

DATA CENTER

Brocade and EMC Solution for Microsoft Hyper-V and SharePoint Clusters

Highlights a Brocade-EMC solution with EMC CLARiiON, EMC Atmos, Brocade Fibre Channel (FC) switches, Brocade FC HBAs, and Brocade IP networking switches as the ideal platform for Microsoft SharePoint applications running on a Microsoft Hyper-V virtualization framework.

BROCADE

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GOAL

The goal of this solution testing was to design, build, and showcase a multi-tiered Microsoft SharePoint solution using Microsoft Hyper-V virtualization. The solution utilizes Brocade® and EMC infrastructure components and highlights the integration and value proposition of the joint development work.

Microsoft Hyper-V infrastructure can help in consolidating multiple application servers on fewer physical servers. This paper describes the base infrastructure from Brocade and EMC using EMC CLARiiON CX4-480, EMC Atmos, Brocade Fibre Channel switches, Brocade Fibre Channel HBAs, and Brocade IP networking equipment—as the ideal platform for Microsoft SharePoint applications running on a Microsoft Hyper-V virtualization framework.

THE BUSINESS CHALLENGE

Every day, organizations create huge volumes of unstructured content in multiple organically grown, unmanaged, incompatible systems. This unstructured content includes documents, e-mail, video files, and Web pages. The content is often unorganized, which can lead to inefficient information sharing and reduced employee productivity.

The infrastructure required to support these disparate environments tends to cause physical server and storage sprawl and additional data center demands. This results in increased energy consumption, physical footprint, and maintenance costs, all contributing to a higher Total Cost of Ownership (TCO) of data center infrastructure.

In addition, multiple isolated storage deployments contribute to inconsistent levels of service and increased complexity of backup and recovery procedures. Management of these systems is a complicated and costly task, which in turn, increases the risk of data loss and extends recovery times. This solution illustrates how organizations can:

- Manage diverse content and streamline business processes by using one common information infrastructure
- Enable affordable high availability across an entire virtualized environment by minimizing downtime and service-level disruption
- Ensure a more effective method of handling data growth
- Optimize data center efficiency by minimizing physical footprint, connectivity requirements, and energy consumption, through server virtualization as well as network and storage consolidation.

ARCHITECTURE

Dell R710 servers are used to host the Microsoft Hyper-V cluster. All the Virtual Machines making up the SharePoint setup are running on this cluster. Networks have been segregated using VLANs into a public network, which is used for the user traffic, management connections, and networks necessary for the heartbeat of the cluster and live migration of Virtual Machines.

SAN connectivity is implemented in a straightforward, dual-fabric architecture, based on best practices.

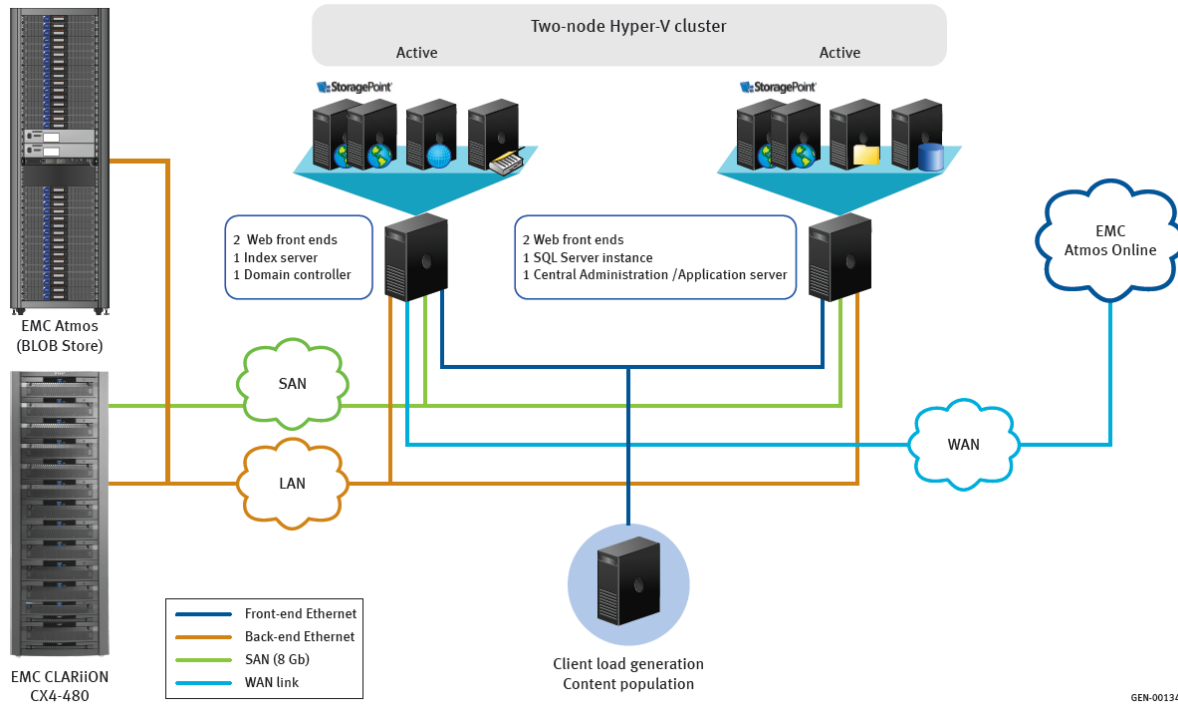


Figure 1. Brocade Hyper-V and SharePoint architecture

HARDWARE

Quantity	Hardware	Description
2	Dell R710 2- socket quad core Xeon E5520 2.26 GHz (8 cores), 72 GB RAM	Infrastructure servers: Hyper-V farm
2	Dell R410	1U server
1	Brocade FCX Series	Ethernet switch for IP connectivity
1	Brocade ServerIron® ADX Series	IP load balancing switch
6	Brocade FC HBAs	Dual-port, 8 Gigabits per second (Gbps) FC HBAs
2	EMC CLARiiON CX4-480	EMC storage
2	Brocade DCX®-4S Backbone	FC SAN connectivity
1	EMC CLARiiON CX4-480 array with FLARE 29 (version 04.29.000.5.003)	Storage array

Quantity	Hardware	Description
	Intel Gigabit ET Quad Port Server Adapter	NICs (per server) for virtual switches
1	Virtual Machine (VM): 4 CPUs, 2.26 GHz, 6 GB RAM	Index server running Web Front End (WFE) role dedicated for crawling
4	VM 4 CPUs, 2.26 GHz, 4 GB RAM	VM: WFEs (running query)
1	VM 2 CPUs, 2.26 GHz, 2 GB RAM	VMs: application servers
1	VM 4 CPUs, 2.26 GHz, 24 GB RAM	VMs: application servers

MICROSOFT SHAREPOINT CONFIGURATION

The SharePoint server farm was designed as a publishing and collaboration portal: 30 SharePoint sites (document centers) were populated with random user data configured as 30-site collection. The SharePoint content database was created in a thin pool with two thin LUNs and a total of 3.2 TB of space.

Disk Layout

The solution used the Microsoft maximum recommended sizing of 100 GB for each SQL Server/Office SharePoint Server 2007 content database. A total of 3.2 TB of data was split into 30 x 100 GB content databases, which were spread across 300 GB disks using RAID 5 for redundancy. All VMs used the CX4-480 for operating systems and content drives. TempDBs, ContentDB log, and Search were on 268 GB LUNs. Indexing used a 500 GB LUN.

Microsoft SQL Server 2008

The SharePoint content databases were pre-configured (data file disk space was pre-allocated for optimum performance). Separate data and log LUNs were also used.

Microsoft Hyper-V Infrastructure

All servers in the environment were Virtual Machines. Hyper-V uses Microsoft Failover Clustering to enable live migration of VMs between the Hyper-V cluster nodes. This functionality enabled scaling of servers as required, based on usage and load.

Microsoft Office SharePoint Server 2007 VM resources

As the four WFEs were CPU intensive, each WFE Virtual Machine was allocated four virtual CPUs. The Microsoft Office Excel calculation server was configured as the Central Administration server. As crawling is a CPU-intensive activity, the Index server was configured with four CPUs. To improve the crawl speed, the Index server also ran a dedicated WFE role, so all Index requests were maintained within one machine.

In addition, every WFE server was a Query server for search purposes. The SQL Server VM was allocated four virtual CPUs.

BROCADE INFRASTRUCTURE

The Brocade Fibre Channel infrastructure included:

- Brocade high-performance, dual-port, 8 Gbps FC HBAs in each server. Each HBA is capable of processing up to 500,000 I/Os per Second (IOPS), the first FC HBA on the market capable of this level of FC performance. When combined with a Brocade FC switch infrastructure, this solution can provide Quality of Service (QoS) for three classes of FC network traffic (High, Medium, and Low queues). The classes of QoS can be assigned to Virtual Machines such that a VM is guaranteed network bandwidth through the FC network.
- Two Brocade DCX-4S Backbone platforms in a dual-fabric architecture ensure the highest availability. Each Brocade DCX-4S is capable of providing up to 192 x 8 Gbps FC ports for maximum scalability. The Brocade DCX-4S is a multi-protocol chassis that can run FC, IP, and Fibre Channel over Ethernet (FCoE) protocols, thus making it capable of supporting future data center storage technologies.

The Brocade Ethernet infrastructure includes:

- The Brocade FCX 48-port Ethernet switch, designed for wire-speed and non-blocking performance. FCX switches include 24- and 48-port models, in both Power over Ethernet (PoE) and non-PoE versions. Using built-in 16 Gbps stacking ports and Brocade IronStack technology, you can stack up to eight switches into a single logical switch with up to 384 ports.
- The Brocade ADX 1000 Series application delivery platform provides Layer 4-7 application switching and traffic management. These solutions from Brocade enable high-performance, always-on, and secure IP service delivery in enterprise, service provider, and e-commerce data centers. In this solution, the ADX was used as an IP load balancing solution for Hyper-V Virtual Machines, which provide the SharePoint service through a virtual IP address.

SHAREPOINT LOAD TEST RESULTS

The following table shows the results of testing against the content databases in SQL Server.

Portal Usage Type	User Profile ^a (browse/search /modify %)	Request per sec ^b	Concurrency	Max User Capacity ^c	Average User Response Time (sec) (browse/search/modify)
Heavy read	80 / 10 / 10	30.8	1%	184,800	< 3 / < 3 / < 3
Heavy publishing	70 / 5 / 25	17.5	1%	105,000	< 3 / < 3 / < 3
Heavy collaboration	50 / 20 / 30	15.2	1%	91,200	< 3 / < 3 / < 3

- All users were run against a Microsoft heavy user profile, that is, 60 requests per hour.
- 0% think time was applied to all tests, the elimination of typical user decision time when browsing, searching, or modifying in Office SharePoint Server. For example, a single complete user request is completed from start to finish without user pause, therefore, creating a continuous workload on the system.
- The maximum user capacity is derived from the following formula:

$$\# = \text{seconds per hour} / \text{RPH} / \text{Concurrency\%} * \text{RPS}$$
 Example: $3600 / 60 / 1\% * 54 = 324,000$
 Example: $3600 / 60 / 10\% * 54 = 32,400$ (supported user capacity for 10% concurrency)

The next table shows the load tests against the content databases in Atmos on premis.

Portal Usage Type	User Profile ^a (browse/search/ modify %)	Request per sec ^b	Concurrency	Max User Capacity ^c	Average User Response Time (sec) (browse/search/modify)
Heavy read	80 / 10 / 10	30.1	1%	180,600	< 3 / < 3 / < 3
Heavy publishing	70 / 5 / 25	17.1	1%	102,600	< 3 / < 3 / < 3
Heavy collaboration	50 / 20 / 30	14.8	1%	88,800	< 3 / < 3 / < 3

- a. All users were run against a Microsoft heavy user profile, that is, 60 requests per hour.
- b. 0% think time was applied to all tests, the elimination of typical user decision time when browsing, searching, or modifying in Office SharePoint Server.
- c. The maximum user capacity is derived from the following formula:

= seconds per hour / RPH / Concurrency% * RPS

Example: 3600 / 60 / 1% * 54 = 324,000

Example: 3600 / 60 / 10% * 54 = 32,400 (supported user capacity for 10% concurrency) creating a continuous workload on the system.

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