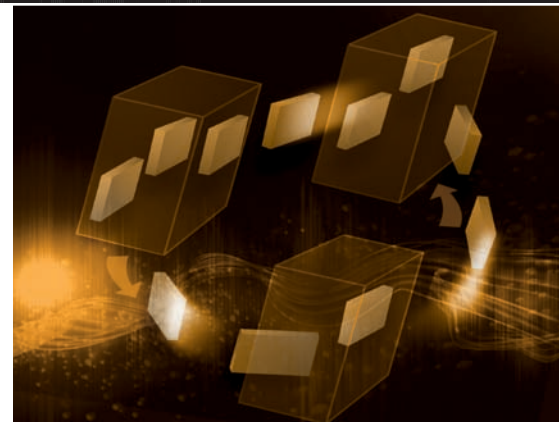


INTRODUCING THE DELL POWEREDGE R805 WITH VMWARE INTEGRATED VIRTUALIZATION



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The new Dell™ PowerEdge™ R805 server is designed and optimized specifically for virtualization. By including VMware® integrated virtualization, the PowerEdge R805 enables quick and easy deployment right out of the box, simplified management, and enhanced security, as well as diskless configuration to help reduce power costs.

Virtualization has entered the mainstream, and is now a critical component when building cost-effective, highly available, and scalable enterprise IT infrastructures—enabling both flexible resource management and automated resource allocation based on strategic enterprise policies. Virtualized infrastructures help simplify IT operations in multiple ways, helping shield software from hardware, enabling secure resource sharing, and facilitating software deployment and relocation. They also help increase business agility by enabling IT staff to dynamically re-provision resources as needed and avoid planned downtime, enhance the efficiency of application testing and development, and facilitate rapid, cost-effective disaster recovery.

Although virtualization helps significantly increase manageability and flexibility, it also comes with its own set of challenges. It introduces an additional software layer—the hypervisor—that, like other software, typically calls for special skills to install and configure and requires regular patches, upgrades, and maintenance. Administrators must consider the deployment and maintenance of virtualization software on every node in a server farm before rolling out their software in virtual machines (VMs).

Virtualization also places additional requirements on the hardware. While virtual disks and configuration

files are typically stored in shared consolidated storage, the hypervisor itself requires hardware resources on the server. Compared with single-core processors, dual- and quad-core processors can allow more VMs to run on a single platform, but also increase the burden on memory and I/O subsystems.

With the introduction of the Dell PowerEdge R805 server with VMware integrated virtualization, Dell has taken a major step toward simplifying and reducing the complexities of virtualized environments. This article discusses the key advantages of this server and how virtualization has been optimized and integrated into the system's design.¹

INTRODUCING THE DELL POWEREDGE R805 SERVER

The 2U, two-socket PowerEdge R805 server includes the same high-availability and management features as the PowerEdge 2950 and PowerEdge 2970, including hot-pluggable redundant power and cooling components, remote management through the Dell Remote Access Controller 5 (DRAC 5), and an optional embedded RAID controller. In contrast to these other servers, however, the PowerEdge R805 is designed specifically to help simplify virtualization deployments, optimize external storage access, and reduce overall power consumption. Almost every subsystem within

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¹The PowerEdge R805 server with VMware integrated virtualization was demonstrated at VMworld 2007 by VMware CEO Diane Greene and Dell CMO Mark Jarvis during the September 11, 2007, opening keynote presentation, available at www.vmworld.com/webcast.

the server includes updated technologies that help increase overall capacity and performance in virtualized environments. The PowerEdge R805 is the first Dell server to feature an internal flash device dedicated to hosting an integrated hypervisor, which helps eliminate the need for power-consuming local drives and enables virtualization to work out of the box with minimal configuration.

In designing the PowerEdge R805 server, Dell recognized that the virtualization software should not function as another OS—it should be an integral part of the system, and easy for administrators to deploy and manage. With that in mind, Dell integrated VMware ESX Server 3i software into the server itself. Unlike previous ESX Server versions, ESX Server 3i does not have a service console, helping greatly reduce the installation footprint of the software and allowing the hypervisor (and limited applications) to be installed on the server's internal storage.

INTEGRATING VMWARE VIRTUALIZATION

VMware integrated virtualization on the PowerEdge R805 server can offer multiple advantages, including easy installation, deployment, and maintenance; a simplified management architecture; reduced power consumption; advanced hardware resources for VM hosting; enhanced security; and

| | VMware ESX Server 3 | VMware ESX Server 3i |
|---|---|---|
| Installation | 17 minutes | 0 minutes |
| Configuration, including IP address, disk partitions, and licensing | 10 minutes | 3 minutes |
| Boot | 3 minutes | Just over 1 minute |
| Patching or upgrading | 10 minutes for patching, 20 minutes for upgrading | Not tested, but predicted to be approximately 3 minutes |

Note: Times may vary in different infrastructures.

Figure 2. Times for installation, configuration, boot, and patching or upgrading tasks on VMware ESX Server 3 and ESX Server 3i

simplified backup and restore compared with previous-generation servers.

Easy installation, deployment, and maintenance

The PowerEdge R805 server is designed to provide a virtualization-ready server right out of the box. Because this system includes factory-installed VMware ESX Server 3i software, administrators do not need to install a virtualization platform themselves. ESX Server 3i can also come pre-activated on each server based on the specific order, helping avoid the need to acquire host licenses from VMware and helping further reduce deployment times, costs, and the possibility of a failed installation or mis-configuration. After booting for the first time, the server provides a simple interface for basic configuration, making it easy for administrators

to bring the server online quickly (see Figure 1).

The reduced software footprint also helps simplify patch management, particularly compared with the upgrade process for ESX Server 2.x and 3.x, and the absence of a service console can help reduce the number of patches and upgrades compared with these two standard versions. Administrators can easily manage the software versions and apply patches through VMware VirtualCenter. In addition, the integrated Secure Digital (SD) card maintains the two latest versions of ESX Server, and patches are applied to the older of these two versions; if the patch is not successful, the server can automatically boot to the last known functioning version.

Figure 2 summarizes the installation, configuration, boot, and patching or upgrading times for ESX Server 3 and ESX Server 3i, as measured in tests by Dell engineers in September 2007. Both platforms were tested on the same PowerEdge R805 server with quad-core AMD Opteron™ 2350 processors and 8 GB of RAM. As these times show, a server with integrated ESX Server 3i software can help significantly reduce the time to perform common tasks, helping increase administrative efficiency—an advantage that multiplies when these servers are deployed across the data center.

Simplified management architecture

Reducing the footprint of the virtualization software and integrating it into the

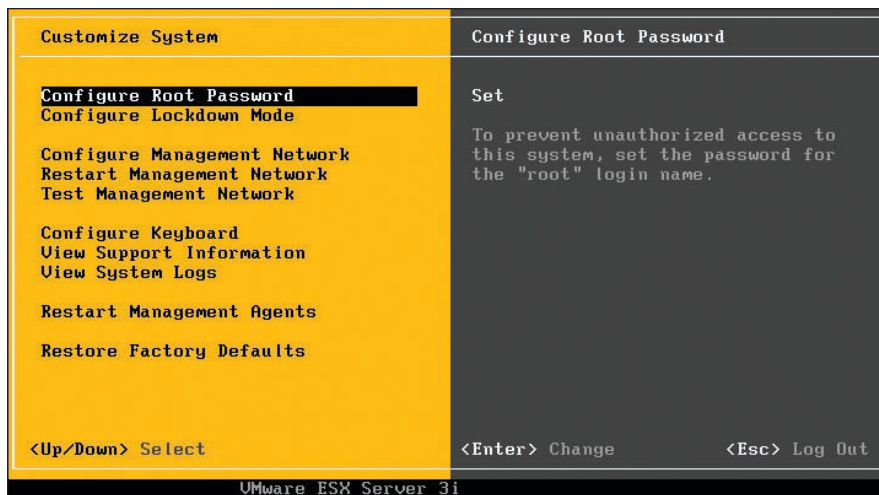


Figure 1. Administrative setup window for VMware integrated virtualization on the Dell PowerEdge R805 server

server can help significantly simplify management as well. Managing VMware integrated virtualization is more like managing server firmware than managing a new and complex software layer. Once the server boots, it provides a simple interface for basic configuration and management of the virtualization software layer, without requiring complex command-line interfaces (CLIs). Once administrators have set up the management network and administrator passwords, they can easily manage the server using VMware Virtual Infrastructure Client and/or VMware VirtualCenter.

To help reduce the system footprint and simplify deployment, ESX Server 3i does not have a traditional service console management interface where Dell OpenManage™ agents are installed. Instead, ESX Server 3i exposes hardware health information through standard protocols like WS-Management or Simple Network Management Protocol (SNMP). Administrators can now monitor and manage the hardware through any management application that supports any of these standard protocols—for example, by using Dell OpenManage IT Assistant to monitor the PowerEdge R805 server through SNMP. In addition, VMware provides a remote CLI packaged as a VM that advanced administrators can use to remotely configure and manage the server. Administrators who currently utilize Dell OpenManage, or another management tool that requires an agent in the service console, should consider deploying ESX Server 3.5 rather than ESX Server 3i to provide a familiar management approach.

Reduced power consumption

The PowerEdge R805 server includes several power-saving features. Integrating ESX Server 3i allows both solid-state and low-power operations. Local hard drives are optional, and can be eliminated to save power or included to store VM files locally.

A configuration without local hard drives or a storage controller can help reduce power consumption by up to 35 W compared with a configuration that includes those components.² Dell recommends a diskless configuration with ESX Server 3i.

Advanced hardware resources for virtual machine hosting

Dell has redesigned the architecture of the PowerEdge R805 server to help increase VM performance. Figure 3 outlines this server's key features alongside those of the PowerEdge 2970, and Figure 4 illustrates its key components.

The quad-core architecture of the AMD Opteron 2300 series processors in the PowerEdge R805 enables the system to run more VMs than servers with previous-generation single- or dual-core processors. In addition, ESX Server 3i software takes advantage of the Rapid Virtualization Indexing feature of this series of processors, enabling VM memory mapping information to be stored directly in the processor and helping reduce the overhead previously required by software hypervisors.

The PowerEdge R805 server is also designed to offer significantly higher I/O bandwidth than the PowerEdge 2950 and PowerEdge 2970, and is one of the first PowerEdge models to include four Gigabit Ethernet network ports without using an expansion slot. Dell also anticipates that in 2008, two of these ports will be upgradable to 10 Gigabit Ethernet. Four PCI Express (PCIe) slots—three x8, one x4—offer support for four additional dual- or quad-port network interface cards or host bus adapters.

Server memory capacity is a key factor in determining how many VMs a server can host. The PowerEdge R805 server includes 16 dual in-line memory module (DIMM) slots, supporting up to 128 GB of memory. The AMD Non-Uniform Memory Architecture (NUMA) also helps enhance the performance of many applications running on VMs.

Enhanced security

By basing its service console on a hardened Linux® distribution, ESX Server software already helps provide a secure virtualization environment. ESX Server 3i

| | Dell PowerEdge 2970 | Dell PowerEdge R805 |
|-------------------------------------|---|--|
| Processor series | AMD Opteron 2200 or 2300 | AMD Opteron 2200 (to provide backward compatibility with VMware VMotion™ technology) or 2300 |
| Memory slots | 8 DIMM slots | 16 DIMM slots |
| Memory capacity | Up to 64 GB | Up to 128 GB |
| Local hard drives | Up to eight drives | Up to two drives (not required for integrated virtualization) |
| I/O slots | Three PCIe slots (two x8, one x4) | Four PCIe slots (three x8, one x4) |
| RAID controller | Integrated RAID controller | Integrated RAID controller (not required for integrated virtualization) |
| Networking | Two embedded Gigabit Ethernet network ports (not upgradable to 10 Gigabit Ethernet ports) | Four embedded Gigabit Ethernet network ports (two of which Dell anticipates will be upgradable to 10 Gigabit Ethernet in 2008) |
| Internal solid-state storage | None | One internal SD slot to store integrated virtualization software |

Figure 3. Key features of the Dell PowerEdge R805 server compared with those of the PowerEdge 2970

²Based on tests performed by Dell engineers in October 2007 comparing two PowerEdge R805 servers with AMD Opteron 2350 processors, 8 GB of RAM, and VMware ESX Server 3i: one with no hard drives, and one with a PowerEdge Expandable RAID Controller (PERC) 6/i and two 36 GB, 10,000 rpm Serial Attached SCSI (SAS) hard drives.


further enhances security by eliminating the service console altogether, thereby helping to reduce the number of open network ports, to prevent other programs from being installed that can compromise security, and to simplify the process of securing the IT infrastructure.

Simplified backup and restore

Enterprises often use redundant mirrored local drives in their IT environment. Although eliminating local drives on the PowerEdge R805 server can help reduce power consumption and simplify management, it also renders this level of redundancy unavailable. To help compensate, VMware VirtualCenter provides simplified backup and restore processes for the integrated ESX Server hypervisor, helping administrators protect their VMs and configurations.

SIMPLIFYING DATA CENTER VIRTUALIZATION

Data centers in enterprises of all sizes are rapidly adopting virtualization as a key element of their IT infrastructure. Ideally, servers should enable virtualization out of the box, requiring very little configuration and utilizing a transparent virtualization software layer to help simplify deployment, management, and maintenance. Administrators should be able to directly provision tasks on virtualized servers without worrying about installing and configuring the hypervisor.

By integrating VMware virtualization software into the PowerEdge R805 server, Dell has taken a significant step toward this goal, offering virtualization that no longer depends on a special software layer requiring specific skills to install and manage. Instead, the PowerEdge R805 is designed to seamlessly integrate virtualization—helping significantly simplify the installation, deployment, management, and maintenance of virtualized environments. 

Balasubramanian Chandrasekaran is a systems engineer in the Dell Virtualization Solutions Engineering Group. His research

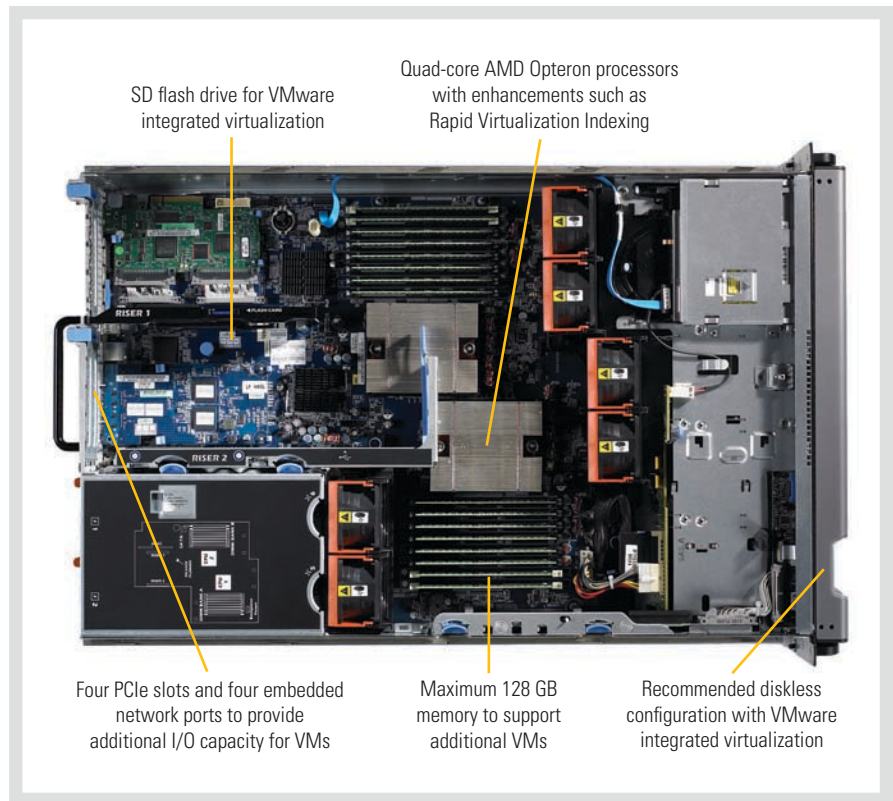


Figure 4. Key components of the Dell PowerEdge R805 server

interests include data center virtualization, high-speed interconnects, and high-performance computing. Balasubramanian has an M.S. in Computer Science from the Ohio State University.

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