# Microsoft Exchange 2013 on VMware
# Use Cases

vmware

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# 1. Introduction

The communication vehicles available to an organization have increased greatly over the past few years. Many organizations have adopted the approach of social networking to encourage conversation between employees and provide a more interactive experience. Although this new way of communicating is becoming more popular, email is still used as the main mode of communication. The term *email* has come to mean much more than just sending electronic mail between user mailboxes. Today, when someone says, "I need to get into my email," it can mean that they want to check their calendar, look for a document, obtain contact information, or even make a call. This stems from the way collaboration tools have become integrated and the proliferation of Microsoft Exchange.

Exchange is the most widely used email system in the world. The integration between Exchange and Microsoft Office, SharePoint, and Lync makes it a strong contender for new organizations looking for a core to their email and collaboration strategy. In established organizations, Exchange has been the communications engine for many versions, and it has met the requirements. With each new version of Exchange, enhancements to availability, performance, and scalability become compelling reasons to explore migration. Exchange 2013 continues the tradition with a new architecture, enhanced availability features, and further optimized storage I/O operations.

Even with the improvements, however, Exchange 2013 is still susceptible to the shortcomings inherent in most applications running directly on physical hardware, such as hardware platform dependence, underutilization of server computing resources, lack of flexibility to respond to changing workloads, and heavy costs associated with maintaining disaster recovery, test, and development environments. The architectural improvements in Exchange Server 2013 cannot fully address these limitations.

The ideal platform for Exchange adapts easily to changing workloads, provides flexibility to accommodate changing demands on an organization's IT infrastructure, remains reliable and resilient despite system outages, and improves both staff and infrastructure hardware effectiveness. A new operational platform based on VMware® vSphere® can accomplish these goals.

# 2. Microsoft Exchange on vSphere Use Cases

Many VMware customers running Exchange are already taking advantage of the benefits offered by virtualization to improve their organization's messaging capabilities and effectiveness. For organizations not already using vSphere, the path required to migrate from previous versions to Exchange 2013 presents an ideal opportunity to begin leveraging the power and flexibility of vSphere.

This section explores use cases that VMware customers have expressed as key areas where virtualization of Exchange has helped to increase agility and efficiency, achieve virtualization goals, and lower total cost of ownership. These use cases are presented along with examples to help provide additional context.

## 2.1 Efficient Use of the Latest Server Hardware

Multisocket, multicore, high-throughput processors are prevalent in datacenters today. Most applications cannot effectively leverage the processor and memory configurations that are seen as normal in the virtualization space. Consider the processors and memory that today's servers are meant to accommodate to make supporting a single application feasible. Scaling these back can lead to larger implementation footprints, higher capital and operational costs, and reduced RTO.

The latest generation of server hardware provides an overwhelming amount of processing and memory capabilities. For many organizations, particularly those not using virtualization, it is unlikely that the Exchange environment alone uses the full computing power of these systems, and this is before high availability, disaster recovery, and test and development environments are factored in. However, in many cases, the cost of filling all available processor sockets and stocking up on memory might not result in a substantial cost increase if you can utilize the resources. With vSphere, all available compute resources can be put to use.

For example, smaller Exchange 2013 deployments can benefit from server consolidation and still preserve a scaled-out high availability model. Larger environments can run very large Exchange virtual machines and benefit from the increased flexibility vSphere provides. Running multiple virtual machines on the latest server hardware is an excellent way to maximize the value derived from this new, more powerful hardware.

Exchange does not run in a vacuum. There are services that Exchange must have in proximity and services that require interaction with Exchange to function. It is often desirable to run services such as Active Directory, DNS, or mail hygiene appliances on underutilized compute resources. This allows you to further leverage hardware investments and reduce costs for deployment, maintenance, support, power, cooling, and floor space.

**Example**: During their design process this customer found that using the preferred server hardware (mid-range blade server with 16 cores and a minimum of 64GB memory), mailbox role CPU utilization during a failover event would consume only around 27% of the total resources available, according to the Exchange mailbox role calculator and the proposed processor SPECint2006 ratings. During normal operations the utilization would be well below their goal of running each physical server to at least 50% utilization. Additionally, the email environment required other services, such as archiving and backup, that would require additional server hardware if kept physical.

Rather than purchase non-preferred hardware and risk underutilizing their investment, the decision was made to virtualize the Exchange environment to allow them to more appropriately size the Exchange machines and use the additional resources for other services. This also allowed them to keep to their plan of deploying a database availability group (DAG) across two physical machines.

## 2.2 Maintain Role Isolation Without Additional Hardware Expense

Exchange Server roles can be consolidated, which is often an attempt to drive server utilization in physical environments. However, by deploying separate roles, maintenance, troubleshooting and scalability become easier without impacting the other co-located services. By contrast, maintaining this agility in a physical environment means that more hardware is generally underutilized.

The new Exchange 2013 architecture reduces the number of server roles with consolidation, much like earlier versions of Exchange. The five server roles that were introduced in Exchange 2007 and maintained through Exchange 2010 have been combined for better scalability, manageability, and availability. The server roles in Exchange 2013 are as follows:

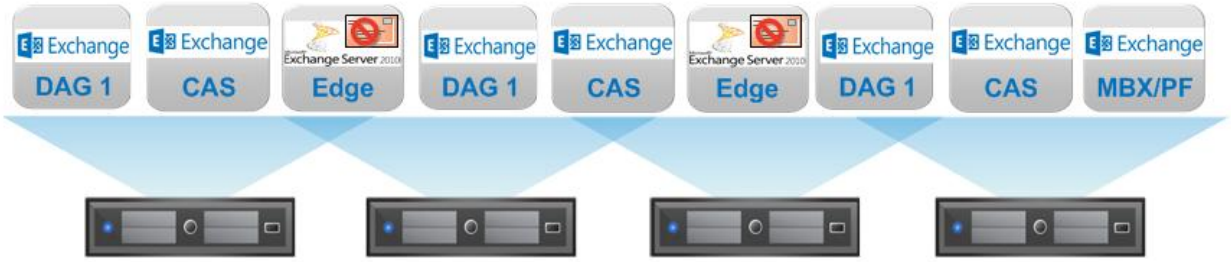
- Mailbox server role – The Exchange 2013 Mailbox server role combines the Exchange 2010 features of the mailbox, client access protocols, hub transport, and unified messaging roles. In Exchange 2013 the Mailbox server role handles all mailbox and public folder data and rendering of that data, mail transport to and from mailboxes and public folders, message hygiene, unified messaging features, and database availability features.
- Client Access server (CAS) – The Exchange 2013 Client Access server role continues to be the access point for all client communications such as Outlook, Outlook Web Access, and ActiveSync. Along with serving its client access functions, the Client Access server role is the entry point for email into the Exchange organization, however mail queuing and message hygiene functions are not performed at this layer.

**Note** The Edge Transport server role is not included in Exchange 2013, but was available in Exchange 2010. It might be used in an Exchange 2013 environment.

Although Microsoft recommends combining server roles (installing both the Client Access and Mailbox server roles on a single Exchange server), customers might nevertheless choose to deploy dedicated server roles. By deploying dedicated server roles, customers can patch, troubleshoot, and scale the environment much more efficiently than with multirole servers. For example, if a customer takes down a multirole server for maintenance, the mailbox databases are activated on another server that has been sized to take on the additional load, but the client access array has one less server for the same load. If the Client Access server role needs maintenance, active databases on the multirole server must be activated on other servers.

VMware does not provide specific guidance regarding multiple or dedicated roles. This should be a decision that takes into consideration process, maintenance, and troubleshooting, as well as established practices in the virtual infrastructure, such as virtual machine sizing. In either case, vSphere provides the flexibility to support any configuration an organization chooses to adopt for the Exchange 2013 environment.

**Figure 1. Exchange 2013 Server Roles in a Virtualized Environment**



**Example**: VMware IT supports many different client access protocols, including POP, IMAP, ActiveSync and Outlook Anywhere. The initial deployment of Exchange included multirole servers, as recommended. It was quickly determined that the resources required to support certain protocols were greater than expected and during spikes in activity were impacting the other services hosted on the same Exchange Server instance. Because of the difference in resource requirements, the decision was made to break out the server roles onto dedicated virtual machines. Without virtualization this architecture change would have required more hardware.

By dedicating Exchange Server instances for the Client Access server role, any spike in activity affects only the individual instance of Exchange Server and not any other service, such as mail transport or store.exe.

## 2.3 Design for Today's Workload

Sizing an Exchange environment is a guessing game. Even with the calculators available from Microsoft, architects must take into account future growth and how users interact with the system. These tools can provide a well-performing environment that suffers from being overprovisioned. In a physical deployment the resources are committed to Exchange, and idle resources are left to consume power and cooling with no return. Processor and memory resources built on vSphere can be monitored and fine-tuned at any time to meet changing performance requirements. The ability to adjust resources in this manner provides new levels of flexibility for Exchange virtual machines that are not possible without virtualization.

In a physical server-based Exchange deployment, there is a tendency to overprovision server resources because resources typically remain static until the next upgrade cycle of hardware provisioning. Projected increases in the number of Exchange end users through growth or acquisition can be difficult to estimate, but they still must be factored into server provisioning and sizing decisions.

In an attempt to avoid problems associated with a sudden increase in the mailbox size or population, system architects often choose to oversize physical server CPU, memory resources, and storage using arbitrary growth estimates. This can result in wasted computing capacity, as the resources of these servers are rarely fully utilized.

This problem can be avoided using vSphere. Initial sizing can be done using the recommendations based on Microsoft guidance. In production, real-world data can be used to evaluate the utilization of the environment and determine whether virtual machines can be downsized to provide resources to other workloads. Decreasing CPU and memory allocations to a virtual machine can be accomplished in minutes and requires only a reboot to take effect.

**Example**: A year after this customer completed their migration to a virtualized Exchange environment, the messaging team was told that there would be 500 users added to the environment due to a recent acquisition. The underlying vSphere environment had been sized to accommodate an additional 2000 users given the history of growth. However, the current Exchange environment was reaching its maximum capacity based on processor and memory utilization best practices. The spare vSphere capacity was used to house ancillary virtual machines that could be migrated or decommissioned whenever the resources were needed for Exchange.

To house additional users, the data, and the additional load, the messaging team decided to increase the number of virtual CPUs and memory per Mailbox server. Additionally they would add a single database per Mailbox server to accommodate the data imported from the user's legacy mailboxes.

This strategy allowed the messaging team to utilize server resources efficiently without committing idle resources to uncertain future growth. They were able to make necessary resources available and adjust to the business requirements.

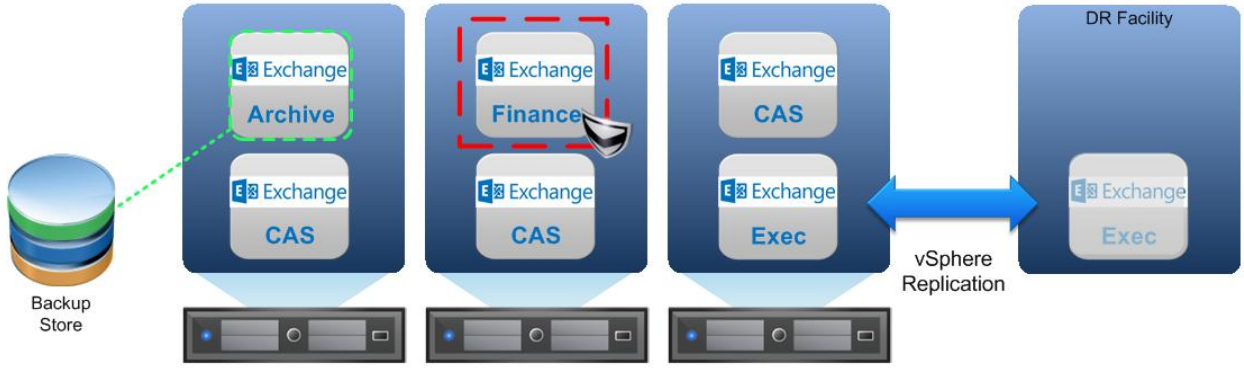
## 2.4 Design for Specific Business Requirements

Deploying Exchange 2013 with vSphere provides additional options to meet specific business and technical requirements of an organization's messaging environment. For example, Mailbox servers serving different regions or with different SLAs can be deployed on dedicated Mailbox servers, public folder servers do not need to be co-located with user mailboxes, and protocol-specific Client Access servers can be dedicated to accommodate stricter security measures.

There are multiple benefits to this approach:

- Support multiple levels of protection – deploy Mailbox servers in a DAG to protect user mailboxes, reduce costs by keeping shared and departmental mailboxes on non-replicated storage outside of the DAG, and isolate public folders.
- Multiple disaster recovery (DR) strategies can be maintained because each Mailbox server virtual machine can be matched with its own DR solution.
- If supporting legacy client access protocols, such as IMAP and POP, dedicated virtual machines can help provide better scalability and security.

**Figure 2. Adapt to Business Requirements**




**Example**: A customer in the retail industry supports many thousands of users with two distinct messaging profiles. The first is the corporate messaging profile, which is very heavy with each user sending and receiving over a hundred emails per day. Additionally, these users have smartphones, use both Outlook and Outlook Web App, and require a very high level of availability. The second messaging profile is for retail store employees whose email accounts are primarily used for corporate communications. These users receive fewer than 10 emails per day, have access only to Outlook Web App, do not use smartphones to access email, and would not be impacted with a few hours of downtime.

To provide an efficient support model, the messaging team decided to create a DAG for the corporate office users and standalone Mailbox servers for the retail store employees. All virtual machines are protected using VMware vSphere High Availability (HA). This model allows them to provide the features required by each set of users while keeping cost and infrastructure to a minimum.

## 2.5 Rapidly Provision Exchange Servers with Virtual Machine Templates

Virtual machine templates can speed deployment times by eliminating repetitive operating system installation and patching tasks. New virtual machines can deploy the core configuration in minutes,

allowing rapid provisioning of applications into production and the reduction of manual work required during deployment.

Deploying a new Exchange server can take many hours, including the time it takes to configure the hardware and storage, install the operating system and patches, and install the associated applications and updates. This process must be repeated for each server instance, which can result in very long deployment times, especially for large, complex architectures.

By contrast, a virtual machine template can be configured and stored once for each type of server in the environment, allowing Exchange administrators to keep a virtual library of all server images. This saves many hours when deploying new systems, especially in large Exchange deployments that support tens of thousands of mailboxes.

To save time and reduce outages in software troubleshooting scenarios, it can be faster to deploy a new virtual machine from a template, configure Exchange, add the new Exchange server to the DAG, and connect the existing virtual disks or raw device mappings to the virtual machine. After the databases are connected to the new virtual machine, database replication can bring the databases up to date, and active databases can be rebalanced to distribute the workload. The old virtual machine can be used for root cause analysis or can be decommissioned.

VMware vSphere PowerCLI™ is a powerful command line tool that lets you automate all aspects of vSphere management, including network, storage, virtual machine, and guest operating system. vSphere PowerCLI is distributed as a Windows PowerShell snap-in and includes more than 300 PowerShell cmdlets, documentation, and samples. For more information on vSphere PowerCLI, go to http://communities.vmware.com/community/vmtn/vsphere/automationtools/powercli.

**Example**: An Exchange hosting company uses vSphere to virtualize the entire hosted environment. New Exchange virtual machines are deployed weekly for new production environments, custom user portal testing, and various testing including Windows patches and Exchange roll-ups. To streamline the deployment of new Exchange virtual machines, they have pre-built templates that contain the operating system and latest patches, all Exchange prerequisite features, and software such as IIS, .NET Framework, and Office filter packs. Each deployed virtual machine also contains a set of scripts that perform post-deployment tasks such as adding the guest to the appropriate domain and organizational unit in Active Directory, installing monitoring and antivirus agents, and initiating the Exchange installation. This customer has been able to cut deployment times down to minutes instead of hours by being able to deploy multiple virtual machines in parallel and minimizing administrator interaction.

## 2.6 Reduce Costs of Maintaining an Exchange Lab

Using VMware virtual machines for your Exchange lab can dramatically reduce the amount of hardware required for functionality testing and eliminate the need for hardware that is identical to production. When the vSphere infrastructure is in place, provisioning new test environments for Exchange can take minutes rather than the hours or days it might take to rack and cable physical servers.

VMware virtualization is an excellent foundation for Exchange 2013 evaluation and testing. vSphere allows organizations to build a logical architecture that exactly mimics the production environment but requires a fraction of the hardware. The flexibility that virtualization provides enables organizations to use a more realistic, less error-prone testing process in developing and testing infrastructure designs. vSphere helps IT staff to avoid the lengthy reconfiguration tasks required in a physical server-based test lab. Post-rollout, a vSphere test lab provides an easy and affordable way to maintain a completely isolated test and development configuration that mirrors the production environment. This can yield valuable long-term benefits for continual testing, troubleshooting, training, and maintenance of Exchange 2013.

With VMware virtualization, you can begin evaluating Exchange 2013 with minimal hardware commitment and maximum flexibility. With today's server hardware, it is possible to configure dozens of independent

virtual machines on a single VMware ESXi™ host. Entire Exchange 2013 and Active Directory environments hosted on virtual machines can be staged on a relatively small number of physical servers to evaluate new Exchange 2013 features, test upgrades, and train users and IT staff.

Flexibility is a primary trait of virtual machines. Testing virtual machines on different hardware or storage platforms can be as simple as copying a few files. Testing varying memory or processor configurations requires only editing the virtual machine configuration. Testing patches and service packs can be controlled with VMware virtual machine snapshots and rollback capabilities.

**Example**: As this customer considered the business case for migrating to Exchange 2013, they decided to build a test environment that could be used by various groups within the organization to evaluate Exchange 2013 and test compatibility with business applications that tightly integrate with the current email environment.

To create the test environment with minimal expense, the customer used a recently decommissioned ESXi host updated to the latest version in use within the organization. With this single ESXi host, they were able to construct a complete test environment, comprising Exchange 2013 DAG members and Client Access servers, Active Directory, and Exchange 2007 servers, the version from which they were upgrading.

Using this approach, the customer was able to build a test environment that modeled the proposed production environment and allowed them to identify and remediate potential blockers before moving into a pilot phase.

## 2.7 Reduce Planned Downtime with vSphere vMotion

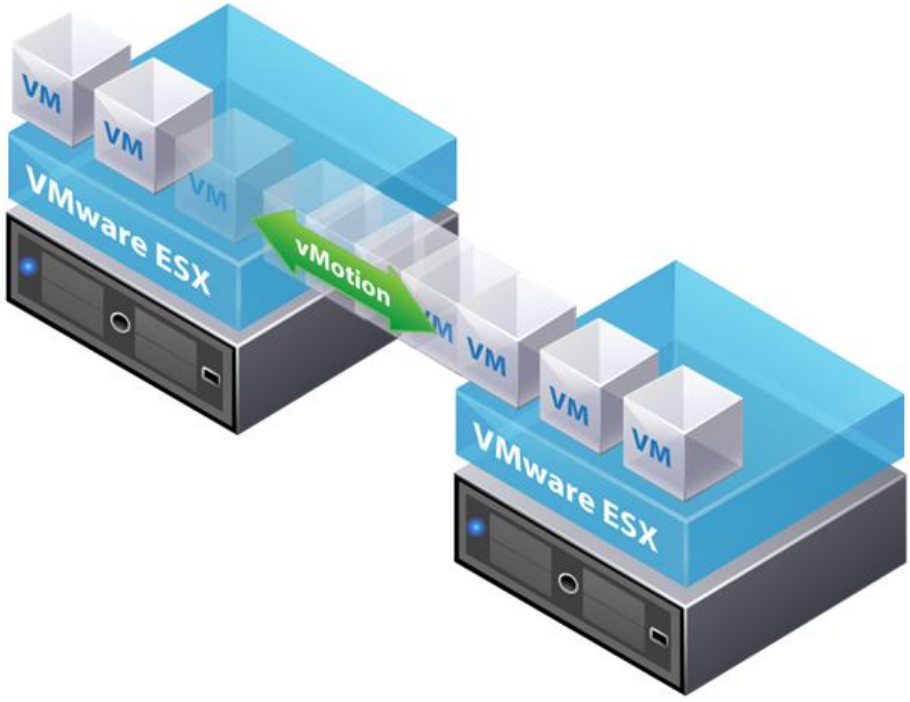
Virtual machines decouple the operating system and applications from the underlying hardware, allowing supporting infrastructure to grow and change rapidly. VMware vSphere vMotion® allows any virtual machine to be migrated across physical servers, even servers from different vendors with different hardware configurations. Planned downtime can be minimized, and a more flexible infrastructure enables the Exchange environment to be more resilient. In an environment without virtualization, this level of flexibility does not exist.

Due to the critical importance of Exchange within organizations and the care that must be taken when designing and deploying Exchange systems, Exchange deployments tend to be relatively static, meaning that the workload is more intimately tied to the hardware platform on which it runs. As a result, hardware upgrades to the messaging system infrastructure tend to directly correspond to the release and upgrade cycle of the Exchange application itself.

With the frequent changes that are sometimes required in the business world, the static nature of the Exchange system infrastructure can limit the ability to meet changing demands in the organization's messaging environment. For example, a massive influx of new email users or the addition of new services for devices such as Android, iPhones, and BlackBerry devices can require additional hardware and significant system re-engineering to support.

In contrast to a static, physical server deployment, VMware decouples the operating system and associated applications from the underlying server hardware. With vSphere vMotion, any virtual machine can be migrated between ESXi hosts with no interruption to service, as shown in the following figure. vSphere vMotion allows administrators to move Exchange virtual machines to more powerful hardware without outages or costly system re-engineering. This added agility allows the Exchange environment to change as the business environment changes. Planned downtime can also be minimized because Exchange virtual machines can be migrated to alternate hosts during scheduled hardware maintenance windows.

**Figure 3. Migrating Virtual Machines Across ESXi Hosts with vSphere vMotion**



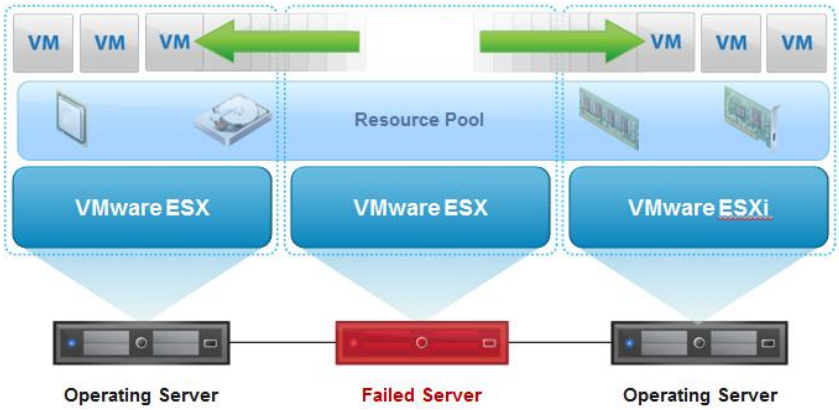

**Example**: As part of ongoing maintenance, this customer regularly performs hardware maintenance on their ESXi hosts. To accomplish this without disruption, hosts are placed in maintenance mode using VMware vSphere Distributed Resource Scheduler™ (DRS) to initiate vSphere vMotion migrations of virtual machines to other hosts in the cluster. After all virtual machines are migrated off of the host, hardware maintenance is performed. After completion the host is taken out of maintenance mode and is again available to run virtual machines. DRS rebalances the workload in the vSphere cluster as needed.

## 2.8 Reduce Unplanned Downtime

The vSphere platform can be leveraged to provide a wide range of availability options. vSphere HA provides protection from server hardware failure that is independent of the operating system or applications and works for every virtual machine running on vSphere. To aid in dynamic load balancing of Exchange virtual machines, DRS can be used to balance workloads automatically. Base solutions built on vSphere HA and DRS can be deployed with minimal configuration changes and provide a robust availability solution. These solutions can also be enhanced to provide higher levels of availability by combining them with load balancing and DAGs.

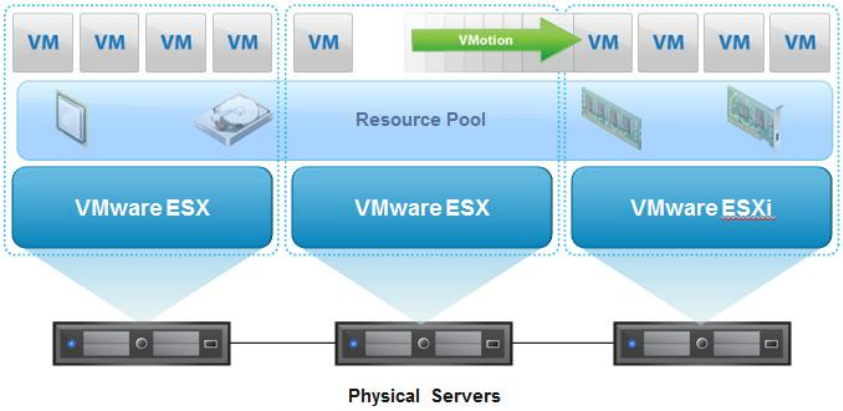
vSphere HA provides simple, low-cost protection for all virtual machines by protecting them from physical host failure. In the event of a hardware failure, vSphere HA automatically restarts all failed virtual machines on remaining ESXi hosts in the vSphere cluster, as shown in the following figure. This minimizes disruption to the Exchange environment. vSphere HA is straightforward to set up and protects every virtual machine, regardless of operating system or application, and without requiring complex clustering software.

**Figure 4. How vSphere HA Manages an ESXi Host Hardware Failure**




With DRS, virtual machines are dynamically load balanced across an entire pool of server resources. DRS collects resource usage information for all hosts and virtual machines and generates recommendations for virtual machine placement. These recommendations can be applied manually or automatically. DRS can dynamically load balance all virtual machines in the environment by shifting workloads across the entire pool of ESXi hosts, as shown in the following figure. This helps Exchange virtual machines to gain access to the CPU and RAM resources they need to maintain optimal performance.

**Figure 5. DRS Dynamic Load Balancing**




Solutions built using vSphere HA and DRS provide out-of-the-box high availability for the entire Exchange environment without requiring any additional configuration or software. For Exchange environments deployed with vSphere, the vSphere HA and DRS solution provides a new alternative that leverages the simplicity of standalone virtual machines and provides complete server hardware redundancy for every virtual machine, not just the clustered ones.

Along with protection from hardware failure, vSphere HA can provide operating system monitoring that extends protection into the guest operating system. When enabled for virtual machine monitoring, vSphere HA establishes a heartbeat with VMware Tools™, which is installed in the guest operating system, and which monitors the heartbeat. If there is failure in the heartbeat communication, vSphere HA then inspects network and storage I/O. If network and storage I/O has stopped, vSphere HA determines that the guest operating system has suffered a failure and restarts the virtual machine.

vSphere HA provides hardware and operating system failure detection. If application-aware high availability is a requirement, vSphere HA can be combined with DAGs to provide even higher levels of protection. A few examples for extending the vSphere HA and DRS solution are as follows:

- vSphere HA and DAG – A DAG can be protected at the infrastructure level using vSphere HA. In the event of a hardware failure that results in a DAG node also failing, mailbox databases are activated on another DAG node. vSphere HA powers on the failed DAG node on another ESXi host. The node then rejoins the DAG and brings passive databases up to date and ready for an administrator to rebalance the active databases. vSphere HA significantly reduces the time to resume full protection of the DAG.
- vSphere DRS and DAG – Geared towards simplifying maintenance, DRS allows vSphere administrators to perform intrusive maintenance on ESXi hosts without affecting running workloads. When an ESXi host must go down for maintenance, the vSphere administrator can place the host in maintenance mode. This triggers DRS to migrate running virtual machines to other hosts using vSphere vMotion. For Exchange administrators, this means that there is no longer the requirement to activate passive databases to prepare for host maintenance. DAG members are easily migrated to another host and migrated back after host maintenance is complete.

**Example**: A financial services company supports over 18,000 mailboxes for financial advisors and contractors. During the design phase of their Exchange environment, which was to be an upgrade from Exchange 2003, they evaluated deploying a DAG versus using vSphere HA. Some key considerations for the organization were deploying and supporting three copies of email data to support local high availability and disaster recovery, management overhead for additional copies of email data, and being dependent on clustering components that they had not done in the past.

This customer saw great value in using an operating system and application-agnostic solution for high availability across the virtual datacenter. Leveraging established maintenance windows for patching, they tested and practiced data recovery procedures which met SLAs. vSphere HA allowed this customer to successfully virtualize their Exchange environment without deploying database availability groups.

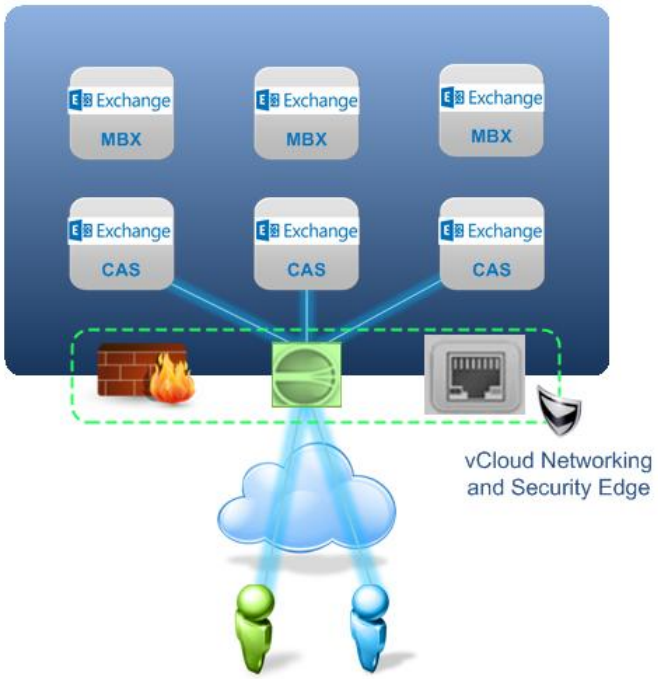
## 2.9 Load Balancing with vCloud Networking and Security

Traditionally, Windows Network Load Balancing (NLB) or hardware load balancers have been used in Client Access server load balancing. Microsoft recommends using Windows NLB only for small deployments and generally recommends using hardware load balancers. Windows NLB is not compatible with Exchange environments using multirole Exchange servers in a DAG. For environments that cannot use Windows NLB, or choose not to, VMware vCloud® Networking and Security Edge™ can provide load balancing using an integrated solution without the complexity and cost of implementing hardware-based solutions.

Exchange 2013 Client Access servers provide a single ingress point for all client connectivity, whether it is using Outlook Web App from a browser, the Outlook client, or ActiveSync devices. To provide high availability for the client access layer, multiple Client Access servers are deployed into a Client Access server array. Exchange 2013 does not provide a mechanism for distributing the load among servers in a client access array. High availability and load distribution are typically achieved using a hardware or software load balancing solution. Although Microsoft supplies Windows NLB with Windows Server, the recommended approach is to deploy a dedicated load balancing solution.

The VMware vCloud Networking and Security™ suite of security products includes components that can be utilized to achieve load balancing for Exchange 2013. vCloud Networking and Security Edge provides Layer 4 load balancing to provide an integrated solution that uses compute resources already available in your datacenter.

**Figure 6. vCloud Networking and Security**




**Example**: This customer has decided to deploy Exchange 2013 across two datacenters to provide both high availability as well as site resilience. To minimize the number of servers they must support, they have decided to use multirole Exchange 2013 servers in a DAG by installing the client access and mailbox components on a single virtual machine. Each site contains two Exchange 2013 multirole servers in a single stretched DAG. Both sites allow for incoming client connectivity and require load-balancing solutions.

The customer has used Windows NLB for load balancing in the past, but because the DAG requires components of Windows Failover Clustering, Windows NLB is not supported as a feature on these virtual machines. Hardware load balancers were considered but would require a pair of appliances per site to achieve high availability. vCloud Networking and Security Edge was chosen to provide highly available load balancing for the client access connectivity. With this solution the customer can utilize hardware resources available within the vSphere environment and can avoid the additional cost and maintenance of hardware load balancers.

## 2.10 Implement Simple and Reliable Exchange Disaster Recovery

vSphere simplifies Exchange disaster recovery by reducing hardware compatibility constraints and, through consolidation, the number of physical servers required at the DR site. Using VMware vCenter™ Site Recovery Manager™, disaster recovery testing can be performed with no impact to the production email environment. If a completely native approach is required, DAGs can be used, and they continue to provide all of the benefits of vSphere during a site failover.

An important benefit of virtualization is abstraction of the operating system and application from the underlying server hardware. This is extremely useful in disaster recovery scenarios because it eliminates the traditional requirement of physical server-based disaster recovery to provide identical hardware at the DR site. Any virtual machine can be brought online on any supported ESXi host without worrying about hardware or software compatibility. The ability to run multiple virtual machines on a single server also reduces the costs of a DR solution through consolidation of Exchange components and services on fewer

physical servers than would normally be required. Having all the necessary Exchange Server roles and Active Directory components running in virtual machines at a DR site can be achieved with minimal hardware and can help speed recovery in a disaster situation.

Using DAGs as a disaster recovery solution means another application-specific set of procedures during a disaster. Additionally, testing involves moving production users into the DR environment. Using vCenter Site Recovery Manager as a DR solution enables full testing of the DR plan with no impact to the production environment and provides an application-agnostic approach that can be used throughout the software-defined datacenter.

**Example**: VMware IT established goals for disaster recovery that included minimizing data loss, the ability to test recovery with minimal impact to production, and a consistent DR procedure regardless of the application. Using storage-level replication, the Exchange virtual machines are replicated to the disaster recovery site, located 1100 miles from the production datacenter, maintaining a recovery-point objective of less than two minutes. Having the virtual machines replicated to the recovery site allowed VMware IT to implement vCenter Site Recovery Manager to orchestrate the recovery of the Exchange virtual machines in the case of a disaster.

vCenter Site Recovery Manager was configured with recovery plans to protect each Exchange Mailbox server, allowing individual servers to be recovered and fully functional in the DR site within minutes. Recovery of individual servers or the entire environment can be tested at any time, with no impact to production. SRM has allowed VMware IT to continue to provide a highly available email environment using VMware technologies for both high availability and disaster recovery while achieving all of their DR goals.

# 3. Conclusion

The critical nature of messaging requires that any new platform chosen for hosting Exchange environments is as reliable and proven as the traditional physical server alternative. More than 100,000 customers worldwide use VMware products. More than 50% of VMware customers running Exchange have virtualized it for production. The vSphere platform has the maturity, stability, performance and functionality required to host Exchange 2013 infrastructures.

To meet the needs of a continually shifting business landscape, today's messaging environments must also be highly available, flexible, and cost-efficient. Using vSphere as the preferred platform for Exchange 2013 can help you better align your messaging environment to your business goals.

Features such as vSphere HA and DRS can decrease downtime associated with server hardware failure and allow for more rapid recovery of messaging services. By taking advantage of the hardware abstraction, vSphere vMotion greatly enhances the resilience and agility of your messaging system, allowing zero-downtime hardware replacements and upgrades, and the ability to quickly scale to changing workloads. Virtual machine templates streamline the deployment of Exchange virtual machines and greatly enhance efficiency in the development cycle.

Finally, vSphere helps to maintain a cost-effective Exchange 2013 environment by maximizing utilization of computing power through conservative resource requirement sizing and taking advantage of other physical server consolidation opportunities. The robust feature set of vSphere can help to reduce management costs as well, eliminating many mundane and repetitive tasks and freeing up IT administrators for other challenges that are strategically important to the business.

Go to http://www.vmware.com for more information, or contact your local VMware sales representative