Exchange 2010 Solution Reviewed Program (ESRP) – Storage v3.0

(http://technet.microsoft.com/en-us/exchange/ff182054.aspx)

Dell Compellent Model 30 with 3.5GB Flash Cache:

(72 total spindles per array were used on this test)

Microsoft ESRP 3.0 20,000 mailbox solution for Dell Model 30

Compellent Storage Center 5.3 20,000 Mailbox Microsoft Exchange Server 2010 Mailbox Resiliency Storage Solution (Jan 25, 2011)

Tested Deployment

The following tables summarize the testing environment:

Simulated Exchange Configuration:

Number of Exchange mailboxes simulated	10,000 tested(20,000 simulated)
Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	5 tested(10 simulated)
Number of active mailboxes/server	2,000
Number of databases/host	2
Number of copies/database	2
Number of mailboxes/database	1,000
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	.10 (.12 tested)
Database LUN size	1.2 TB
Log LUN size	200 GB
Total database size for performance testing	9.75 TB
% storage capacity used by Exchange database**	83%

Primary Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	SAS
Storage model and OS/firmware revision	Compellent Storage Center 5.3.1 http://www.windowsservercatalog.com/item.aspx?idItem=e5dfe92f-aeee-91c3-fd93-cfe736e05a63&bCatID=1282
Storage cache	3.5 GB
Number of storage controllers	2
Number of storage ports	4 active ports per controller
Maximum bandwidth of storage connectivity to host	8 Gbit/sec (2x4GB GB HBA)
Switch type/model/firmware revision	Cisco 9134 FC Switch 4.1 (3a)
HBA model and firmware	QLogic QMH2462 (2.12)
Number of HBA's/host	1 Dual-port HBA
Host server type	2xQuad core Intel Nahalem E5506 2.13 Ghz
Total number of disks tested in solution	60 Active for DB, 6 active for log, 6 hot spares = 72 total spindles
Maximum number of spindles can be hosted in the storage	576 SAS (288 per Storage Center)

Primary Storage Software

HBA driver	QLogic StorPort FC HBA Driver 9.1.8.6
HBA QueueDepth Setting	16
Multi-Pathing	Microsoft Windows 2008 R2 MPIO Round-Robin(In-Box DSM)
Host OS	Microsoft Windows 2008 R2
ESE.dll file version	14.00.692.000
Replication solution name/version	Microsoft Exchange Server 2010 DAG Replication

Primary Storage Disk Configuration (Mailbox Store Disks)

Disk type, speed and firmware revision	SAS 15k 450GB, XRH9
Raw capacity per disk (GB)	419.19 GB
Number of physical disks in test	60
Total raw storage capacity (GB)	25.38 TB
Raid level	RAID10
Total formatted capacity	12.69 TB
Storage capacity utilization	76.84%
Database capacity utilization	38.42%

Note: Primary Storage Software does not list Data Progression - auto-tiering might be disabled during the test. All disks are 450GB 15K NL-SAS.

Storage Disk Configuration (Transactional Log Disks)

Disk type, speed and firmware revision	SAS 15k 450GB, XRH9
Raw capacity per disk (GB)	419.19 GB

Number of Spindles in test	6
total raw storage capacity (GB)	2.46 TB
Raid level	RAID10
Total formatted capacity	1.23 TB

EMC VNX 5300 with 8GB Flash Cache:

(64 total spindles per array were used on this test)

Microsoft ESRP 3.0 20,000 mailbox solution for EMC VNX5300

EMC VNX5300 Unified Storage 20,000 users with 1.5GB mailboxes Microsoft Exchange 2010 Mailbox Resiliency Storage Solution (Aug 2, 2011)

Tested deployment The following tables summarize the testing environment.

Table 3. Simulated Exchange configuration

Attribute	Value
Number of Exchange mailboxes	20,000
Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	4 (2 tested)
Number of active mailboxes/server	5,000 (10,000 simulated in Jetstress testing)
Number of databases/mailbox server	20
Number of copies/database	2
Number of mailboxes/database	500
User profile	0.10 (0.12 tested in Jetstress)
Database LUN size	1.3 TB
Log LUN size	50 GB
Total database size for performance testing	40 TB (20 TB for each server)
Percentage of storage capacity used by Exchange database[3]	77% (40/52)

Table 4. Storage hardware

Component	Description
Storage Connectivity (FC or iSCSI)	FC
Storage model and OS/firmware revision	VNX5300, VNX Block Operation Environment version: 05.31.000.5.011 http://www.windowsservercatalog.com/item.aspx?idItem=6d5fa064-ca7f-bfb5-9e76-f4c39dc1c667&bCatID=1282
Storage cache	8 GB mirrored
Number of storage controllers	Two storage processors (SPs)

[3] Storage performance characteristics change based on the percentage utilization of the individual disks. Tests that use a small percentage of the storage (~25 percent) may exhibit reduced throughput if the storage capacity utilization is significantly increased beyond what is reported in this paper.

Component	Description
Number of storage ports	4 (Two for each storage processor)
Maximum bandwidth of storage connectivity to host	16 Gbps (2*8 Gbps FC Ports)
Switch type/model/firmware revision	Cisco MDS 9509 FC switch, 4 Gbps, Firmware 3.2.2c
HBA model and firmware	Emulex LPe12002-E 8Gb 2-port PCIe Fibre Channel Adapter, Firmware 1.00A12
Number of HBAs/host	2
Host server type	Dell PowerEdge R810 with Intel(R) Xeon(R) L7555, 1.87 GHz CPU, Eight cores, 128 GB RAM
Number of disks used in solution	68
Maximum number of disks supported by VNX5300 storage array	125

Table 5. Storage software

Component	Description
HBA driver	7.2.41.2
HBA QueueTarget Setting	0
HBA QueueDepth Setting	32
Multi-pathing	EMC PowerPath 5.5 SP1
Host OS	Microsoft Windows Server 2008 R2 Enterprise SP1
ESE.dll file version	14.01.0279.000
Replication solution name/version	N/A

Table 6. Storage disk configuration (mailbox store disks)

Attribute	Description
Disk type, speed and firmware revision	2 TB NL SAS 7.2k RPM, Firmware BS17
Raw capacity for each disk (GB)	1,834 GB
Number of physical disks in test	64
Total raw storage capacity (GB)	117, 376 GB
RAID level	RAID 1/0
Total formatted capacity	52 TB (26 TB for each server)
Storage capacity utilization (percentage)	45% (52*1024/117, 376)
Database capacity utilization (percentage)	35% (40*1024/117,376)

Table 7. Storage disk configuration (transactional log disks)

Attribute	Description
Disk type, speed, and firmware revision	2 TB NL SAS 7.2k RPM, Firmware BS17
Raw capacity for each disk (GB)	1,834 GB
Number of physical disks in test	4
Total raw storage capacity (GB)	7,336 GB
RAID level	RAID 1/0
Total formatted capacity	2 TB (1 TB for each server)

Table 8. Replication Configuration

Attribute	Description
Replication mechanism	Exchange 2010 DAG Mailbox Resiliency
Number of links	2
Simulated link distance	LAN
Link type	IP
Link bandwidth	Gigabit Ethernet (1 Gbps)