Microsoft Exchange Server 2010 High Availability in Dell Advanced Infrastructure Manager Environment

This white paper showcases automatic re-provisioning a failed mail server with Dell 12th generation servers. Use of Dell AIM and Microsoft Exchange Server 2010 together allows quick and automatic recovery of an offline email server without IT intervention.

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August 2012| Rev 2.0

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Executive summary

Dell Advanced Infrastructure Manager (AIM) provides multiple benefits when deploying and managing Exchange. Re-provisioning a failed Microsoft® Exchange Mailbox server in an environment managed by Dell Advanced Infrastructure Manager (AIM) significantly reduces the restore time, with minimum manual intervention. Also, the dependencies on multiple Information Technology (IT) expertise like Server Engineers, Network administrators, and so on can be reduced because Dell AIM has a unified approach towards managing these infrastructure components. Microsoft Exchange Server 2010 Database Availability Group (DAG) deployed in Dell AIM managed server pool will be in a degraded state only for minutes before it gets restored to its original configuration. Dell AIM complements the native high availability of Exchange by rapidly restoring a failed server in the DAG. Compare this to the hours of manual effort it would take to bring up a failed Exchange Server involving locating hardware, deploying the Operating System (OS) and Exchange 2010, and mounting the failed databases on the new server.

Apart from restoring DAG in an automated way, other benefits of AIM include centralized management of the network and compute Exchange infrastructure, ability to dynamically configure and manage Exchange MAPI (Messaging API) and DAG replication networks on multiple servers from single console. Using AIM, high availability can also be provided to the non-mailbox server roles including the Active Directory (AD) domain controller.

Introduction

To provide resiliency at the database level, the Exchange 2010 server makes use of replication based strategies and enables native high availability (HA) for email data through DAG. A DAG facilitates database-level recovery from failures. However for server failures, the DAG does not provide automatic recovery mechanisms back to the original state prior to the server failure. Exchange provides multiple storage options to host Exchange databases and Storage Area Network (SAN) is a viable option. Some of the benefits of hosting Exchange databases on SAN include storage consolidation, storage virtualization benefits, and isolating the server failures from the database failures.

On a server failure, DAG recovers a failed database by activating one of its passive copies hosted on one of the functional members of the DAG. However, DAG then runs in a degraded state because the Input/Output Operations per Second (IOPS) and latency requirements for the failed database may not be met accurately. In a small sized DAG, successive server failures may result in loss of email data. For DAG to be healthy again, the failed server must be restored quickly and the database copies must be redistributed per the original configuration. Reinstating the degraded DAG to its original configuration by quickly recovering the failed mailbox server is critical for the organizations to meet their recovery time objective. Manually re-provisioning a failed Mailbox server may take considerable amount of time, and may need expertise from multiple silos.

This paper describes a study performed by the engineers at Dell Global Solutions Engineering which shows significant reduction in restore time for the DAG upon failure of a multi-role Exchange Server 2010 SP2 in a two-member, two-copy DAG having SAN-based databases. (multi-role is defined as Mailbox, Hub Transport and Client Access Server roles collocated on a single physical server). The paper also explains additional benefits of AIM to the Exchange 2010 ecosystem.

Audience and scope

This whitepaper is intended for sales engineers, IT administrators, and field engineers interested in achieving the business continuity benefits from deploying Exchange native HA in an AIM-managed environment. This paper assumes that the reader has a working knowledge of Dell AIM and Microsoft Exchange Server 2010.

After reading this paper, the reader should be able to answer the following questions:

- How can the complexity of re-provisioning a multi-role Exchange Server be reduced using AIM?
- How quickly can a failed multi-role Exchange Server be re-provisioned in DAG, restoring the DAG's original configuration in a complete automated way, using AIM managed infrastructure?

This paper explains how AIM version 3.5.1 can complement the native HA of Exchange to provide rapid recovery of a mailbox/multi-role Exchange server, based on a lab study. It also describes a detailed architecture consisting of a SAN based two-member, two-copy DAG configured using the latest Dell hardware, which includes Dell PowerEdge™ 12th generation servers, Dell PowerConnect™ Switches and EqualLogic™ storage in an AIM managed environment based on the iSCSI SAN best practices.

Overview of Microsoft Exchange 2010 and DAG

Microsoft Exchange Server enables email-based collaborative communications for enterprise businesses. It is a storage-intensive enterprise workload comprised of several server roles namely Mailbox server, Hub Transport server, Client Access server, Edge Transport server, and Unified Messaging server. Exchange Server requires an AD Domain Controller, with which it communicates over the Messaging API (MAPI) network.

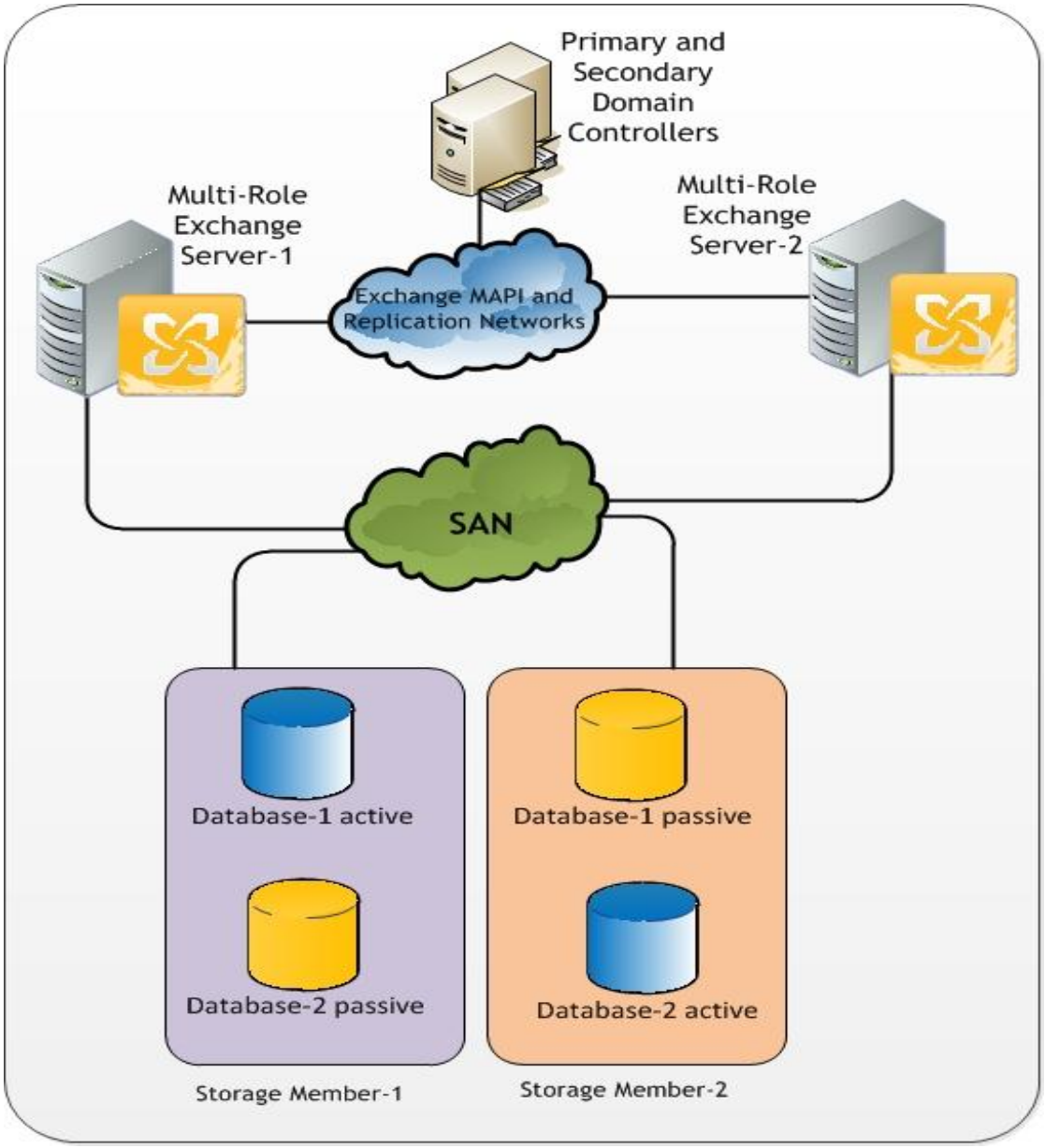
A server running the Mailbox server role is eligible to become a member of an Exchange DAG, an application-level high availability solution that recovers a failed database by activating one of the database replicas (passive copy) hosted on a functional server in the DAG. A server in a DAG is capable of hosting a replica of a mailbox database from any other server. Servers in a DAG work together to provide automatic recovery from failures that affect mailbox databases. The failures generally include disk failures, server failures, data corruption, etc. In Exchange solutions with SAN-based databases, server failures are perceived as database failures by the DAG because the database hosted on a failed server is no longer accessible.

A DAG facilitates mailbox database replication, database switchovers, and failovers with the help of Active Manager. The Active Manager runs on every member in the DAG and manages switchovers and failovers. A DAG has up to 16 servers running Mailbox server role. Exchange solutions support databases to be stored on shared storage accessible by all the DAG members using either Internet Small Computer System Interface (iSCSI) or Fibre Channel (FC) interconnects. With SAN storage, typically one storage volume represents one Exchange database. The servers connect to the volume using the iSCSI or FC Host Bus Adapters (HBAs).

Whenever a database or server failure is encountered, passive copy of the failed database is activated on the server that has the connection to the passive copy of the database. Generally, DAG perceives a server failure as a database failure because the volume and hence the databases the server connects to are no longer accessible. However, the mailbox data is present on the shared storage and can be made available on another server. In case of storage failures, SAN-based databases have storage level recovery mechanisms such as clones, snapshots, etc.

An example of two copy Exchange DAG with two servers is shown in Figure-1. The active copy of Database-1 and passive copy of Database-2 are hosted on multi-role Exchange Server-1 whereas; an active copy of Database-2 and passive copy of Database-1 are hosted on multi-role Exchange Server-2. The AD communicates to the multi-role Exchange servers through the MAPI network, while the DAG uses the replication network to synchronize the databases. The SAN is separated from the MAPI and the replication networks. In case Exchange Server-1 encounters a hardware failure, the passive copy of Database-1 gets activated. While the application and data are still available, the DAG is now in a degraded state. Exchange Server-1 needs to be recovered, either by correcting the hardware issue or re-provisioning, redeploying and recreating the identity of Exchange Server-1 on a spare server. Further, the copy of Database-1 should be mounted and the healthy mailbox databases redistributed to balance the load across the two servers.

Figure 1. Example two copy Exchange DAG



Manual recovery of the failed server can be a long process involving tasks such as rolling back the AD records for the failed Exchange server, preparing server hardware for software installations, installing the OS with Exchange pre-requisites, configuring the host networking to join the AD domain, installing Exchange server bits, preparing the Exchange environment to join the DAG, mounting the databases and waiting for the replay logs to make the databases healthy, then redistributing the active databases to restore the original DAG configuration. These steps may involve expertise from various IT departments, resulting in a DAG member being in a failed state for a long period of time.Faster re-provisioning of a failed Mailbox server due to hardware failures can be achieved in an AIM-managed environment.

Overview of Dell AIM

AIM is infrastructure management software whose features include server failure detection, workload mobility and automated network configuration per the workload requirements. AIM is capable of retargeting workloads within a managed server pool on detecting server hardware failures, and configuring the networking in an automated way upon workload retargets. One of the key features of AIM is to decouple workloads from the underlying hardware to provide immunity against server hardware failures. AIM facilitates boot from SAN so that the Exchange bits and execution environment can be isolated from hardware failures.

AIM uses personas, server environments captured on disk that include the OS, optional Dell AIM agent software, application software, and the networking, to decouple the server software from the server hardware. The host networking information can encapsulated in user defined AIM logical networks which can be associated with a persona through network connections. AIM uses these logical networks to rapidly provision the network configurations on the servers. AIM networks are logical constructs with IPv4 network address and network masks. They behave in the same way as conventional networks, except that they're built out of virtual LANs (VLANs) over physical NICs, switches, and cables. AIM uses System Control Network (SCN), a logical network, to discover new servers and their capabilities, to communicate status and configuration changes between itself and personas. AIM iSCSI SAN element is a new feature in AIM 3.5.1 which enables iSCSI SAN and SCN separation. For more information on AIM features refer to AIM 3.5.1 documentation.

AIM facilitates grouping hosts into server pools. Server pools help control predefined sets of network-booted personas and can grant role-based access control to the users. AIM enables failover only within a server pool. Once a server pool is created, servers and personas can be assigned to it. In our study, an AIM-managed server pool is created to manage hosts in the DAG. For an existing Exchange deployment, the setup needs to be migrated to AIM managed environment[1]. The DAG consists of two members. An additional network booted host is added to the pool as a stand-by server, for the failover scenario.

These AIM features can benefit the Exchange DAG. If a mailbox server suffers from a server hardware failure, AIM brings up the Mailbox server automatically on a spare host and dynamically configure the host networking so that the Mailbox server joins the DAG. Once the databases on the recovered server are healthy and all the necessary Exchange services have started, a script provided by Exchange distribution called *RedistributeActiveMailboxDatabases.ps1* is used to balance the active databases.

[1] Migrating Exchange to AIM environment

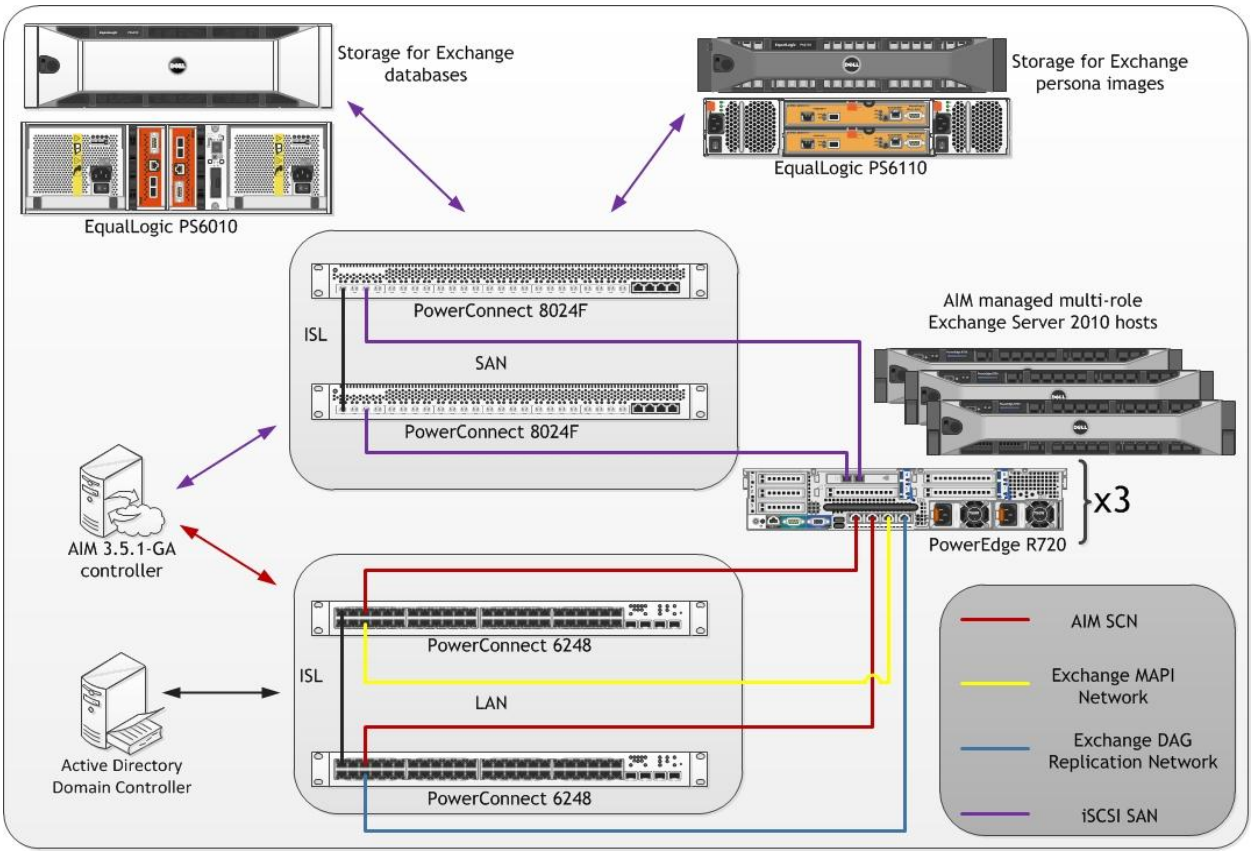
Reference architecture

To provide proof points for the time savings in repurposing a failed multi-role Exchange server in an environment managed by AIM, Engineers at Dell Global Solutions Engineering have designed an architecture leveraging 12th generation Dell hardware listed in Table-1. Figure-2 shows the topology of the setup in study.

Table 1. Major infrastructure components

	Hardware components	Description
Servers	3x PowerEdge R720 Rack servers	AIM managed servers hosting multi-role Exchange Server 2010 SP2
Switches	2x PowerConnect 6248	AIM managed LAN switches
	2x PowerConnect 8024F	SAN switches: Not managed by AIM
Network cards per server	1x Broadcom 5720 Quad Port 1Gb Network Daughter Card	LAN On Motherboard (LOM) used for SCN, Exchange MAPI and Replication Network.
	1x Broadcom 57810 Dual Port 10Gb Add-in Network Adapter	Connection to iSCSI SAN: booting Persona images and connecting to SAN based Exchange databases.
Storage	1x EqualLogic PS6110	Storage for Persona images.
	1x EqualLogic PS6010	Storage for Exchange databases.

Figure 2. Topology for Exchange in an AIM managed environment



The architecture consists of three PowerEdge R720 rack servers as AIM-managed compute nodes. At any given time, two of the servers are responsible for hosting multi-role Exchange Server 2010 SP2, while the third one acts as a stand-by server in the AIM-managed server pool. The specifics of the management networking (Integrated Dell Remote Access Controller (iDRAC), etc.) are not shown in the architecture.

PowerEdge R720 is a 2-socket, 2U rack server capable of running complex workloads such as Microsoft Exchange Server 2010. The R720 provides highly scalable memory, I/O capacity and flexible network options. Some of the significant features of the server include support for up to 24 Dual Inline Memory Modules (DIMMs); PCIe 3.0 enabled expansion slots and choice of Network Interface Card (NIC) technologies. With all these features, PowerEdge R720 is suitable for hosting a multi-role Exchange Server 2010 with Microsoft Windows Server 2008 R2 SP1 installation. For more information on PowerEdge R720 servers refer to the product information. The architecture design does not restrict the servers used for Active Directory Domain Controller and the AIM controller.

Network design

The network architecture implements the iSCSI SAN and SCN separation[2], an iSCSI SAN best practice supported in the AIM environment, by keeping SCN on the dedicated AIM managed Local Area Network (LAN) switches and having dedicated SAN switches for the iSCSI traffic. The SAN switches are not managed by AIM. The AIM controller is responsible for managing only LAN switches and the host ports connected to them. A 1Gbps bandwidth is sufficient for each of the SCN and the application networks, specifically Exchange MAPI and DAG replication. These three networks are designed to use the Broadcom 5720 1Gbps Quad-port LOM. Two ports are allocated for SCN, and one port each for MAPI and replication networks. MAPI and replication networks are configured as AIM-managed networks.

The Exchange persona connects to these AIM Networks through AIM network connections. The AIM-managed Exchange MAPI and Replication network connections are configured in such a way that hosts are manually assigned static IP addresses because static IP addresses on MAPI are required by the domain controller, and static IP addresses on the replication network are required by DAG. Redundancy for the MAPI and Replication networks is achieved with the help of the channel failover capability provided by AIM networks. The MAPI network is configured with the primary channel as 3 and secondary channel as 4, while the replication network is configured with the primary channel as 4 and secondary channel as 3. This provides additional redundancy at the NIC level for the Exchange networks. Since the iSCSI SAN is not managed by AIM, no channel allocation is necessary for the SAN. Separate Virtual Local Area Networks (VLANs) are used for SCN, Exchange MAPI and Replication networks. Table-2 shows suggested VLANs and channel assignments.

Table 2. AIM channel allocation and VLANs

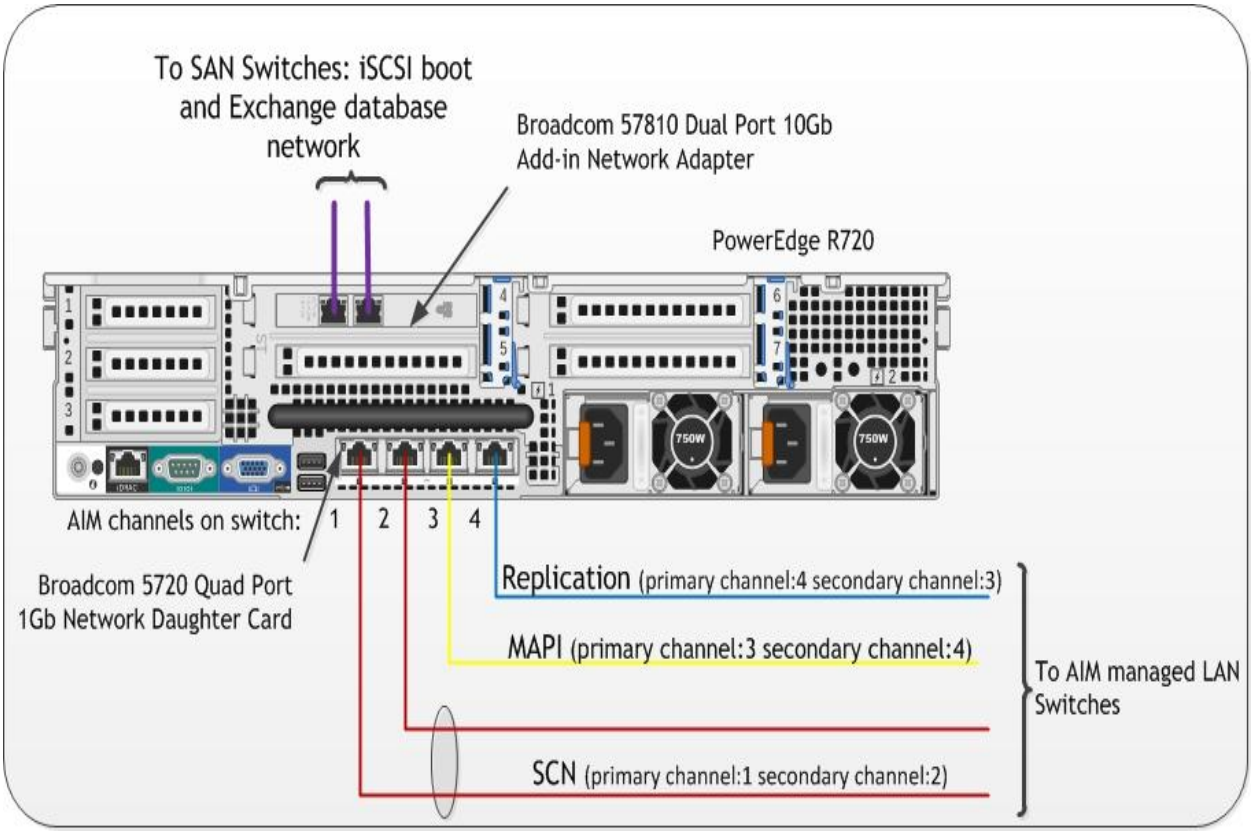
Network description	VLAN	AIM Primary Channel	AIM Secondary Channel
AIM SCN	4004	1	2
Exchange Public Network (MAPI)	X	3	4
Exchange Private network (DAG Replication)	Y	4	3
iSCSI SAN (Boot network + DB network)	N/A	N/A	N/A

[2] For more details, please refer the white paper describing implementation of iSCSI SAN and SCN separation.

The Exchange personas use hardware iSCSI to boot from SAN and are configured in trunk mode. When the persona network mode is set to trunk, each physical network interface on the persona is configured in a way that it can access multiple VLANs. This means that the AIM software agent will create tagged network interfaces on top of the physical interfaces in the OS and then configure all the networking settings required by the persona's network connections using those interfaces. Persona trunk mode is essential for providing redundancy at the network adapter level. A single network is used for Exchange databases and persona-boot, so that one instance of iSCSI SAN element suffices for both iSCSI boot and Exchange databases. The SAN switches are kept unmanaged as required for SAN separation by AIM. Figure-3 shows AIM channel allocation on the switch ports connected to the hosts.

The SCN and iSCSI SAN separation enables use of dedicated network for iSCSI storage. The iSCSI boot facilitates administrators to boot a server OS over an iSCSI based SAN, which simplifies the server management and maintenance of the server. In our study, the AIM personas boot using the Broadcom 57810. It is an iSCSI boot-capable network adapter that supports the iSCSI Boot Firmware Table (iBFT) format. One volume per persona image is allocated on the EqualLogic storage with access to the volumes controlled using iSCSI initiator name.

Figure 3. AIM channels and host networking.



Storage design

For the purpose of our study, only one EqualLogic PS6010 is used to store Exchange databases, and one EqualLogic PS6110 is used to store the persona images. During the study, sample Exchange databases are created with the Microsoft LoadGen tool to observe the effect on the database connections and states during the failover. One volume per Exchange database is created on PS6010, and one volume per persona image is created on PS6110. Consistent iSCSI SAN IP addresses for the iSCSI HBAs across the server pool are guaranteed by the iSCSI SAN element for hardware iSCSI booting of the persona.

Upon persona boot, the Microsoft software iSCSI initiator is used to establish connection to the Exchange database volumes. Access to these volumes is also restricted by iSCSI initiator name. The Exchange database volumes to be mounted on a persona server use the same iSCSI initiator name as that of the persona's image volume. Table-3 shows the storage volume layout for persona images and Exchange databases. The active copy of Database-1 and the passive copy of Database-2 are mounted on a persona with the image for Exchange Server-1. These volumes use the same iSCSI initiator name, as is done with the active copy of Database-2, passive copy of Database-1 and Exchange Server-2 volumes.

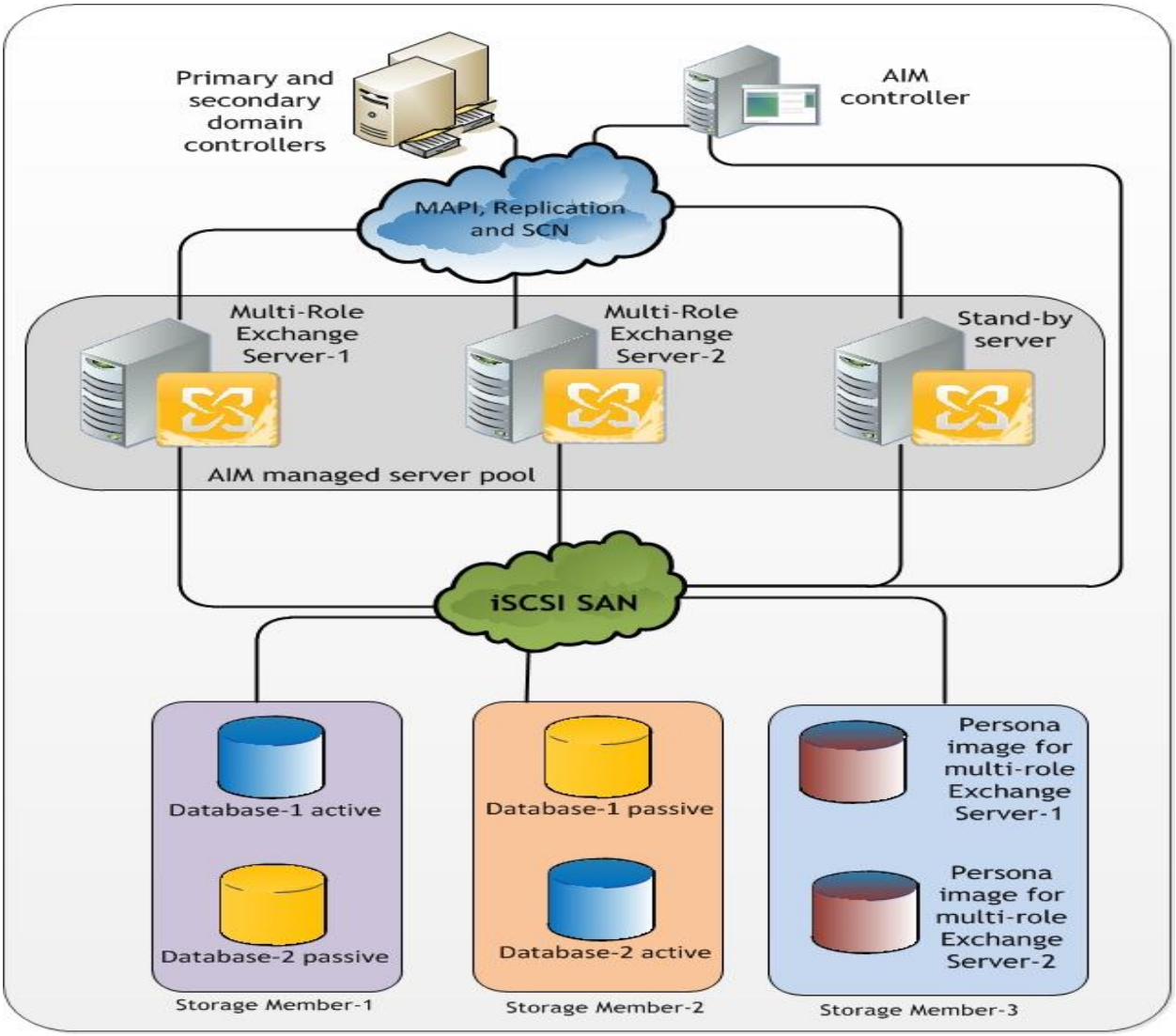
Table 3. Storage volumes: allocation and access

Volumes	Description	Storage	iSCSI initiator name
Exchange Server-1	Persona image: Windows Sever 2008 R2 SP1 with multi-role Exchange Server 2010 SP2 installation	EqualLogic PS6110	Exchange1
Exchange Server-2	Persona image: Windows Sever 2008 R2 SP1 with multi-role Exchange Server 2010 SP2 installation	EqualLogic PS6110	Exchange2
Database-1Active	Active copy for Exchange database-1	EqualLogic PS6010	Exchange1
Database-2Active	Active copy for Exchange database-2	EqualLogic PS6010	Exchange2
Database-1Passive	Passive copy for Exchange database-1	EqualLogic PS6010	Exchange2
Database-2Passive	Passive copy for Exchange database-2	EqualLogic PS6010	Exchange1

Improved Exchange availability with AIM

This section describes the failover scenario studied in the AIM-managed Exchange DAG, shown in Figure-4. Figure-4 is the logical representation of the reference architecture shown in Figure-2. The two-copy Exchange DAG example shown in Figure-1 is mapped in an environment managed by AIM and shown in Figure-4. Exchange Server-1 and Exchange Server-2 are network-booted servers whose boot image resides on Storage Member-3. In case of server failure, AIM can compensate for the failed server by rebooting its persona on the AIM managed Stand-by server. The OS and application no longer reside on the server hard-drives but are instead volumes carved out of a SAN. The Dell AIM controller manages the AIM environment. It runs on a dedicated server and communicates with the environment via managed network infrastructure. When a persona's boot image resides on network storage, the AIM controller can assign it to any appropriate network-bootable server, or retarget it to a backup server in case a server in the pool fails.

Figure 4. Exchange two copy DAG in an AIM managed environment



The Exchange DAG in the study is configured as follows: a two-copy, two-member Exchange DAG is configured in the AIM-managed environment. Exchange Server-1 hosts the active copy of Database-1 and the passive copy of Database-2 while Exchange Server-2 hosts the active copy of Database-2 and the passive copy of Database-1. Database-1 is mounted on Exchange Server-1 and Database-2 on Exchange Server-2. This is the original configuration of the DAG.

Failover scenario

The failure considered in the study is a server hardware failure. Exchange Server-1 is brought down using hard shutdown by holding the power button on the server, simulating hardware failure. The Exchange Active Manager finds that one of the DAG members has failed and hence the database mounted on this DAG member is no longer accessible and needs to be moved to its passive copy on Exchange Server-2. The Active Manager activates the passive copy of Database-1 hosted on Exchange Server-2. Thus, upon failure of Exchange Server-1, both the databases get mounted on Exchange Server-2. The DAG is in a degraded state as Exchange Server-2 is handling twice its normal workload.

The failed Exchange Server-1 needs to be recovered in order to remount Database-1. Recovering the failed server in a non-AIM environment may take a considerable amount of manual intervention and time. Keeping the DAG in degraded state for long period may increase risk of it failing. Essentially, Exchange Server-1 needs to be recovered in minimum amount of time, and made ready to host copies of Database-1 and Database-2, while further activating the Database-1 copy to re-instate the original DAG configuration.

The failure is simulated in the AIM-managed environment. The Exchange native HA comes into action first to activate the Database-1 copy hosted on Exchange Server-2. The AIM controller also detects that Exchange Server-1 is no longer functional with the help of a heart beat mechanism assisted by the AIM agent running on the Exchange Server-1 persona. Being SAN booted, the Exchange Server-1 image is isolated on the SAN and can be booted on any other server capable of network boot. Upon failure detection, AIM boots up the persona image for Exchange Server-1 on the Stand-by server in the pool and reconfigures corresponding switchports with VLANs required by MAPI and the replication networks, thereby recreating the network identity of Exchange Server-1. The AIM networks and the network connections help configure the host networking for Exchange Server-1. The stand-by server now is the retargeted and recovered Exchange Server-1 with the required networking configured.

Once the necessary Exchange and AIM services are ready, Exchange Server-1 joins the DAG. The logs are replayed on Exchange Server-1 to change the state of database copies hosted by Exchange Server-1 to *Healthy*. The databases are ready for re-distribution in order to restore the DAG's original configuration. To summarize the scenario: during failover Exchange native high availability acts first as the Active Manager detects the failure at the application level, including the cluster nodes. Simultaneously, AIM detects the server failure and brings up the SAN-stored persona on a stand-by host. AIM uses the System Control Network and user defined AIM-managed networks for managing switches and host networking. It configures the host networking and switch ports connected to the stand-by host to bring up the Exchange MAPI and DAG Replication networks. The stand-by host is now the re-provisioned Exchange server, which is ready for the database re-distribution. The re-distribution of databases can be automated through a script explained in the next section and detailed in the Appendix.

The AIM controller, by default, waits for 15 minutes for the persona services to respond, after which the controller upon no response retargets the persona. However, for a persona having workloads such as Exchange Server, it may take longer for the persona agent services to be functional upon persona boot. We recommend adjusting the persona boot timer accordingly. The persona boot timer for this study is set to twenty minutes. In order to customize the persona boot timer per the workload requirement, please refer to the method of setting the persona boot timer.

Automating the database redistribution

So far, AIM has helped in recovering Exchange Server-1, the failed multi-role Exchange server, without any manual intervention, up to a point at which the concerned administrator just needs to redistribute the active databases. Re-distribution of the active databases can also be automated leveraging the `RedistributeActiveDatabases.ps1` script provided with Exchange. In the study, during the DAG configuration, the active database copies are configured with an activation preference of 1, and passive copies with an activation preference of 2.

The `RedistributeActiveDatabases.ps1` can now be used with a `BalanceDbsByActivationPreference` switch and forced confirmation `–Confirm:$false` to

redistribute the databases automatically; thus achieving complete automation in recovering a failed multi-role Exchange server. A script to automate this process is shown in the Appendix.

Note: You may want to verify that the required host iSCSI, Exchange and AIM services have started and databases are healthy before running the `RedistributeActiveDatabases.ps1` script.

Measured improvements in Exchange availability with AIM

This section provides approximate numbers for time savings while restoring the DAG in the AIM environment. Clearly, restoring a failed multi-role Exchange server is easier and quicker in an AIM-managed environment than re-provisioning it in non-AIM environment. As a part of the study, a list of activities and associated timeline for manually deploying a multi-role Exchange Server is established to observe how long it would take to manually re-provision the failed server without any assistance from AIM. Major steps considered in that order while establishing the timeline are:

- Deploy/prepare server for OS installation.
- Install OS with required patches.
- Activate the OS with appropriate licenses.
- Preparation for Exchange.
- Configure MAPI and Replication host networks.
- Join the domain and reboot.
- Install Exchange prerequisites.
- Install Exchange Server 2010 SP2.
- Connect to the Databases.
- Resume Exchange database copies and redistribute active databases.

Based on the administrator's expertise, the time it may take to accomplish this task can range from few hours to a day. It would take longer if the server failure occurs during non-working hours. The same task can be accomplished in less than an hour in an-AIM managed environment with least manual intervention during any time.

Additional benefits of Exchange with AIM

The application failover capabilities can be extended to non-mailbox server roles, including the AD domain controller; to provide fault tolerance to all the compute nodes involved in the Exchange ecosystem. Apart from enabling workload failovers, AIM provides monitoring and managing capabilities at the infrastructure level. The Exchange compute and networking infrastructure can be monitored through a single management console. AIM provides a 'cable once and reconfigure repeatedly' kind of network environment. The LAN switches are completely managed by AIM, so the Exchange specific networks can be configured in minutes on multiple Exchange servers via single console without having to manually reconfigure the LAN switches.

The storage volumes can be kept ready for Exchange installation (referred to as "gold volumes"). The volumes can be cloned at the storage level; AIM personas and networks can be created on the fly to install new Exchange Severs. This process facilitates bringing up new Exchange servers in a scale-out scenario and creating an Exchange ecosystem quickly. AIM also facilitates role based access control to the infrastructure. These benefits provide proof points that the Exchange ecosystem can be better managed in an AIM environment.

Conclusion

Exchange on AIM presents an advantage to Exchange Server by minimizing the management overhead, while improving availability to the application. The primary function of AIM is to separate the OS and application from local disks and make them available to a pool of servers. If one server fails, AIM quickly brings up the OS and application on another server in the same pool.

The study described in this paper demonstrates the improved availability provided by AIM to an Exchange DAG solution, by reducing the time for which an Exchange DAG is in a degraded mode upon a server failure. The paper provides proof points for how quickly and effortlessly a failed server can be repurposed in a DAG and how the recovery process could be automated. It shows how AIM works in tandem with the Exchange native HA to help facilitate business continuity for an enterprise email system like Exchange server.

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Appendix

The script used in the study follows a simple approach for redistributing the active databases. A batch file is responsible for spawning the Exchange Management Console (EMC). A Windows PowerShell 2.0 script is used to retrieve the status of the mailbox databases to verify their readiness for redistribution and redistribute the databases across the DAG members based on their activation preference.

The batch file and the PowerShell script can be executed as a startup item on persona boot. You may want to consider a delay before executing the batch file. This delay is for the AIM persona agent services and Exchange services to start after the persona boot.

Sample batch file:

C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -noexit -command ". 'C:\Program Files\Microsoft\Exchange Server\V14\bin\RemoteExchange.ps1'; Connect-ExchangeServer -auto; c:\scripts\Redistribute.ps1"

Sample PowerShell script to redistribute the active databases: Redistribute.ps1

```
<#
      Sample script to redistribute active databases
      Should be executed with Administrator privileges
#>

#Extract the system info to retrieve domain specific information
$sysinfo=Get-WMIObject -Class Win32_ComputerSystem
#Location where the Exchange scripts are stored
$scriptsDir = 'C:\Program Files\Microsoft\Exchange Server\V14\Scripts'
cd $scriptsDir

#Set the excution policy for the shell
set-executionpolicy unrestricted

#Check the mailbox database status and take care of "Failed", "Failed and
Suspended" and "Suspended" states
$hostN = $sysinfo.Name
write-host "`nInitial Database Status:`n"
Get-MailboxDatabaseCopyStatus -server $hostN
Get-MailboxDatabaseCopyStatus -server $hostN |where-object {$_.Status -like
"Failed"} | suspend-mailboxdatabasecopy -confirm:$false
Get-MailboxDatabaseCopyStatus -server $hostN |where-object {$_.Status -like
"Failed and Suspended"} | resume-mailboxdatabasecopy -Confirm:$false
Get-MailboxDatabaseCopyStatus -server $hostN |where-object {$_.Status -like
"Suspended"} | resume-mailboxdatabasecopy -Confirm:$false

#Redistribute the active databases
.\RedistributeActiveDatabases.ps1 -BalanceDbsByActivationPreference -
Confirm:$false

#May want to wait before action to complete
start-sleep -s 30

#View the updated state of mailbox databases
write-host "`n`nUpdated Database Status:`n`n"
sleep -s 3
Get-MailboxDatabaseCopyStatus -server $hostN
```