



Hyper-V Server 2008 R2 Live Migration med mere

*Brian Lauge Pedersen
Technical Solutions Professional
blauge@microsoft.com*

*Laurits Kofoed
Consultant
lauritsk@microsoft.com*



Windows Server® 2008 R2

Agenda

- Microsoft Virtualization Strategy/Portfolio
- Windows Server 2008 R2 Hyper-V Overview
- Live Migration
- Interoperability
- Feature Overview
- System Center Virtual Machine Manager R2
- Microsoft Hyper-V Server 2008 R2
- Q & A

Microsoft Virtualization Strategy

The Platform
you know



Key feature
of platform

Tools
you know

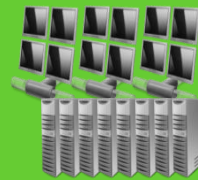
Data center to
desktop



Full range of products
& solutions

Large partner
eco-system

End-to-End
Management



Physical and Virtual &
Cross-hypervisor

Interoperability

Best TCO/ROI



1/6th the price
up front

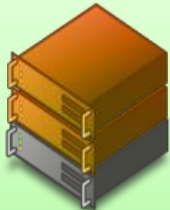
Lower ongoing costs

Microsoft Virtualization Products



*Remote Desktop
Services*

 Windows Server® 2008 R2
Remote Desktop Services



*Server
Virtualization*

 Windows Server® 2008 R2
Hyper-V™

*Application
Virtualization*



Microsoft®
Application
Virtualization



Microsoft®
System Center



*Desktop
Virtualization*

Microsoft®
Virtual PC Microsoft®
Enterprise Desktop
Virtualization

“Having one vendor for the hypervisor, operating system, and much of our application software was very appealing to us from a support and cost perspective.”

Bert Van Pottelberghe,
Sales Director, Hostbasket



*User State
Virtualization*

Document Redirection and
Offline Files

 Windows® 7

 Windows Server® 2008 R2

Extensive, Unified Management

- Wide-spread virtualization requires comprehensive, seamless management
- Only Microsoft System Center suite delivers
 - All integrated, all for one price
 - Physical and virtual machines (Hyper-V and VMware)
 - Host and **in-guest** management
 - Single pane of glass
- No rip and replace for existing VMware customers

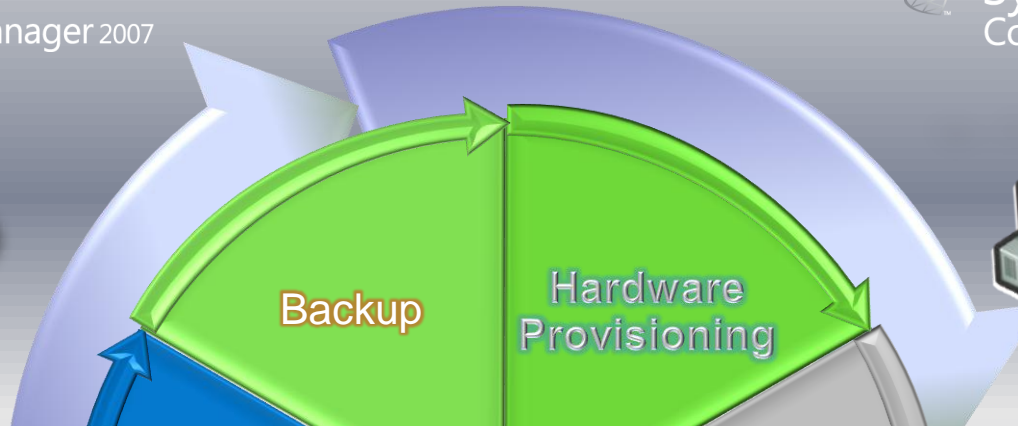


Managing Physical and Virtual Server Lifecycles

Microsoft®
System Center
Data Protection Manager 2007



Microsoft®
System Center
Configuration Manager 2007



Microsoft®
System Center



Microsoft®
System Center
Operations Manager 2007



Microsoft®
System Center
Virtual Machine Manager
Windows Server® 2008 R2

In-Guest Management and Monitoring

- Integrate virtualization into existing tools, personnel, processes
- Focus on applications, workloads running on virtual machines
- Manage, monitor virtual machines just like physical machines
- Microsoft System Center Virtual Machine Manager 2008 R2 integrated with System Center Operations Manager 2007 R2

Virtualized Workloads

Microsoft®
Exchange Server 2007

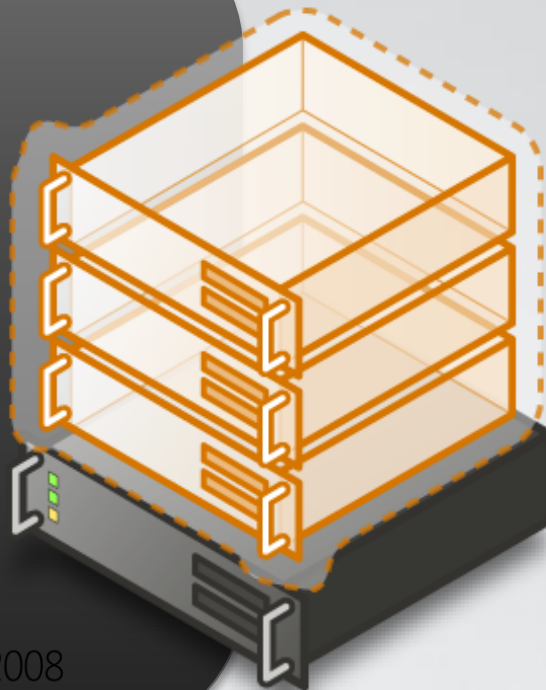
Microsoft®
SQL Server® 2008

Microsoft®
Office SharePoint®
Server 2007

Microsoft®
System Center

Windows® 7

Windows Server® 2008



Microsoft supports our key server applications in a virtualized environment

Microsoft has updated server workload licensing to enable virtualization mobility

Management of the workloads is key, not just the virtual machine

“Maxol runs Exchange Server 2007, SQL Server 2005, Terminal Services, and file and print servers as key workloads in its virtual environment. Going forward, nearly every business application at Maxol will be a candidate for virtualization.”

Maxol Case Study

“We’ve seen first-hand that we can virtualize everything from file, print, and web servers to database servers running SQL Server and Oracle, and actually have the virtual machine run **faster** than what it ran on our original physical box.”

Janssen Jones, Indiana University

Server Consolidation: Comune di Roma

The Fastest Way to Reduce Costs

Challenges:

- Underutilized hardware
- Excessive power consumption
- Desire to Improve Business Agility
- Expensive space across datacenter & branch offices

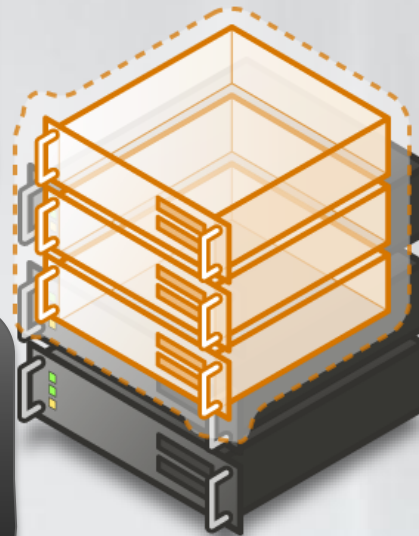
"With Hyper-V, we are exploiting the capacity of Intel-based enterprise servers to build a scalable, reliable virtualization environment capable of consolidating multiple physical servers at once."

Luigi Baldoni

Chief Information Officer, Comune di Roma

*"IT staff used the performance monitoring tool within the Microsoft Management Console (MMC) to assess the performance of both 64-bit and 32-bit VMs. **"So far, the performance of Hyper-V is near to that of a physical system, and the MMC interface is simple and intuitive."***

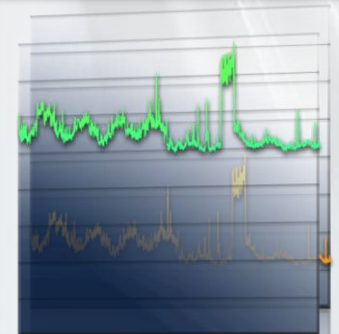
Giulio Moroni, Comune di Roma Technical Leader



 Windows Server[®] 2008
Hyper-V[™]

Some Hyper-V Workloads:

- BizTalk 2006 Enterprise
- Active Directory
- IIS 7.0
- Oracle



**Server
Utilization**

UK Host: PoundHost & BlueSquare

Switched from VMware to Hyper-V

Challenges:

- Wanted to expand product offerings & provide greater flexibility
- High Cost of VMware impacted bottom line
- Lower Costs for IT & Power

Process:

1. Customers order VMs online & order is validated via PoundHost billing system
2. PowerShell™ scripts create vms to the customer's exact specifications
3. Microsoft System Center Virtual Machine Manager 2008 creates the virtual machine on the host server, System Center Configuration Manager 2007 installs the operating system, configures Internet Protocol (IP) addresses, installs the customer's business software and all necessary security updates

Result:

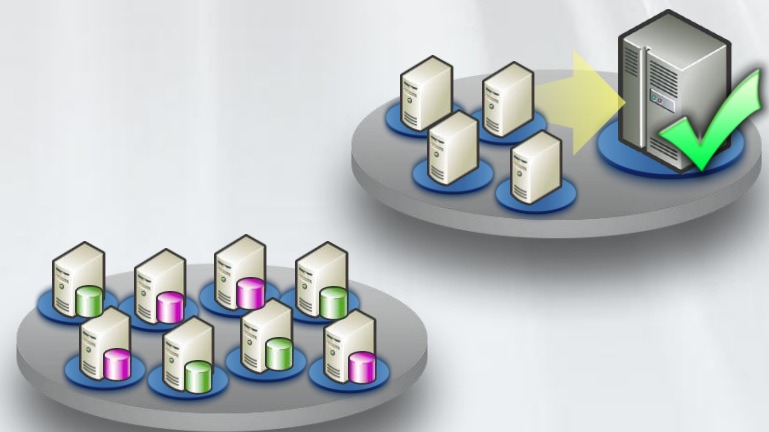
Demand for Windows Server 2008 R2-based servers has been much stronger than PoundHost anticipated. "We sold 100 virtual machines in the first two months and expect to sell another 1,000 in the next two months," Munson says. "We've doubled virtual-machine sales with our Hyper-V offering, plus operating costs are lower because Hyper-V is so much less expensive than VMware. A host server containing 50 guest servers would cost over £750 [\$1,200] a month with VMware but only £66 [\$107] a month with Hyper-V—an 80 percent savings. Our profitability has increased by 55 percent with Hyper-V."



"With Hyper-V, we can offer customers much greater flexibility, and the System Center solutions build the server automatically."

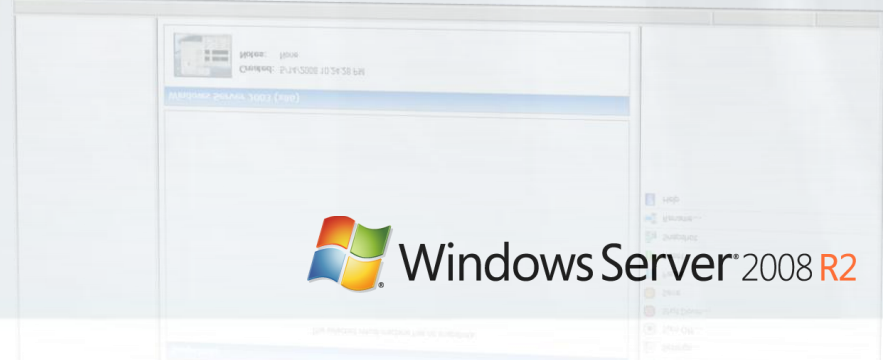
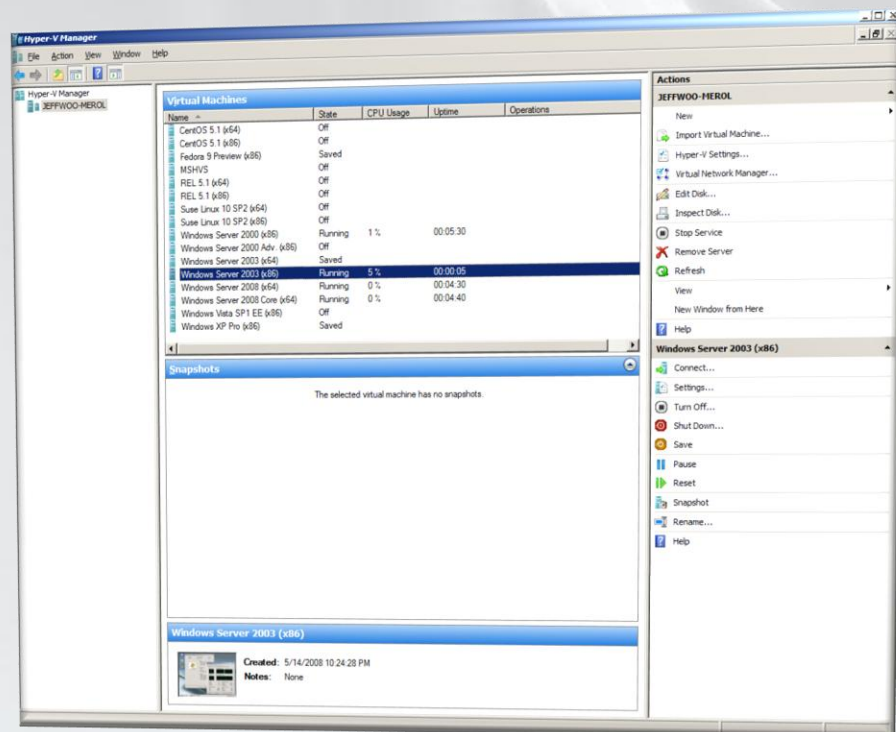
Windows Server 2008 R2 Hyper-V

- Building on rock solid Windows Server 2008 Hyper-V architecture
 - Over 400 case studies from customers worldwide: SMB, Branch to Enterprise (www.microsoft.com/virtualization)
 - Over 1 million downloads of Hyper-V RTM in 12 months
 - Fastest growing bare metal hypervisor in x86 history
- Microsoft.com powered by Hyper-V since V1 Beta
 - ~15,000 requests per second
 - Over 40 million hits per day
 - Over 1.2 billion page hits per month
- Enabling new dynamic scenarios:
 - Dynamic Data Center
 - Virtualized Centralized Desktop
- Customer Driven



Windows Server 2008 R2 Hyper-V New Features

- Live Migration
- New Processor Support
 - Improved Performance
 - Lower Power Costs
- Enhanced scalability
 - Greater VM Density
 - Lower TCO
- Networking Enhancements
 - Improve Performance
 - 10 Gb/E Ready
- Dynamic VM Capabilities
- Enhancements to Server Core
 - Ease Management
 - Lower TCO





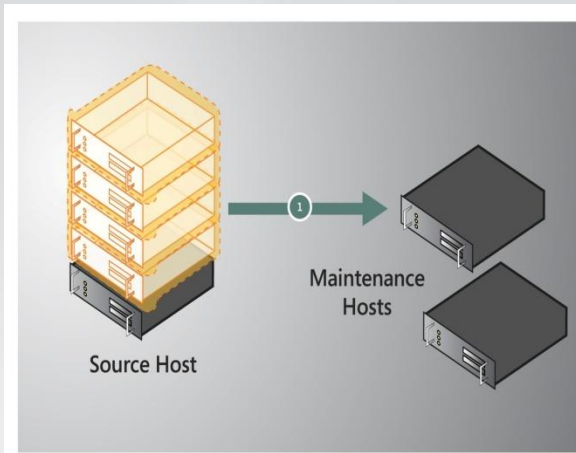
Windows Server® 2008 R2

Hyper-V Live Migration

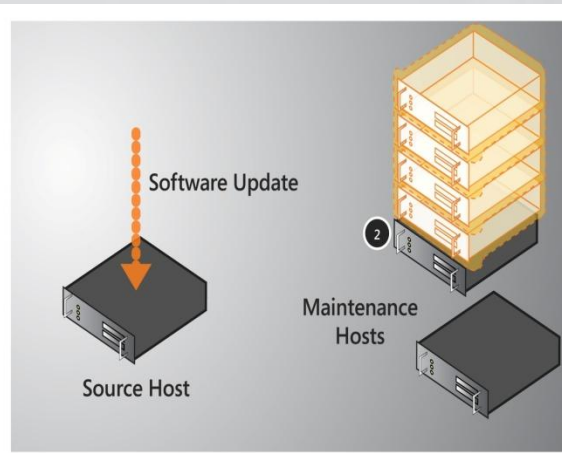
Live Migration

- #1 Customer Request
- Moving a virtual machine from one server to another without loss of service
 - Guest OS is unaware of the migration
 - Maintain TCP connections of the guest OS
 - VM is treated as a black box
 - Building block for Dynamic Data Center through business agility, cost reduction and increase in productivity
- Enables new dynamic scenarios
 - Load balancing VMs via policy

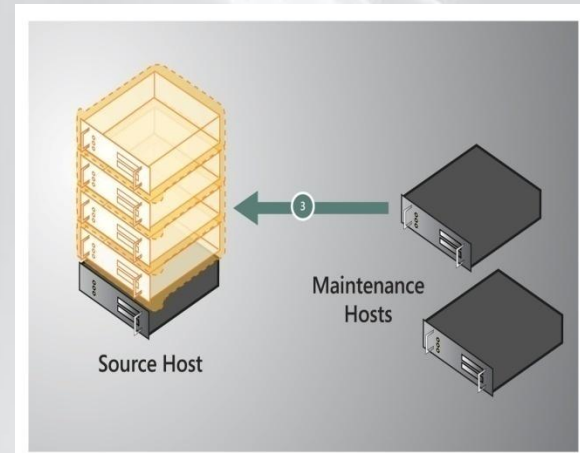
Key Scenario: Host Servicing



Live Migrate VMs
from Source to
Destination



Service Source –
Patching or Hardware
Servicing, no downtime
seen by VMs on
Destination

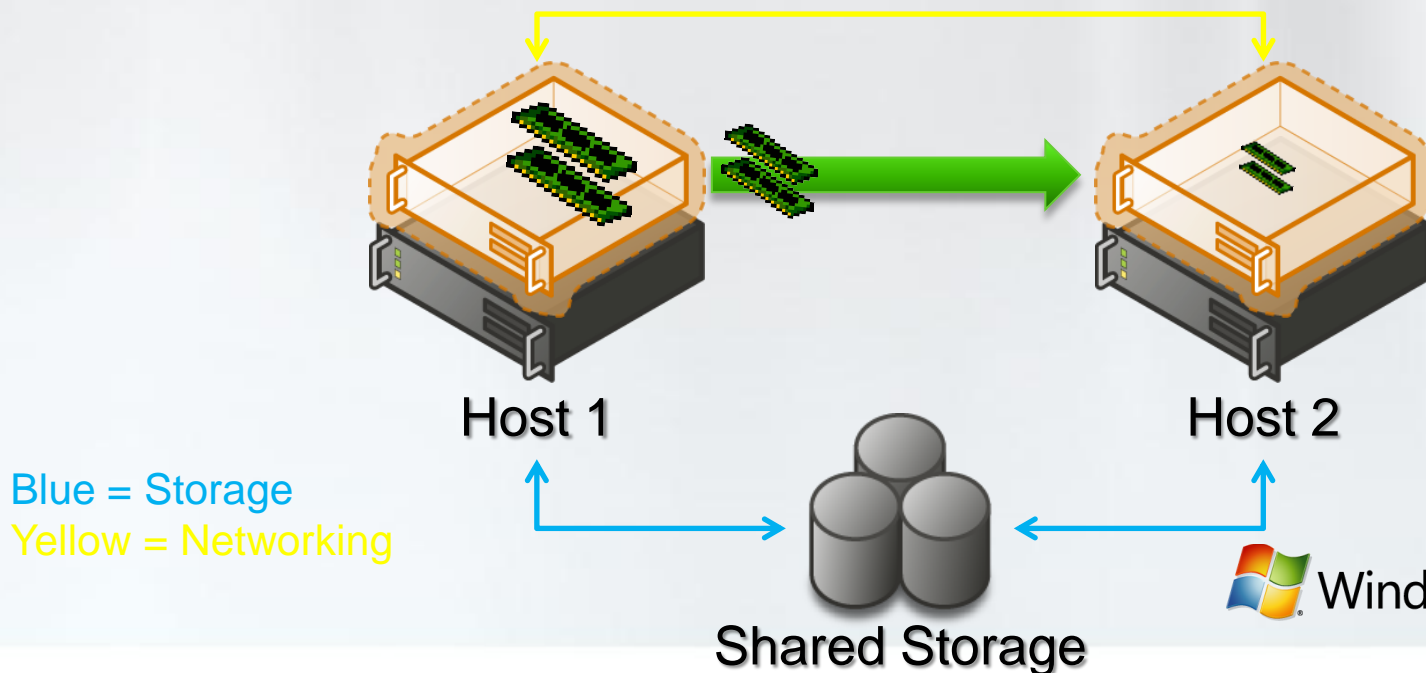


Live Migrate VMs from
back from Destination
to Source

No workload downtime during maintenance window

Live Migration: How It Works

1. Create VM on target server
2. Copy memory pages from the source to the target via Ethernet
3. Final state transfer
 - a) Pause virtual machine
 - b) Move storage connectivity from source host to target host via Ethernet
4. Run new VM on target; Delete VM on source

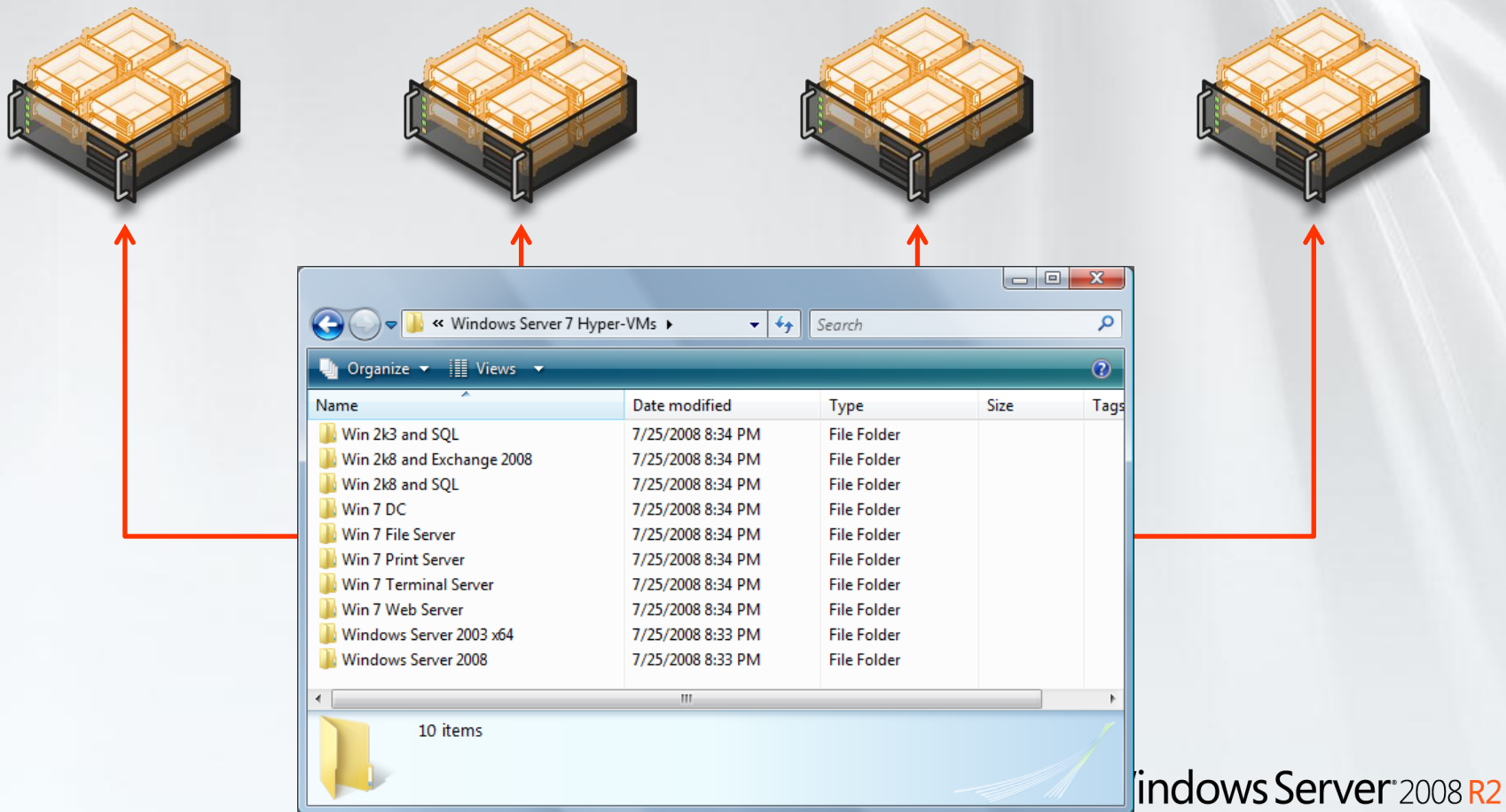


Migration & Storage

- Windows Server 2008 R2 Hyper-V
 - NEW Cluster Shared Volume (CSV)
 - CSV provides a single consistent file name space
 - All Windows Server 2008 R2 servers see the same storage simultaneously
 - Easy setup; Uses NTFS
 - No reformatting SANs
 - Create one big data store
 - No more drive letter problems
 - Existing tools just work

Cluster Shared Volumes

- All servers “see” the same storage



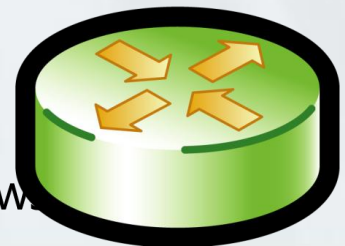
CSV Compatibility

It Just Works

- No special hardware requirements
- No file type restrictions
- No directory structure or depth limitations
- No special agents or additional installations
- No proprietary file system
 - Uses well established traditional NTFS
- Doesn't suffer from numerous VMFS limitations such as...

Advanced Storage Capabilities

- Is there a Hyper-V Storage Certification?
 - What about storage De-duplication?
 - What about Storage Replication?
- Hyper-V is compatible with block based de-duplication and replication solutions that are certified for Windows Server 2008/2008 R2.
- Solutions from: NetApp, HP, Dell, EMC, Hitachi, NEC, Compellent and more...
 - www.windowsservercatalog.com





Windows Server® 2008 R2

New Processor Features

64 Logical Processor Support

- Overview
 - **4x improvement** over Hyper-V V1
 - Hyper-V can take advantage of larger scale-up systems with greater amount of compute resources
- Up to 384 Running Virtual Machines & Support for up to 512 Virtual Processors (VPs) PER SERVER
 - 384 single VP VMs OR
 - 256 dual VP VMs (512 Virtual Processors) OR
 - 128 quad VP VMs (512 Virtual Processors) OR
 - any combination so long as you're running up to 384 VMs and up to 512 Virtual Processors



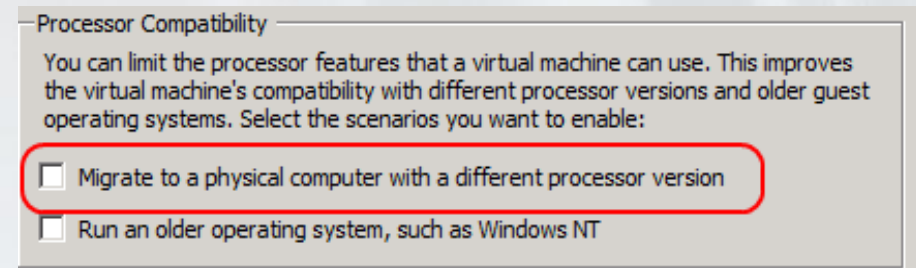
Processor Compatibility Mode

• Overview

- Allows live migration across different CPU versions within the same processor family (i.e. Intel-to-Intel and AMD-to-AMD).
 - Does NOT enable cross platform from Intel to AMD or vice versa.
- Configure compatibility on a per-VM basis.
- Abstracts the VM down to the lowest common denominator in terms of instruction sets available to the VM.

• Benefits

- Greater flexibility within clusters
- Enables migration across a broader range of Hyper-V host hardware



Cluster Example

- Hardware:
 - 4 Generations of Intel VT Processors
 - 4 Node Cluster using 1 Gb/E iSCSI
- Test:
 - Created script to continuously Live Migrate VMs every 15

Result: 20,000+ Migrations in a week!



Forward & Backward Compatibility

- How Does it Work?
 - When a VM is started the hypervisor exposes guest visible processor features
 - With Processor Compatibility Enabled, the guest processors is normalized and the following processors features are “hidden” from the VM

Host running AMD based processor	Host running Intel based processor
SSSE3, SSE4.1, SSE4.A, SSE5, POPCNT, LZCNT, Misaligned SSE, AMD 3DNow!, Extended AMD 3DNow!	SSSE3, SSE4.1, SSE4.2, POPCNT, Misaligned SSE, XSAVE, AVX

Windows Server 2008 R2

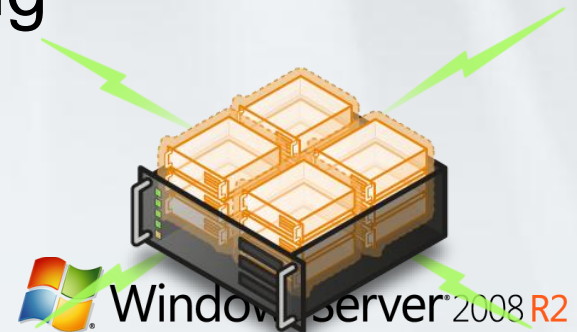
Core Parking

- Overview

- Scheduling virtual machines on a single server for density as opposed to dispersion
- This allows “park/sleep” cores by putting them in deep C states

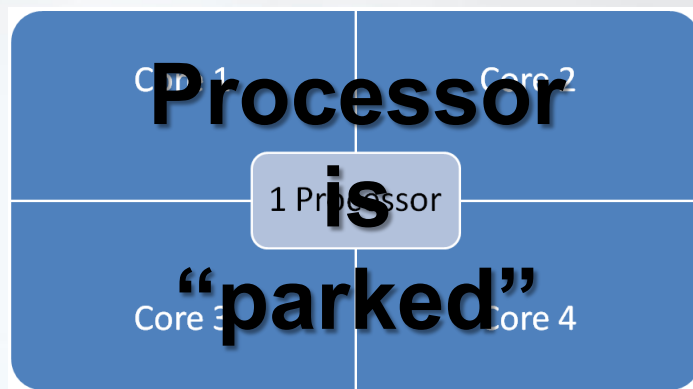
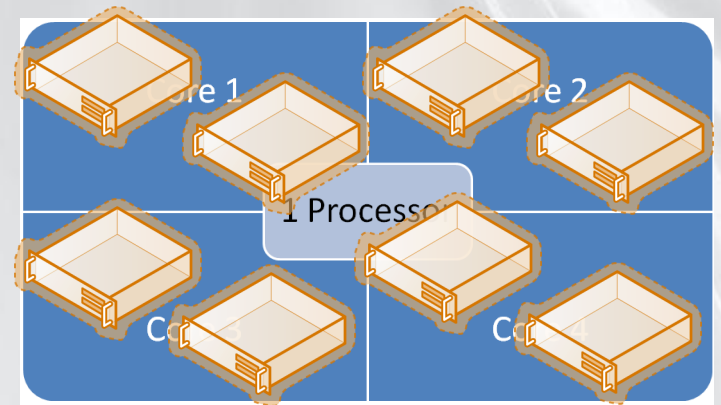
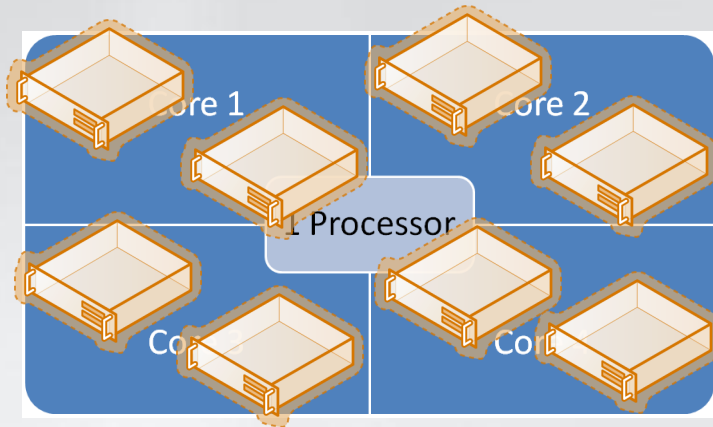
- Benefits

- Enhances Green IT by reducing CPU power consumption

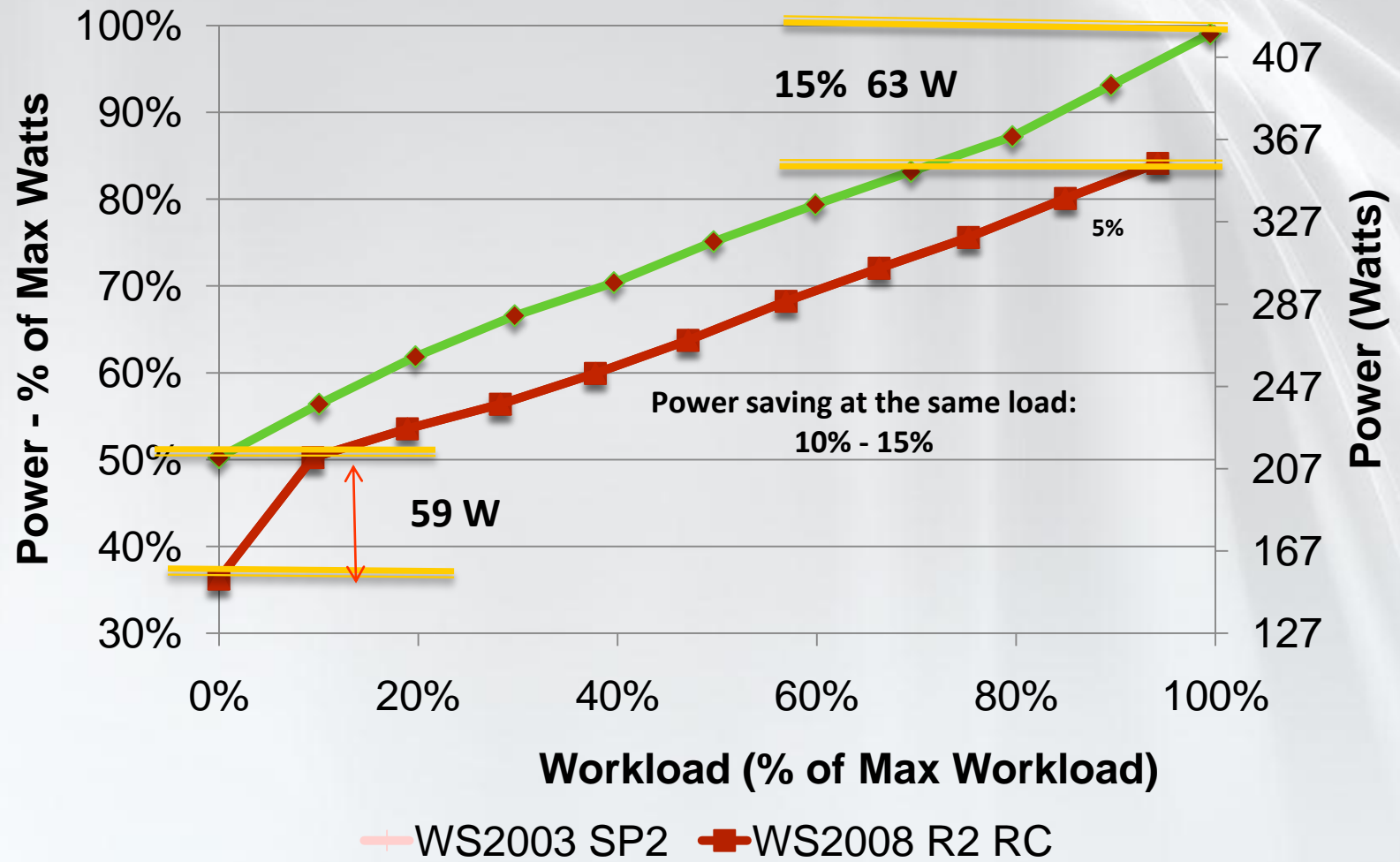


Windows Server 2008 R2 Core Parking

16 LP Server



R2 Power Efficiency Improvement



What Windows Server 2008 R2 Early-Adopting Customers Are Saying

- “With virtualization, **we will save about 50 percent of our annual energy budget** for cooling and electricity.”
 - Lukas Kucera – IT Services Manager at Lukoil CEEB
- “The work that Microsoft has done in these areas—particularly the ability to shift workloads across CPUs—is doing wonders for reducing our energy consumption.”
 - Jeffrey Altman – President and CEO at Secure Endpoints
- **“89% Energy Savings with Microsoft Virtualization”**
 - Chris Steffen – Principle Technical Architect at Kroll Factual Data
 - Video Case Study at spotlightoncost.com



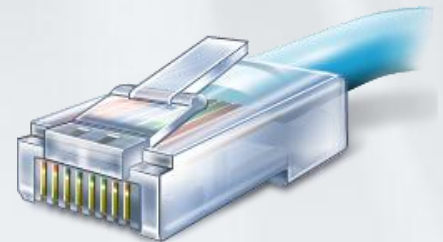
Windows Server® 2008 R2

Hyper-V Networking

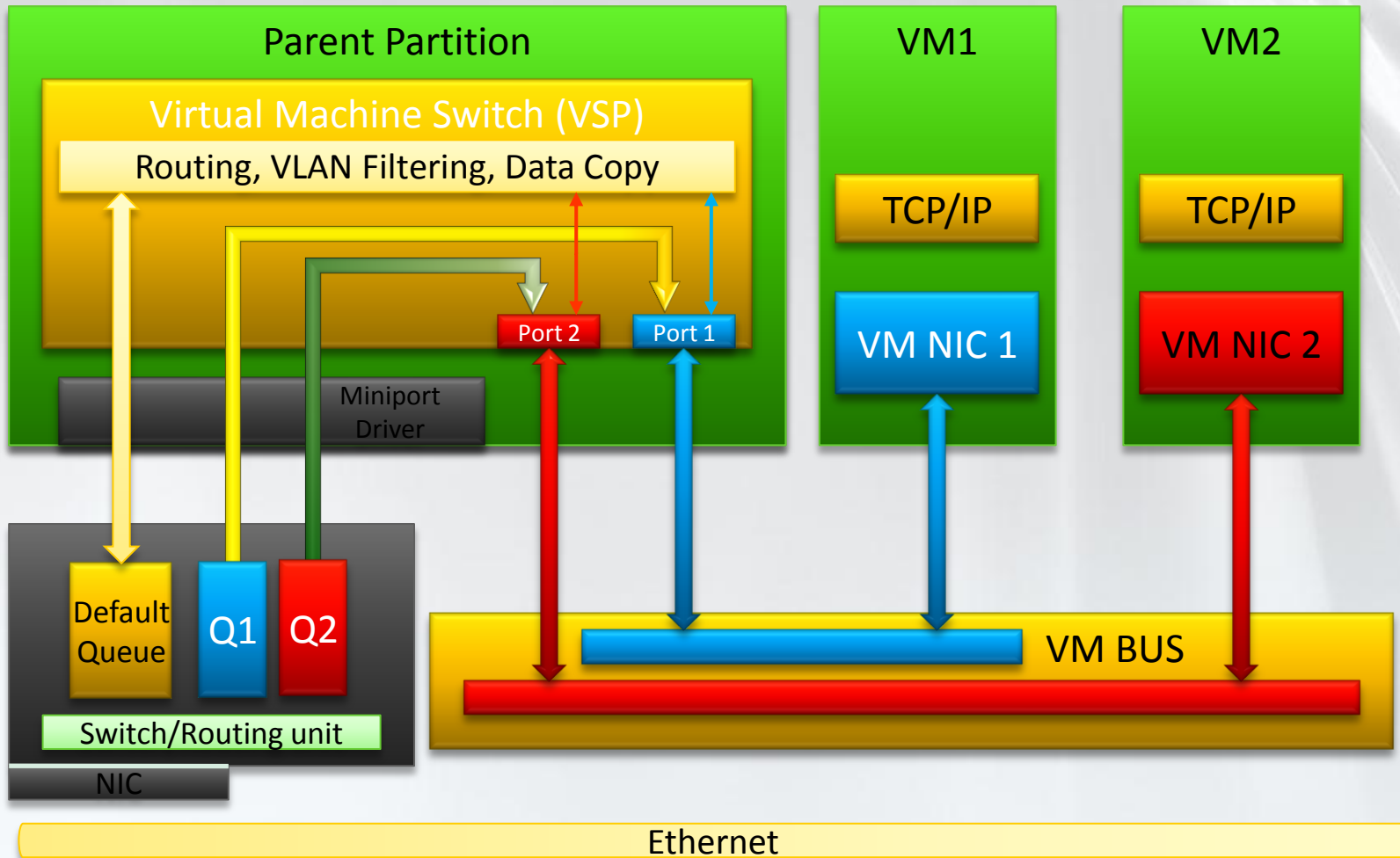
Hyper-V R2 Networking

10 Gb/E Ready

- Chimney Support (10Gb/E)
 - TCP/IP traffic in a VM can be offloaded to a physical NIC on the host computer.
 - Reduce CPU burden; Live Migration is fully supported with Full TCP Offload
 - Works best with long-lived connections with large data transfers
- VMQ Support (10Gb/E)
 - NIC can DMA packets directly into VM memory
 - Host no longer has device DMA data in its own buffer resulting in a shorter path length for I/O (performance gain)
- Jumbo Frame Support (1 Gb/E & 10 Gb/E)
 - Enables 6x larger payload per packet
 - Improves throughput
 - Reduce CPU utilization of large file transfers



Network I/O Data Path With VMQ





Windows Server® 2008 R2

Hyper-V Interoperability

Interoperability

Novell



CITRIX



"DHMC runs both Windows Server 2008 and Windows Server 2003 as guest operating systems under Hyper-V, as well as Linux. To date, DHMC has virtualized Web servers, sites on Microsoft Office SharePoint® Server 2007, reporting servers, medical applications, domain controllers, file and print servers, Citrix servers, and more."

Dartmouth Hitchcock Medical Center Case Study

Interoperability agreements with Novell and Citrix (Xen) to support Linux on Hyper-V

SVVP (Server Virtualization Validation Program) to certify non-Microsoft Hypervisors for Microsoft Support

System Center Operations Manager supports monitoring of non-Windows, including Linux

System Center Virtual Machine Manager manages VMware ESX servers

Microsoft Contributes to Linux

- In July '09, Microsoft contributed over 20,000 lines of code to the Linux kernel under GPL v2
- Drivers to enhance performance
 - Synthetic Disk
 - Synthetic Networking
 - VMBus

August '09: Microsoft Drivers Included in
Linus Torvalds Official Kernel (v2.6.32)



Windows Server® 2008 R2



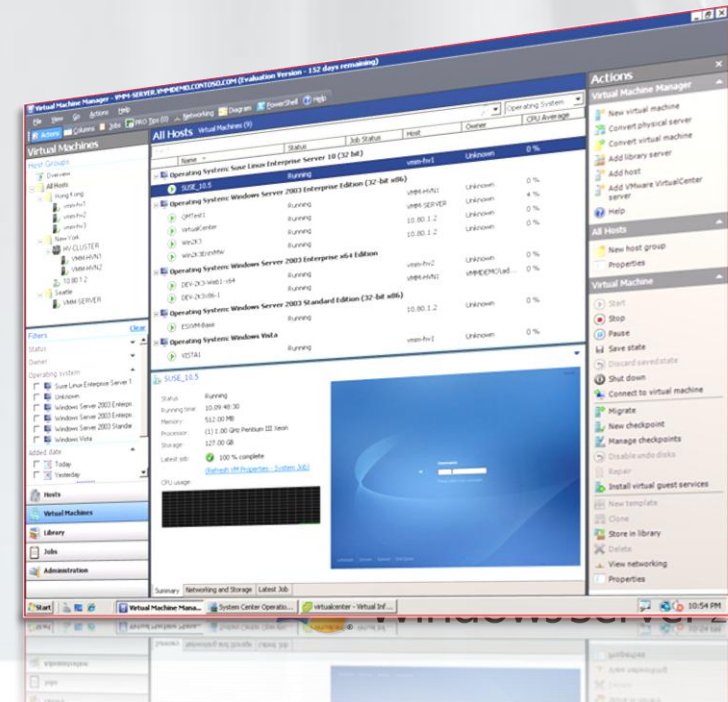
Microsoft®

System Center

Virtual Machine Manager 2008 R2

A centralized, heterogeneous management solution for the virtual datacenter

- **Maximize Resources**
 - Centralized virtual machine deployment and management for Hyper-V, Virtual Server, and VMware ESX servers
 - Intelligent placement of Virtual Machines
 - Fast and reliable P2V and V2V conversion
 - Comprehensive application and service-level monitoring with Operations Manager
 - Integrated Performance and Resource Optimization (PRO) of VMs
- **Increase Agility**
 - Rapid provisioning of new and virtual machines with templates
 - Centralized library of infrastructure components
 - Leverage and extend existing storage infrastructure and clusters
 - Allow for delegated management and access of VMs
- **Leverage Skills**
 - Familiar interface, common foundation
 - Monitor physical and virtual machines from one console
 - Fully scriptable using Windows PowerShell



What's new in VMM 2008 R2

- Support for new Windows Server 2008 R2 features
 - Live migration
 - Support for CFS (Clustered Shared Volumes and 3rd party solutions)
 - Hot add/remove of VHDs, Pass-through disks
- Maintenance mode
 - Evacuate VMs from host using Live migration
- Storage Enhancements
 - Storage Vmotion Support
 - Quick Storage Migration w/Hyper-V
 - Enhanced Migration of VMs for clusters
- Rapid Provisioning of Virtual Machines



Microsoft
System Center
Virtual Machine Manager 2008 R2



Windows Server® 2008 R2

Live Migration

- Enables migration of running VMs without downtime
- Requirements
 - Hosts need to be part of a failover cluster
 - Host processor type should be same
 - Must have access to shared storage
 - Cluster Shared Volumes (CSV) is highly recommended
 - Dedicated network for the live migration traffic
- Multiple Simultaneous Live Migrations
 - A given host can participate in one Live Migration at a time as source or destination for up to **8** concurrent Live Migrations in a 16 node cluster





Windows Server® 2008 R2

Demo

Host compatibility

- VM migration requires host hardware to be compatible
 - CPU features, enlightenment parity etc
- Compatibility checks
 - VMM R2 does deep check for compatibility
 - Supported for both Hyper-V and VMWare VMs
- Make VM compatible (Hyper-V specific)
 - Setting per VM: Needs VM to be restarted to take effect
 - Turns off certain CPU features in VM
 - Tradeoff between using advanced CPU features versus making VM more compatible for migration



Clustered Shared Volumes (CSV)

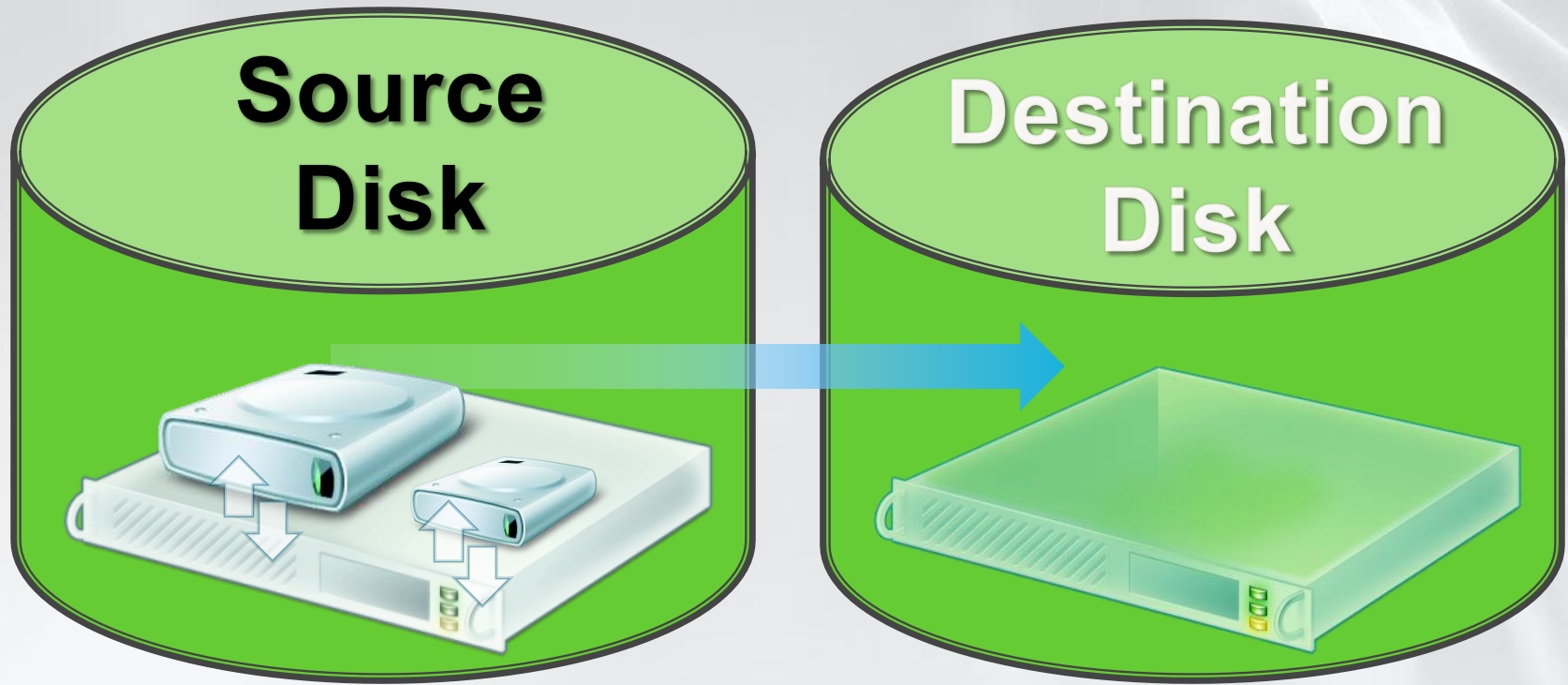
- Enables multiple nodes in a cluster to access a single shared LUN
- VMM 2008 R2
 - Allows multiple VMs within the cluster to share a LUN
 - Enables packing more VMs per LUN without needing to carve out individual LUNs
 - Enables live migration of individual VMs without affecting other VMs on the LUN
- Support for 3rd party CFS
 - Detect CFS disks and enable HAVM
 - Allow multiple VMs per LUN

Storage Migration

- VMM R2 adds support for Quick Storage Migration
 - Migrate VM to a different location with minimal downtime
 - On same Host or different host

Feature	Quick Storage Migration	VMWare Storage vMotion
Storage agnostic	Yes	No (requires VMFS)
VM downtime	< 2 mins	< 2 sec
Migration of VMs with snapshots	Yes	No
Requires access to both source and target storage	No	Yes
Migrate VM to different host along with migrating storage	Yes	No

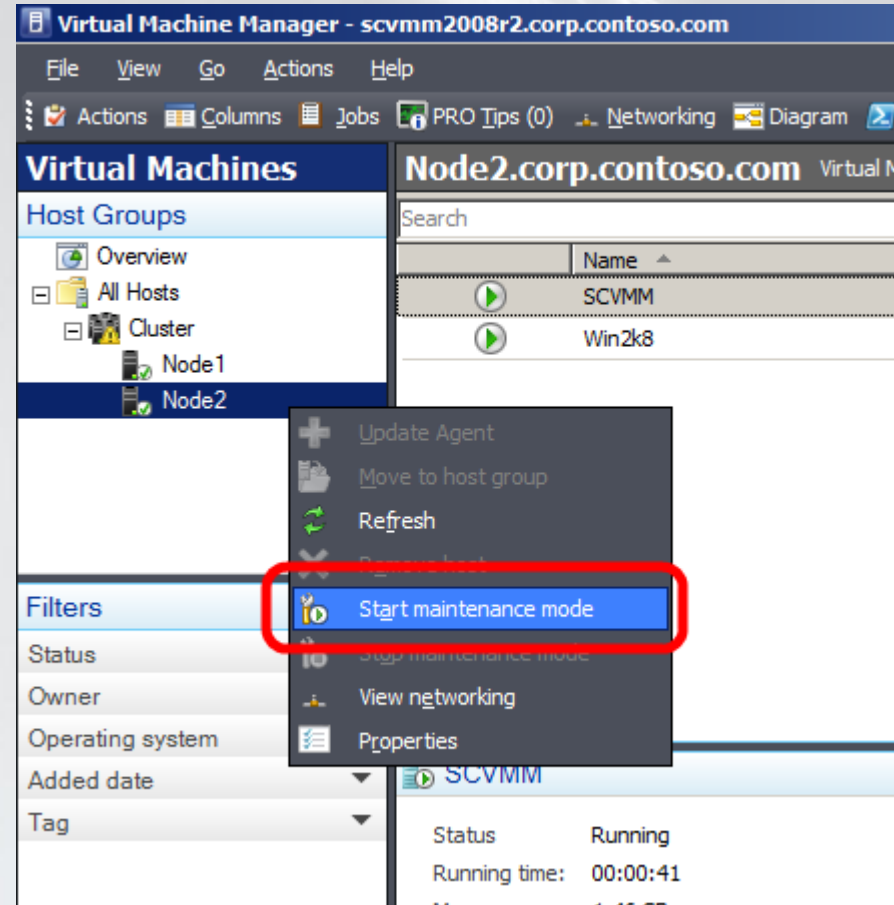
Quick Storage Migration



Quick Storage Migration Enables VM Migration from one storage infrastructure to another!

Maintenance Mode

- VMM R2 Allows Host Servers To Be Put Into a Maintenance Mode
 - Useful for Servicing Hardware, Software or Power Energy Management
 - If Host Is Clustered VMs Running On The Host Are Automatically Live Migrated To Other Hosts
 - If Host Is Standalone Admin Can Choose To Save State or Shutdown VMs
- Placement
 - Host in maintenance mode gets zero star ratings
- Supported for Hyper-V, Virtual Server and VMWare Hosts



Network related enhancements

- Network Optimization
 - Win2k8 R2 supports 2 types of network optimizations: VMQ & Chimney
 - During VM creation: Enable/disable network optimization
 - If enabled, VMM will configure the VM to use VMQ or Chimney, if available on the host
 - Placement: Detect and show availability of Network optimization on the host
- Enable/Disable MAC spoofing
- Ability to reuse port groups defined in VMWare VirtualCenter



Select Host

Select Source

Virtual Machine Identity

Configure Hardware

Select Destination

Select Host

Select Path

Select Networks

Additional Properties

Summary

Select a host for the virtual machine.

Hosts are rated based on the virtual machine's requirements and default placement options. To change placement options for this virtual machine, click Customize Ratings.

Search		in All Hosts	
Rating	Host	Transfer Type	Network Optimization
★★★★★	alejanp-tm4.redmond.corp.microsoft.com	Network	✓

Details

[What do these ratings mean?](#)

Details

Rating Explanation

SAN Explanation

Description

Status

OK

Operating system

Microsoft Windows Server 2008 R2 Enterprise ,

Virtualization software

Microsoft Hyper-V

Virtualization software status

Up-to-date

Virtual machines

VMM has detected that host has NIC that has either VMQ or Chimney capabilities

Previous

Next

Cancel

Hot Add of VM storage

- Ability to add/remove storage to running VMs
 - Reduces downtime and provides flexibility to admins to add/remove storage as needed
- Admin needs to add storage space to VM
 - He would need to stop the VM to do this
 - With VMM R2 and Win2k8 R2
 - Admin can create additional storage and add it to running VM
- Admin needs to backup a VM
 - Can create VSS snapshot of his running OS
 - Use the new disk as destination of snapshot
 - Remove the disk from running VM

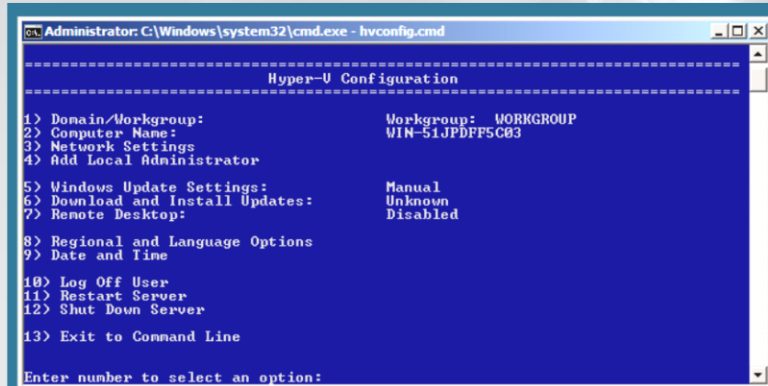
Disjoint domains

- Host has different FQDN in AD and DNS
 - For example: server name is foo
 - FQDN in AD: foo.domain.contoso.com
 - FQDN in DNS: foo.contoso.com
- For Kerberos authentication, SPN needs to be created for DNS Name
- VMM 2008
 - Required custom SPN to be manually configured in AD
- VMM 2008 R2
 - Automatically creates custom SPN for DNS name
 - AD needs to be configured to give permissions to VMM for SPN read/write permissions

Microsoft Hyper-V Server R2

New Features

- Live Migration
- High Availability
- New Processor Support
 - Second Level Address Translation
 - Core Parking
- Networking Enhancements
 - TCP/IP Offload Support
 - VMQ & Jumbo Frame Support
- Hot Add/Remove virtual storage
- Enhanced scalability
- Free download:
 - www.microsoft.com/hvs



The screenshot shows a Windows command prompt window titled "Administrator: C:\Windows\system32\cmd.exe - hvconfig.cmd". The window displays the "Hyper-V Configuration" utility. The utility has a blue background with white text. It shows a list of configuration options on the left and their current values on the right. The options are: 1) Domain/Workgroup: WORKGROUP, 2) Computer Name: WIN-51JPDF5C83, 3) Network Settings, 4) Add Local Administrator, 5) Windows Update Settings: Manual, 6) Download and Install Updates: Unknown, 7) Remote Desktop: Disabled, 8) Regional and Language Options, 9) Date and Time, 10) Log Off User, 11) Restart Server, 12) Shut Down Server, and 13) Exit to Command Line. At the bottom, it says "Enter number to select an option:".

```
Administrator: C:\Windows\system32\cmd.exe - hvconfig.cmd

Hyper-V Configuration

1) Domain/Workgroup:          Workgroup: WORKGROUP
2) Computer Name:            WIN-51JPDF5C83
3) Network Settings
4) Add Local Administrator
5) Windows Update Settings:   Manual
6) Download and Install Updates: Unknown
7) Remote Desktop:           Disabled
8) Regional and Language Options
9) Date and Time
10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line

Enter number to select an option:
```

Microsoft®
Hyper-V™ Server 2008 R2

Microsoft Virtualization:

November 2005

Virtual Server 2005 R2

- 32-bit Guests: Up to 4 GB per VM
- Uni-Processor Guests
- High Availability via scripts
- Up to 8 Cluster Nodes

June 2008

Windows Server 2008

- Hyper-V R1
- 16 LP Support/Up to 128 VMs
- 1 Terabyte Memory
- 32-bit/64-bit (Up to 64 GB per VM)
- SMP Guests
- High Performance I/O (VSP/VSC/VMBus)
- HA Integrated/Included
- Quick Migration Included
- Up to 16 Cluster Nodes

July 2009

Windows Server 2008 R2

- Hyper-V R2
- 64 LP Support/Up to 384 VMs/Up to 512 VPs
- Live Migration
- Cluster Shared Volumes
- Processor Flexibility
- Power Enhancements
- 10 Gb/E Ready
- Hot Add Virtual Storage
- Connection Broker for Hosted Desktops
- Quick Storage Migration with SCVMM R2

**Greater
Performance**

**High Availability
Built-In**

**Live Migration
Built-In**

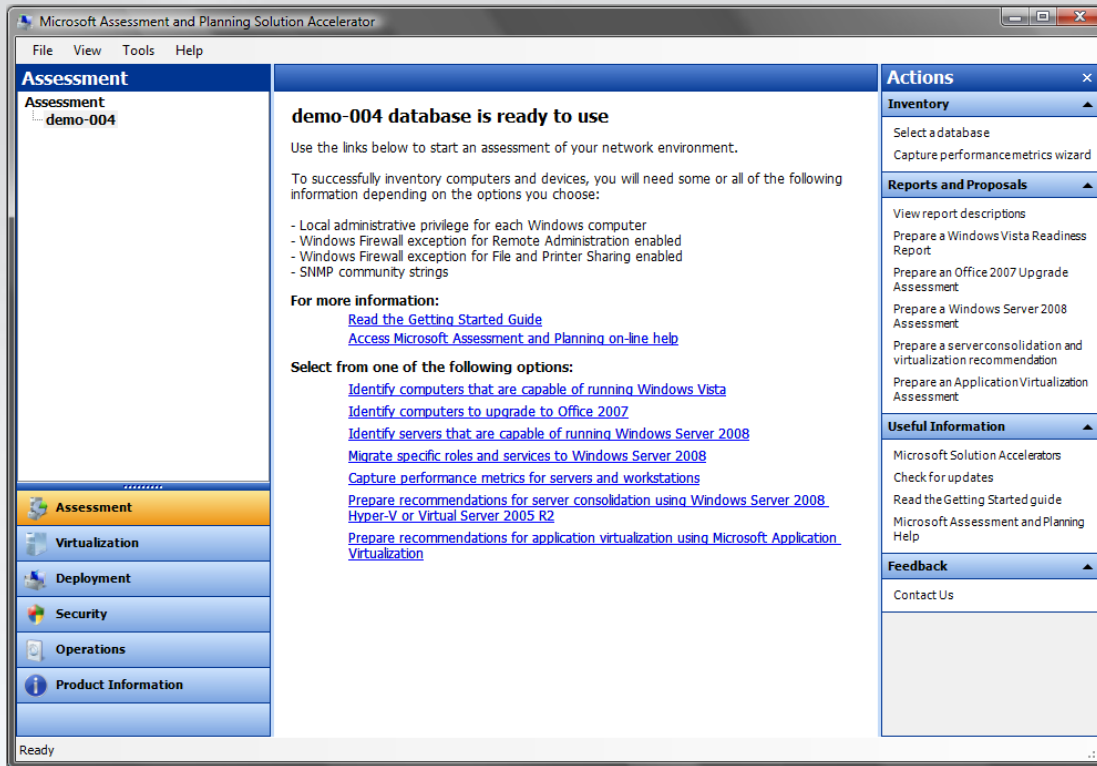
**More
Capabilities**

**Increased
Scalability**

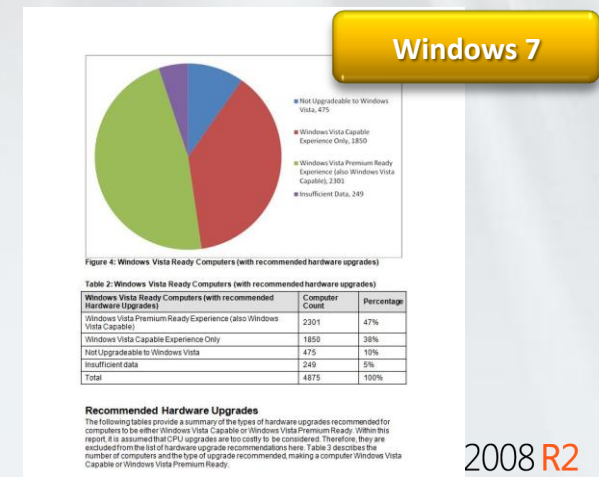
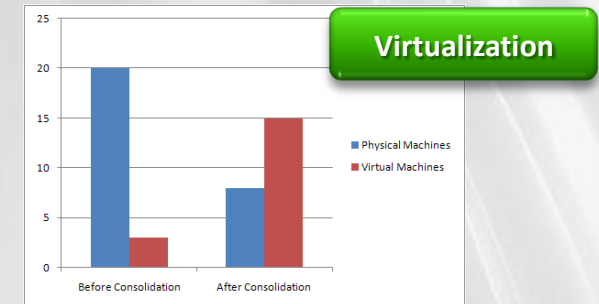
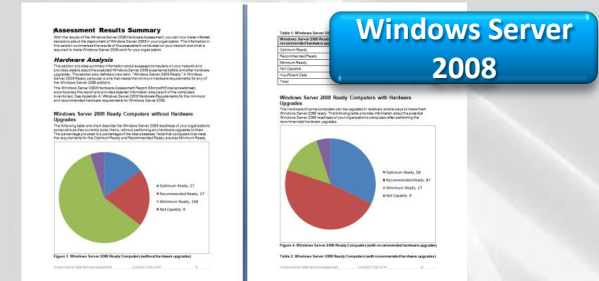
**Ready for Next
Gen Servers**

MAP: User Interface & Reports

Server Migration & Virtualization Candidates



- Heterogeneous Server Environment Inventory Linux, Unix & VMware
- Windows 7 & Server 2008 R2 HW & Device Compatibility Assessment
- Speed up Planning with Actionable Proposals and Assessments
- Collect Inventory of Servers, Desktops and Applications Agentlessly
- Offers Recommendations for Server/Application Virtualization
- Works with the Virtualization ROI Tool to generate ROI calculations
- More on MAP: <http://www.microsoft.com/map>



Online Resources

Microsoft Virtualization Home/Case Studies from customers around the world:

<http://www.microsoft.com/virtualization>

Windows Server Virtualization Blog Site:

<http://blogs.technet.com/virtualization/default.aspx>

Windows Server Virtualization TechNet Site:

<http://technet2.microsoft.com/windowsserver2008/en/servermanager/virtualization.mspx>

MSDN & TechNet Powered by Hyper-V

<http://blogs.technet.com/virtualization/archive/2008/05/20/msdn-and-technet-powered-by-hyper-v.aspx>

Virtualization Solution Accelerators

<http://technet.microsoft.com/en-us/solutionaccelerators/cc197910.aspx>

How to install the Hyper-V role

<http://www.microsoft.com/windowsserver2008/en/us/hyperv-install.aspx>

Windows Server 2008 Hyper-V Performance Tuning Guide

http://www.microsoft.com/whdc/system/sysperf/Perf_tun_srv.mspx

Using Hyper-V & BitLocker White Paper

<http://www.microsoft.com/downloads/details.aspx?FamilyID=2c3c0615-baf4-4a9c-b613-3fda14e84545&DisplayLang=en>



Windows Server® 2008 R2

Campus Days
14.-16. januar 2010



THANK YOU!



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