



Getting the Most out of Virtualization — EMC Consulting Virtualizes Tier-One Enterprise Apps

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Management Summary

Server virtualization is a major innovation sweeping the enterprise IT landscape. It is driving cost and resource efficiencies that were heretofore unseen, especially for x86 server platforms. Virtualization even lays a foundation for improved service levels to the business, providing for new ways to think about high availability and disaster recovery.

However, this wave of server virtualization still has more ground to cover. **Enterprises have virtualized only about a quarter of their server infrastructure at this point. They tend to virtualize second-tier applications, but stop short of virtualizing tier-one, mission-critical applications like databases, e-commerce, and messaging.** What is hindering them from extending virtualization further? Concerns rooted in the past about application performance and vendor support in a virtual environment still resonate, though they largely have been addressed today. **Most importantly, enterprises want to know they are “doing it right” when virtualizing mission-critical applications.**

This is where EMC Consulting enters the picture, with a service for virtualizing enterprise applications, like Microsoft’s *Exchange Server*, *SQL Server*, and *SharePoint Server*. EMC Consulting can close any skill or resource gaps and accelerate the transition. EMC Consulting brings to the table expertise in both applications and virtual environments to optimize the deployment and to help enterprises get the most out of server virtualization. Read on for details.

Understanding Server Virtualization

In many ways, server virtualization came along at just the right time. Enterprise data centers faced many challenges and constraints that server virtualization helped alleviate.

- **A proliferation of servers** with dedicated applications running at low utilization (e.g., 10 to 20%).
- **The difficulty of managing** hardware and software in such a fragmented environment.
- **The high cost to power and cool** data centers, as well as IT’s rising proportion of energy consumption in modern societies.
- **Data centers at maximum power load**, and unable to draw more power from the grid
- **Data centers at maximum physical capacity**, forcing enterprises to consider expensive new data center construction.
- **Rising requirements** for computer processing, network bandwidth, storage, and high availability – juxtaposed against flat or declining IT budgets.

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Virtualization enables multiple software applications to run on a single physical platform, so an enterprise's applications can run on a fewer number of more highly utilized servers. This represents a fundamental leap forward in IT efficiency. Virtualization addresses the cost, power, space, and management issues listed above. It also lays a foundation for common backup, recovery, and site resiliency processes across all applications – making these processes more effective and easier to manage.

You could say server virtualization is the best thing since sliced bread. As a loaf of bread becomes more useful when it is sliced (to make sandwiches, toast), so a physical server becomes more useful when it is virtualized – or partitioned into virtual machines, each of which can run a discrete operating system and application.

The main components of server virtualization are:

- **Host** – Physical server being virtualized.
- **Hypervisor** – Software layer that abstracts and virtualizes the host.
- **Virtual machine (VM)** – Self-contained virtual server.
- **Guest** – Operating system that runs in a virtual machine, such as *Windows*, *Linux*, and *UNIX*. The guest can be a desktop OS in a virtual desktop solution.
- **Applications** – The same software that runs on a physical server, but now runs in a virtual machine.

From a physical point of view, everything about the server looks the same, though you might hear it hum a little louder because more is going on inside! The hypervisor is managing the system's resources and allocating them among multiple VMs. Whereas traditionally only one application and operating system ran on a single host, now that host can run multiple VMs, with each VM running a dedicated, self-contained application and OS. Therefore, the server is utilizing more completely its resources, and thus is doing more work. Moreover, the 64-bit processing platforms with multiple cores and extra memory that are available in servers today mean the hypervisor has ample resources to share among the VMs. Mainstream server virtualization products include VMware *vSphere*, Microsoft *Hyper-V*, and Citrix *XenServer*.

Benefits of Virtualization

Virtualization targets the problems associated with a proliferation and underutilization of standalone servers filling up enterprise

data centers. These tend to be x86 platforms running a single application in a *Windows* or *Linux* environment. Due to their relatively low cost, enterprises have purchased them on an ad hoc basis to meet evolving application needs. So, they have proliferated over time. Older servers are typically underutilized, often at about 10 to 20% of capacity while over-consuming power, cooling, and data center floor space. The latest generation of x86 servers compounds this problem, because the new servers have more cores per processor and the cores have increased processing capacity significantly over older generations. It is also challenging to manage and maintain such a fragmented infrastructure.

Using server virtualization to consolidate applications and workloads onto fewer physical servers confers numerous benefits:

- **Save on hardware costs** – With a fewer number of highly utilized¹ servers, an enterprise can save on server hardware. Beyond that, they also save on network ports and storage capacity, especially if the new infrastructure includes shared, networked storage.
- **Save on power, cooling, and floor space** – Less physical hardware consumes less power, cooling, and floor space in the data center. This saves on rising electricity bills. For enterprises with data centers at maximum capacity – for power consumption or floor space or both – virtualization extends new life to their current infrastructure and let them avoid or defer new data center construction. This is a huge capital savings, since new construction for a tier-one data center can cost as much as \$1,000 per square foot.
- **Save on software licenses and maintenance** – Some software licenses allow multiple instances of an application to run in virtual machines on a single physical server without paying additional software costs. For instance, Microsoft *Windows Server Enterprise Edition* can be installed up to four times on one host. This reduces software licensing and ongoing maintenance costs.
- **Robust and streamlined IT management** – A virtual environment can provide robust and streamlined management. First, a consolidated infrastructure has fewer hardware components to manage. Software administration can be centralized and streamlined with virtualization-aware management tools. Common processes for backup, recovery, and disaster recovery

¹ Ideally, around 70% utilized, leaving some overhead for usage spikes and natural application growth.

(DR) can be applied to all applications. Live workload migration improves uptime for routine maintenance tasks, such as patches and upgrades. It can also facilitate system failovers for recovery purposes. Provisioning a new VM is a snap – so easy, in fact, that it is a good idea to have some discipline around the provisioning process to avoid “VM sprawl.” Virtual desktop technology runs user instances in a central server, removing the need for managing software on distributed desktop PCs.

- **Improve high availability and DR planning** – Virtualization allows for the establishment of common processes for backup, recovery, and site failover across applications (including live workload migration), so IT can implement these protective measures more simply and reliably. Dissimilar hardware may be used at a failover site, making it less costly and therefore more likely that an enterprise will implement DR for a given application.
- **Faster application testing, development, and rollout** – Application testing and development activities can leverage VMs and snapshot copies to speed up the process dramatically. Provisioning the final production environment is **also faster, taking minutes to deploy a new VM** instead of days or weeks for a new physical server. Overall, it makes an enterprise more agile and responsive to changing business requirements.

The bottom line is cost savings in several dimensions, all of which make an impact, especially in this sagging economy. It also means IT can be more responsive and supportive of business requirements.

Adoption Underway, But More to Go

The adoption of server virtualization in enterprises is well underway, though it does not yet encompass the majority of server infrastructure. About a quarter of the server infrastructure has been virtualized. **Enterprises have tended to virtualize second-tier applications like test and development, Web and file servers, and back-office applications, but stop short of virtualizing tier-one, mission-critical applications like database management systems, e-commerce, and messaging.** If the benefits of virtualization are strong and varied – and they are – then why not extend it further? Concerns rooted in the past about application performance and vendor support in a virtual environment still resonate, though they have largely been addressed today. Other concerns about delivering consistent

service levels in a virtual environment and establishing good governance and management processes also exist, but these are surmountable as well. New automated and virtualization-aware management tools are available. Consulting services (like EMC Consulting – more about them later) can help close the gaps. **Most importantly, enterprises want to know they are “doing it right” when virtualizing mission-critical applications.** See the text box on the next page entitled *Why Self-Imposed FUD No Longer Applies.*

EMC Consulting for Virtualizing Enterprise Applications

EMC Consulting has a practice dedicated to virtualizing enterprise applications, especially tier-one applications like Microsoft’s *Exchange*, *SQL Server*, and *SharePoint*. It is part of a broader initiative at EMC to assist enterprises in virtualizing their data center. In fact, EMC has definitively pegged virtualization and cloud computing as the future of IT and, in myriad ways, is gearing its products and services to that end.

- Storage, information management, and security products that integrate with and support virtual environments.
- Extensive partnerships with Microsoft and VMware.
- Numerous “EMC Proven” solution templates for virtual environments.
- EMC Consulting practices for applications, infrastructure, and governance in virtual environments.

In the area of enterprise application virtualization, EMC Consulting follows a stepwise process for transitioning applications from a physical to virtual environment.

- **Strategy** – Analyze and rationalize the application portfolio.
- **Design** – Profile application characteristics, design, pilot, and test.
- **Implement** – Migrate applications to virtual environment.
- **Operations** – Develop effective processes for IT management.

For virtualizing enterprise applications, the most important skill EMC brings is deep understanding of both applications and virtual environments. Both of these are required to optimize and get the most out of a virtual environment, in terms of application performance, functionality, high availability, recoverability, and manageability. EMC Consulting also can provide and configure other infrastructure elements, such as:

- **Backup and recovery** – e.g., *Avamar, Net-Worker*
- **Replication and site resiliency** – e.g., *RecoverPoint*
- **Shared networked storage** – e.g., *Symmetrix V-Max, Clariion*
- **Security**

For instance, an enterprise can experience benefits of virtualization in servers with direct-attached storage, but the possibilities for efficiency, manageability, and recoverability expand greatly in a shared storage environment like a SAN.

EMC Consulting also has at its disposal

“EMC Proven” solution templates for virtual environments. These include solutions for Exchange, SQL Server, and SharePoint. EMC designs and tests them in its global solution centers in North America, Europe, and Asia. The configurations are then published in a reference architecture with best practices and implementation guidelines.

Furthermore, it has expertise in the up-and-coming technology of client virtualization – also known as virtual desktop infrastructure (VDI). PC instances run in a central server and users access it over a network on a low-cost terminal.

Why Self-Imposed FUD No Longer Applies

Usually, *FUD* is created by one vendor to cast inferred aspersions against a competitor’s offerings. If enough *fear, uncertainty, and doubt* are introduced into any equation, it becomes difficult to make a procurement decision in favor of the target of the FUD. Sometimes, no decision is made and the status quo lingers. However, sometimes FUD is self-imposed. How many times have you taken a wait and see attitude about buying some new technology (e.g., a hybrid automobile), choosing to let someone else be the pioneer and potentially take the arrows in the back. You sit back and wait for the procurement decision to be sufficiently comfortable and justifiable.

You may have been doing this, intentionally or not, by waiting to run enterprise applications in a virtualized environment. Here is one way to look at the FUD that is involved.

- **Fear of operational failure** – This happens when you think that the risks of changing the way (or where) you run an application are greater than the perceived benefits. The benefits of reducing TCO or improving systems management may not have seemed sufficient to place very important applications onto virtualized servers. Rather than risk an operational failure, you continue to run single applications on what now may be a much too powerful server (for the single workload).
- **Uncertainty of support** – This may have been the biggest impediment to change. If your application or middleware vendor statement of support for virtualization is soft (conditional) or absent, you may not want to take on the potentially significant burden of having to demonstrate that the bug or problem is not related to running in a virtualized environment.
- **Doubts about the skills to make it happen** – This often is the first reason to self-impose a moratorium on change. If you are not confident that you have the skills and experience to make a transition happen on plan and on budget, then you either dismiss the change as “not being ready for prime time,” where you cleverly don’t articulate that it is you that are not ready, or you decide to take the time to experiment and gain the experience and skills that you feel are necessary.

Let’s address these out of order, starting with uncertainty. Lack of support in a production-virtualized environment for enterprise applications, in general, and Microsoft’s enterprise applications, in particular, was a valid concern, but no more. With Microsoft’s Server Virtualization Validation Program (SVVP), Microsoft has created a vehicle for software vendors to validate applications that run in virtualized environments. Three key Microsoft products (SQL Server 2008, Exchange Server 2010, SharePoint) discussed herein all are or will be validated for virtualized environments.)

The Fear and Doubt components are related. You aren’t sure if you have the skills to pull it off and you aren’t sure if you have the ability to size the virtualized server properly to meet heavy and potentially widely-varying operational demands. These can be mitigated by partnering with someone who has the experience to address these concerns – experience that should include significant expertise and experience in moving the application(s) to the targeted virtual environment. The added expense of seeking outside expertise might be offset entirely by accelerating the time to implementation or reducing TCO from the status quo. Thus, it is important to assess why you are hesitating to move to virtualizing enterprise apps. If the barriers are self-imposed, then they may be easier to remove than you expect.

Conclusion

You can virtualize enterprise applications like Microsoft's Exchange, SQL Server, and Share-Point. The major obstacles have been removed – old notions about being too I/O-intensive or CPU-intensive or lacking vendor support no longer apply. Server virtualization has come a long way and is now prime time and mainstream.

If you want to get the most out of virtualization and your enterprise is ready to go beyond tier-two or non-production applications then consider virtualizing enterprise applications. Moreover, if you would like help with the transition, EMC Consulting definitely has the skills to accelerate it. Go for it!



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