

WHITE PAPER

VMware® Infrastructure and IBM WebSphere Software



Table of Contents

1. Introduction	1
2. IBM WebSphere Application Servers	2
3. IBM WebSphere Virtual Enterprise Overview	3
4. VMware Infrastructure Overview	6
4.1. Solution Architecture	6
5. Detailed Use Cases	7
5.1. Server Containment.....	7
5.2. Rapid Provisioning	7
5.3. Change Management	8
5.4. Data Center Optimization	9
5.5. High Availability	11
5.6. Business Continuity/Disaster Recovery	12
6. Summary	15

1. Introduction

Organizations are challenged by under-utilization of their application and hardware servers, the lack of adequate hardware resources and space to house them, the energy needed for application support and the service required for business operations. In order to meet the demand for IT services, many moved toward Service Oriented Architecture (SOA) as the underpinning for their enterprise application strategy. Not surprisingly, this increased complexity has made IT management and administration the leading driver of IT costs, which are growing at an alarming rate.

Reducing the cost of key resources such as energy and personnel while improving utilization of hardware and software can yield environmental as well as financial benefits. Virtualization is one means by which organizations can improve data center efficiency and utilization of IT resources. Virtualization can also help organizations to reduce their expenditures for energy. As more IT areas become valid targets for virtualization, new opportunities to improve utilization and energy efficiency open up.

IBM and VMware have been working on joint initiatives to provide customers with tested, scalable and optimized combinations of IBM hardware and software products on VMware Infrastructure. IBM® WebSphere® software platform is one of the most widely deployed application server platforms. By leveraging the power of infrastructure virtualization solutions delivered by VMware and IBM, IBM WebSphere Application Server deployments can be efficiently consolidated, rapidly provisioned and highly optimized in your virtualized datacenter.

This document explains the benefits of running IBM WebSphere applications on VMware Infrastructure along with IBM WebSphere Virtual Enterprise for different use cases. These use cases provide tangible cost reduction, operational efficiency and time saving benefits.

2. IBM WebSphere Application Servers

As the foundation of the IBM WebSphere software platform, the WebSphere Application Server delivers the secure, scalable, resilient application infrastructure needed for a Service Oriented Architecture (SOA).

IBM WebSphere Application Server leverages the industry's premier Java™ 2 Enterprise Edition (J2EE™) 1.4 and Web services application platform to help build, run, integrate and manage dynamic, on demand business application solutions and helps deliver on the promise of SOA by enabling IT organizations to:

1. Build and deploy application services quickly and easily.
2. Run services in the most secure, scalable, highly available environment.
3. Reuse software assets and extend their reach.
4. Manage applications effortlessly.
5. Grow as needs evolve, leveraging core assets and skills.

Designed for full Java™ 2 Platform, Enterprise Edition (J2EE) V1.4 compatibility and support for Java 2 Platform, Standard Edition (J2SE) 5.0, WebSphere Application Server delivers a range of new features that can help you:

- Improve time to value and make the most of existing technology skills with more simple, rapid development and deployment.
- Be confident applications and data are secure, and that you can eliminate lost business opportunities with a more scalable, secure, highly available SOA runtime environment.
- Improve the flexibility of your business and increase return on investment with extensive communication services.
- Minimize the cost of managing your environment with effective application management tools.

For customers who need to develop, deploy and manage secure, portable applications that run on a multitude of server and desktop systems, WebSphere Application Server is a premier platform of choice. The following WebSphere application servers are applicable in the context of this document:

1. **IBM WebSphere Application Server – Express:** Combines visual, IBM Rational development tool with full J2EE application server
2. **IBM WebSphere Application Server Community Edition:** Lightweight Java EE 5 application server based on open source Apache Geronimo
3. **IBM WebSphere Application Server:** Core J2EE 1.4 configuration; optimized to ease administration in scalable, single-server environment
4. **IBM WebSphere Application Server Network Deployment:** Delivers near-continuous availability, with advanced performance and management capabilities, for mission-critical applications

3. IBM WebSphere Virtual Enterprise Overview

Application infrastructure virtualization provides the ability to separate applications from the physical infrastructure that they run on. Workloads can then be placed dynamically and migrated across a pool of application server resources, allowing the infrastructure to adapt and respond to business needs, and requests to be prioritized and intelligently routed to respond to the most critical applications and users. It frees the enterprise from a tight coupling between an application and associated application servers. This loose coupling enables open standards based software to intelligently manage and shift workloads according to agreed-upon business policy to meet service level agreements (SLAs).

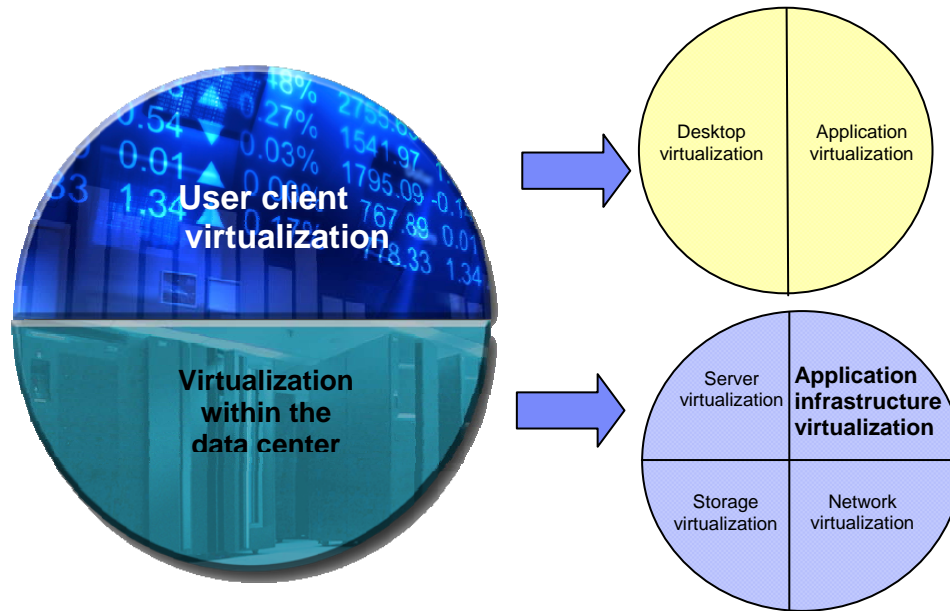


Figure 1. Expanding Virtualization to Applications and Application Servers

WebSphere Virtual Enterprise provides application infrastructure virtualization capabilities that lower operational and energy costs to create, run, and manage enterprise applications and SOA environments. The benefits of WebSphere Virtual Enterprise for application servers are analogous to those of VMware Infrastructure for physical servers: it increases flexibility and agility to ensure business process integrity, improve service and application performance, and better manage application health. WebSphere Virtual Enterprise provides capabilities complementary to VMware Infrastructure such as policy-based workload management to manage application service levels and application health management to increase application availability. Together they offer a comprehensive, powerful infrastructure virtualization solution for WebSphere application server environments as well as BEA WebLogic, JBoss, and Apache Tomcat application server environments.

WebSphere Virtual Enterprise provides these key benefits in server virtualization environments:

- Extends the economic benefits of VMware Infrastructure by reducing virtual machine sprawl and consolidating application servers in virtual machines.
- Ensures the peaceful coexistence of multiple applications in virtual machines.
- Increases the availability, performance, and resilience of the virtual infrastructure.
- Enables horizontal scalability of the virtual infrastructure.

Table 1. WebSphere Virtual Enterprise Key Features and Benefits

Feature	Function	Benefit
Policy-based workload management	<ul style="list-style-type: none"> • WebSphere Virtual Enterprise determines which server in a cluster is best able to process user requests, ensuring the best possible response time. • WebSphere Virtual Enterprise supports the specification of service level agreements (SLAs) for each application running on a pool of application servers, including WebSphere Application Server or other servers such as BEA WebLogic, JBoss, Apache Tomcat, PHP. • It monitors applications to ensure they are meeting their SLAs, automatically starts new instances of high-priority applications and stops instances of low-priority applications. • It enables you to define a single pool of servers for all your applications and use policy-based workload management to manage the environment autonomically and provide the best response time to your most important applications based on your SLAs. 	<ul style="list-style-type: none"> • Improves application performance, providing better response to users. • Allows you to specify that one application is more important than another. It has many facilities to ensure that high-priority applications get more computing resources, therefore providing better response times to users. • Ensures that higher priority applications always get more computing resources and provide better response times than lower priority applications. • Through virtualization of application server resources, allows you to support the same number of applications on a smaller number of hardware servers with fewer software licenses. This allows you to save on both hardware and software license costs as well as maintenance and operations costs. •
Application health management	Health-policy management provides system intelligence to monitor for preexisting software conditions such as memory leaks and failed servers. If it detects these conditions, the system can automatically act to resolve them.	Allows the application to continue running and providing service to users even though the application might have serious defects. Allows you to continue servicing your customers while the application defects are being fixed.

Feature	Function	Benefit
Operational management	With the administration console, you can see at a glance what is happening in your infrastructure and assess the relative health of your application resources.	Allows you to chart application performance against business goals to easily determine success. Uses alerts to notify administrators when intervention is required to meet your business goals, helping to decrease personnel-intensive monitoring and management.
Application edition management	Application edition management enables you to install new versions of an application while the current version is still running in production. This feature automatically routes new users to the new version while allowing current users to finish their work on the current version.	Allows a new version of an application to automatically be put into production with zero downtime and no interruption of service, all without manual operator intervention.

4. VMware Infrastructure Overview

VMware Infrastructure is the most widely deployed software suite for optimizing and managing IT environments through virtualization – from the desktop to the data center. The only production-ready virtualization suite, VMware Infrastructure delivers results at more than 20,000 customers of all sizes, where it is used in a wide variety of environments and applications. The suite is fully optimized, rigorously tested and certified for the widest range of hardware, operating systems and software applications allowing for enterprise-wide standardization independent of operating systems and hardware. VMware Infrastructure provides built-in management, resource optimization, application availability and operational automation capabilities that deliver transformative cost savings as well as increased operational efficiency, flexibility and IT service levels.

4.1. Solution Architecture

Figure 2 is a graphical representation of the solution architecture for running WebSphere application servers and WebSphere applications on VMware Infrastructure along with WebSphere Virtual Enterprise. Several applications can run on the same physical server in virtual machine nodes containing the applications, application server instances and the operating system of choice. VMware Infrastructure enables deployment of virtual machines running different operating systems on the same physical server. WebSphere Virtual Enterprise complements VMware Infrastructure by providing policy-based workload management, application health management, and application edition (or versioning) capabilities.

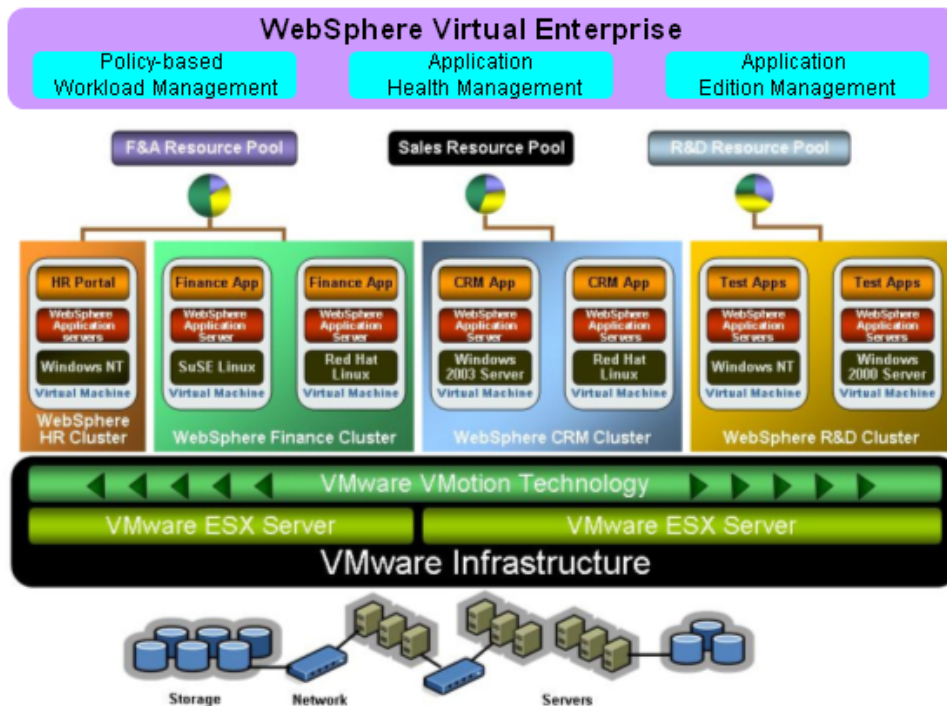


Figure 2: Solution Architecture

5. Detailed Use Cases

VMware Infrastructure and IBM WebSphere Virtual Enterprise provide key benefits for IBM WebSphere application servers and IBM WebSphere applications in the particular situations outlined below.

5.1. Server Containment

Many traditional application deployments based on WebSphere application servers generate significant server sprawl because multiple physical systems host the different layers of the application. This server sprawl occurs across development, test and production environments. In development environments, for example, each developer has at least one dedicated physical system and each test cycle uses dedicated servers assigned for the duration of the tests. This situation can lead to over provisioning, manageability and resource issues resulting in higher ownership and operational costs.

VMware virtualization technology contains server sprawl by running IBM WebSphere application servers in virtual machines consolidated onto fewer, highly scalable, reliable enterprise-class servers, resulting in higher server utilization. In addition, WebSphere Virtual Enterprise's policy-based workload management can be used to increase the utilization of WebSphere application servers running in virtual machines, thereby optimizing the number of virtual machines required.

Key Benefits:

1. Consolidate dedicated and isolated environments for all developers on a few physical systems
2. Host multiple WebSphere application servers on the same physical system, providing significant consolidation and lowering total cost of ownership (TCO)
3. Host multiple WebSphere application servers within a virtual machine and manage them with WebSphere Virtual Enterprise
4. Run multiple operating system, application server types and application server versions on the same system, eliminating the need for dedicated hardware for each one.
5. Increase the utilization of virtual machines containing WebSphere application servers with WebSphere Virtual Enterprise.
6. Eliminate the need for dedicated test systems with multiple test environments sharing the same physical system.

Customers using VMware Infrastructure have been able to achieve significant consolidation, radically increasing server utilization and containing server sprawl. Further, customers using WebSphere Virtual Enterprise have been able to achieve similar ratios of consolidation for application servers. Using the two in conjunction optimizes and streamlines the application server infrastructure.

5.2. Rapid Provisioning

VMware virtualization solutions significantly reduce time to provision new WebSphere (development, test or production) application environments. Typically a new deployment requires new hardware procurement followed by installation of the operating system and the applications. This process takes significant time and IT resources. With VMware Infrastructure, IBM WebSphere customers can take advantage of virtual machine libraries and templates to provision new pre-configured application environments in minutes on virtualized

infrastructure hardware. This enables rapid WebSphere application deployments with sophisticated automation capabilities and centralized control and responsibility for hardware resources while giving business units and application owners complete control over how resources are utilized.

You can also leverage WebSphere Virtual Enterprise's application edition management to streamline the deployment of WebSphere applications and support multiple versions of their applications including application deployment and rollback, application deployment validation, and edition-aware routing capabilities.

Key Benefits:

1. Rapidly provision new WebSphere Application Server instances from virtual machine templates.
2. Pass WebSphere application development images directly to testers.
3. Pass WebSphere virtual machine images from test back to development for problem replication and resolution.
4. Recreate distributed WebSphere Application Server instances in production environments on a single "virtualized" physical system for test purposes.
5. Move test/QA application server instances to production in minutes.
6. Reset test images (after test completion) from templates, snapshots and virtual machine libraries cutting down on test setup and reset time.
7. Store different WebSphere applications and server versions in virtual machine libraries that can be provisioned instantly.
8. Roll back development and test images during problem resolution using virtual machine snapshots.
9. Rapidly provision additional WebSphere Application Server instances during peak loads.
10. Streamline activation, deployment and validation of WebSphere applications using WebSphere Virtual Enterprise.

5.3. Change Management

Patching and upgrading existing applications is high on the list of IT challenges facing any WebSphere customer. IT departments face two key challenges in change management: testing patches and upgrades for compatibility with standard corporate hardware, OS and application configurations; and efficiently deploying critical patches and upgrades throughout the enterprise. Traditionally, IT organizations need to procure hardware (mirroring production) and create test beds mirroring the operating system and application configurations of the production environment. With VMware Infrastructure, you can clone production or create a set of virtual machine template libraries mirroring production that can be used to provision the test environment. You can test the latest patches and upgrades against these virtual machines running WebSphere applications, eliminating the need for dedicated hardware to perform these tests. Once testing is completed, you can roll the patches into production with minimal interruption to end users. In case of problems, snapshots allow you to roll back the virtual machines instantly to a known good state.

In addition, you can use WebSphere Virtual Enterprise's application edition management to validate the deployment of new versions of applications. You can perform this validation by creating VMware virtual machines on existing physical resources, further eliminating the need for dedicated hardware for validation tests. If problems arise with a new version of an application, WebSphere Virtual Enterprise can instantly roll back to the previous version of the application or service.

Key Benefits:

1. Achieve faster change management with fewer system resource requirements.
2. Test patches on multiple configurations (OS, WebSphere Application Server versions etc.) concurrently, all hosted on the same physical system.
3. Instantly roll back application server virtual machines during problem resolution using snapshots.
4. Add or upgrade WebSphere applications independent of other WebSphere components in production.
5. Create a library of standard production configurations to perform change management testing and deployment.
6. Migrate WebSphere application server instances on virtual machines to other systems while performing maintenance or changes on the current physical system.
7. Complement the previous capability with WebSphere Virtual Enterprise's server maintenance mode, which allows work to be routed to other WebSphere application servers if migrating the application server instance is not desired.

5.4. Data Center Optimization

A VMware Infrastructure environment provides additional management capabilities that help optimize the infrastructure resources used by both WebSphere applications and other application types in an enterprise data center. IBM WebSphere Application Server Network Deployment delivers world-class clustering and near-continuous availability, with advanced performance and management capabilities for mission-critical applications. IBM's WebSphere Virtual Enterprise provides policy-based workload management to increase utilization of the application server environment and to prioritize the usage of application server resources according to application's service level objectives. You can easily set application service level objectives and WebSphere Virtual Enterprise will prioritize the usage of application server resources according to these policies. VMware Infrastructure solutions address resource management across the entire data center infrastructure and across multiple IBM WebSphere Application Server clusters.

VMware Dynamic Resource Scheduler (DRS), part of VMware Infrastructure, dynamically allocates and balances computing capacity across a collection of hardware resources aggregated into logical resource pools. VMware DRS continuously monitors utilization across resource pools and intelligently allocates available resources among the virtual machines based on pre-defined rules that reflect business needs and changing priorities.

You can set VMware DRS to operate in advisory or "recommendation" mode, where it consults with a human operator before taking any action such as, for example, moving a virtual machine to a new host for load balancing reasons. For application server environments, this allows for co-existence and a harmonic relationship between IBM WebSphere Virtual Enterprise, which is looking at application SLAs, and the decisions that DRS makes which are based on the availability of lower-level computing resources such as CPU and memory. VMware DRS can also operate in "partially automated" mode, which automatically chooses the optimal VMware ESX host on which to deploy WebSphere Application Server instances in order to make use of their full capacity. It will not move the virtual machines during normal operations, but only make recommendations in the vCenter Console.

When an IBM WebSphere Application Server virtual machine experiences an increased load, IBM WebSphere Virtual Enterprise intelligently routes HTTP traffic to other application server

instances to increase utilization and to deliver application response times that meet your service level agreements.

You can also use WebSphere Virtual Enterprise and VMware DRS in conjunction by allowing WebSphere Virtual Enterprise to optimize resources for WebSphere application servers according to business policy and using VMware DRS to optimize resources for other workload types.

Servers at Full Capacity

In the event of all VMware ESX hosts being fully utilized, and where predefined service level agreements cannot be met, an additional ESX host can be added to your VMware Infrastructure environment to provide a larger resource pool to handle the extra load. VMware DRS will automatically allocate additional resources from the newly added ESX host instance by placing virtual machines among the physical servers. You can set WebSphere Virtual Enterprise to recognize these virtual machines automatically and, in turn, route workloads to them.

Dealing with Resource Overcommitment

VMware Infrastructure allows you to overcommit both CPU and memory resources on a physical machine. Often this is done to optimize physical resource allocation for a set of virtual machines in which applications (or workloads) running in those virtual machines are not used concurrently. Overcommitment allows resource allocation to expand dynamically when a virtual machine experiences heavy usage. Often this is a desirable effect, but if multiple virtual machines request (or balloon) CPU or memory at the same time it can have an undesirable impact on both performance and throughput. Using WebSphere Virtual Enterprise in conjunction with the underlying VMware technology can help mitigate this effect.

For CPU overcommitment scenarios, WebSphere Virtual Enterprise can:

- Prioritize requests in real time so that the requests with the most importance meet their SLAs. Lower priority requests still execute, but have more delay.
- Dynamically shift application requests to virtual machines on physical machines that have additional processing capacity.
- Start additional instances of the application in virtual machines on other physical machines with excess capacity. After the new instance is started, workload is dynamically shifted to restore response times.

For memory overcommitment scenarios, WebSphere Virtual Enterprise can:

- Recognize that memory overcommitment is going to occur and move applications to physical machines that have excess memory.
- If necessary, stop cluster members to free up memory to prevent/correct the memory overcommitment even if there is no additional location to start a replacement instance.

Key Benefits:

1. Dynamically migrate development and test IBM WebSphere applications requiring additional capacity to the physical server with the optimal resource capacity.
2. Define resource pools, policies and priorities for different developer, test and production IBM WebSphere Application Server environments to efficiently manage resource allocation.

3. Allocate processor and memory resources to virtual machines running on the same physical servers and prioritize access to those resources across virtual machines.
4. Optimize IBM WebSphere Application Server deployment across a virtualized enterprise data center by providing reserved resource pools with pre-defined minimum and maximum resource requirements.
5. Use resource pools to control resources available for IBM WebSphere and non-IBM WebSphere application environments.
6. Guarantee IT autonomy and service levels to applications and business organizations.
7. Automate physical server maintenance by dynamically relocating IBM WebSphere Application Server virtual machines without disruption to end users.
8. Optimize the service level of distributed applications by controlling the aggregate allocation of resources for the entire set of virtual machines running the distributed IBM WebSphere and non-IBM WebSphere application environments.
9. Realize the benefits of physical resource over commitment with VMware infrastructure, but use WebSphere Virtual Enterprise to mitigate the effects of actual over commitment.

5.5. High Availability

VMware virtualization works alongside IBM WebSphere Application Server clustering and WebSphere Virtual Enterprise to deliver enhanced infrastructure and application high availability for critical business functions. WebSphere Virtual Enterprise operates at the application server level to increase application availability and to route work around problem areas intelligently. Using VMware Infrastructure, you can implement a unified disaster recovery (DR) platform that allows production IBM WebSphere Application Server virtual machines to be recovered in the event of hardware failure without investing in costly one-to-one mapping of production and DR hardware.

Application Availability

WebSphere Virtual Enterprise provides a health management framework for WebSphere application servers that can significantly increase application availability and help meet application service level objectives. The health management framework consists of health conditions and associated corrective actions. WebSphere Virtual Enterprise ships with a set of pre-defined health conditions (e.g. memory leak detection, excessive memory usage) and corrective actions (e.g. restart server). Both the health conditions and the associated action plans can be fully customized including support for complex expressions and access to PMI and MBean operands. WebSphere Virtual Enterprise's health management framework provides a first line of defense for poor application health by mitigating common health problems and routing around unhealthy servers. Deeper application management solutions such as IBM's Tivoli Composite Application Manager for WebSphere extend WebSphere Virtual Enterprise's health management by adding deep-dive application problem determination capabilities.

Predicted Physical Server Downtime

While an IBM WebSphere Application Server cluster consists of multiple IBM WebSphere Application Server instances running simultaneously and working together to provide application failover and load-balancing, VMware VMotion enables the live migration of running IBM WebSphere Application Server virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. Live migration of virtual machines enables you to perform evacuation for hardware maintenance without scheduling downtime and disrupting business operations. At an application server level, WebSphere Virtual Enterprise provides a server maintenance mode

that allows you to perform problem determination on a server or other maintenance without disruption to production traffic. If the server is a member of a dynamic cluster, WebSphere Virtual Enterprise will start additional application server instances to assure capacity and the minimum policy on the dynamic cluster is met. By using both in conjunction, while the application server in the virtual machine is migrated to another physical machine using VMotion, WebSphere Virtual Enterprise can assure that workload requests are serviced by other, capable application servers in the virtualized environment.

Unpredicted Physical Server Downtime

VMware HA provides easy to use, cost effective high availability for IBM WebSphere applications running in virtual machines. In the event of physical server failure, affected IBM WebSphere Application Server virtual machines are automatically restarted on other physical servers that have spare capacity. WebSphere Virtual Enterprise will seamlessly recognize the migration of virtual machines from one physical machine to another. VMware HA minimizes downtime and IT service disruption while eliminating the need for dedicated stand-by hardware and installation of additional software. VMware HA provides uniform high availability across the entire virtualized IT environment without the cost and complexity of failover solutions tied to either operating systems or specific applications.

Backup

VMware Consolidated Backup provides an easy to use, centralized facility for LAN-free and non-disruptive backup of virtual machines. VMware Consolidated Backup simplifies backup administration and reduces the load for VMware ESX host machines.

Key Benefits:

1. Increase application availability using WebSphere Virtual Enterprise's health management capabilities to achieve application service level objectives.
2. Save development and test images for backup and audit using snapshots and consolidated backup.
3. Save layers of Images for regression (that is, keep exact version of OS, IBM WebSphere Application Server, patches, state and so forth) using snapshots and backup.
4. Use snapshots to enable point in time restores and rollbacks during test and development problem resolution.
5. Automatically detect failure of physical servers running IBM WebSphere Application Server instances in production.
6. Route work to other application servers to avoid problem areas or while a virtual machine is migrated.
7. Ensure capacity availability to support IBM WebSphere Application Server virtual machine failovers.
8. Automatically restart failed IBM WebSphere Application Server virtual machines with VMware HA.
9. Automatically restart application server instances using WebSphere Virtual Enterprise.
10. Use VMware Consolidated Backup to enable full and incremental file backup of virtual machines.

5.6. Business Continuity/Disaster Recovery

Customers often depend on the business applications hosted in WebSphere application servers for the very lifeblood of their business. These applications must survive any disaster that occurs in a data center (such as a fire or a flood). If one or more critical applications (such as online banking, order entry or billing) are not available because of such a disaster, the

business immediately suffers. Being able to recover quickly and reliably from a major disaster affecting a key data center where those applications are housed is crucial.

The speed and accuracy with which critical WebSphere-based applications can be brought back into service at a recovery site determines the business's recovery time. To protect themselves, customers put disaster recovery plans in place today that are largely based on manual procedures (sometimes called "runbooks") for re-configuring everything that is needed at a new site (computers, networks, databases, applications infrastructure servers) to support the business applications. While these manual recovery plans can work, it is usually difficult and expensive to test them on a regular schedule. Even worse, the speed of recovery using these methods is often measured in hours if not in days.

Cost effective Disaster Recovery with VMware

Disaster recovery plans are expensive in part because they can require a 1:1 relationship between the production site hardware and the recovery hardware at the fail-over site. One effective strategy for reducing the high costs of redundant hardware is to replicate some or all of the production site machines using virtual machines at the recovery site. This practice means that the recovery hardware can be significantly less expensive than the production version as you can consolidate your DR environment on fewer hardware resources. Using this strategy, you might bring up an entirely virtualized data center to maintain business continuity in the event of a failure at a non-virtualized one. Having recovery virtual machines available to replace out of service production virtual machines is also a natural path. These strategies do not absolve the business from the need for some redundancy in hardware at the recovery site, but they certainly can reduce the costs of that hardware.

Automated Disaster Recovery Testing and Failover

The second issue in business continuity is the time to recover business functionality. The answer to this requirement lies in the rapid provisioning of the WebSphere production environment at a recovery site and the timely instantiation of the WebSphere application servers and their hosted applications. Performing all of this under the control of a scripted automation tool is key to success. VMware Site Recovery Manager (SRM) enables you to do exactly that by using virtual machines at the recovery site that are provisioned by a provisioning manager, or by WebSphere Virtual Enterprise's application edition capabilities, with the appropriate applications.

Accelerate the Recovery Process

Ensure that you are able to meet your recovery time objectives (RTOs) for WebSphere-based applications by automating the recovery process. Site Recovery Manager eliminates the slow manual steps of recovery, turning the complex paper runbooks into an integrated part of your virtual infrastructure management. You can test disaster recovery plans regularly without interfering with your production systems.

Ensure that a Reliable Recovery takes place

Site Recovery Manager eliminates common causes of failure during recovery and makes it possible to test your recovery plans thoroughly and easily. By automating recovery, Site Recovery Manager eliminates error-prone manual steps in the recovery process and ensures that recovery procedures will be consistently executed as intended. Site Recovery Manager also makes it easy to execute non-disruptive tests of recovery plans within an isolated testing environment so that you can ensure that they are up to date and will execute successfully. This DR testing facility in itself is a significant benefit if you are concerned about business continuity.

Simplify the Disaster Recovery process

Simplify and centralize the process of creating, updating and managing recovery plans. Site Recovery Manager guides you through the process of building, managing and executing disaster recovery plans. It integrates seamlessly with VMware Infrastructure, VMware vCenter Server and WebSphere Virtual Enterprise to make recovery plans significantly easier to manage and update. It also integrates easily with storage replication software from leading storage vendors to simplify the use of advanced replication software with your VMware virtual infrastructure.

Key Benefits:

VMware Site Recovery Manager helps ensure business continuity in a disaster scenario by

- Speeding up the recovery process through automation.
- Ensuring that a recovery takes place in a reliable way.
- Simplifying and lowering the cost of the disaster recovery process.

6. Summary

Deploying IBM WebSphere applications on VMware Infrastructure, complemented by IBM's WebSphere Virtual Enterprise, drives tangible benefits through the complete software lifecycle from development to production, and enables cost-effective and reliable high availability and business continuity. By expediting and simplifying the application development and testing processes you will experience faster time to production while maintaining high quality throughout these processes. Rapid provisioning and change management in production environments increase IT flexibility, allowing timely response to dynamic business needs. Data center optimization enables efficient resource pooling, which maximizes hardware utilization and leads to a cost effective environment while maintaining mission critical quality-of-service objectives.

Together, IBM and VMware reduce both cost and deployment time while providing increased operational efficiencies and accelerated time to market — driving lower TCO and increased ROI for their customers deploying IBM WebSphere applications on VMware Infrastructure.

To find out more about WebSphere Virtual Enterprise and how to conduct a free Value Assessment that will show the ROI for deploying it to manage your virtualized Java workloads on VMware Infrastructure, [click here](#) or visit <http://www-01.ibm.com/software/webservers/appserv/extend/virtualenterprise/>.



**VMware, Inc. 3401 Hillview Ave. Palo Alto CA 94304 USA Tel 1-877-486-9273
Fax 650-427-5001 www.vmware.com**

© 2008 VMware, Inc. All rights reserved. Protected by one or more of U.S. Patent Nos. 6,397,242, 6,496,847, 6,704,925, 6,711,672, 6,725,289, 6,735,601, 6,785,886, 6,789,156, 6,795,966, 6,880,022, 6,961,941, 6,961,806, 6,944,699, 7,069,413; 7,082,598 and 7,089,377; patents pending.

