Virtualize Critical Applications with IBM and VMware:

More Business Value, Less Business Risk

AT A GLANCE

"Virtualization is a key building block needed to create business growth over time. However, virtualization for the sake of scalability and flexibility isn't enough. Continuity is equally important. If IT is to migrate these critical applications to a virtualized infrastructure, continuity must be considered at every stage in the application lifecycle—and layer of the IT infrastructure."

Executive summary

For most organizations today, IT has become the central nervous system—the fundamental service that makes all other services possible. And toward optimizing IT—making it more responsive, flexible, scalable, and cost-effective—virtualization has become a leading theme. Increasingly, organizations have virtualized key services and applications to ensure they receive the resources they require in realtime, respond dynamically to unpredictable demand levels, and deliver the best possible end-user experience and business outcome.

In the particular case of critical business applications, however, virtualization hasn't always been adopted as comprehensively as it might be. And as a result, it hasn't yielded as much business value as it could. Applications such as core databases, enterprise resource planning, and organization-wide collaboration often continue to be deployed and managed via legacy architectures: systems that serve specific applications using specific, dedicated resources.

Dedicated architectures of this type ensure critical applications will have the full capacity of the assigned systems, shared with no others. That capacity, however, may not continue to suffice in today's demanding business climate—or tomorrow's.

Imagine an outward-facing service offered by a Web retailer to the public and driven by multiple Oracle databases. Such a service could easily experience a usage spike during the holiday season. If the underlying platform hasn't been virtualized, IT might be hard-pressed to scale the service to meet demand— meaning not just that revenues are lost, but that the customer experience doesn't meet expectations and the organization's brand is diminished.

Similar arguments apply in the case of internal services, such as those driven by leading enterprise resource planning (ERP) applications like SAP. Once virtualized, these applications, too, can receive the resources they require in real time, translating directly into higher productivity from users and a superior business outcome. Equally important: a virtualized application is unshackled from the interdependencies of the underlying hardware, making it far easier to update and manage. This flexibility enables the IT department to implement changes more rapidly in order to keep pace with business demands.

Trust IBM and VMware solutions for your critical applications

Virtualization is a key building block needed to create business growth over time. However, virtualization for the sake of scalability and flexibility isn't enough. Continuity is equally important. If IT is to migrate these critical applications to a virtualized infrastructure, continuity must be considered at every stage in the application lifecycle—and layer of the IT infrastructure. The virtualized environment must be created and maintained by best-in-class solutions from proven industry leaders, and resilient enough to minimize the downtime of applications and services by proactively anticipating and addressing a wide range of potential threats to continuity.

IBM and VMware can deliver just that environment. Each is an established leader in the virtualization space, with hundreds of thousands of successful virtualization deployments around the world across every industry.

IBM and VMware solutions have also been specifically developed to interoperate seamlessly. Together, they deliver a complete virtualization platform—spanning both hardware and software—that can be tailored to suit any organization's specific needs and context.

And for business leaders focused on the continuity challenges implied by virtualizing critical x86-based applications, IBM and VMware solutions can also deliver the highest levels of business resilience. They can not only maximize application and service uptime, but also orchestrate a swift and effective response to any continuity challenge in the event of a problem.

IBM and VMware solutions, in short, can deliver all the benefits of virtualization to critical business applications while also minimizing business risk.

IBM's best-in-class hardware and service management tools deliver a rock-solid foundation

IBM is a world leader in business resilience and continuity solutions; the IBM virtualization portfolio has been developed with these issues in mind from the start. As a result, IBM offers an extensive range of hardware and software spanning servers, networking, storage and storage virtualization, and management tools—all perfectly suited to creating an exceptionally resilient virtualized infrastructure.

Consider the following offerings, all of which interoperate not just with each other, but also with VMware virtualization solutions:

- **Systems**
  Thanks to many unique optimizations, IBM System x servers, now in their fifth generation and available as both standalone hosts and in BladeCenters, offer unprecedented levels of uptime and service availability for today's critical applications.
  Predictive Failure Analysis, for instance, can detect emerging

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technical problems in system components and notify IT administrators in advance—significantly reducing the odds of downtime. IT managers looking for best-in-class capabilities will find that Predictive Failure Analysis also covers twice the range of hardware component classes offered by competing alternatives.

System x servers also include extensive built-in redundancy, allowing hot-swap and hot-add capabilities for every major subsystem, including memory, disk, I/O fans, and power supplies. This maximizes system flexibility, empowers service scalability, and enables an exceptionally rapid response in the event of a subsystem issue.

Memory reliability—a crucial variable for any critical application—is particularly impressive. IBM Active Memory Enhanced error recovery with Chipkill memory and Memory ProteXion help minimize errors, accelerate error correction, and maximize data integrity.

IBM System x hosts also increase application performance and reliability via eXFlash solid-state drives (SSDs), which have no moving parts and far lower failure rates than traditional drive systems. For enterprise-class database applications in particular, which require the highest performance in both reliability and read times, SSD technology is exceptionally well suited—and IBM offers industry-leading SSD capacity per server.
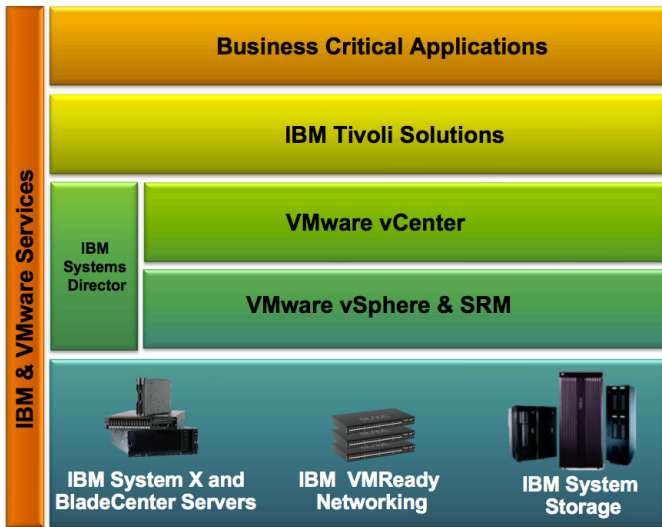
• **Storage**
Storage is among the most essential of all resources for today's critical applications, and virtualized storage can drive the best possible utilization of it. When storage can be allocated as a fluid resource, whenever and wherever it may be required to meet application requirements, both the uptime and performance of those applications will be substantially enhanced.

IBM System Storage Disk Systems can empower applications with as much virtualized storage as they require. These leading solutions are also available in a range of formats and capabilities that can match any organization's—or application's—specific needs. The storage they supply can scale from tens of terabytes all the way up to hundreds of petabytes, allowing effortless, rapid data migration and application upgrades with little/no downtime.

Furthermore, they are extensively VMware-enabled, interoperating with VMware Center, VMotion, VMware Site Recovery Manager, as well as VAAI (VMware APIs for Array Integration). This allows IT administrators to treat VMware management solutions as a centralized point of command over IBM storage. Tasks ranging from flash copy creation to virtual machine migration across hosts to disaster recovery can all be managed using VMware solutions, and physically carried out via IBM System Storage Disk Systems.

• **Networking switches**
Another critical resource to today's leading critical applications is network access. For best results, this should be dynamically managed based on the needs of the application—an essential strength of virtualization.

Business Critical Applications

IBM Tivoli Solutions

VMware vCenter

VMware vSphere & SRM

IBM Systems Director

IBM & VMware Services

IBM System X and BladeCenter Servers

IBM VMReady Networking

IBM System Storage

VMWARE AND IBM SERVICES:

IBM and VMware solutions work in a seamless fashion to provide a layered, virtualized infrastructure that provides critical business applications with all the resources they need to be more flexible, scalable, and resilient.

IBM hardware offerings provide a rock-solid hardware foundation—systems, storage, and networking—to drive VMware's best-in-class virtualization environment. As more resources are required by applications, those resources will be allocated in a fluid, real-time fashion.

Given this architecture, core business applications can then safely be deployed. And over time, they can be managed for best business value via both VMware and IBM Tivoli solutions, which integrate extensively with each other, and the hardware, to deliver complete visibility and control over service quality.

In this context, however, virtualization implies certain challenges because there is no longer a 1:1 relationship between hosts and servers. Instead, dozens or even hundreds of virtual servers can concurrently exist on a shared host, and these servers can migrate across hosts based on business policies. This flexible, dynamic architecture makes it a complex matter to ensure that each virtual server's network attributes are continually managed correctly.

Fortunately, IBM network switches come standard with a special solution—VMready—that eliminates that issue. VMready switches automatically track virtual server migrations; as virtual servers shift from host to host, so, too, do the network attributes in each case, such as quality of service (QoS) and VLAN (virtual local area network) characteristics. This means that critical applications running in those virtual servers continue to have the network resources and capabilities they need. And from a business standpoint, the services they support will remain highly available and responsive.

IBM's VMready-enabled network switches also integrate with VMware's vCenter management environment. This integration gives IT administrators a straightforward way to monitor and manage network resources for VMware-hosted virtual servers, ensuring that critical applications perform as intended even when virtual servers migrate across from physical systems. As VMotion tasks execute, virtual servers' ports and policies will migrate in parallel and in real time.

• **Management solutions**
Toward getting the highest continuity from critical applications, storage management solutions can play a key role. They can, among other things, orchestrate backup and recovery functions to preserve not just data, but entire virtualized environments. In this way, even the worst-case scenario—such as a physical disaster at a data center—doesn't imply a business disaster, because core applications and services can be restored rapidly and effectively.

IBM's flagship solution family in this class is IBM Tivoli Storage Manager—a complete, enterprise-class solution that can backup data, based on business policies, from anywhere in the infrastructure, including virtual servers. This solution uses an incremental forever backup approach and can orchestrate backup/recovery processes in a highly scalable, cost-effective, performance-conscious manner thanks to leading features such as sophisticated built-in deduplication and support for tiered storage, which matches each storage environment's costs with the business priority of the data being stored.

In the case of virtualized architectures running critical business applications, IBM Tivoli Storage Manager for Virtual Environments is a powerful solution in particular. This offering gives organizations an optimized way to backup and restore the vast data repositories on virtual machines in a business-transparent way that won't affect daily operations. The solution provides flexible recovery options; file, volume, and image all from a single image backup. IBM Tivoli Storage Manager for Virtual Environments significantly

improves the Recovery Time Objective (RTO) for virtual server recovery with Near Instant Restore capability that makes data available to guests immediately upon initiation of recovery while the data is copied in the background.

Making that possible: the solution's support for VMware's vStorage APIs (application programming interfaces) for Data Protection, including block-level incremental backups based on VMware's Changed Block Tracking. Data can be both backed up and restored with incredible efficiency and consistency, increasing the availability of every application that depends on that data.

VMware vSphere 5: The world's leading x86 virtualization platform just got better

Critical applications such as enterprise databases and enterprise resource planning are no place for compromise. Organizations that virtualize these applications will need the best available virtualization environment—one proven to support all the features and functions required to make the transition not just an effective one, but a truly optimized, successful one that will fulfill business goals both today and tomorrow.

With the introduction of vSphere 5, VMware sets a new gold standard for a virtual platform that has all the capabilities required for virtualizing critical applications. vSphere 5 extends its precedessor's already robust feature set to establish a complete portfolio of solutions that are simply best-in-class at every layer—

from the hypervisor all the way up to business resilience functionality through optimized disaster recovery processes.

Today, VMware solutions can meet and exceed the needs of business-critical applications in three fundamental ways:

• **Matchless scalability and performance.**
With vSphere 5, VMware has once again taken a quantum leap in performance and scalability. And by running vSphere on IBM System x servers, Storage Disk Systems, and VMready switches, you have the optimal foundation to virtualize critical applications, for best business value—fulfilling user demand in real time even under the most challenging conditions.

• **Exceptional high availability and disaster recovery.**
VMware solutions offer comprehensive protection for your core applications and services while also minimizing management complexity. Once virtualized, critical business applications can leverage innovative capabilities such as vMotion to eliminate planned downtime, or features like High Availability and Fault Tolerance to minimize unplanned downtime. And when it comes to disaster recovery, a virtual infrastructure built on VMware and IBM components is unsurpassed in terms of reliability and features.

• **Broad industry support.**
No virtualization environment on the x86 platform is as well established or proven as VMware—and no environment is supported by as many organizations and third-party solutions. VMware offers the broadest available support from the IT industry

VIRTUALIZATION ARCHITECTURE: KEY ELEMENTS	SOLUTION	CAPABILITIES
Systems	IBM System x and BladeCenter Servers	Extraordinary uptime thanks to unique IBM optimizations in predictive failure analysis, memory integrity, SSD support, and others.
Storage	IBM System Storage	Fluid allocation of storage whenever and wherever required to meet application demands in real time.
Networking	IBM VMready network switches	Smart, virtualization-aware switches that track virtual machine migration across hosts and automatically reapply network performance attributes/policies as needed.
Infrastructure Virtualization	VMware vSphere	Gold-standard virtualization environment, featuring best-in-class performance and scalability for every logical layer from hypervisor to disaster recovery.
Management	VMware vCenter, Site Recovery Manager, and Data Recovery; IBM Tivoli Storage Manager for Virtual Environments	Management solutions that perform key tasks such as data backup, archiving, restoration and virtual machine re-creation, as well as their orchestration as part of a complete disaster recovery strategy. These solutions integrate with each other and the hardware to provide service assurance for core applications in the virtualized infrastructure.

in categories ranging from integrated hardware to operating systems to management solutions (including more than 1,400 service providers supporting more than 2,500 applications).

That extraordinary range of choice means you can build a custom virtual infrastructure specifically tailored to your needs. It also means you can deploy VMware environments with confidence that they will not just interoperate with the infrastructure you have today; they'll continue to work seamlessly as that infrastructure evolves in the future.

Get complete protection for your critical applications and data—at every stage of their lifecycles

And for complex, demanding critical applications such as Oracle and SAP, VMware and IBM solutions can help you maximize application uptime—ensuring that applications create as much business value as possible through the fewest interruptions of service and the least impact on key services. No organization can be completely prepared for every disaster, but with VMware and IBM solutions, disaster recovery processes are significantly accelerated and enhanced.

One excellent example: VMware Site Recovery Manager, which is now in its fifth generation. By eliminating many complex manual recovery steps, this solution can make disaster recovery a much simpler and swifter task. Specifically, following a disaster at a primary site, it can orchestrate the process of restoring virtual machines at the recovery site. Instead of managers having to walk through particular recovery tasks themselves—which is not only slower, but also prone to inadvertent error—Site Recovery Manager can execute those tasks itself.

To accomplish this, it interoperates with IBM System Storage products and IBM's Tivoli Storage Manager, which provides application-aware, online, consistent, and centralized backups for business critical applications to avoid downtime, protect vital enterprise data infrastructure, and minimize operation costs. Virtual servers at the recovery site are then rapidly re-created and repopulated with applications and data, and core services are restored.

Site Recovery Manager also has considerable value as a means of creating and testing disaster recovery strategies. It can be used to verify that a strategy is as comprehensive as intended (that it will actually work in the event of a disaster), and to assess the speed and accuracy of the process—all critical metrics needed to make disaster recovery a practical reality instead of an abstract goal.

And for organizations that are exclusively using x86 computational platforms, instead of a range of different platforms based on different instruction sets, VMware Data Recovery is a very cost-effective option for basic data backup and archiving.

This solution—a built-in feature of vSphere—is particularly well suited to the needs of mid-market, growing organizations, such as those which have fewer than 100 virtual machines to manage at any given time. It offers full-image backup of each of those machines, as well as full or incremental recovery of them on demand, right down to specific files and directories.

Additional strengths include a relatively simple management environment, relatively low-bandwidth operation, and minimal storage overhead—all of which are likely to appeal to IT managers in the small and mid-sized business (SMB) space.

Conclusion

Critical business applications such as core databases and enterprise resource planning have yet to be virtualized at many organizations. Instead, they continue to be supported by single-application, legacy architectures characterized by limited resources.

Organizations looking to increase the business value generated by these applications can achieve that by working with IBM and VMware to create a tailored, virtualized infrastructure designed to drive up flexibility and scalability and drive down business risks.

All the benefits of virtualization can thus be achieved for core business applications while increasing—not decreasing—service continuity.

Find Out More

VMware–IBM Alliance: http://www.vmware.com/solutions/partners/alliances/ibm-home.html

VMware Business Continuity: http://www.vmware.com/solutions/business-continuity/index.html

VMware Disaster Recovery: http://www.vmware.com/solutions/datacenter/business-continuity/disasterrecovery/disasterrecovery.html

VMware vSphere: http://www.vmware.com/products/vsphere/overview.html

IBM System x & BladeCenter: http://www-03.ibm.com/systems/x/os/vmware/

IBM System Storage: http://www-03.ibm.com/systems/storage/disk/?cm_re=masthead-_-products-_-stg-disk

IBM VMready Switches: http://www-03.ibm.com/systems/networking/software/vmready.html

IBM Tivoli Storage Manager for Virtual Environments: http://www-01.ibm.com/software/tivoli/products/storage-mgr-ve/

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