



Virtualizing Business-Critical Applications: Microsoft Exchange

WHITE PAPER

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Virtualization continues to define the modern architecture of enterprise IT, establishing both a new model for how applications are run and a path to cloud computing. Still, some organizations are hesitant about migrating business-critical applications such as Microsoft Exchange to a virtual environment.

In this strategy brief, we examine the current state of business-critical application virtualization, particularly of Exchange: How pervasive is it? What is the market saying about the pace—and the wisdom—of this evolution? We discuss how the latest software and hardware advances have shifted the thinking about virtualization, and offer examples of organizations that have successfully taken this important step. Last, we present partners that can ensure a successful Exchange migration, and we discuss ways to maximize your newly virtualized landscape.

Virtualization Journey

You know it better than anyone: software is increasingly being operated in a virtual world. Consider these findings:

- At the close of 2011, estimates from VMware and independent market analysis concluded that customers had virtualized, on average, more than 40 percent of their workloads.
- These same studies estimated that customers would increase the share of workloads by approximately 10 percentage points annually.
- More than two-thirds of all server workloads will be running on virtual machines by 2014.
- Separate studies show that, beginning in 2010, there were more virtual servers deployed by enterprises globally than physical servers—indicating that customers had shifted to a “virtualization first” philosophy.
- The number of virtual machines used in the market for server workloads will grow by a factor of five between 2010 and 2015.

Clearly, virtualization is enabling many organizations around the globe to improve manageability, increase speed and agility, and shed costs—while serving as the clear foundation for cloud computing. Yet, despite this seismic shift, some have yet to migrate their most critical applications to a virtual environment. The reasons vary: business-critical applications are frequently governed by a complex set of internal teams with different goals, and the organizations are hesitant to risk the availability of core applications.

Why Virtualize Business-Critical Applications?

Business-critical applications are at the heart of an organization; their performance, availability and reliability are vital to the success of the business. As a result, organizations can be especially cautious about changing an application platform when that application is core to the business’s revenue generation or operational performance.

Yet the IT status quo, with its silos of application environments and spiraling operations costs, is becoming unsustainable. According to the research firm Forrester, companies are now spending 70 percent of IT budgets on application maintenance and updates (1)—a situation that is certain to change, given the premium placed today on reducing IT expenditures.

“Business-critical applications provide competitive advantage. The real risk for companies is missing the opportunity to innovate with IT and drive toward business agility.”

– CIO Magazine/IDG report, December 2011

Other research reflects this dynamic. In January 2012, IDC predicted that this year will see a phase of adoption characterized by needs and goals that differ significantly from those in past years—server consolidation chief among them (see Figure 1). This represents the market as a whole; the most forward-thinking of organizations are well ahead of this curve.

Moreover, an IDG Research study published by the CIO Custom Solutions Group in late 2011 demonstrated that virtualization of business-critical applications has become a mainstream trend across the market. IDG surveyed 300 corporate decision makers at enterprises around the world, exploring the experiences of enterprises that have virtualized business-critical applications—packaged and custom—and determining which benefits these companies have realized as a result. IDG’s findings included these points:

- There is overwhelming support among business and IT leaders for taking business-critical applications to the next level in preparation for the cloud era.
- Enterprises that have virtualized their critical applications are getting excellent results:
 - Sixty percent reported improved quality of service—including increased efficiency, improved business continuity and less downtime.
 - Sixty percent reported reduced total cost of ownership.
- Of the respondents, 78 percent agreed that when critical applications were virtualized, their IT teams became more agile, and 75 percent agreed that their overall business has become more agile.

Why Virtualize Microsoft Exchange?

We’ve discussed the current thinking about virtualizing business-critical applications in general. Let’s turn now to the central question: Why virtualize Exchange? And perhaps just as important: Why now? Have the facts changed?

In a word: yes. First, we’ll examine how the evolution of Exchange 2010, VMware® vSphere® 5.0 and the latest hardware is affecting the virtualization equation. Then we’ll present the key reasons to virtualize Exchange, accompanied by the case study of a major company that has done so.

Significant Improvements in Exchange 2010

As its adoption in the marketplace continues, Exchange 2010 is proving to be much easier to deploy and operate than its predecessors. Moreover, the dynamics of deploying Exchange 2010 are shifting dramatically in ways that align well with the benefits offered by the vSphere platform. Architectural improvements of Exchange 2010 on a 64-bit platform have drastically improved memory use and reduced disk I/O load—addressing two key shortcomings of Exchange 2003 and 2007. In addition, Microsoft has added many features that improve messaging performance, reliability and scalability. These improvements provide a major step forward.

However, Exchange 2010 is still subject to many of the shortcomings inherent in most applications running directly on physical hardware—including hardware platform dependence, underutilization of server computing resources, lack of flexibility to respond to changing workloads, and high costs associated with maintaining disaster recovery, testing and development environments.

RECENT UPDATES IN MICROSOFT POLICIES

Organizations considering the virtualization of Exchange should be aware of these two recent policy updates from Microsoft:

- Support for Exchange 2010 running on VMware infrastructure/vSphere** – VMware ESX® 3.5 Update 2 was the first hypervisor to be listed under the Microsoft Server Virtualization Validation Program (SVVP). This certification ensures that VMware customers who run ESX 3.5 Update 2 or later (including vSphere), Windows Server 2008 and Exchange Server 2007 SP1/Exchange 2010 have access to cooperative technical support from Microsoft and VMware. Additionally, if escalation is required, VMware can now escalate mutual issues rapidly and work directly with Microsoft engineers to expedite resolution.
- Relaxed policies for application license mobility** – Microsoft has updated its licensing policy for 41 server applications, including Exchange, to accommodate their use in a virtual environment more effectively. The application licenses are still tied to a physical server, but Microsoft has removed the clause that restricted reassignment of an application license between servers to once every 90 days. With this change, you can remain compliant while performing virtual machine migration (VMware vSphere vMotion®) and high availability in a virtual environment (vSphere High Availability), without the need for excessive application licenses.

Latest Hardware Exceeds Requirements

Advances in hardware—such as dual- and quad-core processors, higher memory density and advances in storage technology—are far outpacing the performance requirements of even the most intensive applications, including Exchange. This is especially true when those applications are virtualized and hardware resources are being utilized at an optimal level.

vSphere 5.0 Boosts Performance

VMware has met improvements in Exchange 2010 and server hardware technology with significant advances in vSphere 5.0 (See Figure 2). These performance enhancements include:

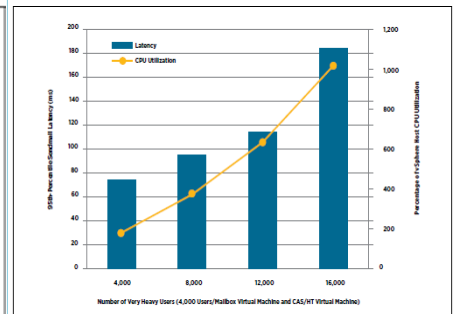
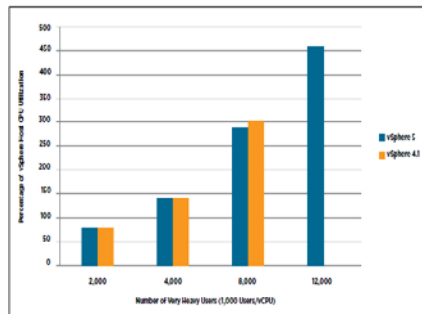
- 32 vCPUs per virtual machine (Microsoft’s recommended maximum is 12 vCPUs for standalone and 24 vCPUs for multirole)
- 1TB of memory per virtual machine
- More than a million IOPS supported on a single VMware ESXi™ 5 host

Testing of Exchange 2010 in virtual operation was completed with Microsoft’s Jetstress and LoadGen tools, the standards for Exchange performance analysis. These tests show that performance for a virtualized Exchange server is comparable to a nonvirtualized server running on the same hardware.

Figure 2. vSphere 5 Performance of Exchange 2010

vSphere 5 Performance of Exchange 2010

- **Single VM scale-up test @ 1000 users per vCPU**
- **5% CPU utilization reduction for 8 vCPU VM in vSphere 5**
- **Linear CPU utilization increase up to 12,000 users**
- **Multi-VM scale-out test @ 4000 users per mailbox VM**
- **16,000 users across 4 x 4vCPU/28GB VMs had a Send Mail latency of 184ms**



Compelling Reasons to Virtualize Exchange

Taken together, these software and hardware advances mean that a virtualized Exchange environment results in powerful benefits:

- Better availability** – Virtualization holds enormous advantages over physical infrastructures with regard to availability. Virtual machines that reside on the same physical server share underlying hardware resources but are completely isolated from each other—as if they were physically separated. This means that if one virtual machine experiences availability problems, it does not affect the availability of applications running on the other virtual machines on the server. And if the underlying hardware itself experiences performance or availability problems, live applications migrate automatically from one physical server to another with no interruption in service.

INTERMEDIA GAINS AGILITY AND STABILITY—WHILE REDUCING RISK

Challenge: New York-based Intermedia—the world's largest hosted Microsoft Exchange service, with more than 320,000 users—wanted to simplify datacenter management, ensure customer uptime, and gain business agility to scale rapidly and deploy new services as the company grew.

"We are continually deploying new infrastructures, and there was a high cost associated with time spent in a datacenter 3,000 miles away," says Brent Rich, Intermedia's vice president of operations. "In contrast, moving toward a cloud-based infrastructure on the VMware platform, we can deploy as much resource as needed in a prebuilt environment—and not have to send someone back to the datacenter just to install a server."

Solution overview: Intermedia virtualized its deployment of Microsoft Exchange 2010 on the VMware platform, designing its virtual infrastructure for fast scalability and high redundancy to ensure uptime:

- In each of the two datacenters hosting Exchange 2010, the company built four quadrants of VMware ESX clusters; each cluster has 15 servers, totaling 60.
- Each corner of the quadrant architecture is completely redundant—with its own physical servers, storage and networking—and designed to run at 35 percent capacity or less.
- Front-end services lie on the two top quadrants; on the bottom, Intermedia replicates Exchange databases between sides using a database availability group (DAG).
- The vMotion feature of vSphere enables Intermedia to move virtual machines among these redundant resources in the event of failure, or to dynamically adjust to changing load conditions.

"VMware software allows us to increase redundancy by abstracting the application away from the underlying hardware," Rich says. "The only way to have true five nines is to have that level of redundancy. The business benefit is that VMware virtualization reduces risk."

Although application-level clustering has been the prevalent solution for most Exchange implementations, virtualization with the vSphere platform can enhance the overall availability of Exchange by providing options that help to limit both planned and unplanned downtime. In fact, the features provided by vSphere may satisfy the availability requirements of many organizations, eliminating the need to follow traditional clustering approaches. For other organizations that require a greater degree of availability, application-level clustering can be combined with vSphere High Availability features to create an extremely flexible environment, with options for failover and recovery at both the hardware and application levels.

- **Higher quality of service** – A major challenge facing Exchange owners today is the ability to maintain service levels. Service-level agreement (SLA) issues include drops in performance due to unplanned growth, and applications that do not scale in any direction quickly, much less dynamically. Virtualization addresses these challenges: performance and capacity can be managed in a far more proactive and predictive manner, and applications can easily be scaled on demand. By running all Exchange server roles, including the mailbox server, on vSphere 5.0, you can exceed the performance of physical servers, and multiple mailboxes can be scaled out on larger, multicore servers to increase overall throughput.
- **Faster time to market** – Delays in bringing new applications to market can result in significantly higher deployment costs. Virtualization increases the speed and agility with which you can test and deploy, and with automated provisioning, time to market can be reduced from the usual period of months to a matter of hours.
- **Consolidation and lower costs** – By virtualizing, the Exchange infrastructure can typically be consolidated by a factor of 5 to 10 compared with a physical environment. And by reducing the amount of hardware required to run your Exchange environment, you can save money not only on the hardware itself but also on the related power, cooling and management costs.

When to Deploy?

For many organizations considering virtualizing their Exchange landscape, the question of "if" is closely tied to the question of "when." Although each company is different, certain triggers create opportunities for virtualizing Exchange applications:

- **Hardware refreshes** – If you're looking into purchasing new hardware—because your existing hardware is coming off lease or its maintenance is finished—it is a good time to also look into virtualization. Deploying virtualization on the latest chipset greatly enhances performance.
- **Data platform changes** – Virtualization is becoming a high-profile item on chief information officers' agendas, as they examine how to reduce the cost of their database architecture across their applications.
- **Database migration** – This is a major technology change and most likely involves a change in hardware. It makes sense to further reduce your operating costs, not just the capital expenditures, by changing your database and virtualizing at the same time.
- **New Exchange installations** – In hindsight, deploying a new landscape or a new module on physical hardware might be viewed as a missed opportunity to gain a new set of competitive and cost advantages. Your implementation can proceed much more quickly when you don't have to deal with physical servers.
- **Upgrades** – Virtualizing is a perfect way to help speed up Exchange upgrade projects. You can reduce the costs in the rollouts by virtualizing those projects immediately and then putting disaster-recovery technology around them.
- **Disaster recovery** – Many companies still use tape or disks (or both) as their backup for catastrophic failures; having a virtualization solution in place for disaster recovery is a major step in automation.

INTERMEDIA GAINS AGILITY
AND STABILITY—WHILE
REDUCING RISK - CONT

Results:

- **Improved agility** – Rapid provisioning enables scalability for business growth and fast response to business opportunities.
- **Reduced risk** – 99.999 percent availability achieved through redundancies is gained by abstracting applications away from physical hardware.
- **Streamlined IT management** – Virtualization eliminates time and cost of physically managing a datacenter 3,000 miles away.

Today, Intermedia runs five Exchange 2010 domains hosting more than 115,000 mailboxes in two datacenters in California and New Jersey. It plans to open two additional datacenters in the near future. The company also hosts approximately 200,000 mailboxes on legacy versions of Exchange that have not been virtualized. Moving forward, all new deployments will be on the virtual platform.

“We rely on VMware technology, and not just for consolidation benefits; we’re really using it for management ease and business agility,” Rich says. “It also supports us to meet uptime SLAs, and success has proven that we can virtualize even our core Exchange 2010 application with confidence.”

Getting Started with VMware Professional Services

So, how to begin? Whether you’re still undecided about migrating Exchange to a virtual environment or you’re ready to deploy, the VMware Professional Services organization is an ideal partner. Its Business-Critical Application Virtualization Services provide the expertise and solutions needed to design your requirements for availability, performance and other parameters into the framework—before you build—reducing risk and deployment time, and increasing ROI.

Best Practices, from Discovery to Optimization

Your VMware Professional Services team of experts can take you through each stage of the development cycle, from initial discussions through optimization, shown in the following list. Some organizations will want to start with the initial discovery stage; others that are further along in the development cycle might consider engaging the Professional Services team in the assessment or planning stages.

- **Discover** – Our Virtualization Advisory Workshop is perhaps best suited for customers who are unsure whether to move forward with virtualizing Exchange, or certain components of it. During the workshop, our consultants present best practices and available solutions, perform a high-level evaluation of your company’s current state and requirements, and outline a virtualization road map. The workshop can be expanded to include a deeper analysis, including a review of architecture options, proposal of a solution and analysis of risk.
- **Assess** – There are two options within this service:
 - **Virtualization Accelerator Service** – This option is ideal for customers who have gained support for virtualizing Exchange, and are now ready to demonstrate feasibility to other key stakeholders. Our experts work with your team to install and test a single virtualized Exchange workload in a preproduction environment, providing solution validation as well as insight and knowledge related to implementing and managing a virtualized Exchange environment.
 - **Virtualization Assessment Service** – The Business-Critical Application Virtualization Assessment Service for Microsoft Exchange is intended for customers who need help developing a road map for their specific Exchange initiative, validating or defining related requirements, and defining an Exchange virtualization architecture framework. VMware consultants work with your team to evaluate your current environment—people, processes and technology—and help to determine your specific path to successfully designing, implementing and operating a virtual Exchange environment.
- **Plan and design** – This step is intended for organizations that already have well-defined requirements and executive support to virtualize Exchange, but lack the staffing, experience or expertise to develop detailed production-ready design specifications. Our consultants help you employ best practices to ensure successful virtualization of your Exchange infrastructure.
- **Deploy** – This service is ideal for organizations that have completed the plan and design process and would benefit from expert guidance on the implementation process. Using best practices, our virtualization experts install, configure and perform extensive system testing on the virtualized environment to support the rigorous requirements of your Exchange applications. They conduct extensive system and QA testing and provide production migration assistance and oversight, helping to expand your team’s knowledge while keeping the project on track.

RAYMOND JAMES AND VMWARE PROFESSIONAL SERVICES DEPLOY A SUCCESSFUL UPGRADE

Challenge: For financial services giant Raymond James, Microsoft Exchange applications are a critical, high-profile technology. The company manages about 1.9 million accounts across 2,300 locations in the United States, Canada, Europe and Latin America. Without Exchange, this would be impossible. And because the company operates in a highly regulated industry, it must ensure that its email servers meet mandatory governance and data security standards—placing a high premium on maintaining a stable, safe and highly available Exchange environment. Recently, the company decided to upgrade from Microsoft Exchange 2003 to 2010, and it turned to VMware.

Solution: Once the company had completed an initial design, it invited the VMware Professional Services organization and a VMware Technical Account Manager (TAM) to perform an architectural review. The VMware TAM was able to identify the right technical resources to review the scope of the project and guarantee a successful execution.

“With the Professional Services team, there was a significant value-add to the VMware architectural review process,” notes Sue Werner, systems engineer, Raymond James. “They caught issues early on, before we began building the environment, which kept downstream reconfigurations to a minimum. They also helped us feel more confident in our design decisions.”

- **Optimize** – This service is ideal for customers who have virtualized Exchange and want to maximize value. VMware consultants perform a full health assessment of your virtualized Exchange environment: analyzing and reviewing operational elements, developing a scorecard, and providing actionable recommendations to tune the virtual environment for efficiency, stability and future growth. VMware consultants can also provide advice and operational assistance to help increase your team's knowledge of current best practices and bridge any gaps in skills.

Throughout the process, our reliable, repeatable methodology and seasoned consultants help reduce risk and downtime, accelerate your deployment, and ensure first-time success.

Additional Resources

These additional services can help organizations cultivate and foster the growth of their virtualized platform:

- **VMware Accelerate™ Advisory Services** – This VMware organization consists of former CIOs, CTOs and industry consultants who are experts at uncovering hidden barriers, identifying opportunities and formulating value-centric business strategies for accelerating transformation initiatives.
- **VMware Technical Account Management Services (TAMs)** – Available through the Professional Services organization, TAMs are cross-functional VMware experts who develop a thorough understanding of your IT and business objectives and help you accelerate the return on your VMware investment.
- **VMware Education Services and certification programs** – These offerings help you build and recognize the in-house skills needed to effectively design, operate and develop your virtualized business-critical environment.
- **VMware Authorized Training** – This training gives you the skills and confidence to handle enterprise-level deployments of vSphere. It is available at more than 600 locations worldwide, either directly from VMware or at one of more than 200 VMware Authorized Training Centers.
- **Free online training** – VMware also offers free online classes in virtualizing Exchange. For more information, visit the VMware Training page or go to <http://mylearn.vmware.com/register.cfm?course=131407>.
- **VMware Partners** – The network of VMware service partners is an excellent resource for helping you move forward with Exchange virtualization. We've brought together a broad range of technology and service partners—more than 25,000 of them—and your VMware account representative can recommend specific ones to serve your needs best.

RAYMOND JAMES AND VMWARE
PROFESSIONAL SERVICES DEPLOY
A SUCCESSFUL UPGRADE, CON'T

Results: The company immediately began realizing the benefits of a virtualized Exchange environment:

Manageability - The team uses the vSphere Distributed Resource Scheduler™ (DRS) to dynamically allocate its mailbox server loads across its ESXi hosts. This helps automate management tasks associated with load balancing, providing a resource-efficient way to support high availability.

Consolidation - The virtualized environment requires far fewer servers than would have been necessary had the team remained with a conventional server platform. "We would have needed 40 physical servers," Werner notes. "Instead, we required only 6."

Flexibility - Leveraging vMotion technology lets the team migrate servers between hosts so that maintenance tasks don't impact Exchange application availability. Also, with much faster server restarts, Werner's team can get more done during maintenance windows.

Reduced risk - The new Exchange environment's disaster-recovery processes have performed flawlessly as well, validating the data replication functionality of VMware vCenter™ Site Recovery Manager™ technology.

Scalability - "One of our overall goals is to support a more agile environment," says Werner. "VMware virtualization allows us to scale up rapidly if the business requires it."

"Implementing our new Microsoft Exchange environment has further validated the benefits of VMware," Werner concludes. "It has enabled us to make significant progress toward our virtualization goal."

Maximizing Your Virtualized Exchange Environment

Once you've virtualized Exchange, how can you fully optimize and maximize the investment? There are many options; here are two examples:

- **Business continuity and disaster recovery** - vCenter Site Recovery Manager (SRM) 4.0 provides business continuity and disaster-recovery protection for virtual environments—an especially important consideration for Exchange. Disaster-recovery testing using physical servers can be difficult because it is usually very disruptive, expensive in terms of resources, and extremely complex. By leveraging virtualization, SRM addresses this problem while making planning and testing simpler to execute.
- **Proactive management of performance across the entire infrastructure** - Traditional tools and processes designed for fragmented, static physical infrastructures don't provide the automation and control you need to effectively manage highly virtualized and private cloud environments. VMware vCenter Operations Management Suite™ provides automated operations management using patented analytics and an integrated approach to performance, capacity and configuration management. Tightly integrated with vSphere, vCenter Operations enables IT organizations to get better visibility and actionable intelligence to proactively ensure service levels, optimum resource usage and configuration compliance in dynamic virtual and cloud environments.

Conclusion

We are at a crucial point in the virtualization of Exchange applications. Organizations are being driven forward by a business environment that demands ever-greater agility and stability, with reduced risk and cost. This demand comes at a time when the common arguments against virtualizing Exchange—insufficient performance and the risk of not meeting service levels—have faded in the face of recent advances in software and hardware.

Depending upon where you are in the decision cycle, we encourage you to consider one of these next steps:

- **If you are considering virtualization for Exchange and want to learn more** - Schedule a Virtualization Advisory Workshop. This workshop helps you understand what is required in virtualizing Exchange and discusses the risks, best practices and a high-level transformation road map.
- **If you are ready to embark on Exchange virtualization** - Contact VMware Professional Services, and we will work with you to begin the journey.

With the resources provided by our Professional Services teams and partners, VMware can help you advance your virtualization initiatives and enhance your IT agility—all while maintaining your organization's required service levels.

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