



Agenda

- Virtual Machine Monitor
- Architecture Virtual Server 2005 R2
 - VM Additions
 - Hardware-assisted virtualization
- Architecture Windows Virtualization

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About the Presenter

- Consultant and trainer
 - Virtualization
 - Security, ISA Server and Forefront
- Virtualization background:
 - Microsoft MVP for Virtual Machine Technology
 - Whitepaper at microsoft.com: "Virtual PC for Developers"
 - Manage all Virtual PC / Virtual Server-based labs at TechEd / IT Forum and other international TechEds
 - Create and optimize many VMs
 - Create virtualization tools (Virsoft)
 - Tools to analyse and optimize VMs
 - Tools to handle VHD-files
- Contact:
 - Beekelaar Consultancy
 - ronald@beekelaar.com



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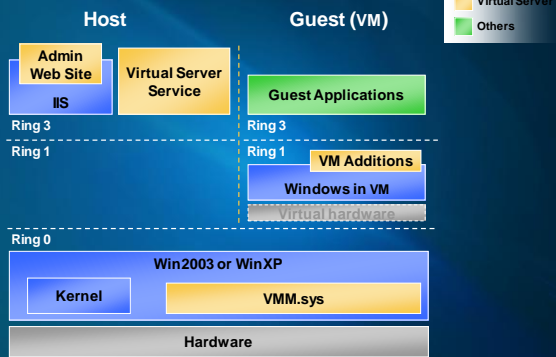
Architecture

Virtual Machine Monitor (VMM)

- CPU needs to switch between host process and guest process
- VMM switches context between those processes
- Computer runs either host context or VMM context
- Only one operating system can "run" on CPU
- Ring compression

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Architecture



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CPU virtualization

Still one problem left to solve

- We want CPU **direct-mode execution**
 - Guest OS runs directly on CPU - fast! (99% speed)
 - When a privileged operation is required, a **trap** occurs, and VMM handles operation in kernel mode
- **Problem:** x86 is not **fully** virtualized in this way
 - 20 kernel-mode **read** CPU instructions are allowed from outside ring 0 !
- Four possible solutions:
 - a) Recompile OS and applications without those 20 instructions
 - = avoid those 20 instructions
 - b) Use **Binary Translation** execution
 - = patch code while running on host
 - c) Install **VM Additions** in guest
 - = patch code in memory in VM
 - d) Use **hardware-assisted virtualization**
 - = catch instructions in special ring "-1"

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CPU virtualization

Solutions

- **Binary translation**
 - Translate guest instruction code to host instruction code
 - Always possible, but is very slow
- **VM Additions**
 - Patches dll-code in memory in VM (=similar to a rootkit)
 - Not possible for 64-bit Vista/Longhorn
 - Note that VM Additions also do:
 - Time-sync, heartbeat, shutdown support
 - optimized SCSI disk, and better mouse/video driver
- **Hardware-assisted virtualization**
 - Use Intel VT or AMD Virtualization CPU
 - CPU solves the problem by maintaining settings per VM
 - Can be considered as ring "-1"

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VM Additions

Versions

Build	Release	Notes
10.21	with Virtual PC 5.2	(was named Virtual PC Additions)
13.40	with Virtual PC 2004	
13.187	(download)	Supports Win XP SP2
13.206	with VS2005	
13.306	with Virtual PC 2004 SP1	
13.518	with VS2005 SP1 beta	
13.531	(download)	Supports Win2003 SP1
13.552	with VS2005 R2	Supports Win2003 R2 and Vista (-build 5270)
13.705	with VS2005 R2 SP1 beta1	
13.706	(download - Connect)	Supports Vista B2 (-build 5384) and Longhorn
13.709	(download - Connect)	Supports Vista RC1
13.715	with VS2005 R2 SP1 beta2	Supports Vista RTM
13.724	with Virtual PC 2007 beta	
13.803	with Virtual PC 2007	Get at www.microsoft.com/virtualpc

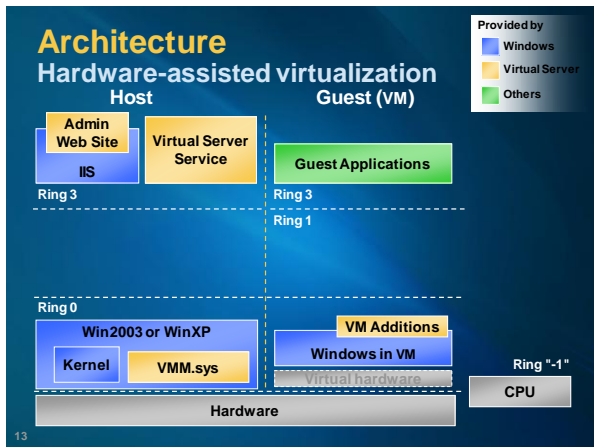
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VM Additions

Linux

- Adds:
 - time sync
 - Heartbeat
 - shutdown support
 - SCSI disk
 - mouse/display driver
 - But not **direct-mode execution** support
- Distributions (9x)
 - Red Hat 7.3/9.0, Enterprise 2.1/3/4
 - SuSE Linux 9.2/9.3/10.0, Enterprise Server 9
 - More available at release VS 2005 R2 SP1

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Hardware-assisted virtualization

Intel VT or AMD Virtualization

- Supported in:
 - Virtual PC 2007
 - Virtual Server 2005 R2 SP1
 - Windows Virtualization (is requirement)
- Enable in BIOS
 - Plus enable in Virtual PC 2007 Options
- Windows guests do **not** run faster
 - Up-to-date **VM Additions** already provide direct-mode execution
 - Windows installation is 2x-3x faster
 - Non-Windows guests (Linux, Netware) run faster

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Virtual Server 2005 R2 Specifications

- Host**
 - CPU
 - VS2005 Standard Edition: max 4 CPUs (1 or 2 cores)
 - VS2005 Enterprise Edition: max 32 CPUs (1 or 2 cores)
 - Memory: max 64 GB
- Guest**
 - CPU: max 1
 - Memory: max 3.6 GB
 - Network adapters: max 4
 - Unlimited bandwidth!
 - USB: no
 - USB keyboard/mouse is supported
 - Workaround for USB smartcard-readers exists!

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Virtual Server 2005 R2 What's new

- Performance**
 - Increased performance
- Scalability**
 - x64 hosts: Win2003 and WinXP
- Availability**
 - Virtual Machine clustering
 - Failover VM on same host
 - Uses Shared SCSI (or iSCSI) in guest
 - Virtual Server Host clustering
 - Move VS2005 to other host
 - Planned and unplanned downtime
 - Requires script - <http://go.microsoft.com/fwlink/?LinkId=55644>

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Virtual Server 2005 R2 What's new (cont'd)

- Additional guest support
 - + Win2003 SE SP1
 - + WinXP SP2
- PXE Booting
- F6 disk (SCSI disk)
 - Speeds up Windows installation
- Virtual Disk Precompactor.iso
- Also...
 - Supports hyperthreading on host
 - Reserve space for save state file (.vsv)
 - Open Windows Firewall ports at install

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Virtual Server 2005 R2 SP1 What's new

- Features
 - Intel VT and AMD Virtualization support
 - Volume Shadow Copy (VSS) support
 - Active Directory integration using Service Connection Points
 - Vista as Guest support
 - Includes VHD mount tool
 - Also...
 - Host clustering whitepaper included
 - Default vhd capacity is 127 GB (was 16 GB)
 - Virtual SCSI fix for Linux 2.6.x guests

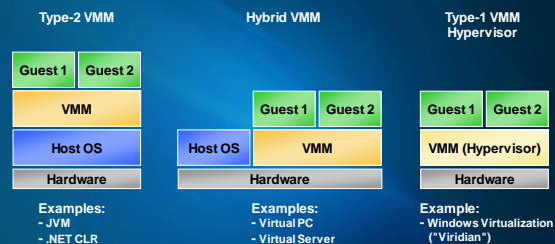
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Differences VS2005 - VPC2007

- | | |
|---|---|
| <ul style="list-style-type: none"> • <u>Virtual Server 2005:</u> <ul style="list-style-type: none"> • Use multiple host CPUs <ul style="list-style-type: none"> • Multithreaded • Multiple CD ROM drives • NAT through host ICS • Unlimited networks <ul style="list-style-type: none"> • Using vnc-files on host • Only in VS2005: <ul style="list-style-type: none"> • SCSI disk (in VM) • COM API • Remote Management • Run as service <ul style="list-style-type: none"> • Auto start VMs | <ul style="list-style-type: none"> • <u>Virtual PC 2007:</u> <ul style="list-style-type: none"> • Use single host CPU <ul style="list-style-type: none"> • Single thread for all VMs • Single CD ROM drive • NAT support • Unlimited networks <ul style="list-style-type: none"> • Using host (loopback) adapters • Only in VPC2007: <ul style="list-style-type: none"> • Sound card (VM) • Folder Sharing • Drag-and-drop • Copy / Paste |
|---|---|

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Windows Virtualization VMM arrangements



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Windows Virtualization

- Virtualization for Windows Server
 - Code name "Viridian" (= color: rgb 64-1 [redacted])
 - Windows Hypervisor
 - Thin layer of software, underneath "host OS" (~160 KB)
 - Parent partition - manages child partitions
 - Child partition - any number of OS, managed by parent
 - Virtualization Stack
 - Runs in root partition (= parent partition)
 - Provides virtualization of devices
 - WMI interface for management
 - Virtualization Service Providers (VSPs)
 - Hardware sharing architecture
 - Need "viridian" drivers in guest

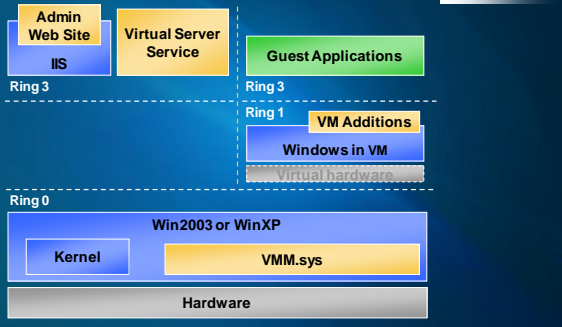
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Windows Virtualization

- Virtualization for Windows Server
 - Requires
 - x64 hardware
 - Intel VT / AMD-V processor
 - Provides
 - 32-bit and 64-bit guest
 - Max 8 CPU per VM
 - Hot "add": processor, memory, network, disk
 - 32+ GB RAM per VM
 - Live virtual machine migration
 - Multiple snapshots
 - No new driver model
 - Can use existing Windows drivers in guest
 - Same set of emulated hardware
 - S3 Trio video card, DEC 21440 network card, etc
 - Support for Server Core as parent OS

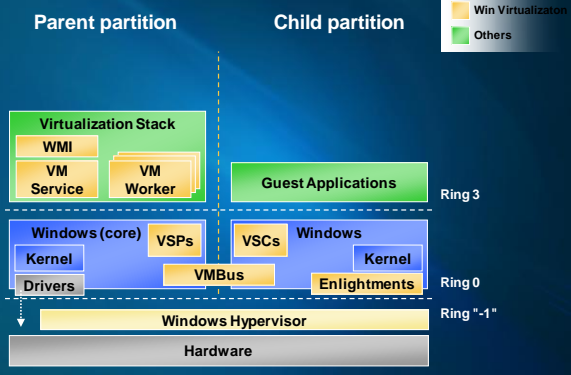
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Architecture Virtual PC / Virtual Server 2005 R2

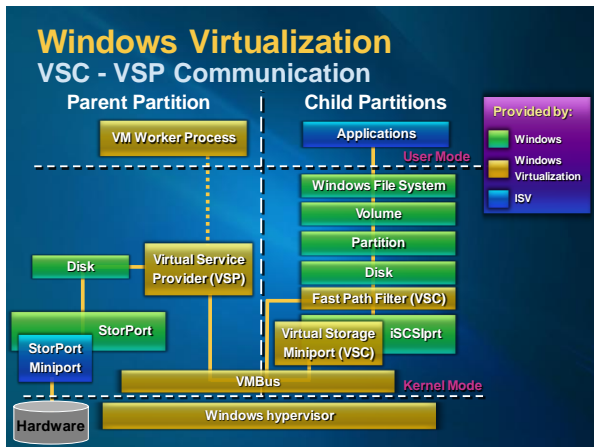


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Windows Virtualization



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Virtual Server 2005 vs Windows Server Virtualization

	Virtual Server 2005 R2	Windows Server Virtualization
32-bit VMs?	Yes	Yes
64-bit VMs?	No	Yes
Multi-processor VMs?	No	Yes, up to 8 processor VMs
VM memory support?	3.6 GB per VM	More than 32 GB per VM
Hot add memory/processors?	No	Yes
Hot add storage/networking?	No	Yes
Can be managed by System Center Virtual Machine Manager?	Yes	Yes
Microsoft Cluster support?	Yes	Yes
Scriptable / Extensible?	Yes, COM	Yes, WMI
Number of running VMs?	64	More than 64, As many as hardware will allow.
User interface	Web Interface	MMC 3.0 Interface

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- ### For more information Useful links
- **Weblogs**
 - **Virtual PC Guy** (Ben Armstrong - MS)
 - http://blogs.msdn.com/Virtual_PC_Guy/
 - **Virtual Vista** (Mike Kolitz - MS)
 - <http://blogs.msdn.com/mikekol/>
 - **Windows Virtualization** (John Howard - MS)
 - <http://blogs.technet.com/jhoward/>
 - **Scripts**
 - **TechNet**
 - www.microsoft.com/technet/scriptcenter/scripts/vs/default.msp
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- ### For more information Whitepapers
- **Virtualization Licensing Brief**
 - www.microsoft.com/licensing/resources/volbrief.msp
 - **Using iSCSI with Virtual Server 2005 R2**
 - <http://go.microsoft.com/fwlink/?LinkId=55646>
 - **Virtual Server Host Clustering whitepaper and script**
 - <http://go.microsoft.com/fwlink/?LinkId=55644>
 - **Virtual Server Guest Clustering**
 - www.microsoft.com/technet/prodtechnol/virtualserver/deploy/cvs2005.msp
 - **Virtual PC for Development and Debugging**
 - www.microsoft.com/windows/virtualpc/techinfo/debug.msp
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For more information

Download software

- Virtual Server 2005 R2 EE
 - www.microsoft.com/windowsserversystem/virtualserver/software/default.aspx
- Virtual Server 2005 R2 SP1 Beta2
 - connect.microsoft.com - sign-up for beta
- Virtual PC 2007 - including Additions 13.803
 - www.microsoft.com/virtualpc
- Linux VM Additions
 - www.microsoft.com/windowsserversystem/virtualserver/evaluation/linuxguestsupport/default.aspx
- VSMT
 - <http://go.microsoft.com/fwlink/?LinkId=37030>
- Virtual Machine Manager (beta)
 - Sign up at connect.microsoft.com

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Q&A

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Outros Recursos Para Profissionais de TI

- TechNet Plus
 - 2 incidentes de suporte gratuito profissional
 - software exclusivo: Capacity Planner
 - software Microsoft para avaliação
 - actualizações de segurança e service packs
 - acesso privilegiado à knowledge base
 - formação gratuita
 - e muito mais.



Tenha acesso directo a ferramentas e recursos técnicos essenciais

TechNet Plus Subscription

www.microsoft.com/portugal/technet/subscricoes

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Questionário de Avaliação

Passatempo!

- Complete o questionário de avaliação e devolva-o no balcão da recepção.
- Habilite-se a ganhar uma Xbox 360 por dia!



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Session Name

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