method**

1. On the source system, create a backup of your database. You may perform either an online or an offline backup.
   This backup must be written to disk if you want the software provisioning manager to automatically refresh the database content from the backup. This is the default mode.
   You can also use other backup types. In this case, you must do the restore of the database manually. The software provisioning manager will pause at the appropriate processing step and prompt you to restore the database.
   The following examples give details for creating a backup to disk.
   In the following examples, replace `<DBSID>` with the name of the database for your SAP System and `<backup_dir>` with a full path name of the directory to which the database server can write the database content. This directory must exist and be empty.
   • Using an online backup:
     If you choose this option, your SAP system can still be used during the backup.
You can only use this option if your database is running in log retention mode. For more information, see the following documentations:

- Installation of SAP Systems Based on the Application Server <Stack> of SAP NetWeaver 7.1 to 7.5 on UNIX: IBM Db2 for Linux, UNIX, and Windows at https://support.sap.com/sltoolset System Provisioning Installation Option of Software Provisioning Manager

1. Log onto the database host of your source system as the db2<dbsid> user.
2. Create a backup directory: mkdir <backup_dir>
3. Run the following command: db2 backup db <DBSID> online to <backup_dir> compress include logs
4. If your database backup is encrypted, retrieve your current master key label. You will need to import the master key to the target database instance in order to restore your target database. In order to retrieve your current master key label and export it, do the following as user db2<dbsid>:
   1. To get the <labelname>, execute the following command:
      
      ```
      db2 "SELECT MASTER_KEY_LABEL FROM TABLE(SYSPROC.ADMIN_GET_ENCRYPTION_INFO())"
      ```
   2. Then run the following command:
      
      ```
      setenv PATH ${PATH}:/db2/db2<dbsid>/sqllib/gskit/bin
      ```
   3. Depending on your platform, run the following:
      
      - AIX: setenv LIBPATH ${LIBPATH}:/db2/db2<dbsid>/sqllib/lib64/gskit
      - HP: setenv SHLIB_PATH ${SHLIB_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit
      - Linux and Solaris: setenv LD_LIBRARY_PATH ${LD_LIBRARY_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit
   4. Export the master key with the label <labelname> from your source system with the following command. You can choose to export all master keys from the source system by omitting -label <labelname> from the command:
      
      ```
      gsk8capicmd_64 -cert -export -db "/db2/db2<dbsid>/keystore/<source_keystore>.p12" -stashed -target <source_master_keyfile>.p12 -target_type pkcs12 -target_pw <strong_password> -label <labelname>
      ```
   5. Copy the keystore file <source_master_keyfile>.p12 to the keystore directory in the home directory of your target db2<dbsid> user on your target system.

   - Using an offline backup:
     1. Stop the SAP system.
     2. Log onto the database host of your source system as the db2<dbsid> user.
     3. Create a backup directory using the following command: mkdir <backup_dir>
     4. If the database server is not running, start it with the following command: db2start
     5. Run the following command: db2 backup db <DBSID> to <backup_dir> compress
     6. If your database backup is encrypted, retrieve your current master key label. You will need to import the master key to the target database instance in order to restore your target database.
In order to retrieve your current master key label and export it, do the following as user

db2<dbsid>:

1. To get the <labelname>, execute the following command:

   `db2 "SELECT MASTER_KEY_LABEL FROM TABLE(SYSPROC.ADMIN_GET_ENCRYPTION_INFO())"`

2. Then run the following command:

   `setenv PATH ${_PATH}:/db2/db2<dbsid>/sqllib/gskit/bin`

3. Depending on your platform, run the following:

   - **AIX:**
     `setenv LIBPATH ${LIBPATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
   - **HP:**
     `setenv SHLIB_PATH ${SHLIB_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
   - **Linux and Solaris:**
     `setenv LD_LIBRARY_PATH ${LD_LIBRARY_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`

4. Export the master key with the label <labelname> from your source system. You can choose to export all master keys from the source system by omitting `-label <labelname>` from the command:


5. Copy the keystore file <source_master_keyfile>.p12 to the keystore directory in the home directory of your target db2<dbsid> user on your target system.

2. On the database host of the target system, do the following:

   1. Stop all SAP application server instances but leave the database instance running.
   2. Make sure that the backup directory <backup_dir> is accessible on the target system and is readable for the db2<dbsid> user. This only applies if you want the software provisioning manager to refresh the database content automatically (the default mode).
   3. If your backup image is encrypted, you must provide the master key used with the backup image.

   1. Log on as db2<dbsid> to your database host.
   2. Run the following command:

      `setenv PATH ${PATH}:/db2/db2<dbsid>/sqllib/gskit/bin`

   3. Depending on your platform, run the following:

      - **AIX:**
        `setenv LIBPATH ${LIBPATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
      - **HP:**
        `setenv SHLIB_PATH ${SHLIB_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`
      - **Linux and Solaris:**
        `setenv LD_LIBRARY_PATH ${LD_LIBRARY_PATH}:/db2/db2<dbsid>/sqllib/lib64/gskit`

   4. Import the master key from your source system.

      Make sure the file permissions allow access to the copied source keystore file. You can choose to import all master keys from the source system or only the one used with the backup image by adding `-label <labelname>` to the following command:

      `gsk8capicmd_64 -cert -import -db <source_master_keyfile>.p12 -target /db2/db2<dbsid>/keystore/sapdb2<dbsid>_db_encr.p12 -stashed`

5. Optional: to view all existing master keys and their respective labels, enter the following command:

   `gsk8capicmd_64 -cert -list -db "/db2/db2<dbsid>/keystore/sapdb2<dbsid>_db_encr.p12" -stashed`

4. Refresh the database content as follows:

   1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
   2. On the Welcome screen, run option ➤ **Generic Options** ➤ **Refresh Database Content** ➤
If you want to restore your database manually, you must choose to run the software provisioning manager in custom mode.

When you are prompted to enter your connect user and schema information, you must enter the schema of your source system and the connect user of your target system.

In the software provisioning manager, enter the master key label of your target system when asked in the **Define Parameters** phase.

We recommend using the master key label of your target system. The default for a newly installed system is `sap_db2<dbsid>_<hostname>_dbencr_000`. You can use any existing master key label of your target system.

### Next Steps

To adhere to the SAP standard naming conventions for tablespaces, we recommend that you consider renaming the tablespaces after the installation to reflect the new system name. Each tablespace must be renamed individually. To rename a tablespace, enter the following command:

```
db2 rename tablespace <old_name> to <new_name>
```

**Example**

```
db2 rename tablespace <SAPSID_SOURCE>#DIMD to <SAPSID_TARGET>#DIMD
```

If you use the **deferred table creation** function and you renamed your tablespaces, you also have to execute the following command using the `db6util` tool:

```
db6util -rtvt <SAPSID_SOURCE>% <SAPSID_TARGET>%
```

For more information, see SAP Note 1227165.

**Caution**

Make sure that you use an up-to-date version of the `db6util` tool. You require at least a version that supports the option `-rtvt`. To check the command options of the `db6util` tool, enter the following command:

```
db6util -h
```

In addition, you have to update the **tablespace** names in tables `TSDB6`, `IADB6`, and `TADB6`. To rename all tablespaces in the respective tables according to the standard naming conventions, use the following commands:

- For table `TSDB6`, enter the following SQL command:

  ```
  update <source_database_schema>.tsdb6 set tabspace = '<SAPSID_TARGET>%', indspace='<SAPSID_TARGET>%' 
  substr(tabspace, 5, length(tabspace)-4), indspace='substr(indspace, 5, length(indspace)-4)
  ```

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• For table IADB6, enter the following SQL command:

```sql
update <source_database_schema>.iadb6 set tabspace = '<SAPSID_TARGET>#'||
substr(tabspace,5,length(tabspace)-4)
```

• For table TADB6, enter the following SQL command:

```sql
update <source_database_schema>.tabdb6 set tabspace = '<SAPSID_TARGET>#'||
substr(tabspace,5,length(tabspace)-4)
```

• Perform the follow-up activities for system copy.
  For more information, see Follow-Up Activities [page 135].

### Related Information

- Running Software Provisioning Manager [page 62]
- Deleting a Database Schema Manually [page 193]
- Follow-Up Activities [page 135]

### 6.3 Copying the Database Only - Refresh Database Content on Oracle Database

Using the Refresh Database Content option in the software provisioning manager, you can refresh the content of an existing database using a database backup without having to copy the primary application server instance and to reinstall additional applications servers. No new database instance is installed. You can do the refresh using either database-specific methods (backup/restore) or the SAP standard method based on R3load.

### Prerequisites

• The source system and the target system already exist.
• If you want to use the Database Backup/Restore Method, source and target database version must match. It is not possible to use a target database version that is lower than the source database version.
• If you want to use the Database Backup/Restore Method, the database schema must be identical in the source and target database.
• If your source system has Oracle Database Vault (DV) enabled, and you want to enable DV on the target system as well, you need the password of user secadmin / c##secadmin during the software provisioning manager import procedure [page 83]. For more information, see SAP Note 2218115.
• If your source system has Oracle TDE, consider the additional information in section Support of Oracle Transparent Data Encryption (Oracle TDE) [page 189].
• Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The software provisioning manager will prompt you for this password during the Refresh Database Content procedure.
**Context**

We recommend that you use option *Refresh Database Content* if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

**Using the SAP Standard Method**

1. On the source system, do the following:
   1. Stop the SAP system.
   2. Perform the database instance export as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option ➤ <Product> ➤ Software Life-cycle Options ➤ System Copy ➤ <Database> ➤ Source System Export ➤ <Distribution Option> ➤ Based on AS ABAP ➤ Database Instance Export
2. On the target system, do the following:
   1. Stop all SAP application server instances.
   2. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option ➤ Generic Options ➤ Refresh Database Content

**Using the Database Backup/Restore Method**

Follow the procedure for Oracle backup/restore in Database-Specific System Copy [page 87] and the instructions in Oracle-Specific Procedure [page 89].

1. On the source system, do the following:
   Create a backup of your database following the procedure Oracle backup/restore in Database-Specific System Copy [page 87] and the instructions in Oracle-Specific Procedure [page 89].
2. On the target system, do the following:
   1. Restore the backup of your database following the procedure Oracle backup/restore in Database-Specific System Copy [page 87] and the instructions in Oracle-Specific Procedure [page 89].
   2. Stop all SAP application server instances.
   3. Refresh the database content as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option ➤ Generic Options ➤ Refresh Database Content
Next Steps

Perform the follow-up activities for system copy.
For more information, see Follow-Up Activities [page 135].

Related Information

Running Software Provisioning Manager [page 62]
Follow-Up Activities [page 135]

6.4 Copying the Database Only - Refresh Database Content on IBM Db2 for z/OS

Using the Refresh Database Content option in the software provisioning manager, you can refresh the content of an existing database using a database backup without having to copy the primary application server instance and to reinstall additional applications servers. No new database instance is installed. You can do the refresh using either database-specific methods or the SAP standard method based on R3load.

Prerequisites

- The source system and the target system already exist.
- Prerequisite for using a database-specific method is that source and target database version are identical.
- Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The software provisioning manager will prompt you for this password during the Refresh Database Content procedure.

Context

We recommend that you use option Refresh Database Content if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.
Using the SAP Standard Method

1. On the source system, do the following:
   1. Stop the SAP system.
   2. Perform the database instance export as follows:
      1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
      2. On the Welcome screen, run option <Product> > Software Life-cycle Options > System Copy > <Database> > Source System Export > <Distribution Option> > Based on AS ABAP > Database Instance Export
   2. On the target system, do the following:
      1. Stop all SAP application server instances, but leave the ASCS instance running.
      2. Refresh the database content as follows:
         1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
         2. On the Welcome screen, run option <Product> > Software Life-cycle Options > System Copy > <Database> > Source System Export > <Distribution Option> > Based on AS ABAP > Database Instance Export

Using the Database-Specific Method

1. Execute all steps as described in section IBM Db2 for z/OS Specific Procedures [page 111].
2. Refresh the database content as follows:
   1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
   2. On the Welcome screen, run option <Product> > Software Life-cycle Options > System Copy > <Database> > Source System Export > <Distribution Option> > Based on AS ABAP > Database Instance Export

Next Steps

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 135].

Related Information

Running Software Provisioning Manager [page 62]
Follow-Up Activities [page 135]
6.5 Copying the Database Only - Refresh Database Content on SAP MaxDB

Using the Refresh Database Content option in the software provisioning manager, you can refresh the content of an existing database using a database backup without having to copy the primary application server instance and to reinstall additional applications servers. No new database instance is installed. You can do the refresh using either database-specific methods or the SAP standard method based on R3load.

Prerequisites

- The source system and the target system already exist.
- If you want to use the database backup/restore method, source and target database version must match. You cannot use a target database version that is lower than the source database version.
- No kernel media and no RDBMS media are required.
- Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The software provisioning manager will prompt you for this password during the Refresh Database Content procedure.

Context

We recommend that you use option Refresh Database Content if you need to equalize the database content of two or more already existing and configured systems, for example in automatized system landscapes with “template” systems which have to correspond to precisely defined standards, such as predefined host names, network settings, users, security policies.

Using the SAP Standard Method

On the source system, do the following:

1. Stop the SAP system.
2. Perform the database instance export as follows:
   1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
   2. On the Welcome screen, run option <Product> Software Life-cycle Options System Copy <Database> Source System Export <Distribution Option> Based on AS ABAP Database Instance Export

On the target system, do the following:

1. Stop all SAP application server instances, but leave the ASCS instance and the database instance running.
2. Refresh the database content as follows:
   1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
   2. On the Welcome screen, run option ★Generic Options ★Refresh Database Content★

Using the Database Backup/Restore Method

On the source system, do the following:

Create Database Backup. If you want to import the content using the software provisioning manager, you perform the backup into single backup file.

You can also use other backup types. In this case, you must do the restore of the content manually, the software provisioning manager will stop when reaching the appropriate processing step. For more information, see SAP MaxDB-Specific Procedure [page 104], subsection Prerequisites.

On the target system, do the following:

1. Stop all SAP application server instances, but leave the ASCS instance and the database instance running.
2. Make the backup available on the target system.
3. Define the backup template, which is referencing the backup from the source system. For more information regarding backup template definition read MaxDB online Help at http://maxdb.sap.com/Documentation SAP MaxDB <version> Library Database Administration Backing Up Databases
4. Refresh the database content as follows:
   1. Start the software provisioning manager on the database host as described in Exporting the Source System [page 58].
   2. On the Welcome screen, run option ★Generic Options ★Refresh Database Content★

Next Steps

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 135].

Related Information

Running Software Provisioning Manager [page 62]
SAP MaxDB-Specific Procedure [page 104]
Follow-Up Activities [page 135]
7 Follow-Up Activities

To finish the system copy of your SAP system, perform the follow-up activities described in the following sections.

Related Information

Performing Follow-Up Activities in the Source System [page 136]
Performing Follow-Up Activities in the Target System [page 137]
8 Performing Follow-Up Activities in the Source System

This section describes the follow-up steps that you have to perform in the source system after the target system installation has completed.

Procedure

1. Reschedule released jobs.

   If you stopped scheduling of released jobs and of jobs that must run periodically before you started the system copy procedure, release them again by running report BTCTRNS2. For more information, see General Technical Preparations [page 42].

2. Using CCMS, adapt your operation mode timetable to the original status (transaction SM37).
9 Performing Follow-Up Activities in the Target System

You have to perform the following follow-up activities in the target system.

Installing the SAP License Key [page 137]
Once the installation of the target system is completed and the SAP system copy has been imported, you have to install a new SAP license key.

SAP Solution Manager: Connection Between SLD and LMDB [page 138]
For an SAP Solution Manager system, check the connection between System Landscape Directory (SLD) and Landscape Management Database (LMDB).

Performing Follow-Up Activities for ABAP [page 139]

Checking the Database Parameters for IBM Db2 for Linux, UNIX, and Windows [page 147]

Performing Jobhead Correction after Homogeneous System Copy [page 148]

9.1 Installing the SAP License Key

Once the installation of the target system is completed and the SAP system copy has been imported, you have to install a new SAP license key.

You must install a permanent SAP license. When you install your SAP system, a temporary license is automatically installed.

⚠️ Caution

- Before the temporary license expires, you must apply for a permanent license key from SAP. We recommend that you apply for a permanent license key as soon as possible after installing your system.
- Before installing the license key, make sure that SAP Note 831812 is applied.

For more information about ordering and installing the SAP license, see the SAP Library for your release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="http://help.sap.com/nw70">http://help.sap.com/nw70</a></td>
</tr>
</tbody>
</table>
More Information

For more information about SAP license keys, see https://support.sap.com/en/my-support/keys.html.

9.2 SAP Solution Manager: Connection Between SLD and LMDB

For an SAP Solution Manager system, check the connection between System Landscape Directory (SLD) and Landscape Management Database (LMDB).

- Consider the following if you move parts of a system, for example the database, or the complete system to new hardware:
  - Each change in the host name generates new elements in the system landscape directory (SLD) which can result in system duplicates.
  - SAP recommends using stable (virtual) host names which remain constant over time, in the system profiles. SAP Note 1052122 lists the profile parameters evaluated by the SLD Data Suppliers for the host names.
  - If you omitted to use virtual host names at installation time or if you cannot use virtual host names now, the SLD offers a possibility to prevent the creation of system duplicates. For more information, see SAP Note 1727294.
  - If you cannot apply SAP Note 1727294 to the SLD, and if you already found a duplicate registration for the system in the SLD, refer to SAP Note 1694004 for guidance how to clean up such inconsistencies. SAP Note 1747926 describes the cleanup procedure for older SLD releases.
  - If you want to copy an SAP Solution Manager system with a filled Landscape Management Database (LMDB), see SAP Note 1797014.
  - If you want to create a new synchronization connection between the Landscape Management Database (LMDB) and the System Landscape Directory (SLD), see SAP Note 1699142.
• If you want to delete a synchronization connection between two SLD systems or between an SLD system and LMDB, see SAP Note 1770691.

9.3 Performing Follow-Up Activities for ABAP

Note
Make sure that you also complete the post-installation steps contained in the installation guide [page 24]. This system copy guide describes only the system copy-specific steps that are required in addition.

Activities at Operating System Level [page 139]
This section includes the adaptations that you have to make at operating system level in your target system.

Activities at Database Level [page 140]
This section includes the adaptations that you have to make at database level in your target system.

Activities at SAP System Level [page 141]
This section includes the adaptations that you have to make at SAP system level in your target system.

Checking the Target System [page 146]
The following actions are suitable for checking the consistency of the target system.

Replacing the PSEs in the Target System [page 146]
Replace all existing PSEs in the target systems with new ones, which contain the new system’s information. Proceed as follows:

9.3.1 Activities at Operating System Level

This section includes the adaptations that you have to make at operating system level in your target system.

Procedure

1. Adapt the configuration files at operating system level to meet network and SAP requirements.
2. Adapt additional SAP software components (for example, RFC, CPIC, SAP ArchiveLink) if required.
3. Adapt additional non-SAP software components (for example, archiving systems, monitoring tools, job schedulers) if required.
4. Adapt backup programs (for example, BRBACKUP, BRARCHIVE, BACKINT) if required.
5. Adapt non-SAP directories, file systems, NFS mounts, and so on, if required.
6. Check the SAP parameters of the default and instance profiles.
7. Check your UNIX shell files for special entries.
8. Check `crontab` or `AT` jobs.
9. Check operating system files (for example, `.netrc`, `.rhosts`).
10. Check operating system printers.
11. If the spool requests are stored at file system level, you must copy the subdirectories with the spool files to the new global directory. For more information, see SAP Note 20176.
12. Oracle Database only: Adapt the database profiles `init<SAPSID>.ora`, `init<SAPSID>.dba`, and `init<SAPSID>.sap`.

### 9.3.2 Activities at Database Level

This section includes the adaptations that you have to make at database level in your target system.

#### Procedure

1. Before starting the SAP system, make sure that the logging mechanism of the database is active.
2. Check the parameters in the database profiles.
3. Oracle Database only: Perform the following steps:
   a. Delete all entries from the following tables:
      - `DBSTATHORA`
      - `DBSTAIHORA`
      - `DBSTATIORA`
      - `DBSTATTORA`.
   b. Delete the user `OPS$<SOURCE_SAPSID>ADM`.
   c. If you changed the `<DBSID>` during the system copy, we recommend that you adapt the `global_name` parameter by using the following SQL command:
      ```sql
      alter database rename global_name to <NEW_DBSID>;
      ```
      If the parameter does not exist on your system, ignore this step.
4. Run report `RSSDBTICMCLEANUP` in the following cases:
   - You copied a system using SAP MaxDB in both the source system and the target system.
   - You copied a system and changed the database platform from SAP MaxDB to a different database platform.

   For more information, see SAP Note 1179714.

#### Next Steps

**MS SQL Server only**: Clean up the `DB13` job-related tables and `msdb` jobs as described in SAP Note 1817705.
9.3.3 Activities at SAP System Level

This section includes the adaptations that you have to make at SAP system level in your target system.

**Note**

You can use ABAP post-copy automation (PCA) to automatically perform follow-up activities at system level. ABAP post-copy automation (PCA) provides task lists with a predefined sequence of configuration tasks to configure extensive technical scenarios automatically. For more information, see SAP Note [1614266](https:// notes.sap.com/1614266).

To be able to use PCA, you must install the license for SAP Landscape Virtualization Management Enterprise Edition. For more information, see SAP Note [1912110](https://notes.sap.com/1912110).

**Procedure**

1. If you performed a Unicode conversion using as target system ID the same `<SAPSID>` as the source system ID and the (local or NIS-mounted) operating system users of the target system still have the environment of the operating system users of the source system, you need to update the user environment for the operating system users of the target system as follows:

   Update the `PATH` variable so that it points to the platform-specific directory for Unicode.

   **Example**

   Update the `PATH` value `/usr/sap/<SAPSID>/SYS/exe/nuc/linuxx86_64` to `/usr/sap/<SAPSID>/SYS/exe/uc/linuxx86_64`.

2. Run an installation check: [Administration] [System administration] [Administration] [Installation Check](transaction SM28).

3. Configure the Transport Management System (transaction STMS).

   **Note**

   If you changed the `<SAPSID>` during the system copy, all open transport, repair, and customizing requests that have not been released in the source system will be released automatically. If you did *not* change the `<SAPSID>`, open requests will *not* be released automatically.

4. Adapt the transport parameters and transport routes in the Transport Management System (TMS) as follows:

   a. Call transaction STMS.

   b. To adapt the transport parameters, choose [Overview] [Systems] [your system] [Transport Tool].

   c. To adapt the transport routes, choose [Overview] [Transport Routes].

5. Delete all entries from the following tables: `ALCONSEG`, `ALSYSTEMS`, `DBSNP`, `MONI`, `OSMON`, `PAHI`, `SDBAD`, `SDBAH`, `SDBAP`, `SDBAR` (transaction SE11).

6. Delete canceled and finished jobs.
Execute ABAP program RSBTCDEL, marking the field delete with forced mode: Tools > ABAP Workbench > ABAP Editor (transaction SE38).

7. Adapt all jobs needed in the target system:
   a. Copy the old jobs.
   b. Modify the new jobs.
   c. Delete the old jobs.

8. Check the consistency of the Temporary Sequential Objects (TemSe) and spool requests.
   Call transaction SP12 or choose SAP Menu > Tools > CCMS > Print > TemSe Administration and run report RSP01043. For more information, see SAP Notes 98065 and 48400.

9. Adapt the definition of the printers to meet the new system requirements:
   - Device types and character set definitions
   - Spool servers
   - Output management systems (OMS)

10. Delete entries in table DDLOG for buffer synchronization.

11. Synchronize the buffers as described in SAP Note 36283 and adapt the client information for the logical system.


13. If you have performed a system copy with R3load, you must set up the trusted and trusting RFC relationships again.


15. Check the ABAP Secure Store [page 144].

16. Create new operation modes and remove old ones:
   a. Create new operation modes and instance definitions.
   b. Maintain the time table using the new operation modes.
   c. Delete the old operation modes and old instance definitions.

17. Adapt the operation mode time tables (CCMS): Tools > Administration > CCMS > Configuration > Operation mode calendar (transaction SM63).

18. Adapt the instances and profiles (CCMS): Tools > Administration > CCMS > Configuration > OP modes/instances (transaction RZ04).

19. Define or remove the SAP system users and revise the authorizations of the system users: Tools > Administration > User maintenance > Users (transaction SU01).

20. Run transaction SE14 to delete all entries from tables TPFET and TPFHT. These contain information about changes made to the profile of your source system.
    IBM DB2 i: Use the commands CLRPFM R3<SAPSID>DATA/TPFET and CLRPFM R3<SAPSID>DATA/TPFHT.

21. Adapt other CCMS settings (for example, alert thresholds, reorganization parameters of CCMS table MONI) if required.

22. Delete all entries from table TLOCK, which holds the repair requests from your source system.
23. Make data archived in the source system (data that does not reside in the database but was moved to a different storage location using SAP Archive Management) accessible in the target system. Adapt the file residence information in the target system. For more information, see the SAP Online Documentation (SAP Web Application Server ➔ System Administration ➔ Application Data Archiving and Reorganization).

24. Redefine database actions (backup, update statistics, and so on) if you have used the DBA calendar in the source system (transaction DB13).

25. Check the logon groups and the assignment of the application servers to the logon groups (transaction SMLG). If required, create new logon groups and assign the new application servers to these logon groups.

26. Check the connection to SAPNet – R/3 Frontend (transaction OSS1).

27. Check self-defined external commands (transaction SM69).

28. Check entries of the following tables in all relevant systems:
   - TXCOM (transaction SM54)
   - THOST (transaction SM55)

29. Check the logical system names. For more information, see Preparations [page 42]. If you need to change logical system names in the system that results from the copy, change the logical system names at this time, as described in SAP Notes 103228 and 544509. Follow your corporate naming strategy for logical systems when making this change.

   BW customers: If you have copied an SAP BW system, see SAP Note 325525.

30. For every client in your SAP system check the detail settings (client role, changes and transports for client-dependent objects, changes for client-independent objects, protection level, restrictions) (transaction SCC4).

31. Check if you can delete clients that are no longer used in the target system (transaction SCC5).

32. Check the contexts and segments of remote application servers for the SAP Monitoring Infrastructure if required (transaction RZ21).

33. Configure the domain controller in the Transport Management System (TMS) by using transaction STMS.

34. Post-processing for customer objects:
   - If customer objects are not original in the new system, use transaction SE06 to modify the corresponding entries in table TADIR.
   - If you encounter problems modifying a customer development class using transaction STMS or SM31, try using the option Validate (ENTER) instead of the option Save to save your changes.

35. ABAP Program Loads

   The ABAP loads are platform-dependent programs that are generated during runtime and stored in database tables. They are not exported when you use the R3load procedure to copy your SAP system. The ABAP loads are generated in the target system when they are first used. This might, however, reduce production system performance. To avoid this, you can use transaction SGEN to generate the missing loads.

   Load generation requires a large amount of system resources. Therefore, it makes sense to schedule the generation job to run overnight.

   For a detailed description of the features, see the online documentation in transaction SGEN by choosing Information on the SAP Load Generator, or in the Job Monitor by choosing Job Monitor.

36. If you changed the database management system (for example, IBM i to MaxDB) when copying the system, you have to start program RS_BW_POST_MIGRATION in the background with variant SAP&POSTMGRDB. If you did not change the database management system when copying the system,
you have to start program RS_BW_POST_MIGRATION in the background by using variant SAP&POSTMGR. Program RS_BW_POST_MIGRATION performs necessary modifications on database-specific objects (mainly BW objects).

**Note**
You are required to perform the step independently of whether your target system is an SAP BW system or not.

Relevant for IBM Db2 for Linux, UNIX, and Windows (IBM Db2) version 10.5 and higher only: If you want to implement DB2 BLU Acceleration on your migrated SAP BW system, also follow the instructions in the appendix of the database administration guide *SAP Business Warehouse on IBM Db2 for Linux, UNIX, and Windows: Administration Tasks*, available at https://help.sap.com/viewer/db6_admin.

### Related Information

Checking the ABAP Secure Store [page 144]

### 9.3.3.1 Checking the ABAP Secure Store

You check the ABAP Secure Store as follows.

**Procedure**

1. Start transaction SECTORE.
2. Choose Check Entries and Execute.
3. Filter the result by error messages:
   - If you see at least one error message of type SECTORE 030 ("Incorrect global key for entry ..."), proceed as follows:
     1. Restore a legacy key-file that was used in the source system.
You can find information about this process in the SAP Library for your release at:

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td>[<a href="http://help.sap.com/nw70">http://help.sap.com/nw70</a>][1] Application Help</td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability Security</td>
</tr>
<tr>
<td></td>
<td>System Security System Security for SAP</td>
</tr>
<tr>
<td></td>
<td>NetWeaver AS ABAP Only Secure Storage (ABAP)</td>
</tr>
<tr>
<td></td>
<td>Importing Keys after a System Copy</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 1</td>
<td>[<a href="http://help.sap.com/nw701">http://help.sap.com/nw701</a>][1] Application Help</td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability Security</td>
</tr>
<tr>
<td></td>
<td>System Security System Security for SAP</td>
</tr>
<tr>
<td></td>
<td>NetWeaver AS ABAP Only Secure Storage (ABAP)</td>
</tr>
<tr>
<td></td>
<td>Importing Keys after a System Copy</td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability Security</td>
</tr>
<tr>
<td></td>
<td>System Security System Security for SAP</td>
</tr>
<tr>
<td></td>
<td>NetWeaver AS ABAP Only Secure Storage (ABAP)</td>
</tr>
<tr>
<td></td>
<td>Importing Keys after a System Copy</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td>[<a href="http://help.sap.com/nw703">http://help.sap.com/nw703</a>][1] Application Help</td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability Security</td>
</tr>
<tr>
<td></td>
<td>System Security System Security for SAP</td>
</tr>
<tr>
<td></td>
<td>NetWeaver AS ABAP Only Secure Storage (ABAP)</td>
</tr>
<tr>
<td></td>
<td>Importing Keys after a System Copy</td>
</tr>
</tbody>
</table>

2. Repeat the check.

- If you see at least one error message of type SECSTORE 031 ("System-dependent data for entry … changed: …"), you must perform a record migration.

You can find information about this process in SAP Note 816861.
9.3.4 Checking the Target System

The following actions are suitable for checking the consistency of the target system.

**Procedure**

1. Perform an initial consistency check (transaction SM28).
2. Check the system log on all application servers (transaction SM21). In case of warnings, see SAP Note 43434.
3. Check the consistency of the database (transaction DB02).
4. Perform a server check (transaction SM51).
5. Test transactions frequently used by the customer.
6. FI customers: Run the job SAPF190 (accounting reconciliation) and compare the results to those gained on the source system before the system copy.
7. FI customers: Run the jobs RFUMSV00 (tax on sales/purchases), RAGITT01 (asset history sheet), RAZUGA01 (asset acquisitions), and RAABGA01 (fixed asset retirements) and compare the results to those gained on the source system before the system copy.
8. CO customers: Run the report group 1SIP and compare the results to those gained on the source system before the system copy.

9.3.5 Replacing the PSEs in the Target System

Replace all existing PSEs in the target systems with new ones, which contain the new system’s information. Proceed as follows:

**Procedure**

1. In your ABAP system, call transaction STRUST.
2. Proceed as described in the documentation Creating or Replacing a PSE in the SAP Library at: http://help.sap.com/nw70

**Note**

- Since replacing a PSE will remove all of the previously used certificates, also import all necessary trusted certificates into the new PSE’s certificate list. (Check the old PSE’s certificate list.)
- Distribute the new PSE’s public-key certificate to the systems where it will be used.
• Make sure the new PSE contains the new system ID.

• Note the naming conventions to use for each PSE. The naming conventions are usually specified by the Certification Authority (CA) where you obtain the certificate, however, the type of PSE also has some restrictions, for example, for the SSL server PSE, the CN part of the Distinguished Name must be the host name used to access the server. For the system PSE, we recommend using the SID as the CN part. Therefore, make sure that the Distinguished Name used for the PSE conforms with the naming convention that applies.

9.4 Performing Follow-Up Activities for ABAP

9.5 Checking the Database Parameters for IBM Db2 for Linux, UNIX, and Windows

**i Note**

This section is only valid if your database is IBM Db2 for Linux, UNIX, and Windows.

After installation has completed, make sure that you check the parameters of the database configuration and of the database manager configuration. A check of the database parameters ensures that your database parameters conform with the latest SAP recommendations where necessary and are adapted to your needs.

**Procedure**

You can check the parameters of the database in one of the following ways:

• Compare the current parameters of your database with the parameters as they are recommended for SAP systems in the following SAP Notes:

<table>
<thead>
<tr>
<th>Database Version</th>
<th>Corresponding SAP Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 V9.7</td>
<td>1329179</td>
</tr>
<tr>
<td>IBM Db2 10.1</td>
<td>1692571</td>
</tr>
<tr>
<td>IBM Db2 10.5</td>
<td>1851832</td>
</tr>
<tr>
<td>IBM Db2 11.1</td>
<td>2303771</td>
</tr>
<tr>
<td>IBM Db2 11.5</td>
<td>2751102</td>
</tr>
</tbody>
</table>
• Use the DBA Cockpit to compare the current parameters with the standard parameters. In the DBA Cockpit (transaction DBACOCKPIT), on the Database tab page, choose Configuration Parameter Check.

**i Note**
The parameter check in the DBA Cockpit is available as of SAP Basis 7.00 with enhancement package 2 and support package 6. For more information about the parameter check, see the Database Administration Guide: Database Administration Using the DBA Cockpit – IBM Db2 for Linux, UNIX, and Windows listed in Online Information from SAP [page 207].

9.6 Performing Jobhead Correction after Homogeneous System Copy

This topic is only valid for 'Platform': z/OS

**Use**

**i Note**
This section is only relevant for customers using CCMS to monitor their SAP systems.

After copying your system, the CCMS jobhead still points to the former database SSID. To complete the homogeneous system copy, the SSID needs to be set to the target system.

**Caution**
Only experienced users should use this utility.

**Procedure**

To set the SSID to the target system:
1. Call transaction DBACOCKPIT.
2. Choose Configuration Homogeneous System Copy: Jobhead Correction.
3. Modify the necessary data.
Homogeneous System Copy Jobhead Correction

This screen allows you to copy all jobheads from D6Y0 to ABCD. By default, the original jobheads of D6Y0 will be removed. You can keep the original jobheads by selecting the check box.

The JCL job card (SAP term: Jobhead) of a JCL job determines for example the user, under which the JCL job is executed, or the message class. JCL jobs are used to LINKEDIT and BIND SAPCL and to retrieve the BACKUP SYSTEM Utility History. DB13 is able to create and upload JCL jobs for RUNSTAS, REORG and COPY.

The jobheads are stored in table DB2JOB and SSID as part of the jobhead key. The key is:

\[ \text{JOBNAME=JOBHEAD_<SSID>} \].

You can edit the jobhead in [DBA Cockpit > Configuration > Job Profile/DBA Cockpit > Jobs > Jobs Profile].

After performing a system copy (typically the database SSID changes) you need to copy or rename the jobheads to the new database SSID. If you skip this action, a default jobhead is used. The jobheads of the system copy source system are not used.

In case of DB2 data sharing, you need to proceed this action for each data sharing member.

In case, that you do not use functionality which is based on JCL jobs, you can skip this action completely.
10 Additional Information

Related Information

R3load Procedures Using the Migration Monitor [page 150]
Analysis of the Export and Import Times [page 177]
Table Comparison with Software Update Manager [page 177]
Using the Package Splitter [page 181]
Database Instance Installation on Oracle Automatic Storage Management [page 199]
Additional Information about the “OraBRCopy” Tool [page 203]
Online Information from SAP [page 207]

10.1 R3load Procedures Using the Migration Monitor

This section contains user documentation about the migration monitor system copy tool.

About the Migration Monitor [page 151]
This section lists the functions and features of the Migration Monitor.

Configuration [page 153]
Assigning DDL Files to Packages [page 166]
Defining Groups of Packages [page 167]
Processing Split Tables [page 168]
If tables have been split during the export, ensure before the import starts that the table exists (only once) and that the primary key and the indexes are created (only once) before or after (as defined in the DDL template) the table data has been imported. These tasks are automatically synchronized by the migration monitor.

Starting the Migration Monitor [page 169]
Using the migmonCtrl Add-On for the Export [page 173]
Output Files [page 175]
Installing the Target System Using the Migration Monitor [page 176]
10.1.1 About the Migration Monitor

This section lists the functions and features of the Migration Monitor.

Purpose

The Migration Monitor does the following:

- Creates R3load command files
- Creates R3load task files if required
- Starts R3load processes to unload the data
- Transfers packages from source to target host if required
- Starts R3load processes to load data as soon as a package is available
- Informs the person performing the system copy in the event of errors

Note

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPuptool - which were available so far only in the SAPEXEDB_<...>.SAR archive of the kernel media, has now been made available in the software provisioning manager archive (70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB_<...>.SAR archive of the kernel media. There is no action required from your side; the software provisioning manager uses the relevant loadtools automatically once you run it from the extracted 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive. For more information, see SAP Note 2472835.

The Migration Monitor is integrated in the software provisioning manager, but it is also possible to start the Migration Monitor manually with the corresponding option in the software provisioning manager. To do this, you require a properties file.

Note

IBM Db2 for Linux, UNIX, and Windows only:

If you run the migration monitor manually for the import phase, you must use the DDLDB6.TPL file that was created by SWPM during the system copy on the target system. This file is located in the installation directory. It might be different than the DDLDB6.TPL file located with your export. This will be the case if your target system uses tablespace pools and your source system does not.

Caution

For all SAP systems based on SAP NetWeaver 7.0 and higher, you can use the socket option without restrictions.

For more information about how to start the Migration Monitor manually, see Starting the Migration Monitor [page 169].
When you start the Migration Monitor manually:

- You can adjust any parameters. For more information, see Configuration [page 153].
- You gain flexibility – for example, you can repeat, test and abort runs of the Migration Monitor.
- The process becomes more complex since it requires many additional manual activities.
- The properties file has to be created manually.

**Recommendation**

Reuse an existing properties file from previous runs of software provisioning manager as template.

**Tool**

The tool is located in the MIGMON.SAR SAPCAR archive. The archive file contains the following:

- Scripts:
  - export_monitor.sh/export_monitor.bat
  - import_monitor.sh/import_monitor.bat
  - res_check.sh/res_check.bat
  - import_dirs.sh/import_dirs.bat
- jar archives:
  - migmon.jar
  - rescheck.jar
  - activation.jar
  - mail.jar
- Property files:
  - export_monitor_cmd.properties
  - import_monitor_cmd.properties
- migmonCtrl add-on:
  - Scripts
    - dyn_control_export_monitor.sh/dyn_control_export_monitor.bat
    - dyn_control_import_monitor.sh/dyn_control_import_monitor.bat
  - jar archives
    - migmonctrl.jar
  - Property files:
    - migmonctrl_cmd.properties

**Prerequisites**

The correct directory structure for R3load dump files must exist on both the source and target hosts.
10.1.2 Configuration

The following options can be specified using the property file or using the command line. Command line parameters take precedence over parameters specified in the property file. Options are case-sensitive, that is, options that are not recognized are ignored.

Help

With the following command line options, the tool displays all parameters available: --help, --?

Version

With the following command line option, the tool displays version information: --version

General Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>monitorTimeout</td>
<td>Monitor timeout in seconds</td>
<td>During a timeout, the monitor thread sleeps and does not analyze any files or analyze its processing state. The default timeout value is 30 seconds.</td>
</tr>
</tbody>
</table>

E-Mail Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>mailServer</td>
<td>SMTP server</td>
<td>Server name or IP address of the company SMTP server</td>
</tr>
<tr>
<td>mailFrom</td>
<td>“From” e-mail address</td>
<td>-</td>
</tr>
<tr>
<td>mailTo</td>
<td>“To” e-mail address</td>
<td>Can contain an address list separated by “;” or blanks.</td>
</tr>
</tbody>
</table>
### Additional Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>bg</td>
<td>Enables background mode</td>
<td>Takes effect only as command line option</td>
</tr>
<tr>
<td></td>
<td>If the tool is running in background mode, the UNIX shell windows or Windows command prompt can be closed after startup.</td>
<td></td>
</tr>
<tr>
<td>secure</td>
<td>Enables secure mode</td>
<td>Takes effect only as command line option</td>
</tr>
<tr>
<td></td>
<td>If the tool is running in secure mode, command line parameters (for example, passwords) are hidden for Java processes. Secure mode implicitly enables background mode.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Use this mode if you have to specify passwords on the command line.</strong></td>
<td></td>
</tr>
<tr>
<td>trace</td>
<td>Trace level</td>
<td>Possible values:</td>
</tr>
<tr>
<td></td>
<td><strong>all. off. 1</strong> (error), <strong>2</strong> (warning), <strong>3</strong> (info), <strong>4</strong> (config, default), <strong>5, 6, 7</strong> (trace)</td>
<td></td>
</tr>
</tbody>
</table>

### Export Monitor – Options

**Export Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>installDir</td>
<td>Installation directory</td>
<td>Directory where the installation tool (software provisioning manager 1.0, R3SETUP) is started. If you run the Migration Monitor without using the installation tools, the installation directory is the directory where the R3load TSK and log files are written.</td>
</tr>
<tr>
<td>exportDirs</td>
<td>List of export directories</td>
<td>Separator on Windows: “;” Separator on UNIX, IBM: “:” The exportDirs parameter points to the directory where the R3load dump files are written. In the exportDirs directory, the subdirectories DATA, DB, and DB/&lt;TARGET_DBTYPE&gt;. For example, DB/ORA must exist.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>client</strong></td>
<td>Client operating mode</td>
<td>Running in client mode means that the Migration Monitor runs parallel to standard software provisioning manager export process and transfers the exported dump files to the import server.</td>
</tr>
<tr>
<td><strong>server</strong></td>
<td>Server operating mode</td>
<td>Running in server mode means that the Migration Monitor creates <strong>R3load</strong> TSK files (if necessary), <strong>R3load cmd</strong> files, and starts the <strong>R3load</strong> processes.</td>
</tr>
</tbody>
</table>

All options below are for **server mode**. The import monitor always runs in server mode. If you want to run the export monitor in server mode, specify the **server** parameter in the properties file of the export monitor.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>orderBy</strong></td>
<td>Package order</td>
<td>Can be the name or path of the file that contains package names. If the option value is omitted, package order is not determined.</td>
</tr>
<tr>
<td><strong>ddlFile</strong></td>
<td>DDL control file</td>
<td>Path or filename of DDL control file. The default is <strong>DDL&lt;DBTYPE&gt;.TPL</strong>. If the filename is used without a path, the DDL control file from the export <strong>DB</strong> subdirectory is used.</td>
</tr>
<tr>
<td><strong>ddlMap</strong></td>
<td>DDL mapping file</td>
<td>File with mapping between DDL files and package names.</td>
</tr>
<tr>
<td><strong>r3loadExe</strong></td>
<td>Path of the <strong>R3load</strong> executable</td>
<td>Optional; default is <strong>R3load</strong>. If only the name of the <strong>R3load</strong> executable is available, the JVM looks for the <strong>R3load</strong> executable using operating system-specific process search rules.</td>
</tr>
<tr>
<td><strong>tskFiles</strong></td>
<td><strong>yes</strong> to create task files; <strong>no</strong> to skip</td>
<td>Up to and including version 4.6, this must be set to <strong>no</strong>; as of version 4.7 set to <strong>yes</strong>. If the <strong>R3load</strong> task files <em>.TSK</em> already exist, the monitor does not overwrite them.</td>
</tr>
<tr>
<td><strong>dataCodepage</strong></td>
<td>Code page for data files</td>
<td>See SAP Note 552464. Possible values: 4102, 4103, 1100.</td>
</tr>
<tr>
<td><strong>taskArgs</strong></td>
<td>Additional <strong>R3load</strong> arguments for the <strong>TASK</strong> phase</td>
<td>Appended to the <strong>R3load</strong> command line. Options already set by the monitor: <strong>-ctf</strong>: <strong>-l</strong>.</td>
</tr>
<tr>
<td><strong>loadArgs</strong></td>
<td>Additional <strong>R3load</strong> arguments for the <strong>LOAD</strong> phase</td>
<td>Appended to the <strong>R3load</strong> command line. Options already set by the monitor: <strong>-e</strong>: <strong>-datacodepage</strong>: <strong>-l</strong>: <strong>-p</strong>: <strong>-r</strong>: <strong>-socket</strong> (if the socket option is specified); <strong>-o</strong> (if the omit argument is specified and task files are not used, that is, the value of the <strong>tskFiles</strong> option is <strong>no</strong>).</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>jobNum</strong></td>
<td>Number of parallel export jobs, default: 1</td>
<td>Any positive number. The value can be changed dynamically at runtime.</td>
</tr>
<tr>
<td><strong>decluster</strong></td>
<td>Default value is <strong>false</strong></td>
<td>Possible values: <strong>true</strong> or <strong>false</strong></td>
</tr>
<tr>
<td>(use this option only for target dbType = HDB)</td>
<td></td>
<td>If this option is <strong>true</strong>, the Migration Monitor calls <code>R3load</code> with option <code>-decluster</code>.</td>
</tr>
<tr>
<td><strong>firstExportSAPNTAB</strong></td>
<td>Default values is <strong>false</strong></td>
<td>Possible values: <strong>true</strong> or <strong>false</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this option is <strong>true</strong>, the Migration Monitor first exports the SAPNTAB package in single thread mode.</td>
</tr>
<tr>
<td><strong>onlyProcessOrderBy</strong></td>
<td>If set to <strong>true</strong> only the jobs from file configured with orderBy are processed.</td>
<td></td>
</tr>
</tbody>
</table>

**Network Exchange Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>net</strong></td>
<td>Network operating mode</td>
<td>Exported dump files must be visible on the import host to use this mode.</td>
</tr>
<tr>
<td><strong>netExchangeDir</strong></td>
<td>Network exchange directory</td>
<td>⚠️ Caution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean up the <strong>netExchangeDir</strong> before starting a new export.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Used for communication between the export and import monitors. Must be writable for the export monitor and readable for the import monitor. The export monitor writes a <code>&lt;Package&gt;.SGN</code> file to the network exchange directory as a signal to the import monitor that the package has been exported successfully and that the import can be started.</td>
</tr>
</tbody>
</table>

**FTP Exchange Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ftp</strong></td>
<td>FTP operating mode</td>
<td>Exported dump files are transferred automatically from the source host (directory <code>exportDirs</code>) to the target host (directory <code>importDirs</code>) using FTP.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ftpHost</td>
<td>Remote FTP host</td>
<td>Name or IP address of the import server</td>
</tr>
<tr>
<td>ftpUser</td>
<td>Name of the remote FTP user</td>
<td>The FTP user specified here should be <code>&lt;sapsid&gt;adm</code> to make sure that the package files can be read during the import (which is started as <code>&lt;sapsid&gt;adm</code>).</td>
</tr>
<tr>
<td>ftpPassword</td>
<td>Password of the remote FTP user</td>
<td>△ Caution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Security risk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For more information, see the <code>secure</code> parameter in section Additional Options.</td>
</tr>
<tr>
<td>ftpExportDirs</td>
<td>List of remote FTP directories for export dump</td>
<td>Both <code>;</code> and <code>:</code> separators are valid. This is the directory on the target host to which the dump is transferred. The value is the same as for <code>importDirs</code> in the properties file of the import monitor.</td>
</tr>
<tr>
<td>ftpExchangeDir</td>
<td>Remote FTP exchange directory</td>
<td>Used for communication between the export and import monitors. Must be writable for the export monitor and readable for the import monitor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>△ Caution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean up the <code>ftpExchangeDir</code> before starting a new export.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The export monitor writes a <code>&lt;Package&gt;.SGN</code> file to the FTP exchange directory as a signal for the import monitor that the package is exported successfully and that the import can be started.</td>
</tr>
<tr>
<td>ftpJobNum</td>
<td>Number of parallel FTP jobs; the default is 1.</td>
<td>Any positive number; 0 for an unlimited number of jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The value can be changed dynamically at runtime.</td>
</tr>
</tbody>
</table>
### Export Socket Host

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>socket</strong></td>
<td>Socket operating mode</td>
<td><strong>R3load</strong> does not write dump files to the file system but the export and import work through the socket connection.</td>
</tr>
<tr>
<td><strong>host</strong></td>
<td>Remote import host</td>
<td>Name or IP address of the import host.</td>
</tr>
<tr>
<td><strong>port</strong></td>
<td>Host port number</td>
<td>Must be the same as the port number on the import host. Any free port on the import host from <strong>1024</strong> to <strong>65535</strong>.</td>
</tr>
</tbody>
</table>

### FTP Copy Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ftpCopy</strong></td>
<td>FTP copy operating mode</td>
<td>Used as a separate program call for migration with sockets if no share directory is used. All files produced by <strong>R3ldct1</strong> and <strong>R3szchk</strong> are transferred from the source to the target host using FTP.</td>
</tr>
<tr>
<td><strong>exportDirs</strong></td>
<td>List of export directories</td>
<td>Separator on Windows: “;” Separator on UNIX, IBM i: “:” In the <strong>exportDirs</strong> directory, the subdirectories <strong>DATA</strong>, <strong>DB</strong>, and <strong>DB/&lt;TARGET_DBTYPE&gt;</strong> (for example, <strong>DB/ORACL</strong>E) must exist. The <strong>R3load STR</strong> files have to exist in the subdirectory <strong>DATA</strong>, the <em><em>DDL</em>.TPL</em>* files in the subdirectory <strong>DB</strong>, and the <strong>R3load EXT</strong> files (if required) in the subdirectory <strong>DB/&lt;TARGET_DBTYPE&gt;</strong>.</td>
</tr>
<tr>
<td><strong>ftpHost</strong></td>
<td>Remote FTP host</td>
<td>Name or IP address of the import server</td>
</tr>
<tr>
<td><strong>ftpUser</strong></td>
<td>Name of the remote FTP user</td>
<td>The FTP user specified here must be <code>&lt;sapsid&gt;adm</code> to make sure that the package files can be read during the import (which is started as <code>&lt;sapsid&gt;adm</code>).</td>
</tr>
<tr>
<td><strong>ftpPassword</strong></td>
<td>Password of the remote FTP user</td>
<td>☢️ Caution Security risk</td>
</tr>
<tr>
<td><strong>ftpExportDirs</strong></td>
<td>List of remote FTP directories for export dump</td>
<td>Both “;” and “:” separators are valid. This is the directory on the target host to which the dump is transferred. The value is the same as for <strong>importDirs</strong> in the properties file of the import monitor.</td>
</tr>
</tbody>
</table>

Any other option is ignored by the export monitor.
Export Options for the “migmonCtrl” Add-On

The *migmonctrl* add-on was developed to improve the performance of the export by offering new export strategies.

These are the following:

- **“export by size”**
  The *.EXT* files are used.

- **“export by runtime”**
  The information is taken from the migration time analyzer output file *export_time.txt*. If you also did an import already, you can add the *import_time.txt* file as well. The additional options are added to the *export_monitor_cmd.properties* file.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>migmonCtrl</em></td>
<td>Enabling the add-on</td>
<td>-</td>
</tr>
<tr>
<td><em>orderBy</em></td>
<td>File with package order</td>
<td>If <em>migmonCtrl</em> is set, the file is created dynamically. It still has the same format as the <em>order_by</em> file, which you can create manually. If it is created by the add-on, the file has two groups called <em>LARGE</em> and <em>SMALL</em>. Depending on the sort order (size or runtime), the packages are listed from biggest/longest to smallest/shortest in group <em>LARGE</em> and from smallest to biggest in group <em>SMALL</em>. Therefore the biggest and smallest packages are exported together. This ensures that the biggest tables are exported right from the beginning but also that input is provided to the import side by exporting the smallest table.</td>
</tr>
<tr>
<td><em>jobNumLarge</em></td>
<td>Amount of jobs set in group <em>LARGE</em></td>
<td>The number can be changed during runtime.</td>
</tr>
<tr>
<td><em>jobNumSmall</em></td>
<td>Amount of jobs set in group <em>SMALL</em></td>
<td>The number can be changed during runtime. To keep up the number of <em>jobNumLarge + jobNumSmall</em>, packages from group <em>LARGE</em> are moved into group <em>SMALL</em> when the number of unprocessed packages in group <em>SMALL</em> becomes smaller than <em>jobNumSmall</em>. In addition to that, <em>jobNumSmall</em> is increased when the number of unprocessed packages in group <em>LARGE</em> becomes smaller than <em>jobNumLarge</em>.</td>
</tr>
</tbody>
</table>
### Option: customSortOrderFile
- **Description**: If certain jobs need to be exported right from the start, they can be configured in this file.
- **Comment**: SAPAPPL0_24_1 REPOSRC T100 /BIC/MYBWTABLE

### Export by Size

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>extFileDir</td>
<td>Absolute path of EXT files generated by R3szchk</td>
<td>Mandatory if the export is to be sorted by size</td>
</tr>
</tbody>
</table>

### Export by Runtime

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>exportTimeFile</td>
<td>Absolute path of file export_time.txt created by migtime.jar</td>
<td>Mandatory if the export is to be sorted by runtime</td>
</tr>
<tr>
<td>importTop</td>
<td>Amount of analyzed packages used from file import_time.txt</td>
<td>Can only be used if parameter importTimeFile is set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For parallel export/import, long running jobs on the import side need to be exported first.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The importTop option adds the long running jobs on top of group LARGE.</td>
</tr>
<tr>
<td>importTimeFile</td>
<td>Absolute path of file import_time.txt created by migtime.jar</td>
<td>Optional</td>
</tr>
</tbody>
</table>

### Package Filter Files

With package filter files you can distribute the export over several servers. To use this feature you have to create the filter files first. This requires a separate run of the migration monitor. For this you can temporarily add the following options to the export_monitor_cmd.properties file or simply add them to the command line.

#### Creating Package Filter Files

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>createPackageFilter</td>
<td>Needs to be set to create package filter files.</td>
<td></td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>excludePackage</td>
<td>Comma separated string</td>
<td>Packages that must not be included in the filter file</td>
</tr>
<tr>
<td>outputFile</td>
<td>package_list_%hostName%.txt</td>
<td>Location and name of result files %hostName% is replaced with the actual name of the host.</td>
</tr>
<tr>
<td>hostNames</td>
<td>Comma separated string</td>
<td>The names are only used for the file name: &lt;outputFile&gt;_&lt;hostName&gt;.txt</td>
</tr>
</tbody>
</table>

Using Package Filter Files

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>onlyProcessOrderBy</td>
<td>-</td>
<td>If this option is set to true, only the jobs from orderBy file are processed.</td>
</tr>
<tr>
<td>packageFilter</td>
<td>package_list_%hostName%.txt</td>
<td>File that contains packages used for the export. This can be used if the export is to be executed on multiple hosts.</td>
</tr>
<tr>
<td>netStatisticsFile</td>
<td>package_filter_%hostName%.statistics</td>
<td>If parallel export/import is chosen, this file is created when the Migration Monitor has finished all jobs from the package list.</td>
</tr>
</tbody>
</table>

Mandatory Options for the Export Monitor

- Client mode: `installDir`, `exportDirs`, one of the options `ftp.net` (and their related parameters)
- Server mode: `installDir`, `exportDirs`, `tskFiles`, one of the options `ftp.net`, `socket` (and their related parameters)

**Note**
The value of the `dbType` option is determined automatically in the shell script or batch files from the `dbms_type` environment variable.
## Import Monitor – Options

### Import Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>installDir</strong></td>
<td>Installation directory</td>
<td>The installation directory is the directory in which the installation tools (<em>software provisioning manager 1.0.R3SETUP</em>) are started. When you run the Migration Monitor without using the installation tools, the installation directory is the directory where the <strong>R3load TSK</strong> and log files are created.</td>
</tr>
<tr>
<td><strong>importDirs</strong></td>
<td>List of import directories</td>
<td>Separator on Windows: &quot;;&quot; Separator on UNIX, IBM i: &quot;:&quot; The <strong>importDirs</strong> parameter points to the directory where the R3load dump files are written. In the <strong>importDirs</strong> directory, the subdirectories <strong>DATA</strong>, <strong>DB</strong>, and <strong>DB/&lt;TARGET_DBTYPE&gt;</strong> (for example, <strong>DB/ORA</strong>) must exist.</td>
</tr>
<tr>
<td><strong>orderBy</strong></td>
<td>Package order</td>
<td>This option is used only if the import monitor works without the export monitor in standalone mode, that is, all export dump files are available on the import host before the import monitor is started. Values can be:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>name</strong>: Load packages in alphabetical order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>size</strong>: Load packages starting with the largest one or a path of the file that contains the package names</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the option is omitted then the package order is not defined.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>ddlFile</strong></td>
<td>DDL control file</td>
<td>Path or file name of DDL control file The default is <code>DDL&lt;DBTYPE&gt;.TPL</code>. If the file name is used without path, the DDL control file from the export DB subdirectory is used.</td>
</tr>
<tr>
<td><strong>i Note</strong></td>
<td><strong>IBM Db2 for Linux, UNIX, and Windows only:</strong></td>
<td>If you run the migration monitor manually for the import phase, you must use the DDLDB6.TPL file that was created by SWPM during the system copy on the target system. This file is located in the installation directory. It might be different than the DDLDB6.TPL file located with your export. This will be the case if your target system uses tablespace pools and your source system does not.</td>
</tr>
<tr>
<td><strong>ddlMap</strong></td>
<td>DDL mapping file</td>
<td>File with mapping between DDL files and package names</td>
</tr>
<tr>
<td><strong>r3loadExe</strong></td>
<td>Path of the R3load executable</td>
<td>Optional; default is R3load. If only the name of the R3load executable is available, the JVM looks for the R3load executable using operating system-specific search rules for the process.</td>
</tr>
<tr>
<td><strong>tskFiles</strong></td>
<td>yes to create task files; no to skip</td>
<td>Before version 4.6, this must be set to no. Starting from version 4.7, it must be set to yes. If the R3load task files *.TSK already exist, the monitor does not overwrite them.</td>
</tr>
<tr>
<td><strong>extFiles</strong></td>
<td>yes to include EXT files; no to skip</td>
<td>Add EXT file entries to cmd files. If the EXT files cannot be found in the DB/&lt;TARGET_DBTYPE&gt; import dump subdirectory, the package processing is aborted.</td>
</tr>
<tr>
<td><strong>dbCodepage</strong></td>
<td>Database code page for the target database</td>
<td>See SAP Note 552464 See SAP Note 552464&lt;sup&gt;552464&lt;/sup&gt; Possible values are: 4102, 4103, 1100</td>
</tr>
<tr>
<td><strong>migrationKey</strong></td>
<td>Migration key</td>
<td>-</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>omit</strong></td>
<td><strong>R3load</strong> omit value</td>
<td>Can contain only <strong>DTPIVAFLMU</strong> letters.</td>
</tr>
<tr>
<td><strong>-omit D</strong></td>
<td>omit data; do not load data</td>
<td></td>
</tr>
<tr>
<td><strong>-omit T</strong></td>
<td>omit tables; do not create tables</td>
<td></td>
</tr>
<tr>
<td><strong>-omit P</strong></td>
<td>omit primary keys; do not create primary keys</td>
<td></td>
</tr>
<tr>
<td><strong>-omit I</strong></td>
<td>omit indexes; do not create indexes</td>
<td></td>
</tr>
<tr>
<td><strong>-omit V</strong></td>
<td>omit views; do not create views.</td>
<td></td>
</tr>
<tr>
<td><strong>-omit A</strong></td>
<td>omit AMDPs; do not create ABAP managed procedures</td>
<td></td>
</tr>
<tr>
<td><strong>-omit F</strong></td>
<td>omit flexible objects; do not create flexible objects (database functions, database filter rules, session variables)</td>
<td></td>
</tr>
<tr>
<td><strong>-omit L</strong></td>
<td>omit flexible indexes; do not create flexible indexes</td>
<td></td>
</tr>
<tr>
<td><strong>-omit U</strong></td>
<td>omit unload; do not unload table after data load</td>
<td></td>
</tr>
</tbody>
</table>

If you want to combine several **-omit** options, list these options without blank, for example **-omit TV**.

Alternatively, option **-include** can be used to specify a positive list of task types, which have to be executed (any unspecified task types are omitted):

**-include <task-type-list>**

The **-include** option supports the same list of tasks as the **omit** option. For example, **-include TDPIMU** generates tasks to create tables (T), load data (D), create a primary index (P), to create secondary index (I), to merge delta log (M), and to finalize load (+U).

<table>
<thead>
<tr>
<th>taskArgs</th>
<th>Additional <strong>R3load</strong> arguments for the <strong>TASK</strong> phase</th>
<th>Appended to the <strong>R3load</strong> command line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The following options are already set by the monitor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>-ctf; -l; -o</strong> (if the <strong>omit</strong> argument is specified).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>loadArgs</th>
<th>Additional <strong>R3load</strong> arguments for the <strong>LOAD</strong> phase</th>
<th>Appended to the <strong>R3load</strong> command line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The following options are already used by the monitor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>-i; -dbcodepage; -l; -p; -k; -r; -socket</strong> (if the socket option is specified);</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>-o</strong> (if the <strong>omit</strong> argument is specified and task files are not used, that is, the value of <strong>tskFiles</strong> option is <strong>no</strong>).</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>jobNum</td>
<td>Number of parallel import jobs; the default is 1</td>
<td>Any positive number; 0 for an unlimited number of jobs. You can change the value dynamically at runtime.</td>
</tr>
<tr>
<td>decluster</td>
<td>false</td>
<td>Possible values: true or false. If this option is true – migmon calls R3laod with option –decluster.</td>
</tr>
<tr>
<td>ignorePackageSizeCalculation</td>
<td>Default is false</td>
<td>Possible values: true or false. Use this option if you see performance issue in the time before starting the first import jobs. The first task of the Migration Monitor is to collect all packages that are mentioned in the table line for the importDirs parameter. In this first step, called CollectPackages, the Migration Monitor also calculates the package size. If the packages are spread over many mounted locations this can take some time. To improve the performance of the CollectPackages step, set this option to true. Later the packages are imported without following &quot;size ordering&quot; of packages. Use this option only if there is a big delay during the start of the first import jobs.</td>
</tr>
<tr>
<td>collectLogicalPackages</td>
<td>Default is false</td>
<td>Possible values: true or false. Import Migration Monitor is extended with this option for processing “logical” packages. To one standard package corresponds either one STR or one WHR file (for example, SAPAPPL1.STR, REPOSRC-1.WHR). To one “logical” package corresponds either one STR.logical or one WHR.logical file (for example SAPCLU4.STR.logical, SAPCDCLS-1.WHR.logical). The logical packages are located in the same directory where the standard packages are located, for example importDirs/ABAP/DATA. Set this option to true if an import is running on SAP HANA database (HDB) and an export was run with the decluster=true option.</td>
</tr>
</tbody>
</table>
### Import Exchange Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>exchangeDir</code></td>
<td>Exchange directory</td>
<td>If this option is not set, the monitor runs in standalone mode, that is, without the export monitor. All the export dump files or the SAP export media from the installation kit must be available on the import host and be specified with the <code>importDirs</code> parameter (for example, in the properties file). If there is an old <code>export_statistics.properties</code> file (for example, from a previous export run), remove this file.</td>
</tr>
</tbody>
</table>

### Import Socket Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>socket</code></td>
<td>Socket operating mode</td>
<td>-</td>
</tr>
<tr>
<td><code>port</code></td>
<td>Server port number</td>
<td>Any free port from 1024 to 65535.</td>
</tr>
</tbody>
</table>

Any other option is ignored by the import monitor.

### Mandatory Options for Import Monitor

- Server mode (default): `installDir, importDirs, tskFiles, extFiles`, one of the options `exchangeDir` or socket (and their related parameters)
- Standalone mode: `installDir, importDirs, tskFiles, extFiles`
- IBM i-specific: `loadArgs= -nojournal`

**i Note**

The value of the `dbType` option is determined automatically in the shell script or batch files from the `dbms_type` environment variable.

### 10.1.3 Assigning DDL Files to Packages

It is possible to use several different DDL*.TPL templates during the export or import. The assignment of a specific DDL file to a single package is done within a simple text file, which then has to be specified using the `ddlMap` option within the properties file of the migration monitor. Packages not listed in the DDL mapping file use the default DDL control file.
### 10.1.4 Defining Groups of Packages

The "package group" feature is an enhancement to defining a package order. By defining groups, you can for example prevent certain packages being executed in parallel and you can define how many large tables are exported or imported at the same time. In addition, you can specify different values for the parameters $jobNum$ and $taskArgs$ or $loadArgs$ for each package. Package groups can be defined in the same text file in which the package order can be defined (see parameter $orderBy$). The previous package order format is also fully supported.

A group starts with any arbitrary name in brackets and ends when the next group starts.

If package groups are defined, the maximum number of parallel R$3$load jobs is the sum of $jobNum$ of all packages. All packages without a package group will be assigned to a “default group” with the number of jobs that was defined in the properties file of the migration monitor.

⚠️ **Caution**

Package groups defined with the $orderBy$ parameter ignore the SAPVIEW and SAP$0000$ packages.

---

### Example

#### Package Order File with Group

```plaintext
# custom package order
# package names
SAPAPPL0
SAPAPPL1
SAPAPPL2
# package group
  [ SEQUENTIAL GROUP ]
```
10.1.5 Processing Split Tables

If tables have been split during the export, ensure before the import starts that the table exists (only once) and that the primary key and the indexes are created (only once) before or after (as defined in the DDL template) the table data has been imported. These tasks are automatically synchronized by the migration monitor.

Context

WHR files are part of the package and have to be copied to the DATA export subdirectory to make sure that the same WHR file is used for the export and import of the corresponding package.

You can ensure this by using the Defining Groups of Packages [page 167] feature.

❖ Example

The target database does not support parallel data import. This example is valid for all database platforms:

During the export you have split the table `MY_FIRST_TABLE` into 3 packages and `MY_SECOND_TABLE` into 5 packages. Now you want to run a maximum of 10 R3load processes for parallel data import.

Create the file `inputFile.txt` with the following content:

```
[ MY_FIRST_TABLE ]
jobNum = 1
MY_FIRST_TABLE-1
MY_FIRST_TABLE-2
MY_FIRST_TABLE-3

[ MY_SECOND_TABLE ]
jobNum = 1
MY_SECOND_TABLE-1
MY_SECOND_TABLE-2
MY_SECOND_TABLE-3
MY_SECOND_TABLE-4
MY_SECOND_TABLE-5
```

In this file, you can also define the processing order of packages or you can assign DDL files to packages.
The `inputFile.txt` file has to be specified as a value for the migration monitor parameter `orderBy`.

An R3load job is started for every group (`MY_FIRST_TABLE` and `MY_SECOND_TABLE`). The number of parallel R3load jobs is the total of the number of R3load jobs of each group plus the number of R3load jobs defined for the default group (which is made up of all packages without an explicit group name) defined by the parameter `jobNum`.

In this example, the parameter `jobNum` in the `import_monitor_cmd.properties` file has to be set to 8 to ensure that no more than 10 R3load processes run in parallel.

**Procedure**

**Re-Starting the Import of a Split Table Package**
If the import of a package fails, the rows that belong to this package have to be deleted using the `WHERE` condition assigned to this package before the data import is started again. The deletion with a `WHERE` clause can be very time-consuming. Therefore, it is faster to delete all rows of the corresponding table manually and re-import all packages instead.

Only if the number of failed packages is low and a lot of the packages for this table have completed successfully, it might be faster to perform the automatic restart which includes the execution of a `DELETE` with `WHERE` for each failed package.

The following steps describe the procedure in detail:

1. Identify the reason for the failure of the import of the packages.
2. Manually delete all rows of the table for which the import of one or more packages failed.
3. Remove the TSK files of all packages that import data into this table (`<table name>`-<counter>__TPI.TSK). Do not remove the TSK files that create either the table or the indexes for this table.
4. Adapt the file `import_state.properties` in the installation directory. Replace the status “+” of all packages for the corresponding table that had been imported successfully and has to be re-imported by “0”.
   For more information, see Restarting R3load Processes [page 80].
5. Restart the import.

**10.1.6 Starting the Migration Monitor**

The Migration Monitor has to be started on the **source database host** (export monitor) and on the **target database host** (import monitor).

You can start it using one of the following methods:

- The UNIX shell scripts `export_monitor.sh` / `import_monitor.sh`
- The Windows batch files `export_monitor.bat` / `import_monitor.bat`
- As part of the export / import procedure of software provisioning manager 1.0

You can specify options in the command line or in the export or import property files, as described in Configuration [page 153]. The names of the property files are `export_monitor_cmd.properties` and `import_monitor_cmd.properties`.
import_monitor_cmd.properties. Templates for these files are included in the application archive and must be located in the current user’s working directory.

Any options specified in the command line take precedence over the corresponding options in the application property file. Options are case-sensitive, that is, options that are not recognized are ignored.

Prerequisites

- Make sure that the export dump directory and its subdirectory exist as described in the following table:

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;export dump dir&gt;/DATA</td>
<td>Contains the STR files generated by R3ldct!</td>
</tr>
<tr>
<td>&lt;export dump dir&gt;/DB</td>
<td>Contains the DDL&lt;DBTYPE&gt;.TPL files generated by R3ldct!</td>
</tr>
<tr>
<td>&lt;export dump dir&gt;/DB/&lt;DBTYPE&gt;</td>
<td>Contains the EXT files generated by R3szchk (optional)</td>
</tr>
</tbody>
</table>

- Make sure that the export dump directory can be accessed from the target host, either using a shared directory (local to the export host) or by using Migration Monitor’s FTP feature.

Procedure

1. Start the tool in one of the following ways:
   - Use the following commands depending on your operating system:
     - UNIX shell scripts
       ```bash
       export_monitor.sh /import_monitor.sh
       ```
     - Windows batch files
       ```cmd
       export_monitor.bat /import_monitor.bat
       ```
     - IBM i-specific
       1. Set the environment variable `PASE_THREAD_ATTACH` to “Y” using:
          ```bash
          ADDENVVAR PASE_THREAD_ATTACH 'Y'
          ```
       2. Run the command:
          ```cmd
          CALL QP2TERM
          ```
       3. ./export_monitor.sh /./import_monitor.sh
   - Automatically as part of the software provisioning manager export and import procedure
   - Manually within the software provisioning manager:
     1. On the Parameter Mode Default Settings software provisioning manager screen, choose Custom.
     2. On the SAP System Export for Target System screen, select Start Migration Monitor Manually.
     3. The software provisioning manager stops and asks you to start the Migration Monitor manually and to continue with the software provisioning manager as soon as the Migration Monitor has finished successfully.
If you use FTP access and security is required, start the Migration Monitor in secure mode to prevent seeing the FTP password in the command line parameter string or in the property file (for example, on UNIX or IBM i:/export_monitor_secure.sh –ftpPassword <password>).

For more information about FTP, see FTP Exchange Options and FTP Copy Options in Configuration [page 153].

2. Close the shell window or command processor. The monitor process runs in the background.

3. Specify options as required in one of the following ways:
   - In the command line:
     Specify the option in the format: –optionName optionValue
   - In the application property file:
     Add an option as a new line in the format: optionName=optionValue

   **Example**

   Command line for UNIX or IBM i:
   
   ./export_monitor.sh –ftp
   
   ./export_monitor.sh –ftpCopy
   
   ./export_monitor.sh –socket –host <import_server> –port 5000

   **Example**

   Command line for Windows cmd.exe:
   
   export_monitor.bat –net
   
   export_monitor.bat –socket

   **Example**

   export_monitor_cmd.properties file with export options:
   
   # Export Monitor options
   # Operating mode: ftp | net
   #net
   ftp
   #
   # Common options
   #
   # List of export directories, separator on Windows ; on UNIX,IBM i:
   exportDirs=C:\TEMP\export_dump
   # SAPinst start directory
installDir=C:\install\start

# Monitor timeout in seconds
monitorTimeout=30

# FTP options

# Remote FTP host
ftpHost=server

# Name of remote FTP user
ftpUser=sysadm

# Password of remote FTP user
ftpPassword=password

# List of remote FTP directories for export dump, separator : or ;
ftpExportDirs=/install_dir/export_dump

# Remote FTP exchange directory
ftpExchangeDir=/install_dir/exchange

# Number of parallel FTP jobs
ftpJobNum=3


Example

import_monitor_cmd.properties file with import options:

# Import Monitor options

# Common options

# List of import directories, separator on Windows ; on UNIX,IBM i:
importDirs=/install_dir/export_dump

# SAPinst start directory
installDir=/install_dir/start

# Exchange directory
exchangeDir=/install_dir/exchange

# Generation of task files: yes | no
tskFiles=yes
10.1.7 Using the “migmonCtrl” Add-On for the Export

The add-on can be activated by starting the migration monitor with the following scripts and programs:

- The UNIX shell scripts dyn_control_export_monitor.sh
- As part of the export procedure of the software provisioning manager

UNIX – example for the export_monitor_cmd.properties file using sort by size:

```
server dbType=ORA exportDirs=/hana/s2p_to_hana/exportDVD/ABAP installDir=./ orderBy=./order_by.txt ddlFile=DDLORA_LRG.TPL r3loadExe=/hana/s2p_to_hana/sapKernel/oracle/linuxx86_64/R3load tskFiles=yes dataCodepage=4103 jobNum=5 monitorTimeout=10 loadArgs=--continue_on_error trace=all migmonCtrl jobNumLarge=25 jobNumSmall=25 extFileDir=/hana/s2p_to_hana/exportDVD/ABAP/DATA
```

UNIX – example for the export_monitor_cmd.properties file using sort by time:

```
server dbType=ORA exportDirs=/sapdb/exportDvD_741/ABAP installDir=/home/emroot/export_plx110 orderBy=/home/emroot/export_plx110/order_by.txt ddlFile=DDLORA_LRG.TPL r3loadExe=/usr/sap/QO1/D01/exe/R3load tskFiles=yes dataCodepage=4103 jobNum=5 monitorTimeout=10 loadArgs=--continue_on_error trace=all migmonCtrl jobNumLarge=10 jobNumSmall=10 minRuntime=0 exportTimeFile=./export_time.txt importTop=5 importTimeFile=./import_time.txt
```
Example

Example for a command line call to create package filter files:

```
./dyn_control_export_monitor.sh -createPackageFilter -outputFile package_list_%hostName%.txt -hostNames plx101,plx110
```

UNIX – example for a `export_monitor_cmd.properties` file when using a package filter:

```
server
dbType=ORA
exportDirs=/sapdb/exportDvD_741/ABAP
installDir=/home/emroot/export_plx110
orderBy=/home/emroot/export_plx110/order_by.txt
ddlFile=DDLORA_LRG.TPL
r3loadExe=/usr/sap/QO1/D01/exe/R3load
tskFiles=yes
dataCodepage=4103
jobNum=5
monitorTimeout=10
loadArgs=-continue_on_error
trace=all
decluster=true
migmonCtrl
jobNumLarge=10
jobNumSmall=10
extFileDir=/sapdb/exportDvD_741/ABAP/DATA
packageFilter=/sapdb/exportDvD_741/ABAP/DB/HDB/package_filter_plx110.txt
onlyProcessOrderBy=true
```

UNIX – example for an `export_monitor_cmd.properties` file when using a package filter and parallel export/import:

```
server
dbType=ORA
exportDirs=/sapdb/exportDvD_741/ABAP
installDir=/home/emroot/export_plx110
orderBy=/home/emroot/export_plx110/order_by.txt
ddlFile=DDLORA_LRG.TPL
r3loadExe=/usr/sap/QO1/D01/exe/R3load
tskFiles=yes
dataCodepage=4103
jobNum=0
monitorTimeout=10
loadArgs=-continue_on_error
net
netExchangeDir=/sapdb/exportDvD_741/SGN
trace=all
decluster=true
migmonCtrl
jobNumLarge=10
jobNumSmall=10
extFileDir=/sapdb/exportDvD_741/ABAP/DATA
packageFilter=/sapdb/exportDvD_741/ABAP/DB/HDB/package_filter_plx110.txt
onlyProcessOrderBy=true
netStatisticsFile=package_filter_plx110.statistics
```
10.1.8 Output Files

Export

- `export_monitor.log`
- `export_state.properties`
- `ExportMonitor.console.log`

Import

- `import_monitor.log`
- `import_state.properties`
- `ImportMonitor.console.log`

migmonCtrl add-on

- `migmonctrl.log`
- `MigmonJobber.console.log`

Both the export and import state files contain package state lines such as `SAPUSER=+`.

The format of state lines is `<PACKAGE>=<STATE>`. Possible values for state are listed in the following table:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Package export/import not yet started</td>
</tr>
<tr>
<td>?</td>
<td>Package export/import in progress</td>
</tr>
<tr>
<td>-</td>
<td>Package export/import finished with errors</td>
</tr>
<tr>
<td>+</td>
<td>Package export/import finished successfully</td>
</tr>
</tbody>
</table>

If any ftp or net exchange options are used, then the export state file might contain a second `<STATE>` column that refers to the state of the package transfer.

Then the export state file contains package state lines such as `SAPUSER=++`.

The format of state lines is `<PACKAGE>=<STATE>`. Possible values for state are listed in the following table:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Package export not yet started</td>
</tr>
<tr>
<td>?</td>
<td>Package export in progress</td>
</tr>
<tr>
<td>-</td>
<td>Package export finished with errors</td>
</tr>
<tr>
<td>+0</td>
<td>Package export finished successfully; package transfer not yet started</td>
</tr>
<tr>
<td>+?</td>
<td>Package transfer in progress</td>
</tr>
<tr>
<td>+-</td>
<td>Package transfer finished with errors</td>
</tr>
</tbody>
</table>
10.1.9 Installing the Target System Using the Migration Monitor

Use

This section describes the steps that you have to perform to install the target system using the Migration Monitor.

Prerequisites

Make sure there is enough free space on the target system for the database load. To find out the size of the export and the sizes of the tablespaces or dbspaces that are created, look at the file DBSIZE.XML located in the directory <DRIVE>:<EXPDIR><DB><DATABASE> (Windows) or <EXPDIR>/DB/<DATABASE> (UNIX).

Procedure

1. If you want to start the installation of the target host using the Migration Monitor, make sure that at least the dump directory with the following files is accessible on the target host and that it contains the correct data before you start the software provisioning manager:
   • <dump dir>/LABEL.ASC
   • <dump dir>/DB/<DBTYPE>/DBSIZE.XML
   • <dump dir>/DB/DDLORA.TPL
   If the dump directory is not shared on the target host, copy the files from the source system to the target system as soon as they have been created on the source host using the (export) Migration Monitor’s FTP copy options.
2. Start the software provisioning manager as described in the installation documentation for your SAP component.
3. To install the target system, follow the instructions in the software provisioning manager input dialogs and enter the required parameters as far as the ABAP System > Database screen. On this screen, choose Standard System Copy/Migration (R3load-Based).
4. Select the Use Migration Monitor option.

If you need more information about input parameters, position the cursor on the field of the required parameter and press F1.
5. When the software provisioning manager displays the CD browser window and asks for the Export Migration CD, enter the path to the export directory <EXPDIR>.

6. Continue as described in the installation documentation for your SAP component until a dialog box appears that states:
   If the export has been started on the source system and the export monitor is running, you can now start the data load by starting the import monitor.

7. Check that the prerequisites in the dialog box are fulfilled by your system. If so, start the Migration Monitor.

8. Complete the installation as described in the installation documentation for your SAP solution.

   ▲ Caution
   If you have to restart the import after an error, just restart the software provisioning manager. The import is continued with the table that was not imported successfully.

10.2 Analysis of the Export and Import Times

You can reduce the runtimes by splitting the packages in question or extracting long-running tables from the packages.

You can use the MIGTIME.SAR archive to analyze the runtimes of the individual packages. It is contained in the <OS>/COMMON/INSTALL directory of the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive. It is unpacked to the installation directory using SAPCAR and contains documentation in addition to the tools.

10.3 Table Comparison with Software Update Manager

This section describes how to compare table contents using the Software Update Manager 1.0 (SUM) tool during a system copy project.

We call this functionality “Table Comparison with SUM”. The tool only needs access to the database, so you can run it regardless of whether the ABAP system is running or not. The “Table Comparison with SUM” functionality is available as of Software Update Manager (SUM) 1.0 SP11.

Related Information

- Modes of the Table Comparison Tool [page 178]
- Restrictions [page 178]
- Using the Table Comparison Tool [page 179]
10.3.1 Modes of the Table Comparison Tool

You can run the table comparison tool either in “single” or “twin” mode.

The tool has the following modes of operation:

- In “single” mode, the tool only accesses the SAP database of the current system it is running on. This is supported for all database types supported by SAP. In this mode, the tool generates checksums for the selected user or for all SAP tables. The tool reports the directory containing the checksums at the end. This directory must then be transferred to the target host. There the tool must be run again in “single” mode and must have read/write access to the previously generated checksum directory. It uses them as a reference and generates the corresponding checksums for the target database. Any discrepancy found is reported. checksums are only generated for ranges of rows, so the granularity of reported checksum differences is rather “coarse”.

“Single” mode means that you run the Table Comparison Tool with SUM separately and twice:
Single mode corresponds to the SUM options Generate Export Checksums (to be executed on the source system) and Generate Import Checksums (to be executed on the target system).
1. You execute SUM option Generate Export Checksums on the source system to create the checksums.
2. You execute SUM option Generate Import Checksums on the target system to verify the checksums by comparing them with the content of the tables in the target database.

- “Twin” mode is by default unavailable in a regular system copy because you cannot connect simultaneously from one application server to both the source and the target database system. Therefore we recommend using “single” mode.

Related Information

Table Comparison with Software Update Manager [page 177]

10.3.2 Restrictions

This section describes the cases when you cannot use Table Comparison with SUM.

You can only use Table Comparison with SUM:

- If both the source system and the target system use the same endian type. For details on the endian type of an SAP system, see SAP Note 552464.
- If there has been no Unicode Conversion, that is no change from Non-Unicode to Unicode.

Related Information

Table Comparison with Software Update Manager [page 177]
10.3.3 Using the Table Comparison Tool

This section describes how to use the Table Comparison Tool.

Prerequisites

- Make sure that you run Table Comparison before the central instance on the target system is started for the first time. Otherwise the comparison might return wrong results because table content was already updated when the instance was started.
- The database of the system for which you want to use the tool is up and running. Make sure that `R3trans -x` works.
- You have downloaded the Table Comparison tool as described in SAP Note Central Note - Software Update Manager <1.0 | 2.0> SP<Latest_Number> at https://support.sap.com/sltoolset System Maintenance System Maintenance Scenarios Software Update/Upgrade using SUM.
- We strongly recommend that you do not perform productive operations while you apply table comparison with the Software Update Manager (SUM): Since the tool generates checksums, changing table contents might lead to incorrect results if you apply the tool while the system is running.
- Make sure that you have installed the latest version of the SAP Host Agent. For more information, see SAP Note 1031096 and the SAP Library [page 25] for your release at:

  i Note
  Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 25], and then continue the navigation as described below.

  Function-Oriented View Solution Life Cycle Management by Key Capability SAP Host Agent.

- Make sure that you have configured SUM so that it works together with the SAP Host Agent:
  1. Log on as user `root` and call the SUMSTART script as follows:
     `<SUM_Directory>/abap/SUMSTART confighostagent`
     If you are working with symbolic links for the SUM directory, you need to call the SUMSTART script with the logical path information.
  2. Restart the SAP Host Agent using the following command:
     `<HOSTAGENT_Directory>/exe/saphostexec -restart`

Procedure

1. Log on as user `<sapsid>adm`.
2. Unpack the SUM archive by executing the following commands:
   ```
   mkdir <SUM_Directory>
   cd <SUM_Directory>
   SAPCAR -xvf SUM.SAR
   ```
Example

```bash
mkdir /usr/sap/put
cd /usr/sap/put
SAPCAR -xvf SUM.SAR
```

3. Proceed as follows to start SUM using the SAP Host Agent:

   a. Open a browser window and enter the following URL in the address bar:

   If you use SUM 2.0 SP06 or higher, enter: https://<hostname>:1129/lmsl/sumabap/<SAPSID>/doc/slui

   If you use SUM 1.0 or SUM 2.0 lower than SP06, enter: https://<hostname>:1129/lmsl/migtool/<SAPSID>/doc/sluigui

   **Note**
   - 1129 is the https port of the SAP Host Agent.
   - Use http instead of https if SSL is not configured. In this case, the URL you have to enter looks as follows:
     - If you use SUM 2.0 SP06 or higher: http://<hostname>:1128/lmsl/sumabap/<SAPSID>/doc/slui
     - If you use SUM 1.0 or SUM 2.0 lower than SP06: http://<hostname>:1128/lmsl/migtool/<SAPSID>/doc/sluigui

   b. A dialog box appears in which you enter as user name the `<sapid>adm` and the password.

   After logon, the SAP Host Agent starts SUM by calling the `SAPup` executable in the background.

   From a technical point of view, the `SAPup` executable is started twice, as can be seen from the process list:
   - One entry with `gt=httpchannel` represents `SAPup` handling the requests coming from SAP Host Agent.
   - The second `SAPup` with parameter `guiconnect` is triggering tools such as `R3trans`, `tp`, or `R3load`.

   SUM starts with the `SAPUI5`-based user interface.

   The initial screen is displayed.

4. On the initial screen, you can choose between the following options, which both work in “single” mode:

   - Generating export checksums
     This is the option for checking tables in the source system.
   - Generating import checksums
     This is the option for checking tables in the target system.

   You cannot use the option for direct table content check for system copy purposes.

5. You can specify the tables for which you want to compare content on the source and target system:

   - Compare all tables
     When you decide to perform a full comparison, it is strongly recommended to exclude some tables where the content is changed during a regular system copy. Otherwise the verification for these tables fails. Create a file in the directory `<SUM_DIR>/abap/bin` before you run the export.
Name this file EUCLONEDEFS_ADD.LST and enter the following content:

DDNTT nocontent ignrcdiffs
REPOLOAD nocontent ignrcdiffs

The list of tables to be ignored in the comparison check can be modified according to individual requirements, for example, if it is clear that the table has been changed on the target system and the difference is expected.

It is also possible to run the check on the target system without the modification. If an error is raised on the two tables mentioned above, you can ignore the comparison check differences and continue SUM in the dialog.

• Provide a list of tables
If you only want to check a selected number of tables, provide an input file like this:

$ cat /tmp/CRCTableList.lst # Tables to be checked TAORA IAORA

Enter the full path to this file in the input field provided.

6. If no error occurs, you are informed that the tool has generated the checksum in the specified directory.
   a. You can now move the directory to a host that has access to your target database.
   b. Rerun the tool on the target system with option Generate Target Checksums. Before you rerun the tool, make sure that the central instance is stopped.
   
   This time you have to provide the path to this directory in the Table List field.

7. Verify the result of the table comparison. If the differences in the table contents of the source and target system are inconsistent, and you cannot explain the differences - for example, due to changes in the target system during the table comparison check on the source system - open an incident on component BC-INS-MIG.

Related Information

Table Comparison with Software Update Manager [page 177]

10.4 Using the Package Splitter

Here you find information what you can do with the Package Splitter tool.

You can use the Package Splitter tool for splitting the following:

• STR/EXT files
• STR files
• WHR files

The tool is located in the SPLIT.SAR archive in the /<OS>/COMMON/INSTALL folder in the directory structure of software provisioning manager 1.0.

Content of the archive file:

• split.jar
• `str_splitter.sh/str_splitter.bat`
• `where_splitter.sh/where_splitter.bat`

**Related Information**

*Configuration* [page 182]
*Starting the Package Splitter* [page 185]
*Executing the STR Splitter and the WHERE Splitter* [page 186]
*Output Files* [page 186]

### 10.4.1 Configuration

Here you find information about command line options of the Package Splitter tool.

**Help**

The tool displays the available parameters, if you call it with one of the following command line options:

- `–help`
- `–?`

**Version**

The tool will display the version information (release branch and build date), if you call it with the following command line option:

`–version`

**STR Splitter Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>strDirs</td>
<td>List of STR file directories</td>
<td>Separator on Windows: ;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Separator on UNIX: :</td>
</tr>
</tbody>
</table>
### Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>extDirs</td>
<td>List of EXT file directories</td>
<td>Separator on Windows: ;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Separator on UNIX: :</td>
</tr>
<tr>
<td>outputDir</td>
<td>Output directory</td>
<td>If missing, then the directories that contain the corresponding STR/EXT files are used.</td>
</tr>
<tr>
<td>top</td>
<td>Maximum number of tables</td>
<td>Largest N tables are extracted from the packages.</td>
</tr>
<tr>
<td>tableLimit</td>
<td>Table size limit in MB</td>
<td>All tables larger than tableLimit are extracted from packages.</td>
</tr>
<tr>
<td>packageLimit</td>
<td>Package size limit in MB</td>
<td>All packages larger than packageLimit are split into packages smaller than this limit.</td>
</tr>
<tr>
<td>tableFile</td>
<td>File with the table names that are to be extracted</td>
<td>All tables from the file are extracted from the packages. This file must contain the table names on separate lines (one name on each line).</td>
</tr>
<tr>
<td>maxNumberOfTables</td>
<td>• Integer value</td>
<td>Split the packages as keep the maximum number of tables in package.</td>
</tr>
<tr>
<td></td>
<td>• Maximum number of tables in the package</td>
<td></td>
</tr>
</tbody>
</table>

#### Example

```
maxNumberOfTables=500
```

This parameter is with higher priority.

### WHERE Splitter Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>whereDir</td>
<td>WHERE file directory</td>
<td>Directory with WHR files.</td>
</tr>
<tr>
<td>strDirs</td>
<td>List of STR file directories</td>
<td>Separator on Windows: ;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Separator on UNIX: :</td>
</tr>
<tr>
<td>outputDir</td>
<td>Output directory</td>
<td>If missing, then the directory that contains the corresponding WHR files is used.</td>
</tr>
</tbody>
</table>
### whereLimit

- **Option:** whereLimit
- **Description:** Maximum number of WHERE clauses
- **Comment:** All WHR files that have more than whereLimit WHERE clauses are split into WHR files with whereLimit WHERE clauses.

### whereFiles

- **Option:** whereFiles
- **Description:** Whitespace separated list of WHR files
- **Comment:** Names of WHR files to be split. WHR files should exist in WHERE file directory.

### Trace Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>trace</td>
<td>Trace level</td>
<td>Possible values: all, off, 1 (error), 2 (warning), 3 (info), 4 (config, default), 5, 6, 7 (trace)</td>
</tr>
</tbody>
</table>

### Mandatory Options

- Splitting STR and EXT files:
  - strDirs, extDirs, top and/or tableLimit and/or packageLimit and/or tableFile
- Splitting STR files:
  - strDirs, tableFile
- Splitting WHR files:
  - whereDir, whereLimit

### Related Information

*Using the Package Splitter [page 181]*
10.4.2 Starting the Package Splitter

Here you find information about how to start the Package Splitter tool.

You can start the Package Splitter tool using one of the following:

- UNIX shell script `str_splitter.sh` / `where_splitter.sh`
- As part of the export procedure (STR Splitter) in the software provisioning manager

The application allows you to specify options in the command line and/or in the application property file. The name of the property file is `package_splitter_cmd.properties`.

Any options specified in the command line take precedence over the corresponding options in the application property file. Options are case-sensitive; any options that are not recognized are ignored. To specify an option:

- in the command line, enter `-optionName optionValue`
- in the application property file, insert the new line `optionName=optionValue`

STR Splitter

Example of a command line for a UNIX terminal:

```
./str_splitter.sh -strDirs /export_dump/DATA -extDirs /export_dump/DB/ORA
-outputDir /split_output -top 20 -tableLimit 50 -packageLimit 200 -trace all
```

WHERE Splitter

You can start the tool using the UNIX shell script `where_splitter.sh`.

```
./where_splitter.sh -whereDir /r3a_dir -strDirs /export_dump/DATA -outputDir /split_output -whereLimit 5 -trace all
```

Related Information

Using the Package Splitter [page 181]
10.4.3 Executing the STR Splitter and the WHERE Splitter

Proceed as described in this section to execute the STR Splitter / WHERE Splitter.

Procedure

1. Prepare the properties file `package_splitter_cmd.properties` (optional).
2. Start the Package Splitter tool using the shell script or batch file.
3. Analyze the screen output and log file.

Related Information

Using the Package Splitter [page 181]

10.4.4 Output Files

Here you find information about the output files of the Package Splitter tool.

STR Splitter

- Newly split STR/EXT files
- Original backup of STR/EXT files (*.STR.old/*.EXT.old)
- `SAPSTR.LST` file
- `str_splitter.log`
- `PackageSplitter.console.log`

WHERE Splitter

- Newly split WHR files
- Original backup of WHR files (*.WHR.old)
- `SAPSTR.LST` file
- `where_splitter.log`
- `PackageSplitter.console.log`
STR Splitter Notes

SAP0000 and SAPVIEW packages are never modified by the splitter. SAPNTAB package is always created and contains 5 predefined tables:

SVERS, DDNTF, DDNTF_CONV_UC, DDNTT, DDNTT_CONV_UC

Integration

Before you start to split files, we strongly recommend that you back up your original STR/EXT or WHR files in separate backup directories. These backup files can be used later to try other splitting options. If the output directory is specified, then the newly split files are generated in this directory; otherwise they are generated in the directories where the corresponding original files are located.

The original backup files (backup name is <file_name>.old) are always located in the same directories where the corresponding original files are located.

Related Information

Using the Package Splitter [page 181]

10.5 Implementing Oracle Database Vault with Software Provisioning Manager 1.0

The software provisioning manager 1.0 supports Oracle Database Vault. This section provides information about implementing Oracle Database Vault (DV) with the software provisioning manager.

Prerequisites

- Your Oracle database version must be 12.1 or higher.
- Check the prerequisites, restrictions, and patch requirements as listed in SAP Note 2218115.

Context

For Database Independent System Copy [page 48], the software provisioning manager prompts whether DV is to be installed.
For the Oracle-Specific Procedure [page 89] the DV is already installed in the source database and must be first disabled to complete the scenario and can then be enabled before the scenario is completed.

DV requires the following additional users:

- non-CDB: secadmin/secacctmgr/ (+ backup accounts)
- CDB: c##secadmin/c##secacctmgr / (+ backup accounts)

These Database Vault administrator accounts are created by the software provisioning manager. For more information see SAP Note 2218115.

Backup Database Vault administrator accounts are also created. For more information, see SAP Note 2884334.

**Procedure**

1. Start the software provisioning manager and choose the export option for your system variant as described in Running Software Provisioning Manager [page 62].

2. During the target system installation, on the Oracle Database screen where you are prompted to enter the required Oracle database parameters, mark the Install Oracle Database Vault checkbox.

3. During the target system installation, on the Database Accounts for Oracle Database Vault screen, specify the following:
   - Provide the passwords for the Oracle Database Vault user accounts secadmin and secacctmgr which are to be created by the software provisioning manager.
   - If you want to be enabled after the installation has completed, mark the Enable Oracle Database Vault checkbox.

**Next Steps**

Configure Oracle Database Vault as described in SAP Note 2218115.
10.6 Support of Oracle Transparent Data Encryption (Oracle TDE)

Oracle Transparent Data Encryption (TDE) for Oracle 18c is supported as of software provisioning manager 1.0 SP27 for SAP systems based on SAP NetWeaver.

Prerequisites

• Oracle database 18c or higher
• software provisioning manager 1.0 SP 27 or higher
• SAP system is based on SAP NetWeaver 7.0 or higher
• If you perform a system copy or a database refresh with R3load, the Oracle database on the target system does not need to have the same encryption type as the Oracle database on the source system. You can always change the encryption type when the Oracle database or the Oracle tablespaces are recreated, and the data are reloaded again in the Oracle database by R3load.

Constraints

• Oracle Database 18c only supports TDE tablespace encryption, but not yet TDE full database encryption. For more information, see SAP Note 2485122.
• With the software provisioning manager 1.0 you cannot configure TDE and encrypt tablespaces in the database of an already existing SAP System. You have to do this manually.
  • You can manually configure TDE in an SAP system that already exists.
  • You can manually convert a non-encrypted Oracle SAP database into an encrypted Oracle SAP database.
• With the software provisioning manager 1.0 you cannot deconfigure TDE and decrypt the data in the database of an existing SAP system. You have to do this manually.
  For more information, see SAP Note 2485122.

Supported Software Provisioning Manager 1.0 Scenarios

• SAP system installation from scratch
  See section Support of Oracle Transparent Data Encryption (Oracle TDE) in the installation guide [page 24].
• SAP system copy
  When you copy an SAP system with the software provisioning manager 1.0, there are two options for copying the database. From a security perspective, the first option is the preferred option as the SAP data remains security encrypted during the whole system copy process.
  • Option 1: Backup / Restore
The software provisioning manager 1.0 creates a new encrypted database by restoring an encrypted database backup. The data remains encrypted during the whole process.

- **Option 2: Export / Import with R3load, or Oracle Data Pump**
  The software provisioning manager 1.0 (1) unloads the SAP application data with R3load to SAP export dump files, (2) creates a new encrypted database, (3) loads the SAP export dump files and then (4) deletes the SAP export dump files. The data in the SAP export dump files is not encrypted with Oracle TDE.

  **Exporting SAP data with R3load.**
  Oracle TDE encrypts SAP application data that is stored inside the Oracle database. When the data is written to Oracle database files, online redo log files or archive files, the data is encrypted. Oracle TDE is only effective and protects your SAP application data as long as you keep it inside the Oracle database.
  When you export SAP application data with Oracle data pump into encrypted Oracle data pump export files, the data remains encrypted. This method allows you to safely export/import Oracle data from one Oracle database to another Oracle database.
  Whenever you export SAP application data with R3load from the Oracle database into R3load dump files, the SAP application data is not encrypted and not protected any more by Oracle Transparent Data Encryption.

  **Exporting SAP Data with Oracle Data Pump**
  To perform import or export operations with Oracle tools, you must use Oracle Data Pump.
  For more information, see 2485122.

- **SAP system rename**
  See section **Support of Oracle Transparent Data Encryption (Oracle TDE)** in the system rename guides at [https://support.sap.com/sltoolset](https://support.sap.com/sltoolset) > System Provisioning > Rename a System using Software Provisioning Manager > System Rename Option of Software Provisioning Manager 1.0

- **SAP system database refresh**
  Copying the Database Only - Refresh Database Content on Oracle Database [page 129]
  For more information, see SAP Note 2485122.

### Supported Oracle 18c Configuration Scenarios

- **Oracle single instance installation**
  Software keystore is located in filesystem

- **Real Application Clusters (RAC)**
  See section **Installing Oracle Real Application Clusters** in the installation guide [page 24].
  Software keystore is shared (in ASM or shared filesystem)

- **Automatic Storage Management (ASM)**
  See section **Database Instance Installation on Oracle Automatic Storage Management** in the installation guide [page 24].
  Software keystore is located in ASM

- **Oracle Database Vault**
  SAP Note 2218115
  Oracle TDE and Oracle DV can be combined together.

For more information, see SAP Note 2485122.
**Supported TDE Encryption Algorithms**

- The software provisioning manager 1.0 allows you to choose which encryption key to use.
- Default Encryption is TDE or AES128.
- NOTDE is the value for No Transparent Data Encryption.
- Currently only user tablespaces can be encrypted.
- Tablespaces System, Psaptemp, and Sysaux are not supported.

**Log und SQ files in installation directory for TDE**

During the installation, Database Refresh and Systemcopy with R3load with the software provisioning manager 1.0 the TDE will be set and installed when the Install Oracle TDE checkbox is marked.

For a database rename, the wallet is already available with the same master key as before. Only the Auto Login Wallet will be reset. The following log and sql files are created in the installation directory for TDE.

- CreateKeystore.log & CreateKeystore.sql
  - Create keystore log and sql file
  - During the installation or system copy the keystore is created in $SAPDATA_HOME/orawallet/tde
- CreateKSKey.log & CreateKSKey.sql
  - Create keystore key log and sql file
  - The Master Key is written to the keystore file ewallet.p12 and a backup file ewallet_<number>.p12 is created as well.
- CreateKSAutologin.log & CreateKSAutologin.sql
  - Create keystore auto login log and sql file
  - During startup the wallet will be open automatically. The Auto Login Wallet file is cwallet.sso in the keystore.

**10.7 IBM Db2 for Linux, UNIX, and Windows Database**

**Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database** [page 192]

**Deleting a Database Schema Manually** [page 193]

You can generate and use the following scripts to delete a database schema manually (not the complete database). During the manual deletion, you must delete all tables and indexes, modules, views, functions, procedures, variables, and tablespaces belonging to the schema.

**Online Information from IBM** [page 195]
10.7.1 Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database

Use

⚠️ Caution
This section applies only to your database. You only have to perform the steps outlined in this section once – even if you install multiple SAP systems into one database.

Roll forward recovery enables you to recover lost data due to media failure, such as hard disk failure, and applies log file information (log journal) against the restored database. These log files contain the changes made to the database since the last backup.

⚠️ Caution
A production system must run in log retention mode.

If a system is not running in log retention mode, all changes applied to the database since the last complete backup are lost in the event of a disk failure.

In log retention mode, the log files remain in the log directory (log_dir). To archive the log files, you can use the Db2 log file management solution. For more information, see the documentation Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

Procedure

1. Log on to the database server as user db2<dbsid>.
2. To activate log retention mode and to specify the log archiving method, set configuration parameter LOGARCHMETH1 to one of the following options:
   - LOGRETAIN
     No log archiving takes place. Log files remain in the log directory.
   - DISK:<log_archive_path>
     Log files are archived to a disk location. You can archive them to tape using the Db2 tape manager (db2tapemgr) at a later point in time.
   - TSM:<TSM_management_class>
     Log files are archived to Tivoli Storage Management (TSM)
   - USEREXIT
     For downward compatibility with the former user exit concept, you can specify value USEREXIT for parameter LOGARCHMETH1.
   - VENDOR:<path_to_vendor_lib>
     Log files are archived to a library that is provided by your vendor storage management.

To set configuration parameter LOGARCHMETH1 for your preferred archiving method, enter the following command:

```
db2 update db cfg for <dbsid> using LOGARCHMETH1 <log_archiving_method>
```
For more information, see the documentation Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

3. To activate the settings, restart the database. The database is now in backup pending mode. You need to take an offline backup before you can continue.

4. To start the offline backup for a single-partitioned database, enter the following command:
   
   ```
   db2 backup db <dbsid> to <device>
   ```

   **Example**
   
   For example, to perform an offline backup of database C11 to tapes in devices rmt0 and rmt1, enter the following command:
   
   ```
   db2 backup database C11 to /dev/rmt0, /dev/rmt1
   ```

   **Note**
   
   On a multipartitioned database, you must activate log retention mode on all database partitions. In addition, you also have to perform an offline backup for all database partitions.

   For more information about how to start a Db2 backup, see the IBM Db2 online documentation.

---

**More Information**

- Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows (see Online Information from SAP [page 207])
- For direct access to online information about Db2 that is provided by IBM, see Online Information from IBM [page 195].
- For access to more documentation for SAP systems on IBM Db2 for Linux, UNIX, and Windows, see Online Information from SAP [page 207].

---

### 10.7.2 Deleting a Database Schema Manually

You can generate and use the following scripts to delete a database schema manually (not the complete database). During the manual deletion, you must delete all tables and indexes, modules, views, functions, procedures, variables, and tablespaces belonging to the schema.

---

**Prerequisites**

- Make sure that any instance that uses the schema is stopped.
- The database must be up and running.
**Context**

You delete a database schema in the following situation: You are running multiple components on one database (MCOD) and you **only** want to delete the database schema of the corresponding component to be deleted.

You also delete a database schema if you want to delete the Java part of an SAP system (ABAP+Java or Java Add-In).

**Procedure**

1. Log on to the database server as `db2<dbsid>` and open a command prompt.
2. To delete all tables of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
   ```sql
   db2 "SELECT 'DROP TABLE ' || CHR(34) || VARCHAR(tabschema) || CHR(34) || CHR(34) || '.' || CHR(34) || tabname || CHR(34) || ';' FROM syscat.tables WHERE tabschema='<SAP_SYSTEM_SCHEMA>' AND TYPE in ('T','G') " | grep "DROP" > drop_<sap_system_schema>_tables.txt
   ```
   where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all tables, run this script using the following command:
   ```bash
   db2 --tvf drop_<sap_system_schema>_tables.txt
   ```
3. To delete all views of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
   ```sql
   db2 " SELECT 'DROP VIEW ' || CHR(34) || VARCHAR(tabschema) || CHR(34) || CHR(34) || '.' || CHR(34) || tabname || CHR(34) || ';' FROM syscat.tables WHERE tabschema='<SAP_SYSTEM_SCHEMA>' AND TYPE='V' " | grep "DROP" > drop_<sap_system_schema>_views.txt
   ```
   where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all views, run this script using the following command:
   ```bash
   db2 --tvf drop_<sap_system_schema>_views.txt
   ```
4. To delete all modules of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
   ```sql
   db2 " SELECT 'DROP MODULE ' || CHR(34) || VARCHAR(moduleschema) || CHR(34) || CHR(34) || '.' || CHR(34) || modulename || CHR(34) || ';' FROM syscat.modules WHERE moduleschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_modules.txt
   ```
   where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all modules, run this script using the following command:
   ```bash
   db2 --tvf drop_<sap_system_schema>_modules.txt
   ```
5. To delete all functions of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
```
db2 " SELECT 'DROP SPECIFIC FUNCTION ' || CHR(34) || VARCHAR(funcschema) || CHR(34) || ' ' || CHR(34) || specificname || CHR(34) || ';' FROM syscat.functions WHERE funcschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_functions.txt
```

where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

b. To delete all functions, run this script using the following command:

```
db2 -tvf drop_<sap_system_schema>_functions.txt
```

6. To delete all procedures of the database schema, proceed as follows:

a. Enter the following SQL statement to create a script:

```
db2 " SELECT 'DROP SPECIFIC PROCEDURE ' || CHR(34) || VARCHAR(routineschema) || CHR(34) || ' ' || CHR(34) || specificname || CHR(34) || ';' FROM syscat.routines WHERE routineschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_procedures.txt
```

where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

b. To delete all procedures, run this script using the following command:

```
db2 -tvf drop_<sap_system_schema>_procedures.txt
```

7. To delete all variables of the database schema, proceed as follows:

a. Enter the following SQL statement to create a script:

```
db2 "SELECT 'DROP VARIABLE ' || CHR(34) || VARCHAR(varschema) || CHR(34) || '.' || CHR(34) || varname || CHR(34) || ';' FROM syscat.variables WHERE varschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_variables.txt
```

where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

b. To delete all variables, run this script using the following command:

```
db2 -tvf drop_<sap_system_schema>_variables.txt
```

8. Drop the database schema using the following command:

```
db2 drop schema <SAP_SYSTEM_SCHEMA> restrict
```

9. Delete all tablespaces by performing the following steps:

a. To see an overview, list all tablespaces using the following command:

```
db2 list tablespaces
```

b. When you delete the Java part of an SAP system (ABAP+Java or Java Add-In), delete only the Java tablespaces, that is `<SAPSID>##DBD` and `<SAPSID>##DBI`.

c. In an ABAP-only or Java-only system, delete all tablespaces starting with `<SAPSID>`.

d. To delete the relevant tablespaces, enter the following command:

```
db2 drop tablespace <tablespace_name>
```

### 10.7.3 Online Information from IBM

You can use the following IBM documentation landing page as a starting point to all kinds of documentation for your IBM Db2 for Linux, UNIX, and Windows version: [https://www.ibm.com/docs/en/db2](https://www.ibm.com/docs/en/db2).
The following tables provide direct links to IBM Db2 online documentation and manuals, listed by database version:

**IBM Db2 Documentation**

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<th>Internet Address</th>
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</thead>
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<tr>
<td>IBM Db2 11.5</td>
<td><a href="https://www.ibm.com/docs/en/db2/11.5">https://www.ibm.com/docs/en/db2/11.5</a></td>
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**IBM Manuals**

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</table>

### 10.8 Oracle Database

**Support of Oracle Transparent Data Encryption (Oracle TDE) [page 189]**

Oracle Transparent Data Encryption (TDE) for Oracle 18c is supported as of software provisioning manager 1.0 SP27 for SAP systems based on SAP NetWeaver.

**Database Instance Installation on Oracle Automatic Storage Management [page 199]**

**Installing Oracle Real Application Clusters on your Target System [page 200]**

You want to install your target system with Oracle Real Application Clusters (RAC) using the software provisioning manager in an SAP environment. This section provides additional information for the RAC installation using the Software Provisioning Manager.

**Additional Information about the OraBRCopy Tool [page 203]**
10.8.1 Support of Oracle Transparent Data Encryption (Oracle TDE)

Oracle Transparent Data Encryption (TDE) for Oracle 18c is supported as of software provisioning manager 1.0 SP27 for SAP systems based on SAP NetWeaver.

Prerequisites

- Oracle database 18c or higher
- software provisioning manager 1.0 SP 27 or higher
- SAP system is based on SAP NetWeaver 7.0 or higher
- If you perform a system copy or a database refresh with R3load, the Oracle database on the target system does not need to have the same encryption type as the Oracle database on the source system. You can always change the encryption type when the Oracle database or the Oracle tablespaces are recreated, and the data are reloaded again in the Oracle database by R3load.

Constraints

- Oracle Database 18c only supports TDE tablespace encryption, but not yet TDE full database encryption. For more information, see SAP Note 2485122.
- With the software provisioning manager 1.0 you cannot configure TDE and encrypt tablespaces in the database of an already existing SAP System. You have to do this manually.
  - You can manually configure TDE in an SAP system that already exists.
  - You can manually convert a non-encrypted Oracle SAP database into an encrypted Oracle SAP database.
- With the software provisioning manager 1.0 you cannot deconfigure TDE and decrypt the data in the database of an existing SAP system. You have to do this manually.

For more information, see SAP Note 2485122.

Supported Software Provisioning Manager 1.0 Scenarios

- SAP system installation from scratch
  See section Support of Oracle Transparent Data Encryption (Oracle TDE) in the installation guide [page 24].
- SAP system copy
  When you copy an SAP system with the software provisioning manager 1.0, there are two options for copying the database. From a security perspective, the first option is the preferred option as the SAP data remains security encrypted during the whole system copy process.
  - Option 1: Backup / Restore
    The software provisioning manager 1.0 creates a new encrypted database by restoring an encrypted database backup. The data remains encrypted during the whole process.
Option 2: Export / Import with R3load, or Oracle Data Pump

The software provisioning manager 1.0 (1) unloads the SAP application data with R3load to SAP export dump files. (2) creates a new encrypted database, (3) loads the SAP export dump files and then (4) deletes the SAP export dump files. The data in the SAP export dump files is not encrypted with Oracle TDE.

Exporting SAP data with R3load.

Oracle TDE encrypts SAP application data that is stored inside the Oracle database. When the data is written to Oracle database files, online redo log files or archive files, the data is encrypted. Oracle TDE is only effective and protects your SAP application data as long as you keep it inside the Oracle database.

When you export SAP application data with Oracle data pump into encrypted Oracle data pump export files, the data remains encrypted. This method allows you to safely export/import Oracle data from one Oracle database to another Oracle database. Whenever you export SAP application data with R3load from the Oracle database into R3load dump files, the SAP application data is not encrypted and not protected any more by Oracle Transparent Data Encryption.

Exporting SAP Data with Oracle Data Pump

To perform import or export operations with Oracle tools, you must use Oracle Data Pump. For more information, see 2485122.

SAP system rename

See section Support of Oracle Transparent Data Encryption (Oracle TDE) in the system rename guides at https://support.sap.com/slitoolset > System Provisioning > Rename a System using Software Provisioning Manager > System Rename Option of Software Provisioning Manager 1.0

SAP system database refresh

Copying the Database Only - Refresh Database Content on Oracle Database [page 129]

For more information, see SAP Note 2485122.

Supported Oracle 18c Configuration Scenarios

Oracle single instance installation

Software keystore is located in filesystem

Real Application Clusters (RAC)

See section Installing Oracle Real Application Clusters in the installation guide [page 24]. Software keystore is shared (in ASM or shared filesystem)

Automatic Storage Management (ASM)

See section Database Instance Installation on Oracle Automatic Storage Management in the installation guide [page 24]. Software keystore is located in ASM

Oracle Database Vault

SAP Note 2218115
Oracle TDE and Oracle DV can be combined together.

For more information, see SAP Note 2485122.
Supported TDE Encryption Algorithms

- The software provisioning manager 1.0 allows you to choose which encryption key to use.
- Default Encryption is TDE or AES128.
- NOTDE is the value for No Transparent Data Encryption.
- Currently only user tablespaces can be encrypted.
- Tablespaces System, Psaptemp, and Sysaux are not supported.

Log und SQ files in installation directory for TDE

During the installation, Database Refresh and Systemcopy with R3load with the software provisioning manager 1.0 the TDE will be set and installed when the Install Oracle TDE checkbox is marked.

For a database rename, the wallet is already available with the same master key as before. Only the Auto Login Wallet will be reset. The following log and sql files are created in the installation directory for TDE.

- CreateKeystore.log & CreateKeystore.sql
  - Create keystore log and sql file
  - During the installation or system copy the keystore is created in $SAPDATA_HOME/orawallet/tde
- CreateKSKey.log & CreateKSKey.sql
  - Create keystore key log and sql file
  - The Master Key is written to the keystore file ewallet.p12 and a backup file ewallet_<number>.p12 is created as well.
- CreateKSAutologin.log & CreateKSAutologin.sql
  - Create keystore auto login log and sql file
  - During startup the wallet will be open automatically. The Auto Login Wallet file is cwallet.sso in the keystore.

10.8.2 Database Instance Installation on Oracle Automatic Storage Management

This section provides information on the installation of a database instance on an Oracle Automatic Storage Management (ASM).

Software provisioning manager performs the following steps that differ from the general installation on non-ASM systems:

- It creates the oracle user and the additional Oracle groups oinstall, asmdba, asmadmin, and asmoper.
- It installs the correct user environment for the oracle and <sapsid>adm users.
Prerequisites

- You must have installed the Oracle GRID software. This software ensures that ASM can be used.
- You must have created the following Oracle disk groups:
  - +DATA, +<DBNAME>_DATA or +DATA_<DBMACHINENAME> for all data files, online redo logs (first copy), and control file (first copy).
  - +ARCH, +<DBNAME>_ARCH for control file (second copy) and archive redo logs (not for engineered systems such as Exadata or SuperCluster).
  - +RECO, +<DBNAME>_RECO or +RECO_<DBMACHINENAME> for control file (third copy), online redo log (second copy), RMAN backups and fast recovery area.
  - +OLOG, + MLOG for redo log file are optional for larger systems (not for engineered systems such as Exadata or SuperCluster).

More Information

For more information, see SAP on Oracle Automatic Storage Management (ASM).

10.8.3 Installing Oracle Real Application Clusters on your Target System

You want to install your target system with Oracle Real Application Clusters (RAC) using the software provisioning manager in an SAP environment. This section provides additional information for the RAC installation using the Software Provisioning Manager.

Prerequisites

**Example**

As an example, this section describes the installation steps for RAC on your target system using the following installation parameters:

- **DB_SID=C11**
- **default ASM data diskgroup=+DATA**
- **database hostnames (three node cluster)=vhost1,vhost2,vhost3**
- **three-digit threads=001,002,003** (it is also possible to have single-digit threads=1,2,3)

During the target system installation, the software provisioning manager executes the Oracle executable `$ORACLE_HOME/bin/srvctl` to create the `<DBSID>` cluster database (add database) and adds three instances (add instance) on the different hosts. While the database is being loaded, the cluster is disabled (disable database).
When the database installation, database load and also additional steps like update statistics, setting database users and creating secure store have all finished, the software provisioning manager sets the database to cluster mode (cluster_database=true) and enables the cluster database (enable database).

You can find all these commands in the software provisioning manager log files sapinst_dev*.log in the installation directory (default: /tmp/sapinst_instdir):

```
Example
/oracle/C11/<release-specific folder name>/bin/srvctl add database -d C11 -o
/oracle/C11/<release-specific folder name> -p +DATA/C11/spfileC11.ora -a DATA
/oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i C11001 -n vhost1
/oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i C11002 -n vhost2
/oracle/C11/<release-specific folder name>/bin/srvctl add instance -d C11 -i C11003 -n vhost3
/oracle/C11/<release-specific folder name>/bin/srvctl disable database -d C11
sqlplus "/ as sysdba"
ALTER SYSTEM SET CLUSTER_DATABASE=true
exit
/oracle/C11/<release-specific folder name>/bin/srvctl enable database -d C11
```

When the database installation has finished and the software provisioning manager has stopped, you can check the database status as Oracle user or <sapsid>adm user with the following command:

**Oracle 11:** `srvctl status database -d C11`  
**Oracle 12 and higher:** `srvctl status database -db C11`

**Context**

For additional information about how set up SAP systems to use Oracle Real Application Clusters (RACs), see the whitepapers at https://www.sap.com/community/topic/oracle.html

SAP on Oracle Real Application Clusters (RAC)

These whitepapers describe all required changes to the Oracle database, Oracle network configuration, Oracle instance parameters, and so. However, they do not contain information about RAC installation with the software provisioning manager.

**Procedure**

1. You can then start the database on all nodes with the following command:
Oracle 12 and higher: `srvctl start database -db C11`

The software provisioning manager does not start the database on all nodes after the installation has finished. Only the first database RAC node is started.

You need to start all other instances manually after completing the preparation on the other database nodes. In addition, when the installation is finished, the `<sapsid>adm` environment variable `ORACLE_SID` is set to `C11001` on the first node.

2. You prepare all other database instances as described in the following:

After completing the installation of the first RAC database node, you need to prepare all other database nodes with the software provisioning manager. These installation preparation steps create the required operating system users and groups and also install the required kernel files like `dba*tools` and SAP Host Agent.

You can find this option on the `Welcome` screen of the software provisioning manager at:  

- `Generic Installation Option`  
- `Oracle`  
- `Database tools`  
- `RAC/ASM/Exadata Database Instance Preparation - Kernel <Version>`

3. You install the central instance and the dialog instances:

For the RAC installation, the software provisioning manager performs some additional steps during the installation of the dialog instance so that the application server of the dialog instance can connect to the cluster nodes. For this, the software provisioning manager updates the `tnsnames.ora` file with some additional RAC-specific entries.

The software provisioning manager modifies `tnsnames.ora` like in the following example:

```
C11.WORLD
C11001.WORLD, C11002.WORLD, C11003.WORLD
C11_DVEBMGS01.WORLD
C11_D02.WORLD
```

The software provisioning manager modifies SAP instance or start profiles like in the following example, where `<xx>` is a free sequence number in the instance profile or start profile:

```
SETENV_xx = dbs_ora_tnsname=C11_DVEBMGS01
SETENV_xx = dbs_ora_tnsname=C11_D02
```

During the installation of the dialog instance, the software provisioning manager tries to restart the instance but this fails because the RAC services are not registered at the cluster ware. To register the RAC services, the software provisioning manager creates the required commands in a shell script in the local installation directory.

You need to execute these shell scripts on one node of the cluster database as follows:

1. Log on to the database server as the Oracle user.
2. Set the Oracle environment to the home directory of the RDBMS using the following command:
   ```
   setenv ORACLE_HOME /oracle/C11/<release-specific folder name>
   ```
3. Run the shell script using the following command:
   ```
   call <Path_Of_Shell_Script>/C11_DVEBMGS01.sh
   ```
Example

Entries of the shell script:
```
srvctl add service -d C11 -s C11_DVEBMGS01 -r C11001 -a C11002,C11003 -P BASIC -y AUTOMATIC -q true -j long -e SELECT -m BASIC -z 3 -w 5
srvctl start service -d C11 -s C11_DVEBMGS01
```
Entries of shell script for the dialog instance server C11_D02.sh:
```
srvctl add service -d C11 -s C11_D02 -r C11002 -a C11001,C11003 -P BASIC -y AUTOMATIC -q true -j long -e SELECT -m BASIC -z 3 -w 5
srvctl start service -d C11 -s C11_D02
```

Oracle 12 and higher:

Entries of the shell script:
```
srvctl add service -db C11 -service C11_DVEBMGS01 -preferred C11001 -available C11002,C11003 -tafpolicy BASIC -policy AUTOMATIC -notification true -failovertype SELECT -faileovermethod BASIC -failoverretry 3 -failoverdelay 5
srvctl start service -db C11 -service C11_DVEBMGS01
```
Entries of shell script for the dialog instance server C11_D02.sh:
```
srvctl add service -db C11 -service C11_D02 -preferred C11002 -available C11001,C11003 -tafpolicy BASIC -policy AUTOMATIC -notification true -failovertype SELECT -faileovermethod BASIC -failoverretry 3 -failoverdelay 5
srvctl start service -db C11 -service C11_D02
```

After you have executed these commands on the database server, the installation of the dialog instance can continue. Now you can start the instance without connection problems.

4. You start the dialog instance instance.

10.8.4 Additional Information about the “OraBRCopy” Tool

Related Information

Configuration [page 204]
Output Files [page 206]
## 10.8.4.1 Configuration

### Help

The tool displays the available parameters, if you call it with one of the following command line options:

- `-help`
- `-?`

### Version

The tool will display the version information (release branch and build date), if you call it with the following command line option:

- `-version`

### Application Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>oracleHome</code></td>
<td>Oracle home directory</td>
<td>Determined automatically in script/batch files from the <code>ORACLE_HOME</code> environment variable</td>
</tr>
<tr>
<td><code>sourceSid</code></td>
<td>Source database SID</td>
<td>Determined automatically in script/batch files from the <code>ORACLE_SID</code> environment variable</td>
</tr>
<tr>
<td><code>targetSid</code></td>
<td>Target database SID</td>
<td></td>
</tr>
<tr>
<td><code>listenerPort</code></td>
<td>Listener port number</td>
<td>Mutually exclusive with <code>tnsAlias</code>. Can be found in the <code>listener.ora</code> file of the source database.</td>
</tr>
<tr>
<td><code>tnsAlias</code></td>
<td>Oracle TNS alias</td>
<td>Mutually exclusive with <code>listenerPort</code>. Can be found in the <code>tnsnames.ora</code> file of the source database.</td>
</tr>
<tr>
<td><code>password</code></td>
<td>Password of SYSTEM database user</td>
<td></td>
</tr>
<tr>
<td><code>generateFiles</code></td>
<td>Generates control/trace and</td>
<td></td>
</tr>
<tr>
<td></td>
<td><code>init&lt;TARGET_DBSID&gt;.ora</code> files.</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>forceLogSwitches</td>
<td>Forces log switches. If this option is specified then Oracle database will be stopped during the tool execution.</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>bg</td>
<td>Enables background mode</td>
<td>i Note: Takes effect only as command line option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the tool is running in the background mode, the UNIX shell window or Windows command prompt can be closed after startup.</td>
</tr>
<tr>
<td>secure</td>
<td>Enables secure mode</td>
<td>i Note: Takes effect only as command line option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the tool is running in the secure mode, command line parameters (ex. passwords) will be hidden for java process. The secure mode implicitly enables background mode.</td>
</tr>
<tr>
<td>trace</td>
<td>Trace level</td>
<td>Possible values: all, off, 1 (error), 2 (warning), 3 (info), 4 (config, default), 5, 6, 7 (trace)</td>
</tr>
</tbody>
</table>

### Mandatory Options

- Generate files mode
  `generateFiles, targetSid, password, listenerPort or tnsAlias`
- Force log switches mode
  `forceLogSwitches, password, listenerPort or tnsAlias`
10.8.4.2 Output Files

- CONTROL.SQL
- CONTROL.TRC
- init<TARGET_DBSID>.ora
- ora_br_copy.log
- OraBRCopy.console.log

10.9 SAP Adaptive Server Enterprise Database

During installation of the target system, a significant amount of time is spent for database content import, index creation and index statistics generation.

The duration of loading the database content depends on:

- the amount of data to import into the database
- the number of parallel import processes
- active database engines
- database cache sizes
- available physical memory
- the throughput of the I/O subsystem
- configured import features like index and statistics creation after table content load with several parallel consumers
- available CPU resources
- the number of import packages working on the same database table
- other applications running on the same host consuming CPU and memory

The standard import procedure includes a two step approach:

- Load the data into the database and create indexes
- Update statistics after the data is loaded

For system copies of SAP NetWeaver ABAP with R3load and SAP Adaptive Server Enterprise (SAP ASE) database release of 16 SP03 or higher it is possible to combine these two steps with the result of a reduced duration of the complete import phase. The software provisioning manager 1.0 is able to adapt the templates of the migration monitor in a way that index statistics are generated during table data import and index creation in a parallel way.

With that approach it is not necessary to perform a separate “update statistics” step.

Configuration of the parallelization of the database content import

Tuning the duration of the database content import is done by configuring the number of parallel import processes (R3load) and the number of parallel worker processes in the SAP ASE database server for index
creation and statistic updates. The software provisioning manager 1.0 offers dialog screens to enter the following parameters:

- SAP System Database Import
  - Number of Parallel Jobs
- SAP ASE Database System Parameters
  - Level of Parallelism
    - Number of consumers used by the create index with consumers command
    - Maximum number of worker processes allowed per query used by the create index with consumers and update stats with consumers commands
- SAP ASE Database Statistics
  - Number of Parallel Jobs

The number of indexes created in parallel is defined by the number of R3load jobs configured for the migration monitor.

The number of indexes that can potentially be created in parallel is calculated based on the number of worker processes divided by the number of threads per index creation (number of indexes that can potentially be created in parallel = number of worker processes / number of threads per index creation).

The software provisioning manager is using default values that may fit for most cases. Finding the “best fit” configuration especially for migrations is an interactive process because it depends on the current environment and the data to import.

**10.10 Online Information from SAP**

More information is available online as follows:

<table>
<thead>
<tr>
<th>Title</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview page: Central access to all guides for SAP on IBM Db2</td>
<td><a href="https://help.sap.com/viewer/p/DB6">https://help.sap.com/viewer/p/DB6</a></td>
</tr>
<tr>
<td>SAP on Db2 for Linux, UNIX, and Windows Community</td>
<td><a href="https://community.sap.com/topics/db2-for-linux-unix-windows">https://community.sap.com/topics/db2-for-linux-unix-windows</a></td>
</tr>
<tr>
<td>Running an SAP System on IBM Db2 with the Db2 pureScale Feature</td>
<td>IBM Db2 11.5:</td>
</tr>
<tr>
<td></td>
<td><a href="https://help.sap.com/docs/r/db6_purescale_11_5">https://help.sap.com/docs/r/db6_purescale_11_5</a></td>
</tr>
<tr>
<td></td>
<td>IBM Db2 11.1: <a href="https://help.sap.com/viewer/db6_purescale_11_1">https://help.sap.com/viewer/db6_purescale_11_1</a></td>
</tr>
<tr>
<td></td>
<td>IBM Db2 10.5: <a href="https://help.sap.com/viewer/db6_purescale_10_5">https://help.sap.com/viewer/db6_purescale_10_5</a></td>
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<tr>
<td></td>
<td>IBM Db2 10.1: <a href="https://help.sap.com/viewer/db6_purescale_10_1">https://help.sap.com/viewer/db6_purescale_10_1</a></td>
</tr>
<tr>
<td></td>
<td>(out of mainstream maintenance)</td>
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System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX
<table>
<thead>
<tr>
<th>Title</th>
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<tr>
<td>Database Administration Using the DBA Cockpit: IBM DB2 for Linux, UNIX, and Windows</td>
<td><a href="https://help.sap.com/viewer/db6_dbacockpit">https://help.sap.com/viewer/db6_dbacockpit</a> (English)</td>
</tr>
<tr>
<td></td>
<td><a href="https://help.sap.com/viewer/db6_dbacockpit_de">https://help.sap.com/viewer/db6_dbacockpit_de</a> (German)</td>
</tr>
<tr>
<td>SAP Business Warehouse on IBM Db2 for Linux, UNIX, and Windows: Administration Tasks</td>
<td>Db2 10.5 and higher: <a href="https://help.sap.com/viewer/db6_bw">https://help.sap.com/viewer/db6_bw</a></td>
</tr>
<tr>
<td></td>
<td>Db2 10.1 and lower: <a href="https://help.sap.com/viewer/db6_bw_10_1">https://help.sap.com/viewer/db6_bw_10_1</a> (out of mainstream maintenance)</td>
</tr>
<tr>
<td>Database Administration Guide for SAP on IBM Db2 for z/OS</td>
<td><a href="https://help.sap.com/viewer/db2_administration_guide">https://help.sap.com/viewer/db2_administration_guide</a></td>
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<td>SAP on Db2 for z/OS Community</td>
<td><a href="https://www.sap.com/community/topic/db2-for-zos.html">https://www.sap.com/community/topic/db2-for-zos.html</a></td>
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<td>TLS with Client Certificate Authentication for SAP Application Server Connections to Db2 on IBM Z</td>
<td><a href="https://www.sap.com/documents/2020/10/90ca5a5f-b37d-0010-87a3-c30de2ff8ff.html">https://www.sap.com/documents/2020/10/90ca5a5f-b37d-0010-87a3-c30de2ff8ff.html</a></td>
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</tbody>
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