

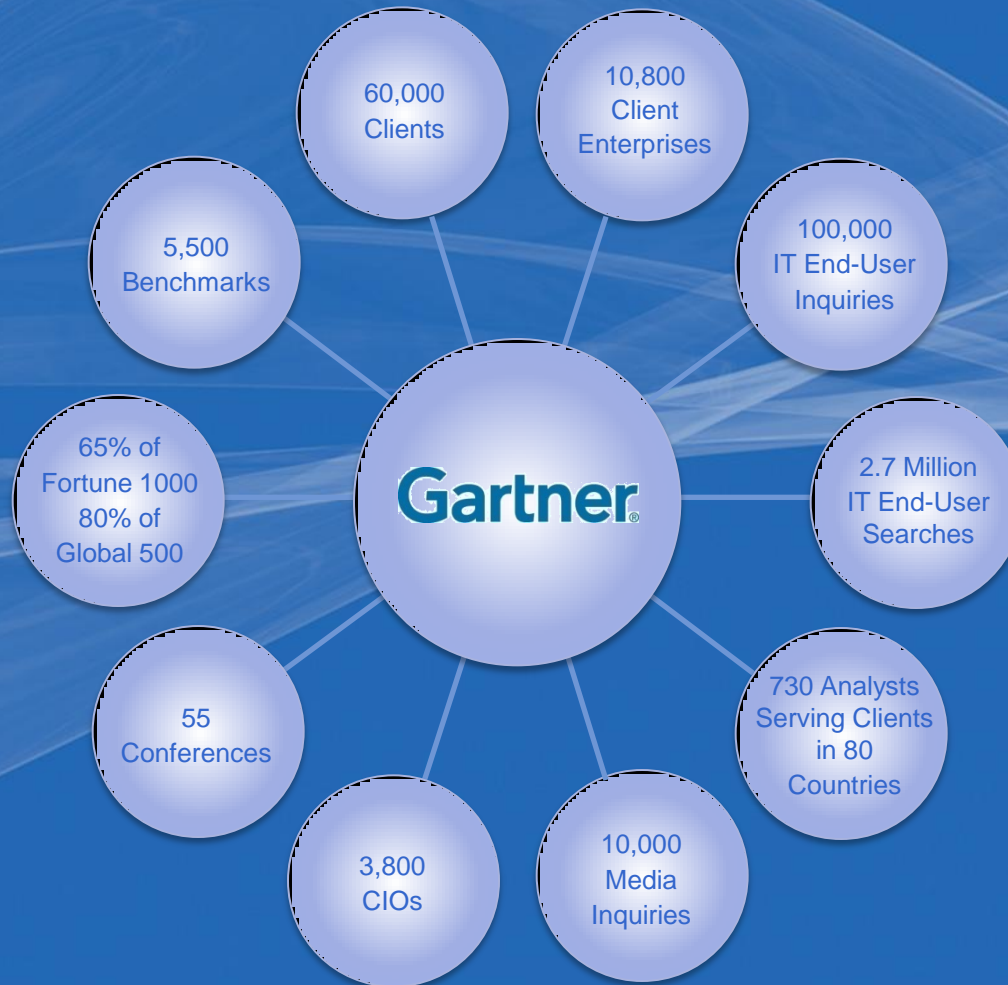
Server Virtualization: From Virtual Machines to Clouds

Thomas Bittman

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Thank you for joining this Gartner webinar.

Today's topic is "Server Virtualization: From Virtual Machines to Clouds"



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Server Virtualization: From Virtual Machines to Clouds

Thomas Bittman

Server Virtualization Misconceptions

Is it still hot?

There will be more VMs deployed during 2011 than in 2001-2009 combined.

It's for large enterprises

Within a year, the penetration in midsize companies will exceed the global 500.

It saves money

Done badly, it will cost you more in staff and software costs.

It's a commodity

Choices now influence your path to cloud computing.

It's an IT thing

CIOs consider virtualization the No. 1 technology trend — the business impact is huge.

VMware dominates

In 2005, VMware's installed base market share was 100%. By 2012, it will be 65%.

Key Issues

IT virtualization is the abstraction of IT resources in a way that masks the physical nature and boundaries of those resources from resource users.

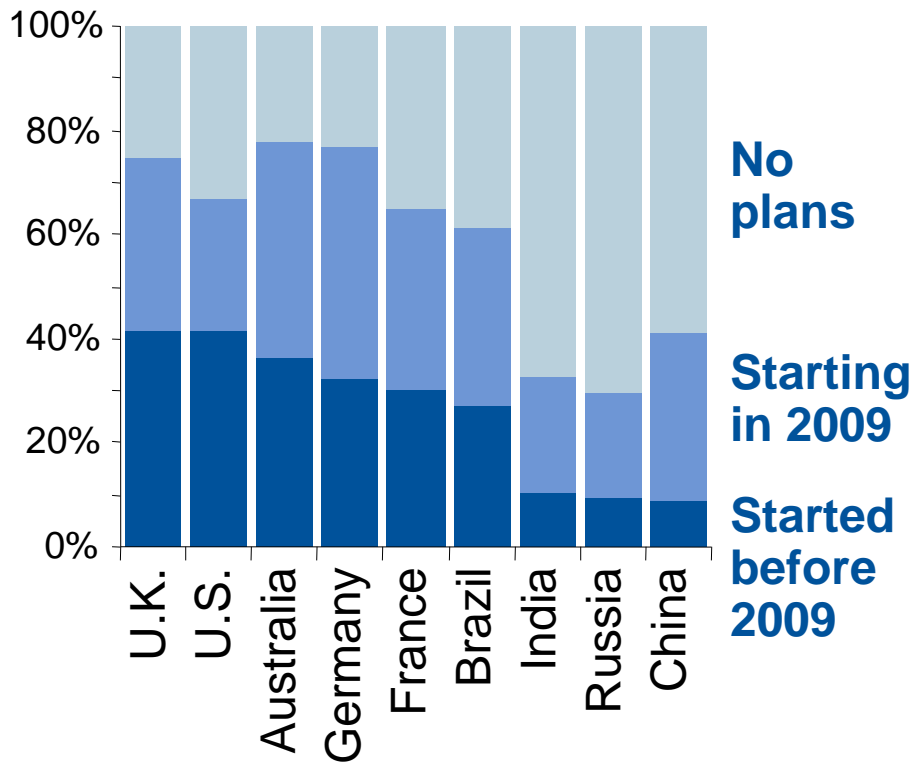
1. How will the server virtualization market evolve?
2. What are server virtualization best practices?
3. How will server virtualization lead to cloud computing?

A Brief History of the x86 Server Virtualization Infrastructure Market

| | | |
|---|------|--|
| | 2001 | VMware ESX Server SWsoft (Parallels) Virtuozzo |
| | 2002 | |
| Xen (OSS) <i>Microsoft acquires Connectix technology</i> | 2003 | |
| | 2004 | Microsoft Virtual Server 2005 <i>EMC acquires VMware SWsoft acquires Parallels</i> |
| Solaris 10 (includes Containers) Novell SLES 10 (with Xen) | 2005 | |
| KVM (OSS - led by Qumranet) Oracle VM RHEL 5.0 (includes Xen) KVM included in Linux kernel <i>Citrix acquires XenSource</i> <i>EMC IPOs VMware</i> | 2006 | XenSource XenServer Virtual Iron |
| | 2007 | |
| Red Hat Enterprise Virtualization (RHEV) <i>Oracle acquires Sun and Virtual Iron</i> | 2008 | Microsoft Hyper-V <i>Red Hat acquires Qumranet</i> |
| | 2009 | |

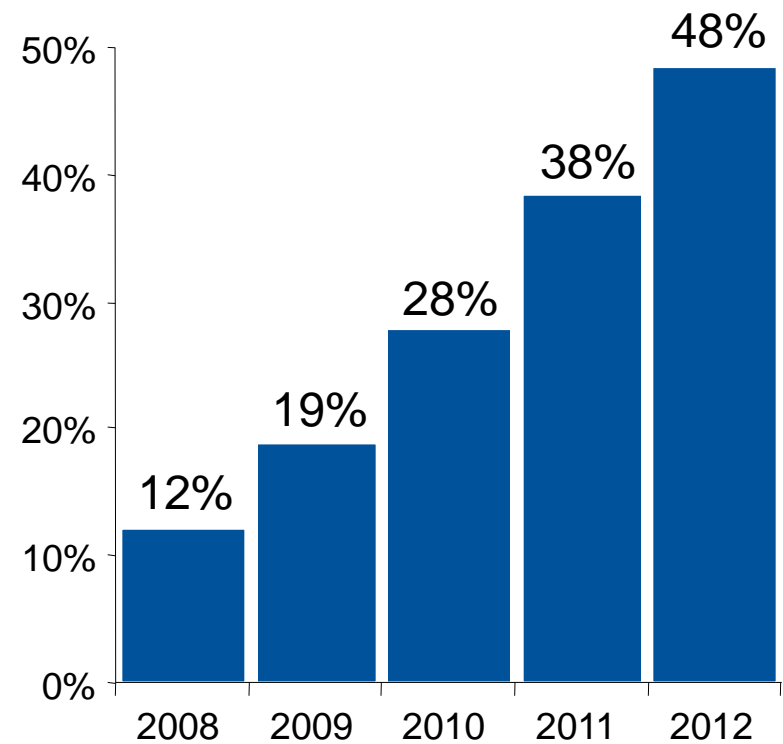
Server Virtualization Penetration

Q. Has your organization started to invest in virtualization, or does it plan to invest in virtualization during 2009?



2009 survey of 1,394 companies with 100-999 employees (roughly equal number of companies per country)

Percentage of Installed x86 Workloads Running in a VM



Strategic Planning Assumption

By 2013, the majority of workloads running on x86 architecture servers in enterprises will be running in virtual machines.

Through at least 2014, 95 percent of enterprises with less than 1000 employees will have only one form of virtual machine technology in use for x86 architecture servers.

x86 Server Virtualization Market Landscape



- Market leader
- Private clouds and cloud migration
- Application architecture and management expansion

Novell®

- Strategically focused on "Perfect Guest" OS and heterogeneous virtualization management
- Partnerships with Microsoft, VMware, Citrix



- Virtuozzo Containers successful niche mainly with service providers



- Newest competitor, focused on KVM
- Limited ecosystem (e.g., management)

Microsoft

- Windows synergy
- Most successful in smaller enterprises that haven't virtualized yet
- Promoting heterogeneity

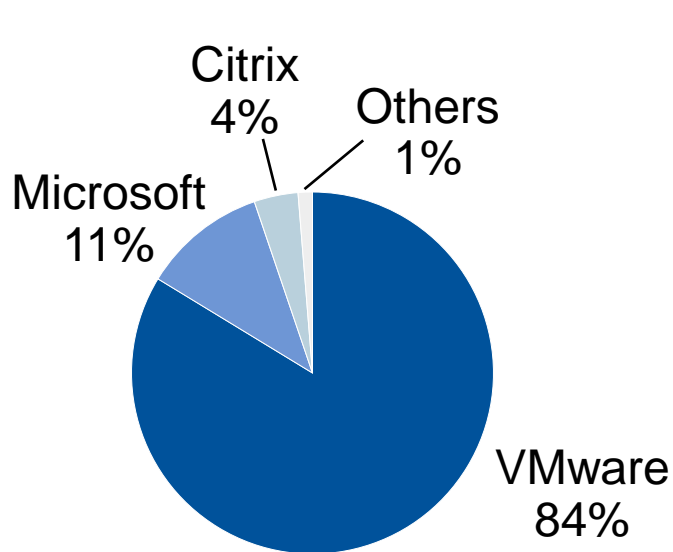
CITRIX

- Leading provider of Xen-based virtualization
- Also manages Hyper-V
- Challenged to find a market niche between leaders

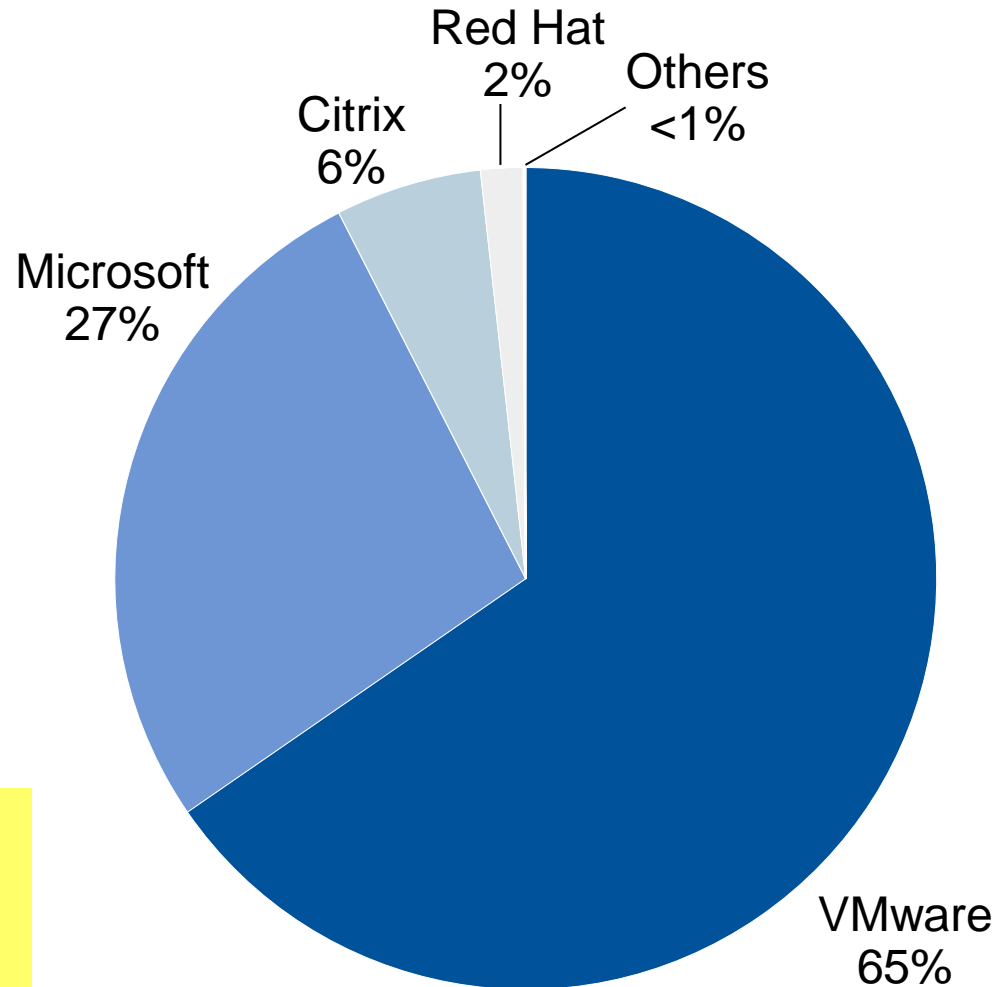
ORACLE®

- Uses certification and licensing
- Strong solution in Oracle-managed stack, weak elsewhere
- Solaris Containers complements

Virtual Machine Installed Base Projections



2009
(10.8M VMs)

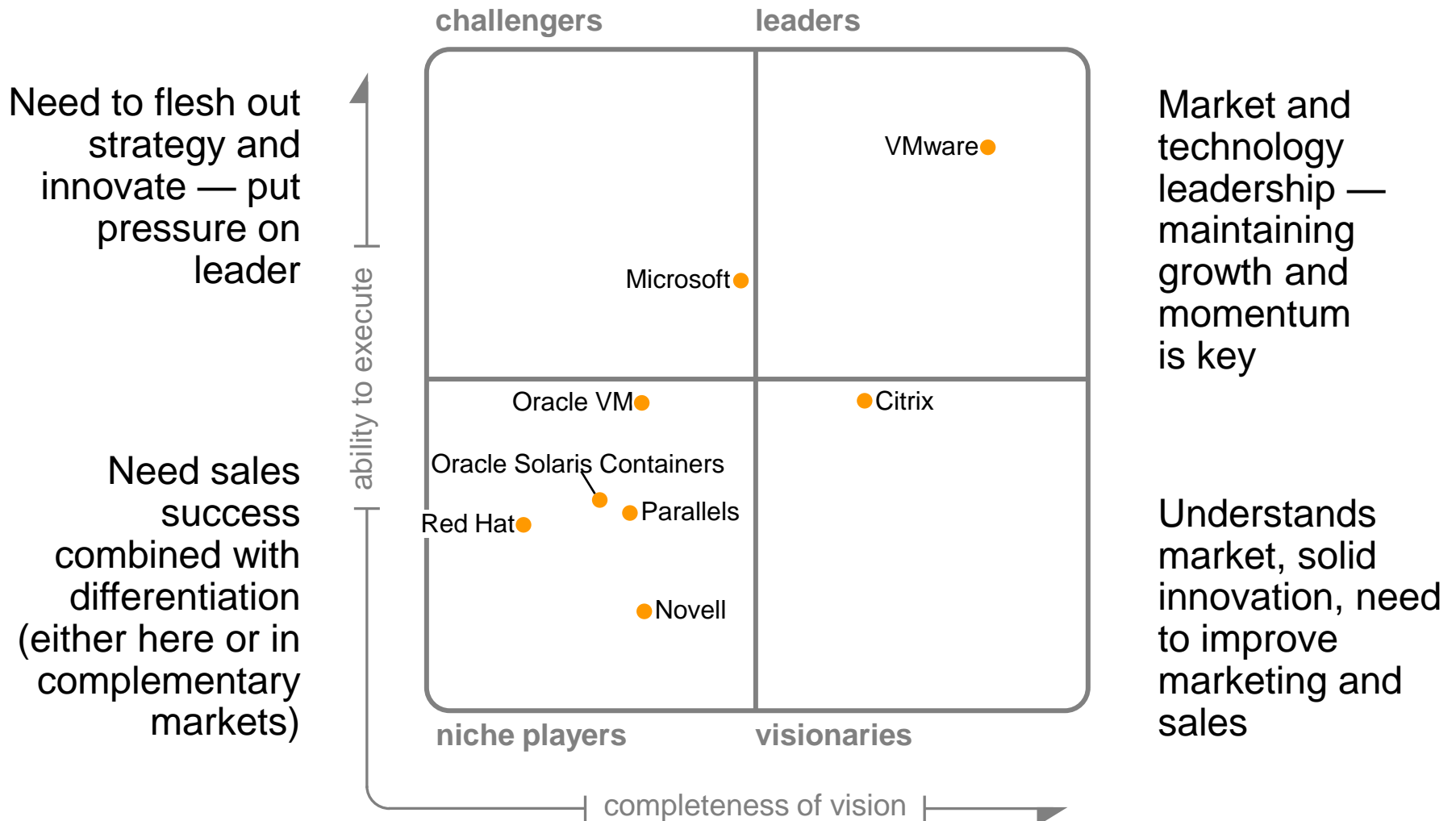


2012
(58M VMs)

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The installed base of virtual machines will grow **5X** in three years.

x86 Server Virtualization Infrastructure Magic Quadrant



As of May 2010

VMware or Microsoft?

By 2012, at least 25% of the virtual machine installed base in enterprises will be Microsoft Hyper-V.

Microsoft

Reasons to choose Microsoft:

- Smaller deployment (<100 VMs)
- Server virtualization is primarily being used for less-critical servers
- Exclusively or primarily using Windows operating system
- Heavy user of Microsoft management (Systems Center)
- Low cost more important than features
- Simplicity in managing a mixed physical server and virtual server environment important

 **vmware**

Reasons to choose VMware:

- Existing investment in VMware skills, technology, automation
- Large deployment (>200 VMs)
- Low tolerance for downtime
- Requirement for high density of VMs per server
- Mix of server operating systems
- Maturity and features more important than low cost
- Building a VMware-centric private cloud infrastructure and the vCloud initiative are attractive

Best Practices: Starting to Virtualize Servers



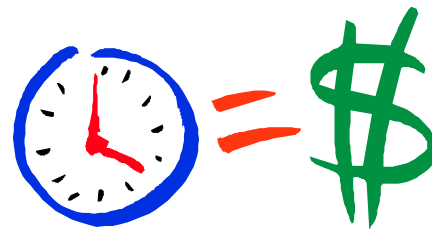
**Start
small**

**But
think big**



**Require
rapid ROI**

**But think
agility**



**Be
application
smart**

**Pool
well**



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Operationalizing Virtualization: Mind Your Porridge



- **Too cold** and you won't achieve potential savings
- **Too hot** and you'll have VM sprawl, cost overruns, breakdowns
- Be proactive, and plan ahead to be **just right**

Assets/Configuration

- Don't wallpaper over problems
- Expect higher demand, more transient use
- Manage the speed (approvals, quotas, chargeback, reporting)
- Don't forget offline "assets"
- Dependency management gets harder
- Descriptive metadata will evolve
- Be strategic — cloudsourcing is coming

Performance/Capacity

- Merging: Incremental, asynchronous capacity changes
- Shift to holistic capacity planning
- VM placement important — but don't overanalyze or overoptimize
- Beware of VM performance overhead and VM resource competition
- Descriptive metadata will evolve

Funding/Chargeback

- Virtualization <> "free"
- From project-based to use-based — asynchronous asset buying
- Account for all use, expose simplicity (less dynamic, less detail, more predictable)
- Build metrics that are not dependent on physical hosts — and lead to external cloud alternatives

Securing Virtual Servers: Issues and Possibilities



Issues

- Virtualization introduces new "platform" that must be included in patch, configuration and vulnerability management
- Offline VMs need to be kept up to date and protected
- Early virtual switches are not visible to traditional network-based security
- VMs will become mobile — security policies that are not mobile (such as tied to IP or MAC addresses) are broken

Possibilities

- Security appliances shifting from physical and proprietary to virtual
- VM state inspection becomes a new security opportunity, without agents in the virtual machines
- Security decoupled from workloads requires security metadata, enables adaptability — including to the cloud

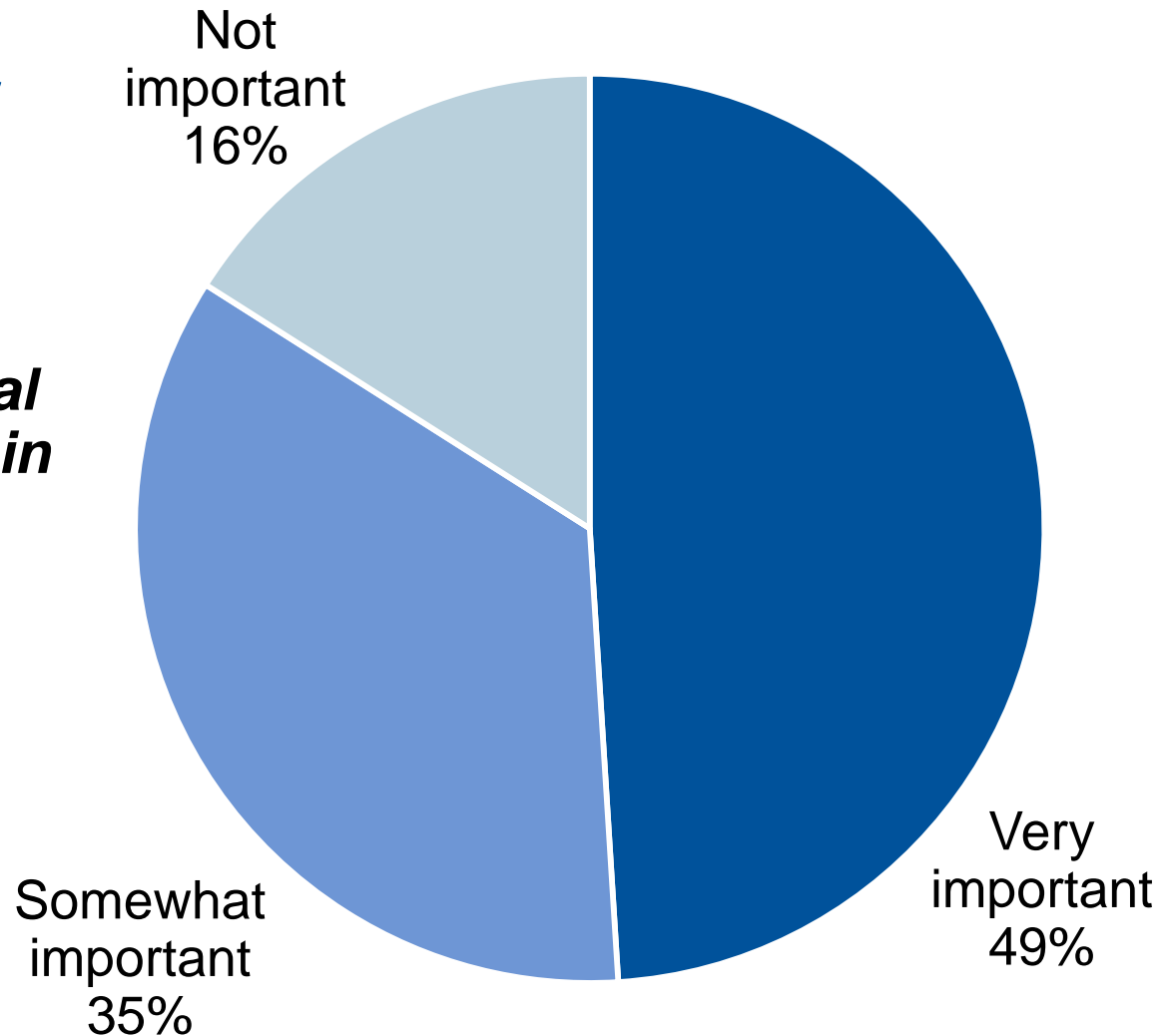


Heterogeneous Virtual Machines?

**Gartner Datacenter
Conference Poll
December 2009**

***How important will
heterogeneous virtual
machine support be in
your enterprise by
2012?***

N = 156



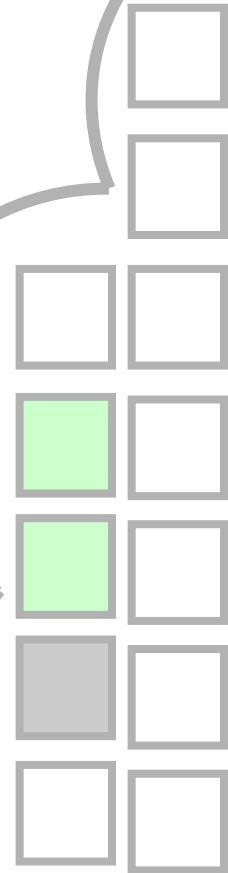
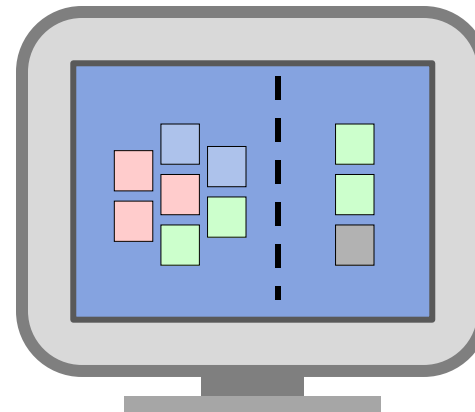
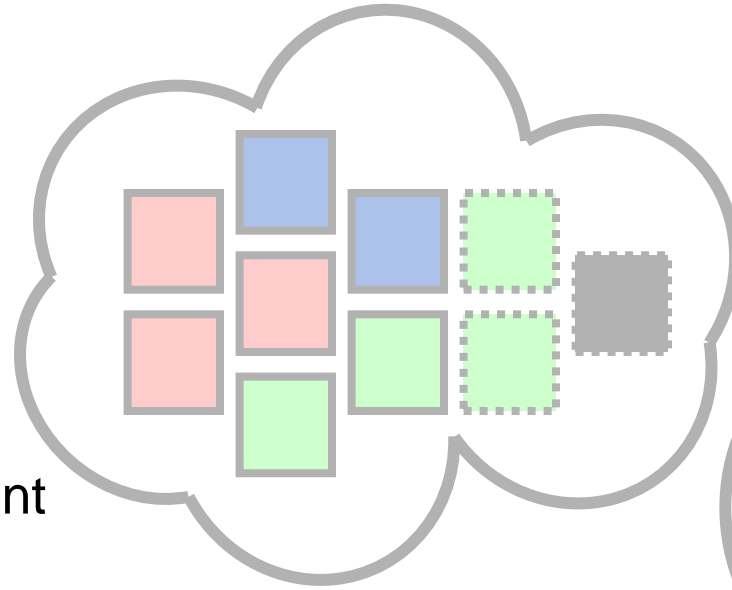
Strategic Planning Assumption

By 2014, fewer than 10 percent of enterprises with more than 1000 employees will manage two or more forms of virtual machines heterogeneously.

The Future of Server Virtualization

VM?

- Automated long-distance live migration
- Fault-tolerant VMs
- Service-smart VM management
- Private cloud: self-service, metered usage
- Migration (including live) between on-premises and off-premises
- Single console management for on-premises and off-premises
- Disaster recovery either on-premises or off-premises



Virtualization Is a Modernization Catalyst and Unlocks Cloud Computing

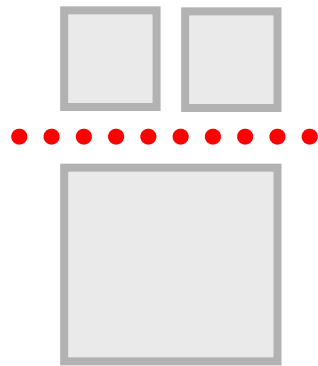
Attributes of Cloud Computing
Service-Based
Scalable and Elastic
Shared
Metered By Use
Internet Technologies



- Abstracts implementation from users
- Forces service-level discussion
- Technology hoster becoming service provider
- Enables faster delivery and resource changes
- Enables hardware sharing
- Enables economies of scale
- Software pricing and licensing models broken — some kind of usage-based model needed
- Usage tracking and chargeback to manage use

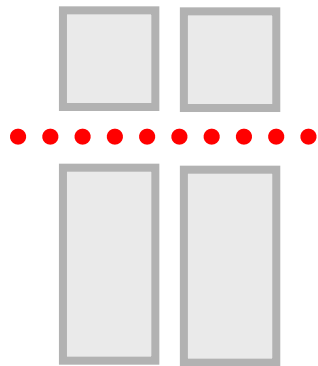
Virtualization Leads Inexorably to Cloud Computing

Stage 1: Server Virtualization



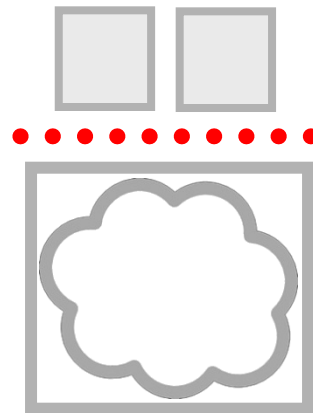
- Hardware efficiency
- Capital cost
- Deployment speed

Stage 2: Distributed Virtualization



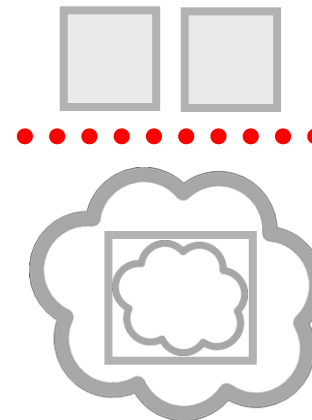
- Flexibility
- Automation
- Operational cost
- Reduced downtime

Stage 3: Private Cloud



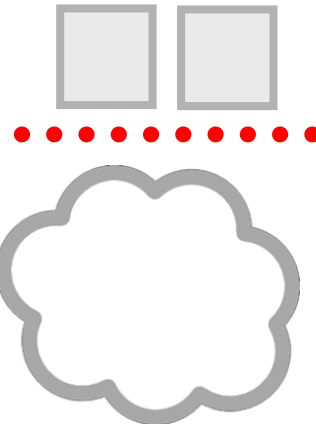
- Self-service
- Service standardization
- IT as a business
- Usage-based pricing

Stage 4: Hybrid Cloud



- Capital and operational cost
- Overdrafting on demand

Stage 5: Public Cloud



- No capital cost
- Total usage flexibility
- Low barrier to entry

Strategic Planning Assumption

By year-end 2012, half of the Global 100 will have at least one service that they consider to be a private cloud computing service, using virtual machines as a basic building block.

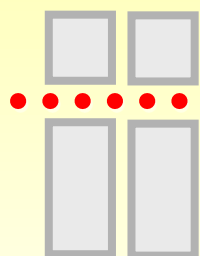
Virtualization Enablers and Different Paths in the Cloud

Build a Private Cloud

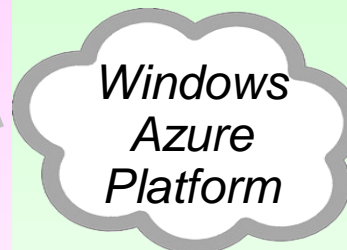
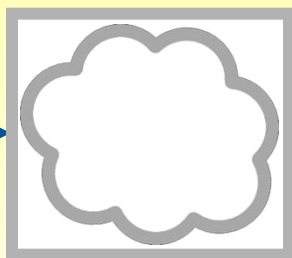
Federate with a Cloud Provider

Migrate to Cloud Provider

Microsoft



Dynamic Data Center Toolkit for Enterprises

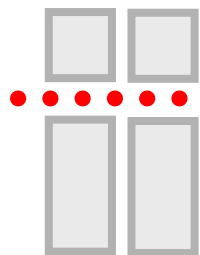


"in the future"

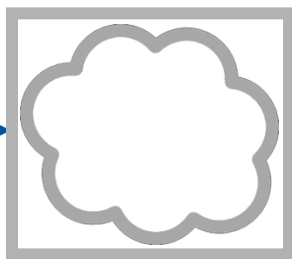


Dynamic Data Center Toolkit for Hosters

vmware



"Redwood"

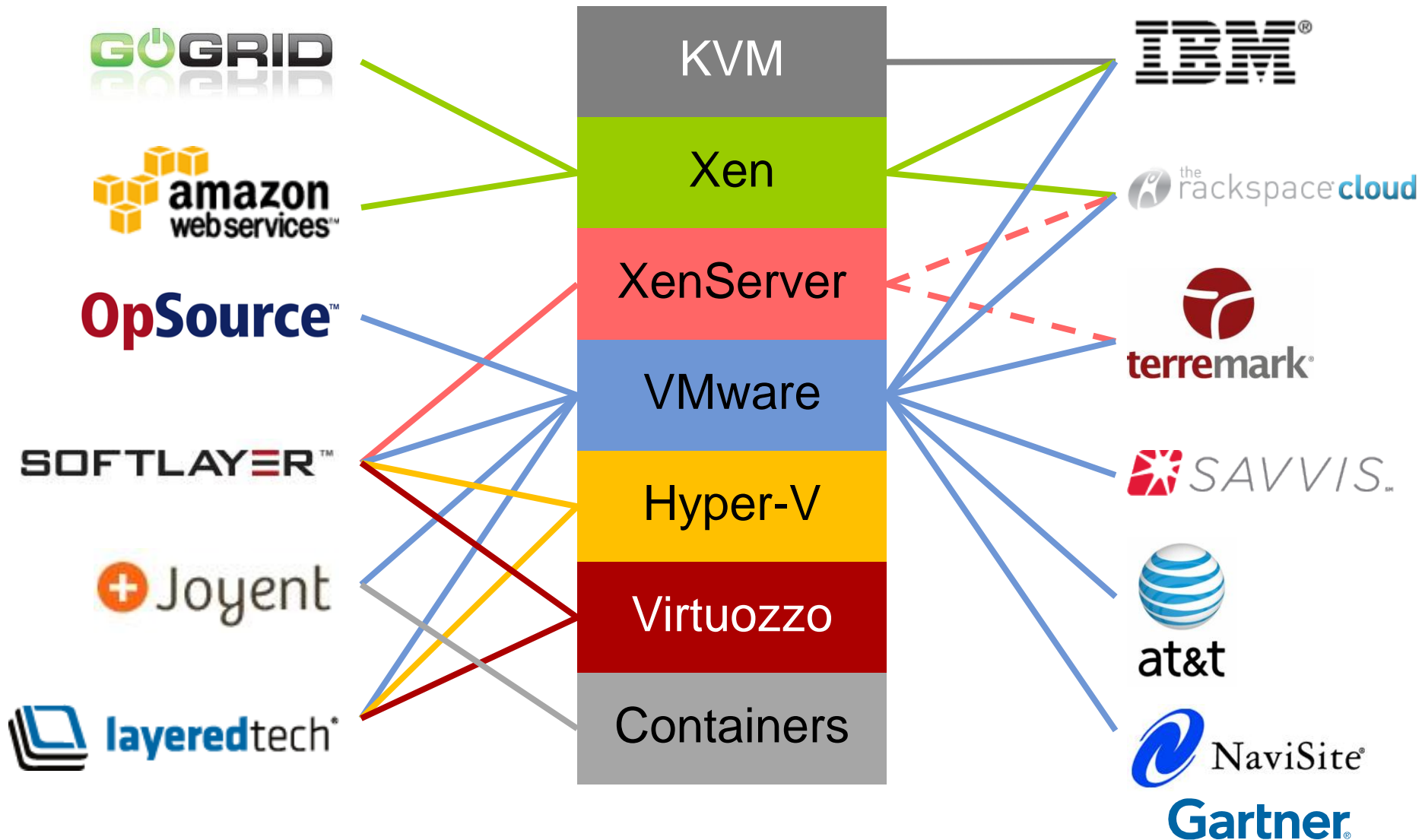


vCloud



"Redwood"

Infrastructure as a Service: Virtual Machines in the Cloud



Action Plans

CIOs and I&O leaders should ...

- **Now**
 - If you haven't yet, start virtualizing
 - If you have virtualized, perform a health check
- **Your Next 90 Days**
 - Develop a strategy with respect to private cloud computing
 - Benchmark your chosen virtualization solution against competitors
- **Your Next 12 Months**
 - Develop a hybrid cloud computing strategy and make sure your virtualization plans match
 - Ensure the strategy of your chosen virtualization solution matches your own

Related Gartner Research

- **"Magic Quadrant for x86 Server Virtualization Infrastructure"**
Thomas Bittman, Philip Dawson, George Weiss (G00200526)
- **"Server Virtualization: One Path That Leads to Cloud Computing"** Thomas Bittman (G00171730)
- **"Server Virtualization for x86: A Benefits Impact Assessment"**
Cameron Haight, Stewart Buchanan, Thomas Bittman (G00165864)
- **"Hype Cycle for Virtualization, 2009"**
Phil Dawson, Thomas Bittman, et al (G00168837)
- **"Best Practices Before You Virtualize Your Servers"**
Thomas Bittman, John Enck (G00153718)

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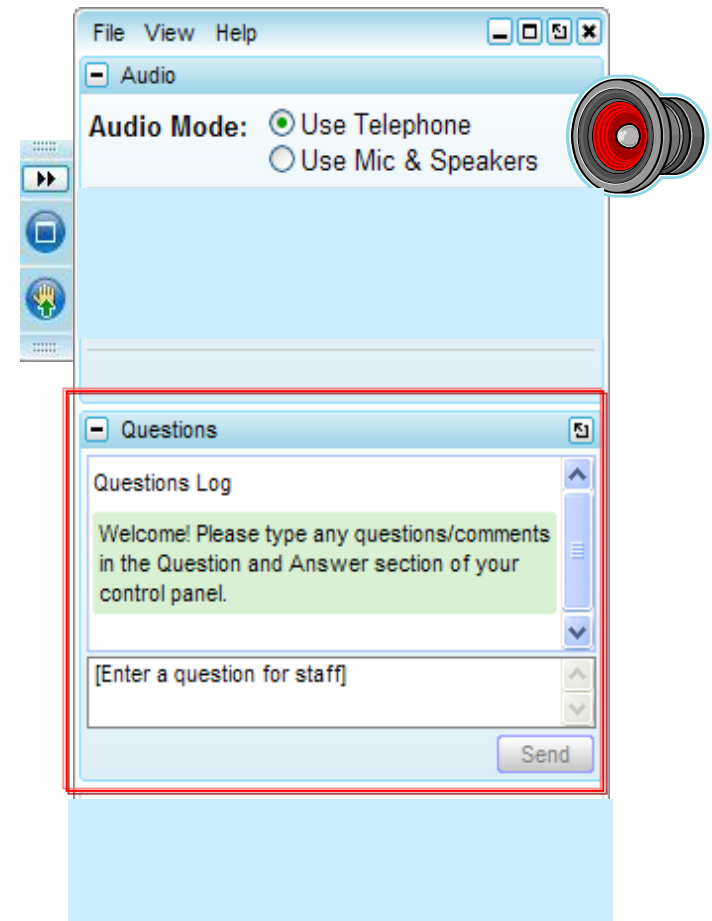


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