



Multiplatform Virtualization Architectures

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Agenda

- » IDEAS overview
- » Overview of virtualization trends
 - Business benefits of deploying virtualization
 - Virtualization technology overview
- » Positioning Server Virtualization Options
 - IBM System z, System p
 - HP Integrity
 - Sun Microsystems SPARC
 - Industry-standard (x86/x64)
- » Summary & recommendations



- » IT research firm w/global coverage
- » Comparative assessments of datacenter technology
 - **Systems, software, storage & services**
- » Research disciplines:
 - **Cost of acquisition**
 - Independent, multi-vendor pricing database in multiple currencies
 - Produce tools for comparing cost of acquiring specific configurations
 - **Systems performance**
 - Maintain historical database of industry-standard benchmark results
 - Produce composite performance metrics
 - **Technology analysis**
 - In-depth qualitative comparisons
 - Maintain detailed feature/function scorecards
 - Perform user studies on technology adoption

Business Benefits of Deploying Virtualization

- » Consolidation
 - Improved resource utilization
 - Reduced hardware footprint
 - Lower power and cooling requirements
- » Improved test and development processes
- » Improved responsiveness & agility
 - Simplified resource provisioning
- » Simplified High Availability (HA) / Disaster Recovery (DR)
- » Legacy application support

Virtualization Technology Overview



- » Virtualization introduces abstraction layer separating processing from physical resources
- » Many forms of virtualization possible
 - Servers
 - Storage
 - Network
 - Desktops
 - Applications
- » Related technology trends
 - Blade servers
 - Multi-core / multi-threading processors
 - Grid computing (“cloud computing”)
 - Application translation

Server Virtualization Methods



Technique	Advantages	Disadvantages
Hard Partitions	<ul style="list-style-type: none">•Maximum isolation between virtualized workloads•Can protect workloads against some HW failures•Can enable online HW upgrade	<ul style="list-style-type: none">•Limited granularity (1+ CPUs/partitions)•May have limited flexibility (w/out OS support)•Reconfiguration can be time-consuming
Logical (“Soft”) Partitions (LPARs)	<ul style="list-style-type: none">•Finer granularity than hard partitions	<ul style="list-style-type: none">•Lacks protection from extreme hardware failures
Virtual Machines	<ul style="list-style-type: none">•Finer granularity than LPARs	<ul style="list-style-type: none">•Incurs higher performance overhead
Virtual Servers (OS Virtualization)	<ul style="list-style-type: none">•Maximum granularity & responsiveness	<ul style="list-style-type: none">•All workloads must run on same OS instance (i.e. kernel revision & patch level)

Positioning Server Virtualization Options



Virtualization Platform	Key Benefits	Notes
IBM System z Mainframes	<ul style="list-style-type: none"> • Industry-leading maturity, performance & functionality 	<ul style="list-style-type: none"> • Suitable for z/OS & Linux only
IBM System p PowerVM	<ul style="list-style-type: none"> • Strong virtual infrastructure support w/live migration capabilities (Live Partition Mobility, Live Application Mobility) 	<ul style="list-style-type: none"> • Suitable for UNIX, i5/OS & Linux only
HP Integrity: <ul style="list-style-type: none"> • nPars • vPars • Integrity Virtual Machines 	<ul style="list-style-type: none"> • Heterogeneous platform: suitable for UNIX, Linux & Windows workloads • Leading HA/DR & WLM integration w/HP Virtual Server Environment (VSE) 	<ul style="list-style-type: none"> • I/O overhead in Integrity Virtual Machines • Lacks migration functions for virtualized workload
Sun SPARC Servers <ul style="list-style-type: none"> • Dynamic Domains • Logical Domains (LDOMs) 	<ul style="list-style-type: none"> • Proven isolation & reconfiguration in Dynamic Domains 	<ul style="list-style-type: none"> • Suitable for UNIX only • Lacks migration functions for virtualized workload
x86/x64 Hardware	<ul style="list-style-type: none"> • Growing choice of platforms 	<ul style="list-style-type: none"> • I/O overhead still major concern in VMs

x86 Server Virtualization Options



» Virtual Machine Platforms

- VMware
- Xen implementations
 - Citrix/XenSource
 - Virtual Iron
 - Red Hat Enterprise Linux
 - SUSE Linux Enterprise Server
 - Sun xVM
 - Oracle
- Microsoft Hyper-V
- Linux Kernel Virtual Machine (KVM)

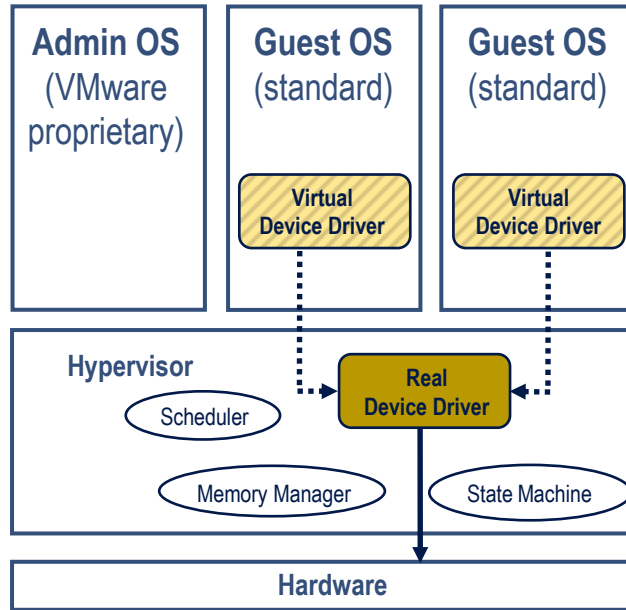
» Virtual Server Solutions

- Parallels (Swsoft Virtuozzo)
- Solaris Containers

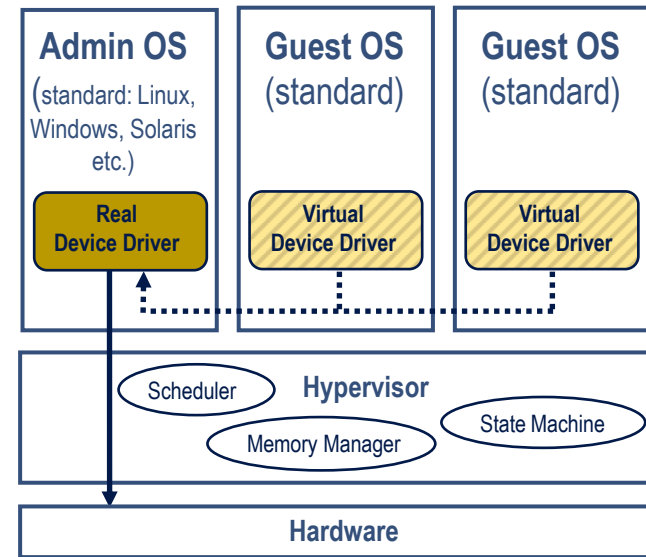
» Hardware-assisted Partitions

- Unisys ES7000
- IBM X Architecture
- Hitachi Virtage

Integrating Virtualization Into Standard Operating Systems



**VMware ESX
Device Driver Model**



**Xen & Hyper-V
Device Driver Model**

Summary

- » Virtualization adoption patterns different for x86 vs. other platforms (UNIX, mainframes etc.)
 - x86 virtualization driven primarily by large-scale consolidation
 - UNIX virtualization driven by workload management & utilization
- » I/O virtualization more robust & mature on non-x86 platforms
 - X86 HW providers face key decisions on device driver support

Recommendations

- » Classify suitability of workloads for virtualization
 - Measure performance characteristics over time
 - Understand dependency on different resources (CPU, memory, I/O)
- » Choose appropriate virtualization platform
 - Match workloads with maturity of x86 vs. other platforms (UNIX, mainframes)
 - Evaluate different x86 virtualization approaches & products
 - Key criteria: performance, price, compatibility, manageability, virtual infrastructure
- » Adapt management procedures & tools for virtualization
 - Provisioning tools
 - Create master images, stronger automation: true “zero-touch” provisioning
 - Lifecycle-based provisioning tools
 - Increased visibility of state & activity of virtual resources
 - Better oversight over virtual machine activity
 - Map relationships between physical and virtual resources
 - Focus on deployment of virtual infrastructure (long term)

Which Virtual Machine Platform Is Best For Your Needs?

Invitation to beta-test IDEAS
Collaborative Product Evaluation
on X86 Virtual Machine
platforms:

<http://ideasint.eval.com>

- » **Compare** quality of products at multiple levels of functionality
- » **Contribute** ratings for specific product functions
- » **Customize** evaluations based on your functional preferences

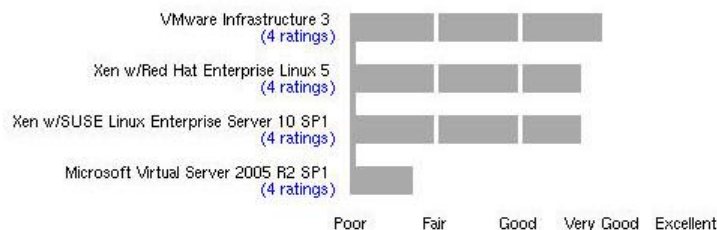


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IDEAS COLLABORATIVE PRODUCT EVALUATION BETA

X86 Virtual Machine Platforms : Availability : Resiliency Functions

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Resiliency functions help to reduce and unplanned and planned downtime resulting from hardware issues. Administrators should be able to add and remove disks online, i.e. without requiring a reboot, both at the physical level of the virtual machine monitor host and the guest operating system. Guest operating systems should have multiple paths to virtual storage, and then multiple paths to physical hardware within the virtual machine host. When necessary, it should be possible to create a direct path from the guest operating system to physical storage with write-through I/O, instead of going through a software driver. Finally, it should be possible to group network cards up into teams that can reliably sustain high traffic levels.

Click on one of the links below to see how resiliency functions are supported by each of the studied virtual machine platforms:

- » **Write-through I/O** (4 ratings) High Priority
- » **Storage access multipathing** (4 ratings) Medium Priority
- » **Hot-add virtual disk** (4 ratings) Medium Priority
- » **NIC Teaming** (4 ratings) Low Priority

Set Weights

Show: All Functions Set Credibility: 1 (16 ratings) Save: Change