A Comparison of VMware and {Virtual Server}

Kurt Lamoreaux

Consultant, MCSE, VCP
Computer Networking and Consulting Services

A Funny Thing Happened on the Way to HP World 2004…

- Call for speakers at the start of the year…
  - "Why not talk about the new Virtual Server product from Microsoft, I'm sure it will be released by then."

- Session summary
  - "This presentation will provide performance comparisons between VMware ESX and Microsoft's Virtual Server product. This information will be based on real test data obtained on equivalent hardware. "

- So here's what we will really talk about…

Overview

- Terminology

- Review Product Histories

- Architecture Comparison

- Vendor Positioning of Products

- The Issue of Support

- Supported Hardware and OSes

- Virtual Hardware Comparison

Overview – continued…

- Features and Tools

- Scalability

- Manageability

- Reliability

- Performance

- Cost

- Recommendations

Terminology

- Virtual Machine

- Guest OS

- Host OS

- Remote Console

Product Histories

- ## VMware
  - Workstation released in 1999
  - GSX and ESX released in 2001
  - SMP for ESX, VirtualCenter & VMotion as well as P2V Toolkit released in 2003
  - VMware purchased by EMC in 2004
  - VMware an EMC company

- ## Virtual Server
  - Virtual PC for Mac released in 1997 by Connectix
  - Virtual PC for Windows released in 2000
  - Connectix purchased by Microsoft in 2003
  - Connectix? Connectix who?
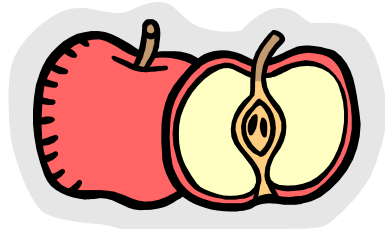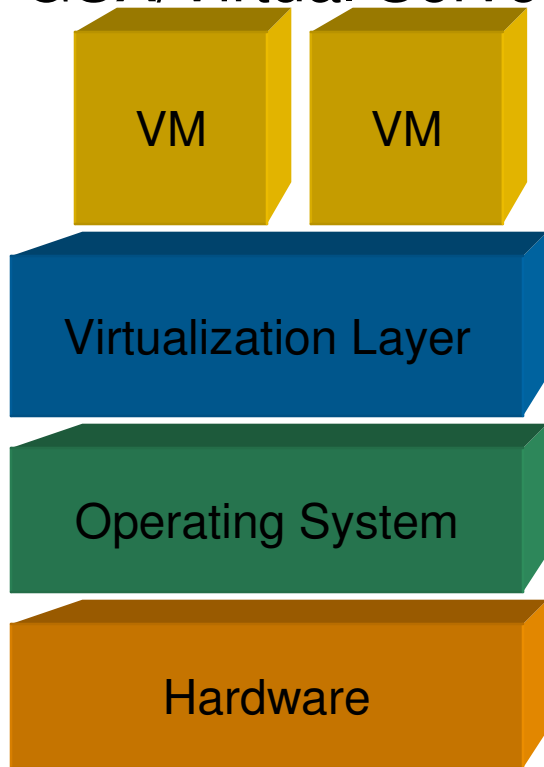 - Virtual Server released in 200?

What Products to Compare

- Virtual Server – GSX or ESX?
  - ESX is a different architecture – its own microkernel

- What about Workstation and VirtualPC?
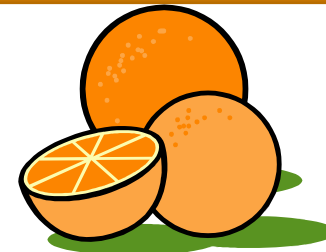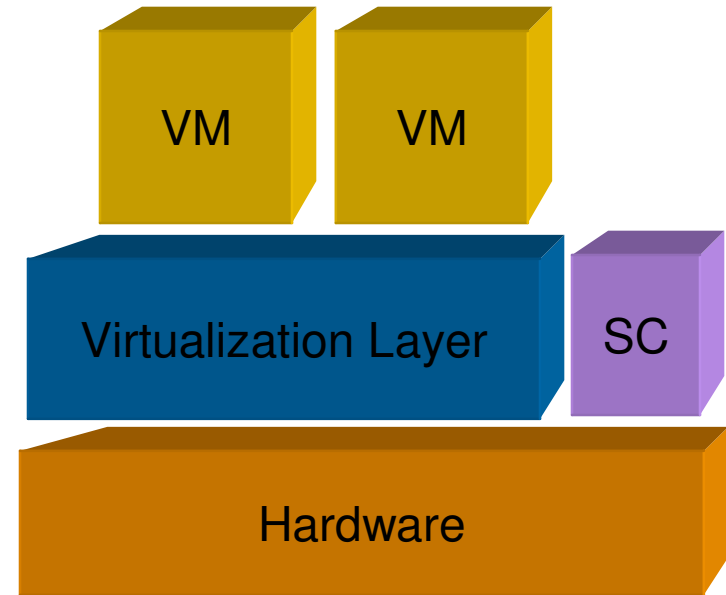
- What about everyone else?

Architecture Comparison

How Does Microsoft Position Virtual Server?

- NT 4 Server Migration

- Test and Development

- Departmental Server Consolidation

- Disaster Recovery

- Part of Dynamic Systems Initiative

How does VMware Position GSX and ESX?

- NT 4 Server Migration
- Test and Development
- Server Consolidation
- Disaster Recovery
- Legacy OS or Application support for Microsoft, Linux or Novell environments
- Single server to enterprise level solution
- GSX – Most flexible deployment options
- ESX – Highly scaleable, mission critical deployment
- Both products part of VMware's Virtual Infrastructure solution
  - VirtualCenter
  - VMotion (ESX only)

What is VirtualCenter?

- ## VirtualCenter
  - A single view, or "dashboard" of all virtual machines
  - Monitoring of system availability and performance
  - Automated notifications with email alerting
  - Robust access control integrated with Windows authentication

- ## VMotion
  - Migrate a running VM to a different physical server connected to the same (SAN) without service interruption.
  - Performing zero-downtime maintenance by moving virtual machines around so the underlying hardware and storage can be serviced without disrupting user sessions.
  - Continuously balancing workloads across the data center to most effectively utilize resources in response to changing business demands.

VirtualCenter Requirements

- Management Server -- Supported Operating Systems:
  - Windows 2000 Server
  - Windows 2000 Advanced Server
  - Windows 2003 Server (Web, Standard, Enterprise)
  - Windows XP Professional

- Management Server -- Minimum Hardware Configuration:
  - Pentium IV 2.0GHz
  - 2GB RAM
  - Minimum 1 10/100Mbps NIC (1Gbps NIC recommended)
  - Can run in a virtual machine

- VirtualCenter Client Requirements:
  - Minimum 256MB RAM (512 MB recommended)

- VirtualCenter Client Supported Operating Systems:
  - Windows 98 SE
  - Windows NT4.0 (SP6a required)
  - Windows XP (Home and Professional)
  - Windows 2000 (all versions)
  - Windows 2003 (all versions)

- VirtualCenter Supported Databases:
  - Microsoft SQL Server 2000
  - Microsoft SQL Server 7
  - Oracle 8i and Oracle 9i
  - Microsoft Access (default for demo purposes only)

How Important Is Support?

- Support for guest OS

- Support for host OS

- Support for 3rd party applications running in VM

- 3rd party support for guest OS and applications

Supported Host Operating Systems

- Virtual Server
  - Windows Server 2003 Standard, Enterprise, Datacenter and SBS
- GSX
  - Windows Edition
    - Microsoft Windows Server 2003 Std, Ent and Web
    - Microsoft Windows 2000 Server Std and Adv, SP 3+ (experimental support for 64-bit editions)
  - Linux Edition
      64-bit
    - Red Hat Enterprise Linux 3.0 AS, ES, WS
    - SuSE Linux Enterprise Server 8
      32-bit
    - Mandrake Linux 8.2, 9.0, 9.2
    - Red Hat Enterprise Linux 2.1, 3.0 AS, ES, WS
    - Red Hat Linux 7.1, 7.2, 7.3, 8.0, 9.0
    - SuSE Linux Enterprise Server 7, 8
    - SuSE Linux 7.3, 8.0, 8.1, 8.2, 9.0, 9.1
    - Turbolinux Server 7.0, 8.0
    - Turbolinux Workstation 8.0

Supported Guest Operating Systems

- ## Virtual Server

  - Windows NT 4.0 Server SP4 to SP6
  - Windows 2000 Server SP2 to SP4
  - Windows Server 2003

- ## GSX

  - Windows Server 2003 Web, Standard, and Enterprise Editions
  - Windows Server 2003 Small Business Server
  - Windows 2000 Professional; Windows 2000 Server and Advanced Server
  - Windows NT Workstation 4.0 and Windows NT Server 4.0
  - Windows XP Professional and Windows XP Home Edition
  - Windows Me
  - Windows 98 and Windows 98 SE
  - Windows 95 (all OSR releases)
  - Windows 3.1, MS-DOS 6
  - Novell NetWare 4.2, 5.1, 6.0 and 6.5
  - Red Hat Enterprise Linux 2.1 and 3 (AS, ES and WS)
  - Red Hat Linux
  - SuSE Linux Enterprise Server 7 and 8
  - SuSE Linux
  - Turbolinux
  - Mandrake Linux
  - FreeBSD

Supported Guest OS – continued…

- ESX
    - Windows Server 2003
    - Windows XP Professional
    - Windows 2000 Server, Advanced Server
    - Windows NT 4.0 Server, Service Pack 4 and higher
    - Red Hat 7.3, 8.0, and 9.0; Advanced Server 2.1
    - SuSE Linux 8.2 and SuSE Linux Enterprise Server 8.0

Supported Hardware

- Virtual Server
  - Microsoft Windows Server 2003 Hardware Compatibility List
    - http://www.microsoft.com/hwdq/hcl
    - Support for 32-bit processor – up to 32 – optimized for 8
    - Can run on AMD 64-bit if host OS is 32-bit
- GSX
  - Hardware
    - Support for Intel and AMD 64-bit processor – up to 32
  - Windows Host
    - Microsoft Hardware Compatibility List
  - Linux Host
    - Vendor specific support
- ESX
  - ESX supported hardware
    - http://www.vmware.com/support/esx21
    - Support for up to 16 processors (plus hyperthreading)

Virtual Hardware

	Virtual Server 2005	GSX 3.1	ESX 2.1.1
# Processors	1	1	Up to 2 with SMP
Max memory	3.6GB RAM	3.6GB RAM	3.6GB RAM
Motherboard	440BX chipset	440BX chipset	440BX chipset
BIOS	AMI BIOS 2.10	Phoenix BIOS 4.0	Phoenix BIOS 4.0
# PCI devices	4	6	5
Video	S3 Trio64 SVGA	VMware VGA	VMware VGA
SCSI Controller	Adaptec 2940	LSI Logic Ultra160 Mylex(BusLogic)BT-958	LSI Logic Ultra160 Mylex(BusLogic)BT-958
SCSI Storage	4 HBA - 2TB/device 7 devices/HBA	3 HBA – 256GB/device 21 devices/HBA Tape & cdrom support	4 HBA – 9TB/device 15 devices/HBA Tape & cdrom support
USB Support	None	2 USB 1.1 ports	None
NIC	Intel 21140 (up to 4)	AMD PCInet (up to 4)	AMD PCInet VMxnet (total up to 4)

Feature Comparison

	Virtual Server 2005	GSX 3.1	ESX 2.1.1
Undoable Disks	Undoable Differencing	Undoable "snapshot"	Undoable "snapshot" Append
Controllable Resource Allocation	CPU Windows System Resource Manager	Windows System Resource Manager 3rd party products	CPU Memory Network
Use of image files	CD and floppy	CD and floppy	CD and floppy
Memory Usage	Up to host maximum	Up to host maximum	> Total RAM Shared memory Balloon driver

Feature Comparison – part 2

	Virtual Server 2005	GSX 3.1	ESX 2.1.1
PXE support	Boot floppy only	yes	Yes
Networking	Private and shared External/NAT (config)	Private and shared Teamed NICs External/NAT	Private and shared Teamed NICs External/NAT/VLAN
Clustering VMs	Same host server	Same host server	Same host server Different hosts V/P cluster pair
Pause VM	Suspend Pause	Snapshot Suspend	Snapshot Suspend
Encrypted connections	Admin and client	Admin and client	Admin and client

HP WORLD 2004
Solutions and Technology Conference & Expo

Feature Comparison – part 3

	Virtual Server 2005	GSX 3.1	ESX 2.1.1
Remote client console	Windows client ActiveX web control	Windows client Linux client	Windows client Linux client
Security	Admin and user	Admin and user Enhanced with VirtualCenter	Admin and user Enhanced with VirtualCenter
Simultaneous VMs	Up to 64 VMs	Up to 64 VMs	Up to 80 VMs
VM Specific guest OS addins	Yes	Yes	Yes
Programming interface	COM	COM and Perl	VMware SDK Com and Perl
Scripted guest events	Yes	•Yes	•Yes
Management	MOM 3rd party tools	VirtualCenter 3rd party tools	VirtualCenter w/ VMotion 3rd party tools

Scalability

- Virtual Server
  - Unknown scalability
  - Optimized for up to 8CPUs and 32GB RAM
  - Management of multiple host servers requires 3rd party tools beyond MOM monitoring

- GSX/ESX and VirtualCenter
  - Highly scalable
  - VirtualCenter provides full-featured, centralized management of large number of host servers

Manageability

- Virtual Server
    - Per server web management
    - Monitoring as part of MOM integration
    - 3rd party tools for rapid deployment

- GSX/ESX and VirtualCenter
    - Per server web management
    - Dedicated multi-server management via VirtualCenter
    - 3rd party tools for rapid deployment

Reliability

- Virtual Server
  - Unknown reliability
  - Support from Microsoft and 3rd parties such as HP

- GSX/ESX and VirtualCenter
  - Mature products
  - Large number of deployments
  - Support from VMware and 3rd parties such as HP
  - Fault tolerance through VirtualCenter and VMotion
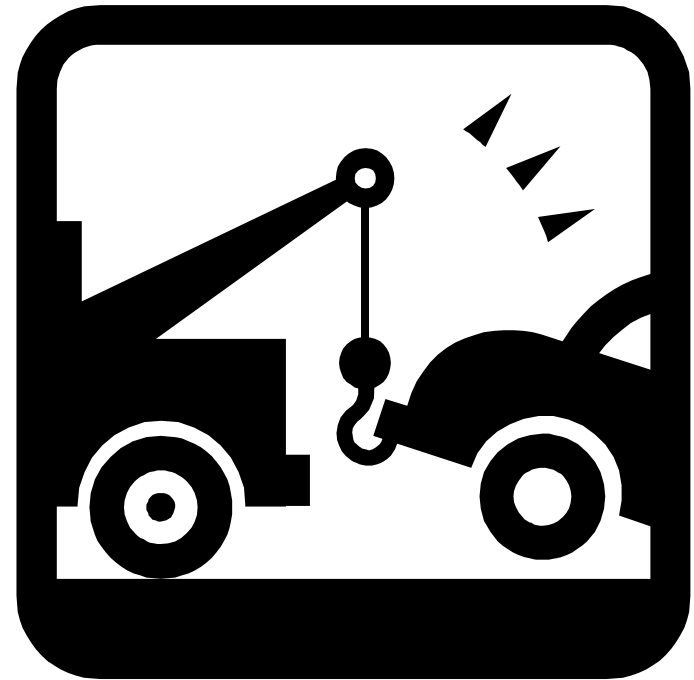
Performance – Can It Be Measured?

- ## Performance Tools inside the VM
  - May not accurately report due to virtualization

- ## Performance Tools on host OS
  - May not provide specific information regarding specific VMs

- ## What to test
  - What is an accurate test to determine real world performance

- ## 3rd party tools or built-in?
  - Each product can support both
  - Often requires customized approach

Achieving Best Performance

- General tips
  - Install VM custom drivers
  - Run mixed roles on same host server
  - Use monitoring tools on host server
  - Disable peripherals (CD-ROM, floppy) when not in use
  - Disable graphics intensive visual effects
  - Preallocate virtual disk space
  - Run client in full screen mode

- Virtual Server specific tips
  - Disable hyperthreading

- GSX specific tips
  - Recommended maximum VMs per processor – 4

- ESX specific tips
  - Run same OS on same host server
  - Use VirtualCenter and VMotion for dynamic allocation between multiple servers
  - Recommended maximum VMs per processor – 8

Purchase Price Comparison

- Virtual Server
  - Standard Edition – up to 4 processors ($?)
  - Enterprise Edition – up to 32 processors ($?)

- GSX with VirtualCenter
  - $3100 per server/2 processor (required support extra)

- ESX with VirtualCenter, SMP, VMotion
  - $5000 per server/2 processor (required support extra)

Recommendations

Virtual Server

Smaller, Microsoft OS centered deployments

Primarily single host server deployments without the addition of 3rd party tools

Testing purposes only until product release

VMware GSX/ESX

Single server to enterprise level deployments.

GSX and VirtualCenter
Emphasis on broad OS support

ESX and VirtualCenter
Emphasis on performance and reliability
VM Clustered servers in production environments

Additional Information

- VMware GSX
  - http://www.vmware.com/products/server/gsx_features.html

- VMware ESX
  - http://www.vmware.com/products/server/esx_features.html

- Microsoft Virtual Server
  - http://www.microsoft.com/windowsserversystem/virtualserver/default.mspx

Additional Information – continued...

- VMware VirtualCenter
  - http://www.vmware.com/products/vmanage/vc_features.html
  - http://www.vmware.com/support/developer/vc-sdk/

- VMware P2V Assistant
  - http://www.vmware.com/products/vtools/p2v_features.html

- Microsoft's Dynamic Systems Initiative
  - http://www.microsoft.com/windowsserversystem/dsi/default.mspx

- Microsoft Operations Manager
  - http://www.microsoft.com/mom/

- HP Rapid Deployment Pack
  - http://h18013.www1.hp.com/products/servers/management/rdp.html

Other Seminars at HP World

- 3772 – Hands-on workshop RDP and ESX
  - Today and tomorrow

- 3326 – Improving Availability and Simplifying Disaster Recovery with Virtualization Technology

- Yesterday… but you can get the slides!
  - 3329 – Improving Blade Economics with Virtualization Technology
  - 3783 – Server Virtualization: Changing the rules.

Questions?

Co-produced by: