System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.52 on Windows

Target Databases: SAP ASE; SAP MaxDB; Oracle; IBM Db2 for z/OS; IBM Db2 for Linux, UNIX, and Windows; MS SQL Server
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Document History

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<td>Updated version for Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
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**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](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>.
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
  - Secure ABAP message server connection, documented in: New Features, SAP System Parameters
  - Database Migration Option Preparation: Support of Oracle Database, documented in: New Features, Preparing Target Database Oracle
  - Using SAPuptool for table splitting, documented in: New Features, Table Splitting, Preparing the Table Split
  - LOADTOOLS.SAR archive in Software Provisioning Manager enabled for NUC, documented in: New Features, Downloading and Extracting the Software Provisioning Manager Archive
  - Enabling IPv6, documented in: New Features, Prerequisites for Running 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) was added to section Additional Information About the Installer
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<td></td>
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<td>○ Media Signature Check, documented in: New Features, Running the Installer, Preparing the Media Required for Performing the Export. This feature implies that section Creating Kernel Archives from an Existing SAP System has been deleted from this documentation because the related option in the installer had to be removed.</td>
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<td>○ Load tools are now available as LOADTOOLS.SAR in the Software Provisioning Manager archive, documented in: New Features, Downloading and Extracting the Software Provisioning Manager Archive, System Copy and Migration Optimization, Database Independent System Copy, R3load Procedures Using the Migration Monitor</td>
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<td>○ Simplified additional application server instance installation, documented in: New Features, Preparing the Installation Media, Downloading SAP Kernel Archives (Archive-Based Installation)</td>
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<td>○ New SAPUI5-based graphical user interface (GUI) “SL Common GUI”, documented in: Prerequisites for Running the Installer, Running the Installer, Useful Information About the Installer</td>
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<td>○ Refresh database content using a database backup enabled for SAP MaxDB, documented in: Copying the Database Only · Refresh Database Content.</td>
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<td>Verification of the integrity of data units in Software Provisioning Manager, documented in: New Features, Downloading the Software Provisioning Manager Archive Using a dedicated kernel for the export, documented in: New Features, Using a Dedicated Kernel for the Export, Downloading Dedicated Kernel Archives for the Export, System Copy Procedure</td>
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<td>• Section Preparing the Media Required for Performing the Export [page 42] refactored, created subsections Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43], Downloading Dedicated Kernel Archives for the Export [page 45]</td>
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<td></td>
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<td>Using RMOSSWPM*.SAR instead of SWPM*.SAR for outdated OS versions not supported by SAP kernel</td>
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<td>7.40 and higher, documented in: [Introduction Constraints]</td>
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<td>- Archive-Based Installation (see New Features [page 11])</td>
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<td>- Export option description corrected in Running the Installer [page 63]</td>
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<td>- Correction in Sorted Versus Unsorted Unload [page 31]: Default was changed from &quot;sorted&quot; to</td>
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<td>&quot;unsorted&quot;</td>
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<td>1.0</td>
<td>2013-07-17</td>
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1 Homogeneous and Heterogeneous System Copy

This document describes how to perform a homogeneous or heterogeneous system copy of an SAP system based on the application server ABAP of SAP NetWeaver 7.1 to 7.52 with source operating system Windows, using Software Provisioning Manager 1.0 SP25 ("installer" for short), which is part of SL Toolset 1.0 SP25.

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

Using Software Provisioning Manager 1.0 you can use either database-specific methods or database-independent methods [page 24].

**i Note**
Before you start preparing for a system copy with Software Provisioning Manager 1.0, make yourself also familiar with the Database Migration Option (DMO) of Software Update Manager (SUM) and make a decision, which tool - either Software Provisioning Manager or DMO - would best serve your purpose.


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

**i Note**
Not all SAP NetWeaver releases or SAP Business Suite applications that are available in Software Provisioning Manager 1.0 and are described in this guide might have been released already. To make sure that the system copy options you want to perform are already supported, see SAP Note [1680045](https://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 Management. For more information, see SAP Note [1709155](https://support.sap.com/pam) and [https://help.sap.com/lama](https://help.sap.com/lama).
1.1 About Software Provisioning Manager 1.0

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

“SAPinst” has been renamed to “Software Provisioning Manager” (“installer” for short) in this documentation, but the terms “SAPinst” and “sapinst” are still used in:

- The name of the technical framework of Software Provisioning Manager. For more information about the SAPinst Framework, see SAP Note 2393060.
- Texts and screen elements in the Software Provisioning Manager GUI
- Names of executables, for example sapinst.exe
- Names of command line parameters, for example SAPINST_HTTPS_PORT

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

1.2 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>Support of Oracle 18</td>
<td>You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 18 database. For more information, see <a href="https://support.sap.com/pam">https://support.sap.com/pam</a>.</td>
<td>Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
</tr>
<tr>
<td>IBM Db2 for Linux, UNIX, and Windows: Dropping the database schema automatically while running the Database Refresh or Move option or 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 Instance [page 117] and Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows [page 125].</td>
<td>Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
<td></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 67] and Troubleshooting with the Installer [page 72].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Database Migration Option Preparation: Support of Oracle Database</td>
<td>With the Software Provisioning Manager, you can now perform preparation steps for Database Migration Option (DMO) for the Software Update Manager (SUM). In addition to the already supported databases, Oracle database is now supported. For more information, see Preparing Target Database Oracle [page 142].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Using SAPuptool for table splitting</td>
<td>If the SAP kernel version of the source system is 7.40 or higher, the SAPuptool which is contained in LOADTOOLS.SAR is used for table splitting instead of R3ta. For more information, see Preparing the Table Split [page 56].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
</tbody>
</table>

**Note:**
This feature is related to features LOADTOOLS.SAR archive in Software Provisioning Manager enabled for NUC in this table below and LOADTOOLS.SAR archive in Software Provisioning Manager below in this table.
### Feature: LOADTOOLS.SAR archive in Software Provisioning Manager enabled for NUC

The load tools in `SWPM<Support_Package_Number>_SP<Version_Number>.SAR` are now also enabled for a system copy using non-Unicode (NUC) SAP kernel version 7.40 or higher.

For more information, see [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](page 43).

### Note

This feature enhances feature LOADTOOLS.SAR archive in Software Provisioning Manager of Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21) (see entry LOADTOOLS.SAR archive in Software Provisioning Manager below in this table).

### Feature: Media Signature Check

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 42) and [Running the Installer](page 63).

### Feature: LOADTOOLS.SAR archive in Software Provisioning Manager

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the `SAPEXEDB.SAR` archive of the kernel media, has now been made available in the Software Provisioning Manager archive. For a system copy using Unicode kernel version 7.40 or higher, the load tools from the `SWPM<Support_Package_Number>_SP<Version_Number>.SAR` are used automatically.

For more information, see [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](page 43).

### Feature: Support of Oracle Database Vault

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 described in this documentation.

For more information, see [Implementing Oracle Database Vault with the Installer](page 192).
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<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>
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<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 67], Running the Installer [page 63].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Database Migration Option Preparation: Support of SAP MaxDB</td>
<td>With the Software Provisioning Manager, you can now perform preparation steps for Database Migration Option (DMO) for the Software Update Manager (SUM). In addition to the already supported databases, SAP MaxDB is now supported. For more information, see Database Migration Option Preparation [page 135].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Refresh Database Content for SAP MaxDB</td>
<td>For SAP MaxDB 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 118].</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 43]. 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>
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<tr>
<td>Option to Restrict Access to Database Export</td>
<td>When running the database export, you can specify restricted access to the export directory. For more information, see Prerequisites in System Copy Procedure [page 48].</td>
<td>Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>Use Dedicated Kernel for System Copy</td>
<td>During the Define Parameters step to use for the system copy. For more information, see phase of the source system export, you can now specify dedicated SAP kernel archives that you Downloading Dedicated Kernel Archives for the Export [page 45].</td>
<td>Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>Refresh Database Content for all Databases Except SAP MaxDB</td>
<td>For all databases except SAP MaxDB, 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 118].</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>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Database Migration Option Preparation        | With Software Provisioning Manager you can now perform preparation steps for Database Migration Option (DMO) for Software Update Manager (SUM). Currently the following databases are supported:  
  - SAP ASE  
  - MS SQL Server  
  - IBM Db2 for Linux, UNIX, and Windows  
  For more information, see Database Migration Option Preparation [page 135].                                   | Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)          |
| Archive-Based Installation                   | You can now download the required **installation archives** instead of the complete SAP kernel installation media. For more information, see section **Downloading Specific Installation Archives (Archive-Based Installation)** in section **Preparing the Installation Media** in the target system **installation guide** [page 20].  | Software Provisioning Manager 1.0 SP17 (SL Toolset 1.0 SP17)          |
| System Provisioning for SAP NetWeaver 7.5 and SAP NetWeaver 7.5-based Products | All system provisioning tasks (installation, system copy, system rename) are available for the new SAP NetWeaver 7.5 release. The Dual Stack option, which integrates an AS ABAP and AS Java in a single system (common System ID `<SAPSID>`, common startup framework, common database), is no longer supported in SAP systems based on SAP NetWeaver 7.5.  
  - After upgrading to SAP NetWeaver 7.5 PI, you first have to split the still existing dual stack-system before you can use SAP NetWeaver 7.5 PI productively.  
  - SAP NetWeaver 7.5 is Unicode only  
  - The primary application server instance directory has been renamed from `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>` to `/usr/sap/<SAPSID>/D<Instance_Number>`.  
  - Declustering and depooling of tables during the installation is enabled by default. For more information, see SAP Note 1892354. | Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)          |
<p>| System Provisioning for SAP Solution Manager 7.2 | All system provisioning tasks (installation, system copy, system rename) are available for the new SAP Solution Manager 7.2 release. Compared to previous SAP Solution Manager releases, SAP Solution Manager 7.2 is no longer provided as a classical dual-stack system (ABAP system with Java Add-in), but consists of a separate ABAP and Java stack. | Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)          |</p>
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating Kernel Archives from existing SAP System</td>
<td>You can reuse the binaries of a dedicated SAP system for a new SAP system installation or target system installation in the context of a system copy by creating *.SAR archives based on the *.lst files from the executable (exe) directories of the source SAP system.</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP14)</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>This feature is only available for Unicode systems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Caution</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>This feature has been deprecated with Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21) and the related option has been removed from the Welcome screen. This deprecation has been accomplished to ensure compliancy with the new feature “Media Signature Check” of Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21) described above in this table.</td>
<td></td>
</tr>
<tr>
<td>Executing R3szchk in Parallel</td>
<td>Valid for all Databases except of SAP ASE:</td>
<td>Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
</tr>
<tr>
<td></td>
<td>You can now execute R3szchk in parallel. Using this feature you can improve the runtime of the export.</td>
<td></td>
</tr>
<tr>
<td>Usage Type Library Deprecation for SAP Systems Based on SAP NetWeaver 7.3 EHP1 and Higher</td>
<td>Software Provisioning Manager 1.0 no longer uses the “Usage Types” definitions in its business logic for SAP systems based on SAP NetWeaver 7.3 EHP1 and higher. This is done to unify modeling and terminology across all SAP tools used during the planning, installation and maintenance activities. The “Product Instance” definition replaces “Usage Types” regarding product modeling. For more information, see SAP Notes 1970349 and 1877731.</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
<tr>
<td>Feedback Evaluation Form</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 Prerequisites for Running the Installer [page 61].</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
</tbody>
</table>
### Naming Conventions

This section contains the naming conventions used in this documentation.

- **“usage type”**, “technical usage”, and “product instance”
  As of software provisioning manager 1.0 SP07 (SL Toolset 1.0 SP12), the term “product instance” replaces the terms “usage type” and “technical usage” for SAP systems based on SAP NetWeaver 7.3 including enhancement package 1 and higher. For more information, see [SAP Note 1877731](page 4). Note that there is no terminology change for older releases and all mentioned terms can be used as synonyms. As this guide is a generic document, the currently used terms remain but only “product instance” is going to be used from now on when referring to SAP NetWeaver 7.3 EHP1 and higher.
  For more information, see [New Features [page 11]].

- **System Copy**
  Duplication of an SAP system. Certain SAP parameters might change in a copy. When you perform a system copy, the installer installs all the instances again, but it uses a copy of the source system database to set up the database.

- **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.

- **Homogeneous System Copy**
  During homogeneous system copy, you use the same operating system and database platform as the original system.
  You can perform it using either [Database Independent System Copy [page 47]] or [Database-Specific System Copy [page 82]] methods.

- **Heterogeneous System Copy**
  During heterogeneous system copy, you change either the operating system or the database system, or both. **Heterogeneous system copy** is a synonym for migration.
  You can perform it using the [Database Independent System Copy [page 47]] method.

- **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>
<th>How to find out</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;SAPSID&gt;</td>
<td>SAP system ID</td>
<td>—</td>
</tr>
<tr>
<td>&lt;S_HOST&gt;</td>
<td>System name of the source host</td>
<td>Command hostname</td>
</tr>
<tr>
<td>&lt;T_HOST&gt;</td>
<td>System name of the target host</td>
<td>Command hostname</td>
</tr>
<tr>
<td>&lt;S_SAPSID&gt;</td>
<td>SAP system ID of the source system</td>
<td>&lt;SAPSID&gt; of the original system</td>
</tr>
<tr>
<td>&lt;T_SAPSID&gt;</td>
<td>SAP system ID of the target system</td>
<td>&lt;SAPSID&gt; of the target system</td>
</tr>
<tr>
<td>&lt;S_DBSID&gt;</td>
<td>Database ID of the source system</td>
<td>&lt;DBSID&gt; of the original system</td>
</tr>
<tr>
<td>&lt;T_DBSID&gt;</td>
<td>Database ID of the target system</td>
<td>&lt;DBSID&gt; of the target system</td>
</tr>
</tbody>
</table>

**Note**

Database ID <DBSID> identifies the database instance. The installer prompts you for the <DBSID> when you are installing the database instance.

The <DBSID> can be the same on IBM i as the <SAPSID>.

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

### 1.4 Constraints

This section contains the constraints valid for the system copy procedures described in this documentation.

- 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.

- If SAP HANA is the source database, you cannot use the Database Independent System Copy [page 47] procedure for SAP systems based on SAP NetWeaver AS for ABAP 7.52, because SAP NetWeaver AS for ABAP 7.52 already uses certain artifacts in the SAP HANA 2.0 database which are not supported by R3load.

- Declustering with Software Provisioning Manager only works if you perform a system copy of the complete system using the method described in section Database Independent System Copy [page 47]. An “inplace-declustering” solution with Software Provisioning Manager is not supported.

- SAP ASE is not supported on SAP NetWeaver 7.1 / 7.1 EHP1 for banking services from SAP and SAP NetWeaver Mobile 7.1 / 7.1 EHP1.

- 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](http://wiki.scn.sap.com/wiki/x/n4efFg).

- 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 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.
- 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](http://wiki.scn.sap.com/wiki/x/n4efFg).
- This documentation describes how to copy data from one SAP system to another SAP system based on SAP Netweaver Application Server. This documentation does not describe how to copy data from non-SAP systems to SAP systems.
- If you want to perform a Unicode Conversion, see one of the following SAP Notes:
  - SAP Note [551344](http://wiki.scn.sap.com/wiki/x/n4efFg) – Unicode Conversion Documentation
  - SAP Note [1051576](http://wiki.scn.sap.com/wiki/x/n4efFg) – Conversion of Single Code Page Systems to Unicode
  - SAP Note [928729](http://wiki.scn.sap.com/wiki/x/n4efFg) – Combined Upgrade & Unicode Conversion (CU)
- SAP does not support all data archiving operations after a system copy.
  - If you used data archiving in the source system, you might not always have access from the target system to the archive files that were created. For more information, see [SAP Note 153433](http://wiki.scn.sap.com/wiki/x/n4efFg) and Data Management Landscape & Transformation Solutions at [https://support.sap.com/dm](https://support.sap.com/dm).
  - Access from the target system to archived files in the source system without a dedicated archive migration project is only supported as follows:
    - You have copied a source system that uses external data archiving. The target system has read-only access to this archive.
    - You have copied a source system that uses data archiving locally. You can either arrange network access for appropriate archive file sharing or copy all archive files to the file system of the target system.

  **Note**

  Only valid for SAP Business Warehouse:

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

In all other cases, contact Data Management Landscape & Transformation Solutions at [https://support.sap.com/dm](https://support.sap.com/dm).

- When you perform a system copy, all product instances or usage types in the source system are copied to the target system. This means that none of the product instances or usage types in the target system can be excluded from the system copy, nor can you select product instances or usage types.
- “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 system ID and SID (SAPSID = SID = SAP system name)
  - Host name
  - IP addresses
  - Services and ports
  - Logical destinations and logical system names
  - Other technical infrastructure names
- Use file system persistency.
- Set up dependencies between Java and ABAP.

1.5 Accessing the Installation Guides

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

http://support.sap.com/sltoolset

System Provisioning > Install a System using Software Provisioning Manager > Installation Option of Software Provisioning Manager 1.0 SP<Current Number> > Installation Guides - Application Server Systems > Installation Guides - Application Server Systems - Software Provisioning Manager 1.0 > SAP Application Server Systems Based on SAP NetWeaver

In the table, filter for the following: Database = <Your Target Database>, Product Release = SAP NetWeaver 7.X, Operating System Platform = <Your Target OS Platform>, Technical Stack = <Your Technical Stack>.

1.6 Accessing the SAP Library

The references to the SAP NetWeaver Library documentation in this guide always refer to the following on SAP Help Portal. When you come across a reference to SAP Library documentation in this guide, you always have to add the path of this reference to the basic URL for the SAP NetWeaver release your SAP product is based on, as given in the list below:

- SAP systems based on SAP NetWeaver AS for ABAP 7.52:
  https://help.sap.com/nw752abap

- SAP systems based on SAP NetWeaver Application Server for ABAP 7.51 innovation package:
  https://help.sap.com/nw751abap

- SAP systems based on SAP NetWeaver 7.5:
  http://help.sap.com/nw75
- SAP systems based on SAP NetWeaver 7.4:
  http://help.sap.com/nw74
- SAP systems based on SAP NetWeaver 7.3 including Enhancement Package 1:
  http://help.sap.com/nw731
- SAP systems based on SAP NetWeaver 7.3:
  http://help.sap.com/nw73
- SAP systems based on SAP NetWeaver Mobile 7.1 including Enhancement Package 1:
  http://help.sap.com/nwmobile71
- SAP systems based on SAP NetWeaver Mobile 7.1:
  http://help.sap.com/nwmobile71
- SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0:
  http://help.sap.com/nwmobile71

**Note**

Since the SAP NetWeaver Mobile 7.1 Library is the only available SAP Library for ABAP systems based on SAP NetWeaver 7.1, in this guide we always refer to it also for SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0.
2 Planning

This section describes how to plan your system copy.

Related Information

Before You Start [page 22]
Use Cases for System Copy [page 23]
System Copy Methods [page 24]
Creating a System Copy Plan [page 25]
Basic Planning Aspects and Parameters [page 26]
System Copy and Migration Optimization [page 29]

2.1 Before You Start

- The SAP OS/DB Migration Check prepares you in an optimal way for a successful migration and supports smooth continued operations on the new platform. The OS/DB Migration Check is mandatory, if you are going to migrate a productive system.
  For more information, see https://support.sap.com/support-programs-services/services/os-db-migration.html. In addition to the information contained on this page, check the SAP OS/DB Migration Planning Guide that is available in the Media Library.
- Before you start the system copy, you must read the following:
  ○ SAP Notes
    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 7.1 and Higher
    Make sure that you have the most recent version of the SAP Notes, which you can find at: https://support.sap.com/notes.
  ○ Guides for the target system installation
    This system copy guide describes only the source system export in full detail. As for the installation of the target system, this system copy guide describes only the system copy-specific steps in section Setting Up the Target System [page 76], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 20].
  ○ SAP System Copy and Migration at https://wiki.scn.sap.com/wiki/display/SL/System+Copy+and+Migration
  ○ SAP system landscape copy:
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 system IDs (<SAPSID>).
- 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.

i 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.

i Note

SAP systems based on SAP NetWeaver 7.4 SP03 and higher:

During any migration or copy of a system with declustered and/or depooled tables – such as an SAP HANA system – your target system receives the same database layout. That is, it receives declustered and depooled tables. Therefore, consider the recommendations for your target platform as described in SAP Note 1892354.

i 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:

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

- **The database-independent procedure using SAP tools**
  Use this method if database-specific methods are either not available or not suitable. For more information, see Database-Independent System Copy [page 47].

  **Note**

  If SAP HANA is the source database, you cannot use the Database Independent System Copy [page 47] procedure for SAP systems based on SAP NetWeaver AS for ABAP 7.52, because SAP NetWeaver AS for ABAP 7.52 already uses certain artifacts in the SAP HANA 2.0 database which are not supported by R3load.

- **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 82].

- **Copy single instances only**
  The following options are supported:
  - You can move a primary application server instance to a different host within your system. For more information, see Copying the Primary Application Server Instance Only [page 115].
  - You can move a database instance to a different host within your system. For more information, see Copying the Database Only – Move Database Instance [page 116].
  - You can refresh an existing database instance without having to copy the primary application server instance and to reinstall additional applications servers. For more information, see Copying the Database Only – Refresh Database Instance [page 117].
  - 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 118]

  **Caution**

  You cannot copy single product instances, usage types, or components!

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

1. Perform the export [page 60].
2. For the import, choose the relevant system copy options as described in the process flows of the system copy procedure [page 48].

### 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

This section provides information about basic planning aspects and parameters required for system copy.

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
- Use a local directory to perform the export, in order to increase the performance and avoid data corruption. When using NFS, consult SAP Note 2093132 for recommendations about NFS configuration and restrictions. Also take into account that it may directly affect performance.

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

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.

Using a Network-Drive

If you want to use a Network-drive for system copy, make sure that you create secure file share permissions. Be aware that the communication protocol for this drive needs to be a safe one, for example SSFS (see also General Technical Preparations [page 38]).

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

**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.

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

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.

### SAP License

Once the installation is completed and the SAP system copy has been imported, you require a new license key for the target system. The license key of the source system is not valid for this system.

For information about ordering and installing the SAP license, see the SAP Library [page 20] for your release at:

**Note**
Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

- SAP NetWeaver 7.3 and higher: [Solution Life Cycle Management > SAP Licenses]
- SAP NetWeaver for Banking Services from SAP: [Administrator’s Guide > Configuration of SAP NetWeaver > General Configuration Tasks > License Configuration]
SAP NetWeaver Mobile 7.1 / 7.1 including Enhancement Package 1: Administrator’s Guide ➤ Configuration ➤ General Configuration Tasks ➤ License Configuration

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

Archiving files

Data that has been archived in the source system (data that does not reside in the database but was moved to a different storage location using SAP Archive Management) must be made accessible in the target system. Adapt the file residence information in the target system.

For more information, see the following:

- The SAP Library [page 20] for your release at:

  i Note
  Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

  ○ SAP NetWeaver 7.3 and higher: SAP NetWeaver Library: Function-Oriented View ➤ Solution Life Cycle Management ➤ Data Archiving

  ○ SAP NetWeaver for Banking Services from SAP: Administrator’s Guide ➤ Technical Operations for SAP NetWeaver (TOM) ➤ General Administration Tasks ➤ Data Archiving

  ○ SAP NetWeaver Mobile 7.1 / 7.1 including Enhancement Package 1: Administrator’s Guide ➤ Technical Operations (TOM) ➤ General Administration Tasks ➤ Data Archiving


Access to archive files is platform-independent.

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

For special prerequisites and required procedures for SAP BW and IBM Db2, including the implementation of DB2 BLU acceleration, see the appendix of the database administration guide SAP Business Warehouse on IBM DB2 for Linux, UNIX, and Windows: Administration Tasks, available at https://help.sap.com/viewer/db6_admin.

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.

More Information

FAQ - System Copy and Migration at: https://wiki.scn.sap.com/wiki/display/SL/FAQ+-+System+Copy+and+Migration

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 and in SAP Note 1875778.

- **Database Tuning [page 30]**
  - 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.
- **Sorted Versus Unsorted Unload [page 31]**
- **Package Splitting [page 32]**
- **Table Splitting [page 33]**
- **R3load Options [page 35]**
  - This section provides information about available R3load options.
- **Migration Monitor [page 36]**
  - 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 [page 36]**
  - You can use the Distribution Monitor to speed up Unicode Conversion by distributing the R3load workload to multiple machines.
- **Defining the Unload/Load Order [page 37]**
- **Database-Specific Central Notes [page 37]**
  - 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 – Database Independent

If possible, update the database statistics.

i Note
This recommendation is not valid for MSSQL Databases. For more information, see SAP Note 1660220.

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 and to the relevant SAP Note.

i Note
IBM Db2 for Linux, UNIX, and Windows databases have their recommendations in separate notes, one for each release. You can find them easily searching for Standard Parameter Settings under SV-BO application area. For example, for IBM Db2 for Linux, UNIX, and Windows V9.7, the relevant SAP Note is 1329179.

Database Tuning Measures – Oracle

- Refer to SAP Notes 936441 and 1918774 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 in the SAP Library for your release [page 20] at:

  i Note
  Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

- 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.
- You can use the parameter checker. For more information, see SAP Note 1111426.

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.

Database Tuning Measures – MS SQL Server

Refer to SAP Note 1054852 for recommendations on how to size and tune the MS SQL database in an SAP NetWeaver or SAP Business Suite environment.

2.6.2 Sorted Versus Unsorted Unload

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

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

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

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

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

Related Information

Using the Package Splitter [page 187]
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 you might consider splitting the table by using the Table Splitter. An example of the improvement when performing a table split can be seen in the figure below:

For copying large ABAP tables, the tool R3ta or - if the SAP kernel version of the source system is 7.40 or higher - 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 SAP 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.
- **R3ta tool only:** 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.
- **R3ta tool only:** 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 - if the SAP kernel version of the source system is 7.40 or higher - 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 - if the SAP kernel version of the source system is 7.40 or higher - the SAPuptool), you must be aware of the fact, that a badly chosen WHERE condition can increase the total table processing time a lot. In addition, the consultant takes over the responsibility for the completeness of the data!
- You can often reduce the export time of a table which is processed with WHERE conditions if you create a (temporary) additional index on the column used within the WHERE condition.
**Caution**

This may not be possible on databases that need exclusive access on the table when creating an index.

---

**Database-Specific Information about Table Splitting**

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

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**Related Information**

- Preparing the Table Split [page 56]
- R3load Options [page 35]

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# 2.6.5 R3load Options

This section provides information about available R3load options.

**i Note**

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB.SAR archive of the kernel media.

There is no action required from your side, the installer uses the relevant loadtools automatically once you run it from the extracted SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive.

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.

**Note**

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB.SAR archive of the kernel media. **There is no action required from your side**, the installer uses the relevant loadtools automatically once you run it from the extracted SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive.

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 158]
- 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](#).
An up-to-date version of the load tools - such as R3load, R3szchk, R3ldct1, SAPupptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the load tools available in the SAPEXEDB.SAR archive of the kernel media. There is no action required from your side, the installer uses the relevant load tools automatically once you run it from the extracted SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive.

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 29]
3 Preparation

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. This is not necessary when performing a test run.

Context

The following section describes important preparations on the source system before you perform homogeneous or heterogeneous system copy.

For more information about SAP System Administration, see the Administration information in the SAP Library [page 20] for the SAP NetWeaver release your source system is based on:

i Note

Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

<table>
<thead>
<tr>
<th>SAP NetWeaver Release</th>
<th>SAP Library Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP systems based on SAP NetWeaver Mobile 7.1 and</td>
<td>[Application Help]</td>
</tr>
<tr>
<td>SAP systems based on SAP NetWeaver for Banking Services</td>
<td>[SAP Library: English]</td>
</tr>
<tr>
<td>SAP systems based on SAP NetWeaver Mobile 7.1 including</td>
<td>[SAP NetWeaver Mobile Library]</td>
</tr>
<tr>
<td>Enhancement Package 1</td>
<td>[Administrator’s Guide]</td>
</tr>
</tbody>
</table>
Before you start a system copy, 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 by 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 primary application server instance.

For more information about release and roadmap information around the kernel versions and their relationship to SAP NetWeaver support packages including important notes on downward compatibility and release dates, see the document Understanding Kernel Releases for the SAP NetWeaver AS ABAP at: https://archive.sap.com/documents/docs/DOC-54170

2. Check if canceled or pending update requests exist in the system. If canceled or pending updates exist, you must update these again or delete them from all clients. Proceed as follows:
   b. Delete the default values for the client, user, and time.
   c. Choose all update requests.
   d. Check if table VBDATA contains any entries. If there are entries, update or delete the corresponding update requests.
   e. To check whether this action was successful, call transaction SE16 for table VBDATA.

3. Stop scheduling of all released jobs.

Go to transaction SE38 and run report BTCTRNS2. For more information, see SAP Note 37425.

4. Adapt the operation mode timetable to make sure that no switching of operating modes takes place while a system is being copied (transaction SM63).

5. Write down the logical system names of all clients:
   ○ 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-up actions after the system copy.
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.

**SAP Business Warehouse (BW) only:** If you are still in the process of planning your BW system landscape, see SAP Note 184447 for information about how to set up your system landscape, especially for information about system naming.

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. For more information, see SAP Note 870601.

7. To avoid stopping the database due to a log directory being full, make sure that the log backup is enabled during the import.

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 192].

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. **Prepare the media required for the export [page 42]:**
   a. Prepare the Software Provisioning Manager archive as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43].
   b. If you want to use a dedicated kernel, you can specify this on the screen **Use Dedicated Kernel for System Copy** while performing the export. If you choose this option, you are prompted for the required kernel archives.

   For more information, see Downloading Dedicated Kernel Archives for the Export [page 45].
3.2 Product-Specific Preparations

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:

  In transaction SAPF190, for classic FI, choose [Accounting, Financial Accounting, General ledger, Periodic Processing, Closing, Check/count, Reconciliation].

  For a new general ledger, choose [Accounting, Financial Accounting, General ledger, Periodic Processing, Closing, Check/count, Reconciliation (New)].

- 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.

  - RFUMSV00 (tax on sales/purchases)
  - RAGITTO1 (asset history sheet)
  - RAZUGA01 (asset acquisitions)
  - RAAABGA01 (fixed asset retirements)

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

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

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

SAP Business Warehouse

- When planning the copy of an SAP Business Warehouse (BW) system, read SAP Notes 886102 and 1707321.
- Especially if you want to perform a heterogeneous system copy to another database, make sure that all the data from the Persistent Staging Area (PSA) associated with a 7.X DataSource are extracted and loaded to the Data Targets using Data Transfer Process (DTP) before you perform the database migration. For more information, see SAP Note 2129192.

3.3 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.

For the media required for performing the target system installation, see section Preparing the installation Media in the installation guide [page 20] for the operating system platform and database of your target system.

- Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43]
  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.

- Downloading Dedicated Kernel Archives for the Export [page 45]
  If you want to use a dedicated kernel for the database export, you must download the SAPEXE.SAR and SAPEXEDB.SAR for your operating system, kernel release and database beforehand.
3.3.1 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 latest version of 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.

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB.SAR archive of the kernel media. There is no action required from your side, the installer uses the relevant loadtools automatically once you run it from the extracted SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive.

**Procedure**

1. **Download the latest version of the Software Provisioning Manager 1.0 archive**
   SWPM10SP<Support_Package_Number>_<Version_Number>.SAR from:
   
   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. To check the validity of the downloaded executable, right-click the executable and choose Properties. On the Digital Signatures tab you can find information about the SAP signature with which the executable was signed.
d. 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 SWPM10SP<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:

         ```bash
         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 SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive by executing the following command:

      ```bash
      Note
      Check SAP Notes 2178665 and 1680045 whether additional information is available.
      <Path to SAPCAR>\sapcar.exe -tvVf<Path to Download Directory>
      \SWPM10SP<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:

   ```bash
   <Path to SAPCAR>\sapcar.exe -xvf <Path to Download Directory>
   \SWPM10SP<Support_Package_Number>_<Version_Number>.SAR -R <Path to Unpack Directory>
   ```

   **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.
3.3.2 Downloading Dedicated Kernel Archives for the Export

If you want to use a dedicated kernel for the database export, you must download the `SAPEXE.SAR` and `SAPEXEDB.SAR` for your operating system, kernel release and database beforehand.

**Context**

Using this feature, you no longer have to do kernel updates in your systems just for the purpose of being able to copy it. Instead, the installer provides you the option to use a different kernel just for the purpose of system copy. This means you do not provide a kernel to be installed but only to be used by the installer for performing the export. For this option, you have to provide a separately downloaded `SAPEXEDB.SAR` and `SAPEXE.SAR` archive.

**Note**

The signature of installation archives is checked automatically by the installer during the **Define Parameters** phase while processing the **Software Package Browser** screens. The installer only accepts archives whose signature has been checked. After scanning the archives and verifying the signature, an info file is written where you can find detailed information about matching and non-matching archive files. You can access this info file by choosing the info file link in the Archive Scanning Result section of the **Software Package Browser** screen. The info file contains only the results of the latest archive scan. For more information, see SAP Note 2393060.

**Procedure**

1. Go to [http://support.sap.com/swdc](http://support.sap.com/swdc) > **Software Downloads** > SUPPORT PACKAGES & PATCHES > **By Category** > **Additional Components** > **SAP Kernel** > `<Version>`

2. Choose the required package:

   **Caution**
   
   - Make sure that you always choose `SAPEXE<Version>.SAR`, `SAPEXEDB<Version>.SAR` of the same SAP kernel release and extension:

   **Example**

   - If `SAPEXE<Version>.SAR` is of version **7.42 EXT**, then `SAPEXEDB<Version>.SAR` must also be of version **7.42 EXT**.
   - If `SAPEXE<Version>.SAR` is of version **7.45**, then `SAPEXEDB<Version>.SAR` must also be of version **7.45**.

   - `SAPEXE<Version>.SAR`
     - **SAP KERNEL <Version> <UC | NUC> <Operating System> DATABASE INDEPENDENT**
i Note

*SAP KERNEL* <Version> <NUC> is only available for SAP systems based on SAP NetWeaver 7.4 or lower

- If you want to install an SAP system based on SAP NetWeaver 7.5, you can only choose 7.45 UNICODE for *SAP KERNEL* <Version>.
- If you want to install an SAP system based on SAP NetWeaver 7.4, you can choose either 7.45 or 7.42 for *SAP KERNEL* <Version>.
- If you want to install an SAP system based on SAP NetWeaver 7.3 including EHP1 or lower, choose 7.21 EXT for *SAP KERNEL* <Version>.
- SAPEXEDB<Version>.SAR

---

#DATABASE INDEPENDENT

i Note

*SAP KERNEL* <Version> <NUC> is only available for SAP systems based on SAP NetWeaver 7.4 or lower

- If you want to install an SAP system based on SAP NetWeaver 7.5, you can only choose 7.45 UNICODE for *SAP KERNEL* <Version>.
- If you want to install an SAP system based on SAP NetWeaver 7.4, you can choose either 7.45 or 7.42 for *SAP KERNEL* <Version>.
- If you want to install an SAP system based on SAP NetWeaver 7.3 including EHP1 or lower, choose 7.21 EXT for *SAP KERNEL* <Version>.
4 Database Independent System Copy

With the installer, you can export and import your database content in a database-independent format. The installer uses the **R3load** tool for exporting and importing the database content.

**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](https://launchpad.support.sap.com/#/softwarecenter).

An up-to-date version of the load tools - such as **R3load, R3szchk, R3ldctl, SAPuptool** - which were available so far only in the **SAPEXEDB.SAR** archive of the kernel media, has now been made available in the Software Provisioning Manager archive (**SWPM10SP<Support_Package_Number>_<Version_Number>.SAR**), in a sub-archive named **LOADTOOLS.SAR**, located in the **COMMON/LOADTOOLS** folder. For a system copy using kernel version 7.40 or higher, the load tools from the **SWPM10SP<Support_Package_Number>_<Version_Number>.SAR** are used automatically instead of the loadtools available in the **SAPEXEDB.SAR** archive of the kernel media. **There is no action required from your side**, the installer uses the relevant loadtools automatically once you run it from the extracted **SWPM10SP<Support_Package_Number>_<Version_Number>.SAR** archive.

**Note**

Declustering / depooling of ABAP tables is supported for SAP systems based on SAP NetWeaver 7.4 SP03 and higher. For more information, SAP Note [1892354](https://support.sap.com/view/cd/1892354).

**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.
Existing Target System

If the target system already exists and if you do not plan to perform an MCOD installation, delete the database on the target system before the import. For more information, see chapter Installation of Multiple Components in One Database in the installation documentation for your SAP component.

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 differ in 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 and smaller pieces.
- There are several options of how to split packages. For a detailed description of the options, see 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 – combined.
- “Splitting of STR Files” is part of the “Advanced Export Parameters” and is enabled by default. If you select the splitting option (if you did not already perform some tests before), using the splitting tool parameters selected by the installer is a good starting point.

⚠ Caution

If you want to split STR files, 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.

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.

⚠ Note

As a result of the export, a dump of the database schema belonging to the SAP system is stored in the export directory. During the entire life-cycle of this export dump, you must ensure adequate protection from unauthorized read access and modification of the data exported. Therefore, you now have the option to specify a restricted access level for the export directory when you run the installer [page 63] to perform the export. You are enabled to specify that only the <sapsid>adm executing the export has permission to read and modify the database export.
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 the export options and the resulting output files.

Follow the sequence of steps described below for a:

- Standard system
  - Standard system – Performing the Export on the Source System
  - Standard 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

Standard System – Performing the Export on the Source System

To perform the export for a standard system, proceed as follows on the standard system host:

1. **Heterogeneous system copy only**: Generate the migration key at https://support.sap.com/migrationkey, entering the installation number of your source system when prompted.
2. Perform the export on the **standard system host**:
   1. Make sure that the QCM tables are deleted from your system as described in General Technical Preparations [page 38].
   2. Generate DDL statements [page 54].
3. Prepare the system for table splitting [page 56] (optional).

4. You run the installer [page 63] 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.

5. If required, you prepare parallel export and import [page 59].

6. Start the installer [page 63] to export the database instance.

   **i Note**
   
   If you want to run a system copy with parallel export/import using the Migration Monitor, for example with the socket option, and the target database is declustered, start the installer with command line option SUPPORT_DECLUSTERING=false.

   On the Welcome screen, choose option Database Instance Export.

   **i Note**
   
   If you are running a system copy with parallel export/import using the Migration Monitor and the target database is declustered - that is you started the installer with command line option SUPPORT_DECLUSTERING=false as described above - add the following load options parameter in the screen for advanced load configuration (SAP System Advanced Load Configuration) screen:

   ```
   -sort_cluster
   ```
   
   You can check the parameter within the export_monitor_cmd.properties file located in the installation directory, in the taskArgs=-sort_cluster entry.

   **i Note**
   
   ○ If parallel export and import has been prepared, ensure the following:
     ○ You choose Parallel Export and Import for the database instance ABAP export on the SAP System Database Export screen.
     ○ If you decided to transfer the export directory instead of sharing it to the target host, 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.
     ○ If table splitting for ABAP tables has been prepared before the data export via the installer, the installer export automatically does the following:
       ○ It forces package splitting.
       ○ It forces the use of an input file for table splitting.
       ○ It uses the existing whr.txt file from the dump directory as default for the package splitter input file.

   **i Note**
   
   If R3load processes fail due to an error, solve the problem, and perform the restart as described in Restarting R3load Processes [page 75].
3. If you want to perform table comparison with Software Update Manager (SUM) [page 183], proceed as follows:
   1. Stop all instances of the source system once the export has completed.
   2. Run table comparison [page 184] for the source system.
   3. You can restart the instances of the source system.

Standard System – Setting Up the Target System

You 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 76], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 20].

You perform the following steps on the **standard system host**:

1. You prepare the standard system host for the installation of your target system as described in the installation guide.
2. If you have already prepared the export [page 59] on the source system because you want to perform export processes in parallel to import processes, you perform the following steps:
   1. 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 all files that have been generated in step Preparing Parallel Export and Import [page 59] on the source system.
   2. You transfer the export files to the standard system target host [page 77].
   3. You install the target system [page 78].
   If you did not prepare the export on the source system, you install the target system.
   For more information, see Installing the Target System [page 78].
3. If required, on the host or hosts of the application server instance, you install further additional application server instances 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**, proceed as follows:

1. **Heterogeneous system copy only**: Generate the migration key at https://support.sap.com/migrationkey, entering the installation number of your source system when prompted.
2. You perform the database instance export.
   We recommend that you perform this step on the database instance host. If your source database is SAP HANA, you perform this step on any application server instance host.
1. Make sure that the QCM tables are deleted from your system as described in General Technical Preparations [page 38].
2. Generate DDL statements [page 54].
3. You run the installer [page 63] to prepare the source system for the export. On the Welcome screen, choose the Export Preparation option.

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

4. Prepare the system for table splitting [page 56] (optional).
5. If required, you prepare parallel export and import [page 59].
6. Run the installer [page 63] to export the database instance.

   **Note**
   If you want to run a system copy with parallel export/import using the Migration Monitor, for example with the socket option, and the target database is declustered, start the installer with command line option SUPPORTDECLUSTERING=false.

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

   **Note**
   If you are running a system copy with parallel export/import using the Migration Monitor and the target database is declustered - that is you started the installer with command line option SUPPORTDECLUSTERING=false as described above - add the following load options parameter in the screen for advanced load configuration (SAP System Advanced Load Configuration) screen:

   ```bash
   -sort_cluster
   ```

   You can check the parameter within the export_monitor_cmd.properties file located in the installation directory, in the taskArgs=-sort_cluster entry.

   **Note**
   - If parallel export and import has been prepared, ensure the following:
     - You choose Parallel Export and Import for the database instance ABAP export on the SAP System Database Export screen.
     - If you decided to transfer the export directory instead of sharing it to the target host, 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.
     - If table splitting for ABAP tables has been prepared before the data export via the installer, the installer export automatically does the following:
       - It forces package splitting.
       - It forces the use of an input file for table splitting.
       - It uses the existing whr.txt file from the dump directory as default for the package splitter input file.
3. If R3load processes fail due to an error, solve the problem, and perform the restart as described in Restarting R3load Processes [page 75].

3. If you want to perform table comparison with the Software Update Manager (SUM) [page 183], proceed as follows:
   1. Stop all instances of the source system once the export has completed.
   2. Run table comparison [page 184] 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

You use the installer to set up the target system and import the database files that you have exported from the source system.

- **i 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 76], but refers for all steps that are identical with a new system installation to the appropriate operating system and database-specific installation guide [page 20].

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. You prepare the **ASCS instance host**, the **database instance host**, and the **host of the primary application server instance** for the installation of the corresponding instances of your target system as described in the installation guide.
2. You install the **ASCS instance** for the target system as described in the installation guide.
3. You perform the following steps on the **database instance host**:
   ○ If you have already prepared the export [page 59] on the source system because you want to perform export processes in parallel to import processes, you perform the following steps:
     1. 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 have been generated in step Preparing Parallel Export and Import [page 59] on the source system.
     2. You transfer the export files to the database instance target host [page 77].
     3. You install the database instance of the target system.
        For more information, see Installing the Target System [page 78].
   ○ If you did **not** prepare the export on the source system, you install the database instance of the target system.
     ○ You transfer the export files to the database instance target host [page 77].
     ○ You install the database instance of the target system.
        For more information, see Installing the Target System [page 78].
4. On the host of the primary application server instance, you install the primary application server instance of the target system.
5. If required, on the host or hosts of the additional application server instance, you install further additional application server instances 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`.

**Prerequisites**

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

**Context**

- You must perform this procedure before starting the installer.
- For additional database-specific information, see also 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`.
   
   The **Report SMIGR_CREATE_DDL: Generate DDL Statements for Migration** screen appears.
3. Specify the required parameters on the **Report SMIGR_CREATE_DDL: Generate DDL Statements for Migration** screen.
   - 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.
   - **Note:** Only enter a database version that is available in the value help.

   **Additional Parameters:**
   - **Unicode Migration:** This checkbox should be enabled if the target system is a Unicode system. For SAP systems based on SAP NetWeaver 7.5 or higher, this checkbox is always enabled and is not changeable any longer.
- **Installation Directory:** Specify a directory to which the generated files are to be written.

- **Optional Parameters:**
  The parameters *Table Category* and *Table Name* are used to limit the amount of tables to be processed in `SMIGR_CREATE_DDL`. These parameters are for test purposes only.

4. **Execute the program.**

The DDL statements are generated and are written to the specified directory.

```
**Note**
Ensure that the user `<sapsid>adm` of the **source system** has write access and the user `<sapsid>adm` of the **target system** has read access to the directory with the generated SQL files.
```

From there, the installer copies them to the `<Export_Dump_Directory>/ABAP/DB` export directory.

```
**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.
```

### 4.1.2 Using a Dedicated Kernel for the Export

As a customer running a productive system, you are sometimes confronted with kernel patches that are required for an ABAP system copy. Since you do not want to change the kernel for your productive landscape, you would like to be able to use a dedicated kernel just for software lifecycle activities for the system, whereas the system itself is to remain unchanged. During the system copy export, while processing the *Use Dedicated Kernel for System Copy* screen, you can specify that you want to use a dedicated kernel. Having chosen this option, on the next screen you are prompted for SAP kernel archives that you want to use for the export itself - `SAPEXE.SAR` and `SAPEXEDB.SAR`. The installer then uses these archives instead of those installed in the source system for running the export.

**Related Information**

- Preparing the Media Required for Performing the Export [page 42]
- System Copy Procedure [page 48]
### 4.1.3 Preparing the Table Split

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

**Prerequisites**

- 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:
  - IBM Db2 for z/OS (Only create a temporary index if you want to perform an unsorted unload.)
  - Oracle
  
  For more information, see section *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 158].

**Restrictions**

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

1. Create a file that contains lines of the form `<table>%<nr_of_splits>` for all tables to be split.
   
   **Oracle PL/SQL splitter only:** Use the form `<table>%<nr_of_splits>;<rowid_or_column>`. For more information about the Oracle PL/SQL splitter, see SAP Note 1043380.

2. Start the installer as described in Running the Installer to Perform the Export [page 63].

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

4. Follow the instructions on the 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 or - if the SAP kernel version of the source system is 7.40 or higher - SAPuptool jobs.

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

5. After you have entered all requested input parameters, the 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 ABAP/DATA subdirectories of the export directory.

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

7. Check in the export directory `<Export_Dump_Directory>/ABAP/DATA` if `*.WHR` files and a `whr.txt` file have been created for all tables that are to be split.
   
   - If no `*.WHR` files and no `whr.txt` file could be produced for some of these tables, create fewer packages for these tables:
     1. Create a new, empty installation directory.
     3. Run the Prepare Table Splitting service again and provide an input file that contains only the missing tables with a lower number of packages for each defined table.
   
   - If the `*.WHR` files and an entry in the `whr.txt` file have been created for the missing tables, merge these results with the results from the first Prepare Table Splitting run:

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 perform a database export using the Oracle-specific method with the Oracle PL/SQL splitter.
For more information, see paragraph *Creating a Temporary Index*.

### Related Information

- Using Hints (R3ta Only) [page 58]
- Creating a Temporary Index [page 58]
- Processing Split Tables [page 174]

#### 4.1.3.1 Using Hints (R3ta Only)

Some platforms allow the creation and usage of an `R3ta_hints.txt` file, with which you can instruct R3ta to use specific columns of a table to create a `WHERE` condition.

With the file `R3ta_hints.txt`, you can instruct R3ta to use specific columns of a table to create a `WHERE` condition. The file has to be located in the directory in which you start R3ta.

With one line in the file `R3ta_hints.txt`, you specify the table name followed by one or more column names, separated by a blank. The columns have to be part of the primary key of the table. These specifications are used by R3ta to create the `WHERE` condition.

A file `R3ta_hints.txt` with column hints for several tables is delivered with the installation media (folder `IM_<OS>`). If you want to modify this file, copy it from the directory `IM_<OS>/COMMON/INSTALL` to the installation directory and adapt it according your requirements as soon as the *Parameter Summary* dialog appears and before starting the processing phase.

#### 4.1.3.2 Creating a Temporary Index

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

### Context

**IBM Db2 for z/OS only:** Create the corresponding temporary index on the database with database tools. Only create a temporary index if you want to perform an unsorted unload. This is the case when you use a `DDBDB2.TPL` file with no `ORDER_BY_PKEY` and the `R3load` does not overrule this setting. Which tables cannot be unloaded unsorted is described in SAP Note 954268.

- Use the `DEFER YES` parameter to create the index.
- Afterwards, use the `REBUILD INDEX` job to speed up the index creation process.
For each table to be split, R3ta or - if the SAP kernel version of the source system is 7.40 or higher - SAPuptool creates the following files to facilitate the creation of the temporary index:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;table&gt;_IDX.STR</td>
<td>Contains the description of the temporary index; the default index name is &lt;table&gt;~IMG.</td>
</tr>
<tr>
<td>&lt;table&gt;_IDX.TSK</td>
<td>Contains the task to create the temporary index.</td>
</tr>
<tr>
<td>&lt;table&gt;_IDX.cmd</td>
<td>R3load command file for creating the temporary index.</td>
</tr>
<tr>
<td>DRP_&lt;table&gt;_IDX.TSK</td>
<td>Contains the task to drop the temporary index.</td>
</tr>
<tr>
<td>DRP_&lt;table&gt;_IDX.cmd</td>
<td>R3load command file for dropping the temporary index.</td>
</tr>
</tbody>
</table>

You can use the R3load cmd, STR, and TSK files created by the R3ta or - if the SAP kernel version of the source system is 7.40 or higher - SAPuptool to create the index.

**Procedure**

1. **IBM DB2 for IBM i; IBM Db2 for Linux, UNIX, and Windows; IBM Db2 for z/OS; SAP MaxDB; MS SQL Server, Oracle only:** Make sure that you do not lock the table while creating the temporary index. Depending on your database platform it might be necessary to modify the create index statement in the DDL<DBTYPE>.TPL file.

2. Call R3load as user <sapsid>adm with the following parameters:

   ```bash
   R3load -dbcodepage <dbcodepage_of_source_system> -i <table>_IDX.cmd -l <table>_IDX.log
   ```

   If your source system is a non-Unicode system, the dbcodepage is 1100. If your source system is a Unicode system, the dbcodepage is 4102 (big-endian) or 4103 (little-endian).

**4.1.4 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 a database size file named 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 as described in Exporting the Source System [page 60].
   This step creates the export directory structure, calculates the size of the target system and generates the DBSIZE.XML that is required to set up the target system.
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 Transferring the Export Files to the Target Host [page 77].

Related Information

About the Migration Monitor [page 158]
Transferring the Export Files to the Target Host [page 77]

4.1.5 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 48].

Related Information

Prerequisites for Running the Installer [page 61]
Running the Installer [page 63]
4.1.5.1 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 do trust the self-issued certificate of the installer after carefully performing the “thumbprint” verification described in Running the Installer [page 63]. 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 67].

- You need 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. The installer creates an installation directory sapinst_instdir, where it keeps its log files, and which is located directly in the %ProgramFiles% directory. For more information, see Useful Information About the Installer [page 67].

- 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.exe 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.exe 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.

- **Caution:** 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.

### 4.1.5.1.1 Required User Authorization for Running the Installer

Although the installer automatically grants the rights required for the installation to the user account used for the installation, you have to check whether this account has the required authorization to perform the installation. The authorization required depends on whether you intend to perform a *domain* or *local* installation. If necessary, you have to ask the system administrator to grant the account the necessary authorization before you start the installation. If you attempt the installation with an account that does not have the required authorization, the installation aborts.

This section informs you about the authorization required for a domain and a local installation.

#### Procedure

- **Caution**
  
  *Do not* use the user `<sapsid>adm` for the installation of the SAP system.

**Domain Installation**

For a domain installation the account used for the installation needs to be a member of the local Administrators and the domain Admins group of the relevant domain. All machines in the system must belong to the same domain. In a domain installation, the user information is stored centrally on the domain controller and is accessible to all hosts in the system.

If the SAP system is to be distributed across more than one machine, SAP strongly recommends you to perform a domain installation to avoid authorization problems.

- **Caution**
  - If you install a distributed system as a local installation, this can lead to authorization problems for the operating system users `<sapsid>adm` and `SAPService<SPSID>`. It can also lead to problems with the transport directory, which is usually shared by several SAP systems. SAP does not support distributed SAP systems running with local user accounts.
  - Only valid for ‘High Availability’ HA (Windows)
    
    In a high-availability configuration, you always have to perform a *domain* installation.
  - For performance and security reasons, SAP does not support an SAP system installation on a domain controller.
  - If for any reason, the account used for the installation is not a member of the domain Admins group, you can perform the installation with a domain user who is a member of the local Administrators group. However, the domain administrator has to prepare the system appropriately for you.
For a domain installation, you need to:

1. Check that the account used for the installation is a member of the domain Admins group.
2. If required, obtain these rights by asking the system administrator to enter the account as a member of the domain Admins group.

Local Installation

For a local installation the account used for the installation needs to be a member of the local Administrators group of the machine involved. In a local installation, all Windows account information is stored locally on one host and is not visible to any other hosts in the system.

If the SAP system is to run on a single machine, you can perform a local installation.

⚠️ Caution

Do not use the Windows built-in account Administrator or the renamed built-in account to install your SAP system. The built-in account only has restricted network access rights that are required by the installer. If you renamed the built-in account Administrator, do not create a new account named Administrator.

For a local installation, you need to:

1. Check that the account used for the installation is a member of the local Administrators group.
2. If required, obtain these rights by asking the system administrator to enter the account as a member of the local Administrators group.

### 4.1.5.2 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 61].

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 67].
**Procedure**

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

   Make sure that you log on as a user with the required authorization for running the installer.

   This user must be at least a member of the local **Administrators group**.

   ▲ **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 administrator credentials 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 `sapinst.exe` from the command line. You must 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 42].

3. Start the installer as follows:

   Double-click `sapinst.exe` from the directory to which you unpacked the Software Provisioning Manager archive file.

   ▶ **Note**

   By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the `sapinst` executable with command line option `SAPINST_BROWSER=<Path to Browser Executable>`, for example `SAPINST_BROWSER=firefox.exe`.

   ▶ **Note**

   If you want to run a system copy with parallel export/import using the Migration Monitor, for example with the socket option, and the target database is declustered, start the installer for the database instance export with command line option `SUPPORTDECLUSTERING=false`.

   The installer GUI starts automatically by displaying the **Welcome** screen.

4. The installer is starting up.

   The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see Prerequisites for Running the Installer [page 61]) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the **Welcome** screen.

   If the SL Common GUI does not open automatically, you can find the URL you require to access the SL Common GUI at the bottom of the **Program Starter** window of the installer. You find the icon of the **Program Starter** window in the taskbar of your Windows host. Open a supported web browser and run the URL from there.

   ...

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

---

**Note**

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

1. Terminate the installer as described in *Useful Information about the Installer* [page 67].
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
   You can use a fully-qualified host name.

**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.xxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
      %userprofile%\sapinst\%
   2. In the `sapinst_exe.xxxxx.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] [Database] [System Copy] [Source System] [Based on AS ABAP].

**Note**

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 47].

**Note**

Do not perform these steps if you perform a system copy using a *database-specific* method because then you do not perform an export using Software Provisioning Manager 1.0 (the "installer") but only...
use Software Provisioning Manager 1.0 for installing the target system. For more information, see Database-Specific System Copy [page 82]).

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. If the installer prompts you to log off from your system, log off and on again.
The installer restarts automatically.

8. 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**
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 192].

**Caution**
The signature of installation media and installation archives is checked automatically during the Define Parameters phase while processing the Media Browser and - if you perform an archive-based installation - the Software Package Browser screens.

Note that this automatic check is only committed once and not repeated if you modify artifacts 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.

For more information, see SAP Note 2393060.

9. 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.

10. To start the execution, choose Next.

   The installer starts the export and displays its progress of the system copy export during the processing phase.

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:

    `%userprofile%\..sapinst\`
13. 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 67].

**Related Information**

Useful Information about the Installer [page 67]
Interrupted Processing of the Installer [page 69]
Troubleshooting with the Installer [page 72]

### 4.1.5.2.1 Additional Information about the Installer

The following sections provide additional information about the installer.

Useful Information about the Installer [page 67]

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

Interrupted Processing of the Installer [page 69]

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

Troubleshooting with the Installer [page 72]

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

Troubleshooting during the Export Process [page 73]

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 74]

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

### 4.1.5.2.1.1 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 of version 1.0 SP24 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/.

The SL Common GUI connects the web browser on a client with the sapinst executable - which is part of Software Provisioning Manager - running on the installation host using the standard protocol HTTPS. For the SL Common GUI, the installer provides a pre-generated URL in the Program Starter window. If you have a supported web browser installed on the host where you run the installer, the SL Common GUI starts automatically.

By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the sapinst executable with command line option

```
SAPINST_BROWSER=<Path to Browser Executable>, for example
SAPINST_BROWSER=firefox.exe.
```

Alternatively you can open a supported web browser on any device and run the URL from there. For more information about supported web browsers see Prerequisites for Running the Installer [page 61].

If you need to run the SL Common GUI in accessibility mode, apply the standard accessibility functions of your web browser.

- As soon as you have started the sapinst.exe executable, the installer creates a .sapinst directory underneath the <Drive>:\Users\<User> directory where it keeps its log files. <User> is the user which you used to start the installer.

After you have reached the Welcome screen and selected the relevant installer option for the SAP system to be exported, the installer creates a directory sapinst_instdir, where it keeps its log files, and which is located directly in the %ProgramFiles% directory. If the installer is not able to create sapinst_instdir there, it tries to create sapinst_instdir in the directory defined by the TEMP environment variable.

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.

> 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 (TEMP, TMP, TMPDIR, or SystemRoot). These executables are deleted after the installer has stopped running.

Directories called sapinst_exe.xxxxxx.xxxx sometimes remain in the temporary directory after the installer has finished. You can safely delete them.

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, go to the directory %TEMP%\sapinst_exe.xxxxxx.xxxx after you have started the installer, and enter the following command:

```
sapinst.exe -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 steps on the primary application server instance of the source system, make sure that you have at least the same amount of disk space available in `\SAPLOC\<SAPSID>\<InstanceName>\<SAPSID>\program` as is used in `\SAPLOC\<SAPSID>\<InstanceName>\<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.

  **Note**
  
  If you need to terminate the installer, choose `File > Exit` in the menu of the Program Starter window.

### 4.1.5.2.1.2 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><strong>Retry</strong></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 <strong>Retry</strong>. If the same or a different error occurs, the installer displays the same dialog box again.</td>
</tr>
<tr>
<td><strong>Stop</strong></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><strong>Continue</strong></td>
<td>The installer continues the installation from the current point.</td>
</tr>
<tr>
<td><strong>View Log</strong></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 63].
2. Make sure that the media media required for the export are still available. For more information, see Preparing the Media Required for Performing the Export [page 42].
   
   ➤ **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.
3. Restart the installer by double-clicking sapinst.exe from the directory to which you unpacked the Software Provisioning Manager archive.

   By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the sapinst executable with command line option **SAPINST_BROWSER=<Path to Browser Executable>**, for example **SAPINST_BROWSER=firefox.exe**.
4. The installer is restarting.

The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see Prerequisites for Running the Installer [page 61]) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the Welcome screen.

If the SL Common GUI does not open automatically, you can find the URL you require to access the SL Common GUI at the bottom of the Program Starter window of the installer. You find the icon of the Program Starter window in the taskbar of your Windows host. Open a supported web browser and run the URL from there.

```
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</i>

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 67].
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
   You can use a fully-qualified host name.

<i>Caution</i>

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.xxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
      `%userprofile%\.sapinst\`
   2. In the `sapinst_exe.xxxxx.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*:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Perform a new run</em></td>
<td>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: <code>log_&lt;Day&gt;_ &lt;Month&gt;_ &lt;Year&gt;_ &lt;Hours&gt;_ &lt;Minutes&gt;_ &lt;Seconds&gt;</code></td>
</tr>
<tr>
<td>❖ <strong>Example</strong></td>
<td><code>log_01_Oct_2016_13_47_56</code></td>
</tr>
<tr>
<td>✉ <strong>Note</strong></td>
<td>All actions taken by the export for system copy before you stopped it (such as creating directories or users) are not revoked.</td>
</tr>
<tr>
<td>□ <strong>Caution</strong></td>
<td>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.</td>
</tr>
<tr>
<td><em>Continue with the existing one</em></td>
<td>The installer continues the interrupted export for system copy from the point of failure.</td>
</tr>
</tbody>
</table>

### 4.1.5.2.1.3 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 2393060 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 the files in the .sapinst directory underneath the <Drive>:\Users\<User> directory, where <User> is the user that you used to start the installer.
     - For more information, see Useful Information about the Installer [page 67].
     - To check the log and trace files of the installer GUI for errors, go to the directory %userprofile%\.
     - 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 69].
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.

4.1.5.2.1.4 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)
  a. Remove the <Package>.<nnn> dump files, the <Package>.TOC file, and the <Package>.log file.
  b. Make sure that all tables in the <Package>.*TSK* file have the status flag xeq or err set.
  c. Repeat the export of the complete package.
4.1.5.2.1.5 Using the Step State Editor (SAP Support Experts Only)

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

**i 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 61].

**Procedure**

1. Start the installer from the command line as described in Running the Installer [page 63] 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.
4.1.5.3 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 181]) allow package states to be manually updated to restart failed R3load processes.

Example

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

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

Procedure

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

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

Example

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Status</th>
<th>Table Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAB_1</td>
<td>ok</td>
<td>TAB_1</td>
<td>ok</td>
</tr>
<tr>
<td>TAB_2</td>
<td>err</td>
<td>TAB_2</td>
<td>ok</td>
</tr>
<tr>
<td>TAB_3</td>
<td>xeq</td>
<td>TAB_3</td>
<td>err</td>
</tr>
<tr>
<td>TAB_4</td>
<td>xeq</td>
<td>TAB_4</td>
<td>xeq</td>
</tr>
</tbody>
</table>

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

○ 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.

4.1.6 Setting Up the Target System

Related Information

Transferring the Export Files to the Target Host [page 77]
Installing the Target System [page 78]
4.1.6.1 Transferring the Export Files to the Target Host

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

Context

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

Procedure

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

   △ Caution
   
   Do not create this directory under the installation directory or another directory that contains installation information (such as the installation media or 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.

   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.

   i Note
   
   All files have to be accessible for user `<sapsid>adm` of the target system which is created during the target system installation.
4.1.6.2 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: `<DRIVE>:\<EXPDIR>\DB\<DATABASE>`

- **SAP MaxDB only**: If the database platform of your target system is **SAP MaxDB**, you must reserve at least twice as much space as 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.

- The installer automatically performs a reload. 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.

Context

This system copy guide describes only the export of the source system in detail. For the installation of the target system, you use the installation guide for the database and operating system platform of your target system. This procedure describes only the additional system copy-specific steps for the target system installation and refers for the remaining steps to the target system installation guide [page 20].

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

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.

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 `Define Parameters` phase. You can find the latest version of the installer at: [System Provisioning Manager](http://support.sap.com/sltoolset)
i Note
If you are running a system copy with parallel export/import using the Migration Monitor and started
the export with command line option SUPPORT_DECLUSTERING=false (see System Copy Procedure
[page 48]), you must now start the installer for the installation of the target database instance with
command line option SUPPORT_DECLUSTERING=true for the import during the target system
installation.

3. On the Welcome screen, navigate to the following folder according to the requirements of your target
system: <Product> <Database> System Copy Target System <System_Variant> Based
on AS ABAP.

4. Run the option required for your system copy.
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 146] 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 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 Database Import screen on the summary screen and
then revise this screen. Only then appears the screen where you can enter the migration key, which is
required for a heterogeneous system copy. If you forget to revise this screen setting during the Define
Parameters phase, the installer will abort in the processing phase when checking the migration key and
will ask you for a valid migration key.

i Note
If you are running a system copy with parallel export/import using the Migration Monitor and the target
database is declustered - that is you started the installer with command line option
SUPPORT_DECLUSTERING=true as described above - make sure that you choose the Custom
parameter mode. Otherwise the screen for advanced load configuration (SAP System Advanced Load
Configuration) will not appear.

i 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 192].

⚠️ Caution
- 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 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.
Do not create the installation directory (for example: `sapinst_instdir`) in the following directories:

- `\usr\sap\<SAPSID>`

If you want to perform export processes in parallel to import processes and you have prepared the export, you must do the following:

- Choose **Custom** on the **Parameter Mode** screen.
- Select **Parallel Export and Import** on the **SAP System Database Import** screen.
- On the **SAP System Database** screen, choose **Standard System Copy/Migration (Load-Based)**. The SAP data dump from the migration export media that was created during the database instance export is loaded in the newly installed SAP system database.
- When the installer displays the **Media Browser** screen and prompts for the **Export Location**, enter the path to the export directory `<EXPDIR>`.
- If you perform a heterogeneous system copy, enter the Migration Key on the **Database Import** screen.
- If you are running a system copy with parallel export/import using the Migration Monitor and the target database is declustered - that is you started the installer with command line option `SUPPORTDECLUSTERING=true` as described above - add the following load options parameter in the **SAP System Advanced Load Configuration** screen:
  
  ```
  -datacodepage <datacodepage_of_source_system>
  ```

  You can check the parameter within the `import_monitor_cmd.properties` file located in the installation directory, in the `loadArgs` entry.

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

- If you have to restart the import after an error, just restart the installer. The import continues with the table that has not yet been successfully imported.
- If you have to restart failed R3load processes, see *Restarting R3load Processes* [page 75].
- 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:
  
  `<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 183].

  Proceed as follows:

  1. Make sure that the primary application server instance is not started after the import has finished successfully.

     If your system is based on SAP NetWeaver 7.4 or higher, you can mark the check box **Interrupt installation before starting the SAP system** on the screen **Actions Before SAP System Start** to ensure this.

  2. Run table comparison [page 184]

  3. Start the instances of the target system.
i Note

If you have to restart failed R3load processes, see Restarting R3load Processes [page 75].

You can use the Migration Checker to ensure that the import has been performed successfully. The Migration Checker automatically checks that the import has started and that all objects have been imported. For more information about additional checks with the Migration Checker, see the Migration Checker User Guide contained in the MIGMON.SAR archive, which is available in the following directory:

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:

<Path_To_Unpack_Directory>\COMMON\INSTALL\MIGCHECK.SAR
The following sections describe the database-specific methods for the system copy.

**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.

**Process**

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

- Standard system
- Distributed system
- High-availability system

**Standard System**

**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.

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

1. **Oracle only:** You generate the control file structure for the target database [page 88].
2. **Oracle only:** If required, you create an offline backup of the source database [page 96].

**Process Flow on the Target System**

**Note**

For the target system installation, you use the installation guide [page 20] for your target operating system and database.

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

1. You install the database software as described in the installation guide.
2. Start the installer as described in the installation guide and follow the instructions on the installer screens until you are requested to perform the database backup/restore.
3. To complete the system copy, you perform the follow-up activities [page 144].

**Distributed System or High Availability System**

**Note**

When performing a system copy using a database-specific method, it is no longer 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.

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

1. **Oracle only**: On the database instance host of the source system, you generate the control file structure for the target database [page 88].
2. **Oracle only**: If required, on the database instance host, you create an offline backup of the source database [page 96].

**Process Flow on the Target System**

**Note**

For the target system installation, you use the installation guide [page 20] for your target operating system and database.

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

1. On the database instance host, you install the database software as described in the installation guide.
2. On the database instance host, start the installer as described in the installation guide and follow the instructions on the installer screens until you are requested to perform the database backup/restore.

**Note**

If required, you have to restart the installer as described in the installation guide.

3. To complete the system copy, you perform the follow-up activities [page 144].
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.

\*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 192].

**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 85]

- Using a CONTROL SQL File Created by the ORABRCOPY Tool [page 88]

**Related Information**

Database-Specific System Copy [page 82]

### 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&lt;SID&gt;.ora files from the source system will be saved in this directory.

**Restrictions**

You cannot change the database schemas SAP&lt;SchemaId&gt; and SAP&lt;SchemaId&gt;DB. There is no “move” schema.

The &lt;DBSID&gt; can be changed because the rename process is able to create new control files with a new &lt;DBSID&gt;.

The &lt;SAPSID&gt; can be also changed.
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:
   ```
   <Password> -function PrepareDatabaseCopy -dbname saphostctrl -user sapadm <DBSID> -dbtype ora -dbconfdir <shared_directory> -copymethod Online -timeout -1
   ```
2. Back up the data files, for example using image copy or snapshot technology.
3. After the database backup has finished, you have to set the database back to a normal mode using the following command:
   ```
   saphostctrl -user sapadm <password> -function FinalizeDatabaseCopy -dbname <DBSID> -dbtype ora -dbconfdir <shared_directory> -copymethod Online -timeout -1
   ```
4. You can copy the database from the source to the target system but alternatively, you can also install the Oracle database software in the target system.

   It is possible to copy the database software automatically with the tool when the database software has the same <DBSID> as the database <DBSID>.

   ❖ Example

   ```
   <Source DBSID> = C67
   <Target DBSID> = T67
   The Oracle software is under c:\oracle\C67\112 and the Oracle database files are under c:\oracle\C67 and d:\oracle\C67.
   The tool moves c:\oracle\C67 to c:\oracle\T67 and d:\oracle\C67 to d:\oracle\T67 with all subdirectories.
   ```

5. If there are database files under the directory that contains the Oracle software and you do not want to move the Oracle software, you have to move the database directory manually.

   For more information about how to install the Oracle database software, see section Installing the Oracle Database Software in the Installation Guide - Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.5x on Windows: Oracle (see Accessing the Installation Guides [page 20]).

5. 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 7.1 to 7.5x on Windows: Oracle* (see Accessing the Installation Guides [page 20]).

6. 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 7.1 to 7.5x on Windows: Oracle* (see Accessing the Installation Guides [page 20]).

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.SQ L File Created by the ORABRCOPY Tool

#### Related Information

- Generating the Control File Structure [page 88]
- Preparing the Target System (Oracle) [page 92]
- Restoring the Database Files on the Target System [page 94]
- Restoring the Database Files on the Target System with BR*Tools [page 95]
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 199].

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> 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.bat script in one of the following ways:
   - If you perform an offline manual copy, enter the following commands:
     ora_br_copy.bat -generateFiles -forceLogSwitches -targetSid <TARGET_DBSID> -password <system_password> -listenerPort <listener_port>
     The tool creates the files CONTROL.SQL, CONTROL.TRC and init<targetSID>.ora in your installation directory, shuts down and restarts the database and performs the required log switches.
   - If you perform an offline or online backup using BR*Tools, enter the following commands:
     ora_br_copy.bat -generateFiles -targetSid <TARGET_DBSID> -password <system_password> -listenerPort <listener_port>

   i Note

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

**Note**

If an error occurs, check the log file:

<INSTDIR>/ora.brcopy.log

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

**Example**

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

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

LOGFILE
GROUP 1 ( 
'D:\ORACLE\NEW\ORIGLOGA\LOG_G11M1.DBF',
'D:\ORACLE\NEW\MIRRLOGA\LOG_G11M2.DBF'
) SIZE 50M,
GROUP 2 ( 
'D:\ORACLE\NEW\ORIGLOGB\LOG_G12M1.DBF',
'D:\ORACLE\NEW\MIRRLOGB\LOG_G12M2.DBF'
) SIZE 50M,
GROUP 3 ( 
'D:\ORACLE\NEW\ORIGLOGA\LOG_G13M1.DBF',
'D:\ORACLE\NEW\MIRRLOGA\LOG_G13M2.DBF'
) SIZE 50M,
GROUP 4 ( 
'D:\ORACLE\NEW\ORIGLOGB\LOG_G14M1.DBF',
'D:\ORACLE\NEW\MIRRLOGB\LOG_G14M2.DBF'
) SIZE 50M

DATAFILE
'D:\ORACLE\NEW\SAPDATA1\SYSTEM_1\SYSTEM.DATA1',
'D:\ORACLE\NEW\SAPDATA3\IMS_1\IMS.DATA1',
'D:\ORACLE\NEW\SAPDATA3\IMS_2\IMS.DATA2',
'D:\ORACLE\NEW\SAPDATA3\IMS_3\IMS.DATA3',
'D:\ORACLE\NEW\SAPDATA3\IMS_4\IMS.DATA4',
'D:\ORACLE\NEW\SAPDATA4\IMS_5\IMS.DATA5',
'D:\ORACLE\NEW\SAPDATA4\IMS_6\IMS.DATA6',
'D:\ORACLE\NEW\SAPDATA4\IMS_7\IMS.DATA7',
'D:\ORACLE\NEW\SAPDATA4\IMS_8\IMS.DATA8',
'D:\ORACLE\NEW\SAPDATA4\IMS_9\IMS.DATA9',
'D:\ORACLE\NEW\SAPDATA1\IMS700_1\IMS700.DATA1',
'D:\ORACLE\NEW\SAPDATA1\IMS700_2\IMS700.DATA2',
'D:\ORACLE\NEW\SAPDATA1\IMS700_3\IMS700.DATA3',

System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.52 on Windows
Database-Specific System Copy
Note

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:
   
   ```sql
   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 {
   "D:\ORACLE\NEW\ORIGLOGA\LOG_G11M1.DBF",
   "D:\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. `D:\ORACLE\NEW\SAPDATA1\SYSTEM_1\SYSTEM_DATA1`,
   `D:\ORACLE\NEW\SAPDATA3\IMS_1\IMS_DATA1`,
   ...
   `D:\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`
   `D:\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 tablespace names of the new target system. When installing the target primary application server instance, the target database instance, or the target additional application server instance make sure that you enter the correct database schema names (which are the database schema names of the source system). The schema names of the source and target system must be identical.

   a. On the Welcome screen, choose `<Your Product> > <Your Database> > System Copy > Target System > <System Variant> > <Technical Stack> >`
   
   b. When the installer prompts for the database copy method, 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. Proceed as follows:...

2. Restore the database files on the target system.

3. If they do not exist, create the following directories on the target system:
   o <drive>:\oracle\TARGET_DBSID\mirrlog<x>
   o <drive>:\oracle\TARGET_DBSID\origlog<x>
   o <drive>:\oracle\TARGET_DBSID\sapdata<x>
   o <drive>:\oracle\TARGET_DBSID\sapreorg
   o <drive>:\oracle\TARGET_DBSID\saparch
   o <drive>:\oracle\TARGET_DBSID\oraarch
   o <drive>:\oracle\TARGET_DBSID\saptrace
   o <drive>:\oracle\TARGET_DBSID\saptrace\background
   o <drive>:\oracle\TARGET_DBSID\saptrace\usertrace
   o <drive>:\oracle\TARGET_DBSID\origlogA\cntrl
   o <drive>:\oracle\TARGET_DBSID\sapdatal\cntrl
   o <drive>:\oracle\TARGET_DBSID\saparch\cntrl
   o <drive>:\oracle\TARGET_DBSID\sapcheck

4. Make sure that the following directories are empty (except the subdirectory saparch/cntrl):
   o <drive>:\oracle\TARGET_DBSID\saparch
   o <drive>:\oracle\TARGET_DBSID\oraarch

5. Set the security settings for the built-in accounts and groups SYSTEM, Administrators, SAP_<SAPSID>_GlobalAdmin (domain installation), and SAP_<SAPSID>_LocalAdmin (local installation) for all directories as follows:
   a. In the Windows Explorer, right-click the Oracle root directory and choose Properties.
   c. Deselect Inherit from parent the permission entries....
   d. In the next dialog, choose Copy to copy the permission entries that were previously applied from the parent to this object.
   e. Choose OK.
   f. Set the permissions for the above-mentioned accounts SYSTEM, Administrators, SAP_<DBSID>_GlobalAdmin, or SAP_<DBSID>_LocalAdmin to Full Control.
   g. Delete all other accounts.
5.1.2.3 Restoring the 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 either by using an offline backup or by copying the listed files from the source directories to the target directories.

Directories on UNIX

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

Source: <INSTDIR>

Target: <SAPINST_INSTDIR>

Source: <INSTDIR>

Target: init<TARGET_DBSID>.ora

Directories on Windows

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

Source: <INSTDIR>

Target: <SAPINST_INSTDIR>

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

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

4. Make sure that the control files are not restored. If necessary, remove them. The file names are specified by the parameter control_files 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.

<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;&lt;DB_VERSION&gt;_&lt;BIT&gt;\database</td>
<td></td>
</tr>
</tbody>
</table>

2. Call the restore and recovery function of BR*Tools. If you follow these instructions, the prerequisites are fulfilled. The main prerequisite is that the corresponding BR*Tools logs (BRBACKUP detailed and summary log, BRARCHIVE summary log) are copied from the source to the target system. In addition, the postprocessing steps mentioned in the SAP Note 1003028 are covered during the standard system copy procedure. For more information about the execution of restore and recovery under the control of BRRECOVER and the exact syntax of BRRECOVER, see the section Homogeneous Database Copy in SAP Note 1003028. For more information about BR*Tools, see the SAP Library [page 20] 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 20], and then continue the navigation as described below.

3. Shut down the Oracle database instance as follows:

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

### 5.1.3 Creating a Backup

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

**Related Information**

Creating an Offline Backup [page 96]
Creating an Offline or Online Backup with BR*Tools [page 97]

#### 5.1.3.1 Creating an Offline Backup

Create an offline backup, if required. There are different possibilities for preparing the actual transfer of the database files:

- If you have an up-to-date offline backup, you can use it (provided that redo logs were cleaned up with forced log switches).
- If you want to transport the database file (for example, on tape) or if you have to perform the database shutdown at a certain time, stop the database (normal shutdown) and perform a complete offline backup. You can use the trace file `CONTROL.TRC` created by `OraBrCOPY` to determine the file system trees that have to be saved.
• 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 steps.

5.1.3.2 Creating an Offline or Online Backup with BR*Tools

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 [page 20] for your release at:

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 20], and then continue the navigation as described below.</td>
</tr>
</tbody>
</table>

- SAP NetWeaver for Banking Services from SAP:
- SAP NetWeaver Mobile 7.1 / 7.1 including Enhancement Package 1:
- SAP NetWeaver 7.3 and higher:
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 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: http://maxdb.sap.com/doc/7_6/default.htm
  Alternatively, you can use Database Studio. For more information, see: 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. 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, \textit{SAP<SAPSID>} – for example, \textit{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 \textit{single} file.

**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 47].

**Disadvantage**

You can only copy between systems with the \textit{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:

   \texttt{<Product> <Database> System Copy Target System <System Variant> <Technical Stack>}

2. When the installer prompts for the database copy method, choose \textit{Homogeneous System Copy}.

3. In the MaxDB Backup Template screen, choose one of the following, \textit{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
     1. Register your database instance in the DBMGUI
     2. 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.

**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, DBSTATATTADA, 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

4. After installation is completed, maintain the database connection for CCMS.
   For more information, see [SAP Note 588515](https://support.sap.com).

### 5.3 MS SQL Server-Specific Procedure

This section describes how to perform a homogeneous system copy of an MS SQL Server database by using the backup/restore method, or the detach/attach method in an SAP environment. The installer installation tool supports both methods.

**Context**

The backup/restore method and the detach/attach method have the following advantages compared to the R3load method:
- You can use an existing backup.
- These methods are much faster than the database-independent method [page 47].

**Note**

- For more information about the system copy procedure, see also [SAP Note 151603](https://support.sap.com).
- With SQL Server, you can use backup images across the Windows platforms x86, IA64, x64. That is, you can make a backup on one type of platform and use it on another type.
You can only attach database files from a lower SQL Server release to a higher one, but not the other way around.

Procedure

1. Detach the database files from the source system database or create a backup and copy the files to the target system.

For more information about backing up your SQL Server database, see the SAP Library [page 20] at:

i Note
Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

SAP Release and SAP Library Quick Link

- SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0
- SAP NetWeaver 7.1 including Enhancement Package 1 for Banking Services from SAP 5.0 and 6.0
- SAP NetWeaver Mobile 7.1
  http://help.sap.com/nwmobile71
- SAP NetWeaver Mobile 7.1 including Enhancement Package 1
  http://help.sap.com/nwmobile711

i Note
Since the SAP NetWeaver Mobile 7.1 Library is the only available SAP Library for ABAP systems based on SAP NetWeaver 7.1, in this guide we always refer to it also for SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0.
2. Attach the database files or restore the backup of the source database on the target database server.

3. Run the installer to install the target system as follows: by choosing the following on the Welcome screen:

   1. **Start the installer as described in** Exporting the Source System [page 60].

   2. **On the Welcome screen, run the options under**

      - Product
      - Database
      - System Copy
      - Target System
      - Distribution Option
      - Based on AS ABAP

   3. **Choose the installation options exactly in the order they appear.**

   4. **For more information, see the MS SQL Server installation guide for your SAP system at:**

      http://support.sap.com/sltoolset

      System Provisioning
      Installation Option of Software Provisioning Manager 1.0

4. **When the installer prompts for the database copy method, choose** Homogeneous System Copy.

Related Information

Running the Installer [page 63]

5.4 IBM Db2 for Linux, UNIX, and Windows-Specific Procedures

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

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

  Note
  For more information about cross-platform backups, also see Backup and restore operations between different operating systems and hardware platforms in the IBM Db2 Information Center at https://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.admin.ha.doc/doc/c0005960.html.

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

Context

  Note
  You can also create an SAP system copy with a Db2 database if more advanced techniques like file system snapshots are available. The necessary procedure in this case is called database relocation. The database relocation procedure differs significantly from the backup/restore procedure and is not described in this guide.

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

The installer is used for the installation on the target system host as described in the installation documentation for your SAP component. Before you start 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 installation guide [page 20].

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 47].

Disadvantages of the Backup Method

- You cannot change the name of the database schema. The name of the database schema is the same as that of the source system.
However, you can change the name of the connect user during the Define Parameters phase of the target system installation.

- You cannot copy an individual MCOD component to another system. You can only copy the complete system.

**Procedure**

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

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

   ![Product] > ![Database] > ![System Copy] > **Target System** > ![System_Variant] > ![Technical_Stack]

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

   **Caution**

   Be aware of the following constraints when using the backup method for a homogeneous system copy:
   - You cannot change the name of the database schema. During the dialog phase, make sure that you enter the database schema exactly as on your source system.
   - The tablespace names remain the same during the database restore. However, you can change them after the installation.
   - If you want to change the name or the location of the Db2 container on the target system, you have to adapt the Db2 container paths or names in the redirected restore script and then perform a redirected restore. For more information, see the documentation **Database Administration Guide: SAP on IBM Db2 for Linux, UNIX, and Windows**, section **Usage of Tool 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. For more information, see **Setting up partitioned database environments** in the IBM Db2 Information Center at: [http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.server.doc/doc/t0023605.html](http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.server.doc/doc/t0023605.html)

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 manual **Db2 Command Reference**.

   **Note**

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

This is the recommended method.

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


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

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

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.

**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)
  ```

System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.52 on Windows
For table IADB6, enter the following SQL command:

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

For table TADB6, enter the following SQL command:

```sql
update <connect_user_name>.tabdb6 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)
  - DFTDBPATH (DBM)
  - Path to log files (DB)
  - If set, NEWLOGPATH (DB), OVERFLOWLOGPATH (DB), FAILARCHPATH (DB) and MIRRORLOGPATH (DB)

### More Information

- IBM Knowledge Center at https://www.ibm.com/support/knowledgecenter/SSEPGG.

### 5.5 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 47].

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.

i 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 108]
2. Step 2: Consider DB2 Procedures of the Target System [page 109]
3. Step 3: Delete All Obsolete Objects of the Target System [page 109]
4. Step 4: Copy All Objects of the Source System into the Target System [page 110]
5. Step 5: Add All DB2 Subsystem Libraries to a PARMLIB Containing Definitions Required for APF [page 110]
6. Step 6: Alter the BSDS of the Target System [page 110]
7. Step 7: Change Entries of logcopy Data Sets in the BSDS of the Target System [page 110]
8. Step 8: Customize DB2 Modules Using DSNTIJUZ [page 111]
9. Step 9: Configure the Distributed Data Facility (DDF) [page 111]
10. Step 10: Start the Target System Using ACCESS(MAINT) [page 111]
11. Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 112]
12. Step 12: Stop and Restart the Target System [page 112]
13. Step 13: Create DSNTEP2 and DSNTEP4 Load Modules for the Target System [page 112]
14. Step 14: Alter All WLM Environments of Stored Procedures [page 112]
15. Step 15: Perform Post-Offline System Copy Actions (Optional) [page 113]

5.5.1 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:

```
SELECT 'ALTER PROCEDURE ' CONCAT
   SCHEMA CONCAT '.' CONCAT 'NAME CONCAT '''
   CONCAT 'WLM ENVIRONMENT ' CONCAT 'STRIP(WLM_ENVIRONMENT) 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 '''
   CONCAT 'WLM ENVIRONMENT ' CONCAT 'STRIP(WLM_ENVIRONMENT) CONCAT '''
FROM SYSIBM.SYSROUTINES
WHERE ROUTINETYPE='F'
   AND FENCED = 'Y';
```
5.5.2 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.

5.5.3 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 110] of this process flow.
5.5.4 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 ADRSSU.
   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.

5.5.5 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.

5.5.6 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.

5.5.7 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.
5.5.8 Step 8: Customize DB2 Modules Using DSNTIJUZ

For the target system you have to customize the DB2 data-only load module DSNHMCMID, 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 / 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.

5.5.9 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.

5.5.10 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 112] 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 112].

For data sharing systems, start the first member and continue with Step 11: Update the DB2 Catalog Using CATMAINT UPDATE VCAT SWITCH [page 112].
5.5.11 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.

5.5.12 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 112] if problems occur while the target system is being stopped or restarted.

5.5.13 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.

5.5.14 Step 14: Alter All WLM Environments of Stored Procedures

Use

In step 1 [page 108] 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.

**5.5.15 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 SYSIBM.SYSUERAUTH;
   ```
   Maintain this table according to your needs.
2. Grant new users or revoke obsolete users.
3. If required, change the user authorizations of the target system.
   The IBM Db2 catalog still contains the authorizations of the source system.

**5.6 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 `<Drive>:\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 47].

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:

   - Choose the installation services in exactly the order they appear. For more information, see the installation guide [page 20] for your SAP NetWeaver-based system on SAP ASE.
   - 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.
6 Copying Single Instances Only

If you want to copy single instances of your SAP system only, you can use one of the following procedures, depending on your use case.

⚠️ Caution
You **cannot** copy single product instances, usage types, or components!

Related Information

- Copying the Primary Application Server Instance Only [page 115]
- Copying the Database Only – Move Database Instance [page 116]
- Copying the Database Only – Refresh Database Instance [page 117]
- Copying the Database Only - Refresh Database Content [page 118]

6.1 Copying the Primary Application Server Instance Only

With this procedure, you can move a primary application server instance to a different host within your system.

Prerequisites

The ABAP central services instance (ASCS instance) is installed.

Procedure

1. Shut down all application servers.
2. Uninstall the old primary application server instance as described in the Additional Information section of the installation guide.
3. On your **target** host, start the installer as described in Running the Installer [page 63].
4. On the Welcome screen, navigate to the following folder according to the requirements of your target system:

   ```
   <Product> <Database> System Copy Target System Distributed System or High-Availability System Based on <Technical Stack> Primary Application Server Instance
   ```
5. After the installation has finished, restart all additional application server including the instance services.

6.2 Copying the Database Only – Move Database Instance

You can use this procedure to move a database instance to a different host within your system. You can perform the move using either database-specific methods or the SAP standard method based on R3load.

Context

“Move” means moving the database instance to a different host to refresh the database content.

If you only want to “refresh” the database content with the database instance staying on the same host, use either the procedure described in Copying the Database Only – Refresh Database Instance [page 117] or the procedure described in Copying the Database Only - Refresh Database Content [page 118]

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

Procedure

⚠️ Caution

- The <DBSID> must not be changed.
- When copying the database only, you cannot change to another database but need to perform a database-homogeneous copy.
- The old database instance cannot be uninstalled using the installer-based uninstall procedure. This always deletes the current database of the system.

1. On the source host, run the installer to perform the export in one of the following ways:
   - If you perform the export using R3load, on the Welcome screen, choose |<Product> |<Database> | System Copy | Source System | Based on AS ABAP | Database Instance Export | to export the database.
   - If you perform the export using database-specific tools, you must start them manually.
2. On the target host, stop all SAP application server instances, but leave the ASCS instance running.
3. On the target system, run the installer and choose |<Product> |<Database> | System Copy | Target System |<System_Variant> | Based on AS ABAP | Database Refresh or Move | to install the database.

ℹ️ Note

Since the target database instance is to replace the source database, do not change the <DBSID>.
4. When the installer has completed the installation of the database, restart your system including all instance services.

5. Shut down the old database instance.

6. **SAP MaxDB only**: Set up the xuser entries from the home directory of the users `<sapsid>adm` and `<SAPSID>SAPService` on each application server as follows:

   ```
   xuser -c <os_user> -U <key> -u <dbuser>,<password> -d <dbsid> -n <dbhost> -S SAPR3 -t 0 -I 0 set
   ```

   The required keys and dbusers are as follows:
   - Key `DEFAULT` with dbuser `<SAPSID>`
   - Key `c` with dbuser `control`
   - Key `w` with dbuser `supervia`

---

### Related Information

- **Running the Installer** [page 63]

### 6.3 Copying the Database Only – Refresh Database Instance

With this procedure you can refresh an existing database instance that is a new database instance is installed - without having to copy the primary application server instance and to reinstall additional applications servers. You can perform 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.
- You must prepare the kernel media and the RDBMS media as described in *Preparing the Installation Media* in the documentation Installation Guide - SAP Systems based on the Application Server ABAP Dual-Stack (ABAP+Java) on

#### Context

This procedure implies a “refresh of the database instance” using kernel and RDBMS media with the database instance staying on the same host.
If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to only refresh the database content using a database backup - that is without using kernel and RDBMS media, and without installing a new database instance - use the procedure described in Copying the Database Only - Refresh Database Content [page 118].

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

Procedure

1. On the source system, perform the export in one of the following ways:
   - If you perform the export using R3load, start the installer and on the Welcome screen choose <Product> <Database> System Copy Source System Based on AS ABAP Database Instance Export to export the database.
   - If you perform the export using database-specific tools, you must start them manually.

2. On the target host, stop all SAP application server instances, but leave the ASCS instance running.

3. Run the installer and choose <Product> <Database> System Copy Target System <System_Variant> Based on AS ABAP Database Refresh or Move to install the database.

IBM Db2 for Linux, UNIX, and Windows only: 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 Database Refresh or Move option by choosing to drop the schema on screen IBM Db2 for Linux, UNIX, and Windows - Drop Existing Schemas
   - Manually before you run the Database Refresh or Move option, as described in Deleting a Database Schema Manually [page 196].

Related Information

Running the Installer [page 63]

6.4 Copying the Database Only - Refresh Database Content

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 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.

**i Note**

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117]

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

**i Note**

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

**Related Information**

Copying the Database Only - Refresh Database Content on MS SQL Server [page 119]
Copying the Database Only - Refresh Database Content on SAP ASE [page 122]
Copying the Database Only - Refresh Database Content on IBM Db2 for Linux, UNIX, and Windows [page 125]
Copying the Database Only - Refresh Database Content on Oracle Database [page 128]
Copying the Database Only - Refresh Database Content on IBM Db2 for z/OS [page 130]
Copying the Database Only - Refresh Database Content on SAP MaxDB [page 132]

### 6.4.1 Copying the Database Only - Refresh Database Content on MS SQL Server

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. To refresh the content of an existing database you can use either database backups or a copy of the database device files of the SAP database.

**Prerequisites**

- The source system and the target system already exist.
- The version of the source and target database must match. It is not possible to use a target database version that is lower than the source database version.
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.

---

**Note**

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117].

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

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**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 60].
      2. On the Welcome screen, run option <Product> <Database> System Copy Source System 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 60].
      2. On the Welcome screen, run option Generic Options <Database> Refresh Database Content.
Using the Database-Specific Method

Procedure Using Database Backups

1. On the database host of the source system, create a full database backup.
   For more information about backing up your SQL Server database, see the SAP Library 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 20], and then continue the navigation as described below.

   SAP Release and SAP Library Quick Link

   - SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0
   - SAP NetWeaver 7.1 including Enhancement Package 1 for Banking Services from SAP 5.0 and 6.0

   SAP Library Path (Continued)

   - SAP NetWeaver Mobile 7.1
   - SAP NetWeaver Mobile 7.1 including Enhancement Package 1

   i Note

   Since the SAP NetWeaver Mobile 7.1 Library is the only available SAP Library for ABAP systems based on SAP NetWeaver 7.1, in this guide we always refer to it also for SAP NetWeaver 7.1 for Banking Services from SAP 5.0 and 6.0.

   SAP Release and SAP Library Quick Link

   - SAP NetWeaver 7.3
   - SAP NetWeaver 7.3 including Enhancement Package 1
   - SAP NetWeaver 7.4
   - SAP NetWeaver 7.5
   - SAP NetWeaver AS for ABAP 7.51 innovation package
     [https://help.sap.com/nw751abap](https://help.sap.com/nw751abap)
   - SAP NetWeaver AS for ABAP 7.52
     [https://help.sap.com/nw752abap](https://help.sap.com/nw752abap)


2. On the database host of the target system, proceed as follows:
   1. Stop all SAP application server instances, but leave the ASCS instance running.
   2. Drop the old SAP database on the target server and restore the backup of the source server. Make sure the name of the SAP database remains the same as before on the target database Server.
3. Refresh the database content as follows:
   1. Start the installer on the database host as described in Exporting the Source System [page 60].
   2. On the Welcome screen, run option Generic Options <Database> Refresh Database Content.

Procedure With Copying 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. Detach the database files and copy the files to the target database server.
   3. Attach the database again.
   4. Restart the SAP system.
2. On the database host of the target system, do the following:
   1. Stop all SAP application server instances, but leave the ASCS instance running.
   2. Drop the old SAP database on the target server and attach the source database. Make sure the name of the SAP database remains the same as before on the target database server.
   3. Refresh the database content as follows:
      1. Start the installer on the database host as described in Exporting the Source System [page 60].
      2. On the Welcome screen, run option Generic Options <Database> Refresh Database Content.

Next Steps

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 144].

Related Information

Running the Installer [page 63]
Follow-Up Activities [page 144]

6.4.2 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 7.3 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/Documentation.

- 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.

i Note

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117]

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

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 60].
   2. On the Welcome screen, run option → Product → Database → System Copy → Source System → 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 60].
      2. On the Welcome screen, run option → Generic Options → Database → 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 60].
      2. On the Welcome screen, run option → Generic Options → Database → 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 `<drive>:\sybase\<SAPSID>\sapdata_2` and `<drive>:\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 `<drive>:\sybase\<SAPSID>\sapdata_1` and `<drive>:\sybase\<SAPSID>\saplog_1`) to the newly created `sapdata` and `saplog` folders.

4. Also transfer the manifest file created on the source system to target system.

5. Verify that the OS user `syb<dbsid>` is able to read both the database device files and the manifest file.

6. Refresh the database content as follows:
   1. Start the installer on the database host as described in Exporting the Source System [page 60].
   2. On the Welcome screen, run option ➤ **Generic Options** ➤ **Database** ➤ **Refresh Database Content**

**Next Steps**

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 144].

**Related Information**

Running the Installer [page 63]
Follow-Up Activities [page 144]

**6.4.3 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.

**Note**

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117]

For more information, see [https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/](https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/)

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 60].
   2. On the Welcome screen, run option `System Copy > Source System > 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 60].
      2. On the Welcome screen, run option `Generic Options > Database > 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 196].

### 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.

   ```
   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 60].
      2. On the Welcome screen, run option [Generic Options] [Database] [Refresh Database Content]

      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 144].

Related Information

Running the Installer [page 63]
Deleting a Database Schema Manually [page 196]
Follow-Up Activities [page 144]

6.4.4 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 192].
- Make sure that you have the password for the DDIC user in client O00 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.

Note

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117]

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/

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 60].
      2. On the Welcome screen, run option <Product> <Database> System Copy Source System 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 60].
2. On the Welcome screen, run option \( Generic \) <Database> \( Refresh \) Database Content

## Using the Database Backup/Restore Method

Follow the procedure for Oracle backup/restore in Database-Specific System Copy [page 82] and the instructions in Oracle-Specific Procedure [page 84].

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 82] and the instructions in Oracle-Specific Procedure [page 84].
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 60].
      2. On the Welcome screen, run option \( Generic \) <Database> \( Refresh \) Database Content

## Next Steps

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 144].

## Related Information

Running the Installer [page 63]
Follow-Up Activities [page 144]

## 6.4.5 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.

**Note**

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117]

For more information, see https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/.

**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 60].
      2. On the Welcome screen, run option [Product] [Database] System Copy Source System 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 60].
      2. On the Welcome screen, run option [Generic Options] [Database] Refresh Database Content
Using the Database-Specific Method

1. Execute all steps as described in section IBM Db2 for z/OS Specific Procedures [page 106].
2. Refresh the database content as follows:
   1. Start the installer on the database host as described in Exporting the Source System [page 60].
   2. On the Welcome screen, run option Generic Options <Database> Refresh Database Content

Next Steps

Perform the follow-up activities for system copy.
For more information, see Follow-Up Activities [page 144].

Related Information

Running the Installer [page 63]
Follow-Up Activities [page 144]

6.4.6 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.

**Note**

If you want to “move” the database instance to a different host, use the procedure described in Copying the Database Only – Move Database Instance [page 116].

If you want to “refresh” the complete database instance - then you need kernel and RDBMS media to install a new database instance - use the procedure described in Copying the Database Only – Refresh Database Instance [page 117].

For more information, see [https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/](https://blogs.sap.com/2017/03/02/refresh-database-content-without-reinstalling-the-database-or-kernel-for-abap-systems/)

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 60].
   2. On the **Welcome** screen, run option **<Product> <Database> System Copy > Source System > 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 60].
   2. On the **Welcome** screen, run option **Generic Options > <Database> > Refresh Database Content**.

Using the Database Backup/Restore Method

On the source system, do the following:

Create Database Backup. If you want to import the content using the 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 98], 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 60].
   2. On the Welcome screen, run option ➤ Generic Options  ➤<Database>  ➤ Refresh Database Content

**Next Steps**

Perform the follow-up activities for system copy.

For more information, see Follow-Up Activities [page 144].

**Related Information**

Running the Installer [page 63]
SAP MaxDB-Specific Procedure [page 98]
Follow-Up Activities [page 144]
7 Database Migration Option Preparation

In this section, you can find the preparation steps for Database Migration Option (DMO) for Software Update Manager (SUM) with the currently supported target databases.

For more information about Database Migration Option (DMO) for Software Update Manager (SUM), see the documentation Upgrade Guide - Database Migration Option of Software Update Manager 1.0 SP<current number>/ 2.0 SP<current number> - Target Database: <Supported Database> at: https://support.sap.com/sltoolset System Maintenance Database Migration Option (DMO) with SUM 1.0 SP<current number>/ SUM 2.0 SP<current number> Guides for DMO with SUM 1.0 SP<current number>/ SUM 2.0 SP<current number>

⚠️ Caution
Creating the DMO target database with enabled SSL is not supported for SAP ASE. For an existing SAP System on SAP ASE, SSL can only be enabled by using either the Database Independent System Copy [page 47] or the SAP ASE Server-Specific Procedure [page 113] of Software Provisioning Manager 1.0.

Related Information

Preparing Target Database MS SQL Server [page 135]
Preparing Target Database SAP ASE [page 137]
Preparing Target Database IBM Db2 for Linux, UNIX, and Windows [page 139]
Preparing Target Database SAP MaxDB [page 141]
Preparing Target Database Oracle [page 142]

7.1 Preparing Target Database MS SQL Server

You use Software Provisioning Manager (the “installer” for short ) to prepare the target database MS SQL Server for the Software Update Manager (SUM) with Database Migration Option (DMO) run.

Prerequisites

- Make sure that you have successfully installed an MS SQL Server database and that the parameters are maintained accordingly. If you have to install the database and to maintain the parameters, follow the procedure below.
- You have downloaded and extracted the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive both on the source and on
the target host as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43].

⚠️ Caution

Make sure that both on the source and on the target host you use the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive for running the Software Provisioning Manager.

Do not use the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR because the Software Provisioning Manager version in this archive does not contain the Database Migration Option preparation.

Procedure

Use the Software Provisioning Manager (the “installer” for short) to install and configure the MS SQL Server database for the DMO scenario as follows:

1. Create the database sizing for the target database.
   a. Start the Software Provisioning Manager on an application server instance host of the source system.
      
      For more information, see Running the Installer [page 63]

   b. On the Welcome screen choose Generic Options SQL Server Preparations Database Migration Option Create Database Sizing.

      This option calculates appropriate database sizing and estimates the space requirements for the MS SQL Server target database in your DMO scenario.

2. Prepare the target database instance.
   a. Start the Software Provisioning Manager on the target database host.

      For more information, see Running the Installer [page 63]

   b. On the Welcome screen choose Generic Options SQL Server Preparations Database Migration Option Prepare Database Instance.

      This option configures an empty SAP NetWeaver-like target database and creates the database including logins, schema, and users for your DMO target system.

   c. Follow the instructions on the Software Provisioning Manager screens and provide the following information:
      
      ○ For the systems profile, provide the profile directory of the DMO source system.

      ○ For the SAP kernel, provide the installation kernel media of the SAP target system release.

      ○ For the SQL Server database, choose to create a new database with the same <DBSID> as the source system <DBSID>.

      ○ For the migration export, specify the Database Sizing Export directory that was created with the option Create Database Sizing.
Next Steps

After you have completed DMO preparation, you can run DMO as described in https://support.sap.com/slitoolset System Maintenance Database Migration Option (DMO) of SUM SP.<Number>.

Related Information

Running the Installer [page 63]

7.2 Preparing Target Database SAP ASE

You use Software Provisioning Manager (the “installer” for short) to prepare the target database SAP ASE for the Software Update Manager (SUM) with Database Migration Option (DMO) run.

⚠️ Caution

Creating the DMO target database with enabled SSL is not supported for SAP ASE. For an existing SAP System on SAP ASE, SSL can only be enabled by using either the Database Independent System Copy [page 47] or the SAP ASE Server-Specific Procedure [page 113] of Software Provisioning Manager 1.0.

Prerequisites

- Make sure that you have successfully installed a SAP ASE database and that the parameters are maintained accordingly. Once you have executed DMO Benchmarking Option or aborted a DMO run and want to restart from the beginning, delete all objects belonging to SAPSR3 in the database <SAPSID> within the SAP ASE database. For more information, see SAP Note 2523137.
- If you have to install the database and to maintain the parameters, follow the procedure below.
- You have downloaded and extracted the SWPM10SP<Support Package Number>_<Version Number>.SAR archive both on the source and on the target host as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43].

⚠️ Caution

Make sure that both on the source and on the target host you use the SWPM10SP<Support Package Number>_<Version Number>.SAR archive for running the Software Provisioning Manager.

Do not use the 70SWPM10SP<Support Package Number>_<Version Number>.SAR because the Software Provisioning Manager version in this archive does not contain the Database Migration Option preparation.
**Procedure**

Use the Software Provisioning Manager (the “installer” for short) to install and configure the SAP ASE Server database for the DMO scenario as follows:

1. Create the database sizing for the target database.
   a. Start the Software Provisioning Manager on an application server instance host of the source system.
      For more information, see Running the Installer [page 63]
   b. On the Welcome screen choose Generic Options ➔ SAP ASE ➔ Preparations ➔ Database Migration Option ➔ Create Database Sizing ➔.
      This option calculates appropriate database sizing and estimates the space requirements for the SAP ASE target database in your DMO scenario.

2. Prepare the target database instance.
   a. Start the Software Provisioning Manager on the target database host.
      For more information, see Running the Installer [page 63]
   b. On the Welcome screen choose Generic Options ➔ SAP ASE ➔ Preparations ➔ Database Migration Option ➔ Prepare Database Instance ➔
      This option configures an empty SAP NetWeaver-like target database and creates the database including logins, schema, and users for your DMO target system.
   c. Follow the instructions on the Software Provisioning Manager screens and provide the following information:
      - In the General Parameters screen, provide the profile directory of the DMO source system.
      - For SAP System ID (<SAPSID>) enter the same <SAPSID> as used within the source system.
        The Database ID <DBSID> must be the same as the <SAPSID>.
      - For the SAP kernel, provide the installation kernel media of the SAP target system release.
      - For the migration export, specify the Database Sizing Export directory that was created with the option Create Database Sizing.

**Next Steps**

After you have completed DMO preparation, you can run DMO as described in https://support.sap.com/sitoolset ➔ System Maintenance ➔ Database Migration Option (DMO) of SUM SP<Number> ➔.

**Related Information**

Running the Installer [page 63]
7.3 Preparing Target Database IBM Db2 for Linux, UNIX, and Windows

You use Software Provisioning Manager (the “installer” for short) to prepare the target database IBM Db2 for Linux, UNIX, and Windows for the Software Update Manager (SUM) with Database Migration Option (DMO) run.

Prerequisites

- You have downloaded and extracted the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive both on the source and on the target host as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43].

⚠️ Caution

Make sure that both on the source and on the target host you use the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive for running the Software Provisioning Manager.

Do not use the 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR because the Software Provisioning Manager version in this archive does not contain the Database Migration Option preparation.

- You have made yourself familiar with the installation parameters for the IBM Db2 for Linux, UNIX, and Windows database as listed in section Planning > Basic Installation Parameters > SAP System Database Parameters of the documentation Installation Guide - SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.5 on UNIX : IBM Db2 for Linux, UNIX, and Windows (see Accessing the Installation Guides [page 20]).

Procedure

Use Software Provisioning Manager (the “installer” for short) to install and configure the IBM Db2 for Linux, UNIX, and Windows database for the DMO scenario as follows:

1. Start the installer [page 63] on an application server instance host of the source system.

   On the Welcome screen, choose option Generic Options > IBM Db2 for Linux, UNIX, and Windows > Preparations > Database Migration Option > Create Database Sizing.

   This option calculates appropriate database sizing and estimates the space requirements for the target database IBM Db2 for Linux, UNIX, and Windows in your DMO scenario.

   Follow the instructions in the installer input screens and enter the required parameters.
2. Start the installer [page 63] on the DMO target host - this is the host where you want to migrate the IBM Db2 for Linux, UNIX, and Windows database.

On the Welcome screen, choose option Generic Options ➤ IBM Db2 for Linux, UNIX, and Windows ➤ Preparations ➤ Database Migration Option ➤ Prepare Database Instance.

This option configures an empty SAP NetWeaver-like target database and creates the database including logins, schema, and users for your DMO target system.

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

Next Steps

After you have completed DMO preparation, you can run DMO as described in https://support.sap.com/sitoolset ➤ System Maintenance ➤ Database Migration Option (DMO) of SUM SP<Number>.

Related Information

Running the Installer [page 63]
7.4 Preparing Target Database SAP MaxDB

You use Software Provisioning Manager (the “installer” for short) to prepare the target database SAP MaxDB for the Software Update Manager (SUM) with Database Migration Option (DMO) run.

Prerequisites

- Make sure that you have successfully installed a SAP MaxDB database using Software Provisioning Manager by following the procedure below.
- You have downloaded and extracted the `SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` archive both on the source and on the target host as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 43].

⚠️ Caution

Make sure that both on the source and on the target host you use the `SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` archive for running the Software Provisioning Manager.

Do not use the `70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` because the Software Provisioning Manager version in this archive does not contain the Database Migration Option preparation.

Procedure

Use the Software Provisioning Manager (the “installer” for short) to install and configure the SAP MaxDB Server database for the DMO scenario as follows:

1. Create the database sizing for the target database.
   - a. Start the Software Provisioning Manager on an application server instance host of the source system.
      
      For more information, see Running the Installer [page 63]
      
      b. On the Welcome screen choose Generic Options > MaxDB > Preparations > Database Migration Option > Create Database Sizing.
      
      This option calculates appropriate database sizing and estimates the space requirements for the SAP MaxDB target database in your DMO scenario.

2. Prepare the target database instance.
   - a. Start the Software Provisioning Manager on the target database host.
      
      For more information, see Running the Installer [page 63]
      
      b. On the Welcome screen choose Generic Options > MaxDB > Preparations > Database Migration Option > Prepare Database Instance.
This option configures an empty SAP NetWeaver-like target database and creates the database including logins, schema, and users for your DMO target system.

c. Follow the instructions on the Software Provisioning Manager screens and provide the following information:

- In the General SAP System Parameters screen, provide the profile directory of the DMO source system.
- For the Database ID (<DBSID>) enter the SAP MaxDB target database ID. You can choose any <DBSID> that is not among the reserved IDs listed in SAP Note 1979280.
- For the SAP kernel, provide the installation kernel media of the SAP target system release. For more information, see section Preparing the Installation Media the installation guide for your operating system and database at http://support.sap.com/sitoolset | System Provisioning | Installation Option | Guide for Systems Based on SAP NetWeaver 7.1 and Higher.
- For the migration export, specify the Database Sizing Export directory that was created with the option Create Database Sizing.

Next Steps

After you have completed DMO preparation, you can run DMO as described in https://support.sap.com/sitoolset | System Maintenance | Database Migration Option (DMO) of SUM SP<Number>.

Related Information

Running the Installer [page 63]

7.5 Preparing Target Database Oracle

Prepare the target database Oracle for the Software Update Manager (SUM) with Database Migration Option (DMO) run.

Prerequisites

Make sure that you have successfully installed an Oracle database using the installer by following the procedure below.
Context

Use the installer to install and configure the Oracle Server database for the DMO scenario as follows.

Procedure

1. Run the installer to install and configure the Oracle database for the DMO scenario.

2. On the Welcome screen choose ➤ Generic Options ➤ Oracle ➤ Preparations ➤ Database Migration Option.

3. Select Create Database Sizing. Execute this option on an application server of the source system.

   It calculates appropriate database sizing and estimates the space requirements for the target database Oracle in your DMO scenario.

4. Select Prepare Database Instance. Execute this option on the DMO target database host.

   It configures an empty SAP NetWeaver-like target database and creates the following for your DMO target system:
   - Database
   - oracle tablespaces
   - An empty SAP schema (default SAPSR3) and user

   Provide the following information:
   - In the General SAP System Parameters screen, provide the profile directory of the DMO source system.
   - For the Database ID (DBSID) enter the Oracle target database ID.
   - For the SAP kernel, provide the installation kernel media of the SAP target system release. For more information, see section Preparing the Installation Media the installation guide [page 20] for your operating system and database.
   - For the migration export, specify the Database Sizing Export directory that was created with the option Create Database Sizing.
   - In the DMO Tablespace Configuration screen, specify the DMO target release.

Example

Provide **752** for creating release-specific tablespace **PSAPSR3<Release>** if your target release is 752.
8 Follow-Up Activities

To finish the system copy of your SAP system, you have to perform follow-up activities in the source and target system.

**Note**

**SAP systems based on SAP NetWeaver 7.4 and higher only:** You can perform some of the ABAP system configuration tasks listed in this section in an automated way by using predefined task lists. For more information, see the installation and configuration guides for ABAP post-copy automation at [https://help.sap.com/viewer/p/ABAP_POST-COPY_AUTOMATION](https://help.sap.com/viewer/p/ABAP_POST-COPY_AUTOMATION).

**Related Information**

Performing Follow-Up Activities in the Source System [page 144]
Performing Follow-Up Activities in the Target System [page 144]

8.1 Performing Follow-Up Activities in the Source System

This section describes the follow-up steps that you have to perform in the source system after the target system installation has completed.

**Procedure**

1. Reschedule released jobs.
   
   If you stopped scheduling of released jobs and of jobs that must run periodically before you started the system copy procedure, release them again by running report BTCTRNS2. For more information, see General Technical Preparations [page 38].

2. Using CCMS, adapt your operation mode timetable to the original status (transaction SM37).

8.2 Performing Follow-Up Activities in the Target System

To complete the system copy process, you need to perform several follow-up activities on the target system.
8.2.1 Installing the SAP License Key

Once the installation of the target system is completed, 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.

For more information about ordering and installing the SAP license, see the SAP Library [page 20] for your release at:

**Note**

Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
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</thead>
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<tr>
<td>SAP NetWeaver 7.3</td>
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</tr>
<tr>
<td>SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td><img src="http://help.sap.com/nw731" alt="Function-Oriented View: English" /></td>
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<tr>
<td>SAP NetWeaver 7.4</td>
<td><img src="http://help.sap.com/nw74" alt="Solution Life Cycle Management" /></td>
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<td>SAP NetWeaver 7.5</td>
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<td>SAP NetWeaver Application Server for ABAP 7.51 innovation package</td>
<td><img src="https://help.sap.com/nw751abap" alt="Solution Life Cycle Management" /></td>
</tr>
<tr>
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<td><img src="https://help.sap.com/nw752abap" alt="SAP Licenses" /></td>
</tr>
</tbody>
</table>

**More Information**

For more information about how to order permanent SAP license keys, see [https://support.sap.com/licensekey](https://support.sap.com/licensekey).
8.2.2 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.

8.2.3 Performing Follow-Up Activities for ABAP

8.2.3.1 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 operating system files (for example, _netrc, Rhosts).
8. Check operating system printers.
9. 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.
10. Oracle only: Adapt the database profiles init<SAPSID>.ora, init<SAPSID>.dba, and init<SAPSID>.sap.

8.2.3.2 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. Delete all entries from the following tables: ALCONSEG, ALSYSTEMS, DBSNP, MONI, OSMON, PAHI, SDBAD, SDBAP, SDBAR.
4. Delete entries in the table DDLOG for buffer synchronization.
5. Oracle Database only:
   a. Delete all entries from the following tables:
      DBSTATHORA, DBSTAIHORA, DBSTATIORA, DBSTATTORA.
   b. Delete the user OPS$<SOURCE_SAPSID>ADM (if existing).
   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:

      \texttt{alter database rename global\_name to <NEW\_DBSID>;}\n
      If the parameter does not exist on your system, ignore this step.
6. 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.
7. 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 192].
8.2.3.3 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**

   Update the `PATH` value `<Drive>:\usr\sap\<SAPSID>\SYS\exe\nuc\ntx86_64` to `<Drive>:\usr\sap\<SAPSID>\SYS\exe\uc\ntx86_64`.

2. Run an installation check (transaction SM28).
3. Delete all entries from the tables TPFET and TPFHT (transaction SE14).

   These tables contain information about changes made to the profile of your source system.
4. Import the system profiles into the database (transaction RZ10).
5. If you changed the SAP system ID during the system copy, delete all entries from table TLOCK, which holds the repair requests from your source system.
6. Maintain the operation modes.
   a. Create new operation modes and instance definitions (transaction RZ04).
   b. Maintain the time table using the new operation modes (transaction SM63).
   c. Delete the old operation modes and old instance definitions.
7. Adapt other CCMS settings (for example, alert thresholds, reorganization parameters of CCMS table MON1) if required.
8. 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.
9. Define or remove the SAP system users and revise the authorizations of the system users: **Tools > Administration > User maintenance > Users** (transaction SU01).
10. Synchronize the buffers as described in SAP Note 36283 and adapt the client information for the logical system.

11. Configure the spool server.
   a. Adapt the definition of the printers to meet the new system requirements (transaction SPAD):
      - Device types and character set definitions
      - Spool server
      - Output management systems (OMS)
   b. Delete obsolete spool requests and spool inconsistencies while executing the ABAP program RSP00041 (transaction SE38).
   c. Call transaction SP12 and run report RSP01043 for a spool data consistency check.
      For more information, see SAP Notes 98065 and 48400.

12. Configure batch jobs.
   a. Delete canceled and finished batch jobs while executing the RSBTCDEL ABAP program, selecting Delete with forced mode (transaction SE38).
   b. Adapt all jobs needed in the target system.

13. If you have used the DBA Calendar in the source system, redefine database actions (backup, update statistics, and so on) (transaction DB13).

14. Maintain the security configuration.
   a. Call transaction STRUST.
   b. Replace all existing PSE files in the target system with new ones, which contain the new system’s information.
      For more information, see the SAP Library [page 20] for the SAP NetWeaver release your SAP system is based on at:

      SAP NetWeaver for Banking Services from SAP:
      - Function-Oriented View ➔ Security ➔ System Security ➔ System Security for SAP NetWeaver AS ABAP Only ➔ Trust Manager ➔ Creating PSEs and Maintaining the PSE Infrastructure ➔ Creating or Replacing a PSE
      - SAP NetWeaver Mobile 7.1 / 7.1 including Enhancement Package 1:
      - SAP NetWeaver 7.3 and higher:
      - Security ➔ System Security ➔ System Security for SAP NetWeaver AS ABAP Only ➔ Trust Manager ➔ Creating PSEs and Maintaining the PSE Infrastructure ➔ Creating or Replacing a PSE

      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
15. Adapt RFC server groups.
   Call transaction RZ12 and change the instance name of RFC server groups under Group assignment.

16. Adapt RFC destinations copied from the source system to the target system.

   **Caution**
   Before you delete RFC destinations, make sure that they are not needed in the target system.

   a. To check and adapt qRFC destination, call transaction SMQR.
   b. To check and adapt tRFC destination, call transaction SM58.
   c. To delete obsolete RFC destinations, call transaction SM59.

17. Check the ABAP Secure Store [page 152]

18. Configure the Transport Management System (TMS).

   a. Reschedule the transport dispatcher (RDDIMPDP) in client 000:
      1. Log on as user DDIC.
      2. Call transaction SE38.
      3. Run program RDDNEWPP and set the priority to high.

   b. Adapt the transport parameters and transport routes in the TMS as follows:
      1. Call transaction STMS.
      2. To adapt the transport parameters, choose ▶️ Overview ▶️ Systems ▶️ <your system> ▶️ Transport Tool ▶️
      3. To adapt the transport routes, choose ▶️ Overview ▶️ Transport Routes ▶️
      4. Configure the domain controller in the Transport Management System (TMS) by using transaction STMS.

   **Note**
   If you did not change the SAP system ID during the system copy, all open transport, repair, and customizing requests that have not been released in the source system will not be released automatically.

19. 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 Constraints [page 18] and the SAP Library [page 20] for your release at:
20. Check self-defined external commands (transaction SM69).

21. Check the logical system names. For more information, see Preparations [page 38]. 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 only:** If you have copied an SAP BW system, see SAP Note 886102.

22. 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).

23. Check if you can delete clients that are no longer used in the target system (transaction SCC5).

24. Check the contexts and segments of remote application servers for the SAP Monitoring Infrastructure if required (transaction RZ21).

25. 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.

26. **BW only:** Start program RS_BW_POST_MIGRATION in the background. Program RS_BW_POST_MIGRATION performs necessary modifications on database-specific objects (mainly BW objects).

   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.

   **Relevant for IBM Db2 for Linux, UNIX, and Windows (IBM Db2) version 10.5 and higher only:** If you want to implement DB2 BLU Acceleration on your migrated SAP BW system, also follow the instructions in the appendix of the database administration guide SAP Business Warehouse on IBM Db2 for Linux, UNIX, and Windows: Administration Tasks, available at https://help.sap.com/viewer/db6_admin.

27. Generate the ABAP load.

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.

---

**Note**

Make sure that you have sufficient space available on your database. The generation of all existing objects requires about 2 to 9 GB of free space.
For a detailed description about how to generate the ABAP load, call transaction SGEN and choose "Information about the SAP Load Generator".

**Related Information**

Checking the ABAP Secure Store [page 152]

### 8.2.3.3.1 Checking the ABAP Secure Store

**Procedure**

1. Start transaction SECSTORE.
2. Choose Check Entries and Execute.
3. Filter the result by error messages.

   Depending on the SAP NetWeaver release your SAP system is based on, you have to proceed in one of the following ways:

   - **Your SAP system is based on an SAP NetWeaver release lower than 7.40:**
     - 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 [page 20] for your release at:

          ![Note]
          
          Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

          ![Function-Oriented View](Security > System Security > System Security for SAP NetWeaver AS ABAP Only > Secure Storage (ABAP) > Importing Keys after a System Copy)

   - **Your SAP system is based on SAP NetWeaver 7.40 or higher:**
     - If you see at least one error message of type `SECSTORE 089 ("Key ... for entry ... is missing in the secure storage in the file system")`, proceed as follows:
       1. Reimport encryption keys that were used in the source system and stored in the secure storage in the file system.
You can find information about this process in the SAP Library [page 20] for your release at:

i Note
Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.


2. Repeat the check.
   ○ If you see at least one error message of type SECSTORE 030 (“Incorrect global key for entry …”), you need to restore a legacy key-file that was used in the source system.
   You can find information about this process in the SAP Library [page 20] for your release at:

i Note
Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], and then continue the navigation as described below.

   ○ If you see at least one error message of type SECSTORE 031 (“System-dependent data for entry … changed: …”), you must perform a record migration.
   You can find information about this process in SAP Note 816861.

8.2.3.4 Product-Specific Follow-Up Activities

Related Information

Business Warehouse (BW) Specific Follow-Up Activities [page 154]
Embedded Search [page 154]
8.2.3.4.1 Business Warehouse (BW) Specific Follow-Up Activities

This section provides references to documentation describing how to perform BW-specific follow-up activities. Perform the BW-specific follow-up activities as described at:


8.2.3.4.2 Embedded Search

This section includes the steps that you have to perform to connect TREX with the ABAP target system.

\[\text{i Note}\]
Valid for SAP NetWeaver 7.3 and higher.

Prerequisites

You have applied SAP Note 1293026.

Procedure

1. To establish the connection between TREX and the ABAP target server, run the script configureTrexRfcConnection.py on the host where TREX is installed.

2. On the ABAP server, perform the following steps:
   a. To delete copied search object connectors, call transaction SE38. Run the report ESH_ADM_INDEX_ALL_SC with option Delete.
   b. Call transaction SE16 to find out the TREX destination from table ESH_ADM_TREX.
   c. Call transaction SM59 to delete the program ID of the TREX destination. TREX retrieves the correct new program ID automatically.

\[\text{i Note}\]
If you have applied SAP Note 1303185, program ESH_ADM_INDEX_ALL_SC automatically deletes the program ID of the TREX destination.

   d. Create new search object connectors.
   For more information, see the SAP Library [page 20] for your release at:
8.2.3.5  Checking the Target System

The following actions are required 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. FI customers: Run the job SAPFI90 (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).
6. FI customers: Run the jobs RFUMSV00 (tax on sales/purchases), RAGITT01 (asset history sheet), RAZUGA01 (asset acquisitions), and RAABGA01 (fixed asset retirements) and compare the results to those gained on the source system before the system copy.
7. CO customers: Run the report group 1SIP and compare the results to those gained on the source system before the system copy.

8.2.4  Checking the Database Parameters for IBM Db2 for Linux, UNIX, and Windows

**Use**

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**iNote**

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 20], and then continue the navigation as described below.

Search ➤ Search Services in SAP NetWeaver AS ABAP ➤ Embedded Search ➤ Setting Up Embedded Search ➤ Creating Connectors ➤
After installation has completed, make sure that you check the parameters of the database configuration and of the database manager configuration. A check of the database parameters ensures that your database parameters conform with the latest SAP recommendations where necessary and are adapted to your needs.

Procedure

You can check the parameters of the database in one of the following ways:

- Compare the current parameters of your database with the parameters as they are recommended for SAP systems in the following SAP Notes:

<table>
<thead>
<tr>
<th>Database Version</th>
<th>Corresponding SAP Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 V9.7</td>
<td>1329179</td>
</tr>
<tr>
<td>IBM Db2 10.1</td>
<td>1692571</td>
</tr>
<tr>
<td>IBM Db2 10.5</td>
<td>1851832</td>
</tr>
<tr>
<td>IBM Db2 11.1</td>
<td>2303771</td>
</tr>
</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 204].
9 Additional Information

Related Information

R3load Procedures Using the Migration Monitor [page 157]
Analysis of the Export and Import Times [page 182]
Table Comparison with Software Update Manager [page 183]
Using the Package Splitter [page 187]
Additional Information about the OraBRCopy Tool [page 199]
Using PowerShell [page 201]
Online Information from SAP [page 204]

9.1 R3load Procedures Using the Migration Monitor

This section contains user documentation about the Migration Monitor system copy tool.

About the Migration Monitor [page 158]
This section lists the functions and features of the Migration Monitor.

Configuration [page 159]

Assigning DDL Files to Packages [page 173]
Defining Groups of Packages [page 173]
Processing Split Tables [page 174]
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 176]

Using the migmonCtrl Add-On for the Export [page 180]

Output Files [page 181]
9.1.1 About the Migration Monitor

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

Purpose

The Migration Monitor does the following:

- Creates R3load command files
- Creates R3load task files if required
- Starts R3load processes to unload the data
- Transfers packages from source to target host if required
- Starts R3load processes to load data as soon as a package is available
- Informs the person performing the system copy in the event of errors

Note

An up-to-date version of the load tools - such as R3load, R3szchk, R3ldctl, SAPuptool - which were available so far only in the SAPEXEDB.SAR archive of the kernel media, has now been made available in the Software Provisioning Manager archive (SWPM10SP<Support_Package_Number>_<Version_Number>.SAR), in a sub-archive named LOADTOOLS.SAR, located in the COMMON/LOADTOOLS folder. For a system copy using kernel version 7.40 or higher, the load tools from the SWPM10SP<Support_Package_Number>_<Version_Number>.SAR are used automatically instead of the loadtools available in the SAPEXEDB.SAR archive of the kernel media. There is no action required from your side, the installer uses the relevant loadtools automatically once you run it from the extracted SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive.

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 176].

When you start the Migration Monitor manually:

- You can adjust any parameters. For more information, see Configuration [page 159].
- You gain flexibility – for example, you can repeat, test and abort runs of the Migration Monitor.
- The process becomes more complex since it requires many additional manual activities.
- The properties file has to be created manually.
→ Recommendation

Reuse an existing properties file from previous runs of software provisioning manager as template.

Tool

The tool is located in the MIGMON.SAR SAPCAR archive. The archive file contains the following:

- **Scripts:**
  - export_monitor.sh/export_monitor.bat
  - import_monitor.sh/import_monitor.bat
  - res_check.sh/res_check.bat
  - import_dirs.sh/import_dirs.bat

- **jar archives:**
  - migmon.jar
  - rescheck.jar
  - activation.jar
  - mail.jar

- **Property files:**
  - export_monitor_cmd.properties
  - import_monitor_cmd.properties

- **migmonCtrl add-on:**
  - **Scripts**
    - dyn_control_export_monitor.sh/dyn_control_export_monitor.bat
    - dyn_control_import_monitor.sh/dyn_control_import_monitor.bat
  - **jar archives**
    - migmonctrl.jar
  - **Property files:**
    - migmonctrl_cmd.properties

Prerequisites

The correct directory structure for R3load dump files must exist on both the source and target hosts.

9.1.2 Configuration

The following options can be specified using the property file or using the command line. Command line parameters take precedence over parameters specified in the property file. Options are case-sensitive, that is, options that are not recognized are ignored.
Help

With the following command line options, the tool displays all parameters available: `-help`, `-?`

Version

With the following command line option, the tool displays version information: `-version`

General Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>monitorTimeout</td>
<td>Monitor timeout in seconds</td>
<td>During a timeout, the monitor thread sleeps and does not analyze any files or analyze its processing state. The default timeout value is 30 seconds.</td>
</tr>
</tbody>
</table>

E-Mail Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>mailServer</td>
<td>SMTP server</td>
<td>Server name or IP address of the company SMTP server</td>
</tr>
<tr>
<td>mailFrom</td>
<td>“From” e-mail address</td>
<td>-</td>
</tr>
<tr>
<td>mailTo</td>
<td>“To” e-mail address</td>
<td>Can contain an address list separated by “;” or blanks.</td>
</tr>
</tbody>
</table>

Additional Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>bg</td>
<td>Enables background mode</td>
<td>Takes effect only as command line option</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the tool is running in background mode, the UNIX shell windows or Windows command prompt can be closed after startup.</td>
</tr>
</tbody>
</table>
### Export Monitor – Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>installDir</code></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>
<tr>
<td><code>exportDirs</code></td>
<td>List of export directories</td>
<td>Separator on Windows: “;” &lt;br&gt;Separator on UNIX, IBM i: “:” &lt;br&gt;The <code>exportDirs</code> parameter points to the directory where the <code>R3load</code> dump files are written. In the <code>exportDirs</code> directory, the subdirectories DATA, DB, and DB/<code>&lt;TARGET_DBTYPE&gt;</code> must exist.</td>
</tr>
<tr>
<td><code>client</code></td>
<td>Client operating mode</td>
<td>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.</td>
</tr>
<tr>
<td><code>server</code></td>
<td>Server operating mode</td>
<td>Running in server mode means that the Migration Monitor creates <code>R3load TSK</code> files (if necessary), <code>R3load cmd</code> files, and starts the <code>R3load</code> processes.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>orderBy</td>
<td>Package order</td>
<td>Can be the name or path of the file that contains package names. If the option value is omitted, package order is not determined.</td>
</tr>
<tr>
<td>ddlFile</td>
<td>DDL control file</td>
<td>Path or filename of DDL control file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The default is <code>DDL&lt;DBTYPE&gt;.TPL</code>. If the filename is used without a path, the DDL control file from the export DB subdirectory is used.</td>
</tr>
<tr>
<td>ddlMap</td>
<td>DDL mapping file</td>
<td>File with mapping between DDL files and package names</td>
</tr>
<tr>
<td>r3loadExe</td>
<td>Path of the R3load executable</td>
<td>Optional; default is <code>R3load</code>. If only the name of the R3load executable is available, the JVM looks for the R3load executable using operating system-specific process search rules.</td>
</tr>
<tr>
<td>tskFiles</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>dataCodepage</td>
<td>Code page for data files</td>
<td>See SAP Note 552464. Possible values: 4102, 4103, 1100</td>
</tr>
<tr>
<td>taskArgs</td>
<td>Additional R3load arguments for the TASK phase</td>
<td>Appended to the R3load command line. Options already set by the monitor: <code>-ctf; -l</code></td>
</tr>
<tr>
<td>loadArgs</td>
<td>Additional R3load arguments for the LOAD phase</td>
<td>Appended to the R3load command line. Options already set by the monitor: <code>-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)</code>.</td>
</tr>
<tr>
<td>jobNum</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>decluster</td>
<td>Default value is false</td>
<td>Possible values: <code>true</code> or <code>false</code>. If this option is true, the Migration Monitor calls R3load with option <code>-decluster</code>.</td>
</tr>
</tbody>
</table>

All options below are for server mode. The import monitor always runs in server mode. If you want to run the export monitor in server mode, specify the `server` parameter in the properties file of the export monitor.
### Network Exchange Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>firstExportSAPNTAB</strong></td>
<td>Default values is <strong>false</strong></td>
<td>Possible values: <strong>true</strong> or <strong>false</strong>&lt;br&gt; If this option is true, the Migration Monitor first exports the <strong>SAPNTAB</strong> package in single thread mode.</td>
</tr>
<tr>
<td><strong>onlyProcessOrderBy</strong></td>
<td></td>
<td>If set to <strong>true</strong> only the jobs from file configured with <strong>orderBy</strong> 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>
<tr>
<td><strong>netExchangeDir</strong></td>
<td>Network exchange directory</td>
<td><strong>⚠️ Caution</strong>&lt;br&gt; Clean up the <strong>netExchangeDir</strong> before starting a new export. Used for communication between the export and import monitors. Must be writable for the export monitor and readable for the import monitor. The export monitor writes a <code>&lt;Package&gt;.SGN</code> file to the network exchange directory as a signal to the import monitor that the package has been exported successfully and that the import can be started.</td>
</tr>
</tbody>
</table>

**FTP Exchange Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ftp</strong></td>
<td>FTP operating mode</td>
<td>Exported dump files are transferred automatically from the source host (directory <strong>exportDirs</strong>) to the target host (directory <strong>importDirs</strong>) using FTP.</td>
</tr>
<tr>
<td><strong>ftpHost</strong></td>
<td>Remote FTP host</td>
<td>Name or IP address of the import server</td>
</tr>
<tr>
<td><strong>ftpUser</strong></td>
<td>Name of the remote FTP user</td>
<td>The FTP user specified here 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>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ftpPassword</td>
<td>Password of the remote FTP user</td>
<td>! Caution Security risk. For more information, see the secure parameter in section Additional Options.</td>
</tr>
<tr>
<td>ftpExportDirs</td>
<td>List of remote FTP directories for export dump</td>
<td>Both “;” and “:” separators are valid. This is the directory on the target host to which the dump is transferred. The value is the same as for 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Must be writable for the export monitor and readable for the import monitor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The export monitor writes a <code>&lt;Package&gt;.SGN</code> file to the FTP exchange directory as a signal for the import monitor that the package is exported successfully and that the import can be started.</td>
</tr>
<tr>
<td>ftpJobNum</td>
<td>Number of parallel FTP jobs; the default is 1.</td>
<td>Any positive number; 0 for an unlimited number of jobs. 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>R3load 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 1024 to 65535.</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 R3lctl and R3szchk are transferred from the source to the target host using FTP.</td>
</tr>
</tbody>
</table>
| exportDirs | List of export directories         | Separator on Windows: “;”  
Separater on UNIX, IBM i: “:”  
In the exportDirs directory, the subdirectories DATA, DB, and DB/<TARGET_DBTYPE> (for example, DB/OR0) 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.

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>
<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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the same format as the <code>order_by</code> file, which you can create manually.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If it is created by the add-on, the file has two groups called</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LARGE and SMALL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depending on the sort order (size or runtime), the packages are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>listed from <strong>biggest/longest tosmallest/shortest</strong> in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>group <strong>LARGE</strong> and from smallest to biggest in group <strong>SMALL</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Therefore the biggest and smallest packages are exported together.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This ensures that the biggest tables are exported right from the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>beginning but also that input is provided to the import side by</td>
</tr>
<tr>
<td></td>
<td></td>
<td>exporting the smallest table.</td>
</tr>
<tr>
<td>jobNumLarge</td>
<td>Amount of jobs set in</td>
<td>The number can be changed during runtime.</td>
</tr>
<tr>
<td></td>
<td>group <strong>LARGE</strong></td>
<td></td>
</tr>
<tr>
<td>jobNumSmall</td>
<td>Amount of jobs set in</td>
<td>The number can be changed during runtime.</td>
</tr>
<tr>
<td></td>
<td>group <strong>SMALL</strong></td>
<td>To keep up the number of <code>jobNumLarge + jobNumSmall</code>,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>packages from group <strong>LARGE</strong> are moved into group <strong>SMALL</strong> when the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>number of unprocessed packages in group <strong>SMALL</strong> becomes smaller than</td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>jobNumSmall</code>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In addition to that, <code>jobNumSmall</code> is increased when the number of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unprocessed packages in group <strong>LARGE</strong> becomes smaller than <code>jobNumLarge</code>.</td>
</tr>
<tr>
<td>customSortOrderFile</td>
<td>-</td>
<td>If certain jobs need to be exported right from the start, they can</td>
</tr>
<tr>
<td></td>
<td></td>
<td>be configured in this file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>SAPAPPL0_24_1_REPOSRC T100 /BIC/MYBWTABLE</code></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 <strong>EXT</strong> files</td>
<td>Mandatory if the export is to be sorted by size</td>
</tr>
<tr>
<td></td>
<td>generated by <strong>R3szchk</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Export by Runtime

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>exportTimeFile</strong></td>
<td>Absolute path of file <strong>export_time.txt</strong> created by migtime.jar</td>
<td>Mandatory if the export is to be sorted by runtime</td>
</tr>
<tr>
<td><strong>importTop</strong></td>
<td>Amount of analyzed packages used from file <strong>import_time.txt</strong></td>
<td>Can only be used if parameter <strong>importTimeFile</strong> is set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For parallel export/import, long running jobs on the import side need to be exported first.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The <strong>importTop</strong> option adds the long running jobs on top of group <strong>LARGE</strong>.</td>
</tr>
<tr>
<td><strong>importTimeFile</strong></td>
<td>Absolute path of file <strong>import_time.txt</strong> created by migtime.jar</td>
<td>Optional</td>
</tr>
</tbody>
</table>

### Package Filter Files

With package filter files you can distribute the export over several servers. To use this feature you have to create the filter files first. This requires a separate run of the migration monitor. For this you can temporarily add the following options to the **export_monitor_cmd.properties** file or simply add them to the command line.

#### Creating Package Filter Files

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>createPackageFilter</strong></td>
<td>Needs to be set to create package filter files.</td>
<td></td>
</tr>
<tr>
<td><strong>excludePackage</strong></td>
<td>Comma separated string</td>
<td>Packages that must not be included in the filter file</td>
</tr>
<tr>
<td><strong>outputFile</strong></td>
<td><strong>package_list_%hostName_.txt</strong></td>
<td>Location and name of result files</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%hostName% is replaced with the actual name of the host.</td>
</tr>
<tr>
<td><strong>hostNames</strong></td>
<td>Comma separated string</td>
<td>The names are only used for the file name: <strong>&lt;outputFile&gt;_&lt;hostName&gt;.txt</strong></td>
</tr>
</tbody>
</table>
Using Package Filter Files

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>onlyProcessOrderBy</td>
<td>-</td>
<td>If this option is set to true, only the jobs from orderBy file are processed.</td>
</tr>
<tr>
<td>packageFilter</td>
<td>package_list_%hostName%.txt</td>
<td>File that contains packages used for the export. This can be used if the export is to be executed on multiple hosts.</td>
</tr>
<tr>
<td>netStatisticsFile</td>
<td>package_filter_%hostName%.statistics</td>
<td>If parallel export/import is chosen, this file is created when the Migration Monitor has finished all jobs from the package list.</td>
</tr>
</tbody>
</table>

Mandatory Options for the Export Monitor

- Client mode:
  installDir, exportDirs.
  one of the options ftp, net (and their related parameters)

- Server mode:
  installDir, exportDirs, tskFiles.
  one of the options ftp, net, socket (and their related parameters)

- 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

<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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When you run the Migration Monitor without using the installation tools, the installation directory is the directory where the R3load TSK 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 executables | 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</td>
<td>to include EXT files; Add EXT file entries to cmd files.</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>to skip them</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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></td>
<td>-omit D: omit data; do not load data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit T: omit tables; do not create tables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit P: omit primary keys; do not create primary keys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit I: omit indexes; do not create indexes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit V: omit views; do not create views</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit A: omit AMDPs; do not create ABAP managed procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit F: omit flexible objects; do not create flexible objects (database functions, database filter rules, session variables)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit L: omit flexible indexes; do not create flexible indexes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-omit U: omit unload; do not unload table after data load</td>
</tr>
<tr>
<td></td>
<td></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></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>
</tr>
<tr>
<td></td>
<td></td>
<td>-include &lt;task-type-list&gt;</td>
</tr>
<tr>
<td></td>
<td></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 R3load arguments for the TASK phase</td>
<td>Appended to the R3load command line&lt;br&gt;The following options are already set by the monitor:&lt;br&gt;(-ctf; -l; -o) (if the omit argument is specified).</td>
</tr>
<tr>
<td>loadArgs</td>
<td>Additional R3load arguments for the LOAD phase</td>
<td>Appended to the R3load command line&lt;br&gt;The following options are already used by the monitor:&lt;br&gt;(-i; -dbcodpage; -l; -p; -k; -r; -socket) (if the socket option is specified);&lt;br&gt;(-o) (if the omit argument is specified and task files are not used, that is, the value of tskFiles option is no).</td>
</tr>
<tr>
<td>jobNum</td>
<td>Number of parallel import jobs; the default is 1.</td>
<td>Any positive number; 0 for an unlimited number of jobs&lt;br&gt;You can change the value dynamically at runtime.</td>
</tr>
<tr>
<td>decluster</td>
<td>(use this option only for target dbType = HDB)</td>
<td>Possible values: true or false.&lt;br&gt;If this option is true – migmon calls R3laod with option – decluster.</td>
</tr>
<tr>
<td>ignorePackageSizeCalculation</td>
<td>Default is false</td>
<td>Possible values: true or false.&lt;br&gt;Use this option if you see performance issue in the time before starting the first import jobs. The first task of the Migration Monitor is to collect all packages that are mentioned in the table line for the importDirs parameter.&lt;br&gt;In this first step, called CollectPackages, the Migration Monitor also calculates the package size. If the packages are spread over many mounted locations this can take some time. To improve the performance of the CollectPackages step, set this option to true. Later the packages are imported without following ”size ordering” of packages. Use this option only if there is a big delay during the start of the first import jobs.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>collectLogicalPackages</td>
<td>Default is false</td>
<td>Possible values: true or false Import Migration Monitor is extended with this option for processing “logical” packages. To one standard package corresponds either one STR or one WHR file (for example, SAPAPPL1.STR, REPOSRC-1.WHR). To one “logical” package corresponds either one STR.logical or one WHR.logical file (for example SAPCLU4.STR.logical, SAPCDCLS-1.WHR.logical). The logical packages are located in the same directory where the standard packages are located, for example importDirs/ABAP/DATA. Set this option to true if an import is running on SAP HANA database (HDB) and an export was run with the decluster=true option.</td>
</tr>
</tbody>
</table>

**Import Exchange Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>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). 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)
- Standalone mode:
  installDir, importDirs, tskFiles, extFiles
- IBM i-specific:
  loadArgs= -nojournal

Note
The value of the dbType option is determined automatically in the shell script or batch files from the dbms_type environment variable.

9.1.3 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

```text
# 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/DDLORA.TPL # package names SAPAPPL0
SAPAPPL1 SAPSDIC [ UNSORTED UNLOAD ] DDL file for unsorted unload ddlFile = ./
DDLORA_LRG.TPL # table names TABLE_A TABLE_B TABLE_C
```

9.1.4 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
```

9.1.5 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
- MS SQL Server 2008 or lower
  Parallel data import is supported as of MS SQL Server 2008 R2

You can ensure this by using the Defining Groups of Packages [page 173] 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
```

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 75).
5. Restart the import.

### 9.1.6 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 159]**. 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><code>&lt;export dump dir&gt;/DATA</code></td>
<td>Contains the <strong>STR</strong> files generated by R3ldctl</td>
</tr>
<tr>
<td><code>&lt;export dump dir&gt;/DB</code></td>
<td>Contains the <strong>DDL&lt;DBTYPE&gt;.TPL</strong> files generated by R3ldctl</td>
</tr>
<tr>
<td><code>&lt;export dump dir&gt;/DB/&lt;DBTYPE&gt;</code></td>
<td>Contains the <strong>EXT</strong> 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:
         ```
         ADDENVVAR PASE_THREAD_ATTACH 'Y'
         ```
       2. Run the command:
         ```
         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 159]`.

2. Close the shell window or command processor. The monitor process runs in the background.
3. Specify options as required in one of the following ways:
   - In the command line:
     ```
     Specify the option in the format: `-optionName optionValue`
     ```
   - In the application property file:
     ```
     Add an option as a new line in the format: `optionName=optionValue`
     ```

   **Example**
   
   Command line for UNIX or IBM i:
   ```
   ./export_monitor.sh -ftp
   ./export_monitor.sh -ftpCopy
   ./export_monitor.sh -socket -host <import_server> -port 5000
   ```

   **Example**
   
   Command line for Windows cmd.exe:
   ```
   export_monitor.bat -net
   ```
export_monitor.bat –socket

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
mailFrom@mail@sap.com
# "To" email address
mailTo@mail@sap.com mail@yahoo.com

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
jobNum=3

# E-mail options

# SMTP server
mailServer=sap-ag.de

# "From" email address
mailFrom=mail@sap.com

# "To" email address
mailTo@mail@sap.com mail@yahoo.com

9.1.7 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 Windows batch files dyn_control_export_monitor.bat
- As part of the export procedure of the software provisioning manager

UNIX – example for the export_monitor_cmd.properties file using sort by size:

```
server
dbType=ORA
exportDirs=/hana/s2p_to_hana/exportDVD/ABAP
installDir=.
orderBy=./order_by.txt
ddlFile=DDLORA_LRG.TPL
r3loadExe=/hana/s2p_to_hana/sapKernel/oracle/linuxx86_64/R3load
tskFiles=yes
dataCodepage=4103
jobNum=5
monitorTimeout=10
loadArgs=-continue_on_error
trace=all
migmonCtrl
jobNumLarge=25
jobNumSmall=25
extFileDir=/hana/s2p_to_hana/exportDVD/ABAP/DATA
```

UNIX – example for the export_monitor_cmd.properties file using sort by time:

```
server
dbType=ORAEexportDirs=/sapdb/exportDvD_741/ABAP
installDir=/home/emroot/export_plx110/order_by.txt
ddlFile=DDLORA_LRG.TPL
r3loadExe=/usr/sap/QO1/D01/exe/R3load
tskFiles=yes
dataCodepage=4103
jobNum=5
monitorTimeout=10
loadArgs=-continue_on_error
trace=all
migmonCtrl
jobNumLarge=10
jobNumSmall=10
minRuntime=0
exportTimeFile=./export_time.txt
importTop=5
importTimeFile=./import_time.txt
```
Example

Example for a command line call to create package filter files:

dyn_control_export_monitor.bat -createPackageFilter -outputFile package_list_%hostName%.txt -hostNames plx101,plx110

UNIX – example for a `export_monitor_cmd.properties` file when using a package filter:

```plaintext
server dbType=ORA exportDirs=/sapdb/exportDvD_741/ABAP installDir=/home/emroot/export_plx110 orderBy=/home/emroot/export_plx110/order_by.txt
ddlFile=DDLORA_LRG.TPL r3loadExe=/usr/sap/QO1/D01/exe/R3load tskFiles=yes
dataCodepage=4103 jobNum=5 monitorTimeout=10 loadArgs=-continue_on_error
trace=all decluster=true migmonCtrl jobNumLarge=10 jobNumSmall=10 extFileDir=/
sapdb/exportDvD_741/ABAP/DATA packageFilter=/sapdb/exportDvD_741/ABAP/DB/HDB/package_filter_plx110.txt onlyProcessOrderBy=true
```

UNIX – example for an `export_monitor_cmd.properties` file when using a package filter and parallel export/import:

```plaintext
server dbType=ORA exportDirs=/sapdb/exportDvD_741/ABAP installDir=/home/emroot/export_plx110 orderBy=/home/emroot/export_plx110/order_by.txt
ddlFile=DDLORA_LRG.TPL r3loadExe=/usr/sap/QO1/D01/exe/R3load tskFiles=yes
dataCodepage=4103 jobNum=0 monitorTimeout=10 loadArgs=-continue_on_error net
netExchangeDir=/sapdb/exportDvD_741/SGN trace=all decluster=true migmonCtrl
jobNumLarge=10 jobNumSmall=10 extFileDir=/sapdb/exportDvD_741/ABAP/DATA
packageFilter=/sapdb/exportDvD_741/ABAP/DB/HDB/package_filter_plx110.txt
onlyProcessOrderBy=true netStatisticsFile=package_filter_plx110.statistics
```

### 9.1.8 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 $\text{PACKAGE}=\text{STATE}$. 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 $\text{STATE}$ column that refers to the state of the package transfer.

Then the export state file contains package state lines such as $\text{SAPUSER}=++$.

The format of state lines is $\text{PACKAGE}=\text{STATE}$. 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>

### 9.2 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 $\text{MIGTIME.SAR}$ archive to analyze the runtimes of the individual packages. It is contained in the $<\text{OS}>/\text{COMMON/INSTALL}$ directory of the $70\text{SWPM10SP<Support_Package_Number>_<Version_Number>.SAR}$ archive. It is unpacked to the installation directory using SAPCAR and contains documentation in addition to the tools.
9.3 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 183]
Restrictions [page 183]
Using the Table Comparison Tool [page 184]

9.3.1 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 183]

9.3.2 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...
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) | 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 183]

### 9.3.3 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 primary application server 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/sfreetoolset [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 20] for your release at:

  ```
  Note
  Navigate to the SAP Help Portal page for the SAP NetWeaver release your SAP product is based on as described in section Accessing the SAP Library [page 20], 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. Call the SUMSTART script as follows:
     `<SUM_Directory>`\abap\SUMSTART confighostagent
  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:

      ```
      ```

      **i 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 ignrcrdiffs
  REPOLOAD nocontent ignrcrdiffs
  
  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:
  
  ```bash
  $ 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 primary application server 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 183]
9.4 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 <Drive>:\<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 187]
Starting the Package Splitter [page 190]
Executing the STR Splitter and the WHERE Splitter [page 192]
Output Files [page 191]

9.4.1 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><code>strDirs</code></td>
<td>List of STR file directories</td>
<td>Separator on Windows: ; Separator on UNIX: :</td>
</tr>
<tr>
<td><code>extDirs</code></td>
<td>List of EXT file directories</td>
<td>Separator on Windows: ; Separator on UNIX: :</td>
</tr>
<tr>
<td><code>outputDir</code></td>
<td>Output directory</td>
<td>If missing, then the directories that contain the corresponding STR/EXT files are used.</td>
</tr>
<tr>
<td><code>top</code></td>
<td>Maximum number of tables</td>
<td>Largest N tables are extracted from the packages.</td>
</tr>
<tr>
<td><code>tableLimit</code></td>
<td>Table size limit in MB</td>
<td>All tables larger than tableLimit are extracted from packages.</td>
</tr>
<tr>
<td><code>packageLimit</code></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><code>tableFile</code></td>
<td>File with the table names that are to be extracted</td>
<td>All tables from the file are extracted from the packages. This file must contain the table names on separate lines (one name on each line).</td>
</tr>
<tr>
<td><code>maxNumberOfTables</code></td>
<td>Integer value Maximum number of tables in the package</td>
<td>Split the packages as keep the maximum number of tables in package.</td>
</tr>
</tbody>
</table>

| Example | `maxNumberOfTables=500` | This parameter is with higher priority |
## WHERE Splitter Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>whereDir</td>
<td>WHERE file directory</td>
<td>Directory with WHR files.</td>
</tr>
</tbody>
</table>
| strDirs   | List of STR file directories | Separator on Windows: ;  
|           |                          | Separator 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>
</table>
| trace  | Trace level | Possible values:  
|        |             | all, off, 1 (error), 2 (warning), 3 (info), 4 (config, default), 5, 6, 7 (trace) |

## 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
9.4.2 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:

- Windows batch file `str_splitter.bat`/`where_splitter.bat`
- 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 Windows `cmd.exe`:

```
str_splitter.bat -strDirs C:\export_dump\DATA -extDirs C:\export_dump\DB\ORA -
outputDir C:\split_output -top 20 -tableLimit 50 -packageLimit 200 -trace all
```

### WHERE Splitter

You can start the tool using the Windows batch file `where_splitter.bat`

```
where_splitter.bat -whereDir C:\r3a_dir -strDirs C:\export_dump\DATA -outputDir C:\split_output -whereLimit 5 -whereFiles "DD03L.WHR TODIR.WHR" -trace all
```
Related Information

Using the Package Splitter [page 187]

9.4.3 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 187]

### 9.4.4 Executing the STR Splitter and the WHERE Splitter

Proceed as described in this section to execute the STR Splitter / WHERE Splitter.

**Procedure**

1. Prepare the properties file `package_splitter_cmd.properties` (optional).
2. Start the Package Splitter tool using the shell script or batch file.
3. Analyze the screen output and log file.

**Related Information**

Using the Package Splitter [page 187]

### 9.5 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 47], the installer prompts whether DV is to be installed.

For the Oracle-Specific Procedure [page 84], Copying the Database Only – Refresh Database Instance [page 117], and Copying the Database Only - Refresh Database Content on Oracle Database [page 128] the DV is already installed in the source database and must be first disabled to complete the scenario and can then be enabled before the scenario is completed.

DV requires the following additional users:

- 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 63].
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.

9.6 IBM Db2 for Linux, UNIX, and Windows Database

Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database [page 194]
Deleting a Database Schema Manually [page 196]
You can generate and use the following scripts to delete a database schema manually (not the complete database). During the manual deletion, you must delete all tables and indexes, modules, views, functions, procedures, variables, and tablespaces belonging to the schema.

Online Information from IBM [page 198]

9.6.1 Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database

Use

⚠️ Caution

This section only applies 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 provides the ability 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 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, you must 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)
   - VENDOR:<path_to_vendor_lib>
     Log files are archived to a library that is provided by your vendor storage management
For downward compatibility with the former user exit concept, you can specify value USEREXIT for parameter LOGARCHMETH1.

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 Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

3. To activate the settings, you must restart the database. The database is now in backup pending mode. You need to take an offline backup before you can continue.

4. If you plan to make a backup to tape on Windows, you have to initialize the tape drive by entering the following command:

db2 initialize tape on \\.<tape_device>

5. 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 TAPE0 and TAPE1, enter the following command:

db2 backup database C11 to \\..TAPE0, \\..TAPE1

**Note**

On a multi partition 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**

- For access to the Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows and more documentation about SAP systems on IBM Db2 for Linux, UNIX, and Windows, see Online Information from SAP [page 204].
- For access to online information about Db2 that is provided by IBM, see Online Information from IBM [page 198].
9.6.2 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') " | find "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:
      ```sql
      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' " | find "DROP" > drop_<sap_system_schema>_views.txt
      
      where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
b. To delete all views, run this script using the following command:

```bash
db2 –tvf drop_<sap_system_schema>_views.txt
```

4. To delete all modules of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:

   ```sql
db2 " SELECT 'DROP MODULE ' || CHR(34) || VARCHAR(moduleschema) || CHR(34) || '.' || CHR(34) || modulename || CHR(34) || ';' FROM syscat.modules WHERE moduleschema='<SAP_SYSTEM_SCHEMA>" " | find "DROP" >
drop_<sap_system_schema>_modules.txt
```

   where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

   b. To delete all modules, run this script using the following command:

   ```bash
db2 –tvf drop_<sap_system_schema>_modules.txt
```

5. To delete all functions of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:

   ```sql
db2 " SELECT 'DROP SPECIFIC FUNCTION ' || CHR(34) || VARCHAR(funcschema) || CHR(34) || ' ' || CHR(34) || specificname || CHR(34) || ';' FROM syscat.functions WHERE funcschema='<SAP_SYSTEM_SCHEMA>" " | find "DROP" >
drop_<sap_system_schema>_functions.txt
```

   where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

   b. To delete all functions, run this script using the following command:

   ```bash
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:

   ```sql
db2 " SELECT 'DROP SPECIFIC PROCEDURE ' || CHR(34) || VARCHAR(routineschema) || CHR(34) || ' ' || CHR(34) || specificname || CHR(34) || ';' FROM syscat.routines WHERE routineschema='<SAP_SYSTEM_SCHEMA>" " | find "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:

   ```bash
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:

   ```sql
db2 "SELECT 'DROP VARIABLE ' || CHR(34) || VARCHAR(varschema) || CHR(34) || ' ' || CHR(34) || varname || CHR(34) || ';' FROM syscat.variables WHERE varschema='<SAP_SYSTEM_SCHEMA>" " | find "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:

   ```bash
db2 –tvf drop_<sap_system_schema>_variables.txt
```

8. To delete the database schema, use the following command:

   ```bash
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>
      ```

9.6.3 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>Database Version</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<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>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IBM Manuals</th>
<th>Database Version</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<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></td>
<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></td>
<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>
9.7 Oracle Database

Additional Information about the OraBRCopy Tool [page 199]

9.7.1 Additional Information about the “OraBRCopy” Tool

Related Information

Configuration [page 199]
Output Files [page 201]

9.7.1.1 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 environment variable</td>
</tr>
<tr>
<td>sourceSid</td>
<td>Source database SID</td>
<td>Determined automatically in script/batch files from the ORACLE_SID environment 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 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 file of the source database.</td>
</tr>
<tr>
<td>password</td>
<td>Password of SYSTEM database user</td>
<td></td>
</tr>
<tr>
<td>generateFiles</td>
<td></td>
<td>Generates control/trace and init&lt;TARGET_DBSID&gt;.ora files.</td>
</tr>
<tr>
<td>forceLogSwitches</td>
<td></td>
<td>Forces log switches. 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>
<tbody>
<tr>
<td>bg</td>
<td>Enables background mode</td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Takes effect only as command line option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the tool is running in the background mode, the UNIX shell window or Windows command prompt can be closed after startup.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Comment</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>secure</strong></td>
<td>Enables secure mode</td>
<td><strong>i Note</strong> 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.</td>
</tr>
</tbody>
</table>

| **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` 4

**9.7.1.2 Output Files**

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

**9.8 Using PowerShell**

SAP uses Windows PowerShell to run and describe Windows commands.

For Windows Server 2012 (R2) and higher, SAP only uses Windows PowerShell to run and describe Windows commands.

Windows PowerShell is a powerful tool integrated in the Windows operating system. It uses object-oriented methodology, which allows fast and stable script development.
For more information about the Windows PowerShell, see:

There you can find links to the online help, online documentation, scripting repository, downloads, and blogs.

If you want to use the PowerShell feature, note the following:

- **Windows Server 2016**
  Windows Server 2016 contains PowerShell 5.0
  You can update to PowerShell 5.0 (search the internet for *Windows Management Framework 5.0*).

- **Windows Server 2012 R2**
  Windows Server 2012 R2 contains PowerShell 4.0.

- **Windows Server 2012**
  You can update to PowerShell 4.0 (search the internet for *Windows Management Framework 4.0*).

- **Windows Server 2008 R2**
  Windows Server 2008 R2 contains PowerShell 2.0.
  For more information about PowerShell 2.0, see http://support.microsoft.com/kb/968929.
  You can update to PowerShell 3.0 or 4.0 (search the internet for *Windows Management Framework 3.0* or *Windows Management Framework 4.0*).

- **Windows Server 2008**
  You have to activate the PowerShell feature with Start ➤ Administrative Tools ➤ Server Manager ➤ Features.
  On Windows Server 2008, you can update to PowerShell 3.0 (search the internet for *Windows Management Framework 3.0*).

### How to Start PowerShell

⚠️ Caution

Make sure that you start the PowerShell in administrator mode.

- **Windows Server 2012 (R2) and higher**
  Open the command prompt and enter the command: `powershell.exe`

To start PowerShell on Windows Server 2008 (R2), you have the following options:

- From the command prompt, by entering the command: `powershell.exe`
- From the **Start** Menu:
  - PowerShell 1.0:
    - Choose ➤ **Start** ➤ **All Programs** ➤ **Windows PowerShell 1.0** ➤ **Windows PowerShell** ➤
  - PowerShell 2.0:
    - Choose ➤ **Start** ➤ **All Programs** ➤ **Windows PowerShell** ➤ **Windows PowerShell** ➤
How to Work with PowerShell

Most commands that are used in cmd.exe are also available in the PowerShell (defined as aliases).

You can use well-known commands, such as cd, type, copy, move, mkdir, delete, rmdir. There is also online help available, which you can access by typing the command: help (or help <command>).

This is a list of differences between PowerShell and cmd.exe:

- Before you can run PowerShell scripts (text files with the file extension .ps1 that contain PowerShell statements), you might have to change the default security setting to allow the execution of non-signed scripts as follows:

```
set-executionpolicy ("unrestricted")
```

- By default, when double-clicking PowerShell scripts (.PS1 files) in the Windows explorer, this does not execute the script as is the default for .cmd files, but opens the script in an editor. If you want to activate automatic script execution after a double-click, you have to change the value HKEY_CLASSES_ROOT \Microsoft.Powershellscript.1\Shell\Open\Command from notepad.exe to the full path of the PowerShell executable.

- The output of PIPE commands is not just a stream of characters (strings) but a stream of objects. You can easily access the properties and methods for these objects (see the process list DLL example below).

- The current working directory is not part of the directory search path that the PowerShell looks at for scripts and programs. The PowerShell only searches directories listed in the environment variable path. Therefore, you might have to run a local program with .\sapcontrol.exe or specify its full path.

- You can use the UNIX-like directory delimiters, such as cd /usr/sap/C11.

- You can have your current working directory in a UNC path (cd \\sapglobalhost\sapmnt).

- The shell distinguishes between environment variables and shell variables:
  - Use of shell variables:
    - Definition: $x="hello"
    - Reference: write-host $x
  - Use of an environment variable:
    - Definition: $env:x="hello"
    - Reference: write-host $env:x

- The PowerShell has an interesting container concept called ps-drives. Within ps-drives you can navigate in other objects, such as the registry or shell internal lists in the same way as you typically navigate in a file system (cd, dir, del, and so on).

```
dir env: to get a list of environment variables
dir variable: to get the list of shell variables
dir HKLM: to get a list of registry keys in HKEY_LOCAL_MACHINE
get-psdrive to get a list of available ps-drives
```

- Windows PowerShell has full access to the .NET runtime. You can directly access missing functions in the PowerShell via .NET.

- With Windows PowerShell, you can create GUI-class user interfaces using Windows forms.
PowerShell Commands

The following table lists some PowerShell commands that are available on Windows Server 2012 (R2) and higher:

<table>
<thead>
<tr>
<th>Command</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>stop-service sap*</code></td>
<td>Stops all Windows services with service name starting with “SAP”</td>
</tr>
<tr>
<td><code>get-process</code></td>
<td>Lists currently started processes on your system</td>
</tr>
<tr>
<td>`get-process</td>
<td>sort starttime</td>
</tr>
<tr>
<td>`get-process</td>
<td>sort starttime</td>
</tr>
<tr>
<td>`get-process</td>
<td>sort starttime</td>
</tr>
<tr>
<td>`get-process</td>
<td>%{$<em>.name;&quot;-----------&quot;;$</em>.modules}`</td>
</tr>
<tr>
<td>`$processes = (get-process</td>
<td>sort starttime)`</td>
</tr>
<tr>
<td><code>$processes.length</code></td>
<td>The number of processes in the array (is equivalent to the number of processes on your computer)</td>
</tr>
<tr>
<td><code>$processes[$processes.length-1].kill()</code></td>
<td>Invokes the kill method (terminate process) of the last started process</td>
</tr>
<tr>
<td><code>(dir a.txt).set_attributes(&quot;readonly&quot;)</code></td>
<td>Sets the file <code>a.txt</code> to “read-only”</td>
</tr>
</tbody>
</table>

9.9 Online Information from SAP

More information is available online as follows:

<table>
<thead>
<tr>
<th>Titel</th>
<th>Internet Address</th>
</tr>
</thead>
</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) |
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<td>Database Administration Using the DBA Cockpit: IBM DB2 for Linux, UNIX, and Windows</td>
<td><a href="https://help.sap.com/viewer/db6_dbacockpit">https://help.sap.com/viewer/db6_dbacockpit</a> (English) <a href="https://help.sap.com/viewer/db6_dbacockpit_de">https://help.sap.com/viewer/db6_dbacockpit_de</a> (German)</td>
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<td>SAP Business Warehouse on IBM Db2 for Linux, UNIX, and Windows: Administration Tasks</td>
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<td>SAP on Db2 for Linux, UNIX, and Windows Community</td>
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<td>Database Administration Guide for SAP on IBM Db2 for z/OS</td>
<td><a href="https://help.sap.com/viewer/db2_administration_guide">https://help.sap.com/viewer/db2_administration_guide</a></td>
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<td><a href="https://www.sap.com/community/topic/db2-for-zos.html">https://www.sap.com/community/topic/db2-for-zos.html</a></td>
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System Copy for SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.1 to 7.52 on Windows

Additional Information
Important Disclaimers and Legal Information

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