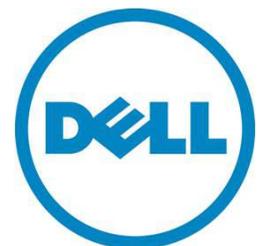


Storage Options for Microsoft[®] Exchange 2010

A Dell White Paper

Abstract: For customers who are planning a deployment of Exchange 2010 choosing the right storage architecture can be a confusing task. Storage requirements are growing due to increased mailbox capacities and the personal archiving capability. Microsoft is advocating the choice of Direct Attached Storage as an alternative to the cost of traditional FC SAN shared storage. This whitepaper explores implementation cost, data protection, storage management and ongoing cost of operations for various storage options.



THIS WHITE PAPER IS FOR INFORMATIONAL PURPOSES ONLY, AND MAY CONTAIN TYPOGRAPHICAL ERRORS AND TECHNICAL INACCURACIES. THE CONTENT IS PROVIDED AS IS, WITHOUT EXPRESS OR IMPLIED WARRANTIES OF ANY KIND.

© 2010 Dell Inc. All rights reserved. Reproduction of this material in any manner whatsoever without the express written permission of Dell Inc. is strictly forbidden. For more information, contact Dell.

Dell, the *DELL* logo, and the *DELL* badge, *PowerConnect*, and *PowerVault* are trademarks of Dell Inc. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell Inc. disclaims any proprietary interest in trademarks and trade names other than its own.

November 2010

Introduction.....	1
Simplified capacity management	1
Exchange storage protection	2
Database Availability Group (DAG)	2
DAG in a SAN.....	3
Enhancing RPO in Exchange 2010 with SAN Snapshots.....	3
Enhancing RTO in Exchange with EqualLogic Auto Snapshot Manager	4
Backup Strategies – Using a backup server with SAN Snapshots	4
Archiving in Exchange - SAN benefits.....	5
Virtualizing Exchange	5
Scalability of virtualized Exchange	5
Exchange Virtualization and HA	6
Exchange Virtualization and DR	6
SAN options	7
Fibre Channel Storage Area Networks	7
The best of both worlds: iSCSI.....	7
Dell EqualLogic PS Series: Self-managing, self-scaling self-healing iSCSI SAN	9
Storage integration	10
Windows integration points for storage	10
Dell EqualLogic: Integrated with Windows, Exchange and virtualization.....	10
Conclusion	12

Introduction

Electronic communication services are considered a critical business application that can dramatically impact the daily operations of any organization. As e-mail applications are heavily dependent on storage resources, it is useful to explore the tight integration between Microsoft® Exchange environments and storage platforms.

This white paper provides a specific look at how Microsoft® Exchange 2010 uses storage, and describes the challenges presented by Exchange and identifies some opportunities for value-added features in different storage options.

As a primary vehicle for sharing information and transmitting documents, the growth of e-mail has led to increasing demands for storage resources. Additionally, the dependence on e-mail communication in business has made it essential to have highly available and optimally performing Microsoft® Exchange environments that can not only maintain and ensure business continuity, but also provide fast data recovery in case of downtime or disaster. Furthermore, the state of today's compliance environment often requires organizations to keep electronic communications readily available for extended periods of time – this drives the e-mail capacity requirements higher than ever. As a result of these fundamental shifts in e-mail solution requirements, the supporting IT infrastructure – in particular, the storage – must be high performance, flexible, scalable, and above all, reliable, to meet today's demands as well as those of tomorrow.

Dell and Microsoft have a strategic partnership that goes back for many years. One of the important aspects of this partnership is the ongoing testing and validation of Microsoft applications and operating systems with Dell products and services. As the Dell and

Microsoft product portfolios have grown over the years, so has the scope and impact of this collaboration. Today, a huge range of software and hardware configurations are exercised in the lab, and our customers benefit from expert guidance for enterprise-class architectures. In this whitepaper, Microsoft® Exchange testing in Dell labs and experience garnered from customer engagements have been collected and distilled to provide specific guidance for the information technology professional.

Simplified capacity management

A big challenge with Exchange 2010 installations is configuring the right amount of storage capacity, especially given that there is great demand for increased mailbox sizes. With many storage options, including DAS and some SAN technologies, either you buy it all upfront and configure your mailbox databases to retain the maximum conceivable amount of email, or you face a never-ending battle to keep ahead of the space demand bouncing ball. Another challenge is that under-provisioned storage can lead to service interruptions. This is highly undesirable and the typical strategy to avoid such interruptions is to over-provision Exchange storage.

Another option is thin provisioning as enabled by a SAN that implements storage virtualization. Storage virtualization abstracts the details of storage hardware configuration and allows volume (LUN) allocation to be done without knowledge of the complexity of hardware implementation. An example of this is providing the capability for an administrator to request a volume of a certain size, and leave it to automated management software to figure out what spindles and controllers actually store the bits. This type of virtualization reduces management cost and simplifies growth.

Thin provisioning allows the administrator to configure volumes of the expected total size,

even if that size exceeds available physical space on storage. Warnings are set so that the administrator is notified when a pre-determined level of physical storage capacity is utilized. The administrator can then add



Figure 1 Thin provisioning reduces up-front storage costs and ongoing storage administration

additional capacity, which is automatically added in to the available storage for the database volumes. This reduces administration costs, reduces up-front expenditures in the beginning of an Exchange implementation, and allows the gradual purchase of storage capacity over time as it is needed, reducing storage over-provisioning.

In an Dell™ EqualLogic™ PS Series SAN, when a new array is plugged in to the network and powered up, it only takes a few mouse clicks in a graphical interface to add the new array to the SAN. This is very quick and simple. From there, the automated storage management features enable the new capacity and performance to be utilized immediately on the pre-existing Exchange workload with no further administrative intervention.

Exchange storage protection

Database Availability Group (DAG)

With Exchange 2010, Microsoft® introduced the concept of Database Availability Groups

(DAGs.) Database availability groups address 2 challenges simultaneously: Server Resiliency and Storage Resiliency.

Database availability groups introduce the concept of "Database Copies". The "Active" database is the primary database store. The "Database copy" is a redundant copy of the active database that provides storage resiliency. If there is a server or storage problem that prevents the active database from satisfying requests, a process called the "active manager" will automatically change the database copy into the active database.

There can be multiple copies maintained in a DAG. In fact it is possible to have up to 16 copies of a database in a DAG. Microsoft® indicates that if there are at least 3 copies of email databases being maintained in a DAG, that organizations can forgo RAID protection and eliminate the traditional routine of backups. Another feature that we're pointing out here is called "Lagged Logs." Exchange gives the administrator the option of delaying the replay of transaction logs into a database copy. This has the effect of reducing the possibility that data corruption will be quickly propagated across all data copies in an organization, and provides a single point-in-time copy of the active database that trails the state of the active database by a set time period lag. Each Lagged Log database copy requires another complete copy of the email database be kept on tier-one spinning media.

DAG in a SAN

Microsoft® has expressed that with the efficiencies of Exchange 2010 disk IO and the redundant copies provided by DAG that it is possible to use direct attached disk as the primary storage for an Exchange 2010 email database. Another approach would be to create a high availability deployment DAG architecture leveraging the resiliency and ease of management features of Microsoft® Exchange DAGs and the simplified storage administration, availability and data protection of a storage area network. Dell EqualLogic PS Series SANs have a capability called Pooling that allows collections of arrays to be created which allow physical separation of data within the SAN. With the active databases stored in one pool and the copies stored in another pool this guarantees that active databases and database copies will not share any spindles in the SAN, and is designed to provide a high level of database protection and availability. This type of storage architecture virtualizes the hardware resources, creating a shared storage resource that is highly reliable, high performance, scalable and simple to manage. It hides the complexity of storage administration, RAID sets, volume management, etc. helping to reduce storage cost-of-ownership.

Enhancing RPO in Exchange 2010 with SAN Snapshots

EqualLogic SANs ship with an all-inclusive software package called Auto Snapshot Manager/Microsoft Edition (ASM/ME) that leverages VSS to enable the creation of application-consistent "smart copies". These allow clean capture and recovery of email database information from Exchange 2010 using space-efficient EqualLogic snapshots. These point-in-time copies essentially preserve the state of the database at a specific moment. Incremental storage is then used to store changes to the database. This is more space efficient than having to keep a complete database copy online, as is required with lagged logs. ASM also allows the creation of flexible schedules for the capture of smart copies. Database integrity checks can be configured to run on a designated server, offloading the verification process. With these capabilities, the administrator can keep a set of point-in-time copies of the email databases, increasing the number of recovery points available. These additional Recovery Points (RPO) enhance recoverability in the event of a database corruption, illustrated in figure 2.

In a non-DAG environment, Snapshots are one of the few ways to establish a disk-based recovery point.

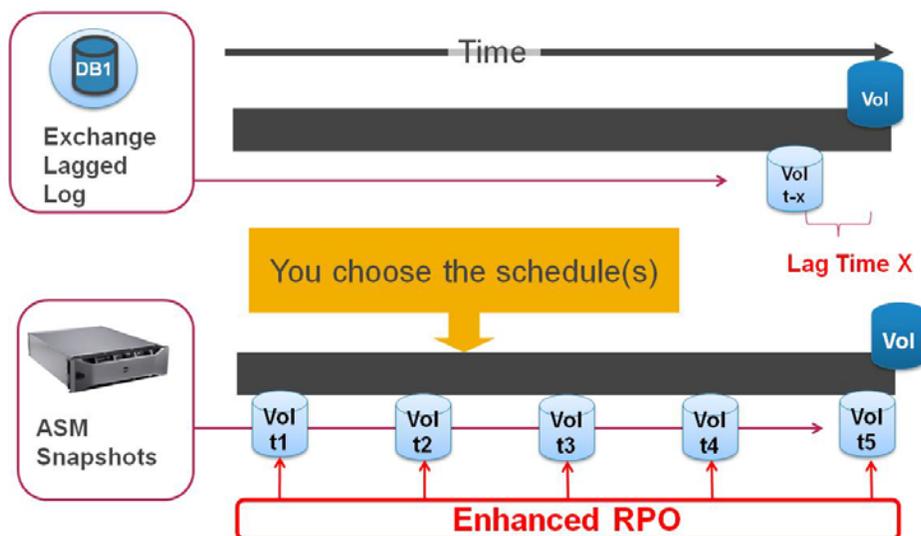


Figure 2 Enhanced recovery points with scheduled SAN snapshots

Enhancing RTO in Exchange with EqualLogic Auto Snapshot Manager

Database availability groups have the capability to recover from a database failure by a process called a "DAG reseed". This means that the Active Manager process causes the server hosting the database copy (the source) to send the data to the server that has a database in need of rebuilding (target), the target server rebuilds the corrupt database. Among the challenges with this process are that every bit from the database copy must be transmitted across the LAN from the source server to the target server, and both the server hosting the database copy and the server hosting the database being rebuilt must consume CPU cycles during the rebuild process. Because of network bandwidth and throttling of the reseed process to make sure it doesn't interrupt other email tasks, it can take hours and even days to reseed a corrupted database.

capability to relieve network and processing loads while also reducing the Recovery Time (RTO) associated with reaching a normal state of operation for the DAG.

Of course in a non-DAG environment, rebuilding from snapshots or backups is the only option.

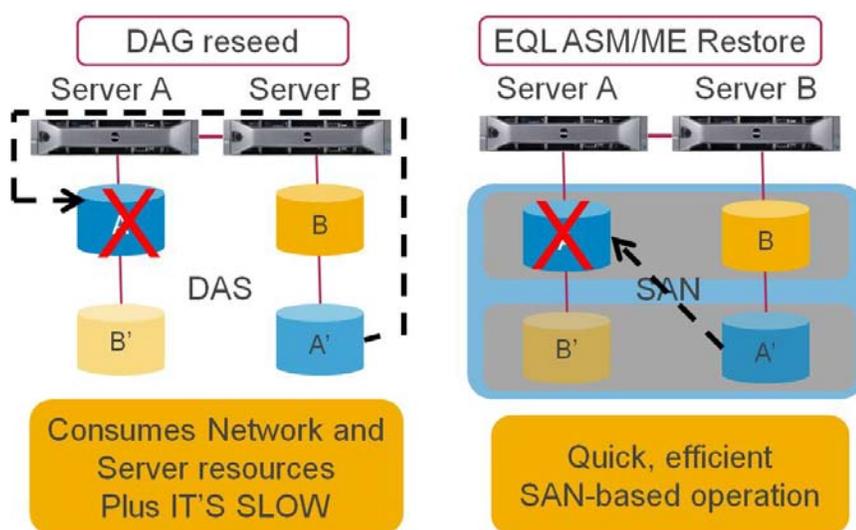
Backup Strategies – Using a backup server with SAN Snapshots

In a direct attached storage environment or in a SAN where a backup appliance is not used the backup process must transfer data across the LAN, using processing cycles on the mail server CPUs and bandwidth on the LAN. Note that even using DAG copies as the backup source doesn't alleviate these drawbacks. Unless a separate server is configured to manage only DAG copies (not likely since this causes even more processor and disk overhead for an Exchange environment) every

DAG copy is being managed by a server that is the active server for some email database.

Dell recommends the use of a backup appliance. In an EqualLogic SAN, this backup appliance can leverage the VSS provider which is included as part of the Host Integration Toolkit, that ships bundled with every array. The backup appliance can then mount those snapshot volumes directly and use them as the source for the chosen backup strategy backup to disk or backup to tape. This eliminate mail server processing overhead of the backup process, reduces LAN traffic

associated with transferring volume data to backup, and reduces backup window (overall backup time.) Dell offers the PowerVault™ DL Backup to Disk Appliance, which is an integrated, comprehensive appliance for disk-based backup that includes server, and the



An alternative is to use an ASM/ME Smart Copy

Figure 3 Two recovery time strategies in an Exchange DAG

to rebuild a corrupted database. This allows the administrator to use an application-consistent snapshot as the source to quickly restore the production volume to the chosen recovery point. The database volume is nearly instantaneously rolled back to the point in time of the chosen snapshot. ASM Restore uses this

choice of software from two of the leading backup vendors on the market – Symantec™ and CommVault®.

Archiving in Exchange - SAN benefits

Microsoft® Exchange adds a Personal Archive capability for the 2010 release. This provides a great benefit to most organizations, especially those who've suffered from the proliferation of .pst files. As with using .PST files, end users can lower the amount of information stored in their primary email box, this is done by moving mail to the Personal Archive. Unlike .PST files, the Personal Archive storage is managed by the enterprise IT organization. This enables administrators to keep business-critical information stored in email and manage it in compliance with retention and discovery mandates.

With the first release of Exchange 2010, the personal archive for a mailbox had to be deployed on the same volume as the mailbox database. With the advent of SP1 which was released in early September, 2010, the personal archive can be deployed on a separate volume; giving IT professionals have the option of tiering storage. This could allow a less costly online storage option for the personal archive which usually contains less-often-used files. It is important to note that Personal Archive files on a separate volume in an Exchange DAG do not have DAG copies. Therefore, any information stored in a Personal Archive must have alternative data protection established.

EqualLogic SAN pooling can be used to place Microsoft® Exchange 2010 personal archive files on a different tier of storage and protect them with SAN hardware reliability. For example, it might be the choice of the administrator to put primary mailbox storage

on 10k SAS configured in RAID 10 for data protection and performance, and put the personal archive volumes on 7.2k SATA drives configured in dual parity RAID 6 for safe yet cost-effective high capacity. SAN storage for Personal Archive files can reduce storage costs while providing data protection with reliable SAN storage, reducing the possibility of data loss.

Virtualizing Exchange

Scalability of virtualized Exchange

There are multiple server roles in an Exchange 2010 environment. The HUB, CAS and EDGE servers are natural candidates for virtualization. They are less disk IO intensive processes, and have no issues with being consolidated within a virtualized server.

The benefits of virtualizing Exchange mail

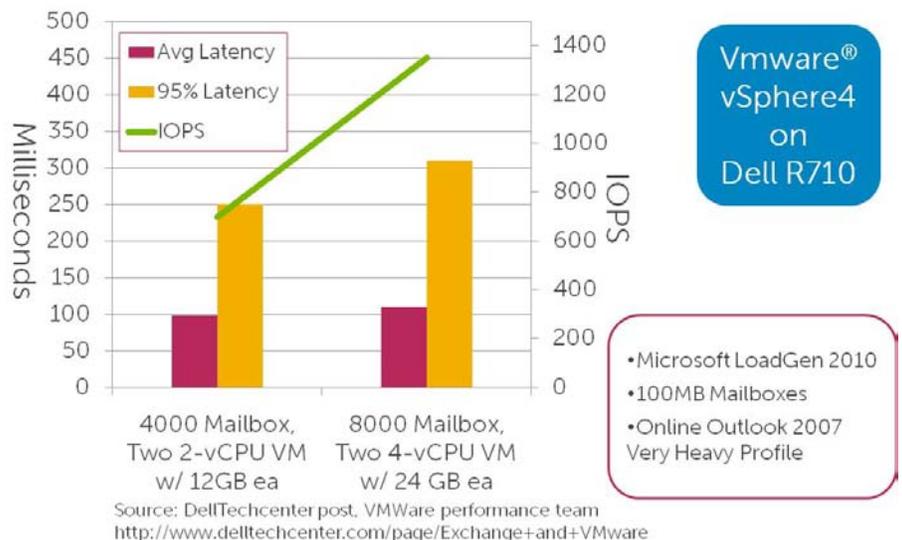


Figure 4 Scalability of virtualized Exchange Server

server can be summarized by saying that it provides agility to the data center. Virtualization provides administrators with the ability to handle increases in email server processing loads. But "What about performance?" you say... Can Microsoft® Exchange Server 2010 really scale in a virtualized environment to handle extra

workload? Testing of Exchange 2010 scalability in virtualized environments has been done showing that a single server in a virtualized environment can scale from 4,000 to 8,000 users, with little effect on Sendmail latency. These results can be found in a link called Exchange 2010 Scale-Up Performance on vSphere 4 on Dell Techcenter on the web at <http://www.delltechcenter.com/page/Exchange+and+VMware>.

Exchange Virtualization and HA

Another benefit of virtualization is increasing availability in the data center. Stand-alone (non-DAG) Exchange servers can support many thousands of mail boxes, but lack the server resilience of DAG deployed servers. Virtualizing Exchange Server can provide high availability with automatic failover in the case of a server outage. Because the mail box databases reside on shared storage, the new server will be able to resume mail services.

Database Availability Groups are supported in hardware virtualization environments provided that the virtualization environment has been configured to never automatically move mailbox servers that are members of a DAG to another root server. There are customers using HA capabilities of virtualization today who attest to the usefulness of this configuration, but it is not supported by Microsoft.

What does this mean in practice? If you have a virtualized DAG and experience a server outage, Exchange will cause the server managing the database copy to take over for the failed server, just like in a non-virtualized DAG. To recover, a new server must be brought on-line to replace that capacity. This is easier and quicker in a virtualized environment. Instead of having to manually configure new servers and their associated storage, the new server is quickly spun up on a spare virtual machine.

Exchange Virtualization and DR

One of the most compelling areas of value for virtualizing Exchange 2010 is in establishing a remote site for disaster preparedness. DAG gives you the ability to stretch a DAG to establish copies of all databases on a remote site, including lagging the logs to prevent logical corruption from being propagated immediately to the remote site. Testing of the DR plan should be performed to ensure the process is well known and staff is trained.

Using the disaster recovery features of the virtualization environment complemented by the array-based replication of your SAN can significantly enhance DR. Instead of application-specific DR knowledge and processes, a centrally managed and automated recovery process can be established that is consistent across the data center and will also enable dramatically improved testing of recovery plans.

SAN options

Fibre Channel Storage Area Networks

Fibre Channel (FC) is one of the most widely deployed SAN technology. FC was originally developed to solve the cabling problems associated with connectivity and distance. Eventually, the industry expanded the technology for SAN application, and FC today offers a robust shared-storage solution. However, despite its benefits, the number of actual FC deployments for Exchange remains relatively modest, due to several limitations of FC, and once again several key problems left unresolved.

First, it is relatively expensive to deploy and grow FC SANs. In a FC environment, the adaptors, switches, and cabling used to link SAN components together can be costly, and well out of reach for most of the mainstream market. The advent of Fiber Channel over Ethernet (FCoE) and the ongoing standardization of Data Center Bridging will allow specialized FCoE NICs to be attached to 10GbE cabling. FC SAN deployment and maintenance can be complicated, and requires special IT expertise that DAS and NAS do not and therefore is frequently outsourced. Because of the added complexity of FC SANs, expensive software is often required to automate and simplify operations, particularly for large deployments. Severe interoperability issues between equipment vendors compound these problems.

Second, although FC SAN addressed some of the scalability issues shared by NAS and DAS, it brought new issues related to complexity and costly capacity upgrades. Most FC SANs are deployed in a "frame based" architecture. A controller "head" and rack is purchased with an initial amount of storage, and then as additional storage is needed, the administrator must either add storage devices (and accompanying complexity) to the network, or upgrade to a larger, more expensive frame

whose installation requires system downtime and usually an expensive consulting engagement. To avoid these problems, IT departments must either buy and install expensive management and virtualization software, or continually over-buy storage capacity.

Third, the FC SAN storage administrator requires a rarified level of knowledge, from RAID geometries to application I/O workloads to manage LUN configuration. Indeed, this expertise will be taxed on a routine basis for the regular deployment and maintenance of storage systems. This means that specialized staff, indeed entire departments are needed to manage these high-end shared storage systems.

Other than for very large Exchange deployments, most organizations have failed to see the cost justification for running Exchange on a FC SAN. Although FC SAN presents functional benefits for Microsoft® Exchange environments, its price tag makes it difficult for many organizations to switch to an FC SAN storage environment.

The best of both worlds: iSCSI

iSCSI combines the venerable SCSI block-level protocol with standard Ethernet, the most widely used networking technology. The result is a highly scalable SAN technology that utilizes Ethernet's affordable and familiar infrastructure. With the adoption of the standard by the Internet Engineering Task Force (IETF) and strong vendor support from industry leaders such as Microsoft® and Cisco®, iSCSI has rapidly matured into a practical and popular SAN technology – and specifically the right storage technology for Microsoft® Exchange.

iSCSI serves the same function as the FC network protocol, transporting SCSI commands and responses back and forth between the servers hosting Exchange and the storage. Whether FC or iSCSI is used, the result

is the same: the operating system sees SCSI disk devices.

With FC, the hardware layer and the fabric network are unique to storage, so special components, Host Bus Adapters (HBAs) and switches are required. With iSCSI, an existing Ethernet network can be utilized, thus requiring no additional networking infrastructure. iSCSI can be implemented using HBAs that attach to standard IP switches, or with the Windows® iSCSI software initiator that presents itself to the server like an HBA, but instead uses existing NICs to attach to the switches. The vast majority of servers, and nearly all servers running Exchange, use standard NICs with the Windows® iSCSI initiator software. Even a large, 8,000-user Exchange environment requires only about half the speed of a single GbE NIC port. With the advent of 10GbE, higher bandwidth can be supported, but Exchange is transaction-intensive, not bandwidth-intensive. As a result, 10GbE is most commonly used in link aggregation and not needed for email server communication to the SAN. Also, most servers have multiple ports and can utilize Microsoft's MPIO for higher availability and performance if needed. Today's high speed CPUs can run iSCSI at line speed over standard NICs using only a marginal amount of CPU, and specialized NICs are available that offload this processing if desired.

Together, standard NICs and the low cost of Ethernet switches offer compelling purchase and maintenance cost savings over FC while maintaining performance advantages of a SAN. However, the savings are not limited to the hardware costs alone. With iSCSI, IT departments utilize their existing IP networking expertise, without needing specially trained staff. This familiarity with the network infrastructure eliminates a key problem of complexity associated with FC SANs.

Dell EqualLogic PS Series: Self-managing, self-scaling self-healing iSCSI SAN

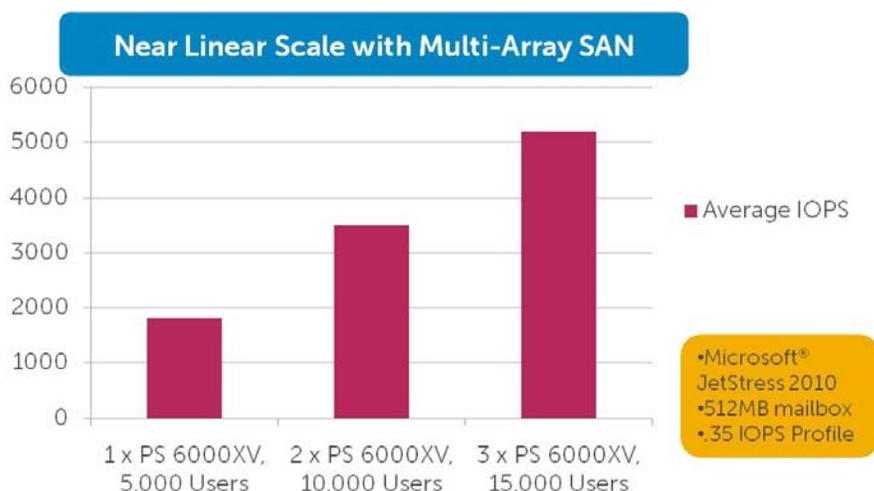
While iSCSI offers great advances for the network portion of the SAN, administrators can still face storage management challenges. The Dell EqualLogic PS Series technology was developed to take storage management to the next level by driving intelligence down to the storage array. All of the tasks associated with daily storage management, load balancing, and provisioning are handled by the PS Series arrays transparently to the administrator - and all are accomplished while the system is online, through a common intelligent interface. In addition, the PS Series arrays can be combined to create a virtualized SAN that scales up to 1536 TB under a single management interface (in a 16 array SAN using 48 2TB drives.)

PS Series disk arrays automate tasks internally, with minimal intervention. Multiple arrays can work together, presenting a single storage view to both administrators and applications consuming the storage. Scalability issues are eliminated - the task of balancing workloads across disks and arrays is delegated to the systems themselves rather than to the administrator.

PS Series arrays address the Exchange infrastructure growth problem in multiple ways. First, PS stands for Peer Storage, an indication of the fact that it is a modular SAN architecture that allows scale-out growth in self-contained modules, in contrast to the frame-based scale-up model usually seen with FC SANs. Second, most aspects of storage expansion are automated. Adding arrays to an existing deployment requires minimal effort and causes no disruption to Exchange users. Add an array to the SAN and new storage resources are immediately available to the

virtualized storage pool. These resources include more than just additional capacity - each module includes more disk spindles, controller cache, power and more GbE or 10GbE ports for additional network bandwidth. Each new array adds capacity and IO performance to support more Exchange users.

Dell has specifically tested the scalability of



Source: Dell Whitepaper - Sizing and Best Practices for Deploying Exchange 2010... July 2010
Author Ananda Sankaran - www.delltechcenter.com/page/Exchange+and+VMware

Figure 5 Scalability of Exchange performance and capacity in a Dell EqualLogic PS Series iSCSI SAN

EqualLogic SANs in an Exchange environment. We tested 3 different user loads using Microsoft® JetStress 2010. Each time we added 5,000 users, we also added another PS6000XV array. As we did that, the PS Series management software automatically added the new capacity into the SAN and started migrating data to the new storage. What was even more compelling is that as storage capacity was added, so was performance. Since this is a frameless architecture, when a new array is added, so are controller, network, and memory resources. Our tests show essentially linear scale in IOPS performance of Exchange workloads as additional arrays are added.

Storage integration

Windows integration points for storage

While architecting storage for your Microsoft® Exchange infrastructure, it is important to consider the role of the operating system (Microsoft® Windows®) on which your Exchange server will reside, and how well your storage solution integrates with key Windows® features.

Microsoft® Windows® Server can help organizations reduce storage management costs while improving storage efficiency. With continuing improvements around data availability and storage connectivity as well as storage management consoles, Windows® Server continues to grow as a more integrated server and storage infrastructure.

Enhanced, built-in support for Storage Area Network (SAN) hardware from multiple vendors allows easy, reliable access to organizational data, without the need for third-party tools. Microsoft® Windows® Server includes several features to help organizations manage corporate data and improve storage utilization. Windows® Server has specific support for networked storage solutions, including services and drivers designed for high performance and fabric management of SANs. These services include:

- Volume Shadow Copy Service (VSS), which enables current state “snapshot” style backups of volumes, folders, or files
- Virtual Disk Service (VDS), which enables software applications to configure and manage SAN arrays independent of specific implementations via a hardware provider model
- Enhanced disk management capabilities such as the ability to grow volumes (using VDS)

- Support for remote SAN boot, flexible volume mounting, and an enhanced driver model for SAN deployment scenarios

- Multi-path I/O (MPIO) support for high availability and load balancing

While it is not mandatory to integrate all of the features and functionality offered by Microsoft® Windows® into your storage solution, it is important to choose a storage vendor that is dedicated to integrating the ongoing improvements led by Microsoft® at the server and application levels.

Dell EqualLogic: Integrated with Windows, Exchange and virtualization

Windows integration for Dell EqualLogic PS Series SANs is provided at several levels. VDS and VSS providers are included as part of the Host Integration Tools (HIT) and provide integration with Windows® file systems and compatible backup tools. Also provided is an MPIO Device Specific Module (DSM). This provides connection awareness of the PS Series SAN to Windows® hosts, simplifying configuration, enabling reliable network connections, and enhancing performance.

Auto Snapshot Manager / Microsoft Edition (ASM/ME) is an all-inclusive software package that ships with all Dell EqualLogic PS Series arrays to facilitate the deployment, ongoing management, and protection of Dell EqualLogic iSCSI SANs in your Microsoft® Windows® environments. ASM/ME has specific integration with Microsoft® Exchange including Exchange Server 2010.

ASM/ME is a VSS requestor which enables the automation of data protection through the creation of application-aware snapshots, clones and replicas of the Exchange 2010 mail databases and logs, called “Smart Copies” . Smart Copy snapshots use space-efficient PS Series snapshots. As Smart Copies are created ASM/ME runs a consistency checker that verifies that the result is a well-formed

Exchange 2010 object, this processing can be optionally run on a system that will offload these processing demands from mail servers. These Smart Copies can be used to improve RPO and RTO as discussed earlier in this paper. They can also be used for offloading searches, establishing full copies for test and dev work etc. and automatically replicated to an off-site array for enhanced data protection.

ASM/ME has a flexible scheduling capability to govern the creation of Smart Copies as often as needed to meet RPO and RTO requirements. ASM/ME also provides the capability to do brick-level restores of email database files from the corresponding Smart Copies.

Microsoft® Windows® Hyper-V™ support is included with ASM/ME and VMware® ESX Server is supported with Auto Snapshot Manager / VMware Edition (ASM/VE). Both environments are supported with advanced software integration that ships all-inclusive with every PS Series array.

Windows® MPIO provides the ability to scale IO to the EqualLogic SAN. Since each array has multiple Ethernet ports, more NICs in the Windows® server means more potential data paths to leverage with MPIO. The Dell EqualLogic HIT also contains a Device Specific Module for Windows® MPIO. This gives SAN connection awareness to the Windows® network stack. In a multi-member pool where data is automatically distributed across arrays, this allows a NIC to directly connect to the array where specific blocks being requested are stored, reducing network hops and increasing response times.

Also available is the Dell Management Pack for Microsoft Systems Center Console. The [Dell EqualLogic Storage Array Management Pack Suite 4.0](#) integrates OpenManage™ monitoring functionality with PRO-Pack enablement making the management packs virtualization-aware. This is available as a free download

from

<http://support.us.dell.com/support/downloads/format.aspx?releaseid=R266477>.

Conclusion

Dell's EqualLogic PS Series arrays utilize core storage technologies and build on the innovations of storage over IP as well as breakthroughs such as virtualization. The PS Series is designed to provide a high performance, intelligent, full-featured storage solution for Exchange 2010 that simplifies the overall storage management experience by addressing the challenges that launched the storage networking revolution: managing explosive data growth and meeting escalating service requirements without adding complexity or increasing cost.

The deployment of the PS Series as the storage platform for Microsoft® Exchange Server can provide a comprehensive yet flexible email system that is efficient, simple and safe. Because of its seamless scalability, IT administrators can easily adapt to future growth of mailboxes and users. Business continuity and disaster protection features are included at no extra cost. Specific integration with Windows® and Exchange combined with expertise and knowledge gained from testing and deployments make EqualLogic PS Series SANs a great storage choice for your Microsoft® Exchange storage.

	DAS	FC SAN	EQL iSCSI SAN
Administration Cost	Medium	High	Low
Purchase Cost	Low	High	Medium
Resource Utilization	Low, over-provisioned	Medium	High, consolidated
Virtualization	Not possible	Yes	Yes, integrated for "no extra cost"
Server Options	Rack, Stand-alone	Stand-alone Rack, Blade	Stand-alone, Rack, Blade
Recovery Points (RPO)	One or few lagged logs (extra storage)	Snapshots	Your schedule, space-efficient snapshots
Recovery Time (RTO)	Slow, resource intensive, DAG Reseed	Snapshots	SAN-based application consistent snapshot, unique SAN-based copy
Upgrades	Labor intensive, manual	Frame-based, Complex	Modular, simple
Backup	Network/processor load	Off-host	Off-host
Archive	More drives, no DAG copies	Tiered pools, SAN protection	Tiered pools, SAN protection

Figure 6 Exchange 2010 Storage Options Comparison Table



Author: Bob Ganley

THIS WHITE PAPER IS FOR INFORMATIONAL PURPOSES ONLY, AND MAY CONTAIN TYPOGRAPHICAL ERRORS AND TECHNICAL INACCURACIES. THE CONTENT IS PROVIDED AS IS, WITHOUT EXPRESS OR IMPLIED WARRANTIES OF ANY KIND.