

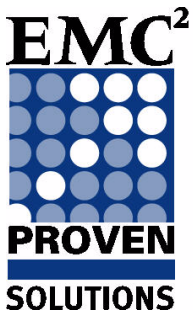


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EMC Backup and Recovery for SAP with IBM DB2 on IBM AIX

Enabled by EMC Symmetrix DMX-4, EMC CLARiiON CX3,
EMC Replication Manager, IBM Tivoli Storage Manager, and EMC NetWorker

Reference Architecture



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About this Document

Purpose

This document describes the reference architecture of the EMC Backup and Recovery for SAP with IBM DB2 on IBM AIX solution. The solution was validated with EMC Symmetrix DMX-4, EMC CLARiiON CX3, EMC Replication Manager, the SAP ECC 6 (ERP2005) ABAP stack, EMC NetWorker, and IBM Tivoli Storage Manager. The solution was validated by EMC Global Solutions Centers (GSC).

This document was produced as part of the EMC Total Customer Experience (TCE) program by the GSC TCE Customer Integration Labs working in collaboration with the EMC SAP Global Solutions Practice, EMC Engineering, and EMC technical field consultants.

Audience

This document is intended for technical staff interested in evaluating or implementing an automated backup and recovery solution for an SAP production database by leveraging EMC hardware and software in an enterprise environment. Executives evaluating such a solution will also find this document useful.

Scope

This document provides an overview of the EMC Backup and Recovery for SAP with IBM DB2 on IBM AIX solution. An architectural overview and descriptions of the hardware and software components used in the solution are also included.

Note: This document describes only the features and methodologies specific to this solution. For more detailed information on specific components of this solution, or other EMC solutions, consult the appropriate EMC and third-party documentation.

The business challenge

In today's world, SAP customers face many challenges trying to meet their backup and recovery requirements. Large databases with thousands of gigabytes take an extremely long time to back up using traditional backup-to-tape methods. If an online backup must run into busy production hours, this affects overall SAP production system performance and makes it difficult to choose an appropriate point in time if recovery is needed. System maintenance windows are generally too short to accommodate a full offline backup, while longer SAP downtime to perform an offline backup is not practical because of the criticality of business uptime.

The technology solution

One of the most efficient ways to eliminate the need for production downtime and to reduce the time required to perform full SAP backups is to leverage the replication technologies available in storage systems. The split-mirror replication technology can be used to make replicas of SAP production volumes. Those volumes can then be mounted to another server (backup host) and backed up from there without affecting the production system.

Not only does this approach minimize the effect of the backup process on the production system, but it also provides an additional level of protection and the ability to execute a faster operational recovery from the backup host. This host can be used as a secondary system if the primary system becomes unavailable. The backup management software can still be used to manage

backups while taking advantage of these replication technologies at the storage level.

The EMC® Backup and Recovery for SAP with IBM DB2 on IBM AIX solution uses EMC Replication Manager to seamlessly manage the online creation and mounting of replication volumes. This eliminates the need to develop and maintain custom replica scripts, and offloads the backup from the production SAP server. The solution also supports industry-leading backup products, such as EMC NetWorker® and IBM Tivoli Storage Manager (TSM), to further automate offline backup and recovery of the SAP DB2 database and uses the EMC Disk Library virtual tape library to eliminate the problems of physical tape backups.

Solution components

The solution includes components from EMC, IBM Tivoli, SAP, IBM DB2, and Cisco. This section briefly describes the EMC, SAP, and IBM Tivoli components. For details on all of the components that make up the reference architecture, see [“Hardware and software resources” on page 12](#).

EMC Symmetrix DMX-4

The new Symmetrix® DMX-4 system is the next generation in the DMX series and extends EMC’s leadership in the high-end enterprise storage market. The DMX-4 delivers immediate support for the latest generation of disk drive technologies: 4 Gb/s FC drives for high performance and SATA II for high capacity. Symmetrix DMX-4 is the first and only high-end storage that can support both of these latest generations of disk drive technologies.

EMC CLARiiON CX3 UltraScale series

The EMC CLARiiON® CX3 UltraScale™ architecture, based on a high-performance, high-availability design, enables the EMC CLARiiON CX3 UltraScale series to address a broad range of application environments. The EMC CLARiiON CX3 UltraScale series systems are built on a redundant modular architecture and run the FLARE® storage operating environment. The innovative UltraScale architecture incorporates state-of-the-art CPUs and the highest performing memory subsystem, leveraging low-latency, high-bandwidth PCI Express interconnect technology.

EMC Disk Library

An alternative to traditional, tape-based offerings, the EMC Disk Library (EDL) family integrates high-capacity, low-cost drives; tape-emulation software; and powerful functionality to deliver a simple-to-deploy and easy-to-use disk-based backup/restore offering. The DL4000 series provides full end-to-end 4 Gb/s bandwidth for high-performance backup environments that are up to five times faster than physical tape.

- EMC Replication Manager** Replication Manager automates and simplifies management of disk-based replicas. It orchestrates critical business applications, middleware, and underlying EMC replication technologies to create and manage replicas at the application level for a variety of purposes, including operational recovery, backup, restore, development, simulation, and repurposing. Customers interested in reducing manual scripting efforts, improving recovery, and creating parallel access to information can implement Replication Manager to put the right data in the right place at the right time. Replication Manager supports consistency group technology replication, which enables SAP DMX environments running multiple SAP systems to achieve consistent copies of the entire SAP landscape.
- EMC SnapView** EMC SnapView™ is a storage system-based software application that enables the creation of a copy of a LUN by using either clones or snapshots. A clone, also referred to as a business continuation volume (BCV), is an actual copy of a LUN. A snapshot is a virtual point-in-time copy of a LUN. This solution uses the SnapView clone technology.
- EMC TimeFinder** The TimeFinder® family of software is the most powerful suite of local storage replication solutions available. Fully leveraging the industry-leading, high-end Symmetrix hardware architecture, it offers unmatched deployment flexibility and massive scalability to deliver a wide range of in-the-box data copying capabilities to meet mixed service-level requirements with minimal operational impact. The TimeFinder family provides customers with options like full volume clones and mirrors, space-saving snapshots, cross-volume and storage-system consistency, tight integration with industry-leading applications, and simplified usage through automated management.
- EMC NetWorker** EMC NetWorker helps protect data by simplifying and centralizing backup and recovery operations. With its record-breaking performance, NetWorker is the ideal backup software for small offices as well as large data centers. It ensures reliable backup and recovery across local area network (LAN), wide area network (WAN), and storage area network (SAN) environments. NetWorker simplifies management with one solution for multiple and different platforms such as UNIX, Microsoft Windows, Linux, and VMware virtualized systems.
- IBM Tivoli Storage Manager** IBM Tivoli Storage Manager is a powerful storage software suite that addresses the challenges of complex storage management in distributed heterogeneous environments. It protects and manages a broad range of data, from workstations to the corporate server environment. More than 44 different operating platforms are supported, using a consistent graphical user interface.

SAP ERP 2005 IDES

SAP ERP 2005 IDES is an SAP demo/development system based on ECC 6. IDES demo landscapes are preconfigured installations of mySAP Business Suite components, populated with the data and business processes of a fictional enterprise. SAP ERP 2005 IDES was used in the development of this solution to demonstrate SAP DB2 database clones and backup and recovery.

Physical architecture

Figure 1 illustrates the physical architecture of the solution as validated in the EMC NetWorker environment.

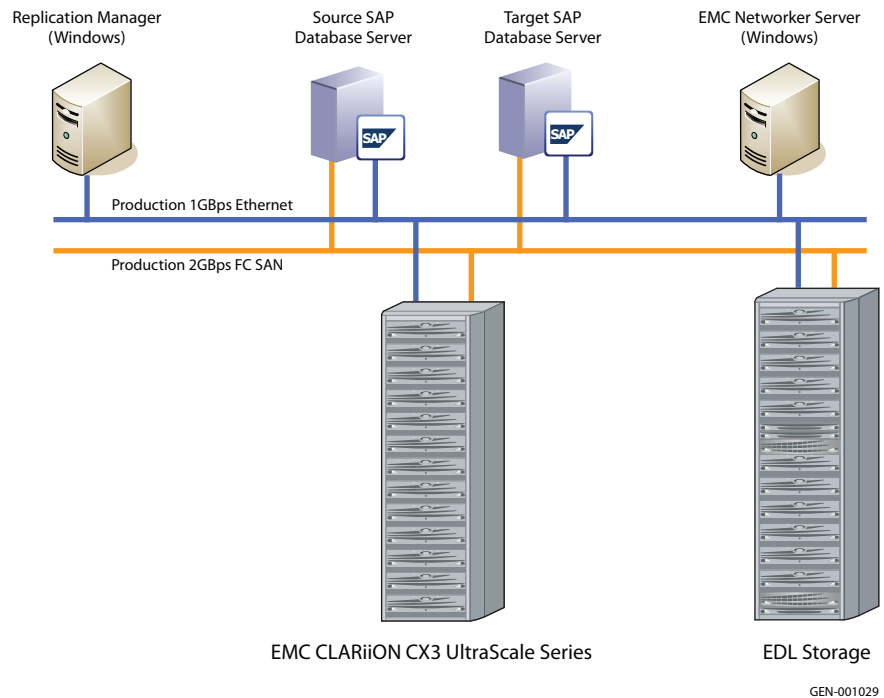


Figure 1 Physical architecture as validated in the EMC NetWorker environment

Figure 2 illustrates the physical architecture of the solution as validated in the IBM TSM environment.

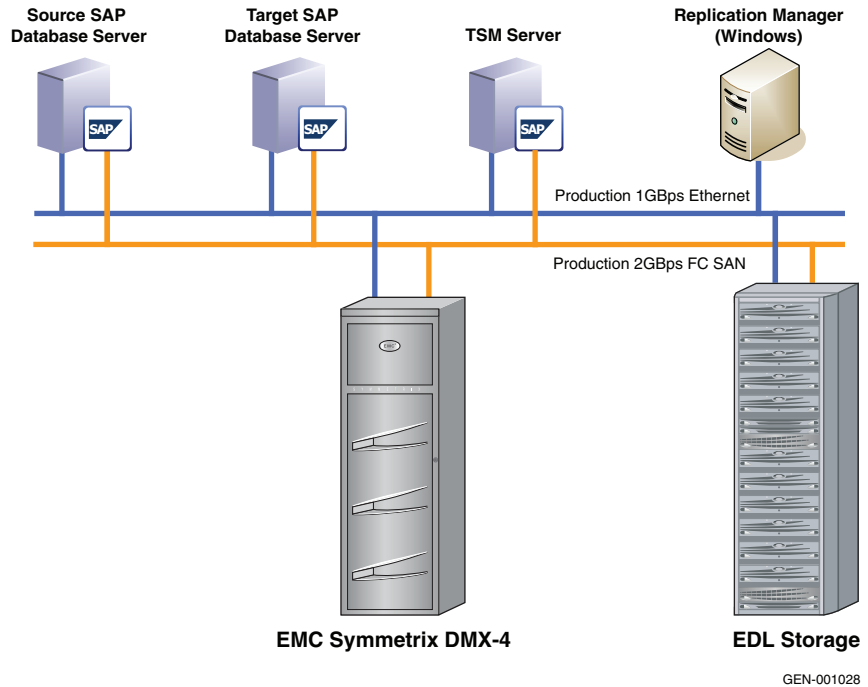


Figure 2 Physical architecture as validated in the IBM TSM environment

Note: The EMC storage, DMX-4 and CX3, are interchangeable in the two validated environments.

Hardware and software resources

Table 1 and Table 2 list the hardware and software resources used in the validated solution.

Table 1 **Hardware resources**

Equipment	Quantity	Configuration
Storage array	1	EMC Symmetrix DMX-4 146 GB 15k drives ucode: 5773 (123.83)
Storage array	1	EMC CLARiiON CX3-40 UltraScale Series 146 GB 15k drives FLARE: 03.24.040.5.014
Fibre Channel switch	1	Cisco MDS 9509s 64 ports
Network switch	1	Cisco 3560G 64 ports
SAP server	TSM environment: 2 NetWorker environment: 2	IBM p570 Four CPUs 8 GB RAM IBM AIX 5.3 ML06 64-bit Two Emulex LP11002-E HBAs
EMC Replication Manager server	1	Dell 1950 Two dual-core 3.0 GHz Intel Pentium 4 processors 6 GB memory Two 73 GB 10k internal SCSI disks Two on-board 10/100/1000 MB Ethernet NICs
EMC NetWorker server	1	Dell PowerEdge 2650 2 CPUs 4 GB RAM
TSM server	1	IBM p570 Four CPUs 8 GB RAM IBM AIX 5.3 ML06 64-bit Two Emulex LP11002-E HBAs
EMC EDL Storage	1	DL-4206

Table 2 Software resources

Software	Version	Configuration/comments
IBM AIX 5.3	IBM AIX 5.3 ML06 64-bit	Installed on SAP source and target
IBM DB2 9.1	IBM DB2 9.1 Fix Pack 2	Installed on SAP source and target
SAP Applications	ECC6 (ERP 2005)	Installed on SAP source and target, ABAP Stack only
EMC PowerPath®	5.1	Installed on SAP source and target
EMC NetWorker	7.4.2	<p>Installed on backup server AIX Agent installed on SAP target server DB2 Agent installed on SAP target server</p> <hr/> <p>Note: AIX Agent and DB2 Agent must also be installed on the SAP source host if a user wants to restore to the source host directly.</p> <hr/> <p>NetWorker Storage Node installed on SAP target server</p>
EMC Solutions Enabler	6.5.0.12	Installed on SAP source and target
EMC Replication Manager	5.1 SP2	Storage management software RM Agent installed on SAP source and target servers
EMC ADMSnap	2.9.0.0	Installed on SAP source and target servers For NetWorker environment only
EMC Navisphere® CLI	6.24.2.5	Installed on SAP source and target servers For NetWorker environment only
EMC Navisphere Agent	6.24.2.5	Installed on SAP source and target servers For NetWorker environment only
Java JDK	1.4.2 64-bit	Special Java Hybrid J9 version is required for SAP on AIX platforms
IBM Tivoli Storage Manager	5.5 64-bit	Server/Client/ERP modules installed on SAP target server

Process overview

The EMC Backup and Recovery for SAP with IBM DB2 on IBM AIX solution automates the entire online backup and recovery process by integrating the leading backup management software (EMC NetWorker and IBM TSM) and EMC Replication Manager. The automated process includes initiating the backup job, replicating the production source image to the target, and backing up the replica to EDL. The solution automates the following sequence of events:

1. The administrator-scheduled backup job is initiated by the backup management software (EMC NetWorker or IBM TSM), which is the central point of backup and recovery operations.
2. The backup management software utilizes EMC Replication Manager to create replicas of the production database image while the production database remains online and mounts the replicas on the target host.
3. The backup management software backs up the replica to the EDL virtual tape library.

The recoverable point-in-time image can be restored from EDL to the target system by an administrator. Following the restore operation, the database can be fully recovered to a specific point in time on the target system by copying the transaction logs from source to target and applying them on the target. If a decision is then made to overwrite production, the administrator may choose to perform a restoration from target to source using EMC Replication Manager.

Storage design

For the DB2 replication, SAP systems are installed on both source and target hosts. The database directory, primary and secondary logs, data files, and temporary tablespace are hosted on the EMC Symmetrix/CLARiiON array and are replicated from source to target. The rest of volumes can be hosted on either the EMC Symmetrix/CLARiiON array or on local disks. They are not replicated to the target system.

It is important to note that the offline logs generated by the database during normal operations should be backed up independently by traditional means and kept available to be applied to the replica if necessary.

Both the production host and the backup host are connected to the EMC Symmetrix/CLARiiON array. The EMC Disk Library (EDL) is visible only to the backup host since the backup operation is performed on the host only.

EDL is configured to emulate a specific tape library with four tape drives. Virtual tapes are created within the tape library and managed by a volume pool by the backup management software. The backup process is configured to take advantage of multiple streams within each tape drive and the multiplexing of backup sessions on all available drives.

Backup process design

Figure 3 illustrates the backup process.

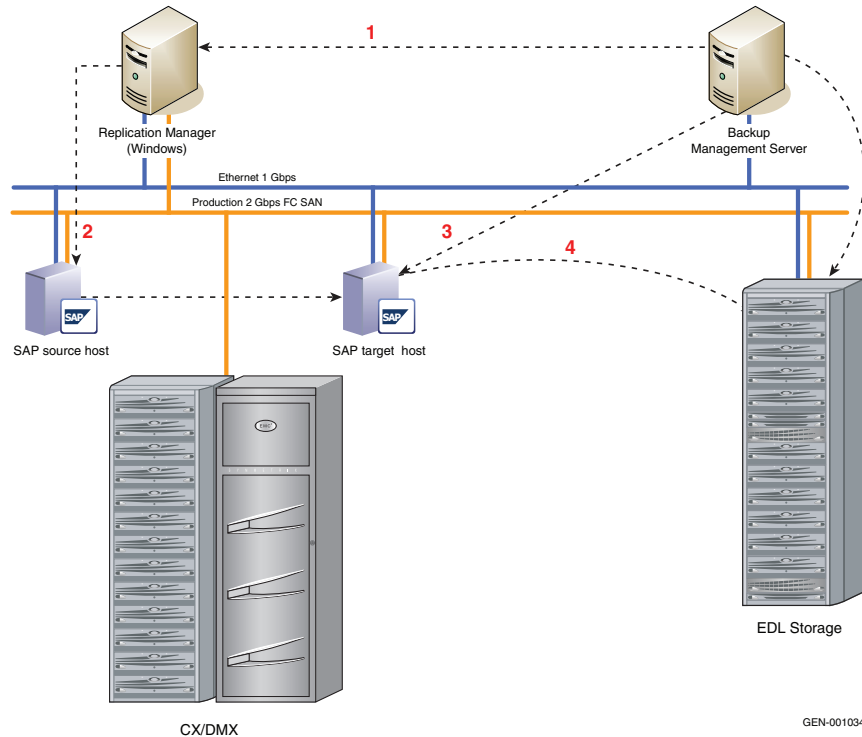


Figure 3 Backup process

1. The backup management software calls EMC Replication Manager as a pre-backup call to start the clone process.
2. EMC Replication Manager starts the online split to split the mirror from the source to the target, and then mounts the backup host.
3. The backup management software initiates a database backup on the target host.
4. The backup management software backs up the replica to EMC Disk Library. After the backup, the environment is ready for the next backup cycle.

Recovery process design

Figure 4 illustrates the restore/recovery process.

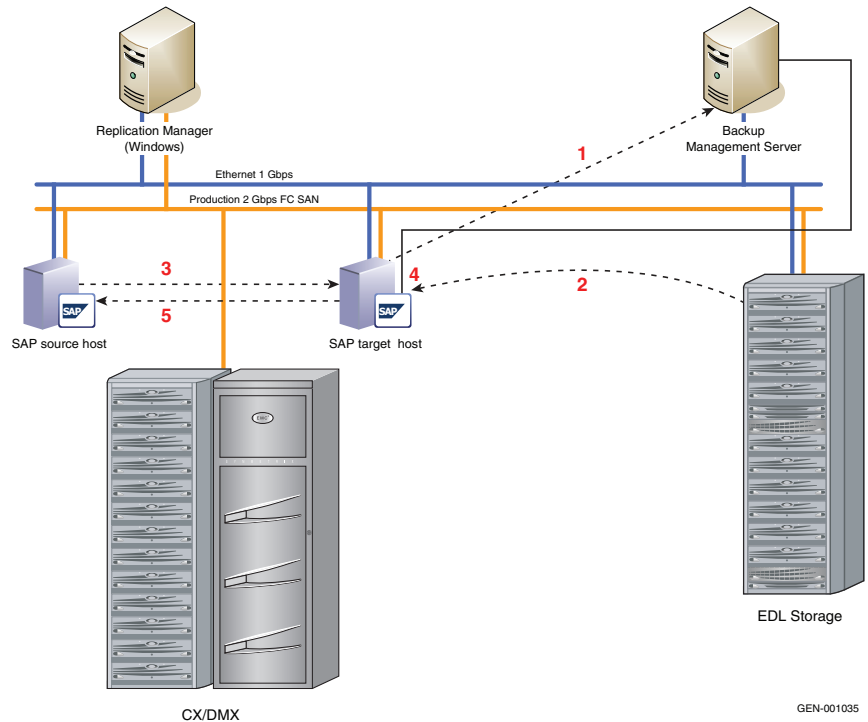


Figure 4 Recovery process

1. The target host calls the backup management server to start the restore process.
2. The backup management software restores the backup from EMC Disk Library to the target host.
3. An administrator copies the archive logs from the SAP source to the target.
4. The administrator applies the archive logs to the target, resulting in a point-in-time recovery of the database.
5. EMC Replication Manager restores the copy of the database back to the source host.

Conclusion

This reference architecture depicts a validated SAP ERP production backup and recovery solution for IBM DB2. The solution depicts a validated design using an EMC CLARiiON CX3 or EMC Symmetrix DMX-4 storage system, an EMC Disk Library DL-4206, EMC Replication Manager, and EMC NetWorker or IBM TSM. The solution provides the following benefits:

- Eliminates manual scripting of replica creation and management and eliminates the ongoing maintenance of such scripts
- Eliminates downtime caused by offline backups; increases the availability of the production environment; all systems remain online during backups
- Eliminates sluggish system performance associated with conventional online backups
- Reduces manual intervention required by conventional backup methods; both backup and restore can be administered by a single BASIS administrator
- Increases the speed of point-in-time recovery, because data retrieval is faster from disk than from tape

EMC can help accelerate assessment, design, implementation, and management while lowering the implementation risks and cost of creating a backup and recovery solution for SAP with IBM DB2 on IBM AIX.

To learn more about this and other solutions contact an EMC representative or visit www.EMC.com/solutions/sap.