

**EMC Backup and Recovery for
Microsoft SQL Server**

Enabled by Quest LiteSpeed

Reference Architecture

EMC NAS Product Validation



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Reference architecture overview

Document purpose

EMC's commitment to consistently maintain and improve quality is led by the Total Customer Experience (TCE) program, which is driven by Six Sigma methodologies. As a result, EMC has built Customer Integration Labs in its Global Solutions Centers to reflect real-world deployments in which TCE use cases are developed and executed. These use cases provide EMC with an insight into the challenges currently facing its customers.

This document describes the reference architecture of the EMC Backup and Recovery solution for Microsoft SQL Server enabled by Quest LiteSpeed and EMC[®] Celerra[®]. This was tested and validated by EMC Global Solutions.

Solution purpose

The purpose of this reference architecture is to build and demonstrate the functionality, performance, and scalability of a well-performing backup and recovery solution for Microsoft SQL Server 2008 by using Quest LiteSpeed and EMC Celerra.

This reference architecture validates all aspects of the solution and provides guidelines for building similar solutions.

This reference architecture is not intended to be a comprehensive guide to explain every aspect of the Backup and Recovery for Microsoft SQL Server 2008 using Quest LiteSpeed solution.

EMC Backup and Recovery for Microsoft SQL Server - Enabled by Quest LiteSpeed - Proven Solution Guide available on Powerlink[®] provides comprehensive information about this solution. This is a confidential document available to EMC employees and partners on Powerlink.

The business challenge

Databases are an integral part of virtually every business enterprise. From Customer Relationship Management (CRM) and human resource systems, payroll, business intelligence, web content and more, designing and building a database infrastructure to support these functions and protect the data it contains is a major challenge.

These systems are always on and are accessed by users. At the same time, they store more and more data. In many cases, it is not acceptable to take the database offline for nightly backups and in the event a restore is required, it must be restored quickly and with minimum impact to users.

The technology solution

It is important to work with an experienced provider of backup and recovery solutions – one with a strong track record and the ability to deliver. EMC has designed solutions for protecting Microsoft SQL Server 2008 database environments using Quest LiteSpeed software and EMC Celerra unified storage platforms.

This solution demonstrates how an EMC Celerra unified storage platform can be used to design a robust Microsoft SQL Server 2008 environment. In this solution, Quest LiteSpeed is used to take disk-based backups of the SQL Server database to the Common Internet File System (CIFS) share.

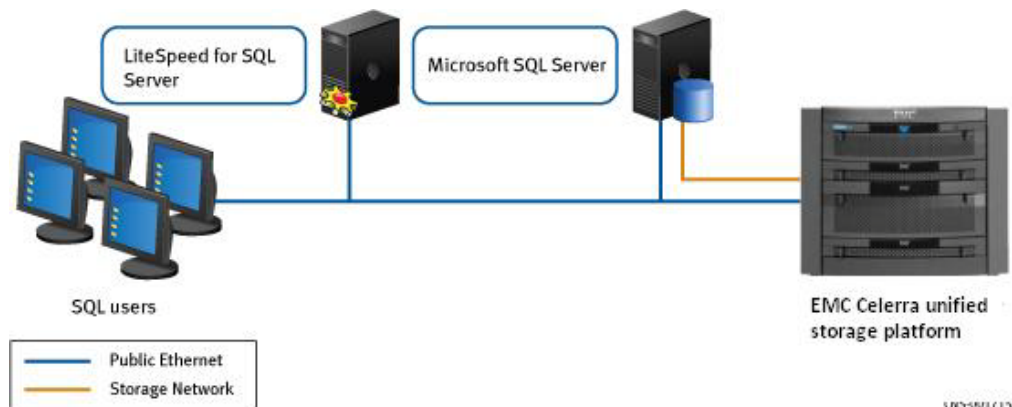
The solution benefits

- **Reduces the number of physical servers:** Using VMware to virtualize servers helps to reduce the number of physical servers required in an environment and improve manageability and flexibility of the SQL Server environments.
- **Simplifies the backup management:** This solution reduces the complexity of backup management by centralizing and scheduling the SQL database backups using Quest LiteSpeed.
- **Improves storage efficiency:** QLS SmartDiff backup can provide a compression ratio up to 40:1, thereby reducing the cost to store backup substantially. The time to backup also reduces significantly. Apart from that, EMC Celerra deduplication also helps to reduce the storage footprint for SQL backups.
- **Reduces complexity and improves granularity in restore jobs:** This solution reduces complexity and time to recover from a disaster situation by using a double-click restore feature. More granular restores can be done by using object-level recovery. It is possible to restore selected rows of data from the backups.

Solution architecture

Architecture diagram

The following illustration depicts the overall physical architecture of the solution.



Reference architecture overview

The validated solution is built with a SQL Server 2008 environment on EMC Celerra unified storage platforms.

The key components of the reference architecture are:

- Microsoft SQL Server 2008
- EMC Celerra unified storage platform
- Quest LiteSpeed 5.1

Microsoft SQL Server 2008 is installed on a server and Quest LiteSpeed 5.1 is installed on another server.

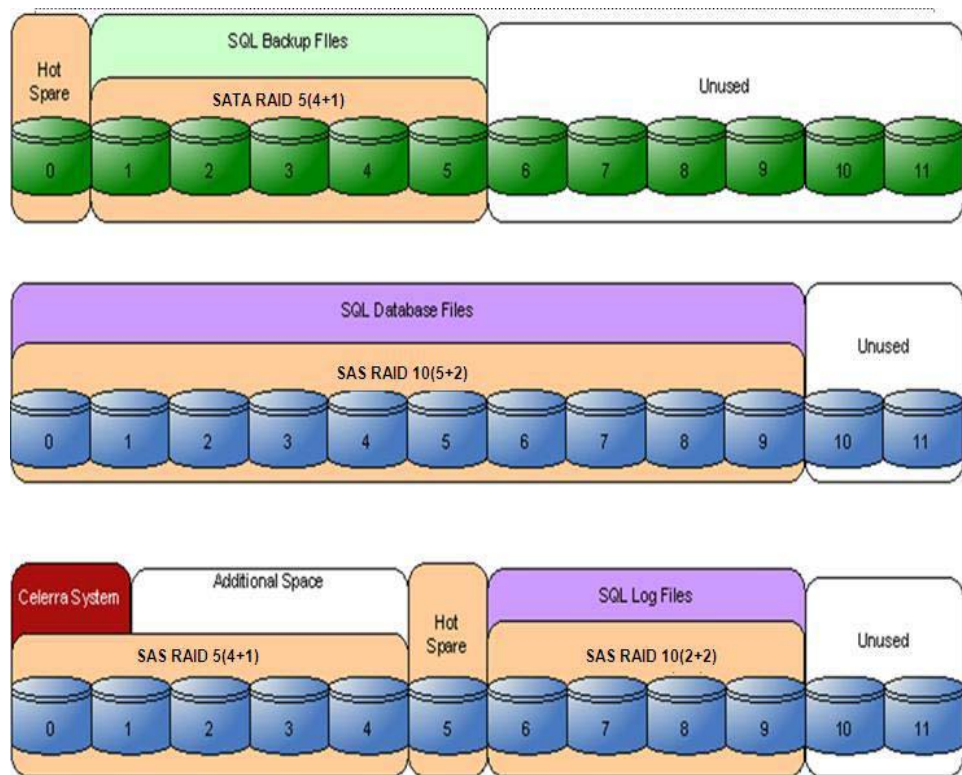
EMC Celerra system is used to store the production database, log files, and database backups.

The different storage protocols used in the solution are:

- Fibre Channel (FC) protocol: SQL database drives are accessed by the SQL servers using the FC protocol.
- CIFS protocol: The backup target is a network share accessed through the CIFS protocol.

Storage layout

The following illustration shows how storage is provisioned in one possible configuration of the validated solution.



Storage layout overview

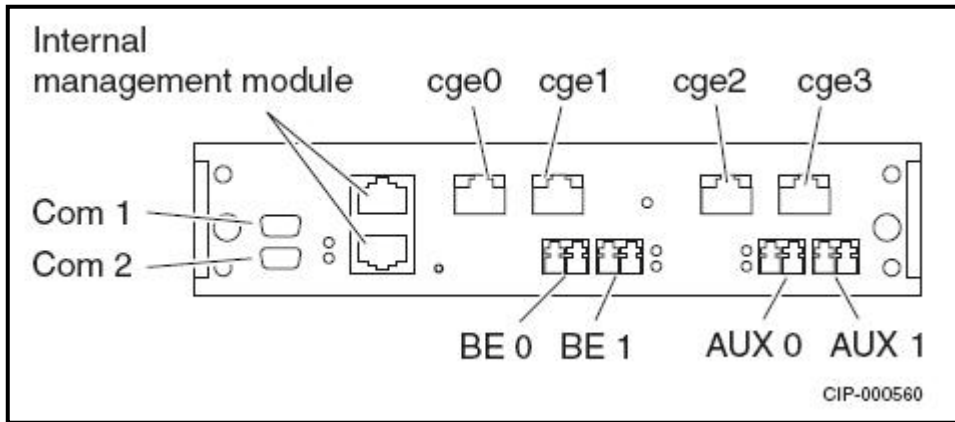
The validated solution uses storage through the FC and CIFS protocols. The FC protocol is used to provide the storage for SQL database and log files. The CIFS protocol provides access to the area used for database backups.

To satisfy the performance requirements and to allow several array-based functions, the validated solution specifies that the primary database should reside on a FC storage. The validated solution uses 14 spindles to host database and transaction logs. The protection level used is RAID 10 for high performance.

The CIFS area in Celerra provides space to accommodate full, differential, and transactional log backups as required. Five low-cost, low-power SATA drives with a

RAID 5 protection level are used for the CIFS area.

Network layout The following illustration shows the ports on an EMC Celerra NX4.



Network layout overview System-wide network design and architecture are outside the scope of this document and solution. This section explains the recommendations for proper functionality that are consistent with industry-accepted best practices and should be compatible with existing network infrastructure and policies.

EMC Celerra storage arrays contain at least two Data Movers, which can operate independently. Each Data Mover can have a minimum of four Ethernet ports. For high-availability purposes, the Data Movers can be bound together as aggregated links, or have multiple physical connections serving a single logical connection.

EMC Celerra comes with an integrated CLARiiON® storage system that has two storage processors (SPs). The front-end ports on the SPs may be connected to a SAN switch or directly connected to a host bus adapter (HBA) on a host or Data Mover. The validated solution uses a SAN switch for FC connectivity between the storage array, Data Movers, and servers. Port 0 and Port 1 on each SP are used for host or server connectivity. Port 2 and Port 3 are used to connect to the Celerra Data Movers.

Key components

Introduction

This section briefly describes the key components of this solution.

For details on all the components that make up the reference architecture, see [Hardware and software resources](#).

EMC Celerra unified storage platform

The EMC Celerra unified storage platform is a dedicated network server optimized for files and block access, delivering high-end features in a scalable, easy-to-use package. For the ultimate in scalability, the Celerra unified storage platforms leverage both the innovative EMC CLARiiON Fibre Channel RAID storage - delivering best-in-class availability and data protection, and industry-leading EMC Celerra availability, performance, and ease of management.

Celerra unified storage platforms deliver a single-box block and file solution offering a centralized point of management for distributed environments. This makes it possible to dynamically grow, share, and cost-effectively manage multi-protocol file systems and also provide multi-protocol block access. Administrators can take advantage of simultaneous support for NFS and CIFS protocols by enabling Windows and Linux/UNIX clients to share files by using the sophisticated file-locking mechanisms and by leveraging iSCSI or Fibre Channel for high-bandwidth or latency-sensitive applications.

The usage of the low-power SATA II drives in Celerra reduces the power consumption because they require 32 percent less energy per terabyte than traditional 1 TB SATA II drives. Also, the Celerra deduplication compresses all inactive files and then single-instances them to remove duplicate copies. This software, available at no additional cost, leverages EMC Avamar[®] deduplication and RecoverPoint compression technologies. Celerra data deduplication supports all Celerra functionality and features an intuitive, single-click start-up with an automated policy.

Quest LiteSpeed

Quest LiteSpeed provides the ability to protect against SQL Server's data loss. As the enterprise grows, so does the complexity and importance of protecting SQL Server's data. LiteSpeed software provides the power and flexibility to meet these challenges.

The LiteSpeed software is a cross-platform, client-server application that provides the ability to remotely manage all LiteSpeed clients and servers from a graphical interface. The LiteSpeed server backs up SQL Server databases regularly by using scheduled backups. They are preferred over the manual backups because the backups occur automatically, and data can be recovered more easily. The impact of LiteSpeed on the SQL Server is minimal because it has a high-performing compression technology. It also reduces storage costs, and backup and recovery windows. It offers a very flexible maintenance plans creation, which includes the restoration of individual database objects, and ease of migration to another SQL Server, and enables enterprise-wide deployment and upgrades through the remote installation capability.

Quest LiteSpeed provides backup and restore for SQL database and transaction logs. LiteSpeed enables the backup and restore of Microsoft SQL Server data. It provides an enterprise view of the backup and recovery environment through a GUI. It also provides internal scripting backup and recovery commands using T-SQL or a fully functional command line interface.

Validated environment profile

Profile characteristics The solution was validated with the following environment profile.

Profile characteristic	Value
SQL 2008 database size	207 GB
Instances and databases	Single instance and single database
Number of database files	Four files each on a different LUN
Workload	OLTP
Storage for SQL database	Fibre Channel (FC) storage
Storage for SQL backups	CIFS share
Production SQL 2008 databases RAID type, physical drive size and speed	RAID 10, 300 GB SAS drives (15k rpm)
Backup area RAID type, physical drive size and speed	RAID 5, 1 TB, 7.2k rpm SATA disks

Hardware and software resources

Hardware The following table lists the hardware used to validate the solution.

Equipment	Quantity	Configuration	Purpose
Storage	1	EMC Celerra NX4 - CLARiiON AX4-5F8 Two Data Movers 300 GB SAS drives (15k rpm) 6k rpm to 7.2k rpm SATA drives (1000 GB)	One array for the production
Enterprise Class Fibre Channel switch	1	4 GB Fibre Channel switch	
Enterprise network switch	1	Gigabit Ethernet switch	
HP Proliant DL585 D5 server	1	4 Quad-Core 2.31 Ghz AMD Opteron processors, 72 GB RAM, four 1 Gigabit Ethernet adapters, two FC HBAs	ESX 4.0 server that hosts the SQL Server virtual machine with 4 vCPUs and 16 GB RAM
HP Proliant DL 385 D5 server	2	Two Quad-Core 3 Ghz Intel Xeon processors, 20 GB RAM	ESX 4.0 servers that host utility, application server, and virtual machines (load generation, Quest LiteSpeed Server)

Software

The following table lists the softwares used to validate the solution.

Software	Version
VMware vSphere	4.0
Microsoft Windows Server	Windows 2008 x64 Enterprise Edition SP2 Windows 2003 x32 Enterprise Edition R2 SP2
Microsoft SQL Server	SQL Server Enterprise Edition 2008 SP1
EMC Celerra DART	5.6.46.4
EMC CLARiiON FLARE®	02.23.050.5.705
Quest LiteSpeed	5.1

Conclusion

Summary

The SQL Server environment's backup and recovery are an integral part of an organization to ensure high availability of data and recovery in case of corruption of data.

This reference architecture depicts a validated Backup and Recovery solution for Microsoft SQL Server 2008 using an EMC Celerra unified storage platform and Quest LiteSpeed. This solution reduces the complexity of backup management by centralizing and scheduling the SQL database backups by using Quest LiteSpeed. The QLS SmartDiff backup reduces the cost to store backup with a compression ratio of up to 40:1. The time to backup also can be reduced significantly.

This solution uses deduplication and reduces the storage footprint for SQL backups. The low-power SATA drives used as a backup destination also help to reduce the total power consumption.

Next steps

EMC can help accelerate assessment, design, implementation, and management while lowering the implementation risks and costs of a backup solution for a Microsoft SQL Server 2008 environment.

To learn more about this and other solutions, contact an EMC representative.
