



# Hypervisor Competitive Differences: Beyond the Data Sheet

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## Disclaimer

**This session may contain product features that are currently under development.**

**This session/overview of the new technology represents no commitment from VMware to deliver these features in any generally available product.**

**Features are subject to change, and must not be included in contracts, purchase orders, or sales agreements of any kind.**

**Technical feasibility and market demand will affect final delivery.**

**Pricing and packaging for any new technologies or features discussed or presented have not been determined.**

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# Agenda

- Project background
- Evaluation criteria
- Vendor scorecards



# Project Background

- Three month Burton Group project
- Goal: identify production-class hypervisor evaluation criteria
  - Required
  - Preferred
  - Optional
- Input came from Burton Group analysts and clients (Global 1000 organizations)
- Outcome: 70 page report detailing hypervisor selection criteria and notes on differentiating “true features” from “marketing checkboxes”

## Bottom Line

- Hypervisors cannot be compared by their data sheets
- Hypervisor feature attributes must be carefully evaluated
  - Configuration granularity
  - Performance
  - Scalability
  - Integration with the organization's management ecosystem
- Hypervisors that do not meet Burton Group's noted feature requirements are not ready for production roles

## Context

- Server virtualization is one of the fundamental building blocks of the dynamic data center
- x86 virtualization hypervisors are a core infrastructure technology
  - Hypervisor selection impacted by long term IT strategy
  - Commitments to hypervisor platforms often last several years
- Validating hypervisor compatibility with the organization's business and technical needs requires:
  - Awareness of the hypervisor's technical nuances
  - Integration avenues with all other data center infrastructure components (e.g., networks, storage, security, and enterprise management and orchestration software)

## Evaluation Criteria

- High availability
- Live migration
- Memory management
- Networking
- Storage
- Security
- Compute
- Paravirtualization
- Management
- Power
- Licensing
- Support

# High Availability

## Eliminates the physical host as a single point of failure

### ■ Required

- Fan-out failover
- Ability to assign a run priority to each VM in the cluster
- Scalability to a minimum of eight physical nodes

### ■ Preferred

- Guest OS and application failure detection
- Partial physical node failure detection
- Multiple heartbeat network paths

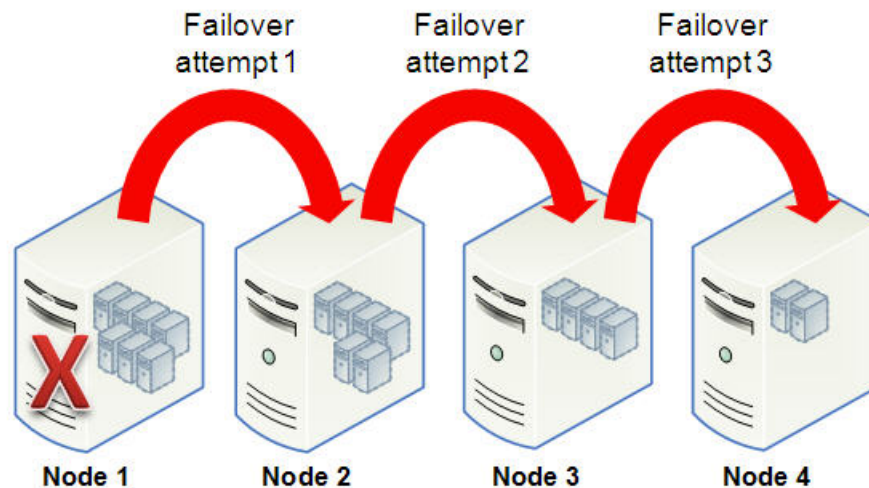
### ■ Optional

- Integration with third party HA software (e.g., Symantec, SteelEye)



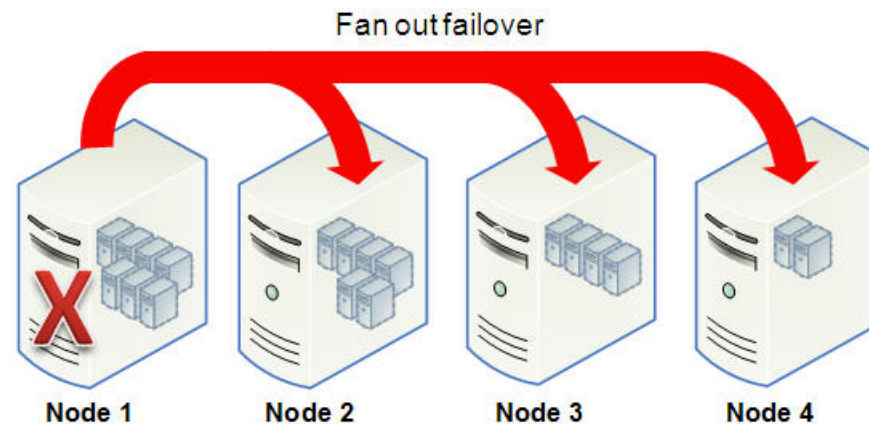
# VM Failover by Logical Node Order

- All VMs try to restart on the next node on the cluster
- Prolongs recovery
- Requires 3-node cluster to test

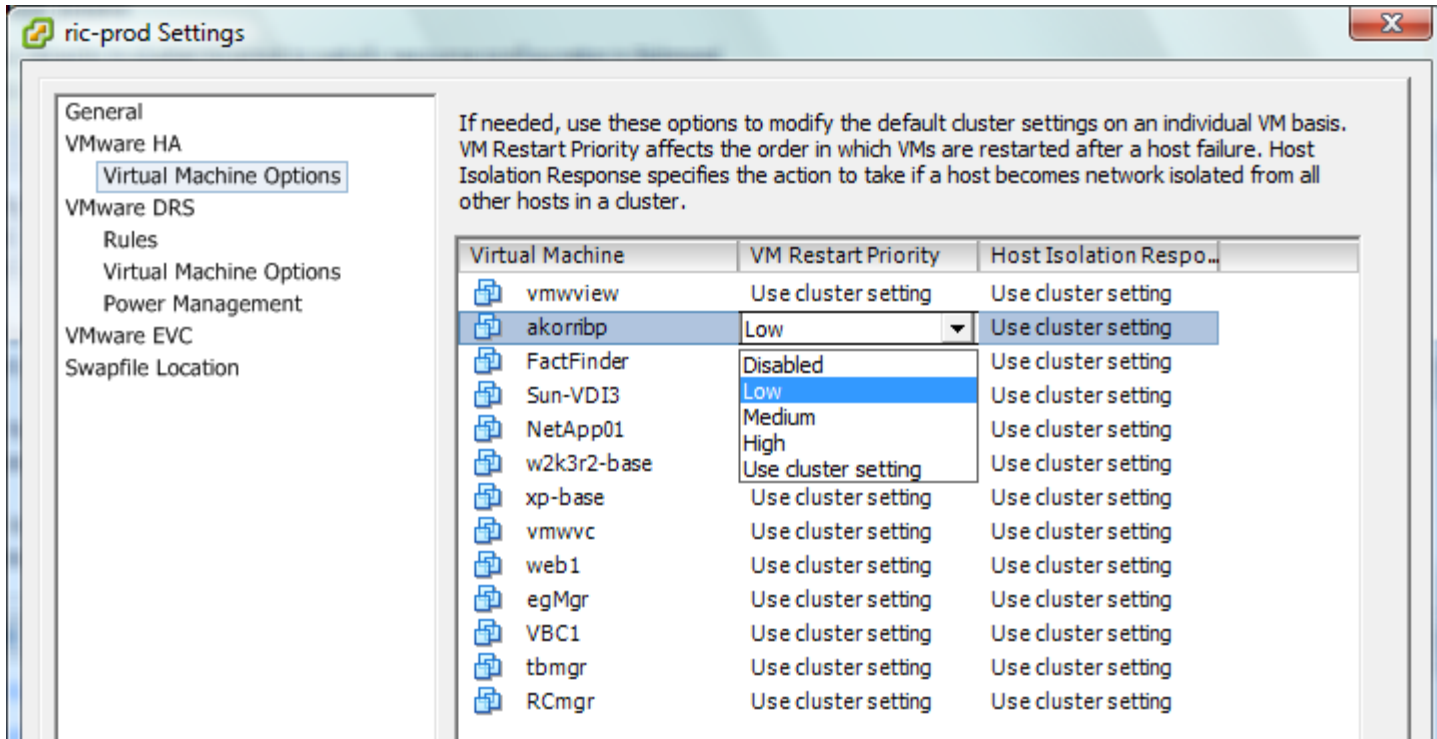


# Fan-out Failover

- VMs evenly redistributed on surviving cluster nodes following a physical node failure
- VM run priority determines start order



# VM Restart Priority Configuration



If needed, use these options to modify the default cluster settings on an individual VM basis. VM Restart Priority affects the order in which VMs are restarted after a host failure. Host Isolation Response specifies the action to take if a host becomes network isolated from all other hosts in a cluster.

Virtual Machine	VM Restart Priority	Host Isolation Respo...
vmwview	Use cluster setting	Use cluster setting
akorribp	Low	Use cluster setting
FactFinder	Disabled	Use cluster setting
Sun-VDI3	Low	Use cluster setting
NetApp01	Medium	Use cluster setting
w2k3r2-base	High	Use cluster setting
xp-base	Use cluster setting	Use cluster setting
vmwvc	Use cluster setting	Use cluster setting
web1	Use cluster setting	Use cluster setting
egMgr	Use cluster setting	Use cluster setting
VBC1	Use cluster setting	Use cluster setting
tbmgr	Use cluster setting	Use cluster setting
RCmgr	Use cluster setting	Use cluster setting

# Live Migration

## Supports non-disruptive scheduled maintenance and dynamic workload balancing

### ■ Required

- Hypervisor supports live migration

### ■ Preferred

- Supports Extended Migration and Flex Migration
  - Ensures migration success across different hardware-assisted virtualization server platform generations
  - Cluster runs at the lowest common denominator
- Capable of simultaneously live migrating two or more VMs
  - How long will it take to live migrate 15 VMs?

# Additional Live Migration Feature Considerations

- Methods for initiating a live migration
- Supported shared network storage
- Target physical host CPU compatibility validation
- Target physical host service level validation
  - Does the target host have adequate resources to meet a VM's service level requirements?
- Ability to factor technical (e.g. CPU, memory, I/O) and non-technical (e.g. security zone restrictions) factors that would impact VM placement
- Ability to prioritize concurrent live migration jobs
- Application performance during a live migration job

# Memory Management

## ■ Required

- Supports hardware-assisted memory virtualization
  - Implementations
    - AMD Rapid Virtualization Indexing (RVI)
    - Intel Extended Page Tables (EPT)
  - Offers significant performance improvements for many multi-threaded enterprise applications

## ■ Preferred

- Memory overcommit
- Large page table support in the VM guest and hypervisor

## ■ Optional

- Memory page sharing

# Networking

## ■ Required

- Network interface card (NIC) teaming and load balancing
- Unicast isolation
- 802.1Q virtual local area network (VLAN) trunking

## ■ Preferred

- Promiscuous monitoring
- Link failure detection
- Media Access Control (MAC) address security
- Centralized virtual switch management
- Third party virtual switch integration
- Dynamic network I/O buffer and cache tuning

# Networking

## ■ Optional

- Supports 10GbE SR-IOV-enabled network interfaces
- Manually tunable network I/O buffer and cache options



# Storage

## ■ Required

- Supports iSCSI and Fibre Channel (FC) networked storage
- Officially supported by enterprise data protection software

## ■ Preferred

- Offers tools and APIs to create application-consistent VM snapshots
- Dynamic storage I/O buffer and cache tuning
- Fibre channel over Ethernet (FCoE)
- Active-active multipath
- Virtual disk multi-hypervisor compatibility

# Storage

## ■ Optional

- Bi-directional CHAP for iSCSI authentication
- NFS shared storage
- Integration with virtual or physical storage virtualization appliances
- SNS/iSNS support
- NPIV support
- Manually tunable storage I/O buffer and cache options
- API to bridge hypervisor and storage infrastructure

# Security

## ■ Required

- Directory service integration
- Role-based access controls (RBAC)
- Management traffic is secured
- Security logging and auditing of administrative actions

## ■ Preferred

- Vendor provides specific hardening guidelines and plug-ins for their hypervisor and all trusted components
- Integrated firewall
- Configuration file integrity checking
- Centralized hypervisor patch management

# Security

## ■ Preferred (continued)

- VM memory state secured in live migration transit
- Physical or virtual security appliance integration
- Security API for consumption by third party security products
- Multi-factor authentication for management server

## ■ Optional

- TPM support for server, hypervisor, and VM attestation
- EAL common criteria certification

# Compute

## ■ Required

- Supports a minimum virtual CPU (vCPU) to physical CPU (pCPU) core scalability ratio of 1:1

## ■ Preferred

- Supports vCPU to pCPU core oversubscription by a factor of 4:1

## ■ Optional

- Supports vCPU to pCPU core oversubscription by a factor of 8:1 for virtual desktop workloads

# Paravirtualization

## ■ Required

- Paravirtualized Windows Server 2003/2008 guest OS device drivers

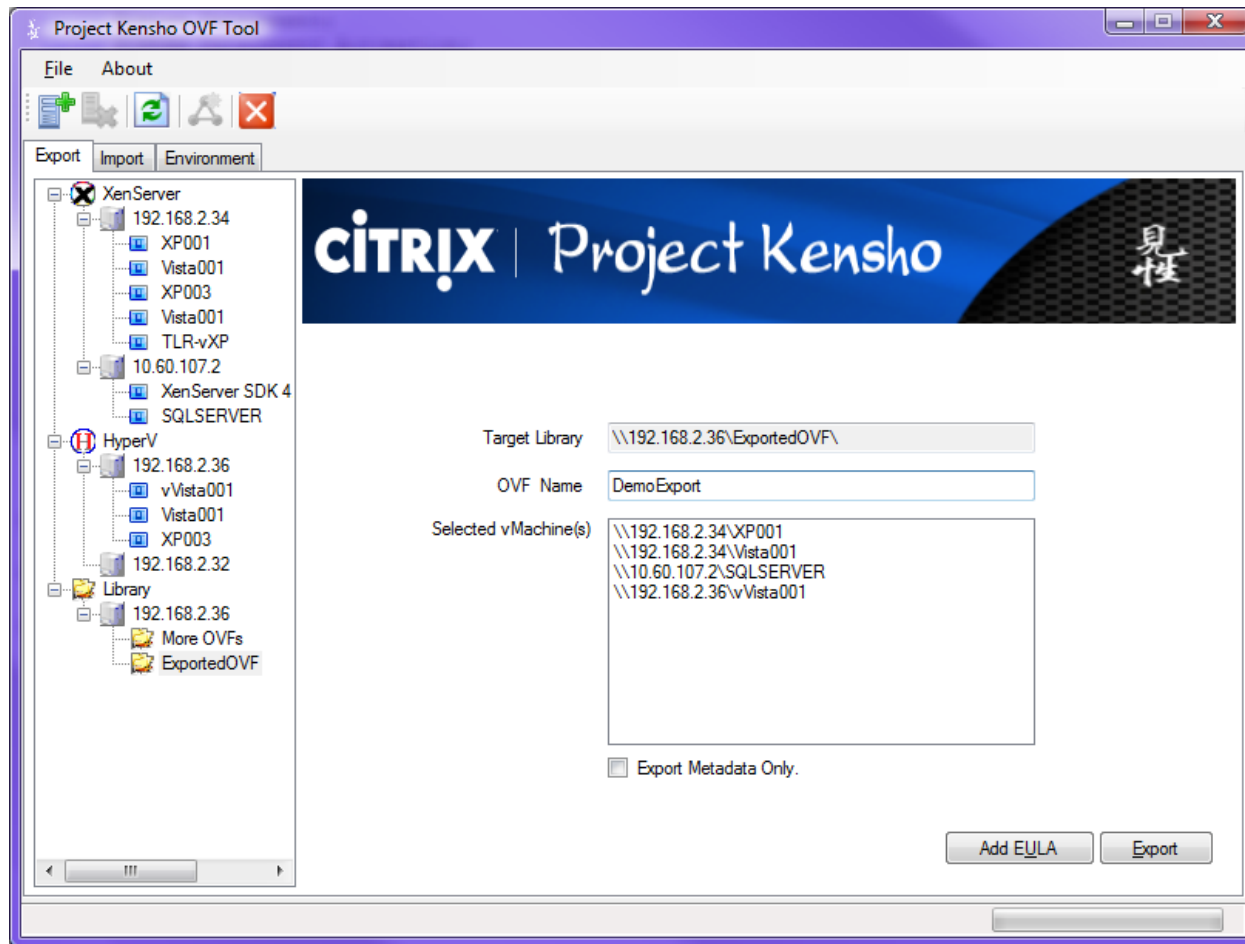
## ■ Preferred

- Paravirtualized Linux OS kernels and device drivers

## ■ Optional

- Paravirtualized Windows 2000/XP/Vista guest OS device drivers
- Paravirtualized Sun Solaris 10 guest OS device drivers
- Multi-hypervisor paravirtualized device driver compatibility

# VM Interoperability – Project Kensho



# Management

## ■ Required

- Client- or web-based management console
- SNMP trap capability for system events and policy thresholds
- Integration with enterprise management solutions
- Management server is fault tolerant

## ■ Preferred

- Command line interface (CLI) and scripting support
- Supports Open Virtualization Format (OVF) and CIM-based management
- Virtual hard disk format is compatible with other hypervisors
- Management server scales to support a minimum of 10,000 VMs

## ■ Optional: supports dynamic VM load balancing



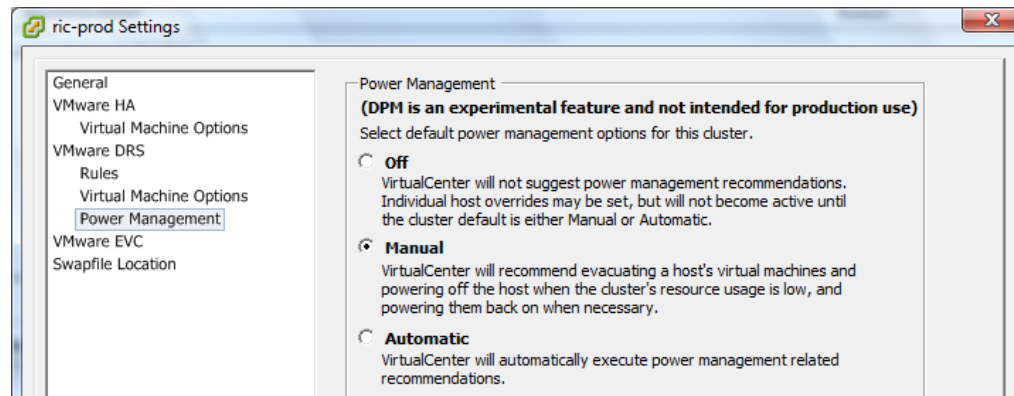
# Power Management

## ■ Preferred

- Supports hardware-assisted virtualization active power management features
  - Intel Core i7 power management
    - [http://blogs.intel.com/technology/2008/11/through\\_the\\_eyes\\_of\\_intel\\_core.php](http://blogs.intel.com/technology/2008/11/through_the_eyes_of_intel_core.php)

## ■ Optional

- Supports automated server shutdown/startup or suspend/resume



# Licensing

## ■ Preferred

- Hypervisors licensed per physical server instance

## ■ Optional

- Hypervisors licensed per physical server CPU socket
- Hypervisors licensed per physical server CPU core
- Hypervisors licensed per number of concurrently running VMs

# Support

## ■ Required

- Three years minimum of market
- One year minimum of extended support
- Published support lifecycle dates at product launch

## ■ Preferred

- Six months minimum of retirement

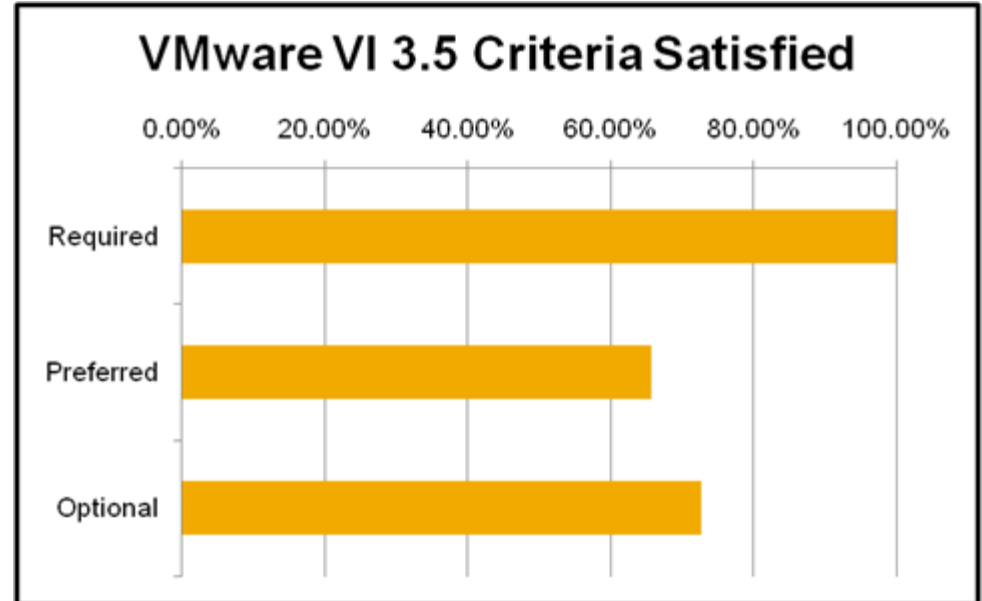


# Vendor Scorecards

- VMware VI 3
- Microsoft Hyper-V
- Citrix XenServer
- Virtual Iron

# VMware VI 3.5 Update 3

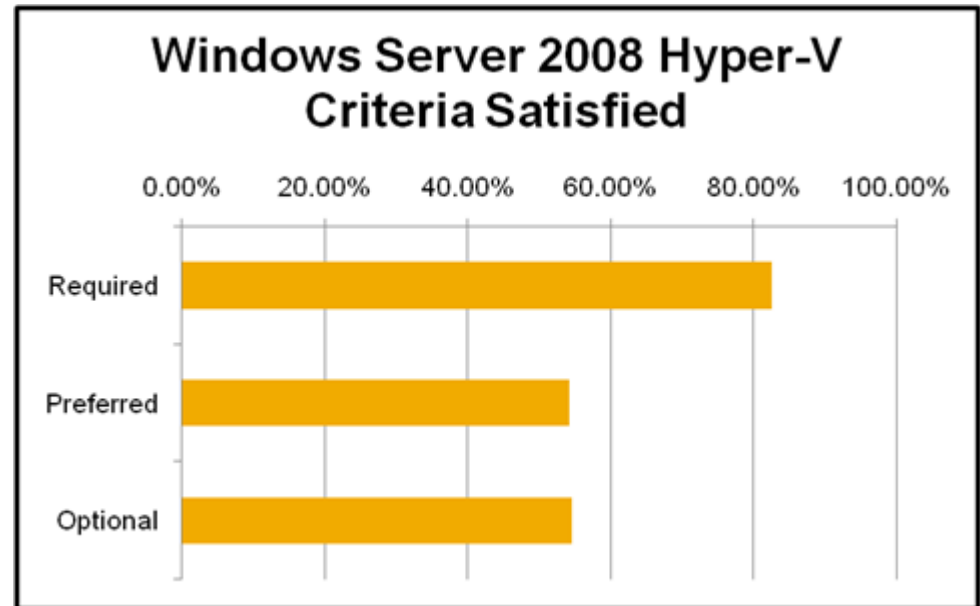
- First hypervisor to satisfy Burton Group's production-class hypervisor evaluation criteria
- Room for improvement with missing preferred features
  - Partial physical node failure detection
  - Dynamic I/O buffering and cache tuning
  - Bi-directional CHAP, iSNS, TPM support
  - Virtual hard disk compatibility



# Microsoft Windows Server 2008 Hyper-V

## What's missing?

- High availability
  - Assignable VM restart priority
- Live migration
- Hardware-assisted memory virtualization support
- Fault tolerant management server



# Citrix XenServer 5.0

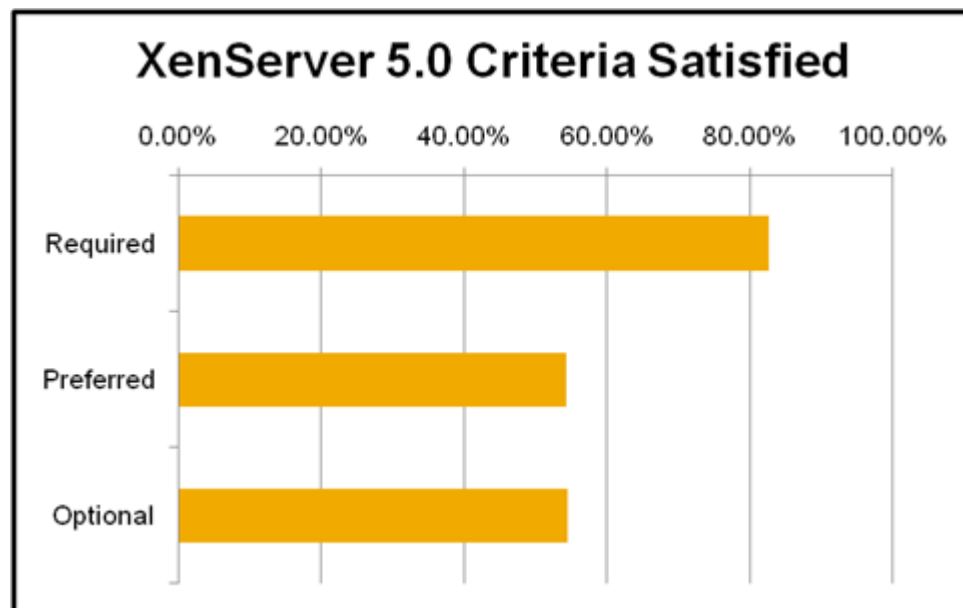
## What's missing?

### ■ Networking:

- 802.1Q VLAN trunking

### ■ Security:

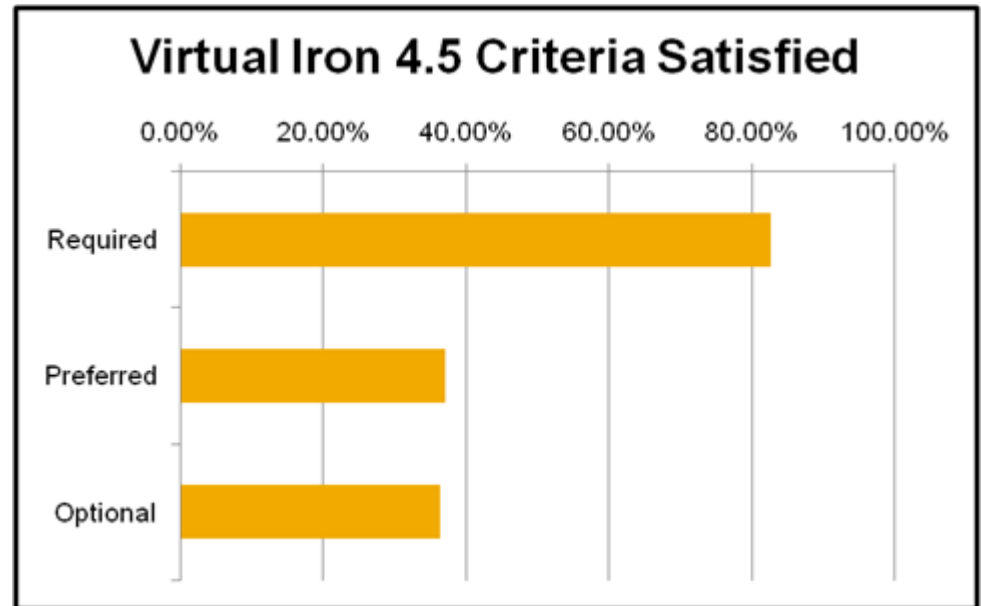
- Directory services integration
- Role-based access controls
- Security logging and auditing of administrative actions



# Virtual Iron 4.5

## What's missing?


- Enterprise-class support policy
- Management:
  - SNMP
  - Third party integration
  - Fault tolerant management server





# Summary

- Server virtualization hypervisors are an infrastructure technology and involve a long term commitment
  - The hypervisor is the foundation for your data center
  - Choose wisely!
- Nothing is set in stone. You know your requirements better than anyone.
- Define your organization's virtualization requirements and stick to them.
- Additional information:
  - Blog: [chriswolf.com](http://chriswolf.com), [dcsblog.burtongroup.com](http://dcsblog.burtongroup.com)
  - Email: [cwife@burtongroup.com](mailto:cwolf@burtongroup.com)



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is possible.

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 directly applicable to my job     
 indirectly applicable to my job     
 personally interesting, but not applicable to my job

2. Did this session provide information that can help you do your job better?  
 Yes     
 Slightly     
 No

3. This session was... (pick one)  
 Too technical     
 Just right     
 Not technical enough

4. What is your technical experience level?  
 Not technical     
 Novice     
 Intermediate     
 Full-armed

5. Based on what you learned in this session, what is your likelihood to...  
 implement what you heard in your environment     
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Please rate your satisfaction with the session or lab on each of the following factors:

6. How satisfied are you...  
 Very Satisfied        
 Somewhat Satisfied        
 Neutral        
 Somewhat Dissatisfied        
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A. OVERALL SATISFACTION  
 B. With the relevance of the material for your needs  
 C. That the session matched the session description (BREAKOUT SESSION ONLY)  
 D. With the amount of time allocated for the session  
 E. With the speaker's presentation skills  
 F. With the speaker's knowledge of the subject  
 G. That the speaker effectively answered questions  
 LAB ONLY  
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What, if anything, was the value of the session or how could it be improved?  
 \_\_\_\_\_  
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