Virtualization and the U2 Databases

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Opening Procedure

- Orange arrow allows you to manipulate the GoTo Webinar control panel
- This webinar will be recorded and posted to our Rocket U2 web site for you to replay at a later date
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- All attendees are muted during the presentation
- Fifteen minute Q&A session – after the presentation

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Nik Kesic's Bio

- Joined Unidata in 1995
- ATS (Advanced Technical Support), U2 Common Clients and DB tools
- College degree in Telecommunications
- Provides consultancy, Level 3 support and training
- Published articles on web enablement using RedBack, Sockets, XML, SOAP, SSL and Encryption
- MCP (Microsoft Certified Professional) in networks
- Current role: Lead Technical Support for Rocket U2

Brian Kupzyk's Bio

- Joined Informix in 2000
- B.S., Information Systems, Metropolitan State College of Denver
- M.S., Information Systems, University of Colorado at Denver
- Expertise: UniData®, UniVerse®, SB+ and SB/XA, emphasis in general components, installation, and licensing
- Developer for uvdiag and udtdiag on UNIX, U2 Resource Kit, XDEMO Account
- Authored various articles from U2 Support (Technotes) over the years including: 'How To Authorize UniVerse 10.2.x and Higher', 'Understanding the SB+ and SB/XA Security API'
- Current role: Senior Technical Engineer for Rocket U2

Agenda

- Webinar Origins
- Virtualization Architecture
- Popular Virtualization Products
- Rocket U2 Support for Virtualization
- UNIX Tuning Considerations for Virtualization
- Windows Tuning Considerations for Virtualization
- Case Study
- Questions and Answers

Webinar Origins

- Many Rocket U2 customers moving to virtualization
- Support calls
- Software behaves differently
- Performance issues

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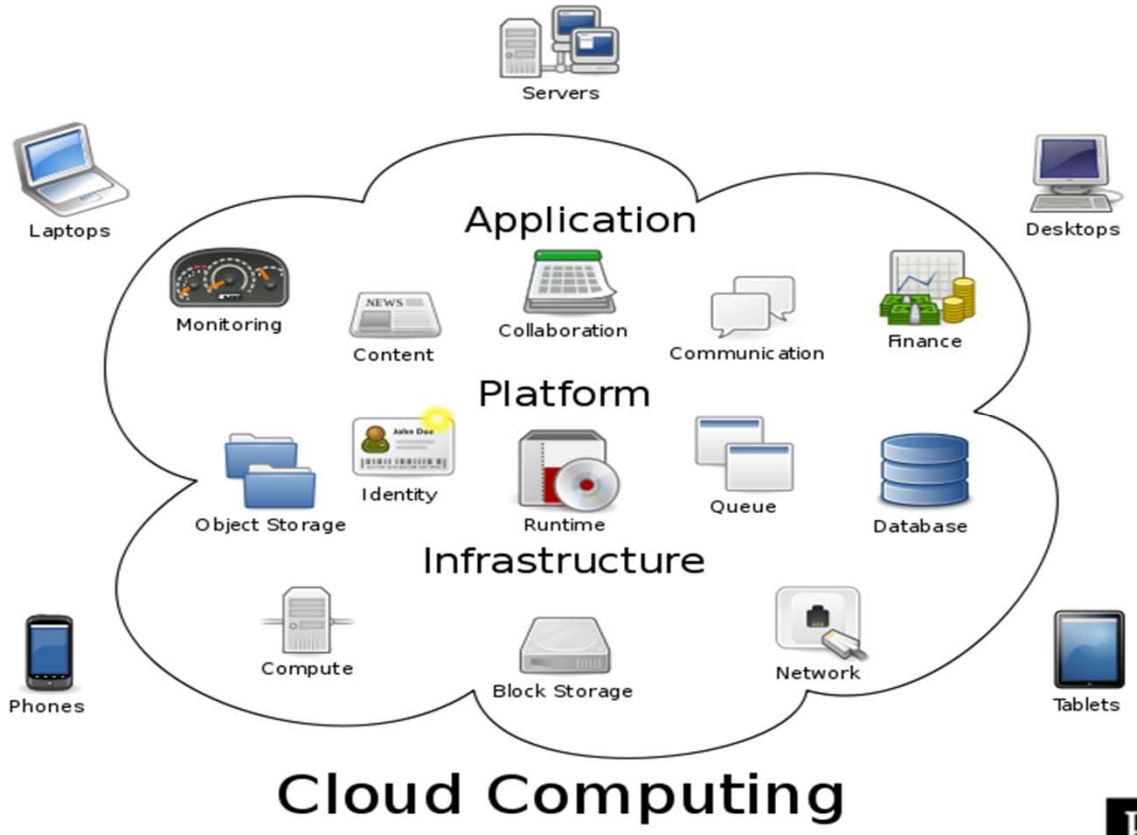
Definition of Virtualization

- Definition of Virtualization
  - Not physically existing
  - Made by software to *appear* as if it physically exists: "virtual images"
- Definition of a Virtual Machine (VM)
  - Software implementation of a computing environment in which an operating system (OS) or program can be installed and run
  - Emulates a physical computing environment
  - Hardware requests managed by a virtualization layer which translates these requests to the underlying physical hardware

Cloud Computing

Cloud computing is the delivery of software as a service (SaaS) and often uses scalable virtualized technology.



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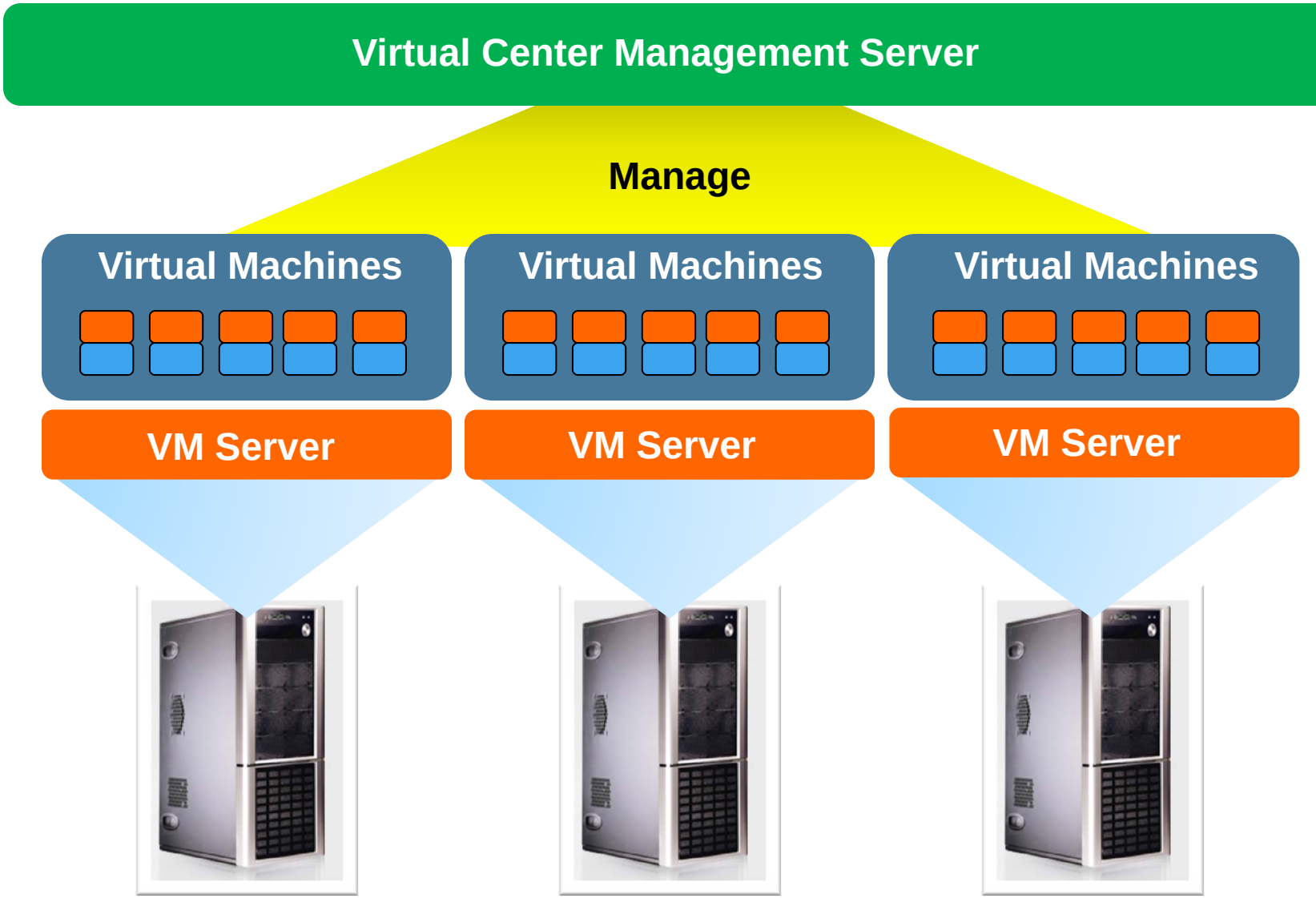
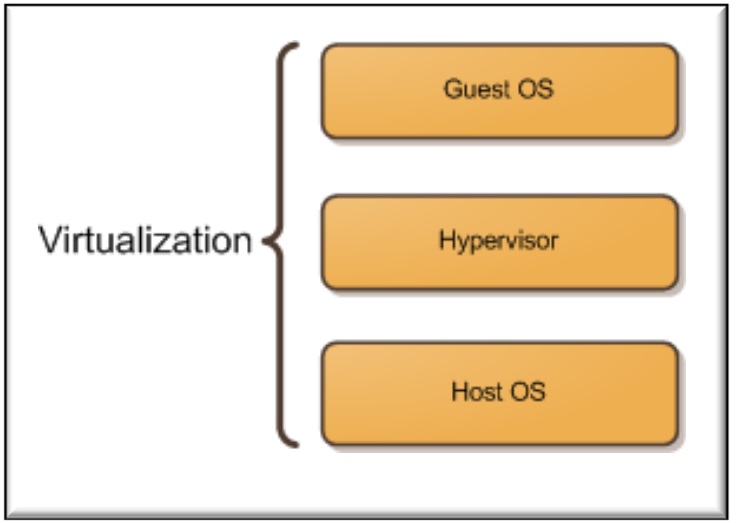
Virtualization Architecture



Virtualization Architecture Basics

- **Guest OS**
  - Operating system installed inside a virtual machine (or a partition)
- **Hypervisor**
  - Virtual Machine Monitor (VMM)
- **Host OS**
  - Virtualization product or the partitioning product



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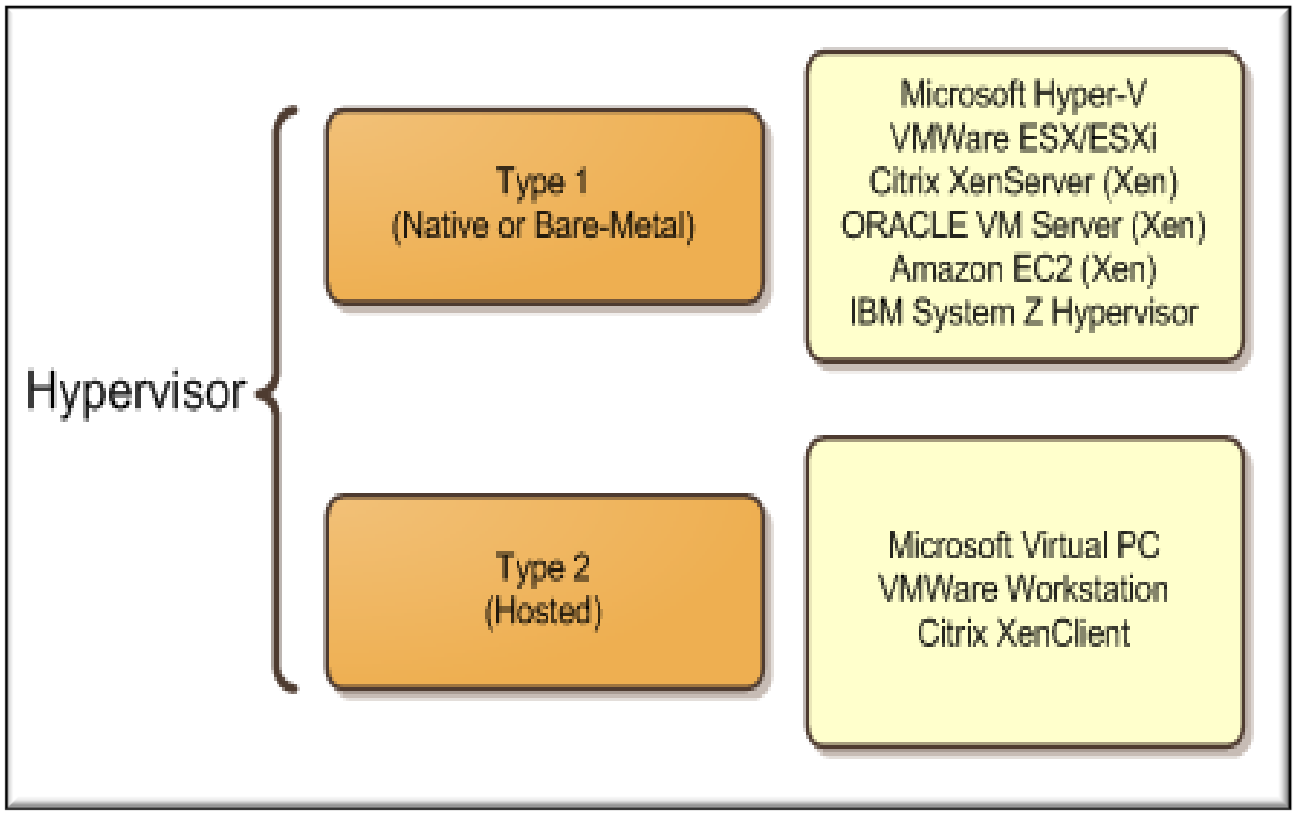
Guest OS

- **Virtualization Product**
  - Guest OS can be completely different from the host OS
- **Partitioning Product**
  - Guest OS must be identical to the host OS (not in all cases)

HyperVisor

- Native / Bare-Metal
- Hosted
  - VM Player



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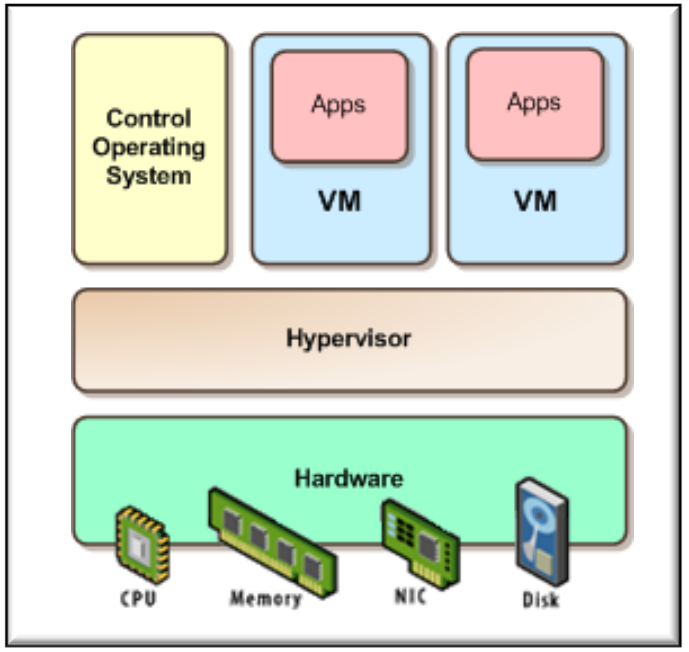
Bare Metal – Type 1

- Runs the Hypervisor / Guest OS
- This type of virtualization is the leading enterprise solution
- Offers best performance



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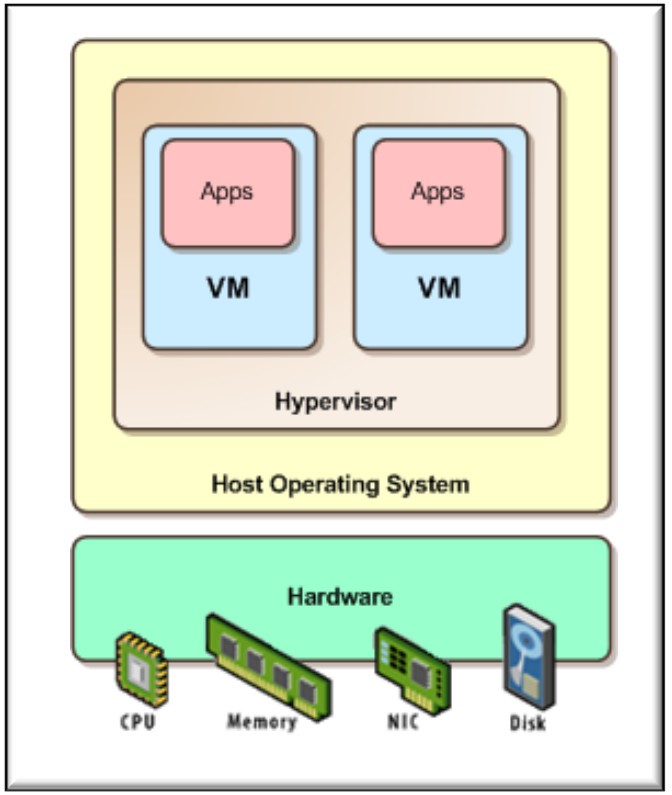
Hosted – Type 2

- Runs applications with a conventional operating environment
- Typically used in client side virtualization
- Not the same as terminal services



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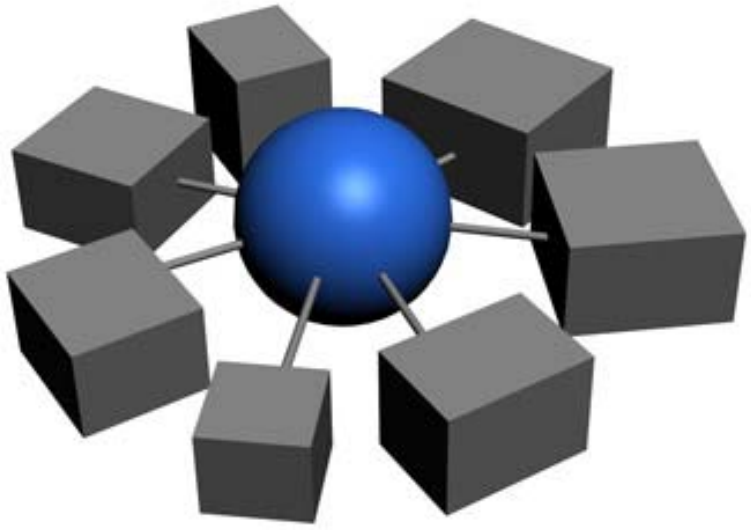
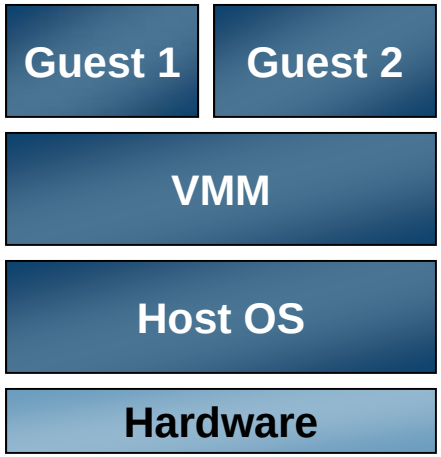
Host OS

- The host operating system provides a host to one or more virtual machines (or partitions) and shares physical resources with them
- This is where the virtualization product or the partitioning product is installed



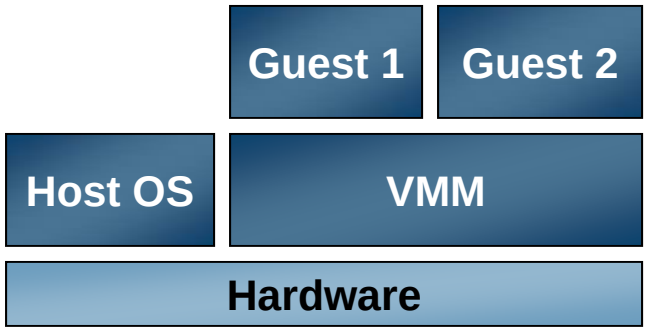
VMM Arrangements

Type-2 VMM



Examples:
JVM
CLR

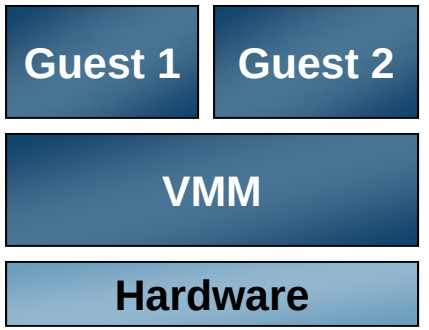
Hybrid VMM



Examples:
Virtual PC & Virtual Server

What Microsoft® has today

Type-1 VMM (Hypervisor)



Examples:
Windows® Virtualization

What Microsoft® is building for the future

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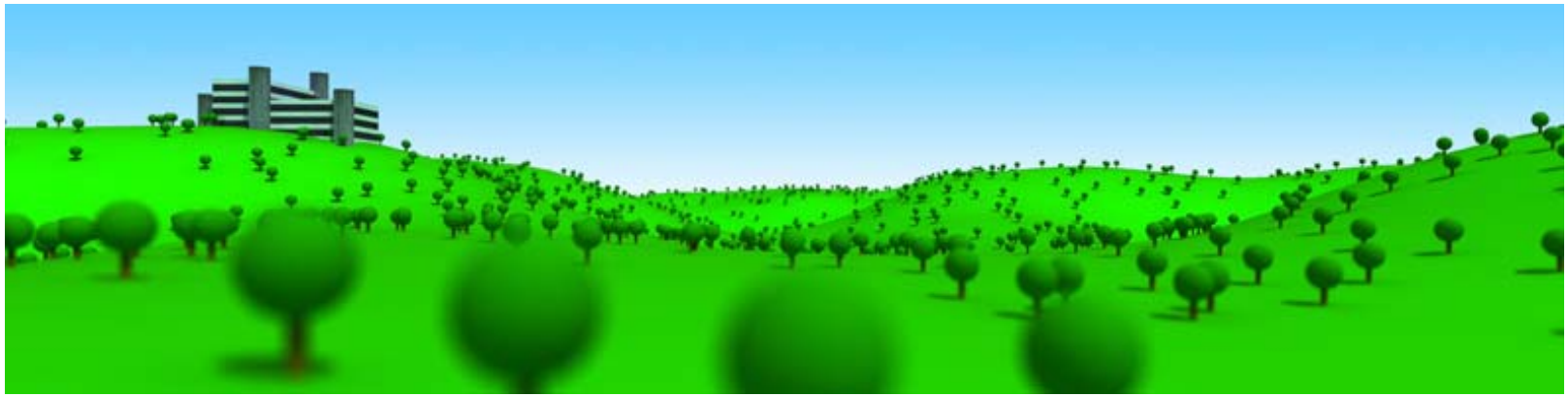
Virtualization Landscape

- Para-virtualization
- Full virtualization without hardware assist
- Full virtualization with hardware assist
- OS virtualization
- Hosted virtualization



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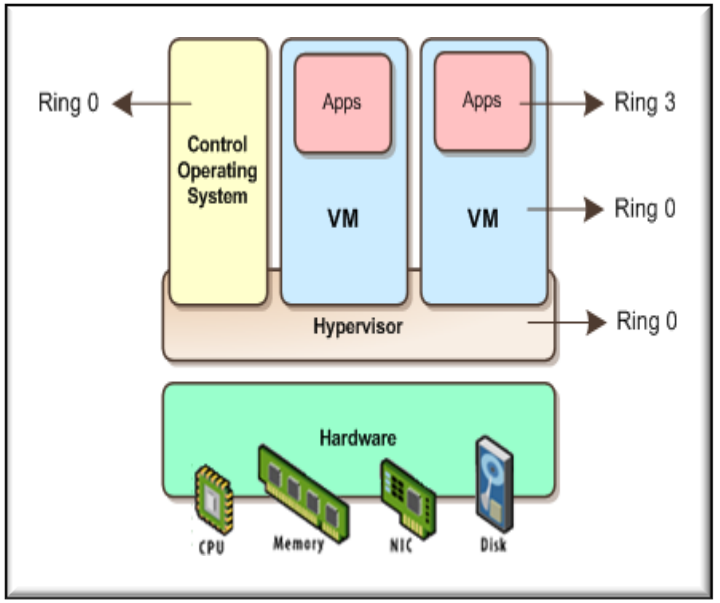
Para-Virtualization

- The kernel of the guest operating system is modified specifically to run on the Hypervisor
- Guest kernel communicates directly with the Hypervisor
  - Results in greater performance levels than other virtualization approaches



Ring 0 - Kernel mode processes
Ring 1 - System services
Ring 2 - Device drivers
Ring 3 - User mode processes

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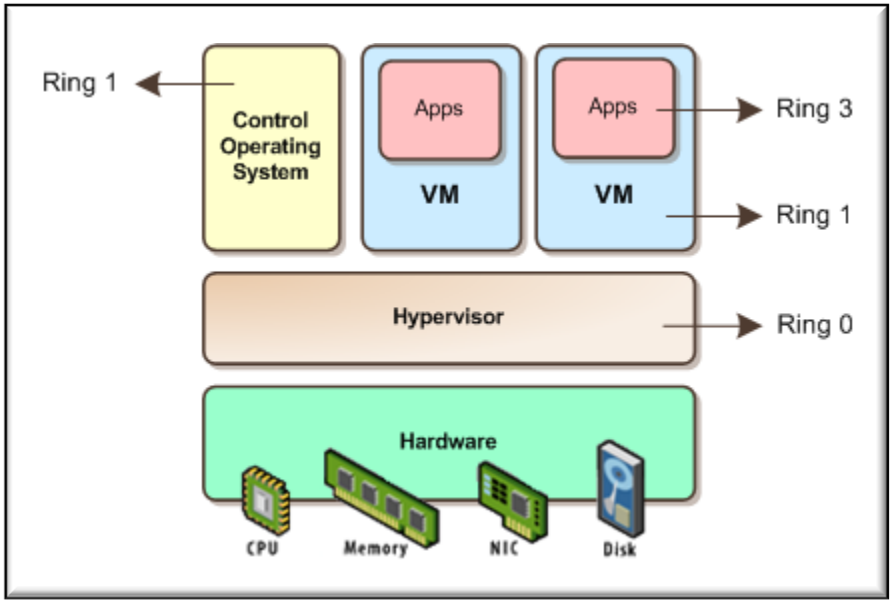
Full Virtualization Without Hardware Assist

- Provides support for unmodified guest operating systems
- In this scenario, the hypervisor provides CPU emulation
- Inferior performance levels when compared to those provided by para-virtualization



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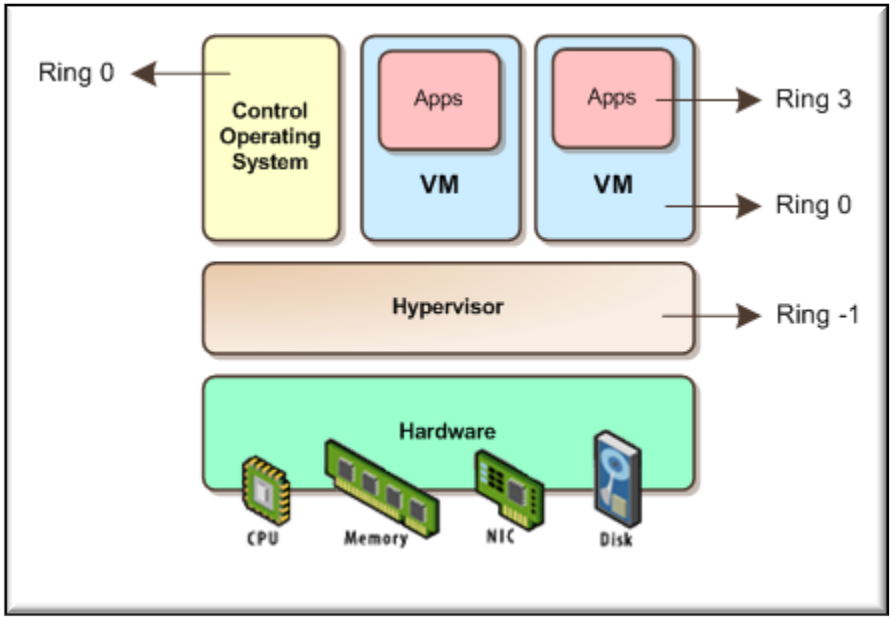
Full Virtualization With Hardware Assist

- Hardware virtualization leverages virtualization features built into the latest generations of CPUs from both Intel and AMD
  - Intel VT and AMD-V provide extensions necessary to run unmodified guest virtual machines without the overheads inherent in full virtualization CPU emulation
    - *These new processors provide an additional privilege mode below ring 0 (ring 1) in which the hypervisor can operate, leaving ring 0 available for unmodified guest operating systems*



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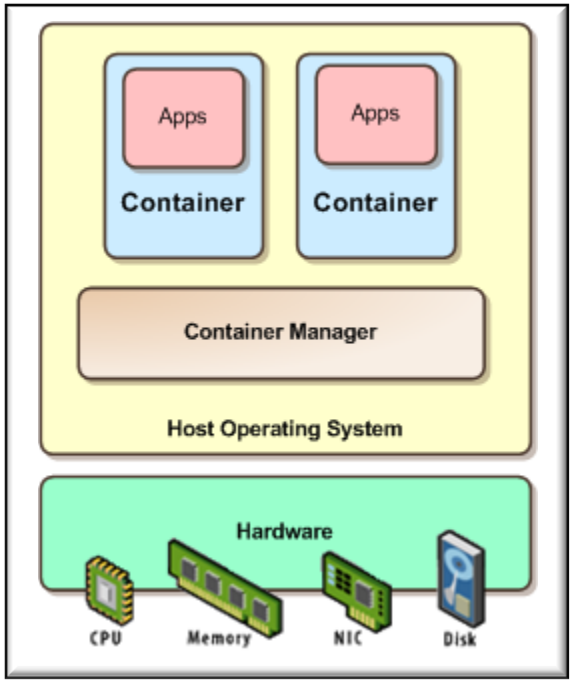
OS Virtualization

- Compared with Hypervisor-based virtualization, container based virtualization offers a completely different approach to virtualization
  - Instead of virtualizing with a system in which there is a complete operating system installation, container based virtualization isolates containers work from within a single OS
    - *In cases where only one operating system is needed, the main benefits of container based virtualization are that it doesn't duplicate functionality and improves performance*



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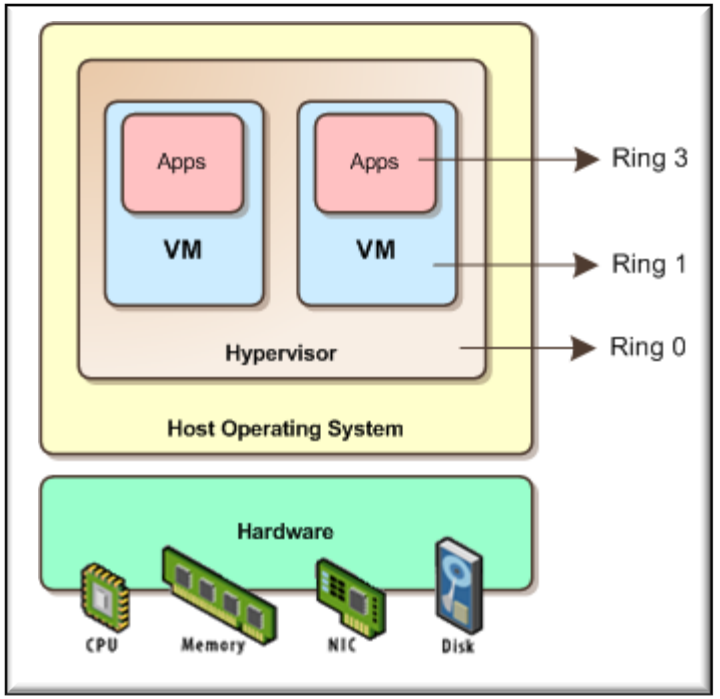
Hosted Virtualization

- Most familiar form of virtualization
  - All of the desktop virtualization products, such as VMware Work-station/Player, and Parallels Desktop for the Mac, and Microsoft Virtual PC
- Benefits to hosted virtualization
  - Users can install a virtualization product onto their desktop just as any other application, and continue to use their desktop OS
  - Hosted virtualization products also take advantage of the host OS's device drivers, resulting in the virtualization product supporting the same hardware as the host



Popular Virtualization Products

Bare Metal

- VMware ESX/ESXi®
- Citrix XEN Server®
- Oracle VM Server®
- Amazon EC2®
- IBM System z Hypervisor®
- Solaris Zones®
- AIX LPARS / WPA®
- Microsoft Hyper-V Server 2008®

Hosted

- Microsoft Virtual PC®
- Microsoft 2008 with Hyper-V®
- VMware Workstation/Player®

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Rocket U2 Support for Virtualization

- Virtualization technology is used to partition a single physical machine into many physical or logical partitions with each partition (virtual environment) providing the look and feel of an independent physical environment
- Each ***virtual environment*** represents a complete system, with processors, memory, networking, and other system resources
- **Every instance of Rocket U2 software in a virtualized environment must have its own unique Rocket U2 license**

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Rocket U2 Support for Virtualization

- ***Rocket U2 can make no guarantees with respect to performance or scalability in a virtualized environment***
- Rocket U2 software products leverage binary compatibility provided by the virtualization technologies because the Virtual Environment products themselves provide transparency to the operating systems, applications, and middleware that operate above it
- If you submit a standard usage or defect-related service request, and your software is running on a virtual environment, Rocket U2 Technical Support will assume that the problem is common to both native and virtual operating environments

Rocket U2 Support for Virtualization

- Setup, configuration and tuning of virtual environments is not part of standard Rocket U2 Support
- Customers looking for support for setting up a virtual environment should consult the appropriate vendors and Rocket U2 Professional Services
- For additional information about a specific virtual environment, contact the vendor of the virtualization technology

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Interlude

"Rocket U2 products are like bowls of fruit; they require resource nourishment to stay sprightly"

Don't forget the Memory!

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UNIX Tuning Considerations for Virtualization

- Allocate system resources
- Tune your disk subsystem
- Tune your file systems
- Tune caching
- Apply U2 tuning parameters
- Benchmark your system by placing a load on it
- Adjust tuning parameters accordingly

Windows Tuning Considerations for Virtualization

- Allocate system resources
- Start by tuning the Virtual Server Hypervisor
- Tune the Host Operating Environment
- Tune the Guest Operating Environment
- Tune U2 parameters
- Tune disk subsystem
- Benchmark the system by placing a load on it
- Adjust parameters accordingly

Virtualization Expectations

- Increase performance
- Easier to manage
- A greener planet
  - Air con
  - Power
  - Foot print
- Cost
- UPS (Uninterrupted Power Supply)
- Backup / Recovery
- Flexibility
- Resource sharing
- Security
- Reliability

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Case Study – Overview

- Character based application running on a Rocket U2 database
- Application is a distribution system with twenty-five warehouses
- Customer complained of a poor response in the application
- Customer concluded it was a database issue

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Case Study – Findings

- The disk subsystem needed to be tuned
- CPU was spending too much time on system calls and not enough time servicing the user
- Paging occurred on the Host Operating Environment
- Virtual I/O system required tuning
- Resource utilization was high

Case Study – Virtualization Approach

- Allocated enough resources to the partitions
- Tuned the virtualization product before adding a Host or Guest Operating Environment
- Added the Guest and/or Host Operating Environment
- Tuned the Guest and/or Host Operating Environment
- Added the database and tuned
- Placed a load on the system
- Adjusted tuning as necessary

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Case Study – Lessons Learned

- Virtualization is another level that requires tuning
- Host and/or Guest Operating Environments require tuning
- Database requires tuning
- Allocate enough resources
- Tune the I/O subsystem
- Make sure the partition is not paging

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Support for Virtualization

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- For additional information about a specific virtual environment, contact the vendor of the virtualization technology
- Or you may email us your question later at: **U2AskUs@rocketsoftware.com**

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Questions & Answers

To ask a question:

- Click on hand icon with green arrow and we will call your name

Or you may email us your question later at:

U2AskUs@rocketsoftware.com

For more information on Professional Services email: U2Services@rocketsoftware.com

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References

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