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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System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX
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/sitoolset System Provisioning Copy a System using Software Provisioning Manager System Copy Option of Software Provisioning Manager 1.0 SP <Current Number>.

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

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>2.9</td>
<td>2018-09-17</td>
<td>Updated version for Software Provisioning Manager 1.0 SP24 (SL Toolset 1.0 SP24)</td>
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<tr>
<td>2.8</td>
<td>2018-05-07</td>
<td>Updated version for Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
</tbody>
</table>
Updated version for Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)

- New Features:
  - Installer Log Files Improvements, documented in: New Features, Useful Information about the Installer, Troubleshooting with the Installer

- 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 Common GUI - has been deprecated with SP22. As of SP22, SL Common GUI is the only available installer GUI:
    - 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 Installer (Java SDT GUI only), Starting the Java SDT GUI Separately, Running the Installer in Accessibility Mode (general accessibility information was moved to Useful Information About the Installer).
    - The Java SDT GUI-specific information was removed from the common installer sections: Running the Installer, Useful Information About the Installer, Interrupted Processing of the Installer, Troubleshooting with the Installer

- New section Using the Step State Editor (SAP Support Experts Only) added to section Additional Information About the Installer.
<table>
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<td></td>
<td>- New Features:</td>
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<td></td>
<td>○ Media Signature Check, documented in: New Features, Running the Installer, Preparing the Media Required for Performing the Export</td>
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<td></td>
<td></td>
<td>○ Support of Oracle 12.2., documented in: New Features</td>
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<tr>
<td></td>
<td></td>
<td>○ Support of Oracle Database Vault, documented in: New Features</td>
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<tr>
<td>2.5</td>
<td>2017-05-22</td>
<td>Updated version for Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
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<tr>
<td></td>
<td></td>
<td>- New Features:</td>
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<tr>
<td></td>
<td></td>
<td>○ New SAPUI5-based user graphical interface (GUI) “SL Common GUI”, documented in: Prerequisites for Running the Installer, Running the Installer, Useful Information About the Installer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Cleanup of operating system users, documented in: SAP System Parameters, Creating Operating System Users and Groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Refresh database content using a database backup enabled for all databases, documented in: Copying the Database Only - Refresh Database Content</td>
</tr>
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<tr>
<td></td>
<td></td>
<td>- New Features:</td>
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<td></td>
<td></td>
<td>○ Verification of the integrity of data units in Software Provisioning Manager, documented in: Downloading the Software Provisioning Manager Archive</td>
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<td>Description</td>
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<tr>
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<td>Updated version for Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)</td>
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<td>Updated version for Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP14)</td>
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<td>1.8</td>
<td>2015-04-27</td>
<td>Updated version for Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
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<td>1.7</td>
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<td>Updated version for Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
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<tr>
<td>1.0</td>
<td>2013-07-17</td>
<td>Initial version</td>
</tr>
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</table>
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 Software Provisioning Manager 1.0 SP24 (“installer” for short), which is part of SL Toolset 1.0 SP24.

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 a detailed list of SAP system products and releases covered by this guide, see SAP Note 1738258. For information about supported operating system and database platforms, see the Product Availability Matrix at http://support.sap.com/pam.

**i 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 Virtualization Management. For more information, see SAP Note 1709155 and https://help.sap.com/lama.

1.2 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 (“installer” for short) in this documentation. However, the term “SAPinst” is still used in:
  - Texts and screen elements in the software provisioning manager (“installer”) 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

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

**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 <code>hostname</code>)</td>
</tr>
<tr>
<td><code>&lt;T_HOST&gt;</code></td>
<td>System name of the target host (command <code>hostname</code>)</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>
</tbody>
</table>
### New Features

This section provides an overview of the new features in Software Provisioning Manager 1.0 (the “installer” for short).


<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 for Linux, UNIX, and Windows: Dropping the database schema automatically while running the installer 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 IBM Db2 for Linux, UNIX, and Windows - Drop Existing Schemas. For more information, see Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows [page 104].</td>
<td>Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
<tr>
<td>Installer Log Files Improvements</td>
<td>Installer log files are now available immediately after the installer has been started, that is before a product has been selected on the Welcome screen. For more information, see Useful Information About the Installer [page 56] and Troubleshooting with the Installer [page 61].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Media Signature Check</td>
<td>The signature of media is checked automatically by the installer during the Define Parameters phase while processing the Media Browser screens. As of now the installer only accepts media whose signature has been checked. See also the description of this new security feature in SAP Note 2393060. For more information, see Preparing the Media Required for Performing the Export [page 35] and Running the Installer [page 51].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------</td>
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<td>-------------</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 17] described in this documentation. For more information, see Implementing Oracle Database Vault with the Installer [page 165].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Support of Oracle 12.2</td>
<td>Software Provisioning Manager (the “installer”) 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 Common GUI with SAPINST 7.49</td>
<td>With the new installer framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) “SL Common GUI”. For more information, see Useful Information About the Installer [page 56], Running the Installer [page 51].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</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 installer 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 101].</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 36]. 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>Feature</td>
<td>Description</td>
<td>Availability</td>
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<tr>
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<td>--------------------------------------------------</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</td>
<td>Oracle, IBM Db2 for z/OS: 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 the Installer [page 51].</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
<tr>
<td>Installation option ASCS Instance available for central and distributed system installation</td>
<td>You can also choose to install the ABAP central services instance (ASCS instance) when installing a central system or distributed system based on SAP NetWeaver Application Server for ABAP. So far this was only possible for high-availability systems.</td>
<td>Software Provisioning Manager 1.0 SP05 (SL Toolset 1.0 SP11)</td>
</tr>
</tbody>
</table>

### 1.4 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:**
  
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.
- The target system installation consists of both the target database and target instance/application server installations. For the scenarios below, the following holds:
- 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. For more information and guidance see the 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.
- 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 [153433](https://support.sap.com/dm).

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 NetWeaver Business Warehouse:**

If you use ADK-based archiving of request administration data in SAP NetWeaver 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](https://support.sap.com/dm) or [sap_dmlt_gce@sap.com](mailto: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.
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](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](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 65], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide available at [http://support.sap.com/sitoolset](http://support.sap.com/sitoolset). System Provisioning ▶️ Installation Option of Software Provisioning Manager
  - SAP system landscape copy:
    - Best Practice document SAP System Landscape Copy for SAP NetWeaver and SAP Solutions at: [https://support.sap.com/esacademy](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.

  **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:

- 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 38).

- 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 70).
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>
</tbody>
</table>
|                                 | ● System copy procedure on UNIX using R3load  
  For more information, see [System Copy Procedure](page 39).                                                                                     |
|                                 | ● System copy procedure for a homogeneous system copy only  
  For more information, see [SAP MaxDB-specific procedure](page 86).                                                                                |
| IBM Db2 for Linux, UNIX, and Windows | Use one of the following:                                                                                                                          |
|                                 | ● System copy procedure using R3load  
  For more information, see [System Copy Procedure](page 39).                                                                                     |
|                                 | ● Backup of IBM Db2 for Linux, UNIX, and Windows  
  For more information, see [IBM Db2 for Linux, UNIX, and Windows Specific Procedures](page 88).                                              |
| IBM Db2 for z/OS                 | Use one of the following:                                                                                                                          |
|                                 | ● System copy procedure on UNIX using R3load  
  For more information, see [System Copy Procedure](page 39).                                                                                     |
|                                 | ● Additional Information:                                                                                                                           |
|                                 | ○ 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. |
|                                 | ○ When R3ta is used to split tables, DELETE with WHERE is not performed if import errors occur in the target system.  
  For more information, see [SAP Note 778729](page 86).                                                                                         |
| Oracle                          | Use one of the following:                                                                                                                          |
|                                 | ● System copy procedure on UNIX using R3load  
  For more information, see [System Copy Procedure](page 39).                                                                                     |
|                                 | ● R3load method with Export/Import Monitors  
  For more information, see [R3load Procedures Using the Migration Monitor](page 129).                                                           |
|                                 | ● Oracle-specific procedure for a homogeneous system copy only  
  For more information, see [Oracle-Specific Procedure](page 72).                                                                                  |
<table>
<thead>
<tr>
<th>Database</th>
<th>Available Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP ASE</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 39].</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 129].</td>
</tr>
<tr>
<td></td>
<td>● Homogeneous system copy only: Backup/Restore or Detach/Attach method</td>
</tr>
<tr>
<td></td>
<td>For more information, see SAP ASE Server-Specific Procedure [page 99].</td>
</tr>
</tbody>
</table>

**i 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 101]

### 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://help.sap.com/nw70">Function-Oriented View</a> Solution Life Cycle</td>
</tr>
<tr>
<td></td>
<td><a href="http://help.sap.com/nw70">Management by Key Capability</a> SAP Licenses</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td><a href="http://help.sap.com/nw703">Management by Key Capability</a> SAP Licenses</td>
</tr>
</tbody>
</table>

For more information about SAP license keys, see [http://support.sap.com/licensekey](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>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
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<tbody>
<tr>
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<tr>
<td></td>
<td><a href="http://help.sap.com/nw70">Management by Key Capability</a> Data Archiving</td>
</tr>
<tr>
<td>SAP NetWeaver Release</td>
<td>Location</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including EHP1</td>
<td><a href="http://help.sap.com/nw701">http://help.sap.com/nw701</a> Application Help</td>
</tr>
<tr>
<td></td>
<td>Function-Oriented View Solution Life Cycle</td>
</tr>
<tr>
<td></td>
<td>Management by Key Capability Data Archiving</td>
</tr>
<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>
</tr>
<tr>
<td></td>
<td>Function-Oriented View Solution Life Cycle</td>
</tr>
<tr>
<td></td>
<td>Management by Key Capability Data Archiving</td>
</tr>
<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>
</tr>
<tr>
<td></td>
<td>Function-Oriented View Solution Life Cycle</td>
</tr>
<tr>
<td></td>
<td>Management by Key Capability Data Archiving</td>
</tr>
</tbody>
</table>

Access to archive files is platform-independent.

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

For special prerequisites and required procedures for SAP NetWeaver 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.
This section provides information about available R3load options.

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 “installer” for short), but it is also possible to use the monitor for copying older releases by starting it manually.

Distribution Monitor
You can use the Distribution Monitor to speed up Unicode Conversion by distributing the R3load workload to multiple machines.

Defining the Unload/Load Order

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.

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>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="http://help.sap.com/nw70/Application">http://help.sap.com/nw70/Application</a> Help Function Oriented View English SAP NetWeaver by Key Capability Database Administration for MaxDB MaxDB Basic Information Concepts of the Database System Performance</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 1</td>
<td><a href="http://help.sap.com/nw701/Application">http://help.sap.com/nw701/Application</a> Help Function Oriented View English SAP NetWeaver by Key Capability Database Administration for MaxDB MaxDB Basic Information Concepts of the Database System Performance</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 2</td>
<td><a href="http://help.sap.com/nw702/Application">http://help.sap.com/nw702/Application</a> Help Function Oriented View English SAP NetWeaver by Key Capability Database Administration for MaxDB MaxDB Basic Information Concepts of the Database System Performance</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td><a href="http://help.sap.com/nw703/Application">http://help.sap.com/nw703/Application</a> Help Function Oriented View English SAP NetWeaver by Key Capability Database Administration for MaxDB MaxDB Basic Information Concepts of the Database System Performance</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:

![Diagram showing improvement with package splitting](image)

The installer by default applies Package/STR Splitting. The installer prepares and runs the Package Splitter.
Related Information

Using the Package Splitter [page 160]

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 installer 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.
Database-Specific Information about Table Splitting

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

Related Information

Preparing the Table Split [page 45]
R3load Options [page 29]

2.6.5 R3load Options

This section provides information about available R3load options.

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 “installer” for short), but it is also possible to use the monitor for copying older releases by starting it manually.

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 129]
- SAP Note 784118 (System Copy Tools for ABAP Systems)

2.6.7 Distribution Monitor

You can use the Distribution Monitor to speed up Unicode Conversion by distributing the R3load workload to multiple machines.

For more information, see SAP Note 855772.

2.6.8 Defining the Unload/Load Order

The installer presents a dialog 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, only for import)

The Migration Monitor has a property orderBy to specify the order of processing packages.

2.6.9 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 23]
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>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 2</td>
<td><a href="http://help.sap.com/hw702">http://help.sap.com/hw702</a> System Administration and Maintenance Information Technical Operations for SAP NetWeaver &lt;Language&gt;</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td><a href="http://help.sap.com/hw703">http://help.sap.com/hw703</a> System Administration and Maintenance Information Technical Operations for SAP NetWeaver &lt;Language&gt;</td>
</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. Set all released jobs from Released to Scheduled: Tools > CCMS > Background Processing > Jobs - Overview and Administration (transaction SM37)

   You also need to do this for jobs that must run periodically (see SAP Note 16083). Select all jobs ( include start after event) as follows:

   Job > Released > Scheduled

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, make sure that you have read section Implementing Oracle Database Vault with the Installer [page 165].

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 SAPF190 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)
   ○ RAGITT01 (asset history sheet)
   ○ RAZUGA01 (asset acquisitions)
   ○ RAABGA01 (fixed asset retirements)

12. BI customers: If you want to perform a system landscape copy for SAP NetWeaver 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).

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 installer as such.

For the media required for performing the target system installation, refer to section Preparing the installation Media in the installation guide for your operating system platform and database at https://help.sap.com/sitoolkit > Area System Provisioning > Guide for Installation of Systems Based on SAP NetWeaver 7.0 / 7.0 EHPs (see also Installing the Target System [page 67]).
i Note

The signature of media is checked **automatically** by the installer during the Define Parameters phase while processing the Media Browser screens. As of now the installer only accepts media whose signature has been checked. See also the description of this new security feature in SAP Note 2393060.

Related Information

Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 36]

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.

Context

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.

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](https://support.sap.com/sitoolset) ➔ System Provisioning ➔ Download Software Provisioning Manager

2. Make sure that you use the latest version of the SAPCAR tool when manually extracting the Software Provisioning Manager archive.

i Note

An older SAPCAR version might extract archive files in a wrong way and this could prevent the installer from working consistently.
Proceed as follows to get the latest version of SAPCAR:

a. Go to https://launchpad.support.sap.com/#/softwarecenter
   SUPPORT PACKAGES & PATCHES
   By Category ➤ SAP TECHNOLOGY COMPONENTS ➤ SAPCAR
b. Select the archive file for your operating system and download it to an empty directory.
c. Rename the executable to sapcar.exe.

For more information about SAPCAR, see SAP Note 212876.

3. Using the latest version of SAPCAR, you can verify the signature of the downloaded 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive as follows:

   a. Get the latest version of the SAPCRYPTOLIB archive to your installation host as follows:
      1. Go to https://launchpad.support.sap.com/#/softwarecenter
         SUPPORT PACKAGES & PATCHES and search for "sapcryptolib".
      2. Select the archive file for your operating system and download it to the same directory where you have put the SAPCAR executable.
      3. Use the following command to extract the SAPCRYPTOLIB archive to the same directory where you have put the SAPCAR executable:
         sapcar -xvf sapcryptolibp_84...sar -R <target directory>
      4. Download the Certificate Revocation List from https://tcs.mysap.com/crl/crlbag.p7s and move it to the same directory.
   b. Verify the signature of the downloaded 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive by executing the following command:

      /<Path to SAPCAR>/sapcar -tvVf <Path to Download Directory>/
      70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR -crl<file name of revocation list>

4. 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>

   i Note
   Make sure that all users have read permissions for the directory where you want to unpack the installer.

   △ 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 installer, 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.

**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/.

**Note**

When performing the export, the installer 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 installer generates a database dump of all SAP objects that are defined in the ABAP Dictionary (R3load). Other objects are not exported by the installer.
- 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 installer 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 installer 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/ORA.

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 39].

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 installer 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](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 32].
   2. Generate DDL statements. For more information, see Generating DDL Statements [page 43].
   3. Prepare the system for table splitting (optional). For more information, see Preparing the Table Split [page 45].
You run the installer [page 51] 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.

You run the installer [page 51] to export the database instance and the central instance.

On the Welcome screen, choose the option Database Instance Export.

For more information, see Running the Installer to Perform the Export [page 51].

**Note**

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

For more information, see Restarting R3load Processes [page 64].

If you want to perform Table Comparison with Software Update Manager (SUM) [page 156] 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 157] for the source system.
3. You can restart the instances of the source system.

Central System – Setting Up the Target System

Use the installer 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 65], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide available at http://support.sap.com/sitoolset System Provisioning > Installation Option of Software Provisioning Manager.

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.
2. If you have already prepared the export (for more information, see Preparing Parallel Export and Import [page 47]) 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 66] to the central system target host.
4. **Install the target system [page 67].**
5. If required install additional **dialog instances** on **dialog instance hosts** as described in the installation guide.

### 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](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 32]].
   2. Generate DDL statements. For more information, see [Generating DDL statements [page 43]].
   3. You run the installer [page 51] to prepare the source system for the export. On the **Welcome** screen, choose the **Export Preparation** option.

   **i 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 45]].
5. You run the installer [page 51] to export the database instance. On the **Welcome** screen, choose the option **Database Instance Export**. For more information, see [Running the Installer to Perform the Export [page 51]].

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

   **i Note**
   If R3load processes fail due to an error, solve the problem and perform a restart.
   For more information, see [Restarting R3load Processes [page 64]].

3. If you want to perform **Table Comparison with Software Update Manager (SUM) [page 156]** 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 157]** 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 installer 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 65], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide available at [http://support.sap.com/sitoolset](http://support.sap.com/sitoolset) System Provisioning > Installation Option of Software Provisioning Manager.

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.
2. Install the **ASCS instance** for the target system as described in the installation guide.
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 47]) 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 66] to the central instance target host.
   - Install the database instance of the target system. For more information, see Installing the Target System [page 67].
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.

### 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 installer.
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-Unicode 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 installer 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.

i 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 tool processes large tables. Instead of exporting/importing one table with one R3load process, the table is processed in, for example, 10 entities.

Prerequisites

- For the following databases, we recommend that you create an index on the column listed in the hints file for the table you want to split before starting R3ta:
  - Db2 for z/OS (Only create a temporary index if you want to perform an unsorted unload.)
  - Oracle

  For more information, see the paragraph Creating a Temporary Index.

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 129].

Parallel data export of a table is supported by all database platforms but parallel data import is not. If the target database platform does not support the parallel data import, the migration monitor has to be configured so that the data import processes the packages sequentially. For more information, see Processing Split Tables.

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)

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

⚠️ Caution
- The tables listed in this file have to appear in alphabetical order.
- This file must not contain empty lines.

2. Start the installer as described in Running the Installer to Perform the Export [page 51].

3. On the Welcome screen, choose <Product> ➜ Software Life-Cycle Options ➜ System Copy ➜ <Database> ➜ Source System Export ➜ System_Variant ➜ Based on <Technical_Stack> ➜ Table Splitting Preparation.

4. Follow the instructions on the installer 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 jobs.

⚠️ Caution
The specified path to the export directory must not contain blanks!

5. After you have entered all requested input parameters, the installer displays the Parameter Summary screen. This screen shows both the parameters that you entered and those that the installer 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 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 have been created for all tables that are to be split.
   - If no *.WHR files 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 have been created for the missing tables, merge these results with the results from the first Prepare Table Splitting run:
     1. Copy the *.WHR files from <Temporary_Dump_Directory>/ABAP/DATA to <Export_Dump_Directory>/ABAP/DATA.

8. If required, create the temporary index on the tables of the source system to be split.
Oracle only: This is not required if you export the database using the Oracle-specific method with the Oracle PL/SQL splitter.
For more information, see the paragraph Creating a Temporary Index.

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.

Context

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

- Creating the export directory structure
- Calculating the size of the target database
- Creating database size file `DBSIZE.XML`

⚠️ Caution

Parallel export and import without 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.

Procedure

1. Run the installer to perform the Export Preparation.

   This step calculates the size of the target system and generates the `DBSIZE.XML` that is required to set up the target system.

   For more information, see Exporting the Source System Using the Installer [page 48].

2. Share or transfer the complete export directory with its structure and the generated `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 Using the Installer [page 48] and Transferring the Export Files to the Target Host [page 66].
4.1.4 Exporting the Source System

Here you can find information about how to run the installer 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 39].

4.1.4.1 Prerequisites for Running the Installer

Make sure you fulfil the following prerequisites before running the installer.

- For the SL Common GUI, 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 Common GUI:
    - 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 Common GUI 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 Common GUI.

⚠️ Caution

The installer uses a self-signed certificate, which is used temporarily only while the installer is running. This certificate is not trusted by the browser unless it is imported manually by the user running the installer. This behavior is intentionally designed in this way because - unlike ordinary public web servers - the installer has different usage patterns. You must configure your browser to trust the self-issued certificate of the installer after carefully performing the “thumbprint” verification described in Running the Installer [page 51]. For more information about adding trusted certificates, see the documentation of your browser.
For more information about the SL Common GUI, see Useful Information About the Installer [page 56].

- We recommend that you use the csh shell for the installation. If you want to use another shell, make sure that you have read SAP Note 202227.
  The installer uses csh scripts during the installation to obtain the environment for user <sapsid>adm. This is also true if user <sapsid>adm already exists from an earlier SAP system installation, and the shell of this user is not csh. Before you start the installer, execute the following command as user <sapsid>adm to make sure that the csh scripts are up-to-date:
  
  /bin/csh -c "source /home/<sapsid>/cshrc;env"

- Check the value of the environment variable TEMP, TMP, or TMPDIR:

<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>

- 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 300 MB of free space in the installation directory for each installation option. In addition, you need 300 MB free space for the installer executables. If you cannot provide 300 MB free space in the temporary directory, you can set one of the environment variables TEMP, TMP, or TMPDIR to another directory with 300 MB free space for the installer 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 the Installer [page 56].
- 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 installer.
  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.

- Only valid for "Platform": HP-UX, Linux, Oracle Solaris
  HP-UX, Linux, Oracle-Solaris: Make sure that you have set the limits for operating system users root, <sapsid>adm, and your database-specific operating system users (see also section “Creating Operating System Users and Groups” and “Running the Installer” in the installation guide).

⚠️ 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:

Example

The following table lists example output taken from SUSE Linux Enterprise Server 11 (x86_64).

<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>
<tr>
<td>descriptors</td>
<td>8192</td>
</tr>
<tr>
<td>memoryuse</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 11 (x86_64).

<table>
<thead>
<tr>
<th>Output sh</th>
<th>Output ksh</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpu time (seconds)</td>
<td>cpu time (seconds)</td>
<td>unlimited</td>
</tr>
<tr>
<td>file size (blocks)</td>
<td>file size (blocks)</td>
<td>unlimited</td>
</tr>
<tr>
<td>data seg size (kbytes)</td>
<td>data size (Kibytes)</td>
<td>unlimited</td>
</tr>
<tr>
<td>stack size (kbytes)</td>
<td>stack size (Kibytes)</td>
<td>8192 KB</td>
</tr>
<tr>
<td>core file size (blocks)</td>
<td>core file size (blocks)</td>
<td>unlimited</td>
</tr>
<tr>
<td>open files</td>
<td>nofile</td>
<td>8192</td>
</tr>
<tr>
<td>max memory size (kbytes)</td>
<td>max memory size (Kibytes)</td>
<td>unlimited</td>
</tr>
</tbody>
</table>

End of 'Platform': HP-UX, Linux, Oracle Solaris

- 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 installer and the SL Common GUI.
  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 installer 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 SAP Note 2230669, 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 the Installer

This section describes how to run the installer to perform the export for system copy.

**Prerequisites**

For more information, see Prerequisites for Running the Installer [page 48].

**Context**

The installer has a web browser-based GUI named “SL Common GUI of the Software Provisioning Manager” - “SL Common GUI” for short. This procedure describes an installation where you run the installer and use the SL Common GUI, that is you can control the processing of the installer from a browser running on any device.

For more information about the SL Common GUI, see Useful Information About the Installer [page 56].

**Procedure**

1. Log on to the host where you want to run the installer.
   
   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.

If your security policy requires that the person running the installer is not allowed to know the credentials of a user with root permissions on the host where the installer 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 35].

→ 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 installer as follows:

Open a command prompt and enter the following command:

`/<Path_To_Unpack_Directory>/sapinst`

The installer GUI starts automatically by displaying the Welcome screen.

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

`/<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 installer is starting up.

The installer now starts and waits for the connection with the SL Common GUI.

You can find the URL you require to access the SL Common GUI at the bottom of the shell from which you are running the installer.

```plaintext
...  ********************************************************************************
Open your browser and paste the following URL address to access the GUI
https://[<hostname>]:4237/sapinst/docs/index.html
Logon users: [<users>]  
```
If the host specified by `<hostname>` cannot be reached due to a special network configuration, proceed as follows:

1. Terminate the installer as described in Useful Information About the Installer [page 56].
2. Restart the installer 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 the Installer [page 48]) installed on the host where you run the installer, 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 installer.
   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:
   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the installer 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 Common GUI 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 38].

**Note**

Do not perform these steps if you use a database-specific method (see Database-Specific System Copy [page 70]).
6. Choose Next.

**Note**

If there are errors during the self-extraction process of the installer, you can find the log file dev_selfex.out in the temporary directory.

7. Follow the instructions in the installer input screens and enter the required parameters.

**Note**

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.

**Note**

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.

**Note**

Oracle Database only: If your source system has Oracle Database Vault, consider the additional information in section Implementing Oracle Database Vault with the Installer [page 165].

**Caution**

The 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 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 installer displays the Parameter Summary screen. This screen shows both the parameters that you entered and those that the installer set by default. If required, you can revise the parameters before starting the export procedure.

9. To start the execution, choose Next.

The installer 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 installer has finished. Sometimes these remain in the temporary directory.

**Note**

If there are errors with the installer extraction process, you can find the log file dev_selfex.out in the temporary directory.
→ Recommendation

Keep all installer 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 installer directories with all their contents. Save the copy to a physically separate medium, such as a medium or a USB drive that is separate from your installation hosts.

This might be useful for analyzing any issues that might occur later when using the system. For security reasons, do not keep the installer directories on hosts where you processed it, but make sure that you delete them after saving them separately.

11. If you copied installation media to your hard disk, you can delete these files when the installer 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 installer:

   `<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.

   **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 installer has completed.

14. The installer 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 installer log files in the sapinst_instdir directory. For more information, see Useful Information About the Installer [page 56].

Related Information

Useful Information About the Installer [page 56]
Interrupted Processing of the Installer [page 58]
Troubleshooting with the Installer [page 61]

4.1.4.3 Additional Information about the Installer

The following sections provide additional information about the installer.

   Useful Information About the Installer [page 56]
   
   This section contains some useful technical background information about the installer and the installer GUI.

   Interrupted Processing of the Installer [page 58]
Here you find information about how to restart the installer if its processing has been interrupted.

Troubleshooting with the Installer [page 61]
This section tells you how to proceed when errors occur while the installer is running.

Troubleshooting during the Export Process [page 62]
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 63]
This section describes how to use the Step State Editor available in the installer.

4.1.4.3.1 Useful Information About the Installer

This section contains some useful technical background information about the installer and the installer GUI.

- Software Provisioning Manager (the “installer” for short) has the web browser-based “SL Common GUI of the Software Provisioning Manager” - “SL Common GUI” for short. The SL Common GUI 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 soon as you have started the sapinst executable, the installer 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 installer.
  - 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 installer.
Shell Used | Command
--- | ---
Bourne shell (sh) | `TEMP=<Directory>`
 | `export TEMP`
C shell (csh) | `setenv TEMP <Directory>`
Korn shell (ksh) | `export TEMP=<Directory>`

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

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

- The installer 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 installer 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 installer, which might be useful if an error occurs.

⚠️ Caution
If the installer cannot find a temporary directory, the installation terminates with the error `FCO-00058`.

- To see a list of all available installer properties, start the installer as described above with command line parameter `-p`:
  ```
  ./sapinst -p
  ```
- If you want to perform the export in unattended mode, see SAP Note 2230669, which describes an improved procedure using `inifile.params`.
- Before starting the export, make sure 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 installer by choosing the Cancel button.

ℹ️ Note
If you need to terminate the installer, press `Ctrl` + `C`.
4.1.4.3.2 Interrupted Processing of the Installer

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

Context

The processing of the installer might be interrupted for one of the following reasons:

- An error occurred during the Define Parameters or Execute phase:
  The installer 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 installer by choosing Cancel in the SL Common GUI.

⚠️ 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>
<tbody>
<tr>
<td>Retry</td>
<td>The installer retries the installation from the point of failure without repeating any of the previous steps. This is possible because the installer records the installation 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 installer displays the same dialog box again.</td>
</tr>
<tr>
<td>Stop</td>
<td>The installer stops the installation, closing the dialog box, the installer GUI, and the GUI server. The installer records the installation progress in the keydb.xml file. Therefore, you can continue the installation from the point of failure without repeating any of the previous steps. See the procedure below.</td>
</tr>
<tr>
<td>Continue</td>
<td>The installer continues the installation from the current point.</td>
</tr>
<tr>
<td>View Log</td>
<td>Access installation log files.</td>
</tr>
</tbody>
</table>

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 the Installer [page 51].

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 35].

   → 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.

   Only valid for 'Platform': Oracle Solaris

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

   End of 'Platform': Oracle Solaris

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

   <Path_to_Unpack_Directory>/sapinst

4. The installer is restarting.
   
   The installer now starts and waits for the connection with the SL Common GUI.
   
   You can find the URL you require to access the SL Common GUI at the bottom of the shell from which you are running the installer.

   ...

   **************************************************************************
   
   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 installer as described in Useful Information About the Installer [page 56].
   2. Restart the installer 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 the Installer [page 48]) installed on the host where you run the installer, 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 installer.

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

1. Go to the sapinst_exe.xxxxxx.xxxx directory in the temporary directory to which the installer 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 Common GUI 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 installer does not continue the interrupted export for system copy option. Instead, it moves the content of the old installer directory and all installer-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 installer 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 installer continues the interrupted export for system copy from the point of failure.

### 4.1.4.3.3 Troubleshooting with the Installer

This section tells you how to proceed when errors occur while the installer is running.

**Context**

If an error occurs, the installer:
- Stops processing
- Displays a dialog informing you about the error
**Procedure**

1. Check SAP Note [1548438](https://support.sap.com) for known installer 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 installer 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 installer 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 which you used to start the installer. For more information, see Useful Information About the Installer [page 56].
     - To check the log and trace files of the installer GUI for errors, go to the directory *<User_Home>/sapinst/*.
     - Then continue by choosing Retry.
     - If required, abort the installer by choosing Cancel in the tool menu and restart the installer. For more information, see Interrupted Processing of the Installer [page 58].
3. 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](https://support.sap.com).

### 4.1.4.3.4 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)**
  - b. Make sure that all tables in the *<Package>*.TST 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 *ora<dbsid>* cannot create or open files in the installer directory.
Reason:
Only members of the sapinst UNIX group can access the installer directory. This group is created by the installer as of SAP NetWeaver 7.1.

Solution:
1. Manually associate <sapsid>adm and ora<dbsid> OS users with sapinst group if this association is missing.
2. Verify the /etc/group file and check if the sapinst group exists and OS users are members of this group.
3. If the sapinst group does not exist yet, start the installer. The installer creates this group during startup before the product catalog list is displayed.
4. Edit /etc/group file and associate OS users with sapinst group.
5. Continue with the export.

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

This section describes how to use the Step State Editor available in the installer.

- 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 installer meets the requirements listed in Prerequisites for Running the Installer [page 48].

Procedure

1. Start the installer from the command line as described in Running the Installer [page 51] with the additional command line parameter SAPINST_SET_STEPSTATE=true
2. Follow the instructions on the installer 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 installer during the Execute Service phase. By default all steps are in an initial state. Underneath each step, you see the assigned installer 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 installer to pause.
- Mark the checkbox in front of the Skip option of the steps which you want the installer 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 installer 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 installer.

5. Continue until you have run through all the steps of the Execute Service phase of the installer.

### 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 153]) 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 “–”.
   ○ 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 installer or the Migration Monitor to proceed with the system copy.

4.1.5 Setting Up the Target System
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.

   \[\text{Caution}\]
   
   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 installer does not ask you to specify the export directory and automatically chooses one that you may not want to use. In this case, the installer 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.
     
     \[\text{i Note}\]
     
     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 installer.

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 installer recognizes this automatically and skips the related steps.

Procedure

1. Prepare the target system host as described in the installation guide for the operating system and database platform intended for the target system. You can find this installation guide at:

   http://support.sap.com/sitoolset Area System Provisioning Guide for Installation of Systems Based on SAP NetWeaver 7.0 / 7.0 EHPs

   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 installer as described in the installation guide 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 installer to avoid performance problems during the dialog phase. You can find the latest version of the installer on the SAP Service Marketplace.
3. On the Welcome screen, navigate to the following folder according to the requirements of your target system:

   \(<Product>\) > Software Life-Cycle Options > System Copy > \(<Database>\) > Target System Installation > \(<System_Variant>\) > Based on \(<Technical_Stack>\).

4. Run the installation options required for your system copy in the sequence they are listed in the specific folder and according to process flow in Setting Up the Target System Using the Installer [page 66].

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

   If you need to perform some follow-up activities in the target system [page 117] before it is started by the installer, make sure that on the Parameters Settings screen you choose parameter mode Custom. Then the installer 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 installer will abort in the processing phase when checking the migration key and will ask you for a valid migration key.

**Note**

**Oracle Database only:** If your source system has Oracle Database Vault, consider the additional information in section Implementing Oracle Database Vault with the Installer [page 165].

- 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 installer 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 the Installer section in the appropriate installation guide 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 DYNPSOURCE 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.

6. 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 64].
- 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 installer:
  - 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 156].
  Proceed as follows:
  1. Make sure that the central instance is not started after the import has finished successfully.
  2. Run table comparison [page 157] for the target system.
  3. Start the instances of the target system.
5 Database-Specific System Copy

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)

1. Create a database backup with database-specific tools as described in the section for your database:
   - SAP MaxDB-Specific Procedure [page 86]
   - IBM Db2 for Linux, UNIX, and Windows-Specific Procedures [page 88]
   - IBM Db2 for z/OS Specific Procedures [page 92]
   - SAP ASE Server-Specific Procedure [page 99]
2. Oracle only: Generate the control file structure for the target database [page 75].
3. Oracle only: If required, create an offline backup of the source database [page 84].

Process Flow on the Target System

1. Oracle only: You prepare the target system [page 80]:
   1. Follow the instructions on the installer screens until the installer 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 113].

**Distributed System or High Availability 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 installer in the source system to export it. You only have to run the installer 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 86]
   - IBM Db2 for Linux, UNIX, and Windows-Specific Procedures [page 88]
   - IBM Db2 for z/OS Specific Procedures [page 92]
   - SAP ASE Server-Specific Procedure [page 99]
2. **Oracle only**: On the database instance host of the source system, generate the control file structure for the target database [page 75].
3. **Oracle only**: If required, on the database instance host, create an offline backup of the source database [page 84].

**Process Flow on the Target System**

**Note**
For the target system installation, you use the installation guide for your target operating system and database, available at [http://support.sap.com/slitoolset][1] ➔ System Provisioning ➔ Installation Option of Software Provisioning Manager ➔ Installation Guides - Application Server Systems. In the following we refer to this documentation as “installation guide.”

1. **Oracle only**: You prepare the target system [page 80]:
   1. On the database instance host, start the installer as described in the installation guide and follow the instructions on the installer screens until the installer 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 113].
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 installer for the installation on the target system host as described in the installation documentation for your SAP component. Only the installer 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 installer 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, consider the additional information in section Implementing Oracle Database Vault with the Installer [page 165].

**Oracle Storage-Based System Copy Methods Available in the Installer**

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 installer 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 73]

- Using a CONTROL SQL File Created by the ORABRCOPY Tool [page 75]

**Related Information**

Database-Specific System Copy [page 70]

**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 (the “installer” for short) 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 74]
Performing Offline Recovery [page 74]

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:
   ```bash
   saphostctrl -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:
   ```bash
   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 installer 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* at https://support.sap.com/sltoolset

   ![System Provisioning](https://support.sap.com/sltoolset)

   ![System Provisioning](https://support.sap.com/sltoolset)

   ![System Provisioning](https://support.sap.com/sltoolset)

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 installer 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 at https://support.sap.com/sitoolset System Provisioning Installation of Software Provisioning Manager Installation Guides - Application Server Systems.

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 installer stops for database restore, copy all saved files to the target System.

   Make sure that you also copy the source init<SID>.ora file

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

Related Information

Generating the Control File Structure [page 75]
Preparing the Target System (Oracle) [page 80]
Restoring Database Files on the Target System [page 81]
Restoring the Database Files on the Target System with BR*T tools [page 82]

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 172].
**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:
     ```bash
     ./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:
     ```bash
     ./ora_br_copy.sh -generateFiles -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, and performs the required log switches.

**i Note**

During the online backup, the database must be up and running. To ensure this, this command must not contain the parameter `-forceLogSwitches`.

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:

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
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/SYSTEM.DATA1',
   '/oracle/NEW/sapdata3/ims_1/ims.DATA1',
   ...
   '/oracle/NEW/sapdata1/ims700_1/ims700.DATA1'
   ...
   The count of the data files must be equal to the count of the corresponding data files in the trace file.

5. ALTER TABLESPACE PSAPTEMP ADD TEMPFILE
   '/oracle/NEW/sapdata3/temp_1/temp.DATA1'
SIZE 350M REUSE AUTOEXTEND OFF;
...
The size must be equal to the corresponding size in the trace file.

6. The number of rows with `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 `sapdata<n>` file systems on the target system host are large enough.

#### Procedure

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

   △ **Caution**
   
   When you perform a system copy with the Oracle backup/restore method, you cannot change the database schema and the table space names of the new target system. When installing the target central instance, database instance, or dialog instance make sure that you enter the correct database schema names (which are the database schema name of the source system). The schema names of the source and target system must be identical.

   a. On the Welcome screen, choose `<SAP Product> Software Life-Cycle Options System Copy Database Target System Installation <System Variant>`.
   b. When the installer prompts for the installation type, choose `Homogeneous System Copy (Backup/Restore)`.
   c. Proceed until the installer stops to restore the database files on the target system.

   The following message is displayed:

   **SAPinst now stops the installation. Please 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. 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>`
4. Make sure that the following directories are empty (except the subdirectory saparch/cntrl):
   - /oracle/<TARGET_DBSID>/saparch
   - /oracle/<TARGET_DBSID>/oraarch

5. 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 and Oracle 10).
   To do this, enter the following command:
   - Oracle 12c: `chown -R oracle:oinstall <directory>`
   - Oracle 11g and Oracle 10: `chown -R ora<target_dbsid>:dba <directory>`

6. Restore the database files on the target system either manually (see Restoring Database Files on the Target System Manually [page 81]) or with BR*Tools (see Restoring the Database Files on the Target System with BR*Tools [page 82]), then proceed with the installer.

### 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 84].
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>
<tr>
<td>Source: &lt;INSTDIR&gt;</td>
<td>CONTROL.SQL</td>
</tr>
<tr>
<td>Target: &lt;SAPINST_INSTDIR&gt;</td>
<td></td>
</tr>
<tr>
<td>Source: &lt;INSTDIR&gt;</td>
<td>init&lt;TARGET_DBSID&gt;.ora</td>
</tr>
<tr>
<td>Target: /oracle/&lt;DBSID&gt;/</td>
<td></td>
</tr>
<tr>
<td>&lt;DB_VERSION&gt;_&lt;BIT&gt;/dbs</td>
<td></td>
</tr>
</tbody>
</table>

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<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

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.

   Source and Target Directories on UNIX

<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>
<tr>
<td>Source: &lt;INSTDIR&gt;</td>
<td>init&lt;TARGET_DBSID&gt;.ora</td>
</tr>
<tr>
<td>Target: /oracle/&lt;DBSID&gt;/</td>
<td></td>
</tr>
<tr>
<td>&lt;DB_VERSION&gt;_&lt;BIT&gt;/dbs</td>
<td></td>
</tr>
</tbody>
</table>

2. Call the restore and recovery function of BR*Tools. For more information about the required steps and prerequisites, see SAP Note 1003028.

   The main prerequisite is that the corresponding BR*Tools logs (BRBACKUP detailed and summary log, BRARCHIVE summary log) are copied manually from the source to the target system. In addition, the postprocessing steps mentioned in this SAP Note are performed automatically by the installer.
SAP Note 1003028 also comprises information about executing restore and recovery under the control of BRRECOVER and the exact syntax of BRRECOVER (see section Homogeneous Database Copy).

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

<table>
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<th>SAP NetWeaver Release</th>
<th>Location</th>
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</thead>
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<tr>
<td></td>
<td>Cycle Management by Key Capability</td>
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<tr>
<td></td>
<td>Administration Tasks</td>
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<tr>
<td></td>
<td>Database Administration for Oracle</td>
</tr>
<tr>
<td></td>
<td>Guide: Oracle</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<tbody>
<tr>
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</tr>
<tr>
<td>Cycle Management by Key Capability</td>
<td>General</td>
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<tr>
<td>Administration Tasks</td>
<td>Database Administration</td>
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<td>Database Administration for Oracle</td>
<td>SAP Database</td>
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<td>Guide: Oracle</td>
<td>BR*Tools for Oracle DBA</td>
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<td>Solution Life</td>
</tr>
<tr>
<td>Cycle Management by Key Capability</td>
<td>General</td>
</tr>
<tr>
<td>Administration Tasks</td>
<td>Database Administration</td>
</tr>
<tr>
<td>Database Administration for Oracle</td>
<td>SAP Database</td>
</tr>
<tr>
<td>Guide: Oracle</td>
<td>BR*Tools for Oracle DBA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.0 including EHP3</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function-Oriented View</td>
<td>Solution Life</td>
</tr>
<tr>
<td>Cycle Management by Key Capability</td>
<td>General</td>
</tr>
<tr>
<td>Administration Tasks</td>
<td>Database Administration</td>
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<tr>
<td>Database Administration for Oracle</td>
<td>SAP Database</td>
</tr>
<tr>
<td>Guide: Oracle</td>
<td>BR*Tools for Oracle DBA</td>
</tr>
</tbody>
</table>

3. Shut down the Oracle database instance as follows:

```
sqlplus /nolog
connect / as sysdba
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 84]
Creating an Offline or Online Backup with BR*Tools [page 84]

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.TR C 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 81].

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>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="http://help.sap.com/nw70">http://help.sap.com/nw70</a></td>
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<td></td>
<td>Function-Oriented View &lt;Language&gt;</td>
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<td>Management by Key Capability</td>
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<td>for Oracle</td>
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<td></td>
<td>BR*Tools in Action</td>
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<td></td>
<td>Copy with BR*Tools</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including EHP1</td>
<td><a href="http://help.sap.com/nw701">http://help.sap.com/nw701</a></td>
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<td>Function-Oriented View &lt;Language&gt;</td>
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<td>Management by Key Capability</td>
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<td></td>
<td>for Oracle</td>
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<tr>
<td></td>
<td>BR*Tools in Action</td>
</tr>
<tr>
<td></td>
<td>Copy with BR*Tools</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including EHP2</td>
<td><a href="http://help.sap.com/nw702">http://help.sap.com/nw702</a></td>
</tr>
<tr>
<td></td>
<td>Function-Oriented View &lt;Language&gt;</td>
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<td>Management by Key Capability</td>
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<td>for Oracle</td>
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<td>BR*Tools in Action</td>
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<td></td>
<td>Copy with BR*Tools</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including EHP3</td>
<td><a href="http://help.sap.com/nw703">http://help.sap.com/nw703</a></td>
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<td>Function-Oriented View &lt;Language&gt;</td>
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<td>Management by Key Capability</td>
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<td>BR*Tools in Action</td>
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<tr>
<td></td>
<td>Copy with BR*Tools</td>
</tr>
</tbody>
</table>

Note

If you choose a backup method with BR*Tools, you also have to restore the database files on the target system with BR*Tools. For more information, see Restoring the Database Files on the Target System with BR*Tools [page 82].
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](http://MAXDB.sap.com/doc/7_6/default.htm) 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)**
  You are using the SAP MaxDB Database Manager (DBMGUI) version 7.5.0 Build 12 or above. For more information, see:
  Alternatively, you can use Database Studio. For more information, see:
  - [http://MAXDB.sap.com/doc/7_7/default.htm](http://MAXDB.sap.com/doc/7_7/default.htm)

- **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 installer prompts you, configure the database data volumes according to this value.

Context

The installer is used for installation on the target system host as described in the installation documentation for your SAP solution at [http://support.sap.com/sitoolset](http://support.sap.com/sitoolset) in the installer, 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<SAPSID> — for example, SAPR3.

You can perform this procedure in the following ways:

- Manual restore
  The installer 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 installer.

- Automatic restore
  The installer 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 38].

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 installer as follows and then follow the prompts:

   1. <Product> ➔ Software Life-Cycle Options ➔ System Copy ➔ Target System Installation ➔ <System Variant>

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:
     1. Start the data recovery wizard from DBMGUI
     2. Register your database instance in the DBMGUI
     3. Check the database instance in the admin state.
3. Choose [Recovery](#) > [Recovery with Initialization …](#)
4. In [type of recovery](#), select [Restore a medium](#).
5. Specify the backup medium.
6. Start the restore procedure.

### i Note

The recovery wizard does not start the recovery immediately. It initializes the database instance first. It takes some time for the database server to format the database volumes.

2. After the restore, check the state of the target database instance. Change the database state to online if it is not already in online state.
3. Delete the entries from the following tables to make sure that information about the backup history for update statistics in the Computing Center Management System (CCMS) from the old system does not appear in the new system:
   - CNHIST
   - CNREPRT
   - CNMEDIA
   - DBSTATHADA
   - DBSTAIHADA
   - DBSTATIADA
   - DBSTATTADA
   - SDBAADAUPD
4. Continue with the installer or restart it if you stopped it during the recovery.
   - [Restore by the Installer](#)
     
     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 a Db2 backup can be used 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 installer. System copy using native Db2 backup/restore procedures **without** the installer 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.
- If errors occur when restoring the backup on the target system, the complete restore must be repeated.
Context

An SAP system copy with a Db2 database can be also created 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 installer is used for installation on the target system host as described in the installation documentation for your SAP component. Before starting the installer 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 appropriate installation guide at http://support.sap.com/sitoolset.

In the ABAP system, only the installer 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 38].

Disadvantages of the Backup Method

- You cannot change the name of the database schema. The name of the database schema of the target system 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.

   **Note**

   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. To do so, use the INCLUDE LOGS option of the BACKUP DATABASE command. Logs are by default included in an online backup.

2. To create a target system, run the installer on the target system host by choosing the following on the Welcome screen:

   <Product> ➤ Software Life-Cycle Options ➤ System Copy ➤ IBM Db2 for Linux, UNIX, and Windows ➤ Target System Installation ➤<System_Variant> ➤ Based on <Technical_Stack>

   Perform the installation options in the given sequence and follow the instructions on the installer dialogs. The installer prompts you to perform the database restore during the installation phase.
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 brdb6brt.

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.

4. 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 Db2 documentation Db2 Command Reference.
     
     **Note**
     With a simple restore, you cannot change the name or 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.
     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 roll forward operation to bring the database into a consistent state.
     
     You can now continue with the installation.

5. 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. To rename a single tablespace, enter the following command:

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

**Example**

    ```
    db2 rename tablespace <SAPSID_SOURCE>#STABD to <SAPSID_TARGET>#STABD
    ```
If you use the **deferred table creation** function, you also have to execute the following command for each renamed tablespace using the `db6util` tool:

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

For more information, see SAP Note [1227165](https://support.sap.com).  

⚠️ **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 <connect_user_name>.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:
  ```
  update <connect_user_name>.iadb6 set tabspace = '##<SAPSID_TARGET>##'||
  substr(tabspace,5,length(tabspace)-4)
  ```

- For table TADB6, enter the following SQL command:
  ```
  update <connect_user_name>.tadb6 set tabspace = '##<SAPSID_TARGET>##'|||
  substr(tabspace,5,length(tabspace)-4)
  ```

**Next Steps**

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

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

**More Information**

- **Database Administration Guide: SAP on IBM Db2 for Linux, UNIX, and Windows and Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows.** 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.

- IBM Knowledge Center at [https://www.ibm.com/support/knowledgecenter/SSEP0G](https://www.ibm.com/support/knowledgecenter/SSEP0G)
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 38].

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 93]
2. **Step 2: Consider DB2 Procedures of the Target System** [page 95]
3. **Step 3: Delete All Obsolete Objects of the Target System** [page 95]
4. **Step 4: Copy All Objects of the Source System into the Target System** [page 95]
5. **Step 5: Add All DB2 Subsystem Libraries to a PARMLIB Containing Definitions Required for APF** [page 95]
6. **Step 6: Alter the BSDS of the Target System** [page 96]
7. **Step 7: Change Entries of logcopy Data Sets in the BSDS of the Target System** [page 96]
8. **Step 8: Customize DB2 Modules Using DSNTIJUZ** [page 96]
9. **Step 9: Configure the Distributed Data Facility (DDF)** [page 97]
10. **Step 10: Start the Target System Using ACCESS(MAINT)** [page 97]
11. **Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH** [page 97]
12. **Step 12: Stop and Restart the Target System** [page 97]
13. **Step 13: Create DSNTEP2 and DSNTEP4 Load Modules for the Target System** [page 98]
14. **Step 14: Alter All WLM Environments of Stored Procedures** [page 98]
15. **Step 15: Perform Post-Offline System Copy Actions (Optional)** [page 98]

**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 SECADM.

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';
   
   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:

<table>
<thead>
<tr>
<th>Note</th>
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<tbody>
<tr>
<td>This is only an excerpt from the result.</td>
</tr>
</tbody>
</table>

   ```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.

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 95] of this process flow has been completed successfully.</td>
</tr>
</tbody>
</table>
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 95] 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 DSNJU003 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 DSNJU003 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 (DSNHDECP), 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 ADMTPROC 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 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 97] 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 97].

For data sharing systems, start the first member and continue with Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 97].

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 98] 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 93] 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:
   ```sql
   SELECT * FROM SYSCBM.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 installer 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 backup.
- 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 38].

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 installer to install the target system by choosing the following on the Welcome screen:

   - `<Product>` > `Software Life-Cycle Options` > `System Copy` > `Database` > `Target System Installation` > `System Variant` > `Based on <Technical Stack>`

   **Note**
   - Choose the installation services in exactly the order they appear. For more information, see the SAP ASE installation guide for your SAP NetWeaver-based system at: [http://support.sap.com/sitoolset](http://support.sap.com/sitoolset) > `System Provisioning` > `Installation Option`.
○ On the installer screen SAP SystemDatabase, make sure that you select Homogeneous System Copy (SAP ASE-specific: Attach database device or Load database dump).
○ The installer 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 installer tries to find the database devices mentioned in the manifest file automatically, otherwise it asks for the files during the installer execution phase.
Using the Refresh Database Content option in the installer, 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. The sections below describe how to use the Refresh Database Content option for your database.

→ 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.

Related Information

Copying the Database Only - Refresh Database Content on SAP ASE [page 101]
Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows [page 104]
Copying the Database Only - Refresh Database Content on Oracle Database [page 107]
Copying the Database Only - Refresh Database Content on IBM Db2 for z/OS [page 108]
Copying the Database Only - Refresh Database Content on SAP MaxDB [page 110]

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

Using the Refresh Database Content option in the installer, 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 dumps and handling of database device files, see the SAP ASE Administration Guide at http://support.sap.com.

- 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 installer 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 installer 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 installer on the database host as described in Exporting the Source System [page 48].
      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 installer on the database host as described in Exporting the Source System [page 48].
      2. On the Welcome screen, run option Generic Options Refresh Database Content.
Using the Database-specific Method

Procedure Using database and transaction dumps

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:
      ```
      use master
      go
      dump database <SAPSID> to '<dump_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 installer on the database host as described in Exporting the Source System [page 48].
      2. On the Welcome screen, run option [Generic Options ➤ Refresh Database Content]

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<dsid>` is able to read both the database device files and the manifest file.
6. Refresh the database content as follows:
   1. Start the installer on the database host as described in Exporting the Source System [page 48].
   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 113].

Related Information

Running the Installer [page 51]
Follow-Up Activities [page 113]

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 installer, 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.
  - 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 installer 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 installer on the database host as described in Exporting the Source System [page 48].
      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 database instance running.
   2. Refresh the database content as follows:
      1. Start the installer on the database host as described in Exporting the Source System [page 48].
      2. On the Welcome screen, run option Generic Options Refresh Database Content
         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 168].

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.
   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.
   ○ Using an offline backup:
i Note

You can only use this option if your database is running in log retention mode. For more information, see the following documents:

- Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: IBM Db2 for Linux, UNIX, and Windows at https://support.sap.com/slttoolset
  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`

   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`

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.
   3. Refresh the database content as follows:
      1. Start the installer on the database host as described in Exporting the Source System [page 48].
      2. On the Welcome screen, run option [Generic Options] > Refresh Database Content

i Note

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.

Next Steps

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 113].

Related Information

Running the Installer [page 51]
Deleting a Database Schema Manually [page 168]
6.3 Copying the Database Only - Refresh Database Content on Oracle Database

Using the *Refresh Database Content* option in the installer, 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, consider the additional information in section *Implementing Oracle Database Vault with the Installer* [page 165].
- Make sure that you have the password for the DDIC user in client 000 of your source system at hand. The installer 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 installer on the database host as described in *Exporting the Source System* [page 48].
      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 installer on the database host as described in Exporting the Source System [page 48].
      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 70] and the instructions in Oracle-Specific Procedure [page 72].

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 70] and the instructions in Oracle-Specific Procedure [page 72].
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 installer on the database host as described in Exporting the Source System [page 48].
      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 113].

Related Information

Running the Installer [page 51]
Follow-Up Activities [page 113]

6.4 Copying the Database Only - Refresh Database Content on IBM Db2 for z/OS

Using the Refresh Database Content option in the installer, 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 installer 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 installer on the database host as described in Exporting the Source System [page 48].
      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 installer on the database host as described in Exporting the Source System [page 48].
      2. On the **Welcome** screen, run option **Generic Options > Refresh Database Content**.

**Using the Database-Specific Method**

1. Execute all steps as described in section **IBM Db2 for z/OS Specific Procedures** [page 92].
2. Refresh the database content as follows:
   1. Start the installer on the database host as described in Exporting the Source System [page 48].
   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 113].

**Related Information**

- [Running the Installer](#) [page 51]
- [Follow-Up Activities](#) [page 113]

### 6.5 Copying the Database Only - Refresh Database Content on SAP MaxDB

Using the *Refresh Database Content* option in the installer, 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 installer 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 installer on the database host as described in Exporting the Source System [page 48].
   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 installer on the database host as described in Exporting the Source System [page 48].
   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 Backup/Restore Method

On the source system, do the following:

Create Database Backup. If you want to import the content using the installer, 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 installer will stop when reaching the appropriate processing step. For more information, see SAP MaxDB-Specific Procedure [page 86], 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 installer on the database host as described in Exporting the Source System [page 48].
   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 113].
Related Information

Running the Installer [page 51]
SAP MaxDB-Specific Procedure [page 86]
Follow-Up Activities [page 113]
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 114]
Performing Follow-Up Activities in the Target System [page 115]
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. If you canceled or scheduled released jobs and jobs that must run periodically before you started the copy procedure, reschedule these jobs (transaction SM37).
2. Using CCMS, adapt your operation mode timetable to the original status (transaction SM37).
Performing Follow-Up Activities in the Target System

You have to perform the following follow-up activities in the target system.

- **Installing the License Key** [page 115]
  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 116]
- **Performing Follow-Up Activities for ABAP** [page 117]
- **Checking the Database Parameters for IBM Db2 for Linux, UNIX, and Windows** [page 124]
- **Performing Jobhead Correction after Homogeneous System Copy** [page 125]

### 9.1 Installing the 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>
</table>
## SAP Solution Manager: Connection Between SLD and 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.

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>Location</th>
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<td>SAP NetWeaver 7.0 including EHP2</td>
<td><a href="http://help.sap.com/nw702">Application Help</a> ◄ SAP NetWeaver by Key Capability ◄ Solution Life Cycle ◄ SAP Licenses ◄</td>
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<tr>
<td>SAP NetWeaver 7.0 including EHP3</td>
<td><a href="http://help.sap.com/nw703">Application Help</a> ◄ SAP NetWeaver by Key Capability ◄ Solution Life Cycle ◄ SAP Licenses ◄</td>
</tr>
</tbody>
</table>

### More Information

For more information about SAP license keys, see [https://support.sap.com/en/my-support/keys.html](https://support.sap.com/en/my-support/keys.html).
9.3 Performing Follow-Up Activities for ABAP

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.

5. **Oracle Database only** If you have chosen to enable Oracle Database Vault, make sure that you perform the required configuration steps. For more information, see Implementing Oracle Database Vault with the Installer [page 165].

### 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.

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.

**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
   ```
   ```bash
   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).

   **i 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 
      Administration > System administration > Administration > Transport Tool.
   c. To adapt the transport routes, choose 
      Administration > System administration > Administration > 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**: 
   Administration > System administration > 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.

12. Adapt the RFC destination: 

    Administration > Administration > Network > RFC destinations (transaction SM59).

13. If you have performed a system copy with R3load, you must set up the trusted and trusting RFC relationships again.

14. Clean the transactional RFC: 

    Administration > Monitor > Transactional RFC (transaction SM58).

15. Check the ABAP Secure Store [page 122].

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): [Administration > CCMS > Configuration > Operation mode calendar](transaction SM63).

18. Adapt the instances and profiles (CCMS): [Administration > CCMS > Configuration > OP modes/instances](transaction R204).

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 32). 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 NetWeaver 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).

i Note
You are required to perform the step independently of whether your target system is an SAP NetWeaver 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 NetWeaver 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 122]
### 9.3.3.1 Checking the ABAP Secure Store

You check the ABAP Secure Store as follows.

**Procedure**

1. Start transaction **SECSTORE**.
2. Choose **Check Entries** and **Execute**.
3. Filter the result by error messages:
   - If you see at least one error message of type **SECSTORE 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></td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability</td>
</tr>
<tr>
<td></td>
<td>System Security</td>
</tr>
<tr>
<td></td>
<td>NetWeaver AS ABAP Only</td>
</tr>
<tr>
<td></td>
<td>Importing Keys after a System Copy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.0 including enhancement package 1</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://help.sap.com/nw701">http://help.sap.com/nw701</a></td>
<td>Application Help</td>
</tr>
<tr>
<td>SAP NetWeaver by Key Capability</td>
<td>Security</td>
</tr>
<tr>
<td>System Security</td>
<td>System Security for SAP</td>
</tr>
<tr>
<td>NetWeaver AS ABAP Only</td>
<td>Secure Storage (ABAP)</td>
</tr>
<tr>
<td>Importing Keys after a System Copy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.0 including enhancement package 2</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://help.sap.com/nw702">http://help.sap.com/nw702</a></td>
<td>Application Help</td>
</tr>
<tr>
<td>SAP NetWeaver by Key Capability</td>
<td>Security</td>
</tr>
<tr>
<td>System Security</td>
<td>System Security for SAP</td>
</tr>
<tr>
<td>NetWeaver AS ABAP Only</td>
<td>Secure Storage (ABAP)</td>
</tr>
<tr>
<td>Importing Keys after a System Copy</td>
<td></td>
</tr>
</tbody>
</table>
2. Repeat the check.

- If you see at least one error message of type `SECTORE 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 (Accounting ➤ Financial Accounting ➤ General ledger ➤ Periodic Processing ➤ Closing ➤ Check/count ➤ Comparison).
7. FI customers: Run the jobs RFUMSV00 (tax on sales/purchases), RAGITTO1 (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`.

   **i 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

**Use**

**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 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>
</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 175].

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:

```
JOBNAME=JOBHEAD_<SID>.
```

You can edit the jobhead in

DBA Cockpit ➔ Configuration ➔ Job Profile/DBA Cockpit ➔ Jobs ➔ Jobs

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.

End of 'Platform': z/OS
10 Additional Information

Related Information

R3load Procedures Using the Migration Monitor [page 128]
Analysis of the Export and Import Times [page 155]
Table Comparison with Software Update Manager [page 156]
Using the Package Splitter [page 160]
Database Instance Installation on Oracle Automatic Storage Management [page 172]
Additional Information about the OraBRCopy Tool [page 172]
Online Information from SAP [page 175]

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 129]
This section lists the functions and features of the Migration Monitor.

Configuration [page 130]

Assigning DDL Files to Packages [page 144]

Defining Groups of Packages [page 144]

Processing Split Tables [page 145]
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 147]

Using the migmonCtrl Add-On for the Export [page 152]

Output Files [page 153]

Installing the Target System Using the Migration Monitor [page 154]
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

The Migration Monitor is integrated in the Software Provisioning Manager (the “installer” for short), 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.

⚠️ 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 147].

When you start the Migration Monitor manually:

- You can adjust any parameters. For more information, see Configuration [page 130].
- 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
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 If the tool is running in background mode, the UNIX shell windows or Windows command prompt can be closed after startup.</td>
</tr>
<tr>
<td>secure</td>
<td>Enables secure mode</td>
<td>Takes effect only as command line option 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>
</tr>
</tbody>
</table>

### Note

Use this mode if you have to specify passwords on the command line.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Possible values:</th>
</tr>
</thead>
<tbody>
<tr>
<td>trace</td>
<td>Trace level</td>
<td>all, off, 1 (error), 2 (warning), 3 (info), 4 (config, default), 5, 6, 7 (trace)</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><strong>installDir</strong></td>
<td>Installation directory</td>
<td>Directory where the installation tool (software provisioning manager 1.0, <code>R3SETUP</code>) is started. If you run the Migration Monitor without using the installation tools, the installation directory is the directory where the <code>R3load TSK</code> and log files are written.</td>
</tr>
</tbody>
</table>
| **exportDirs** | List of export directories | Separator on Windows: `;`  
Separator on UNIX, IBM i: `:`  
The `exportDirs` parameter points to the directory where the `R3load` dump files are written. In the `exportDirs` directory, the subdirectories `DATA`, `DB`, and `DB/<TARGET_DBTYPE>`. For example, `DB/ORACLE` must exist. |
| **client** | Client operating mode | Running in client mode means that the Migration Monitor runs parallel to standard installer export process and transfers the exported dump files to the import server. |
| **server** | Server operating mode | Running in server mode means that the Migration Monitor creates `R3load TSK` files (if necessary), `R3load cmd` files, and starts the `R3load` processes. |

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>
</tbody>
</table>
| **ddlFile** | DDL control file | Path or filename of DDL control file  
The default is `DDL<DBTYPE>.TPL`  
If the filename is used without a path, the DDL control file from the export `DB` subdirectory is used. |
<p>| <strong>ddlMap</strong> | DDL mapping file | File with mapping between DDL files and package names |
| <strong>r3loadExe</strong> | Path of the <code>R3load</code> executable | Optional; default is <code>R3load</code>. If only the name of the <code>R3load</code> executable is available, the JVM looks for the <code>R3load</code> executable using operating system-specific process search rules. |</p>
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>tskFiles</strong></td>
<td>Yes to create task files; no to skip</td>
<td>Up to and including version 4.6, this must be set to no; as of version 4.7 set to yes. If the R3load task files *.TSK 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 R3load arguments for the TASK phase</td>
<td>Appended to the R3load command line Options already set by the monitor: -ctf, -l</td>
</tr>
<tr>
<td><strong>loadArgs</strong></td>
<td>Additional R3load arguments for the LOAD phase</td>
<td>Appended to the R3load command line. Options already set by the monitor: -e, -datacodepage, -l, -p, -r, -socket (if the socket option is specified); -o (if the omit argument is specified and task files are not used, that is, the value of the tskFiles option is no).</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 false</td>
<td>Possible values: true or false If this option is true, the Migration Monitor calls R3load with option -decluster.</td>
</tr>
<tr>
<td><strong>firstExportSAPNTAB</strong></td>
<td>Default values is false</td>
<td>Possible values: true or false If this option is true, the Migration Monitor first exports the SAPNTAB package in single thread mode.</td>
</tr>
<tr>
<td><strong>onlyProcessOrderBy</strong></td>
<td></td>
<td>If set to true only the jobs from file configured with orderBy are processed.</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>
</tbody>
</table>
### FTP Exchange Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ftp</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>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&lt;br&gt;Security risk.&lt;br&gt;For more information, see the <code>secure</code> parameter in section Additional Options.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ftpExportDirs</td>
<td>List of remote FTP directories for export dump</td>
<td>Both &quot;;&quot; and &quot;:&quot; separators are valid. This is the directory on the target host to which the dump is transferred. The value is the same as for importDirs 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. 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. 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>socket</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>host</td>
<td>Remote import host</td>
<td>Name or IP address of the import host.</td>
</tr>
<tr>
<td>port</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 to 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>ftpCopy</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>R3lctl</strong> and <strong>R3szchk</strong> are transferred from the source to the target host using FTP.</td>
</tr>
</tbody>
</table>
### 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>migmonCtrl</td>
<td>Enabling the add-on</td>
<td></td>
</tr>
</tbody>
</table>

---

**Option** | **Description** | **Comment** |
---|---|---|
**exportDirs** | List of export directories | Separator on Windows: “;”  
| | | Separator on UNIX, IBM i: “:”  
| | | In the **exportDirs** directory, the subdirectories **DATA**, **DB**, and **DB/<TARGET_DBTYPE>** (for example, **DB/ORA**) must exist. The **R3load STR** files have to exist in the subdirectory **DATA**, the **DDL*.TPL** files in the subdirectory **DB**, and the **R3load EXT** files (if required) in the subdirectory **DB/<TARGET_DBTYPE>**. |
| **ftpHost** | Remote **FTP** host | Name or IP address of the import server |
| **ftpUser** | Name of the remote **FTP** user | The **FTP** user specified here must be `<sapsid>adm` to make sure that the package files can be read during the import (which is started as `<sapsid>adm`). |
| **ftpPassword** | Password of the remote **FTP** user |  
| | | **Caution**  
| | | Security risk |
| **ftpExportDirs** | List of remote **FTP** directories for export dump | 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 **importDirs** in the properties file of the import monitor. |

Any other option is ignored by the export monitor.
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>orderBy</td>
<td>File with package order</td>
<td>If <code>migmonCtrl</code> is set, the file is created dynamically. It still has the same format as the <code>order_by</code> file, which you can create manually. If it is created by the add-on, the file has two groups called <code>LARGE</code> and <code>SMALL</code>. Depending on the sort order (size or runtime), the packages are listed from <code>biggest/longest</code> to <code>smallest/shortest</code> in group <code>LARGE</code> and from smallest to biggest in group <code>SMALL</code>. 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>jobNumLarge</td>
<td>Amount of jobs set in group <code>LARGE</code></td>
<td>The number can be changed during runtime.</td>
</tr>
<tr>
<td>jobNumSmall</td>
<td>Amount of jobs set in group <code>SMALL</code></td>
<td>The number can be changed during runtime.</td>
</tr>
<tr>
<td>customSortOrderFile</td>
<td>If certain jobs need to be exported right from the start, they can be configured in this file.</td>
<td>If certain jobs need to be exported right from the start, they can be configured in this file.</td>
</tr>
</tbody>
</table>

### 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 <code>EXT</code> files generated by <code>R3szchk</code></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 <code>export_time.txt</code> created by <code>migtime.jar</code></td>
<td>Mandatory if the export is to be sorted by runtime</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><code>createPackageFilter</code></td>
<td>Needs to be set to create package filter files.</td>
<td></td>
</tr>
<tr>
<td><code>excludePackage</code></td>
<td>Comma separated string</td>
<td>Packages that must not be included in the filter file</td>
</tr>
<tr>
<td><code>outputFile</code></td>
<td><code>package_list_%hostName%.txt</code></td>
<td>Location and name of result files %hostName% is replaced with the actual name of the host.</td>
</tr>
<tr>
<td><code>hostNames</code></td>
<td>Comma separated string</td>
<td>The names are only used for the file name: <code>&lt;outputFile&gt;_&lt;hostName&gt;.txt</code></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><code>onlyProcessOrderBy</code></td>
<td>-</td>
<td>If this option is set to true, only the jobs from <code>orderBy</code> file are processed.</td>
</tr>
</tbody>
</table>
### Package Filter

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>

### Net Statistics File

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<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)
- **FTP copy:**
  - `exportDirs`, `ftpHost`, `ftpUser`, `ftpExportDirs`, `ftpExchangeDir`

**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>installDir</td>
<td>Installation directory</td>
<td>The installation directory is the directory in which the installation tools (software provisioning manager 1.0.R3SETUP) are started. When you run the Migration Monitor without using the installation tools, the installation directory is the directory where the <code>R3load TSK</code> and log files are created.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| importDirs| List of import directories | Separator on Windows: “;”  
Separator on UNIX, IBM i: “:”  
The `importDirs` parameter points to the directory where the R3load dump files are written. In the `importDirs` directory, the subdirectories DATA, DB, and DB/<TARGET_DBTYPE> (for example, DB/ORA) must exist. |
| orderBy   | Package order          | 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:  
- **name**: Load packages in alphabetical order  
- **size**: Load packages starting with the largest one or a path of the file that contains the package names  
If the option is omitted then the package order is not defined. |
| ddlFile   | DDL control file       | Path or file name of DDL control file  
The default is DDL<DBTYPE>.TPL. If the file name is used without path, the DDL control file from the export DB subdirectory is used. |
| ddlMap    | DDL mapping file       | File with mapping between DDL files and package names |
| r3loadExe | Path of the R3load executable | 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. |
| tskFiles  | yes to create task files; no to skip | 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. |
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>extFiles</td>
<td>yes to include EXT files; no to skip them</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>dbCodepage</td>
<td>Database code page for the target database</td>
<td>See SAP Note 552464. Possible values are: 4102, 4103, 1100.</td>
</tr>
<tr>
<td>migrationKey</td>
<td>Migration key</td>
<td>-</td>
</tr>
<tr>
<td>omit</td>
<td>R3load omit value</td>
<td>Can contain only DTPIVAFLMU letters.</td>
</tr>
<tr>
<td></td>
<td>-omit D: omit data; do not load data</td>
<td>-omit T: omit tables; do not create tables</td>
</tr>
<tr>
<td></td>
<td>-omit P: omit primary keys; do not create primary keys</td>
<td>-omit I: omit indexes; do not create indexes</td>
</tr>
<tr>
<td></td>
<td>-omit V: omit views; do not create views.</td>
<td>-omit A: omit AMDPs; do not create ABAP managed procedures</td>
</tr>
<tr>
<td></td>
<td>-omit F: omit flexible objects; do not create flexible objects (database functions, database filter rules, session variables)</td>
<td>-omit L: omit flexible indexes; do not create flexible indexes</td>
</tr>
<tr>
<td></td>
<td>-omit U: omit unload; do not unload table after data load</td>
<td>If you want to combine several -omit options, list these options without blank, for example -omit TV.</td>
</tr>
<tr>
<td></td>
<td>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):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-include &lt;task-type-list&gt;</td>
<td>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).</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>taskArgs</td>
<td>Additional <strong>R3load</strong> arguments for the <strong>TASK</strong> phase</td>
<td>Appended to the <strong>R3load</strong> command line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following options are already set by the monitor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-ctf; -l; -o (if the omit argument is specified).</td>
</tr>
<tr>
<td>loadArgs</td>
<td>Additional <strong>R3load</strong> arguments for the <strong>LOAD</strong> phase</td>
<td>Appended to the <strong>R3load</strong> command line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following options are already used by the monitor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-i; -dbcdecode; -l; -p; -k; -r; -socket (if the socket option is specified);</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-o (if the omit 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>jobNum</td>
<td>Number of parallel import jobs; the default is <strong>1</strong>.</td>
<td>Any positive number; <strong>0</strong> for an unlimited number of jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can change the value dynamically at runtime.</td>
</tr>
<tr>
<td>decluster (use this option only for target <strong>dbType = HDB</strong>)</td>
<td>false</td>
<td>Possible values: <strong>true or false</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this option is true – migmon calls <strong>R3laod</strong> with option – decluster.</td>
</tr>
<tr>
<td>ignorePackageSizeCalculation</td>
<td>Default is false</td>
<td>Possible values: <strong>true or false</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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 <strong>importDirs</strong> parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In this first step, called <strong>CollectPackages</strong>, 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 <strong>CollectPackages</strong> step, set this option to <strong>true</strong>. Later the packages are imported without following “size ordering” of packages. Use this option only if there is a big delay during the start of the first import jobs.</td>
</tr>
</tbody>
</table>
### collectLogicalPackages

**Default is false**

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.

---

### Import Exchange Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>exchangeDir</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 importDirs parameter (for example, in the properties file).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If there is an old export_statistics.properties 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>socket</td>
<td>Socket operating mode</td>
<td>-</td>
</tr>
<tr>
<td>port</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)
10.1.3 Assigning DDL Files to Packages

Use

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.

Example

DDL Mapping File

```plaintext
# DDL mapping file ddl_mapping.txt
# !!! line with [GROUP_NAME] can be skipped
# used for documentation purposes only
# SORTED UNLOAD
# DDL file for sorted unload ddlFile = /export_dump/ABAP/DB/ORA/DDORA.TPL
# package names
SAPAPPL0
SAPAPPL1
SAPSAPLD
SAPSAPLA
SAPSAPLT
SAPSAPD
# UNSORTED UNLOAD
# DDL file for unsorted unload ddlFile = ./DDORA_LRG.TPL
# table names
TABLE_A
TABLE_B
TABLE_C
```

10.1.4 Defining Groups of Packages

Use

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 R3load 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 SAP0000 packages.

Example

Package Order File with Group

```plaintext
# custom package order
# package names
SAPAPPL0 SAPAPPL1 SAPAPPL2
# package group
[ SEQUENTIAL GROUP ]
jobNum = 1
# table names
TABLE_A TABLE_B TABLE_C
```

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.

The following database platforms do not support parallel data import:

- IBM Db2 for Linux, UNIX, and Windows

You can ensure this by using the Defining Groups of Packages [page 144] 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:

```plaintext
[ MY_FIRST_TABLE ]
jobNum = 1
MY_FIRST_TABLE-1
```

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

Additional Information
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 64].
5. Restart the import.
10.1.6 Starting the Migration Monitor

Use

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 130]. The names of the property files are `export_monitor_cmd.properties` and `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 R3ldctl</td>
</tr>
<tr>
<td>&lt;export dump dir&gt;/DB</td>
<td>Contains the DDL&lt;DBTYPE&gt;.TPL files generated by R3ldctl</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
       `export_monitor.sh` / `import_monitor.sh`
     - Windows batch files
       `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:
   
   ```bash
   CALL QP2TERM
   ```
3. `./export_monitor.sh` ./import_monitor.sh

Automatically as part of the installer export and import procedure
Manually within the installer:
1. On the Parameter Mode Default Settings installer screen, choose Custom.
2. On the SAP System Export for Target System screen, select Start Migration Monitor Manually.
3. The installer stops and asks you to start the Migration Monitor manually and to continue with the installer as soon as the Migration Monitor has finished successfully.

**Note**

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 130].

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:

```bash
./export_monitor.sh -ftp
./export_monitor.sh -ftpCopy
./export_monitor.sh -socket -host <import_server> -port 5000
```

**Example**

Command line for Windows cmd.exe:

```bash
export_monitor.bat -net
export_monitor.bat -socket
```

4. Use `monitor*.log` and `*.console.log` files to check the monitor processing state.

**Example**

`export_monitor_cmd.properties` file with export options:

```properties
# 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
#
# E-mail options
#
# SMTP server
mailServer=sap-ag.de
# "From" email address
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
# Inclusion of extent files: yes | no
extFiles=yes
# Monitor timeout in seconds
monitorTimeout=30
#
# R3load options
#
# DB code page for the target database
dbCodepage=1100
# Migration key
migrationKey=
# Additional R3load arguments for TASK phase
taskArgs=
# Additional R3load arguments for LOAD phase
loadArgs=
# Number of parallel import jobs

Processing Steps of a System Copy (Oracle only)

With the settings in the property file listed in the examples above and an Oracle database as source and target database, the following prerequisites must be fulfilled. In our example, the export host is a Windows host and the import host is a UNIX host:

- The following directories must exist on the **export host** (parameter: `exportDirs`):
  - `c:\temp\export_dump\ABAP\DATA`
  - `c:\temp\export_dump\ABAP\DB`
  - `c:\temp\export_dump\ABAP\DB\ORA`
  
  The `c:\temp\export_dump\ABAP\DATA` directory must contain the STR files generated by R3ldctl.
  
  The `c:\temp\export_dump\ABAP\DB` directory must contain the DDL<DBTYPE>.TPL files generated by R3ldctl.
  
  The `c:\temp\export_dump\ABAP\DB\ORA` directory must contain the EXT files generated by R3szchk.

- The following directories must exist on the **import host** (parameter: `importDirs`):
  - `/install_dir/export_dump/ABAP/DATA`
  - `/install_dir/export_dump/ABAP/DB`
  - `/install_dir/export_dump/ABAP/DB/ORA`
  
  The `/install_dir/export_dump/ABAP\DATA` directory must contain the STR files generated by R3ldctl.
  
  The `/install_dir/export_dump/ABAP\DB` directory must contain the DDL<DBTYPE>.TPL files generated by R3ldctl.
  
  The `/install_dir/export_dump/ABAP\DB\ORA` directory must contain the EXT files generated by R3szchk.

The following steps are performed during a system copy:

1. The export monitor writes the R3load dump files and the TOC files to the directory `c:\temp\export_dump\ABAP\DATA`.
2. The R3load log files, cmd files, and TSK files (if required) are located in the directory `c:\<install_dir>\start` (installDir parameter). The export itself is not done by the export monitor, as the monitor is running in client mode (server parameter is not set).
3. When a package has been exported successfully, the export monitor transfers all files belonging to that package (TOC, STR, EXT, 001, and so on) to the target host (`ftpHost` parameter) to the corresponding...
subdirectories of the directory `/<install_dir>/export_dump` (ftpExportDirs parameter) as user `<sapsid>adm` (ftpUser parameter) with password (ftpPassword parameter).

4. When the package files have been completely transferred to the server, the export monitor writes a `<package>.SGN` signal file to the `/<install_dir>/exchange` directory (ftpExchangeDir parameter) to notify the import monitor that it can start importing this package.

5. The import monitor starts to import a package as soon as the `<package>.SGN` file is found in the `/<install_dir>/exchange` directory (exchangeDir parameter).

6. The R3load log files, cmd files, and TSK files (if required) are located in the directory `/<install_dir>/start` (installDir parameter).

7. The DDLORA.TPL file must be copied to the `/<install_dir>/start` directory (installDir parameter) before you start the import monitor.

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 ddFile=DDLORA_LRG.TPL r3loadExe=/hana/s2p_to_hana/sapKernel/oracle/linux86_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 ddFile=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 ddFile=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/
exportDirs=exportDvD_741/ABAP orderBy=/home/emroot/exportDvD_741/order_by.txt
ddlFile=DDLORA_LRG.TPL r3loadExe=/usr/sap/QO1/D01/exe/R3load tskFiles=yes
dataCodepage=437 jobNum=0 monitorTimeout=10 loadArgs=-continue_on_error
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>
<tr>
<td>++</td>
<td>Package transfer finished successfully</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 installer:
   - `<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 installer as described in the installation documentation for your SAP component.

3. To install the target system, follow the instructions in the installer 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.

   \[\text{i Note}\]
   
   If you need more information about input parameters, position the cursor on the field of the required parameter and press F1.

5. When the installer 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.

   \[\text{Caution}\]
   
   If you have to restart the import after an error, just restart the installer. 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 156]
Restrictions [page 157]
Using the Table Comparison Tool [page 157]

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 156]
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

Restrictions [page 157]

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 SP<Latest_Number> at https://support.sap.com/sftoolset/ System Maintenance.
- 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 13] for your release at:

  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 13], 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**

   ```
   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:

      ```
      ```

      **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:
        ```
        ```

   b. A dialog box appears in which you enter as user name the `<sapsid>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 igncrcdiffs
  REPOLOAD nocontent igncrcdiffs
  ```
  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 156]
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 160]
Starting the Package Splitter [page 163]
Executing the STR Splitter and the WHERE Splitter [page 164]
Output Files [page 164]

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: ; Separator on UNIX: :</td>
</tr>
<tr>
<td>extDirs</td>
<td>List of EXT file directories</td>
<td>Separator on Windows: ; 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>
</tbody>
</table>
| maxNumberOfTables | • Integer value  
|               | • Maximum number of tables in the package | Split the packages as keep the maximum number of tables in package. |

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>
</tbody>
</table>
| strDirs    | List of STR file directories | Separator on Windows: ;  
Separater on UNIX: : |
| outputDir  | Output directory         | If missing, then the directory that contains the corresponding WHR files is used. |
| whereLimit | Maximum number of WHERE clauses | All WHR files that have more than whereLimit WHERE clauses are split into WHR files with whereLimit WHERE clauses. |
| whereFiles | Whitespace separated list of WHR files | 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
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 installer

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`.

Example of a command line for a UNIX terminal:

```
./where_splitter.sh -whereDir /r3a_dir -strDirs /export_dump/DATA -outputDir /split_output -whereLimit 5 -trace all
```
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.

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 160]

**10.5 Implementing Oracle Database Vault with the Installer**

The installer supports Oracle Database Vault. This section provides information about implementing Oracle Database Vault (DV) with the installer.

**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 38], the installer prompts whether DV is to be installed.

For the Oracle-Specific Procedure [page 72] 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 addional users:

- secadmin
- secacctmgr

These users are created by the installer.

For more information about Oracle Database Vault, see the Oracle Database documentation referred to in SAP Note 2218115.

Procedure

1. Start the installer and choose the export option for your system variant as described in Running the Installer [page 51].
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 installer.
   - 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 IBM Db2 for Linux, UNIX, and Windows Database

Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database [page 167]

Deleting a Database Schema Manually [page 168]

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.
10.6.1 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 Db2's own 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 175])
- For direct access to online information about Db2 that is provided by IBM, see Online Information from IBM [page 171].
- For access to more documentation for SAP systems on IBM Db2 for Linux, UNIX, and Windows, see Online Information from SAP [page 175].

10.6.2 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) || 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:
      ```
      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) || 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:
      ```
      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) || 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:
      ```
      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:
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) || ' - ' || 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>
```
10.6.3 Online Information from IBM

You can use the following IBM Knowledge Center welcome page as a starting point to all kinds of documentation for your IBM Db2 for Linux, UNIX, and Windows version: http://www.ibm.com/support/knowledgecenter/en/SSEPGG

The following tables provide direct links to IBM Db2 online documentation and manuals, listed by database version:

<table>
<thead>
<tr>
<th>IBM Db2 Knowledge Center</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 10.5</td>
<td><a href="https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.kc.doc/welcome.html">https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.kc.doc/welcome.html</a></td>
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<thead>
<tr>
<th>IBM Manuals</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 11.1</td>
<td><a href="http://www-01.ibm.com/support/docview.wss?uid=swg27050624">http://www-01.ibm.com/support/docview.wss?uid=swg27050624</a></td>
</tr>
<tr>
<td>IBM Db2 10.5</td>
<td><a href="http://www.ibm.com/support/docview.wss?uid=swg27038855">http://www.ibm.com/support/docview.wss?uid=swg27038855</a></td>
</tr>
<tr>
<td>IBM Db2 10.1</td>
<td><a href="http://www.ibm.com/support/docview.wss?uid=swg27024478">http://www.ibm.com/support/docview.wss?uid=swg27024478</a></td>
</tr>
</tbody>
</table>

10.7 Oracle Database

Database Instance Installation on Oracle Automatic Storage Management [page 172]

This section provides information on the installation of a database instance on an Oracle Automatic Storage Management (ASM).

Additional Information about the OraBRCopy Tool [page 172]
10.7.1 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).

10.7.2 Additional Information about the “OraBRCopy” Tool

Related Information

Configuration [page 173]
Output Files [page 175]
10.7.2.1 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>oracleHome</td>
<td>Oracle home directory</td>
<td>Determined automatically in script/batch files from the ORACLE_HOME envi-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ronment variable</td>
</tr>
<tr>
<td>sourceSid</td>
<td>Source database SID</td>
<td>Determined automatically in script/batch files from the ORACLE_SID envi-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ronment variable</td>
</tr>
<tr>
<td>targetSid</td>
<td>Target database SID</td>
<td></td>
</tr>
<tr>
<td>listenerPort</td>
<td>Listener port number</td>
<td>Mutually exclusive with tnsAlias. Can be found in the listener.ora file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of the source database.</td>
</tr>
<tr>
<td>tnsAlias</td>
<td>Oracle TNS alias</td>
<td>Mutually exclusive with listenerPort. Can be found in the tnsnames.ora</td>
</tr>
<tr>
<td>password</td>
<td>Password of SYSTEM database user</td>
<td></td>
</tr>
<tr>
<td>generateFiles</td>
<td>Generates control/trace and</td>
<td>init&lt;TARGET_DBSID&gt;.ora files.</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</td>
<td>If this option is specified then Oracle database will be stopped during the tool execution.</td>
</tr>
</tbody>
</table>

### Additional Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
</table>
| bg   | Enables background mode | i Note  
Takes effect only as command line option.  
If the tool is running in the background mode, the UNIX shell window or Windows command prompt can be closed after startup. |
| secure | Enables secure mode | i Note  
Takes effect only as command line option.  
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. |
| trace | Trace level       | Possible values: all, off, 1 (error), 2 (warning), 3 (info), 4 (config, default), 5, 6, 7 (trace) |

### Mandatory Options

- Generate files mode  
  generateFiles, targetSid, password, listenerPort or tnsAlias  
- Force log switches mode  
  forceLogSwitches, password, listenerPort or tnsAlias
10.7.2.2 Output Files

- CONTROL.SQL
- CONTROL.TRC
- init<TARGET_DBSID>.ora
- ora_br_copy.log
- OraBRCopy.console.log

10.8 Online Information from SAP

More information is available online as follows:

<table>
<thead>
<tr>
<th>Title</th>
<th>Internet Address</th>
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<tbody>
<tr>
<td>Central access to all guides for SAP on IBM Db2</td>
<td><a href="https://help.sap.com/viewer/p/DB2">https://help.sap.com/viewer/p/DB2</a></td>
</tr>
</tbody>
</table>
| Running an SAP System on IBM Db2 with the Db2 pureScale Feature | IBM Db2 11.1: [https://help.sap.com/viewer/db6_purescale_11_1](https://help.sap.com/viewer/db6_purescale_11_1)  
IBM Db2 10.5: [https://help.sap.com/viewer/db6_purescale_10_5](https://help.sap.com/viewer/db6_purescale_10_5)  
IBM Db2 10.1: [https://help.sap.com/viewer/db6_purescale_10_1](https://help.sap.com/viewer/db6_purescale_10_1) |
| Database Administration Using the DBA Cockpit: IBM DB2 for Linux, UNIX, and Windows | [https://help.sap.com/viewer/db6_dbacockpit](https://help.sap.com/viewer/db6_dbacockpit) (English)  
[https://help.sap.com/viewer/db6_dbacockpit_de](https://help.sap.com/viewer/db6_dbacockpit_de) (German) |
| SAP Business Warehouse on IBM Db2 for Linux, UNIX, and Windows: Administration Tasks | Db2 10.5 and higher: [https://help.sap.com/viewer/db6_bw](https://help.sap.com/viewer/db6_bw)  
Db2 10.1 and lower: [https://help.sap.com/viewer/db6_bw_10_1](https://help.sap.com/viewer/db6_bw_10_1) |
| Database Administration Guide for SAP on IBM Db2 for z/OS | [https://help.sap.com/viewer/db2_administration_guide](https://help.sap.com/viewer/db2_administration_guide) |

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

Additional Information
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<td>SAP on Db2 for z/OS Community</td>
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</tr>
</tbody>
</table>
Important Disclaimers and Legal Information

Hyperlinks

Some links are classified by an icon and/or a mouseover text. These links provide additional information.

About the icons:

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Example Code

Any software coding and/or code snippets are examples. They are not for productive use. The example code is only intended to better explain and visualize the syntax and phrasing rules. SAP does not warrant the correctness and completeness of the example code. SAP shall not be liable for errors or damages caused by the use of example code unless damages have been caused by SAP’s gross negligence or willful misconduct.

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