



Upgrade Guide | PUBLIC

Software Update Manager 2.0 SP16

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Zero Downtime Option for SAP S/4HANA

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Document History

Document: Zero Downtime Option of SUM 2.0 SP16 for SAP S/4HANA

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

Caution

Before you start implementation, 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 *Zero Downtime Option (ZDO) for SAP S/4HANA using SUM 2.0*.

Version	Date	Description
1.0	2023-02-13	Initial version

1 Before You Start

This part of the document contains information about the basic aspects of this ZDO guide.

1. [About This Document \[page 5\]](#)
2. [Naming Conventions \[page 7\]](#)
3. [Required SAP Notes and Further Documentation \[page 5\]](#)
4. [New Features \[page 6\]](#)

1.1 About This Document

This document gives you an overview of the upgrade and update procedure of SAP S/4HANA with the Software Update Manager (SUM) tool using its *Zero Downtime Option* (ZDO).

To reduce the technical downtime of your SAP S/4HANA system to the minimum, SAP introduced a procedure that allows users to continue using the business functions of the system during the upgrade or update activities. This feature is provided with the *Zero Downtime Option* (ZDO) feature of the Software Update Manager (SUM) tool.

This document explains the high-level concept and the principles of ZDO, giving you a transparency you need to understand how ZDO is organized and functioning. Going further you receive an initial information on planning, preparation, and follow-up activities as well as information about using SUM with ZDO.

The focus is on the special features of ZDO, assuming you're familiar with SAP upgrade and update procedure using SUM tool. The information in this document is intended primarily for SAP system administrators with operating system, database, and SAP NetWeaver Application Server knowledge, and would be interesting and useful for the functional experts as well as project managers.

The document

- provides you with information to consider before and during the upgrade and update procedure using SUM with ZDO, and what you can do in case you encounter errors
- describes specifics, when you want to upgrade or update your existing SAP systems based on SAP NetWeaver Application Server for ABAP using ZDO

1.2 Required SAP Notes and Further Documentation

In addition to this document, you need other information such as the current central SUM note or the SUM guide for SAP ABAP systems.

The *SUM guide* describes how to update SAP systems based on SAP NetWeaver using the Software Update Manager (SUM). It includes planning, preparation and follow-up activities, information about using SUM, and troubleshooting information.

The latest version of this document as well as the central SUM note are available on the SAP Support Portal at: <https://support.sap.com/sltoolset> → **tab "System Maintenance"** > **System Maintenance Scenarios** > **Software Update/Upgrade using SUM**.

Furthermore, check the following SAP Notes on ZDO before you start:

SAP Note	Title
2707731	Prerequisites and Restrictions of Zero Downtime Option of SUM for SAP S/4HANA

These SAP Notes have more information about the

- supported products and releases
- required database versions
- restrictions on the application side

1.3 New Features

The following table lists significant new features and improvements of the Zero Downtime Option of SUM 2.0. The table also indicates the SUM version in which the new or improved features were introduced.

Feature	Description	Availability
ZDO Consistency Check enhanced	The ZDO Consistency Check now also checks and validates the consistency of SLT scenarios. For more information, see Specific Phases for ZDO [page 14] .	SUM 2.0 SP14
Multiple SLT servers are supported	For SAP HANA database, ZDO supports now multiple SLT servers. For more information, see SLT Replication Handling [page 36] .	SUM 2.0 SP14
High availability maintenance mode is supported	ZDO supports now the update of high availability systems. A dialog in the phase SUM_ASK_ZDO_CONFIGURATION asks you whether you want to switch to HA maintenance mode for further execution. For more information, see High-Availability Setup [page 33] .	SUM 2.0 SP14
Supported add-ons	The number of supported add-ons has been enhanced. For more information, see Add-On Handling [page 33] .	SUM 2.0 SP14






Feature	Description	Availability
BW Check	The documentation regarding BW Check and the phase RUN_RSPTBFIL_ZDM_CHECK_BW has been updated. For more information, see Specific Phases for ZDO [page 14] .	SUM 2.0 SP15

1.4 Naming Conventions

This section deals with the most important naming conventions used in this document.

For more naming conventions, see the *SUM Guide* mentioned in [Required SAP Notes and Further Documentation \[page 5\]](#).

Term	Description
bridge subsystem	The state of the customer system when all existing application servers are reconnected to the bridge database schema. From a technical perspective, the bridge database schema reuses the shadow database schema.
customer buffer	A file that contains the list of customer transports.
FDCT	Short for: fast data copy transfer. Refers to copying content of changed tables to a target version table.
original system	A customer system as combination of an SAP ABAP system and a database schema (including all related objects, that is, repository and application tables) for which the maintenance event is planned.
SAPup	An executable that is called internally by SUM.
shadow system and shadow database schema	The shadow system is used to prepare the repository and the dictionary objects of the target release in the shadow database schema.
SLT and CDC replication	SLT is short for: SAP landscape transformation CDC is short for: change data capturing SLT is an extraction, transformation, and loading (ELT) tool that allows you to load and replicate data in real time, or to schedule data from a source system and a non-source system into the SAP HANA database.
SUM	Short for: Software Update Manager

Term	Description
SUM directory	<p>Directory that is created when the SUM archive is unpacked on the host where the tool is initially started. During the unpacking, data and programs are copied to this directory.</p> <p>The recommended standard path of the SUM directory is:  <i>usr</i>  <i>sap</i>  <i><SID></i>  <i>SUM</i> </p>
target system	Final system state running on the target release. The system is connected again to the original database schema.
update	<p>A collective term for all the software logistics processes that you can perform using SUM (such as performing release upgrades, installing enhancement packages, or updating a system with support package stacks).</p> <p>In this document, the term is used in the context of</p> <ul style="list-style-type: none"> • release upgrades • application of feature package stacks • application of support package stacks <p>using SUM.</p>
upgrade subsystem	Finalization of the repository of target release. The upgrade subsystem operates on the original database schema.
UPL	Short for: usage and procedure logging. It is used to log all called and executed ABAP units such as programs, function modules, classes, methods, and subroutines.
V1	Stands for version 1 and represents the source release.
V2	Stands for version 2 and represents the target release.
ZDO	Short for: Zero Downtime Option. A procedure to minimize the technical downtime during the maintenance event.

2 Introduction

This part of the document contains information about the basic concept and the technical details of the ZDO of SUM.


1. [The ZDO Concept \[page 9\]](#)
2. [Downtime Optimization Approaches \[page 11\]](#)
3. [Technical Details of the Zero Downtime Option \[page 11\]](#)
4. [Specific Phases for ZDO \[page 14\]](#)

2.1 The ZDO Concept

This section describes the idea behind the Zero Downtime Option (ZDO) of the Software Update Manager (SUM).

A technical system downtime during an update can be expensive. For this reason, the ideal solution would be to run an update without having a technical system downtime. With the ZDO of SUM, updates of ABAP applications can be run without a technical downtime and with a minimized business downtime.

The idea behind ZDO is to have a bridge-subsystem in parallel with the production system. During the update on the production system, users can continue their work on the bridge-subsystem. The bridge-subsystem reflects the source release and contains all data of the production system that users need to continue their work.

All business transactions of the applications that are enabled for ZDO are fully available during the update. Applications that aren't fully available during the bridge runtime are listed accordingly in SAP Note [2707731](#). Users can continue, for example, working with transactions, scheduling and running batch jobs, and running print requests.

During the update, the network connections between systems are preserved.

The ZDO approach is beneficial for the following maintenance events:

- Applying support package stacks
- Applying feature packages
- Customer system releases
- System release upgrades

There are three facts about the Zero Downtime Option:



Option of Software Update Manager



Minimal database space requirements



Only a single restart needed

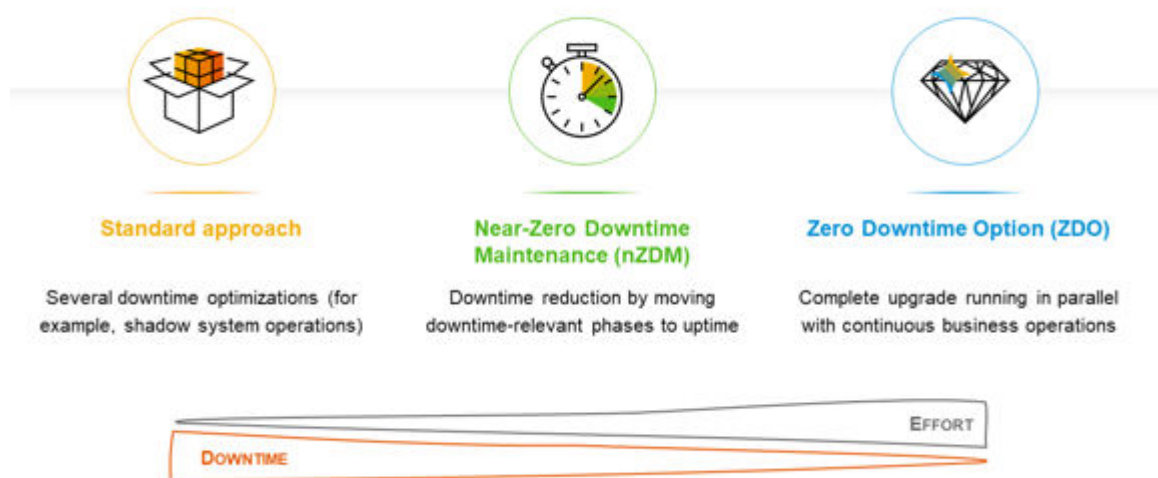
1. ZDO comes along with SUM that is the standard tool for software maintenance. There's no additional license needed and no separate tool required.
2. The database footprint is rather small since not the entire database is cloned. Instead, only selective tables are cloned. The clone tables are determined based on the changes to be performed during the maintenance event.
3. The technical downtime goes down to a single restart of the application servers. The database, however, isn't restarted. Usually, the restart takes approximately 5 to 15 minutes dependent on the number of application servers.

For more information, see also the blog [Leveraging Zero Downtime Option of SUM for SAP S/4HANA Support Package Stack updates](#) 🖱️ in the SAP Community.

2.2 Downtime Optimization Approaches

The Software Update Manager supports downtime-optimized approaches for some scenarios for updating SAP S/4HANA.

In the past years, the approaches to minimize downtime have evolved significantly. Among the approaches shipped along with Software Update Manager 2.0, there are three main approaches for applying release upgrades, support package stacks, and feature package stacks:



Both, the standard approach and the near-Zero Downtime Maintenance (nZDM) include major improvements for minimizing the technical downtime. However, the technical downtime cannot be reduced with the standard approach and also not with nZDM. This can be achieved with the *Zero Downtime Option* (ZDO) of SUM as the next level of downtime-optimization.

Note, however, that the more you want to optimize the downtime, the more effort you have in the project. The effort includes both the project planning effort and the testing effort, which is higher for zero downtime updates.

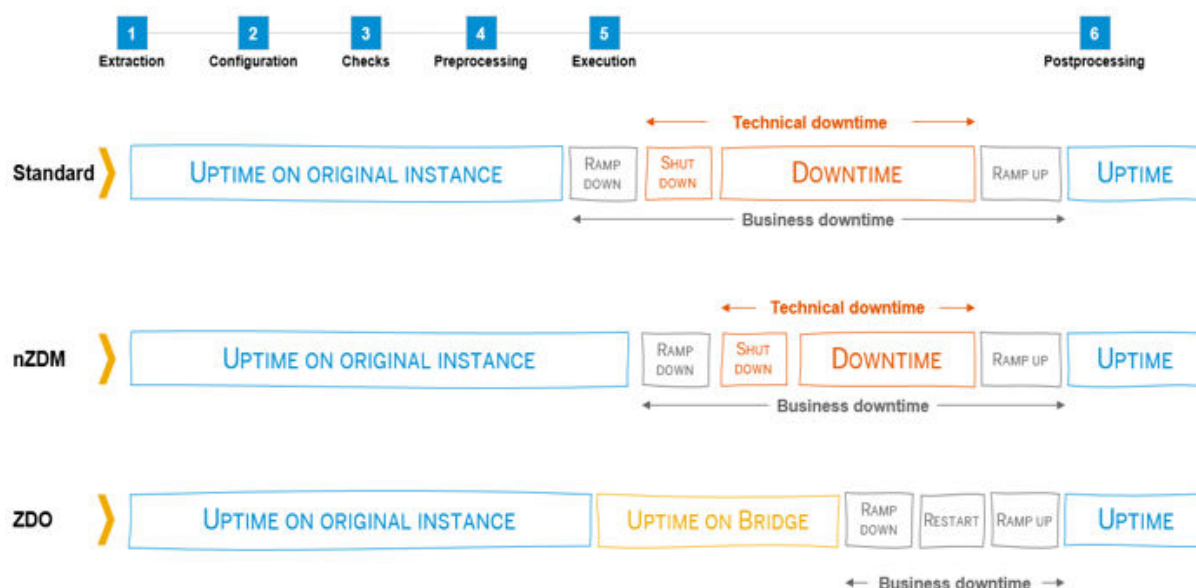
You can get an overview about the different approaches and scenarios on the SAP Support Portal at <https://support.sap.com/en/tools/software-logistics-tools/software-update-manager.html#section>.

2.3 Technical Details of the Zero Downtime Option

This section deals with the Zero Downtime Option (ZDO) from a technical point of view.

The basic principle of the ZDO is to update an SAP system while production is running in parallel. When updating with ZDO, the SAP system runs productively on the old release while the update process is performed at the same time. In this way, the update has no technical downtime.

The following figure illustrates how the technical downtime is already reduced when using the nZDM approach. With the ZDO approach, the technical downtime can be eliminated and replaced by the *uptime on the bridge*.



The General Solution Approach

The bridge subsystem is a part of the existing system that runs in parallel to the update subsystem during system maintenance. In the standard approach and the nZDM approach, all users are logged off from the system at a certain point in time, and the technical downtime starts. With the ZDO approach, all users are transferred transparently and in the background to the bridge subsystem. The Software Update Manager connects the users from one database schema to another database schema.

The following picture shows the basic steps of the ZDO procedure:

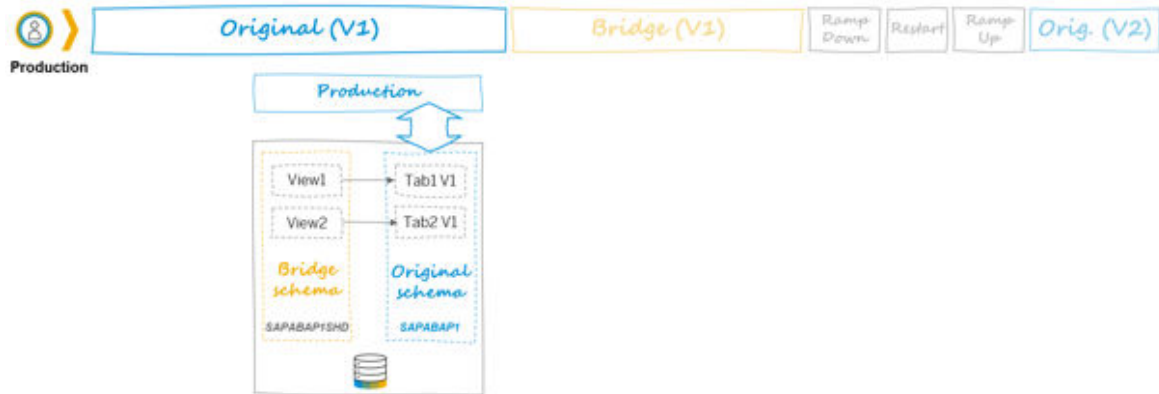


1. Business users work with release 1 while the update is running in the uptime.
2. Business users are smoothly transferred and reconnected to the bridge subsystem without any interruption.
3. While productive business operations continue on the source release, the remaining update phases run in parallel on the subsystem that is being updated. In this way, the Software Update Manager can perform during uptime activities that are performed in other approaches during downtime.
4. At the end of the update, the application server must be restarted to activate the new release version, which usually takes between 5 and 15 minutes. The database is not restarted.

Afterwards, the system is on the new release 2.

The Bridge Concept

1. At the beginning of the ZDO procedure, the upgrade system is running on the original version. During an update with ZDO, SUM works on a single database with two schemas: The bridge schema (for example in the following figure `SAPABAP1SHD`) and the original schema (`SAPABAP1` in this example).

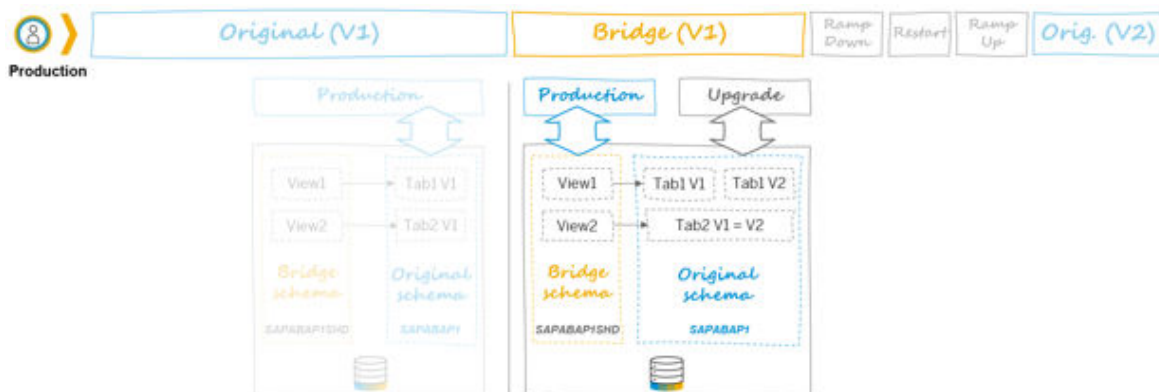


2. The Software Update Manager generates for each SAP-specific or customer-specific table a view in the bridge schema, which then refers to the original tables. At this point in time, only one version of the tables (V1) exists, which represents the source release. The original schema continues to be used productively.
3. When the rollover to the bridge subsystem is initiated in phase `REQ_USER_ROLLOVER_PREP` (see also [Transition of Users to Bridge Subsystem \[page 53\]](#)), all work processes are automatically reconnected to the bridge schema in phase `BRIDGE_RECONNECT` (see also [Database Reconnect Transition Method \[page 53\]](#)).

After all users have been transferred to the bridge subsystem, the default database schema of the production system is renamed by appending `SHD` to its name. For example, the `SAPABAP1` database schema is renamed to `SAPABAP1SHD`.

The upgrade subsystem with which the upgrade is performed, is still connected with the original database schema (`SAPABAP1` in the example).

4. While the upgrade is being performed on the target release tables (V2 tables), the generated views (view 1 in the example illustration) continue to point to the source release tables (`tab1 V1` in the example). As a result, the productive use can continue on the bridge subsystem.
If no adjustment of the table structure is required during the upgrade, no additional V2 table is created (in the example, `tab 2 V1=V2`), and the generated view (in the example, view 2) still points to this table.



5. At the end of bridge phase, the system needs must be shut down. As with any other upgrade, activities are required such as:
 - cleanup of queues
 - descheduling of jobs
 - check for erroneous update processes
 - logging off all users
 - locking the system
6. After the restart of the system, business users are connected back again to the original schema and the business operations can continue.

2.4 Specific Phases for ZDO

In addition to the phases of a standard update procedure, the following phases are specific to ZDO:

Phase	Purpose	Comment
PREP_CONFIGURATION/ SUMASK_ZDO_CONFIGURATION	Configuration of ZDO	<p>The administrator is asked if a system backup needs to be performed during the system re-start.</p> <p>For more information, see Backup Strategy for ZDO [page 42]</p>
RUN_RSPTBFIL_ZDM_CHECK_BW	SAP BW Check	<p>Checks for an active SAP BW system. As a result, the following log messages are possible:</p> <ul style="list-style-type: none"> • NO_BW_SCOPE: System scope is NO_BW_SCOPE, ZDO is supported • ANALYTICS_ONLY: System scope is ANALYTICS_ONLY, ZDO is supported • DATA_WAREHOUSE: System scope is DATA_WAREHOUSE, ZDO is not supported, see SAP note 2707731 • DATA_WAREHOUSE: System scope is DATA_WAREHOUSE, critical objects on allow list, ZDO is possible <p>For more information, see Error in Phase RUN_RSPTBFIL_ZDM_CHECK_BW [page 58].</p>

Phase	Purpose	Comment
PREP_GENCHECKS/ PARRUN_ZDO_CONSISTENCY_*	ZDO consistency check for ABAP dictionary objects, database objects, SLT logging tables, and SLT triggers	<p>The purpose of the check is to detect inconsistencies already in the original system at an early stage as part of the General Checks module.</p> <p>For example, ZDO can only handle database indexes that are defined in the data dictionary. Undefined indexes disappear in the target release when the table is to be cloned. Such indices must be removed directly or defined in the data dictionary using the transactions SE11 or SE14.</p> <p>See also in chapter Known Issues [page 58] the section ► <i>Error in Phase PARRUN_ZDO_CONSISTENCY_CHECK or RUN_ZDO_CONSISTENCY_CHECK_POST</i> ► <i>With Regard To The SLT Setup</i> ►.</p> <div> <p>⚠ Caution</p> <p>If inconsistencies are found during the ZDO consistency check, you can ignore them and continue the update procedure with ZDO. Note, however, that this can lead to consequential errors in the procedure, which may even require a reset of the Software Update Manager. We therefore strongly recommend correcting the inconsistencies instead of ignoring them.</p> </div>

Phase	Purpose	Comment
SUMCHK_ZDO_HTA_HTC	Check for SAP HANA repository objects, as these objects cannot be used for the SUM procedure with ZDO.	<p>After you start the Software Update Manager, the system checks for customer-specific SAP HANA repository objects for which the following transport option is used:</p> <ul style="list-style-type: none"> • SAP HANA Transport for ABAP (HTA) for SAP HANA Repository • SAP HANA Transport Container (HTC) <p>These customer-specific SAP HANA repository objects are not accessible during ZDO. If they are found, a dialog box appears on the interface. It contains:</p> <ul style="list-style-type: none"> • warnings for objects that do not yet exist in the SAP HANA database • error messages for objects that exist in the SAP HANA database and in ABAP. You can either ignore these error messages and at the same time accept that these objects cannot be accessed during ZDO. Or you can migrate these objects to the <i>SAP HANA Deployment Infrastructure (HDI)</i> before you start the upgrade with ZDO. <p>For more information, see SAP Note 3180989.</p>
MAIN_SHDIMP / SUBMOD_SHD2_RUN / GENKEYTRACE	Test import for ZDO	Preparation step required for ZDO table classification.
MAIN_SHDIMP / SUBMOD_SHD2_RUN / CHECK4NOTES_TOOL_SHD2	Implementation of SAP Notes in the shadow system	Checks for SAP Note corrections required by SUM in the shadow system. These SAP Notes belong to the target release.
MAIN_SHDIMP / SUBMOD_SHD2_RUN / SUBMOD_LC4BRI_PREP / RUN_RSPTBFIL_ZDM_CLASSIFY	Table classification to calculate the handling of tables during the ZDO procedure	<p>In phase <code>RUN_RSPTBFIL_ZDM_CLASSIFY</code>, tables are classified as follows on how they are handled during the upgrade.</p> <ul style="list-style-type: none"> • <i>Share</i>: Tables are not affected by the upgrade • <i>Clone</i>: Tables are populated with new or additional content • <i>Read Only</i>: Tables to which complex structural changes are made <p>A possible business impact can be estimated with the Impact Analysis [page 22].</p>

Phase	Purpose	Comment
MAIN_SHDIMP / SUBMOD_SHD2_RUN / SUBMOD_LC4BRI_PREP / RUN_IMPACT_ANALYSIS_ZDO	Impact analysis by SUM in batch mode	Analysis of the table classification impact on productive usage statistics regarding tables that are modified by after-import methods. From this phase on, the dialog version of the impact analysis can also be used. For more information, see Impact Analysis Usage [page 25] .
Start phase: MAIN_BRISETUP / REQ_USER_ROLLOVER_PREP Completed with phase: MAIN_BRITRANS / REQ_USER_ROLLOVER_FINAL	Rollover to bridge subsystem	From this point in time, tables classified as <i>Read Only</i> become read-only for the bridge subsystem.
MAIN_SWITCH / EU_SWITCH_ZDM	Smart switch	SUM renames the original tables classified as <i>Clone</i> tables.
MAIN_SWITCH / SUBMOD_LC4BRI_EXEC / SQLRUNTASK_FDCT_TRANSFER	Fast data copy transfer	Creation of live clone tables.
MAIN_NEWBAS / SUBMOD_ZDO_REPLAY / RUN_ZDOREPLAY_REPLAY_LKPM	Replay phases	Replay of the changes created during the runtime of phase SQLRUNTASK_FDCT_TRANSFER.
MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / RUN_PREP_CHECK_ILACCESS	Illegal access check	Checks for illegal table access from the upgrade subsystem.
Start phase: MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / REQ_USER_ROLLBACK_PREP If you have chosen in phase SUMASK_ZDO_CONFIGURATION that a backup has to be requested, you are prompted in phase MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / REQ_ZDO_SYSTEM_BACKUP to perform the complete system backup Completed with phase: MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / REQ_USER_ROLLBACK_FINAL	End of bridge subsystem	Roll back to the productive system and system restart. The target release becomes active after the system restart.

3 Planning

This part of the document contains information about the planning of your update procedure using the ZDO of SUM.

1. [Project Planning Aspects \[page 18\]](#)
2. [Impact Analysis \[page 22\]](#)
3. [Restrictions During the Runtime of the Bridge Subsystem \[page 30\]](#)

3.1 Project Planning Aspects

This part of the document contains information about basic project planning aspects.

1. [Test Cycles \[page 18\]](#)
2. [Exemplary High-Level Project Plan \[page 19\]](#)
3. [Additional Steps for ZDO \[page 20\]](#)
4. [Estimation of the Right Time for Rollover and Rollback \[page 21\]](#)

3.1.1 Test Cycles

Before you execute an update using the Zero Downtime Option in your productive system, plan and prepare the project by performing several test cycles.

The first cycle is essential for the overall success of the project. On this basis, you assess if ZDO is the right approach for your update project.

→ Recommendation

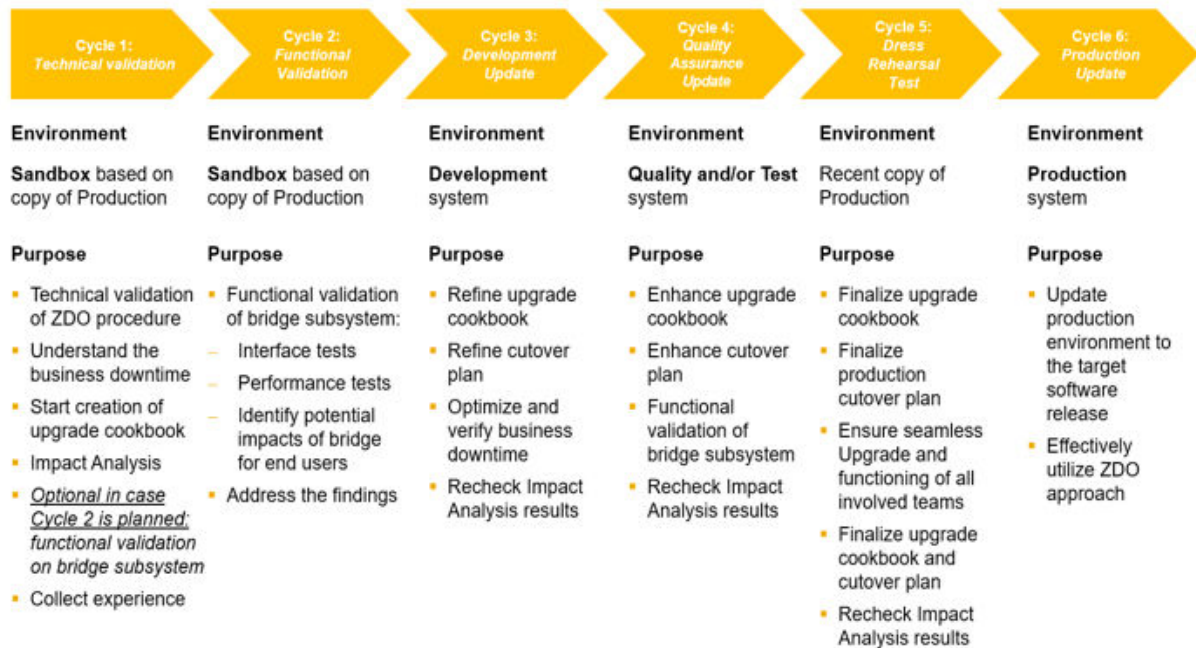
We strongly recommend running the first cycle in a sandbox system, ideally built from an up-to-date system copy of the production system. Running the first cycle on a sandbox system has the following purposes:

- You familiarize yourself with the technical approach of the *Zero Downtime Option*
- You specify the expectations for the business downtime
- You validate the bridge subsystem from a technical perspective
- You perform business validation tests in the sandbox system to verify the functionality of all core business processes during the bridge phase
- You analyze potential conflicts between update and production using the [Impact Analysis \[page 22\]](#)
- You create an update cookbook

3.1.2 Exemplary High-Level Project Plan

This chapter deals with a high-level project plan as an example for 3-level system landscape.

The following exemplary project plan is a high-level project plan for a system landscape with 3 levels including all systems from sandbox to production. It is highly recommended using the same update approach (that is, standard update, nZDM, or ZDO) across the system landscape.



Cycle 1 and cycle 2 can be combined into one test cycle that focuses on both, the technical validation of the ZDO procedure and the functional validation of the source release when running on a bridge subsystem.

i Note

Check the results of cycles 1 and 2 carefully. Especially, the results of the impact analysis must be interpreted and discussed with the respective functional teams. Based on the findings, you make a Go or No Go decision for the further ZDO project.

ZDO is used for all systems including development and quality assurance or test systems. The last cycle before production must run on an up-to-date copy of production to ensure that all potential issues that can occur in production are found.

3.1.3 Additional Steps for ZDO

This section deals with some steps to be considered in addition to the standard update procedure using SUM.

Installing SUM Toolbox

The *SUM Toolbox* is mandatory. It must be installed on every system that is updated with ZDO. Before you start the update procedure, make sure that the latest version of the SUM toolbox is available in each system in the system landscape and in the sandbox system.

For more information about the SUM toolbox, see SAP Note [3092738](#) .

Interpreting the Results of the Impact Analysis

This step is essential and must not be skipped. If you ignore the results, a serious business impact on production can occur if unchecked business-relevant tables are set to read-only. For more information, see [Impact Analysis at a Glance \[page 22\]](#).

Functional Validation During the Bridge Runtime on a Non-Productive System

We recommend testing all business processes that must be available for daily operation on the bridge subsystem. For this, the source release must be validated again. Compared to standard upgrades, where only the target release is tested, the test effort can increase significantly.

Considering Load Verification

As with the functional validation, it is recommended to trigger a load check in a non-productive system during the time when users are working on the bridge subsystem. From the upgrade tool perspective, there is no requirement to have real users in the system. The load can also be generated with any load generation and test tool.

Testing the Database Replication Setup

Database triggers used by *SAP Landscape Transformation* (SLT) scenarios require more attention for ZDO. For more information, see [SLT Replication Handling \[page 36\]](#).

→ Recommendation

If SLT is used on a productive system, we strongly recommend performing this test already as part of the first sandbox iteration.

3.1.4 Estimation of the Right Time for Rollover and Rollback

This section deals with the estimation of the right time for rollover and rollback.

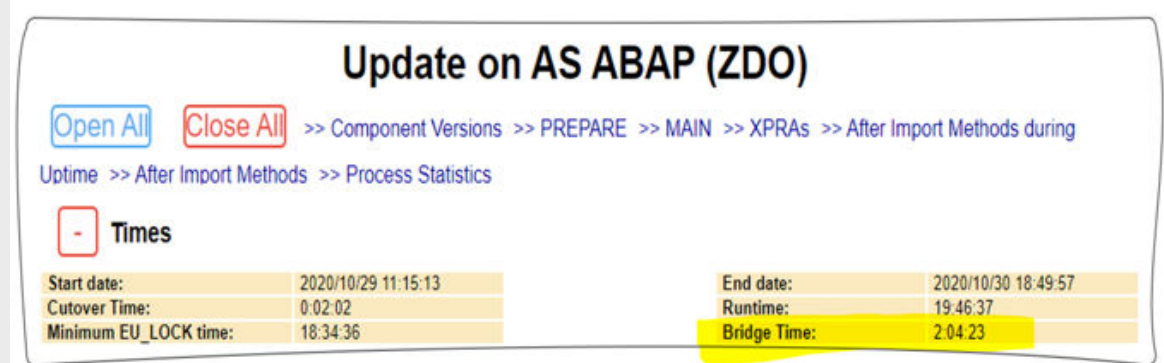
We recommend performing the rollover to the bridge subsystem outside the peak hours. Some steps after the rollover, such as the smart switch in the EU_SWITCH_ZDM phase, need an exclusive database lock on the table to switch the table spontaneously.

Analyze the system load (dialog and batch load) and the alignment of the rollover to the bridge subsystem best in close collaboration with the functional teams. As of this point in time, read-only restrictions are active for the read-only tables.

Also calculate the rollover to the bridge subsystem based on the runtimes from the last pre-production test cycle performed with an up-to-date copy of the production.

❖ Example

Example of a runtime analysis and a time estimation:



Assuming, as per the upgrade analysis file (upgana.xml), the net-runtime of the bridge subsystem in the dress rehearsal cycle took approximately hours. Add then a buffer to calculate the recommended runtime of the bridge subsystem in production.

If the net runtime of the bridge subsystem in the last test cycle took some hours according to the upgrade analysis file (upgana.xml), add to the calculated runtime of the bridge subsystem in production a buffer.

→ Recommendation

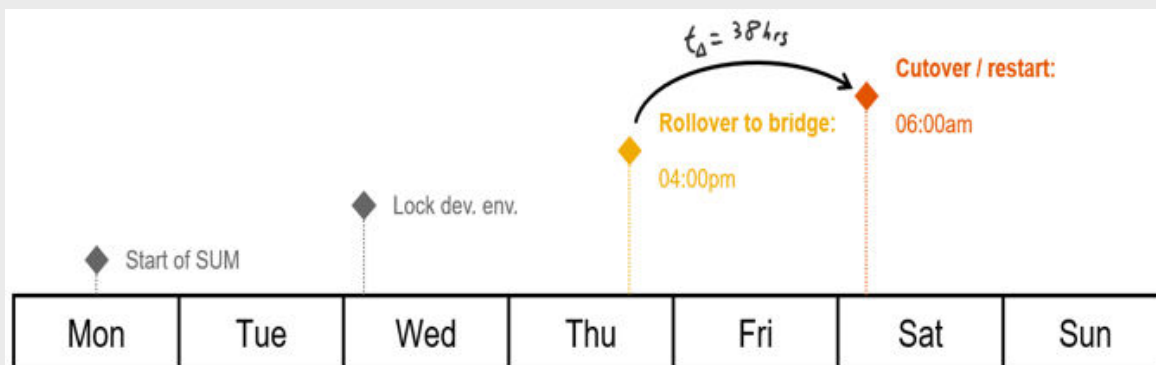
To calculate the productive bridge runtime, add approximately 24 hours buffer runtime to the net runtime. Example:

- Bridge runtime in last test cycle: 2 hours
- Recommended runtime in production: at least 26 hours

Furthermore, check when the cutover shall take place.

❖ Example

In this example, the cutover and restart of the system is planned for Saturday morning 06:00 am:



The recommended minimum runtime of the "Bridge" subsystem is about 26 hours, therefore you can now calculate time for the transition to the bridge. In the example, the system has a low system load every Thursday at 4 pm. Since the delta between this time and the planned restart time is 38 hours, which is longer than the recommended 26 hours, all requirements are met.

i Note

There is no maximum runtime of the bridge subsystem. As long as there are no business constraints, you can extend the bridge runtime to meet your project requirements.

3.2 Impact Analysis

This part of the document contains information about the impact analysis for ZDO.

1. [Impact Analysis at a Glance \[page 22\]](#)
2. [Exporting Table Statistics to the Productive System \[page 24\]](#)
3. [Impact Analysis Usage \[page 25\]](#)
4. [Applying Best Practice for Impact Analysis \[page 29\]](#)

3.2.1 Impact Analysis at a Glance

This section deals with the impact analysis as a preparatory step for an update with ZDO.

Performing an update with a downtime-optimization approach can have a certain impact on the ongoing business operations of the bridge subsystem. Therefore, impact analysis is an important step in preparing the update procedure with ZDO.

The following impacts are checked by the impact analysis for ZDO:

- Read-only restrictions for users on the bridge subsystem
- Database triggers (such as SLT triggers) that have to be removed from certain tables, or an initial load is required after the update is complete
- Additional free space on the database required for the cloned tables
- Tables that are smart-switched but have a high number of changes

To identify these impacts in advance, you can export table statistics from your production system and provide them to Software Update Manager in the first test cycle run in the sandbox system. The impact analysis can predict what happens when the defined update scope is applied in the production system.

The results of the impact analysis are based on the following factors:

- The defined scope (list of software components as well as source and target state of software component versions) must be identical in all systems. If the stack definition is changed, the result also changes.
- The exported table statistics represent the business operations on the bridge subsystem. All relevant business processes are included according to the exported statistics file. For more information about project planning aspects, see [Project Planning Aspects \[page 18\]](#).

The following SAP Notes are relevant for the impact analysis for ZDO:

- SAP Note [2402270](#): Export of Table Statistics for SUM Impact Analysis
- SAP Note [2471883](#): SUM Impact Analysis for ZDO
- SAP Note [3092738](#): Software Update Manager Toolbox - Central SAP Note

The analysis is based on statistical data from the production system as the user activities take place in this system. For this purpose, a tool must be provided in the production system that enables the export of the statistical data. This data is then analyzed either in a special phase in SUM or by a dialog report in the system.

Part of the update is the table classification in phase RUN_RSPTBFIL_ZDM_CLASSIFY, which calculates how the tables are handled during the update. Both customer-specific and SAP-delivered tables are included.

The most important table classification types are:

Table Classification Type	Example	Comment
Share	The update does not change the table or only adds a new non-key field.	The tables are not cloned. There are no restrictions.
Clone	The update provides table content or a structural change.	Additional database space is needed for the table clone, and the change record and replay. There are no restrictions.
Clone read-only	The update provides a complex structural change, or an XPRA accesses the table.	Additional database space is needed for the table clone, and the change record and replay. The table is read-only for users for the time when they work on the bridge subsystem.

To identify ZDO-related table restrictions, the impact analysis combines table statistics exported from your production system with the ZDO table classification result in the system where SUM is running.

Overview on Reports and Tools Related to Impact Analysis

The following list contains all relevant reports and tools for the impact analysis and their main purpose.

Delivered with SUM 2.0 Tool Import (Will Be Deleted After the Upgrade)

Report	Purpose
RSUPG_RUN_IMPACT_ANALYSIS	Used by the Software Update Manager in batch mode in phase RSUPG_RUN_IMPACT_ANALYSIS

Tools Delivered with SUM Toolbox (SAP Note 3092738)

Tool	Purpose
Export data for impact analysis	Export of table statistics of the production system to a compressed file (such as <code>zdimpana.zip</code>)
Export of SUM classification data	Export of table classification data of the Software Update Manager (such as <code>puttb_shd.zip</code>)
Impact Analysis	Dialog version of the impact analysis that can be used in the system upgraded with ZDO after phase RUN_RSPTBFIL_ZDM_CLASSIFY is completed

For more information, see the following SAP Community blogs:

- [Impact Analysis as part of Software Update Manager 2.0](#)
- [Software Update Manager Toolbox is Available Now](#)

3.2.2 Exporting Table Statistics to the Productive System

The table usage statistics is representative for the time when the update is performed. In particular, it's important to consider the time when business users are working on the bridge subsystem.

Context

An ideal dataset covers a period of time with all activities and business processes, such as the time in the week when SUM performs the update. To export table size information, make sure that the database statistics are up-to-date. Outdated database statistics can result in inaccurate size values.

i Note

The export tool is delivered as part of the *Software Update Manager Toolbox*. For more information, see:

- SAP Note [3092738](#): Software Update Manager Toolbox - Central SAP Note
- Blog [Software Update Manager Toolbox is Available Now](#)
- Blog [Impact Analysis as part of Software Update Manager 2.0](#)

Execute the tool **Export data for Impact Analysis** in transaction SUMT00LBOX to export the statistical data to the productive system.

Procedure

1. Call transaction SUMT00LBOX.
2. Execute the tool **Export data for Impact Analysis** to export the statistics to the file ZDIMPANA.ZIP.
3. Check for periods that are not flagged as **Contains Imports** to avoid false positives in impact analysis.

For example, if you perform daily imports into the productive system, you cannot select a period. In this case, you must continue with the selection of periods that are flagged as **Contains Imports**.

If you export a large period of time, such as a month or more, it is possible that you also export statistics about table accesses that are not necessarily relevant to the business processes needed during the runtime of the bridge subsystem.

4. Provide the exported file ZDIMPANA.ZIP to the save subdirectory of the SUM directory.

Note that the save subdirectory is only created by the Software Update Manager during the **Preprocessing** roadmap step.

3.2.3 Impact Analysis Usage

This section deals with aspects of the impact analysis usage.

If you keep the default selection for all fields, the statistics file ZDIMPANA.ZIP located in <SUM directory>/abap/save is used.

Starting the Impact Analysis

There are two possibilities to run the impact analysis:

1. In batch mode: The Impact Analysis is called during a SUM run in phase RUN_IMPACT_ANALYSIS_ZDO. This phase uses the file ZDIMPANA.ZIP.
2. As a dialog from the SUM toolbox: The impact analysis of the delivered as part of the *Software Update Manager Toolbox*. For more information, see SAP Note [3092738](#). After the phase RUN_RSPTBFIL_ZDM_CLASSIFY is completed, it can be called in dialog mode.

Evaluating the Impact Analysis

Note

The evaluation of the impact analysis cannot be called until the RUN_RSPTBFIL_ZDM_CLASSIFY phase is completed.

If something is found, SUM stops in phase RUN_IMPACT_ANALYSIS_ZD0 with an error message:

Log file for phase RUN_IMPACT_ANALYSIS_ZD0: <DIR_PUT>/SUM/abap/log/IMPANAUPG.<SID>

The results need to be checked in detail, which takes a while. Therefore, you can ignore the error at this time by selecting *ignore phase errors and proceed to next phase*. While SUM continues with the update, check every single result of the impact analysis carefully.

You have two options to perform the check:

- Read the text-based log file output.
- Use the dialog mode of the impact analysis in SUM Toolbox.

Impact Analysis Output in SUM Toolbox

In the following, you see an example of an impact analysis output triggered in the dialog mode:

The screenshot shows the SUM Toolbox interface with the following sections:

- File Selection:** Table classification data: Data from local system table PUTTB_SHD. Table statistics: /usr/sap/PPM/SUM/abap/save/ZDIMPANA.ZIP. Execute button.
- Header:** SUM scenario: ZD0. Source system ID: S4H. Database platform: HDB. Contains imports: No. Number of evaluated days: 16.
- Overall Summary:** Estimated DB size for cloned tables (GB): 251. Total number of read-only tables: 2. Total change volume for all tables per day (mio): 18.7. Total number of cloned tables: 3. Estimated growth for logging tables per day (GB): N/A. Online replication volume for cloned tables per day (mio): 2.4.
- Impact Analysis Findings:** Number of large tables: 0. Number of tables with database triggers: 1. Number of read-only tables: 1.
- Findings Table:**

Severity	Category	Message Text	Table Name	Package	Applic. Component	Software Component
▲	Smart-switch	TABL COVRES will be smart-switched, but has 14.5 changes/second	COVRES	SCOV_MAIN	BC-DWB-TOO-COV	SAP_BASIS
▲	Read-only	Implement SAP Note 308977 to avoid business impact on bridge subsystem due to read-only restriction on TABL CREP_HTTP	CREP_HTTP	SCMS	BC-SRV-KPR-CMS	SAP_BASIS
▲	Read-only	Read-only restriction on TABL PAT01 is considered uncritical	PAT01	SPAM	BC-UPG-OCS	SAP_BASIS
▲	Cloned	TABL STXL will be cloned, but has size of 163,005 GB	STXL	STXD	BC-SRV-SCR	SAP_BASIS
▲	Smart-switch	TABL STXL will be smart-switched, but has 13.5 changes/second	STXL	STXD	BC-SRV-SCR	SAP_BASIS
●	Triggers	TABL STXL SLT replication requires initial reload after rollback (REQ_USER_ROLLBACK_FINAL)	STXL	STXD	BC-SRV-SCR	SAP_BASIS

The user interface is divided into five sections:

Section	Purpose
(1) File Selection	<p>Displays the relevant data for performing the impact analysis.</p> <p>The following three scenarios are covered:</p> <ol style="list-style-type: none"> Impact analysis on the system where a ZDO upgrade procedure is active. <ul style="list-style-type: none"> The source for the table classification data is the database table in the system that contains this information. The source for the table statistics is the file ZDIMPANA . ZIP located in <SUM directory>/abap/save. Impact analysis on the system where a ZDO upgrade procedure is active, but using a new table statistics file. <ul style="list-style-type: none"> The source for the table classification data is the database table in the system that contains this information. The table statistics are uploaded via SAP GUI. Removed impact analysis on any other system of the same system landscape as, such as development system. <ul style="list-style-type: none"> The table classification data has been exported via SUM toolbox from a system where the ZDO upgrade procedure is completed. The output file PUTTB_SHD . ZIP is uploaded via SAP GUI. The table statistics are uploaded via SAP GUI.
(2) Header	Displays information such as export date, source system ID, number of evaluated days, and whether software changes such as importing shipments are included during the exported time.
(3) Overall Summary	Displays the total number of cloned tables, read-only tables, and additional database space for cloned tables. It also displays the total change volume for all tables in the system, and the online replication volume for cloned tables per day. These numbers help you to better understand the ratio of cloned tables compared to the total number of changes in the system.
(4) Impact Analysis Findings	Summarizes and aggregates the issues. Also, gives an estimate on the required database free space for the clone tables.
(5) Result table in ALV grid	Displays results at severity, category, and table level.

i Note

Check the result table carefully as these findings can be relevant and critical when you perform an update with ZDO in the productive system.

Possible Categories

Category	Comment
Read-only	<p>The most critical category that always has to be checked in detail.</p> <p>The table is used in the productive system according to the provided statistics, but is read-only during the runtime of the bridge subsystem.</p>
Triggers	<p>If database triggers exist in the production system, a reload can be necessary, or the trigger must be dropped. For more information, see SLT Replication Handling [page 36].</p>
Cloned	<p>Large tables that are cloned.</p>
Smart-switch	<p>Tables that are cloned, but changed frequently in production.</p> <p>All clone tables are renamed in phase EU_SWITCH_ZDM, which requires an exclusive lock. However, the more changes a table has, the more difficult it is to get an exclusive table lock.</p>
Comp. view	<p>Tables that receive a new non-key field can be kept as "shared". The bridge subsystem only sees the old fields using a compensation view.</p> <p>The new field is added dDuring the upgrade in phase PARCONV_UPG. This requires an exclusive table lock.</p>

Possible Severities:

Severity	Comment
Green (square)	<p>Uncritical finding. Usually, no further action is required.</p> <p>By default, these entries are hidden. To display them as well, click the green button in the ALV Grid menu bar.</p>
Orange (triangle)	<p>No immediate action is required. You are only reminded of a specific message, such as a warning that a table is smart-switched.</p>
Red (circle)	<p>These messages must be checked in more detail with the business teams, as there is a potential risk to productive business operations.</p>

3.2.4 Applying Best Practice for Impact Analysis

This section deals with the best practices for the impact analysis.

Context

The impact analysis called by SUM during the update runs in batch mode and evaluates a single record provided with file `ZDIMPANA.ZIP`.

However, it can be an advantage to perform the impact analysis with different periods of time. This helps to identify tables that are irrelevant or non-critical for the point in time when the update is scheduled to run in the production system.

Some tables that are set to read-only by the update can only be used for a single business process that is likely to run in the first week of a month. However, if the update is planned for the third week of a month, this table can also be considered as non-critical.

Ideally, you follow this best practice already in the sandbox system, where the first test cycle of the update with ZDO project is performed.

Procedure

1. As a preparation, execute the export of table statistics with the *SUM Toolbox* in the production system.

Make sure that the time period represents the uptime on the bridge subsystem, and run the tool **Export data for Impact Analysis** in the *SUM Toolbox* several times.

❖ Example

You run the export in calendar weeks 20, 21, 22, and 23. As a result, four separate ZIP files are created. (Note: If you use the dialog version for the impact analysis, you do not have to follow a specific naming convention for these files.)

For more information, see [Exporting Table Statistics to the Productive System \[page 24\]](#).

2. Execute the tool **Impact Analysis** with the *SUM Toolbox* in the sandbox system.
Make sure that at least phase `RUN_IMPACT_ANALYSIS_ZDO` is reached.
3. In the file selection screen of the impact analysis, choose the F4 help to upload the table statistics via SAP GUI.
4. Export the result list into a spreadsheet.
5. Perform steps 3 and 4 again for each table statistics file.
6. Consolidate the results of the impact analysis into a single spreadsheet.
7. Check whether tables are displayed only once or regularly.
8. Try to identify false positive results that could have been caused by an import of transports or an irregular process.

3.3 Restrictions During the Runtime of the Bridge Subsystem

During the runtime of the bridge subsystem, some restrictions must be considered.

Read-only Mode for Some Tables

During the bridge phase, ZDO sets some tables to read-only mode for the following different reasons:

- a complex structural change
- a conflicting table access by XPRA, XCLA, or `After Import Method` in phase XPRAS_AIMMRG
- a technical restriction because of the ZDO procedure

Normally, a read-only table does not affect the productive use of the system. The Impact analysis can detect possible read-only conflicts already during text cycles in the sandbox system. For more information, see [Impact Analysis Usage \[page 25\]](#).

Maintenance Mode in SUM

The update procedure with ZDO runs according to the *maintenance mode* of SUM. This means that the following update-related restrictions of the maintenance are active during ZDO process:

Workbench lock	As in the standard update procedure, the system is locked against the creation, modification, and deletion of Workbench objects after the LOCK_EU phase has been reached.
Transport lock	As in the standard update procedure, the system is locked against the import of transport requests after reaching the phase LOCK_EU.


Customizing lock

The system is locked against customizing changes. Exceptions to this are changes made during the runtime of the bridge subsystem as [Current settings](#).

i Note

- In productive environments, it is not a restriction, because the customizing is not changed directly in the productive system.
- Customizing that has been modified in the bridge subsystem to match the [Current settings](#) can cause unexpected dumps because the corresponding tables are set to read-only during by the ZDO procedure.

Transaction RZ10

The transaction **RZ10** is disabled during operations on the bridge subsystem. For more information, see SAP Note [2007911](#) .

Number ranges

Changes to number range intervals are not allowed during operations on the bridge subsystem. This can lead to inconsistencies in number assignment.

Native Database Connections to the Original Database Schema

As described in [Technical Details of the Zero Downtime Option \[page 11\]](#), the database schema changes during the rollover to the bridge subsystem.

If an external application or system uses native database connections to the original database schema (such as SAPHANADB), the application will be connected to the data belonging to the target release during the runtime of the bridge subsystem. Therefore, all native database connections must be disconnected as soon as the rollover to bridge is carried out in phase REQ_USER_ROLLOVER_PREP.

The connection can be re-established after the restart as soon as the phase REQ_USER_ROLLBACK_FINAL is reached.

4 Preparation

This part of the document contains information about the preparatory activities for your update procedure using the ZDO of SUM.

1. [Hardware Requirements Check \[page 32\]](#)
2. [High-Availability Setup \[page 33\]](#)
3. [Add-On Handling \[page 33\]](#)
4. [Preliminary Checks \[page 34\]](#)
5. [Handling UPL Data Collection Job \[page 34\]](#)
6. [SAP Business Warehouse Extractor Handling \[page 35\]](#)
7. [Silent Data Migration Handling \[page 35\]](#)
8. [SLT Replication Handling \[page 36\]](#)
9. [Usage of Custom Database Schemas \[page 40\]](#)
10. [Backing Up Table Content in the SAP HANA Repository 1.0 \[page 40\]](#)
11. [Migration of Native SAP HANA Database Objects \[page 41\]](#)
12. [Backup Strategy for ZDO \[page 42\]](#)

4.1 Hardware Requirements Check

CPU, Main Memory, Disk, and Swap Space

In general, the hardware requirements are the same as for the near-Zero Downtime Maintenance approach. Make sure that there is enough temporary disk space available in the file system for the ZDO update because large files are written temporarily to disk during some phases.

i Note

We recommend that the file system with the SUM directory has about 100 GB more disk space for the ZDO procedure than is required for the standard update.

See also in the *SUM Guide* the chapter [► Preparation ► Checking the Hardware Requirements ►](#).

Space Requirements in the Database

Make sure that enough temporary and permanent free space is available in your database. In addition to the requirements from the standard update, ZDO requires free database space for the clone tables. The additional

free space cannot be quantified beforehand because it depends on the scope of maintenance and on the size of the system.

However, if you already run the impact analysis in the first test cycle in the sandbox system, a projection is done by cumulating the sizes of the clone tables. This calculation is based on the provided statistics file `ZDIMPANA.ZIP`.

For more information, see [Impact Analysis at a Glance \[page 22\]](#).

4.2 High-Availability Setup

This section covers the update of SAP systems with a high availability (HA) setup.

ZDO for SUM supports the update of high availability systems. The prerequisite is that the HA setup is set up correctly, that is, file systems such as `DIR_PROFILE` are also present on the bridge subsystem and are checked for functioning before starting the update. There are no further requirements for the HA system from ZDO side.

i Note

We highly recommend setting up the same HA solution in a non-productive environment.

During the update with ZDO, a dialog in the phase `SUM_ASK_ZDO_CONFIGURATION` asks you whether you want to switch to HA maintenance mode for further execution. If you want to use this mode, and your system is installed with an HA switch-over environment, make sure that the failover capabilities of the cluster switch-over software are disabled in the target release during the cutover and rollback to the original system. The Software Update Manager stops for this in the phase `REQ_USER_ROLLBACK_PREP`.

For more information about how to prepare the ASCS instance for downtime, see the *SUM 2.0 Guide*. Navigate here to ► [6 Running the Software Update Manager](#) ► [6.2 Actions During the Roadmap Steps](#) ► [Preparing the ASCS Instance for the Downtime \(HA Only\)](#) ►.

4.3 Add-On Handling

This section deals with the handling of add-ons by ZDO.

- All installed add-ons in the system must be ZDO compliant to perform an update with the ZDO functionality. See SAP Note [2707731](#) for a list of add-ons that are **not** enabled for ZDO.
- If you have add-ons in the system that are **not** enabled for ZDO, you can request a customer-specific project. For more information, see section [6. Registration Process for Customer-Specific Projects](#) of SAP Note [2707731](#).

4.4 Preliminary Checks

In addition to other tools, the Software Update Manager Toolbox software also includes a tool *ZDO Preliminary Checks*.


Before the Software Update Manager is started, you can use the ZDO preliminary checks to verify that the system can be updated with the Zero Downtime option of the Software Update Manager.

The checks must be performed in all systems that are to be updated with ZDO. Start with the sandbox system, which is ideally a recent copy of your production system to get the most benefit from the checks.

The focus of the preliminary checks is on the following topics:

- Use of the SAP Business Warehouse
- Status of the *Silent Data Migration* infrastructure
- Consistency check of data dictionary and database
- Consistency check of SAP HANA content deployment
- Consistency check of active nametab objects
- Verification of ZDO compliance of SLT setup

For more information about the SUM Toolbox, see SAP Note [3092738](#) .

For more information about the ZDO Preliminary Checks, see the SAP Community blog [Introducing the ZDO Preliminary Checks as part of SUM Toolbox](#) .

4.5 Handling UPL Data Collection Job

The section covers the handling of the data collection job of Usage & Procedure Logging UPL.

Context

If (UPL) is activated in your system, the data collection job `/SDF/UPL_PERIODIC_EXT_JOB` runs daily, extracts data from table `COVRES`, and deletes its content by processing the table either with the [Truncate](#) or with the [Drop/Create](#) option. Since this operation is incompatible with ZDO, it must be deactivated. Proceed as follows:

Procedure

1. Deactivate the batch job before phase `MAIN_BRISSETUP/REQ_USER_ROLLOVER_PREP`.
 - For local instances of batch job `/SDF/UPL_PERIODIC_EXT_JOB`, use report [/SDF/UPL_CONTROL](#).
 - If UPL is triggered by your Solution Manager system, proceed as follows:

1. Log on to your Solution Manager system.
 2. Call transaction SOLMAN_SETUP.
 3. In the list of scenarios, expand the subtree *Cross Scenario Configuration* and select *Usage Logging*.
 4. In section *Configure Usage Logging*, select the rows that belong to your ZDO target system.
 5. Choose *Deactivate Selected*.
2. Reactivate the batch job after SUM phase MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / REQ_USER_ROLLBACK_FINAL.
- For local instances of batch job / SDF/UPL_PERIODIC_EXT_JOB , use report **/SDF/UPL_CONTROL**.
 - If UPL is triggered by your Solution Manager system, proceed as follows:
 1. Log on to your Solution Manager system.
 2. Call transaction SOLMAN_SETUP.
 3. In the list of scenarios, expand the subtree *Cross Scenario Configuration* and select *Usage Logging*.
 4. In section *Configure Usage Logging*, select the rows that you deactivated previously.
 5. Choose *Activate Selected*.

4.6 SAP Business Warehouse Extractor Handling

Long running SAP Business Warehouse (SAP BW) extractor queues can lead to lock situation in certain phases of the update.

The following phases acquire exclusive locks on database tables that are processed in the respective phase:

- EU_SWITCH_ZDM
- SQLRUNTASK_LC4BRI_CRETRIGGER
- SQLRUNTASK_FDCT_TRANSFER
- PARMVNT_XCNV
- PARCONV_UPG

In general, we recommend deactivating SAP BW extractors during the bridge phase.

4.7 Silent Data Migration Handling

The **Silent Data Migration Infrastructure (SDMI)** is a framework that enables automatic application data migration during system uptime.

The migration of application data usually takes place in the course of release upgrades or updates during downtime. However, the SDMI also supports update or upgrade procedures with zero downtime option, so that silent data migrations can run in parallel to regular productive business operations after the procedure.

Before you start an update or upgrade procedure with zero downtime option, make sure that all relevant silent data migration classes have been executed successfully. With transaction **SDM_MON**, you can display all relevant classes for silent data migration across all clients in the system. If any unfinished silent data

migration classes exist, the Software Update Manager stops with an error in phase PREP_GENCHECKS / RUN_SDM_CHECK_STARTRELEASE.

❁ Example

Excerpt from the log file UPG_SDM_CHK_STARTRELEASE . <SID> in case of an error:

```
2EETG010 "SDM has unfinished migration" "CL_SDM_POCR_CORRECT_KPIS" "in client
000" "and SAP Note 2691264 can help"
4 ETG011 " "
2EETG010 "SDM has unfinished migration" "CL_SDM_POCR_CORRECT_KPIS" "in client
300" "and SAP Note 2691264 can help"
```

The procedure can only be continued if all relevant classes for silent data migration are completed.

For more information about the **Silent Data Migration Infrastructure (SDMI)**, see:

- the SAP Help Portal at <https://help.sap.com/viewer/a72da595f6a0485f8ad1a30851c2e314/201909.000/en-US/a9e0718f5277446285758e6c94e5abc5.html>
- the upgrade guides for SAP S/4HANA 2020 or higher at https://help.sap.com/viewer/product/SAP_S4HANA_ON-PREMISE. Choose ► **Implement** ► **Upgrade Guide** ►.

4.8 SLT Replication Handling

This section covers aspects with regard to the **SAP Landscape Transformation Replication Server (SLT)** and its replication handling.

- [Introduction \[page 36\]](#)
- [SLT Is Not Supported on Bridge Subsystem \[page 37\]](#)
- [SLT Is Supported on Bridge Subsystem \[page 37\]](#)
- [Setup of the RFC Connection to the SLT Server \[page 39\]](#)
- [Reduction of SLT Observer Job Runtime \[page 39\]](#)
- [Reset and SLT \[page 40\]](#)

Introduction

ZDO supports the SLT replication during an update if the connection between the SLT Server and the system that is upgraded or updated using ZDO is based on the **Remote Function Control (RFC)** technique. The system that is upgraded or updated using ZDO can either be an SLT source system or an SLT target system. This section only handles the previous case in which the system is an SLT source system and SLT triggers are present in your system. There is nothing to do for the subsequent case.

Besides an SLT Server setup, SLT can also part of the **Core Data Services (CDS)** reader and of the SLT reader scenario of *SAP Data Intelligence*.

If the system that is upgraded or updated using ZDO of SUM is an SLT source system, SLT replication is supported until the rollover to the bridge subsystem. You can decide in phase SUMASK_RFC_2_SLT_SERVER to

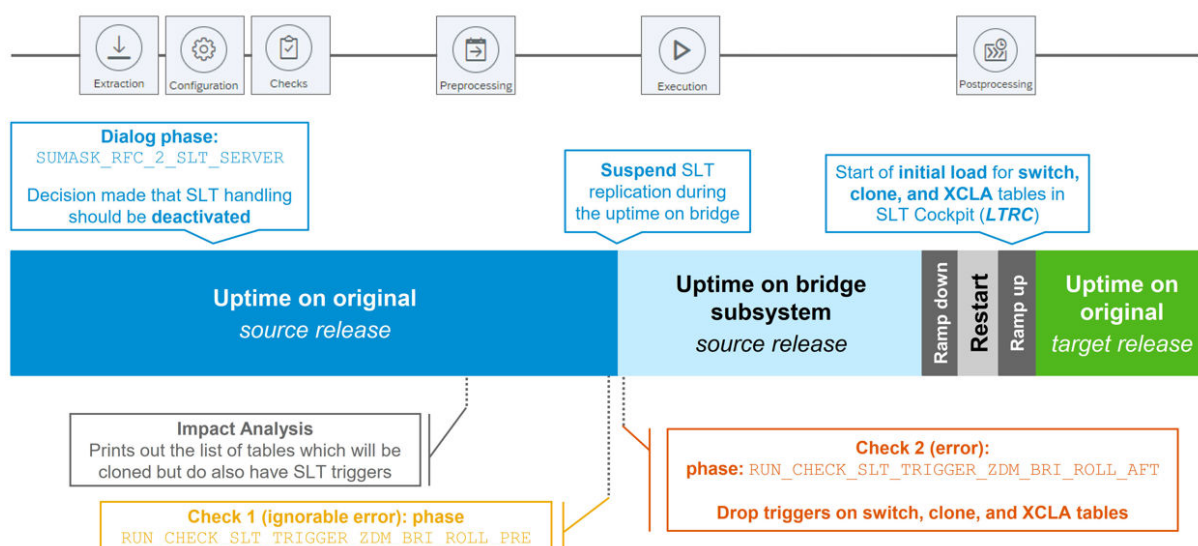
activate SLT processing so that SLT is also supported on the bridge subsystem. In this case, you can be asked during this phase for an RFC connection from the system that is upgraded or updated using ZDO to the SLT server. It must be provided if old /1LT/ SLT triggers exist in your system.

Note

Depending on the source system and SLT Server configuration, there are two SLT replication logics (in the following, referred to as "old" and "new"), which are handled slightly different during upgrade or update. While the triggers have the prefix /1LT/ in the **old** SLT replication logic, they have the prefix /1DH/ in the **new** SLT replication logic. The new SLT triggers can only be present on SAP S/4HANA 2020 or newer versions.

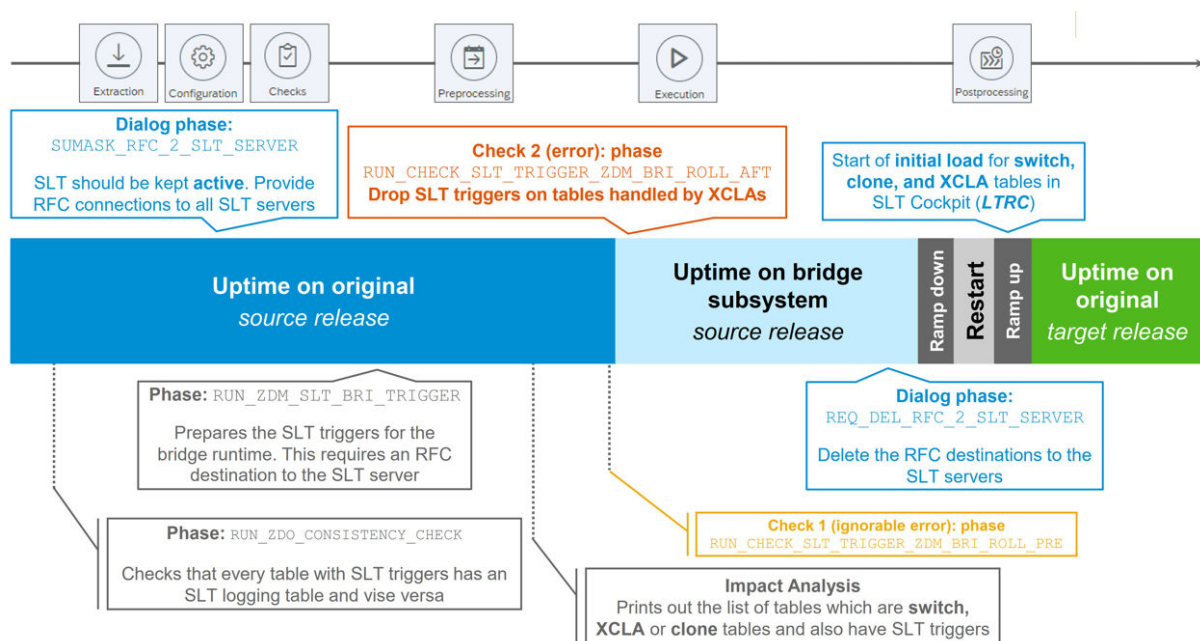
SLT Is Not Supported on Bridge Subsystem

In the following, you see a phase overview when SLT is not enabled on the bridge subsystem.



SLT Is Supported on Bridge Subsystem

In the following, you see a phase overview when SLT is enabled on the bridge subsystem.



If SLT handling on the bridge is enabled in phase SUMASK_RFC_2_SLT_SERVER, SUM looks for all SLT trigger on the system. If it finds

- old SLT triggers: It asks for a list of RFC connections to all SLT server of your setup
- only new triggers: It doesn't ask for a list of RFC connections
- no triggers: SUM runs with disabled SLT on the bridge

On XCLA tables, SLT replication is still not supported on the bridge subsystem. The phases RUN_CHECK_SLT_TRIGGER_ZDM_BRI_ROLL_PRE and RUN_CHECK_SLT_TRIGGER_ZDM_BRI_ROLL_AFT check, whether there are XCLA tables that are also part of the SLT replication. The triggers must be removed at the latest in phase RUN_CHECK_SLT_TRIGGER_ZDM_BRI_ROLL_AFT.

⚠ Caution

Delete in phase RUN_CHECK_SLT_TRIGGER_BRI_ROLL only triggers. SLT logging tables must not be deleted, otherwise SUM run into errors.

Additional requirements:

- SAP HANA database version 2.00.42 or higher
- For new SLT Trigger replications, CL_DHCDC_ZDO_UPGRADE_FACADE is part of the source system
- For new SLT Trigger replications, the SLT Observer job runtime is reduced to 10 minutes or less
- Do not start or stop SLT replication for a table after phase SUMASK_RFC_2_SLT_SERVER, otherwise SUM can run into errors.
- Use the *Note Analyzer* to ensure that the latest SLT-related corrections are implemented before you start the SUM procedure with ZDO. Both your SLT servers and the system being updated or upgraded with ZDO must be up to date. For more information, see SAP Notes [2596411](#) and [3016862](#). In addition, you can find a complete list of the relevant SAP Notes in the corresponding SAP Notes "Release Information SLT", which are listed in SAP Note [2572945](#).
- The connection between the SLT Server and the system that is updated or upgraded using ZDO must be RFC-based. Replication via a database connection is not supported.

Setup of the RFC Connection to the SLT Server

Depending on your SLT setup, you are asked in phase SUMASK_RFC_2_SLT_SERVER for a list of RFC connections from your system that is upgraded or updated using ZDO to the SLT Server.

Create the RFC destination manually in the source system with the following attributes:

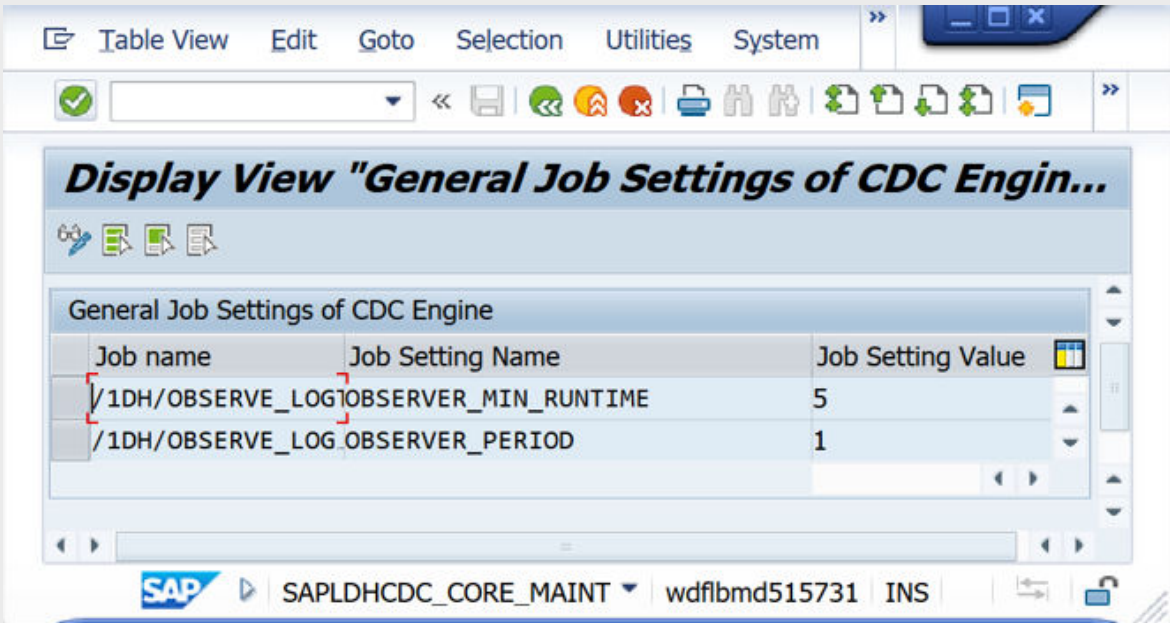
Type:	ABAP
Destination:	Central SLT server
Roles assigned to the user:	SAP_IUUC_REPL_ADMIN, SAP_IUUC_REPL_REMOTE, and SAP_MWB_PROJECT_MANAGER

At the end of the update, you are prompted to delete the RFC destinations in phase REQ_DEL_RFC_SLT_SERVER.

Reduction of SLT Observer Job Runtime

If a new SLT replication is used, reduce the runtime of the /1DH/OBSERVE_LOGTAB job from 60 minutes (default) to 10 minutes or less to avoid a time-out in the Bridge Reconnect phase. To verify if you can have new SLT triggers in your system check if the class CL_DHCDC_ZDO_UPGRADE_FACADE exists. You can change the runtime in the maintenance view of table DHCDC_JOBSTG with the following attributes:

❖ Example



The screenshot shows the SAP 'Display View General Job Settings of CDC Engine' interface. The title bar reads 'Display View "General Job Settings of CDC Engine...'. Below the title bar, there is a table with three columns: 'Job name', 'Job Setting Name', and 'Job Setting Value'. The table contains two rows of data:

Job name	Job Setting Name	Job Setting Value
/1DH/OBSERVE_LOG	OBSERVER_MIN_RUNTIME	5
/1DH/OBSERVE_LOG	OBSERVER_PERIOD	1

Red brackets are drawn around the 'Job name' and 'Job Setting Name' columns. The SAP status bar at the bottom shows 'SAPL DHCDC_CORE_MAINT', 'wdfbmd515731', and 'INS'.

⚠ Caution

The value change does not affect a currently running observer job.

For more information on managing your SLT replication, see the documentation on SAP Help Portal: [Managing the Replication Process Using Transaction LTRC](#)

Reset and SLT

If you reset the SUM procedure with ZDO before the smart switch in phase EU_SWITCH_ZDM, the SLT configuration of the original system is not affected. However, if you reset the procedure after the phase EU_SWITCH_ZDM, the SLT replication of the smart-switched tables fails after phase SETUPGPAPAR_ZDM_REVOKE_UNFREEZED. Therefore, an Initial Load is required for these tables after the reset.

4.9 Usage of Custom Database Schemas

This section deals with the customer-specific database schemas.

You can create own database schemas in an SAP HANA database. However, they are different from *SAP HANA Deployment Infrastructure* (HDI) containers. If you only work with HDI containers as described in [Migration of Native SAP HANA Database Objects \[page 41\]](#), no further action is required.


As described in [Technical Details of the Zero Downtime Option \[page 11\]](#), the database schema changes during the rollover to the bridge subsystem. This change also implies a change of the database schema user that is used by the work processes.

To access the custom database schema from the bridge subsystem, make sure that the schema user of the bridge subsystem (for example, SAPHANADBSHD) has the same authorizations as the original schema user (such as SAPHANADB) before entering the bridge subsystem.

4.10 Backing Up Table Content in the SAP HANA Repository 1.0

This section deals with the backup of table content in the SAP HANA repository 1.0.

Prerequisites

- You have applied SAP Note [2642660](#) .
- The SUM procedure has reached REQ_USER_ROLLOVER_FINAL.

Context

The ZDO of SUM offers the option to reset native SAP HANA database objects. For this purpose, back up the content of tables in the SAP HANA repository 1.0, also known as `_SYS_BIC`.

Immediately after the phase `REQ_USER_ROLLOVER_FINAL` is reached, proceed as follows to back up your tables content:

Procedure

1. Open the *SAP HANA Studio* and log in with the **SYSTEM** user to the system on the database and the tenant where you want to export the table data.
2. Open the SQL console in the database schema `_SYS_BIC`.
3. To get the list of all table names, enter the following statement:

```
select TABLE_NAME from tables where SCHEMA_NAME='_SYS_BIC' and  
is_user_defined_type='FALSE';
```

4. For each table, export the data to a specific folder by entering the following statement:

```
export <table_name> as csv into '<folder_name>' with replace;
```

4.11 Migration of Native SAP HANA Database Objects

In SAP HANA databases, native SAP HANA database objects are stored in the SAP HANA repository 1.0, also known as `_SYS_BIC`. To ensure a proper encapsulation of the source and target releases during updates with ZDO, the database objects and database artefacts are cloned.

The users of the bridge subsystem that runs on the source release do not see the updated database artifacts, which are prepared for the target release when the objects are cloned. However, SAP HANA repository 1.0 does not provide the functionality to ensure the isolation of the source and target release.

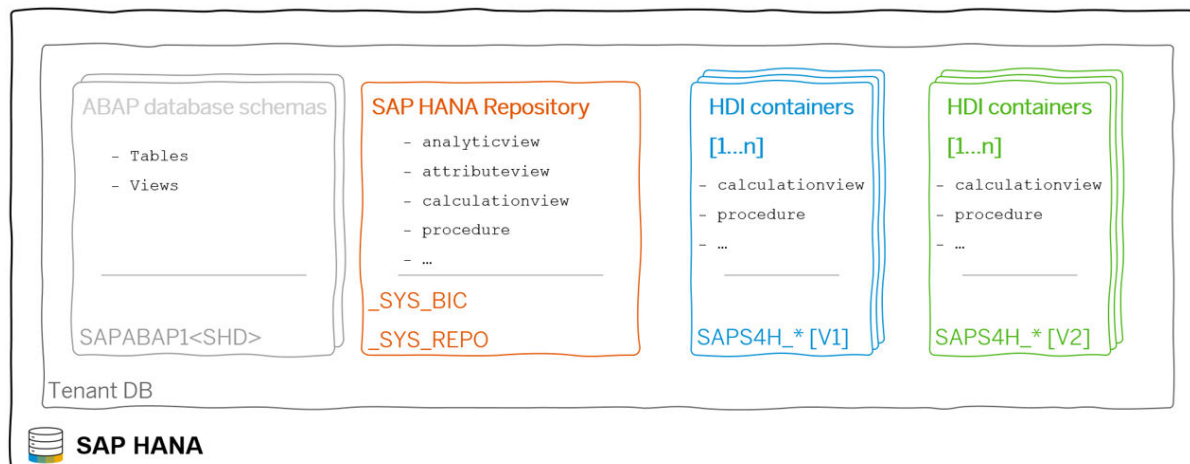
To prepare an SAP S/4HANA system for updates with ZDO, all objects stored in `_SYS_BIC` must be migrated to new containers based on the HTA for HDI technology (*SAP HANA Transport for ABAP (HTA) for SAP HANA Deployment Infrastructure (HDI)*).

To prepare an SAP S/4HANA system for updates with ZDO, all objects stored in `_SYS_BIC` must be migrated to new containers that are based on HTA for HDI technology. HTA for HDI means *SAP HANA Transport for ABAP (HTA) for SAP HANA Deployment Infrastructure (HDI)*. For more information, see the [HTA for HDI](#) documentation on the SAP Help Portal.

Note

All objects stored in SAP HANA repository 1.0 (`_SYS_BIC`) are not accessible during the runtime of the bridge subsystem.

The following figure shows a typical SAP S/4HANA database architecture:



Note the following information about the mandatory migration of following listed objects to HDI containers:

- All objects stored in `_SYS_BIC` and used by business processes:
Applications such as *SAP BPC* and *SAP Real-Time Consolidation* have provided migration reports. For these application-specific migration reports, see the following SAP Notes:
 - *SAP Business Planning and Consolidation*: SAP Note [2649528](#)
 - *SAP Real-Time Consolidation*: SAP Note [2643245](#)
 - *SAP Customer Activity Repository*: SAP Notes [2948917](#) and [2981564](#)
- All custom objects that are used by business processes:
Use the *SAP HANA XS Advanced Migration Assistant* for the migration of customer objects. For more information, see the [SAP HANA XS Advanced Migration Guide](#).
See the following tutorial for the correct naming of the native SAP HANA objects: [Tutorial: Developing and Consuming HDI Objects in ABAP](#)

4.12 Backup Strategy for ZDO

This section deals with aspects of the data backup in the ZDO procedure.

During a ZDO update, the users continue to work until the end of the maintenance event. They have to log off from the system only for the time of the cutover.

During the uptime processing, database logging is kept active, and if scheduled, regular system backups are triggered in the background. Before the cutover is started, it is recommended to perform a full system backup that includes:

- a synchronous state of the database
- the SUM directory
- the system and instance directories
- the kernel directory

After a major problem occurs after a switch over to the new release, you can restore the system to the state of the full system backup. Then, a reset of the SUM procedure could be performed as described in [Resetting the ZDO Procedure \[page 50\]](#).

You are asked in a dialog in phase SUMASK_ZDO_CONFIGURATION of roadmap step **Configuration** whether you want to run a system backup during the transition from the bridge subsystem to the target subsystem.

If you choose this option, a further dialog in phase REQ_ZDO_SYSTEM_BACKUP of roadmap step [Postprocessing](#) prompts you to start the system backup. If you confirm, the bridge subsystem stops, and you can start to perform a full system backup.

To reset the update from this point in time, back up now the complete SUM directory including all subdirectories! In addition, the current state of the database, the system and instance directories, and the kernel directory must be backed up to be able to restore to a consistent state.

5 Running the Software Update Manager

This part of the document contains information about the update procedure using the ZDO of SUM.

1. [Roadmap Steps with ZDO Features \[page 44\]](#)
2. [Resetting the ZDO Procedure \[page 50\]](#)
3. [Special Features for ZDO \[page 51\]](#)

5.1 Roadmap Steps with ZDO Features

This section describes ZDO-specific actions during the different roadmap steps of a SUM procedure.

The following roadmap steps are affected:

- [Get Roadmap: Enabling ZDO During the Initial Dialogs \[page 44\]](#)
- [Configuration \[page 45\]](#)
- [Execution \[page 46\]](#)
- [Checks \[page 45\]](#)
- [Postprocessing \[page 49\]](#)

5.1.1 Get Roadmap: Enabling ZDO During the Initial Dialogs

If you are eligible to use the Zero Downtime Option, you can select the option in the initial dialogs of SUM.

Context

For more information about the initial dialogs, see in the *SUM Guide* the following chapters:

- [► Planning ► Initial Dialogs for the Scenario Specification \(Get Roadmap\) ►](#)
- [► Running the Software Update Manager ► Actions During the Roadmap Steps ► Specifying the Scenario to Get the Roadmap ► Making Entries for Scenarios with Configuration File ►](#)

To enable the ZDO feature, proceed as follows:

Procedure

1. During the specification of the scenario strategy in phase `MOD_SELROADMAP / SELECT_ROADMAP`, you select first the strategy *Downtime-optimized* and here the ZDO feature. Then choose *Next*.
2. In a subsequent dialog, you are asked to report an incident to get a password that authorizes you to use the ZDO feature.
3. After you have received the password, enter it in the dialog and choose *Next*.

5.1.2 Configuration

The section deals with ZDO-specific activities in the **Configuration** roadmap step of the Software Update Manager.

Parameter Setting for the Procedure

To configure the procedure, you can adapt the number of your uptime and downtime processes as well as your SGEN processes.

Possibility of a System Backup

A dialog asks you in phase `SUMASK_ZDO_CONFIGURATION` whether you want to run a system backup during the transition from the bridge subsystem to the target subsystem. If you choose this option, a further dialog in phase `REQ_ZDO_SYSTEM_BACKUP` of roadmap step *Postprocessing* prompts you to start the system backup.

For more information, see [Backup Strategy for ZDO \[page 42\]](#).

5.1.3 Checks

The section deals with ZDO-specific activities in the **Checks** roadmap step of the Software Update Manager.

Phase	Check
<code>RUN_RSPTBFIL_ZDM_CHECK_BW</code>	This phase includes a check for an active SAP Business Warehouse (SAP BW).

Phase	Check
RUN_ZDO_CONSISTENCY_CHECK_*	In this phase, the <i>ZDO Consistency Check</i> for ABAP dictionary objects and SLT setup is performed.
SUMCHK_ZDO_HTA_HTC	This phase includes a check for SAP HANA repository objects, as these objects cannot be used during the SUM procedure with ZDO.

For more information, see [Specific Phases for ZDO \[page 14\]](#).

5.1.4 Preprocessing

The section deals with ZDO-specific activities in the **Preprocessing** roadmap step of the Software Update Manager.

In phase RUN_IMPACT_ANALYSIS_ZDO, the Software Update Manager reads these table statistics and checks the tables for conflicts. It stops with errors if critical conflicts are found, or if the table statistics file ZDIMPANA.ZIP has not been provided.

For more information, see [Impact Analysis Usage \[page 25\]](#).

5.1.5 Execution

This section deals with ZDO-specific activities in the **Execution** roadmap step of the Software Update Manager.

- [Start of User Roll-Over to Bridge Subsystem \[page 46\]](#)
- [Monitoring the Reconnection of Work Processes \[page 47\]](#)
- [Monitoring the Change Recording and Replay Phases \[page 48\]](#)

5.1.5.1 Start of User Roll-Over to Bridge Subsystem

This section deals with the transition of the users to the bridge subsystem.

Start of User Roll-Over to Bridge Subsystem

The transition of the users to the bridge subsystem in phase MAIN_BRITRANS/REQ_USER_ROLLOVER_PREP starts and rolls all users and work processes over to the bridge subsystem.

If the system is configured for a connection to the database using the *Secure User Store* (`hdbuserstore`), make sure that all application servers instances have access to the shared `hdbuserstore`.

If the `hdbuserstore` is stored on a local file system, perform one of the following options:

- **Option 1:**

On the remote ABAP hosts, manually create `hdbuserstore` for the shadow system connection using the following command:

```
hdbuserstore SET UPGSHDKEY <ENV> <USERNAME>SHD <PASSWORD> <ENV>
```

i Note

- Replace `<ENV>` and `<USERNAME>` with the values from `hdbuserstore` list.
- Replace `<PASSWORD>` with the password for the shadow database user (`ABAP_SHADOW_DB_USER_PASSWORD`) that you have set in phase `PREP_INSTALL / INITSHD`.

- **Option 2:**

Switch your database connection to the *ABAP Secure Store* (SSFS).

i Note

Make sure to back up the HTC content of tables in the SAP HANA repository 1.0 after `REQ_USER_ROLLOVER_FINAL` is successfully completed. For more on this backup, see [Migration of Native SAP HANA Database Objects \[page 41\]](#) and SAP Note [2642660](#) as well.

Completion of User Roll-Over to Bridge Subsystem

The transition of the users to the bridge subsystem is completed in phase `MAIN_BRITRANS / REQ_USER_ROLLOVER_FINAL`. Confirm the dialog by choosing *Next*. The update activities can be started.

5.1.5.2 Monitoring the Reconnection of Work Processes

This section deals with monitoring the reconnection of the work processes.

Context

In phase `MAIN_BRITRANS / BRIDGE_RECONNECT`, the Application Server ABAP (AS ABAP) work processes are reconnected from the original database schema to the database schema of the bridge subsystem. However, the work processes cannot be reconnected until they have completed the current unit of work.

To identify the work processes that have completed the reconnection, do the following:

Procedure

1. Call transaction **SM66** in your SAP system.
2. Choose the icon [Change Layout](#).
3. From the [Column Set](#) box, select [Database Reconnect Status](#) and drag it to the [Displayed Columns](#) box.
4. Choose [Apply](#).

As a result, the [Database Reconnect Status](#) column of each work process is displayed as an additional column in the work process overview.

If the reconnection exceeds your planned update schedule, you can force it manually. However, this can cause the termination of long-running batch jobs that prevented the work processes from reconnecting.

To force the reconnection, open the [Process Control Center](#) in the *More* menu item [SUM Utilities \(Extended UI\)](#). Select the row with the process name **FORCE_RECONNECT** and choose [Start](#).

For more information on the [Process Control Center](#), see in the SUM Guide the chapter ► [Introduction](#) ► [The Software Update Manager](#) ► [SUM Utilities \(Extended UI\)](#) ►.

5.1.5.3 Monitoring the Change Recording and Replay Phases

You can monitor the replay phases and the replay progress of your update or upgrade with ZDO.

Context

Proceed as follows:

Procedure

Call transaction **CRR_CONTROL** for monitoring.

If phase **RUN_ZDOREPLAY_REPLAY_LKPM** runs longer than expected, you can monitor the replay progress using transaction **CRR_CONTROL** in the upgrade subsystem.

5.1.6 Postprocessing


This section deals with ZDO-specific activities in the **Postprocessing** roadmap step of the Software Update Manager.

Preparation of User Roll-Back to Original System

In phase `MAIN_BRITRANS/REQ_USER_ROLLBACK_PREP`, users are transferred from the bridge subsystem (V1) back to the production system (V2). All users must log off from the bridge subsystem.

Confirm the dialog in SUM by choosing [Next](#).

i Note

- For a kernel update on remote instances, especially the ASCS instance, you must manually put the new kernel in the replication directory. The kernel is distributed automatically after the production system is restarted.
- On remote Windows hosts, you must need to install the Microsoft Visual C++ runtime environment (`vcredist_*.msi` or `.exe` package) that is delivered with the new SAP kernel.
- Before you shut down the system, perform the steps described in SAP Note [2050677](#) .

Request for System Backup

If you have chosen in phase `SUMASK_ZDO_CONFIGURATION` of roadmap step [Configuration](#) that you want to run a system backup during the transition from the bridge subsystem to the target subsystem, a dialog in phase [REQ_ZDO_SYSTEM_BACKUP](#) prompts you to start the system backup.

For more information, see [Backup Strategy for ZDO \[page 42\]](#).

Completion of User Rollback to the Original System

The update procedure is complete. All users can log on again to the original productive system. Confirm the dialog in SUM by choosing [Next](#).

5.2 Resetting the ZDO Procedure

During the update with ZDO, you have a reset option provided that the cutover has not been performed.

Prerequisites

Make sure that phase REQ_ZDO_SYSTEM_BACKUP has not yet been passed.

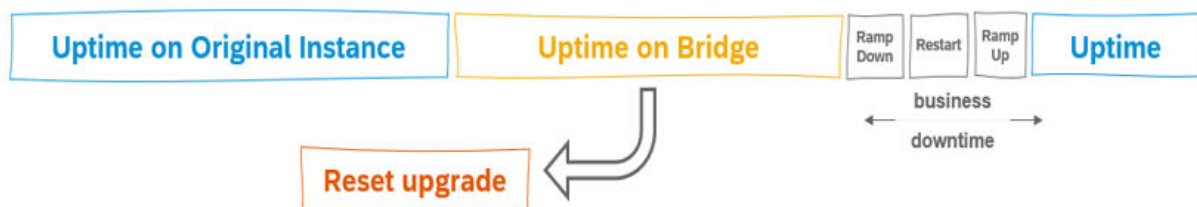
Context

As long as the users were not rolled over to the bridge subsystem and the phase REQ_USER_ROLLOVER_PREP has not been passed, you can perform a reset during uptime processing as in the standard update procedure.



For more information, see in the *SUM Guide* the chapter ► [Running the Software Update Manager](#) ► [Working with the SUM Tool](#) ► [Resetting the Update](#) ►.

However, if the user rollover to the bridge subsystem has already been performed and the phase REQ_USER_ROLLOVER_PREP is completed, the reset works in a two-step approach. If a system backup is performed (see also [Backup Strategy for ZDO \[page 42\]](#)), the reset function is available until phase REQ_ZDO_SYSTEM_BACKUP.



To reset the procedure, proceed as follows. After finishing both steps, you can start another update using Software Update Manager.

Note

- **Reset Conditions**

The reset procedure for ZDO can be executed completely in the uptime if the following conditions are met:

- Source release SAP Basis 755 or higher. This release corresponds to SAP S/4HANA 2020 or higher.
- SAP kernel 781 or a higher version. See the prerequisites for the SAP kernel used in SAP Note [3215062](#). For more information about the SAP Kernel conditions, see also SAP Note [3169721](#).

Otherwise, step 2 of the following procedure requires downtime because the bridge subsystem is stopped and deleted. You can push this downtime to the next regular downtime window according to your maintenance plan.

- **Reset and SLT**

If you reset the SUM procedure with ZDO before the smart switch in phase EU_SWITCH_ZDM, the SLT configuration of the original system is not affected. However, if you reset the procedure after the phase EU_SWITCH_ZDM, the SLT replication of the smart-switched tables fails after phase SETUPGPAR_ZDM_REVOKE_UNFREEZED. Therefore, an Initial Load is required for these tables after the reset. For more information about SLT, see [SLT Replication Handling \[page 36\]](#).

Procedure

1. In the [More](#) menu, choose [Reset](#) and confirm the [Resetting Procedure](#) dialog with [Yes](#).

The reset procedure removes all read-only restrictions for the bridge subsystem during uptime. After this removal, all read-only tables are writable again and users can continue with regular production operation.

2. When you continue with the reset procedure, the bridge subsystem is stopped and deleted.

5.3 Special Features for ZDO

This section describes special features for the ZDO:

1. [Restoring Table Content in the SAP HANA Repository 1.0 \[page 52\]](#)
2. [Final Validation \[page 52\]](#)
3. [Bridge and Update Subsystems During the Update \[page 52\]](#)
4. [Transition of Users to Bridge Subsystem \[page 53\]](#)
5. [Database Reconnect Transition Method \[page 53\]](#)
6. [Locks on the Bridge Subsystem \[page 54\]](#)

5.3.1 Restoring Table Content in the SAP HANA Repository 1.0

This section deals with the option to restore table content in the SAP HANA repository 1.0.

Context

The ZDO of SUM offers the option to reset native SAP HANA database objects. After the reset, you must restore your *SAP HANA Transport Container* (HTC) content, to import from the specified folder the content of all database tables of the `_SYS_BIC` schema.

Proceed as follows:

Procedure

1. Open the *SAP HANA Studio* and log in with the **SYSTEM** user to the system on the database and the tenant where you want to import the table data.
2. Open the SQL console in the database schema `_SYS_BIC`.
3. To get the list of all table names, enter the following statement:

```
select TABLE_NAME from tables where SCHEMA_NAME='_SYS_BIC' and  
is_user_defined_type='FALSE';
```

4. For each table, truncate the data before importing the old data by entering the following command:

```
truncate table <table_name>;
```
5. For each table, import the data from the location where you have previously saved the data of this table by entering the following command:

```
import <table_name> from '<folder_name>' with data only;
```

5.3.2 Final Validation

Perform a final validation. Check custom development activities and third-party applications by scans and test runs.

5.3.3 Bridge and Update Subsystems During the Update

During the update procedure, two subsystems exist in parallel: the bridge and the update subsystem.

The bridge subsystem and the update subsystem are subsystems of the production system, each with its own database schema.

Both subsystems share several services. However, only the batch jobs and transactions running in the bridge subsystem are assigned to the production instances.

5.3.4 Transition of Users to Bridge Subsystem

Before the update can be started on the update subsystem, all users must be disconnected from the original production system and transferred to the bridge subsystem.

The transfer from the production system to the bridge subsystem runs smoothly at database connection level. This process runs unnoticed by the users.

The bridge subsystem is a separate subsystem in the context of the production system. Once all users are transferred to the bridge subsystem after the MAIN_BRITRANS/REQ_USER_ROLLOVER_FINAL phase, the repository tables as well as other tables that need to be accessed by the update are renamed. The bridge subsystem retains access to the renamed tables.

After the update has finished, all activities that were started on the bridge subsystem must be completed. All users are logged off the bridge subsystem and all activities are shut down. The users are then logged on to the production system again.

i Note

Always keep these steps in mind to avoid prolonged cool-down time.

5.3.5 Database Reconnect Transition Method

The section deals with the transition method for the database reconnect (DB reconnect)

The ZDO of SUM enables an update in parallel to the user activities in the SAP system. The aim is to ensure

1. a smooth transfer of users from the productive system to the bridge subsystem
2. their reconnection to the bridge subsystem without downtime

Typically, an SAP application server collects requests from multiple front ends and dispatches them to the work processes that execute the requests, such as a specific ABAP program. Several dialog work processes run on one application server.

The transition of the dialog and batch work processes to the bridge subsystem requires a database connection to the database schema on the bridge subsystem. For the transition, the production system and the bridge subsystem must have the same start release and the same table content in the database schemas.

i Note

Make sure that all SAP application servers are running with the same kernel version.

The advantages of this method are:

- No system downtime
- Automated procedure

- No logout and logon of users required
- Transparent for administrators
- Automated workload roll-over

The database connection must be changed for all users who are connected to the database schema of the bridge subsystem.

When the transition is started, any work process that becomes free to be scheduled for a new logon or a newly started batch job was previously idle. Such a work process is either already in the bridge database schema, or it used the idle time to perform the DB reconnect. The effect is that every new logged-in user and each newly started batch job are automatically in a work process on the bridge subsystem. The idled work processes are reconnected immediately. SUM checks the status of the **Task Handler** whether all tasks of the work processes are reconnected and then continues with the update procedure.

Users who are in a session without calling a **COMMIT WORK** are logged off when the timeout is reached. The timeout is controlled by a parameter.

If no **COMMIT** is set, a default value defines the maximum number of seconds for the abort case.

You can monitor the reconnect status as described in [Monitoring the Reconnection of Work Processes \[page 47\]](#).

5.3.6 Locks on the Bridge Subsystem

This section is about the locks on the bridge subsystem.

During the update procedure, the bridge subsystem communicates with the tables that are affected by the update. To avoid collisions between the update and the users who work on the bridge subsystem, locks are implemented on the bridge subsystem. These locks can be set by the following processes:

Process	Comment
Table conversion	At the beginning of the update, affected tables become read-only to prevent them from being modified.
After-import methods (AIM)	At the end of the update, affected tables are locked to prevent them from being modified. In this case, you receive an error message with the user usr_persist .

The following locks are implemented in addition:

Lock	Comment
EU_LOCK	At the beginning of the update, a generic lock is set for affected tables and applications.

Lock	Comment
Client locks	At the beginning of the update, after-import methods (AIM) lock tables that are affected by the update. These tables remain locked until the update is completed.

Caution

If you try to access read-only tables, for example by executing transactions or reports, you receive a runtime error. This is to avoid inconsistencies.

6 Follow-Up Activities

This part of the document contains information about the follow-up activities that you need to perform after you've updated your SAP system with ZDO of SUM.

You can already start the following follow-up activities when the SUM has reached the phase `MAIN_POSTPROC / SUBMOD_BRIDGE_POSTPROC / REQ_USER_ROLLBACK_FINAL`:

- Reactivate the batch job for UPL data collection. For more information, see [Handling UPL Data Collection Job \[page 34\]](#).
- Reactivate BW extractors. For more information, see [SAP Business Warehouse Extractor Handling \[page 35\]](#).

In addition to the follow-up activities specific to the update with ZDO of SUM, consider also the follow-up activities that are described in the *SUM Guide*.

7 Troubleshooting

This section provides additional information about how to proceed with general troubleshooting or how to resolve known issues that occurred during the update.


1. [General Troubleshooting Activities \[page 57\]](#)
2. [Known Issues \[page 58\]](#)

7.1 General Troubleshooting Activities

This section deals with general activities to perform a successful troubleshooting.

Consider the following troubleshooting activities:

- [Check the relevant log files \[page 57\]](#)
- [Analyze short dumps \[page 57\]](#)
- [Check the background job overview \[page 58\]](#)

For additional known issues and their solution, see SAP Note [2707753](#) .

Checking the Relevant Log Files

As a first step in a problem, we recommend that you look at the SUM user interface. In many cases, an excerpt from a log file is displayed here, which is a good starting point for error analysis. Additional log files are available in the ► [abap](#) ► [log](#) ► subdirectory of the *SUM Directory*. Call up the list of log files and sort the display in descending order by time. Check the most recent files first, as SUM updates the log files frequently. In some cases, checking the most recent log files in the subdirectory ► [abap](#) ► [tmp](#) ► is also useful.

Analyzing Short Dumps

The analysis of short dumps can help to correct errors in the ABAP system. Use the [ABAP Dump Analysis](#) (transaction ST22), which you can use to list the short dumps that occurred in the ABAP system.

If the cause of a short dump is unclear or if you cannot correct the error yourself, report an incident for the application component listed in the header line of the short dump list.

Checking the Background Job Overview

Using transaction **SM37**, you can monitor jobs running in your SAP system and find information about aborted jobs. To check for aborted jobs, enter the following in the dialog *Simple Job Selection*:

Job Name	*
User Name	DDIC or *
Job Status	Choose <i>Canceled</i>
Job Start Condition	Enter a relevant timeframe. Example: Enter the current date in <i>From</i> and <i>To</i> to get all aborted jobs of the current day.

7.2 Known Issues

This part of the document contains additional information on how to proceed when you want to correct known problems during the ZDO procedure.

If a problem is not listed here, or if you need additional assistance, report an incident on component BC-UPG-DTM-TLA. Use the following convention for the short description: **[ZDO of SUM] - <Issue short description>**

The following issues are known:

- [Running SUM with ZDO After a Previous Run Has Been Reset \[page 59\]](#)
- [Reset: Error in Phase RUN_RSDB02CK_REV \[page 59\]](#)
- [Cleaning up the Orphaned Update Records \[page 60\]](#)
- [Error in File LONGPOST.Log \[page 60\]](#)
- [Error in Phase MAIN_POSTCLEAN/TOOLIMP_DELETE_ABAP \[page 61\]](#)
- [Error in Phase MAIN_NEWBAS/XPRAS_AIMMRG \[page 61\]](#)
- [Remaining Views After Reset of a ZDO Update to SAP S/4HANA 2020 \[page 62\]](#)
- [Performance of Phase SQLRUNTASK_FDCT_TRANSFER on SAP HANA DATABASE \[page 62\]](#)
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Running SUM with ZDO After a Previous Run Has Been Reset

Symptom	Solution
During the reset of a ZDO update, newly added database tables are not dropped.	Make sure in transaction DB02 that there are no additional database tables that belong to SAP.

Reset: Error in Phase RUN_RSDB02CK_REV

Symptom	Solution
One of the following tables does not exist in the database: TEST_P00L1 VER_SEC_INDX VER_SEC_TAB1 CRR_CHCNC CRR_CHCWC CRR_CHENC CRR_CHEWC CRR_CHLNC CRR_CHLWC CRR_CHSNC CRR_CHSWC CRR_CH_LOCK CRR_CH_SI CRR_CSCWC CRR_CT1P CRR_CT1S1 CRR_CT1S2 CRR_CT1S3 CRR_CT2P CRR_CT2S1 CRR_CT2S2 CRR_CT3P CRR_CT3S1 CRR_CT3S2	Create the tables manually in the database using transaction SE14. Afterwards repeat the phase.

Cleaning up the Orphaned Update Records

Symptom	Solution
<p>SUM stops in phase MAIN_NEWBAS/RUN_UPDATE_CHECK with the following error message:</p> <p>A2EESZDM 669 Record in VBHDR found for update: key "<UPDATE KEY>" report "<REPORT>" state "2" date <TIME STAMP></p>	<ol style="list-style-type: none">1. Call transaction SM13 on the bridge subsystem and enter date and time of the error message. A list of all update records is displayed.2. Using the menu item  Settings  Layout  Current... , add the additional column name Update Key to the displayed columns of the update records table.3. Filter the list by the update key from the error message.4. Clean up the update records found by the filter condition.

Error in File LONGPOST.Log

Symptom	Solution
<p>You see the following error in log file Longpost.log:</p> <p>### CURRENT PHASE: RUN_RSUPGDDLSCREATE</p> <p>1PEPU203X--> Messages extracted from log file "RSUPGDDLSCREATE.Y20" <--</p> <p>A4PEDDUT 368 Create statement view "ACMAUTE639F7F4D8" could not be generated</p>	<p>You can ignore this error because it is a generated CDS view that was additionally handled during the update in the XPRA phase.</p> <p>The view should therefore exist in the database and no further action is required.</p>

Error in Phase MAIN_POSTCLEAN/TOOLIMP_DELETE_ABAP

Symptom	Solution
<p>The phase MAIN_POSTCLEAN/TOOLIMP_DELETE_ABAP fails with an error message similar to:</p> <p>2EEDA480 Update fails (mode flag "D" to "X" in DDXTT. Table: "<TABNAME>")</p> <p>The reason is that a new instance of batch job RDDIMPDP was scheduled for the upgrade subsystem in phase MAIN_NEWBAS/JOB_RDDNEWPP. After switching off the subsystem isolation in phase MAIN_POSTPROC/SUBMOD_BRIDGE_POSTPROC/RUN_RLFW_SYSTEMSEP_OFF, this additional instance of batch job RDDIMPDP becomes active on the target system. This is not supported.</p>	<p>Execute transaction SM37 in client 000. Select as follows:</p> <ul style="list-style-type: none">• Job Name: RDDIMPDP• User Name: *• Job Status: Released• Or after event: SAP_TRIGGER_RDDIMPDP <p>Multiple instances of the RDDIMPDP batch job must not be displayed. Delete them all.</p> <p>Then schedule a new instance of the batch job RDDIMPDP. Use the RDDNEWPP program for this, as described in SAP Note 34964.</p> <p>Then repeat the phase.</p>


Error in Phase MAIN_NEWBAS/XPRAS_AIMMRG

Symptom	Solution
<p>You see in phase XPRAS_AIMMRG the following error message:</p> <p>[...]</p> <p>A2EERSAR 203 Source system "<LOGSYSNAME>" does not exist</p> <p>2EESY530 An exception was raised</p> <p>A2 ERSBK 034 Generate D versions from "DTP_7MODTUOAGKW6IILPKSNI78RCH" ("R/3730" -> "<LOGSYSNAME>")</p> <p>A2EERS_EXCEPTION 120 Operation &3"0TCTTABCAT_TEXT</p> <p><LOGSYSNAME>get_access" could not be carried out for &1"DTPA" &2"DTP_46MRIQEWUMPPSW8YXAMKD4JMZ"</p> <p>[...]</p>	<p>See SAP Note 1649901.</p>

Remaining Views After Reset of a ZDO Update to SAP S/4HANA 2020

Symptom	Solution
After a reset, there are still database views that should have been deleted.	<p>Check with the following select statement the existence of the views in the database:</p> <pre>select tabname from puttb_shd where srctype = 'B' and srcform = 'T' and dsttype = 'W' and dstform = 'T'.</pre> <p>If affected views still exist in the database, drop them manually.</p>

Performance of Phase SQLRUNTASK_FDCT_TRANSFER on SAP HANA DATABASE

Symptom	Solution
<p>The <i>Fast Data Copy</i> transfer, which is executed in the phase SQLRUNTASK_FDCT_TRANSFER, has an impact on the performance of the SAP HANA database. Especially, the I/O performance of a production system must be monitored during the execution of this phase.</p> <p>See SAP Note 1999993  for more information on a health check of your SAP HANA database. It describes how to use and interpret the results of the SAP HANA mini checks.</p> <p>To ensure a stable and consistent data copy, SUM sets the number of processes for the execution of the SQL statements of phase SQLRUNTASK_FDCT_TRANSFER by default to 2.</p> <p>You can increase the number of parallel DDL processes if</p> <ul style="list-style-type: none">• you have business requirements to minimize the run-time of phase SQLRUNTASK_FDCT_TRANSFER• a performance analysis SAP HANA database of the productive system shows that more parallel processes can be used without affecting the performance and stability of the SAP HANA database	<p>Add to file SAPup_add.par the following line to increase the number of DDL processes:</p> <pre>/SQLRUNTASK_FDCT_TRANSFER/HDB/parprocs/DDL = <number of parallel processes></pre> <p>The file SAPup_add.par is located in the subdirectory bin of the SUM directory. If this file does not exist yet, create it.</p> <p>Note: Consider also the load on the productive system during this analysis. Setting the number of DDL processes to a higher value can lead to a massive impact on the productive system and a significant database slowdown.</p>

During Reset System Separation Between Bridge System and Upgrade System Isn't Correctly Reset

Symptom	Solution
<p>During the reset, the system separation between bridge subsystem and upgrade subsystem is not reset correctly. This can cause problems, such as scheduled background jobs that are not recognized correctly by the system and therefore are not triggered as expected.</p> <p>For example: A transport is to be imported into the system and seems to hang after the DDIC import. In the SLOG*, you see messages such as:</p> <p>ERROR: Background job RDDIMPDP could not be started or terminated</p> <p>ERROR: Please check that the R/3 system is running.</p> <p>ERROR: Please check the system. Use transactions SM21, SM37, SM50..</p>	<p>Delete the RFC connection SAP_UPGRADE_UPG_SYSTEM using transaction SM59.</p> <p>Then execute program RLFW_SYSTEM_SEPARATION in transaction SE38. Use the parameter <i>p_action</i> = <i>DEACTIVATE</i> and <i>logfile</i> = <i>RLFW_SYSTEMSEP_OFF</i>.</p>

Error in PARRUN_ZDO_CONSISTENCY_CHECK or RUN_ZDO_CONSISTENCY_CHECK_POST

With Regard To The SLT Setup

Symptom	Solution
<p>You are using an SLT server setup. SUM stops in phase PARRUN_ZDO_CONSISTENCY_CHECK or RUN_ZDO_CONSISTENCY_CHECK_POST with one of the following two error messages:</p> <p>A2EESUPG 763 Table <table> has no SLT triggers, but has an SLT logging table <logging table></p> <p>A2EESUPG 764 Table <table> has no SLT logging table in DDIC, but has an SLT trigger <SLT trigger></p>	<ol style="list-style-type: none">1. Check if the table is part of SLT replication.2. If so, check the connection of the SLT setup: Is the SLT replication done using an RFC connection or a second database connection?3. Possible solutions are:<ol style="list-style-type: none">1. If the table is not part of the SLT replication, delete the SLT triggers and the found logging table. Then repeat the phase.2. If the table is part of the SLT replication based on an RFC connection, regenerate the missing SLT objects.3. If the table is part of SLT replication based on a second database connection, the Software Update Manager does not support SLT handling in the bridge subsystem. In this case, we recommend changing the connection to an RFC-based connection. Alternatively, reset SUM, restart the procedure from the beginning and deactivate the SLT handling in phase SUMASK_RFC_2_SLT_SERVER.

With Regard To ABAP Dictionary Objects

Symptom	Solution
<p>The ZDO consistency check detects that ABAP Dictionary objects are inconsistent. The system displays error messages such as:</p> <p>A2EESUPG 642 Index "XYZ" of table "TABLE1" does not exist in DDIC(DB-Idx Name:"TABLE1~YXZ")</p> <p>A2EESUPG 234 Table "TABLE2" is inconsistent in key information NT <-> DB</p> <p>A2EESUPG 007 Unable to determine the table delta between "TABLE3" and "TABLE3"</p>	<p>Resolve the inconsistencies using the ABAP Dictionary tools provided with the transactions SE11 and SE14. If you cannot resolve the inconsistencies, report an incident on component BC-UPG-DTM-TLA.</p>

Error in Phase RUN_RSPTBFIL_ZDM_CHECK_BW

Symptom	Solution
<p>SUM stops in phase RUN_RSPTBFIL_ZDM_CHECK_BW with following error message:</p> <pre>A2EESZDM_SRC 074 System scope is DATA_WAREHOUSE, ZDO is not supported, see SAP note 2707731</pre> <p>Furthermore, the log file contains detailed information about why the scope DATA_WAREHOUSING was determined. Example messages:</p> <pre>A4 ESZDM_SRC 070 Begin check for active BW. A4 ESUPG2 013 No allow file ZDO_BW_EX- CEPTION.LST found for BW check A4 ESUPG 003 Objecttype: Advanced Data Stores A4 ESZDM_SRC 082 Advanced Data Stores: 0 found A4 ESUPG 003 Objecttype: Data Stores A4 ESZDM_SRC 082 Data Stores: 0 found A4 ESUPG 003 Objecttype: Info Cubes A2EESZDM_SRC 082 Info Cubes: 4 found A2EESUPG 002 /CPD/CPFP_R01 A2EESUPG 002 /CPD/PFP_C01 A2EESUPG 002 /CPD/PFP_R01 A2EESUPG 002 /ERP/SFIN_R01 A4 ESUPG 003 Objecttype: Persistent Stag- ing Areas A4 ESZDM_SRC 082 Persistent Staging Areas: 0 found A4 ESUPG 003 Objecttype: HANA-Composite Provider A4 ESZDM_SRC 082 HANA-Composite Pro- vider: 0 found A4 ESUPG 003 Objecttype: Local Workspace provider A4 ESZDM_SRC 082 Local Workspace pro- vider: 0 found A4 ESUPG 003 Objecttype: Characteristics with transitive attributes A4 ESZDM_SRC 082 Characteristics with transitive attributes: 0 found A4 ESUPG 003 Objecttype: Characteristic with external view A4 ESZDM_SRC 082 Characteristics with external view: 0 found A4 ESUPG 003 Objecttype: Open Opera- tional DataStore A4 ESZDM_SRC 082 Open Operational Data- Store: 0 found A4 ESUPG 003 Objecttype: Non HDI Hana Models A2EESZDM_SRC 082 Non HDI Hana Models: 1 found A2EESUPG 002 ZJSALESHV A2EESZDM_SRC 074 System scope is</pre>	<p>The ZDO of SUM does not support the DATA_WAREHOUSE scope of SAP BW. During the analysis, you must find out why the SAP BW objects are active in the system and whether they are used at all. We recommend the following procedure:</p> <ol style="list-style-type: none"> 1. Clarify with your functional teams which business applications are used in SAP S/4HANA and use the determined SAP BW objects (Advanced Data Stores, Data Stores, InfoCubes, or Persistent Staging Areas). 2. If the functional teams confirm that SAP BW objects are used by the business applications, the SUM procedure with ZDO is not possible. If in doubt, report an incident on the application component that uses the active SAP BW object. 3. You can skip the check if <ul style="list-style-type: none"> • you can confirm that SAP BW is not used by the functional teams or the use of SAP BW can be restricted during the bridge phase • the check, however, has determined the active use of data warehousing <p>To accept unsupported SAP BW objects and continue the procedure, create the file <code>ZDO_BW_ALLOW.LST</code> and add it to the <code>var</code> subdirectory of the SUM Directory. In the file, specify in the form of a simple list the SAP BW objects that can be ignored. Enter one object name per line without separators as end-of-line representation.</p> 4. If you cannot restrict the usage of critical SAP BW objects for the bridge phase, you can report an incident on component BC-UPG-DTM-TLA.

Symptom

Solution

DATA_WAREHOUSE, ZDO is not supported,
see SAP Note 2707731
A4 ESZDM_SRC 075 For the complete list,
execute report RSUPG_CHECK_BW
A4 ESUPG 002
A4 ESZDM_SRC 071 End check for active BW

⚠ Caution



The output of the log file `RSZDM_CHK_BW.<SID>` written by the Software Update Manager can be incomplete because the number of lines per object type is limited to 25. To get a complete object list, execute the **ZDO Preliminary Checks** tool of the *SUM Toolbox* and check the result of the *SAP BW Check-ID* for SAP Business Warehouse.

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