Technical Report

Optimizing SAP Lifecycle Management with NetApp Solutions for SAP on Microsoft SQL Server

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Abstract

This technical report describes the optimization of SAP lifecycle management with NetApp® storage technology and software integration products.

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1 Introduction

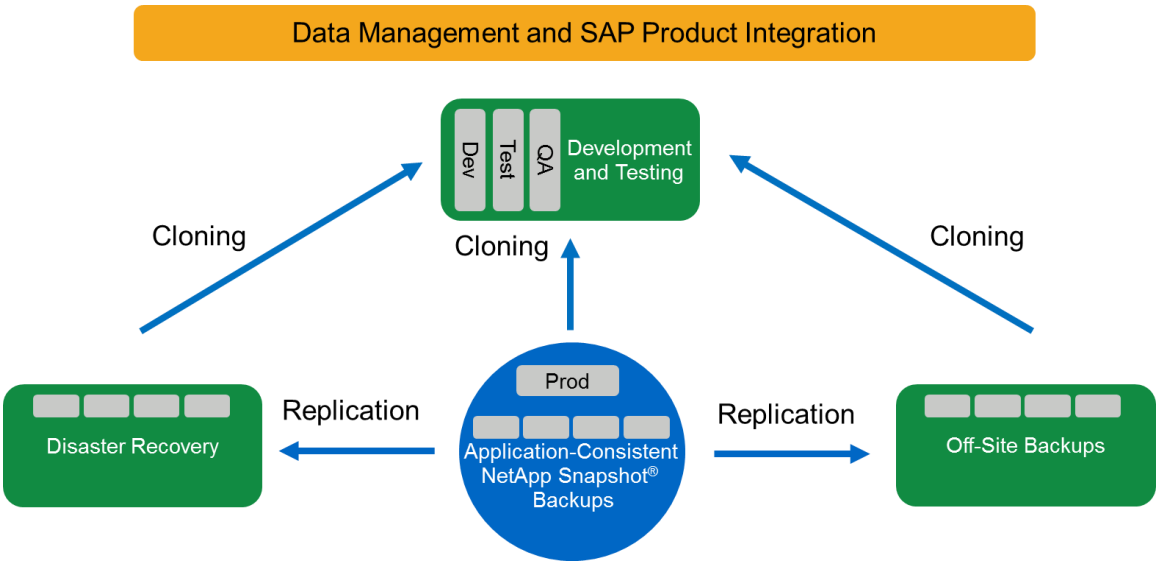
In today's dynamic business environment, companies must provide ongoing innovation and react quickly to changing markets. Under these competitive circumstances, companies that have introduced greater flexibility into their work processes adapt to market demands more effectively.

Changing market demands also require regular integrations, changes, and updates in a company's SAP environments. IT departments must implement these changes with fewer resources and over shorter time periods. Minimizing risk when deploying these changes requires thorough testing with actual production data in quality assurance (QA) or test systems.

Traditional SAP lifecycle-management approaches to QA and test-system provisioning are primarily based on manual processes. These manual processes are often error-prone and time-consuming, which delays innovation and the response to business requirements.

NetApp solutions for optimizing SAP lifecycle management are integrated into the SQL Server database and lifecycle-management tools. These tools combine the efficient application of data protection with the flexible provisioning of SAP test systems, as is shown in Figure 1.

Figure 1) Optimizing SAP lifecycle management by product integration.



1.1 The Foundation: Application-Consistent NetApp Snapshot Backups

The creation of application-consistent NetApp Snapshot backups on the storage layer is the foundation for all of the operations described in this document. Storage-based Snapshot backups are created by using the NetApp SnapCenter® Plug-In for Microsoft SQL Server and interfaces provided by the Microsoft SQL Server database. SnapCenter registers Snapshot backups in the SQL Server backup history so that the backups are visible within the SAP system.

Storage-based Snapshot backups provide significant advantages when compared with traditional backup approaches. Advantages include rapid backup and restore processes (less than a minute), no performance drain on database servers, and no network load during the backup process.

1.2 Options: Data Protection—Off-Site Backups and/or Disaster Recovery

Application-consistent Snapshot backups can be replicated from the storage layer to an off-site backup site or a disaster recovery site that is controlled by SnapCenter. Replication is based on block changes and is therefore space and bandwidth efficient. In addition, different backup retention policies can be defined for backups on the primary site and the off-site backup site.

1.3 Flexibility: Use Any Production Snapshot Copy for SAP System Provisioning

NetApp technology and software integration allows you to use any existing Snapshot copy of the production system as a source for an SAP system copy. This storage can be either the same storage that is used for the SAP production systems, the storage that is used for off-site backups, or the storage at the disaster recovery site. This flexibility allows you to separate development and test systems from production if required, and it also covers other situations, such as the testing of disaster recovery scenarios at the disaster recovery site.

1.4 Integration: Data Protection and Efficient SAP System Provisioning

There are various scenarios and use cases for the provisioning of SAP test systems, and there are also different requirements for the level of automation. NetApp software products for SAP integrate into database and lifecycle management products from SAP to support different scenarios and levels of automation.

The NetApp SnapCenter Plug-In for SQL Server is used to provision the required storage volumes based on an application-consistent Snapshot backup and creates the new database at the target system.

SAP Software Provisioning Manager (SWPM) is used to perform the required changes on the target system to which the database has been attached. Depending on the use case—including SAP system copy, system clone, or system refresh—additional manual steps, such as SAP postprocessing, are required. We cover more details in the section “SAP System Copy Scenarios.”

A fully automated, end-to-end provisioning of SAP test systems can be performed by using SAP Landscape Virtualization Management (LVM). NetApp Storage Services Connector (SSC) integrates into SAP LVM and provides the required operations for SAP LVM at the storage layer.

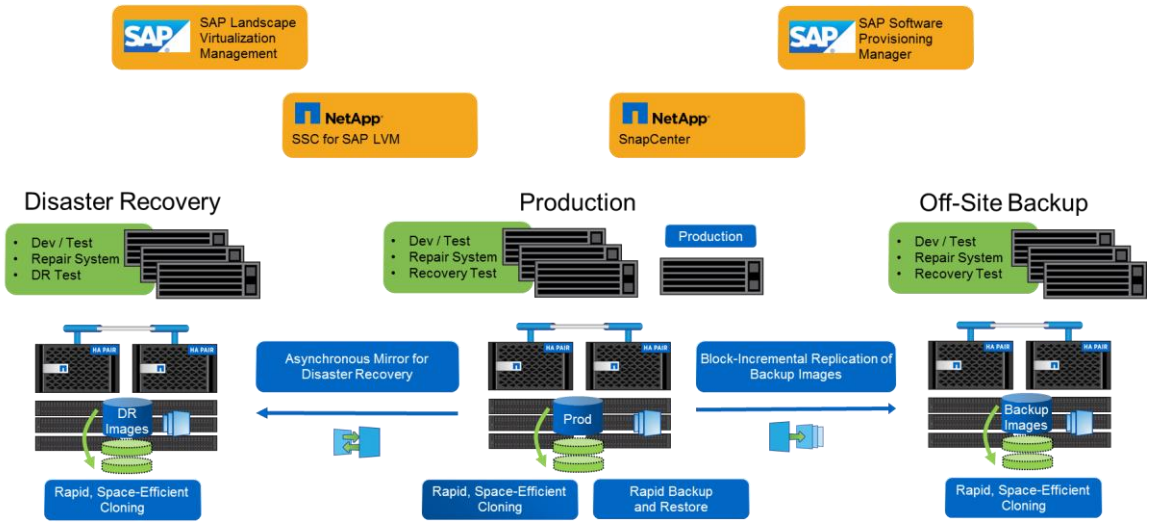
NetApp SnapCenter and NetApp SSC support storage cloning at the production storage system or at the destination storage system that is used for disaster recovery or off-site backup, as is shown in Figure 2.

1.5 Technology: Rapid, Space-Efficient Provisioning Based on Storage Cloning

NetApp FlexClone® copies provide space-efficient volume clones directly at the storage level in a manner that is completely transparent to the user. FlexClone copies are based on Snapshot copies and can be created in a matter of seconds without interrupting operations at the source volume. Because data is not copied but rather is referenced in place, the amount of storage required is limited to data that is changed at the source and the target system.

Figure 2 shows an architecture overview.

Figure 2) Architecture overview.



2 SAP System Copy Scenarios

SAP offers different products that can be used to clone, copy, or refresh SAP systems:

- **SAP Software Provisioning Manager.** This software is used to create or refresh a copy of an SAP system and SQL Server database, including the SAP application software. In this scenario, storage Snapshot backups of the SQL Server database are used. SAP postprocessing is not covered by SWPM.
- **SAP Landscape Virtualization Management.** This software provides end-to-end workflow automation to clone, copy, or refresh SAP systems. SAP LVM uses SWPM functionality and adds automated SAP postprocessing. NetApp SSC integrates into SAP LVM to automate all required tasks at the storage layer.

2.1 SAP System and Microsoft SQL Server Database Copy with SAP SWPM

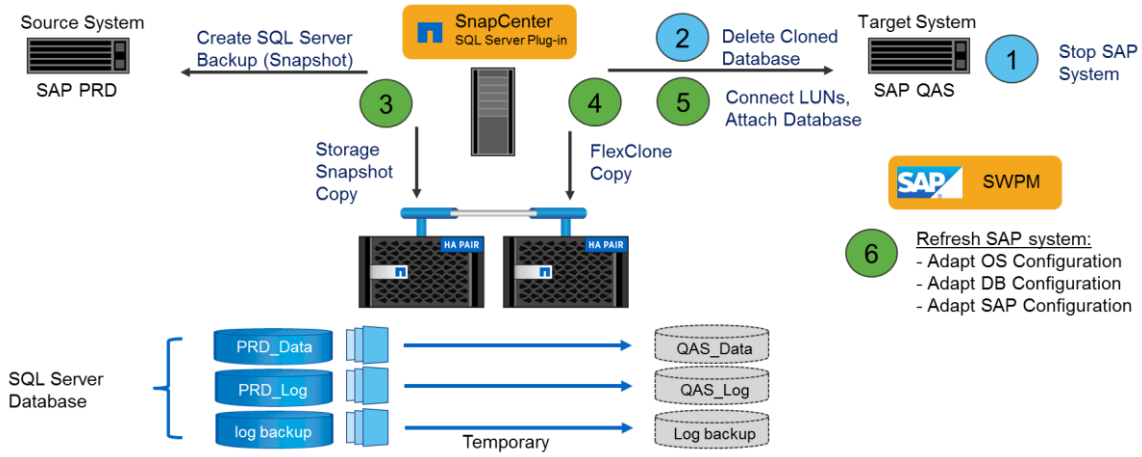
Figure 3 shows the workflow for an SAP system copy with SAP SWPM. The SAP system PRD is used as the source system for the copy process. Microsoft SQL Server must be installed at the target system. The NetApp SnapCenter SQL Server plug-in is configured to create storage-based Snapshot backups of the source database, as is shown in step 3 of Figure 3. SnapCenter is also used to provision the FlexClone copies based on the selected storage Snapshot copy and to mount the LUNs at the target system, as is shown in steps 4 and 5.

Finally, SAP SWPM is used to execute all of the required changes at the OS, database, and SAP layers by using the system copy and refresh database instance dialog.

Note: SAP postprocessing is not performed by SWPM and must be performed manually.

A detailed description of SAP system copy with SAP SWPM is covered in the section “SAP System Copy and Refresh with SAP SWPM.”

Figure 3) Refresh SAP system and SQL Server database with SAP SWPM.



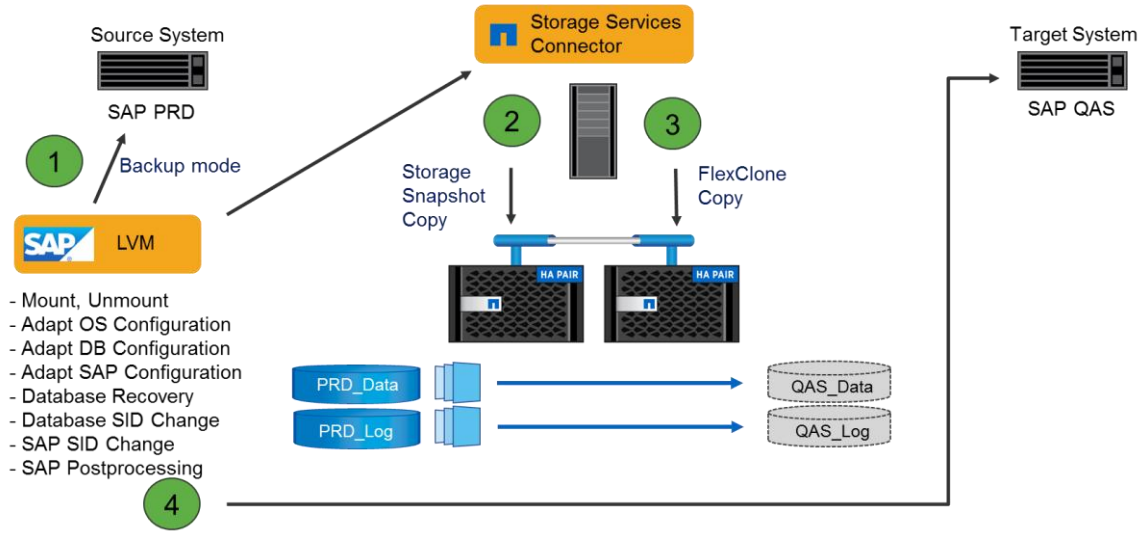
2.2 SAP System Copy with SAP LVM

Figure 4 shows the workflow for an SAP system copy operation with SAP LVM. The SAP system PRD is used as the source system for the copy process.

NetApp SSC is configured to create storage-based Snapshot backups of the source database, as is shown in step 2 of Figure 4. A system copy can be created either by using an existing Snapshot backup or by creating a new on-demand backup with SAP LVM.

NetApp SSC is integrated into SAP LVM and executes all required storage commands for Snapshot copies and cloning. SAP LVM controls the mount commands at the target system and also executes all of the required changes at the OS, database, and SAP layers. SAP LVM also automates SAP postprocessing and thus offers end-to-end automation.

Figure 4) Provisioning of a new SAP system with SAP LVM.

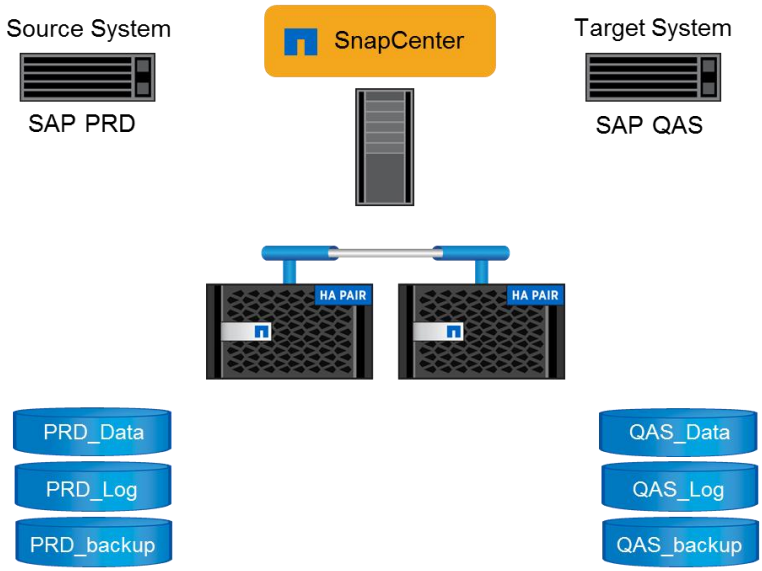


For a detailed description of SAP system copy with SAP LVM, see TR-4018: Integrating NetApp FAS with SAP Landscape Virtualization Management.

3 SnapCenter and SQL Server Plug-In Configuration

Figure 5 shows the setup that was used for this document. The source system for SAP system copy is PRD and the target system is QAS. Both systems have SWPM installed.

Figure 5) Lab setup.

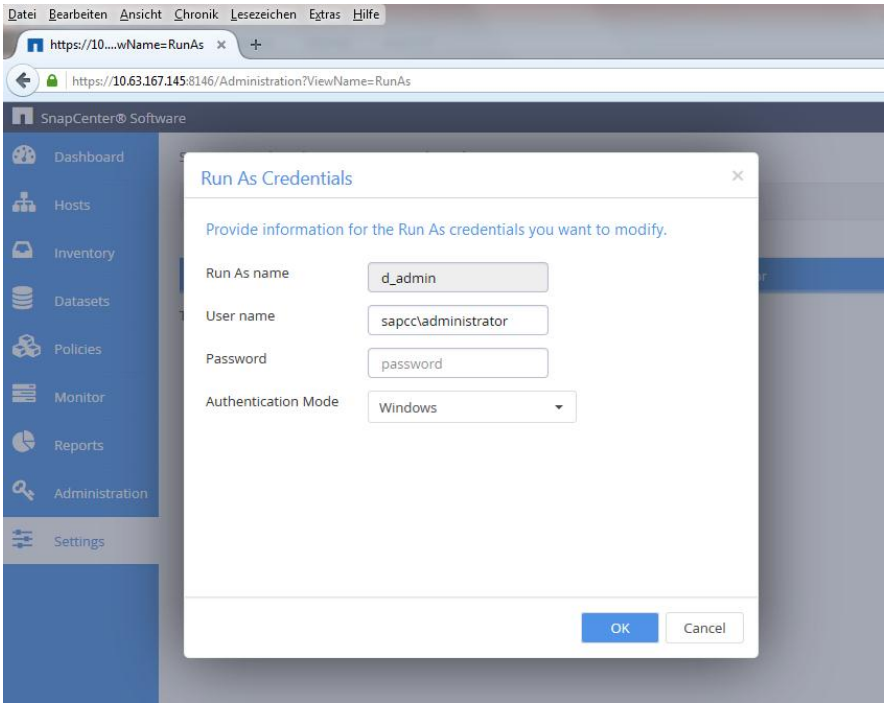


NetApp SnapCenter is used to create clones of storage-based NetApp Snapshot backups of the system PRD. This setup was installed according to methods described in [TR-4467: SAP with Microsoft SQL Server on Windows Best Practices Using NetApp Clustered Data ONTAP and SnapCenter].

The following sections assume a basic understanding of SnapCenter and the SnapCenter Plug-Ins for Microsoft SQL Server and Microsoft Windows. For more information about the base functionality of these programs, see the SnapCenter and SnapCenter plug-in administration guides.

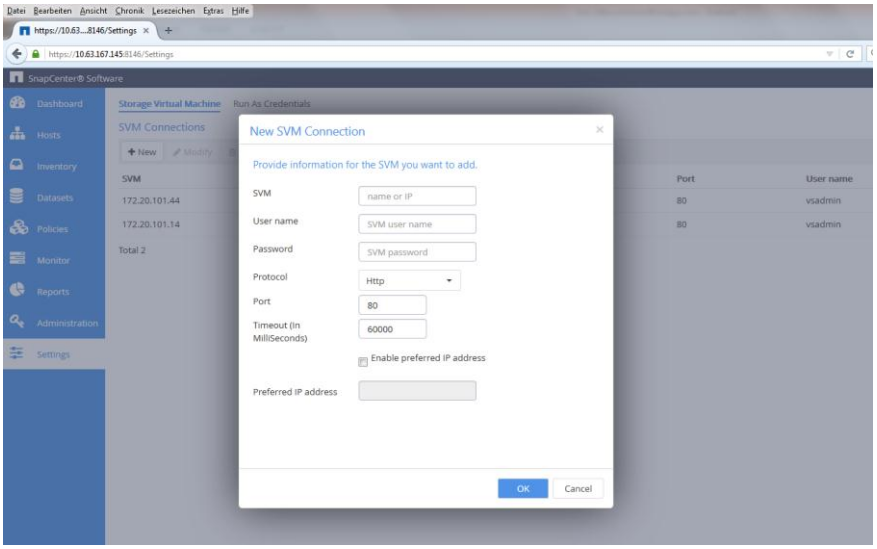
3.1 Create User Credentials

User credentials are required to perform tasks such as the provisioning and configuration of SnapCenter plug-ins to hosts, the performance of SQL Server database backups, and other tasks. Therefore, you must create Run As credentials for each needed user within the Settings menu. Needed users are local administrators of the Windows host or the SQL Server instance. For this and the following steps, log in with the SnapCenter GUI.



3.2 Storage Virtual Machine Settings

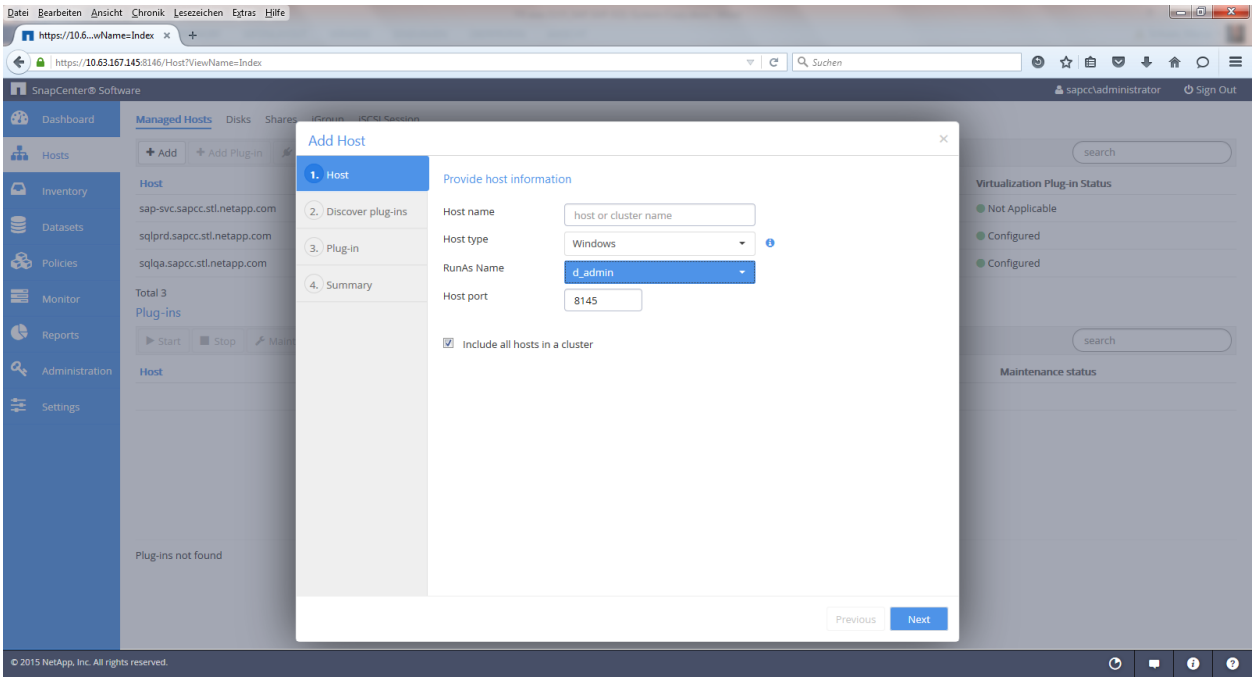
Each storage virtual machine (SVM) that is used as a source or a target storage system for the SAP systems must be added to SnapCenter. If you have not already performed this step, add the SVMs to SnapCenter by using the New SVM Connection wizard in the Settings menu.



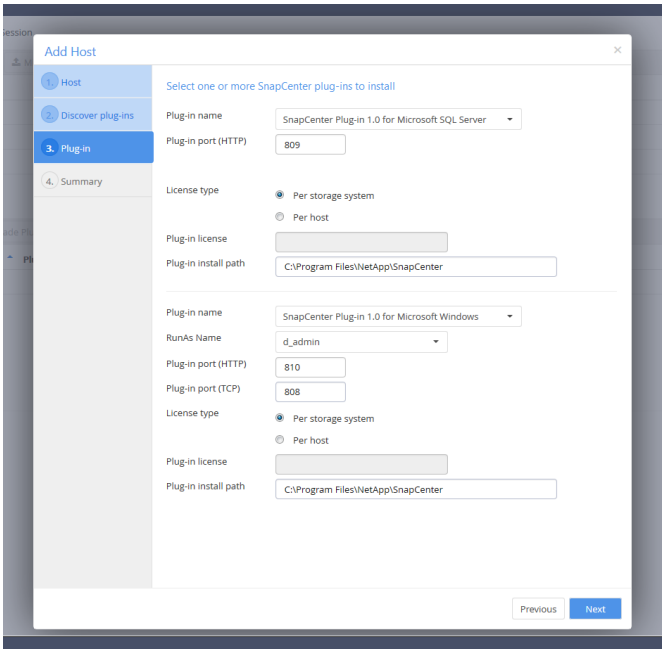
3.3 Deployment of SnapCenter for SQL Server Plug-In

The SnapCenter Plug-Ins for SQL Server and Windows must be deployed on the source and the target hosts. To deploy these plug-ins, complete the following steps:

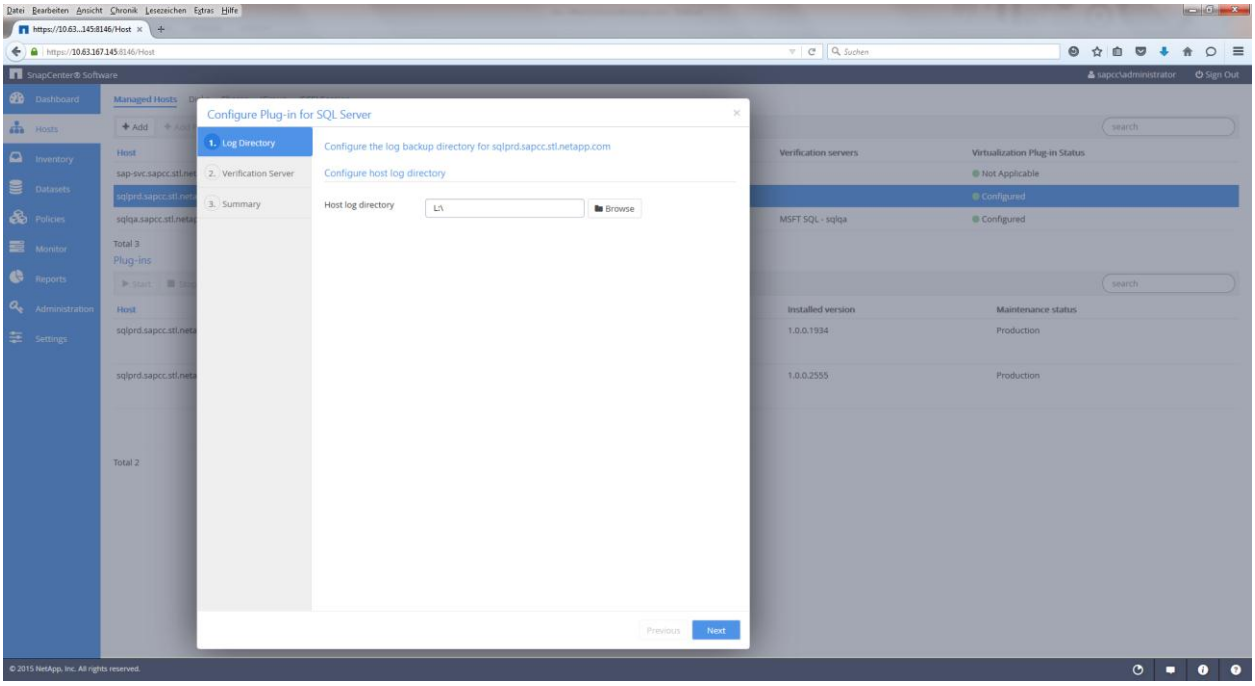
1. Start the Add Host wizard from the SnapCenter Hosts menu and deploy the SnapCenter Plug-Ins for Microsoft Windows and Microsoft SQL Server. Select the previously created Run As credentials.



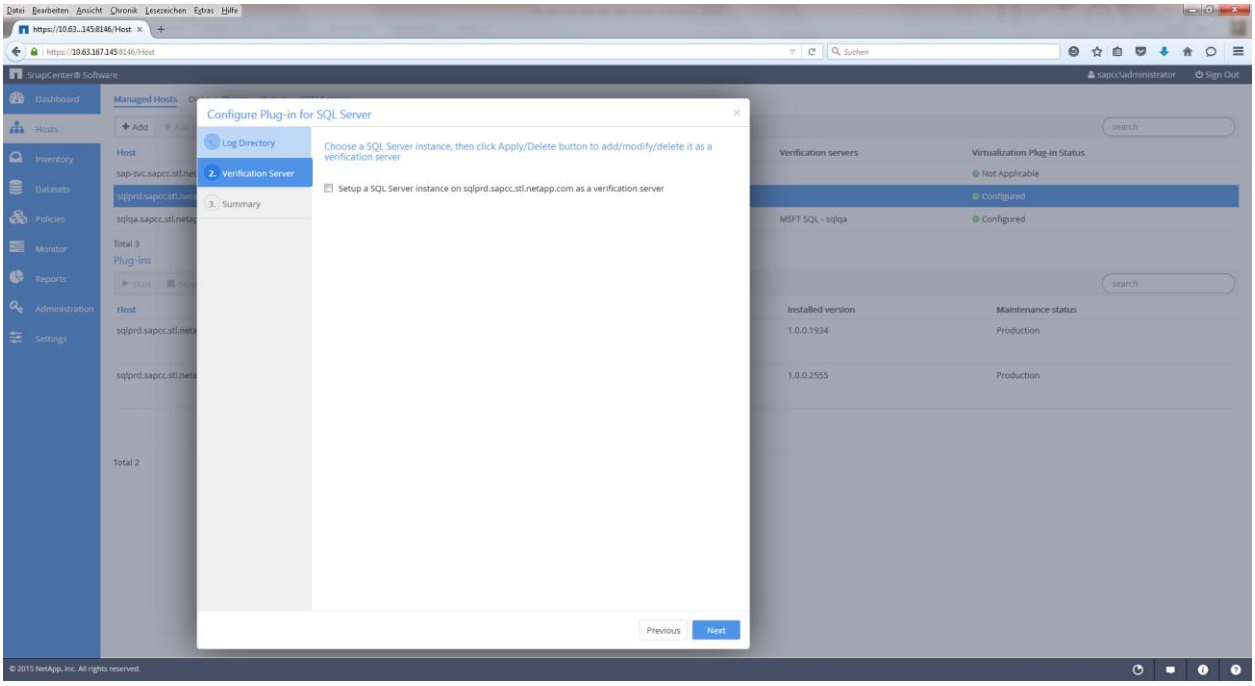
2. Select the Microsoft SQL Server and Microsoft Windows plug-in.



3. Click Next to go to the summary page. Then click Finish.
4. Configure the SQL Server plug-in and provide the path to the log backup directory. This directory must be stored on a NetApp LUN.

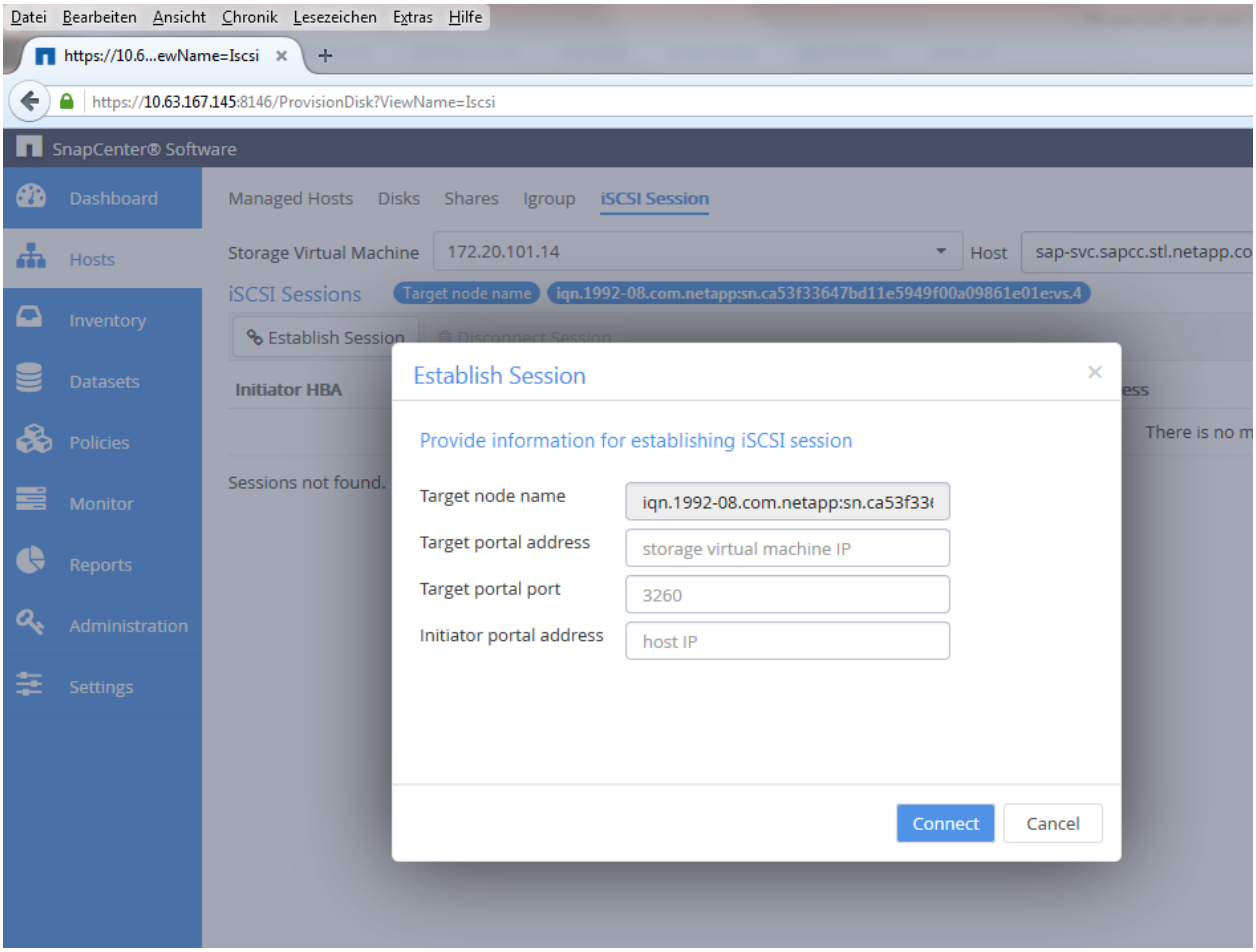


5. If desired, add this SQL Server instance as the verification server instance.



3.4 iSCSI Preparation

In the case of iSCSI, the hosts must establish an iSCSI session on the SVM where the cloned LUNs are located. This can be the same SVM where source system LUNs are stored, or it can be the SVM of the SnapVault® or SnapMirror® destination, depending on whether the clone must be created at the source storage system or the destination storage system.



For more details, see the administration guides for SnapCenter and the SnapCenter plug-ins.

3.5 Creating Policies

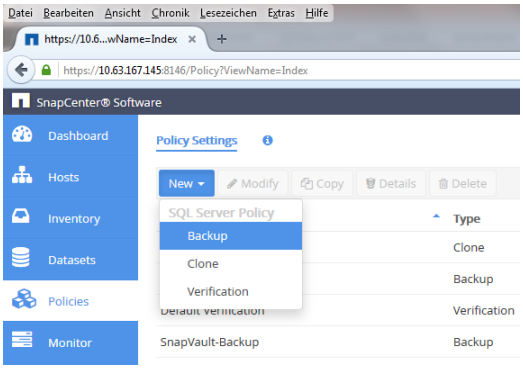
The following policies must be created as prerequisites for the creation of a cloning dataset:

- A backup policy
- A clone policy

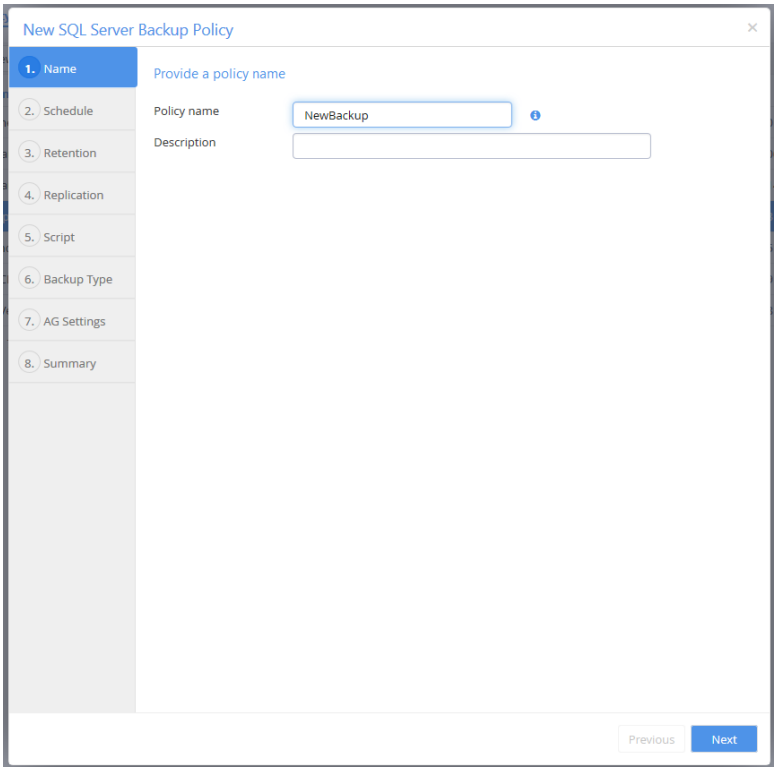
Create Backup Policy

To create a new backup policy, complete the following steps:

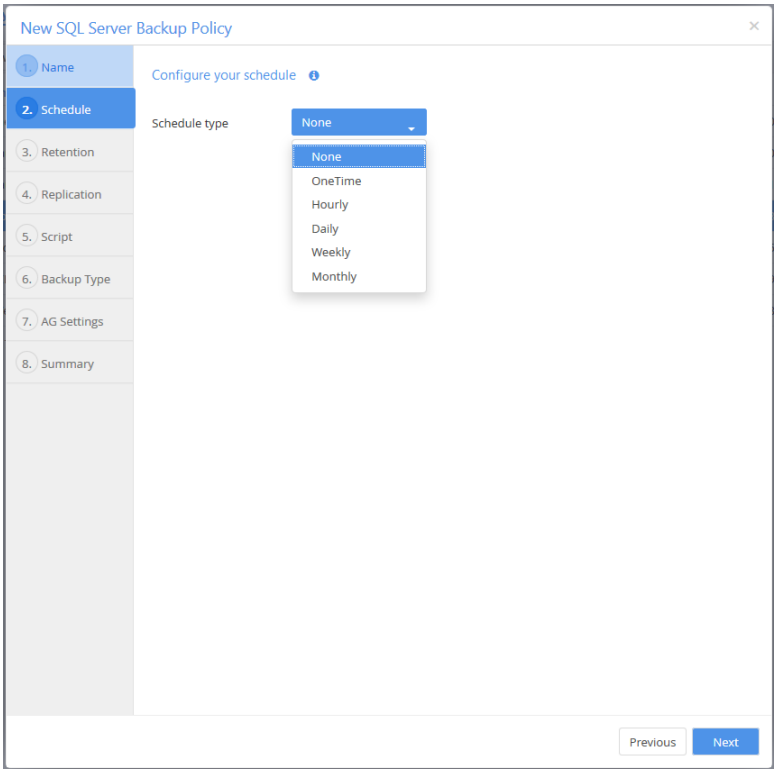
1. Select Policies > New > Backup.



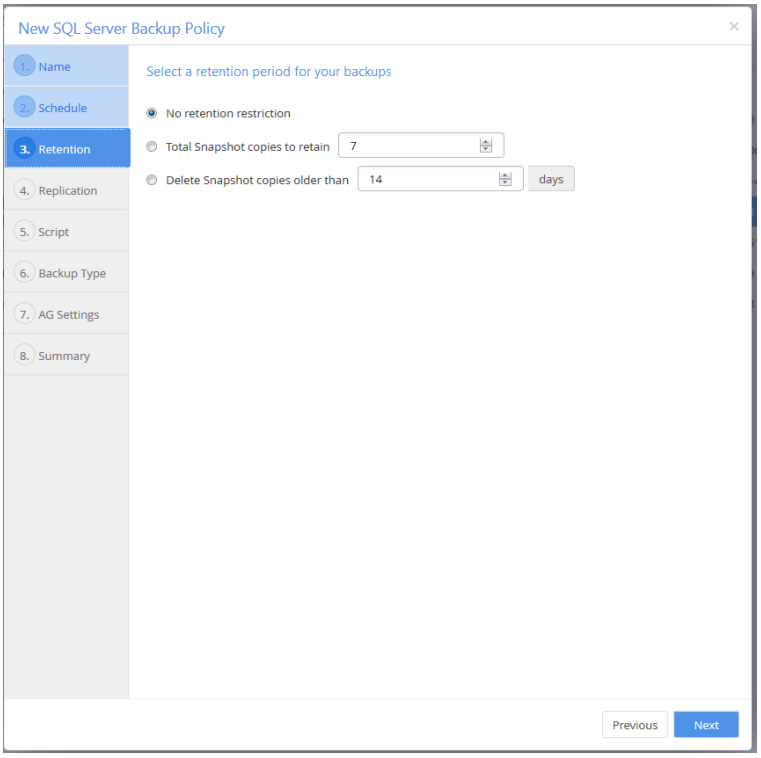
2. Provide a policy name.



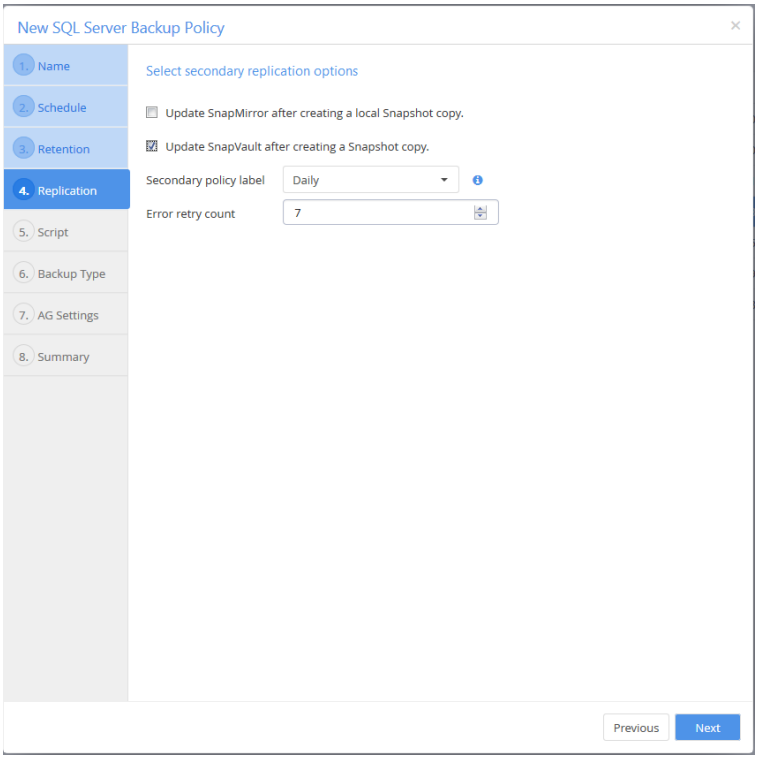
3. Select the desired schedule type.



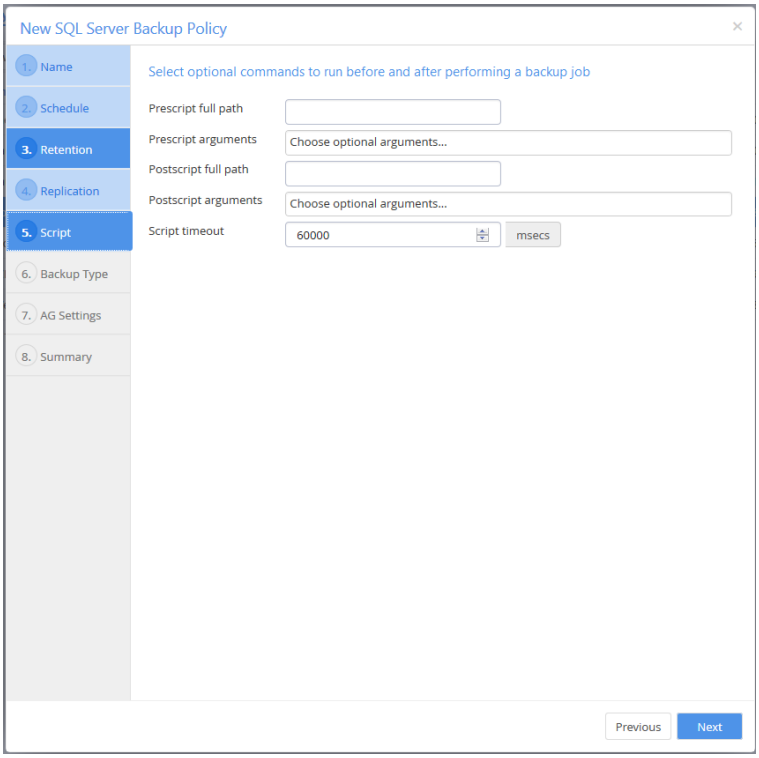
4. Define the retention time.



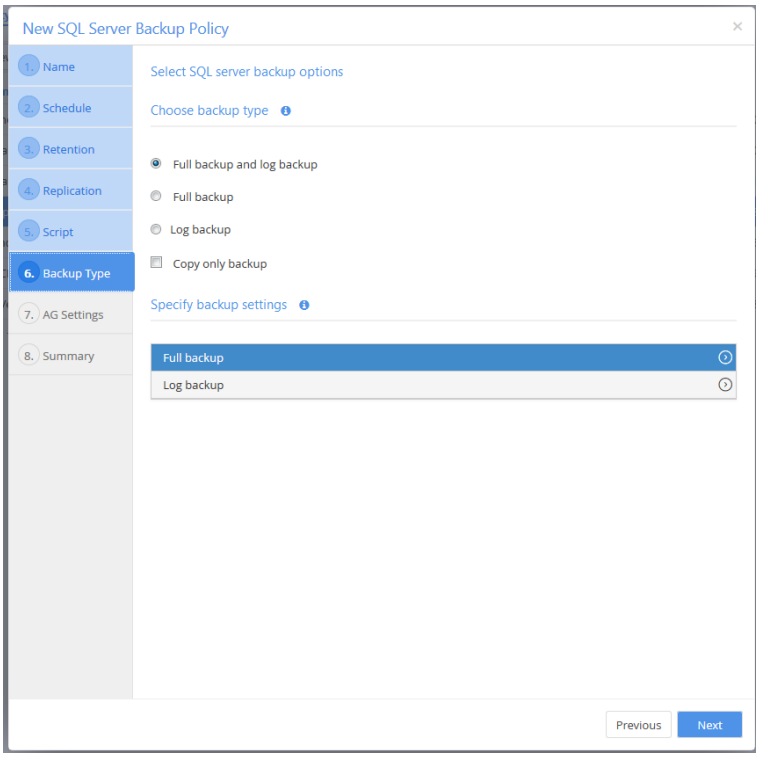
5. Select a replication option, if any.



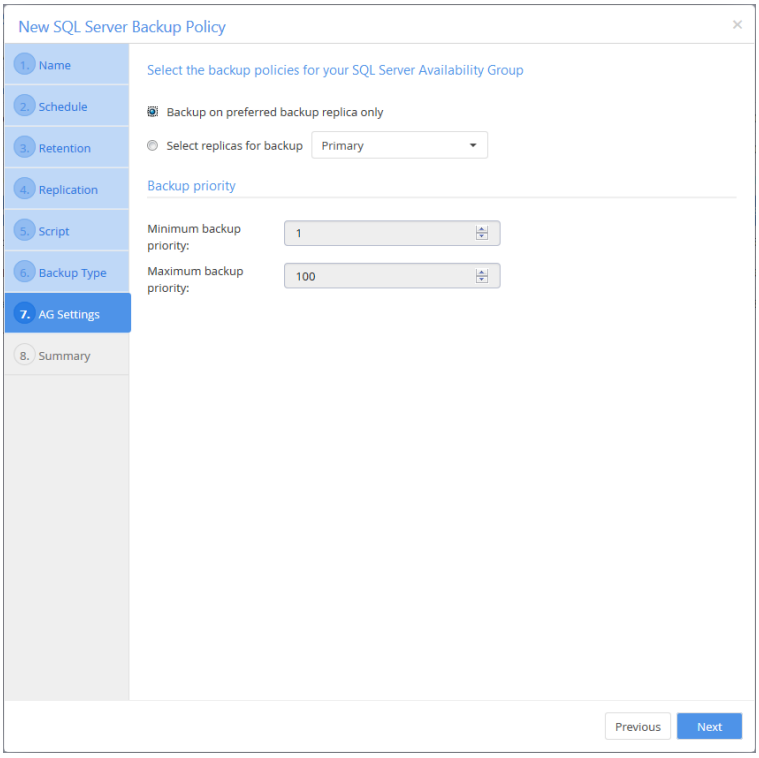
6. Select a script if required.



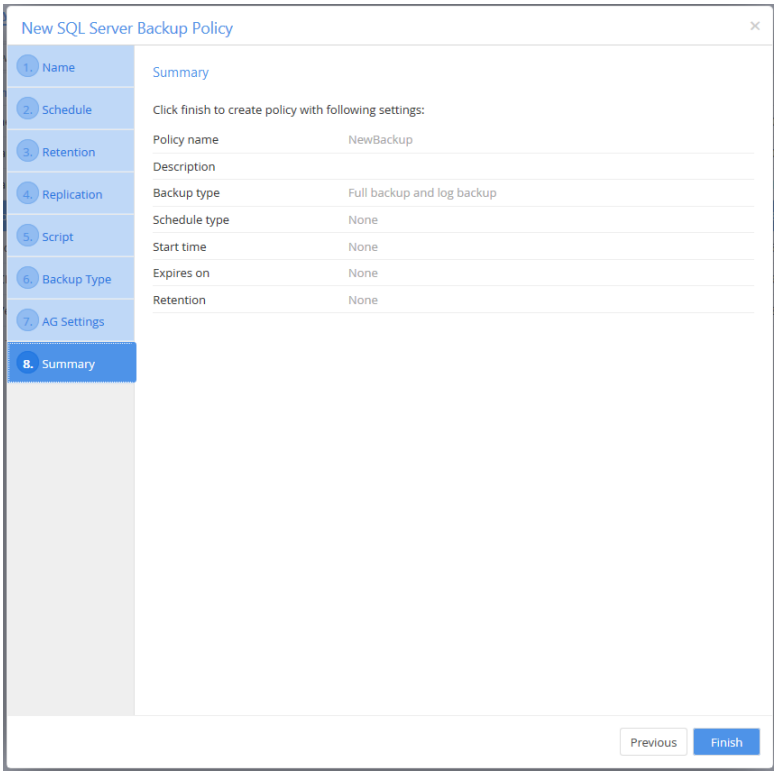
7. Select Full Backup or Full Backup and Log Backup for the backup type.



8. Provide Microsoft SQL Server availability group settings, if applicable.



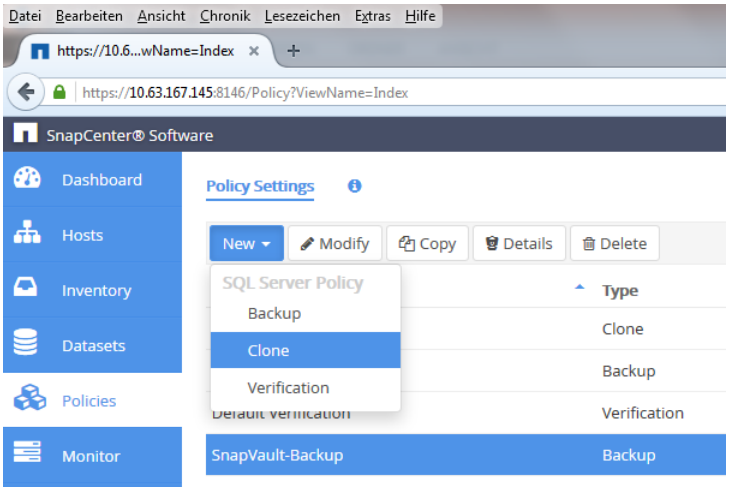
9. Review the summary and click Finish.



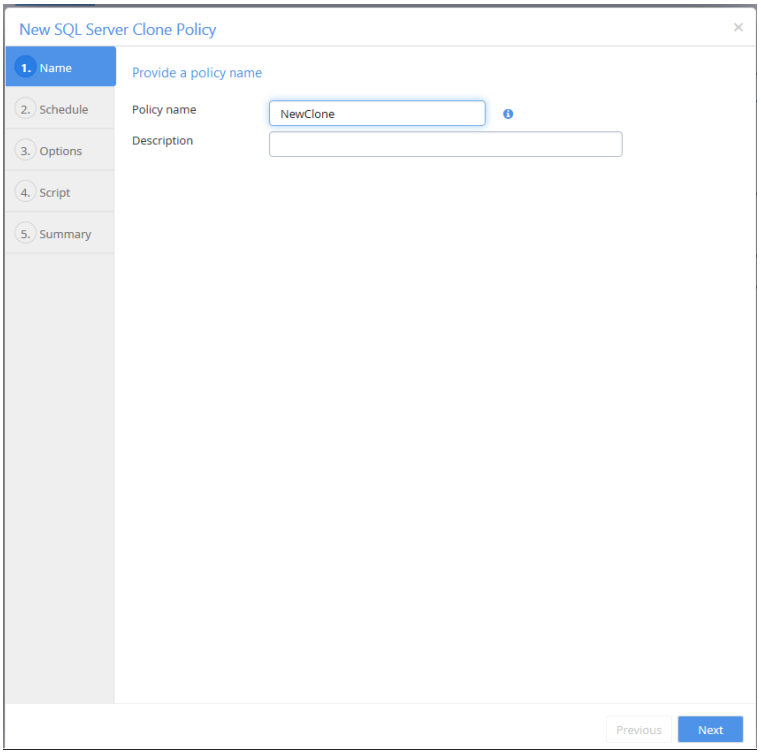
Create Clone Policy

To create a new clone policy, complete the following steps:

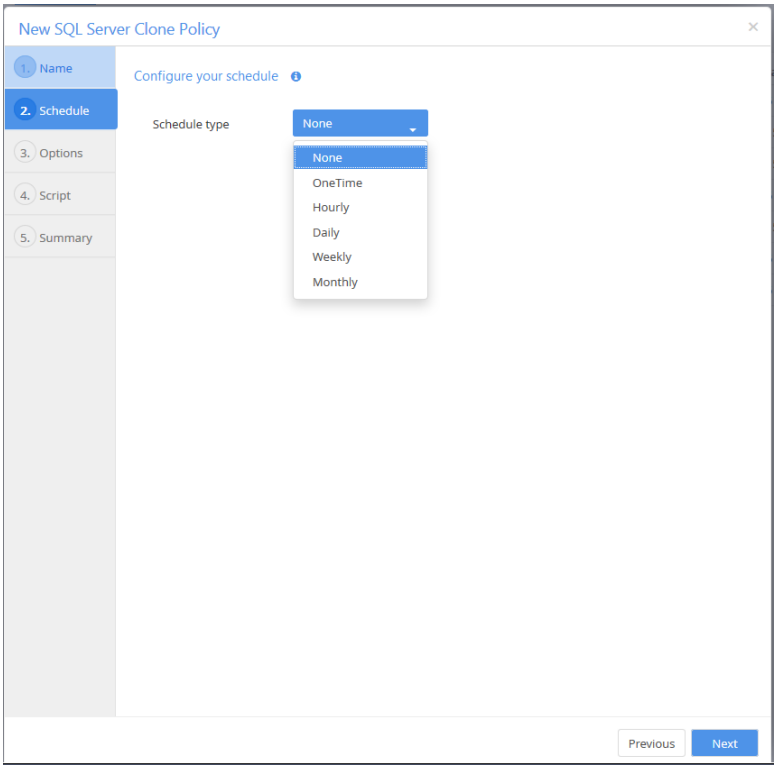
1. Select Policies > New > Clone.



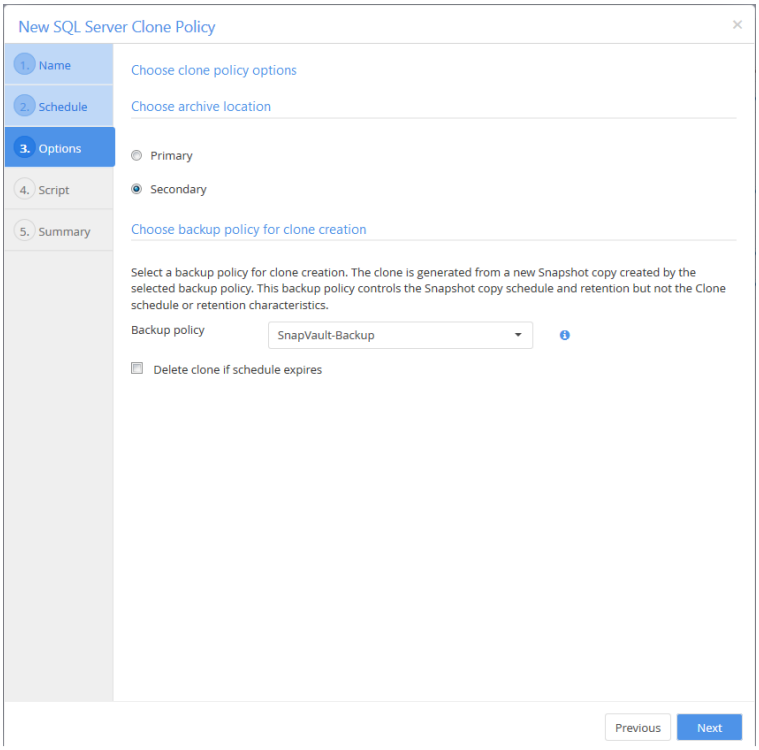
2. Provide a name for the policy.



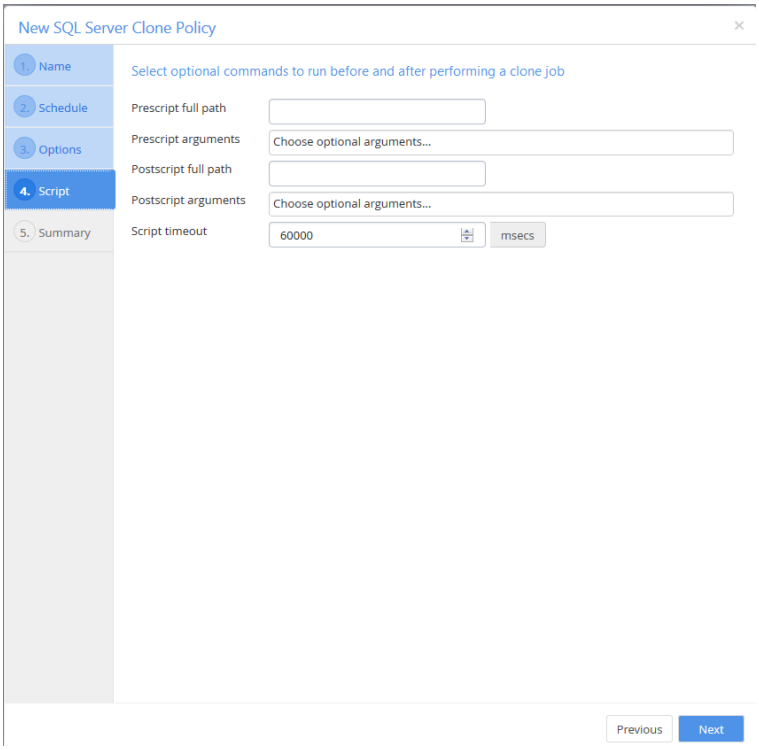
3. Configure the schedule. Usually no schedule is used for SAP system copies.



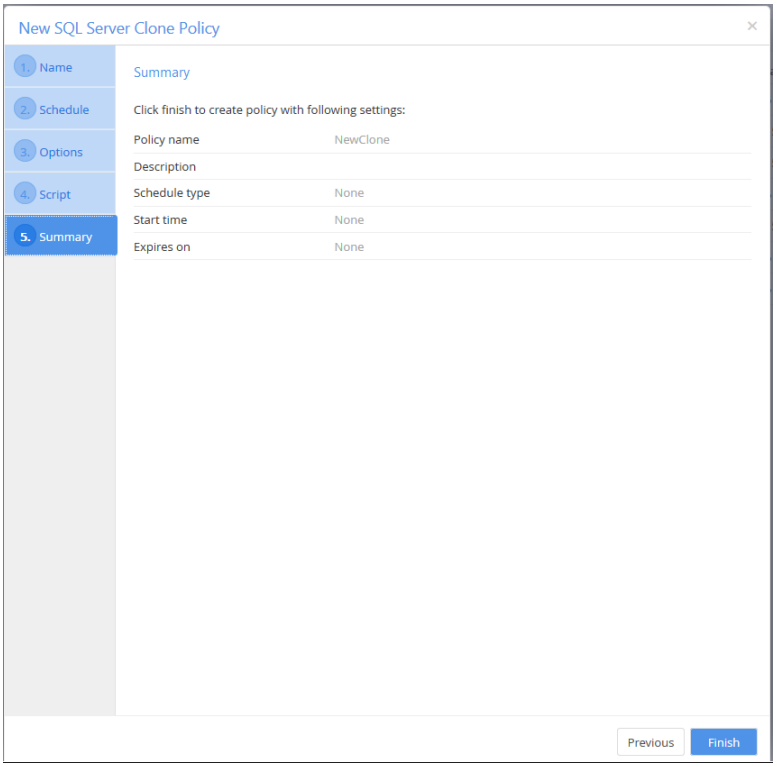
4. Select the desired location to use for primary or secondary cloning, and select the backup policy.



5. Select any necessary scripts.



6. Review the summary and click Finish.



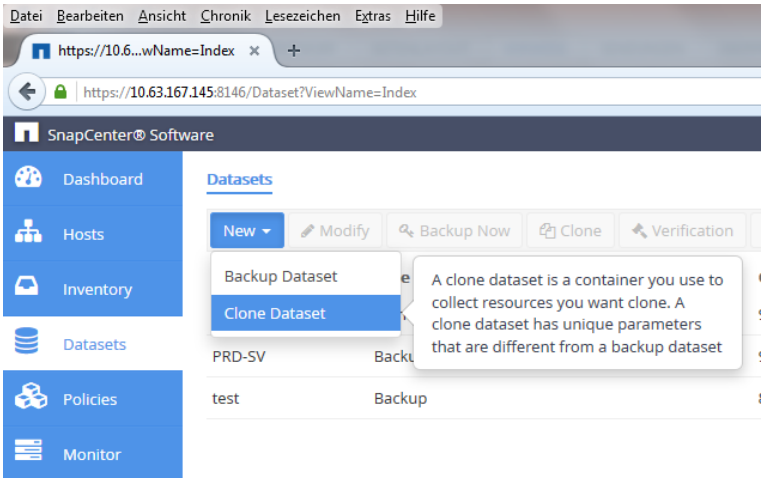
3.6 Define Clone Dataset

With SnapCenter, you can configure datasets for different tasks such as backup and cloning.

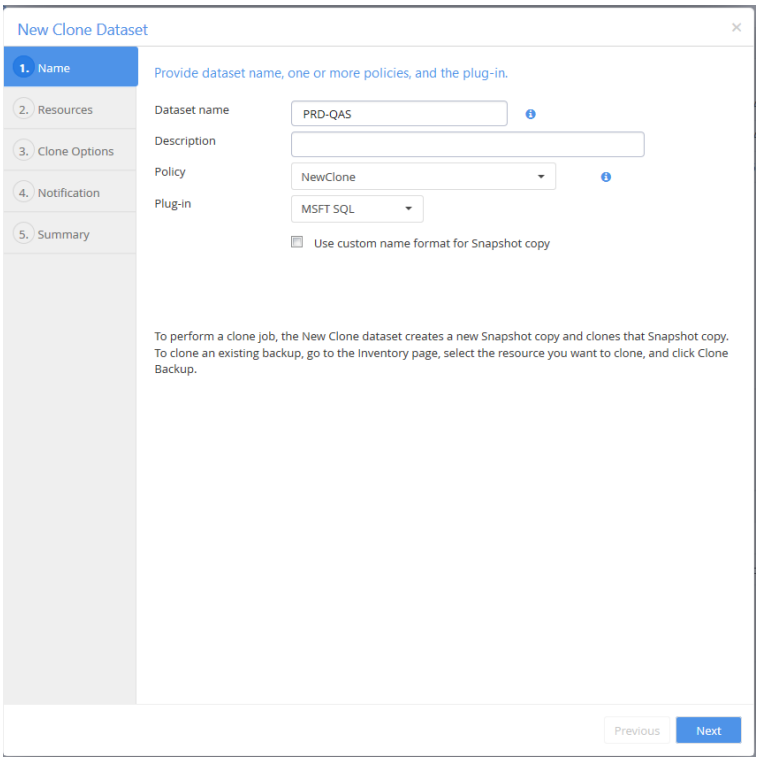
After a dataset has been defined, it can be scheduled or reused at any time without additional configuration steps.

To create a new cloning dataset, complete the following steps:

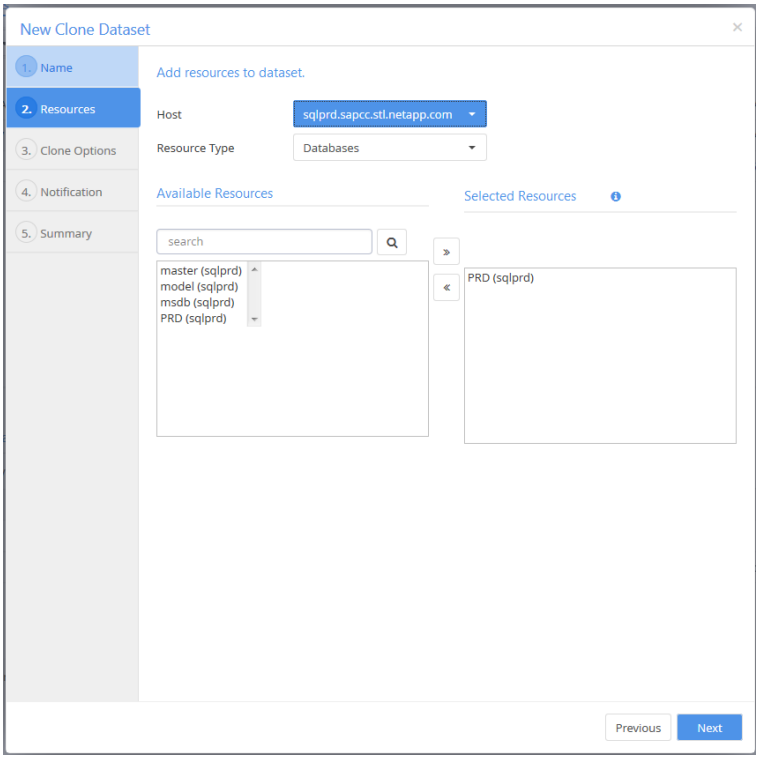
1. Select Datasets > New > Clone Dataset.



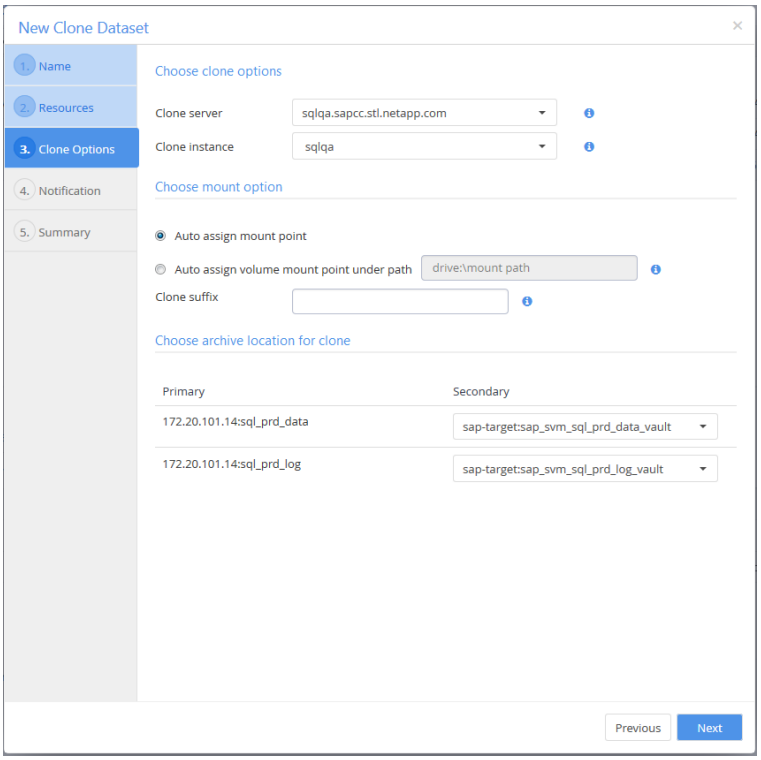
2. Provide a name for the dataset and select a cloning policy.



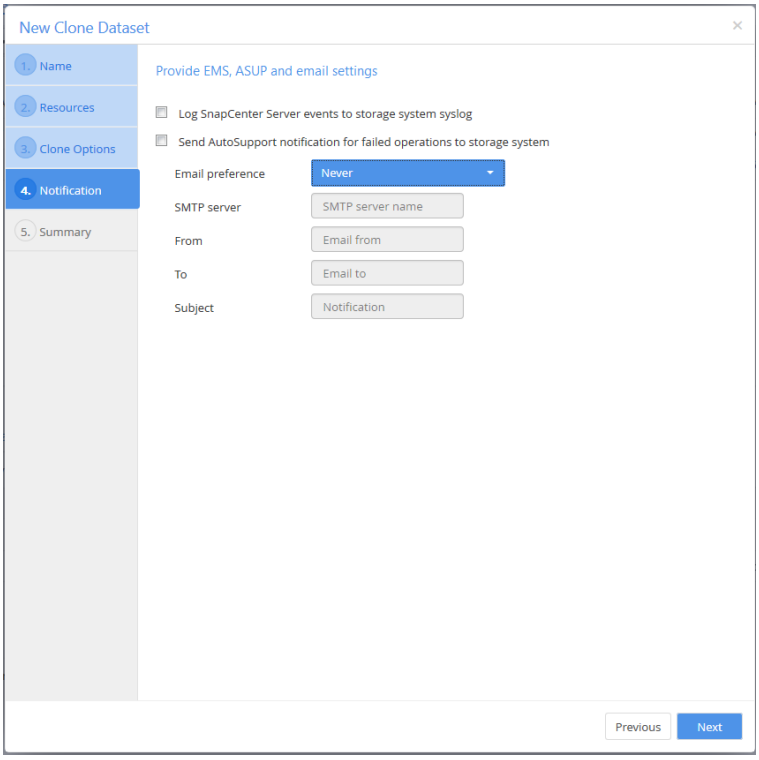
3. Select the source database of the source system as a resource. In this example, the source is database PRD.



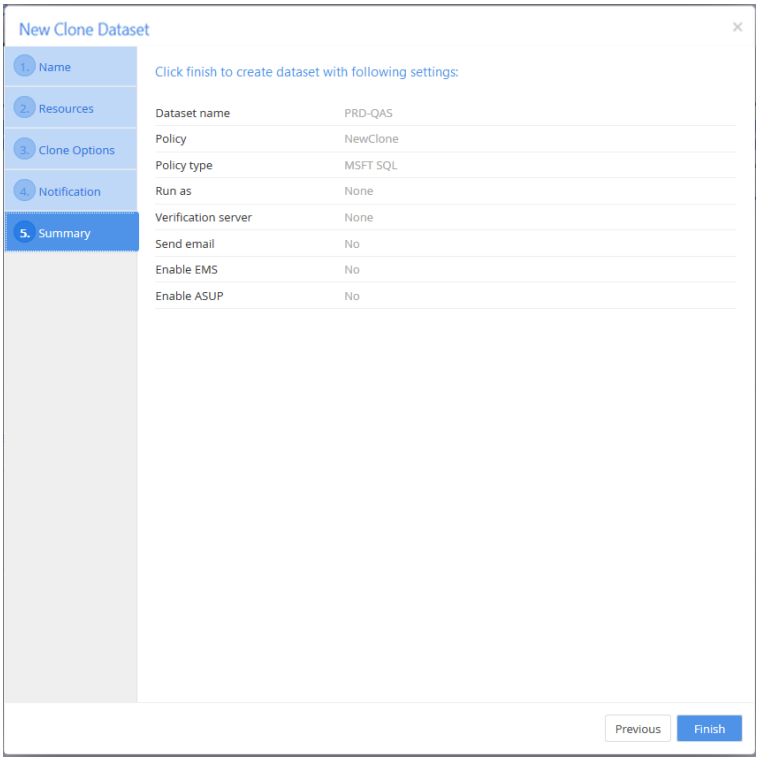
4. Select the desired target server and database instance. In this example, the clone is created at the secondary storage SVM, so the secondary target is selected.



5. Select and provide the desired notification settings.



6. Review the summary and click finish.



4 SAP System Copy and Refresh with SAP SWPM

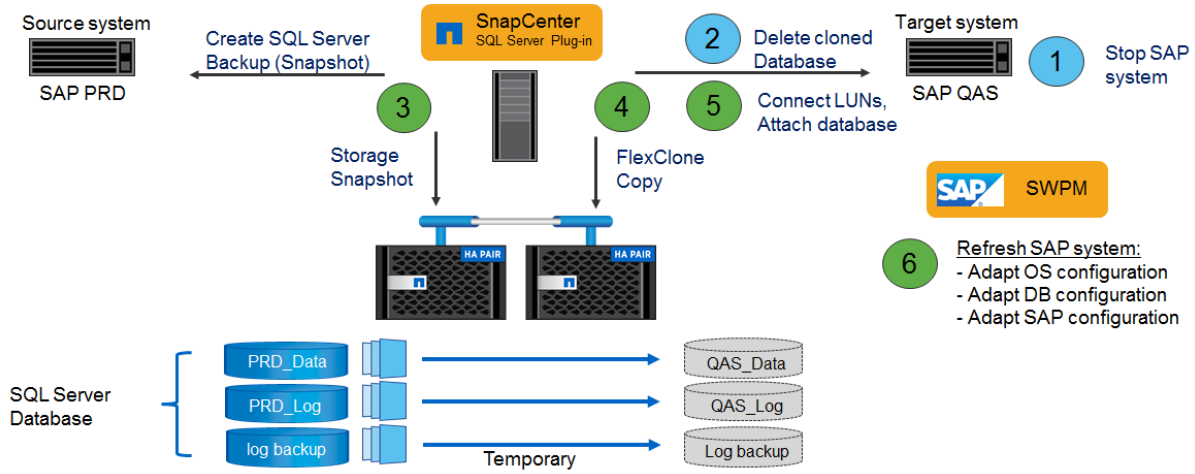
To refresh the target SAP system with SWPM, complete the following steps:

- Stop the target SAP system.

- In the case of a system refresh, delete the existing clone of the database at the target system by using NetApp SnapCenter. If the database was renamed manually, change it back to the name that was used in the cloning workflow before you use the Clone Delete wizard.
- Create a new clone of the PRD database and attach it to the destination system by using the clone dataset of SnapCenter with a new backup (step 3 to step 5 in Figure 6).
- Start SWPM to create a new SAP system based on the cloned database or to refresh the database instance (step 6).

Figure 6 shows the workflow of the SAP system refresh operation with SWPM.

Figure 6) SAP system refresh with SAP SWPM.



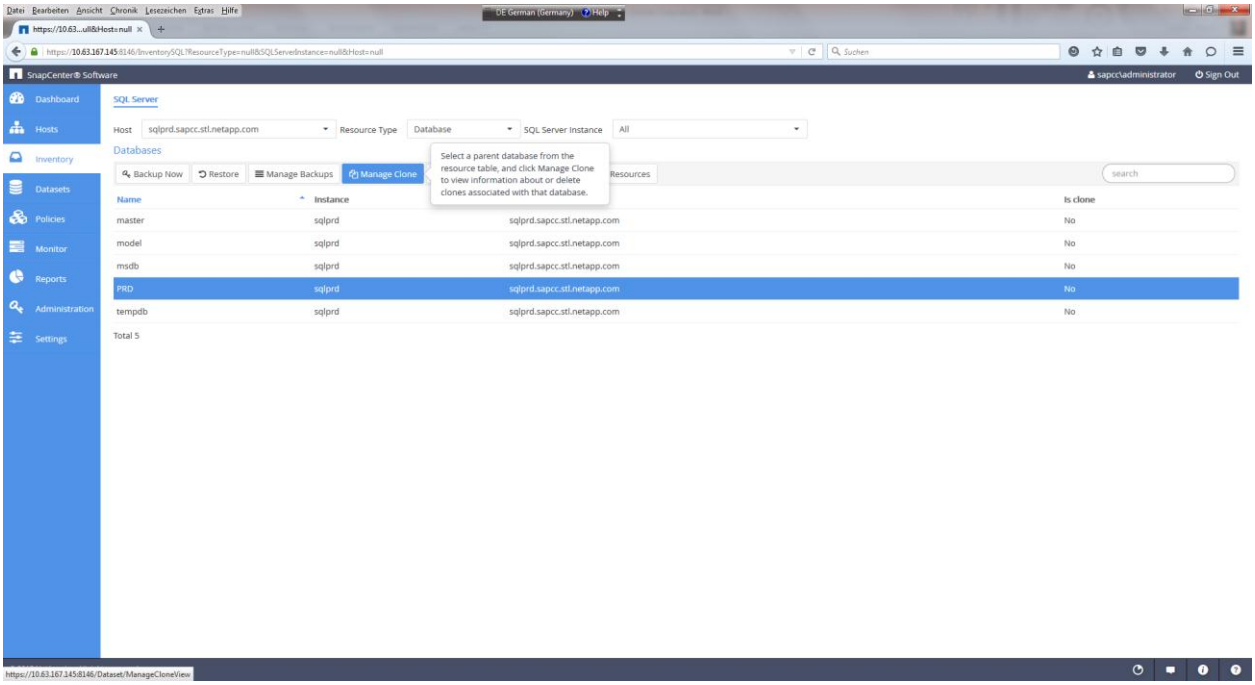
4.1 Delete Cloned Database From Target System

The descriptions in this section only apply to a refresh of a database in an existing SAP system.

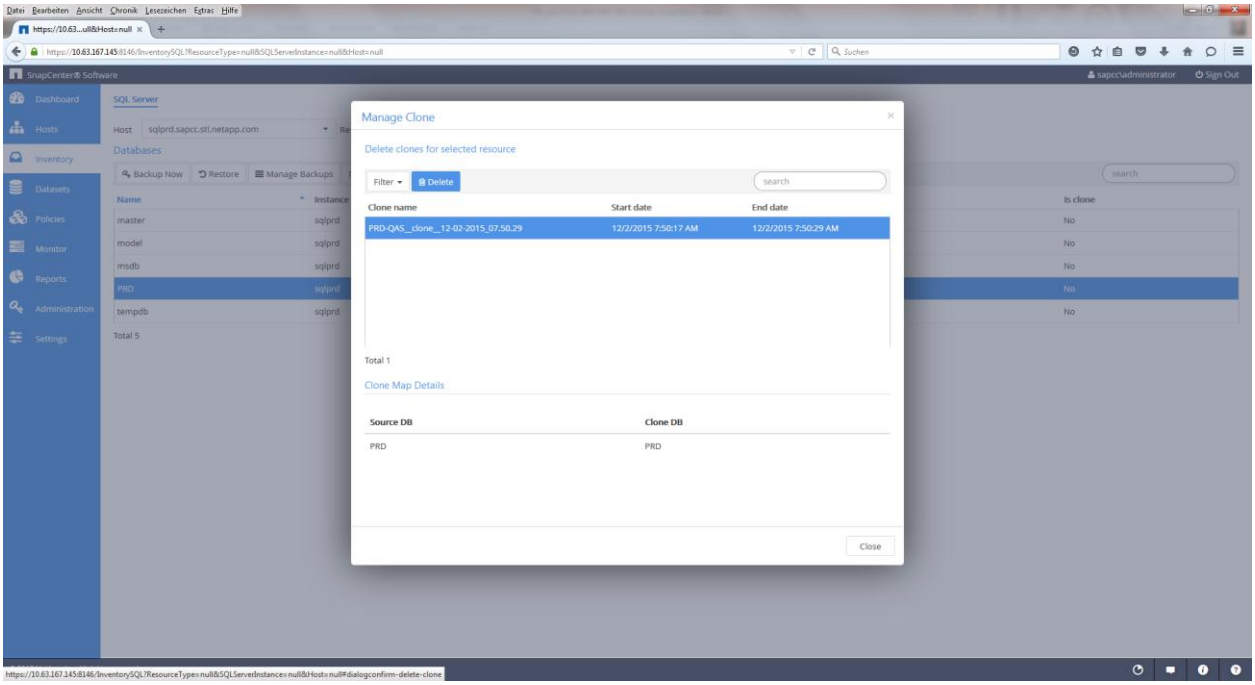
Before you start the delete clone operation with SnapCenter, you must stop the SAP system. Also, if the name has been change manually, change it back to the name that was used by the clone dataset.

To perform a delete clone operation, complete the following steps:

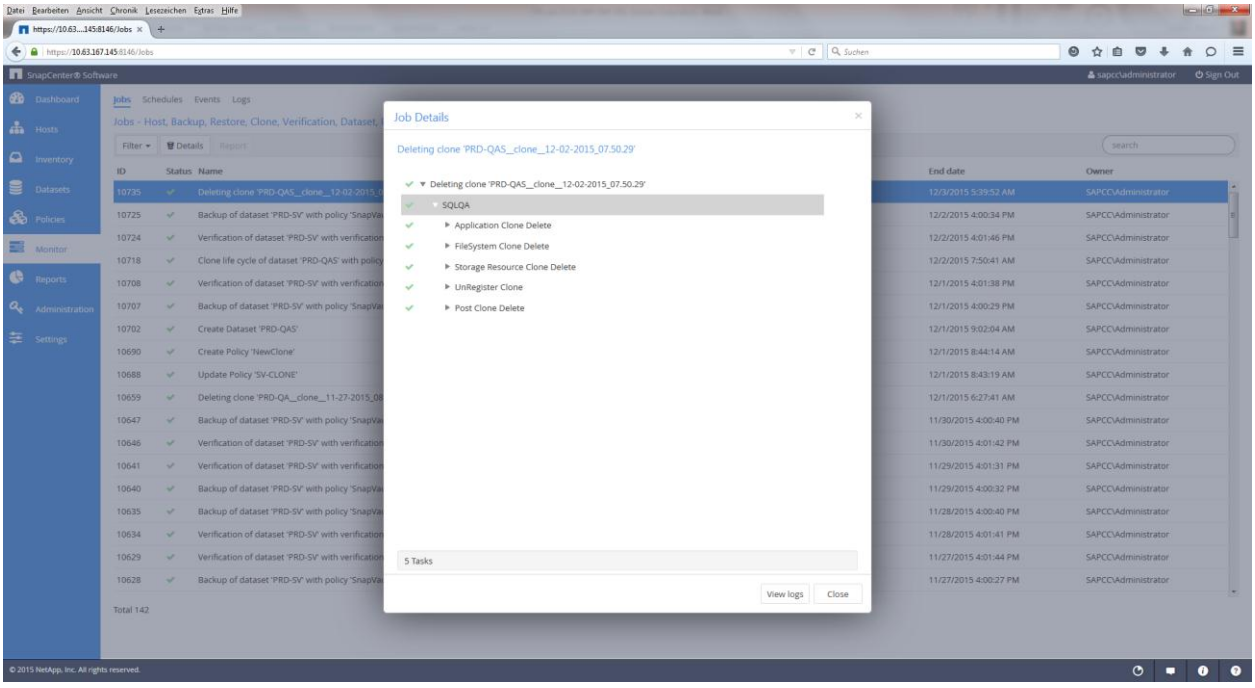
1. Select Inventory > Manage Clone.



2. Select the cloned database and click Delete. Confirm that you want to delete the clone.



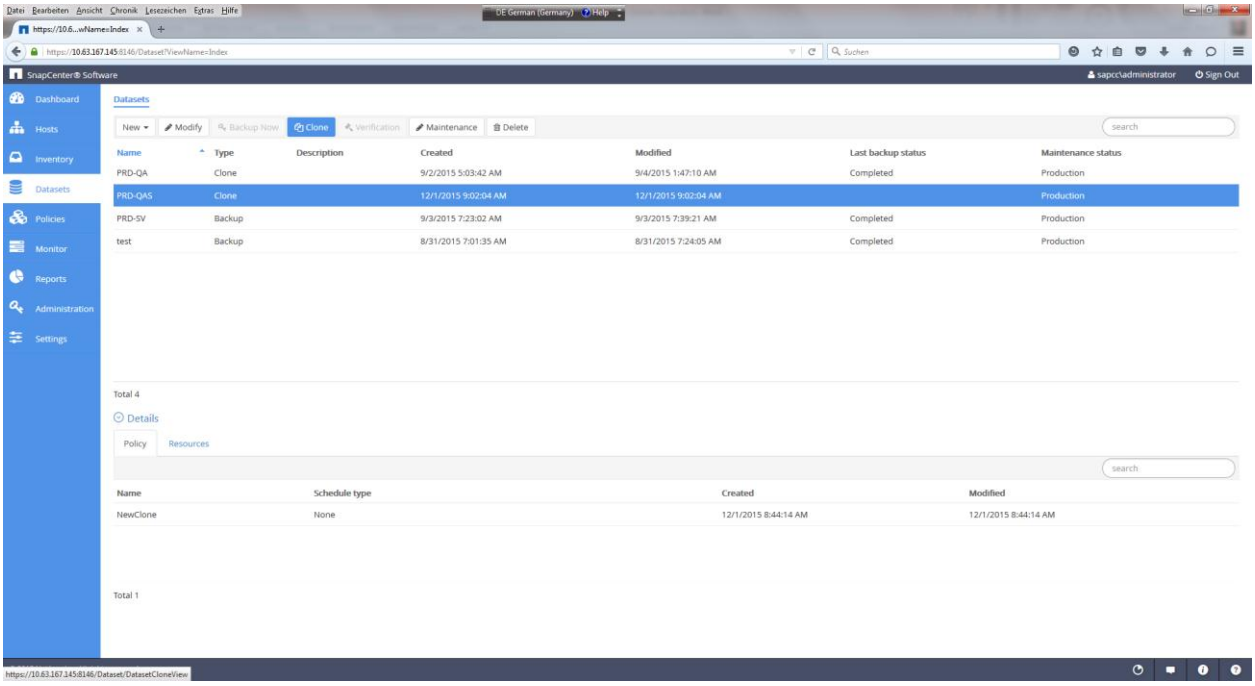
3. Check to see whether the clone delete job finished successfully.



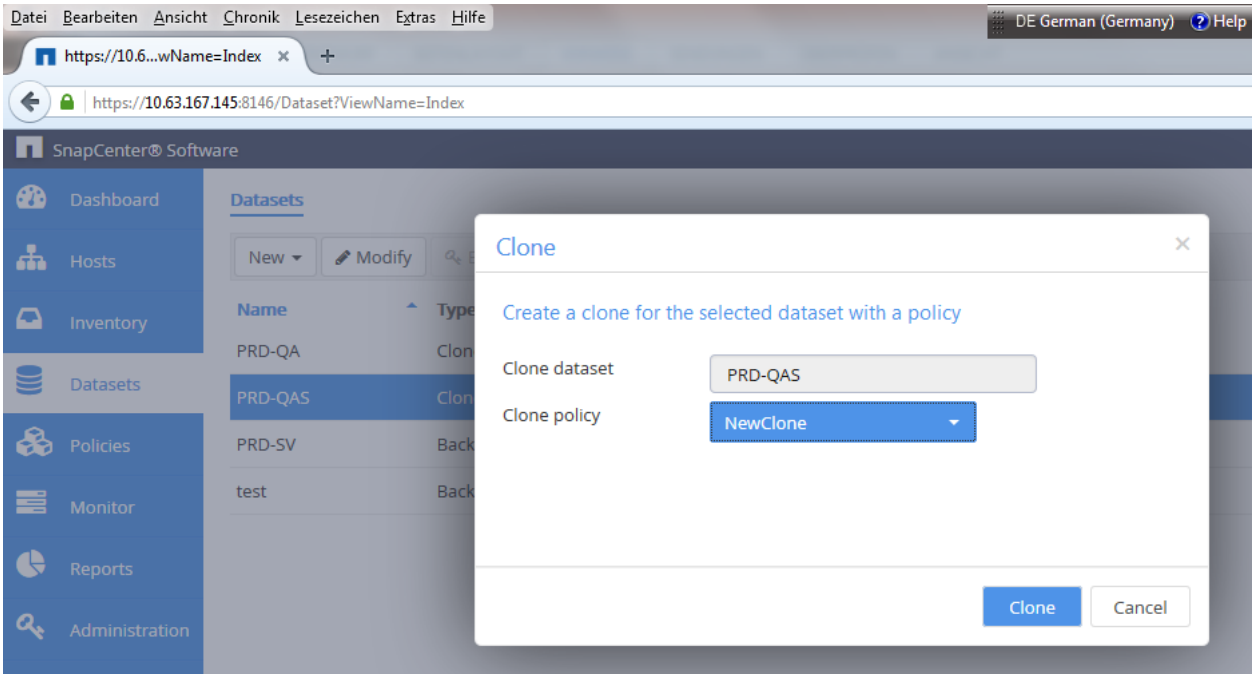
4.2 Create and Mount FlexClone Database Copy on Target System

To create and mount a FlexClone copy on the target system, complete the following steps:

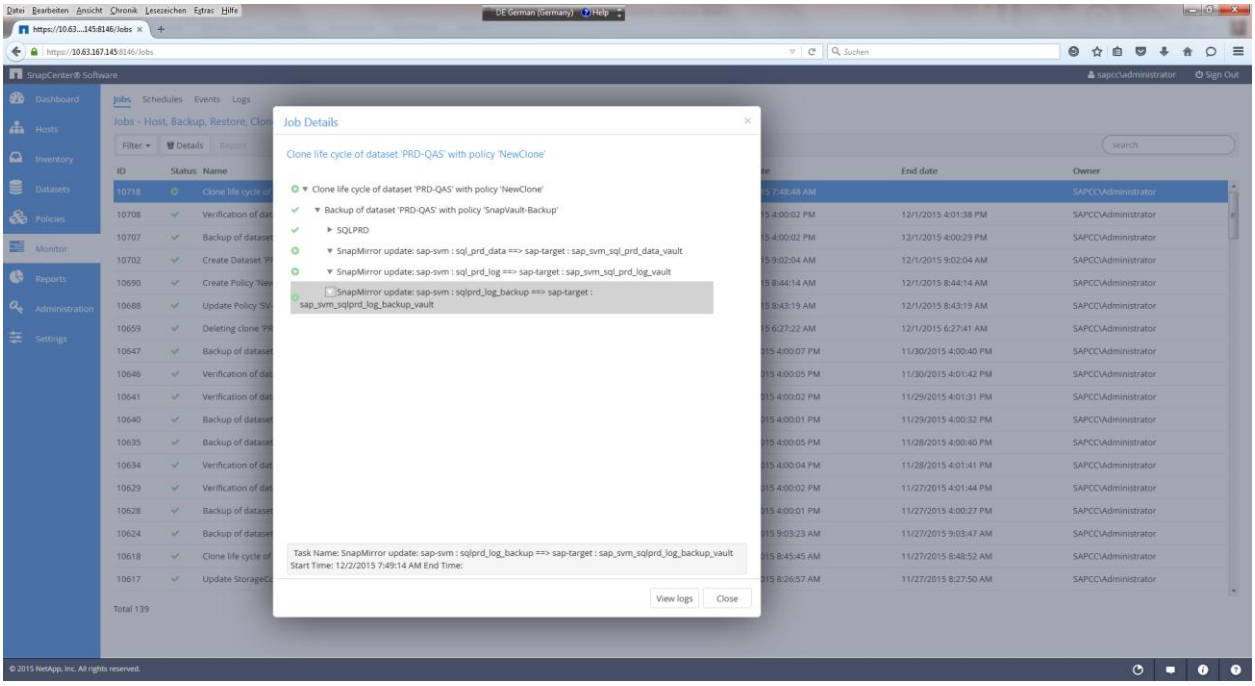
1. Select Datasets and select the cloned dataset created previously.



2. Start the clone process by clicking Clone.



3. Monitor progress from the Monitor menu, select the cloning job, and click Details. This process usually takes a few minutes.



When this process has finished, log in to the target server and start SWPM.

4.3 Refresh a Database or Create a New SAP System By Using SWPM

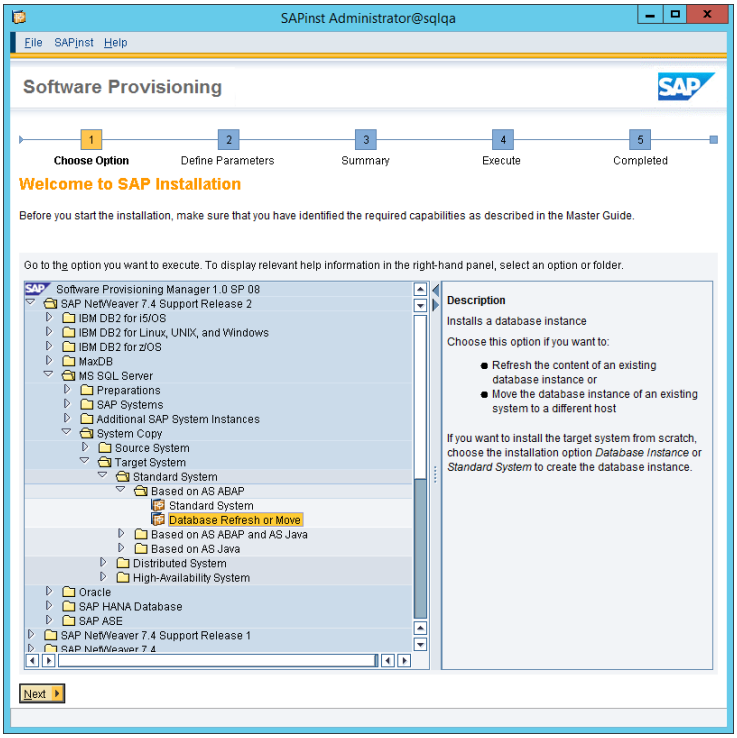
When the cloned database is available at the target system, you can start SWPM to refresh an existing SAP system or to create a new SAP system. If the name of the database does not fit with the desired one, you can rename the database name by using Microsoft SQL Server Management Studio.

Database Refresh of an Existing SAP System

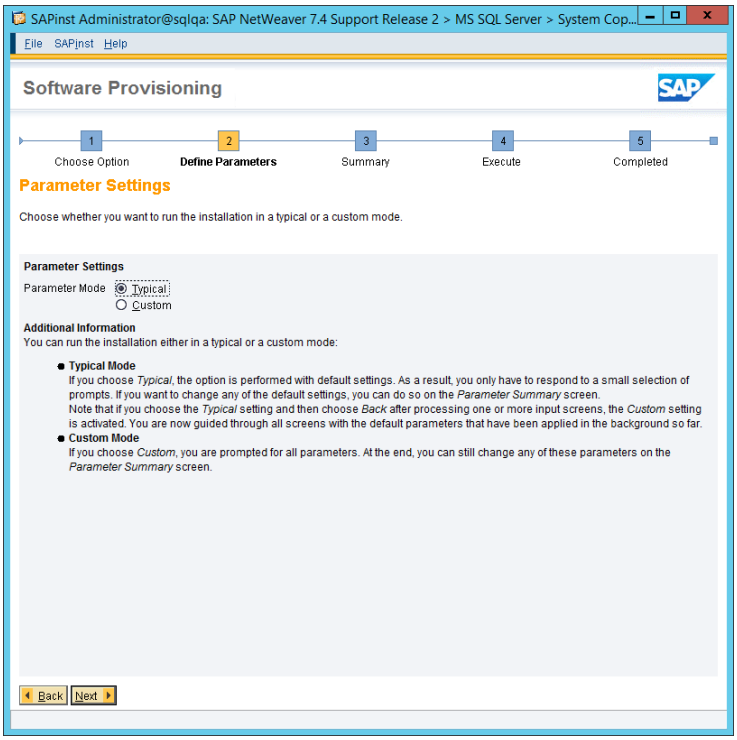
To perform a database refresh of an existing SAP system, complete the following steps:

1. Start SWPM and select your product. In this example, we use a standard NetWeaver 7.40SR2 ABAP system.

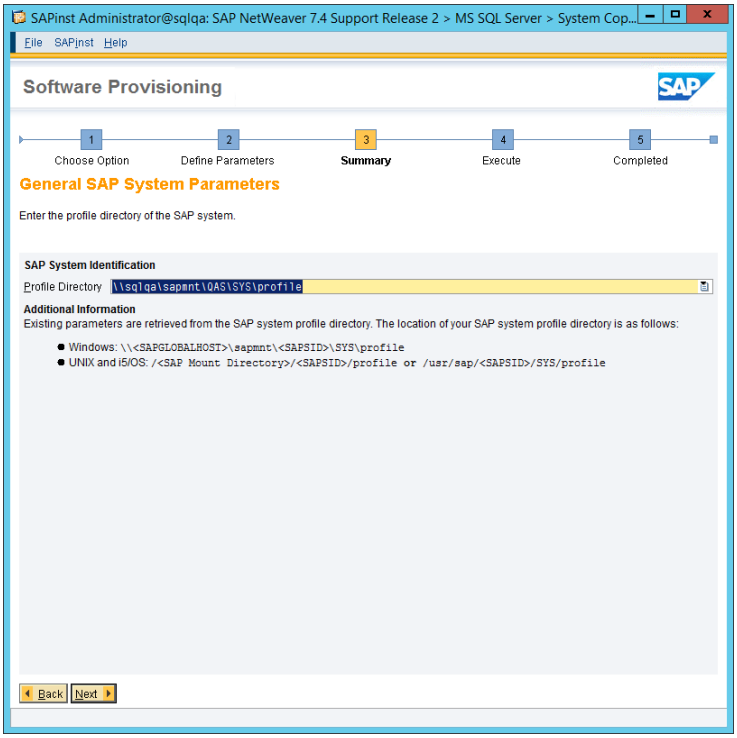
   Select SAP NetWeaver 7.4 Support Release 2 > MS SQL Server > System Copy > Target System > Standard System > Based on AS ABAP > Database Refresh or Move. Click Next.



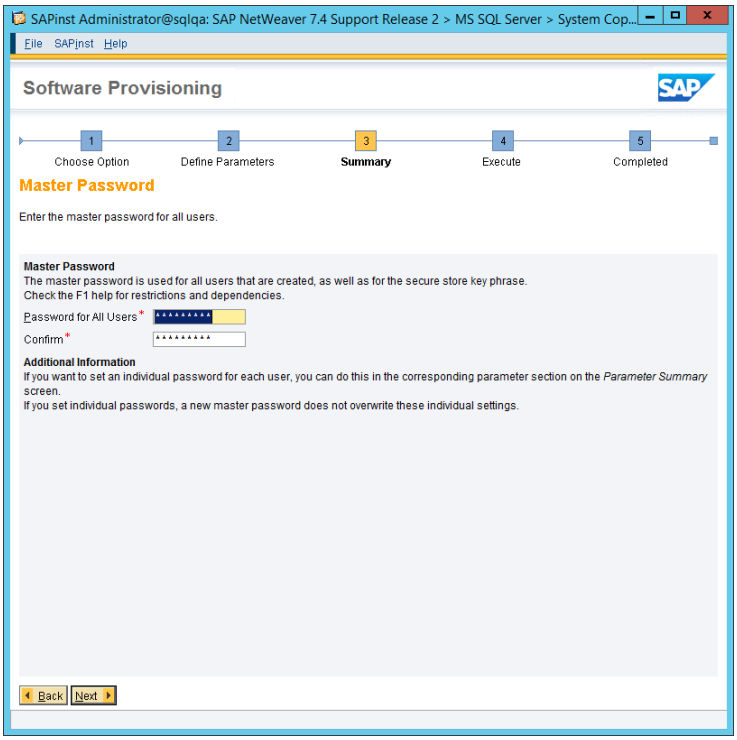
2. Select the required parameter mode. In this example, we select the typical mode.



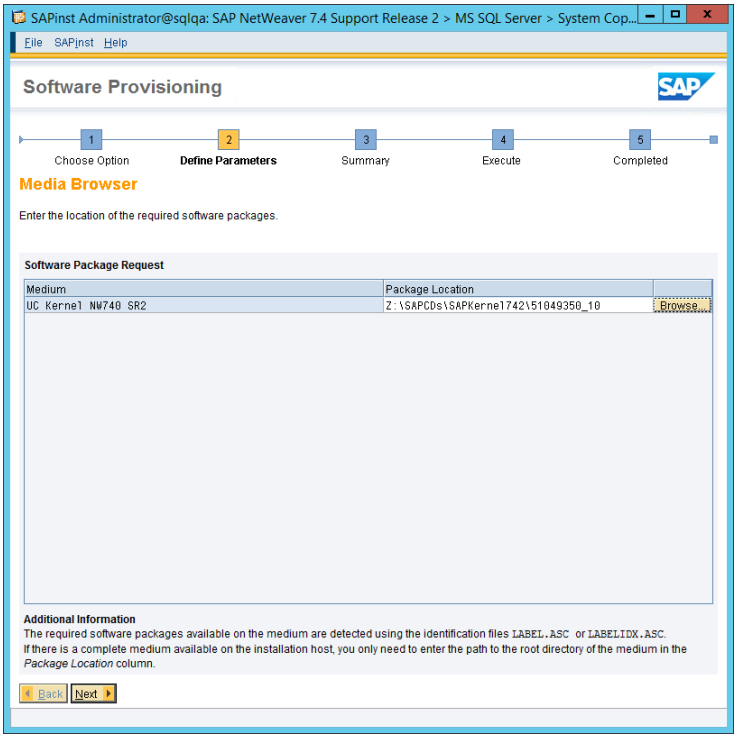
3. Check the path to the profile directory and correct it if necessary.



4. Set the master password.

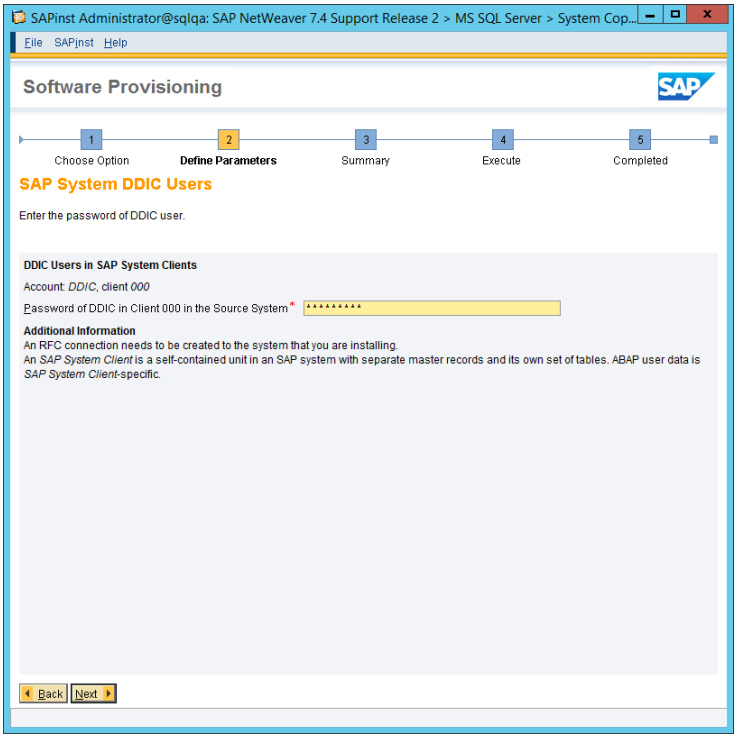


5. Provide the path to the kernel directory.

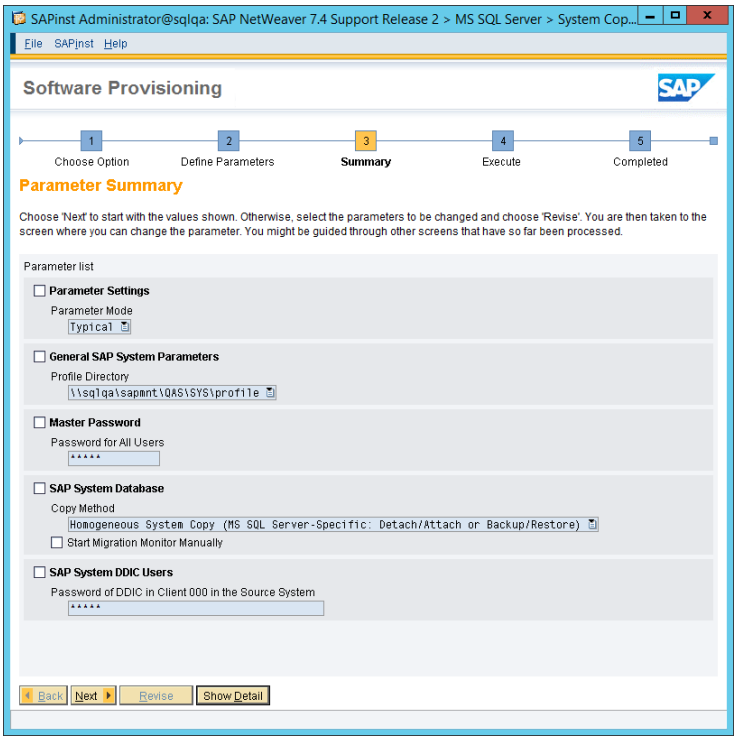


6. When the dialog asks for the copy method, select the Homogenous System Copy method.

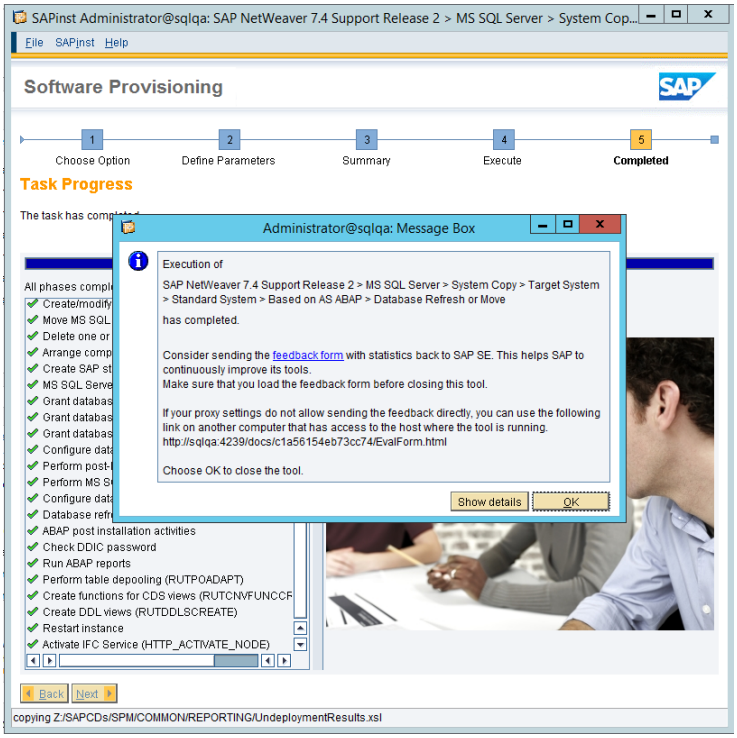
7. Provide the password for user DDIC.



8. Check the provided parameter and start the database refresh process.



9. The runtime for a database refresh is typically less than 15 minutes. After this process finishes successfully, you can start system postprocessing.

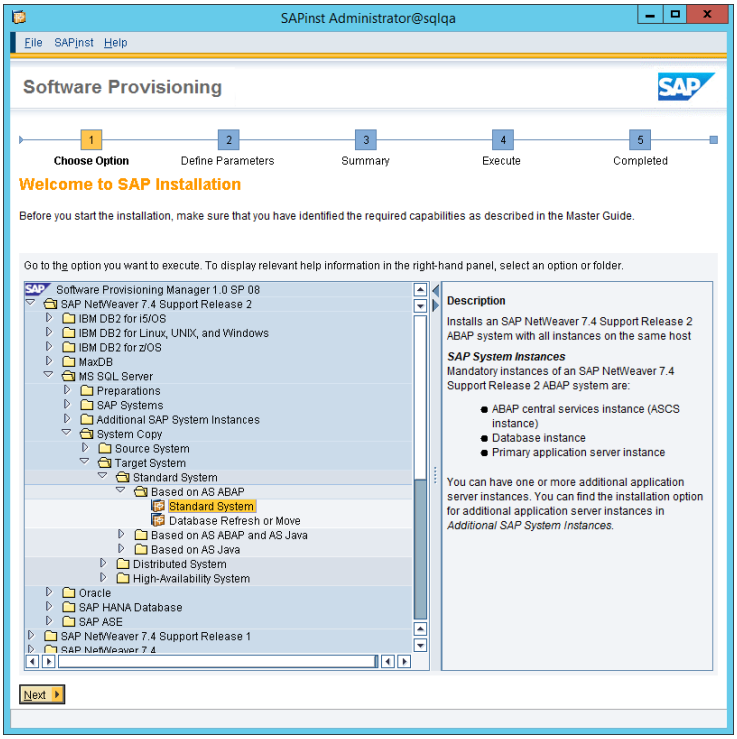


New SAP System Based on a System Copy

To create a new SAP system based on a system copy, complete the following steps:

1. Start SWPM and select the product that you use. In this example, we use a standard NetWeaver 7.40SR2 ABAP system.

   Select SAP NetWeaver 7.4 Support Release 2 > MS SQL Server > System Copy > Target System > Standard System > Based on AS ABAP > Standard System. Click Next.



2. Provide the information required to refresh the database instance. When prompted for the copy method, select the Homogenous System Copy method.

The complete SWPM is not shown here because there are too many different SAP product variations and versions. Therefore the next steps in your environment might differ from this example.

References

The following references were used in this technical report:

- TR-4018: Integrating NetApp FAS with SAP Landscape Virtualization Management
  http://www.netapp.com/us/media/tr-4018.pdf
- TR-4467: SAP with Microsoft SQL Server on Windows Best Practices Using NetApp Clustered Data ONTAP and SnapCenter
  http://www.netapp.com/us/media/tr-4467.pdf

Version History

Version	Date	Document Version History
Version 1.0	December 2015	Initial version

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.