Upgrade Guide | PUBLIC
Software Update Manager 2.0 SP18
Document Version: 1.0 – 2023-10-09

Updating SAP ABAP Systems on UNIX and Linux: Oracle

THE BEST RUN SAP

Content

Document History

Document: Updating SAP ABAP Systems with SUM 2.0 SP18

The following table provides an overview of the most important document changes.

> ⚠ Caution
>
> Before you start, make sure that you have the latest version of this document. You can find the latest version on the SAP Support Portal at http://support.sap.com/sltoolset. Choose tab *System Maintenance*, then the scenario *Software Update/Upgrade using SUM* *Software Update/Upgrade with SUM 2.0 SP18*.

Version	Date	Description
1.0	2023-10-09	Initial version

1 Before You Start

1.1 About This Document

This chapter deals with the basic aspects of this document.

Purpose

This document describes how to **update SAP systems based on SAP NetWeaver ABAP using the Software Update Manager (SUM) 2.0 SP18.**

The Software Update Manager is a multi-purpose tool that supports various processes, such as performing a release upgrade, installing enhancement packages, applying support package stacks, installing add-ons, or updating single components. For clarity and readability, the term “update” is used in this document for all supported processes.

For more information about the Software Update Manager, see the blog Software Update Manager (SUM): introducing the tool for software maintenance on the SAP Community Network.

For more information about the supported maintenance procedures and update paths, see the current Software Update Manager Note 3296457 and its attachments.

> **i Note**
>
> The Software Update Manager 2.0 SP18 is part the *Software Logistics Toolset 1.0 SPS 39* and exists in parallel to the *Software Update Manager 1.1 SP02*. Both SUM versions, however, cover separate scenarios. The easy decision matrix is:
>
> - SUM 2.0 is used for ABAP single stacks, targeting systems based on SAP_BASIS 750 and higher
> - SUM 1.1 is always used if the source system is either a dual-stack system, or a Java stack.
> - SUM 1.1 is used for ABAP stack if the target release is based on SAP_BASIS 740 or lower
> - SUM 1.1 is used for ABAP stack if the start release is based on SAP_BASIS 700 up to 740. If your source system is based on SAP Basis 4.6C, 6.20, or 6.40, use SUM 1.0 SP26 instead.
>
> For more information, see the information on the Software Update Manager in the SAP Support Portal.

Integration in the Documentation Landscape

This document only contains information about the Software Update Manager tool and the update procedure using this tool, as well as about some actions directly related to basic SAP NetWeaver functionality.

It is essential that you read the *Master Guide* (or *Upgrade Master Guide*, if such exists as a separate document) for your product version. The *Master Guide (Upgrade Master Guide)* guides you through the complete update and refers you to the required documentation for each step.

If there are preparation and follow-up activities for the update that are specific to your product, they are described in a product-specific document. This document is also referenced in the *Master Guide* (or *Upgrade Master Guide*). It is crucial that you perform the product-specific preparation activities before you start the Software Update Manager and that you perform the follow-up activities after the Software Update Manager has finished successfully.

To find the latest version of these documents, access the SAP Help Portal for your SAP NetWeaver release. See also Other Required Documentation [page 14].

Structure of This Document

→ Recommendation

We recommend that you use the Quick Guide [page 57] to guide you through the process. The Quick Guide checklist provides you with an overview of all necessary tasks in chronological order. If you are experienced in performing updates, the checklist may contain all you need to know to perform the update successfully. If you need more information, follow the links to the detailed descriptions.

i Note

If this document contains information for more than one operating system, database or product release, texts that apply to one or more of these aspects are marked with bars. The types of bars are the following:

- With regular thickness when they are only valid for individual paragraphs within the topic
- In bold and placed directly below the title of a topic when they are valid for the entire content of the topic

This document is structured in the following sections:

Section	Use
1 - Before You Start	Contains information about important new features, some naming conventions in this document, other required SAP Notes and documentation.
2 - Introduction	Guides you through the basic concepts of the update and upgrade, and introduces you into the tool *Software Update Manager*.
3 - Quick Guide	Provides you with an overview of all necessary tasks in chronological order.

Section	Use
4 - Planning	Contains information about planning your SAP system update
5 - Preparation	Contains information about the preparations that you need to make before you update your system.
6 - Running the Software Update Manager	Contains information about the use of the Software Update Manager during the update procedure: • How to set up and start the SUM • Additional supporting tools and features • Important actions and entries during the roadmap steps • Further options after the SUM run
7 - Follow-Up Activities	Contains information about the follow-up activities that you need to perform after you have updated your SAP system.
A - Appendix	• SUM Analysis Contains information about the reports that are generated by the SUM to analyze the update procedure. • Troubleshooting Contains information about known problems and troubleshooting them. • Administration Contains supplementary information, for example, about database administration tasks. • List of Referenced SAP Notes Lists all SAP Notes with additional information about the update procedure that are referenced in this document besides the SAP Notes [page 13] that are relevant for the update preparation. • List of Referenced Documentation Lists the documentation that is referenced in this document and contains information about where to find this documentation.

1.2 New Features

The following table lists significant new features and improvements of the Software Update Manager 2.0. The table also indicates the SUM version in which the new or improved features were introduced.

New Features for the Individual SUM Versions

Feature	Description	Availability
In SUM Utilities, SAP HANA database statistics can be displayed.	Visualized SAP HANA database statistics such as CPU, memory, or disk utilization can be displayed via the menu item *Database Statistics* of the SUM Utilities (Extended UI) [page 42].	SUM 2.0 SP14
Output of list of required SAP Notes during prerequisite check.	As part of the prerequisite check, a check is performed for SAP Notes that are required for the software maintenance process, and the result is output as a list. For more information, see Performing a Prerequisites Check [page 132].	SUM 2.0 SP14
SUM Toolbox now available.	The *Software Update Manager Toolbox* is an ABAP-based transaction that allows you to run certain tools and reports related to the different scenarios offered by Software Update Manager, especially to downtime-optimized approaches. For more information, see SUM Toolbox [page 53].	SUM 2.0 SP14
Cluster data check	You can use the cluster data check integrated in SUM to check all pooled tables or cluster tables in the system. For more information, see Checking Cluster Data [page 104].	SUM 2.0 SP15
Help moved and new question mark	The *Help* menu item is now part of the *More* menu. And a question mark icon next to a heading or title on the SUM interface indicates that there is a context-sensitive SUM guide topic. For more information, see SUM User Interface (SUM UI) [page 27].	SUM 2.0 SP15
Phase list removed from `SUM Utilities`	The phase list has been removed from the `SUM Utilities`. The information about the phases is now available in the menu item *Task List* on the SUM user interface. For more information, see SUM UI: Menu Bar [page 34].	SUM 2.0 SP15
`SAPupConsole.log` content is displayed on the UI	A box is displayed on the SUM UI that shows the progress information of the file `SAPupConsole.log`. For more information, see the section *Progress Display From the SAPConsole.log File* in chapter SUM User Interface (SUM UI) [page 27].	SUM 2.0 SP16

Feature	Description	Availability
Errors in phase `PARDIST_ORIG` can be ignored	You can ignore errors in phase `PARDIST_ORIG` in the same way as it is possible in phase `PARMVNT_APPL_VIEWS`. For more information, see Errors in the PARMVNT_APPL_VIEWS or PARDIST_ORIG Phase [page 228].	SUM 2.0 SP16
SNC Logon for DDIC-User	The Software Update Manager offers the possibility to run with own Single-Sign On (SSO) credentials as prerequisites for the SUM run on an SAP ABAP system with Secure Network Communications (SNC). For more information, see Configuring SAPup for SAP ABAP System with SNC [page 250].	SUM 2.0 SP18
SUM UI revised	The user interface has been revise and some changes and adjustments have been made. For more information, see SUM User Interface (SUM UI) [page 27] and the following chapters.	SUM 2.0 SP18

1.3 Naming Conventions

Term	Comment
update	In this document, the term “update” is used as a collective term for all the software logistics processes that you can perform using the Software Update Manager (such as performing release upgrades, installing enhancement packages, or updating a system with support package stacks).
Software Update Manager, SAPehpi, and SAP upgrade tools	The Software Update Manager evolved from the previous SAP Enhancement Package Installer and SAP upgrade tools. The tool has been renamed to reflect its broader use. However, note that on a technical level, the name of the executable `SAPup` is still in use, for example, in the log files or in commands.
SUM directory and <update directory>	In this document, “SUM directory” and “<update directory>” are used as synonyms when referring to directory `<path to SUM directory>/SUM`.

Term	Comment
SAP system	In this document, the term “SAP system” is used for SAP NetWeaver systems as well as for SAP application systems. “SAP” is also used as a synonym for “SAP NetWeaver” or “SAP application” in terms such as “SAP start profile” or “SAP system language”.
SAP system ID	In this document, the SAP system ID is abbreviated as “SAP-SID” or “sapsid”. If “<sapsid>” is used, your SAP system ID has to be in lowercase letters, for example, “prd”. If “<SAP-SID>” is used, you have to write in uppercase letters, for example, “PRD”.
ID for the SAP system release	In this document, “<rel>” stands for the relevant SAP system release, without a decimal point, such as “740”. If an enhancement package has been installed in the system, the last digit indicates the enhancement package version, such as “731” for SAP enhancement package 1 for NetWeaver 7.3.
SAP system instances	As of SAP NetWeaver 7.1, the concept and naming of SAP system instances has changed. The terms “central instance” and “dialog instance” are no longer used. Instead, the SAP system consists of the following instances: • Application server instances Application server instances can be installed as “primary application server instance” or “additional application server instances”. • Central services instance • Database instance Throughout this document, we use the new terms “primary application server instance” and “additional application server instance”. For releases lower than SAP NetWeaver 7.1, the “primary application server instance” corresponds to the “central instance” and the “additional application server instance” corresponds to the “dialog instance”.
Solaris and Oracle Solaris	As of operating system version 10, Solaris has been renamed to “Oracle Solaris”. However, the former name “Solaris” may occur in this document as well.

1.4 Required SAP Notes

Use

To prepare and perform the update of your SAP system, you need some additional information that is not included in this document. This information is in a range of SAP Notes in SAP Support Portal (http://

support.sap.com/notes), some of which you have to read before you start with the preparations. Besides the central Software Update Manager Note, there are separate SAP Notes for the database-specific sections. When you actually perform the update, you may need information from some additional SAP Notes. These SAP Notes are named at the appropriate places in this document.

SAP Notes for Preparing the Update

Request the following SAP Notes from SAP Support Portal before you start the update procedure:

- Central Software Update Manager Note
- SAP Note for your database

Since these SAP Notes are updated regularly, make sure that you always use the newest version.

SAP Notes Required to Prepare the Update

SAP Note Number	Description
3296457	Central Software Update Manager Note
2976852	Oracle-specific

Other SAP Notes

In addition to the SAP Notes that you need for preparing the update, this document also refers you to other SAP Notes that contain **additional** information. These SAP Notes are listed in the List of Referenced SAP Notes [page 259].

1.5 Other Required Documentation

Before, during and after the update, other documentation for SAP NetWeaver can be necessary. The applicable paths to the SAP Help Portal (http://help.sap.com) regarding the SAP NetWeaver versions mentioned in this document are as follows:

SAP Library Paths

Release	Path
SAP NetWeaver AS for ABAP 7.52	http://help.sap.com/nw752abap
SAP NetWeaver AS for ABAP 7.51 innovation package	http://help.sap.com/nw751abap

Release	Path
SAP NetWeaver 7.5	http://help.sap.com/nw75

For more information about accessing this documentation, see the product-specific document for your target release.

2 Introduction

2.1 Basic Concepts

2.1.1 Upgrades and Updates in an SAP System Group

> **i** Note
>
> As written in the Naming Conventions, the term "Update" is used in this document as a collective term for all the tasks that can be performed using this tool. However, in this section we differentiate between update and upgrade. For this, bear in mind the main difference between these scenarios:
>
> - Update: Activities to maintain or enhance a system, for example:
> - Installing enhancement packages
> - Installing add-ons
> - Applying support package stacks or support packages
> - Upgrade: The switch from an older software version to a new version.

If you have an SAP system group consisting, for example, of a production system, a quality assurance system, and a development system, you have to consider the entire system group regarding the sequence of updates.

In addition, the update procedure influences the development activities, for example, dual maintenance might be temporarily necessary to ensure that your production system is supported with emergency corrections.

Sequence of Updates

Update or upgrade your systems in the same sequence in which you transport your modifications. Update each system with the same software packages.

If your system group consists of three SAP systems and includes a quality assurance system that has been set up between the development and production system, work in the following order:

1. Development system
2. Quality assurance system
3. Production system

> → Recommendation
>
> We strongly recommend that you perform transports only between systems of the same level (regarding release, enhancement package, or support package), and where the same business functions are activated. If you do not follow this recommendation, you do so at your own risk regarding potential problems.

If you have modified SAP objects that you want to retain, you have to proceed in the above sequence. The version management functions of the SAP system record all the changes you make only in the system in which

you made the modifications (the development system). Only this SAP system offers you optimal support when you adjust modifications.

Changes made in the development system after the update can be transported automatically to your other SAP systems. If you use this procedure, you no longer need to perform time-consuming adjustments in the production system.

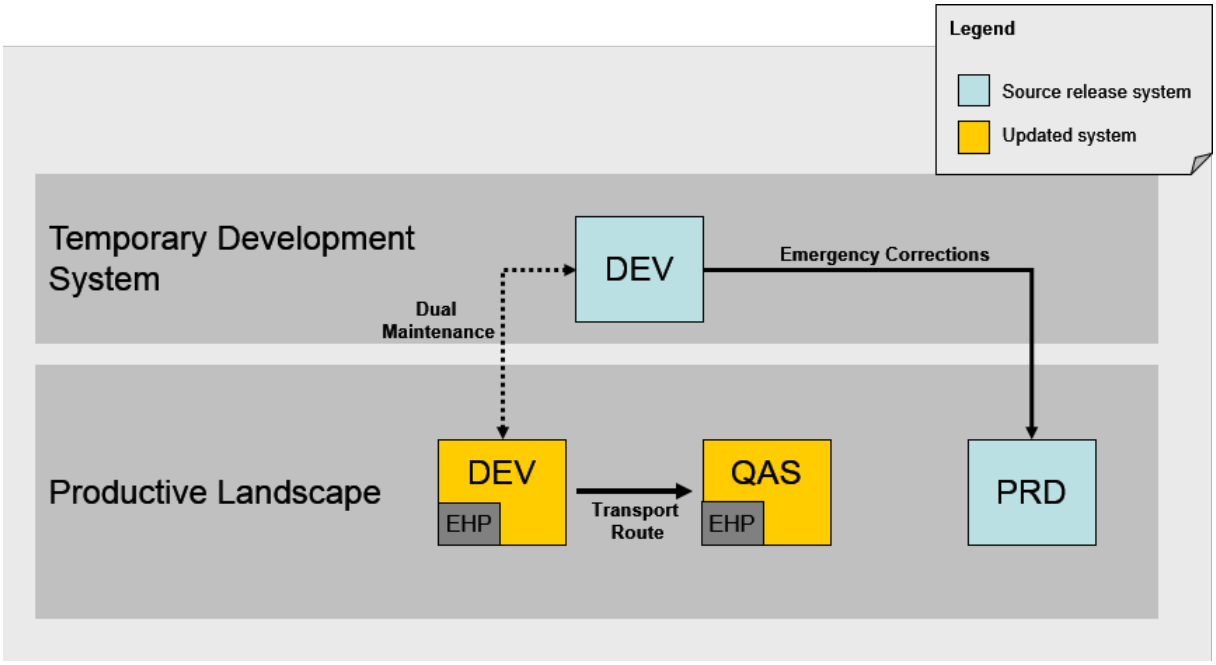
> ⚠ Caution
>
> If you have modified SAP objects, make sure that you keep your development system. Do **not** copy your production system to your development system for test purposes.

Impact on Development

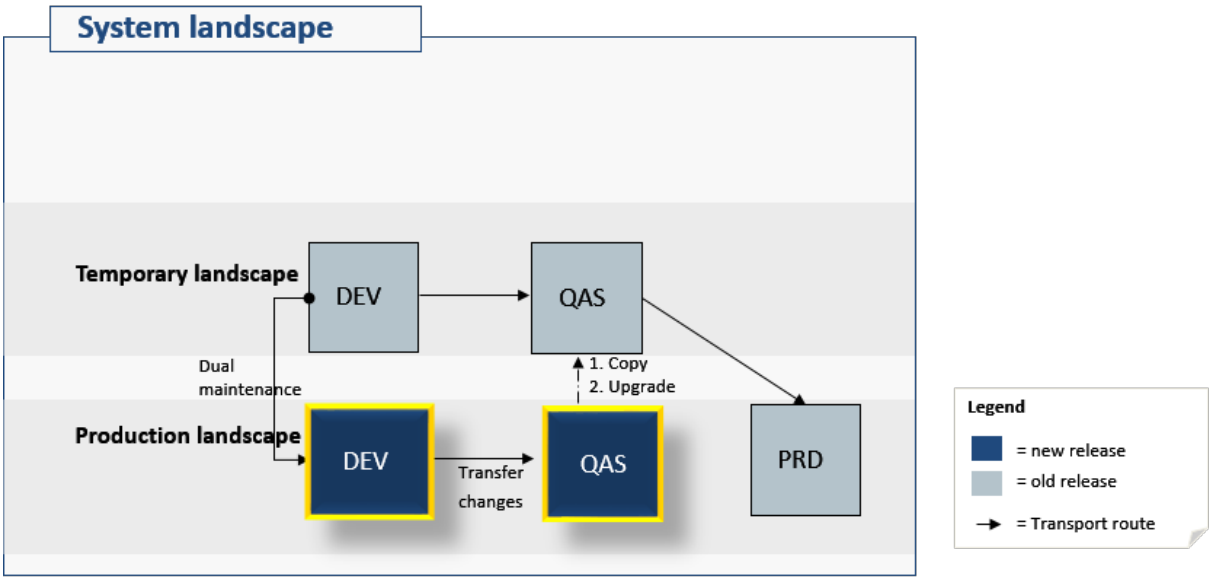
At a certain point in time during the update procedure, the development environment of the system that is updated is locked. Changes to the system are not possible, and the repository objects are set globally to *not modifiable*. Consider this development freeze in your project plan and inform your developers about it.

> i Note
>
> You can check the system change status by calling transaction `SE06` (Set Up Transport Organizer).
> Navigate to *System Change Option* > *Global Setting*.

To avoid the development system being unavailable during the update, we recommend that you add a temporary copy of your development system to your system landscape. This temporary development system can supply your production system with emergency corrections or support a phased development go-live after you have updated the original development system. You then have to make any corrections in the original development system as well as in the temporary development system. Make sure that your developers are notified about the dual maintenance.



Update in an SAP System



Upgrade in an SAP System

2.1.2 Upgrade Schedule Planning

You need to create an exact schedule for your SAP system upgrade.

Prerequisites

You have decided on the scenario strategy.

Context

> **i** Note
>
> This section is only relevant if you perform a release upgrade.

Procedure

1. Decide when to begin preparing for the upgrade.

   When you start, the upgrade preparations depend not only on the length of the preparations but also on the length of the upgrade itself.

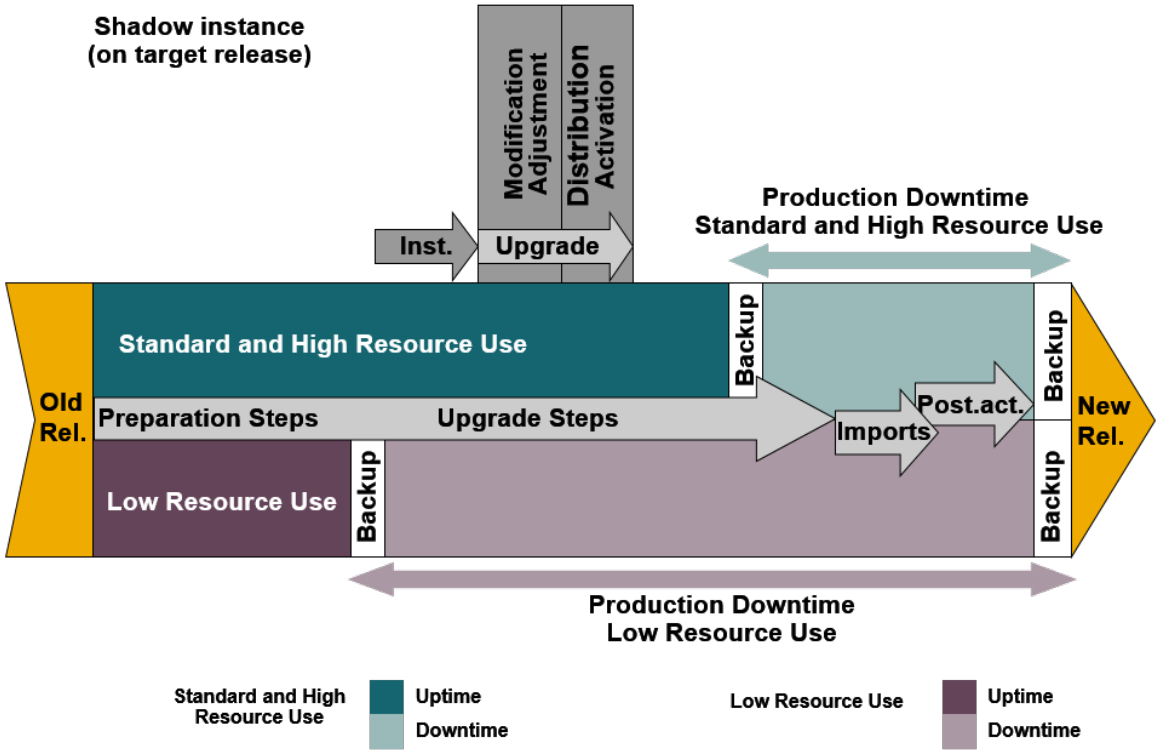
   To determine the expected total length of the upgrade of your production system, perform a test upgrade of an SAP system with a similar set of data (a system copy of your production system is ideal
2. Decide when to start the upgrade.

   If you have special requirements regarding the availability of your SAP system, adjust the procedure and the length of the upgrade to fit the expected amount of downtime.

   During the upgrade, various actions are performed by and in the shadow system. The runtime of these actions depends on various factors and is therefore specific to each SAP system:
   - Creating the shadow repository
   - Importing the additional software packages such as languages, support packages, and add-ons. The minimum runtime of the import phase increases with every support package, add-on, and language that is included.
   - Adjusting modifications to the ABAP Dictionary objects (transaction SPDD)
   - Mass activation and distribution

   If you have chosen *Standard* or *Downtime-optimized*, you can continue to use your SAP system in production operation during these actions, as they run in the `Preprocessing` roadmap step.

   If you finish the preparation before the scheduled start of downtime, the upgrade procedure will wait with the start of the downtime until you trigger it. You can trigger the start of the downtime by choosing *Next* when the `Preprocessing` roadmap step is completed.



Upgrade Up- and Downtime

3. Take the necessary measures to extend the time in which the upgrade can run unmonitored.

   - Specify all mount directories at the start of the upgrade.
     The Software Update Manager asks you to specify mount directories when you start upgrading. This significantly increases the amount of time the upgrade can run without user input.
   - Early locking of the ABAP Workbench
     If you are sure that you can do without the ABAP Workbench, confirm the lock when you are asked for the first time.

4. Decide when a full backup is performed after the upgrade.

   The full database backup is a prerequisite for resuming production operation of your system when archiving is deactivated.

   It has to be carried out after you have performed all necessary follow-up activities. This has the advantage that all database changes resulting from follow-up activities are included in the full backup.

5. Decide when production operation resumes.

   If possible, resume production operation only after you have performed all required follow-up activities.

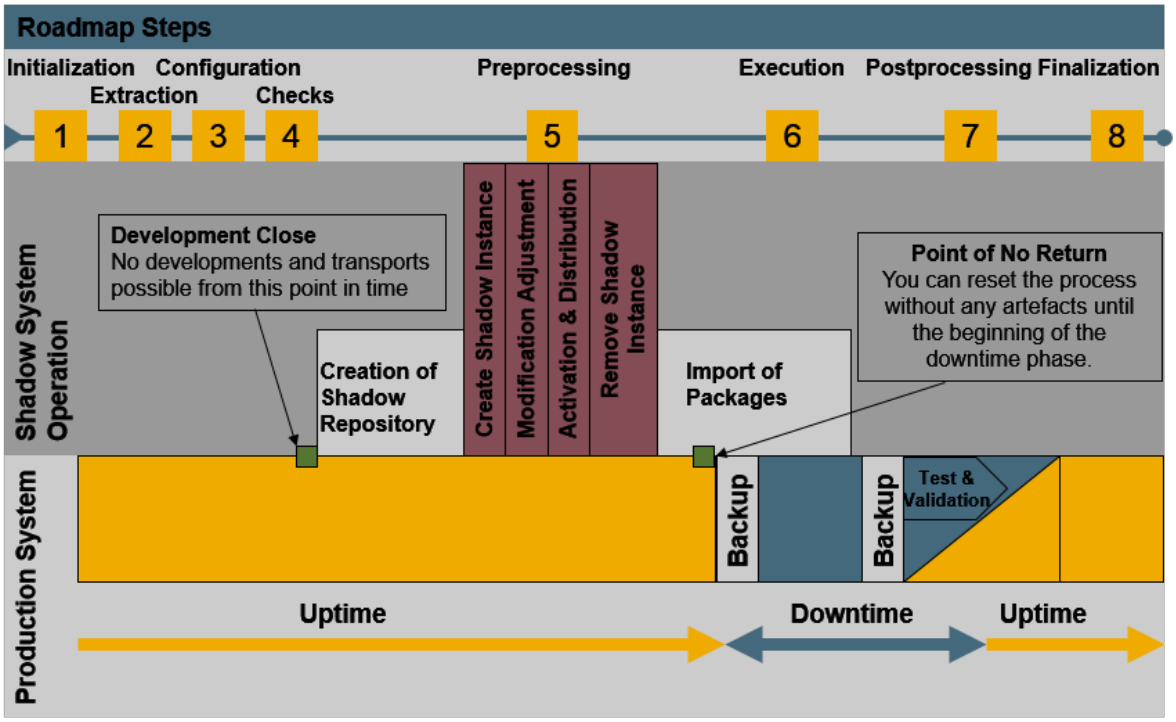
2.1.3 Update Schedule Planning

> **i Note**
>
> This section is relevant if you perform an SPS update.

The following section provides you with important information of the technical update procedure to enable you to set up the schedule for updating your SAP system.

The update procedure is a sequence of roadmap steps (*Get Roadmap* (with the initial dialogs), *Extraction*, *Configuration*, *Checks*, *Preprocessing*, *Execution*, *Postprocessing*). User interaction is required at the beginning and at the end of the update procedure, whereas in between the procedure can run unattended. For the user interactions at the beginning until the first phases of the *Preprocessing* roadmap step, you can calculate approximately one day.

The following figure shows the chronological sequence of the update procedure:



Overview of the Update Procedure

The update procedure requires a system downtime of several hours starting with the *Execution* roadmap step. If you have a defined maintenance window for the downtime, start the Software Update Manager in good time. You can easily stop the program when the update procedure is ready to start the downtime and then resume the update procedure when it fits your maintenance window. For example, when you plan the downtime for the weekend, start the Software Update Manager at the beginning of the week.

During the *Preprocessing* roadmap step, the Software Update Manager builds up a second system (the shadow system) by cloning the original system. Therefore, consider to run the *Preprocessing* roadmap step during a phase with low database load (for example, at a predecessor weekend).

At the beginning of the *Preprocessing* roadmap step, the ABAP Workbench has to be locked. This has an impact on the development system as you can no longer provide corrections. The production system is also affected as no emergency corrections can be implemented in the system.

Right before the downtime starts, you have to back up your database and important directories.

Finally, consider the time needed for follow-up activities such as manual clean-up steps, load generation, adjustment transports, tests, or validation and backups.

> **i Note**
>
> When you start the update preparations, they depend not only on the length of the preparations but also on the length of the update itself. To determine the expected total length of the update of your production system, perform a test update of an SAP system with a similar set of data (a system copy of your production system is ideal).

Database-Specific Aspects

For the most important database-specific aspects that might have an impact on your overall planning, see Database-Specific Aspects [page 78].

Support Package Handling During the Enhancement Package Installation

An enhancement package requires a specific support package stack level in the system that you want to update. If the system is on a lower support package stack level, all required support package stacks are applied to the system in a single step, together with the enhancement package installation. When you download the enhancement package using the Maintenance Planner, the required support package stacks are automatically calculated and downloaded. The Software Update Manager installs these support package stacks as part of the enhancement package installation procedure.

> **i Note**
>
> According to the Support Package stacks that you have to apply, further test effort might be required due to changes contained in these support packages.

2.1.4 Technical Details of the Upgrade Procedure

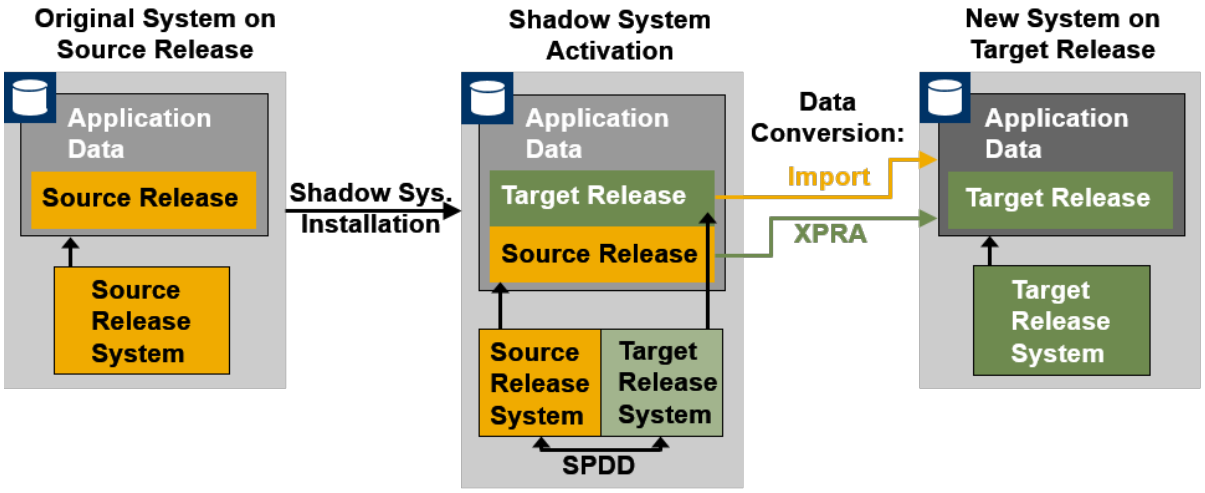
> **i Note**
>
> This section is only relevant if you perform a release upgrade.

SAP systems are upgraded with the System Switch Upgrade procedure. This procedure installs an instance of the target release, the shadow system, in parallel with the current source release system in the same database. The parallel system contains all the software of the target release and is used to perform actions on the target release while the source release is still in production operation.

Operating two instances in parallel places increased demands on free space in the file system, in the database, and on the system resources. No precise guidelines can be given for the duration of an upgrade. The duration of the shadow system installation depends on a great extent on the amount of data, the database system, and the hardware and can take several hours. Although the system can still be used in production operation, consider a possible performance decrease during this shadow system installation process. If necessary, some

parameters in the production system must be adjusted to enable you to operate the production and the shadow systems in parallel.

The following figure shows the process flow of the upgrade with the major steps of the process.



Process Flow of a System Switch Upgrade

The complete upgrade procedure is divided into roadmap steps. In these roadmap steps, the following actions take place:

- *Get Roadmap*
  The Software Update Manager analyzes the source system and the database, and it collects by means of a dialog sequence the needed information for the wanted scenario to assemble the roadmap.
- *Extraction*
  The Software Update Manager extracts the required software.
- *Configuration*
  In this roadmap step, you enter information required for the upgrade procedure such as information about software components, add-ons, and support packages that you want to include as well as information about the shadow system.
- *Checks*
  The Software Update Manager checks if the operating system and database version of your source release match the requirements of the target release. It also checks some application-specific requirements.
- *Preprocessing*
  In the *Preprocessing* roadmap step, the Software Update Manager creates the shadow system. This roadmap step requires only few user entries. And during the roadmap step, both the substitution table import and the shadow system operation start.
  When the roadmap step is finished and you choose *Next*, the downtime starts.
- *Execution*
  This roadmap step runs without any user interaction. While the processes of the *Execution* roadmap step are running, the system is in downtime. The switch to the new system takes place in this roadmap step. The Software Update Manager converts application tables and data to match the target release layout. In addition, it switches the SAP kernel.
- *Postprocessing*
  The Software Update Manager saves the log files and prompts you to start with certain follow-up activities.
- *Finalization and Summary*

The Software Update Manager removes files and directories that are no longer required and completes the upgrade. Moreover, it displays a feedback form on the SUM UI and prompts you to send your feedback to SAP for technical analysis. For more information, see Evaluating the Software Update Manager [page 186].

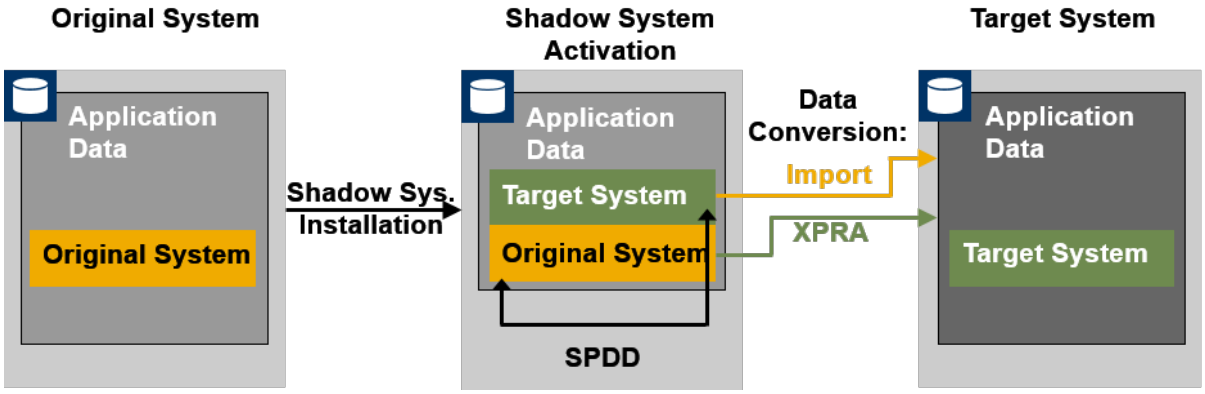
2.1.5 Technical Details of the Update Procedure

> **i Note**
>
> This section is relevant if you perform an SPS update, or if you install an add-on.

The Software Update Manager updates your system using a system cloning and switch procedure. This procedure installs a copy of the system, the shadow system, in parallel with the original system. The shadow system is used to update the affected software components and to install the additional components, while the original system is still in production operation.

Operating two instances in parallel places increased demands on free space in the file system, in the database, and on the system resources. No precise guidelines can be given for the duration of the update procedure. The duration of the system cloning depends on a great extent on the amount of data, the database system, and the hardware and can take several hours. Although the system can still be used in production operation, you have to take into account a possible performance decrease during this cloning process. If necessary, some parameters in the production system must be adjusted to enable you to operate the production and the shadow systems in parallel.

The following figure shows the process flow of the update procedure with the major steps of the procedure.



Process Flow of an Update Procedure Using the System Switch Procedure

When you install **add-ons**, use the procedure relevant for their delivery method. Add-ons delivered through a `stack.xml` configuration file are installed during the procedure by the Software Update Manager.

The complete update procedure is divided into roadmap steps. In these roadmap steps, the following actions take place:

- *Get Roadmap*
  The Software Update Manager analyzes the source system and the database, and it collects by means of a dialog sequence the needed information for the wanted scenario to assemble the roadmap.
- *Extraction*
  The Software Update Manager extracts the required software.

- *Configuration*
  In the *Configuration* roadmap step, you enter information required for the upgrade procedure such as information about software components, add-ons, and support packages that you want to include as well as information about the shadow system.
- *Checks*
  The Software Update Manager checks if the operating system and database version of your source release match the requirements of the target release. It also checks some application-specific requirements.
- *Preprocessing*
  In this roadmap step, the Software Update Manager creates the shadow system. This shadow system is then used for various update activities while you can still use the original system in production operation. The Software Update Manager builds up the shadow system by cloning parts of the original system. All tables of the SAP NetWeaver Application Server are needed as shadow tables to operate the shadow system. The shadow system is used to perform the modification adjustment of the ABAP Dictionary objects and the activation of new ABAP Dictionary objects that are part of the update. Finally, the Software Update Manager performs the shadow import and writes directly into the shadow tables. Modifications to the contents of the original tables are indicated by triggers. These tables are copied and imported during downtime.
- *Execution*
  In this roadmap step, the switch to the target system takes place. The Software Update Manager completes the copy import action during downtime for all tables with set triggers. The `EU_SWITCH` phase completes the switch to the new system. All tables prepared in the shadow system are copied to the target system. The `KX_SWITCH_1` phase switches the SAP kernel. The `ENVFILES` phase changes the environment for the new release. The `PARCONV_UPG` phase converts the application table, and the phase `TABIM_UPG` imports the remaining data. Finally, the `XPRAS_AIMMRG` phase starts the XPRAs required by the system update.
- *Postprocessing*
  The Software Update Manager saves the log files and prompts you to start with certain follow-up activities. Furthermore, it runs cleanup activities and generates the evaluation.
- *Finalization and Summary*
  The Software Update Manager removes files and directories that are no longer required and completes the upgrade. Moreover, it displays a feedback form on the SUM UI and prompts you to send your feedback to SAP for technical analysis. For more information, see Evaluating the Software Update Manager [page 186].

2.2 The Software Update Manager

The following sections provide you with important information about the update program Software Update Manager (SUM) and its user interface:

- SUM Utilities (Extended UI) [page 42]
- SUM Observer Monitor [page 46]
- SUM MailNotifier [page 50]
- SUM Toolbox [page 53]
- SUM Directory [page 53]
- Storage of Passwords [page 55]

2.2.1 The Software Update Manager 2.0 in Brief

The Software Update Manager is the tool for the software maintenance of your SAP systems. In the following, you get a short overview about the tool.

The Software Update Manager is part of the *Software Logistics Toolset (SLToolset)* and a multipurpose tool that supports various software maintenance processes, such as:

- Performing release upgrades
- Installing enhancement packages
- Applying Support Package Stacks
- Installing add-ons
- Updating single components
- Performing system conversions to SAP S/4HANA

> **i Note**
>
> For clarity and readability, the term “update” is used in this document for all supported processes.

The Software Update Manager 2.0 supports among others the following system maintenance processes that are relevant with regard to SAP S/4HANA:

- Upgrading or updating your SAP S/4HANA version
- Upgrading or Updating to SAP Business Suite 7 Innovation 2016 based on SAP NetWeaver 7.5 or higher
- Upgrading or Updating to SAP NetWeaver 7.5 or higher
- Applying Support Packages Stacks to systems based on SAP NetWeaver 7.5 or higher

If you want to migrate your source database to a new database, you have to perform in addition a database migration. SAP introduced a one-step procedure that combines the system update and the database migration. This is provided with the *Database Migration Option (DMO)* feature of the SUM tool. For more information, see the DMO Guide related to your SUM version.

The main benefits of DMO are:

- Simplified migration steps
- System update and database migration combined in one tool
- Reduced business downtime
- The source database remains consistent, thus a fast fallback is possible

For more information about the SUM tool and the Software Logistic Toolset, you may see the following blogs in the SAP Community:

- Software Update Manager (SUM): introducing the tool for software maintenance
- The Delivery Channel for Software Logistics Tools: “Software Logistics Toolset 1.0”

See also the SAP Support Portal at http://support.sap.com/sltoolset ▶ *System Maintenance* ▶ *Software Update Manager (SUM) for <version>* to find the latest version of the tool, the appropriate documentation and SAP Note.

2.2.2 SUM User Interface (SUM UI)

The user interface of the Software Update Manager (SUM UI) is based on SAP Fiori.

For more information about SAP Fiori, see the following pages:

- SAP Fiori on sap.com:http://www.sap.com/fiori
- SAP Fiori on the SAP Help Portal: https://help.sap.com/viewer/p/SAP_FIORI_OVERVIEW

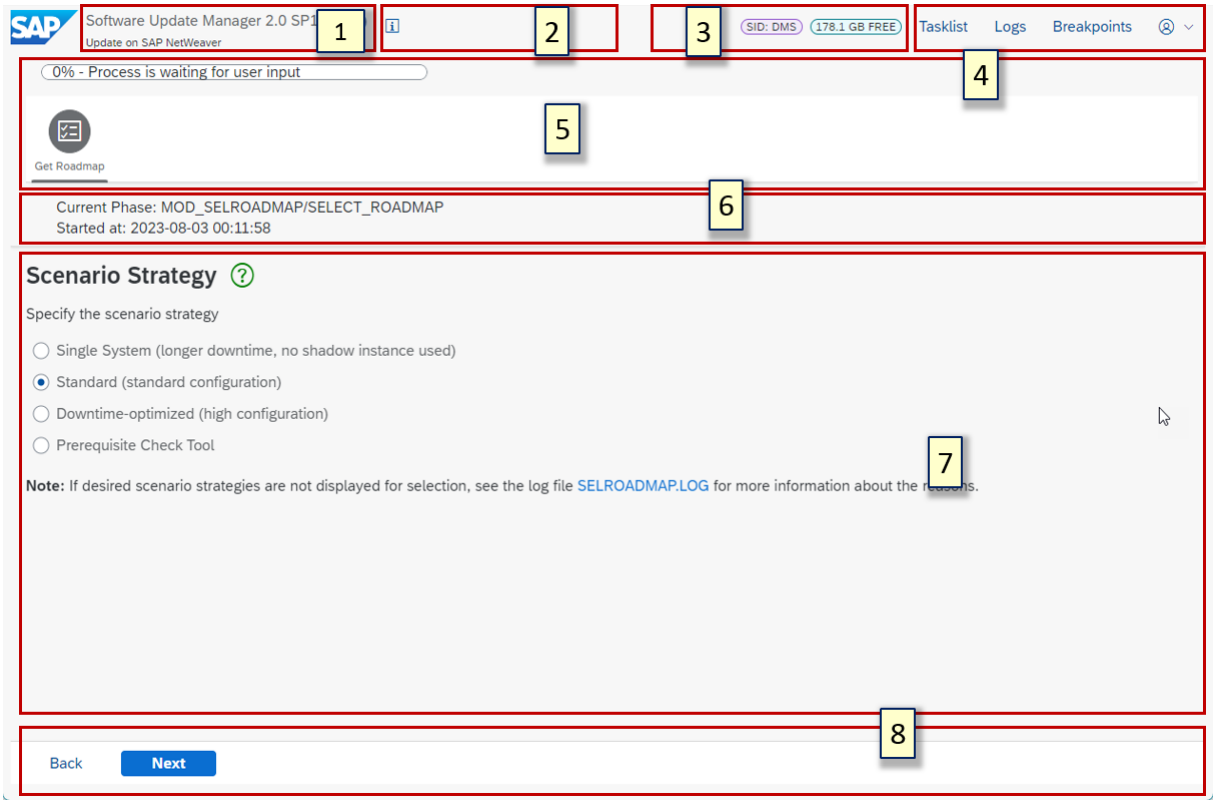
Prerequisites

- If you want to use the Secure Hypertext Transmission Protocol (HTTPS) for Starting or Restarting the Software Update Manager [page 121]: You have configured secure socket layer (SSL) for SAP Host Agent as described in the SAP Host Agent documentation at https://help.sap.com/viewer/host_agent ▶ *SAP Host Agent Configuration* ▶ *SSL Configuration for the SAP Host Agent* .
- Supported web browsers:
  - Microsoft Edge (latest release, not using compatibility view)
  - Microsoft Internet Explorer 11 (not using compatibility view)
  - Google Chrome (latest release)
  - Mozilla Firefox (latest release)

> → Recommendation
>
> We strongly recommend that you always use the latest available web browser release.

> i Note
>
> Note that future versions of the Software Update Manager no longer support Internet Explorer 11, as this browser is deprecated. For more information, see the corresponding blog in the SAP Community.

In the following example, you get an impression of the basic structure of the SAP Fiori-based user interface of the Software Update Manager:



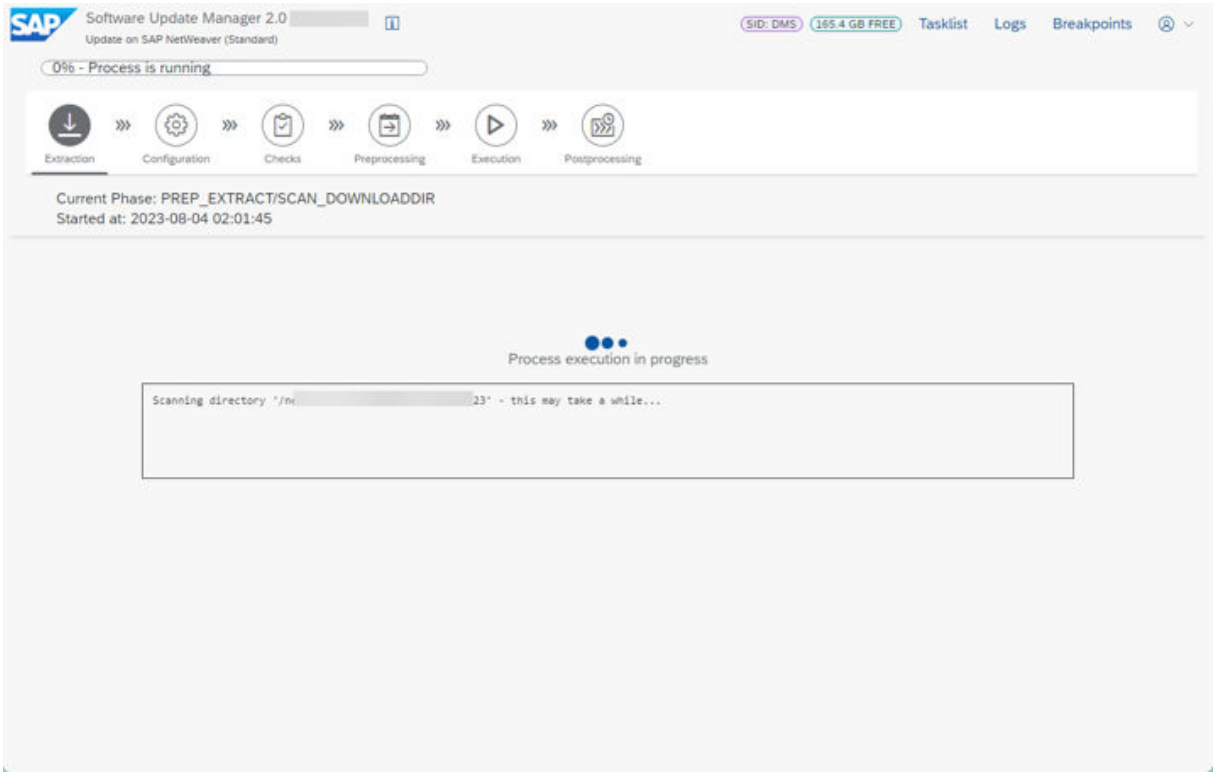
Legend:

1. - Upper line: Applied SUM tool version including support package and patch level
   - Lower line: Current scenario and strategy based on the input given in the initial dialogs
2. Area for flags that are displayed under certain conditions. For more information, see SUM UI: Flags [page 31].
3. Area for the the SAP system ID and free disk space information. For more information about the latter, see SUM UI: Free Disk Space Information [page 33].
4. Menu bar of SUM: *Tasklist*, *Logs*, *Breakpoints*, and the *More* menu. For more information, see SUM UI: Menu Bar [page 34].
5. - Upper line: Progress bar showing the progress in percent. In some phases, a second progress bar is displayed in addition, sometimes with additional information. See the following sections for more information.
   - Lower line: Bar with the roadmap steps. The current roadmap step is highlighted.
6. The current phase and its start time.
7. Area for dialogs, messages, second progress bar, etc. Among other things, you will be informed during a successful procedure about the next phase to be executed. If the phase cannot be precisely determined, the next roadmap step is displayed.
8. Buttons that are necessary during the current phase, such as *Back* and *Next*.

> **i Note**
>
> A question mark icon next to a heading or title on the SUM user interface indicates that there is a context-sensitive help topic.

Progress Display From the SAPConsole.log File

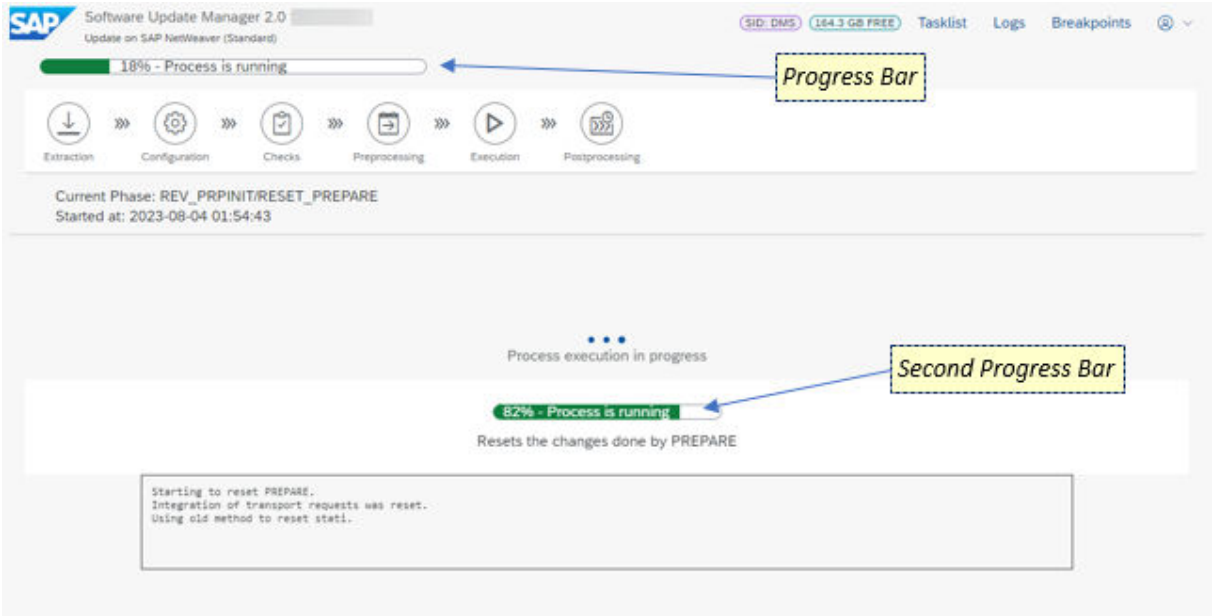
If the Software Update Manager is in a normal process execution and, for example, no dialog or other information is displayed, the message `Process execution in progress` is displayed on the SUM UI. Example:



Below this message you often see a box containing the progress information of the file `SAPupConsole.log` regarding the currently executed phase. It allows you to see which processes are currently running in the background by the Software Update Manager. Example:

Second Progress Bar

The duration of the different phases within a roadmap step can vary significantly. If long-running phases start within the roadmap step, a second progress bar is displayed on the UI. It is only valid for the current phase and supports you in estimating the progress of a long-running phase. Example of a second progress bar:



> **i** Note
>
> When you hover the mouse over the progress bar, a tooltip opens with further information. Beside the process state and the current time stamp, the estimated remaining runtime of the SUM procedure is displayed. The estimated runtime is displayed with the following format: mm:ss or hh:mm:ss. The abbreviation *ETA* means: Estimated Time of Arrival.

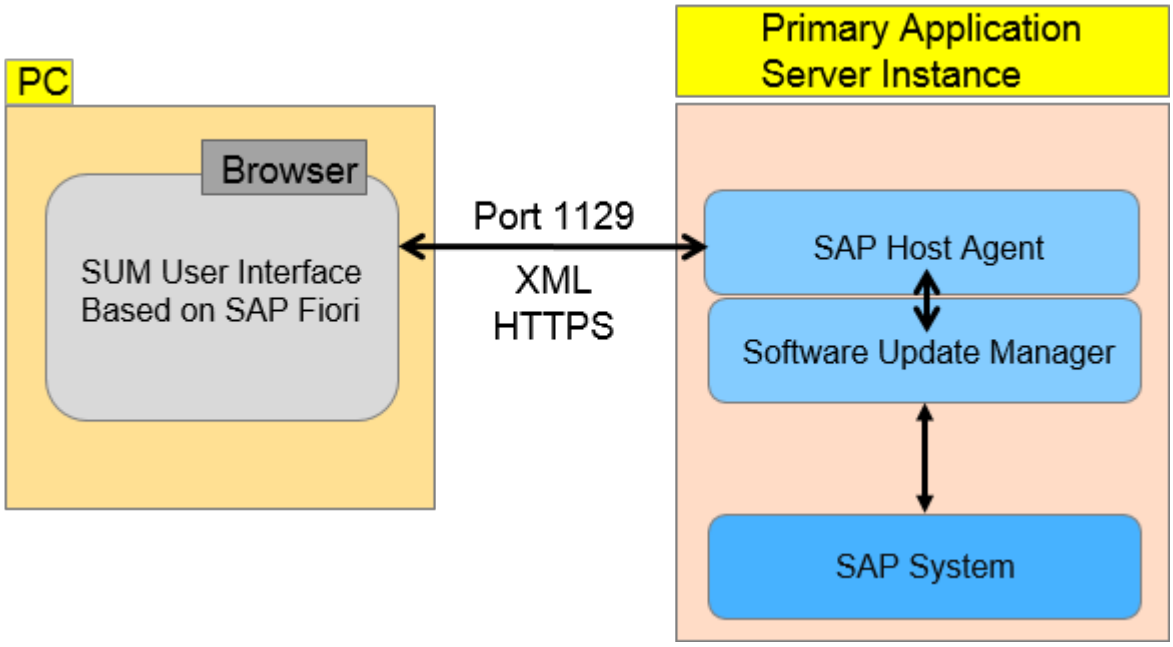
2.2.3 SUM UI: Communication with Back-End Processes

This chapter deals briefly with the technical background of the SUM UI.

To display the SUM UI correctly, it is necessary that Software Update Manager is known to the SAP Host Agent so that both can communicate with each other. For more information. see Registering SUM in SAP Host Agent [page 120].

You start the SUM user interface (UI) by entering the URL, which is relevant for your platform technology, in the address bar of a browser. This action connects the browser with the Software Update Manager by means of the SAP Host Agent. You can connect from a client machine, or from the same host. By default, the SUM UI uses

the standard protocol HTTPS (for a secure connection) and port 1129 of the SAP Host Agent. SUM then calls internally the relevant executables, which carry out the update steps.



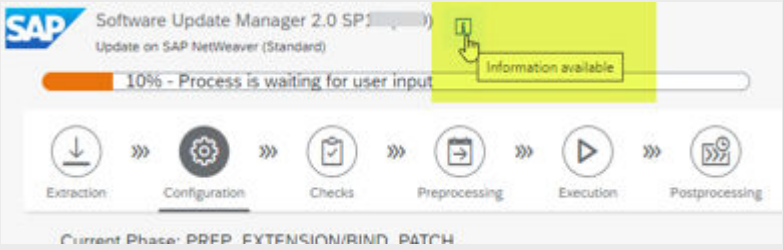
Communication Between the Browser and the Instance Where SUM is Running

> **i Note**
>
> The Software Update Manager internally calls the SAPup executable. Technically, SAPup is started twice, which is visible in the process list. One entry with *gt=httpchannel* represents the SAPup handling the requests coming from the SAP Host Agent. The second SAPup with parameter *guiconnect* triggers tools such as `R3trans`, `tp`, or `R3load`.

2.2.4 SUM UI: Flags

This section describes the flags that can be displayed during an update.

In the middle upper part of the SUM UI, next to the tool version title and the scenario information, flags with different shapes and colors can appear under certain conditions.

> **Example**
>
> 
>

Currently, three flags are available. Sometimes two of them or all appear at the same time side by side.

- `Checks.log` flag [page 32]
- `Failed Buckets Notification` flag [page 33]
- `Aborted Daemon Processes` flag [page 32]

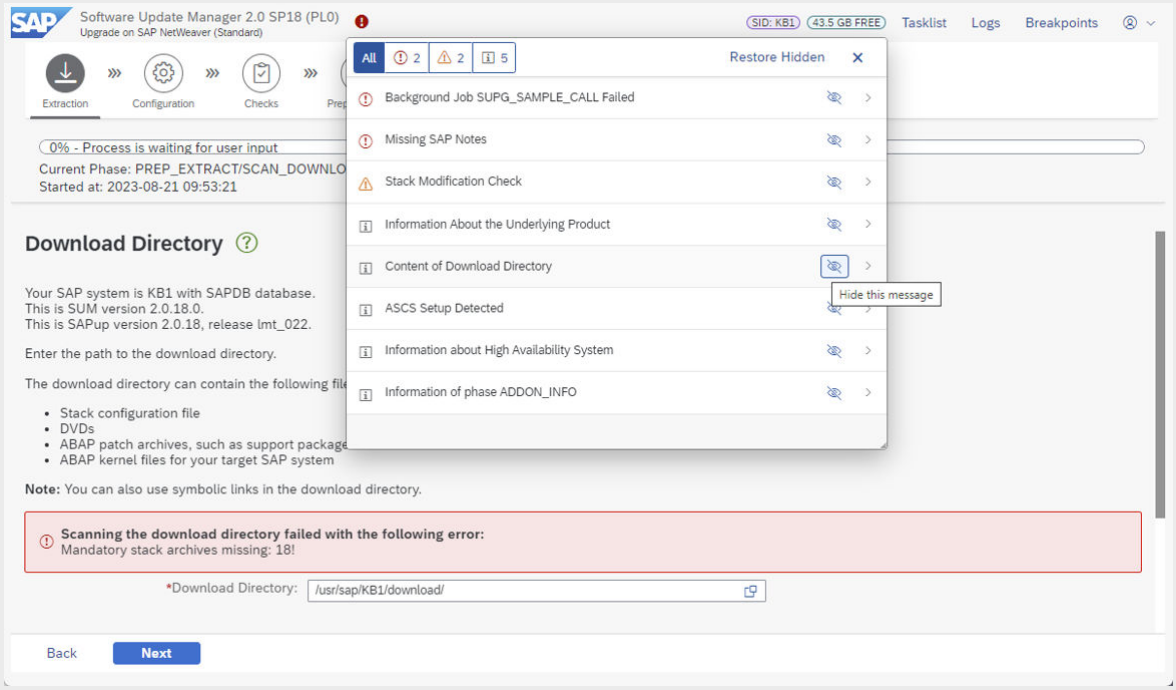
Checks.log Flag

The checks.log flag reflects the content of the file `checks.log` related to the current roadmap step. Depending on the type of the entry with the highest severity, the flag has a different shape and color. It can be of type information (= green or blue square), warning (= yellow or orange triangle), or error message (= red circle).

You can click the flag to open a dialog box with a list of the current log file entries. You are also warned with this flag against P-messages stored in the `Longpost.log` file. For more information, see Solving P-Errors [page 192].

You can select an entry and click the right arrow to get detailed information about the entry. Moreover, you can hide single messages in the list. Hidden messages can be restored.

Example



Failed Daemon Processes Flag

This flag occurs in form of a red triangle if you perform one of the following features of the Software Update Manager:

- Downtime-optimized Database Migration Option (downtime-optimized DMO)
- Near-Zero Downtime Maintenance (nZDM)

The related tooltip *There are failed daemon processes!* informs you about the aborted or failed daemon processes of the SAPup executable.

When you click the icon, a new browser window with the SUM Utilities (Extended UI) [page 42] opens in which *Process Control Center* is displayed directly. The detailed process overview lists the aborted daemon processes, and you can select and restart a process.

Failed Buckets Notification Flag

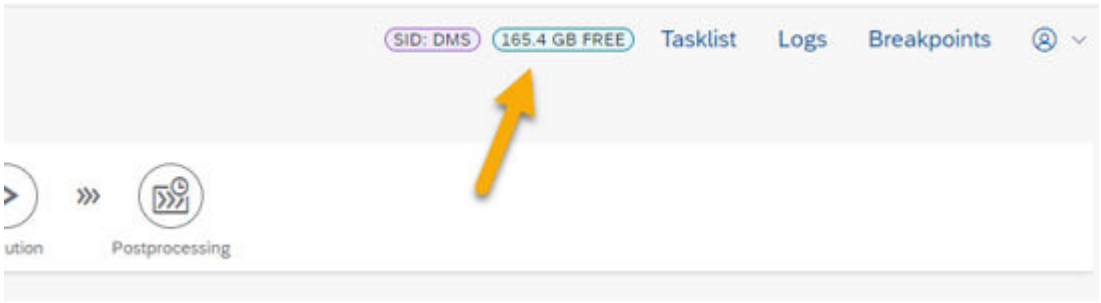
This flag is relevant when you are executing the Database Migration Option (DMO) of the Software Update Manager, and failed buckets occur. A flag in the form of a red triangle appears with the tooltip*There are failed process buckets!*.

When you click the icon, a new browser window with the SUM Utilities (Extended UI) [page 42] opens. The *Process Control Center* is displayed directly and allows you to monitor and maintain the buckets.

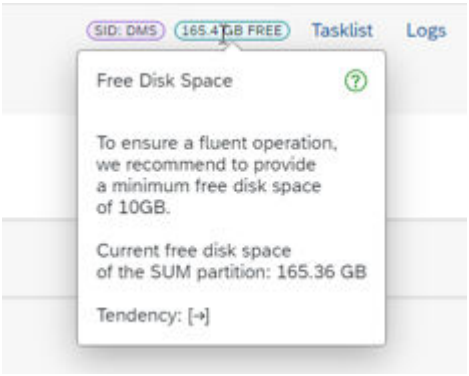
2.2.5 SUM UI: Free Disk Space Information

This feature concerns the indication of the current free disk space and the tendency, and it warns you by colors when the disk space falls below a certain limit.

An information label is permanently displayed on the left-hand side of the menu bar. In the label, the current free disk space on the SUM partition is displayed. Example:



When you hover over the label, you get a tooltip with a more detailed information and in addition a tendency indicator and, if applicable, a warning. Example:



Depending on the defined thresholds, the label can get different colors:

- More than 10 GB: The information label is displayed in **green** color.
- 10 GB and lower, down to 5 GB: The information label is displayed in **orange** color.
  In the tooltip, you see the warning `You should consider increasing the SUM partition size!`.
- 5 GB and lower: The information label is displayed in **red** color.
  In the tooltip, you see the warning `You should urgently increase the SUM partition size!`.

2.2.6 SUM UI: Menu Bar

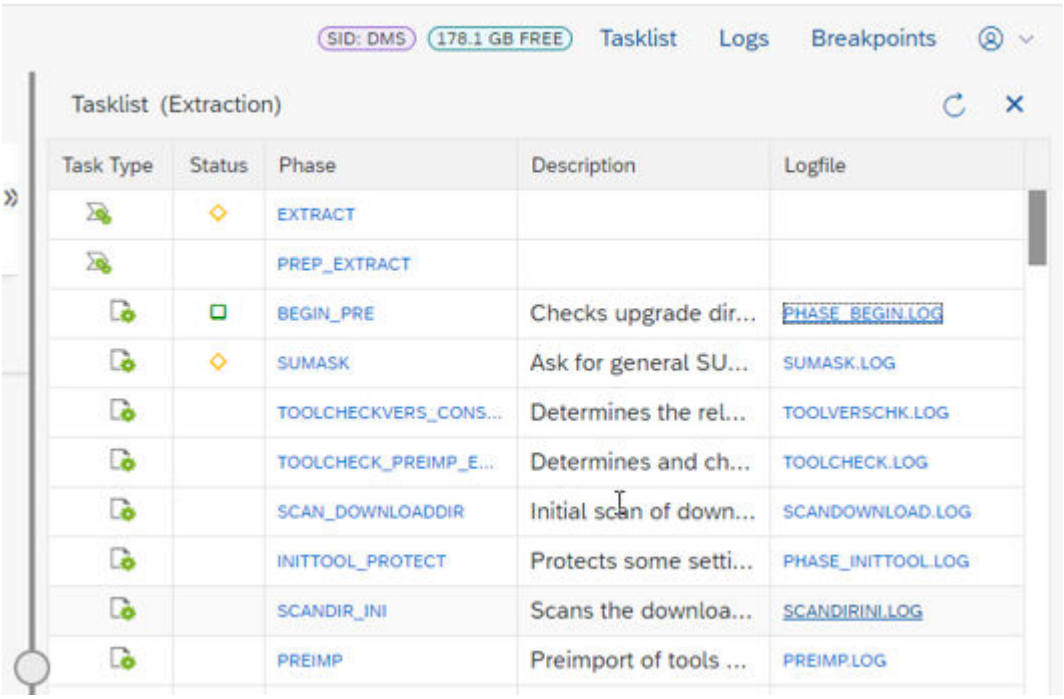
This section describes the different menu items that are available on the right side at the top of the SUM user interface.

The following menu items are covered in detail:

- Task List [page 35]
- Logs [page 35]
- Breakpoints [page 37]
- More Menu [page 38]

> **i** Note
>
> A slider on the left side of the *Tasklist*, *Logs*, or *Breakpoints* display allows you to change its size.

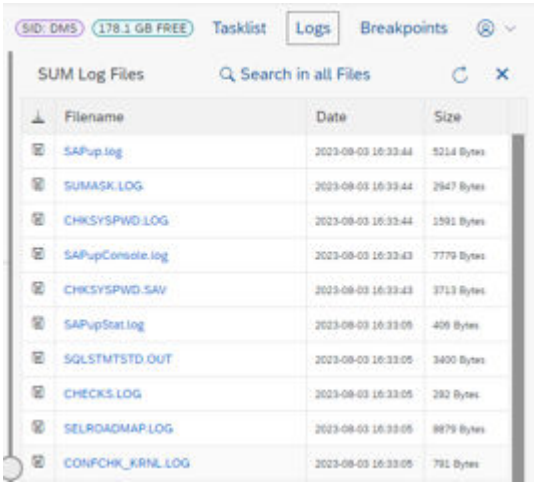
Tasklist



This option displays the phase list of the Software Update Manager, including existing phase descriptions, based on the `phaselist.xml` file. You can use the list to display the status of the current, previous, and subsequent phases of the procedure. The icons used in the *Task Type* and *Status* columns are described in the legend available in the *More* menu. Alternatively, you can hover over the icons to open a tooltip with the description.

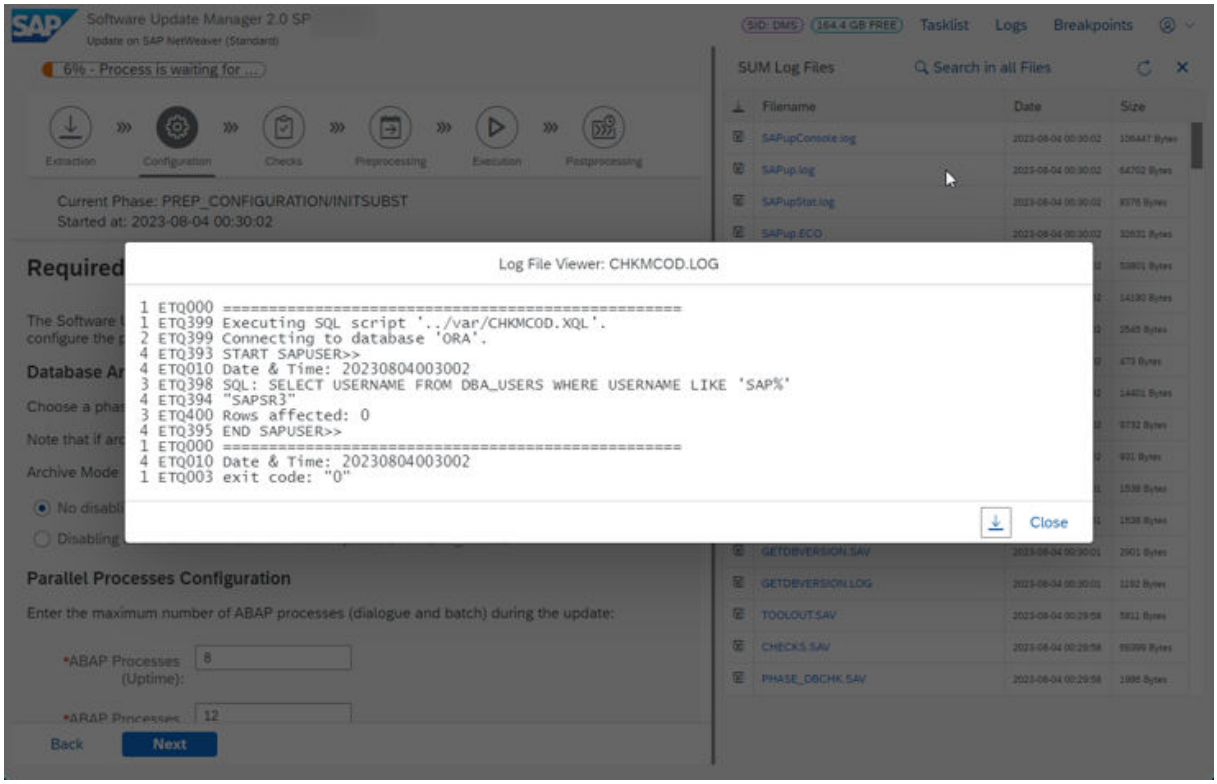
Click a phase name in column *Logfile* to open the log file viewer with the content of the related log file, which is mentioned in the far right column, provided that the file already exists.

Logs



You can open an overview of the available log files for the current step or phase. Furthermore, you can sort the list ascending or descending by names or date, and you can download a file directly.

Click a file name in row *Filename* to open the log file viewer with the content of the related log file. In addition, you can download the log file. Example of a log file content in the viewer:

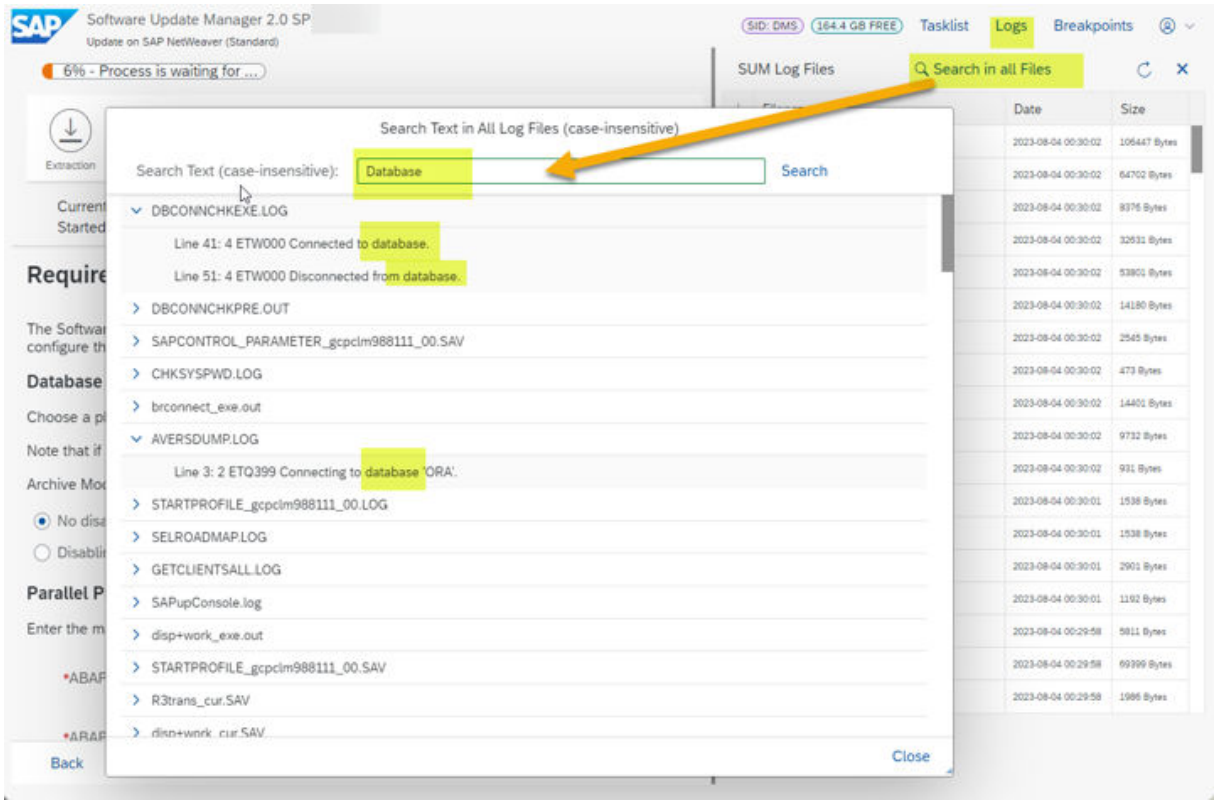


> **Note**
>
> - Alternatively, you can access the log files on file system level in directory *<SUM directory> > abap > log*. Some phases or steps generate log files in subdirectories of the log directory, so you can still need file system access to analyze them.
> - `.sar` files cannot be displayed in the log viewer because of their binary content. However, they can be downloaded, too.

Text search in log files

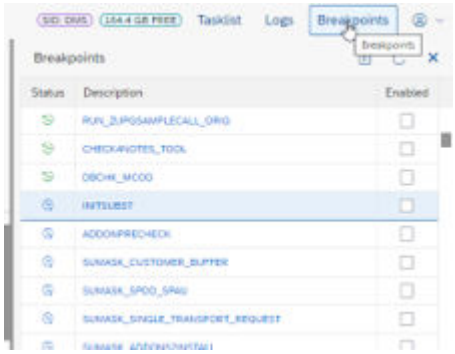
The log window offers you also the option to search the log files for character strings. You can use the button *Search in all Files* for this purpose. A second window opens in which you can enter the wanted search expression, for example: **`database`** or **`error`**. Note that the search is case-insensitive. As a result you get a list of log files names that contain the searched character string. You can expand each line to get a more detailed listing of the lines in which the string you are looking for occurs.

Example of a search for entries with **database**:



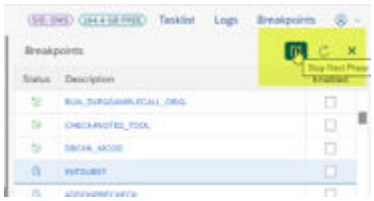
If you double-click a line, the file viewer opens and displays the content of the file around the line found. The searched string is highlighted. If you click *OK* in the file viewer, it is closed and the results list is displayed again.

Breakpoints



SUM offers the possibility to use breakpoints, which allow you to pause the update procedure at a specified point. A list of the breakpoints is displayed. You can click the header *Description* to get a dropdown list with sort- and filter options. The icons for the breakpoint status are described in the legend.

A further feature allows you to switch on or off the single-step mode by means of a button *Stop Next Phase* to pause the procedure at every next phase.



For more information, see Breakpoints During the Update [page 126].

More

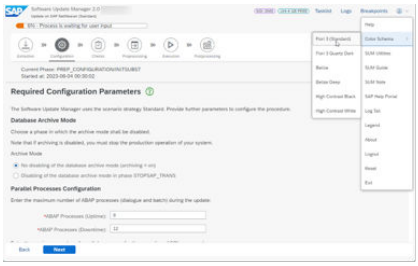
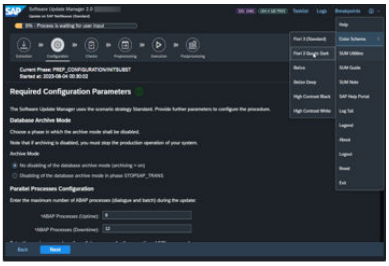
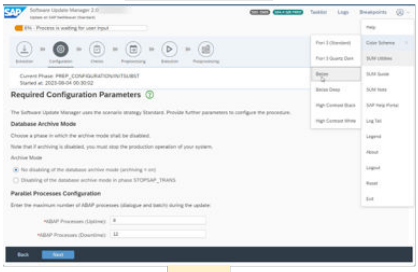
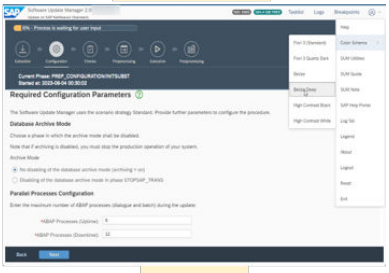
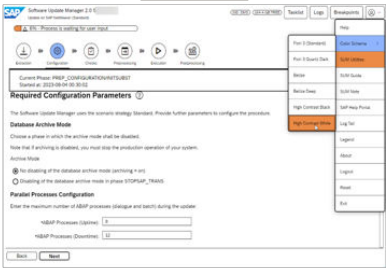
In the upper right corner of the SUM UI, you find the *More* menu. Use this menu to get support or more information, reset the update, or log out from the browser session. Depending on the status of the update procedure, different options are offered.

Help

If you choose this option, a context-sensitive online help is displayed in a new tab with the content of the related SUM guide. Ideally, the topic related to the dialog from which you open the help window is shown.

If there is no appropriate help available, the table of contents of the SUM guide is shown automatically. You can jump from here to the content that is relevant for you.

> **i Note**
>
> Alternatively, you can use the F1 button to open the help window.
>
> The question mark icon next to a heading or title on the SUM interface indicates that there is a context-sensitive help topic.

Color Schema	The option *Color Schema* offers you themes that you can use with the SAP Fiori-based user interface. You can choose between the following themes: • *Fiori 3 (Standard)* • *Fiori 3 Quartz Dark* • *Belize* • *Belize Deep* • *High Contrast Black* • *High Contrast White*  Fiori 3 (Standard)  Fiori 3 Quartz Dark  Belize  Belize Deep  High Contrast Black  High Contrast White
Utilities	Opens a new window with an extended user interface. For more information, see SUM Utilities (Extended UI) [page 42].
SUM Guide	Opens the entry page for the SUM 2.0 guides in a new web browser window. Here you can filter for database and operating system to get the related SUM 2.0 guide.
SUM Note	Opens a new web browser window, in which the central SAP Note for the current Software Update Manager version is displayed. The source of the SAP note is the SAP Support Portal.

SAP Help Portal	Opens the SAP Help Portal in a new web browser window, which contains SAP product documentation and other related information such as SAP Notes, product availability information, and community content.
Log Tail	Opens the log tail viewer for selected log files. In a pop-up window, the chosen log file is reloaded and displayed at short time intervals. You can pause the display to check some log lines.
Legend	The legend explains the meaning of the icons that are used for • the different phase types and status in the task list • the different breakpoint status .
About	Displays information about the current version of the Software Update Manager, the Software Logistics Protocol, and the Software Logistics UI Client.
Logout	Logs you off the current browser session. Note that the update procedure itself continues running in the background. To log on again, proceed as described in Starting or Restarting the Software Update Manager [page 121].
Reset	Note that this option is not always available in the menu. It sets the system to a state that allows the update procedure to be restarted from the beginning. This option is only available during resettable phases. However, it is available at the end of a successful update procedure without DMO. For more information, see Resetting the Update [page 125].
Exit	Note that this option is not always available in the menu. It stops and exits the current update process and displays the initial dialog of the SUM user interface ("*Tool start required*"). If you choose *Exit* during this dialog, you also terminate the `SAPup` process on the server and stop SUM completely. An appropriate message on the SUM UI appears, and you can close the web browser page. Alternatively, you can restart the Software Update Manager again by refreshing the web browser page or by clicking on the link in the message. You can continue from the point where you chose *Exit*.
Cleanup	Note that this option is not always available in the menu. It cleans up the `SUM` directory and terminates all running `SAPup` processes on the server. An appropriate message on the SUM UI appears, and you can close the web browser page. In this way, the Software Update Manager has been stopped completely so that using *Exit* is not necessary anymore. This option is only available at the end of a successful update procedure or after you have chosen *Reset*. At the end of a successful update procedure, a cleanup prevents the execution of a reset afterwards. On the other hand, after a reset has finished successfully, the cleanup is obligatory. See also Resetting the Update [page 125].

2.2.7 SUM UI: Buttons

During the update, the buttons *Back*, *Next*, and *Cancel* are displayed depending on the current step or phase and dialog.

If you encounter an issue during the update procedure such as aborts or errors, the Software Update Manager displays in some cases the buttons *Repeat* or *Init* or both. *Init* basically means that the current phase will be initialized again and restarted. However, this varies depending on the phase.

Due to several restrictions or limitations only certain processes of a phase might be repeated again and not the whole phase. If you choose *Repeat*, the current process within a phase will be repeated from the point where update procedure stopped.

2.2.8 SUM UI: Mandatory Input Elements

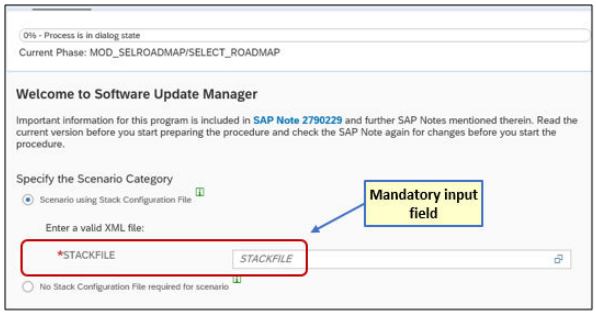
This chapter briefly deals with some input fields in the dialogs.

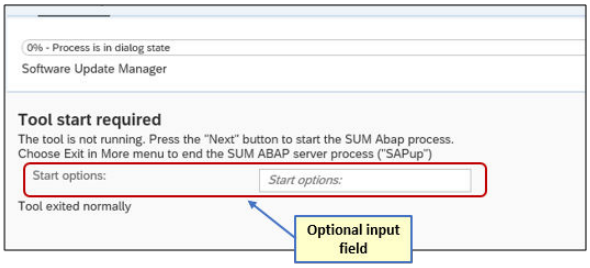
During the procedure with the Software Update Manager, you encounter a sequence of dialogs. They contain divers elements such as input fields, radio buttons, or checkboxes. These elements require your input such as a file name or a password, or your action such as ticking a checkbox or selecting a radio button.

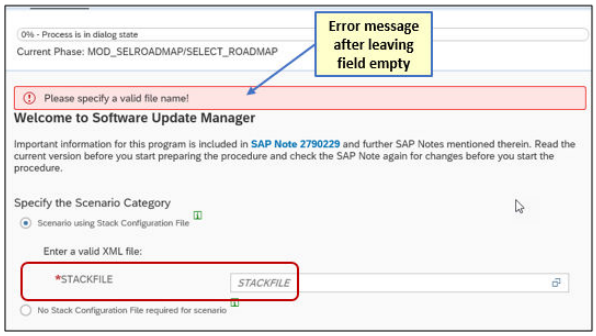
Input fields or checkboxes are in general of type optional or mandatory. They can be distinguished by a little star ("*asterisk*") in front of the label of a checkbox or an input field, which indicates a mandatory input element. If you come across such an element, you must enter the required input, or you must tick the checkbox to proceed with the SUM procedure.

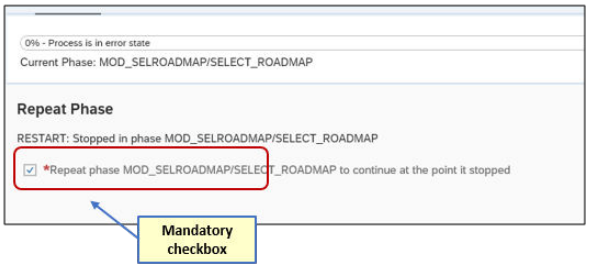
If an element is left empty, a warning is displayed, or the *Next* button is grayed out. The Software Update Manager thus prevents the next step.

In the following, you see examples for an optional input field, a mandatory input field, and a mandatory checkbox:





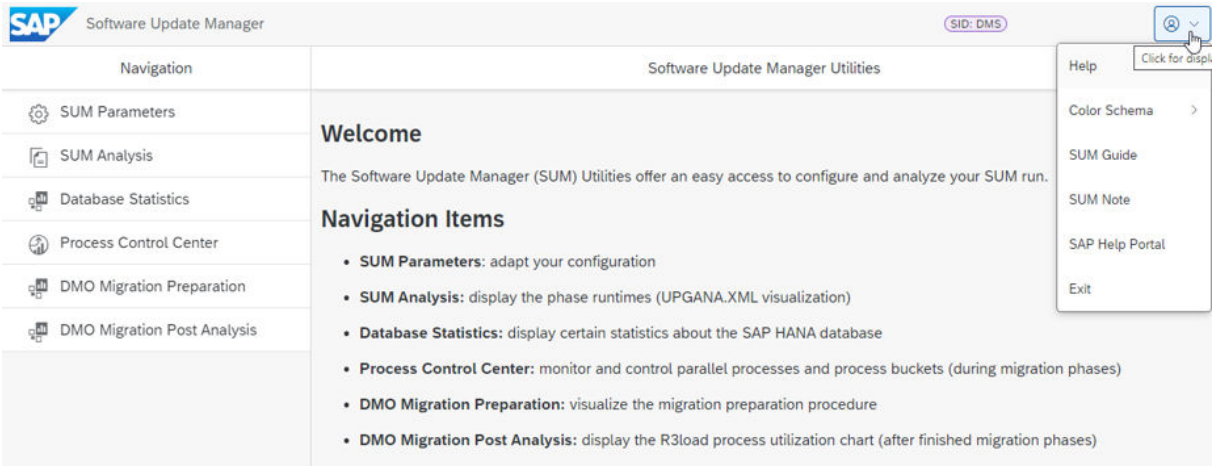




2.2.9 SUM Utilities (Extended UI)

The Software Update Manager Utilities (SUM Utilities) extend the SUM user interface and provide an easy way to configure, monitor, and analyze the SUM run.

To open the SUM Utilities, choose *Utilities* from the *More* menu on the SUM UI: Menu Bar [page 34]. A **new** web browser window opens with an "*extended user interface*" that offers you various additional options:



> **i** Note
>
> The menu item *Database Statistics* is only relevant for SAP Hana database.

The options in detail:

Navigation	Description

SUM Parameters	This option enables you to adapt the configuration of your SAP system by processing the following parameters:
	• *SUM Process Parameters* (such as the number of ABAP processes, SQL processes, `R3trans` processes). Further options are:
	  • Control of the ABAP batch job execution.
	  That is, you can specify a dedicated server, or you let the system decide where to run the jobs.
	  • Decision on the reconfiguration of the temporary instance or the shadow instance.
	  This is especially relevant when you have chosen the scenario strategy *Downtime-optimized*. The temporary instance is affected when you have selected the *downtime-optimized Database Migration Option*. The shadow instance, on the other hand, is affected when you work with the *near-Zero Downtime Maintenance (nZDM)*.
	  To monitor the reconfiguration, use the *CRR Control Center* which is mentioned in the following section *Process Control Center*.
	• *SUM Shadow System Parameters* (such as the instance number)
	• *SUM Migration Parameters* (such as the migration key)
	• *SUM Passwords*
	Each dialog with a password request is displayed here again. This can be passwords for
	  • user `DDIC`
	  • SAP Service user (`SAPServiceSID`)
	  • shadow system user `DDIC`
	  • database user `SYSTEM`
	  • shadow database user `SYSTEM`
	• *SUM Migration Passwords* (such as system user password for the target database. The password concerns the database migration and refers to the password for the database user `SYSTEM` of the target database)
	i Note
	In each dialog box, you can enter a new password that overwrites the existing password.
	Note, however, that you do not change the password in your SAP system, but only the password that the Software Update Manager uses to communicate with your SAP system.

SUM Analysis	*SUM Analysis* This option visualizes the `UPGANA.XML` file, which contains detailed information about the update procedure and the runtime of the different phases. See also Using the SUM Analysis Feature [page 213].

Navigation	Description
Process Control Center	For more information, see the following table.
DMO Migration Preparation	This option is relevant if you are executing the database migration option (DMO) of the Software Update Manager. For more information, see the DMO guide.
DMO Migration Post Analysis	This option is relevant if you are executing the database migration option (DMO) of the Software Update Manager. For more information, see the DMO guide.

Process Control Center

With the *Process Control Center*, you can monitor and handle running processes. It consists of the following options:

Charts Control Center (Process and Load Monitor)	On the view *Evolution of Parallel Processes*, you can monitor the `R3load` processes that run in parallel during phase `EU_CLONE_MIG_*_RUN`. The moving graph shows in real time the number of currently running `R3load` processes depending on the time. By moving the horizontal slider, you can dynamically increase or decrease the total number of `R3load` processes. The following *Process Buckets* table provides you with information about the status of each `R3load` process pair, that is, export and import processes. If an `R3load` process fails, you can analyze the appropriate log file and restart the `R3load` process pair provided that the issue is solved. For the restart, select the appropriate row and choose *Reschedule* in the top-right corner of the table. Note that during the update procedure the SUM UI can inform you about failed buckets by means of the *Failed Buckets Notification Flag* (see also SUM UI: Flags [page 31]). The flag disappears after you have restarted failed buckets successfully.

CRR Control Center (Replication Process Monitor)

Shows the current status of the *Change Recording & Replay (CRR)* procedure during the uptime. For more information about CRR, see Using the Record & Replay Technique in nZDM [page 73].

This information is relevant for the Using the near-Zero Downtime Maintenance (nZDM) Feature [page 72] technology as well as for the *downtime-optimized Database Migration Option*. For more information about the downtime-optimized DMO, see the *Planning* section of the *DMO Guide*.

- *Current Replication Status*
  This view gives you an overview of the ABAP-based and the `R3load`-based replication status. If both the ABAP-based and the `R3load`-based replication status are used in parallel, the system provides a total CRR status.
  If the CRR status is 75% and higher and the indicator *Ready for Downtime:* displays a *Yes*, you can enter the downtime and continue with the update.
- *ABAP Replication Monitor*
  This monitor displays the number of background processes that are used for the replication in the shadow instance. You can set the number of background processes by using the plus or minus button or by entering a number directly. Afterwards, you must accept the change to save the new number of processes.

  > **i Note**
  >
  > The number of background processes is limited to the value of parameter ABAP `PROCESSES (UPTIME)` that was defined during the `Configuration` roadmap step. The maximum number of processes that can be used for replication depends on the actual available background processes during the start of the replication.

  The list shows all tables currently processed by the ABAP-based replication and gives additional information. It is possible to use predefined filters for *Planned*, *Idle*, *Running*, and *Failed* table entries. Click the *Show Logfile* button to get more information about the replication processing.
- *R3load Replication Monitor*
  You can start and stop the `R3load` replication process and dynamically adjust the number of parallel `R3load` replication processes. The list displays the tables currently being replayed and their status and progress.
  Additionally, you see a list of running buckets from which you can navigate to the individual log files. The list also allows you to filter for failed processes to restart them. This feature is described in the DMO guide. Note that with `R3load` replication, you can restart individual buckets instead of stopping and starting the whole `R3load` replication.

If there are issues, see Error Handling for the Replication Process Monitor [page 242].

Process Control Center (Background Process Monitor)

This view displays all registered background processes and its status. In addition, you can start, stop, or kill such a background process.

The Software Update Manager starts background processes, for example, for the replication. They run in parallel beside the SAPup work process. In general, all registered background processes have the status `running`.

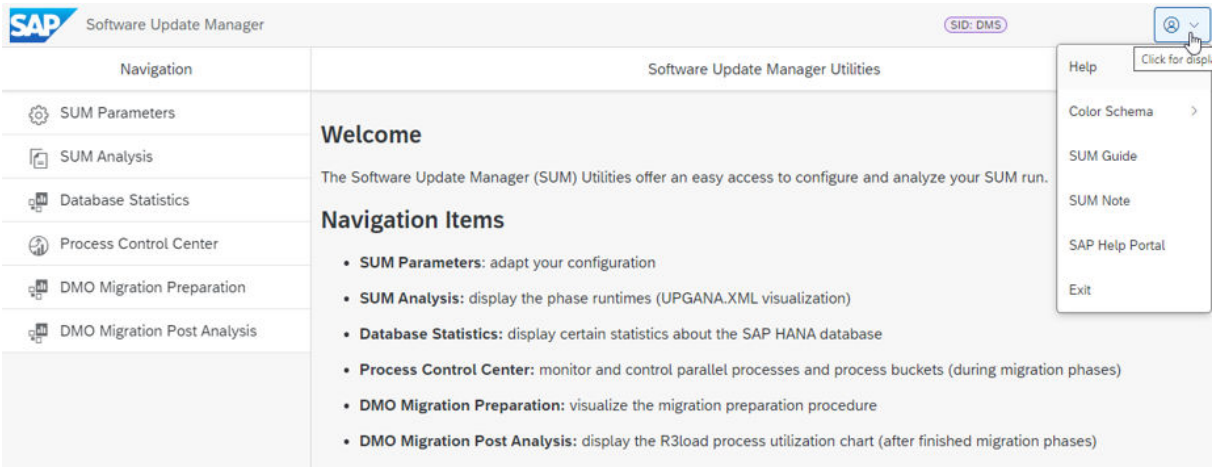
2.2.10 SUM Observer Monitor

The Software Update Manager offers an additional user interface that is called the `observer monitor`. It is displayed as the *SUM Observer Monitor*.

Default Display

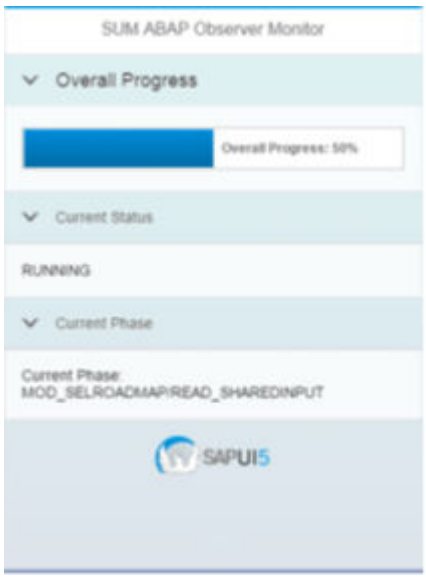
The *SUM Observer Monitor* is a kind of non-administrative mode or guest mode of the SUM user interface. It allows you to monitor a current update procedure and provides you with information about its status. You cannot enter data or change the update procedure.

You can use the SUM Observer Monitor in browsers on different devices, such as on a desktop PC or on a mobile device. And you can use it with any Software Update Manager technology (SUM ABAP, SUM Java, or the SUM dual-stack version). The SUM UI automatically determines the type of the Software Update Manager, indicates it in the title bar, and displays the appropriate status information. In the following, you see an overview of the *SUM Observer Monitor* in a browser window on a desktop PC:



SUM Observer Monitor in a Browser Window on a Desktop PC

In the following, you see an example of the SUM ABAP Observer Monitor on a mobile device.



SUM Observer Monitor in a Browser Window on a Mobile Device

For more information about starting the observer monitor, see Starting the SUM Observer Monitor [page 123].

Display of Additional Sections *Last Dialog* and *Troubleticket*

You have the option to expand the information display in the observer monitor with the areas *Last Dialog* and *Troubleticket*. To activate this display of these areas, the following lines must be present in the file `SAPup_add.par`:

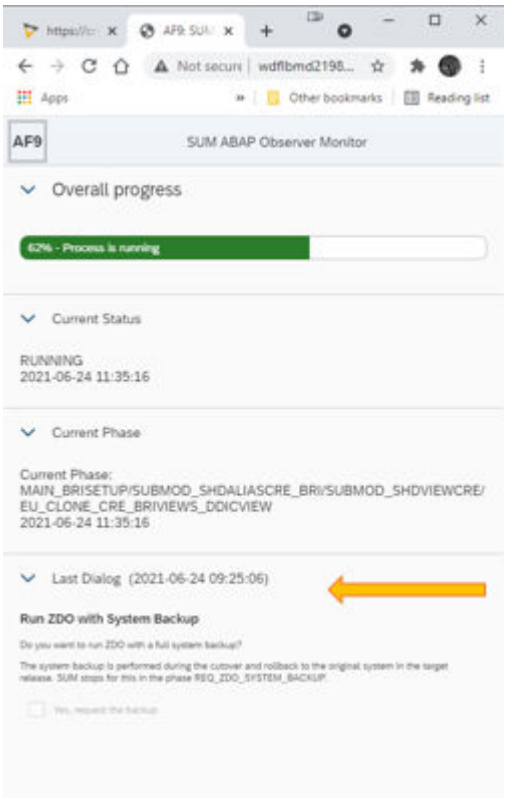
```
/observer/show_dialogs = yes
```

```
/observer/show_troubleticket = yes
```

> **i** Note
>
> The file `SAPup_add.par` is located in the subdirectory `bin` of the SUM directory. If this file does not exist yet, create it manually.

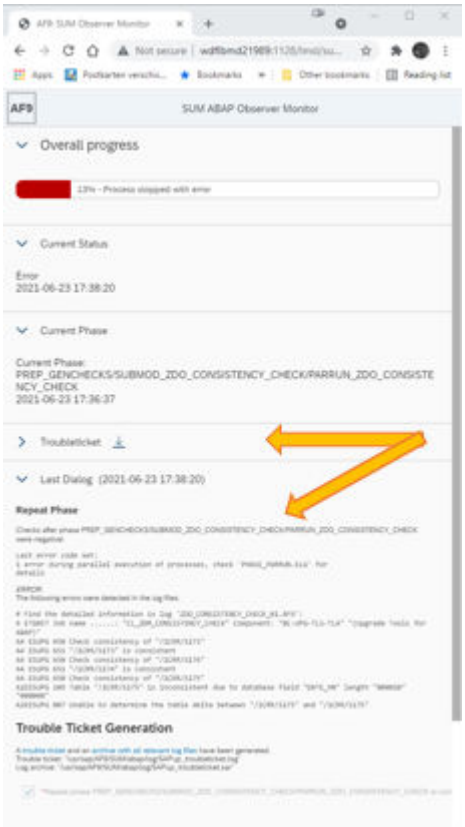
When these sections are activated, the `SUM Observer Monitor` displays the following:

1. If the Software Update Manager is waiting in a dialog, this dialog is also visible in the `SUM Observer Monitor` in a reduced form. However, the dialog display is read-only. That is, you have no possibility, for example, to enter data or to choose a button. Example:



2. If the Software Update Manager is in an error state, you see in the `SUM Observer Monitor` an excerpt of the error message that is displayed on the regular user interface. In addition, the section *Troubleticket* is

available, but initially collapsed. However, a download button is displayed with which you can download the `SAPup_troubleticket.zip` archive. Example:



3. After the download of the `SAPup_troubleticket.zip` archive, its content can be displayed in the *Troubleticket* section. Example:

2.2.11 SUM MailNotifier

The MailNotifier is a Java-based tool that notifies you by email when the Software Update Manager waits in a dialog for a user action.

If you are using the MailNotifier, you do not have to check the SUM user interface frequently, which is especially helpful during long-running update phases.

Structure

The MailNotifier tool of SUM consists of two Java files:

1. `MailNotifierApp.jar`: the executable `jar` file
2. `MailNotifierApp.props`: the properties file

Both files are part of the downloadable SUM archive. The MailNotifier files are unpacked to the subdirectory `<SUM directory>/abap/mailNotifier` of the SUM directory.

Copy both files to a PC or host that can be connected to both the SUM ABAP process (via HTTP or HTTPS) and the SMTP mail server. Furthermore, the PC or host must have at least Java 8 installed so that the MailNotifier can run on it. If necessary, you must ask your mail provider to enable SMTP connections.

Configuration

To configure the MailNotifier, add or update parameters and their descriptions such as for `Mail Server` and `SUM host` to the properties file `MailNotifierApp.props`. Other parameters are:

- `check.interval`: This parameter defines the interval in which the MailNotifier checks the status of the upgrade procedure.
- `check.dialog.tries`: This parameter defines how often the Software Update Manager provides the MailNotifier with the dialog status before it sends an email. This means that if you immediately handle the SUM dialog (and thus the MailNotifier receives the SUM dialog status only once, for example), the tool sends an email.

Instead of using the property file, you can provide the parameters on the command line using the schema `property=value` when starting the `jar` file.

> ⚠ Caution
>
> For security reasons, we recommend that you do **not** enter any passwords in the property file or on the command line. The MailNotifier prompts you on the command-line interface to enter the passwords manually, as shown in the following example:

```
...\SUM\abap\mailNotifier>java -jar MailNotifierApp.jar
properties=MyMailNotifierApp.props
[30.06.2016 09:16:22] INFO SumMailNotifier (Version 1.4.5) - starting ...
[30.06.2016 09:16:22] INFO Reading properties from classpath
"com/sap/lm/sl/upg/notifier/MailNotifierApp.props"
[30.06.2016 09:16:22] INFO Reading properties from file "MyMailNotifierApp.props"
[30.06.2016 09:16:22] INFO Requesting missing mandatory properties:
Property sum.pwd:
Property mail.pwd:
```

> ℹ Note
>
> - **https is the default as of SAP Host Agent 7.22 PL 52**
>
> If you have installed the SAP Host Agent 7.22 with patch level 52 or a higher SAP Host Agent version, the URL with http is automatically redirected to the secure *https* communication protocol. For more information about this SAP Host Agent, see SAP Note 3036093 and on the SAP Help Portal the chapter SSL Configuration for the SAP Host Agent in the SAP Host Agent Guide.
>
> If you want to use the MailNotifier with such a configuration, install the server certificate in the Java Development Kit or Java Runtime Environment that you use. In many Java Runtime Environments, this can be done with *keytool*. Note that the default SAP Host Agent certificate is not supported here. You must first install your own certificate in the SAP Host Agent.
> - **Disabling Certificate Verification**
>
> If necessary, you can also disable the certificate verification using the Java properties file. To do this, set the property *sum.ssl.use.keystore* property in the file to *false*: **`sum.ssl.use.keystore = false`**. By default, this property is set to *true* or handled as such if it is not found in the file.

Basic Functionality

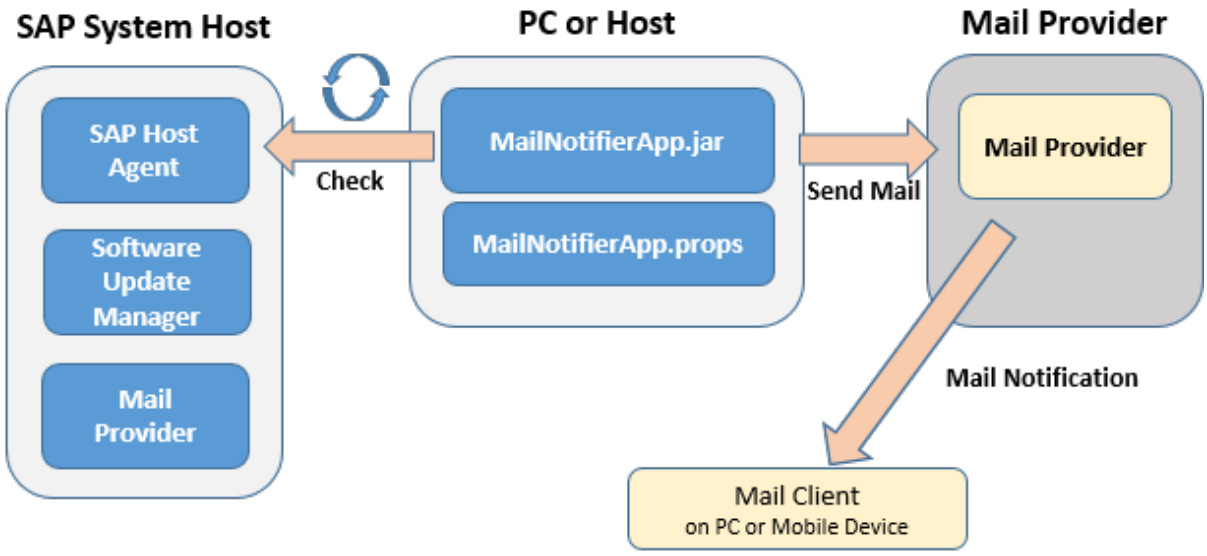
The MailNotifier checks the completeness of the parameters and checks if it is able to reach the update procedure in SUM. Then the tool sends an initial email so that you can check if the configuration is working.

> ✤ Example
>
> ```
> Subject: SumMailNotifier was started (DMS on wdflbmd15588)
> Dear SUM user, this initial notification mail was sent and received successfully!
> This e-mail was generated automatically, based on settings for SumMailNotifier.
> Do not reply.
> ```

Then the tool starts checking the update frequently and if a dialog is waiting for your input, it sends an email notification.

> ✤ Example
>
> ```
> Subject: SUM process (DMS on wdflbmd15588) requires action
> Dear SUM user, your SUM process (DMS on wdflbmd15588) is in dialog state and
> requires your action:
> SUM ABAP process started
> SAPup waiting in breakpoint dialog
> This e-mail was generated automatically, based on settings for SumMailNotifier.
> Do not reply.
> ```

The following figure shows the basic functionality of the MailNotifier:



Basic Functionality of MailNotifier

Preparing the MailNotifier at a Glance

To prepare the MailNotifier, proceed as follows:

1. Check if the following files have been unpacked to the subdirectory `<SUM directory>/abap/mailNotifier` of the SUM directory:
   - `MailNotifierApp.jar`
   - `MailNotifierApp.props`

2. Copy these files to a PC or host that meets the following requirements:
   - It is able to connect to both the SUM ABAP process via HTTP or HTTPS and your SMTP mail server.
   - Java 8 or higher is installed.
3. Configure the MailNotifier by entering the necessary parameters in the properties file `MailNotifierApp.props`.

You can then start the MailNotifier as described in Starting the MailNotifier [page 124].

2.2.12 SUM Toolbox

The `Software Update Manager (SUM) Toolbox` provides you with various tools to support your activities with SUM.

The *SUM Toolbox* is realized as an ABAP-based transaction with transaction code `SUMTOOLBOX`. It allows you to execute specific tools and reports for different software maintenance scenarios using Software Update Manager, with a focus on the downtime-optimized approaches.

The transaction `SUMTOOLBOX` replaces the previous procedure of delivering the tools using separate SAP Notes. Attached to these were Z-reports that had to be implemented manually in the SAP system. With the *SUM Toolbox* as a central entry point for the tools, they are easier to access and to use.

The documentation for each tool is embedded in the SUM Toolbox and can be opened there.

For more information about *SUM Toolbox*, see:

- SAP Note 3092738 (central SAP Note for the *SUM Toolbox*)
- SAP Community blog https://blogs.sap.com/2021/12/10/software-update-manager-toolbox-is-available-now/

2.2.13 SUM Directory

When the SUM archive is unpacked on the host where the tool is initially started, the `SUM` directory is also created and the files and programs are copied to this directory.

One of these files is `summanifest.mf`, which contains important and useful information for the support, such as the Software Update Manager version, the assembly and compilation version, and the machine type.

The recommended standard path of the `SUM` directory is:

`/usr/sap/<SID>/SUM`

> ⚠ Caution
>
> Make sure that unauthorized access to the SUM directory is prevented!
>
> Note that for security reasons, the access rights for all subfolders of the `abap` subdirectory are set to *700* by default. This means that only the owners of the directories have full rights, all others have no access rights. For the subfolder `abap/log` you can switch off this setting, so that other users also have read and execute rights. To do this, the following entry must exist in the `SAPup_add.par` file:
>
> **`/security/allow755`**.

The file `SAPup_add.par` is located in the subdirectory `abap/bin` of the SUM directory. If this file does not exist yet, create it manually.

The `SUM` directory has the following subdirectories:

- `jvm`
- `abap`

Each subdirectory contains files and further subdirectories:

- `jvm`
  Depending on your operating system, this directory contains the Java Virtual Machine delivered by SAP.

  > **i Note**
  >
  > SAP delivers the Java Virtual Machine, which is contained in this subfolder, especially for the use by the Software Update Manager for the update procedure. Do not confuse this Java Virtual Machine with the SAP JVM that is used by SAP systems based on SAP NetWeaver Java or SAP NetWeaver ABAP+Java (dual stack).

- `abap`
  Contains the following subdirectories:

Subdirectory	Description
`bin`	Contains the Software Update Manager, its libraries, and control files. The control files of the Software Update Manager are always updated automatically. The data they contain is critical for the smooth operation of the update tools. It is maintained exclusively by the Software Update Manager.
`buffer`	Contains control information for the transport control program `tp`.
`control`	Contains product-specific information.
`data` and `cofiles`	Contain files that are imported by `R3trans` during the update. They also contain the files for the language import as well as the data files of support packages and add-ons included in the update procedure.
`doc`	Contains all files related to the SUM user interface, the files for the online upgrade guide, and the observer progress files for the *SUM Observer Monitor* as well. Moreover, it contains the subdirectory `analysis` with the ABAP phase documentation and the `Upgana.xml` and `UpgAnalysis.xsl` files, which include information about the update after it has finished. The subdirectory `analysis` also contains the `phaselist.xml` file with the phase descriptions, and some migration duration files as well for the Database Migration Option, such as `migrate_ut_dur.xml` and `migrate_dt_dur.xml`.
`exe`	Contains versions of the SAP kernel. They can originate from an archive that you downloaded from SAP Support Portal to the download directory, or it can be a copy of the kernel used in the start configuration of the system.

Subdirectory	Description
`load`	Contains all subdirectories that are relevant for phases with R3load such as `migrate_ut`, `migrate_dt`, `migrate_ut_create`, or `shdviews`. Note that some phases are important for the database migration option only.
`log`	Contains most of the information about the update. All log files generated during the update and related to it are collected here. **i Note** See also the security notes at the beginning of the chapter in the caution box.
`mailNotifier`	Contains the necessary files for the `MailNotifier` tool.
`mem`	Contains important information used for the restart of the `SAPup` executable, such as current parameter allocations.
`sapnames`	Contains a backup of the profiles.
`save`	Contains files saved during the update by the Software Update Manager that can be used for subsequent updates, for example, the shadow system profile.
`srv`	Contains the HTTP-server.
`system`	Contains the working directory for shadow system.
`tmp`	Used for temporary storage. `R3trans` also stores its log files there before they are handled by `tp`. Some jobs that run directly in the SAP system also generate output files in the `tmp` directory. The most important of these output files include the distribution program, the activation program, and the conversion program, which are started by the Software Update Manager several times during the update.
`trc`	Contains trace files created by the Software Update Manager.
`var`	Contains files into which the Software Update Manager writes data during a procedure and reads it again for the procedure. The data is variable and refers only to the current procedure.

2.2.14 Storage of Passwords

During the update, you have to enter passwords for the users `<SID>adm` and `DDIC`. These passwords are stored in the memory file `MEMSAPup.dat`. The file is located in subdirectory `abap/mem` of the SUM Directory [page 53].

Although the passwords are encrypted, you have to deny the access to the `mem` subdirectory for other operating system users. Only the user `<SID>adm` needs access to this subdirectory. In addition, you should not share this subdirectory in the network.

If you save the SUM directory for later analysis after the update has finished, delete the file `MEMSAPup.dat`.

3 Quick Guide

The quick guide contains lists with actions to perform so that you can use it as check list.

- Check for latest SAP Notes and SAP documentation [page 57]
- Become familiar with the basic concepts and the SUM tool [page 57]
- Plan the update [page 58]
- Prepare the update [page 59]
- Update your system with SUM [page 60]
- Perform follow-up activities [page 63]

The actions are in chronological order so that you can work through them like a checklist. For more information, follow the links to the descriptions of the actions. You can also use the checklist to gain a quick overview of the update procedure.

Required SAP Notes and SAP Documentation

This document is enhanced and updated by SAP Notes. These SAP Notes are an important source of information when you plan and prepare your update, and also help you perform the actual update. The SAP notes are available on the SAP Support Portal (http://support.sap.com/notes).

Furthermore, you require additional documentation before, during, and after the update, such as SAP NetWeaver documentation. The documentation is available on the SAP Help Portal at http://help.sap.com.

☐ 1. You request the current SAP Notes [page 13]. You require at least the following SAP Notes:
   - Central Software Update Manager Note 3296457
   - The relevant database-specific SAP Note 2976852

☐ 2. You make sure that you can access the Further Required Documentation [page 14].

Basic Concepts and SUM Tool Overview

☐ 1. You decide on the sequence of updates in your SAP system group [page 16].

☐ 2. Release upgrade only: You plan the upgrade schedule [page 18].
Start your preparations for the upgrade at the latest two weeks before you upgrade your system. Each language that you import increases the minimum duration of the import by about 30 minutes.
SPS update: You plan the update schedule [page 20].

☐ 3. If you require more detailed information, see Technical Details of the Upgrade Procedure [page 22] or Technical Details of the Update Procedure [page 24].

☐ 4. You familiarize yourself with the Software Update Manager tool [page 25], its features, and user interface.

Update Planning

Before you start the actual update, plan it carefully so that downtime is reduced to a minimum and the update runs as efficiently as possible.

> ⚠ Caution
>
> Start planning your update at least **two weeks** before you want to begin with the update.

☐ 1. You familiarize yourself with the Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66]. With the information from these dialogs, the Software Update Manager assembles the roadmap for the wanted scenario.

☐ 2.
- Database Archiving Parameter [page 72]
- near-Zero Downtime Maintenance (nZDM) [page 72]
- Record and Replay Technique in nZDM [page 73]
- Process and Tool Parameters [page 74]
- Shadow Instance Parameters [page 75]
- SGEN Execution Modes [page 76]

☐ 3. Release upgrade only: You can upgrade the front-end software [page 76] as soon as you receive the software package.

☐ 4. Before you start the upgrade, you check the database-specific aspects [page 78] and include them in your upgrade schedule, if necessary.

☐ 5. **Archive Sizes:** We recommend 21 GB up to the `DOWNCONF_DTTRANS` phase and 26 GB to the end of the upgrade. However, these sizes are only estimations based on sample data.
Archive Sizes, for SAP ERP only: We recommend 35 GB up to the `DOWNCONF_DTTRANS` phase and 43 GB to the end of the upgrade. However, these sizes are estimations based on sample data.

☐ 6. Release upgrade only: You plan data management measures [page 79] to reduce the amount of data, if necessary.

☐ 7. You plan the customizing of the Prepare new environment profiles [page 80].

☐ 8. You plan the modification and enhancement adjustment [page 81] for ABAP, if necessary.

☐ 9. Release upgrade only: You meet the requirements for importing additional languages [page 84] for ABAP, if necessary.

☐ 10. Release upgrade only: You plan the handling of customer-specific translations and languages [page 85] in ABAP during the upgrade.

☐ 11. You plan to exclude customer-specific languages [page 86].

☐ 12. Release upgrade only: You check the support package or patch level [page 87] of the components included in the upgrade export.

☐ 13. You plan the update of distributed and high-availability systems [page 88].

☐ 14. You check whether your system is an MCOD system [page 90].

☐ 15. Release upgrade only: If you want to import a support package before an upgrade [page 91], you check that you meet the requirements.

☐ 16. You inform yourself about the integration of customer transports [page 91] into the update procedure.

☐ 17. You inform yourself about the ASCS instance split [page 93] during the update procedure.

☐ 18. You familiarize yourself with the ASCS Instance Move [page 94].

☐ 19. You familiarize yourself with the Switch to Standalone Enqueue Server 2 [page 95].

Update Preparation

You can perform the preparations while the system is in production operation. The Software Update Manager supports you here by making most of the necessary checks automatically.

> **i Note**
>
> In addition to the general preparations described in this document, you need to perform the preparations that are specific to your product version, which are described in an additional product-specific documents, such as the *Master Guide* or *Upgrade Master Guide* for your SAP product.

☐ 1. You choose the host [page 98] for the preparations.

☐ 2. You check the hardware requirements [page 98]:

- CPU, main memory, disk, and swap space - see https://www.sap.com/about/benchmark/sizing.html
  The minimum swap space is 20 GB.
- Disk space in the file system for the `SUM` directory, the download directory, and directory `DIR_TRANS`.
  The space required depends on the product you are updating. For more information, see the document with additional product-specific information, which is referenced in the *Master Guide* (or *Upgrade Master Guide*, respectively) for your product. We recommend at least 40 GB free space for the `SUM` directory as well as for the download directory, and 20 GB for the directory `DIR_TRANS`.
- Space requirements for the database:
  The Software Update Manager calculates the space requirements for the database. The free space required is in the range from 50 GB to 200 GB.

☐ 3. You check the software requirements:

- Release upgrade: Source release [page 100] of the SAP system
- Release upgrade: You check the uninstallation of software components [page 101].
- Operating system-specific requirements [page 102].
- You plan or perform the upgrade of the operating system and database system [page 102], if necessary. For information about which operating system and database versions are currently supported, see the Product Availability Matrix on SAP Service Marketplace at https://support.sap.com/release-upgrade-maintenance/pam.html.
- You familiarize yourself with the approaches for upgrading the operating system and the database system [page 102].
- You save the environment files [page 104].

☐ 4. You make the preparations at the database level [page 105].

☐ 5. You check the Central Services requirements [page 107] for ABAP:
You call transaction `RZ10` to check the values of the profile parameters `rdisp/mshost` and `rdisp/wp_no_vb`.

☐ 6. You call transaction `RZ04` to set the operation mode [page 108] for the update.

☐ 7. Enhancement package installation and SPS update: You check the number of background processes [page 109].

☐ 8. Source release SAP NetWeaver 7.0 or 7.0 EHP1 only: You make the preparations in the monitoring area [page 110].

☐ 9. You make sure that the requirements for the modification adjustment [page 110] have been met.

☐ 10. You release and confirm open repairs and request [page 111].

☐ 11. You fill the download directory [page 112].

☐ 12. You perform the specific preparations for distributed and high availability systems [page 114].

Running the Software Update Manager

Working with the SUM Tool

☐ 1. You familiarize yourself with the Prerequisites and Introductory Information [page 116].

☐ 2. You meet the requirements for the SUM directory [page 117].

☐ 3. You download and unpack the Software Update Manager [page 118] on the host where you want to run the Software Update Manager. Typically, this is the host on which the primary application server instance is running. However, you can also use an additional application server instance.

☐ 4. You register SUM in SAP Host Agent [page 120].

☐ 5. You start or restart the Software Update Manager [page 121].

☐ 6. You can start the SUM Observer Monitor [page 123] in a second browser window or on a mobile device.

☐ 7. You can use the MailNotifier [page 124] during the update procedure.

☐ 8. You can reset [page 125] the update if needed.

☐ 9. You can use breakpoints during the update [page 126].

☐ 10. You can verify the digital signature [page 128] of the software archives in the download directory.

☐ 11. You can run an update procedure with integrated customer transports [page 129].

☐ 12. You can perform a prerequisite check [page 132]

☐ 13. Release upgrade only: If you need extra software after starting the upgrade, you import or install [page 133] it now.

☐ 14. If needed, you can correct and update information about the installed software instances [page 134] in your SAP system.

Actions During the Roadmap Steps

For a complete list of all phases, see Using the ABAP Phase List for the Update [page 256].

Get Roadmap: Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66]

☐ 1. You specify the Scenario to get the roadmap [page 135], either by

- Making Entries for Scenarios with Configuration File [page 136] or by
- Making Entries for Scenarios Without Configuration File [page 139]

Roadmap Step Extraction [page 141]

☐ 1. You enter the download directory or mount directories for data carrier content, if necessary.

☐ 2. You enter the password of user `DDIC`.

☐ 3. You check the configuration of `sapcpe`.

☐ 4. You implement the SAP Notes that the Software Update Manager displays.

Roadmap Step Configuration [page 144]

☐ 1. Release upgrade only: You decide about using the RASUVAR<x> reports to save variants.

☐ 2. You enter the password for user `SYSTEM`.

☐ 3. Release upgrade only: You check the tool versions of the SAP kernel, `tp`, and `R3trans`.

☐ 4. Release upgrade only: You check the SAP Notes for the add-ons.

☐ 5. Release upgrade only: If you are running an MCOD system, confirm the question.

☐ 6. You enter several paths and parameters. This includes the following:

☐ 7. Moreover, you specify the software that you want to include in the update:

- Release upgrade only: You enter mount directories for the languages.
- You check the SPAM version.
- You enter the path to the stack configuration file.
- You decide about the add-ons.
- You confirm the support packages, if necessary.
- You include support packages.
- You enter the request for the modification adjustment, if necessary.

Shadow instance installation

☐ 1. You make entries for the shadow instance installation [page 154].

Roadmap Step Checks [page 155]

☐ 1. Release upgrade only: You start the application-specific upgrade toolbox.

☐ 2. You check the results of the system check.

☐ 3. If an error message is displayed during the check for database triggers (SLT) on exchange tables, you correct the error.

☐ 4. You check the SPAU fill level display and confirm all obsolete notes, reset all non-adjusted objects with active SAP version to SAP standard versions, carry out the outstanding modification adjustments.

☐ 5. You can review and modify the SAP profiles.

☐ 6. You evaluate the results of the preparation roadmap steps [page 159] in the window that appears after the *Checks* roadmap step has completed.

Roadmap Step Preprocessing [page 166]

☐ 1. You check the Software Update Manager Note, the application-specific SAP Note, and your database-specific SAP Note for new information and changes.

☐ 2. You confirm any unconfirmed support packages.

☐ 3. You check the list of ABAP Dictionary objects with active SAP versions, which have been modified but not yet adjusted, before they will be reset automatically to the SAP standard versions.

☐ 4. Release upgrade only: You enter the passwords for add-ons, if necessary.

☐ 5. Release upgrade only: If applicable, you examine and process the results of the consistency checks for custom software components and ABAP repository objects that SUM will rescue for the ABAP repository of the target system.

☐ 6. Release upgrade only: You upgrade your operating system or database to the required version now at the latest, or you import any software you still need.

☐ 7. Release upgrade only: You remove conflicts between customer tables and new views by deleting the customer tables.

☐ 8. You release the locked objects and confirm repairs in phase `REPACHK2`.

☐ 9. You clean up outstanding updates. You have to do this in the `JOB_RSVBCHCK_R` or `JOB_RSVBCHCK_D` phase at the latest.

☐ 10. You make sure that you can recover the old SAP kernel if this becomes necessary.

☐ 11. You lock the ABAP Workbench.
Release upgrade only: For scenario strategy mode *Standard* or *Downtime-optimized*: You lock the ABAP Workbench in phase `REPACHK2`.
Enhancement package installation and SPS update: For scenario strategy *Standard* or *Downtime-optimized*: You lock the ABAP Workbench in phase `REPACHK_EHPI`.

☐ 12. You process any incomplete conversion requests and restart logs.

☐ 13. Modifications: You confirm the request, if necessary.

☐ 14. Release upgrade only: As of phase `START_SHDI_FIRST`, you can only log on with front-end software [page 76] that is compatible with the target release.

☐ 15. You now clean up outstanding updates, RFC calls, and open data extraction orders as well at the latest.

☐ 16. Release upgrade only: Modifications: If you selected the scenario strategy *Standard* or *Downtime-optimized* in the initial dialogs, adjust modified SAP objects with the SAP standard versions.
Enhancement package installation and SPS update: Modifications: You adjust modified SAP objects with the SAP standard versions.

☐ 17. You check if SUM has generated and exported an safety transport request for objects adjusted with SPDD.

☐ 18. You check the `RSINDCRE.<SID>` log file for any errors that may have occurred during the creation of secondary database indexes.

☐ 19. You perform necessary actions that prepare your SAP system for the downtime.

☐ 20. You ensure that digitally signed SAP Notes can be downloaded and consumed in the shadow system.

Prepare Downtime and Isolate PAS

☐ 1. You perform actions to prepare your SAP system for the downtime, among which you are asked to isolate the primary application server instance [page 179] and back up the `/usr/sap/<SID>` directory including the complete `SUM` directory. You may also need a backup of the home directory of user `<SID>adm`.

Roadmap Step Execution [page 181]

☐ 1. After the shutdown, you reimport the current version of the profile into your SAP system to adjust the instance profile by using transaction `RZ10`.

☐ 2. Release upgrade only: Modifications: If you selected scenario strategy *Single System* in the initial dialogs, you adjust modified SAP objects with the SAP standard versions.

☐ 3. Changes made to the environment of user `<SID>adm` before the update are saved. You can repeat them after the update, if necessary.

☐ 4. If you are running the ASCS instance on a separate host, and the operating system on this host is different from that on the primary application server instance, you will be prompted by the Software Update Manager to install the latest SAP kernel on the separate host with the ASCS instance.

☐ 5. The Software Update Manager asks you to perform the following actions:
- You back up the database.
- You change the database recovery mode.

Roadmap Step Postprocessing [page 183]

☐ 1. Release upgrade only: You configure the automatic start of the SAP start service with the start of the operating system, if required.

☐ 2. If prompted, you can now start to generate loads for your SAP system.

☐ 3. You remove the P errors.

☐ 4. You take into account that the Software Update Manager performs a temporary renaming of SPAU transport request owner and client if you carry out the modification adjustment during the update.

☐ 5. You can perform the modification adjustment for repository objects now and use the related transport request during subsequent updates.

☐ 6. The Software Update Manager performs cleanup activities in the background. However, you can already use the system again.

☐ 7. You take into account that the Software Update Manager saves selected log files and control files in different directories, which SAP Support can use for error analysis if there are problems after the update.

Options After the SUM Run

☐ 1. You evaluate the Software Update Manager [page 186].

☐ 2. You make preparations to run the Software Update Manager for another update [page 188].

☐ 3. If you want to perform a subsequent SUM run on an identical system without re-entering parameter value, you generate a configuration file [page 188].

☐ 4. You stop the Software Update Manager completely [page 189].

Follow-up Activities

The Software Update Manager stops at the latest in the `MODPROFP_UPG` phase and prompts you to start the follow-up activities. The Software Update Manager then executes the last phases and completes the update. At the same time you can perform the follow-up activities specified by the Software Update Manager.

> ⚠ Caution
>
> In addition to the general follow-up activities described in this document, you need to perform the follow-up activities that are specific to your product version, which are described in an additional product-specific document. This document is referenced in the *Master Guide* or *Upgrade Master Guide* for your product.

Actions Before Restarting Production Operation

☐ 1. You solve all remaining P-errors [page 192].

☐ 2. You perform the follow-up activities for SAP profiles [page 193].

☐ 3. You perform the follow-up activities for user root [page 193].

☐ 4. You perform the database-specific actions [page 194]: Among others, you create or update the SAPDBA role, check the environment variables for `BR*Tools`, and back up the database.

☐ 5. You perform follow-up activities in the monitoring area [page 196].

☐ 6. You perform follow-up activities for the SAP kernel [page 197].

☐ 7. You reimport additional programs [page 197] such as RFC-SDK or CPIC-SDK from the *SAP NetWeaver Presentation* DVD, if necessary.

☐ 8. You call transaction SPAU and - if applicable - transaction SPAU_ENH to adjust modifications to Repository objects [page 198], if necessary.

☐ 9. You update the where-used list [page 199] in the ABAP Workbench, if necessary.

☐ 10. Release upgrade only: You adjust the Customizing settings [page 200].

☐ 11. You adjust your own developments [page 200], if necessary.

☐ 12. You perform follow-up activities [page 201] for SAP Solution Manager.

☐ 13. You adjust the user and role administration [page 202].

14. You check the system time zone settings [page 203].

☐ 15. You perform follow-up activities for SAP Profiles [page 193]

☐ 16. You perform the follow-up activities for user root [page 193].

☐ 17. You perform follow-up activities in the monitoring area [page 196].

☐ 18. Release upgrade only: You perform follow-up activities [page 201] for SAP Solution Manager.

19. For data protection and privacy reasons, you delete log files [page 212] that are not needed anymore.

Actions After Restarting Limited Production Operation

You can perform the following follow-up activities during limited production operation of the system.

☐ 1. You perform actions for the Cost-Based Optimizer [page 203].

☐ 2. You reschedule background jobs [page 204] that were locked when you isolated the primary application server instance.

☐ 3. You generate loads [page 204] using transaction `SGEN` and report RSGENINVLAS.

☐ 4. You perform follow-up activities for Application Link Enabling (ALE) [page 206].

☐ 5. You carry out manual actions for upgrading additional application server instances [page 207].

☐ 6. Enhancement package installation and SPS update: You check if indexes that are unknown to the SAP system [page 208] exist in your database.

Actions After Restarting Production Operation

You can perform the following follow-up activities during normal production operation of the system.

☐ 1. You delete old tablespaces [page 208].

☐ 2. You import support packages [page 209], if necessary.
If you want to install additional languages in your ABAP system, you import them **before** you import the support packages as described in the language transport documentation.

☐ 3. Transport Management System (TMS) [page 210]: You distribute the configuration to all systems in the transport domain.

☐ 4. Language transport [page 210]: You copy glossary and terminology data from container tables to database tables.

☐ 5. You save files [page 211] for subsequent updates and you make a backup of the subdirectory that contains the shadow instance profiles, if necessary.

☐ 6. You delete log files [page 212].

4 Planning

This part of the document contains information about planning your SAP system update.

Before you begin the actual update, you have to first plan it carefully. This includes requesting all the SAP Notes you need. Careful planning is a prerequisite for a successful update. The following information helps you plan your update so that downtime is reduced to a minimum, and the update runs as efficiently as possible.

When you plan your update, note the following information in addition to the information in the Quick Guide [page 57]:

- All the times specified in this document are based on hardware with medium performance levels.
- Do not perform any additional actions during the Software Update Manager run that could cause it to run less smoothly.
- Start planning your update at least **two weeks** before you start with the update preparations.
- To make sure that all requirements are met, run the preparation roadmap steps of the Software Update Manager, *Extraction*, *Configuration*, and *Checks* as soon as possible. You can reset and repeat the preparation roadmap steps as often as you need before the beginning of the downtime (see also Resetting the Update [page 125]). The successful execution of the preparation roadmap steps is a prerequisite for starting the actual update in roadmap step *Preprocessing*.
- If you are updating a modified system where changes have been made to the standard ABAP system, you have to start by updating a development or quality assurance system that has the same SAP system release (including Support Package level) and contains the same modifications. The adjustments you perform manually for the new standard in this system can be automatically exported to the global transport directory and are integrated into the update of the production system from there. This procedure eliminates the need for time-consuming adjustments to the production system. The successful execution of the preparation roadmap steps is a prerequisite for starting the update in roadmap step.

Actions

The following sections are important for planning the update:

- Release upgrade only: Import of Additional Languages [page 84]
- Release upgrade only: Handling Customer-Specific Translations and Languages [page 85]
- Excluding Customer-Specific Languages [page 86]
- Release upgrade only: Component Levels Contained in the Upgrade Export [page 87]
- Updating Distributed and High Availability Systems [page 88]
- Updates in an MCOD System Landscape [page 90]
- Release upgrade only: Importing Support Packages Before an Upgrade [page 91]
- Integration of Customer Transports [page 91]
- ASCS Instance Split [page 93]
- ASCS Instance Move [page 94]
- Switch to Standalone Enqueue Server 2 [page 95]

4.1 Initial Dialogs for the Scenario Specification (Get Roadmap)

By means of a dialog sequence at the beginning, the Software Update Manager collects the needed information for the wanted scenario.

In a sequence of dialogs, you can determine the scenario category and the scenario strategy. Furthermore, you can enter additional relevant values and parameters that the Software Update Manager needs to get the roadmap.

> **i** Note
>
> - If desired scenario strategies are not displayed for selection, see the log file `SELROADMAP.LOG` for more information about the reasons.
> - The previous preconfiguration modes `Advanced` as well as the update strategy parameter `downtime-minimized` and `resource-minimized` are not available anymore.

- Scenario Category [page 66]
- Decision on DMO [page 68]
- Scenario Strategy [page 68]
- Additional Parameters [page 69]
- Migration Parameters [page 70]
- Configuration of the Tools [page 70]

Scenario Category

The main starting point is your specification whether you want to use the `stack.xml` configuration file provided by the *SAP Maintenance Planner*. For more information, see Specifying the Scenario to Get the Roadmap [page 135].

Scenario Category with Configuration File

Select the scenario category with configuration file if you want to perform scenarios such as:

- Release upgrades (major release change)
- System updates (EHP installation)
- Support Packages (SPs) / Support Package Stack applications
- Conversion of SAP systems to SAP S/4HANA

In addition, you can use options and features of SUM such as:

- DMO: Database Migration Option (update of an SAP system combined with a migration of the source database to a new target database)
- nZDM: near-Zero Downtime Maintenance (includes features to minimize Business Downtime)

Scenario Category Without Configuration File

If you select the scenario category without configuration file, you can carry out scenarios such as:

- DMO without System Update
  Relevant for DMO with target database SAP HANA: You can run a DMO procedure for migration purpose only without updating the SAP system.
- Customer Transport Integration only
  You want to import your customer transport requests only without performing a standard update procedure. See also Integration of Customer Transports [page 91].
- Benchmarking Tool
  Relevant for DMO: With this migration tool, you can simulate the export and import processes or the export process only to estimate their speed.
- Check Cluster Data
  Relevant for DMO: You want to check the consistency of cluster tables. This check is similar to the SAP_BASIS report `SDBI_CLUSTER_CHECK`. It is performed by the `R3load` executable in discard mode and uses the same technology as the benchmarking tool.
- Table Comparison Check Tool
  With this stand-alone migration tool, you can compare export and import table checksums for your database. The check can, for example, be relevant for the system copy procedure with the *Software Provisioning Manager*.

Further Dialogs After the Scenario Category Decision

After your decision, further initial dialogs are possible:

- Decision on DMO
- Decision on scenario strategy
- Selection of additional parameters
- Configuration of Benchmarking or Table Comparison Tool

These dialogs do not appear one after the other, but first depending on the chosen scenario category and the existing source database, then depending on selections that you made in the previous dialog. In the following, we describe the possible main dialogs. For more details, see:

- Making Entries for Scenarios with Configuration File [page 136]
- Making Entries for Scenarios Without Configuration File [page 139]

Decision on DMO

The Software Update Manager checks the database of your source system. If it is **not SAP HANA database** and the **database migration is not mandatory**, you are prompted to decide whether you want to carry out a database migration to SAP HANA or to SAP ASE database.

> **i** Note
>
> - If DMO is not mandatory, you can also opt for *No migration*.
> - The dialog is not displayed in the following case: Your source database is not SAP HANA database and you carry out a system conversion to SAP S/4HANA. In this case, a database migration DMO to SAP HANA database is required so that the Software Update Manager performs it automatically.

Scenario Strategy

Depending on the scenario category and the decision on DMO, the following options are available:

Strategy Mode	Features
Single System	• Longer downtime • No shadow instance is running in uptime • Only available for the update of support packages or support package stacks
Standard	• Strategy mode for the most scenarios • Standard downtime optimization • Late start of downtime – import and shadow system operation while the SAP system is still in production operation • Standard system resources available • Production operation stops in phase `DOWNCONF_DTTRANS` (at the end of the Preprocessing roadmap step). • Modification adjustment of the ABAP Dictionary objects during production operation • Import of the substitution set into the shadow tables during production operation • Activation and distribution during production operation

Strategy Mode	Features

Downtime-optimized	• Parallel operation of production system and shadow system
	• Higher demand on system resources
	• Shorter downtime
	• Depending on your source database and your previous specifications, the following options are possible:
	  • Uptime Migration (Downtime-optimized DMO)
	  This option allows the migration of selected large application tables partly during uptime.
	  • near-Zero Downtime Maintenance (nZDM)
	  This option allows the move of table structure adaptations and the import of new table content partly to uptime processing for a system update or upgrade.
	  • Zero Downtime Option (ZDO)
	  The ZDO allows the reduction of the technical system downtime to a minimum. Users can apply the business functions of the system during the upgrade or update activities.
	  In a subsequent dialog, you are asked to report an incident to get a password that authorizes you to use the ZDO feature. For more information, see the *ZDO Guide* and the SAP Notes 2707731 (ZDO for SAP S/4HANA) or 2163060 (ZDO for SAP Business Suite).
	For a list of possible combinations, see Making Entries for Scenarios with Configuration File [page 136].

Prerequisite Check Tool	Possible options: • *Prerequisite Check* For more information, see Performing a Prerequisites Check [page 132]. • *Prerequisite Check Extended* (only for a system conversion to SAP S/4HANA or an upgrade of an SAP S/4HANA system) • *Prerequisite Check Extended Without Target Database* (A slightly reduced version of the extended prerequisite check that is applicable when no SAP HANA target database is available. The check runs only on the source database and some dialogs are not displayed.)

Additional Parameters

This dialog is relevant for scenarios with configuration file. You can decide on the following options:

- *Check Archive Authenticity*: Select the check box if the authenticity of all archives in the download directory shall be checked.
- *Switch expert mode on*: Select the checkbox if you want to decide on additional options to adapt the tool configuration.
- *Customer Transport Integration*: Include customer transport requests to reduce business downtime. This option is only available for strategy modes *Standard* or *Downtime-optimized*. It is not displayed if *Single System* has been selected.
  Select the checkbox *Customer Buffer File*, if a customer buffer file shall be considered that contains customer transports for the target release. A subsequent dialog prompts you to enter the path and the name of the buffer file.

Migration Parameters

This dialog is relevant for DMO scenarios with or without configuration file.

- Decide on the table selection for the built-in *Table Comparison* tool
- Enter the *Migration Key*
- Enable the *Migration Repetition* option

Configuration of the Tools

This dialog is relevant for a DMO scenario without configuration file, and you have selected *Benchmarking tool* or *Table Comparison Check Tool*. In this case, the initial dialog is enhanced to choose the options for the execution of the tools.

4.2 Unicode Aspects

A `Combined Upgrade & Unicode Conversion (CU&UC)` for target systems based on SAP NetWeaver 7.5 or higher (such as SAP ERP 6.0 EHP 8) is not possible.

Make sure that the SAP NetWeaver source system already supports Unicode because SAP NetWeaver supports as of version 7.5 Unicode only.

See also SAP Note 2033243.

4.3 Adaption of Parameters

Depending on your chosen scenario strategy, you can adapt further parameters to tailor the update to your specific needs.

There are several parameters with which you can influence the use of SAP system resources for the update procedure during uptime and downtime, such as the number of background processes used by `tp` during uptime and downtime.

near-Zero Downtime Maintenance (nZDM) Technology

The Software Update Manager is equipped with downtime minimizing features, the *near-Zero Downtime Maintenance* (nZDM) technology. This technology allows under certain conditions a significant reduction of Business Downtime compared to current standard update and upgrade tools because more of the downtime-relevant deployment phases will be executed while the system is still available for business users.

Background Process and Tool Parameters

- Release upgrade only: Make sure that these numbers fit to the upgrade strategy and database archiving strategy used.
- Enhancement package installation and SPS update: The background processes are used for the system cloning and thus, their number influences the speed of the system cloning process. Make sure that these numbers fit to the database archiving strategy used.

Shadow Instance Parameters

There are several parameters used for running the shadow instance. Most of these parameters are set automatically, for example, an instance number not yet used in your system landscape.

SGEN Execution Mode

With transaction SGEN, you can generate ABAP loads in your SAP system. Depending on the scenario strategy, you can choose an execution strategy for the ABAP load generation: The system starts SGEN either during the uptime only, or during the uptime and after the downtime.

Memory-Optimized Activation

On 32-bit systems, the activation of ABAP Dictionary objects runs in a memory-optimized mode regardless of the chosen scenario strategy. Compared to the activation on 64-bit systems, the activation consumes less memory, but the runtime lasts longer.

In the following, you can find a description of the parameters and their influence on the runtime of the update:

- Database Archiving Parameter [page 72]
- near-Zero Downtime Maintenance (nZDM) [page 72]
- Using the Record & Replay Technique in nZDM [page 73]
- Process and Tool Parameters [page 74]
- Shadow Instance Parameters [page 75]
- SGEN Execution Modes [page 76]

4.3.1 Database Archiving Parameter

The archiving strategy determines the time intervals in which database mechanisms save actions to the database. This determines whether the database system can recover lost data.

Two options are available: Either the archiving mode is on during the update, or archiving is deactivated at the beginning of the downtime.

If the archiving mode is on, you receive the message `Database is operated in ARCHIVELOG mode`.

> ⚠ Caution
>
> Once you have deactivated archiving, you can no longer use the SAP system in production operation.

At the beginning of the downtime, you are prompted to deactivate archiving. You are prompted again at the end of the downtime to activate archiving.

> ⚠ Caution
>
> **Multiple Components in One Database (MCOD) systems:** If you have an MCOD system, you are prompted if you want to disable archiving. However, if multiple SAP systems are installed in your database, we strongly recommend that you do not disable the archive mode. If you disable archiving, you must stop the production operation of all systems.

Release upgrade only: Sizes for comparing the archives up to the `DOWNCONF_DTTRANS` phase and to the end of the upgrade can be found in the Quick Guide [page 57]. They can vary considerably, depending on the amount of customer data.

4.3.2 Using the near-Zero Downtime Maintenance (nZDM) Feature

You want to use downtime-minimizing features of the Software Update Manager, the so called `near-Zero Downtime Maintenance (nZDM)`.

Prerequisites

You have checked SAP Note 1678565 for more information about the prerequisites, terms and conditions of nZDM.

In addition, you have checked SAP Note 1678564 for more information about restrictions, database-specific settings, and troubleshooting of nZDM.

Context

The Software Update Manager is equipped with the near-Zero Downtime Maintenance (nZDM) technology. This technology includes features to minimize the Business Downtime while performing the following:

- Support package update
- Enhancement package installation
- Upgrade of ABAP-based SAP Business Suite or SAP NetWeaver systems

The main benefit of nZDM is the significant reduction of the Business Downtime compared to previous update tools because more of the downtime-relevant update phases are executed while the system is still up and available for business users. The following deployment phases are executed in nZDM during uptime:

- Table structure adjustment including conversions, based on *Record & Replay* technique
- Main import, based on *Record & Replay* technique

Procedure

During the Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66], choose the scenario strategy *Downtime-optimized*. Afterwards you can select an option based on nZDM.

4.3.3 Using the Record & Replay Technique in nZDM

With the introduction of the `Record & Replay` technique in nZDM, which uses the `Change Recording and Replication (CRR)` framework, you can now capture database changes in tables on the production instance during uptime.

Context

This trigger-based change recording technique allows importing new content into the shadow instance and adjusting table structures to the new release while all users are still able to work in the production system. The Software Update Manager starts the recording of data changes automatically and transfers it to the shadow instance iteratively after the table structure adjustment.

To control the change recording, you can perform the following actions:

Procedure

- **Control the Data Transfer (Monitoring, Stop, and Restart)**

  Use the *CRR Control Center* to monitor, stop, and restart the data transfer. You find it in the SUM Utilities (Extended UI) [page 42] and there as part of the *Process Control Center*.

- **Include or Exclude Tables into or from the Data Transfer**

  Proceed as follows:

  1. From the subdirectory `<SUM directory>/abap/control` open the template file `CRRTABLIST.LST`.
  2. Add an entry to the existing entries in the `CRRTABLIST.LST` file using the following format:
     - To include a single table: **`I <Tabname>`**
     - To exclude a single table: **`E <Tabname>`**

  > **i** Note
  >
  > - Note that the format includes a space between the character and **`<Tabname>`**.
  > - The best time to include or to exclude tables is after the SUM package extraction but before you start the upgrade procedure. `CRRTABLIST.LST` is processed in phase `MODFILE_CRRTABLIST`. After this phase, you can no longer include or exclude tables.

- **Include Large Tables**

  The Software Update Manager checks whether a table is larger than 50 Gigabytes. Such large tables are excluded by default from the data transfer.

  However, you have the option to include them as described previously.

- **Stop the Shadow Instance During the Data Transfer**

  You can perform this action, for example, when you make an offline backup.

  1. Stop the data transfer in the *CRR Control Center*.
  2. In the command-line tool, enter the following command:
     `<SUM directory>/abap/bin/SAPup stopshd`

- **Start the Shadow Instance**

  1. In the command-line tool, enter the following command:
     `<SUM directory>/abap/bin/SAPup startshd`
  2. Restart the Data Transfer in the *CRR Control Center*.

4.3.4 Process and Tool Parameters

You can maintain process and tool parameters to configure the update process additionally. Several processes have parameter values for uptime and downtime. The values for downtime are active during the *Downtime* roadmap step of the update procedure. The values for uptime are active during the *Checks* and *Preprocessing* roadmap steps. Note that high values for processes during the uptime can have an impact on production operation.

- Host name of the background server
  There is usually a background service available on the primary application server instance. You can check it with transaction `SM51`.
  However, in larger systems, the background service can be elsewhere to improve load distribution. In this case, enter the host name and the name of the relevant application server.
  In addition, make sure that the update directory is mounted on the host with the background service, and that the background server can process background jobs of class C.
  The server you select has to be available for background operations round the clock. Check the active operation modes with transaction SM63 to find out if it satisfies this requirement.

- *ABAP PROCESSES (UPTIME)* and *ABAP PROCESSES (DOWNTIME)*
  Number of parallel background processes and activator processes, also number of batch processes scheduled on the app server.
  The specifications have an impact on the `JOB` and `RUN` phases that use parallelization, as well as the `DBCLONE`, `ACT_UPG`, `PARDIST*`, and XPRA runtime phases.
  We recommend a value that is high enough to enable parallel processing, but small enough so that the production system is not affected. Note also:
  - For ABAP processes executed on the original system, the number of available processes on the original system limits the number of parallel jobs.
  - For technical reasons, a maximum of 10 parallel processes are possible in the phase DBCLONE.
- *SQL PROCESSES (UPTIME)* and *SQL PROCESSES (DOWNTIME)*
  Number of parallel SQL processes used by
  - `tp` to execute database statements in `PARMVNT*` and `PARCONV*` phases.
  - `SCEXEC`, `SQLRUNTASK`, and `SQLSELEXE` phases

  > **i** Note
  >
  > **Dynamic change of SQL processes in `SQLRUNTASK` phases**
  >
  > In some cases, it can be necessary to change the number of SQL processes (for example to reduce them) during the run of the `SQLRUNTASK` phases. You can do this using the SUM Utilities (Extended UI) [page 42]. Select *SUM Parameters* > *SUM Process Parameters* > *SQL Processes*. The change should be directly reflected in the number of running processes.
- *R3TRANS PROCESSES (UPTIME)* and *R3TRANS PROCESSES (DOWNTIME)*
  Number of parallel import processes used by `tp` and `R3trans` to import data into the database, mainly in phases `DDIC_UPG`, `SHADOW_IMPORT*`, and `TABIM*`.
  Note that these processes can generate significant loads on the database.
- *R3LOAD PROCESSES*
  Number of `R3load` processes used by for the `EU_IMPORT` and `EU_CLONE` phases.
- *Memory-optimized activation*
  The memory-optimized mode allows the activation of ABAP Dictionary objects with reduced memory consumption, but a longer runtime. This is the default for 32-bit systems.

4.3.5 Shadow Instance Parameters

When the Software Update Manager installs the shadow instance locally, an unused instance number is selected automatically. Furthermore, a random password is generated.

If you want to enter a specific instance number and a password manually, choose the option *Switch expert mode on* in the initial dialogs. Make sure that you enter an instance number that is not used in your system landscape.

For more information about choosing the instance number for the shadow instance, see SAP Note 29972.

4.3.6 SGEN Execution Modes

If you selected the *Standard* or *Downtime-optimized* scenario strategy, you need to choose an execution strategy for the ABAP load generation (transaction `SGEN`).

You can select one of the following SGEN execution modes:

- Release upgrade only: *Do not start ABAP load generation during the upgrade*
  Enhancement package installation and SPS update: *Do not start ABAP load generation during the update*
  If you plan to apply a high number of relevant changes to your system after the update in the form of a transport or a Support Package, we recommend that you generate the ABAP loads manually after the update.
  For more information about starting the load generation manually, see Generating Loads [page 204].
- *Generate ABAP loads on shadow system during uptime*
  With this option, the Software Update Manager uses the maximum number of processes entered below to generate the loads in the shadow system during the uptime.
- *Start asynchronously in post downtime*
  If you select this option, transaction `SGEN` automatically starts after the downtime during the `Postprocessing` roadmap step to regenerate the ABAP loads that were invalidated during the downtime.
- *Generate ABAP loads on shadow system during uptime and start asynchronously in post downtime.*
  With this option, the Software Update Manager uses the maximum number of processes entered below to generate the ABAP loads in the shadow system during the uptime. The transaction `SGEN` automatically starts again after the downtime during the *Postprocessing* roadmap step to regenerate the ABAP loads that were invalidated during the downtime.

> ⚠ Caution
>
> The additional database space needed to generate ABAP loads is not added automatically to the space requirements reported in the *Checks* roadmap step. In addition, you will need approximately the size of REPOSRC~.

> ℹ Note
>
> Usually, the shadow SGEN prolongs the uptime part of the update procedure or several hours. If you run into unexpected time issues with your update schedule and you want to save the SGEN time, you can abort a running shadow SGEN by executing the report RSUPG_SGEN_ABORT_SHADOW in the shadow system. Use the DDIC user for the logon. Note that as soon as the SUM run is completed, you have to perform a manual SGEN run to generate the missing loads.

4.4 Time Frame for Upgrading the Front-End Software

Use

> ℹ Note
>
> This section is only relevant if you perform a release upgrade.

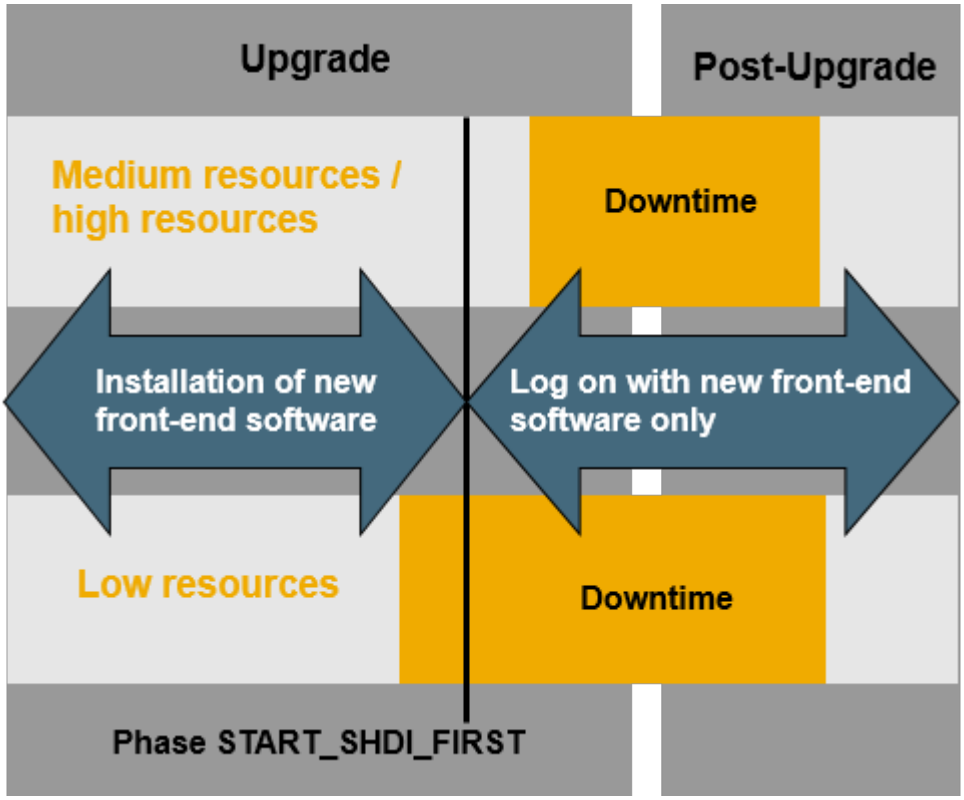
The new SAP system release cannot run until a compatible version of the front-end software (SAP GUI) has been installed. However, as the front-end software is compatible with several SAP system releases, you may not have to upgrade to a new front-end software release.

If you need or want to use a different front-end software, you can import it as soon as you receive the software package. If the front-end software you are using on the source release is not compatible with the target release, the latest possible time for upgrading the front-end software is before you start the shadow system for the first time in the `START_SHDI_FIRST` phase during roadmap step *Preprocessing*.

If you choose scenario strategy *Standard* or *Downtime-optimized*, this phase is part of roadmap step *Preprocessing*.

> **i Note**
>
> You can already update your SAP GUI before you start with the upgrade of your SAP system.

This graphic shows the time period during which you can upgrade the front-end software:



Time Frame for Upgrading the Front-End Software

> **i Note**
>
> You can use the SAP Front-End installation software `NWSAPSetup` to optimize the deployment of SAP GUI to thousands of clients. You can tailor installation packages to match your requirements, distribute patches, and set up automatic update processes for your clients.

More Information

SAP Notes with Additional Information

Which front-end software to use	SAP Note 147519
Hardware and software requirements	SAP Note 26417
Using SAP GUI for HTML	SAP Note 178788
Installing the front-end software and using `NWSAPSetup`	*SAP Front End Installation Guide*

4.5 Database-Specific Aspects

In the following, the most important database-specific aspects are described that might have an impact on your overall planning.

At the end of step *Preprocessing* before the start of roadmap step *Execution*, you are prompted to stop all work in the SAP system.

You have to be able to recover the database to the state it has at this point in time.

> → Recommendation
>
> If you make a full backup of your database now, you need not to import in the event of a recovery all the archives created so far including those written during the previous import.

> i Note
>
> Make sure that you back up the complete `SUM` directory including all subdirectories.

At the beginning of roadmap step *Execution*, you can deactivate the archiving of the database.

If you deactivate archiving, you have to make a full backup of the database before and after the downtime before you switch archiving back on. This has to be executed as an offline backup.

For a detailed description on deactivating and activating the archiving of the database, see Changing the Oracle Database Recovery Mode [page 254].

> i Note
>
> If your system is running SAP NetWeaver 7.5, and you are planning an update from a source release SAP NetWeaver 7.1 or higher, you might have to update the path to the OJDBC driver noted in the instance profile. For more information, see SAP Note 2374056.

4.6 Planning the Data Management

This section deals with the management of large database tables using methods such as data archiving.

Context

> **i** Note
>
> This section is only relevant if you perform a release upgrade.

The upgrade runtime – and in particular the system downtime – is extended when dealing with large database tables. Table conversions during the upgrade and data adjustments at the end of the upgrade are the most time consuming actions and can result in long upgrade runtimes. To avoid these problems, you should minimize the quantity of table entries that have to be converted prior to the upgrade. The best way to achieve this is to carry out data management measures such as archiving or deleting data records from the tables.

As part of an overall Information Lifecycle Management (ILM) process, data management is vital for maintaining a "healthy" live system because it helps to keep system performance high and to make optimal use of existing hardware resources. One of the most effective data management methods is data archiving. It allows administrators to remove data that is no longer needed in everyday operations from the database and store it in archive files. These files can then be passed on to a storage system for long-term storage. After archiving, the data can still be accessed in read-only mode when the need arises, for example, during an audit.

For more information about data archiving, see the blog https://blogs.sap.com/2014/04/02/sap-netweaver-information-lifecycle-management/.

> **⚠** Caution
>
> - **Archiving jobs**
>
> Active archiving jobs managed in transaction SARA can significantly increase runtime and resource demands during an upgrade. We strongly recommend that you do not start any new archiving jobs while the Software Update Manager is running. Also, complete all running archiving jobs before the `Preprocessing` roadmap step begins.

Procedure

1. Before the upgrade, analyze the database to find out which database tables can be reduced in size, and how this can be achieved.
2. If you use the CRM Marketing Segment Builder, you can reduce downtime by deleting target groups in your system. Two secondary indexes of database table CRMD_MKTTG_TG_I are deleted during the upgrade and one existing secondary index is enhanced by additional fields. The Software Update Manager deletes this index and re-creates it during downtime. The time needed to re-create the index depends on the number of records in table CRMD_MKTTG_TG_I. As a guide value, for 10 million records, the recreation needs 200 seconds on an average performance hardware.

3. Check the number of records in your CRMD_MKTTG_TG_I table and calculate the additional downtime. To reduce downtime, delete target groups in your system to remove entries from this table before you start the upgrade.

4.7 Customizing of Environment Profiles

This section deals with the environment profiles of user `<SID>adm`.

If necessary, you can customize and prepare the environment profiles of user `<SID>adm` for the target system already during uptime. As a result, you do not need to perform this customizing after the update procedure.

The environment profiles are stored in the following environment files:

```
.dbenv.csh
.dbenv.sh
.sapenv.csh
.sapenv.sh
```

The Software Update Manager handles these environment files during the following three phases:

1. `ENVFILES_CHECK`
   This phase runs in roadmap step `Checks`.
   The Software Update Manager checks internally what has to be done.
2. `ENVFILES_PREP`
   This phase runs in roadmap step `Preprocessing`.
   The file templates of the environment files are copied to subdirectory `<SUM directory>/abap/sapnames/envfiles`. The Software Update Manager replaces generic placeholders in the files with corresponding values. For better distinction with the template file names, the files are saved with file names in uppercase letters and without leading period as follows:

`.dbenv.csh`	→ `DBENV.CSH`
`.dbenv.sh`	→ `DBENV.SH`
`.sapenv.csh`	→ `SAPENV.CSH`
`.sapenv.sh`	→ `SAPENV.SH`

   An entry in the log file `CHECKS.LOG` informs you that the user environment has been prepared. You have now the option to adjust the environment files to the environment profiles of target system user `<SID>adm`. You can make the changes up to the start of phase `ENVFILES_COPY`, in which the environment files are then copied to the home directory of user `<SID>adm` on your target system.
   See also Important Entries for the Preprocessing Roadmap Step [page 166] → *Environment Profiles Customizing (Phase ENVFILES_PREP)*.

   > ⚠ Caution
   >
   > Do not copy back the environment files to the source directory of the templates.

3. `ENVFILES_COPY`
   This phase runs in the `Execution` roadmap step.

The environment files are copied to the home directory of the `<SID>adm` user on the target system. Here, they are saved again with their original file names as follows:

`DBENV.CSH`	→ `.dbenv.csh`
`DBENV.SH`	→ `.dbenv.sh`
`SAPENV.CSH`	→ `.sapenv.csh`
`SAPENV.SH`	→ `.sapenv.sh`

> **i Note**
>
> Before the environment files are copied to the home directory, the Software Update Manager creates backup files in the directory `<SUM directory>/abap/sapnames` using to the following file name pattern: `ENVBACKUP<original file name>`. (Example: `ENVBACKUP.dbenv.csh`)

Any changes you made to the files after the `ENVFILES_PREP` phase and before the `ENVFILES_COPY` phase are then applied to the target system.
See also Important Entries for the Execution Roadmap Step [page 181] → *Profile of User <SID>adm (Phase ENVFILES_COPY)*.

4.8 Modification and Enhancement Adjustment Planning

This section deals with modifications, which are changes to objects of the SAP standard.

There are two types of modifications: changes to the translation of an object text, and changes to the object itself.

In addition, the *Enhancement Framework* allows enhancements, such as source code plug-ins, implementations of the new kernel-based BAdI, and class enhancements. We recommend using the *Enhancement Framework* to enhance or adapt SAP development objects.

> **i Note**
>
> If you are sure that your SAP system corresponds exactly to the standard SAP system, you can skip this section.

Changes to the Translation of an Object Text

The changes are made in the translation environment (transaction SE63) or in the ABAP Workbench. An SSCR key is not required.

> **⚠ Caution**
>
> Changes to translations of SAP objects are not retained when you update your system. They are overwritten by a new version or deleted. For more information about retaining these changes, see SAP Note 485741.

Modifications and Enhancements of SAP Objects

You possibly need an SSCR key to perform the modification adjustment. Get the key **before** you start the update. For more information, see SAP Support Portal at https://support.sap.com/sscr.

Release upgrade only: All modified standard SAP objects are displayed for adjustment in transaction SPDD or SPAU. Objects that SAP no longer delivers are deleted. If you want to keep these objects, you have to accept the modifications in transaction SPDD or SPAU.

Enhancement package installation and SPS update: All modified standard SAP objects that are contained in a software package that is to be applied to your system are displayed for adjustment in transaction SPDD or SPAU. If you want to keep these objects, you have to accept the modifications in transaction SPDD or SPAU.

All enhancements that you have to adjust are shown in transaction SPAU_ENH. In contrast to modifications of source code units, you only have to adjust enhancements if the underlying SAP development objects were deleted or changed in an incompatible way.

Make sure that you perform the adjustments in transaction SPAU_ENH after the adjustments in transaction SPDD or SPAU and not the other way around.

> ⚠ Caution
>
> Make sure that **before** the update there is at least one package in the customer namespace (Z*). You need this package if you have to create objects during the modification adjustment, for example, for an append structure for customer fields of an SAP table.
>
> You cannot create packages during the update.

The modification adjustment of ABAP Dictionary objects occurs during production operation. This is possible since the complete version management is available in the shadow system. The remaining Repository objects are still adjusted at the end of the update.

> ⚠ Caution
>
> **Potential ABAP Dictionary objects and data loss because of passive deletion of objects**
>
> Be aware of the following issue: You want to perform a system upgrade or a conversion to a product based on SAP NetWeaver 7.50 or higher, and you have created new SAP objects (for example a structure or data element) as part of a manual correction instruction of an SAP Note, either manually or by executing a report attached to an SAP Note. However, the target support package of the upgrade does not include these corrections.
>
> The reason is that the Software Update Manager does not rescue the objects during the SUM run because they are registered in the system as modified SAP objects. Therefore, they do not exist in the target release anymore, but are deleted passively. The objects will show up as deleted objects in SPDD or SPAU. If ABAP Dictionary objects are not manually re-created during SPDD, data loss can occur. For example, this can happen if a structure is used as a table append. You possibly encounter such a situation, for example, if you have implemented larger legal changes, such as Goods and Services Tax in India.
>
> As a solution, see SAP Note 2513585 for more information and for information about preventing the potential object loss, especially if you were requested to execute a report to create ABAP Dictionary objects. Contact SAP Support for assistance in identifying the objects to be saved.

Modification Adjustment in the First System (Development System)

> **i Note**
>
> Since all modifications to standard SAP objects are displayed during the update and you have to adjust all the displayed objects, you have to schedule enough time for the modification adjustment.
>
> This also applies to enhancements of the new Enhancement Framework that you have to adjust. However, you only have to adjust the enhancements if the underlying development objects were deleted or changed in an incompatible way.

You have to test the modification and enhancement adjustment in a development system that has the same SAP system release and that has been modified in the same way as the production system. If the development system contains more modifications or enhancements, or has a different Support Package level, contact an experienced SAP consultant for help. The following explanation assumes that the levels of modification are identical.

1. The list of objects that has to be adjusted in your SAP system is determined in the `ADJUSTCHK` phase. This phase is executed in the *Configuration* roadmap step and runs between the import of the substitution set and the end of the production period.
   The list is part of the log file `UMODPROT.<SID>` that is located in the subdirectory `<SUM directory>/abap/log`.
2. The ABAP Dictionary objects (tables, data elements, domains, and so on) are adjusted during production operation. However, if you choose scenario strategy *Single System*, they are adjusted during downtime before the ABAP Dictionary is activated on the original system.
   The adjusted objects are collected in a repair that is released to a transport request. You have to release the tasks of the SPDD transport request. Do not release this transport request. Instead, flag it using the menu option *Modification Adjustment* > *Assign Transport*.

   > **i Note**
   >
   > Only adjust the objects. However, do not activate them using transaction SE11 (ABAP Dictionary Maintenance).

3. Modified or enhanced repository objects (reports, screens, and so on) are adjusted towards the end of the update. At this stage, the import of SAP objects has already been completed. However, the old modified version is still available in the version database. As with ABAP Dictionary objects, all changes are released to a transport request that is flagged and then exported and registered by the Software Update Manager.
   If you need to adjust enhancements, release these adjustments to the flagged transport request that already contains the adjusted modified objects. Adjust all modifications before you adjust the enhancements.
   Towards the end of the update, the Software Update Manager exports the request to the transport directory `/usr/sap/trans` and registers it for transport in the `umodauto.lst` file.

   > **i Note**
   >
   > Make sure that the user `<SID>adm` has write permissions for the file `<DIR_TRANS>/bin/umodauto.lst`.

Modification Adjustment in Subsequent Systems

For the quality assurance and production system, we recommend that instead of adjusting modifications and enhancements manually, you automatically transfer the transport requests exported from the first system: one for the ABAP Dictionary objects adjusted using transaction SPDD and one for the Repository objects adjusted using transactions SPAU and SPAU_ENH.

> ⚠ Caution
>
> Make sure that the Support Package levels included in the update of the subsequent systems are similar to the Support Package levels included in the update of the first system.

The `ADJUSTPRP` phase in the *Configuration* roadmap step prepares the requests that you entered in phase `SUMASK_SPDD_SPAU` from the development system to be transferred. The phase checks whether all the modifications identified in the system are handled by transport requests. If this is the case, you do not need to perform a modification adjustment.

> ⚠ Caution
>
> The number of objects in the adjustment transport requests can exceed the number of modifications in the receiving system. In this case, the Software Update Manager imports changes that previously did not exist in the receiving system.

For a detailed description of the modification adjustment function, see the SAP Help Portal for your target SAP NetWeaver release at http://help.sap.com and see *Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Application Server* > *Application Server ABAP* > *Application Development on AS ABAP* > *Customer-Specific ABAP Development* > *Changing the SAP Standard (BC)* > *Modifying the Standard* > *Modification Assistant* > *Upgrade Procedure / Support Packages (link at the bottom of Modification Assistant page)*.

4.9 Import of Additional Languages

> i Note
>
> This section is only relevant if you perform a release upgrade.

> → Recommendation
>
> Importing new languages during an upgrade is a highly efficient process and is preferable to importing a language into a production system after an upgrade.

To import additional languages, you can choose between the following options:

- You import additional languages during the upgrade.
  We recommend that you choose this option since importing new languages during an upgrade is a highly efficient process and is preferable to importing a language into a production system after an upgrade. In

this way, you can avoid any sequencing problems arising from Support Packages included in the upgrade, or Support Packages you need to import after the upgrade.

- You import additional languages after the upgrade.
  We recommend that you only use this option if the system contains the Support Packages for the language archives you are using. This is the case if you did not include any additional Support Packages in the upgrade, or did not import any additional Support Packages after the upgrade. For more information, see the *Language Transport* documentation, or SAP Note 352941.

The upgrade procedure itself only offers to update existing languages. You cannot install any new languages during the upgrade. However, you do have the option of classifying new languages in the SAP system before the upgrade with transaction SMLT, and importing them during the upgrade. For more information about this procedure, see SAP Note 322982.

4.10 Handling Customer-Specific Translations and Languages

Using the translation environment in the SAP system, you can translate missing texts of SAP objects or translate existing texts, for example, to customize them with your own terminology. For the latter, define your own language in the SAP system.

Context

> **i Note**
>
> This section is only relevant if you perform a release upgrade.

The Repository scanner scans during the upgrade the SAP system objects that you have changed. For these objects, the Software Update Manager provides a conflict resolution mechanism: Objects for which the SAP standard has not changed for the new release are taken on by the upgrade. Objects that collide with the new SAP standard are offered for modification adjustment.

Changes to language-dependent texts – that means translations of SAP system texts – are not considered as modifications to the SAP system and are not covered by any conflict resolution mechanism either. Therefore, these translations do not appear in the modification adjustment and are not saved during the upgrade of the SAP system. They have to be transported separately when an upgrade is performed.

> **i Note**
>
> **More Information**
>
> - For detailed information about the handling of customer translations during the update, see SAP Note 485741.
> - For more information about using transactions `SMLT_EX`, `SMLT`, customer translations and languages, see the language transport documentation in the SAP Help Portal for your target SAP NetWeaver release. Navigate to *Application Help* > *SAP NetWeaver Library: Function-Oriented View*

> *Solution Life Cycle Management* > *Software Logistics* > *Change and Transport System* > *Language Transport* >.

> ⚠ Caution
>
> If you decide to save your translations, note the following:
>
> - In addition to your translations, the transport request also contains language-independent parts. Importing these language-independent parts into the target system using the standard import tool `tp` or `TMS` can harm your system considerably! Make sure that you only import them with report `RSTLAN_IMPORT_SINGLE`.
> - If SAP has changed the texts for which you have created translations in the target system, the upload of your translation into the target system overwrites the changes made by SAP.

To preserve your translations, proceed as follows.

Procedure

1. Create a transport request or language package using transaction `SMLT_EX` to gather your translations on the source system.
2. Download the transport request or language package from the source system before the upgrade.
3. After the upgrade, upload the transport request or language package to the target system using transaction `SMLT`.

4.11 Excluding Customer-Specific Languages

Context

To avoid that the update procedure aborts, exclude the following languages from the update:

- Custom languages
- Languages provided by SAP that are not supported anymore for the target release

> ℹ Note
>
> Besides the following procedure, you can also exclude a custom language using an entry **`languages_without_update =`** in file `SAPup_add.par`. This file is located in the subdirectory `bin` of the SUM directory. If this file does not exist yet, create it manually.
>
> Example: If you want to exclude French and Spanish, add the following entry:
>
> ```
> languages_without_update = FR; ES
> ```

> ⚠ Caution
>
> The removal or modification of customer-specific languages in the tables `T002C` and `TLSY7` is executed immediately. A later reset of the update procedure does not restore the entries. See also Resetting the Update [page 125].

Procedure

1. Log on to the SAP system.
2. Choose transaction `SE16` and open table `T002`.
3. Check the table for the affected languages that are mentioned at the beginning. Note that custom languages start with "Z" in column `LAISO` ("2-Character SAP Language Code").
4. Note down the associated language keys in column `SPRAS` ("Language Key"), such as "Z".
5. Open table `T002C` and check column `SPRAS` for the noted language keys.
6. Check if they are marked with an "X" in column `LAINST` (*Language Can Be Installed*). If so, remove the "X".
7. Check whether the affected languages are also listed in table `TLSY7`. If so, remove their entries.

4.12 Component Levels Contained in the Upgrade Export

> ℹ Note
>
> This section is only relevant if you perform a release upgrade.

The transport requests that are imported during the upgrade from the *Upgrade Export* archives contain data for the main SAP system components and for add-on components that are included in the standard SAP delivery of SAP NetWeaver or your SAP solution. For Support Releases, the component levels in the archives are usually quite high.

In the `IS_SELECT` phase of the *Configuration* roadmap step, the Software Update Manager only prompts you for add-ons contained in the archive for which we may deliver another update. Add-ons from the standard delivery for which we will not ship updates until the next release are not offered on the screen. You do not have to make a decision about them as they are updated automatically.

In the `BIND_PATCH` phase of the *Configuration* roadmap step, the Software Update Manager asks you to include Support Packages in the upgrade. If the *Upgrade Export* archives already contains a Support Package level higher than `0`, only include Support Packages above this level.

For information about the component levels of the *Upgrade Export* DVD and the minimum Support Package levels, see the SAP Note for SAP NetWeaver / your application:

SAP Notes with Component and Support Package Level Information

SAP NetWeaver / Application	SAP Note Number
SAP CRM	774615
SAP ERP	774615
SAP NetWeaver	789220
SAP SCM	850038
SAP Solution Manager	781448
SAP SRM	819722

> ⚠ Caution
>
> If, for some reason, you have to apply Support Packages shortly before the upgrade, make sure that at least the equivalent Support Package for the target release is included.

4.13 Updating Distributed and High Availability (HA) Systems

This section provides you with information about the update of distributed or high availability (HA) systems.

Context

Distributed Systems

The Software Update Manager is able to handle distributed configurations where your ASCS instance or other ABAP instances are installed on separate hosts as, for example, in a HA environment.

For heterogeneous systems, that is, systems that have different operating systems on the primary and additional application server instances, you have to perform manual actions. Provide at least the target kernel for the remote instances at the download directory. As a prerequisite, the SAP kernel directory of the system must follow the new layout (`/usr/sap/<SID>/SYS/exe/uc/<platform>`) and the SAP kernel replication with program `sapcpe` needs to be configured.

During the downtime, the Software Update Manager operates only with a local single-instance setup while all other instances are stopped. At this point of the update procedure, the Software Update Manager moves all the central services (enqueue service and message service) to the downtime instance. At the end of the downtime and before starting the productive system again, the original system setup will be restored and started afterwards.

> **i Note**
>
> You must have an SAP Host Agent on each SAP application server. This is mandatory since the introduction of the 7.20 or 7.20 EXT kernel as downward-compatible kernel. For more information, see SAP Note 1636252.
>
> In source systems with at least SAP kernel release 7.42, the Software Update Manager uses the certificate infrastructure (*system internal public key infrastructure (PKI)*) for the sapcontrol commands (`-systempki <profile>` option). For more information regarding the system PKI, see SAP Note 2200230.

High Availability Systems

The update of high availability systems differs from updates of distributed systems. Newer system offers the usage of the HA Maintenance Mode during upgrade, but for older systems there is still manual action required. For more information about updating your system in an HA environment, contact your HA solution implementation partner.

> **i Note**
>
> - AIX systems: If you want run SUM in an HA environment controlled by IBM PowerHA, see also SAP Note 2431737.
> - HP-UX systems: If you want run SUM in an HPE Serviceguard Cluster environment on HP-UX systems, see also SAP Note 1779681.
> - If you want run SUM in an HA environment on systems with *Oracle Clusterware*, see also the document *Providing High Availability for SAP Resources with Oracle Clusterware 11g Release 2 and Clusterware 12c Release 1*. You can find the document in the `sapctl` package in the directory `doc`.
> - If you want run SUM in an HA environment on systems with NEC EXPRESSCLUSTER® X 3.3, see also the document *SAP NetWeaver System Configuration Guide*, chapter 8 *SAP NetWeaver Update*. You can find it using the following web address: http://www.nec.com/en/global/prod/expresscluster/en/support/Setup.html .

Maintenance Mode:

Before an update in a system environment with high availability, you must deactivate the HA solution for the clustered resources to prevent the HA software from interfering with the upgrade process. After the upgrade, the HA solution must be activated again. That is, the HA software must be told that *maintenance mode* must be switched on (deactivation of HA solution) or switched off (activation of HA solution) for an instance or the entire SAP system (without the database).

This can be carried out manually or automatically if the Software Update Manager supports the automatic execution of the deactivation and activation of the HA solution. The feature can be activated during the update by the selecting the checkbox *Use of Maintenance Mode*, if an availability check beforehand was successful. Note that you don't have to perform any manual steps such as starting or stopping instances and services, when you use this mode.

For more information about this feature and how to check whether the automatic maintenance mode is available, see SAP Note 2464065.

Below, you find briefly outlined the update process for a **high availability (HA)** system.

Procedure

1. If necessary, you change your HA system configuration and clean up profiles.

   For more information, see section Preparing the Update of Distributed and High Availability Systems [page 114].
2. You start the Software Update Manager.
3. The Software Update Manager checks the profile directory. If the ASCS instance is installed on a different host name, the tool assumes that the update is performed in a distributed or HA environment.
4. If prompted, you install a temporary license key in the shadow system and in the system during downtime. For information about license keys, see https://support.sap.com/licensekey

   > **i Note**
   >
   > The new temporary license will not be removed automatically after the update. You can delete the temporary license manually after the update. Prior to this, use transaction `SLICENSE` to check whether the old license still exists.
5. If you are running the ASCS instance on a separate host, and the operating system on this host is different from that on the primary application server instance, at the end of the downtime you are prompted to install the latest SAP kernel on the separate host with the ASCS instance.

4.14 Updates in an MCOD System Landscape

You can update systems in a Multiple Components in One Database (MCOD) system landscape. Note the following when you update an SAP system in an MCOD system landscape:

- At the start of the update, the Software Update Manager determines automatically whether there is more than one SAP system installed in the database. If there is more than one SAP system installed in the database, you are not prompted about archiving. Archiving is automatically activated during the entire update.

  > **i Note**
  >
  > Do not switch off archiving when updating SAP systems in an MCOD system landscape.
  >
  > All SAP systems in the database are affected if you need to reset the update.
- We recommend not to perform parallel updates in MCOD systems. A restore that is required for one SAP system affects all SAP systems in the database and therefore also other updates.

For more information about MCOD systems, see SAP Community WIKI at https://wiki.scn.sap.com/wiki/pages/viewpage.action?pageId=448466580.

4.15 Importing Support Packages Before an Upgrade

> **i Note**
>
> This section is only relevant if you perform a release upgrade.

If you want to import a Support Package in a system for which you have already scheduled an upgrade, you have to ensure that the target release of the planned upgrade has at least the equivalent Support Package level as the source release.

When you import a current Support Package in the source release and the target release does not have the equivalent Support Package level, corrections of program errors and changes to the ABAP Dictionary may be missing in the target release. In a worst-case scenario, this may cause loss of data during the upgrade.

For more information, see SAP Note 832594.

4.16 Integration of Customer Transports

This section deals with the integration of customer transports into the update procedure to reduce business downtime.

> **i Note**
>
> - The target release must be SAP NetWeaver 7.0 Enhancement Package 2 with SAP_BASIS support package 09 or a higher
> - Note that the total technical downtime of the update procedure might become longer

After the update procedure and before you start the production system, that is, during the business downtime, you import your own transport requests, for example with new customizing or new developments for the target release. To reduce the business downtime, the Software Update Manager is equipped with the feature `Customer Transport Integration with SUM` that integrates your transport requests into the update procedure. Moreover, it enables the import of multiclient customer transport requests and - in connection with the near-Zero Downtime Maintenance (nZDM) technology - the conversions of custom tables during the uptime.

Basic Concept

The Software Update Manager processes during the update a customer transport buffer file from the `Change and Transport System` (CTS). This file is a list of customer transport objects for the import into the target system during the update. It contains the following information:

- Transports in the correct order
- One target client per transport route
- Transport deliveries already calculated by the CTS or the `Change Request Management`

Do not include SAP objects in the customer transport buffer file that were exported in a release or support package lower than the target release or target support package used.

The customer transports are imported logically after the SAP packages (upgrade packages, enhancement packages, and support packages). For example, if the target release of the SAP enhancement package installation is SAP ERP 6.0 Enhancement Package 6 with Support Package Stack level 2, all customer transports to be included must be valid for this target release, too.

The results of the import are synchronized back from the Software Update Manager to the `Transport Management System` (TMS) during the *Postprocessing* roadmap step. Afterwards, the transaction `STMS` can be used to analyze the results of the import.

If you use the `Change Request Management` of SAP Solution Manager, you can also integrate transports that were created by the `Change Request Management`.

> **i Note**
>
> It is also possible to process customer transport objects independently of a standard update procedure. A stack configuration file (`stack.xml`) is not necessary in this case.

Note that customer transport objects are processed according to certain predefined criteria, so that some objects are imported and integrated into the shadow operations and therefore processed in the uptime. Examples for those objects are ABAP Dictionary objects such as tables, view types, or search help, or ABAP objects such as classes, programs, or screens. Objects, which are not processed during uptime, are integrated with SUM downtime operations. Examples for these objects are roles, authorization objects, forms, or customizing.

Included Features and Products

The Customer Transport Integration feature of SUM includes the following features and products:

- Modification handling
  Multiple SPDD and SPAU requests can be included in the customer buffer file together with customer transports. The dialogs to include SPDD or SPAU transport requests and single transport requests, which are normally displayed during the *Preprocessing* roadmap step, are not necessary and therefore not displayed. SPDD/SPAU-related transports in the customer buffer file are identified automatically during the update procedure.
  The correct order of the SPDD and SPAU transport requests in the customer buffer is preserved by the update procedure and already adjusted objects are automatically recognized in the transactions SPDD and SPAU.
- Multiple clients
  Client-specific transport routing is used by default. Therefore, transport requests for multiple target clients are supported. The customer buffer file can contain multiple lines per transport with one target client per transport route (`CTC=1` format).
- Transport Management System (TMS)
  Information about customer transports managed in SUM is transferred to the TMS. The transport logs can be viewed in TMS.
- `Change Request Management`

The `Change Request Management` is a Solution Manager scenario that provides tracking and documentation of change requests and transports. Changes created in the `Change Request Management` can also be integrated in the update procedure.

More Information

The preparation and the use of the Software Update Manager with integrated customer transports is described in Integrating Customer Transports into the Update Procedure [page 129].

4.17 ASCS Instance Split

The Software Update Manager provides a procedure for splitting off the ASCS from the primary application server instance. This procedure creates a new ASCS instance on the application server on which also the SUM is running. The split is optional on systems with a single instance setup, and it is mandatory for systems with a multi-instance setup.

Since the stand-alone enqueue server is the future, we strongly recommend using the stand-alone enqueue server as the better solution. It offers better performance and better scalability for large systems (two or more additional application server instances). In addition, it is already the standard for all new installations and mandatory for high availability setups. In future releases, it becomes mandatory for all systems.

As of SAP NetWeaver 7.50, the enqueue work process used within multi-instance systems is not supported anymore for the following scenarios:

- Conversion of SAP systems to S/4HANA
- Upgrade or Update to SAP Business Suite 7 Innovation 2016 based on SAP NetWeaver 7.5 or a higher SAP NetWeaver version

For more information about the desupport of the enqueue work process, see SAP Note 2146940.

If the Software Update Manager detects in the *Checks* roadmap step that you are using a system with a multi-instance setup (one primary application server instance and several additional application server instances), the ASCS instance split is mandatory and performed automatically. You are informed in the `CHECKS.LOG` file that the ASCS instance split takes place.

If you are using a system with a single instance setup (classical primary application server instance), the Software Update Manager prompts you in a dialog (phase `ASCS_ASK` of the *Checks* roadmap step) to select one of the following options:

- Perform the ASCS instance split
- Keep the current system setup

The ASCS split is optionally possible for updates with target release SAP NetWeaver 7.4 or higher, or if you carry out an update including the database migration option (DMO) of the Software Update Manager.

> **i Note**
>
> - You can manually enter an instance number for the new ASCS instance if you have switched on the expert mode at the beginning of the update. Otherwise, the Software Update Manager assigns automatically the number of the shadow instance to the new ASCS instance.
> - If you perform an ASCS instance split on a high availability (HA) system, contact your HA partner for questions regarding the changes of the cluster configuration.
>   See also the following SAP Notes regarding the ASCS split on
>   - Power HA auf IBM AIX: 2393840
>   - Solaris Cluster: 2271095
>   - Veritas Cluster: 2397558
>   - HP-UX (in an HPE Serviceguard Cluster environment): 1779681

Note that the usage of the enqueue work process is still possible for systems with single instance setup. However, we strongly recommend to perform the ASCS split and to migrate to a setup with a stand-alone enqueue server.

4.18 ASCS Instance Move

The Software Update Manager offers the option of an ASCS instance move.

This feature enables an update procedure even if the ASCS instance is running on an unsupported operating system. For more information about the reduction of supported operating systems, see SAP Note 2620910.

If the Software Update Manager detects an existing ASCS instance on a remote application server host in the *Checks* roadmap step, it prompts you in a dialog in phase **ASCS_ASK** to choose one of the following options:

- *I want the ASCS Instance Move during the SUM run*
- *I want to keep the current instance setup*

If you select the ASCS instance move, the Software Update Manager moves the existing ASCS instance from the remote application server host to the SUM application host during the update procedure.

The ASCS Instance Split [page 93] is optionally possible because you can still change the ASCS instance manually before the production system is restarted. See also Important Entries for the Execution Roadmap Step [page 181] > *Manual Actions for the ASCS Instance (Phase REQ_ASCS_SWITCH)* .

> **i Note**
>
> - The Software Update Manager automatically assigns the number of the shadow instance to the new ASCS instance. However, if you have switched on the expert mode at the beginning of the update procedure, you can manually enter an instance number for the new ASCS instance.
> - Note that you must delete the source ASCS instance manually after an ASCS move.
>   1. Stop the `SAP Startservice` and remove the corresponding file from the `DIR_GLOBAL/sapcontrol` directory.
>   2. If the old ASCS still appears in the `SAP Management Console` (SAP MMC), remove the outdated entries manually using *Delete*.
> - If you perform an ASCS instance move on a high availability (HA) system, contact your HA partner if you have questions regarding the changes of the cluster configuration.

- The Software Update Manager does not offer the usage of the HA Maintenance Mode because the HA configuration is changed. This means that automation is not possible and manual action is required.
- If you use the database migration option (DMO) in addition, and you reset the procedure, you must restart the `SAP Startservice` of the ASCS instance from the remote application server **manually**. For more information, see the chapter *Reset Option* in the *DMO guide* that is mentioned in the List of Referenced Documentation [page 264].

4.19 Switch to Standalone Enqueue Server 2

As of target release ABAP platform 1809, the Software Update Manager changes the ASCS setting to Standalone Enqueue Server 2 and Enqueue Replicator 2.

With the new standalone enqueue server 2, which is offered as of SAP NetWeaver AS ABAP 7.51, the scalability has been further improved. As of SAP NetWeaver AS ABAP 7.52, the high availability architecture has been simplified and the new enqueue replicator 2 has been introduced, which provides an improved failover process. For more information about these features, see the blog High Availability with Standalone Enqueue Server 2 in the SAP Community .

See also SAP Note 2630416 regarding the support for Standalone Enqueue Server 2, and the SAP Help Portal with information about Switching to the Standalone Enqueue Server 2.

During the update procedure, the Software Update Manager:

- Applies the new SAP Kernel.
- Performs the required SAP profile changes.
- Deletes the old `enque/*` parameters except for the mandatory parameter `enque/process_location`.
- Sets the new `ENSA2` parameters accordingly, for example, `enq/enable`.

The automatic transition of old enqueue parameters is not possible during the update procedure. See the documentation in the SAP Help Portal mentioned above for further assistance.

After the update procedure, the production system will be started with the new `ENSA2/ERS2` setup, and you will be asked to change the high availability (HA) settings accordingly.

i Note

- During the update procedure, the shadow instance and the downtime instance are configured with the new enqueue parameters.
- The Software Update Manager does not offer the usage of the HA Maintenance Mode because the HA configuration is changed. This means that automation is not possible and manual action is required.
- If you perform an ASCS update on an HA system, contact your HA partner if you have questions regarding the changes of the cluster configuration.
- Please also note the following information for your HA solution:

Company	HA Solution	Documentation Type	Content	Operating System
NEC	NEC EXPRESSCLUSTER	SAP Note	2635956	Windows, Linux x86_64, Linux on Power LE
Fujitsu	Fujitsu FlexFrame Orchestrator	Guide	See the mandatory FFO release-dependent *SAP Installation Guide*, chapter *ENSA2 New Services* .	Linux x86_64
Suse Linux GmbH	SUSE Linux Enterprise Server for SAP Applications	SAP Note	2641019	Linux x86_64, Linux on Power LE
HPE	HPE Serviceguard	Guide	Deployment of ENSA2 clusters with serviceguard is supported starting with `Serviceguard 12.30`. For technical details, see the latest version of the *Managing Serviceguard Extension for SAP for Linux* document available on the HPE Support Center at: **`https://support.hpe.com/hpesc/public/home`**	Linux x86_64
Red Hat	Red Hat HA solutions for SAP	SAP Note	2641322	Linux x86_64
IBM	PowerHA	SAP Note	2645915	AIX
Veritas	Veritas InfoScale Availability for ENSA2/ER2	SAP Note	2727341	Linux x86_64
SIOS	SIOS Protection Suite for Linux	SAP Note	2854919	Linux x86_64

5 Preparation

This part of the document contains information about the preparations that you need to make before you update your system.

You can prepare for the update while the system is in production operation. Careful preparation of the update is the best guarantee that it runs without errors.

> ⚠ Caution
>
> In addition to the general preparations described in this document, you need to perform the preparations that are specific to your product version, which are described in an additional product-specific document. This document is referenced in the *Master Guide* (or *Upgrade Master Guide*, respectively) for your product.

The Software Update Manager supports you here by making most of the necessary checks automatically. For more information about the checks performed by the Software Update Manager, see the descriptions in Running the Software Update Manager [page 116].

Actions

You perform the following actions before you start the Software Update Manager:

- Determining the Host for the Preparations [page 98]
- Checking the Hardware Requirements [page 98]
- Checking the Software Requirements [page 99]
  - Release upgrade: Checking the Source Release of the SAP System [page 100]
  - Release upgrade: Checking the Uninstallation of Software Components [page 101]
  - Meeting the Operating System-Specific Requirements [page 102]
  - Release upgrade only: Upgrade of the Operating System and Database System: Overview [page 102]
  - Saving the Environment Files [page 104]
- Making Preparations at the Database Level [page 105]
- Checking the Central Services Requirements for ABAP [page 107]
- Setting the Operation Mode for the Update [page 108]
- Enhancement package installation and SPS update: Checking the Number of Background Processes [page 109]
- Source release SAP NetWeaver 7.0 or 7.0 EHP1 only: Making Preparations in the Monitoring Area [page 110]
- Checking the Requirements for the Modification Adjustment [page 110]
- Releasing and Confirming Open Repairs and Requests [page 110]
- Filling the Download Directory [page 112]
- Preparing the Update of Distributed and High Availability Systems [page 114]

5.1 Determining the Host for the Preparations

Context

Execute the update on the host where a suitable, configured and set up application server instance is running. Usually it is the host of the primary application server instance, but it is also possible to use the host of an additional application server instance.

Procedure

Decide which hosts you need for the update preparation and the actual update of the SAP system:

- Host with a configured and set up application server instance. Usually it is the host of the primary application server instance, but it is also possible to use the host of an additional application server instance.
  You have to execute the update on the host where the primary application server instance is running. However, under certain circumstances it is possible to use an additional application server instance.
- Database host - you have to perform the actions that affect the database on the database host.
- User Management Engine host - the remote instance host where the User Management Engine (UME) is located must be running.

5.2 Checking the Hardware Requirements

CPU, Main Memory, Disk, and Swap Space

Check whether you have sufficient hardware resources such as CPU, main memory, disk space, and swap space. The minimum swap space is 20 GB.

For more information about sizing, see the SAP Portal at https://www.sap.com/about/benchmark/sizing.html.

Space Requirements for the File System

Make sure that there is enough temporary disk space available in the file system for the update. You need this free space for the `SUM` directory, the download directory, and directory `DIR_TRANS`. We recommend at least 40 GB free space for the `SUM` directory as well as for the download directory, and 20 GB for the directory `DIR_TRANS`.

As the space requirements depend on the product, see also the document with additional product-specific information for your update procedure to find information about the requirements. This document is referenced in the *Master Guide* or *Upgrade Master Guide*, respectively.

Space Requirements in the Database

Make sure that enough temporary and permanent free space is available in your database.

Release upgrade only: The Software Update Manager calculates the space requirements for the database. The free space required is in the range from 50 to 200 GB.

Enhancement package installation or SPS update: The Software Update Manager takes the status of your database into account and calculates the exact space requirements.

> **i** Note
>
> For Unicode systems, the amount of free space needed is higher than for non-Unicode systems. This highly depends on the database type, application component, and customer data.
>
> For more information about Unicode systems, see the SAP Portal at https://www.sap.com/community/topic/internationalization-and-unicode.html and SAP Note 1139642.

You can recover the difference between the minimum disk space requirements and the permanent disk space requirements by deleting the old substitution tablespaces.

5.3 Checking the Software Requirements

You have to meet certain software requirements before you update the SAP system.

1. Release upgrade and enhancement package installation: Check the source release [page 100] of the SAP system.
2. Release upgrade and enhancement package installation: Check the uninstallation of software components [page 101].
3. Meet the operating system-specific requirements [page 102].
4. Release upgrade only: If necessary, upgrade the operating system and database system [page 102].
5. Save the environment files [page 104].

5.3.1 Checking the Source Release of the SAP System

Make sure that your SAP system has one of the source releases that have been released for this update and apply to all databases.

Context

For information about the supported source releases, see the document with additional product-specific information, which is referenced in the *Master Guide* (or *Upgrade Master Guide*, respectively) for your product.

Different SAP NetWeaver product instances can have different minimum SP levels. If you update an SAP NetWeaver-based system containing various product instances, make sure that your source release is on any acceptable support package level for all product instances implemented in the system.

> **i Note**
>
> This section is relevant if you perform a release upgrade.
>
> The Software Update Manager checks if your source release is supported for the update.

> **⚠ Caution**
>
> If you have to apply support packages to your source release shortly before the update, check whether the equivalent support package for the target release is already available. Otherwise, this can delay your update schedule.

Procedure

Determine the source release of the SAP system

Log on to the system and choose *System* > *Status*.

The release is displayed in the *Component version* field.

5.3.2 Checking the Uninstallation of Software Components

This section deals with the possible uninstallation of product instances and software components calculated by the Maintenance Planner.

Context

> **i Note**
>
> This section is relevant if you perform a release upgrade.

During the planning process with the Maintenance Planner, consider that the update can require the uninstallation of product instances and software components. The Maintenance Planner indicates the necessary uninstallations and the relevant SAP Notes. Read the SAP Notes carefully and, if necessary, carry out possible maintenance steps manually before you start the update.

During the update, the Software Update Manager lists the planned uninstallations and the relevant SAP Notes again in phase `PREP_EXTENSION/UNINSTALL_PREPARE`.

> **⚠ Caution**
>
> You cannot select further software components for the uninstallation in this phase.

Note that the uninstallation of software components requires the deletion of SAP repository or ABAP Dictionary objects, which might impact customer developments and functions. Using the *SAP Add-On Installation Tool* (transaction `SAINT`), you can carry out the uninstallation in a test scenario before the update. The *SAP Add-On Installation Tool* simulates the uninstallation, performs several detailed checks, and provides you with information about affected customer developments and functions. For more information, see the online help of the tool.

Note also that the uninstallation of the mentioned software components is integrated in the SUM procedure. This also applies if only the transaction SAINT is mentioned in the referenced SAP notes.

To simulate the uninstallation, proceed as follows:

Procedure

1. Start the *SAP Add-On Installation Tool* with transaction `SAINT`.
2. Choose *Extras* > *Settings* > *Import Queue* >, and select the scenario *Test*.
3. Choose the tab page *Uninstallable Software Components* and select the software components to be uninstalled.
4. Choose *Start* and follow the further instructions.

5.3.3 Meeting the Operating System-Specific Requirements

All Supported Operating Systems

For information about which operating systems are supported, see the Product Availability Matrix (PAM) on SAP Service Marketplace at http://support.sap.com/pam.

AIX

Depending on your target release, you require specific minimum C++ runtime level and according minimnum SAP kernel version. To check them, proceed as described in SAP Note 1780629. For additional AIX-related recommendations, see SAP Note 1972803.

Linux

Check the minimum SAP kernel requirements for your operating system in SAP Note 1563102.

HP-UX

See SAP Note 837670 to check the minimum operating system patch recommendations for HP-UX.

UNIX-based Operating Systems: Setting Limits for System Users

To avoid errors during the update, ensure that the system user limits are set optimally. To do this, proceed as described in SAP Note 1704753.

5.3.4 Upgrading Operating System and Database

When you update the SAP system, you may have to upgrade your operating system and database to a new version.

Prerequisites

For more information about upgrading Oracle Database, see the Help Portal at http://help.sap.com.

Context

For more information about which versions are currently supported, see the Product Availability Matrix on SAP Support Portal at http://support.sap.com/pam . The Software Update Manager only checks the minimum versions required for the update.

If you need to upgrade an operating system or database, or migrate a database, then the timing and the sequence of the individual upgrades is of great importance. The procedure differs according to the database you use. The following text provides an overview of the main process steps for upgrading the operating system and database system for each database.

> **i** Note
>
> - As of SAP NetWeaver 7.1, SAP only supports systems based on 64-bit on the target release. If you have to migrate the operating system and database to 64-bit, make sure that you plan enough time in your upgrade schedule for the migration, and perform the migration **before** the upgrade.
> If you need to change the hardware, we recommend that you use the SAP System Copy procedure to migrate to 64-bit. For more information about system copy, see the *System Copy Guide* on SAP Support Portal at http://support.sap.com/sltoolset *System Provisioning* *System Copy Option* .
> - Make sure that your current database version is supported for your scenario. To check the minimum database version for updates to
> - **SAP NetWeaver 7.4 SPS08 and higher:**, see SAP Note 1951491
> - **SAP NetWeaver 7.5 and higher:**, see SAP Note 2158828
> - **SAP NetWeaver AS ABAP 7.51 Innovation Package**, see SAP Note 2329005

Procedure

1. Install the Oracle client software for the target release. For more information about this procedure, see SAP Note 819829.
2. Perform the following steps:
   1. Execute the following SQL statement on the database via SQL*Plus:
      ```
      SQL> select * from V$NLS_PARAMETERS where PARAMETER =
      'NLS_NCHAR_CHARACTERSET' ;
      ```
   2. If the NLS_NCHAR_CHARACTERSET returns value US7ASCII, change it to UTF8 as described in SAP Note 669902.
3. Run the Software Update Manager up to the *Checks* roadmap step and analyze the results.

   Roadmap step *Checks* informs you about the minimum version for the operating system and database.

   If necessary, upgrade the operating system.

   If you have not already done so, migrate the Oracle database as described in the document *Upgrade to Oracle Database <Version>: <Platform>* to at least the minimum required version.
4. Upgrade the SAP system

5.3.5 Saving the Environment Files

This section deals with the environment files of user `<sid>adm.`

Context

In phase `ENVFILES` of the `Execution` roadmap step, the Software Update Manager adjusts the environment of user `<sid>adm`. Before you start the update, we recommend that you save your environment files with your specific settings.

> **i** Note
>
> The Software Update Manager doesn't replace the environment files when you only update support packages or support package stacks.

For more information about the phase `ENVFILES`, see section *Profile of User <sid>adm (Phase ENVFILES)* in chapter Important Entries for the Execution Roadmap Step [page 181].

Procedure

Move or copy your environment files with your specific settings to the directory `$HOME/.cshrc`.

5.4 Checking Cluster Data

You can use the cluster data check integrated in SUM to check all pooled tables or cluster tables in the system.

Context

For example, if you use the Database Migration Option of SUM, you can check all pooled or cluster tables in the source system before the migration.

To use the cluster data check, select the option *Check Cluster Data* in the initial dialogues of the Software Update Manager that are described in Making Entries for Scenarios Without Configuration File [page 139].

This check is similar to the SAP_BASIS report `SDBI_CLUSTER_CHECK`. It is performed by the `R3load` executable in discard mode and uses the same technology as the benchmarking tool. In addition to the report `SDBI_CLUSTER_CHECK`, further reports are available such as `SDBI_POOL_CHECK`.

> **i** Note
>
> Note that some reports can have long runtimes for large datasets.

However, we strongly recommend checking cluster data with the check integrated in SUM instead of the report `SDBI_CLUSTER_CHECK`. The integrated check is more performant and the runtime is lower because it can work with highly parallelized processing.

For more information about the cluster data check and the reports, see SAP Note 1784377.

Procedure

- Option 1 (recommended): Check cluster tables using the built-in cluster data check.

  In the initial dialogs of SUM to get the roadmap, select the scenarios without configuration file and choose *Check Cluster Data*. Then follow the instructions in the subsequent dialogs.

  The Software Update Manager uses the `R3load` executable for checks and displays detected errors on the SUM User Interface (SUM UI) [page 27]. The details are written to the log files `EUMIGRATEEXP.LOG` and `R3LDCALLRUN.ELG`. Note that BCD (Binary Coded Decimals) numbers are also checked.
- Option 2: Check pool and cluster tables using the reports that are described in SAP Note 1784377.

5.5 Making Preparations at the Database Level

Context

Several preparatory steps are required at database level.

> **i Note**
>
> **Oracle multitenant database**
>
> To determine the database architecture, SUM checks if the environment variable `ORA_PDB_NAME` has been set. If SUM detects that you run a multitenant Oracle database, also known as pluggable database, it checks and adapts automatically the relevant environment variables for the BR*Tools program, so that these tools are called correctly.
>
> When running on a multitenant database, you are advised in a dialog during the update not to deactivate the archiving mode of your database, which is highly recommended. Therefore, in the dialog is the option for the deactivation deselected by default.

Procedure

1. Make sure that the statistics are up to date for all tables.

Out-of-date statistics can increase the runtime of the update process significantly. Proceed as described in Oracle: Performing Actions for the Cost-Based Optimizer [page 203]

2. Check the value of parameter `shared_pool_size`:

   ```
   select NAME, VALUE from v$parameter where name='shared_pool_size';
   ```

   ```
   select NAME, VALUE from v$parameter where name='shared_pool_reserved_size';
   ```

   If the value is lower than 150 MB, increase it to at least 150 MB (400 MB is better), and restart the database.

   For more information, see SAP Note 556764.

3. Log on as user `<SID>adm` at the operating system level.
4. Log on to the database as the Oracle user `system` with `sqlplus` (default password is `manager`).
5. Check the resource quotas of the database user `SAP<SCHEMA-ID>` or `SAPSR3`:

   Oracle error 1536 can occur during the update if the resource quotas of database user `SAP<SCHEMA-ID>` or `SAPSR3` are limited.

   Make sure that these quotas are unlimited. Check whether the table `DBA_SYS_PRIVS` contains one of the following entries:

   ```
   grantee='SAPSR3/SAP<SCHEMA-ID>',privilege='UNLIMITED TABLESPACE',adm='YES'
   ```

   ```
   grantee='SAPSR3/SAP<SCHEMA-ID>',privilege='UNLIMITED TABLESPACE',adm='NO'
   ```

   To do this, enter the following SQLPLUS statement:

   ```
   select * from dba_sys_privs where grantee = 'SAPSR3/SAP<SCHEMA-ID>';
   ```

   If this entry does not exist, enter the SQLPLUS statement:

   ```
   grant unlimited tablespace to sapsr3/SAP<SCHEMA-ID>;
   ```

6. Log off from the database with the command quit.

   Only if using the *dictionary managed tablespaces* function:

   Make sure that the storage parameters `MAXEXTENTS` and `NEXT` have the correct values for certain tables and indexes. Otherwise, they may overflow during the update. The Oracle-specific SAP Note for the update contains the tables and the required minimum values.

   You can display the current settings with `BRSPACE`. The index names are not constant. However, you can also determine these names with `BRSPACE`.

   SAP Note 11777 describes how to change the parameters `NEXT` and `MAXEXTENTS`.

7. If you want to leave `brarchive` running to avoid archiver stuck situations (`brarchive -f ...`), proceed as follows:

   Release upgrade: Only if you do not switch off archiving during the upgrade.

   SPS update: Only if you leave archiving on during the update.

   1. Create a temporary copy of `brarchive`:
      ```
      cp /usr/sap/<SID>/SYS/exe/run/brarchive /tmp
      ```
   2. Start `brarchive` as user `ora<SID>` from the temporary directory `/tmp/brarchive -f ...`
   3. After the update, delete the copy of `brarchive`.
      This procedure avoids update errors caused by the program files being overwritten during the update.

8. Release upgrade only: If your database version is already higher than the minimum version for the new release, we recommend that you exchange the DBA tools (such as `BRSPACE`) for the upgrade.

   The *Database Software Oracle* archive for the database contains the up-to-date tools that you unpacked on the current SAP kernel when you migrated the database. After you execute the preparation roadmap steps, unpack this archive again into the subdirectory `exe` of the `abap` subdirectory of the `SUM` directory.

   This overwrites the DBA tools, which are optimized for the minimum required database version, with the tools best suited to your database version.

5.6 Checking the Central Services Requirements for ABAP

Context

You have to meet the following requirements before you update your system:

- The message server has to run at the SAP Central Services instance (SCS, ASCS) or on the host with the primary application server instance.
  During the update, the Software Update Manager uses Remote Function Call (RFC) to call function modules and temporarily schedules ABAP report programs for background processing.
  For this reason, the message server has to still be running, especially after the additional application server instances are stopped. You can only guarantee this if the message server is located at the SAP Central Services instance on the same host as the primary application server instance.

SAP systems installed in the standard way meet the specified Central Services requirements for ABAP.

If you are not running a distributed or high availability system, or you are not sure whether you have a standard installation, you can use the following procedure to check the Central Services requirements.

> **i Note**
>
> For distributed or high availability system, the update procedure moves all the central services (message and enqueue server) to the primary application server instance. During the downtime, SUM only operates with one instance while all other instances are stopped.
>
> For more information, see Update of Distributed and High Availability Systems [page 88].

Procedure

1. Call transaction RZ10.
2. Choose *Goto* > *Profile values* > *Of a server*.
3. Choose the server (host) where the primary application server instance is running.

   The profile parameters for this server are displayed with their values.

4. Check the profile parameter `rdisp/mshost`.

   This parameter contains the host name where the message server is running. It has to run on the central instance or on the same host as the primary application server instance. This makes sure that the message server is active during downtime, because only the primary application server instance runs during downtime, while the additional application server instances are stopped.
5. If you have made changes to the standard SAP system, check the profile parameter `rdisp/wp_no_vb`. This parameter displays the number of update processes for the primary application server instance. The number should be greater than `0`.

5.7 Setting the Operation Mode for the Update

Prerequisites

No operation modes should exist that contain servers other than those belonging to the current system.

Context

SPS update:

Various background jobs are started during the update. When you schedule jobs, a check is made to see whether the SAP instance on which you want them to run is defined in an operation mode. The operation mode specifies which services are offered by the work processes (dialog, update, background processing, enqueue, spool, and so on).

Release upgrade only:

Various background jobs are started during the upgrade. An operation mode defines how the resources of the individual instances of your system are configured. By specifying the operation mode, you can therefore determine which services are offered by the work processes (dialog, update, background processing, enqueue, spool, and so on) as well as the times that the services are available.

With the following steps, you perform the following tasks:

- Deleting invalid operation modes
- Defining the valid operation mode for the SAP instance on which you want to upgrade your SAP system

When you schedule background jobs, the Software Update Manager checks whether the SAP instance where the background jobs are intended to run is defined in an operation mode.

Procedure

1. Call transaction RZ04 to check the definition of your operation modes. In addition, check the DUMMY operation mode. The DUMMY operation mode may have `<host name>_<SID>` entered as the server name. Change this entry to **`<host name>_<SID>_<instance number>`**.
2. Delete the invalid operation modes. If operation modes contain names of servers other than those belonging to the system, problems may arise in the background interface in some phases. The jobs may be released, but not set as *active* (in theory, this affects all jobs scheduled to start on a specific server and triggered by an event).
3. If the SAP instance on which you want to perform the update is not entered in an operation mode, create the operation mode for the update as follows:
   a. Call transaction RZ04.
   b. Choose *Operation mode* > *Create*.

      Enter a name for the operation mode, for example, **`Update`**. Enter a short description and then save the operation mode.
   c. Make sure that the instance required for the update has been started up.
   d. Position the cursor on the new operation mode and choose *Operation mode* > *Maintain instances* > *Instances/OP modes*.
   e. Choose *Settings* > *Based on act. status* > *New Instances* > *Generate*.

      This displays all instances and their current configuration.
   f. Choose *Save*.
   g. Call transaction SM63 to enter the operation mode you have defined as an active operation mode for 24 hours (select *Normal operation (24 hours)*).

5.8 Checking the Number of Background Processes

Context

> **i** Note
>
> This section is relevant if you perform an SPS update.

Procedure

Before you start the Software Update Manager, make sure that the primary application server instance of your system is configured to run at least 3 background processes to be able to make use of the parallelization in the `RUN_DBCLONE_INIT` phase.

If you use a background processing host different from your primary application server instance, it also applies to this background processing host.

5.9 Making Preparations in the Monitoring Area

Context

> **i Note**
>
> This section is only relevant if your source release is based on SAP NetWeaver 7.0 or 7.0 EHP1.

As of SAP NetWeaver 7.0 including enhancement package 2, the agents infrastructure has changed significantly. Before the update, you need to perform several activities to ensure a smooth transition to the new release. The procedure depends on the use of a central monitoring system (CEN).

Procedure

Follow the instructions in the SAP Help Portal for your target SAP NetWeaver release.

Navigate to *Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Solution Life Cycle Management* > *Solution Monitoring* > *Monitoring the CCMS* > *Infrastructure of the SAP NetWeaver Management Agents* > *Technical Background of the SAP NetWeaver Management Agents* > *CCMS Agents: Upgrade of Monitored Systems from NW 7.0x to 7.1x or higher* >.

5.10 Checking the Requirements for the Modification Adjustment

If you modified SAP objects in your SAP system, make sure that you meet the requirements for the modification adjustment.

Context

> **⚠ Caution**
>
> If you do not make sure that you have met the requirements for the modification adjustment, we cannot guarantee complete support during the adjustment. You also risk losing the data for ABAP Dictionary objects.

For more information about the requirements for the modification adjustment, see the SAP Help Portal for your target SAP NetWeaver release athttp://help.sap.com/nw:

Release	Path in SAP Help Portal
SAP NetWeaver 7.5 and higher	*Application Help* > *Function-Oriented View* > *Application Server* > *Application Server ABAP* > *Application Development on AS ABAP* > *ABAP Customer Development* > *Changing the SAP Standard* > *Modifying the Standard* > *The Modification Assistant*

Procedure

Check the requirements for the modification adjustment [page 81].

> ⚠ Caution
>
> In particular, make sure that changes to the Repository are allowed in the client in which you want to perform the modification adjustment. To check this, call transaction SCC4.

5.11 Releasing and Confirming Open Repairs and Requests

Before you start the update, you have to release and confirm all the open repairs and requests that conflict with the SAP delivery.

Context

The Software Update Manager determines a list of these repairs and requests. If you ignore open repairs, you could lose modifications.

> i Note
>
> Note that the Software Update Manager performs also checks for inactive customer development objects. During this check, it can occur that SUM reports inactive objects, which cannot be found in the SAP system. For information about removing these inconsistencies, see SAP Note 538167.

Procedure

1. Log on to the SAP system as the owner of the open repair. You can find the user names of the owners in `CHECKS.LOG`.

   > **i** Note
   >
   > If you cannot log on with a specific user ID, you can change the owner of the repair in transaction SE09 as follows:
   >
   > 1. In the list of open repairs, position the cursor on the repair.
   > 2. Choose *Change owner*.
   >
   > To be able to change an owner in transaction SE09, you need project authorization for the Workbench Organizer (S_CTS_PROJEC).

2. Call transaction SE09.
3. Choose *Request/task* > *Find requests*.
4. For *Request type*, only select *Repair*.
5. For *Request status*, select everything **except** *Released*.
6. Choose *Execute*.

   A list of all open repairs for the selected user appears.
7. Position the cursor on the request that you want to release.
8. Choose *Release*.
9. Release the request to which the repair is assigned.

5.12 Filling the Download Directory

You can put all files and software packages with which you want to update your system in a download directory.

Context

In the initial dialogs after the SUM start, you first select the scenario category with configuration file. Enter then the path to the `stack.xml` configuration file that has to be available in your download directory. The Software Update Manager reads the download directory, unpacks the `.SAR` files, and moves the files to the appropriate directories from where they are then further processed by the Software Update Manager.

You can put the following files in the download directory:

- Support package stacks of the target release
  Release upgrade only: The support package stacks include among other things ABAP patches, which are optional. If you do not fill your download directory with ABAP patches, the Software Update Manager will not automatically extract them during the *Extraction* roadmap step.

- Enhancement packages
- SAP kernel for the target release
  Release upgrade only:
  Unless you are performing the upgrade directly after you have downloaded the calculated software archives, you can always check whether there is a newer version of the SAP kernel available on SAP Support Portal and download it to the download directory. The Software Update Manager then unpacks the files and moves them to subdirectory `exe` of the `abap` subdirectory of the `SUM` directory. Downloading the latest version of the SAP kernel has the following advantages:
  - You do not have to install the latest SAP kernel after the upgrade.
    During the *Configuration* roadmap step, the Software Update Manager prompts you to put the latest SAP kernel into the download directory. If the latest SAP kernel is available in this subdirectory, the SAP kernel of your system is already up-to-date after the upgrade.
  - You can avoid this prompt if you download the latest SAP kernel from SAP Service Marketplace to the download directory. It appears if you have included SAP Basis support packages in the upgrade and dependencies exist between these support packages and the SAP kernel version.

  SPS update:
  There may be dependencies between the versions of the SAP Basis support packages and the SAP kernel. If you want to install support packages for SAP Basis during the update and such dependencies exist, then during the *Configuration* roadmap step, the Software Update Manager prompts you to put the latest SAP kernel into the download directory. You can avoid this prompt if you download the latest SAP kernel for the target release from SAP Support Portal to the download directory.
- Additional archives
  In addition to the SAP Kernel archives, the Software Update manager detects and unpacks other patch archives such as `disp+work` package, `Database Library`, `R3trans`, `tp`, `DB2RADM`, and `ILE`.
- Stack configuration XML file
- Calculated archive files
  Release upgrade only: You can provide all necessary language archives in the download directory.

> ⚠ Caution
>
> Make sure that the files and software packages that you want to include in the upgrade, such as `.SAR` files, are located at the top level of your download directory. They should not be located in any subdirectories. This could be the case, for example, when you just copy the upgrade archives into the download directory.

> i Note
>
> **Additional Kernel Components**
>
> Make sure that you have selected all necessary kernel components in the Maintenance Planner, such as the `IGSEXE.SAR` file. Currently, the Maintenance Planner does not calculate these files automatically.
>
> **Usage of Spanning Archives**
>
> The media content may be delivered as spanning archives on SAP Support Portal. This means that the archives are split into several files to avoid a large data volume and provided in multiple archive files. To use these files with the Software Update Manager, you extract the archive files that belong together into the provided subdirectories.
>
> When the Software Update Manager requests DVD mount points, you enter the subdirectories that contain the `MID.XML` file.

Procedure

1. Create a download directory. The directory can be located anywhere on your host.
2. Put all software packages and files required during the update into the download directory.

5.13 Preparing the Update of High Availability Systems

This chapter deals with preparatory activities if you want to update your high availability (HA) system.

Context

To update an HA system, implement an HA system configuration as recommended by SAP to create a reliable starting point for the update.

Furthermore, move the cluster group `SAP <SAPSID>HA` to the cluster node, if the primary application server instance runs on such a node.

Procedure

Create an optimal starting point.

To create a reliable starting point for the update, it is crucial that you implement an HA system configuration as recommended by SAP. Below you can find problems resulting from different configurations and possible solutions:

- Manually set up standalone enqueue server
  The following only applies to standalone enqueue servers (separately started enqueue server process), not to officially supported ASCS instances.
  If you have set up a standalone enqueue server manually, revert this configuration before the execution of the downtime steps of the update. Revert this configuration before the kernel switch step at the latest. The Software Update Manager is unable to detect a manual setup of standalone enqueue servers and, therefore, cannot update them. This can cause problems when the system is started for the first time after the kernel switch.

  > **i Note**
  >
  > *Oracle Solaris Cluster 3.3* and lower:
  >
  > If you are using the old agent `SUNW.sapwebas`, see SAP note 1835686 for the changes on the system. If you are using the new agent `ORCL.ha-netweaver`, you do not need to revert changes in this step.

- Maintain the profile directory.

- Remove any old, unused profiles and backup copies. The directory must contain only active profile files.
- Do not use links to local profiles with different names. The Software Update Manager can only work with physical profile files.

> **i** Note
>
> *Oracle Solaris Cluster 3.3 and 4.x:*
>
> To avoid an unwanted failover of resource groups for SAP instances, suspend these resource groups before starting the Software Update Manager, or before the begin of the *Execution* roadmap step at the latest. To suspend the resource groups and unmonitor the resources, use the following commands:
>
> ```
> clrg suspend <resource group of SAP instance>
> ```
>
> ```
> clrs unmonitor <resource of SAP instance>
> ```
>
> ```
> clrs unmonitor <resource of the sapstartsrv process of SAP instance>
> ```
>
> Perform the above-mentioned commands for all the cluster-controlled SAP instances, including (A)SCS, ERS, PAS (and if under cluster-control, AAS instances). After the downtime, resume the resource groups and monitor the resources for each of the mentioned instances by using the following commands:
>
> ```
> clrg resume <resource group of SAP instance>
> ```
>
> ```
> clrs monitor <resource of SAP instance>
> ```
>
> ```
> clrs monitor <resource of the sapstartsrv process of SAP instance>
> ```
>
> To display the status, enter:
>
> ```
> clrg status <resource group>
> ```
>
> ```
> clrs status –g <resource group>
> ```

6 Running the Software Update Manager

This part of the document contains information about the use of the Software Update Manager.

In section *Working with SUM Tool*, we inform you about important aspects on how to start and to use the SUM, and how to use the additional tools such as SUM Observer Monitor or MailNotifier.

In section *Important Actions During the Roadmap Steps* we mention important actions and entries to which you to pay attention, or that you have to must carry out.

When the update procedure is finished, you still have some further *options after the SUM run*. You can evaluate SUM and give feedback to the update procedure, you can run SUM again either for another update, or you can repeat an update without reentering system parameter values.

Finally, you can stop the Software Update Manager completely.

6.1 Working with the SUM Tool

6.1.1 Prerequisites and Introductory Information

This section provides information about starting and running the Software Update Manager.

Prerequisites

Before you run the Software Update Manager, make sure that the following prerequisites are fulfilled:

- Make sure that the communication ports 1128 and 1129 of your system are open and not blocked by third-party software such as a firewall to ensure the correct operation of the SAP Host Agent. For more information, see TCP/IP Ports of All SAP Products.
- Your system is up and running, including all system instances and all system processes. Do not stop the system manually. The Software Update Manager stops and starts it when needed.
- You are logged on to the update host as user `<SID>adm`.
- User `<SID>adm` has the required permissions:
  The `<SID>adm` user has to be the owner and have full (*xrw*) permissions on all files in the `/usr/sap/<SID>` and `/sapmnt/<SID>` directories. If symbolic links are used, `<SID>adm` has to be the owner of these links as well.

Introductory Information

Note the following:

- All required planning and preparation actions have to be completed.
- The Software Update Manager controls the entire procedure, from checking the system requirements and importing the necessary programs through stopping production operation until production operation is resumed. The procedure is divided up into a number of different roadmap steps. The roadmap steps are in turn divided into individual steps. The successful completion of a step is a precondition for the success of all subsequent steps.
  For a complete list of all steps, see the `phaselist.xml` file available in the directory `<path to SUM directory>/SUM/abap/doc`.
  Alternatively, you can use the Using the SUM Analysis Feature [page 213] utility.
- The Software Update Manager typically runs on the application server of the primary application server instance. However, you can also use an additional application server instance.
- **SPS Update:** All customer implementations to SAP exit function modules within the SAP BASIS are disabled on the shadow instance at the beginning of the update procedure. They are re-enabled at the end of the downtime so that they can be used productively again in the updated system.
  The reason is, that SAP exit function modules with access to tables can be implemented within customer enhancement projects (R3TR CMOD). However, this could lead to errors during the update because these tables do not exist in the shadow system.
- To monitor the procedure, you can use the logs created by the Software Update Manager. To open them use either the *Logs* item in the SUM menu bar, or the log tail viewer in the *More* menu (see also: SUM UI: Menu Bar [page 34]). Alternatively, use the `SUM Analysis` utility (see: Using the SUM Analysis Feature [page 213]).
- Many steps require no user input. In the following chapters, you can find a description of all necessary user input.
- User actions are also required when errors occur. If an error occurs, correct it and repeat the step in which the error has occurred. Once the step has been repeated successfully, you can continue with the update. For more information, see Troubleshooting [page 214].

6.1.2 Meeting the Requirements for the SUM Directory

Context

When the SUM archive is unpacked on the host where the tool is initially started, the `SUM` directory is also created and data and programs are copied to this directory. For more information on the `SUM` directory, see SUM Directory [page 53].

> **i Note**
>
> If a directory with this name already exists, it has to be empty. Otherwise, the startup of the update fails.

The update directory can be a soft link to another physical directory.

Procedure

Make sure that there is enough free disk space for the `SUM` directory. This space is required for the update and the logs and is distributed among several subdirectories [page 53]. For an estimation of the disk space needed for the `SUM` directory, see the update guide that is specific to your product.

> **i Note**
>
> The size in percentage of the subdirectories `data` and `log` of the directory `<SUM directory>/abap` may vary depending on several factors.
>
> The following factors increase the amount of free space needed for these directories:
>
> - Your systems include extensive customer developments or large amounts of individual documentation.
> - You want to include Support Packages and add-ons in the update procedure.
> - Release upgrade only: Your systems contain languages other than English or German.

6.1.3 Downloading and Unpacking the Software Update Manager

Procedure

1. Download the latest version of the Software Update Manager as SUM archive from the main Software Logistics Toolset page on the Support Portal at:

   http://support.sap.com/sltoolset *System Maintenance* *Software Update Manager (SUM)* *Download SUM*

   > **i Note**
   >
   > The latest version of the Software Update Manager can automatically be downloaded when calculating the target software components and the stack configuration file in SAP Maintenance Planner. For more information about using this function, see https://blogs.sap.com/2015/07/09/maintenance-planner-2/.

2. Log on to the host on which you want to run the Software Update Manager as user `<SID>adm`.

   > **i Note**
   >
   > Typically, it is the host on which the primary application server instance is running. However, you can also use an additional application server instance.

3. Unpack the Software Update Manager package with the following command:

   ```
   SAPCAR -xf <download directory>/<path>/<Archive>.SAR -R /usr/sap/<SID>
   ```

   This command creates the directory `SUM` under the `/usr/sap/<SID>` directory. You can also specify another directory. Hereafter, the directory `<path to SUM directory>/SUM` is referred to as `<update directory>`.

⚠ Caution

- According to the SAP Product Standard Security, sensitive data that is stored permanently (such as in a file system) must be protected against unauthorized access. This can be achieved by encrypting the file system. Since the Software Update Manager cannot provide file system encryption, you must unpack the downloaded Software Update Manager package on an encrypted file system to protect sensitive data.
- Do not unpack SUM in the `DIR_GLOBAL` directory, as this can lead to issues during the update.
- Do not extract the Software Update Manager to a directory starting with `/usr/sap/<any capital three letters>/` where <any capital three letters> is not the SID of the managed system.

ℹ Note

- The complete path to the `SUM` directory must not exceed 25 characters.
- The SAP profile parameter `DIR_PUT` is the parameter used to define the directory in which temporary data is stored during the update. If you perform an update with additional application server instances, make sure that:
  - The value of the SAP profile parameter `DIR_PUT` matches the current `<update directory>/abap`.
  - The parameter `DIR_PUT` is known to the additional application server instances.
  - The additional application server instances have read/write-permission for the `<update directory>`.
- If you want to run several updates in parallel on the same host, you have to unpack one SUM instance in each directory of the respective SID directories.
  For example, if you have the SAP system IDs `AB1` and `AB2`, unpack one SUM instance in the respective directory of each SAP system ID. When starting the SUM user interface, you enter the corresponding SAP system ID in the URL, thus connecting to the corresponding SUM instance. For more information, see Starting or Restarting the Software Update Manager [page 121]. Note that when running several SUM instances using the default location **`/usr/sap/<SID>`** is mandatory. Note that SUM creates a shadow instance. Therefore, ensure that SUM instances running in parallel on a host use different instance numbers for these shadow instances. To specify the shadow instance number for each SUM instance, switch on the expert mode, or access the SUM Utilities (Extended UI) [page 42] and choose *SUM Parameters* > *SUM Shadow System Parameters*.

6.1.4 Registering SUM in SAP Host Agent

A precondition for the use of SUM is its registration in the SAP Host Agent.

Prerequisites

- Make sure that you have installed on all application servers instances the latest version of the SAP Host Agent. Check the SAP Software Download Corner at http://support.sap.com/swdc for the versions that are available to download.
  For more information, such as the deprecation of lower versions, see SAP Note 2130510.
  For additional information regarding SAP Host Agent, see SAP Notes 1031096 and 1907566.
- We recommend using the Secure Hypertext Transmission Protocol (HTTPS) for Starting or Restarting the Software Update Manager [page 121]: Make sure that the secure socket layer (SSL) for SAP Host Agent is configured as described in the SAP Host Agent documentation in https://help.sap.com/viewer/host_agent ▶ *SAP Host Agent Configuration* ▶ *SSL Configuration for the SAP Host Agent* ▶

  > **i** Note
  >
  > **https is the default as of SAP Host Agent 7.22 PL 52**
  >
  > - The secure `https` communications protocol is the default to run the Software Update Manager. The URL with `http` is automatically redirected to the secure `https`, if you
  >   - use the insecure `http` communication protocol including port 1128. and
  >   - have installed the SAP Host Agent 7.22 with patch level 52 or a higher SAP Host Agent version
  > - The host agent issues a self-signed certificate automatically if no other certificate is configured. However, it can cause web browsers to issue warnings or error messages because self-signed certificates are considered untrusted.
  >
  > For more information about this SAP Host Agent, see SAP Note 3036093 and on the SAP Help Portal the chapter SSL Configuration for the SAP Host Agent in the SAP Host Agent Guide..
- Make sure that you do not run the Software Update Manager during daylight saving time shifts. Otherwise, the update can fail.
- Always perform the procedure from within the SUM directory.

Context

SAP Host Agent is an agent that can accomplish several lifecycle management tasks, such as:

- operating system monitoring
- database monitoring
- system instance control
- system instance provisioning

Before you start an update, register the Software Update Manager in SAP Host Agent so that the operations and commands to the updated system are executed using SAP Host Agent mechanisms.

Procedure

- Register the Software Update Manager for SAP Host Agent as follows:

  ```
  <SUM directory>/abap/SUMSTART confighostagent
  ```

  > **i** Note
  >
  > Always call the script with the `root` user.

- Optionally, you can customize the user authorization.

  By default, the `<SID>adm` user is authorized to control the SUM user interface (UI). If you want to authorize a different user, you have to edit the file `<HOSTAGENT directory>/exe/operations.d/sumabap.conf` as follows:

  1. At the end of the following line, separated with a comma, add the name of the user for the UI authorization :
     ```
     Authorization:$[SID:#required#tolower]adm
     ```

     > Example
     >
     > For user `slcui`, the line must look as follows:
     >
     > ```
     > Authorization:$[SID:#required#tolower]adm, slcui
     > ```

  2. Restart the SAP Host Agent using the following commands:
     ```
     <HOSTAGENT directory>/exe/saphostexec -restart
     ```

6.1.5 Starting or Restarting the Software Update Manager

This section describes how you start the SUM user interface and the SUM back-end process, or alternatively how you restart SUM if an error, a terminated step, or a system failure occurred.

Prerequisites

- You have met the requirements for the update.
- The SAP system and the database have been started.
- You have registered SUM in SAP Host Agent as described in Registering SUM in SAP Host Agent [page 120].
- The SAPCAR version that is referenced in the environment variable PATH is identical with the one that is located in the kernel directory. In addition, no reference to any other SAPCAR version must exist in the PATH variable.
- You have downloaded and unpacked the latest version of the Downloading and Unpacking the Software Update Manager [page 118] and the software packages that you need for the update.
- When using Internet Explorer, you have to make sure that the URL relevant for your system is listed in the “Trusted” security zone. To do so, proceed as described in the Internet Explorer documentation.

- In case of a SUM restart, you have corrected the errors as described in section Troubleshooting [page 214].

> **i Note**
>
> If you have various systems running on the same application server host, you can start a further Software Update Manager procedure on these systems for system maintenance.
>
> The prerequisite is that the SUM directories remain unchanged and follow the standard path as described in chapter SUM directories.

Procedure

1. Open a web browser window.
2. In the address bar, enter the following URL: **`https://<fully qualified hostname>:1129/lmsl/sumabap/<SID>/slui`**

   > **i Note**
   >
   > - Replace `<SID>` with your system ID.
   > - The system ID in the URL must be written in uppercase letters. Otherwise, errors can occur in the user interface.
   > - 1129 is the https port of the SAP Host Agent.
   > - If the SSL has not been configured, use http instead of https at the beginning of the URL and use port 1128 (**`http://<fully qualified hostname>:1128/lmsl/sumabap/<SID>/slui`**). When using SAP Host Agent 7.22 with patch level 52 or a higher version, the URL is automatically redirected to https. For more information about this SAP Host Agent, see Registering SUM in SAP Host Agent [page 120].

3. In the dialog box that appears, enter the user name `<SID>adm` and the password.

   The SAP Host Agent starts the Software Update Manager, and its user interface is displayed in the web browser.

   > **i Note**
   >
   > In case of a restart, SUM continues from the point where it had previously stopped.
   >
   > **Start Options:** By default, the Software Update Manager starts without any special parameters, and you can skip the field *Start Options*. If you want to start with special parameters provided by SAP, enter them in the field *Start Options* and choose *Next*.

6.1.6 Starting the SUM Observer Monitor

The Software Update Manager offers an additional SUM user interface mode called the `observer mode`. This mode is displayed as `SUM observer monitor`.

Prerequisites

- You have created a user `<SID>obs` and set a password for this user.

  > ⚠ Caution
  >
  > For security reasons, do not use the user `<SID>adm` for the observer mode.
  >
  > **Linux only**: The `<SID>obs` user must be added to the `sapsys` group.

- You have started the Software Update Manager at least one time with the SUM user interface as described in Starting or Restarting the Software Update Manager [page 121].
- You have made sure that the corresponding observer progress file `SUMOBSERVER.XML` exists in the subdirectory `<SUM directory>/abap/doc/analysis`.

> ℹ Note
>
> The `observer mode` has been configured automatically once you have executed the `SUMSTART` script as described in Registering SUM in SAP Host Agent [page 120].

For more information, see SUM Observer Monitor [page 46].

Procedure

1. In the address bar of your browser, enter the following URL:

   `https://<fully qualified hostname>:1129/lmsl/sumobserver/<SID>/monitor/index.html`

   - Replace <SID> with your system ID.
   - The system ID in the URL must be written in uppercase letters.
   - 1129 is the https port of the SAP Host Agent.
   - If the SSL has not been configured, use http instead of https at the beginning of the URL and use port 1128:
     `http://<fully qualified hostname>:1128/lmsl/sumobserver/<SID>/monitor/index.html`

     > ℹ Note
     >
     > If you have installed the SAP Host Agent as of version 7.22 with patch level 52, the URL with http is automatically redirected to https. See Registering SUM in SAP Host Agent [page 120] for more information.

2. Enter the observer user `<SID>obs` and the configured password.

6.1.7 Starting the MailNotifier

The MailNotifier informs you via e-mail when the Software Update Manager (SUM) displays a dialog that requires user interaction.

Prerequisites

- You have prepared the MailNotifier tool as described in SUM MailNotifier [page 50].
- You have started the Software Update Manager as described in Starting or Restarting the Software Update Manager [page 121].

Context

Especially during long-running phases, you have to check the SUM UI frequently to see if a dialog requires any actions or entries from you. To avoid frequent checking, you can configure the MailNotifier tool that notifies you as soon as a dialog is waiting for your input.

To start the MailNotifier, proceed as follows:

Procedure

1. Open a command line interface on the PC or host to which you have copied the `MailNotifierApp` files.
   a. If you want so start the MailNotifier by referencing the properties file, enter the following:

      ```
      java –jar MailNotifierApp.jar properties=<path-to-props-file>
      ```

   b. If you want so start the MailNotifier by providing the parameters in the command line, enter the following:

      ```
      java –jar MailNotifierApp.jar sum.sid=<SID> sum.user=<user> <further
      parameters property=value, if available>
      ```

2. If you did not enter your passwords in the properties file or on the command line, which is what we strongly recommend for security reasons, enter the passwords in the command line interface when the MailNotifier prompts you.

   The tool starts running
3. To make sure that the configuration is working, check the initial mail from the MailNotifier. If necessary, correct the configuration.

Results

If the configuration is correct, the MailNotifier starts checking the update frequently according to your parameter settings. If a dialog is displayed in the Software Update Manager that requires your input, the tool sends an e-mail notification.

For more information about the tool, see SUM MailNotifier [page 50].

6.1.8 Resetting the Update

The Software Update Manager offers the option to reset the update.

Prerequisites

- Make sure that the downtime has not yet started.
  As of the beginning of the downtime, a reset is not possible anymore. To reset the update after the downtime has started, use the system backup created before the SUM process.
- Make sure that the SUM directory has not been cleaned up.
  After the update procedure comes to an end, the Software Update Manager offers the option *Cleanup* in the *More* menu. It cleans up the SUM directory and terminates all running SAPup processes on the server. Note that after a cleanup, you cannot reset the update. For example, you cannot carry out a manual reset on the operating system level after a cleanup. Use a system backup created before the update procedure. Note that a cleanup is mandatory after a reset has been completed.
- If you use the database migration option, make sure that anyDB is still available.

Context

When you choose the *Reset* option, the system is set to a state that allows the update procedure to be restarted from the beginning.

> **i Note**
>
> **Database Migration Option (DMO)**
>
> If you are executing the database migration option of the Software Update Manager, you can reset the update during any roadmap step. For more information, see the *DMO guide*, which is mentioned in the List of Referenced Documentation [page 264] .
>
> All migration activities are also revoked, and the connection to the source database is reestablished. However, consider the following limitations:
>
> - The target database client is not deleted from PAS or AAS automatically.
> - BR tools are not restored.

- The user `DBACOCKPIT` and related roles are not deleted in the target database.

Excluding Customer-Specific Languages

The removal or modification of customer-specific languages in the tables `T002C` and `TLSY7` is executed immediately. A later reset of the update procedure does not restore the entries. See also: Excluding Customer-Specific Languages [page 86].

Procedure

From the SUM UI: Menu Bar [page 34], open the *More* menu and choose *Reset*.

This possibility depends on the phase that the update procedure is currently going through. The update procedure consists of phases that can be reset and phases that you cannot reset directly. Whenever you are in a resettable phase, the Software Update Manager offers you the *Reset* option. If not, choose on the SUM UI *Back* repeatedly until you are in a resettable phase and the *Reset* option appears in the *More* menu. If the update procedure has not progressed far and you choose *Back* repeatedly, the *Welcome* dialog appears.

After you have chosen *Reset*, the Software Update Manager indicates the successful reset procedure and asks you to clean up the SUM directory. Choose *Cleanup* from the *More* menu. After the cleanup is completed, a message appears on the user interface indicating that the SUM ABAP server processes ("SAPup") have been ended. You can close the browser window or the browser tab page, or you can start the update procedure from the beginning.

> **i Note**
>
> For more information about the *More* menu, see SUM UI: Menu Bar [page 34].

6.1.9 Breakpoints During the Update

You can use breakpoints to pause the update procedure at a specified point.

I. Setting Breakpoints

I.a. Setting Breakpoints in the SUM User Interface

On the right-hand side of the browser window, the SUM user interface offers you the option to maintain breakpoints from a list of available breakpoints. You can sort, filter, and search for breakpoints. The icons for the breakpoint status are described in the legend. For more information, see SUM UI: Menu Bar [page 34].

The breakpoint list displays icons in three different colors:

- Green - breakpoint lies in the past
- Orange - breakpoint lies in the currently processed phase
- Blue - breakpoint lies in a future phase

After opening the list, it scrolls automatically to a position where the breakpoint of the current phase is listed at the fourth position from the top, if available. You can scroll away from the position, but each time you choose *Refresh*, the breakpoint list is refreshed and displays the current phase highlighted at the fourth position of the table again.

If SUM stops at a selected breakpoint, it displays a dialog with the options listed in the following in section *Possible Options in the Breakpoint Dialog*.

> **i Note**
>
> **Stop at Next Phase**
>
> By means of the button *Stop Next Phase* located above the breakpoints list, you can switch on or off the single-step mode. With this feature, you can pause the procedure at every next phase.
>
> When the next phase is reached, a selection dialog appears on the SUM UI with the following options.
>
> - Continue in single-step mode (stop before each phase)
> - Delete breakpoints and continue
> - End single-step mode and continue to next breakpoint

I.b. Setting Breakpoints at Operating System Level

Alternatively, you can enter the following commands when you are in the update directory:

- Change the directory with the following command:
  `cd <update directory>/abap/bin`
- If you want the ABAP program to stop at the **next** step, enter the following command:
  `./SAPup stop`
- If you want the ABAP program to stop before a **specific** phase, enter the following command:
  `./SAPup stop <phase name>`
- If you want the ABAP program to stop after a **specific** phase, enter the following command:
  `./SAPup stop -after <phase name>`

> **i Note**
>
> It is not possible to combine the commands **`./SAPup stop <phase name>`** and **`./SAPup stop -after <phase name>`**. The `SAPup stop -after <phase name>` command overwrites the other command and makes it ineffective. That is, you cannot stop the procedure before a phase and then immediately after the phase.

II. Possible Options in the Breakpoint Dialog

> **i Note**
>
> Depending on your scenario and system, the available options may vary.

Once you have set a breakpoint, the Software Update Manager stops at that specific point and displays a dialog with the following options:

- *Continue to next breakpoint*
  SUM continues the update automatically until the next breakpoint is reached. Then, the breakpoints dialog is displayed again.
- *Continue in single step mode (stop before each phase)*
  SUM continues the process phase by phase. You manually move on to each next phase of the process, unless you choose another option.
- *Delete breakpoints and continue*
  SUM deletes all set breakpoints and continues without any further stop.
- *End single step mode and continue to next breakpoint*
  SUM returns to its regular operation, that is, continues automatically until it reaches the next breakpoint, and not at the next phase. When the next breakpoint is reached, the breakpoints dialog is displayed again.
- *Exit program*
  The update process stops and you exit SUM. When you restart the update process, the breakpoint dialog appears again.

6.1.10 Verifying SAP Archives (Digital Signature Handling)

SUM offers the option to check the signature of SAP software archives that are located in the download folder.

Context

SAP offers digital signatures for selected software archives that are provided in the software download area of the SAP Support Portal. SAP Note 2342412 informs you about software archives and media that are currently signed by SAP. The signature of these archives can be verified during the update procedure.

At the beginning of the update, you can decide on the first dialog of the SUM (on which the download directory is specified) whether to check the authenticity of the archives. After selecting the appropriate checkbox, the Software Update Manager triggers during the update the signature check, which is carried out internally by the SAPCAR tool.

In addition, you can include a Certification Revocation List (CRL), which is provided by SAP and updated on a monthly basis. The CRL contains certifications that were revoked after the delivery of software archives. If you want to perform an additional check for revoked signatures, download the CRL and copy it to the download directory before you start the update.

If any archives with missing or wrong signatures are detected during the update, the Software Update Manager displays a dialog in which these archives are listed. In this case, you can either correct the archives in download directory and run the check again afterwards, or you can ignore the messages and continue with the update.

To correct the download directory, return to the initial dialog on which you find an error message stating that the dialog was canceled by the user.

> **i Note**
>
> The initial dialog is then shown with an enhanced text that was not part of its first display.

You can now provide the download directory with new archives with new or updated signatures. Afterwards, keep the option *Check archives authenticity* selected and repeat the update. The signature check is triggered again. Alternatively, you can now switch off the signature check by deselecting the option. You can then repeat the update with disabled signature checking.

Procedure

1. On the initial dialog *Archive Verification*, select the checkbox *Check archives authenticity* to switch on the signature checking.
2. Optional: Include the signature revocation list into the signature check by downloading the list from https://tcs.mysap.com/crl/crlbag.p7s and adding it to the download directory.

   If SUM does not find a CRL in the download directory, it does not check the signatures for revocation.
3. Start the update procedure, and correct or ignore missing or wrong signatures.

   A dialog is displayed that informs you if missing or wrong signatures are detected. You have the option to either ignore the messages, to correct the archives, or to switch off the signature checking.
   - If you want to ignore the messages, select the checkbox *Confirm and continue the procedure* and choose *Next*.
   - If you want to provide new archives with new or updated signatures, choose *Back* to return to the initial dialog. Maintain the archives in the download directory, keep *Check archives authenticity* selected, and choose *Next* to repeat the update procedure with a new signature check.
   - If you want to switch off the signature checking, choose *Back* to return to the initial dialog. Deselect the checkbox *Check archives authenticity*, and choose *Next* to repeat the update procedure but with no further signature check.

6.1.11 Integrating Customer Transports into the Update Procedure

This section deals with the Software Update Manager feature to integrate customer transports into the update procedure to reduce business downtime.

Prerequisites

- The customer transports must be made in a way that they can be imported in an `IMPORT-ALL` mode with return code 4 or 0.
- The customer transports must be tested successfully and verified.
- Make sure that you apply the latest `tp` and `R3trans` for the source release, and that you include the latest `tp` and `R3trans` in the download directory for the target release.

Context

The `Customer Transport Integration` feature offers you the possibility to integrate your transport requests into the update procedure to reduce business downtime. If you want to use the feature, the update procedure differs from the standard update procedure.

For more information about the feature, see Integration of Customer Transports [page 91].

> **i Note**
>
> - To avoid errors in the `Switch Framework` during the activation, apply SAP Notes 585789, 574102, 1386114 and 1695884 in the source release. If the notes are obsolete, do not apply them!
> - The following BAdIs cannot be implemented during the update procedure as part of the customer transports:
>   - `SFW_BF_STATE_CHANGE`
>   - `SFW_SWITCH_STATE_CHANGE`
>   - `SFW_SWITCH_CHANGED`

Procedure

1. Provide the Software Update Manager with transport buffer file

   The transport buffer file is a list of customer transport objects to be imported. The transport buffer file is based on the import queue of the `Transport Management System` (TMS) of the system that you want to update. Make sure that the system use `Extended Transport Control`.

   You have two options to provide the file: Either you copy an existing buffer file to the SUM directory, where it can be consumed, or you use a wizard.

   - If you want to copy the buffer file, change first to operating system level. Then go to the subdirectory `buffer` of the transport directory in the system that you want to upgrade. Copy the file `<SID of the system to be upgraded>` to the download directory of the Software Update Manager. The buffer file contains all transports, which are part of the import queue and to be integrated into the update procedure. Check carefully that you integrate only the wanted transports into the update procedure.
   - If you want to use a wizard, you can use the *Customer Transport Upgrade Integration Wizard*. SAP Note 2450902 gives you more information on how to generate the buffer file, and on how to include the file into the update procedure.

   > **⚠ Caution**
   >
   > The buffer file must not contain buffer lines with `umodes` F or C.

   > **i Note**
   >
   > If `Change Request Management` is used, consider the following:
   > - Make sure that you only integrate transports of changes that were tested successfully. The `Change Request Management` cannot control it.

- Use transports for the production system only from projects with which you want to go live.

2. Monitor the parameters `CTC` and `mainimp_proc`.

   In the transport buffer file, the customer transports are written in the correct order with client-specific `CTC=1` format. The update procedure automatically sets the parameter `CTC` to 1 in the transport profiles (`TPP files`) of the `tp` phases for customer transport integration. This default parameter `CTC=1` activates the client-specific transport control for all managed systems and enables the transport routing for multiple clients in the update procedure.

   The parameter `mainimp_proc` must have the value 1.

   ⚠ Caution

   Do not change the settings for the parameters `CTC` and `mainimp_proc` manually.

   → Recommendation

   - We recommend configuring the sandbox system in SAP Transport Management System (STMS) just like the production system. Make sure that the `CTC` parameter is identical in both system landscapes.
   - We recommend using the selection tool, which is available via the *Customer Transport Upgrade Integration Wizard* in SAP Note 2450902. The selection tool supports you in creating the customer buffer and generates it automatically in `CTC=1` format.
   - If you do not use the selection tool, and the system is configured in `CTC=0` format, you can adapt the customer buffer using the following command in directory `<transdir>/buffer`:
     ```
     tp fillclient ALL buffer=CUSTOMER defaultclient=100 pf=<DIR_TRANS>/bin/
     TP_DOMAIN_<SID>.PFL -dCTC=1
     ```

3. Start the SUM as described in Registering SUM in SAP Host Agent [page 120] and the SUM user interface as described in Starting or Restarting the Software Update Manager [page 121].
4. During the initial dialogs of the update procedure, SUM asks you whether a `stack.xml` file exists or not.
   - If you want to import your customer transport requests only without performing a standard update procedure, select the scenario category without stack configuration file and choose *Customer Transport Integration only* in the next dialog.
   - If you want to import your customer transport requests during the update, select the scenario category with stack configuration file and specify the `stack.xml` file (name including path). In a further initial dialog concerning the additional parameters, select the *Consider Customer Buffer File* checkbox in the *Customer Transport Integration* section. A subsequent dialog prompts you to enter the path and the name of the buffer file that contains customer transports for the target release.

   For more information, see Making Entries for Scenarios with Configuration File [page 136].
5. A dialog appears in phase `SUMASK_CUSTOMER_BUFFER` during the roadmap step *Configuration*.

   If you have chosen a scenario **with** stack configuration file and selected that SUM shall consider a customer buffer file, the dialog shows the already entered path and name of the transport buffer file. If necessary, you can change it.

   Otherwise, provide here path and name of the transport buffer file, which contains the customer transports to be included.

For the transport profile, preselected values are taken over from the transport profile file. However, you can override the preset value of parameter `VERS_AT_IMP` by defining in this dialog that SUM creates the transport profile versions at import time. Note that this option can prolong the update procedure.

Your entries are validated later on in phase `ADJUSTPRP`. If the validation is successful, no further action is required. Otherwise, the corresponding dialogs are displayed.

6. Note that the dialogs to include SPDD or SPAU transport requests are not displayed during the initial dialogs of SUM in phase `SUMASK_SPDD_SPAU`. SPDD- or SPAU-related transports in the customer buffer are identified automatically during the update procedure.

   If necessary, the dialogs for including SPDD or SPAU transport requests are displayed in the `SUMASK_SPDD_SPAU` phase.
7. The Software Update Manager imports and activates one part of the transports in the shadow system and one part during the downtime.
8. If the `Change Request Management` is used to control the transports in your landscape, carry out the following procedure after the update:
   a. Choose in the SAP Fiori Launchpad of the SAP Solution Manager the *Change Management Launchpad Group*.
   b. Choose the tile *Administration Cockpit - Change Control Management*.
   c. Choose the tab *Landscape Overview*.
   d. Select *Delete Transport Tracking Data* to delete the transport tracking data of one or more selected systems.

      You can use this function to delete the buffered transport data information that is contained in the SAP Solution Manager system in the following case: You want to copy a managed system, but the transport history of the central SAP Solution Manager system already contains transport data such as transport statuses and objects.

6.1.12 Performing a Prerequisites Check

You perform a prerequisite check to check the source system before you start the SUM procedure.

Context

The aim of the prerequisite check is to find out if aspects such as source operating system, database version, SPAM version, or others meet the requirements for the target system.

To perform the prerequisite check using the Software Update Manager, proceed as follows:

> ℹ Note
>
> - Make sure that the tools
>   - `Support Package Manager (SPAM)`
>   - `SAP Add-On Installation Tool (SAINT)`
>
>   are already installed on your source system with version 47 or higher.
> - After a successful check run, perform a cleanup of the Software Update Manager first before you start the normal update or conversion procedure.

In case the check aborts with an error, reset the Software Update Manager first and then perform a cleanup. Afterwards you can repeat the check, or you can start an update or conversion procedure. You can find both the *Reset* and the *Cleanup* option in the *More* menu as described in SUM UI: Menu Bar [page 34].

Procedure

1. Start the Software Update Manager.

   For more information, see Starting or Restarting the Software Update Manager [page 121].
2. Specify the scenario category **with** `stack.xml` configuration file.

   Enter the full path of the `stack.xml` configuration file calculated by the *Maintenance Planner*. For more information, see Specifying the Scenario to Get the Roadmap [page 135].
3. Select the scenario strategy *Prerequisite Check Tool* and the option *Prerequisite Check* to start the check.
4. After the check, analyze afterwards the corresponding log file. Its file name is provided by the check tool.

   > **i Note**
   >
   > During the prerequisite check, the Software Update Manager also performs in the phase `CHECK4NOTES_CHKTL` a check for SAP Notes that are required for the software maintenance process. As a result, you get a list of required SAP Notes in section *Required SAP Notes* of the result list. Note that you can ignore SAP Notes that are classified by SAP Note Assistant as *Cannot be Implemented* or *Obsolete*.

6.1.13 Importing or Installing Software After Starting the Upgrade

Context

> **i Note**
>
> This section is only relevant if you perform a release upgrade.

After you have started the upgrade, you may have to import software such as SAP Support Packages, languages, or add-ons (and add-on updates), or you may have to install add-ins of Java software.

Procedure

1. Reset the upgrade procedure as described in Resetting the Update [page 125]. If needed, close the browser window or the browser tab page with the SUM user interface.

2. Import or install the required software.
3. Restart the upgrade and repeat the preparation roadmap steps.

   If you have closed the browser window or the browser tab page, start the SUM UI again as described in Starting or Restarting the Software Update Manager [page 121]. Afterwards, restart the upgrade and repeat the preparation roadmap steps.

6.1.14 Correcting Installed Software Information

Inconsistencies in the information about the installed software instances in SAP systems might cause errors during the regular update processes. Using the Software Update Manager, you can eliminate the inconsistencies.

Prerequisites

You have set up and started the Software Update Manager according to the information in section Running the Software Update Manager [page 116].

You have generated the specific stack configuration file `stack_cisi.xml` in the SAP Maintenance Planner.

Context

By means of the specific stack configuration file `stack_cisi.xml`, which has been calculated in the SAP Maintenance Planner, you can correct and update the information about the installed software instances in your SAP systems. To trigger this scenario, proceed as follows:

Procedure

1. After you have started the Software Update Manager, select in the initial dialogs the scenario category with stack configuration file.
2. In the field for the stack configuration file, enter a valid name and the path to the file `stack_cisi.xml`. Alternatively, you can browse for the file.
3. Follow the instructions in the subsequent dialogs.

6.2 Actions During the Roadmap Steps

6.2.1 Specifying the Scenario to Get the Roadmap

A dialog sequence at the beginning collects the information to determine the wanted scenario.

Context

After you have started the Software Update Manager as described in Starting or Restarting the Software Update Manager [page 121], it displays as a first dialog the *Welcome* page, in which you are prompted to specify the scenario category. Depending on your selection, further dialogs follow. For more information on the scenario determination, see Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66].

In a first step, you decide whether you want to use the `stack.xml` configuration file provided by the *SAP Maintenance Planner* or not.

> **i** Note
>
> - **Invalid `stack.xml` file**
> If a `stack.xml` file is not valid for the SUM procedure, you are informed by the following message: `The specified stack file is not valid for system ID <system ID> and installation number <inst.number>.`. In this case, specify a valid name and path to the stack.xml file.
> - **Digitally Signed and Modified `stack.xml` file**
> If a valid `stack.xml` file calculated in the SAP Maintenance Planner does not contain a validation hash, which may be the case with older files, the Software Update Manager does not perform a modification check. You are warned by the following message: `Warning: The specified stack file is not digitally signed.`
> However, if the `stack.xml` file contains a validation hash, a modification check is performed. If the stack file has been modified in the meantime, you are warned by the following message: `The specified stack file is not the originally calculated stack file. It has been modified.`
> In both cases, either cancel the procedure and calculate a new original `stack.xml` file, or confirm that you ignore the warning about the modified or non-digitally signed stack file and continue. Note that errors can then occur in the subsequent SUM procedure.
> - **Missing scenarios**
> If desired scenario strategies are not displayed for selection in the following dialogs, see the log file `SELROADMAP.LOG` for more information about the reasons.

Procedure

Specify the Scenario Category

Decide, whether you want to use a scenario with or without `stack.xml` configuration file.

- If you want to use a configuration file, enter a valid name and the path to it. Alternatively, you can browse for the file.
  Afterwards, choose *Next* and continue with Making Entries for Scenarios with Configuration File [page 136].
- If you opt to use no configuration file, the field for the stack file name is hidden. Choose *Next* and continue with Making Entries for Scenarios Without Configuration File [page 139].

Results

After all selections have been made, SUM starts the wanted scenario. It is displayed for your information on the SUM UI under the tool name and version. See also SUM User Interface (SUM UI) [page 27], → item 1.

The next roadmap step is the *Extraction* roadmap step, in which you have to make entries and specifications, if necessary. For more information, see Important Entries for the Extraction Roadmap Step [page 141].

6.2.1.1 Making Entries for Scenarios with Configuration File

This section is relevant when you have specified a scenario category with `stack.xml` configuration file.

Context

After you have provided the Software Update Manager the path to the download directory with the `stack.xml` file, it checks in the background the source database of your system.

1. **The source database is not SAP HANA**
   If your source database is **NOT** SAP HANA database, you must decide first whether you want to carry out a database migration. For this decision, the following dialog appears first:
   - *Decision on Database Migration Option*

   Then the following dialogs appear successively:
   1. *Scenario Strategy*
   2. *Additional Parameters for <scenario>*
2. **The source database is SAP HANA**
   If your source database is already SAP HANA database, and the system requirements are met for the *Homogeneous DMO* scenario, the following dialog appears first:
   - *Decision on Database Migration Option*

   If your source database is SAP HANA database, and the system requirements are **NOT** met for the *Homogeneous DMO* scenario, the following dialogs are displayed immediately one after the other:
   1. *Scenario Strategy*
   2. *Additional Parameters for <scenario>*

Procedure

1. **Decide on DMO**

   The dialog *Decision on Database Migration Option* appears only, if

   - your source database is not SAP HANA database
   - your source database is SAP HANA database and the system requirements are met for the *Homogeneous DMO* scenario

   If your source database is not SAP HANA database, and you carry out a system conversion to SAP S/4HANA, the dialog is NOT displayed. In this case, a database migration to SAP HANA database is required so that the Software Update Manager performs it automatically.

   You can decide if you want to use the Database Migration Option (DMO) of the Software Update Manager to migrate your source database to one of the displayed databases.

   If you want to perform a homogeneous DMO scenario, you can confirm the SAP HANA database.

   If you do not want to use the DMO feature, choose *No migration*.

   > **i Note**
   >
   > For more information on DMO and the different migration options, see the SAP Note for DMO mentioned in the SAP Support Portal at http://support.sap.com/sltoolset *System Maintenance* *System Maintenance Scenarios* *Database Migration Option (DMO) using SUM*.

2. **Specify the scenario strategy**

   > **i Note**
   >
   > - If desired scenario strategies are not displayed for selection, see the log file `SELROADMAP.LOG` for more information about the reasons.
   > - The dialog *Scenario Strategy* is skipped in the following cases:
   >   - You want to carry out a database migration to SAP ASE database
   >   - You want to carry out a system conversion to SAP S/4HANA, but the source database does **not** support downtime-optimized database migrations. This can be checked in SAP Note 2547309. If the source database is SAP HANA, a system conversion based on near-Zero Downtime Maintenance (nZDM) is possible, as mentioned in the following.

   Depending on the scenario category and the decision on DMO, one or more of the following options are available for selection:

   - *Single System*
   - *Standard*
   - *Downtime-optimized*
   - *Prerequisite Check Tool*

   1. *Single System*
      This option means a longer downtime, and no shadow instance is running in uptime. Note that this option is only available for the update of support packages or support package stacks.
   2. *Standard*
      This option is the standard configuration for the most scenarios.

3. *Downtime-optimized*
   One of the following variants of this option is available:

Source database is SAP HANA?	Wanted scenario	Available option
Yes	Update or upgrade with business downtime reduction	*near-Zero Downtime Maintenance (nZDM)* or *Zero Downtime Option (ZDO)*
No	Update or upgrade with database migration to SAP HANA database	*Uptime Migration (Downtime-optimized DMO)*
No	Update or upgrade, but no database migration to SAP HANA database	*near-Zero Downtime Maintenance (nZDM)*
Yes	Conversion to SAP S/4HANA	*near-Zero Downtime Maintenance (nZDM)*
No, but • Oracle • IBM Db2 for Linux, Unix, and Windows (DB6)	Conversion to SAP S/4HANA	*Uptime Migration (Downtime-optimized DMO)*

4. *Prerequisite Check Tool*
   The Software Update Manager executes a *Prerequisite Check* as a separate step. If specific mandatory preparatory steps are required, the update procedure can stop to ensure a consistent update. However, the update is stopped if errors persist.

For more information on the scenario strategy options, see Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66].

3. **Decide on additional parameters**

   The following options are available:

- *Check Archive Authenticity*
  options are only available if you perform a systemSelect this checkbox if you want the authenticity of all archives in the download directory to be checked. For more information, see Verifying SAP Archives (Digital Signature Handling) [page 128].
- *Switch expert mode on*
  Choose this option if you want to adapt additional tool configuration options during the update:
  - The Software Update Manager always displays a Support Package overview in phase `BIND_PATCH`, even if manual adjustment is not necessary. You can overrule the Support Package level, which is derived from the stack configuration file. For more information about phase `BIND_PATCH`, see Important Entries for the Configuration Roadmap Step [page 144].
  - You can change the automatically generated instance number for the shadow instance and enter a password manually. (See also: Shadow Instance Parameters [page 75].)
  - During an ASCS Instance Split [page 93], you can manually assign an instance number to the new ASCS instance.
  - You can decide if you want to use saved profiles from a previous update for the shadow system.
- *Customer Transport Integration*
  If you
  - have selected the strategy mode *Standard* or *Downtime-optimized*

- meet the conditions for the Software Update Manager including customer transport requests according to SAP Note 1759080

you can include customer transport requests into the procedure to reduce business downtime. Select the checkbox *Consider Customer Buffer File*, if a customer buffer file shall be considered that contains customer transports for the target release. A subsequent dialog prompts you to enter the path and the name of the buffer file. For more information, see Integration of Customer Transports [page 91].
Note that this option is not displayed if the scenario strategy *Single System* has been selected beforehand.

4. **Decide on Migration Parameters**

   You can
   - decide on the table selection, if you want to perform a table comparison
   - enter the migration key, if necessary
   - enable the migration repetition option for testing purposes

6.2.1.2 Making Entries for Scenarios Without Configuration File

This section is relevant when you have specified a scenario category without `stack.xml` configuration file.

Context

If you opt to use no configuration file, a dialog with a list of possible scenarios appears. Select one option from the list.

Depending on your selection, further dialogs may appear, or the current dialog is enhanced to maintain further parameters and values.

Procedure

1. **Select the scenario to start**

   The following options are available:
   - *DMO without System Update*
     Relevant for DMO with target database SAP HANA: You can run a DMO procedure for migration purpose only without updating the SAP system.
   - *Customer Transport Integration only*
     You want to import your customer transport requests only without performing a standard update procedure. See also Integration of Customer Transports [page 91].
     Note that *DMO with Customer Transport Integration* is only supported for target database SAP HANA.
   - *Benchmarking Tool*

Relevant for DMO: With this migration tool, you can simulate the export and import processes or the export process only to estimate their speed.

- *Check Cluster Data*
  You want to check the consistency of all pooled tables or cluster tables in the system. See Checking Cluster Data [page 104] for more information.
- *Table Comparison Check Tool*
  With this stand-alone migration tool, you can compare export and import table checksums for your database. The check can, for example, be relevant for the system copy procedure with the *Software Provisioning Manager*.

> **i Note**
>
> - If desired scenario strategies are not displayed for selection, see the log file `SELROADMAP.LOG` for more information about the reasons.
> - For more information on the DMO-relevant options, see the DMO Guide. The guide is available on the SAP Support Portal at http://support.sap.com/sltoolset *System Maintenance* *Software Update Manager (SUM)* *Database Migration Option (DMO) using SUM*

2. **Specify the Scenario Strategy and Additional Parameters**

   If you selected in the dialog for selecting the start scenario the option

   - *Customer Transport Integration only* or
   - *DMO without System Update*

   a dialog appears in which you can specify the scenario strategy. The following options are available:

   - *Standard (standard configuration)*
     This option is the standard configuration for the most scenarios.
   - *Downtime-optimized (high configuration)*
     Here, you can choose a further option:

Scenario	Additional Option	Use
DMO without System Update	*Uptime Migration (downtime-optimized DMO)*	If you want to migrate selected large application tables partly in uptime.
Customer Transport Integration only	*Near-Zero Downtime Maintenance (nZDM)*	If you want to move table structure adaptations and import of new table content partly to uptime processing for a system update or upgrade.

   For more information on the scenario strategy options, see Initial Dialogs for the Scenario Specification (Get Roadmap) [page 66] and Making Entries for Scenarios with Configuration File [page 136].

   Afterwards, more dialogs appear, where you can first switch on the expert mode. Then you enter the required system passwords, after that you can specify the download directory and switch on the archive verification.

   In case of *DMO without System Update*, the dialog about the migration parameters appears in addition. In the following, you find more information about it.

3. **Configure the Tools**

   If you selected in the dialog for selecting the start scenario one of the options

- *Benchmarking Tool* or
- *Check Cluster Data*
- *Table Comparison Check Tool*

the initial dialog is enhanced to select the wanted option for the execution of the tools. Afterwards, further dialogs appear as described in the *DMO Guide*.

4. **Decide on Migration Parameters**

   You can
   - decide on the table selection, if you want to perform a table comparison
   - enter the migration key, if necessary
   - enable the migration repetition option for testing purposes

   Note that this dialog does not appear if you have selected *Customer Transport Integration only*.

6.2.2 Important Entries for the Extraction Roadmap Step

This chapter deals with the roadmap step `Extraction`, in which the Software Update Manager extracts the required software.

In the following, we go into detail of some important phases in which you enter information or confirm the existing values when prompted by the Software Update Manager:

- Download Directory or Mount Directories for Data Carrier Content (Phase PREP_INPUT_CHECK/KERNEL_PRE) [page 141]
- Password of User DDIC and Database Users (Phase SUMASK) [page 142]
- Checking the Configuration of sapcpe (Phase PREP_INIT/CHECKPROF_INI) [page 142]
- SAP Note Implementation (CHECK4NOTES_TOOL) [page 143]

Download Directory or Mount Directories for Data Carrier Content (Phase PREP_INPUT_CHECK/KERNEL_PRE)

If data carrier such as the Export DVD are required, provide the download directory with all necessary software archives or with data carrier content. See also Filling the Download Directory [page 112]. If you have **not** copied all the necessary contents, the Software Update Manager asks in a dialog for *DVD Mount Points*. Enter the path to the missing software archives or data carriers to mount them. In addition, SUM provides you for your information with a list of suitable data carriers including media numbers and media descriptions.

> **i Note**
>
> - When you download software archives or data carrier contents from the SAP Support Portal that are split into several ZIP files, you have to correctly recombine the split parts and unpack them into the same directory.
> - Software archives or data carrier contents in the upgrade package, which are not required by the Software Update Manager, are used by other programs related to the upgrade, for example, for importing a new version of the database system.

If you have only **one DVD drive**, you do not have to enter any other mount directories. Whenever necessary, the Software Update Manager prompts you to specify a mount directory or to change the data carrier.

If you have **more than one DVD drive** or if you are able to copy the media contents to disk, enter all the mount directories used. You can enter up to 24 mount directories.

The mount directory path may not contain any blanks or special characters.

> **i** Note
>
> When you enter the mount directories, you can use a wildcard in the last part of the mount directory path, for example, `/mnt/*dvd*`. The Software Update Manager fills the mount directory entry fields with all directories that the wildcard matches. Any duplicate entries found by the wildcard are removed automatically.

If you entered mount directories for all required software archives or data carriers required and SUM finds the right directory, you are not prompted to enter mount directories. If you do this, you can ignore all further instructions to enter mount directories in this document.

If you do not have enough DVD disk drives, you can copy the contents of each DVD to separate directories on your hard disk (provided you have sufficient disk space). Specify the names of these directories when the program prompts you to enter the mount directories.

Password of User DDIC (Phase SUMASK)

Enter the password of user `DDIC` in the system, client 000.

This password is needed for the RFC connection to the SAP system. To be able to perform all necessary actions, user `DDIC` needs the authorization `SAP_ALL`.

During the upgrade, you have to unlock the user. After the upgrade, the user is not locked again automatically.

Usually, it is not necessary to change the password of user `DDIC` during the upgrade. If you do change the password, you have to change it in the original system, the shadow system, and in the Software Update Manager.

For a description of this procedure, see Changing the DDIC Password [page 248].

Checking the Configuration of sapcpe (Phase PREP_INIT/CHECKPROF_INI)

During phase `PREP_INIT/CHECKPROF_INI`, the Software Update Manager is checking various profiles and their settings including the configuration of program `sapcpe` for the kernel replication.

If there is a problem with the configuration of `sapcpe`, phase `PREP_INIT/CHECKPROF_INI` stops and points you to the problem with the kernel directory. Change the replication configuration so that the SAP kernel can be replicated to `$(DIR_INSTANCE)/exe`.

For more information and the corresponding procedure, see SAP Note 1649026.

SAP Note Implementation (CHECK4NOTES_TOOL)

A list of SAP Notes is displayed that you have to implement to avoid activation errors later in the procedure. Use the Note Assistant to apply the SAP Notes. After you have implemented all relevant SAP Notes, repeat the phase and then continue the process.

> → Recommendation
>
> You can ignore inapplicable notes that are classified as *Cannot be implemented* or *Obsolete*. However, we recommend that you transport both these inapplicable SAP Notes and the implementable SAP Notes into the system landscape. If you do not transport the inapplicable SAP Notes, too, the SUM execution in the follow-up systems stops in this phase because these SAP Notes are not at the latest level. To transport the SAP Notes, use report SCWN_TRANSPORT_NOTES as described in SAP Note 1788379. This SAP Note explains the report and its use. Note that the report itself is available in SAP_BASIS as of release 750.

> i Note
>
> Note that the Note Assistant also displays SAP Notes with ABAP-related corrections called *SAP Note transport-based correction instructions (TCI)*. You apply the corrections later on manually using the transaction SPAM. For more information, see SAP Note 2187425.

For more information about applying SAP Notes with the Note Assistant, see the SAP Help Portal for your SAP NetWeaver source release mentioned at Other Required Documentation [page 14]:

SAP Library Paths

Release	Path in SAP Help Portal for SAP NetWeaver
SAP NetWeaver 7.3 to 7.5	*Application Help* > *Function-Oriented View* > *Solution Life Cycle Management* > *Software Logistics* > *Note Assistant*
SAP NetWeaver 7.1 incl. EHP 1	*Application Help* > *Function-Oriented View* > *Application Server Infrastructure* > *Software Logistics* > *Note Assistant*
SAP NetWeaver 7.1	*System Administration and Maintenance Information* > *Technical Operations for SAP NetWeaver* > *General Administration Tasks* > *Software Life-Cycle Management* > *Software Maintenance* > *Note Assistant*
SAP NetWeaver 7.0 SAP NetWeaver 7.0 incl. EHP 1, 2, or 3	*Application Help* > *Function-Oriented View* > *SAP NetWeaver by Key Capability* > *Solution Life Cycle Management by Key Capability* > *Software Life Cycle Management* > *Software Maintenance* > *Note Assistant*

6.2.3 Important Entries for the Configuration Roadmap Step

This chapter deals with the roadmap step `Configuration`, in which the Software Update Manager asks for all information required to run the update. Moreover, you take decisions about the software packages to be included in the procedure.

In the following, we go into detail of some important phases:

Required Configuration Parameters (Phase INITSUBST)

In this dialogue, you are informed about the current scenario strategy, and you are asked to provide further parameters to configure the procedure:

- Database Archiving Parameter
  Decide on the archiving mode of your database. For more information, see Database Archiving Parameter [page 72].
- Parallel Processes Configuration
  Maintain parameter values for uptime and downtime processes. For more information, see Process and Tool Parameters [page 74].
- Batch Host Configuration
  Enter the host name of the background server and select the instance of your system that shall be used as background server. For more information, see Process and Tool Parameters [page 74].
- APO liveCache Execution Mode
  The APO liveCache must be saved before and restored after the downtime according to sections B and C of report `/SAPAPO/OM_LC_UPGRADE_70`. Select if you want an automatic or manual start of the report.
- SGEN Execution Mode
  Configure the execution strategy for the ABAP load generation (transaction `SGEN`). For more information, see SGEN Execution Modes [page 76].

- Update of Additional Application Server Instances
  If you are running additional application server instances, decide if they shall be updated. For more information, see Upgrading Additional Application Server Instances [page 207].

Add-On Requirements Check (Phase ADDONPRECHECK)

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

In this phase, a check is carried out for each installed add-on component to verify that a valid upgrade strategy exists and therefore that the requirements of the target system are met. This is particularly relevant for third-party add-on components, for which you must manually add the required *Attribute Change Packages (ACP)* and upgrade packages to the download directory.

If the SUM stops with an error message during this phase, you have the option to provide the *ACP* or upgrade package according to the upgrade strategy specified by SAP or the add-on vendor and repeat the check. However, you can also ignore the errors and continue with the SUM procedure. If necessary, you are then prompted to make a decision in phase `IS_SELECT`.

> **i Note**
>
> The check requires SPAM version 85 or higher. The check does not run with a lower version.

Inclusion of Customer Transport Buffer File (Phase SUMASK_CUSTOMER_BUFFER)

This phase is executed if the scenario category *Customer Transport Integration only* has been selected.

The Software Update Manager prompts you enter the name and the path of the customer buffer file that you want to include in the update.

If you have

1. have chosen a scenario **with** stack configuration file
2. selected the *Consider Customer Buffer File* checkbox in the *Customer Transport Integration* section in the initial dialog concerning the additional parameters
3. entered in the subsequent dialog the path and the name of the customer transport buffer file that contains customer transports for the target release

this dialog *Inclusion of Customer Transport Buffer File* in this phase displays the already entered file name again. If necessary, you can change it.

You also get some information about the values for the transport file. For the transport profile, preselected values are taken over from the transport profile file. Moreover, you can decide if you want to override the preset value of the `VERS_AT_IMP` parameter. Your entries are validated later on in phase `ADJUSTPRP`. If the validation is successful, no further action is required. Otherwise, the corresponding dialogs are displayed.

Request for Automatic Modification Adjustment (Phase SUMASK_SPDD_SPAU)

If you have exported an ABAP Dictionary modification adjustment transport on a development system that belongs to the same system track as the current system, you can choose the appropriate request in this phase. In addition, you can decide whether you want to double-check the ABAP Dictionary modifications from that transport manually at the beginning of the `ACT_UPG` phase.

Your entries are validated later on in phase `ADJUSTPRP`. If the validation is then successful, no further action is required. Otherwise, the corresponding dialogs are displayed.

> ℹ Note
>
> - The phase is skipped if the scenario category *Customer Transport Integration only* has been selected.
> - Make sure that the support package level of the transport request matches the target support package level of this update.

Request for Single Transport Request (Phase SUMASK_SINGLE_TRANSPORT_REQUEST)

In certain situations, you can use a single transport request to avoid data loss. The Software Update Manager prompts you enter the single change transport requests that you want to include in the update. Your entries are validated later on in phase `BIND_PATCH`. If the validation is then successful, no further action is required. Otherwise, the corresponding dialogs are displayed.

The modification adjustment function ignores this request. In addition, the version history for the objects in such a transport request may not be correct after the update.

> ⚠ Caution
>
> Using the *Single Transport Request* function is risky because it is not imported in the same way as a regular customer transport. For example, the transport is only imported into client 000. Use this function only if the owner of the request can guarantee that it is compatible with the upgrade.

> ℹ Note
>
> - This phase is skipped if the scenario category *Customer Transport Integration only* has been selected.
> - Apart from the single transport request and the requests for the modification adjustment, there is no other way of importing a request into the system before activation, or during the adjustment of the ABAP Dictionary objects.
> - For the data and the cofiles of the single transport request, the Software Update Manager first checks the `DIR_TRANS` directory, then the `DIR_PUT` directory. If the wanted transport request exists in one of these directories, it is taken from there. Otherwise, SUM checks the download directory. If the transport request is found here, SUM copies it to the `DIR_PUT` directory for further processing.

Saving Variants (Phases JOB_RASUVAR1 and JOB_RASUVAR2)

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

After the upgrade, many of your variants can no longer be used because the relevant selection screens have changed. To save the variants, the SAP system offers two reports:

- RASUVAR1 saves your variants on the source system.
- RASUVAR2 restores the variants in the target system.

During phase SAVE_VAR_CHK, you can decide whether you want the upgrade tool to run report RASUVAR1. The report is started in phase JOB_RASUVAR1. If you have decided to run report RASUVAR1, phase JOB_RASUVAR2 automatically starts report RASUVAR2 towards the end of the upgrade.

For more information about the reports, see SAP Note 712297.

Password for Oracle User SYSTEM (Phase DBQUERY_PRE)

The Software Update Manager needs the password for the Oracle user SYSTEM to create the schema for the shadow instance.

Tool Versions (Phase TOOLCHECK_INI)

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

The Software Update Manager checks the tool versions in your system (SAP kernel patch level, the `tp` version, and the date of `R3trans`).

> **i Note**
>
> If necessary, the Software Update Manager prompts you to switch the SAP kernel or the other tools to a version and patch level released for the upgrade.

SAP Kernel

The subsequent roadmap steps require the version of the SAP kernel released for the upgrade. Older versions can contain errors that cause problems in some of the phases.

> **⚠ Caution**
>
> - Apart from the `disp+work` package, you also need the corresponding database library for the SAP kernel.
> - Do **not** replace programs in the `abap/exe` subdirectory of the SUM directory. You may only do this if you receive approval from SAP Support.

If your current SAP kernel does not fulfill the requirements of the upgrade, proceed as follows:

1. Before switching the SAP kernel, back up the existing kernel directory.

   > ⚠ Caution
   >
   > When you switch the SAP kernel, you overwrite all files and subdirectories in directory `/usr/sap/<SID>/SYS/exe/run`.
   >
   > For more information, see the log file `CHECKS.LOG` or `CHECKS.TXT`.

2. Switch the SAP kernel.

   > ⚠ Caution
   >
   > Before continuing the upgrade, make sure that the SAP kernel has at least the minimum required patch level.

Tools R3trans and tp

The upgrade can require a certain version for tools `R3trans` and `tp`. For the required versions of these tools, see SAP Support Portal at:

https://support.sap.com/swdc *Support Packages and Patches* > *Browse Our Download Catalog* > *SAP NetWeaver and complementary products* > *SAP NetWeaver* > *SAP NETWEAVER <Release>* > *Entry by Component* > *Application Server ABAP* > *SAP Kernel <Version>* > *<operating system version>* > *#Database independent*

Add-On Strategy Check (Phase ADDON_INFO)

> ℹ Note
>
> This step is only relevant if you perform a release upgrade.

For most of the add-ons produced by SAP, there are special SAP Notes containing information about the upgrade strategy. In the `ADDON_INFO` phase, the Software Update Manager writes the SAP Note numbers for your upgrade into the `CHECKS.LOG` file. The Software Update Manager lists the general add-on Note as well as, if possible, specific add-on upgrade Notes to the add-ons installed.

Before the upgrade, check all SAP Notes listed in the `CHECKS.LOG` file. If there are add-ons installed in your SAP system for which there is no information in one of the listed SAP Notes, refer to the add-on producer for information.

Mount Directories for Languages (Phase LANG_SELECT)

> ℹ Note
>
> This step is only relevant if you perform a release upgrade.

If not all necessary language archives are available in the download directory, the Software Update Manager prompts you now to mount the necessary directories of the language archives. You must do this even if only the standard languages English and German are installed in your system.

Provided that you have chosen the *Expert Mode*, you also have the option to exclude those languages from the upgrade of which the language archives are missing and that are not yet registered in the ABAP system. You cannot deselect already installed languages. They must be manually removed from the ABAP system beforehand.

> ⚠ Caution
>
> - If you exclude a language, you cannot work in this language directly afterwards.

In principle, it is possible to install additional languages during the upgrade. For more information, see Importing Additional Languages [page 84].

SPAM Version Check (Phase SPAMCHK_INI)

The Software Update Manager calls functions of the SAP Support Package Manager (transaction SPAM). For this, it checks if the level of the SPAM version on your source release is sufficient for the update. If your SPAM version is not high enough, the Software Update Manager searches for a higher version and installs it. If no higher SPAM version is found, the update stops with an error message prompting you to provide a higher SPAM update archive in the download directory.

For more information about importing a SPAM update, see the online help in transaction `SPAM`, or the SAP Help Portal for the corresponding source release at http://help.sap.com/spmanager, *Support Package Manager* > *SAP Library* > *Importing Support Packages with Support Package Manager*.

Decision About Add-Ons (Phase IS_SELECT)

> ℹ Note
>
> The dialog *Add-On Request* appears during an update both in the phase `SUMASK_ADDONS2INSTALL` at the start and later in the phase `IS_SELCT`. The difference is that although you can already enter data in the `SUMASK_ADDONS2INSTALL` phase, it is not yet validated. The data entered in the dialog *Add-On Request* is validated only in phase `IS_SELECT`.

The Software Update Manager determines all the add-ons that are contained in the SAP system and checks, which add-ons can be handled in the `IS_SELECT` phase. Moreover, it checks for which add-ons a decision has already been included in the stack configuration file of the Maintenance Planner, which you have entered in the `SELSTACKXML` phase. The add-ons that can be handled in this `IS_SELECT` phase and that have not been decided using the stack configuration file are displayed. These are, for example, all optional add-ons that are not part of the stack configuration file.

> ℹ Note
>
> To complete phase `IS_SELECT` successfully, none of the add-ons may have status *UNDECIDED*

- Release upgrade only: **Add-ons with default status INST/UPG WITH STD CD**
  All add-ons that are included in the *Upgrade Export* archives and that you can update to a new release appear on the selection screen with default status *INST/UPG WITH STD CD*. For these add-ons, there is no need to make a new decision, unless you want to include a newer version of the add-on in the upgrade. Depending on whether the software components required by the add-on have to be kept the same or have to be updated, the add-on can also remain unchanged or may have to be updated. For this you have the following alternatives:
  - Source release SAP NetWeaver 7.0 only: Upgrade with SAINT packages (*Upgrade the add-on with SAINT package*).
    The packages have to be in the EPS inbox of the transport directory `/usr/sap/trans/EPS/in`.
  - Upgrade with an add-on-specific archive (*Upgrade the add-on with CD/DVD*)
    When you choose this alternative, you are asked to insert the corresponding CD or DVD. The data is copied to the `SUM` directory.
  - Upgrade to the version in the *Upgrade Export* archives (*Upgrade the add-on to version delivered with upgrade DVDs*)
    This alternative is only valid if there is an add-on in the *Upgrade Export* archive. Once you have chosen this alternative, you do not need any additional archives or packages for the add-on.
- **Add-ons with default status KEEP YOURS**
  All add-ons that you can take over unchanged appear on the selection screen with default status *Keep yours*. For these add-ons, there is no need to make a new decision, unless you want to include a newer version of the add-on in the update procedure.
  You can decide whether you want to keep this add-on unchanged, or whether you want to update it. If you want to update it, choose *Upgrade the add-on using SAINT package*.
  The packages have to be in the EPS inbox of the transport directory `/usr/sap/trans/EPS/in`.
- **Add-ons with default status UNDECIDED**
  These are optional add-ons that were installed on the source system. Decide how to proceed.

  > ⚠ Caution
  >
  > Your software vendor has predefined the strategy to choose for each add-on. For more information, contact your software vendor.

  For an add-on with status *UNDECIDED*, you have the following options in addition to the ones described above:
  - *Keep the current add-on version (Use this option only if it is supported by the add-on vendor! A vendor key is required.)*.
    The add-on is transferred unchanged to the target release. If you choose this alternative, you have to enter a vendor key. Ask the add-on vendor beforehand whether you can use the key.

    > i Note
    >
    > This item is only available for target releases lower than SAP NetWeaver 7.53. As of SAP NetWeaver 7.53 , vendor keys can no longer be used because the concept of the vendor keys has been replaced by the `Attribute Change Package (ACP)`.
    >
    > For SAP NetWeaver releases lower than 7.53, SAP can provide the vendor keys only in exceptional cases.
  - Keep the add-on as it is (*Keep the add-on with your version*).
    The add-on is transferred without any changes to the target release. You do not have to enter a vendor key. This option is only possible if the requirements of the installation of the add-on have been met.

- **Deletion of Add-ons**
  You can delete an add-on actively with SAINT package. This option includes a deletion package for the deletion of repository objects as well as for the deletion of table data of the add-on.
- **Reset all decisions**
  If you select option *Reset all decisions* and choose *Continue*, the system resets all the decisions that you have made. The system reinitializes the values and opens the selection screen for decisions about the add-ons again.
  If you want to continue with the decisions that you have made, choose *Continue* without selecting *Reset all decisions*.

Passwords for Add-Ons (Phase ADDONKEY_CHK)

> ℹ Note
>
> This step is only relevant if you perform a release upgrade.

If you use SAP add-on components in your SAP system (such as IS components), you are prompted for passwords. SAP systems that have other software components (add-ons) installed on top of them have to wait until the upgrade has been released by the relevant add-on software vendor.

Support Package Confirmation Check (Phase PATCH_CHK3)

This phase tests whether all support packages have been confirmed.

Unconfirmed support packages are displayed on the screen and in the `PATCHOUT.LOG` file that is located in the subdirectory `log` of the SUM directory. Confirm these support packages with transaction `SPAM`.

Release upgrade only: If the source release contains support packages that are more recent than those in the delivered target release, a warning appears that informs you which support packages these are. All software components appear whose support package level is more up to date than the status of the software components in the *Upgrade Export* archives.

> → Recommendation
>
> Always include all available support packages for the target release, and all available Basis support packages. This means that your system is up to date after the upgrade.

If you use an add-on component, you can find information about including the corresponding add-on support packages or Conflict Resolution Transports in the SAP Note for the add-on supplement archive.

If the Software Update Manager displays a warning that your support package level of the source release is too up to date and you want to include the corresponding support packages of the target release, you have to do this in the next phase `BIND_PATCH`. You can include the support packages for multiple software components in this phase.

Including Support Packages (Phase BIND_PATCH)

In this phase, you are asked in a dialog for support packages. The dialog is normally available only when you have switched on the expert mode at the beginning of the update.

In rare cases, you might have to include support packages of certain software components, such as HR packages, because these packages have a shorter release cycle than the complete support package stack. For these cases, in the phase `BIND_PATCH`, you have the option to add the additional support packages to those that have already been included in the `SELSTACKXML` phase.

If you answer **Yes** to the prompt about including support packages, SUM displays a list of support packages in which you can select those that you want to include into the update.

> ℹ Note
>
> - **Components for which no support package can be included**
> For some components, it is not allowed to include additional Support Packages here. You can recognize them by an entry in the *Maximum Level* column. If you want to include additional support packages to these components, you must update the `stack.xml` file first and then restart the update process.
> - **Downloading the list of support packages**
> SUM offers the option to download the list, for example for documentary purposes. For this, click the *Download* button on top the list. Within the browser, a popup informs you that a file `DATA.CSV` has been generated and downloaded. You can open the file (for example by just clicking the pop-up) with a program or an app that is able to display CSV-files. This can be, for example, the Notepad editor or Microsoft Excel.
> Note that the popup about the download depends on your browser, and the display of the CSV-file depends on your associations of file types with specific apps or programs, that is, whether you have associated a program or an app with the file extension CSV and if this association is set temporary or as a default.

You have to provide information about the support package level you want for your various software components. You can also include a SPAM update and single transport requests.

For this phase, we recommend that you also check the correctness of the support package levels of included software components. Note that only those software components are shown that are activated in the system.

For a complete list of imported software components, see the Using the SUM Analysis Feature [page 213] utility.

It may take a few minutes to unpack the support package data.

If the release of a component does not change during the upgrade, the support packages previously installed for this component are automatically kept and do not have to be included again. Even another adjustment of the modifications contained within using transaction SPDD or SPAU is not required. You can also include additional support packages for this component.

To include support packages, proceed as follows:

1. If you want to include support packages for your various software components, answer **Yes** to the prompt about including support packages in the `BIND_PATCH` phase.
2. In the *Selection* column, enter the support package level you want for your various software components.

> **i Note**
>
> When the `BIND_PATCH` phase is started for the first time, the Software Update Manager tries to find a default support package queue. It first searches for a package inclusion file of a previous upgrade. If it can find one in subdirectory `save` of the `abap` subdirectory of the `SUM` directory, the Software Update Manager checks whether this package inclusion file contains a selection valid for the current upgrade. If the selection is valid, you can use it as the default.
>
> If there is no package inclusion file from a previous upgrade, the Software Update Manager calls the `SPAM Patch Queue Calculator`. It tries to generate a support package queue of all support packages that you have uploaded. If it can generate a valid queue, you can use it as the default.

Release upgrade only: Column *Export Level* contains the support package level delivered with the upgrade export.
SPS update: Column *Export Level* includes the support package level that is already installed in the system.
Column *Minimum Level* contains the minimum support package level required for a component to meet the import prerequisites of the included add-on packages.
Column *Equivalent Level* contains the equivalent support package level. This is the support package level of the target release, which corresponds to the support package level of the source release. To avoid data loss, the support package level of the target release should not be lower than the equivalent support package level.

> **i Note**
>
> You no longer must reset the Software Update Manager to reduce the number of support packages that you want to include. All you must do is to overwrite the default support package level.
>
> If you want to cancel the selection for a software component completely, delete the relevant entry.

Column *Maximum Level* contains the maximum support package level that can be included. The maximum level is set for some central components only (such as SAP_BASIS and SAP_ABA), for which support packages can only be included in the stack configuration file (`stack.xml`). For these components is no further support package inclusion in phase `BIND_PATCH` possible.
Column *Calculated Level* contains the default support package queue, provided that it could be found or calculated. You can take over the queue by selecting field *Take over calculated level* in the dialogue.
Column *Target Level* contains the highest support package level that is currently included. To find out the current state of the SAP system, the Software Update Manager checks the following support package level information:

- Support package level that has already been installed in the source system. This only applies when the release of the SAP component does not change during the upgrade (component upgrade procedure).
- Support package level that is delivered with the upgrade archives (for example, a support release level)
- Support package level that has been included in the stack configuration file
- Support package level that has already been selected and confirmed by the customer

3. Apart from including support packages, you can also include the latest SPAM update for the target release. This prevents any error messages caused by the SPAM update in the source release being newer than the SPAM version in the upgrade archive. It can also save you from having to import the latest SPAM update immediately after the upgrade. The Software Update Manager automatically looks in the EPS inbox for a current SPAM update and includes it automatically.
4. When you confirm the confirmation prompt, you integrate all support packages up to the specified level into the upgrade for this component.

It may take a few minutes to unpack the support package data.

You can include any necessary Conflict Resolution Transports (CRTs) in the upgrade. Any support packages that you cannot include in the upgrade have to be imported into the system after the upgrade.

Validation of the Specifications in the SUMASK*-Phases (Phase ADJUSTPRP)

In this phase, the Software Update Manager checks the entries that you have made in the phases

- `SUMASK_CUSTOMER_BUFFER` [page 145]
- `SUMASK_SPDD_SPAU` [page 146]
- `SUMASK_SINGLE_TRANSPORT_REQUEST` [page 146]

at the beginning of this roadmap step *Configuration*.

That is, your specifications regarding automatic modification adjustments, single transport requests, and customer buffers are validated. If the validation has no errors, no further action is required and SUM continues the procedure. Otherwise, the corresponding dialogs are displayed again in which you can correct your specifications.

6.2.4 Important Entries for the Shadow Instance Installation

This chapter deals with the shadow Instance installation.

The Software Update Manager creates the profiles, directories, and further prerequisites for the shadow instance.

> ℹ Note
>
> The Software Update Manager configures the instance profile of the shadow system setting `PHYS_MEMSIZE` to 40%. If necessary, adapt this to your specific needs.

In the following, we go into detail of some important phases:

- Reusing Shadow Instance Profiles (Phase SHDINST_CPY) [page 154]

Reusing Shadow Instance Profiles (Phase SHDINST_CPY)

If you have made a backup of the `save` directory from a previous upgrade, you can now use the profiles for the shadow instance [page 211] that have been stored in the directory.

> ⚠ Caution
>
> Only use the profiles if both upgrades have the same environment and use the same scenario strategy.

If you want to use the shadow instance profiles, make sure that the `save` directory has been copied to the `SUM` directory and confirm the prompt with **`Yes`**.

6.2.5 Important Entries for the Checks Roadmap Step

This chapter deals with the roadmap step `Checks`. The Software Update Manager checks if the operating system and database version of your source release match the requirements of the target release. Furthermore, it checks some application-specific requirements.

In the following, we go into detail of some important checks:

1. Starting the Application-Specific Upgrade Toolbox [page 155]
2. Checking the Results of the System Check [page 155]
3. Checking for Database Triggers (SLT and SDI) on Switch Tables and Tables to be Converted (Phases RUN_CHECK_SLT_TRIGGER_*) [page 156]
4. SPAU Fill Level Display (Phase PREP_GENCHECKS/SPAU_FILL_LEVEL_DEC) [page 157]
5. Preparing SAP Profiles [page 158]

Starting the Application-Specific Upgrade Toolbox

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

You can start the application-specific upgrade toolbox (ASU toolbox) using transaction `/ASU/UPGRADE`. The system loads the XML file (`ASU.XML`) contained in the `SUM` directory, generates a task list, and branches to the task list maintenance.

For more information, see SAP Note 1000009.

> **i Note**
>
> Log on in English for the English version of ASU Toolbox.
>
> The latest version of the ASU Toolbox is available in English only. Versions in other languages such as German can be outdated. If you want to start the ASU toolbox using transaction `/ASU/UPGRADE`, make sure that the logon language is English to access the English version.

Checking the Results of the System Check

At the end of the *Checks* roadmap step, the Software Update Manager displays the results of the system check. The entries can be error messages, information, or prompts for user actions.

Carry out the user actions before you can start with the *Preprocessing* roadmap step.

Checking for Database Triggers (SLT and SDI) on Switch Tables and Tables to Be Converted (Phases RUN_CHECK_SLT_TRIGGER_*)

The *SAP Landscape Transformation (SLT)* software allows SAP customers to effectively manage the impact that new business or IT-driven transformation requirements have on their existing SAP landscape. The SLT Replication Server is the standard real-time replication tool for Big Data for SAP ABAP-based source systems (Unicode and non-Unicode). Targets are:

- SAP HANA database
- all databases by SAP
- SAP Business Suite
- SAP applications

It also supports non-SAP sources covered by the SAP Product Availability Matrix.

Similarly, the *SAP HANA Smart Data Integration (SDI)* provides tools for accessing source data and deploying, replicating, and transforming that data in SAP HANA On-Premise or SAP HANA Cloud.

Both SLT and SDI use database triggers to detect real-time data changes. Database triggers of the SLT and the SDI can update a database automatically in response to a certain event. However, database triggers that are based on switch tables and tables to be converted can cause issues during the update procedure. The reason is that during the update procedure, switch tables and tables to be converted are replaced in the database with a new version, and the replaced tables are renamed or dropped. If such database triggers exist, the behavior of the `Rename` or `Drop` statement for these tables can vary depending on the database.

To avoid later issues, the Software Update Manager checks if relevant database triggers exist and displays, if applicable, an error message. The check is performed in phase `RUN_CHECK_SLT_TRIGGER_PRE` during the preparations of the update. You can ignore errors in this phase, but communicate them to the responsible SLT or SDI operations team. Not all problematic tables can be identified at this early stage of an update. This means that the list can be incomplete.

The Software Update Manager checks again in phase `RUN_CHECK_SLT_TRIGGER_DTTRANS` shortly before the downtime. In this phase, the list is complete. However, you still can ignore errors in this phase.

A further check is performed in phase `RUN_CHECK_SLT_TRIGGER_DOWNTIME`. In this phase at the latest, you must resolve the errors.

The lines in the error log file are similar to the following:

```
2EETG010 "Found trigger" "/1LT/REPOSRC" "on switch table" "REPOSRC".
```

In this case, follow the instructions of SAP Note 1620618 for SLT triggers or SAP Note 3247939 for SDI triggers to delete the relevant database triggers. Create the deleted triggers again after the downtime, and an initial load of the affected tables is required.

> **i Note**
>
> The check is limited to database triggers that follow the naming convention of the SLT or SDI technology. Database triggers created by other means than SLT or SDI are not covered by this check. Check them manually.

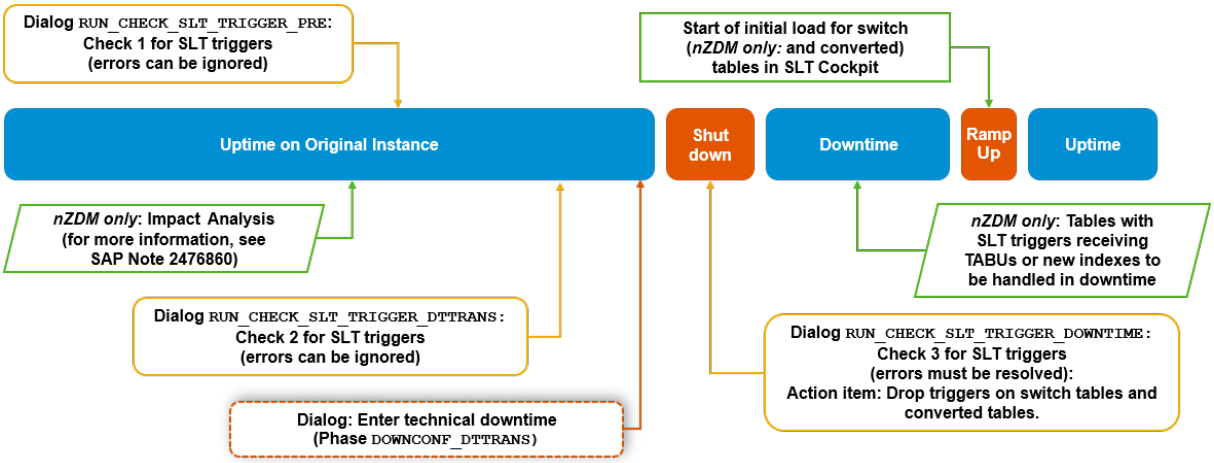
Update Procedure with nZDM

When you include the nZDM feature in the update procedure, you can activate settings to minimize the Business Downtime in the `Downtime-optimized` scenario strategy. See Using the near-Zero Downtime Maintenance (nZDM) Feature [page 72] for more information.

During an update with nZDM, the checks do not list those tables as errors that have triggers for nZDM and database triggers for SLT. When these tables receive new TABUs or indexes, the Software Update Manager excludes them from the uptime and moves them into the downtime. Here you have to handle them, rather than **before** the downtime, as described earlier for the standard update. Excluded from the move to the downtime are tables with SLT triggers that are intended for a conversion and thus for a structural change. They remain in the uptime. However, if these tables exceed the size of 50 GB, they are moved into the downtime, too.

> **i Note**
>
> If it is necessary to deactivate all triggers created by the Software Update Manager SUM in a downtime-optimized approach, see Deactivating Triggers [page 258] for more information.

In the following you get a rough overview about the checks and actions to be taken in a standard procedure including the relevant actions for the update with nZDM:



SPAU Fill Level Display (Phase PREP_GENCHECKS/SPAU_FILL_LEVEL_DEC)

In this phase, the Software Update Manger checks for SAP Notes and repository objects that were modified but not adjusted in the transactions SPDD and SPAU in previous updates. If such objects are detected, the phase `SPAU_FILL_LEVEL_DEC` displays the dialog *Open actions in transaction SPDD and SPAU*. This dialog offers you the possibility to complete all outstanding modification adjustments in an early stage of the current update to reduce the adjustment effort at a later point in time.

The dialog shows the following numbers:

- Obsolete and non-adjusted SAP Notes
- Non-adjusted objects that were modified either with or without Modification Assistant, and the SPDD-relevant objects of them
- Modified but non-adjusted objects with active SAP versions that can be reset to SAP standard versions

You can see the same statistics in transaction SPAU, provided that you use the default selections and you filter according to all possible statuses except for the status *adjusted*. Note that if one or more statuses are excluded

in addition, the shown numbers may differ from the numbers in the dialog *Open actions in transaction SPDD and SPAU* of the Software Update Manager.

If you perform the current update on your development system, we strongly recommend that you perform the following actions:

- Confirm all obsolete notes.
- Reset all non-adjusted objects with active SAP version to SAP standard versions.
- Carry out the outstanding modification adjustments.

Afterwards, release the resulting workbench request into the system landscape before you continue with the current update procedure.

In the development system, you can use the report `RSUPG_AUTO_ADJ_SPAU`. It retrieves the non-adjusted objects that can be reset to the SAP original version and writes a detailed list to a log file. Depending on the number of objects listed in the summary, you can execute this report in the background.

Furthermore, this report offers you the possibility to perform the reset of the listed non-adjusted objects to the SAP original version automatically. For this purpose, set the parameter `p_check` to `<space>` and enter a valid and already existing workbench request as value for parameter `p_trkorr` during the execution of the report.

If you want to use the automatic reset, note the following:

- Import the workbench request, which is required for this automatic adjustment, into the subsequent systems **before** you start the update of these systems.
- Do **not** include this workbench request as single transport request or as SPDD/SPAU transport request during the update.

Preparing SAP Profiles

At the end of the preparation roadmap steps, you have the option to review the new SAP profiles for the SUM procedure and for the target release. These new profiles are available as template in different subfolders of the folder *DIR_PUT* > *sapnames* as follows:

`backup`	SAP profiles of the source system. They are used if there is a reset of the Software Update Manager.
`dttrans`	SAP profiles of the downtime system (single instance) that run with the source kernel.
`newbas`	SAP profiles of the downtime system (single instance) that run with the target kernel.
`prod`	SAP profiles of the productive system

During the downtime, the profiles are copied to the system profile directory.

If needed, you can modify the SAP profiles with regard to your customer-specific settings, SAP Memory Management, or deprecated parameters. The modification must be finished before entering the downtime.

You can also review and modify the SAP profiles as follow-up activity. For more information, see Performing Follow-Up Activities for SAP Profiles [page 193].

> ⚠ Caution
>
> Carry out modifications with particular caution and utmost care to avoid incorrect settings.

6.2.6 Evaluating the Results of the Checks Roadmap Step

This chapter deals with some results of the `Checks` roadmap step.

Context

The results of the *Checks* roadmap step are listed in the log file `CHECKS.LOG` and displayed in the associated notification popup window that opens up once this roadmap step is completed. The entries in the window can be error messages, information, or prompts for user action. Carry out the required user actions before you can start with the *Preprocessing* roadmap step.

The file `CHECKS.LOG` is located in subdirectory `<update directory>/abap/log`.

Procedure

Check the entries in the dialog box and perform any measures required by the information it contains.

Most of the entries are self-explanatory. In the following, you can find information and troubleshooting procedures for entries that are not self-explanatory:

Message	Action
`Insufficient freespace in the database as follows:`	**Release upgrade only:** The new release needs more space in the database. The existing space in your database is not sufficient to import the data for the new release. For information about the extensions that you must make, see the table that follows the message in the dialog box. Add the space you need for any extra data that is created before you actually upgrade your system. **SPS update:** The existing space in your database is not sufficient for the update. For information about the extensions that you must make, see the table that follows the message in the dialog box. Add the space you need for any extra data that is created before you actually update your system. The procedure is described in the section Extending Free Space in the Oracle Database [page 252]. → Recommendation If you are using DICTIONARY-managed tablespaces, tablespaces may still overflow during the update. This can happen because of your specific tablespace fragmentation. To avoid unwanted tablespace overflows during downtime, we recommend that you migrate these tablespaces to LOCALLY managed. Alternatively, you should create at least one AUTOEXTENSIBLE segment to ensure that all requirements can be met. i Note **Release upgrade only:** Due to limited statistical data about table and index sizes, in rare cases the Software Update Manager may ask for more free space than is needed during the upgrade. This occurs especially for index tablespaces. In this case, report an incident to help us improve the statistics.
`In Release <rel> you applied the following unconfirmed patches to your system.`	There are unconfirmed Support Packages in your SAP system (such as Support Packages for technical components SAP_BASIS, or SAP_BW). To confirm these Support Packages, call transaction SPAM.

Message	Action

`There are dependencies between Basis Support Packages included in phase BIND_PATCH and the patch level of the target release kernel in directory <upgrade directory>/exe.`
 	
`The disp+work needs at least patch level <number> or higher.`
 	
`Please proceed as described in note 211077.`
	A Support Package included in update requires a different patch level for the SAP kernel. Proceed as described in SAP Note 211077.

`Change the permission of these executables:`	**Note**
	This entry is only displayed if you perform a release upgrade.
	
	You have to be able to overwrite the programs of the old SAP kernel so that you can copy the new SAP kernel to directory `/usr/sap/<SID>/SYS/exe/run` during the upgrade. The programs that are affected are in the following lines:
	
	`ERROR> No write permission for file <program file>.`
	
	Change the write authorization with:
	
	`chmod ug+w <program file>`
	
	If the program does not belong to the group `sapsys`, you have to either change the group or add user `<SID>adm` to the group temporarily. We do not recommend that you give write authorization to `others`, for security reasons.

`The following function groups (FUGR) are inconsistent. The TADIR entry (and the frame program) have no corresponding entry in the master table TLIBG.`	**Note** This entry is only displayed if you perform a release upgrade. Your SAP system contains customer function groups that have not been entered in table TLIBG. To enter the function groups in table TLIBG, call transaction SE80. If you do not fix the problem, the customer function groups are lost during the upgrade. In case of questions or problems, report an incident on component BC-DWB-TOO-FUB.
`No write permission on <file name>:`	The specified file in the directory of user `<SID>ADM` cannot be overwritten because the authorizations have not been set correctly or the owner of the file is not `<SID>ADM`. Correct this by changing the authorizations or the owner.

Message	Action
`Release these open transport requests and repairs:`	**⚠ Caution** If you ignore open repairs, you could lose modifications. Your SAP system contains locked SAP objects in open repairs or requests. The numbers of these repairs or requests are listed. We recommend that you inform the owners of open repairs or requests so that they release them. You can continue with the update until the REPACHK2 phase. In the REPACHK2 phase, all listed open requests and repairs have to be released. For more information, see Releasing and Confirming Open Repairs and Requests [page 111]. **i Note** If open repairs that do not belong to this system appear, then this system was created by a database copy. You cannot release these repairs in the normal way. To release these repairs, release all tasks and requests in the current system. Call the Workbench Organizer (transaction SE06). All locks created by repairs and requests not known to the system are deleted. The status of the affected tasks and requests changes in this case to *RELEASED*. To release and confirm these open repairs, you have to log on to the system with the name of their owner. The list in the dialog box contains these names.
`Restart logs of DB conversions found. Outstanding DB conversions found.`	Your SAP system contains outstanding conversions and restart logs of terminated conversions. Clean these up as described under Cleaning Up Terminated Conversions in the DB Conversion Phases [page 230].

Message	Action

`Unresolved request found in TRBAT.`
`.......`
`TRBAT entry indicates that a batch job is running.`
`.......`
`TRBAT entry indicates that a batch job has finished.`
`.......`
`Corrupted TRBAT entry found.`
`.......`
	The transport control program `tp` uses table TRBAT to communicate with the SAP system. Entries found in this table by the Software Update Manager can be the remains of terminated or running imports or exports.
	
	When you prepare the update, locate any entries left over from imports or exports that terminated and clean them up. Do not delete entries made by running imports or exports during production operation.
	
	First try to process the TRBAT entries from `/usr/sap/trans/bin` with the following command:
	
	`tp getprots <SID>`
	
	This does not affect any imports or exports that are still running. `tp` informs you about possible processing problems in the file `SLOG<YY><WW>.<SID>`. You can monitor this file using the following command:
	
	`tail -f /usr/sap/trans/log/SLOG<YY><WW>.<SID>`
	
	where `<YY>` is the year (two digits) and `<WW>` is the calendar week (two digits).
	
	To delete any entries in TRBAT that cannot be processed and that are no longer needed, call transaction SM31. In cases of doubt we recommend that you contact SAP Support, which can assess if an entry is still needed.
	
	For more information about the transport control program `tp`, see the SAP Help Portal for your SAP NetWeaver source release at http://help.sap.com.

`The following indexes <number> were read:`	**i** Note This entry is only displayed if you perform a release upgrade. Indexes whose names are identical up to the 14th character were found in a table belonging to the substitution set. The 14th character is an 'X' in one of the two names and is empty in the other. This is an inconsistency and would result in an error during the import of the substitution set. The index with the 'X' as the 14th character can only have occurred in a previous upgrade or have been created outside the SAP system. For more information, contact your SAP consultant.

Message	Action
`The following database tables have names that are identical to names of Basis views. The views will be created in this upgrade. Therefore ...`	**i Note** This entry is only displayed if you perform a release upgrade. Delivered views can have names identical to the names of customer tables in the SAP namespace. You have to delete these tables. If you need the table data, you should make a backup before deleting the tables.

Message	Action
`Open update tasks found; please clean them up`	Make sure that you have cleaned up the following by the `JOB_RSVBCHCK_R`, `JOB_RSVBCHCK_D`, or `JOB_RSVBCHCK_D_MIG` phase (during downtime) at the latest: • All outstanding updates • All outbound queue RFC calls • All open data extraction orders If you are still in the preparation phase (before the beginning of the *Preprocessing* roadmap step) and therefore in production operation, you have to only delete the **terminated** updates. **→ Recommendation** We recommend that you clean up as many updates, RFC calls, and open data extraction orders as possible. Otherwise, you have to clean them up during downtime. To find terminated or outstanding updates, proceed as follows: 1. Call transaction SM13. 2. Delete the default values for the client, user, and time. 3. Select all the update requests. To find outstanding outbound queue RFC calls, proceed as follows: 1. Call transaction SMQ1. 2. Delete the default values for the client. 3. Make sure that the list of outbound queue RFC calls is empty. Otherwise, you might lose data in other systems (for example, in SAP BI). 4. Make also sure that there is no open data extraction order in the system anymore. Otherwise, changes to the ABAP Dictionary structures could have the effect that data extraction requests can no longer be read after the import and their processing terminates. See SAP Note 1081287 for more information. Repeat these checks when production operation ends. For more information, see Isolating the Primary Application Server Instance [page 179]. **⚠ Caution** If you have installed the PI plug-in, more information is displayed.

6.2.7 Important Entries for the Preprocessing Roadmap Step

This chapter deals with the roadmap step `Preprocessing`, in which the Software Update Manager creates the shadow system.

The runtime of this roadmap step depends on the scenario strategy you have chosen. When the roadmap step is finished and you choose *Next*, the downtime starts.

In the following, we go into detail of some important phases:

Confirmation of Support Packages (Phase PATCH_CHK)

Release upgrade only:

This phase checks that the following prerequisites are met:

- Confirm all support packages for the source release. Unconfirmed support packages are displayed on the screen, and in the `PATCHOUT.LOG` file located in the `log` subdirectory.
- The source release does not contain support packages that are more recent than those in the delivered target release.

If you have to confirm support packages for the source release, proceed as follows:

1. Call transaction SPAM and confirm the support packages that are proposed there.

2. If a warning appears that the support package level of your source release is too high, proceed as follows:
   - If you have already included support packages in the `BIND_PATCH` phase, you can ignore this warning.
   - If you have not included any support packages in the `BIND_PATCH` phase, you lose data if you continue with the upgrade. In this case, reset the upgrade, repeat all phases including phase `BIND_PATCH`, and include the necessary support packages.

SPS update:

All support packages have to be confirmed in your system. Unconfirmed support packages are displayed on the screen, and in the `PATCHOUT.LOG` file as well. The log file can be found in the `log` sub directory of the SUM directory.

If you still have to confirm support packages, call transaction SPAM and confirm the support packages that are proposed there.

Automatic Reset of Non-Adjusted Repository Objects to SAP Original Version (Phase RUN_SUM_SPDD_RESET_CANDIDATES or RUN_SUM_SPDD_RESET_CANDIDATES_TRANS)

In this phase, the Software Update Manager identifies and lists ABAP Dictionary objects with active SAP versions that are modified but not yet adjusted, and that can be reset to SAP standard versions. The Software Update Manager compares the existing customer version of a repository object with the new, imported SAP version. If the SAP version is type compatible with the customer version, the Software Update Manager lists the object as a potential reset candidate. Type compatibility in this context means that the customer version is included in the SAP version.

> ### Example
>
> - A domain in the customer version is of type `char` with length 10. The SAP version is of type `char` with length 10 or greater. In this case, the domain is listed as a potential reset candidate. However, if the SAP version of the object is of type `char` with length 9, the domain is not listed as a reset candidate because the customer version is larger than the SAP version.
> - "Type compatibility" means that all fields in the customer version of a structure or a table are also part of the SAP version and are type compatible with the SAP version. Note that the SAP version can contain more fields than the customer version.

The compatibility check includes more data for a comparison than the data mentioned in the previous examples. The log file of the phase `RUN_SUM_SPDD_RESET_CANDIDATES` contains the details about the compared objects and informs you about the reasons why an object is considered to be a potential reset candidate or not. In addition, the log file contains a plain list of all potential reset candidates in the summary section.

The potential reset candidates can be reset automatically using the report `RSUPG_SPDD_RESET_CANDIDATES` that is mentioned in the dialog *Repository Modifications*. Per default, the report runs in a check mode and writes a log file. The following options are available for the execution of the report:

1. `p_check = X`
   This is the check mode and the default. The report calculates the reset candidates and writes them in the log file. The parameter `p_trkorr` is not evaluated.

2. p_check = **<space>**
   The report resets the reset candidates in the system and writes them in the transport request. Note that the parameter `p_check` must be filled.

Make sure that you check the candidates list before you execute the automatic reset because the compatibility check covers the technical perspective only.

> **Example**
>
> You have added a field to a structure. SAP delivers the structure with a field that is named identically and technically compatible. You must decide whether the fields are semantically the same. If the fields have been added for your own purpose, it is probably not identical to the use intended by SAP. On the other hand, the field could be added because of a manual correction described in an SAP Note.

> **Caution**
>
> If either SPPD or SPAU transports are registered or you use the Customer Transport Integration feature (see Integration of Customer Transports [page 91]), the Software Update Manager does **not** calculate potential reset candidates.

Consistency Check for Components and Objects (RUN_RSUPG_TADIR_COMPONENT_CHECK)

> **Note**
>
> This step is only relevant if you perform a release upgrade.

During a System Switch Upgrade procedure (see also Technical Details of the Upgrade Procedure [page 22]), a new ABAP repository is set up in the shadow instance based on the data of the Upgrade Export archives. This repository replaces the repository of the source release. Customer repository objects, which do not belong to SAP and which are to be used after the update, must be rescued before the replacement.

The Software Update Manager performs this rescue by exporting the repository objects from the old ABAP repository and importing them to the new one. The information about the affected repository objects is calculated and collected in phase `RUN_RDDIT006`. It analyzes the SAP system to find customer objects as well as objects modified by the customer. All objects selected for the rescue are written to dedicated transport requests that is imported into the new ABAP repository in various `DIFFEX*` phases.

It is important for a complete and correct rescue that the correct owner is associated to customer objects and that all optional add-ons are correctly installed, too. To avoid a loss of ABAP repository objects, several checks for inconsistencies are performed in phase `RUN_RSUPG_TADIR_COMPONENT_CHECK`. If the Software Update Manager displays error messages as a result of the checks, you have to examine them carefully.

The log file of the phase `RUN_RSUPG_TADIR_COMPONENT_CHECK` also refers to a file that contains a list of all objects with issues.

The following checks are performed:

1. Check for customer indexes
   This check identifies customer indexes on SAP tables in the customer namespaces Z* or Y* that are listed as modifications with status *Reset* but still exist in the ABAP Dictionary. These indexes will not be available

in the target ABAP repository after the update. If you want to keep these indexes, they must be changed again so that they are listed as *Active* modification.

2. Check for ownerships of customer objects
   This check identifies *LOCAL* and *HOME* objects that cannot be identified normally as customer objects and are therefore removed from the repository during the update.

   > **i Note**
   >
   > Directly before the phase `RUN_RSUPG_TADIR_COMPONENT_CHECK`, the phase `RUN_RSUPG_TADIR_COMPONENT_CLEANUP` is executed. In this phase, the report `RSUPG_TADIR_COMPONENT_CHECK` checks the table `TADIR` of the SAP system for customer objects of the software components `LOCAL` or `HOME`, for which the value *SAP* exists as original system. These objects are then automatically updated by replacing the *SAP* entry with the SID of the original system. As a result, these objects are retained automatically and their entries for the original system do not have to be corrected manually.
   >
   > A list of updated customer objects is written to the `UPGCOMPCHK_FIXLOCAL.LST_<SID>` file. This file is located in the subdirectory `var` of the SUM directory.

3. Check for unregistered software components
   This check identifies software components that are not registered correctly as software components in the SAP system. This can be, for example, an add-on that is delivered by means of a transport and not via an add-on installation package. If such a component has been identified, contact its vendor to provide a regular add-on installation package. Only correctly installed software components are rescued.
4. Identify software components without add-on update information
   This part of the log can be identified by searching for a log line *CHECK_COMPS_CVERS*. The main log contains the number of problematic objects per package of the software component. The detailed list of objects is written to an additional log file `<SW_Component>_NO_CUSTOBJ.LST_<SID>`.
5. Check for the completeness of add-ons to be rescued
   This check identifies ABAP repository objects associated to an add-on component that is to be rescued but not part of any piece list by which the add-on was installed. The system rescues add-ons by collecting the objects listed in the piece lists by which the add-ons have been installed and patched. If a vendor has delivered new repository objects as a precorrection by means of transport instead of a regular add-on support package, these objects are not rescued. Contact the vendor to provide a regular support package.

Operating System and Database Version (Phase CONFCHK_X)

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

This target release is released for certain combinations of operating system and database versions only. This phase checks that the operating system and database versions installed on your computer satisfy the requirements for the upgrade.

You can interrupt the procedure at this point if you must import additional software, or if you must upgrade the database or the operating system to a new version because of a version check.

> **⚠ Caution**
>
> Do not change the `SUM` directory.

Conflicts with Customer Tables in the SAP Namespace (Phase VIEWCHK*)

> **i** Note
>
> This step is only relevant if you perform a release upgrade.

This phase displays conflicts between customer tables in the SAP namespace and views that are delivered for the first time. It also writes this information to a log file.

You have to rename or delete the tables. If the tables are transparent, you can delete the customer tables using the Software Update Manager. You have to delete pool or cluster tables manually in the SAP system. First save any data that you need in these tables.

Environment Profiles Customizing (Phase ENVFILES_PREP)

The file templates of the environment files are copied to subdirectory `<SUM directory>/abap/sapnames/envfiles` and stored here with capital letters and without leading point as follows:

`.dbenv.csh`	→ `DBENV.CSH`
`.dbenv.sh`	→ `DBENV.SH`
`.sapenv.csh`	→ `SAPENV.CSH`
`.sapenv.sh`	→ `SAPENV.SH`

An entry in the log file `CHECKS.LOG` informs you that the user environment has been prepared. You have now the option to adjust the environment files to the environment profiles of target system user `<SID>adm`. You can make the changes up to the start of phase `ENVFILES_COPY`, in which the environment files are then copied to the home directory of user `<SID>adm` on your target system.

For more information, see Customizing of Environment Profiles [page 80].

Repairs and Requests Containing Objects Locked by SAP (Phase REPACHK1)

This phase displays all repairs and requests containing objects locked by SAP and writes them to the `REPACHK1.LOG` file.

You can ignore the messages at this point. Release these objects and the repairs confirmed at the latest by the `REPACHK2` phase.

Outstanding or Incomplete Updates (Phase JOB_RSVBCHCK2)

If there are any outstanding or incomplete updates, the update stops in this phase with a message.

If errors occur in this phase and you have not stopped production operation yet, you can skip these errors with *ignore* without entering a password. However, we recommend that you check for these updates and clean them up. The message is:

```
Open update tasks found; please clean them up
```

Free Space in Subdirectory log (Phase FREECHK_X)

This phase checks whether there is enough free space in `log` subdirectory during the update. Make sure you have enough free space in the `log` subdirectory so that the update can run without errors.

If a kernel switch is performed, this phase also compares the free disk space in the SAP kernel directory with the space requirements of the new SAP kernel. Make sure that you are able to restore the old SAP kernel if this becomes necessary.

> ⚠ Caution
>
> All files and subdirectories in the kernel directory `/usr/sap/<SID>/SYS/exe/run` are overwritten when the SAP kernel is switched. For more information, see the log file `CHECKS.LOG`.
>
> This log file includes, among other things, the protection list file `PROTECT.LST`, in which all files and subdirectories appear that can be protected from deletion. To prevent their deletion in the kernel directory, you copy the file `PROTECT.LST` from the directory `/usr/sap/<SID>/abap/var/` to the kernel directory `/usr/sap/<SID>/SYS/exe/run`. Note that the saved files may not fit to the new kernel version.

ABAP Workbench Locking (Phase REPACHK_EHPI)

If you perform an enhancement package installation or an support package stack update, and you have chosen scenario strategy *Standard* or *Downtime-optimized*, the Software Update Manager asked you in this phase to confirm the locking of the ABAP Workbench on all SAP instances.

This lock prevents development objects (for example, ABAP reports, table definitions, and so on) from being changed during the update since these modifications would be lost.

You can continue to use your SAP system in production operation, even if you confirm that the ABAP Workbench can be locked. However, after you have confirmed the ABAP Workbench lock, no more transports can be made into or out of the SAP system. Some further actions can be blocked that either check for this lock as well or for the running update. This is especially known in the area of Business Intelligence and SAP Solution Manager.

This phase displays all the repairs that are still in open transport requests. They are also written to the `REPACHK_EHPI.LOG` file. Release these transport requests so that you can continue; otherwise, the objects contained in these repairs are locked.

> ℹ Note
>
> SUM checks in this phase also for inactive development objects. During this check, it can occur that SUM reports inactive objects, which cannot be found in the SAP system. For information about removing these inconsistencies, see SAP Note 538167.

Unreleased Repairs and Corrections and ABAP Workbench Locking (Phase REPACHK2)

This phase displays all the repairs and corrections that are not released and writes them to the `REPACHK_EHPI.LOG` file. Furthermore, the Software Update Manager asks you during an upgrade in this phase to confirm the locking of the ABAP Workbench on all SAP instances.

Unreleased Repairs and Corrections

Before you continue, you have to release and confirm all the open repairs; otherwise, the objects in them are locked.

For a description of this procedure, see Releasing and Confirming Open Repairs and Requests [page 111].

> ⚠ Caution
>
> If you ignore open repairs, you could lose modifications.

Once you have released and confirmed all the open repairs, you have to repeat the `REPACHK2` phase.

Any modifications made to SAP objects in your repairs might be overwritten during the update.

For information about how modifications are copied to the new SAP standard during the update, see the SAP NetWeaver Library [page 14] for the target release at:

Application Help ▸ *SAP NetWeaver Library: Function-Oriented View* ▸ *Application Server* ▸ *Application Server ABAP* ▸ *Application Development on AS ABAP* ▸ *ABAP Customer Development* ▸ *Changing the SAP Standard* ▸ *Modifying the Standard* ▸ *The Modification Assistant*. In section *The Modification Assistant*, choose *Upgrade Procedure / Support Packages*.

ABAP Workbench Locking

If you perform a release upgrade, and you you have chosen scenario strategy *Standard* or *Downtime-optimized*, the Software Update Manager asks you in this phase if you want the ABAP Workbench to be locked on all SAP instances. This lock is needed to prevent development objects (for example, ABAP reports, table definitions, and so on) from being changed during the upgrade, since these modifications would be lost.

> ℹ Note
>
> After you have confirmed the ABAP Workbench lock, no more transports can be made into or out of the SAP system.

The Software Update Manager waits until the time you entered as the maximum synchronization time for all instances has expired.

This phase displays all the repairs that are still in open transport requests. They are also written to the `REPACHK_EHPI.LOG` file. Release these transport requests so that you can continue; otherwise, the objects contained in these repairs are locked.

> ℹ Note
>
> SUM checks in this phase also for inactive development objects. During this check, it can occur that SUM reports inactive objects, which cannot be found in the SAP system. For information about removing these inconsistencies, see SAP Note 538167.

Terminated Conversion Cleanup (Phase CNV_CHK_XT)

This phase checks whether the following still exist:

- Unprocessed conversion requests
- Restart logs

If there are errors, you receive an error message. Proceed as described in Cleaning Up Terminated Conversions in the DB Conversion Phases [page 230].

Comparison of Modifications (Phase ADJUSTCHK)

If you chose to copy a request in the SUMASK_SPDD_SPAU phase, the modifications it contains are now compared with the modifications in the system. The result of this comparison appears.

You are prompted to confirm that the request was copied. If this request contains all the modifications found in the system, the Software Update Manager does not stop before the activation of the ABAP Dictionary objects. However, you can still specify that you want the Software Update Manager to stop in this phase.

Cleanup of Outstanding Updates (Phases JOB_RSVBCHCK_R and JOB_RSVBCHCK_D)

If some updates have not been performed yet, the Software Update Manager stops in the following phase:

- JOB_RSVBCHCK_R if you perform a support package stack (SPS) update with scenario strategy *Single system*
- JOB_RSVBCHCK_D if you perform an upgrade with scenario strategy *Standard* or *Downtime-optimized*
- JOB_RSVBCHCK_D_MIG if you are executing the database migration option of the Software Update Manager

In these phases, you must clean up all outstanding updates. Furthermore, you have to clean up all outbound queue RFC calls and all open data extraction orders that you notice in the system at this point in time.

Proceed as follows:

1. Clean up the outstanding updates, outbound queue RFC calls, and open data extraction orders as described in Evaluating the Results of the Checks Roadmap Steps [page 159].
   See there under message: `Open update tasks found; please clean them up`
2. Repeat the current phase.

Modification Adjustment and Activation (ACT_UPG)

Depending on the results of the SUMASK_SPDD_SPAU phase, the Software Update Manager can ask you at the beginning of this phase to adjust your modifications to ABAP Dictionary objects. In this way, they correspond to the new SAP standard version of the objects.

> **i Note**
>
> If you selected the scenario strategy *Standard* or *Downtime-optimized* in the initial dialogs, the Software Update Manager requests you to adjust your modifications to ABAP Dictionary objects during the *Preprocessing* roadmap step in phase `ACT_UPG`.
>
> However, if you selected the scenario strategy *Single system* in the initial dialogs step, the Software Update Manager requests you to adjust your modifications to ABAP Dictionary objects during the *Execution* roadmap step in phase `ACT_TRANS`.

The `ACT_UPG` phase can take long, particularly when you have made many modifications to the SAP system or included a lot of support packages. This is because the ABAP Dictionary activation program first calculates the dependent objects and the activation sequence for all ABAP Dictionary objects that must be activated. For example, structures have to be activated before they can be used in tables or table types. These dependencies between ABAP Dictionary objects are often complicated. The same kind of dependencies might have to be calculated several times with different input sets. Nevertheless, you can check in the process overview of transaction SM50 that the batch job `RDDMASGL` is still running.

> **⚠ Caution**
>
> Do not attempt to import adjustment transport requests into the system manually in this phase. This leads to the loss of data in customer fields.
>
> Release upgrade only: Any requests for automatic adjustment from previous upgrades can be included in this upgrade in phase `SUMASK_SPDD_SPAU` only.

Modification Adjustment

> **⚠ Caution**
>
> If you have made structural changes to tables, you have to make adjustments in the `ACT_UPG` phase. Otherwise, data is lost.
>
> The objects are adjusted on the shadow instance.

To make adjustments, proceed as follows:

1. The Software Update Manager prompts you to confirm that you want to perform a modification adjustment.
2. Add an entry for the shadow instance to the SAP Logon.
   For the server and system ID, use the values from the original system; for the instance number, use the value you specified in the preparation units for the shadow instance. The default value is the instance number of the original system plus one.
   Since the original system is still running if you use the scenario strategy *Standard* or *Downtime-optimized*, you can also log on to the shadow instance in transaction `SM59` with the RFC connection `SAP_UPGRADE_SHADOW_SYSTEM`.
3. Log on to the shadow instance as user `DDIC` with the `DDIC` password of the original system.
   Only the users `DDIC` and `SAP*` exist in the shadow instance.
4. To set the system change option, call transaction SE06. Perform the following actions:
   1. Set the global setting to *Modifiable*.
   2. Set the change option for the software components to *Modifiable* or *Restricted modifiable*.
   3. Set the SAP namespace to *Modifiable*.

5. Call transaction SU01 to create one or more users to perform the modification adjustment. The new users exist only on the shadow instance and are not copied to the original system.
   Release upgrade only: Copy the user `DDIC` of client 000.
   SPS update: Since all users of client 000 are copied in the `DBCLONE` phase to the shadow instance, any of them can be used for the modification adjustment.
6. Log on to the shadow instance with one of the new users.
   Modification adjustment of ABAP Dictionary objects has to be performed in client 000.
7. To determine the ABAP Dictionary objects that must be adjusted, call transaction SPDD.

   > ⚠ Caution
   >
   > On the shadow system, adjust only objects of the ABAP Dictionary. You can make changes to the SAP Repository (changing and creating programs or packages, for example), but we do not recommend this since it may make the system inconsistent.

   For more information about transaction SPDD, see the SAP NetWeaver Library [page 14] for the target release at:
   Function-Oriented View > *Application Server ABAP* > *Application Development on AS ABAP* > *ABAP Customer Development* > *Changing the SAP Standard (BC)* > *Modifying the Standard* > *The Modification Assistant* > *Upgrade Procedure /Support Packages (link at the bottom of the page)* > *Adjusting ABAP Dictionary Objects*
   For more information about the Modification Assistant, see the SAP NetWeaver Library [page 14] for the target release at:
   SAP NetWeaver Library Process Integration Library > *Function-Oriented View* > *Application Server ABAP* > *Application Development on AS ABAP* > *ABAP Customer Development* > *Changing the SAP Standard (BC)* > *The Modification Assistant*

Activation

Customer-defined ABAP Dictionary objects may have activation errors during the `ACT_UPG` phase. This happens, for example, when these objects refer to SAP objects that were deleted in the target release. For similar reasons, modifications of ABAP Dictionary objects that belong to the SAP standard delivery may also cause activation errors.

If your customer-defined objects have activation errors, you can correct them using transaction SE11 in the shadow system. If, however, you activate the objects using transaction SE11 in the shadow system, the objects are created with inactive runtime objects. This behavior is different compared to the regular behavior of transaction SE11 in a development system.

> → Recommendation
>
> We recommend that you correct all activation errors in modified ABAP Dictionary objects because follow-up activities after the update might rely on the correctness of these objects.

All changes to an ABAP Dictionary object during the `ACT_UPG` phase are automatically recorded in a transport request. If you have to adjust modified SAP objects in transaction SPDD, the SAP system creates the transport request automatically, as mentioned above. If however, you correct your customer-defined objects, we recommend that you create a transport request and use it as a single transport request in your subsequent system during the update. For more information about including the single transport request, see *Request for Single Transport Request (Phase SUMASK_SINGLE_TRANSPORT_REQUEST)* in Important Entries for the Configuration Roadmap Step [page 144].

However, you can also choose *Accept errors and repeat phase ACT_UPG* to temporarily ignore these errors. You do not need a password to do this. If you chose this option here, you have to activate these objects after the update.

> ⚠ Caution
>
> Only choose *ignore* if you are sure that this does not affect SAP objects.

In case of non-ignorable errors, you must not continue with the next phase. You first have to remove the cause of the termination.

Safety Export for Objects Adjusted with SPDD (Phase UEXP_SPDD_SAV)

During an update, subsequent systems might require an SPDD transport request before the *Postprocessing* roadmap step. To meet this requirement, the Software Update Manager creates and exports a safety transport request directly after the activation phase. This is phase `ACT_TRANS`, if you use scenario strategy *Single System*.

If you use scenario strategy *Standard* or *Downtime-optimized*, the activation phase is called `ACT_UPG`.

This transport request contains all objects of the flagged SPDD transport request. Both the data and the cofiles of the safety transport request are copied to the transport directory of your SAP system. The name of this transport request is stored in the log file `UEXP_SPDD_SAV.LOG`.

Creation of Database Indexes (Phase RUNASYN_RSINDCRE)

The Software Update Manager starts the background job `RSINDCRE` that creates secondary database indexes. The Software Update Manager does not wait for the results of this phase, it continues with the next phase.

If the creation of a secondary database index fails, an error message is written to the log file `RSINDCRE.<SID>` and the creation of the index is repeated during the downtime. This can in rare cases increase the duration of the downtime.

If you want to make sure that all secondary database indexes have been created successfully before you start with the downtime, check log file `RSINDCRE.<SID>` for any error messages. If log file `RSINDCRE.<SID>` displays error messages and you can solve these errors, restart the asynchronous index creation during the uptime by performing the following steps:

1. Check whether background job `RSINDCRE` has stopped and is no longer running as a background job.
2. Reschedule background job `RSINDCRE`.

SAP Notes Implementation in the Shadow System (CHECK4NOTES_TOOL_SHD2)

> **i** Note
>
> This information is relevant for all scenarios with a `stack.xml` configuration file.

The Software Update Manager displays in phase `CHECK4NOTES_TOOL_SHD2` in the shadow system a list of SAP Notes that have to be implemented using the SAP Note Assistant (transaction `SNOTE`). After the implementation of all relevant SAP Notes, repeat the phase and then continue the process.

Note that in ABAP systems, by default, the SAP Note Assistant must be capable of downloading and consuming digitally signed SAP Notes via HTTP connection as this type of SAP Note is now mandatory. The further procedure in phase `CHECK4NOTES_TOOL_SHD2` depends on whether the SAP Note Assistant of your SAP source system is already configured accordingly:

1. The SAP Note Assistant of the source system is enabled to work with digitally signed SAP Notes
   Configure your SAP target system to ensure that:
   - the connectivity for the SAP Note Assistant via HTTPS protocol is configured
   - the support package of the respective target software component `SAP_BASIS` is supported for digitally signed SAP Notes
   - the passwords for the HTTP connections in the shadow system are entered correctly
   - suitable trust anchor certificates to verify TLS server certificates are configured
   - the profile parameter for the HTTP connection is set in file `DEFAULT.PFL` for the shadow system according to SAP Note 510007, and that this parameter is activated

   Afterwards, the SAP Note Assistant can download and process the requested SAP Notes.
2. The SAP Note Assistant of the source system is not enabled to work with digitally signed SAP Notes
   You can manually download the requested SAP Notes from SAP Support Portal and upload them in the shadow system. For a process description and more information, see SAP Note 2537133.

For more information on SAP Note Assistant and digitally signed SAP Notes, see the

- SAP Support Portal at https://support.sap.com/en/my-support/knowledge-base/note-assistant.html
- SAP Help Portal. See the SAP NetWeaver Library [page 14] for your SAP NetWeaver source release, and go to *Application Help* > *Function-Oriented View* > *Solution Life Cycle Management* > *Software Logistics* > *Note Assistant* > *How to Enable and Use Note Assistant to Support Digitally Signed SAP Notes*.

Preparation of SAP System for Downtime (Phase DOWNCONF*)

At the end of the *Preprocessing* roadmap step, the Software Update Manager requests you in phase `DOWNCONF_DTTRANS` to perform actions that prepare your SAP system for the downtime.

The Software Update Manager requests you to perform the following actions:

1. Make sure that all production work in the SAP system is stopped and no users are logged on to the SAP system.
2. Make sure that no scheduled batch jobs can start anymore and await regular completion of currently running jobs.

> **i Note**
>
> The Software Update Manager automatically executes the report `BTCTRNS1` before the update starts. This report transfers all jobs with the status *Released* to the status *Suspended*. (See also the report documentation for more information.)
>
> After the update, you can reschedule jobs using report `BTCTRNS2`. See also Rescheduling Background Jobs [page 204].

3. Isolate the primary application server instance.
   For more information, see Isolating the Primary Application Server Instance [page 179].
4. After having completed these actions, choose *Next* to proceed to the next screen.
   The Software Update Manager stops the primary application server instance.

> **i Note**
>
> **nZDM with Record & Replay Technique**
>
> If you have chosen the near-Zero Downtime Maintenance (nZDM) feature [page 72] that uses the *Record & Replay Technique* (see Using the Record & Replay Technique in nZDM [page 73]) at the beginning of the update, the replication process must be started and the replication rate of recorded changes must reach at least 75 percent before the downtime starts.
>
> The reason is that when you select *Next*, the system stops the online replication, enters the downtime, and starts then the final replication. However, a too early stop of the online replication may result in a longer downtime.
>
> You will get appropriate warnings on the SUM dialog depending on the replication rate.
> - If the replication rate is lower than 75 percent, the downtime cannot be started .
> - If the replication rate is between 75 and 95 percent, the downtime can be started, but the final replication may take longer.
> - If the replication rate is 95 percent and higher, the downtime can be started.
>
> You have the option to choose *Check Status Again*, that is, you can check the status and the progress of the online replication in the *CRR Control Center* in the SUM Utilities (Extended UI) [page 42].

5. Before you enter the downtime, you are requested to perform the following backups:
   1. Back up your database.

      > **⚠ Caution**
      >
      > To restart the update from this point, make sure that you can restore the database, the system directory, and the update directory to the current state.

      In case of problems during the downtime, for example, a hardware failure, you need the backup of your database and the directories to reset the SAP system to the current state. The directories include, among others, profiles, trace files, and files for the SAP kernel needed for a reset of the SAP system.
   2. Back up directory `/usr/sap/<SID>` including the update directory.

      > **i Note**
      >
      > If the update directory is not part of directory `/usr/sap/<SID>`, make a separate backup of the complete directory including the subdirectory `sdt`.

3. Back up the home directory of user `<SID>adm`. If you must reset the update and problems occur when starting and stopping the SAP system, you may need to use the old user profiles contained in this directory.

> **i** Note
>
> If you experienced problems during the downtime and had to restore your SAP system, you can choose *Go productive again* to resume production operation. You can enter the downtime at a later point in time.

6. If you have chosen the scenario strategy *Standard* or *Downtime-optimized*, archiving is disabled. If the disabling of the archiving fails, the Software Update Manager prompts you to disable archiving manually. For information about how to do this, see Changing the Oracle Database Recovery Mode [page 254].

6.2.8 Isolating the Primary Application Server Instance

This chapter deals with isolating the primary application server instance so that only the Software Update Manager can work with the system during downtime.

Context

Isolating the primary application server (PAS) Instance means that you can use it exclusively for the update. The Software Update Manager asks you to isolate the PAS instance when downtime begins.

During downtime, all users have to be logged off from the system. You can use transaction `SM02` to inform the users who are logged on to the system.

Procedure

1. Check if a `saposcol` process is running in the current kernel directory.

   If so, stop and delete it as user `root`. To do this, change to your current kernel directory and enter the following commands:

   ```
   ./saposcol -k
   ./saposcol -d
   ```

   `Collector> leave` (to delete the shared memory and to detach)

   `Collector> exit` (to exit the process)

   ```
   rm saposcol
   ```

   > **i** Note
   >
   > Note that `saposcol` is part of the SAP Host Agent for quite some time already and not part of the SAP Kernel anymore.

2. Check if the SAProuter is not active.

   The SAProuter in the `run` subdirectory should not be active while the new SAP kernel is being imported. You have the following options:

   - Stop the SAProuter now and restart it after the update.
   - SPS update: If you need the SAProuter during the update, stop it at the beginning of the downtime at the latest. If you need the SAProuter during the downtime, make sure that the update is not running in parallel, especially during phase `KX_SWITCH`.

   To display more information about the SAProuter:

   - Enter **`saprouter`** at the operating system level.
     A list of all the parameters appears.
   - See the SAP Help Portal for your target release at: http://help.sap.com, *Application Help* > *Function-Oriented View* > *Application Server* > *Application Server Infrastructure* > *SAProuter*.

3. Make sure that no `CRON` job is scheduled that affects the SAP system. Examples: Starting and stopping the SAP system, saving the database, or similar actions.

   This could impair the full control of the Software Update Manager over the SAP system.

4. AIX-systems only: Check the restrictions for `cpu`, `fsize` and `core` for user `<SID>adm`.

   Enter the command **`lsuser`** as user `root`.

   The parameters should have the following values:

   ```
   cpu=-1
   ```

   ```
   fsize=-1
   ```

   ```
   core=100000
   ```

   If not, use the `chuser` command to change them (enter, for example, **`chuser cpu=-1 <SID>adm`**).

   These changes only take effect for user `<SID>adm` when you have logged on again as `<SID>adm`.

   Then restart the SAP system again.

   > **i Note**
   >
   > For more information about user limits on AIX, see SAP Note 323816.

5. Make sure that no change of operation mode is defined on the primary application server instance during the update.

   If this is the case in normal operation, call transaction SM63 either to choose a single operation mode for all-time spans, or to delete all the assignments.

6. Clean up all outstanding updates as described in Evaluating the Results of the Preparation Roadmap Steps [page 159] when the message `Update records still exist - Please process` appears.

7. Make sure that you can recover the database to its current state.

   Back up the update directory now. If a hardware problem occurs during downtime, you may need to reset the upgrade to the state it had when the SAP system was isolated. So that the Software Update Manager has the correct control information, the `SUM` directory should have the same state as at the beginning of the `MODPROF_TRANS` phase.

8. You can lock the database against remote access. Contact the database administrator, if the primary application server instance and the database server are on the same host.

> ⚠ Caution
>
> Make sure that no transport requests are imported into the system during downtime. Otherwise, you may lose data. For example, by manually importing requests for the automatic adjustment, you may lose all your modifications to the standard SAP system.

6.2.9 Important Entries for the Execution Roadmap Step

This chapter deals with the roadmap step `Execution`, in which the system is in downtime and the Software Update Manager converts application tables and data to match the target release layout.

In the following, we go into detail of some important phases in which you enter information or confirm the existing values when prompted by the Software Update Manager:

- Actions After Shutdown (Phase STOPSAP_<x>) [page 181]
- Modification Adjustment and Activation (Phase ACT_UPG) [page 181]
- Profile of User <SID>adm (Phase ENVFILES_COPY) [page 182]
- Manual Actions for the ASCS Instance (Phase REQ_ASCS_SWITCH) [page 182]
- Database Archiving and Backup (Phase STARTSAP_PUPG) [page 182]

Actions After Shutdown (Phase STOPSAP_<X>)

If you want to use transaction `RZ10` to adjust the instance profile during or after the update, start by reimporting the current version of the profile into your SAP system. If you do not do this, the changes made by the update are reset, which can cause the update to stop running.

Modification Adjustment and Activation (Phase ACT_UPG)

> ℹ Note
>
> This step is only relevant if you perform a release upgrade.

> ℹ Note
>
> If you selected the scenario strategy *Standard* or *Downtime-optimized* in the initial dialogs, the Software Update Manager requests you to adjust your modifications to ABAP Dictionary objects during the *Preprocessing* roadmap step.
>
> For more information, see *Modification Adjustment and Activation (Phase ACT_UPG)* in Making Entries for the Preprocessing Roadmap Step [page 166].

Profile of User <SID>Adm (Phase ENVFILES_COPY)

In this phase, the environment files are copied from the `envfiles` subdirectory to the home directory of the `<SID>adm` user on the target system. Here, they are saved again with lowercase file names as follows:

`DBENV.CSH`	→ `.dbenv.csh`
`DBENV.SH`	→ `.dbenv.sh`
`SAPENV.CSH`	→ `.sapenv.csh`
`SAPENV.SH`	→ `.sapenv.sh`

> **i** Note
>
> Before the environment files are copied to the home directory, the Software Update Manager creates backup files in the directory `<SUM directory>/abap/sapnames` using to the following file name pattern: `ENVBACKUP<original file name>`. (Example: `ENVBACKUP.dbenv.csh`)

If additional application servers with an own home directory of user `<SID>adm` exist, copy the environment files to these servers.

Any changes you made to the files after the `ENVFILES_PREP` phase and before the `ENVFILES_COPY` phase are then applied to the target system. For more information, see Customizing of Environment Profiles [page 80].

Manual Actions for the ASCS Instance (Phase REQ_ASCS_SWITCH)

You are prompted to install the latest SAP kernel on the host with the ASCS instance, when the following conditions are met:

- you are running the ASCS instance on a separate host (for example, in a high availability environment)
- the operating system of the host is different from that on the primary application server instance

Database Archiving and Backup (Phase STARTSAP_PUPG)

You are asked to make a full backup of your database. If you have deactivated archiving, you are asked to change the archiving mode of your database.

Release upgrade only: For more information about database archiving and backup strategies, see Database-Specific Aspects [page 78].

SPS update: For more information about database archiving and backup strategies, see *Database-Specific Aspects* in Update Schedule Planning [page 20].

6.2.10 Important Entries for the Postprocessing Roadmap Step

This chapter deals with the roadmap step `Postprocessing`, in which the Software Update Manager saves the log files and prompts you to start with certain follow-up activities.

In the following, we go into detail of some important phases in which you enter information or confirm the existing values when prompted by the Software Update Manager:

Configuration of SAP Start Service (Phase REQSTARTSRV)

> **i Note**
>
> This step is only relevant if you perform a release upgrade.

The upgrade does not configure the SAP start service (`sapstartsrv`) to start automatically as a daemon when you start the operating system. If you want to set up the automatic start, you have to perform some manual actions.

For more information about setting up the automatic start of the SAP start service during the operating system startup, see SAP Note 823941.

Load Generation (Phase REQ_GENLD)

You can now start to generate loads for your SAP system.

For more information, see Generating Loads [page 204].

Solution of P-Errors (Phase CHK_POSTUP)

Some of the problems, which occur during an update, can be tackled after you have completed the update but before you start the productive system. This type of problem is indicated by a *P* in the second column of the `.ELG` logs.

You can find a complete list of these P messages in the `CHK_POSTUP` phase in the `LONGPOST.LOG` file.

> ⚠ Caution
>
> It is stringently required that you remove the cause of the P messages before you start using your SAP applications again.

> Example
>
> Some of the secondary indexes may not have been created because they were not unique. Use the ABAP Dictionary tools (transaction SE14) to create these indexes in the database.

To remove an error, proceed as described in the long text of the message. You have two options to access the message long text in your SAP system: Either using transaction `SE91` (*Message Maintenance*), or using transaction `UPG_SHOW_LOGFILE` (*Display a SUM LOG File*).

The transaction `UPG_SHOW_LOGFILE` displays only log files located in the subdirectory `DIR_PUT/log` of the `SUM` directory. It is provided by the Software Update Manager and remains in the SAP system after the update.

- Using transaction `SE91`:
  1. Identify the appropriate message class and the message number. In general, the message class is indicated by the letters after the *Px*, followed by message number, and the message short text. The system is the following: P<message language><message class><message number>

     > Example
     >
     > P-message *4PEDH176 Parameter list of append search help "PRCTR_APPEND" differs from appending one* means:
     > - Message type: *P*
     > - Message language: *E* (*English*)
     > - Message class: *DH*
     > - Message number: *176*
     > - Message short text: *Parameter list of append search help "PRCTR_APPEND" differs from appending one*

  2. In your SAP system, choose transaction `SE91` and fill in the fields *Message Class* and *Number* accordingly. Then choose *Display*.
  3. Select the message in the list and choose *Long Text*. The long text with further information appears. Note that no long text is displayed when the checkbox *Self-Explanatory* is selected. In this case, the short text describes the issue sufficiently.
- Using transaction `UPG_SHOW_LOGFILE`:
  1. In your SAP system, choose transaction `UPG_SHOW_LOGFILE`, and enter the log file name. Possible log file names are `LONGPOST.LOG` or `<file name>.<SID>` (for example, `SAPA731ESI.S41`).
  2. Select a level of detail to which you want to expand the list of messages.
  3. In the displayed message list, an icon before a message indicates that a long text exists in addition. To open the associated long text, double-click the message.

Any messages that you do not handle immediately must be handled at the next opportunity.

> **Note**
>
> If you receive an error message stating that a table with the naming convention `M_<four-character matchcode object><one-character ID>` does not have an ABAP Dictionary reference, you can delete this table without informing SAP Support.

Temporary Renaming of SPAU Transport Request Owner and Client (Phase UEXP_SPAU)

If you carry out the modification adjustment during the update, note that the Software Update Manager performs the following in phase `UEXP_SPAU`:

- The owner of the modifications transport request changes temporarily to user `DDIC.`
- The client changes temporarily to client `000.`

After this phase, the Software Update Manager revokes the changes so that the client has the original number and the transport request has the original owner again.

If the Software Update Manager aborts during this phase and you have to look for the transport request, bear in mind that the request owner is user `DDIC`. The number of the transport request remains unchanged.

If you restart the Software Update Manager, it uses the original client and transport request owner again.

Modification Adjustment of Repository Objects (Phase SPAUINFO)

If you modified programs, screens or user interfaces, you have to adjust them with transaction `SPAU` and - if applicable - transaction `SPAU_ENH`. You can either do the modification adjustment now or after you have finished the update. If you adjust the modifications now, the Software Update Manager exports the related transport request to the transport directory and registers it for transport in the `umodauto.lst` file. Using this file, the Software Update Manager can integrate the transport into subsequent updates.

> **Note**
>
> Make sure that the user `<SID>ADM` has write permissions for the file `<DIR_TRANS>/bin/umodauto.lst`

To use this automatic registration of the transport in the `umodauto.lst` file, proceed as follows:

1. If needed, close the browser window or the browser tab page with the SUM UI.
2. Perform the modification adjustment.
3. Restart the update and choose *Adjustment completed*.

If you want to finish the update without adjusting modifications, choose *Continue*.

For more information, see Adjusting Repository Objects [page 198].

Starting Cleanup Processing (Phase REQ_UP_FINAL)

In this phase, the Software Update Manager informs you that it will start as a next step performing cleanup activities. While it is doing this, you can carry out the necessary manual post-processing activities.

Note that imports of customer transports and additional software installations are still possible until phase REQ_FINISH_IMPORT. In this phase, you must confirm that such imports are no longer running or being started. Imports of this type are then only possible again after the update.

Finishing Imports (Phase REQ_FINISH_IMPORT)

Before you continue with this phase, make sure and confirm that all imports of customer transports and additional software installations are completed, and that no such further imports are started until the end of the procedure. Imports of this type are only possible again after the update.

Saving Log Files (Phase SAVELOGS)

The Software Update Manager saves selected log files and control files. If there are problems after the update, SAP Support can use these files for error analysis. The files are saved in the following directory:

```
/usr/sap/trans/sum/<SID>/<target release of SAP Basis>
```

6.3 Options After the SUM Run

6.3.1 Evaluating the Software Update Manager

To give your feedback to the update process, you can send a feedback form to SAP.

Prerequisites

- The update has finished.
- The client with which the update is controlled needs an Internet connection.

Context

SAP is always interested in improving its tools. Our aim is to provide you with a fast and efficient update process. Upon completing the process successfully, the important statistics of the update are collected in

a comprehensive report: the `UPGANA.XML` file. Evaluating the collected information helps us to improve the update process but also brings benefits like transparency and predictability. Note that the form does not collect any business-related data.

To be able to identify areas in need of improvement, we would highly appreciate getting feedback on your experience with the SUM process. For this purpose, we have incorporated a simple feedback form directly in the SUM user interface (*Summary* roadmap step). The *Summary and Evaluation of the Process* dialog contains the following sections:

- *Summary*
  Using the corresponding link in the dialog (*UPGANA.XML*), you can open a process report, which is designed to easily evaluate your update and to better plan follow-up updates. It includes all important artifacts in a single file.
- *Feedback Form*
  This form consists of the following:
  - a simple questionnaire on your experiences with the `SUM` process
  - a free-text feedback field
  - XML data generated during the update process
  - an e-mail field

  .

> **i Note**
>
> SAP offers also the *Technical Downtime Optimization* app. Based on the data from the `UPGANA.XML` file, it can display a visual analysis and evaluation of the system maintenance procedure using SUM. Moreover, the app is able to simulate and estimate the potential downtime savings for nZDM, downtime-optimized DMO, downtime-optimized conversion, and ZDO. In this way, it can help you to optimize the next SUM run to achieve minimum downtime and smooth system maintenance.
>
> For more information about this app, see SAP Note 2881515 and the SAP Community blog Downtime Optimization - Get insights using the new TDO app.

Procedure

1. Answer the questions in the *Feedback Form* section.

   > **i Note**
   >
   > Answering the questions is optional.

2. Choose *SEND TO SAP*.

6.3.2 Running the Software Update Manager for Another Update

This section describes how you start the Software Update Manager again from the beginning for another update.

Prerequisites

You have successfully performed an update, and you have stopped the Software Update Manager afterwards as described in Stopping the Software Update Manager [page 189].

Procedure

1. Rename the update directory used for the update that has already finished.
2. Unpack SUM again and start it as described in Starting the Software Update Manager [page 120].

6.3.3 Running the Software Update Manager Again Using a Configuration File

The SUM offers the option to repeat an update without re-entering system parameter values.

Context

After a first successful update with the Software Update Manager, you can carry out another update on a different system with identical system parameters, but without re-entering the values. The necessary parameters are provided by a configuration file that has been generated after the first update. This means that the SUM no longer needs to display the dialogs for entering these parameters during the next update.

> **i Note**
>
> Note that this approach does not hide all dialogs. Only dialogs requiring parameters are hidden. The Software Update Manager still displays important notifications and transitions from one roadmap step to the next one, which you have to confirm manually.

Procedure

1. Perform a first SUM run and generate the configuration file afterwards:
   a. Perform a first system update with the Software Update Manager on the intended system.

      When this update has finished completely and successfully, you can generate a configuration file that contains all corresponding variables. You may also generate the configuration file for a SUM run that has not reached 100%, however, this file contains all possible variables.
   b. Generate the configuration file using the following command on the command-line interface:

      ```
      <SUM directory>/abap/bin/SAPup genconfiginput
      ```

      The `SAPup` executable generates the configuration file `ConfigInput.xml` in the current directory.

      > ⚠ Caution
      >
      > The generated XML file contains the tags for passwords, but no content. You may enter passwords into the file manually, but in clear text. Therefore, use these tags for uncritical test systems only.
2. Perform a subsequent SUM run using configuration file:
   a. For the new SUM run, unpack the Software Update Manager again on the same or identical system as described in Downloading and Unpacking the Software Update Manager [page 118].
   b. Copy or move the generated configuration file from the first SUM run to the `control` subdirectory `<SUM directory>/abap/control/`.
   c. Start the new update with the Software Update Manager as described in Starting or Restarting the Software Update Manager [page 121].

6.3.4 Stopping the Software Update Manager

After a successful update, you have to stop the Software Update Manager manually.

Context

After the update procedure has been performed successfully, the Software Update Manager displays an appropriate information in the web browser window. Afterwards, all remaining processes on operating system level must be terminated to stop SUM completely. This also applies after a reset and the subsequent cleanup if you do not want to continue the update.

You have three options to stop the Software Update Manager completely:

- Choosing *Exit* from the *More* menu.
- Choosing *Cleanup* from the *More* menu.
- Killing the `SAPup` processes manually on the host.

Procedure

- **Option 1: Stopping the Software Update Manager using the *Exit* option:**
  1. After the update procedure has been performed successfully, choose *Exit* from the *More* menu. This exits the current page and displays the initial dialog of the SUM user interface (*Tool start required*).
  2. Choose *Exit* again. This terminates the SAPup process on the server and therefore stops the Software Update Manager completely. An appropriate message appears on the SUM user interface.
  3. Close the web browser or web browser page.
- **Option 2: Stopping the Software Update Manager using the *Cleanup* option:**
  1. At the end of a successful update procedure or after a reset has finished successfully, choose *Cleanup* from the *More* menu. This option cleans up the SUM directory and terminates all running SUM ABAP server processes (SAPup) processes on the server. Afterwards an appropriate message appears on the user interface. The Software Update Manager has then been stopped completely.
  2. Close the web browser or web browser page.
- **Option 3: Stopping the Software Update Manager by killing the SAPup processes:**
  1. After the update procedure has been performed successfully, choose *Cancel* and then *Ok*.
  2. Close all web browser windows connected with SUM user interface.
  3. Search for all SAPup processes by entering the following:
     - `ps -ef | grep SAPup`
  4. Kill all found process IDs (PIDs) using the following command:
     `kill <PID>`

7 Follow-Up Activities

This part of the document contains information about the follow-up activities that you need to perform after you have updated your SAP system.

When you perform follow-up activities, note the following information:

- Perform the actions described in Quick Guide [page 57] in the specified order.
- Before you start the follow-up activities, the Software Update Manager needs to have reached the `MODPROFP_UPG` phase. The Software Update Manager stops in the `MODPROFP_UPG` phase and prompts you to start several follow-up activities. It then executes the last phases and completes the procedure. At the same time, you can already perform the specified follow-up activities.

The follow-up activities are divided into three blocks:

- Actions needed before resuming production operation
  These actions ensure that all the processes that are relevant to system operation are available again. You can start these actions while the Software Update Manager is finishing the update.
- Actions during limited production operation
  During this time, your SAP system is already consistent and all the processes that are relevant to system operation are available. However, this system state does not yet contain measures for optimizing performance, or actions for resuming standard operation (resuming background processing, or adjusting authorizations, for example). Check the actions that are listed in this block and if necessary, perform them before you restart production operation.
- Actions during production operation
  You can also perform these actions when the system is back to production operation.

> ⚠ Caution
>
> In addition to the general follow-up activities described in this document, you need to perform the follow-up activities that are specific to your product version, which are described in an additional product-specific document. This document is referenced in the *Master Guide* (or *Upgrade Master Guide*, respectively) for your product.

Actions

You have to perform the following actions **before you resume production operation** of your system:

- Solving P-Errors [page 192]
- Performing Follow-Up Activities for SAP Profiles [page 193]
- Performing Follow-Up Activities for User root [page 193]
- Oracle: Performing Specific Actions [page 194]
- Performing Follow-Up Activities in the Monitoring Area [page 196]
- Performing Follow-Up Activities for the SAP Kernel [page 197]
- Reimporting Additional Programs [page 197]
- Adjusting Repository Objects [page 198]
- Updating the Where-Used List in the ABAP Workbench [page 199]
- Release upgrade only: Adjusting Customizing Settings [page 200]

- Adjusting Customer Developments [page 200]
- Performing Follow-Up Activities for SAP Solution Manager [page 201]
- Adjusting the User and Role Administration [page 202]
- Checking the System Time Zone Settings [page 203]

You can perform the following actions **during limited production operation** of your system:

- Oracle: Performing Actions for the Cost-Based Optimizer [page 203]
- Rescheduling Background Jobs [page 204]
- Generating Loads [page 204]
- Performing Follow-Up Activities for Application Link Enabling (ALE) [page 206]
- Upgrading Additional Application Server Instances [page 207]
- SPS update: Checking for Indexes Unknown to the SAP System [page 208]

You can perform the following actions **during production operation** of your system:

- Oracle: Deleting Tablespaces [page 208]
- Importing Support Packages After the Upgrade [page 209]
- Transport Management System: Distributing the Configuration [page 210]
- Performing Follow-Up Activities for the Language Transport [page 210]
- Saving Files for Subsequent Updates [page 211]
- Deleting Log Files [page 212]

7.1 Solving P-Errors

Some of the problems, which occur during an update, are stored as P-messages in the `Longpost.log` file. They must be solved at the latest before you resume production operation.

Context

During the update execution, you are informed about P-messages on the SUM user interface by means of a `Checks.log` flag (see also SUM UI: Flags [page 31]). The flag is displayed as warning with a corresponding message. At that moment, you can already process this type of error.

You can also tackle P-errors at a later point in time in the *Postprocessing* roadmap step. In any case you must ensure that all remaining P-errors are solved before you start the productive system.

If any of them still exist, process them as follow-up activity after the update procedure is completed.

Procedure

Process the P-errors as described in section *Solution of P-Errors (Phase CHK_POSTUP)* in Important Entries for the Postprocessing Roadmap Step [page 183].

7.2 Performing Follow-Up Activities for SAP Profiles

As of SAP NetWeaver release 7.40, the use of start profiles is no longer supported. They are merged with the instance profiles during the update.

Context

During the update, the start profile is merged automatically with the instance profile for all instances that are started on the target system. For those instances for which the profiles are not merged automatically during the update, perform manual steps to merge the profiles. The procedure is described in SAP Note 1898687.

> **i Note**
>
> Review all SAP profiles changes performed by the Software Update Manager. Rework is to be expected, especially in SAP memory management.

After the update, verify the SAP profile settings for your target release:

Procedure

1. Check the file `/usr/sap/sapservices` to make sure that all application server instances are configured properly. If needed, correct the file as user `root`.

   The automatic profile merge procedure registers the profile in file `/usr/sap/sapservices` using an SAP Host Agent call and you therefore need to provide the credentials for user `<SID>ADM`.
2. Call transaction RZ10 (*Maintain Profile Parameters*).
3. Select the wanted profile and choose *Check*.
4. Fix the findings accordingly.

7.3 Performing Follow-Up Activities for User root

To perform the necessary adjustments after the update, you need the user authorizations of the user `root`.

Context

> **i Note**
>
> - The UNIX commands **`chown`** and **`chmod`** below are used to provide root permissions to the `icmbnd` executable. Root permissions are only required for binding ports with port numbers smaller than 1024.

If no ICM server ports have been configured to use port numbers smaller than 1024, we recommend that you do not execute the **chown** and **chmod** commands. For more information about binding ports smaller than 1024, see SAP Note 421359.

- The ICM server ports are configured in the profile parameter `icm/server_port_<n>` that is contained in the instance profile or default profile.

Procedure

1. Log on as user `<SID>adm`.
2. Execute the following commands:

   `su - root`

   If you have one kernel directory: **`cd /usr/sap/<SID>/SYS/exe/run`**

   If you have two kernel directories: **`cd /sapmnt/<SID>/exe/(n)uc/<platform>`**

   If Oracle software is installed under operating system user `oracle`:

   `./oraroot.sh <SID>oracle`

   If Oracle software is installed under operating system user `ora<dbsid>`, and `<DBSID>` equals `<SID>`:

   `./oraroot.sh <SID>`

   If you have an MCOD system or the database name does not correspond to the SAP system name, use the following command to run `oraroot.sh`:

   `./oraroot.sh <SID> <DBSID>` (Note the blank between <SID> and <DBSID>.)

   `cp -p ./icmbnd.new ./icmbnd`

   `chown root:sapsys icmbnd`

   `chmod 4750 icmbnd`

   `exit`
3. Start the SAP system again.

7.4 Oracle: Performing Specific Actions

Prerequisites

You have not yet resumed production operation of the system.

Procedure

Creating and Updating the SAPDBA Role

Release upgrade only: To increase the security of your system, do not assign the DBA role to the `OPS$` database users as of SAP Basis Release 4.x. You have already performed most of the required manual changes when you migrated Oracle to the required version (see the guide *Upgrade to Oracle Database <Version>: <Platform>*).

The Software Update Manager imports additional objects that you need to adjust. This means that you have to execute the SQL script `sapdba_role.sql` again.

Proceed as follows:

1. Log on as user `ora<sid>` at the UNIX level.
2. Start the SQL script with:
   ```
   cd $ORACLE_HOME/dbs
   cp /usr/sap/<SID>/SYS/exe/run/sapdba_role.sql sapdba_role.sql
   sqlplus /nolog @sapdba_role <SAPSCHEMA-ID>
   ```
   Where `<SAPSCHEMA-ID>` is `SR3` for `SAPSR3`.
   If the following error message appears, you can ignore it:
   ```
   Error accessing PRODUCT_USER_PROFILE
   Warning: Product user profile information not loaded!
   You may need to run PUBLD.SQL as SYSTEM.
   ```

Checking the Environment Variables for the BR*Tools Program

To check whether all the environment variables have been set correctly for `BR*Tools` at the UNIX level, see the SAP Library [page 14] for your target release at:

SAP Library Paths

Release	Path in SAP Library
SAP NetWeaver 7.5 SAP NetWeaver AS for ABAP 7.51 innovation package	*Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Database Administration* > *Database Administration for Oracle* > *SAP Database Guide: Oracle* > *Getting Started with Oracle and the SAP System* > *Database System Configuration* > *Environment Variables (UNIX)*

> **i Note**
>
> Release upgrade only:
>
> As of SAP NetWeaver Application Server 6.40, SAP no longer delivers `SAPDBA`. To help you administer your Oracle database, SAP now provides you with the `BR*Tools`. The tools can be used for all SAP Releases running on Oracle 9i and higher.
>
> For more information about the `BR*Tools`, access the SAP Library [page 14] for your target release and using the paths mentioned above, but choose now *SAP Database Guide: Oracle* > *BR*Tools for Oracle DBA*.

Backing Up the Database

The procedure for backing up the database depends on the mode with which you operated the database during the update.

Backup: Database Was Operated in NOARCHIVELOG Mode

Activate ARCHIVELOG mode again and create a full backup of the database. This has to be executed as an offline backup.

Proceed as follows:

1. Stop your SAP system as user `<sid>adm` .
2. Use `BRSPACE` to activate the ARCHIVELOG mode again.
   For instructions on doing this, see Changing the Oracle Database Recovery Mode [page 254].
   This stops and starts the database again.
3. Use the `brbackup` program to start the offline backup of the database.
4. When you have made the backup, you can start up your SAP system again as user `<sid>adm` and continue working.

For more information about offline backups and `brbackup`, see the SAP online documentation on database administration for Oracle.

Backup: Database Was Operated in ARCHIVELOG Mode

Since many archives were created during the update, make a full offline or online backup of the database as quickly as possible. Otherwise, restoring the database may be time-consuming.

7.5 Performing Follow-Up Activities in the Monitoring Area

Setting Up the Monitoring Architecture

With the monitoring architecture of the Computing Center Management System (CCMS), you can monitor your entire IT landscape centrally, including quick and reliable problem reporting. SAP Support can only provide optimal support for landscapes for which the CCMS has been set up properly.

For more information about the configuration tasks, see the *Technical Monitoring Cockpit* section on the SAP Help Portal (http://help.sap.com) for your SAP NetWeaver version.

Monitoring with CCMS Agents

Only relevant if your source release is based on SAP NetWeaver 7.0 or 7.0 EHP1: As of SAP NetWeaver 7.0 including enhancement package 2, the CCMS agents infrastructure has changed significantly. If necessary,

perform the follow-up activities for central monitoring as described in SAP NetWeaver Library [page 14] for your target release at:

SAP Library Paths

Release	Path in SAP Library
SAP NetWeaver 7.5 SAP NetWeaver AS for ABAP 7.51 innovation package	*Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Solution Life Cycle Management* > *Solution Monitoring* > *Monitoring the CCMS* > *Infrastructure of the SAP NetWeaver Management Agents* > *Technical Background of the SAP NetWeaver Management Agents* > *CCMS Agents: Upgrade of Monitored Systems from NW 7.0x to 7.1x or higher*

7.6 Performing Follow-Up Activities for the SAP Kernel

Installing the SAP Kernel

For production operation, you have to replace the SAP kernel that was installed during the update with the current SAP kernel from SAP Service Marketplace.

> **i Note**
>
> If you have downloaded the latest SAP kernel files to the download directory [page 112] before the update, you do not have to replace the SAP kernel.

For more information about installing the current SAP kernel, see SAP Note 19466.

7.7 Reimporting Additional Programs

Context

During the update, the contents of directory `/usr/sap/<SID>/SYS/exe/run` are deleted before the new SAP kernel is imported. If you installed additional programs in this directory such as the RFC library, you have to install them again.

During the *Preprocessing* roadmap step in phase *FREECHK_X*, you were prompted to protect files and subdirectories that you do not want to be deleted during the kernel switch. This protection could be performed during the update by copying the file `PROTECT.LST` into this directory.

If you did not use the `PROTECT.LST` file and if you backed up files and subdirectories of the kernel directory before the update, you can now reimport them into this directory.

Procedure

Download the files for the RFC library, the CPIC library, or `ArchiveLink` and unpack them into the kernel directory.

You can now also reimport files and subdirectories that you have not protected using file `PROTECT.LST`.

7.8 Adjusting Repository Objects

If you have modified objects such as programs, screens or interfaces, you have to adjust them with transaction SPAU.

Context

Adjust notes before adjusting modifications. Modification adjustment of an object is only possible after all notes, which are changing the object, have been adjusted.

In the past, customer exits were used to enhance the standard SAP system without modifying it. To exploit the advantages of the new Business Add-In technology, and to unify enhancement techniques, some of the customer exit definitions you use might have been migrated to Business Add-Ins by SAP. You can migrate the customer exits you have implemented to Business Add-In implementations at the touch of a button. The implementations that need migrating are displayed by the modification adjustment functions.

If you have implemented

- enhancement framework options of the new `Enhancement Framework`, or
- a new kernel-based `BAdI` (also part of the new `Enhancement Framework`),

and the underlying development objects have changed in an incompatible way, adjust these objects in transaction SPAU_ENH. Make sure that you perform the adjustments in transaction SPAU_ENH after the adjustments in transaction SPAU and not the other way around.

We recommend modifying enhancement definitions or enhancement implementations. In some cases you can, however, replace enhancement implementations with your own enhancement implementations.

> **i** Note
>
> After you have completed the update, you have a maximum of 14 days to execute transaction SPAU without the object registration key being checked (SAP Software Change Registration) for the objects that you modified.
>
> This restriction does not apply to SAP S/4HANA systems or to systems based on SAP NetWeaver AS for ABAP 7.51 and higher.

Procedure

1. Adjust repository objects.

   For more information, open the SAP Help Portal for your SAP NetWeaver release and navigate to: *Development* > *Development Information* > *Application Development on AS ABAP* > *Customer-Specific ABAP Development* > *Changing the SAP Standard (BC)* > *Installing Upgrades, Support Packages, and Enhancement Packages* > *Adjusting Repository and ABAP Dictionary Objects*.
2. Process Business Add-Ins (BAdIs).

   For more information, open the SAP Help Portal for your SAP NetWeaver release and navigate to: *Development* > *Development Information* > *Application Server ABAP* > *Application Development on AS ABAP* > *Customer-Specific ABAP Development* > *Changing the SAP Standard (BC)* > *Enhancements to the Standard* > *Classic Techniques* > *Classic BAdIs*
3. Replace enhancement definitions or enhancement implementation.

   For more information, see SAP Note 922557.

7.9 Updating the Where-Used List in the ABAP Workbench

Context

> **i Note**
>
> This action is optional.

The where-used list for ABAP object types has its own index. If you need a complete display of the where-used list in your SAP system, you have to re-create the index after the update.

Procedure

To create the index, you need to run report **SAPRSEUB** in the background.

> **i Note**
>
> Since the runtime of the report may be long, we recommend that you run it in the development system only.

For more information about this report, see SAP Note 28022.

7.10 Adjusting Customizing Settings

Context

> **i** Note
>
> This section is only relevant if you perform a release upgrade.

After the upgrade, there are new and changed functions in your SAP system for which you may have to adjust the Customizing settings.

> **⚠** Caution
>
> Adjusting the Customizing settings is done in close cooperation with the business consultants and other upgrade project team members.

Procedure

1. Call transaction `SPRO_ADMIN`.
2. Select your existing project IMG or create a new Customizing project.
3. Create one or more release-specific project views of your project IMG by selecting the activities for delta Customizing and upgrade Customizing.
4. Call transaction `SPRO`.
5. Choose *Add to work list* and add the project view.
6. Make the necessary Customizing settings in your release-specific project views.

   For more information about creating project views and making Customizing settings, see the online documentation for the transactions.

7.11 Adjusting Customer Developments

Context

The programs and applications that you have written, which run without errors on the source release, may contain syntax or runtime errors after the update. These may be caused by additional developments of the ABAP Workbench, changes to the ABAP syntax, or stronger syntax checks when you update from one release of SAP Basis, SAP Web AS, or SAP NetWeaver AS to the next one. You can solve these problems by adjusting your programs to the new version of the ABAP Workbench.

We also recommend to check the customer developments, which will be replaced by SAP standard during the update, if they are still necessary.

Procedure

For information about adjusting customer developments (recommendations for adjustments and instructions), see the composite SAP Note 2388441. It contains an overview of all SAP Notes for changes that must be kept in mind in the case of an ABAP release change.

7.12 Performing Follow-Up Activities for SAP Solution Manager

Use

To connect the newly updated system to SAP Solution Manager, you need to perform the following activities:

- Make sure that the data is up-to-date in the SAP Solution Manager system.
- Configure the diagnostics capabilities and the `Wily Introscope Agent`.
- If required, update the product version of the system where the Integration Server is installed.

Procedure

Checking System Data

In the System Landscape Directory (SLD), check whether the system landscape is up-to-date. To do this, check whether the newest software component versions are assigned to the relevant technical systems in your system landscape. After having verified that the system information in the SLD is up-to-date, the system needs some time (up to 24 hours) to also update the system information in SAP Solution Manager.

Updating the System Data in SAP Solution Manager

After updating your system, you need to make sure that the correct product version is assigned to the system in SAP Solution Manager.

For more information, see the SAP Library at http://help.sap.com/solutionmanager:

SAP Library Paths

Release	Path in SAP Library
SAP Solution Manager 7.2	*Application Help* > *SAP Library <version>* > *SAP Solution Manager Operations* > *Managing System Landscape Information* . Read sections *Setting Up the Landscape Management Infrastructure* and *Managing Technical System Information*.

Configuring Diagnostics Capabilities and Wily Introscope Agent

1. Start SAP Solution Manager.
2. Call transaction `SOLMAN_SETUP`.
3. On page *SAP Solution Manager: Overview,* choose *Managed System Configuration*.
4. Select the system where the Integration Server is installed.
5. On page *Managed System Configuration* in the process diagram, choose *Diagnostics Configuration*.
6. In row *Configure Diagnostics*, choose *Select URL*.
7. On page *Managed System Configuration* in the process diagram, choose *Wily Introscope Configuration*.
8. In row *Configure Wily Introscope Agent*, choose *Select URL*.
9. Under *Introscope Agent*, choose *Setup Introscope Agent*.

For more information about Wily Introscope Agent, see SAP Community Network at http://wiki.scn.sap.com/wiki/x/CBkMDg.

7.13 Adjusting the User and Role Administration

Use

After the update, you have to make adjustments to the user and role administration. What these are depends on whether you were already using the profile generator in the source release.

Procedure

For information about adjusting the user and role administration, see the SAP NetWeaver Library [page 14] at:

SAP NetWeaver Library Paths

Release	Path in SAP NetWeaver Library
SAP NetWeaver 7.3 / 7.3 including enhancement package 1 / 7.4 / 7.5	*SAP NetWeaver Library* > *Application Help* > *Function-Oriented View* > *Security* > *Identity Management* > *User and Role Administration of Application Server ABAP* > *Configuration of User and Role Administration* > *Checking for Changes in Authorizations After Upgrades*

7.14 Checking the System Time Zone Settings

After a release upgrade, make sure that the time zone settings of your system are up to date.

Context

The release upgrade with the Software Update Manager affects also the contents of the SAP database tables that contain time zone information. Therefore, after an upgrade, you must check the time zone settings of your system in all clients used, including client 000. Make sure that they are up to date.

If you have also used time zones that are not part of the current SAP standard, such as the now obsolete time zone "EST_", you have to add these time zones again manually using transaction STZBC.

Procedure

See SAP Note 198411 for more information and the latest SAP time zone tables content.

7.15 Oracle: Performing Actions for the Cost-Based Optimizer

Use

The following text only describes those actions that you need to perform for the cost-based optimizer (CBO) directly after the update. For more information about this topic, see the following documents in the online documentation:

- > **i** Note
  >
  > As of SAP NetWeaver Application Server 6.40, SAP no longer delivers SAPDBA. To help you administer your Oracle database, SAP now provides you with the `BR*Tools`. The tools can be used for all SAP Releases running on Oracle 9i and higher.
  >
  > For more information about the `BR*Tools`, see the SAP library under
-

Procedure

Scheduling Periodic Statistics Updates

Make sure that the statistics are updated at regular intervals. Update the statistics once manually directly after the update, then schedule this update periodically (every Saturday or Sunday night, for example).

```
brconnect -u / -c -f stats -t all
```

You can schedule these actions with transaction DB13. For more information about transaction DB13, choose *Help* > *Application help*, when your are in the transaction in the SAP system..

7.16 Rescheduling Background Jobs

Use

Use this procedure to release all background jobs that were locked when you isolated the primary application server instance.

Procedure

1. Log on in client 000 as user `DDIC`.
2. Execute report BTCTRNS2.

Errors may occur if a background report was changed by the Software Update Manager, since the report variants are no longer correct. If this is the case, you have to reschedule the job.

7.17 Generating Loads

This section deals with the ABAP load generation (transaction `SGEN`) after the update.

Context

> ⚠ Caution
>
> - Before you start the load generation after the update, make sure that the latest SAP kernel has been installed. If you have added the SAP kernel files to the download directory [page 112], the Software Update Manager installs the SAP kernel. SAP kernel parameters introduced in the latest SAP kernel can otherwise invalidate the loads.
> - The additional database space needed to generate ABAP loads is not added automatically to the space requirements reported in the *Checks* roadmap step. In addition, you need approximately the size of `REPOSRC`.

Load generation requires many system resources. There are several ways to create loads after the update, depending on how you use the SAP system.

- For objects that are new in the SAP system after the update, you can use transaction `SGEN` to create the following loads:
  - ABAP programs in the SAP system
    When you call an ABAP program, a load is automatically generated if it does not already exist for this program. This may, however, impair performance in a production system. To avoid this, you can generate the missing loads using the option *Regenerate after an SAP System upgrade* in transaction `SGEN` before you use the system in production operation.
  - Business Server Page applications (BSP applications) or Web Dynpro applications

  The transaction `SGEN` offers the following options:
  - Selection of predefined generation tasks
  - Selection of software components (such as SAP_ABA, SAP_BASIS) to restrict the number of objects being generated
  - Selection of the application servers for parallel generation
  - Generation in the background
  - Job Monitor for checking the progress of the generation in the background
  - Generation of webdynpro and BSP objects only

  > **i Note**
  >
  > The option to generate webdynpro and BSP objects option is available in releases up to SAP_BASIS 740 and as of SAP_BASIS 757. For systems as of SAP_BASIS 750 up to SAP_BASIS 756, use transaction `SGEN_OLD` instead.
- If you want to regenerate invalidated loads after the update, you can use report `RSGENINVLASM`. This report regenerates all invalidated ABAP loads for every machine type that exists in your system.

  > **i Note**
  >
  > - The load of an object becomes invalid if, since the load was generated, activated changes have been made to the object or objects used by this object (such as includes or tables). This can occur, for example, in SAP systems into which you regularly import objects.
  > - To minimize wait times while the SAP system regenerates invalidated loads, you can schedule the report `RSGENINVLASM` periodically, such as every night.
  > - Until SAP Basis 7.02 SP08, the name of the report is `RSGENINVLAS`.

Procedure

1. Generate loads using transaction `SGEN`.

   Select one of the following options:
   - *Generated all objects of selected components*
   - *Generate all components of selected packages*
   - *Regenerate after system upgrade*
   - *Regenerate the objects of the last run*

- *Regenerate already existing loads*
- *Generate the objects of the transport requests*

For a detailed description of these features, see the online documentation in transaction `SGEN` under *Information on the SAP Load Generator*, or in the job monitor under *Job Monitor*.

2. (Optional:) Call transaction `SE38` and run report `RSGENINVLASM` or `RSGENINVLASM` depending on the release.

> **i** Note
>
> - Running the report is optional.
> - The report is called `RSGENINVLAS` until SAP Basis 7.02 SP08. As of SAP Basis 7.02 SP09, the name of the report is `RSGENINVLASM`.
> - The report regenerates invalidated loads only, not new loads. Use `SGEN` in this case.

7.18 Performing Follow-Up Activities for Application Link Enabling (ALE)

Context

If you are using Application Link Enabling Shared Master Data Management, you need to migrate the change pointers to the new table BDCP2 after the update. Until you have migrated all change pointers, both the former and the new table are used. For performance reasons, migrate the change pointers as soon as possible after the update.

Procedure

1. To check which message types are affected and how many change pointers need to be migrated, run report RBDCPMIG_ALL_WITHOUT_MIG_FLAG in test mode.
2. Decide if you want to run the report for all message types at once or separately.

   Running the report for each message type separately splits up the total runtime into smaller sections.
3. Run report RBDCPMIG_ALL_WITHOUT_MIG_FLAG in production mode.

> **→** Recommendation
>
> If you directly access tables BDCP, BDCPS and BDCPV from your own programs, you need to adjust the source code. We recommend that you do not directly access the SAP tables, but use the interfaces provided for this purpose instead.
>
> When you use change pointers, use the following function modules:
>
> - For generation
>   - CHANGE_POINTERS_CREATE

    - CHANGE_POINTERS_CREATE_DIRECT
    - CHANGE_POINTERS_CREATE_LONG
- For reading
    - CHANGE_POINTERS_READ
- For changing the status
    - CHANGE_POINTERS_STATUS_WRITE
- For deletion
    - CHANGE_POINTERS_DELETE

7.19 Upgrading Additional Application Server Instances

If you opt for updating additional application server instances during the update, some manual actions are required.

Prerequisites

- You perform a release upgrade.
- You have selected the option *Update Dialog Instances* during phase `INITSUBST`.
- The Software Update Manager has changed the kernel directory layout to a platform-dependent kernel structure during phase `KX_SWITCH`.

Context

If the preceding prerequisites are met, some manual actions are required to make a start of productive additional application server instances on remote hosts possible.

Procedure

Re-create the symbolic links for `DIR_CT_RUN` and adapt the profile parameter `DIR_CT_RUN` accordingly.

As a reference, you can check the settings of the primary application server instance.

7.20 Checking for Indexes Unknown to the SAP System

Context

> **i** Note
>
> This section is relevant if you perform an SPS update.

Procedure

1. Call transaction DB02.
2. Choose *Missing Tables/Indexes*.
3. Choose *Unknown objects in ABAP Dictionary*.
4. Check if there are indexes in the database that are unknown to the SAP System. If this is the case, delete them manually.

   For more information, see SAP Note 1227270.

7.21 Oracle: Deleting Tablespaces

Use

Release upgrade only: After the upgrade, several tablespaces are empty and are no longer used. You can delete these tablespaces. This applies to the following tablespaces in a System Switch Upgrade (`<source release>` is the source release for the current upgrade):

SPS update: After the update, several tablespaces are empty and are no longer used. You can delete these tablespaces. This applies to the following tablespaces (`<source release>` is the release of your system before the update)

For a system with old tablespace layout (non-MCOD system):

- `PSAPES<source release>D`
- `PSAPES<source release>I`
- `PSAPEL<source release>D`
- `PSAPEL<source release>I`

For a system with new tablespace layout (MCOD layout):

`PSAP<SCHEMA-ID><source release>`

> **i** Note
>
> Release upgrade only and updates involving a shadow instance: If the source release is the same as the target release, the Software Update Manager cannot use the normal naming conventions. To distinguish

the old tablespace from the new tablespace, Software Update Manager adds an X to the name of the new tablespace: PSAPES<source/target release>DX. You can delete the older, empty tablespace..

SPS update: The source release relates to the SAP Basis release of your system. If this release does not change during the update, the Software Update Manager cannot use the normal naming conventions. To distinguish the old tablespace from the new tablespace, the Software Update Manager adds an X to the name of the new tablespace: PSAPES<source/target release>DX. In this case, you can delete the old tablespace PSAPES<source/target release>D.

To delete tablespaces, use the program BRSPACE. This program checks whether the following prerequisites are met:

- The tablespace is empty.
- The space has actually been released.
  You may be asked whether you want to wait until Oracle releases the files.

Procedure

1. Start the program BRSPACE at the operating system level as user ora<sid> with the following command:
   ```
   brspace -f tsdrop
   ```
2. Choose *Drop tablespace*.
3. Select the tablespace you want to delete.
4. Choose *Continue* to drop the tablespace.
   If the tablespace is empty, BRSPACE executes the drop command on the database and deletes the data files at the operating system level.

7.22 Importing Support Packages After the Update

To make sure that your SAP ABAP software is running smoothly, we recommend that you import new Support Packages into your system as soon as they become available. This also applies after the upgrade, to avoid potential problems in your system before they occur.

If you have not included all the necessary Support Packages in the update, you can still import them after the update.

7.23 Transport Management System: Distributing the Configuration

After an update, you have to distribute the information about the new release to all systems in the transport domain.

Procedure

1. Log on to the system that is configured as the domain controller.
2. Call transaction `STMS` and choose *Overview* > *Systems*.
3. Select the system that has been updated and choose *SAP System* > *Update Configuration*.
4. Choose *Extras* > *Distribute and Activate Configuration*.

7.24 Performing Follow-Up Activities for the Language Transport

Prerequisites

- You have imported a language during the update.
- You are using a glossary or terminology in your system.

Context

To reduce downtime during the update, some data from the *Languages* archive was only imported into container tables, and has not yet been imported into the actual database tables of the system. This data includes glossary and terminology data. If you want to use a glossary or terminology in your system, use the following procedure to copy the data from the container tables to the database tables.

Procedure

Call transaction `SMLT`.

The transaction automatically recognizes that follow-up activities are necessary, and schedules a background job for this purpose.

> ⚠ Caution
>
> For languages that have been supplemented before or imported during the update, you have to perform the supplementation after the update with transaction SMLT.

For more information about language supplementation, see SAP Note 1156507.

7.25 Saving Files for Subsequent Updates

Prerequisites

You are planning a subsequent update with the same environment and, in the case of a release upgrade, with the same scenario strategy.

Context

In phase SAVEPRO, several update files are saved in subdirectory save of the abap subdirectory of the update directory. If you perform a subsequent update with the same environment and, in the case of a release upgrade, with the same scenario strategy, you can reuse these files.

Procedure

1. After the update, make a backup of subdirectory save of the abap subdirectory of the current update directory.
2. When you start with the new update, copy the save subdirectory to the new update directory.

   > i Note
   >
   > **Release upgrade only:** You can copy the subdirectory as soon as you have created the new SUM directory. The new SUM directory has to be empty.

   The following files are saved in the directory and can be used in a subsequent update:

   - Shadow system profile
     In the preparation phase SHDINST_CPY, you can reuse the shadow system profiles.

7.26 Deleting Log Files

For security, data protection, and privacy-related reasons, we recommend that you delete the log files as soon as you no longer need them.

Context

For technical reasons, the Software Update Manager writes various log files. Among other things, these log files contain IDs of users such as `<SID>ADM`, `DDIC`, or `SYSTEM`.

In order to comply with data protection, privacy and security requirements, we strongly recommend that you delete these log files as soon as you no longer need them.

Procedure

Remove the log files from the SUM Directory [page 53] and its subdirectories on the host where the Software Update Manager has initially been started.

A Appendix

A.1 Using the SUM Analysis Feature

This section covers the overview report that contains detailed information about the update process.

Context

With the intent to increase transparency, supportability, and predictability of software maintenance operations, SUM accumulates comprehensive update data during the tool run. The data can be displayed in a special report named *SUM Analysis*, and it is arranged in, but not limited to, the following categories:

- Information about the stack configuration file (`stack.xml`) and archives in the download directory. An additional window opens where several options are offered. For more information, see
- Software component versions and product structure changes
- Important parameter settings, process steps including descriptions of the manual steps and links to relevant SAP Notes
- Statistics about performance and downtime

The *SUM Analysis* report reflects the content of the `upgana.xml` file, which is stored in subdirectory `<SUM directory>/abap/doc/analysis` . The report generated upon successful execution additionally contains the time statistics of the performed update, for example, the calculated `SUM technical downtime` value.

> **i** Note
>
> Note that at the beginning of the procedure no data can be displayed because the file `upgana.xml` has not yet been generated by the Software Update Manager. A data display is possible at a later point in time, after the first phases have been processed.

In addition to the *SUM Analysis* report, SAP offers the app *Technical Downtime Optimization*. It can display a visual analysis and evaluation of the system maintenance procedure using SUM. The application is furthermore able to simulate and estimate the potential downtime savings for nZDM, downtime-optimized DMO, downtime-optimized conversion, and ZDO. In this way, it can help you to optimize the next SUM run to achieve minimum downtime and smooth system maintenance.

For more information about this app, see SAP Note 2881515 and the SAP Community blog Downtime Optimization - Get insights using the new TDO app.

Procedure

1. From the SUM UI: Menu Bar [page 34], open the *More* menu and choose *Utilities*.

A second web browser window with the SUM Utilities (Extended UI) [page 42] opens in which several options are offered.

2. Choose *SUM Analysis*.

A.2 Troubleshooting

This chapter contains information about how to proceed when you want to correct known problems that have occurred during the update.

> **i Note**
>
> In the following, some information is related to steps. As long as the Software Update Manager is running, the step name is displayed on the program tool tab page.
>
> If the Software Update Manager displays a dialog box and you need further information about the required input, you can identify the step you are currently in by using the `SAPupConsole.log`.
>
> This log file is located in directory `<update directory>/abap/log`.

- SUM user interface
  - SUM UI: Known Issues [page 215]
  - Solving Problems with the SUM User Interface [page 216]
- Logs
  - Update Logs [page 216]
  - Evaluating the ELG Log Files [page 220]
- Correcting errors in steps
  - Accelerating the Runtime of Certain Phases [page 221]
  - Correcting Errors in the XPRAS Phase [page 223]
  - Correcting Errors in the DBCHK Phase [page 225]
  - Correcting Errors in the BATCHCHK Phase [page 226]
  - Correcting Errors in the INTCHK and INTCHK_SW Phases [page 227]
  - SPS update: Errors in the DBCLONE Phase [page 227]
  - Errors in the PARMVNT_APPL_VIEWS or PARDIST_ORIG Phase [page 228]
  - Correcting Errors in the JOB Phases [page 229]
  - Cleaning Up Terminated Conversions in the DB Conversion Phases [page 230]
  - Correcting Errors in the TRBATCHK_XT Phase [page 232]
  - Correcting Errors in the ACT_UPG Phase [page 233]
  - Correcting Conversion Errors in the PARCONV Phase [page 234]
  - Correcting Errors in the VALCHK_INI Phase [page 235]
- General problems
  - Error Handling for ABAP [page 235]
  - Correcting Problems when Processing ABAP Steps [page 238]
  - Switch of SAP Programs During the Update [page 239]

- Providing Information to SAP Support [page 239]
- Starting and Stopping the Shadow Instance Manually [page 241]
- Mitigating Issues with the Toolimport [page 241]
- Error Handling for the Replication Process Monitor [page 242]

In addition to the problems listed here, also read the SAP Notes that are relevant to this update.

A.2.1 SUM UI: Known Issues

This part of the document contains additional information about how to proceed when you want to correct known problems that have occurred during the update.

Known Issues with the SUM UI

Symptom	Solution
The error message `sumabap [id=...] terminated with errors : 127 (null)` is displayed after entering the URL in the web browser.	For user `<sid>adm` and group `sapsys`, correct the permissions of the following files and directories: • `<SUM_DIR>/abap` and all subdirectories • `/tmp/.saphostagent__lmsl`
Texts on the user interface are not displayed correctly.	Use the latest version of the Software Update Manager.
After having entered the URL in the web browser and the user name and password (see Starting or Restarting the Software Update Manager [page 121]), you see the error message: `This page can't be displayed`.	1. Make sure that the complete path to the SUM directory does not exceed 25 characters. 2. Make sure that the latest SAP Host Agent version is installed.
You keep getting the error message: `Conflict with another Client`:	• Check if a concurrent user is working in parallel in another browser session with the same SUM tool for the same SAP system. • Make sure that your browser accepts cookies and that they can be read and saved. SUM stores session information in browser cookies. This is necessary for a proper communication between back-end and user interface.

A.2.2 Solving Problems with the SUM User Interface

This section is relevant, if you have problems with the SUM User Interface.

Context

You have several options that might help to solve a problem with SUM User Interface (SUM UI), for example, when an error or a system failure occurred. Note that the following procedure does not represent a sequence that you have to follow step by step, but it has to be read in this way: If the restart of the UI does not work, try step 2. If the restart of the SAP Host Agent does not lead to any success, try step 3, and so on.

Procedure

1. Restart the SUM UI as described in Starting or Restarting the Software Update Manager [page 121].
2. Restart the SAP Host Agent using the following command:

   ```
   <HOSTAGENT directory>/exe/saphostexec -restart
   ```
3. Install the latest SAP Host Agent version.
4. Cancel the running `SAPup` processes that were started by the SUM UI. These processes are started again automatically as soon as you start the SUM UI again in the web browser.
5. To prevent that browser plug-ins and settings interfere with the SUM UI, enter the URL in a new browser window in *Private Browsing* mode of Microsoft Internet Explorer, Microsoft Edge, or Mozilla Firefox, or the *Incognito mode* of Google Chrome.
6. If the problems persist, report an incident on component BC-UPG-TLS-TLA.

A.2.3 Update Logs

The Software Update Manager logs all actions in log files to monitor the update. You can access the log files using the *Log* option on the user interface. Unless otherwise specified below, the log files are stored in the `log` subdirectory of the `abap` subdirectory of the `SUM` directory. If you encounter any errors, you can analyze them to help you find a solution.

SAPup.log

The Software Update Manager records all actions on the ABAP system in the log file `SAPup.log`. These log files provide you with a general overview of the status of the update. They contain information about all phases performed up to this point, the number of reruns, runtimes, final status, and so on. `SAPup.log` is updated by the Software Update Manager only.

Log Files Written by tp

SLOG<Rel>

The ABAP program `tp` lists all its steps in log file `SLOG<rel>`. It also writes additional detailed logs for each step.

A simple method of monitoring the progress of all `tp`-driven phases is to use **`tail`** to monitor the `SLOG` log. To do this, open another terminal window and enter the following command:

```
tail -f <update directory>/abap/log/SLOG<rel>
```

Each `tp`-driven phase is divided up into a number of different steps whose start and end times are noted in the `SLOG` log. The start and end of a phase are indicated by the lines `START put` and `STOP put`. The section in the `SLOG` log relating to the `ACT_UPG` phase looks like this:

Section of SLOG Log Relating to the ACT_<Rel> Phase

START	put	PS1		200103071824 23	ps1adm	ds0007
INFO: event SAP_IMPORT_START triggered successfully						
START	SET STOPMARK	PS1		200103071824 23	ps1adm	ds0007
INFO: Buffer saved as /usr/sap/<sid>/upg_ps1/buffer/PS1SAV.						
STOP	SET STOPMARK	PS1		200103071824 23	ps1adm	ds0007
LIST	put	PS1	(3{3|			
START	tplock_eu	PS1	(	200103071824 23	ps1adm	ds0007
STOP	tplock_eu	PS1	(	200103071824 23	ps1adm	ds0007
START	tpsapstart	PS1	3	200103071824 23	ps1adm	ds0007
STOP	tpsapstart	PS1	3	200103071824 23	ps1adm	ds0007
START	locksysX	PS1	{	200103071824 23	ps1adm	ds0007
STOP	locksysX	PS1	{	200103071824 23	ps1adm	ds0007
START	tpsapstart	PS1	3	200103071824 23	ps1adm	ds0007

```
STOP          tpsapstart    PS1          3            200103071824  ps1adm        ds0007
                                                      23
START         locksys       PS1          |            200103071824  ps1adm        ds0007
                                                      23
STOP          locksys       PS1          |            200103071824  ps1adm        ds0007
                                                      23
INFO: event SAP_IMPORT_STOP triggered successfully
STOP          put           PS1          0008         200103071824  ps1adm        ds0007
                                                      23
```

ALOG<Rel>

This file is also written by `tp`. It provides information about which actions were started by `tp`. For information about these actions, see section *Transport Phase Log Files* below.

ULOG<YY_Q>

In `ULOG<YY_Q>`, “YY” is the year, and “Q” is the quarter.

This file contains all `tp` calls, including the relevant call parameters, which have been executed by the Software Update Manager during the update.

Transport Phase Log Files

Additional detailed logs are also written for most steps in the ABAP system. These are in subdirectory `tmp` of the `abap` subdirectory of the update directory, where you can also monitor them with **`tail -f`**. After the various steps of the phase have been completed, `tp` moves the individual logs to subdirectory `log` of the `abap` subdirectory of the update directory.

The names of transport phase logs have to follow the naming convention `SAP<T><ID>.<SID>`, where `<T>` is the transport step, `<ID>` is any six (or sixteen) character string, and `<SID>` is the name of your SAP system.

You can determine the relevant transport request from the name of the log file by replacing the transport step `<T>` with a **`K`**, omitting `<SID>` and the preceding period. For example, `SAP<T><ID>.<SID>` corresponds to `SAPK<ID>`.

The table below lists the most important steps together with their log names, and specifies which programs execute the steps:

Log Files of Most Important Steps

Step	Log Name	Program Executing the Step
SHADOW_IMPORT	`SAPK??????.<SID>`	`R3trans`
DD IMPORT (H)	`SAPH??????.<SID>`	`R3trans`

Step	Log Name	Program Executing the Step
DD ACTIVATION (A)	SAPA??????.<SID>	ABAP program (RDDMASGL)
DISTRIBUTION OF DD OBJECTS (S)	DS<DATE>.<SID>	ABAP program (RDDDIS0L)
TBATG CONVERSION OF DD OBJECTS (N)	N<DATE>.<SID>	ABAP program (RDDGEN0L)
tpmvntabs	P<DATE>.<SID> PA<DATE>.<SID> PD<DATE>.<SID> PL<DATE>.<SID>	tp
MAIN IMPORT (I)	SAPI??????.<SID>	R3trans
tpmvkernel (c)	C<DATE>.<SID>	tp
TBATG CONVERSION OF MC OBJECTS (N)	N<DATE>.<SID>	ABAP program (RDDGEN0L)
IMPORT OF SELFDEFINED OBJECTS (N)	SAPD??????.<SID>	ABAP program (RDDIC1L)
VERSION UPDATE (V)	SAPV??????.<SID>	ABAP program (RDDVERSL)
EXECUTION OF REPORTS AFTER PUT (R)	SAPR??????.<SID>	ABAP program (RDDEXECL)

Once the logs are located in subdirectory `log` of the `abap` subdirectory of the update directory, you can also display them in the SAP system.

You can do this by executing program RDDPROTT with transaction SE38. RDDPROTT displays all the logs for a specific transport request. In the *Transport Request* field, enter the name of the transport request (for example, SAPK<rel>D01) and then choose *Execute*.

A brief overview of all the logs existing for this transport request appears. Double-click a line to display a log for this step. The logs are broken down into several levels. Level 1 only displays the return code for the step. Check at least level 2 to display any error messages. Double-click an error to see its long text.

After completing each `tp`-driven phase, the Software Update Manager creates a summary of all individual logs in this phase.

The names of the summaries usually comprise the phase name (without underscores) and the extension `.ELG` (for example, DDIC<rel>.ELG). The summary contains the names of the individual logs, any errors that occurred and the return codes. If no errors have occurred, you need to check these summaries only.

A.2.4 Evaluating the ELG Log Files

Context

The `<PHASE>.ELG` log files are summary log files that contain a list of all the errors that occurred during a specific phase of the update. From these files, you can call up detailed log files that contain more information. When errors are detected during a phase, a message appears and prompts you to repeat that phase. First check the `<PHASE>.ELG` log to find out why the step terminated. In some cases, you can choose *ignore* in the Software Update Manager to continue with the update and avoid repeating the failed phase. You always remove the cause of the error. When you choose *ignore*, the Software Update Manager prompts you to enter a password if the errors are serious. In this case, you have to get approval from SAP Support to ignore the error. Remove all errors to avoid the risk of follow-on errors. If you are not sure how to proceed, contact SAP Support.

Procedure

1. Analyze the errors using the detailed log file if necessary. The name of this log is listed in the header of each phase step.
   - No errors have occurred if a return code **less than 8** appears in the log at the end of a step, and no error messages appear for that step.
   - A return code of **8** indicates that some individual objects were not or not completely processed.
   - If a return code is greater than or equal to **12**, then `tp` or a program called by `tp` has terminated.
2. Determine when the program terminated from the last two lines of the `SLOG` log. If `tp` or `R3trans` have terminated, analyze the last log that was written.
3. If a background step in the SAP system terminates, you have to analyze the job log in the SAP system to determine the cause of the error.
   a. Log on as user `DDIC` and call transaction SM37. Enter the job name as the name of the report that usually processes the terminated step (RDDMASGL for DD ACTIVATION, for example).

      Make sure that the date on the SM37 input screen is correct and that an asterisk (*) appears in the *or after event* field. The job overview normally displays one canceled job and one background job that completed normally.
   b. Double-click the canceled job to display the job log.
   c. Double-click the error line to display the long text for the error.
   d. Correct the error.

      > **i Note**
      >
      > If you use a user ID other than `DDIC` to log on to the SAP system and correct the error, the SAP system may prevent you from logging on.
      >
      > In this case, proceed as follows:
      >
      > 1. To unlock the SAP system, enter the following commands. The system may be either the original SAP system or the shadow system, depending on which one the error occurred.
      >   - Original SAP system
      >
      >      ```
      >      cd <update directory>/abap/bin
      >      ./SAPup unlocksys
      >      ```

- Shadow system
  ```
  cd <update directory>/abap/bin
  SAPup unlockshd
  ```

2. Log on to the SAP system or shadow system and correct the error.
3. To lock the original SAP system or shadow system again, enter the following commands:
   - Original SAP system
     ```
     cd /<update directory>/abap/bin
     ./SAPup locksys
     ```
   - Shadow system
     ```
     cd /<update directory>/abap/bin
     SAPup lockshd
     ```
4. Once you have found and corrected the error, repeat the phase by selecting *repeat* in the Software Update Manager.

   The repeated phase is completed quickly, since the transport control program `tp` automatically starts from the point at which it terminated.

A.2.5 Accelerating the Runtime of Certain Phases

Phases Running ABAP Programs

These phases use the SAP system to operate. If you improve the performance of the SAP system, this can speed up these phases.

Phases TABSPC_PREP and CNV_LIST

You experience excessive run times for the preparation phases `TABSPC_PREP` and `CNV_LIST`. Although you have applied the actions recommended in SAP Note 871455, the runtimes of the phases have not decreased considerably.

> ⚠ Caution
>
> This procedure is only a temporary workaround and needs to be reset after the phases have run.

Proceed as described in SAP Note 762426.

Phase RUN_RDDIT006

> i Note
>
> This is only relevant if you perform a release upgrade.

This phase analyzes the SAP system to find objects modified by the customer and customer objects. Therefore, the runtime of phase `RUN_RDDIT006` is longer for SAP systems with many modifications or customer objects. Since this phase starts an ABAP program, you can use the respective ABAP transactions to analyze the performance of this phase.

DIFFEXP Phases

> **i** Note
>
> This is only relevant if you perform a release upgrade.

Since these phases perform copy-to-shadow actions or export the transport requests generated during phase `RDDIT006`, they take longer for SAP systems with many modifications or customer objects.

SHADOW_IMPORT Phases

Release upgrade only:

These phases import the upgrade data into Customizing tables, as well as the transport requests of add-ons, support packages, and languages. During this phase, only the part for the shadow system is imported. The remaining parts are imported during the `TABIM_UPG` phase. These phases take longer for upgrades where many add-ons and support packages have been included in the upgrade or where many languages have to be imported. The duration of the import also depends on the number of clients in the system.

If you chose the scenario strategy *Standard* or *Downtime-optimized*, it uses the number of parallel background processes that you have entered during phase `INITSUBST`.

SPS update only:

These phases take longer if you have included many support packages.

Phase PARCONV_UPG

In this phase, tables are converted to the target release structure. The `PARCONV_UPG` phase uses the number of parallel background processes you specified and three `tp` processes.

The runtime of this phase can be longer for the following reasons:

- Very large tables have to be converted. The tables that are converted are listed in the analysis file, which also displays the conversion time for each table.
- If tables get a new index on the target release or an index needs to be regenerated, these tables are listed in the analysis file under DDLs. The time needed to create the index depends on the size of the table.
- In case of other DDL statements, the runtime of `ALTER TABLE` or `ADD FIELD` statements with fields that contain default values depends on the size of the table.

A.2.6 Correcting Errors in the XPRAS Phase

Context

If errors occur in the `XPRAS_AIMMRG` phase during the execution of XPRA reports, the Software Update Manager stops and refers to the `XPRASUPG.ELG` log, which contains error messages with the following header:

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

XPRA ERRORS and RETURN CODE in <file name>

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

If this header is followed by lines other than the return code, then errors have occurred while the reports were being executed. In addition to the actual error lines, a separate line indicates the names of the reports that generated the preceding error messages.

You can display a detailed help text for each of these error messages in the SAP system. These texts usually contain all the information you need to correct the error.

Procedure

- Find help texts for error messages
  a. Search the `XPRASUPG.ELG` log to find the file name specified in the header.

     > **i Note**
     >
     > The file name that appears in the header of `XPRASUPG.ELG` is important for finding the help text. The file name always has the following format:
     >
     > `SAPR<target_release>XPRA9<ID>.<SID>` (where <ID> is a seven-digit number)
     >
     > The name of the relevant transport request can be derived from the two names. Replace the `R` with a `K` and delete the period and all characters that follow it. You have now `SAPK<ID>` as the name of the transport request.

  b. Log on to the SAP system.
  c. Call transaction `SE09`.
  d. Choose *Request/task* > *Display individually* and enter the name of the transport request `SAPK<ID>`.
  e. Choose *Goto* > *Transport logs* to display the individual transport logs.
  f. Double-click the line *Exec after put* to navigate to the log display for this step. You can expand the log to view it in more detail. The error messages are visible as of the second level.
  g. Position the cursor on the error message and choose *Long text* to display a help text.
- Correct Errors
  a. Follow the instructions in the help text to correct the error.

     If you are asked to implement an SAP Note, proceed as follows:

     1. Enter the following commands to unlock the SAP system:
        ```
        cd <update directory>/abap/bin
        ```

```
./SAPup unlocksys
```

2. Log on to the system with a user other than `DDIC` and implement the SAP Note using the SAP Note Assistant (transaction `SNOTE`).
3. Lock the SAP system using the following command:
```
cd <update directory>/abap/bin
./SAPup locksys
```

b. After you have corrected all the errors, repeat the `XPRAS` phase.

c. Read the documentation of the report in question if you need more information, or if the report still results in errors when you repeat the `XPRAS_AIMMRG` phase. To access this information, log on to the SAP system. Call transaction `SE38` and display the documentation for the report that is named in the error log.

d. Optionally, you can choose *Accept errors and repeat phase XPRAS_AIMMRG*.

The Software Update Manager repeats the phase and accepts all error messages with the return code `8`. The errors have to be removed **after** the update.

You require a password for *ignore all errors*. The Software Update Manager then continues with the next phase, without executing the following XPRAs. Before you can choose *ignore*, you should have the approval from the SAP Support.

- Correct errors after the update

  If possible, correct errors immediately. However, you can correct some errors that occur during the execution of XPRA reports after you have completed the update.

  This option makes sense, for example, when special measures in the SAP application areas are necessary to correct the errors, and the corresponding specialists are not available right now. To do this, you have to suppress the execution of the corresponding report before you repeat the update phase.

  After the update, correct the error and run the report manually using transaction `SE38`.

  For technical instructions on skipping an XPRA report, see SAP Note 122597.

  > ⚠ Caution
  >
  > Skip an XPRA report only if you are sure that you can execute it later (for example, if an SAP Note tells you that this is allowed).
  >
  > If you cannot execute an XPRA report later, and you still want to skip it, contact the SAP Support.

- Consider special error situations
  - The error `"Name xyz has already been used". e065(fdt_core)` occurs in method `FDT_AFTER_IMPORT`.
    To solve the problem, proceed as follows:
    1. Continue the update with option *Accept errors and repeat phase XPRAS_AIMMRG*.
    2. Apply SAP Note 1301695.
    3. Restart the after-import processing for method `FDT_AFTER_IMPORT` using report `FDT_TRANS_Q_RESTART` for S tables, T tables, and C tables.
  - The following short dumps occur:
    - `Runtime Errors COMPUTE_INT_PLUS_OVERFLOW`
    - `Exception CX_SY_ARITHMETIC_OVERFLOW`
    - `Date and Time [...]`

Check whether the short dump is the same as described in SAP Note 1243486. If so, proceed as described there. Otherwise, contact the SAP Support.

- Error messages appear in log files
  - XPRAs are application reports that run at the end of an upgrade. Most XPRA reports have a report documentation that explains what the report does and how errors can be corrected. Call transaction SE38 in the SAP system, enter the report name, choose *Documentation*, and click *Display*. The names of the erroneous XPRAs are mentioned in the log file in messages of type PU132.
  - After-import methods are functions that are executed when a certain object type is part of the update. The name of the erroneous after-import method is mentioned in the log file in messages of type *PU133*. The corresponding component is mentioned in messages of type PU137.
  - In some cases, a hard error occurs that leads to abortion of the batch Job. In these cases, no error logs are written.

A.2.7 Correcting Errors in the DBCHK Phase

Context

The DBCHK phase determines the database version and the release of the SAP system. For this, the Software Update Manager runs the transport control program `tp`, which logs on to the database and reads the necessary information from there. Usually, problems in this phase are caused by a failed database connection, and the system displays the error message `No information received from the database`.

Procedure

1. Check the `SLOG<rel>` file in directory *<SUM directory>* > *abap* > *log*.

   Usually, problems with `tp` are caused by a non-initialized Transport Organizer.
2. Call transaction STMS from the Transport Management System (TMS) to initialize the Change and Transport System.

   For more information, see the TMS online documentation.

To display the documentation, choose *Information* in transaction `STMS`. Or go to the SAP Help Portal and follow the path according to your source release:

SAP Help Portal Paths

Release	Path in SAP Help Portal
• SAP NetWeaver 7.3 • SAP NetWeaver 7.3 incl. EHP 1 • SAP NetWeaver 7.4 • SAP NetWeaver 7.5 • SAP NetWeaver AS for ABAP 7.51 innovation package • SAP NetWeaver AS for ABAP 7.52	*Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Solution Life Cycle Management* > *Software Logistics* > *Change and Transport System* > *Transport Management System (BC-CTS-TMS)*
SAP NetWeaver 7.0 and EHPs up to 3	*Application Help* > *SAP NetWeaver by Key Capability* > *Solution Life Cycle Management by Key Capability* > *Software Life Cycle Management* > *Software Logistics* > *Change and Transport System* > *Transport Management System (BC-CTS-TMS)*

A.2.8 Correcting Errors in the BATCHCHK Phase

Context

This phase tests whether the background server can access the update directory. To do this, the background job RDDIT008 is started on the specified background server. This job writes a test log in subdirectory `tmp` of the `abap` subdirectory of the update directory.

Procedure

1. If errors occur, call transaction SM37 to check whether the background job has run.
   - If the background job cannot be started, this is generally due to a problem with the name of the background server.
     1. Check whether the host specified in phase `INITPUT` is included in the list with a running background service.
        To do this, perform a test call of function module TH_SERVER_LIST in transaction SE37. To display the list, double-click the table parameter *LIST* after executing the function module.
     2. Depending on the problem, you either have to change the network configuration or change the entries made in the `INITPUT` phase.

> **Note**
>
> If you have a setup where in `TH_SERVER_LIST` the entries in the columns *NAME* and *HOST* point to different host names, background jobs cannot be started correctly. To solve this problem, add the batch host information to the file `ConfigInput.xml`. Example:
>
> ```
> <InputCatalog>
> <Property key="BatchHost" value="MyBatchHost"/>
> </InputCatalog>
> ```

- If the job terminates, call transaction SM21 to check the system log of the SAP system.
- If the job is successful, but the Software Update Manager cannot find the log, make sure of the following:
  1. The file system of the update directory has to be mounted on the background server.
  2. The value of the SAP profile parameter `DIR_PUT` has to match the current update directory.

2. To repeat the phase, choose *repeat*.

A.2.9 Correcting Errors in the INTCHK and INTCHK_SW Phases

Context

These phases check whether the inactive nametab is empty. If not, an error occurs.

Procedure

1. To find the affected objects, analyze the `DDXTTCHK.LOG` file.
2. Activate these objects using transaction `SE11`.

   The inactive nametab is then empty.
3. Continue the update with *repeat*.

A.2.10 Errors in the DBCLONE Phase

This section deals with the handling of errors in the `DBCLONE` phase.

> **Note**
>
> This section is relevant if you perform an SPS update.

In the `DBCLONE` phase, the Software Update Manager starts a number of background jobs to create copies of the tables required for operating the shadow system. Depending on your system and your hardware,

this operation can take several hours. These background jobs are executed on the background server that is configured with the `BATCH HOST` parameter. The number of jobs is determined by the parameter `MAX BATCH PROCESSES`. It cannot be higher than nine or the number of background processes configured on the background server.

Each table is copied with a single `INSERT` statement. Therefore, the administrator has to take care that the undo-logs can grow accordingly.

Each cloning job writes a log file called `DBCLONE<NUMBER>.<SID>`. At the end of the phase, all errors found in these log files are collected in the `DBCLONE.ELG` file. The information in the `DBCLONE.ELG` file is rather sparse. Therefore, you also have to check the corresponding log files to find detailed information about the error.

A.2.11 Errors in the PARMVNT_APPL_VIEWS or PARDIST_ORIG Phase

This section deals with errors in the phases `PARMVNT_APPL_VIEWS` or `PARDIST_ORIG` during the handling of views and its dependencies.

The phases handle views and its dependencies. To process all dependent views in the correct order, the Software Update Manager distributes dependent views into different groups. As a consequence, all views within one group can be handled in parallel, while multiple groups are processed sequentially according to the dependencies.

If an activation error occurs during the handling of one group, the Software Update Manager stops the update procedure and thus also the processing of the other groups. You can now choose *Accept errors and repeat <phase name>* to continue the processing of the next group.

In this case, the Software Update Manager creates the log file `HANDLE_DEPENDENT_VIEWS.LOG` and writes corresponding P-messages that are then be displayed in phase `CHK_POSTUP`. (See also *Solution of P-Errors (Phase CHK_POSTUP)* in Important Entries for the Postprocessing Roadmap Step [page 183].

As the option *Accept errors and repeat <phase name>* only affects the handling of one group, you can select this option several times when you have multiple activation errors in different groups.

A.2.12 RFC Error in the PROFREAD Phase on Systems with SNC

This section deals with RFC errors in phase `PROFREAD` on an SAP ABAP system with Secure Network Communications (SNC) and Single Sign-On (SSO).

You have set up and configured your SAP ABAP system for use with SNC and SSO and want to run the Software Update Manager on this system. In this case, the executable SAPup must be set up and configured as an external RFC client with its own SNC credentials so that the Software Update Manager can connect to this system.

If you get an error in phase `PROFREAD` after entering the DDIC password, check the configuration for the SAPup executable if secure authentication for user DDIC is possible instead of using the traditional user ID and password-based authentication.

For more information, see Configuring SAPup for SAP ABAP System with SNC [page 250].

A.2.13 Correcting Errors in the JOB Phases

Context

A `JOB` phase starts a background job in the SAP system and waits for it to be completed. If problems occur during the execution of the background job, you receive an error message.

> **i** Note
>
> The naming convention for the `JOB` phases is `JOB_<name>` or `RUN_<name>`, where `<name>` is the name of the job or report.

Procedure

1. Log on to the SAP system as user `DDIC`.
2. Call transaction SM37 and restrict the start time and start date of the background job as much as possible.
   - If no background job was started, this is generally due to a syntax error in the calling program. If there is no SAP Note explaining this error, contact SAP Support.
   - If the background job was started, there are two possible situations:
     - The job was terminated.
       Check whether the error can be reproduced by selecting *repeat* in the Software Update Manager. If the error occurs again, contact SAP Support. In this case, proceed as described in Providing Information to SAP Support [page 239].
     - The job was completed, but with error messages.
       In certain situations, you can ignore these error messages. In this case the Software Update Manager does not require a password if you choose *ignore*. If you are not sure how to proceed, contact SAP Support.

A.2.14 Cleaning up Terminated Database Conversions

This topic deals with cleaning up terminated conversions in the database conversion phases.

Context

The Software Update Manager indicates terminated conversions with the following error messages:

- `WARNING: The following restart logs of database conversions were found`
- `WARNING: The following unprocessed database conversion requests were found`

The messages are followed by a list with the corresponding entries. These errors can occur in one of the phases

`CNV_CHK_GEN`
`CNV_CHK_IMP`
`CNV_CHK_XT`

> **i** Note
>
> If both messages appear, process the found terminated conversions due to restart logs of database conversions first.

Procedure

Cleaning up Terminated Conversions When Restart Logs of Database Conversions Were Found

1. Call transaction `SE14` (Database Utility) to determine the terminated conversions.
2. Choose *DB Requests* > *Terminated*.
3. If terminated conversions are found, double-click a table name for more details.
4. Check the meaning and status of the table.
   a. Find out whether the table is still needed. Sometimes the tables are test tables that are no longer needed. For SAP tables, contact SAP Support, which can assess if an SAP table is still needed.
   b. Ask the last person who changed the table, or the table owner, to find out its status.

      If the table is no longer needed, choose *Unlock table* in the detailed display. This prevents the conversion from being continued automatically. The table itself does not return to a consistent state. Any data that is still in the temporary table is lost during the next conversion. In some cases, however, the table was already corrected without the reset log being deleted. The function *Unlock table* is harmless in this case.
   c. You can determine the state of the table with *Check* > *Database object and Check* > *Runtime object*.
   d. Check if the table contains the data you expect.

      You can do this with transaction `SE16` (Data Browser), for example. If the data does not exist, it could still be in the temporary table. Contact your SAP consultant or SAP Support for help with saving this data.

5. Determine the cause of the error.

   If you find out that the table is still needed, choose *Object log*. Look for error messages that explain why the conversions were terminated. You could encounter the following problems here:

   - You cannot find a log because it was deleted at some time in the past. Continue with step 6 (continue the conversion to the end).
   - The log does not contain an error message, but ends abruptly. This indicates that the conversion was stopped by an external event. Call transaction SM21 to read the system log and find out the approximate time the conversion was terminated, and to look for the cause of the error.
   - If the log clearly gives a reason for the error, you have to correct it.

6. Continue the conversion to the end.

   In the detailed display, choose *Continue adjustment*. Since you do not know how long this takes, choose processing type *Background*.

   The situation can be as follows:

   - The conversion finished successfully. You can see this because the error message disappears, the *Check* function does not display any further problems, and there is a success message in the object log.
   - The conversion terminates again. A log now exists. Repeat the analysis from step 5 (*Determine the cause of the error*).

   > **i Note**
   >
   > If you still cannot complete the conversion after several attempts, contact an SAP consultant or SAP Support.

Cleaning up Terminated Conversions When Inprocessed Database Conversion Requests Were Found

> **⚠ Caution**
>
> Process the terminated conversions due to unprocessed database conversion requests only after you have processed the terminated conversions due to restart logs of database conversions.

7. Determine the objects that are affected.
   a. Call transaction SE14 (Database Utility) and choose *DB Requests* > *Mass Processing*.
   b. Choose *All requests*.

      The worklist of the conversion program is displayed. This worklist was generated by developments or modifications in your SAP system, but has not yet been processed.

   c. Choose *DB requests* > *Created with import*.

      The worklist, which was not processed correctly during the last update, appears.

8. Check the meaning and status of the requests.

   In contrast to the procedure for the message `The following restart logs of database conversions were found`, this procedure can also include requests for indexes, views, and matchcode objects. The requests that are found are not always terminated. They might not even have been started.

   a. Ask the last person who changed the object if the request should still be processed.
   b. If the user does not want it to be processed, select the request and choose *Delete selected*.

      This removes the objects from the worklist of the conversion program.

Do not remove requests from the last update.

9. Process the unprocessed requests.

   You can select the requests from the list of mass processing requests and schedule a job for execution with the function *Schedule selections*.

   a. In the list of requests created by the import, double-click on an object for a detailed display.
   b. Schedule the request, or continue it. Since you do not know how long this takes, choose processing type *Background*.

A.2.15 Correcting Errors in the TRBATCHK Phases

The `tp` program uses table `TRBAT` to communicate with the SAP ABAP system.

Context

The Software Update Manager checks the table `TRBAT` several times in different roadmap steps, whether it still contains entries. The entries can be the remains of an import or export that either terminated or is still running.

To clean up table `TRBAT`, try the following procedure.

> **i Note**
>
> For more information about the transport control program `tp`, search the SAP Help Portal (https://help.sap.com) for the *Change and Transport System*. Then choose *Transport Tools* > *Transport Control Program tp*.

Procedure

1. Enter the following command:

   ```
   tp getprots <SID>
   ```

   This does not affect any imports or exports that are still running. The `tp` program informs you about possible processing problems in the `SLOG` file in the transport directory of your SAP system.

2. Check the file `SLOG<YY><WW>.<SID>` for recent entries.

   The file is located in the `log` subdirectory of your transport directory. `<YY>` means the year (two digits) and `<WW>` is the calendar week (two digits).

3. Call transaction `SM31` to delete any entries in `TRBAT` that cannot be processed and that are no longer needed.

A.2.16 Correcting Errors in the ACT_UPG Phase

Context

Depending on the results of the `ADJUSTCHK` phase, you may be asked in the `ACT_UPG` phase to adjust your modifications to SAP objects so that they correspond to the latest SAP standard version of the objects. If your SAP system has been modified, error messages with return code 8 might occur during the `ACT_UPG` phase.

The errors are listed in the `ACTUPG.ELG` log file. It shows the same return code for all requests, no matter in which request the errors occurred. Check the error messages in the log file. Errors occurring several times for different objects can have the same cause. In this case, only the object that causes the original error should be corrected and the activation should be restarted. For example, a missing data element leads to error messages for all objects using it.

The shadow instance is automatically unlocked to correct the errors and locked again afterwards.

Procedure

1. Log on to the shadow instance as a user other than `DDIC`.

   If you have not yet created users on the shadow instance, do so now as described in Making Entries for the Preprocessing Roadmap Step [page 166] under *Modification Adjustment and Activation (ACT_UPG)*.
2. Make the required corrections.

   > ⚠ Caution
   >
   > - Use only the maintenance transaction of the ABAP Dictionary (**SE11**) for corrections. Do not try to repair the objects with the *Database Utility* transaction (**SE14**)! It can cause serious inconsistencies.
   > - Do not activate objects manually! The activation does not work yet at this point of time. Use the *Check* functionality to verify your changes.

Results

Once you have corrected all the errors, select *Repeat* to proceed with the update from where it terminated. The phase ACT_UPG continues processing all objects that are not yet processed or that have the status *Error*.

If you cannot correct errors at this point in time, ignore them and proceed. Erroneous objects are then not activated which may lead to errors in later phases.

If you choose *Accept errors and repeat phase*, all error messages with return code 8 are ignored, and the activation of the objects mentioned in the error messages is skipped.

A.2.17 Correcting Conversion Errors in the PARCONV Phase

Context

This procedure enables you to correct problems that occur in the PARCONV_UPG phase. The errors can roughly be divided into two classes:

- Technical problems on the database
  You can recognize these in the system log (transaction SM21), where they are marked with SQL-ERROR followed by an abbreviation with an error number. The problem is often caused by a lack of space.
- Logical errors in the object definition
  These could also appear in the form of SQL errors. Some of them, however, are already detected by the system before a command can be given to the database. This type of error frequently occurs if you decide to revert to the SAP standard when you use the modification adjustment functions in transaction SPDD (ACT_UPG phase).

  > **Example**
  >
  > A field was added to an SAP table. This field was also used in an index or view. In the ACT_UPG phase, however, you decided to return to the standard definition of the table (using transaction SPDD) and this additional field was removed. The index or view definition is now incorrect since the relevant table field is missing. If the index definition is not corrected and the ACT_UPG phase was completed with *ignore*, errors occur when the objects are created.

Procedure

1. Analyze the PARCONV.ELG log.
2. Remove the cause of the error.
   - Technical problems on the database
     Read the documentation in the database system about how to correct the error. If necessary, extend the database.
   - Logical errors in the object definition
     Correct the objects. To do this, you can use transaction SE11. In the above example, you could, for instance, remove the deleted field from the index or view definition or reinsert the deleted field into the table. In addition, check whether the objects that are not contained in the standard system and that are now incorrect can be deleted completely.
3. Repeat the PARCONV_UPG phase.

   For more information about alternative procedures, see SAP Note 177680.

A.2.18 Correcting Errors in the VALCHK_INI Phase

Context

An error can occur when you have reset the update incorrectly. For example, you have aborted the Software Update Manager and deleted the update directory. This results in an inconsistent system state and a failure in phase `VALCHK_INI` when you start the Software Update Manager again.

If you were in one of the preparation roadmap steps when you tried to reset the update, proceed as described below. If you had already reached the *Preprocessing* roadmap step, then contact SAP Support.

Procedure

1. Close the browser window or the browser tab page with the SUM user interface.
2. Change to the `<update directory>/abap/bin` directory.
3. Enter the following command:

   ```
   ./SAPup reset prepare
   ```
4. Delete the update directory.
5. Extract the Software Update Manager archive and start the Software Update Manager again as described in Starting or Restarting the Software Update Manager [page 121].

A.2.19 Error Handling for ABAP

If the Software Update Manager reports an error during the update, it is essential that you find out what caused this error before you continue with the update.

Tool Reaction

The Software Update Manager reacts on errors in different ways:

- The phase in which the error occurs is interrupted. There is an error message on the screen and in the corresponding log file [page 216], and a trouble ticket is created.
- The phase in which the error occurs continues but writes an error message into the corresponding log file.
- The tool aborts.
- In rare cases, the Software Update Manager waits for processes (`tp`, background jobs, and so on) which have terminated or cannot be started.

Error Analysis

Help in the Software Update Manager

The Software Update Manager provides help for many known errors.

Trouble Ticket

As soon as the Software Update Manager writes an error message to the log file, it also creates a trouble ticket. The trouble ticket mentions the phase in which the error occurred and various system parameters. In addition, an archive is created that contains all the relevant log files.

You can find the `SAPup_troubleticket.log` and `SAPup_troubleticket.zip` files in the `<update directory>/abap/log` directory.

Note that these files are overwritten as soon as a new error occurs.

If you cannot solve the cause of the error yourself, report an incident in SAP Support Portal [page 239] and attach the `SAPup_troubleticket.log` and `SAPup_troubleticket.zip` files.

File dev_SAPup

The Software Update Manager can abort due to internal program errors. An error message appears on the user interface. In some cases, the Software Update Manager creates a stack trace. You can find it in file `dev_SAPup` either in subdirectory `tmp` of the `abap` subdirectory of the update directory or, rarely, directly in the update directory.

If the error persists after repeating a phase, report an incident and include the stack trace. The stack trace speeds up processing of the incident.

If you can continue the update after a restart, report an incident anyway and include the stack trace. This helps SAP fix the tool error for future versions of the Software Update Manager.

Log Files

- **ELG Log Files**
  Provided that an .ELG file [page 220] was generated at the end of the phase that terminated, this file provides helpful additional information about the error(s) that occurred during the phase. For more information, see Evaluating the ELG Log Files [page 220].
- **Detailed Log Files**
  In the `.ELG` file, the heading of each phase step displays the name of a log file that contains more detailed information about the error.
  The detailed log files are stored in subdirectory `log` of the `abap` subdirectory of the update directory.

Background Jobs

The reasons for terminated background jobs are either a lack of resources or program errors. The job log records the processing of background jobs. All background job steps executed are listed in the job log with their exit statuses. If a background job is terminated, you can obtain further information about the reasons using the job log. Proceed as follows:

1. Log on to the primary application server instance of the SAP system. During the phases `START_SHDI_FIRST` and `STOP_SHDI_LAST`, it may occur that you have to log on to the shadow instance instead. A SUM dialogue informs you about the correct log on.
2. Call transaction SM37 as user `DDIC`.

3. Enter * as the job name and specify the job conditions (for *or after event* enter *).
4. Start the job display (F8).
5. Sort the job list so that it is displayed chronologically.
   The job name of the job displayed last is the most recent job and generally the job belonging to the terminated step.
6. To display the job log file, double-click the terminated job.
   For some releases, you need to select the terminated job and choose *Job Log* to display the job log file.
7. To display the long text for the error or the ABAP short dump if it was an ABAP job that has terminated with a syntax error, double-click the error line in the job log file.

SAP System Log

The system log provides more accurate information about errors. It logs the incorrect system states occurring during operation. All irregularities such as a lack of resources or database errors during operation are collected here. The system log is administered by the SAP system and is available in the file system as a non-readable file. You use transaction SM21 to display the system log.

Since the update is always performed by user `DDIC`, it is mainly the system log entries for this user that are relevant for error analysis. The Software Update Manager itself does not know about the system log.

Note that no system log exists on the shadow instance.

To analyze the system log, proceed as follows:

1. Call transaction `SM21` as user `DDIC`.
2. Choose *Reread system log*.
   Make sure that you enter the correct period so that only those entries are displayed which correspond to the time when the terminated phase ran.
3. Look for entries for user `DDIC`.
4. To display detailed error descriptions, double-click a single line in the system log.

Sometimes errors occur at the lowest system level. These errors are normally stored in the instance logs. During the update, you can find these logs in the current working directory of your SAP instance as follows:

1. Open the current working directory of your primary application server instance:
   `<update directory>/abap/system/<SID>/DVEBMGS<shadow instance no.>/work` or `/<update directory>/abap/system/<SID>/D<shadow instance no.>/work`
2. Find out which log files have been written.
   To do this, you can use command **`ls -ltr`**.
3. Examine the log files generated last for errors that may be related to the update.

Other Sources of Problems

If no clear errors are found, there may also be a lack of resources in the database or the file system or incorrect profile parameters may have caused the phase to terminate.

A.2.20 Correcting Problems When Processing ABAP Steps

Context

The following ABAP steps are performed in the SAP system:

- ABAP Dictionary activation (A)
- Distribution of ABAP Dictionary objects (S)
- Table conversion (N)
- Matchcode activation (M)
- Import of application objects (D)
- Update of version management (U)
- Execution of XPRAs (R)

The `TRBAT` table forms the interface between the transport control program `tp` and the SAP system. To trigger an ABAP step, `tp` writes control information to this table.

The `JOB_RDDNEWPP` phase schedules the event-driven background job.

For more information about the transport control program `tp` and the communication between `tp` and the SAP system, see the SAP Help Portal and follow the path according to your source release:

Release	Path in SAP Help Portal
• SAP NetWeaver 7.3 • SAP NetWeaver 7.3 incl. EHP 1 • SAP NetWeaver 7.4 • SAP NetWeaver 7.5 • SAP NetWeaver AS for ABAP 7.51 innovation package • SAP NetWeaver AS for ABAP 7.52	*Application Help* > *SAP NetWeaver Library: Function-Oriented View* > *Solution Life Cycle Management* > *Software Logistics* > *Change and Transport System* > *Transport Tools (BC-CTS-TLS)* > *Transport Control Program tp*
SAP NetWeaver 7.0 and EHPs up to 3	*Application Help* > *SAP NetWeaver by Key Capability* > *Solution Life Cycle Management by Key Capability* > *Software Life Cycle Management* > *Software Logistics* > *Change and Transport System* > *Transport Tools (BC-CTS-TLS)* > *Transport Control Program tp*

Procedure

1. Make sure that the SAP system was started correctly. Log on in client 000 as user `DDIC`.
2. Call transaction `SM37` and check whether the background job `RDDIMPDP` has been scheduled.

> **Note**
>
> Make sure that the job `RDDIMPDP` has been scheduled in client 000 as user `DDIC`. Otherwise, you encounter during the update the error message `Upgrade still running: Logon not possible` in the log file. See also Evaluating the ELG Log Files [page 220].

In the *or after event* field, enter an asterisk (`*`) so that event-driven jobs are also displayed.

3. Check when `RDDIMPDP` last ran and whether it ran without errors.
4. Check whether the control information in table `TRBAT` has been entered correctly.

   The table should have one `HEADER` entry and should contain one entry for each transport request. While the ABAP Dictionary objects are being distributed (S) and the tables converted (N), table `TRBAT` may contain only one `HEADER` entry, since these steps are not carried out by transport request.
5. Call transactions `SM37` and `SM50` to check whether `RDDIMPDP` has already started the background job that processes the ABAP step.

A.2.21 Switch of SAP Programs During the Update

In the `KX_SWITCH` phase, the SAP programs in directory `/usr/sap/<SID>/SYS/exe/run` are switched when the kernel switch takes place.

Do not start the SAP system during this period; otherwise, the Software Update Manager cannot overwrite the old files.

A.2.22 Providing Information to SAP Support

If none of the troubleshooting measures solves your problem, you can contact SAP Support.

Context

If the measures described in Troubleshooting [page 214] do not solve your problem, contact the SAP Support. To enable us to help you as quickly and efficiently as possible, follow the procedure given here.

Procedure

If you encounter problems that are specific to the update procedure, report an incident in SAP Support Portal (http://support.sap.com) and assign it to component BC-UPG-TLS-TLA.

Answer the following questions and put these answers in your incident:

1. For which SAP component do you want to perform the update?

2. We recommend that you attach a copy of the Using the SUM Analysis Feature [page 213] to the incident.
3. If a trouble ticket exists, attach it to the incident together with the log archive (`SAPup_troubleticket.zip`). If there is no trouble ticket, include the following information in your incident:
   - Which operating system version are you using?
   - What was the original release of your SAP system?
   - In which phase does the error occur?
     This information is listed at the end of the `SAPup.log` file located in the `SUM/abap/log` directory.
4. Did you have problems with the SAP system before the update?

> **i Note**
>
> We can find the cause of the error more quickly if you set up an online connection to the SAP system.

If you are certain that the problem is not an update-specific one but a product-specific one, assign your incident to the appropriate product-specific component. The following table gives you information about the different components to which you can assign your incident in SAP Support Portal.

Components for Incidents

SAP Product	Component
SAP Solution Manager	SV-SMG
Index Management Server	BC-TRX
OLTP R/3 System	BC-UPG-TLS-TLA
R/3 Standalone Gateway	BC-UPG-TLS-TLA
SAP Add-On	BC-UPG-ADDON
SAP Supply Chain Management	SCM-BAS
SAP Business Connector	BC-MID-BUS
SAP Business Information Warehouse	BW-SYS
SAP Business-to-Business Procurement	BW-BCT-BBP
SAP Customer Relationship Management: • Communication Station and Mobile Development Work-station • CRM Server • Internet Pricing and Configurator (IPC) • Mobile Client Component • SAP R/3, SAP R/3 Enterprise, SAP ECC	• CRM-MW • CRM-MW • CRM-MT-IU-SPE • CRM-MT-IU-MC • BC-UPG-TLS-TLA
SAP TREX Search Engine (SAP DrFuzzy Search Engine)	BC-SRV-TRX
SAP Front End	BC-INS

SAP Product	Component
SAP Internet Transaction Server	BC-FES-ITS
SAP Knowledge Warehouse	KM-KW
SAP Enterprise Core Component	BC-UPG-TLS-TLA
SAP Strategic Enterprise Management	BC-UPG-ADDON
SAP NetWeaver Application Server ABAP	BC-UPG-TLS-TLA
SMART Installation	BC-UPG-TLS-TLA

A.2.23 Starting and Stopping the Shadow Instance Manually

Context

If a problem with the update process occurs that requires actions with regard to the shadow instance to solve the problem, then it might be necessary to start and stop the shadow instance manually.

Procedure

1. Stop the shadow instance manually as follows:
   1. `cd <update directory>/abap/bin`
   2. `./SAPup stopshd`
2. Start the shadow instance manually as follows:
   1. `cd <update directory>/abap/bin`
   2. `./SAPup startshd`

A.2.24 Mitigating Issues with the Toolimport

This section covers problems with the import of ABAP tools performed by SUM.

Context

To prepare the original SAP system for the update procedure, the Software Update Manager imports its own ABAP tools into this start system. This procedure is called `Toolimport` and performed during the *Extraction* roadmap step.

However, short dumps in the running system may occur during or after the implementation of the ABAP tools. This can be caused by API calls to one of the objects that were imported by SUM. Unfortunately, these changes cannot be omitted.

To mitigate possible issues due to the `Toolimport`, you can define the time when the ABAP tools is to be imported, for example, when the system is not or only little used.

Procedure

Set a breakpoint before phase `PREP_IMPORT/TOOLIMPD`.

The Software Update Manager stops the update procedure before this phase. Once you continue, the `Toolimport` will start importing the necessary ABAP tools.

For more information about setting breakpoints, see Breakpoints During the Update [page 126].

A.2.25 Error Handling for the Replication Process Monitor

The *CRR Control Center (Replication Process Monitor)* displays the current status of the Change Recording and Replay (CRR) procedure during the uptime.

> **i** Note
>
> For more information about the *CRR Control Center (Replication Process Monitor)*, see section *Process Control Center* in SUM Utilities (Extended UI) [page 42].

The following issues regarding the Replication Process Monitor are known and may possibly occur:

Replication Not Running

The Software Update Manager stops with the following error message:

```
You cannot enter the downtime yet. You must wait until the replication progress has reached at least 75 percent.
```

If possible, restart the replication as follows:

1. Open the extended UI as described in SUM Utilities (Extended UI) [page 42] and navigate to the *Process Control Center*.
2. Select the *CRR Control Center* and check in the current replication status if the replication is **not** running. If so, start the replication.

PXA Buffer Too Small (ABAP-Based Replication Only)

Note that this issue applies to the **ABAP-based** replication only. If the `PXA buffer` is too small, short dumps during the update can occur that contain `PXA_NO_FREE_SPACE` in the error message. This `PXA buffer` contains the ABAP loads that are needed for the ABAP runtime in the shadow instance.

To solve the issue, reduce the number of processes used for the replication or increase the system parameter `abap/buffersize` as follows:

1. Stop the shadow instance (including transfer).
2. Adapt the shadow instance profile in directory `<SUM directory>/system/<SID>/SYS/profile` by adding or adjusting the parameter `abap/buffersize` with an appropriate value.
3. Start the shadow instance (including transfer).
4. Restart the replication from the *CRR Control Center (Replication Process Monitor)*.

> **i** Note
>
> Starting and stopping the shadow instance (including transfer) are described in Using the Record & Replay Technique in nZDM [page 73].

Tablespace Too Small

If you encounter short dumps indicating that a tablespace overflow occurred, increase the tablespace and restart the transfer.

Error Message in Phase PROCESS_REPLICATE_RRC_STOP

In the log file `REPLICATERRC.LOG`, you detect the following error message:

```
Replay of changes could not be stopped
```

To solve the issue, proceed as follows:

1. Log on to the shadow instance.
2. Start transaction `SM37` (*Overview of job selection*).
3. Select the running transfer job and check its status by choosing *Job* > *Check Status*. When the list is refreshed, the job status changes from status *Active* to *Canceled*.
4. Restart the transfer from the *CRR Control Center (Replication Process Monitor)*.
5. Repeat the phase `PROCESS_REPLICATE_RRC_STOP`.

The System Shows a Slow Replication Progress

You notice that the replication process is slow. In transaction `SM50`, you can see that the jobs for a lock on table `CRRTI` or a select on table `CRRTASKINFO` take a long waiting time. Furthermore, the select on table `CRRTASKINFO` takes longer than 1 second.

To solve the issue, update the statistics for the tables `CRRTASKINFO~`, `UPGTRTOUCH`, `CRRRTI~`, and `CRRRTIT~`.

Replication Fails on Tables with Secondary Unique Indices

You added a table manually to the uptime handling of the downtime-optimized DMO procedure. The table does not receive any structural changes or imports. However, the replication of the table repeatedly fails, and the replication log file contains the following error message:

`MODIFY unexpectedly failed for table <...>`.

The reason Is that the update patterns of the table on the source database are too complicated for the replication so that conflicts in secondary unique indices cannot be resolved. As a result, the writing to the target database is prevented.

To solve the issue, proceed as follows:

1. Set a breakpoint at phase `PROCESS_REPLICATE_RRC_START`.
2. Drop the secondary unique indices before the phase `PROCESS_REPLICATE_RRC_START` starts. Do it at the latest when the breakpoint is reached.
3. Set a breakpoint at phase `XPRAS_AIMMRG` and continue with the SUM procedure.
4. Recreate the indices manually. Carry this out asynchronously after the phase `RUN_RRC_REPLICATE_FINAL` is completed.
   Note that phase `RUN_RRC_REPLICATE_FINAL` begins shortly after phase `DOWNCONF_DTTRANS`.
5. When the phase `XPRAS_AIMMRG` is reached, wait until all indices are successfully recreated.
6. Afterwards, remove the breakpoints and proceed as normal.

If the table was NOT added manually, other reasons are possible: a structural change, a new secondary unique index, or imports. In this case, the issue must be solved by the component of the affected table.

Aborted CRR Agent Batch, Status Black in Phase DOWNCONF_DTTRANS or Error in Phase RUN_RRC_READYFINAL

The following errors may occur:

- during the uptime replication:
  - you detect in the shadow system dumps with an aborted CRR agent batch process of class `CL_CRR_AGENT_BATCH`
  - the replication status is *Black* (= the downtime after phase DOWNCONF_DTTRANS cannot be entered) without single tables showing errors

- during the downtime:
  - the SUM stops in phase `RUN_RRC_READYFINAL` with the error message *ERROR: there are still <...> tasks not in state READY*

To solve the problems, proceed as described in the following. The first steps apply equally to downtime and uptime. This is followed by additional steps for uptime or downtime.

1. **Uptime and Downtime:**
   1. Log on with user `DDIC` to the shadow (!) system.
   2. Call transaction `SM50` and note down the replication jobs.
   3. In a second window, call transaction `SE37`.
   4. Enter function module `CRR_TRANSFER_CONTROL`.
   5. Execute (F8) the function module for testing purposes with parameter *IV_ACTION = STOP*.
   6. Check the first window, in which transaction `SM50` is running, wait until all replication jobs are stopped. It should only take some seconds.
   7. In the second window, in which transaction `SM37` is running, check if the function module is still being executed. If so, cancel the process using the menu items *Symbol* > *Stop Transaction*.
   8. Call transaction `SE37` and enter function module `CRR_TRANSFER_CONTROL` again.
   9. For testing purposes, execute the function module with parameter *IV_ACTION = START* and *IV_REQUESTED_BATCHES = <number of uptime replication processes>*.

      > **i** Note
      >
      > if you do not know the number of uptime replication processes, navigate to directory `SUM/abap/tmp`. Here, numbered files `RRC_REPLICATE_<number>` are available. This highest number is also number of the uptime replication processes.

   10. Within a few seconds, the replication jobs should return and be visible in transaction `SM50`. There should also be a new process `RSUPG_ASYN_RUN_REPLICATE`, which is the previously aborted but now restarted job.
   11. Call transaction `AL11` and navigate to the directory *DIR_PUT* > *abap* > *tmp*.
   12. Check if the file `RRC_REPLICATE.<SID>` has been updated at the restart of the replication.
2. The following steps for **uptime** only:
   1. 1.Go to the *CRR Control Center* of the *SUM Utilities* and start the replication.
   2. Check using transaction `AL11` that the file `CRR_TRANSFER_CONTROL_STATUS.<SID>` is updated again about every 15 seconds.
3. The following steps for **downtime** only:
   1. Switch to the second window, in which transaction `SM37` is running for function module `CRR_TRANSFER_CONTROL`.
   2. Execute (F8) the function module for testing purposes with parameter *IV_ACTION = STOP* and wait until the process is finished.
   3. Resume the procedure in the Software Update Manager. The issue is solved, If the phase `RUN_RRC_READYFINAL` is passed.

A.3 Administration

This part of the document contains additional information about the various administrative tasks that you can or should perform before and during the update.

- Reducing Downtime [page 246]
- Configuring Parallel Processes During the Runtime [page 248]
- Changing the DDIC Password [page 248]
- Determining Versions [page 249]
- Extending Free Space in the Oracle Database [page 252]
- Changing the Oracle Database Recovery Mode [page 254]
- Release upgrade only: Deleting Archived Upgrade Logs [page 255]
- Using the SUM Phase List for the Update [page 256]
- Shadow Instance Handling During The Upgrade [page 257]
- Deactivating Triggers [page 258]

A.3.1 Reducing Downtime

This chapter deals with options to further reduce the downtime.

Context

The System Switch upgrade has been designed to reduce downtime to a minimum. The scenario strategy for the shortest possible downtime is *Downtime-optimized*. In addition to the scenario strategy, there are other options to further reduce the downtime.

Procedure

- Use faster hardware

  Fast hardware is key to speeding up the update. With faster hardware, the overall runtime decreases and, therefore, the downtime as well.

  Some phases benefit from a faster CPU and additional memory. Other phases require fast disk I/O.

  - CPU
    Several phases run parallel processes. However, since the number of parallel processes is not larger than eight, more CPUs may thus not be exploited fully. Four CPUs with 800 MHz are faster than eight CPUs with 400 MHz, for example.
  - RAM
    Additional memory for the database and the SAP kernel can improve speed, especially for phases that use the SAP system, such as the activation phase or the XPRAS phase.

- Disk I/O
  During the main import phases (`EU_IMPORT` (release upgrade only), `SHADOW_IMPORT`, `TABIM`), a fast disk I/O is the key to reducing the upgrade runtime.

- Use fast backup mechanism

  You need to be able to restore the update to the point when downtime began. You can do this using your usual backup and archiving model. You also need to make a backup of your database after the update has finished.

  You can reduce the downtime significantly if you use a fast backup mechanism, such as a RAID-based mechanism or a hardware-based mirror mechanism.

- Configure the update

  You can configure the update by modifying the number of processes used:

  - Number of background processes
    This is the key parameter for running ABAP reports in parallel. Increasing this parameter speeds up phases like `PARDIST_ORIG`, `PARCONV_UPG`, and `XPRAS_UPG`. A value larger than **8** does not usually decrease the runtime.
  - Number of `R3trans` processes
    This parameter affects the number of `R3trans` processes that `tp` starts during phases `SHADOW_IMPORT` and `TABIM`. A value larger than **8** does not usually decrease the runtime.

  Do not increase these parameters to values much larger than the number of CPUs in your system.

- Delete unused clients

  The number of clients has a significant influence on the runtime. During phases `SHADOW_IMPORT` and `TABIM`, the data import for some client-specific tables needs to be cascaded into the different clients. The import time therefore increases with the number of clients.

  The duration of the `XPRA` phase, especially the duration of the after-import methods, also depends on the number of clients.

  If you no longer need certain clients, you should delete them before you start the Software Update Manager because the free space calculation depends on the number of clients.

- Decrease the size of large tables and by archiving content

  In some cases, it is useful to archive some of the content of large tables. If tables are converted during the update, the conversion time depends on the size of the table. If you can decrease the size of a table that needs to be converted, the downtime is reduced. The tables converted during the update are summarized in the reports of the Using the SUM Analysis Feature [page 213] utility.

  The duration of the phase `XPRAS_UPG` also depends on the size of large tables.

- Keep your modification

  If you have modified some tables in the source release, you may need to convert them if you choose to return to the SAP standard.

  This may mean that you need to remove some fields or reduce a field length. You may want to consider keeping your modification to avoid such a conversion.

- Eliminate errors

  During a test update, errors might occur. These errors increase the runtime and downtime of the update significantly.

During the tests, find out, if necessary with the help of SAP Support, how to prepare the SAP system so that these errors do not occur again. For example, if the process fails in phase `PARCONV_UPG` because the tablespaces or containers are too small, increase the free space by the amount of space you need to run the phase.

A.3.2 Configuring Parallel Processes During the Runtime

This section covers the configuration of parallel processes during the update procedure.

Context

At any time during the update procedure, you can increase or decrease the limits that have been specified for the different types of parallel processes.

For some phases, these changes have an immediate effect. For example, changing the values for `R3trans` processes during downtime influences the phase `TABIM_UPG` immediately.

For other phases, you have to carry out the change before the corresponding phase is running. For example, the values for parallel background processes during uptime have to be set before the profiles for the shadow system are created and take effect.

Procedure

Access via SUM Utilities (Extended UI) [page 42]

1. Select in the *More* menu the *SUM Utilities* and navigate there to *SUM Parameters* > *SUM Process Parameters*.

Access via Command-Line Interface

2. Enter the following commands to access the command-line interface in scroll mode (for example, using `ssh`):

```
cd <update directory>/abap/bin
./SAPup set procpar gt=scroll
```

A.3.3 Changing the DDIC Password

Context

In the `PROFREAD` phase, you enter the `DDIC` password. It is not usually necessary to change the password of the user `DDIC` later. After the installation of the shadow system, the password of user `DDIC` in client 000 is the same as on the original system.

However, if you want to change the password after the PROFREAD phase, you have to change it in the system as well as in the Software Update Manager parameter. The passwords in the original system and in the shadow system have to be identical with the passwords known by the Software Update Manager.

Procedure

1. From the SUM UI: Menu Bar [page 34], open the *More* menu and choose *Utilities*.

   A second web browser window with the SUM Utilities (Extended UI) [page 42] opens in which several options are offered.
2. Choose *SUM Parameters*. You can maintain the password for system user `DDIC` or for shadow system user `DDIC`.

A.3.4 Determining Versions

Determining the Operating System Version

At the UNIX level, enter the following command:

```
uname -a
```

Determining the Database Version for Oracle

Enter the following SQL statement:

```
SELECT BANNER FROM V$VERSION;
```

The first line of the display contains the Oracle server release.

Determining the SAP System Release

To determine your SAP source release, choose *System* > *Status* in your SAP system.

The release appears in the *SAP Release* field.

Determining the SAP Kernel Version

To determine the version of the SAP kernel you are using and its patch level, proceed as follows:

1. In the SAP system, choose *Administration* > *System Administration* > *Monitor* > *System Monitoring* > *Servers*.
2. Select a server and choose *Release Notes*.

Determining the Date of R3trans

Call `R3trans` with the following command:

```
R3trans -V
```

The program displays the date and the version number.

Determining the Version of tp

Call `tp` with the following command:

```
tp -V
```

The last line displays the highest patch level.

A.3.5 Configuring SAPup for SAP ABAP System with SNC

The section contain information how to set up the SAPup executable with own Single-Sign On credentials as prerequisites for the SUM run on an SAP ABAP system with Secure Network Communications.

Context

You have set up and configured your SAP ABAP system for use with Secure Network Communications (SNC) and Single Sign-On (SSO). SNC integrates SAP SSO or an external security product with SAP systems. With SNC, you strengthen security by using additional security functions provided by a security product that are not directly available with SAP systems.

For more information about SNC and SSO, see the SAP Help Portal. Example: https://help.sap.com/nw, *ABAP Platform* > *ABAP Platform 2022 (or higher)* > *Securing the ABAP Platform* > *ABAP Platform Security Guide* > *User Administration and Authentication* > *User Authentication and Single Sign-On* > *Integration in Single Sign-On Environments* > *Secure Network Communications (SNC)*

During the *Extraction* roadmap step, you must enter the password of user DDIC in the system, client 000. This password is needed for the RFC connection to the SAP system. See also Important Entries for the Extraction Roadmap Step [page 141].

If you want to run the Software Update Manager on an SAP ABAP system with SSO and SNC, RFC calls with traditional user ID and password-based authentication are not permitted. In this case, the executable SAPup must be set up and configured with own SSO credentials so that the user DDIC can be authenticated securely.

> **i** Note
>
> - The Software Update Manager must run with an own `SECUDIR` subdirectory, that is located in `<SUM directory>/abap/sec`. This subdirectory contains the file `SAPup.pse` with credentials for issuer `CN:SAPup`.
> - The SAPup certificate must be registered in the SAP ABAP system.
> - SUM certificates are not required if the RFC authentication with user and password is allowed, that is, if the parameter *snc/accept_insecure_rfc* is active in your system.

Procedure

1. Create SAPup security `SECUDIR` subdirectory `sec`. The subdirectory must have the following path: `<SUM directory>/abap/sec`.
2. To execute the following console commands, first set the environment variable `SECUDIR` with the path to the `sec` subdirectory as its value.
3. Use the command **`sapgenpse gen_pse -p SAPup.pse`** to create the *Personal Security Environment (PSE)* for the SAPup with the distinguished name `CN=SAPup`.
4. Export the own SAPup certificate using the SAP security tool `sapgenpse`.

   Enter the command:**`sapgenpse export_own_cert -p SAPup.pse -o SAPup.cer`**
5. Import the SAPup certificate into the SAP ABAP System using transaction `STRUST`.
6. Export the SAP system certificate for the SAPup PSE using transaction `STRUST` and the file `system.cer`.
7. Update the file `SAPup.pse` with the SAP system certificate using the tool `sapgenpse`.

   Enter the command: **`sapgenpse maintain_pk -a system.cer -p SAPup.pse`**
8. Update the secure login for the operating system user using the tool `sapgenpse`.

   Enter the command: **`sapgenpse seclogin -p SAPup.pse`**
9. Edit the SNC name *p:CN=SAPup* for user DDIC in the SAP ABAP system using transaction `SU01`.
10. Edit the `SNC access control List (ACL)` in the SAP ABAP system using transaction `SNC0`.
11. Execute the Software Update Manager.
12. Enter the command SAPup **`rfcping`** after the phase PROFREAD to verify if the RFC login with SNC was successful.

A.3.6 Extending Free Space in the Oracle Database

Prerequisites

For performance reasons, you have to take the following restrictions into consideration when creating the new tablespaces:

- Index tablespaces and data tablespaces that belong together should not be on the same disk, and should not be in the same `sapdata` directory.
- `PSAPES<REL>D` and `PSAPEL<REL>D` should not be on the same disk.

  > → Recommendation
  >
  > We recommend the following combination:
  >
  > Disk 1: `PSAPES<Rel>D` and `PSAPEL<Rel>I`
  >
  > Disk 2: `PSAPEL<Rel>D` and `PSAPES<Rel>I`

- AIX: If the AIX user parameter `fsize` (= maximum file size) is set to the default value of 1 GB for user `ora<sid>`, error messages appear if you create tablespaces greater than 1 GB. Where necessary, increase the value of `fsize`. Note that the parameter `fsize` is increased by the same amount for user `<sid>adm`. Otherwise, `<sid>adm` cannot start up the database after large tablespaces have been created.

Context

Extend and create tablespaces as requested by the Software Update Manager.

> ℹ Note
>
> - If you use tablespaces where the `AUTOEXTEND` feature is turned on, the Software Update Manager includes this in its calculation during the free space check. However, you may still have to create the new tablespaces.
> - Avoid fragmenting the database too strongly.
> - Be generous when you extend existing tablespaces.
> - Choose a low degree of fragmentation when you create tablespaces.

To extend and create tablespaces, use program `<SUM directory>/abap/exe/brspace` as user `ora<sid>`. You can use a command line template for `BRSPACE` generated by the Software Update Manager (see file `CHECKS.LOG`). For more information, see the SAP online documentation on the `BRSPACE` program.

`BRSPACE` proposes other values for the extension than those specified in the list. You can overwrite these values, however, you have to meet the minimum requirements of the list.

Procedure

1. Extend the listed tablespaces by at least the specified values.
2. Create the new tablespaces as prompted by the Software Update Manager and with the AUTOEXTEND feature turned on. This applies to the following tablespaces during the procedure:

   Tablespace Extensions for Oracle

For a System with Old Layout	For a System with New Layout
PSAPES<Rel>D	PSAP<SID><Rel>
PSAPES<Rel>I	
PSAPEL<Rel>D	
PSAPEL<Rel>I	

   Release upgrade only: <Rel> stands for the current target release.

   > ⚠ Caution
   >
   > For the tablespace PSAPES<Rel>D, create a data file with at least 2 GB; otherwise, the import of the substitution set terminates.
   >
   > If you have to create a tablespace in more than two fragments, add (n - 2) * 100 MB to the total size of the tablespace, where n is the number of fragments.
   >
   > AIX: Reboot your AIX system to activate the new values.

3. If necessary, extend in the file ORATBSXT.LST the **brspace** command line by the option **-pdb ROOT**.

   During the SUM procedure you might have to adjust the size of too small tablespaces using the BRSPACE utility tool. To extend the required tablespaces easily, the Software Update Manager provides some BRSPACE commands stored in file ORATBSXT.LST. If you are running on a pluggable oracle database the execution of the BRSPACE tool, and you try to extend an undo tablespace such as PSAPUNDO, the extension might fail with an error message similar to: `BR0065E Tablespace 'PSAPUNDO' not found`.

   In this case, you may extend the **brspace** command line in the file ORATBSXT.LST by the option **-pdb ROOT**, provided that the following conditions are fulfilled:

   - You are running on a pluggable Oracle database (this is the case if the environment variable ORA_PDB_NAME is set).
   - The tablespace, which has to be extended, is an undo tablespace (such as PSAPUNDO).
   - This undo tablespace is not available in the DBA_TABLESPACE view in the pluggable database to which you are connected. You can check it by entering the following: **select count(*) from DBA_TABLESPACES where TABLESPACE_NAME = 'PSAPUNDO';** (Note that PSAPUNDO in the command line is an example.) The result must be *0*.

   > Example

Based on PSAPUNDO as example, the **brspace** command should look like the following provided that the above-mentioned conditions are fulfilled:

```
brspace -function tsextend -tablespace PSAPUNDO -size 200 -incrsize 200 -maxsize
800 -autoextend yes -pdb ROOT
```

A.3.7 Changing the Oracle Database Recovery Mode

Use

You need to change the recovery mode of the database at the beginning and end of downtime.

Prerequisites

Make sure that you can recover the current state of the database before you deactivate database archiving.

> → Recommendation
>
> If the last complete database backup was a long time ago and the number of archives collected up to that point is large, we recommend that you make a complete database backup before you deactivate archiving.

Procedure

On the database server, deactivate archiving as follows:

1. Log on as user `ora<dbsid>`.
2. Start program BRSPACE using the following command:
   ```
   brspace [-c force] -f dbalter -a noarchlog -f
   ```

In the same way as when you deactivate archiving, you can reactivate it as user `ora<sid>` with program BRSPACE using the following command:

```
brspace [-c force] -f dbalter -a archlog -f
```

> ℹ Note
>
> You can call BRSPACE for information about the current status of redo log archiving using the following command:
>
> ```
> brspace -c force -f dbshow -c dbstate
> ```

A.3.8 Correcting Problems with Oracle Database Tools

Use

You are running a distributed system with an Oracle database on a standalone database server.

The Software Update Manager introduces the new file system structure (`nuc/uc`) on the primary application server instance. This is the case when the following information appears in the `SAPupConsole.log` file after the `KX_SWITCH` phase:

```
The tool will convert the kernel structure to the new platform dependant [n]uc/
<platform> layout.
```

After the conversion to the new file system structure, the database might not find the database tools during the update anymore.

Procedure

If this error occurs, check the symbolic links on the database host after phase `KX_SWITCH`. If they are no longer valid, rebuild the file system structure under `/usr/sap/<SID>/SYS/exe` as follows:

- For Unicode systems:
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> uc -> /sapmnt/<SID>/exe/uc`
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> dbg -> uc/<platform>`
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> uc -> run -> dbg`
- For non-Unicode systems:
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> nuc -> /sapmnt/<SID>/exe/nuc`
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> dbg -> nuc/<platform>`
  - `lrwxrwxrwx. 1 <sid>adm sapsys <day> 7 <time> uc -> run -> dbg`

A.3.9 Deleting Archived Upgrade Logs

Context

> **i Note**
>
> This section is only relevant if you perform a release upgrade.

You can create more space by deleting archived logs from earlier upgrades that you no longer need.

Procedure

To do this, delete the subdirectories `<target release>` along with their contents:

`/usr/sap/trans/upgrade/<SID>/<target release>`

> Example
>
> If you no longer need the logs of the upgrades to 7.40 and 7.50, you can delete the subdirectories **740** and **750**:
>
> `/usr/sap/trans/upgrade/P11/740`
>
> `/usr/sap/trans/upgrade/P11/750`
>
> `.....`
>
> `/usr/sap/trans/upgrade/T11/740`
>
> `/usr/sap/trans/upgrade/T11/750`
>
> `.....`

A.3.10 Using the SUM Phase List for the Update

Context

The *Tasklist* of the SUM UI provides information about the phases during the SUM procedure and, if available, their description. The phase list is a visualization of the file `phaselist.xml`.

Procedure

From the menu bar of SUM UI, select the item *Tasklist*. For more information, see SUM UI: Menu Bar [page 34].

A.3.11 Shadow Instance Handling During The Upgrade

This topic deals with the setup and operation of the shadow instance that was installed in parallel to the productive instances. It involves the environment in which the kernel is operated during the upgrade.

Database Implementation

All basis tables are imported into the productive database schema with a specific shadow table name. These shadow table names are composed of the original table name and a question mark ? for the IBM i database and a tilde ~ for all other databases.

Then an additional user or schema is installed in parallel, under which the views are created for all the new SAP basis tables. These views can be implemented as database synonyms, aliases, or views. In addition, all other shadow objects (such as views or functions) are created for the system.

The views of the new basis tables on the shadow instance have the same name as the original table and refer to the shadow table of the user, schema, or database.

> **Example**
>
> Example for SAP HANA database:
>
> - Production database user: `SAPABAP1`
> - Shadow database user: `SAPABAP1SHD`
> - Original table: `SAPABAP1.DD02L`
> - Shadow table: `SAPABAP1.DD02L~`
> - Synonym of table name `SAPABAP1SHD.DD02L` with shadow database user: `SAPABAP1."DD02L~"`

The connection for the kernel and the tools to the shadow instance is controlled as follows:

- The environment variable *auth_shadow_upgrade = 1* or profile parameter *auth/shadow_upgrade = 1* switches the connection to the shadow system.
- During the shadow operation, the kernel of the shadow Instance uses the synonyms, aliases, or views with the original names of the tables to access the shadow tables of the original database.
- Do not configure or setup the connection to the shadow system manually. If necessary, the Software Update Manager takes care of the configuration

Kernel Directories

The Software Update Manager automatically starts the load of the shadow instance kernel from the directory `<SUM directory>/exe`

The directories for the shadow instance are `<SUM directory>/system/<SID>/SYS/profile` and `<SUM directory>/system/<SID>/D<NR>/work`.

The shadow instance has its own instance number message server, enqueue server, dispatcher, dialog process, batch process, and update process. The <SID> is identical to the one in the original system.

Starting the Shadow Instance

SAPup automatically starts the shadow instance in the `START_SHDI_*` phases. You can manually start or stop the shadow instance using the commands **`SAPup startshd`** or **`SAPup stopshd`**. See also Starting and Stopping the Shadow Instance Manually [page 241].

To lock or unlock the shadow instance, use the commands **`SAPup lockshd`** or **`SAPup unlockshd`**.

Logging on to the Shadow Instance

Follow the regular logon procedure when you log on to the shadow instance. However, you must specify the instance number of the shadow instance.

The user `DDIC` is created in the shadow instance by default in client 000. It has the same password as the user DDIC in client 000 in the original system.

The functions of the shadow instance are limited.

A.3.12 Deactivating Triggers

It can be necessary to deactivate all database triggers generated by the Software Update Manager in a downtime-optimized approach.

Context

This is then like an emergency stop, and the continuation of the SUM procedure is no longer possible afterwards.

You can perform the deactivation either with the Reset-function on the SUM user interface, or on the operating system level. All triggers are deactivated , which the SUM generated during a downtime-optimized update procedure at the beginning of the `REV_PREPROC` module, which is used for the rollback.

Procedure

- Option 1 (recommended): Use the reset function as described in Resetting the Update [page 125].
- Option 2: Deactivate the triggers on operating system level as follows:
  1. Close the browser window or the browser tab page with the SUM user interface.
  2. Open a command-line interface.
  3. Change to the directory *<SUM directory>* > *abap* > *bin* .
  4. Enter the following command: **`SAPup reset execution [ignore_processes]`**

A.4 List of Referenced SAP Notes

In addition to the SAP Notes that you need to prepare the update (see SAP Notes [page 13]), this document also refers you to other SAP Notes that contain **additional** information. The following lists contain these SAP Notes:

Database-Independent SAP Notes

SAP Note Number	Description	Area
3036093	SAP Host Agent 7.22 PL52	Registering SUM in SAP Host Agent
2200230	Problems with use of system PKI	Updating Distributed and High Availability (HA) Systems
1636252	Installing a 7.20 kernel in SAP Web AS 7.00/7.01/7.10/7.11	Updating Distributed and High Availability (HA) Systems
198411	Current data and information about time zones	Follow-up Activity
2547309	Downtime-optimized DMO with SUM 2.0	Specifying the scenario strategy
2537133	FAQ - Digitally Signed SAP Notes	SAP Notes Implementation
510007	Additional considerations for setting up SSL on Application Server ABAP	SAP Notes Implementation
2620910	SAP S/4HANA 1511, 1610, 1709 and SAP BW/4HANA 1.0: Recommended Application Server Platforms	ASCS Instance Move
2854919	Upgrading from ENSAv1 to ENSAv2 when using SIOS Protection Suite for Linux	Support for Standalone Enqueue Server 2
2727341	Veritas InfoScale Availability Support for Standalone Enqueue Server 2 (ENSA2) / Enqueue Replicator 2 (ER2)	Support for Standalone Enqueue Server 2
2630416	Support for Standalone Enqueue Server 2	Support for Standalone Enqueue Server 2
2635956	NEC EXPRESSCLUSTER: Update to ENSA2 requirements	Support for Standalone Enqueue Server 2
2641019	Installation of ENSA2 and update from ENSA1 to ENSA2 in SUSE HA environment	Support for Standalone Enqueue Server 2
2641322	Installation of ENSA2 and update from ENSA1 to ENSA2 when using the Red Hat HA solutions for SAP	Support for Standalone Enqueue Server 2
2645915	New enqueue server ENSA2 when using PowerHA for SAP on AIX	Support for Standalone Enqueue Server 2
2513585	Potential ABAP Dictionary objects and data loss - ABAP Dictionary objects implemented via UDO-generated reports	Modification Adjustment

SAP Note Number	Description	Area
2450902	Customer Transport Upgrade Integration Wizard	Customer Transport Integration
1898687	Merge start profile with instance profile (Linux/Unix OS)	Follow-Up Activities
2464065	Check of automatic maintenance mode for HA solutions	Update of HA systems
2393840	ASCS Split on PowerHA Cluster	ASCS Split
2397558	ASCS Split on Veritas Cluster	ASCS Split
2388441	ABAP release change - overview	General Update Customer development
2431737	SUM with IBM PowerHA System Mirror for AIX	Update of HA systems
1779681	Central note on HPE Serviceguard HA/DR clustering solutions	Update of HA systems
2146940	Desupport of Enqueue Work Process	ASCS Instance Split
2342412	SL Tools reporting warning for unsigned content	General Update Digital Signature Handling
2260116	Method GET_RUNNING_JOBS of class CL_ARC_UPGRADE_UTIL terminates with error message BT 450	Data Management Planning
1620618	Delete triggers	General Update
1081287	Data extraction orders block the upgrade process	General Update
485741	Dealing with customer translations during the update	Language transport
211077	Exchanging the target release kernel during the update	SAP kernel
922557	Making changes to enhancements	Enhancements
821875	Security settings in the message server	General Update
1227270	Mass activator terminates due to deleted indexes	General Update
29972	Instance numbers in a distributed system	General Update
147519	Maintenance strategy / deadlines SAP GUI	Front end/SAP GUI Release upgrade only
26417	SAP GUI resources: Hardware and software	Front end/SAP GUI Release upgrade only

SAP Note Number	Description	Area
178788	Information about SAP GUI for HTML delivery	Front end/SAP GUI Release upgrade only
352941	Language import and support packages	Language transport Release upgrade only
322982	Installing language during upgrade	Language transport Release upgrade only
1139642	Hardware requirements in Unicode systems	Unicode
1000009	ASU Toolbox 2008	General update Release upgrade only
712297	Short dumps when restoring variants	General update Release upgrade only
823941	SAP start service	Release upgrade only
19466	Downloading SAP kernel patches	SAP kernel Release upgrade only
177680	Correcting conversion problems in the `PARCONV_UPG` phase	General Update
122597	Ignore errors in the `XPRAS_UPG` phase	General Update
1301695	BRFplus AI activation: Name "xyz" has already been used	General update SPS update
1243486	Dump `COMPUTE_INT_PLUS_OVERFLOW` during background cleanup	General update SPS update
1021236	Linux: Using SAP kernel 7.01 and higher on RHEL4 and SLES9	Linux
28022	Customer system: Where-used list of SAP objects	General Update
1156507	Information about language supplementation after the upgrade	Language transport Release upgrade only
774615	Support package levels of ERP/ECC installations/upgrades	General update Release upgrade only
789220	Support package levels for SAP NetWeaver installations/upgrades	General update Release upgrade only

SAP Note Number	Description	Area
850038	Support package levels for SCM/APO installations/upgrades	General update Release upgrade only
781448	Support package levels of SAP Solution Manager installations / upgrades	General update Release upgrade only
819722	Support package levels for SRM_SERVER installations/upgrades	General update Release upgrade only
1649026	SAP JVM Switch tool: Configuring replication using `sapcpe`	General update System administration / troubleshooting
1387739	Out of memory in `ACT_UPG` phase during EHP installation	System administration / troubleshooting
1275873	Memory bottleneck during ABAP Dictionary activation during EHP import	System administration / troubleshooting
832594	Importing support packages before an upgrade	General update
323816	User limits on AIX	System administration / troubleshooting
1678565	Prerequisites, terms, and conditions for nZDM/SUM	General update SPS update
1629598	SAP kernel 720 will replace older kernel versions	General Update
1678564	Restrictions, database-specific settings, and troubleshooting of nZDM for SUM	General Update nZDM
1788379	Transport of SAP Notes	System Maintenance
538167	Active objects are displayed as inactive	General update
1704753	Inst.Systems based on NetWeaver 7.1 and higher: UNIX	System administration / troubleshooting
2130510	SAP Host Agent 7.21	General update System administration
1031096	Installing package `SAPHOSTAGENT`	General update System administration / troubleshooting

SAP Note Number	Description	Area
1907566	Obtaining the latest SAP Host Agent documentation	General update
585789	Poland - SAP R/3 Enterprise upgrade procedure	General Update Customer Transports Integration
574102	Additional information on R/3 upgrade with SAP CORE CEE and former add-ons	General Update Customer Transports Integration
1386114	MRSS 700: Installation and Delta Upgrade Note	General Update Customer Transports Integration
1695884	Unintended deletion of SFW objects during the import	General Update Customer Transports Integration
2187425	Infos for SAP Note Transport based Correction Instructions (TCI)	General update System Maintenance
2146940	Desupport of enqueue work process	General update System Maintenance
2011380	Previous SUM not finished properly and asking for Clean Module Password	Troubleshooting
2374056	SUM: correct OJDBC version after update to SAP NetWeaver 7.5	Troubleshooting
1898687	Merge start profile with instance profile	General update

Oracle

SAP Note Number	Description	Area
2271095	ASCS split on Solaris Cluster	ASCS Split
819829	Oracle Instant Client Installation and Configuration on Unix	Oracle-specific
998004	Update the Oracle Instant Client on Windows	Oracle-specific
669902	Setting the national character set to UTF8	Oracle-specific
871455	Performance When Accessing DBA_SEGMENTS	Oracle-specific
762426	Long runtimes in TABSPC_PREP, CNV_LIST, DYNSPCADD	Oracle-specific
556764	Database parameters and performance	Oracle-specific
11777	Changing parameters NEXT and MAXEXTENTS	Oracle-specific

SAP Note Number	Description	Area
554031	Creating space statistics with BRCONNECT	Oracle-specific
797147	Introscope Installation for SAP Customers	General update
2138309	Introscope 9.7 Release Notes for changes and open issues	General update

A.5 List of Referenced Documentation

The following table contains a list of all documentation referenced in this document and information about where to find this documentation.

Referenced Documentation

Document	Internet Address
For the SAP NetWeaver release: • *Upgrade Master Guide* • *Master Guide* • *Upgrade and Update Guides* • *Installation Guide*	http://help.sap.com/netweaver ▶ *SAP NetWeaver* ▶ *<release>* ▶ *<Version>* ▶ *Installation and Upgrade* See also Other Required Documentation [page 14].
For your SAP application: • *Upgrade Master Guide* • *Master Guide* • *Upgrade Guide* • *Installation Guide*	http://help.sap.com/erp ▶ *<version>* ▶ *Installation and Upgrade*
DMO Guide (guide for the database migration option of SUM)	http://support.sap.com/sltoolset ▶ *System Maintenance* ▶ *Database Migration Option (DMO) using SUM*
Installation Guide	http://support.sap.com/sltoolset ▶ *System Provisioning* ▶ *Install a System using Software Provisioning Manager*

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