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# Microsoft® Virtual Server 2005 R2

## Microsoft® Virtual Server 2005 R2 Product Overview

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### **Abstract**

The purpose of this paper is to provide an overview of the features and benefits of Microsoft® Virtual Server 2005 R2, the virtualization technology for Windows Server™ 2003. Microsoft Virtual Server 2005 R2 is a cost-effective server virtualization technology engineered for the Windows Server System™ platform. As a key part of any server consolidation strategy, Virtual Server increases hardware utilization and enables organizations to rapidly configure and deploy new servers. Virtual machine technology enables customers to run multiple operating systems concurrently on a single physical server. Microsoft Virtual Server 2005 R2 is a complete virtual machine solution with high availability capabilities, robust storage, networking and management features in an easy to use package. Complementing Microsoft's award winning Windows Server 2003 operating system, Virtual Server 2005 R2 provides a powerful, cost-effective virtual machine platform as a part of the Windows Server System. Virtual Server 2005 R2 also represents a key deliverable on the Dynamic Systems Initiative (DSI) roadmap which enables a self-managing dynamic system, and represents Microsoft's continued investment in delivering technology that improves the flexibility and utilization of server hardware resources.

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## Introduction

Virtualization is a key enabling technology that can be leveraged to achieve business benefits. Virtualization technology enables customers to run multiple operating systems concurrently on a single physical server, where each of the operating systems runs as a self-contained computer. Microsoft® Virtual Server 2005 R2 hosted on the Windows Server™ 2003 operating system delivers the capabilities necessary to carry out time and cost saving tasks through virtualization technology in an enterprise-ready computing environment with advanced levels of scalability, manageability and availability. The R2 release of Virtual Server 2005 can improve hardware efficiency and increase administrator productivity while maximizing value through a broad set of partner resources and solutions.

Virtual Server 2005 R2 is a cost-effective server virtualization technology engineered for the Windows Server System™ platform. As a key part of any server consolidation strategy, Virtual Server increases hardware utilization and enables organizations to rapidly configure and deploy new servers. It improves operational efficiency in consolidating infrastructure, applications, and branch office server workloads, consolidating and re-hosting legacy applications, automating and consolidating software test and development environments, and reducing disaster impact.

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## Customer Scenarios

IT organizations today are under incredible pressure today to deliver more value to their business customers—and typically with little or no increase in budgets. Many of those challenges, shared between server administrators and developers, can be addressed with the help of Virtual Server 2005 R2. Today's IT organizations face four major challenges:

- **Increase availability.** Administrators need to insure that their IT systems are highly available.
- **Improve utilization.** With low hardware utilization rates pressures exist to increase their ROI by increasing utilization.
- **Lower operational costs.** In many situations customers are spending a majority of their IT budgets on just running and maintaining their existing systems. They need to lower these costs so they have more IT dollars to invest in new strategic opportunities.
- **Increase responsiveness.** In today's competitive world, IT organizations need to have the flexibility to rapidly roll out new services and adopt new technologies in line with the changing needs of the business.

To meet these challenges, the R2 release of Virtual Server 2005 leverages new technologies focused on key customer business scenarios to reduce hardware costs, reduce provisioning and deployment times for servers, and increase server manager productivity.

### Consolidate Infrastructure, Application, and Branch Office Server Workloads

Virtual Server 2005 R2 is ideal for server consolidation in both the datacenter and the branch office, allowing organizations to make more efficient use of their hardware resources. It allows IT organizations to enhance their administrative productivity and rapidly deploy new servers to address changing business needs. Server consolidation increases the hardware utilization rates for an optimized IT infrastructure.

Deployment and management of distributed server applications typically requires quantities of available hardware resources and is challenging to rapidly provision. Running mixed applications in the same environment is often complex to configure and manage and results in a paradigm of "one server one application". IT organizations are faced with several problems:

- **Underutilized resources:** Applications are running on dedicated servers, resulting in low utilization rates across the compute environment.
- **Increased maintenance complexity:** Maintenance events such as software upgrades or hardware servicing are difficult to manage in the server computing environment.
- **Inability to quickly respond to business needs:** Because each new application requires a dedicated piece of hardware or is difficult to deploy, IT can't quickly adapt to changing business requirements.

Virtual machine technology was developed to address these same challenges, enabling companies to utilize a single machine for consolidating production applications. Furthermore, virtual machines allow for flexibility and agility in deploying applications. Virtual Server 2005 R2 enables businesses to

execute workloads and applications on fewer servers which results in improved hardware utilization and operational flexibility.

## Consolidate and Re-host Legacy Applications

Virtual Server 2005 R2 enables re-hosting of legacy operating systems and their associated custom applications from older hardware to new hardware running Windows Server 2003.

As IT infrastructure enables increasingly powerful and reliable solutions, an ongoing challenge for many businesses is the management and maintenance of existing legacy server-based applications. Business applications often outlive their original hardware, and as support for these primary infrastructural elements diminishes over time, cost of ownership steadily increases. Under ideal conditions, customers would prefer to continue running business applications unchanged, but three factors increase the urgency of legacy application migration:

- Extensive resource demands required to administer and maintain server hardware for individual legacy applications;
- High cost and risk to upgrade or rewrite legacy applications;
- Diminishing hardware support for legacy operating systems.

Customers need a solution to enable legacy or orphaned applications, such as those written for Windows NT® Server 4.0 or Windows 2000 Server, to run on new hardware and software platforms. Many organizations find, for example, that the ISV who installed their application years ago may not be in business. Customers have called for a solution that assures smooth application migration while delivering solid application compatibility. Virtual Server 2005 R2 delivers the best of both worlds: application compatibility with legacy environments, while taking advantage of the reliability, manageability and security features of Windows Server 2003 running on the latest hardware. Virtual Server 2005 R2 delivers this capability by enabling customers to run legacy applications in their native software environment in virtual machines, without rewriting application logic, reconfiguring networks or retraining end users. This gives customers time to refresh older infrastructure systems first, then either upgrade or rewrite out-of-service applications on a timetable that best fits their business needs. Virtual Server 2005 R2 enables better customer choice for legacy application migration with outstanding application compatibility.

## Automate and Consolidate Software Test and Development Environments

Customers across all segments are looking for ways to decrease costs and accelerate application and infrastructure installations and upgrades, while delivering a comprehensive level of quality assurance. In order to achieve testing coverage goals prior to going into production, multiple challenges must be overcome:

- **Network operations:** Incorrect configuration of a test network can endanger production networks.
- **Developer productivity:** Developer productivity is wasted on time-consuming administrative tasks.
- **Server operational and capital costs:** High-quality application test coverage requires replicating production computing environments, which requires costly hardware and human resources posing risk to budgets and schedules.

Virtual machine technology was developed to address these same challenges first encountered during the mainframe era, enabling side-by-side testing and production partitions on the same system. For

x86-based servers (includes both 32-bit and 64-bit environments), Virtual Server 2005 R2 enables better test coverage, developer productivity and user experience.

## **Disaster Recovery**

Virtual Server 2005 R2 can be used as part of a disaster recovery plan that requires application portability and flexibility across hardware platforms. Consolidating physical servers onto fewer physical machines running virtual machines decreases the number of physical assets that must be available in a disaster recovery location. In the event of recovery, virtual machines can be hosted anywhere, on host machines other than those affected by a disaster, speeding up recovery times and maximizing organization flexibility.

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## Virtual Server 2005 R2 Benefits

Microsoft Virtual Server 2005 R2 is a cost-effective server virtualization technology engineered for the Windows Server System™ platform. As a key part of any server consolidation strategy, Virtual Server increases hardware utilization and enables organizations to rapidly configure and deploy new servers with the following key benefits:

- **Efficient use of hardware resources.** Virtual Server 2005 R2 is ideal for server consolidation, allowing organizations to make more efficient utilization of their hardware resources. Virtual machine isolation and resource management enable multiple workloads to coexist on fewer servers, allowing organizations to make more efficient use of their hardware resources. Virtual Server 2005 R2 works with Windows Server 2003 to provide the broadest interoperability with existing storage, network and security infrastructures. Furthermore, Virtual Server 2005 R2 provides high availability across your virtual machine environment both at the guest and host levels.
- **Enhanced administrative productivity and responsiveness.** Virtual Server 2005 R2 enables IT organizations to enhance their administrative productivity and rapidly deploy new servers to address changing business needs. Features such as the comprehensive COM API in Virtual Server 2005 and network booting (PXE booting) for virtual machines enable automated deployment and configuration of connected virtual machines that are easily administered with standard server management tools.
- **Well-supported server virtualization solution.** Virtual Server 2005 R2 is extensively tested and supported by Microsoft in conjunction with its server operating systems and applications. Hence Virtual Server 2005 R2 is a well-supported virtualization solution both within Microsoft and across the broader ISV community.
- **A key deliverable for Microsoft's Dynamic Systems Initiative.** As a part of the Dynamic Systems Initiative (DSI), Microsoft's industry wide effort to dramatically simplify and automate how businesses design, deploy, and operate IT systems to enable self-managing dynamic systems, Microsoft is providing businesses with tools to help them more flexibly utilize their hardware resources. Virtual Server 2005 R2 is another example of how Microsoft is continuing to deliver technology those results in improved server hardware utilization and provides for more flexible provisioning of data center resources.

### Efficient Use of Hardware Resources

Virtual machine isolation and resource management enable multiple workloads to coexist on fewer servers. Ultimately this allows greater overall efficiency of hardware to be realized across the enterprise.

### Virtualization

Virtualization facilitates broad device compatibility and complete support for Windows server environments.

- **Broad device compatibility:** Virtual Server runs on Windows Server 2003 which supports most Windows Server Catalog devices, providing compatibility with a wide range of host system hardware.
- **Multithreaded VMM:** Virtual Server's Virtual Machine Monitor (VMM) provides the software infrastructure to create, manage and interact with virtual machines on multi processor hardware.
- **Virtual machine isolation:** Virtual machine isolation ensures that if one virtual machine crashes or hangs, it cannot impact any other virtual machine or the host system. Maximum application compatibility is achieved through isolation. This allows customers to further leverage their existing storage, network and security infrastructures.
- **Broad x86 guest OS compatibility:** Virtual Server can run all major x86 operating systems in the virtual machine guest environment.
- **Windows guest operating system performance optimization:** Virtual Server optimizes Windows operating systems for computing, storage, and networking performance as virtual machines.
- **iSCSI clustering:** Flexible clustering scenarios provide high availability for mission-critical environments while improving patching and hardware maintenance processes. iSCSI clustering between physical hosts of Virtual Server 2005 R2 offers a cost-effective means of increasing server availability.
- **x64 support:** Virtual Server 2005 R2 runs on the following 64-bit host operating systems: Windows Server 2003 Standard x64 Edition, Windows Server 2003 Enterprise x64 Edition and Windows XP Professional x64 Edition providing increased performance & memory headroom..

### Resource Management

- **CPU resource allocation:** Virtual Server enables fine-grained control of physical hardware for balanced workload management.
- **Memory resource allocation:** Virtual Server enables flexible memory configuration on a per-virtual machine basis. Virtual Server was engineered to prevent performance issues resulting from virtual memory of a virtual machine exceeding the memory of the physical host system.

### Enhanced Administrative Productivity and Responsiveness

Administration is easy with standard server management tools and a simple Web-based interface for Virtual Server management. Administrators and developers can customize and automate control of Virtual Server with scripts written through a robust COM API, which enables automated deployment, configuration of connected virtual machines and more.

### Deployment

Virtual Server's complete scripted control of portable, connected virtual machines enables automated configuration and deployment.

- **Comprehensive COM API:** Enables complete scripted control of virtual machine environments. Virtual Server supports a full-featured Component Object Model (COM) Application Programming Interface (API) that contains 42 interfaces and hundreds of calls, allowing scripts to control nearly every aspect of the product. Because the scripting model is based on COM, users are not tied to a specific scripting language, but can choose between Visual Basic®, C#, Perl and many other

modern development languages. Furthermore, scripts can be “triggered” by certain events within Virtual Server.

- **Virtual Hard Disks (VHDs):** Virtual Server encapsulates virtual machines in portable Virtual Hard Disks, enabling flexible configuration, versioning and deployment.
- **Virtual Networking:** Virtual Server virtual networking features enable secure, flexible networking with guest-to-guest, guest-to-host and guest-to-network connectivity.
- **PXE Boot:** The emulated network card in Virtual Server 2005 R2 now supports Pre-boot Execution Environment (PXE) boot. This network boot allows customers to provision their virtual machines in all of the same ways that they do their physical servers.

## Manage and Migrate

Use Virtual Server’s Administration Website and standard server management tools to administer virtual machines.

- **Virtual Server Administration Website:** The Virtual Server Administration Website enables secure, authenticated administration and client remote access.
- **Active Directory integration:** Virtual machines in Virtual Server function the way you would expect a physical machine, offering full Active Directory integration. This level of integration enables delegated administration and secure, authenticated guest access. Active Directory incorporates significant improvements in management and performance in Windows Server 2003 which can be leveraged through virtual machines hosted by Virtual Server 2005 R2.
- **Microsoft Operations Manager 2005 Management Pack for Virtual Server:** A management pack developed specifically for Virtual Server enables advanced management features within virtual machines.
- **Automated Deployment Services and Virtual Server Migration Toolkit:** The Virtual Server Migration Toolkit provides command line tools for converting from physical-to-virtual (P2V) or virtual-to-virtual (V2V), easing migration to a virtual machine environment.
- **Physical server equivalency:** Organizations can use existing server management tools to administer virtual machines.

## Cost-Effective and Reliable Solution from a Trusted Platform Vendor

As part of the Windows Server System, Virtual Server 2005 R2 is extensively engineered & tested with Microsoft’s server operating systems & applications. Virtual Server is a well supported virtualization solution both within Microsoft and across the broader ISV community. A broad set of partner solutions for Virtual Server built on a foundation of Windows Server 2003 maximizes business value.

## Support

- **Windows qualified drivers:** Virtual machines utilize the Windows host operating system’s qualified device drivers, ensuring robust and stable device support and broad device compatibility.
- **Operating system support:** Microsoft extensively tests Virtual Server in conjunction with Windows Server 2003 and Windows Server 2000.

- **Windows Server System family support:** The Windows Server System Common Engineering Criteria 2005 states, “To help customers improve the utilization of hardware resources, all server products will support Microsoft Virtual Server 2005. Each product must be capable of running from within a virtual instance.”
- **Prescriptive guidance:** Microsoft Solutions Offerings (MSO)s help organizations build proven virtualization solutions.
- **Partner offerings:** Virtual Server is backed by a partner ecosystem including hardware OEMs, management ISVs and services vendors.

### **Ecosystem Support**

Comprehensive COM management interfaces are published and utilized by management tool vendors. Microsoft’s VHD file format is available under royalty-free license, allowing ISVs such as security and management vendors to natively interoperate with Virtual Server.

### **A Key Deliverable for the Dynamic Systems Initiative**

As a part of the Dynamic Systems Initiative (DSI), Microsoft’s industry wide effort to dramatically simplify and automate how businesses design, deploy, and operate IT systems, Microsoft is providing businesses with tools to help them more flexibly utilize their hardware resources. Virtual Server 2005 R2 is another example of how Microsoft is continuing to deliver technology that improves server hardware utilization and provides for more flexible provisioning of data center resources. For more information on DSI, see [www.microsoft.com/dsi](http://www.microsoft.com/dsi).

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## Conclusion

Microsoft Virtual Server 2005 R2 is a cost-effective server virtualization technology engineered for the Windows Server System™ platform. As a key part of any server consolidation strategy, Virtual Server increases hardware utilization and enables organizations to rapidly configure and deploy new servers. Virtual Server can be used to improve operational efficiency in consolidating infrastructure, applications, and branch office server workloads, consolidating and re-hosting legacy applications, automating and consolidating software test and development environments, and reducing disaster impact. It offers improved hardware efficiency by providing a great solution for isolation and resource management, which enable multiple workloads to coexist on fewer servers. Because it offers complete scripted control of a set of connected virtual machines that are easily administered with standard server management tools, Virtual Server 2005 R2 is easy to deploy, manage and — resulting in increased administrator productivity. Furthermore, it is another key deliverable on Microsoft's Dynamic Systems Initiative (DSI) roadmap, in line with Microsoft's continued investment in delivering technology that provides more flexible provisioning and utilization of server hardware resources.