



Technical report: SAP on Microsoft Windows and Microsoft SQL Server with IBM System Storage N series

System-copy benefits and implementation guide

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Table of contents

Abstract	3
Business challenges	3
IBM N series solution	4
N series solution for SAP system copies	4
Necessary steps at the source system	5
Necessary steps at the target system.....	5
Conclusion	6
Technical implementation	7
Prerequisites	7
Installation and configuration	7
Executing the system copy	7
First time cloning	7
Refresh of SAP system	8
Trademarks and special notices	9



Abstract

The information provided in this technical report is meant to be a guide to the benefits of configuring and implementing the IBM System Storage N series system-copy solution for SAP Windows/SQL Server in Fibre Channel or iSCSI environments. SAP environments are increasingly complex, requiring multiple SAP system component copies, commanding staff time, system availability, and storage capacity. IBM N series provides an easy process to create an SAP system copy on demand, in a few minutes, without any impact to the source system. And, cloning functionality, via IBM System Storage N series with SnapManager for SQL Server, allows very efficient storage management.

Business challenges

A typical SAP customer environment today consists of different SAP Business Suite and SAP NetWeaver components. To be able to test application patches, run performance and data integrity tests, or provide user-training environments, copies of SAP components are required. A typical SAP customer needs about 10 copies of different SAP components. These copies must be refreshed, often on a weekly or monthly basis.

The creation of a SAP system copy normally takes several days and negatively affects the production environment. In addition, a lot of manual steps are performed, consuming valuable IT staff time.

The source database must be exported using SAP tools and imported at the target system, or an offline backup of the source database will be restored at the target system. Depending on the database size, these steps have a significant impact on the application availability. It takes many hours to replicate a 1 TB database from the source to the target system. Preparing the cloned system so that it can be used in the new environment takes several additional hours. This preparation is often done manually, consuming the SAP administrators' time.

Being able to create a SAP system copy on demand very quickly is becoming more and more important.

- Quality insurance systems must be refreshed on a weekly basis.
- Additional test systems must be set up quickly to perform specific integration tests.
- Test systems with current production data must be set up quickly during an SAP upgrade project.
- Training systems must be set up or refreshed.

The traditional approach to creating the system copies is not suitable to meet these demands.

SAP copies also consume a significant amount of storage, which needs to be provided. Because these copies are typically clones of the productive system, the amount of storage needed can be very large.



IBM N series solution

The IBM® System Storage™ N series solution for SAP system cloning addresses these issues by providing an easy process to create an SAP system copy on demand, in a few minutes, without any impact to the source system. In addition, cloning functionality offered by IBM System Storage N series with SnapManager® for SQL Server allows very efficient storage management by storing only data changes between the source and the clone.

N series solution for SAP system copies

SAP system copies are accomplished using N series SnapManager for SQL Server utilizing the IBM System Storage N series with FlexClone™ feature to clone SAP databases. A FlexClone copy is a writeable point-in-time image of an IBM System Storage N series with FlexVol™ volume. Based on an IBM System Storage N series with Snapshot™ copy of the source FlexVol volume, the clone is created in a few seconds without interrupting the operation on the source system. FlexClone copies store only changed blocks between the source FlexVol volume and the FlexClone copy, and therefore significantly decrease the amount of disk space needed for SAP system copies. SAPINST (WebAS 7.0 or higher) or the SAP STM tool (WebAS 6.x) is used to perform the SAP-specific task for a homogenous system copy.

Figure 1, on the following page, shows the basic concept of the system-copy solution. Creating an SAP system copy consists of several steps on the source system and several steps on the destination system.

On the source system, a database-consistent snapshot copy using SnapManager for SQL Server of the SAP database is created. This is done during online operation and has no performance impact on the source system. In case of a Java™ or ABAP/Java system, SAPINST has to be executed to export the central instance to the “Migration Export CD” image before the backup is performed. If possible, store the image on a LUN containing database files. The image would be automatically available on the destination after the restore described below has been finished.

On the source system, the previously created snapshot copy will be used to perform a redirected restore to the target system. SnapManager for SQL Server will create a FlexClone image of the database LUNs and connect these LUNs to the target system. The database ID can be changed during the restore process if desired.

On the target system, SAPINST has to be executed to perform the SAP-specific tasks. In addition, SAP-specific post-processing tasks need to be accomplished.

This solution can be used to refresh existing systems or to create new SAP systems and can be accomplished in a few minutes.

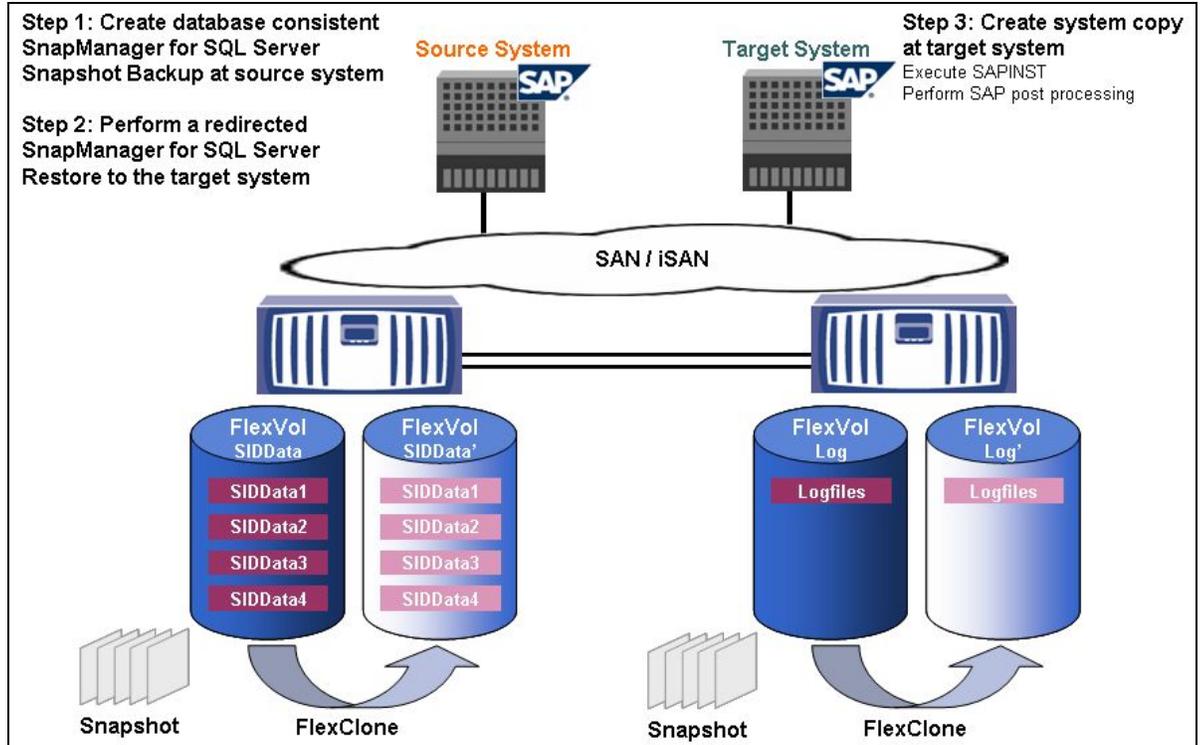


Figure 1) SAP system-cloning overview.

Table 1, on the following page, compares the traditional approach to the IBM N series approach to perform an SAP system copy.

Necessary steps at the source system

With the traditional approach, it is necessary to create a backup of the source database. A source database backup typically has a significant performance impact on the source system and therefore cannot be scheduled during working hours. Depending on the database size, the backup of the database takes several hours. The subsequent steps are typically carried out manually, consuming IT staff time.

With the IBM N series approach, the backup is taken using snapshot functionality. Creating a snapshot copy with SnapManager for SQL takes only a few seconds and has no performance impact on the source system. Therefore, this step can be done at any time during online operation.

Necessary steps at the target system

If a new SAP test system needs to be set up, the Microsoft® SQL Server must be installed once. This step is required with both approaches. With all subsequent refreshes of the system, this step is not necessary.

With the traditional approach, the next step is restoring the offline or online backup from the source system. Depending on the database size, this step takes several hours. The following step to adapt the database to the new system identifier (SID) is typically carried out manually.



With the IBM N series approach, SnapManager for SQL Server creates a FlexClone copy of the database based on the consistent snapshot database backup that was created at the source system. The creation of the LUN clone image takes only a few seconds and can be scheduled at any time. The subsequent step to adapt the database to the new SID is automatically done by SnapManager for SQL Server.

In both scenarios, SAPINST has to be executed to perform the necessary SAP-specific tasks. Additionally, post-processing tasks have to be done.

Traditional approach	IBM N series approach	Advantages
Necessary steps at the source system		
<ul style="list-style-type: none"> Offline or online backup 	<ul style="list-style-type: none"> Snapshot backup during online operation using SnapManager 	<ul style="list-style-type: none"> No impact on operation with N series solution. Can be scheduled at any time.
Necessary steps at the target system		
<ul style="list-style-type: none"> Install SQL Server (if not existing yet) Restore backup from source system Change of database name SAP-specific post-processing tasks 	<ul style="list-style-type: none"> Install SQL Server (if not existing yet) Create FlexClone image based on snapshot backup; mount the LUNs at the target system Change of database name SAP-specific post-processing tasks 	<ul style="list-style-type: none"> Same approach Restore takes several seconds with FlexClone technology used by SnapManager for SQL Server Fully integrated in SnapManager for SQL Same approach

Table 1) SAP system copy comparison.

Conclusion

The N series system copy solution significantly improves the process to create SAP system copies.

- A system copy can be accomplished in several minutes, compared to several days with the traditional approach.
- System copies can be performed at any time because there is no impact to the online operation of the source system.
- Snapshot and FlexClone functionality offered by SnapManager for SQL Server reduces the time necessary to copy the data from the source system to the target system from several hours to several seconds.
- Snapshot and FlexClone functionality significantly reduces the necessary disk space for a SAP system copy by storing only data changes between the source and the target system.



Technical implementation

Prerequisites

This solution is based on the layout provided in the applicable SAP on Microsoft Windows and SQL Server with IBM System Storage N series *Best Practices* document and uses SnapManager for SQL Server snapshot backups of the SQL Server database. This guide assumes that one SAP Windows/SQL Server System (source system) has been installed and configured according to the relevant SAP *Installation Guide* and the target system has been at least prepared and the Microsoft SQL Server has been installed according to the SAP *System Copy Guide*. Both systems must be members of the same Active Directory Domain.

The following infrastructure has been used to test and implement the system copy solution:

- Microsoft Windows Server 2003 R2 SP2 x64
- IBM System Storage N series with SnapDrive® 4.2 using Fibre Channel (FC) as the protocol
- IBM System Storage N series with SnapManager for SQL Server 2.1
- SAP ERP 2005 with SQL Server 2005 database.

The solution could also be used for every WebAS 6.x or higher based SAP solution, Microsoft SQL Server 2000, newer SnapDrive/SnapManager for SQL Server releases, and using iSCSI as the protocol. A system copy from FC protocol-based systems to iSCSI and vice versa is possible. If iSCSI is used to attach the cloned disks to the target system an iSCSI session to the target (N series storage system) has to be established before executing the system copy. Refer to the corresponding paragraph of the appropriate SnapDrive *Installation and Administration Guide*. Microsoft Remote Desktop can be used to connect to the system and to execute SnapManager for SQL Server and the SAP installation tool SAPInst, but without using the "/console" option. If a system copy of a WebAS 6.x should be carried out, the SAP tool STM has to be used instead of SAPInst. Refer to the corresponding SAP *System Copy Guide* for your system. The procedure is the same as described below.

Installation and configuration

SnapManager for SQL Server must be installed and configured on the target and the source system. Please refer to the appropriate SnapManager for SQL Server *Installation and Administration Guide*.

Executing the system copy

Once the configuration has been completed, a system copy (first time and refreshes) can be performed.

First time cloning

In case of a Java Instance or a Java/ABAP instance, an export of the Java central instance at the source system according to the SAP *System Copy Guide*, for SAP NetWeaver 2004s (SR1/2) Java/ABAP+Java, has to be done first. Refer to the section on "SQL Server-Specific Procedure" in the guide. If possible, store the export on a LUN that contains data files of the SAP database. During the restore of the database using SnapManager for SQL Server the files would be available at the target system. Otherwise, copy the export to the target system.



Perform a SnapManager for SQL Server full database backup of the SAP database. After the backup has finished successfully, restore this backup to the target system using the following SnapManager for SQL Server Restore options:

- Restore Database as: NEWSID
- Restore to Server (instance): SQL Server Instance at Target System
- Check the box: Restore to alternate location using writeable snapshot.

It is not necessary to do the verification of the snapshot backup during the backup or restore process. A verification of the snapshot backup could be performed after the database is connected to the target system using the SQL Servers database consistency check (DBCC). Doing so, the cloning of the database is much faster. For further information, refer to the SnapManager for SQL Server *Installation and Administration Guide*.

Execute SAPInst and perform the installation of the database and central instance(s) as described in section “SQL Server-Specific Procedure” of the *SAP System Copy Guide*, for NetWeaver 2004s (SR1/2) Java/ABAP+Java/ABAP. Finally the post-processing tasks have to be done as documented in the *SAP System Copy Guides*.

Refresh of SAP system

Before a refresh of an SAP system can be done, the existing SAP database at the target system has to be deleted.

1. Stop the SAP System.
2. Logon to the SQL Server instance using the SQL Server Management Studio.
3. Detach the SAP database (SID) – Context Menu -> Tasks -> Detach ...
4. In the upcoming Window uncheck the “Keep Full Text Catalogs” box and press ok.
5. Disconnect the LUNs where the database files are stored using SnapDrive. Do not use the force option to disconnect the LUNs. Otherwise, Windows will get “delayed write errors,” which could result in a “strange” behavior of the system.

The refresh of the SAP system can be started. Perform the steps listed in the “FirstTime Cloning” section.

In case of an ABAP-only System, only the database instance has to be refreshed using SAPInst. It is not necessary to install the central instance again.



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