Upgrade Guide | PUBLIC
Near-Zero Downtime Maintenance 1.0 SP23 Java
Document Version: 1.5 SP23 – 2025-01-06

Near-Zero Downtime Maintenance 1.0 SP23 Java

THE BEST RUN SAP

Content

About this Document - nZDM Java for SAP Process Orchestration

This guide describes how you can perform maintenance activities with minimized business downtime using near-Zero Downtime Maintenance (nZDM Java) to **SAP Process Orchestration**, when running on UNIX and Linux-based operating systems.

Document History

> ⚠ Caution
>
> Before you start implementation, make sure you have the latest version of this document. You can find it at: http://support.sap.com/sltoolset *System Maintenance* *near-Zero Downtime Maintenance (nZDM) for Java <version>* *Guide for nZDM Java*.

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

Version	Date	Description
1.0 SP23	2023-05-26	Initial version of the guide for SP23
1.1 SP23	2023-06-20	Updates in Microsoft SQL Server-Specific Configuration Steps
1.2 SP23	2023-11-22	Removed possibility to use an Administrator user to operate with nZDM Java
1.3 SP23	2023-12-19	nZDM Java UI TLS communication enhancement
1.4 SP23	2024-04-22	SAP MII-related updates in Supported Releases and Minimum SPS Levels [page 14]
1.5 SP23	2025-01-06	SAP MII and SAP ME related updates in Supported Releases and Minimum SPS Levels [page 14]

1 Overview

The following sections contain an overview of the near-Zero Downtime Maintenance for Java procedure.

1.1 General Information

The solution near-Zero Downtime Maintenance for SAP NetWeaver Java SP23 enables maintenance activities in SAP NetWeaver Java-stack systems with almost no downtime.

The maintenance activities that nZDM Java supports and facilitates are:

- Performing Support Package Stack (SPS) updates
- Applying single component updates and patches, including kernel and JVM patches
- Performing updates to the SAP NetWeaver database or operating system
- Various other system maintenance activities
- Various testing activities by using the Test Mode functionality

You can perform these activities for the following SAP products:

- SAP Enterprise Portal
- SAP Process Orchestration - combines the integration capabilities of SAP Process Integration (PI, delivered with the Advanced Adapter Engine Extended installation option) with the process modeling, operation, and monitoring capabilities of SAP Business Process Management (BPM)
- SAP Process Orchestration with enabled Cloud Integration Content. For more information, see Cloud Integration Content.
- SAP systems that have only some of the usage types part of SAP Process Orchestration.

  > ### Note
  >
  > You can perform the nZDM Java procedure in pure BPM or Process Integration/Advanced Adapter Engine Extended (PI/AAEX) systems, and in systems that have both Portal and Process Orchestration components. In such cases, the system has to be treated as a Process Orchestration system and **all Process Orchestration-specific steps present in the PO-specific version of this user guide apply to these systems**.

- SAP Manufacturing Integration and Intelligence (MII)
- SAP Manufacturing Execution (ME)

> **Note**
>
> You can only perform patch update in the SAP ME systems. It includes:
>
> - SPS updates, applying single component updates and patches, including kernel and JVM patches of the SAP NetWeaver and SAP MII components
> - Applying single component patches of the SAP ME components
> - Performing updates to the SAP NetWeaver database or operating system
> - Various other system maintenance activities.

> **Note**
>
> nZDM Java does not support SAP NetWeaver dual-stack systems. For additional information about the near-Zero Downtime Maintenance for Process Integration, see https://archive.sap.com/documents/docs/DOC-22975.

nZDM Java is supported for SAP NetWeaver 7.5 and higher releases.

For detailed information about the minimum supported Support Package Stack levels of the listed releases, see Supported Releases and Minimum SPS Levels [page 14].

nZDM Java is available for only some of the SAP NetWeaver database platforms that are listed in the SAP Availability Matrix (PAM). For detailed information about the supported SAP NetWeaver database platforms, see Supported Database Platforms [page 14].

For additional information about the nZDM Java procedure, required software, and troubleshooting, see the current central SAP Note for nZDM Java 3291319. For information about the currently supported SAP NetWeaver databases, see the Product Availability Matrix on SAP Service Marketplace.

1.2 The nZDM Java Procedure

nZDM Java is based on the following SAP and third-party software capabilities and tools:

- Built-in recording and replication functionality in SAP NetWeaver AS Java
- The nZDM Java GUI and nZDM Java Command Line, which are standalone tools for controlling and monitoring the recording and replication processes
- Additional software and tools for performing specific operations, for example cloning, isolation, and switch of a system.

> **Caution**
>
> We strongly recommend that first you perform a test run of the nZDM Java procedure on a development or testing version of your system before you perform the procedure on your productive system. In addition, you must ensure that the test system has exactly the same business functionalities, the same SAP system release (including Support Package level), and contains the same modifications as your productive system.

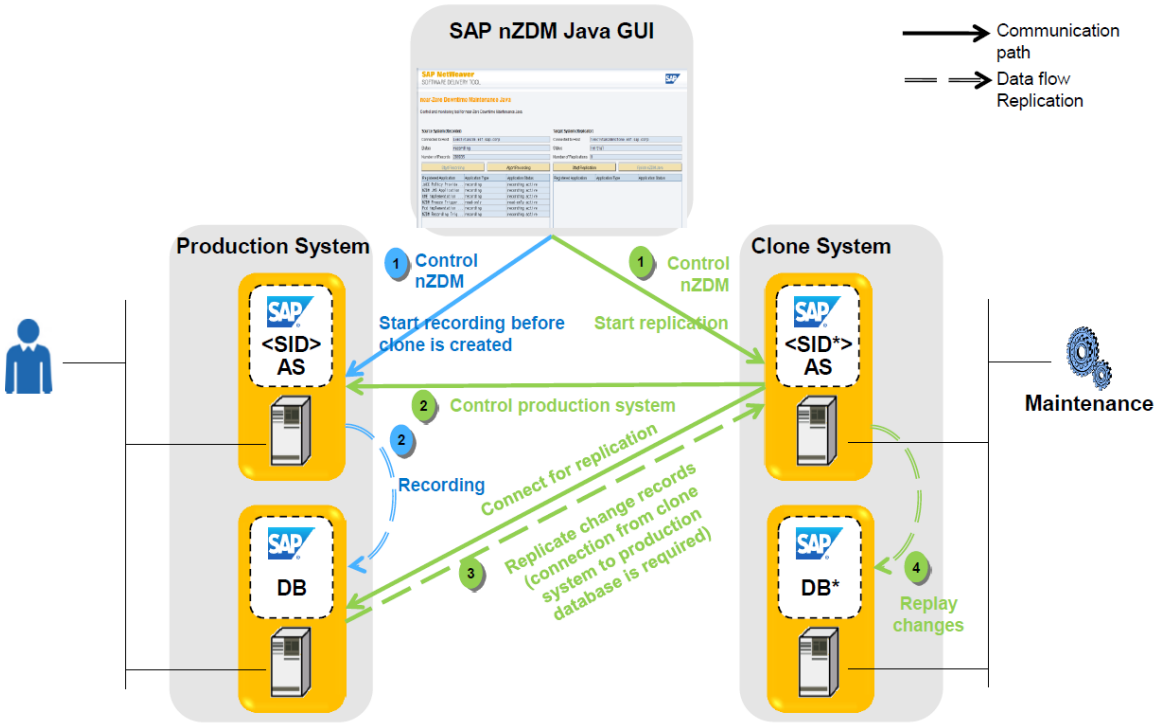
When you execute the nZDM Java procedure, first you start the recording in your production SAP NetWeaver Java-stack system (also referred to as "source system"). While the recording is active, applications in the source system either run in read-only mode, or in recording mode. If an application runs in read-only mode, its

users are notified that they cannot make changes to the data managed by the application. If an application runs in recording mode, nZDM Java records all changes to the data managed by the application.

As a next step, you copy (or clone) your source system and perform the maintenance activities in the copied system (also referred to as "target system"), while the production operation continues in the source system, which is still running on the original version. The target system is isolated from the rest of your landscape to avoid interference with the source system.

When initially created and started, the target system is configured in a special way, which effectively disables any background processing, for example scheduled jobs or message processing. This special configuration causes the system to run in "maintenance mode". In this mode maintenance activities can be performed in the system, but essential business functionalities are disabled, therefore test and verification activities cannot be performed. To perform such activities in the target system, optionally you can temporarily switch it to "test mode", where such restrictions do not apply. To continue with the nZDM Java procedure, you have to revert the system back to maintenance mode by restoring a previously created system backup.

After the maintenance, testing, and verification activities have been completed, you start the replication to the target system. While the replication is running, all data changes recorded in the source system are transferred to the updated target system.



1.3 Procedure Finalization Approaches

When most or all data changes have been replicated, you finish the nZDM Java procedure. At this point, the source system is stopped, and the "maintenance mode" restrictions are removed from the target system, which might involve a system restart. After that, the procedure is finalized in one of the following ways:

- The target system replaces the source system as the new production system ("system switch"). The source system is no longer needed and can be discarded.
- The target system SAP NetWeaver database replaces the source system SAP NetWeaver database ("database switch"). The source system remains the production system. The target system is no longer needed and can be discarded.

> **Note**
>
> Be aware that the system switch is the more straight-forward approach, as it has less manual effort. In comparison, the database switch has higher complexity caused by additional SAP NetWeaver database-specific manual steps.

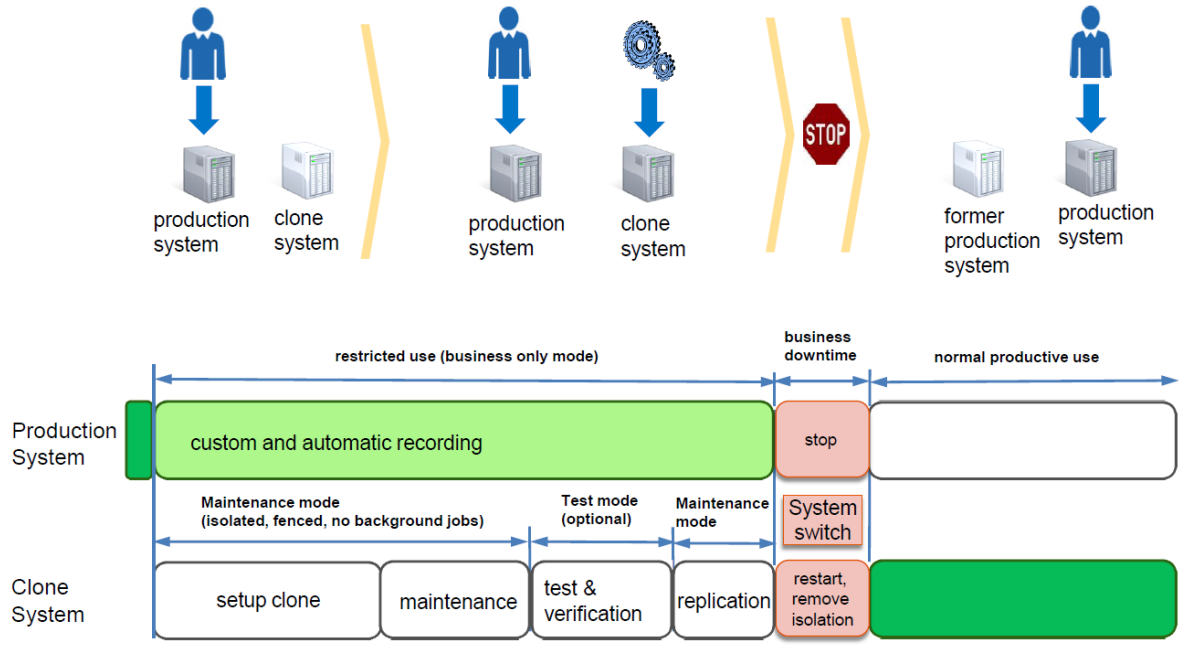
The business downtime takes place from the moment the source system is stopped until the moment when the target system is running without any restrictions and users can resume their work.

There are some important differences between the system switch and database switch approaches, outlined in the following sections.

1.3.1 System Switch

Finalizing the procedure using the system switch approach involves the following major steps:

1. Stopping the source system
2. Finishing the replication of the last remaining changes
3. Restarting the target system to remove the maintenance mode restrictions (not needed for SAP NetWeaver Portal systems)
4. Switching additional application server instances to the target system (can also be done after the downtime has finished)
5. Switching the entry point to the target system, for example SAP Web Dispatcher
6. Removing the isolation of the target system

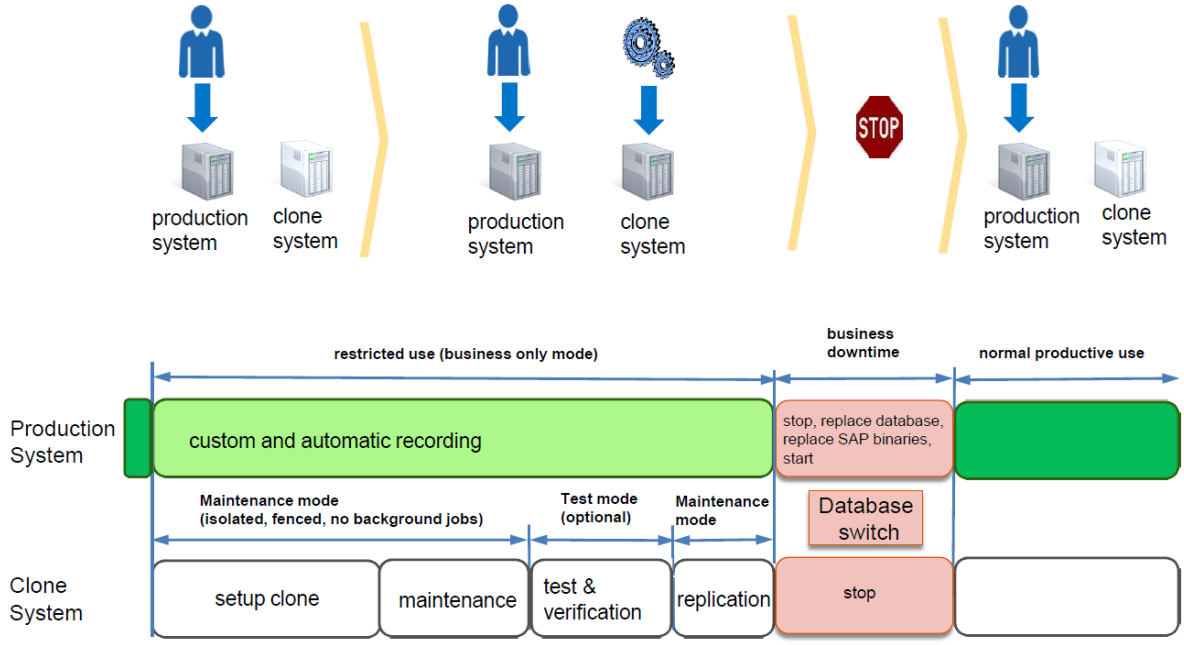


1.3.2 Database Switch

To use the database switch approach, you have to create the SAP NetWeaver database of your target system on the source system SAP NetWeaver database server. This involves performing additional non-standard steps during the copying of your system. Note that the target system configuration and parameters have to be identical to the ones of the source system, with the exception of the DBSID. Due to these and other technical reasons, the SAP Central Services (SCS) and the primary application server instance should not be hosted on the source system.

Once this prerequisite is fulfilled, to finalize the procedure using the database switch approach you have to perform the following major steps:

1. Stop the source system
2. Finish the replication of the last remaining changes
3. Replace the SAP NetWeaver database and SAP binaries of the source system by those of the target system (very fast, as both SAP NetWeaver databases reside on the same server)
4. Start the target system SAP NetWeaver database.
5. Start the source system.



1.3.3 Approach Comparison

Using both approaches, you can shorten the maintenance downtime approximately to the time needed to perform a single system restart, provided that all additional manual steps during the downtime have been as much as possible automated in advance. Therefore, which approach is better for your particular case depends on your environment and system landscape. The following table summarizes the similarities and differences between the two approaches.

Characteristic	System Switch	Database Switch
Support in nZDM Java GUI	Yes	Yes
Resource consumption and performance impact	Lower, the target system is independent from the source system	Higher, both SAP NetWeaver databases share the same server environment
Manual effort during downtime	Low (if automated by scripts) • Switch additional application server instances • Switch the system entry point • Remove the isolation	Low (if automated by scripts) • Stop the source system SAP NetWeaver database • Stop the target system SAP NetWeaver database • Replace SAP NetWeaver database files and SAP binaries • Recreate SAP NetWeaver database configuration and control files • Adapt system profiles (if needed) • Start the source system

Characteristic	System Switch	Database Switch
Downtime duration	**For BPM and PO systems:** Several minutes, one system restart on average	Several minutes, one system restart on average
Automation in Landscape Virtualization Management (LVM)	Yes	No
Ability to perform maintenance of non-SAP software (OS and SAP NetWeaver database updates)	Yes	No

Use the system switch approach in highly virtualized environments where systems are easily copied and moved between hosts, especially if they are managed by LVM. Alternatively, use the database switch approach if your environment is lacking sufficient virtualization capabilities, or if moving your system to different physical hosts is difficult or impossible for some reason.

1.4 Automatic Recording and Replication

Although the overall nZDM Java approach is conceptually the same, the actual recording and replication are implemented differently for Portal and for Process Orchestration (PO) components:

- Portal components like Enterprise Portal Core (EPC), as well as some AS Java components like User Management Engine (UME), implement recording and replication in their Java code in a component-specific way. This approach is called "custom recording and replication". In systems configured as Portal systems, this is the only approach that can be used.
- For PO components, such as Business Process Management (BPM), and a variety of other components, the recording and replication are implemented in a generic way by means of special database triggers. This approach is also known as "automatic recording and replication". In systems configured as PO systems, it is used in parallel to the custom recording approach. In many cases, it can also be used for third-party components.

2 Planning and Prerequisites

This section describes the planning aspects you have to consider and the prerequisites you have to fulfill to prepare for the near-Zero Downtime Maintenance Java procedure.

2.1 Supported Releases and Minimum SPS Levels

The supported minimum SAP NetWeaver releases and SPS levels on which you can perform the nZDM Java are:

- For **SAP Process Orchestration**, SAP Process Integration/Advanced Adapter Engine Extented (PI/AAEX), and **Business Process Management (BPM)** systems:
  - SAP NetWeaver 7.5 SPS00
- SAP Process Orchestration with enabled Cloud Integration Content
  - SAP NetWeaver 7.5 SPS17, after SAP Note 2954857 has been applied.

During the preparation phase of the nZDM Java process, you have to update various components to their latest patch version. See Downloading and Deploying Required Components [page 25].

2.2 Supported Database Platforms

- For SAP Process Orchestration systems, nZDM Java is available for the following database platforms:
  - Oracle Database
  - Microsoft SQL Server
  - SAP HANA 2.0 and higher
  - IBM DB2 for Linux, Unix, and Windows
  - SAP Adaptive Server Enterprise

For additional information, see the current Central SAP Note for nZDM Java 3291319.

2.3 Target System Prerequisites and Recommendations

During the copying of the source system, make sure that the following parameters are set correctly:

- You have to set the SID and host names of the new system (the target system) to match the ones of the original production system (the source system). This ensures that external connections and Single Sign-On are going to work without additional adjustments after the nZDM Java procedure has finished.

- You have to set the SAP NetWeaver database SID (DBSID) to match the SAP NetWeaver database SID of the original production system. This ensures that the database scripts and tools are going to run correctly after the nZDM Java procedure has finished.

> ⚠ Caution
>
> If you intend to use the database switch approach, you have to use a different DBSID for the target system. This is required since in this case the target system database instance is created on the source system database server.

> → Tip
>
> To facilitate the preservation of the source system host names, consider introducing virtual host names to the source system before you run nZDM Java for the first time. If this is not possible, install the target system on virtual host names that are equal to the physical host names of the source system. You can configure these virtual host names either in your DNS, or by modifying the `/etc/hosts` file in the target system hosts.

2.4 System Sizing and Performance Aspects

As activating the recording in the source system causes an increased load on the system during production operation, the source system has to be appropriately sized to handle the increased load. This is due to the fact that changes in monitored tables cause additional operations to be executed and entries to be inserted to the master and change log tables. This might have a negative impact on the response times, throughput, and other performance characteristics of a fully loaded system.

An appropriately sized production system should be able to handle the increased load caused by the change recording. To avoid decreased performance during the nZDM Java procedure, we recommend the following:

- Ensure that your system is sized to handle peak loads that are at least twice higher than the average load during production operation.
- Avoid peak loads while running the nZDM Java procedure if possible.

According to SAP sizing guidelines, the CPU utilization during peak loads should not exceed 65%. Therefore, if for example your SAP NetWeaver database is installed on a dedicated host, you should aim that the average CPU utilization of the SAP NetWeaver database host while performing the nZDM Java procedure does not exceed 30%.

2.5 Planning Aspects for AS Java Core

As many AS Java Core components do not explicitly support change recording during the nZDM Java procedure, changes to the data managed by these components are either not possible, or are lost in a few specific cases. This does not have any significant business impact.

Note the following important aspects:

- System configuration - Changes to the configuration of services and applications stored in the Configuration Manager (CM) repository while the system is in recording mode are lost. Such changes can only be performed by system administrators by means of administration tools such as `configtool` or the *Java System Properties* page in SAP NetWeaver Administrator. We recommend that you avoid such changes if possible. If you do such changes, you have to do them manually in the target system as well.
- System monitoring data collected in the source system while the recording is active is not replicated to the target system. Such data is strictly specific to the system it originates from, so it must not be transferred to a different system. The target system collects its own monitoring data.
- Data cached in the source system is not replicated to the target system. By technical design cached data is temporary and is recreated in the target system if needed.
- User sessions - Changes to user sessions are not replicated to the target system. After the system switch, all existing user sessions are lost, so users have to logon to the system again.
- Java Messaging Service (JMS) - Changes to JMS data while recording is active are not replicated to the target system. Any messages remaining after the source system is shut down are copied to the target system before nZDM Java is finalized, and eventually consumed there. This guarantees that all JMS messages are consumed only once and no messages are lost.
- NetWeaver Administrator (NWA) - Changes to NWA personalization settings, for example personalized look and feel, are lost. There is no impact to any of the essential functionalities of the NWA.
- Web Services - The metering data about how many times a particular web service operation is invoked by a particular user is not replicated to the target system. This information is only used for statistical purposes and should not have any business impact.
- Job Scheduler - For Portal systems and systems that have Portal installed, all Job Scheduler data is read-only in the source system, therefore scheduled tasks cannot be maintained while recording is active. Scheduled jobs are executed both in the source and target systems.
  For SAP Process Orchestration systems, changes to Job Scheduler data are recorded and replicated to the target system, so scheduled tasks can be freely maintained. Scheduled jobs are executed only in the source system. In the target system, they are initially suspended. Their execution resumes only after the nZDM Java procedure has finished.

2.6 Planning Aspects for the User Management Engine (UME)

> **Note**
>
> This section is only relevant if your systems has the User Management Engine.

The User Management Engine (UME) supports change recording during the nZDM Java procedure. This means that changes to UME principals such as users, roles and groups stored in the regular UME SAP NetWeaver database, are recorded on the source system and are replicated to the target system.

Note that the following exceptions apply:

- UME configuration - Changes to the UME configuration are disabled while the system is running in recording mode, since such changes might lead to errors when they are replicated to the target system. If

you try to change the UME configuration, you receive an error message informing you that the system is being updated and changes are not possible.

- Remote repositories - If UME principals are stored in an LDAP directory or in an ABAP system, changes to these are not recorded. In such cases, you have to use the same LDAP directory or ABAP system for the source system and for the target system. This ensures that changes to the LDAP directory or to the ABAP system are available in the target system as soon as the target system has been set up, even if the source system is still in recording mode.

  > ⚠ Caution
  >
  > Do **not** perform any UME activities in the target system while the source system is in recording mode. This can lead to inconsistencies after the replication to the target system if there are complex relationships between the UME SAP NetWeaver database and the data stored in the LDAP directory or the ABAP system.

- **Relevant only if your system has PCD**: Personalization information of the Portal Content Directory (PCD) can be appended to UME users. Deleting users that contain PCD personalization information is disabled while the system is in recording mode.

2.7 SAP Single Sign-On

> ⓘ Note
>
> This section is only relevant if your system has SAP Single Sign-On (SSO) enabled.

The Single Sign-On operates in read-only mode during the nZDM Java procedure. This means that all user actions that require data changes in the SAP NetWeaver database are disabled. Such actions are, for example, configuration changes, secure login, and identity federation, among others.

2.8 Planning Aspects for the Portal in EP Core (EPC)

> ⓘ Note
>
> This section is only relevant if your systems has the EP Core.

SAP Enterprise Portal (specifically, the components of usage type EP Core) implements both change recording and read-only modes during the nZDM Java procedure. The mode used depends on the specific Portal application. Where recording mode is in effect, changes are recorded in the source system and replicated to the target system; where read-only mode is in effect, the application rejects changes and notifies users that changes cannot be made while in read-only mode.

Note the following exceptions and effects:

- Activity Data Collector (ADC) - If ADC is activated, the data collected after the creation of the target system is lost.

- Portal Activity Reporting (PAR) - If active, new data is not collected by PAR while the system is in recording mode.
- Federated Portal Network (FPN) - If the source system is part of a FPN implementation, be aware that trust relationships and configurations between consumer and producer portals need to be manually reestablished after switching to the target system.

2.9 Planning Aspects for Knowledge Management and Collaboration (KMC)

> **Note**
>
> This section is only relevant if your systems has Knowledge Management and Collaboration.

For SAP Enterprise Portal systems, Knowledge Management and Collaboration (KMC) operates in read-only mode during the nZDM Java procedure. This means that all user actions that require data changes, such as configuration changes, CM repository modifications, collaboration room content modifications, are disabled.

You have to consider the following aspects related to the read-only mode of KMC:

- Filesystem content - KMC content located in the file system and not in the shared remote content repository, has to be manually copied to the relevant directory in the target system. For more information, see SAP Note 1178294.
- Long-running tasks, such as re-indexing, are suspended and resumed after the replication to the target system is completed.
- Short-running tasks, such as index deletion, which are active when the read-only mode is initiated, are executed only after the completion of other short running tasks when KMC system switches to read-only mode. Therefore, it might take a few minutes before KMC enters read-only mode.
- Content exchange - The Information and Content Exchange (ICE) service completes the transfer of the currently distributed resource, and then terminates all active content transfers without completing the transfer of the whole package. While KMC is in read-only mode, no new transfers are executed. After KMC exits the read-only mode, the content exchange continues as scheduled.
- Transport of KMC content - The system completes the exports or imports of KMC content that have already been started before switching to read-only mode. While KMC is in read-only mode, no new transports can be started.

For SAP Process Orchestration systems, KMC operates normally during the nZDM Java procedure and all changes to KMC data are recorded and replicated to the target system by means of the automatic recording approach. Note that the following exceptions apply:

- Java Workflow (JWF) - Java Workflow data is read-only while the system is in recording mode. Changes to JWF data such as JWF tasks are not possible.
- Wiki and Forums - If you have Wiki or Forums in your system, all data managed by these add-on components is also read-only. Changes to Wiki pages or forum topics are not possible.

2.10 Planning Aspects for Business Process Management (BPM)

For SAP NetWeaver Process Orchestration systems, BPM operates in business-only mode while recording is active. This means that all changes to BPM runtime data are recorded and replicated to the target system by means of the automatic recording approach. Processes and tasks can be executed and users can interact with the system in the usual manner. However, changes to BPM configuration and design-time data are not possible, so process definitions cannot be created or changed.

Note the following important aspects:

- Business Rules Management (BRM) - BRM data is read-only while the system is in recording mode. Therefore, changes to BRM data, including creating new business rules or changing existing ones, are not possible.
- BPM archiving - BPM archiving, which is based on XML Data Archiving Service (XML DAS), has to be manually disabled before starting the nZDM Java procedure and then re-enabled after the procedure has finished. Recording and replication of large volumes of archived data is avoided for performance reasons. In some cases this might result in an amount of data, which is larger than usual, to be archived when the archiving is re-enabled.

Related Information

Deactivating BPM Archiving [page 40]

2.11 Planning Aspects for Process Integration (PI)

For SAP NetWeaver Process Orchestration systems, PI operates in business-only mode while recording is active, that is, all changes to PI runtime data are recorded and replicated to the target system by means of the automatic recording approach. Business-critical functions such as message processing are not interrupted. However, PI configuration and design-time data is read-only. This means that it is not possible to create, change, import, or deploy Enterprise Service Repository (ESR) and Integration Directory objects, for example communication channels or integration scenarios.

Note the following aspects:

- Background jobs - Archiving, deletion, and other types of background jobs have to be manually disabled before starting the nZDM Java procedure and then re-enabled after the procedure has finished. As with BPM archiving, recording and replication of large volumes of archived or deleted data is avoided for performance reasons. Make sure that you have sufficient space in your database to keep all messages that are accumulated while the nZDM Java procedure is running without relying on archiving or deletion jobs.
- Software Landscape Directory (SLD) - SLD has to be manually set to read-only mode before starting the nZDM Java procedure and then set back to read-write mode after the procedure has finished. Therefore, SLD data cannot be updated while the system is in recording mode.

- Integration Visibility (IV) - This feature is an integrated part of the extended PI monitoring capabilities. All data collected by IV is recorded and replicated to the target system. Only IV discovery data is read-only and therefore cannot be maintained while the system is in recording mode.
- Starting and stopping of channels - Although communications channels cannot be created or changed, they can be freely started or stopped.

Related Information

Deactivating Background Jobs [page 42]
Setting the SAP Landscape Directory to Read-only Mode [page 44]

2.11.1 Planning Aspects for SAP PI with Enabled Cloud Integration Content

Cloud Integration Content supports change recording during the nZDM Java procedure. This means that changes on the source system can be recorded and can then be replicated to the target system.

Note that the following exceptions apply:

- The Management cockpit is read-only while the system is in recording mode. During the nZDM Java procedure deployment of integration content, security material, number ranges, and data sources is not possible. JMS configurations also cannot be changed. Only runtime related actions like starting, stopping of flows, or deleting locks are allowed.

2.12 Planning Aspects for Other SAP Components

Change recording is not supported for SAP components not explicitly mentioned by this guide. This means that changes to the data managed by these components are either not possible, or in a few specific cases, are lost. Depending on the system usage, this may or may not have business critical impact.

> ⓘ Note
>
> In the case of Central Process Scheduler (CPS) by Redwood, CPS data changes are possible while the system is in recording mode, but these changes are not replicated to the target system, thus leading to data loss.

2.13 Planning Aspects for Third-Party Components

Third-party components and applications that do not have their own persistence are treated as SAP components. Since data managed by such components is stored in SAP repositories and tables, changes to

this data are either recorded and replicated or not possible, depending on the mode in which the corresponding SAP components operate. For example, changes to data managed by a third-party portal application,which only uses PCD for storage, are recorded and replicated while recording is active.

Change recording is in general not supported for third-party components that have their own persistence. Changes to the data managed by these components are either not possible or lost, depending on where this data is stored.

- Changes are not possible for third-party components that store their data in database tables inside the SAP NetWeaver schema. All tables in this schema, which are not explicitly classified otherwise, are by default frozen to prevent data loss. For some tables this might not be acceptable, as essential business functions might depend on the ability to change their data. You can identify and classify such tables differently by following the recommendations in this chapter.
- For third-party components that store their data in database tables outside the SAP NetWeaver schema, or in other external repositories, such as the filesystem, changes are possible. Such database schemas or external repositories are not managed by nZDM Java in any way. If such changes may occur during the execution of the nZDM Java procedure, depending on their nature you may need to design and implement additional mechanisms to avoid losing them. For example, you could copy the entire contents of such tables to their corresponding tables in the target system SAP NetWeaver database manually at the end of the procedure.

We recommend the following approach to properly identify and classify third-party tables in the SAP NetWeaver schema:

1. Identify all third-party tables in the SAP NetWeaver schema.
2. Analyze these tables to determine their intended purpose and most important usage characteristics.
3. Based on this information, classify all third-party database tables in one of the following three groups:
    1. **frozen** - changes are not possible
    2. **whitelist** - changes are lost
    3. **graylist** - changes are recorded and replicated

    > ⓘ Note
    >
    > **SAP HANA 2.0 DB only**: Adjust the connection string of your third-party components as described in SAP Note 2509590 if the following preconditions are present:
    > 1. Your third-party components do not use the database connection APIs provided by SAP NetWeaver
    > 2. The components do not use the URL value set in the *Connection Pools* menu of the `configtool`
    > 3. They have tables with large object (LOB) columns that are graylisted.
4. Configure the classification by setting the relevant properties of the nZDM Java application.

Related Information

Configuring Table Classification for Third-Party Tables [page 26]
SAP HANA 2.0: Managing Triggers for LOB Values [page 36]

2.13.1 Identifying Third-Party Database Tables

We recommend the following approach for identifying third-party tables in the SAP NetWeaver schema:

1. Identify all third-party `JDDSCHEMA` components in your SAP system. To do this, in the *System Information* page search for development components with a vendor different from `sap.com` and software type `JDDSCHEMA`.
2. Examining their deployment archives to determine the SAP NetWeaver database tables that they contain. The definition of each table is contained in an XML file named after the table with suffix `.gdbtable`.

2.13.2 Analyzing Third-Party Database Tables

After identifying all third-party tables, you have to analyze them to determine their intended purpose and most important usage characteristics. If possible, contact the developers of the third-party components and ask them to perform this analysis.

The most important aspect to be checked is if the table receives any updates during normal business operation. To do this, proceed as follows:

1. Go to *SAP NetWeaver Administrator*: **`http://<host name>:<port>/nwa`**.
2. Navigate to *Troubleshooting* > *Database* > *Open SQL Monitors* > *Table Statistics Monitor*.
3. Choose *Reset Statistics*.
4. Wait for a certain time period to elapse, during which only normal business operation takes place in the system. The time may range from a few hours to a couple of days depending on the actual scenarios implemented in the system.
5. Filter the third-party tables by name and check if they receive any inserts, updates, or deletes.

Note that some tables are not updated during normal business operation. Instead, they are only updated when configuration or design-time data is changed. Such tables can remain safely frozen during the nZDM Java procedure.

2.13.3 Classifying Third-Party Database Tables

To prevent data loss, all third-party database tables in the SAP NetWeaver schema are by default frozen while the system is in recording mode. This means that all attempts to change the data stored in such tables results in an error. If this is not acceptable, you can classify such tables differently.

For SAP Enterprise Portal systems, you can specify a list of third-party tables that are going to be part of the nZDM Java whitelist. All tables in this list are not frozen and therefore changes to their data are possible, and they are also not recorded. Depending on the nature of these changes, you might need to design and implement additional mechanisms to avoid losing them. In general, all tables that receive updates during normal business operation should be considered as whitelist candidates.

For SAP Process Orchestration systems, in addition to adding tables to the whitelist, you can also specify a list of third-party tables whose changes should be recorded and replicated (graylist). nZDM Java manages the recording and replication of all changes to these tables by means of the automatic recording approach. In this

case, all tables that receive updates during normal business operation should be classified either as whitelist or graylist depending on their purpose and key characteristics. Consider the following principles:

- Tables that receive updates during normal business operation should be classified as **graylist**, except in cases when other considerations listed here apply.
- Tables classified as **graylist** must only receive updates as a result of user actions, that is, they must not receive any updates as a result of system restarts, deployment of new component versions, or background activities.
- Tables that only contain temporary data, or serve as a cache for data that is also stored elsewhere, should be classified as **whitelist** to improve performance.
- Tables that contain monitoring data should be classified as **whitelist** for performance reasons, if losing the monitoring data is considered acceptable.

> ⚠ Caution
>
> - In some cases, it is not possible to correctly classify a table in any of the three categories according to the above principles. In such cases, contact the developers of the third-party component to determine the correct strategy.
> - All third-party tables must have a primary key in order to be managed by the automatic recording.

The replication mechanism works only if the table structures on the replicator system are identical to their counterparts on the recorder system, or if there are only compatible changes to these structures. Note that the SAP NetWeaver database version might be higher on the replicator than the version on the recorder. The following changes are considered compatible and therefore supported:

- Adding new tables and associated objects
- Adding new columns with default values to existing tables
- Adding indexes to existing tables
- Increasing the size of existing columns
- Removing constraints, for example, primary key constraints

> ⓘ Note
>
> Any other changes, such as removing tables or columns, decreasing the size of existing columns, changing column types, or adding new constraints, are considered incompatible and therefore not supported.

3 Preparation

This section describes the activities you have to perform to prepare for the near-Zero Downtime Maintenance Java procedure. You have to perform these activities only once, before performing the nZDM Java procedure for the first time.

3.1 Preparation for All SAP NetWeaver Systems

This section describes the preparation activities for all supported SAP NetWeaver products that you have to perform before the nZDM Java procedure.

3.1.1 Creating a User for nZDM Java

The system user performing the maintenance activities must have the necessary authorizations to operate nZDM Java. You have to create a dedicated nZDM Java user, which has to be deleted after you finish using the nZDM procedure.

Creating a Dedicated nZDM Java User

Procedure

1. In the source system, go to the *User Management Engine* application at **`http://<hostname>:5<instance_number>00/useradmin`**
2. Create a new user. Choose a user name, for example **`NZDMTU`** (nZDM technical user).
3. Fill in all required fields and set the security policy to *Technical User*.
4. In the *Assigned Roles* tab, find the `SAP_NZDM_ADMINISTRATOR` role, assign it to the user, and choose *Save*.
5. Assign the action `Destination_Service_Write_Permission` to the `SAP_NZDM_ADMINISTRATOR` role:
   a. In the *Search Criteria* field, choose *Role*. Search for the `SAP_NZDM_ADMINISTRATOR` role and modify it.
   b. In the *Assigned Actions* tab, under *Available Actions* search for the `Destination_Service_Write_Permission` action. Once the action is listed in the search results, choose *Add* to assign it. Afterward, save the changes to the user role.

3.1.2 Downloading and Deploying Required Components

To fully use the nZDM Java capabilities, certain components have to be present, and running in your SAP system at least on the minimum required version on which nZDM Java can function.

The components you have to check are listed in the table below. Before you start the procedure, ensure that the version of components in your SAP system are equal to or higher than the versions stated in the corresponding SAP Note.

To take advantage of the latest improvements to nZDM Java, update the components to their version stated in the current Central SAP Note for nZDM Java 3291319.

> **Note**
>
> - Update only listed components that exist in your system and are outdated.
> - If a component does not exist in your system, you do not need to download and deploy it, unless explicitly stated otherwise.
> - Calculate the component depencendies by using the SCA Dependency Analysis tool. See SAP Note 1974464. Alternatively, use the Java Support Tool to do so. See SAP Note 2352717.
> - Always update components to their latest available patch.
> - When you are deploying the required components, do not extend the system, that is, do not install additional product instances.
> - Updating some components might require a system restart.
> - **For SAP HANA 2.0**: also perform the procedure described in SAP HANA 2.0: Managing Triggers for LOB Values [page 36] . Use the same system restart for this and above changes.

1.

Component Name	SAP Note and nZDM Java SP
EP RUNTIME <Release><SP> (`EP-RUNTIME`)	2039363
J2EE ENGINE SERVERCORE <Release><SP> (`SERVERCORE`)	2456313 **Only when your SAP NetWeaver DB is Oracle** - 2490515 Only when your SAP NetWeaver DB is HANA 2.0 - 2517624 For SAP PI with Cloud Integration Content: 2983986
J2EE ENGINE FRAMEWORK <Release><SP> (`J2EE-FRMW`)	1907455
J2EE ENGINE LM-CORE <Release> <SP> (`LM-CORE`)	2456313 For SAP PI with Cloud Integration Content: 2983986 **Only when your SAP NetWeaver DB is Oracle** - 2490515 Only when your SAP NetWeaver DB is HANA 2.0 - 2517624
KMC CONTENT MANAGEMENT <Release><SP> (`KMC-CM`)	2083453

Component Name	SAP Note and nZDM Java SP
KMC BASE COMPONENTS <Release><SP> (`KMC-BC`)	2017689
MESSAGING SYSTEM SERVICE <Release> <SP> (`MESSAGING`)	2025782
SOA MONITORS <Release><SP> (`SOAMON`)	1884085
XI ADAPTER FRAMEWORK <Release> <SP> (`SAP_XIAF`)	
XI GATEWAY APPLICATIONS (`SAP_XIIGW_APPL`)	2954857

To download the latest patch version of the components, go to SAP Software Download Center ▶ *Search for Software* and search by component name.

Deploy the components by using the latest version of the Software Update Manager (SUM). Proceed as described in section *Applying Single Component Updates and Patches* of the SUM guide.

Related Information

Supported Releases and Minimum SPS Levels [page 14]
Downloading and Using Software Update Manager 1.0 [page 77]

3.1.3 Configuring Table Classification for Third-Party Tables

Context

If you have third-party tables in your system that should be classified differently from the default read-only group, you have to add these tables to the nZDM Java configuration before performing the procedure.

Proceed as follows:

Procedure

1. Navigate to *SAP NetWeaver Administrator* at **`http://<host name>:<port>/nwa`** ▶ *Configuration* ▶ *Infrastructure* ▶ *Java System Properties* ▶ *Applications*
2. Locate the `tc~lm~nzdm~app` application.

> → Tip
>
> In the name filter, enter **`*nzdm*`**.

3. Choose the *tc~lm~nzdm~app* application and open the *Extended Details* section.
4. Set the `whitelist` property to the list of table names of all third-party tables that have to be open for change (whitelisted). Use a comma as a separator, for example: **`TABLE1,TABLE2`**.
5. Set the `graylist` property to the list of table names of all third-party tables, in which changes should be recorded and replicated (gray-listed). The synthax should adhere to **`TABLE3,TABLE4`**, with a comma as a separator. For example: **`TABLE3,TABLE4`**.
6. Set the `KeyColumns` property to the list of key columns of all third-party tables (graylisted) without a primary key. The syntax should adhere to **`<TABLE_NAME>:<COLUMN_NAME>`**, with each separated by a semicolon, for example: **`MII123:FIELD1,FIELD2;PO456:FIELD1,FIELD3`** .
7. Save your changes.
8. In *SAP NetWeaver Administrator*, go to *Operations* > *Systems* > *Start & Stop* > *Java Applications* .
9. Locate and choose the `tc~lm~nzdm~app` application. Afterward, restart it for all system instances for the changes to take effect.

Results

> ⚠ Caution
>
> Ensure that all graylisted tables have a primary key or a set `KeyColumns` property to prevent errors in the startup of the recording process. In error cases, check for such tables in the `DefaultTrace` log, and afterwards add the missing primary key or `KeyColumn` value.

Related Information

Planning Aspects for Third-Party Components [page 20]

3.1.4 (Optional) Setting Additional nZDM Java Configuration Parameters

In some cases, you might want to adjust various nZDM configuration parameters before performing the nZDM Java procedure. For example, you might want to optimize the recording or replication performance to your system and usage scenario.

> ⚠ Caution
>
> Setting the nZDM Java configuration parameters to inappropriate custom values could have a negative effect on the performance and stability of the nZDM Java procedure. We recommend that you consult with SAP before making any changes, and that you measure the impact of your changes in a test system before deciding to use them for your production system.

Procedure

1. Navigate to *SAP NetWeaver Administrator* at **`http://<host name>:<port>/nwa`** ▶ *Configuration* ▶ *Infrastructure* ▶ *Java System Properties* ▶ *Applications*.
2. Locate and choose the `tc~lm~nzdm~app` application.

   > → Tip
   >
   > In the name filter, enter **`*nzdm*`**.

3. Open the *Extended Details* section.
4. Set the properties you want to change to your preferred values.

Property	Default Value	Description
`whitelist`	`""`	Specifies a list of table names of third-party tables that should be open for change, separated by comma. For example: `TABLE1,TABLE2`.
`graylist`	`""`	Specifies a list of table names of third-party tables in which changes should be recorded and replicated, separated by comma. For example: `TABLE3,TABLE4`.
`KeyColumns`	`""`	Specifies a list of key columns that have to be treated as primary key columns of third-party tables (gray-listed). For example: `TABLE:FIELD1,FIELD2;TABLE1:FIELD1,FIELD3`
`AutoRecordingEnabled`	`false`	If set to `true`, enables the automatic recording and replication of changes to gray-listed tables. Automatic recording is enabled by default if the `ActiveConfiguration` property of the NZDM Service is set to `po`. In this case, setting this property to `true` has no effect.
`LazyRecordingNonKeysEnabled`	`false`	If set to `true`, enables the **lazy recording of non-key fields** automatic recording option. Enabling this option could improve the automatic recording performance in some cases, for example in I/O constrained systems. Consider enabling it if the CPU utilization of the SAP NetWeaver database host in your production system is low (<20%), and you have concerns about the I/O bandwidth of this host.

Property	Default Value	Description
`RecordingChangedOnlyEnabled`	`false`	If set to `true`, enables the **recording only changed fields for updates** automatic recording option. Enabling this option might have a minor negative effect on the automatic recording performance, but improves the replication speed. Consider enabling it if the CPU utilization of the SAP NetWeaver database host in your production system is low (<20%) and you want to achieve the best possible replication speed.
`SnapshotRecordingEnabled`	`false`	If set to `true`, enables the **experimental snapshot** recording mechanism. **Reserved for future use. Do not change.**
`ReplicationFetchSize`	`1000`	Specifies the JDBC fetch size of replication queries. Increasing the value of this parameter improves replication speed, but results in increased Java heap memory usage in the target system. If you want to achieve the best possible replication speed, consider increasing the value of this property 10 times or higher. In this case, for each increment of 10000 of this parameter also increase the Java heap size of the target system Java instances by 100 MB.
`ReplicationTxBatchSize`	`100`	Specifies how many transactions are retrieved at once by replication queries and cached in the target system. Increasing the value of this parameter improves the replication speed, but results in increased Java heap memory usage in the target system. If you want to achieve the best possible replication speed, consider increasing the value of this property 10 times or higher. In this case, also increase the Java heap size of the target system Java instances by 1 GB for each 1000 increment of this parameter.
`ReplicationNumRetries`	`10`	Specifies how may times a failed replication query is retried before stopping the replication. Consider increasing the value of this parameter to `100` or more, if the replication in the target system stops for trivial reasons, for example no network connectivity or SAP NetWeaver database deadlocks.
`RestoreDefaultSettingsOnFinish`	`false`	Reserved for internal use by nZDM Java. **Do not change.**
`SpecialTaskHandlingEnabled`	`false`	This is an SAP-internal parameter. **Do not change**.

Property	Default Value	Description
`SnapshotInterval`	`60`	Specifies the snapshot interval of the experimental snapshot recording mechanism, measured in seconds. **Reserved for future use. Do not change.**
`MaintenanceInterval`	`1`	Specifies the interval of the automatic recording maintenance job, measured in minutes. **Do not change**, unless advised otherwise by SAP.
`StatisticsInterval`	`2`	Specifies the interval of the automatic recording statistics job, measured in minutes. **Do not change**, unless advised otherwise by SAP.

5. Save your changes.
6. In *SAP NetWeaver Administrator*, go to *Operations* > *Systems* > *Start & Stop* > *Java Applications*.
7. Locate and choose the `tc~lm~nzdm~app` application. Afterward, restart it for all system instances for the changes to take effect.

Related Information

Configuring Table Classification for Third-Party Tables [page 26]
Activating the nZDM Java Configuration for Process Orchestration Systems [page 31]

3.2 Preparation for Process Orchestration Systems

This section describes the preparation activities for SAP NetWeaver Process Orchestration systems that you have to perform before the nZDM Java procedure.

3.2.1 Configuring Process Orchestration-Specific System Settings

You have to disable the BPM disposal calculations when performing the nZDM Java procedure in a Process Orchestration system. Proceed as follows:

Procedure

1. Navigate to *SAP NetWeaver Administrator* at **`http://<host name>:<port>/nwa`** *Configuration* > *Infrastructure* > *Java System Properties* > *Services*

2. Locate the service `Galaxy Core Service` (`sap.com/com.sap.glx.core.svc`).

   > → Tip
   >
   > In the *Name* filter, enter `*galaxy*`.

3. Choose the `Galaxy Core Service` and open the *Extended Details* section.
4. Set the `galaxy.internal` property to `nodisposal`. If this property is already set to a custom value, append `,nodisposal` at the end.
5. Save your changes.
6. In *SAP NetWeaver Administrator*, go to *Operations* > *Systems* > *Start & Stop* > *Java Services*.
7. Locate the service `Galaxy Core Service` (`sap.com/com.sap.glx.core.svc`).

   > → Tip
   >
   > In the *Name* filter, enter `*galaxy*`.

8. Choose the `Galaxy Core Service` and restart it for all system instances so that the changes can take effect.

   > ⓘ Note
   >
   > Be aware that restarting the Galaxy Core Service introduces a short period of downtime for BPM.

3.2.2 Activating the nZDM Java Configuration for Process Orchestration Systems

Before you start the nZDM Java procedure, you have to manually configure nZDM Java to use the automatic recording and replication mechanism specific to Process Orchestration configuration. Proceed as follows:

Procedure

1. Navigate to *SAP NetWeaver Administrator* at `http://<host name>:<port>/nwa` > *Configuration* > *Infrastructure* > *Java System Properties* > *Services*.
2. Locate the service `NZDM Service` (`sap.com/tc~lm~nzdm~crrsrv`).

   > → Tip
   >
   > In the *Name* filter, enter `*nzdm*`.

3. Choose the `nZDM Service` and open the *Extended Details* menu.
4. Change the `ActiveConfiguration` property from `ep` to `po`.
5. Perform one of the following steps only if it is relevant for your scenario:
   - If you are using the database switch approach, change the `ReplicatorOnFinish` property from `none` to `stop`. With this property setting, nZDM Java stops the target system at the end of the procedure.

- If you are using Landscape Virtualization Management (LVM) in conjunction with nZDM Java, change the `ReplicatorOnFinish` property from `none` to `running`. With this property setting, nZDM Java keeps the target system running at the end of the procedure. The system is restarted later on by LVM.

6. Save your changes.

3.2.3 Configuring Cloud Integration Content-Specific System Settings

Context

> **Note**
>
> This section is required only if Cloud Integration Content is enabled on the system.

You have to manually set the management cockpit to operate in read-only mode for the duration of the nZDM Java procedure. Proceed as follows:

Procedure

1. Navigate to the SAP NetWeaver Administrator page at *http://<host name>:<port>/nwa* > *Configuration* > *Infrastructure* > *Java System Properties* > *Applications*
2. Locate the application *com.sap.aii.igw.gen.build.deploy.app*. Then choose it, and open the *Extended Details* section.
3. Set the *igw.nzdm.read.only.active* property to *true*. Then save your changes.
4. Back in the SAP NetWeaver Administrator, go to *Operations* > *Systems* > *Start & Stop* > *Java Applications*
5. Locate the *com.sap.aii.igw.gen.build.deploy.app* application. Then choose it, and restart it for all system instances, so that the changes take effect.

Related Information

Cloud Integration Content

3.3 Performing SAP NetWeaver Database-Specific Configuration Steps

Before performing the nZDM Java procedure, you have to change your SAP NetWeaver database configuration to ensure that the automatic recording and replication mechanism works as expected. You have to perform these changes only once - before performing the nZDM Java procedure for the first time.

3.3.1 Oracle-Specific Configuration Steps

Context

You have to grant the following additional privileges to the default database user (`SAPSR3DB` or `SAP<SID>DB`):

Privilege	Description
`SELECT ANY DICTIONARY`	Query system views for information about active transactions.
`CREATE JOB`	Create and manage scheduled jobs.
`ADVISOR`	Access the advisor framework through PL/SQL packages, such as `DBMS_ADVISOR` and `DBMS_SQLTUNE`.
`CREATE ANY SQL PROFILE`	Accept an SQL Profile recommended by the SQL Tuning Advisor, which is accessed through Enterprise Manager or by the `DBMS_SQLTUNE` package.
`DROP ANY SQL PROFILE`	Drop existing SQL Profiles.
Oracle Database 11g Release 2 (11.2) and higher:`ADMINISTER SQL MANAGEMENT OBJECT`	Create, alter, and drop SQL Profiles owned by any user through the `DBMS_SQLTUNE` package.

Procedure

1. Logon to your source system database host as the `ora<sid>` user.
2. Start `sqlplus` as the `sysdba` user by executing the following command:

   ```
   sqlplus / as sysdba
   ```
3. Execute the following commands:

   ```
   GRANT SELECT ANY DICTIONARY TO <Default DB user>;
   GRANT CREATE JOB TO <Default DB user>;
   GRANT ADVISOR TO <Default DB user>;
   GRANT CREATE ANY SQL PROFILE TO <Default DB user>;
   GRANT DROP ANY SQL PROFILE TO <Default DB user>;
   ```

As of **Oracle Database 11g Release 2 (11.2)** and higher, instead of the privileges `CREATE ANY SQL PROFILE` and `DROP ANY SQL PROFILE` you have to use `ADMINISTER SQL MANAGEMENT OBJECT`.

```
GRANT ADMINISTER SQL MANAGEMENT OBJECT TO <Default DB user>;
```

3.3.2 Microsoft SQL Server-Specific Configuration Steps

You have to grant additional privileges and `msdb` roles to the schema user SAP<SID>DB. In addition, you have to manually create a special linked server before using nZDM Java. As Microsoft SQL Server does not have native support for autonomous transactions, nZDM Java simulates them by using this special linked server.

Procedure

1. Grant the following additional privileges and `msdb` roles to the schema user SAP<SID>DB:

Privilege or Role	Description
`VIEW SERVER STATE`	Query system views for information about active transactions.
`SQLAgentUserRole`	Create and manage scheduled jobs.
`SQLAgentReaderRole`	
`SQLAgentOperatorRole`	

   a. Logon to your source system database host as the <SID>adm user.
   b. Start the Microsoft SQL Server Management Studio and connect to your database instance using *Windows Authentication*.
   c. Choose *New Query* and enter the following commands, then choose *Execute*:

```
USE master

GO

GRANT VIEW SERVER STATE TO SAP<SID>DB

GO
```

   Add the `msdb` roles listed in the above table to the schema user SAP<SID>DB. To do this, proceed as described in the Microsoft documentation about adding an SQL login or msdb role to a SQL Server Agent fixed database role.

> ⓘ Note
>
> Once you have assigned the roles, ensure that there is no permissions conflict with other roles assigned to the SAP<SID>DB user. For example, if the user has `TargetServersRole` assigned, you might encounter issues with the nZDM procedure.

2. Create a special linked sever before using nZDM Java.

a. Logon to your source system database host as the <SID>adm user.
b. Start the Microsoft SQL Server Management Studio and connect to your database instance using *Windows Authentication*.
c. Choose *New Query* and enter the following commands, then choose *Execute*:

```
USE master

GO

EXEC sp_addlinkedserver @server = N'NZDMLoopback',@srvproduct = N'
',@provider = N'SQLNCLI',@datasrc = @@SERVERNAME

GO

EXEC sp_serveroption NZDMLoopback,N'remote proc transaction
promotion','FALSE'

GO

EXEC sp_serveroption NZDMLoopback,N'RPC OUT','TRUE'

GO
```

3. > **Note**
   >
   > You have to have remote access to the Microsoft SQL Server. This grants permission to run locally stored procedures from nZDM linked sever.

   Check if the remote access option is enabled:

   a. Logon to your source system database host as the <SID>adm user.
   b. Start the Microsoft SQL Server Management Studio and connect to your database instanse using Windows Authentication.
   c. Choose *New Query* and enter the following commands, then choose *Execute*:

   ```
   SELECT * FROM sys.configurations where name = 'remote access'
   ```

   If the value is 0 the remote access is disabled. You have to enable it.

   To enable the remote access option:

   1. Logon to your source system database host as the <SID>adm user.
   2. Start the Microsoft SQL Server Management Studio and connect to your database instance using Windows Authentication.
   3. Choose *New Query* and enter the following commands, then choose *Execute*:
      ```
      EXEC sp_configure 'remote access', 1;
      GO
      RECONFIGURE;
      GO
      ```
   4. Restart Microsoft SQL Server.

3.3.3 SAP HANA 2.0: Managing Triggers for LOB Values

Context

You need to add a session variable in the JDBC string that is used for connection to the database.

Procedure

1. Open the `configtool` and edit the secure store. Edit the value of the URL in *Connection Pools* is as described in the ODBC-relevant steps in the solution in SAP Note 2509590.

   > **Note**
   >
   > Store the original value of the URL, as you have to restore it later on in the procedure.
   > - Creating the Target System for System Switch [page 51] - if you are using the system switch approach.
   > - Finalizing the nZDM Java Procedure [page 62] - if you are using the database switch approach.

2. Restart the system for the change to take effect.

Related Information

Planning Aspects for Third-Party Components [page 20]
Finalizing the nZDM Java Procedure [page 62]
Creating the Target System for System Switch [page 51]

3.3.4 SAP HANA 2.0 Specific Configuration Steps

Procedure

1. Execute the following statement:

   ```
   ALTER SYSTEM ALTER CONFIGURATION ('indexserver.ini', 'SYSTEM') SET ('metadata', 'enable_drop_global_temp_row_in_use') = 'true' WITH RECONFIGURE
   ```

   For more information, see 2503043.

2. For the correct identification of the target system in landscapes that use internal and external networks at the same time, you have to ensure that the internal IPs of both database systems are different from each other. Alternatively, perform the procedure described in Mapping Host Names for Database Client Access of the SAP HANA Administration Guide.

Perform the following procedure on all SAP NetWeaver system hosts:

1. Depending on the operating system of the host, edit the file `C:\Windows\System32\Drivers\etc\hosts` for Windows, or the `/etc/hosts` for Linux.
2. Get the external HANA VM host name using the command: **`nslookup <HANA VM External IP>`**
3. Add the external HANA VM host name from the previous step into the "hosts" file: **`<HANA VM Internal IP> <fully qualified domain name of HANA VM External host name> <HANA VM External host name>`**

   > Example
   >
   > **`10.23.100.234 <fqdns> <hostname>`**

4. Perform the following steps on the HANA DB:
   1. Use SAP HANA Studio to connect to source HANA system with SYSTEM user and *System database option*.
   2. Navigate to the context menu ▸ *Configuration and Monitoring* ▸ *Open Administration* ▸ *Configuration* and then filter for *public_host*.
   3. Add a new parameter to *System* with key: **`map_<internal HANA hostname> value: <external HANA hostname>`**

3.3.5 IBM DB2 for Linux, Unix, and Windows Configuration Steps

Context

In some cases, the user for connecting to the database might be different than the schema name. In these cases, proceed as follows in the source system:

Procedure

1. Open a command prompt or PowerShell, and start the Config Tool.
2. Navigate to section *Secure Store*, then to the tab *Connection pools*.
3. In the *<SID> properties*, adapt the value of the key for the JDBC URL by adding the following element: **`currentFunctionPath=SYSTEM PATH,SAP<SID>DB;`**.

   The complete JDBC URL should now follow this convention: **`jdbc:db2://host:dbport/<SID>:currentSchema=SAP<SID>DB;currentFunctionPath=SYSTEM PATH,SAP<SID>DB;`**

   The complete JDBC URL has to be similar to the following example:

   > Example
   >
   > **`jdbc:db2://wdflbmd1234:5678/MY1:currentSchema=SAPMY1DB;currentFunctionPath=SYSTEM PATH,SAPMY1DB;`**

4. Restart the system.

3.3.6 SAP ASE-Specific Configuration Steps

You have to grant additional privileges and roles to the schema user SAPSR3DB, and create an external login for that user so that the scheduled jobs can be properly executed. In addition, you have to manually create a special linked server (loopback linked server) before using nZDM Java. Note that this action includes a restart of the database. As SAP ASE does not have native support for autonomous transactions, nZDM Java simulates them by using this special linked server.

> **Note**
>
> Execute all commands listed below by using the `Interactive SQL` utility, unless stated otherwise.

Procedure

1. Grant the following additional privileges and roles the schema user SAPSR3DB.

Privilege or Role	Description
all on `sp_sjob*` procedures	Create Job Scheduler objects
`js_user_role`	Create Job Scheduler objects

   a. As the `sapsa` user, grant the privileges by executing the following commands:

```
use sybmgmtdb
go
grant all on sp_sjobcreate to SAPSR3DB
go
grant all on sp_sjobdrop to SAPSR3DB
go
```

   b. As the `sapsso` user, grant the roles by executing the following commands:

```
grant role js_user_role to SAPSR3DB
go
sp_displayroles SAPSR3DB
```

2. As `sapsa` user, create an external login for the schema user by executing the following commands:

```
sp_addexternlogin SYB_JSTASK, SAPSR3DB, SAPSR3DB, <password>
go
sp_helpexternlogin SYB_JSTASK, SAPSR3DB
```

```
go
```

You have to do this so that scheduled jobs are executed correctly.

3. Perform the steps required for the correct operation of the special linked server, and create that server.
   a. As `sapsa` user, change the database configuration by executing the following commands:

      ```
      sp_configure "cis rpc handling", 1
      go
      sp_configure "enable xact coordination", 0
      go
      sp_configure "number of remote connections", 1000
      go
      sp_configure "number of remote logins", 1000
      ```

   b. Navigate to, and manually edit the `interfaces` file to create a new network site named `NZDMLoopback`. You have to copy the entry for your main server and rename it. See the following example for such an entry:

      ```
      NZDMLoopback
      master tcp ether <hostname> 4901
      query tcp ether <hostanme> 4901
      ```

   c. Restart the SAP NetWeaver database for the changes to take effect.
   d. As `sapsso` user, execute the following commands to create the `NZDMLoopback` server, and to enable password encryption:

      ```
      sp_addserver NZDMLoopback
      go
      sp_serveroption NZDMLoopback, "net password encryption", true
      go
      sp_helpserver
      ```

   e. As `sapsa` user, Add remote logins for local users by executing the following command:

      ```
      sp_addremotelogin <SID>
      ```

   f. As user SAPSR3DB, check whether the `NZDMLoopback` server has been added correctly by executing the following command:

      ```
      NZDMLoopback...sp_who
      ```

4 Performing the nZDM Java Procedure

This chapter provides information about performing the nZDM Java procedure.

> ⚠ Caution
>
> Make sure you do not run nZDM Java during daylight saving time shifts. Otherwise, the procedure might result in errors.

> ⓘ Note
>
> nZDM Java can work in conjunction with the Landscape Virtualization Management software. For more information, see Landscape Virtualization Management [page 78].
>
> As an alternative to performing the nZDM Java procedure by using its GUI, you can also use command tools such as PowerShell. You can find the relevant command line options at the end of each following section, where any steps can be automated. To see the command references, see nZDM Java Command Line [page 72].

4.1 Disabling Non-Critical Functionalities

4.1.1 Deactivating BPM Archiving

Context

The BPM archiving feature allows you to archive process instances based on certain predefined criteria. Before starting the recording in a Process Orchestration system, you have to ensure that BPM archiving will not be executed for the duration of the nZDM Java procedure. Follow these steps and recommendations:

- If any BPM archiving tasks are currently being executed, wait until they are finished before starting the recording.
- If any Java Scheduler tasks are performing BPM archiving, put them on hold before starting the recording.
- Do not start any BPM archiving tasks manually while the source system is in recording mode.

Procedure

1. Navigate to *SAP NetWeaver Administrator* at `http://<host name>:<port>/nwa` ▶ *Operations* ▶ *Jobs* ▶ *Java Scheduler* ▶ *Tasks* ▶.
2. Select the task that you want to put on hold and choose *Hold*.

Related Information

Reactivating BPM Archiving [page 68]

4.1.2 Deactivating Background Jobs for Cloud Integration Content

> ⓘ Note
>
> This section is only relevant if Cloud Integration Content is enabled on the system.

Before starting the recording in a Process Orchestration system, all of the following deletion and archiving jobs in that system have to be deactivated:

- `IGWArchiveJob`
- `IGWCleanUpJobs`
- `IGWMonitorDataCleanUpJob`
- `IGWTraceDataCleanupJob`

> → Remember
>
> We recommend the following:
>
> - If any of the tasks are currently being executed, wait until they are finished before starting the recording.
> - If any Java Scheduler tasks are performing Cloud Integration Content archiving or deletion, put them on hold before starting the recording.
> - Do not start any Cloud Integration Content archiving or deletion tasks manually while the source system is in recording mode.

Stop each the above-listed jobs as follows:

1. Navigate to SAP NetWeaver Administrator at ▶ *http://<host name>:<port>/nwa* ▶ *Operations* ▶ *Jobs* ▶ *Java Scheduler* ▶ *Tasks* ▶
2. Select the task and choose *Hold*.

4.1.3 Deactivating Background Jobs

Context

Before starting the recording in a Process Orchestration system, deletion and archiving jobs in that system have to be deactivated. They have to be reactivated again at the very end of the procedure. Depending on the components available in your system, use one of the following approaches:

- Using the *PI Runtime Workbench*.
- Directly modifying the `BC_MSG_JOBS` database table.

> ⓘ Note
>
> Although you can also deactivate background jobs by using SAP NetWeaver Administrator, this is not recommended.

Related Information

Reactivating Background Jobs [page 69]

4.1.3.1 Deactivating Background Jobs Using the PI Runtime Workbench

Context

> ⓘ Note
>
> This section is only relevant if the PI Runtime Workbench application is present in the system.

Procedure

1. Go to *PI Runtime Workbench* at **`http://<host>:<port>/rwb`**.
2. Navigate to *Component Monitoring* > *Display* > *Integration Server* > *Adapter Engine <SID>* and scroll down to the *Status* tab.
3. Choose *Background Processing*.

   In *Background Processing: Job Configuration* dialog, an overview of all background jobs is available. In the *Job Type* column, the type of the respective job is displayed. Multiple jobs of a specific type might be running.

4. Deactivate all jobs of type "Delete". To do this, on each "Delete" job choose *Edit*, deselect the *Active* checkbox and save your entries.

   > **Note**
   >
   > Make sure that all jobs of type "Delete" are deactivated before you deactivate any job of type "Archive".

5. Deactivate all jobs of type "Archive". To do this, on each "Archive" job choose *Edit*, deselect the *Active* checkbox and save your entries.
6. Deactivate all other types of jobs.
7. Close the *Background Processing: Job Configuration* dialog.

4.1.3.2 Deactivating Background Jobs by Modifying the BC_MSG_JOB Database Table

Context

If the PI Runtime Workbench application is not installed in the system, you can disable the background jobs by performing a direct modification to the `BC_MSG_JOB` database table.

Procedure

1. Retrieve the list of job IDs of all currently active jobs by executing the following query:

   ```
   SELECT JOB_ID FROM BC_MSG_JOB WHERE ACTIVE=1
   ```

   > **Note**
   >
   > Save the list for later use, as you are going to need it to reactivate the jobs later.

2. To disable all background jobs, execute the following SQL statement:

   ```
   UPDATE BC_MSG_JOB SET ACTIVE=0 WHERE ACTIVE=1
   ```

3. Restart the SAP system. This has to be done, so that the system can re-read the table data.

   > **Note**
   >
   > After the maintenance activities have been completed and the production system is fully operational, you have to reactivate the background jobs.

Related Information

Reactivating Background Jobs by Modifying the BC_MSG_JOB Database Table [page 69]

4.1.4 Setting the SAP Landscape Directory to Read-only Mode

Context

The SAP Landscape Directory (SLD) has to be manually set to operate in read-only mode for the duration of the nZDM Java procedure. To do this, proceed as follows:

Procedure

1. Go to *SAP Landscape Directory* at: **`http://<host name>:5<instance number>00/sld`**.
2. Logon as a user that has the `SAP_SLD_ADMINISTRATOR` role assigned (for example, the Administrator user).
3. Navigate to *Administration* > *Settings* > *Server Configuration*.
4. Set the *Write Protection* property to *Read-Only*.
5. Go to *Administration* > *Synchronization*.
6. Select all synchronization subscriptions and choose *Deactivate*.

4.2 Downloading the nZDM Java Tool

Prerequisites

> **Note**
>
> The nZDM Java tool supports only 64-bit Windows and Linux operating systems.

As a prerequisite, you require `SAPCAR` on the host where the tool is started. `SAPCAR` is required for extracting the nZDM Java tool archive.

Context

The nZDM Java GUI components and Command Line comprise the nZDM Java tool. By using the nZDM Java GUI, you can configure, control, and monitor the progress of the nZDM Java recording and replication. After connecting to the source and target systems, you can start or stop the recording in the source system, or the replication to the target system. Also, you can monitor the current recording and replication status, as well as the number of recorded and replicated entries.

The nZDM Java tool is extracted to a destination directory named `NZDMJAVA`. After the archive is extracted, this destination directory contains `java` and `jvm` folders, and executable startup files.

The nZDM Java tool uses the Java 8 virtual machine contained in the `jvm` folder of the nZDM Java tool destination directory. It can be extracted and started on any Windows- or Linux-based computer that can connect to the source and target systems, for example a client computer.

> **Note**
>
> As an alternative to the regular procedure with manual steps applied through the nZDM Java GUI, you can also use the command line options, which you can locate at the end of each section.

Procedure

1. **SAP HANA 2.0 DB only**: Edit the file `/etc/hosts` of the host where you will install nZDM GUI and add the internal HANA VM host name into the hosts file using the following convention:

   `<HANA VM external IP> <fully qualified domain name of HANA VM Internal host name> <HANA VM Internal host name>`

   > **Example**
   >
   > **`10.23.100.234 <fqdns> <hostname>`**

2. Download the nZDM Java tool archive. To do this, go to http://support.sap.com/sltoolset *System Maintenance* *near-Zero Downtime Maintenance (nZDM) for Java <version>* *Download*.
3. Open a command prompt.
4. Extract the nZDM Java tool archive by using the following command: **`SAPCAR –xvf <download directory>/<path>/<Archive>.SAR -R <destination_directory>`**.

Related Information

Downloading and Using SAPCAR [page 77]

4.3 Configuring HTTPs Communication Between nZDM Java Tool and SAP NetWeaver System

To use the capability of HTTPs communication between nZDM Java Tool and SAP NetWeaver system it is necessary that you should configure SSL and enable usage of the HTTPs in your SAP NetWeaver system.

4.3.1 Configuring SSL on the SAP NetWeaver AS Java

To enable access via HTTPS protocol, configure SSL on the SAP NetWeaver AS Java. For more information, see SAP Note 1770585 - How to configure SSL on the AS Java

The keypair should be created with a CN name matching the FQDN or IP address used to access the SAP NetWeaver AS Java from nZDM Java Tool.

4.3.2 Enabling the Usage of the HTTPS Communication Protocol

Enable the usage of the HTTPS communication protocol as described in the official SAP NetWeaver Java documentation for your source release on Enabling TLS Through the SSL Configuration Tool.

4.3.3 Importing HTTPS Communication Protocol Certificates

Prerequisites

Perform this procedure before starting the nZDM Java Tool.

Procedure

1. Go to SAP NetWeaver Administrator: `http://<host name>:<port>/nwa`
2. Navigate to *Configuration* > *Security* > *Certificates and Keys*.
3. Under the *Key Storage* tab page, from the *Views* list, select the view that contains ssl in its name.
4. From the *Entries* list, select the public certificate entry, for example, `ssl-credentials-cert`. If you have configured SSL as described in Configuring SSL on the SAP NetWeaver AS Java [page 46], select this certificate.
5. Export the entry and save it to `/<path to nZDM directory>/ NZDMJAVA/ <certificate_filename>.cert`.
6. In a or PowerShell, navigate to folder `/<path to nZDM directory>/NZDMJAVA/jvm/jre/bin`.
7. To import the certificate to the cacerts list of the jvm used by nZDM, enter the following command:

   ```
   keytool -importcert -file /<path to nZDM directory>/ NZDMJAVA / <certificate_filename>.cert -keystore /<path to nZDM directory>/ NZDMJAVA /jvm/jre/lib/security/cacerts -storepass <keytool password> -noprompt -alias XYZ
   ```

   The default password of the keytool is `changeit`.

> **Note**
>
> You can use the HTTPS protocol without a certificate or trust any certificate by selecting option *Trust any certificate* in the nZDM Java Tool.

4.4 Running the nZDM Java Tool

Prerequisites

- You have extracted the nZDM Java tool.

Procedure

1. Open a command prompt.
2. Navigate to the directory where you have extracted the nZDM Java tool.
3. Start the nZDM Java GUI by executing the `STARTUP.sh` file located in the nZDM destination directory.
4. (Optional) For every further start of the nZDM Java GUI, execute the file located in the destination directory.

4.4.1 (Optional) Switching On the Accessibility Mode of the nZDM Java GUI

Prerequisites

- You have extracted the nZDM Java tool.

Context

You can run nZDM Java in accessibility mode. This allows the GUI to adopt various screen properties from your operating system (OS). For example, you can set custom font (DPI) settings, or high-contrast color schemes. As in the standard mode, you can use keyboard access, that is, executing commands by using shortcut keys.

> **Note**
>
> Adjust the screen properties before starting the nZDM Java GUI by using the OS-specific options.

Procedure

1. Open a command prompt.
2. Navigate to the directory where you have extracted the nZDM Java tool.
3. Start the nZDM Java GUI by entering the following command:

   ```
   startup.sh "guimode=accessible"
   ```

4.5 Connecting to the Source System and Starting the Recording

Context

Before you start recording for the first time, you have to connect to the source system. Proceed as follows in the nZDM Java GUI:

Procedure

1. Choose ▶ *Source System* ▶ *Connect* ▶.
2. In the *Connect* dialog, enter the connection values and the logon credentials that you have configured in the source system:
   a. *Host* - the host name or IP address of the source system
   b. *Port Number* – the HTTP port of the source system, for example **`5<instance_number>00`**, or HTTPs port of the source system, for example **`5<instance_number>01`**.
   c. *User* and *Password* - the credentials of the authorized user for the nZDM Java procedure, which is the nZDM Java technical user of the Source System.
   d. *Enable HTTPs* - Leave this option enabled if you are entering an HTTPs port, or disable it if you are entering an HTTP port. Note that to use the capability of HTTPs communication it is necessary that HTTPs is enabled in your SAP NetWeaver system.
   e. *Trust any certificates* - Select this option if you have already imported the certificate to the jvm cacerts list of the nZDM Java tool and want to trust on it. Leave it disabled if you trust any certificate or use HTTPS protocol without a certificate.
3. Choose *Apply* to confirm your entries.
4. Choose *Start Recording* on the *Source System* part of the nZDM Java GUI.
5. In the *Specify Source System Database Host* dialog, enter the IP address or host name of the source system database host that is reachable from the target system.

   Make sure that the IP address or host name you enter is different from the one that the target system is going to use to connect to its own database host. For example, if the source and target systems are installed on the same virtual host names, use the physical host name or IP address of the source system database host, or any other name that uniquely identifies this particular host. You have to do this to prevent instabilities in the target system, which might lead to the need to create the system again.

Results

All data changes to important business data managed by applications running in recording mode that occur in the source system is recorded. To avoid any deployment in the source system after the recording has started, the system is locked for deployments.

→ Tip

Command line options relevant for this section

1. Connecting to and setting the source system:
   ```
   STARTUP.sh batchmode SetRecorderSystem recorderHost=<host name>
   recorderPort=<port number> recorderUser=<nzdm user name>
   recorderPassword=<nZDM user password> recorderHttps=<true or false>
   [recorderTrustAnyCerts=<true or false>]
   ```
2. Starting the recording
   ```
   STARTUP.sh batchmode StartRecording recorderHost=<host name>
   recorderPort=<port number> recorderUser=<nZDM user name>
   recorderPassword=<nZDM user password> recorderHttps=<true or false>
   [recorderTrustAnyCerts=<true or false>] recorderDbhost=<database host name>
   ```

Related Information

Downloading the nZDM Java Tool [page 44]

4.6 Creating the Target System

Prerequisites

The recording in the source system has to be started before creating the target system.

Context

To perform maintenance activities without stopping production use of your Java-only SAP NetWeaver system, you have to create an exact copy or clone of your source system.

⚠ Caution

- Ensure that the target system and SAP NetWeaver database have the same SID or SAP NetWeaver database SID and system name as the source system. If you have not done so for the SAP NetWeaver database, you have to redirect the application server to the new SAP NetWeaver database SID.

- If you are using a central System Landscape Directory (SLD), you have to isolate the target system from your central SLD system to prevent any data collisions.
- See SAP Note 2427292. If the Kernel version you have is higher than the ones listed in the note, you have to perform the procedure described in section Correcting the Automatic Stop of the Target System [page 85].

For performing the system copy or cloning, you can use any procedure and tool of your preference.

→ Tip

You can also use one of the following SAP products:

- Software Provisioning Manager (SWPM) 1.0, specifically its System Copy functionality. For more information, see System Copy Functionality of the Software Provisioning Manager 1.0 [page 78].
- Landscape Virtualization Management. For more information, see Overview of SAP Landscape Management [page 78]

When using the system copy functionality of SWPM, consider the following recommendations and additional steps:

- If you use a different host for the SWPM GUI, add the following line to the `hosts` file: **`<external IP of the installation host> <fully qualified domain name of installation host> <installation_host_name>`**
- Perform a homogeneous SAP NetWeaver database-specific system copy, as only this method allows you to copy your system without additional downtime.
- Add the following line to the hosts file: **`<target IP> <fully qualified domain name of source host> <source_host_name>`**
- When specifying the parameters of the target system, make sure that all parameters such as SID, instance numbers, ports, and passwords exactly match the equivalent parameters of the source system.
- Initially, you only need a single application server instance in your target system. If your production system has additional application server instances, you can switch them later to your production system as described in Switching the Additional Application Server Instances [page 65].
- To preserve the source system host names when creating the target system, start `sapinst` with the following PowerShell option:
  `SAPINST_USE_HOSTNAME=<virtual host>`
- To keep the configuration of the instances during the application server instance installation (primary or additional), start `sapinst` with the following PowerShell option:
  `JAVA_COPY_REMOVE_INSTANCES_IN_DB=no`
- To have a completely identical target system, copy the kernel and JVM files from the source system to the target system after the system copy has finished.

⚠ Caution

It is important that you verify all target system licenses. When using Software Provisioning Manager 1.0 to create the target system, you have to apply again all relevant licenses, including a maintenance license. In case you have created the system copy using other means, is possible that the hardware key becomes invalid and you need to re-apply all relevant licenses, including a maintenance license. For more information about when hardware key changes occur, see 174911.

→ Tip

For one detailed example, see our blog post on the subject at nZDM Part 1: Prepare the Physical Host of Your Target System.

4.6.1 Creating the Target System for System Switch

Context

ⓘ Note

This section is only relevant if you use the system switch approach. For more information, see Procedure Finalization Approaches [page 9].

When you intend to use the system switch approach, perform the following standard sequence of steps to create the target system:

Procedure

1. Install the central services (SCS) instances on a separate host.
2. Install a new SAP NetWeaver database server for the target system either on the SCS host you used in the previous step of this procedure, or on a separate host. Create and start the SAP NetWeaver database instance in this server, using a SAP NetWeaver database SID (`DBSID`) identical to the source system `DBSID`.
3. Export the data from your source system SAP NetWeaver database and import it into your target system SAP NetWeaver database by performing the required steps specific to your SAP NetWeaver database platform.
4. Install one application server (AS) instance on any of the hosts you used in the previous steps, or on a separate host.
5. **SAP HANA DB 2.0 only**: Open the `configtool` and edit the secure store, so that you restore the original value of the URL in *Connection Pools*, which was changed as described in SAP HANA 2.0: Managing Triggers for LOB Values [page 36].

   ⓘ Note

   Restore the original value for third-party components as well, if you have changed it earlier.
6. (Optional) Install additional application server (AS) instances.

   ⓘ Note

   The additional AS instances are not used during the nZDM Java procedure. Installing them at this point is a recommended measure that ensures the system will have sufficient resources to handle the production operation immediately after the switch. Alternatively, you can switch application server

instances from the source system to the target system at the end of the procedure. For more information, see Switching the Additional Application Server Instances [page 65].

> ⚠ Caution
>
> Do not start the target system at this step of the nZDM Java procedure. You should start it after you perform the steps described in the following:
>
> 1. Performing Configuration Steps in the Target System [page 54] and
> 2. Configuring the Isolation of the Target System [page 55]

Related Information

Switching the Target System to Become the New Production System [page 65]

4.6.2 Creating the Target System for Database Switch

Context

> ⓘ Note
>
> This section is only relevant if you use the database switch approach. For more information, see Procedure Finalization Approaches [page 9].

When using the database switch approach, you have to ensure that the switch is performed in the shortest time possible. Proceed as follows:

Procedure

1. Install the SAP Central Services (SCS) instance on a host different from the source system. To do this, on the SWPM *Welcome* screen, navigate to the dialog corresponding to your required target system: *<Your Product>* ▸ *<Your SAP NetWeaver database>* ▸ *Sysem Copy Target System* ▸ *Distributed System* ▸ *Based on <Technical Stack>* ▸ *SCS Instance* ▸.

   > ⓘ Note
   >
   > For the nZDM Java procedure to execute correctly, it is very important that the SCS, and the primary application server instances are not hosted on the source system.

2. **SAP HANA 2.0 DB only:** Before installing the DB instance, you have to delete the parameter *map_<internal HANA hostname> value: <external HANA hostname>* that you created earlier.
   1. Use SAP HANA Studio to connect to the source HANA system using the SYSTEM user and the System Database option.

2. Navigate to *Configuration and Monitoring* > *Open Administration* > *Open Administration* > *Open Administration* > *Open Administration*, and then filter for *public_host*.
3. Delete a parameter *map_<internal HANA hostname> value: <external HANA hostname>*
4. After installation of the DB instance create it again.

3. Create and start the target system SAP NetWeaver database instance in the source system SAP NetWeaver database server.

   In this case, you have to use a SAP NetWeaver database SID (`DBSID`) that is **different** from the source system `DBSID`. The actions that you have to perform are specific to your SAP NetWeaver database platform. This might involve copying existing SAP NetWeaver database configuration files and replacing the `DBSID`, creating an additional SAP NetWeaver database listener, and others.
4. Export the data from your source system SAP NetWeaver database and import it into your target system SAP NetWeaver database by performing the required steps specific to your SAP NetWeaver database platform.
5. Adapt the target system profiles.

   In the `DEFAULT.PFL` file, add or edit the following parameters:

   ```
   SAPDBHOST = <SAP NetWeaver database host name>
   ```

   ```
   j2ee/dbtype = <dbtype:your SAP NetWeaver database>
   ```

   ```
   j2ee/dbname = <DBSID>
   ```

   ```
   j2ee/dbhost = <database host name>
   ```

   For SAP HANA only: `dbs/hdb/dbname = <DBSID>`

   For MS SQL only: `dbs/mss/server = <database host name>`
6. **SAP HANA 2.0 DB only**: Depending on the operating system of the host, open the file `C:\Windows\System32\Drivers\etc\hosts` for Windows, or the `/etc/hosts` for Linux, and add the internal HANA VM host name using the following convention:

   ```
   <HANA VM External IP> <fully qualified domain name of HANA VM Internal host name> <HANA VM Internal host name>
   ```

   > ✤ Example
   >
   > ```
   > 10.23.100.234 <fqdns> <hostname>
   > ```
7. Install the primary application server (PAS) instance on a host other than the one containing the source system.

   Starting from the SWPM *Welcome* dialog, navigate to the dialog corresponding to your required target system: *<Your Product>* > *<Your SAP NetWeaver database>* > *System Copy Target System* > *Distributed System* > *Based on <Technical Stack>* > *Primary Application Server Instance*.
8. Connect the cloned system to the clone database.
   a. Open `configtool` and edit the secure store, so that it connects to the cloned `<CLONE_SID>`. To do this, in most cases you have to replace the host and SID.

      > ✤ Example
      >
      > The example line

```
jdbc:db2://<hostname>:1234/
B01:currentSchema=SAPB01DB;deferPrepares=0;connectionCloseWithinFlightTran
saction=2;
```

needs to be adapted to

```
jdbc:db2://10.76.224.192:1234/
CLONE:currentSchema=SAPB01DB;deferPrepares=0;connectionCloseWithinFlightTr
ansaction=2;
```

The IP address that you enter must be the one used to access the database host externally.

9. Apply all relevant SAP System certificates to the target system, such as licenses, and the maintenance license.

> **Note**
>
> - There is no need to install additional AS instances for the target system when using the database switch approach. After the switch, the production operation resumes in the source system and the target system is discarded.
> - Ensure that the target system configuration and parameters are identical to the ones of the source system, with the exception of the `DBSID`.
> - It is very important that the SCS and the primary application server instance are not hosted on the source system.

> **Caution**
>
> Do not start the target system at this step of the nZDM Java procedure. You should start it after you perform the steps described in the following:
>
> 1. Performing Configuration Steps in the Target System [page 54] and
> 2. Configuring the Isolation of the Target System [page 55]

4.7 Performing Configuration Steps in the Target System

In some cases, you have to manually perform additional configuration steps in the target system before you start it for the first time. Proceed as described in the following sections for the relevant software in your system.

4.7.1 Configuring the Connectivity of Adobe Offline Forms

Context

> **Note**
>
> This section is only relevant if you have Adobe Offline Forms in your system.

If you have the Adobe Offline Forms in your BPM system, **before** you start the target system for the first time you have to configure its mail inbox folder to a value different from the value used in the source system. This is necessary since setting multiple BPM systems to use the same mail inbox may cause errors.

Procedure

1. Start the Offline Configuration Editor located at:
   `<SID directory>/<instance directory>/j2ee/configtool/offlinecfgeditor.sh`
2. Open the global application property sheet, located at:
   `cluster_config/system/instances/ID<number>/cfg/apps/sap.com/tc~bpem~base~ear/Propertysheet.application.global.properties`
3. Change the `mail.inbox.folder` property value for each instance (`ID<number>`).

4.8 Configuring the Isolation of the Target System

Configuring the target system isolation is crucial for the successful execution of the nZDM Java procedure. You have to isolate the target system from the production network to avoid interference with the source system. This can be done by means of an appropriately configured firewall, or by means of adequate network interface configurations (for example, subnetting).

When you use the system switch approach, at the end of the procedure the source system is stopped and the connectivity to the target system (the new production system) has to be reestablished. This is done by removing the isolation before switching to the target system. When using the database switch approach reestablishing connections is not required, as the target system is not used productively after the procedure.

The following connections have to be available while the nZDM Java procedure is running and both systems are online:

- From the target system to its own SAP NetWeaver database by using Java Database Connectivity (JDBC)
- From the target system to the SAP NetWeaver source database by using JDBC
- From the target system to the source system by using HTTP or HTTPs
- From the target system to the central DNS servers, if such are used
- From the target system to an external UME persistence storage, usually Lightweight Directory Access Protocol (LDAP), if such a storage is used
- From the nZDM Java GUI to the target system by using HTTP or HTTPs
- OS remote access to the target system host from administrator computers

For an overview, including a visual representation of all communication channels, seeTransport Layer Security.

4.9 Performing Maintenance Activities in the Target System

You can perform the following activities to the target system:

- Support Package Stack updates
- Single component updates and patches, including kernel and JVM patches
- Updates to the SAP NetWeaver database or operating system
- Various system maintenance activities

> → Tip
>
> We recommend that you create a backup of the target system before you start the nZDM Java procedure. Use the backup in case of issues with the new production system, or if you have to repeat the nZDM Java procedure from a certain step.

4.9.1 Performing Support Package Stack Updates

Perform Support Package Stack (SPS) updates in the target system by using the latest version of the Software Update Manager (SUM). The procedure is described in detail in chapters "Preparation", "Running the Software Update Manager", and "Follow-Up Activities" of the SUM user guide.

To download the guide relevant for your SAP NetWeaver release, go to http://support.sap.com/sltoolset *System Maintenance* *Software Update Manager (SUM) <version>* *Guides*.

> ⓘ Note
>
> You have to include the latest version of all required components listed in the section *Downloading and Deploying Required Components* relevant for your system, in the stack for your SPS update. This has to be done to avoid version inconsistencies in the new production system and failures during deployment.

Related Information

Downloading and Deploying Required Components [page 25]
Downloading and Using Software Update Manager 1.0 [page 77]

4.9.2 Applying Single Component Updates and Patches

Apply single component updates and patches using the latest version of the Software Update Manager (SUM). Proceed as described in chapter "Applying Single Component Updates and Patches Using a Manually Prepared Directory" of the "Update of SAP Systems Using Software Update Manager <version> <SP level>".

To download the SUM guide, go to http://support.sap.com/sltoolset *System Maintenance* *Software Update Manager (SUM) <version>* *Guides*.

4.10 Connecting to the Target System and Starting the Replication

Prerequisites

You have started the nZDM Java GUI. For more information, see section Running the nZDM Java Tool [page 47].

Context

After the target system is created and started, you have to enter the connection data for the target system in the nZDM Java GUI. The target system also requires a connection to the source system remote SAP NetWeaver database and HTTP/HTTPs access point.

To use an HTTPs access, you have to configure HTTPs communication between the nZDM Java tool and the target system.

1. Stop the nZDM Java tool and configured it.
2. The keypair should be created with a CN name matching the FQDN or an IP address used to access the target system from the nZDM Java tool.
   For more information, see Configuring HTTPs Communication Between nZDM Java Tool and SAP NetWeaver System [page 45].

Proceed as follows in the nZDM Java GUI:

Procedure

1. Choose *Target System* > *Connect*.
2. In the *Connect* dialog, enter the connection data and the logon credentials for the target system.
   - *Host name* - host name or IP address of the target system

     > ⚠ Caution
     >
     > Use a value that explicitly identifies the target system, and which is accessible from the source system. As the target system is a copy of the source system, its virtual host names might be identical to the source system virtual host names. In this case, using one of these host names to connect to the target systems is going to cause errors in the procedure. To avoid this, use a physical host name or an IP address.

   - *Port Number* - HTTP port of the target system, for example **`5<instance_number>00`**), or HTTPs port of the target system, for example **`(5<instance_number>01)`**
   - *User* and *Password* - the credentials of the authorized user for the nZDM Java procedure, which is the nZDM technical user of the target system..

- *Enable HTTPs* - Leave this option enabled if you are entering an HTTPs port, or disable it if you are entering an HTTP port. Be aware that to use the capability of HTTPs communication, it is necessary that HTTPs is enabled in you SAP NetWeaver system.
- *Trust any certificates* - Select this option if you have already imported the certificate to the jvm cacerts list of the nZDM Java tool and want to trust on it. Leave it disabled if you trust any certificate or use HTTPS protocol without a certificate.

3. Choose *Apply* to confirm your entries.
4. Choose *Start Replication* in the *Target System* part of the nZDM Java GUI.

Results

The process of replicating all recorded data changes to the source system is started. The replication might take from several minutes to several hours, depending on the amount of recorded data. Any deployments on the target system are locked until the *Finished* status is reached.

- You can pause or resume the replication at any time by choosing *Pause Replication* and *Resume Replication* in the *Target System* part of the nZDM Java GUI.
- After the replication has been started, do not perform changes in the target system.
- To abort the procedure after the process has been started, first you have to choose *Pause Replication* and then abort the recording. After the procedure has been aborted, you have to reset the source system. The target system cannot be used any further. In such cases you have to start the procedure again from the beginning.

→ Tip

Command line options relevant for this section

1. Setting up the replicator system - connecting to the system and entering system parameters
   ```
   STARTUP.sh batchmode SetReplicatorSystem replicatorHost=<host name>
   replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>] recorderHost=<recorder host
   name> recorderPort=<recorder port> recorderUser=<recorder nZDM user
   name> recorderPassword=<nZDM user password> recorderHttps=<true or false>
   [recorderTrustAnyCerts=<true or false>]
   ```
2. Starting the replication
   ```
   STARTUP.sh batchmode StartReplication replicatorHost=<host name>
   replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>]
   ```

During this phase of the procedure, you can also use one of the following additional options if required:

- Pausing the replication
  ```
  STARTUP.sh batchmode StopReplication replicatorHost=<host name>
  replicatorPort=<port number> replicatorUser=<nZDM user name>
  replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
  [replicatorTrustAnyCerts=<true or false>]
  ```
- Resuming the replication

```
STARTUP.sh batchmode StartReplication replicatorHost=<host name>
replicatorPort=<port number> replicatorUser=<nZDM user name>
replicatorPassword=<nZDM user password replicatorHttps=<true or false>
[replicatorTrustAnyCerts=<true or false>]
```

- Aborting the recording process

```
STARTUP.sh batchmode StopRecording recorderHost=<host name>
recorderPort=<port number> recorderUser=<nZDM user name>
recorderPassword=<nZDM user password> recorderHttps=<true or false>
[recorderTrustAnyCerts=<true or false>]
```

- Resetting the recorder system

```
STARTUP.sh batchmode ResetRecorder recorderHost=<host name>
recorderPort=<port number> recorderUser=<nZDM user name>
recorderPassword=<nZDM user password> recorderHttps=<true or false>
[recorderTrustAnyCerts=<true or false>]
```

4.10.1 (Optional) Verifying Replication Results

We recommend that before finishing the nZDM Java procedure you verify that business-critical data, for example BPM processes or PI messages, is replicated correctly. You can do this by comparing selected samples of these objects between the source system and the target system. To do this, you can use the following tools:

- The *Process Instances* view. To use it, in *SAP NetWeaver Administrator* navigate to *Operations* > *Processes and Tasks* > *Manage Processes*. To see all active processes, choose *Advanced* and set *Status* and *Error Status* to *All*.

  > → Tip
  >
  > We recommend that you limit the display to processes that have been completed within a certain time frame by setting the *Completed From / To* dates appropriately.

- The *Task Instances* view. To use it, in *SAP NetWeaver Administrator* navigate to *Operations* > *Processes and Tasks* > *Manage Tasks*. To see all active tasks, choose *Advanced* and set *Status* to *All*.

  > → Tip
  >
  > We recommend that you limit the display to tasks that have been completed within a certain time frame by setting the *Completed From / To* dates appropriately.

- The *Message Monitoring* and *Sequence Monitoring* views in the *SAP NetWeaver Administrator* page, through which you can check messages and sequences, respectively.
- The *Job Scheduler* view in *SAP NetWeaver Administrator*, through which you can monitor scheduled tasks and executed jobs.

> ⓘ Note
>
> To avoid attempting to compare objects that are not yet replicated, we recommend to do the verification when the number of replicated entries becomes equal to the number of recorded entries. We also recommend that you compare only historical objects, that is, finished processes or delivered messages.

4.11 (Optional) Performing Test Activities in the Target System

Context

At any point of the nZDM Java procedure before it has been finished, you can perform testing in the target system, for example to verify that the changes you have performed are applied correctly and all major production scenarios are operational. To do this, you have to use the nZDM Java Test Mode. Performing test activities in the target system does not affect the active production operation in the source system.

> **Note**
>
> - Be aware that the Test Mode modifies the target system to a state that is unusable for the regular nZDM Java procedure. Before entering Test Mode, you have to create a backup of the target system. This backup is going to be used later to restore the target system to a state in which the nZDM Java procedure can be continued.
> - If you have Adobe Offline Forms in your BPM system, be aware that each BPM system requires its own dedicated mailbox for incoming offline forms. Before you perform any testing activities, you have to redirect the dedicated mailbox as described in the following sub-section.

To enter Test Mode, proceed as follows:

Procedure

1. Temporarily suspend the replication of new entries, if it has been started. To do this, on the nZDM Java GUI choose *Pause Replication*.
2. Create a backup of the target system. You are going to need it a later point in time to continue the regular nZDM Java procedure.
3. On the nZDM for Java GUI, choose *Target System* > *Enter Test Mode*
4. Confirm that you want to enter Test Mode.

   After the target system status changes to *test mode*, you can start performing the testing or verification activities.
5. To check the data integrity in the target system while Test Mode is active by using the System Landscape Directory (SLD), perform the following steps:
   a. Create a test SLD server, located on the target system or on a host that is different from the central SLD host.
   b. Isolate the data connection of the test SLD server from the primary data connection, in order to prevent potential data collisions.
   c. Perform a manual export or unidirectional automated sync from the central SLD server to the test SLD server.
   d. Adjust both the `SLD_Datasupplier` and `SLD_Client` URLs to point to the localhost address of the test SLD server.

→ Tip

Command line options relevant for this section

1. Pausing the replication
   `STARTUP.sh batchmode StartReplication replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`
2. Entering the Test Mode on the replicator system
   `STARTUP.sh batchmode EnterReplicatorTestMode replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`

Results

After you finish testing, you have to restore the backup of the target system, reset the nZDM for Java GUI, and reconnect to the source and target systems to proceed with the nZDM Java procedure.

4.11.1 Redirecting to a Dedicated Mail Account for Adobe Offline Forms

Context

If you have Adobe Offline Forms in your BPM system, before performing test activities, you have to restore the default value of the `mail.inbox.folder` property, then perform one of the following actions:

- Create a dedicated mail account for retrieving mails with attached offline forms.
- Create an additional mailbox folder for the current mailbox account.

Restoring the Default Value of the `mail.inbox.folder` Property

1. Start the Offline Configuration Editor located at:
   `<SID directory>/<instance directory>/j2ee/configtool/offlinecfgeditor.sh`
2. Open the global application property sheet, located at:
   `cluster_config/system/instances/ID<number>/cfg/apps/sap.com/tc~bpem~base~ear/Propertysheet.application.global.properties`
3. Restore the default value of the `mail.inbox.folder` property for each instance (ID<number>).

Setting up the Mail Account or Mailbox Folder

To configure a new mail account or a new mailbox folder, proceed as described at http://help.sap.com for your source release:

Release	Path
SAP NetWeaver 7.5	http://help.sap.com/nw75 ▶ *Application Help* ▶ *Function-Oriented View* ▶ *Composition Environment* ▶ *Business Process Management* ▶ *Configuring Business Process Management* ▶ *Configuring Mail, Notification Messages, and Forms Services*

4.12 Finalizing the nZDM Java Procedure

Context

Finishing the nZDM Java procedure introduces downtime, since it involves stopping the source system and either switching from the source to the target system (with system switch), or switching the SAP NetWeaver database of the source system to the target system SAP NetWeaver database (with database switch). The downtime begins when the source system is stopped, or earlier if users are notified to log off in advance. During the source system stop, users still logged in the system are disconnected. The downtime ends when the target system becomes the new production system (with system switch), or when the source system is started again (with database switch), so that users can continue their usual activities.

When performing the nZDM Java procedure in a Portal system or a system that has Portal installed, a restart of the production system is required only with database switch approach.

When performing the nZDM Java procedure in a Process Orchestration system, finishing the nZDM Java procedure involves a restart of the production system, whether the approach used is system switch or SAP NetWeaver database switch. Therefore, the duration of the downtime is determined by the time required to perform the following activities:

- Replicating the remaining changes from the source to the target system.
- Restarting the target system (when using the system switch in a Process Orchestration system), or stopping and starting the source system (when using SAP NetWeaver database switch).
- Performing additional manual steps required to remove the isolation and switch to the target system (when using system switch), or switch the SAP NetWeaver database of the source system (when using SAP NetWeaver database switch). In most cases, these manual steps can be automated by means of OS scripts.

> ⓘ Note
>
> - To minimize the downtime, initiate the nZDM Java finalization process at a time when almost all or all changes have been replicated.
> - We recommend that all users are logged off from the source system before the nZDM Java procedure is finished. Notify all active users to log off in order to avoid data loss.

> ⚠ Caution
>
> Do **not** stop the source system SAP NetWeaver database, as the target system requires access to this SAP NetWeaver database.

To finish the nZDM Java procedure, proceed as follows:

Procedure

1. **Only for Process Integration systems with enabled Cloud Integration Content**: The management cockpit has to be manually set to operate in read-write mode on the target system.
   1. Navigate to SAP NetWeaver Administrator at *http://<host name>:<port>/nwa* > *Configuration* > *Infrastructure* > *Java System Properties* > *Applications*
   2. Locate the application `com.sap.aii.igw.gen.build.deploy.app`
   3. Choose the `com.sap.aii.igw.gen.build.deploy.app` and open the *Extended Details* section.
   4. Set the *igw.nzdm.read.only.active* property to `false`. Then save your changes.
2. **For Database switch only:** Copy the kernel and SAP JVM binaries of the target system to a temporary location in the source system.
3. **For Database switch only, on SAP HANA DB 1.0 and 2.0**: Open the `configtool` and in the secure store restore the original value of the URL in *Connection Pools*, which was changed as described in SAP HANA 2.0: Managing Triggers for LOB Values [page 36]. You have to restore the original value for third-party components as well, if you have changed it earlier.
4. In the nZDM Java GUI, choose *Finish nZDM Java*. The *Finish nZDM Java* dialog box appears.
5. Confirm that you have completed the preparation activities for entering downtime and wish to finalize the procedure. At this point in time, nZDM Java stops the source system.
6. Ensure that the source system is stopped, and that the SAP NetWeaver database is online.

   > ⓘ Note
   >
   > If the automatic stop of the source system is not possible or has failed, stop it manually before you continue.

7. In the second *Finish nZDM Java* dialog box, confirm that the source system is stopped and the source system SAP NetWeaver database is online. At this point in time, the remaining changes are replicated and nZDM Java is set to status `phase out`.
8. When you are notified that nZDM Java is ready to clean up the target system, choose *OK*.

   > ⓘ Note
   >
   > Ensure that the target system has been automatically restarted. If the restart has failed, manually restart the target system before you continue.This removes the service data used by nZDM Java procedure, and triggers an automatic restart of the target system, so that all custom settings are reverted to values for productive use.

Results

This removes the service data used by nZDM Java procedure, and triggers anAfter the cleanup and target system restart have finished, the system is ready for final preparations before entering productive use. When both the source and target system GUI sections display **finished** status, you can close the nZDM Java GUI.

Also note the following:

- If the `ReplicatorOnFinish` property has been set to `restart`or `running`, the target system remains in running state. If the property has been set to `stop`, the system is automatically stopped. In the latter case, you have to wait for the system to stop before you continue with the procedure. If the property has been set to restart, the system is automatically restarted.
- Note that when using PowerShell, to finish the nZDM Java procedure you have to use the options for stopping the recording, stopping the replicator system, and resetting the recorder system in this particular order. For more information, see sections Source System Commands [page 73] and Target System Commands [page 75].

→ Tip

Ensure that the target system has been automatically restarted. If the Command line options relevant to this section

1. Acquiring the ID of the last recorded transaction:
   ```
   STARTUP.sh batchmode GetLastRecordedTxId recorderHost=<host name>
   recorderPort=<port number> recorderUser=<nZDM user name>
   recorderPassword=<nZDM user password> recorderHttps=<true or false>
   [recorderTrustAnyCerts=<true or false>]
   ```
2. Acquiring the ID of the last replicated transaction:
   ```
   STARTUP.sh batchmode GetLastReplicatedTxId replicatorHost=<host name>
   replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>]
   ```
3. Finishing the recording process
   ```
   STARTUP.sh batchmode FinishRecording recorderHost=<host name>
   recorderPort=<port number> recorderUser=<nZDM user name>
   recorderPassword=<nZDM user password> recorderHttps=<true or
   false> [recorderTrustAnyCerts=<true or false>] replicatorHost=<host
   name> replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>]
   ```
4. Finishing the replication process
   ```
   STARTUP.sh batchmode FinishReplication replicatorHost=<host name>
   replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>]
   ```
5. Reset the replication process
   ```
   STARTUP.sh batchmode ResetReplicator replicatorHost=<host name>
   replicatorPort=<port number> replicatorUser=<nZDM user name>
   replicatorPassword=<nZDM user password> replicatorHttps=<true or false>
   [replicatorTrustAnyCerts=<true or false>]
   ```

4.13 Switching the Target System to Become the New Production System

Context

> **Note**
>
> This section is only relevant if you perform a system switch. For information how to perform a database switch, see Switching the Database of the Source System [page 67].

After all previous steps of the nZDM Java procedure have finished successfully, you can proceed with switching the target system to become the new production system. To reduce the downtime to a minimum, carefully plan the system switch beforehand. Depending on the technical setup of your system landscape, this might include a gradual switch of application servers to the new production system. Note that you might need to perform certain steps before finalizing the nZDM Java procedure as a preparation for the switch.

In general, we recommend that you follow this sequence of steps:

1. Make the target system accessible from the entire system landscape by removing the isolation you previously configured.
2. Switch the central entry point to your system. If you use SAP Web Dispatcher, reconfigure it to connect to the target system.
3. Notify users that they can log on to the new production system.
4. Switch the additional application server instances over to the target system.

Note that switching all additional application server instances can either be performed during the above procedure, or at its end in order to minimize the system downtime. In some cases, allowing user access in the new production system before a sufficient number of application server instances are operational might not be recommended. In such cases, you may consider the following approach:

1. Before finalizing the nZDM Java procedure, take a certain number (usually half) of application servers offline and switch them over to the target system.
2. Finish the nZDM Java procedure as described in Finishing the nZDM Java Procedure [page 62].
3. Make the target system accessible from the entire system landscape by removing the isolation you have previously configured.
4. Switch the central entry point to your system. If you use SAP Web Dispatcher, reconfigure it to connect to the target system.
5. Notify users that they can log on to the new production system.
6. Switch the remaining application server instances over to the target system.

4.14 Switching the Additional Application Server Instances

Context

If your production system has multiple application server instances, you might have created your target system with fewer application server instances than your source system, usually only one. To end up with the same

number of application server instances in your new production system, you have to perform the following procedure for each additional application server instance besides those that were part of your target system from the point it was created:

Procedure

1. Copy the application server instance profile to the profile directory of the target system.
2. If your update has changed the SAP JVM version, edit the profile parameter `SAPJVM_VERSION` and specify the correct version.
3. Stop the additional application server instance, if it is still running.
4. If you specify virtual host names in your `/etc/hosts` file, log on to the instance host as a user that has administrator rights, and update this file.
5. Start the additional application server instance.

4.15 Reconfiguring the SAP Web Dispatcher

Context

If you use SAP Web Dispatcher, you have to reconfigure it to connect to the target system, which is about to become the new production system. To do this, proceed as follows:

Procedure

1. Stop the SAP Web Dispatcher.
2. If you specify virtual host names in your **`/etc/hosts`** file, logon to the SAP Web Dispatcher host as an user that has admiistrator rights, and update this file.
3. If you do not use virtual host names, adapt the **`rdisp/mshost`** parameter of the SAP Web Dispatcher instance profile to point to message server host of the target system.
4. Start the SAP Web Dispatcher.
5. Verify that SAP Web Dispatcher is working correctly. To do this, access the NetWeaver home page via the SAP Web Dispatcher host name and port.

4.16 Switching the Database of the Source System

Context

> **Note**
>
> This section is only relevant if you want to perform a database switch. For information how to perform a system switch, see Switching the Target System to Become the New Production System [page 65].

After all previous steps of the nZDM Java procedure have finished successfully, you can proceed with switching the source system database. To reduce the downtime to a minimum, carefully plan the database switch beforehand and automate the manual activities to be performed by means of OS scripts. Note that you might need to perform certain steps before finalizing the nZDM Java procedure as a preparation for the switch.

Procedure

1. Before finalizing the nZDM Java procedure, copy the kernel and SAP JVM binaries of the target system to a temporary location in the source system.
2. Finish the nZDM Java procedure as described in Finishing the nZDM Java Procedure [page 62].
3. Stop the target system and its database.
4. Stop the source system database.
5. Move the SAP NetWeaver database files of the source system to a backup location.
6. Move the SAP NetWeaver database files of the target system to their corresponding location in the source system.
7. Recreate any SAP NetWeaver database configuration and control files if necessary. The exact actions to be performed are specific to your database platform.
8. Start the source system database.
9. Move the kernel and SAP JVM binaries of the source system to a backup location.
10. Move the kernel and SAP JVM binaries of the target system from the temporary location where you have previously copied them to their corresponding locations in the source system.
11. Adapt any source system instance profiles if necessary. Compare them to your target system instance profiles to identify if any changes are needed. If your update has changed the SAP JVM version, edit the profile parameter `SAPJVM_VERSION` to specify the correct version.
12. Start the source system. Afterward, notify users that they can log on to the production system.
13. Re-apply the original license to the system.

> **Note**
>
> - Since the production operation continues in the original system, you do not need to switch any additional application servers or the central entry point to your system.

4.17 Enabling Non-Critical Functionalities

4.17.1 Reactivating BPM Archiving

Context

At the end of the nZDM Java procedure in a Process Orchestration system, you have to release any BPM archiving Java Scheduler tasks that you have previously put on hold. To release the Java Scheduler tasks

Procedure

1. Navigate to *SAP NetWeaver Administrator* at **`http://<host name>:<port>/nwa`** ▶ *Operations* ▶ *Jobs* ▶ *Java Scheduler* ▶ *Tasks* ▶.
2. Select the task that you want to release and choose *Release*.

Related Information

Deactivating BPM Archiving [page 40]

4.17.2 Reactivating Background Jobs for Cloud Integration Content

> **Note**
>
> This section is only relevant if Cloud Integration Content is enabled on the system.

At the end of the nZDM Java procedure in a Process Orchestration system, you have to release the Cloud Integration Content archiving or deletion Java Scheduler tasks that you have previously put on hold:

- `IGWArchiveJob`
- `IGWCleanUpJobs`
- `IGWMonitorDataCleanUpJob`
- `IGWTraceDataCleanupJob`

Restore each the above-listed jobs as follows:

1. Navigate to SAP NetWeaver Administrator at ▶ *http://<host name>:<port>/nwa* ▶ *Operations* ▶ *Jobs* ▶ *Java Scheduler* ▶ *Tasks* ▶
2. Select the task and choose *Release*.

4.17.3 Reactivating Background Jobs

At the very end of the nZDM Java procedure in a Process Orchestration system, deletion and archiving jobs in that system have to be reactivated again since they are essential for the production operation over a longer period of time. Depending on the components available in your system, use the same approach that you used previously to deactivate them.

4.17.3.1 Reactivating Background Jobs Using the PI Runtime Workbench

Procedure

1. Go to *PI Runtime Workbench* at `http://<host>:<port>/rwb`.
2. Navigate to *Component Monitoring* > *Display* > *Integration Server* > *Adapter Engine <SID>* and scroll down to the *Status* tab.
3. Choose *Background Processing*.
4. Activate all jobs of type "Archive" that have been previously active. To do this, for each "Archive" job that you want to activate, choose *Edit*, select the *Active* checkbox and save your entries.
5. Activate all jobs of type "Delete" that have been active before the nZDM Java activities and procedure.

   > **Note**
   >
   > Make sure that all jobs of type "Archive" are activated before you activate any job of type "Delete".

6. Activate all other types of jobs that have been active before the nZDM Java activities and procedure.
7. Close the *Background Processing: Job Configuration dialog*.

4.17.3.2 Reactivating Background Jobs by Modifying the BC_MSG_JOB Database Table

Context

If the PI Runtime Workbench application is not installed in the system, you can enable the background jobs by performing a direct modification to the `BC_MSG_JOB` database table.

Procedure

Execute the following SQL statement:

```
UPDATE BC_MSG_JOB SET ACTIVE=1 WHERE JOB_ID IN <Job_IDs>
```

In the above statement, replace the **<Job_IDs>** with the list of all job IDs of previously active jobs that you have retrieved and saved earlier.

Related Information

Deactivating Background Jobs by Modifying the BC_MSG_JOB Database Table [page 43]

4.17.4 Setting the SAP Landscape Directory Back to Read-Write Mode

Context

At the very end of the nZDM Java procedure, the SAP Landscape Directory (SLD) has to be manually set to operate in read-write mode. This is essential for the production operation over a longer period of time. To do this, proceed as follows:

Procedure

1. Go to *SAP Landscape Directory* at **http://<host name>:5<instance number>00/sld**.
2. Logon as a user that has the SAP_SLD_ADMINISTRATOR role assigned, for example the Administrator user.
3. Navigate to *Administration* > *Settings* > *Server Configuration*.
4. Set the *Write Protection* property back to *None*.
5. Select all synchronization subscriptions and choose *Activate*.

A Appendix

A.1 Tools

This chapter described various tools part of near-Zero Downtime Maintenance for Java required during the nZDM Java process.

A.1.1 The nZDM Java GUI

The graphic user interface (GUI) of nZDM Java provides functions for controlling and monitoring the nZDM Java recording and replication processes.

Features

The GUI consists of the following main elements:

- Menu bar
  The menu bar contains options you need to work with the GUI and perform special nZDM Java actions. It has the following entries:
  - *File*
    - *Exit*- use this option to exit the GUI.
  - *Source System*
    - *Connect* - use this option to connect to the source system (recorder).
    - *Customize read-only message* - this option allows you to edit the default read-only message that is displayed to system users while nZDM Java is running.
    - *Reset to default read-only message* - use this option to reset a previously edited read-only message to the predefined default.
    - *Specify source system database host* - use this option to specify the database host of the source system after starting the recording and before you create the target system.
  - *Target System*
    - *Connect* - use this option to connect to the target system (replicator).
    - *Enter Test Mode* - use this option if you want to perform testing to the target system before you finalize the procedure.
  - *Utilities*
    - *Reset GUI* - use this option to reset the GUI, if for example you want to refresh the connection state of the recorder or replicator systems.
  - *Help*
    - *SAP Notes* - this option opens the SAP Support Portal search page for SAP Notes.
    - *About* - this option displays information about the versions of the nZDM client (GUI), server version, nZDM Services version, and of the nZDM Java versions operational in the source and target systems.

- *Source System (Recorder)* and *Target System (Replicator)* status fields
  The status fields display information about the source or target systems, respectively. The status fields are the following:
  - *Connected to Host* - these fields display the name of the respective host nZDM Java is connected to.
  - *Status* - these fields display the current status the respective host is in.
  - *Progress* - these fields indicate the data progress of the specific system. Depending on the version of the nZDM components and GUI, the displayed values are either the number of processed records and replications, or the ID of the last processed transaction.
- Both source and target system GUI sections display information about the registered applications whose activities are monitored. They are listed in the *Registered Application* column. The *Application Type* column displays the approach nZDM uses for an application, that is, whether application changes are recorded or only read. The *Application Status* field displays information on whether the corresponding approach toward an application is being started, already running, or stopped.
- *Start Recording* - choose this to start recording in the source system.
- *Abort Recording* - choose this to abort recording in the source system. If the recording has been aborted, the pushbutton changes to *Reset nZDM*.
- *Reset nZDM* - choose this to reset both systems to an initial state.
- *Start Replication* - choose this to start the replication to the target system. After the replication is started, the pushbutton changes to *Pause Replication*.
- *Pause Replication* - choose this if you have to pause the replication to the target system. After the replication is paused, the button changes to *Resume Replication*.
- *Resume Replication* - choose this to resume the replication to the target system if it has been paused. Once the replication is resumed, the button changes back to *Pause Replication*.
- *Finish nZDM Java* - choose this to finish the nZDM procedure, once the number of recorded and replicated change entries is almost identical..

A.1.2 nZDM Java Command Line

> **Note**
>
> Before you start the procedure using the command line mode, execute the mandatory steps in chapters Planning and Prerequisites [page 14] and Preparation [page 24].

You can operate the nZDM Java tool by entering specific commands in a PowerShell. You can use these commands, for example, if you want to perform the procedure without the nZDM Java GUI, or if you want to use these commands to create an automation script to further minimize the human interaction in the procedure.

1. Navigate to the directory where you have extracted the nZDM Java tool.
2. From that directory, open a PowerShell.
3. Follow the procedure described in chapter Performing the nZDM Java Procedure [page 40] by use the according commands listed in sections Source System Commands [page 73] and Target System Commands [page 75]. The commands you have to enter in PowerShell are named as the relevant steps in the procedure, or perform all of the separate operations in one command (ports, hosts, and so on).

A.1.2.1 Source System Commands

This section contains the PowerShell commands that you can use for the source system (recorder). The commands are listed under the subsection named as the corresponding topic of the same name in chapter Performing the nZDM Java Procedure [page 40].

The following commands are relevant for sections:

- Connecting to the Source System and Starting the Recording [page 48]
- Resetting the nZDM Java Procedure [page 81]

Operation	Command
Connecting to the source system	`STARTUP.sh batchmode SetRecorderSystem recorderHost=<host name> recorderPort=<port number> recorderUser=<nzdm user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Starting the recording	`STARTUP.sh batchmode StartRecording recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>] recorderDbhost=<database host name>`
Aborting the recording process	`STARTUP.sh batchmode StopRecording recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Resetting the recorder system	`STARTUP.sh batchmode ResetRecorder recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Finishing the recording process	`STARTUP.sh batchmode FinishRecording recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>] replicatorHost=<host _name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]` **Note** • Note that you have to wait for the source system to stop the recording before proceeding further. • After you use this command, you have to use the commands for stopping the replicator system, and resetting the recorder system.

Operation	Command
Acquiring the ID of the last recorded transaction	`STARTUP.sh batchmode GetLastRecordedTxId recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`

The following commands are relevant for the database, and section Restarting the Source System or its Instances [page 79]

Operation	Command
Setting the database host name	`STARTUP.sh batchmode SetRemoteDBHostOfRecorder recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>] recorderDbhost=<database host name>`
Setting the remote database host of the replicator system	`STARTUP.sh batchmode SetRemoteDBHostOfReplicator replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`
Customizing the read-only message in the source system, and reverting the message to its default state	`STARTUP.sh batchmode SetCustomisableReadOnlyMessage recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>] message=<your message to users>` To reset the read-only message, use the same command, but leave the `message` entry blank, that is, leave only `"`.
Acquiring list of applications recorded in the source system	`STARTUP.sh batchmode GetRecordingApplications recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Acquiring list of applications replicated to the target system	`STARTUP.sh batchmode GetReplicatingApplications replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`

Resetting the Recorder System

Operation	Command
Setting up the recorder system	`STARTUP.sh batchmode SetRecorderSystem recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Aborting the recording process	`STARTUP.sh batchmode StopRecording recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Resetting the recorder system	`STARTUP.sh batchmode ResetRecorder recorderHost=<host name> recorderPort=<port number> recorderUser=<nZDM user name> recorderPassword=<nZDM user password> recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`

A.1.2.2 Target System Commands

Connecting to the Target System and Starting the Replication [page 57],

Operation	Command
Setting up the replicator system	`STARTUP.sh batchmode SetReplicatorSystem replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>] recorderHost=<recorder host name> recorderPort=<recorder port> recorderUser=<recorder nZDM user name> recorderPassword=<recorder nZDM user password recorderHttps=<true or false> [recorderTrustAnyCerts=<true or false>]`
Starting the replication	`STARTUP.sh batchmode StartReplication replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`
Pausing the replication	`STARTUP.sh batchmode StopReplication replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`
Resuming replication	`STARTUP.sh batchmode StartReplication replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`

Operation	Command
Finishing replication	`STARTUP.sh batchmode FinishReplication replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`
Resetting the replication	`STARTUP.sh batchmode ResetReplicator replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]` Note that you have to wait until the target system has stopped, and then restarted the replication.
Acquiring the ID of the last replicated transaction	`STARTUP.sh batchmode “GetLastReplicatedTxId” replicatorHost=<host _name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`

(Optional) Performing Test Activities in the Target System [page 60]

> **Note**
>
> You have to pause the replication process before you enter Test Mode. Use the PowerShell command stated above, or choose *Pause Replication* on the nZDM Java GUI.

Operation	Command
Entering the Test Mode on the replicator system	`STARTUP.sh batchmode EnterReplicatorTestMode replicatorHost=<host name> replicatorPort=<port number> replicatorUser=<nZDM user name> replicatorPassword=<nZDM user password> replicatorHttps=<true or false> [replicatorTrustAnyCerts=<true or false>]`

A.2 Additional Software

This chapter includes additional information about the mandatory and optional tools that can be used during the maintenance activities in your SAP system.

A.2.1 Downloading and Using Software Update Manager 1.0

The Software Update Manager (SUM) is a multi-purpose tool that supports various maintenance processes, such as release upgrades, Support Package Stack updates, or updates to specific, single components.

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

> **Note**
>
> Always use the latest version of SUM to deploy the nZDM Java components.

Download the latest version of the guide relevant for your system from http://support.sap.com/sltoolset *System Maintenance* *Software Update/Upgrade with SUM 1.0 <version>* *Guides for SUM 1.0 <version>* .

A.2.2 Downloading and Using SAPCAR

Context

SAPCAR is used to extract SAR archives. It is installed with each SAP NetWeaver system in the kernel directory and its patches are delivered with the SAP KERNEL package (SAPEXE.SAR).

If you are running the nZDM Javal GUI from a remote host that does not have SAP NetWeaver, go to http://support.sap.com/swdc *Software Downloads* , and search for **SAPCAR** to get a list of all versions available for download.

To use SAPCAR, proceed as follows:

Procedure

1. Navigate to the directory in which you have downloaded or copied the archives.
2. Use the following command to start SAPCAR and extract the archive to the current directory:
   - `<path to SAPCAR>/sapcar –xvf <file name>.SAR`
   - Instead of using the current directory as a target directory, you can use the option **–R** to specify a particular target directory. For example: `sapcar –xvf <SAR file> -R <target directory>.`
   - Folders in the archive are created as subdirectories of the target directory, while keeping the directory structure of the archive.

A.2.3 System Copy Functionality of the Software Provisioning Manager 1.0

Context

You can use Software Provisioning Manager (SWPM) to create a copy of your source system by using the system copy functionality. To perform the system copy of your production system without additional downtime, use the homogeneous database-specific system copy option.

For more information about system copy, see:

- General information on the system copy procedure in the SAP Developer Network at: https://www.sdn.sap.com/irj/sdn/systemcopy
- The software provisioning manager 1.0 documentation: http://support.sap.com/sltoolset *System Provisioning* *System Copy Option*.

Related Information

Creating the Target System [page 49]

A.2.4 Overview of SAP Landscape Management

The SAP Landscape Management tool reduces the total cost of ownership (TCO) of SAP systems and improves business agility by simplifying and automating the efforts required to configure, provision, deploy, monitor, and manage systems in both physical and virtualized infrastructures. It provides a central point of control for flexibly assigning computing hosts and managing instances in the system landscape. Some of the features include system copying, cloning, end-to-end monitoring, and virtualization of the whole landscape, among others.

> **Note**
>
> The versions currently supported by nZDM Java are 2.0, 2.1, and 3.0.

For additional information and the tool documentation, see http://help.sap.com/nwlvm and SAP Landscape Management FAQ (LVM, LaMa).

A.3 Troubleshooting

This part of the document contains additional information about correcting known problems that have occurred during the nZDM Java procedure.

A.3.1 Reconnecting the nZDM Java GUI to the Source or Target System

In case the nZDM Java GUI loses connection to the source or target systems, it attempts to reconnect automatically. If this fails, or if you have to close the GUI, you have to restart the GUI and manually reconnect to the systems. Note that this does not have any impact on the execution of the nZDM Java procedure.

Use the *Connect* function for the corresponding system to reestablish the connection. If the GUI loses connection during the finalization of the procedure, that is, after you have triggered the shutdown of the source system, you have to enter the same connection data for the source system as for the target system.

A.3.2 Restarting the Source System or its Instances

Context

Use the following procedure if you have stopped the source system or any of its application server instances, and the system is unable to start again.

Procedure

1. Start the SAP NetWeaver source system database if it has been stopped.
2. Connect remotely to any of the source system application server instance hosts.
3. Open the Java offline configuration editor (`offlinecfgeditor`), located in the configtool directory of the Java instance.
4. Edit the `RecorderDB.url` property in the `Propertysheet properties` file, which is located at:
   a. **`cluster_config/system/custom_global/cfg/services/tc~lm~nzdm~crrsrv/properties/`**.
5. Replace the host name or IP address of the SAP NetWeaver source system database host, as specified earlier, with the host name or IP address of the source system database host as reachable from the source system.
6. Start the source system or its instances that were previously unable to start.
7. If your database has a different externally reachable host name, in the nZDM Java GUI navigate to *Source System* > *Specify Source System Database Host* and set that host name once again.

> → Tip
>
> **Command line options relevant for this section**
>
> Specifying the source system database host
>
> ```
> STARTUP.sh batchmode SetRemoteDBHostOfRecorder recorderHost=<host
> name> recorderPort=<port number> recorderUser=<nZDM user name>
> recorderPassword=<nZDM user password> recorderHttps=<true or false>
> [recorderTrustAnyCerts=<true or false>] recorderDbhost=<database host name>
> ```

Related Information

Connecting to the Source System and Starting the Recording [page 48]

A.3.3 Manually Removing SAP NetWeaver Database Triggers

Context

Generally, triggers and other SAP NetWeaver database objects created by nZDM Java are removed automatically when they are no longer needed. In some rare cases, you might need to delete these objects manually. This might be needed in the following cases:

- When creating the target system using system copy, you experience errors related to certain database tables being read-only before the target system is ready to start for the first time
- When aborting the recording in the source system, and the abort fails.

These SAP NetWeaver database objects can be removed in a standard database client. To remove them manually, execute the following stored procedures:

- `PROC_NZDM_CLEAN_FREEZE`
- `PROC_NZDM_CLEAN_REC`

A.3.4 Checking the nZDM Java Status and Errors

If an error occurs during the nZDM Java procedure with the recording or replication, the nZDM Java GUI displays an error message and the status of the corresponding system in the GUI changes. You can then further investigate the issue to find the root cause and determine how to correct it.

> **Note**
>
> Note the following important difference between recording and replication errors:
>
> - Recording errors are fatal to the nZDM Java procedure. If such an error occurs, the recording in the source system is aborted. You have to reset the nZDM Java procedure and start over from the beginning.
> - Replication errors are generally non-fatal. If such an error occurs, the replication in the target system is stopped. Depending on the root cause, you might be able to resolve the issue and resume the replication. In the worst case, your target system might be unusable. If this is the case, you have to create a new target system and repeat all steps from that point.

To investigate the error, check the logs and traces of the corresponding application server instance. To perform further analysis, you can also check the following SAP NetWeaver database tables in your source or target system:

- `BC_NZDM_STATE` - This table contains information about the current status of the recording in the source system and the replication in the target system. Also, it might contain information about status change errors.

- `BC_NZDM_CHANGE_LOG` - This table contains the recorded changes in the source system. Check this table if you need to monitor what changes are recorded and in which order, and also the transactional sequence of entries.
- `BC_NZDM_ERROR_LOG` - This table contains additional information about certain types of replication errors. Check this table in the target system if the replication has stopped because of errors.

Related Information

Resetting the nZDM Java Procedure [page 81]

A.3.5 Resetting the nZDM Java Procedure

Context

If you need to reset the nZDM Java procedure, proceed as follows:

Procedure

1. Connect the nZDM Java GUI to the source system.
2. If the recording is started, choose *Abort Recording*. Shortly after, the button changes to *Reset nZDM*.
3. Reset the nZDM Java procedure by choosing *Reset nZDM*. This also resets the nZDM Java GUI.
4. Start the procedure from the beginning.

> → Tip
>
> **Command line options relevant for this section**
>
> Aborting the Recording
>
> ```
> STARTUP.sh batchmode StopRecording recorderHost=<host name>
> recorderPort=<port number> recorderUser=<nZDM user name>
> recorderPassword=<nZDM user password> recorderHttps=<true or false>
> [recorderTrustAnyCerts=<true or false>]
> ```
>
> Resetting the recorder system
>
> ```
> STARTUP.sh batchmode ResetRecorder recorderHost=<host name>
> recorderPort=<port number> recorderUser=<nZDM user name>
> recorderPassword=<nZDM user password> recorderHttps=<true or false>
> [recorderTrustAnyCerts=<true or false>]
> ```

A.3.6 Reactivating the Source System

Context

Use the following procedure for reactivating the source system only in one of the following cases:

1. The nZDM Java procedure has aborted after the source system has reached status "phase-out".

   > **Note**
   >
   > You have to remove the target system, and then start the procedure from the beginning to ensure data consistency.

2. You have finished the nZDM Java procedure, and you want to investigate issues in the source system.

   > **Caution**
   >
   > - Starting the source system after you have switched to the new production system is not advised. The nZDM Java procedure guarantees production operation without data loss only in the new production system.
   > - Isolate the source system from the rest of your system landscape before you perform the procedure to prevent issues.

Procedure

1. Start the source system SAP NetWeaver database if it is stopped.
2. Connect to the SAP NetWeaver database with the database user with appropriate rights, and execute the following SQL statement:

   ```
   UPDATE BC_NZDM_STATE SET NZDM_VALUE = 'x' WHERE NZDM_KEY = 'Overall_Rec_State'
   ```

3. Connect remotely to any of the source system application server instance hosts.
4. Open the Java offline configuration editor (`offlinecfgeditor`), located in the configtool directory of the Java instance.
5. Edit the `RecorderDB.url` property in the `Propertysheet` properties file, which is located at:
   a. **`cluster_config/system/custom_global/cfg/services/tc~lm~nzdm~crrsrv/properties/`**.
6. Replace the host name or IP address of the source system SAP NetWeaver database host, as specified earlier, with the host name or IP address of the source system SAP NetWeaver database host as reachable from the source system.
7. Start the source system and its instances.

   > **Note**
   >
   > If you want to restart the procedure, first you have to connect to the nZDM Java GUI on the source system, and then reset the procedure by choosing *Reset nZDM*, which also resets the GUI.
   >
   > Alternatively, you have to use the following nZDM Java Command Line command:
   >
   > ```
   > STARTUP.sh batchmode ResetRecorder recorderHost=<host name>
   > recorderPort=<port number recorderUser=<nZDM user name>
   > ```

```
recorderPassword=<nZDM user password> recorderHttps=<true or false>
[recorderTrustAnyCerts=<true or false>]
```

A.3.7 Correcting Replication Issues

When starting the replication, if you receive an error with a message stating that no data is maintained for the remote SAP NetWeaver database connection, see 1825684.

A.3.8 Troubleshooting Database Issues on IBM DB2 for Linux, Unix and Windows

Correcting Issues with Recording of Database Update Statements

Context

When performing the nZDM Java procedure in a Process Orchestration system, an update statement might fail if temporary tablespace is not large enough to hold both the old and new rows during a database trigger execution. This issue can be identified by checking if the trace file contains the following DB2sql code:

> Code Syntax
>
> -1424 sqlstate: 54040

To solve this issue you have to create a larger temporary tablespace. To do this, execute the following statements:

To do this, execute the following statements:

> Note
>
> The size values in the update statements below are an example. You have to choose the optimal values for your particular system.

Procedure

1. Logon as Database Administrator (for example, `db2<dbsid>`) in a DB2 command window.
2. Execute the following statements:

```
DROP TABLESPACE "PSAPTEMP32"

DROP BUFFERPOOL SAPTEMP32
```

```
CREATE BUFFERPOOL SAPTEMP32 IMMEDIATE ALL DBPARTITIONNUMS SIZE 10 AUTOMATIC
PAGESIZE 32 K

CREATE TEMPORARY TABLESPACE "PSAPTEMP32" IN DATABASE PARTITION GROUP
IBMTEMPGROUP PAGESIZE 32768 MANAGED BY AUTOMATIC STORAGE EXTENTSIZE 2
PREFETCHSIZE AUTOMATIC BUFFERPOOL SAPTEMP32 NO FILE

SYSTEM CACHING DROPPED TABLE RECOVERY OFF
```

Correcting Recording Errors Due to Insufficient Temporary Tablespace Size

Context

When performing the nZDM Java procedure in a Process Orchestration system, an error may occur due to insufficient memory in IBM DB2 for LUW. This issue can be identified as a memory allocation failure in the database log files.

To correct this issue, you have to increase the required instance memory by updating the `INSTANCE_MEMORY` parameter in the database management configuration. We recommend that you set it to 4 GB or higher.

> **Note**
>
> The size values in the update statements below are exemplary. You have to choose the optimal values for your particular system.

Procedure

1. Logon as Database Administrator (for example, `db2<dbsid>`) in a DB2 command window.
2. Execute the following statement:

   ```
   db2 update dbm cfg using INSTANCE_MEMORY 1048576
   ```

   > **Note**
   >
   > The value for the instance memory is expected in 4K blocks.

3. Restart the database by executing the following statements:

   ```
   db2stop force

   db2start
   ```

A.3.9 Resetting the Source System Database Host or IP Address in the Target System

Context

If you have erroneously set the wrong source system database host or IP address when connecting to the source system using the nZDM GUI, proceed as follows:

Procedure

1. Start the SAP NetWeaver target system database if it has been stopped.
2. Connect remotely to any of the target system application server instance hosts.
3. Open the Java offline configuration editor (`offlinecfgeditor`), located in the configtool directory of the Java instance.
4. Edit the `RecorderDB.url` property in the `Propertysheet` properties file, which is located at:
   a. **`cluster_config/system/custom_global/cfg/services/tc~lm~nzdm~crrsrv/properties/`**.
5. Replace the host name or IP address of the SAP NetWeaver source system database host with the host name or IP address of the source system database host, as reachable from the target system.
6. Start the target system or its instances.

A.3.10 Correcting the Automatic Stop of the Target System

When finishing the nZDM Java procedure, if you receive an error with a message:

Example

```
*** MS Message Queue Processor [85853] -> tc~lm~nzdm~crrsrv#... Exception: The
server sent HTTP status code 401: Unauthorized
```

See SAP Note 2427292 for a potential solution to the issue. If the version of the kernel in your system is equal or higher to the version listed in the SAP Note, you have to perform the steps listed in this section. This error denotes that the target system could not be stopped automatically by nZDM Java, and you have to stop it manually.

To prevent future occurrences of this issue, execute the following steps:

1. Open the instance profile located at:
   - **For Windows:** `<Drive>:\usr\sap\<SID>\SYS\profile\<SID>_<INST>_<HOST>`
   - **For Linux- and UNIX-based:** `/usr/sap/<SID>/SYS/profile/<SID>_<INST>_<HOST>`

2. Add the following line to the instance profile: **`jstartup/service_acl=service:*;library:*;interface:; system:Kernel*`**
3. Restart the target system.

A.3.11 Troubleshooting an HTTPs Connection Between the nZDM Java Tool and the SAP NetWeaver System

When connecting to the source or the target system using the nZDM Java tool, you might receive the following error:

```
Error during initialization. For more information check log file
C:\work\NZDM\nzdm_ui\NZDMJAVA\java\log\NZDMEPService.log.

In the /<path to nZDM directory>/ NZDMJAVA/java/log/NZDMEPService.log file found
below error

[Error ]: Exception while sending HTTPS request.
java.io.IOException: Unable to open SSL connection to host "<host>:<port>".
Peer certificate rejected by ChainVerifier.
```

This means that the certificate was not generated correctly or it was not imported to the cacerts list of the jvm used by the nZDM Java tool.

To import the correct sertificate, see Configuring HTTPs Communication Between nZDM Java Tool and SAP NetWeaver System [page 45].

A.4 PDF Typographic Conventions

Type Style	Description
Example	Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Textual cross-references to other documents.
Example	Emphasized words or expressions.
EXAMPLE	Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.
`Example`	Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
`Example`	Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.
`<Example>`	Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.
`Example`	Keys on the keyboard, for example, `F2` or `ENTER`.

Important Disclaimers and Legal Information

Hyperlinks

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

- Links with the icon : You are entering a Web site that is not hosted by SAP. By using such links, you agree (unless expressly stated otherwise in your agreements with SAP) to this:
  - The content of the linked-to site is not SAP documentation. You may not infer any product claims against SAP based on this information.
  - SAP does not agree or disagree with the content on the linked-to site, nor does SAP warrant the availability and correctness. SAP shall not be liable for any damages caused by the use of such content unless damages have been caused by SAP's gross negligence or willful misconduct.
- Links with the icon : You are leaving the documentation for that particular SAP product or service and are entering an SAP-hosted Web site. By using such links, you agree that (unless expressly stated otherwise in your agreements with SAP) you may not infer any product claims against SAP based on this information.

Videos Hosted on External Platforms

Some videos may point to third-party video hosting platforms. SAP cannot guarantee the future availability of videos stored on these platforms. Furthermore, any advertisements or other content hosted on these platforms (for example, suggested videos or by navigating to other videos hosted on the same site), are not within the control or responsibility of SAP.

Beta and Other Experimental Features

Experimental features are not part of the officially delivered scope that SAP guarantees for future releases. This means that experimental features may be changed by SAP at any time for any reason without notice. Experimental features are not for productive use. You may not demonstrate, test, examine, evaluate or otherwise use the experimental features in a live operating environment or with data that has not been sufficiently backed up.
The purpose of experimental features is to get feedback early on, allowing customers and partners to influence the future product accordingly. By providing your feedback (e.g. in the SAP Community), you accept that intellectual property rights of the contributions or derivative works shall remain the exclusive property of SAP.

Example Code

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

Bias-Free Language

SAP supports a culture of diversity and inclusion. Whenever possible, we use unbiased language in our documentation to refer to people of all cultures, ethnicities, genders, and abilities.

www.sap.com/contactsap

THE BEST RUN SAP