



Server and Desktop Virtualization

IT Under Pressure

Management requirements
for improved IT efficiency

Backlog of new IT
projects demanded
by business
managers

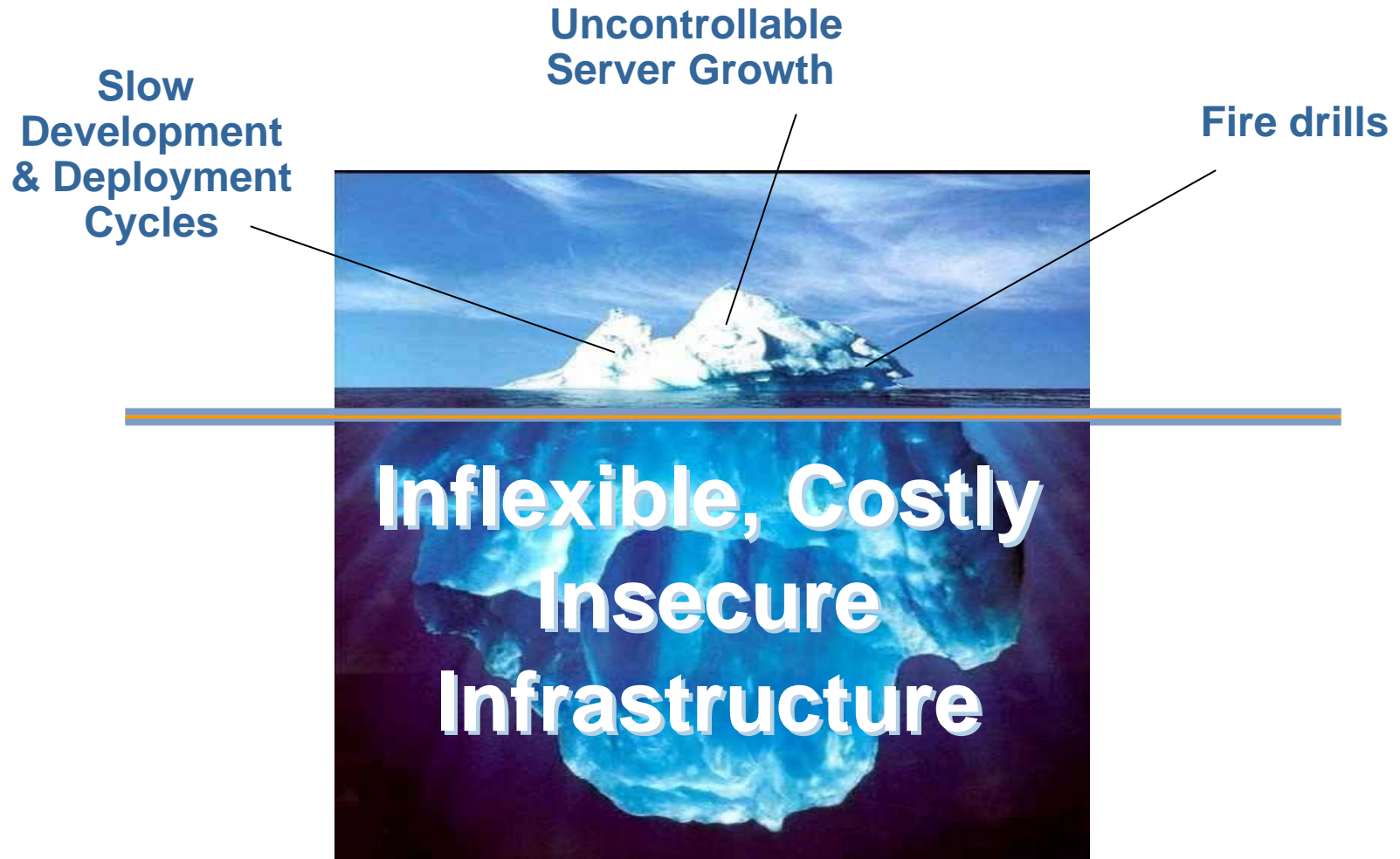
Costly but
underutilized
hardware resources

Budget
constraints

Difficulty of
capacity planning
for future projects



But Already Facing Challenges



Datacenter Infrastructure Today

Increasing use of x86 servers

- 91% of all enterprise servers bought in 2004 (*Gartner Dataquest*)

But those servers are not utilized efficiently

- Typical x86-based server utilization: 5-15%
- Best practice for x86 servers of one application per server
- Repurposing servers is difficult and costly

And the need for servers continues to grow

- Need to duplicate datacenter for disaster recovery
- Need additional servers to support test and development of new applications
- Need servers for staging



Result: Inflexible, Costly Server Sprawl

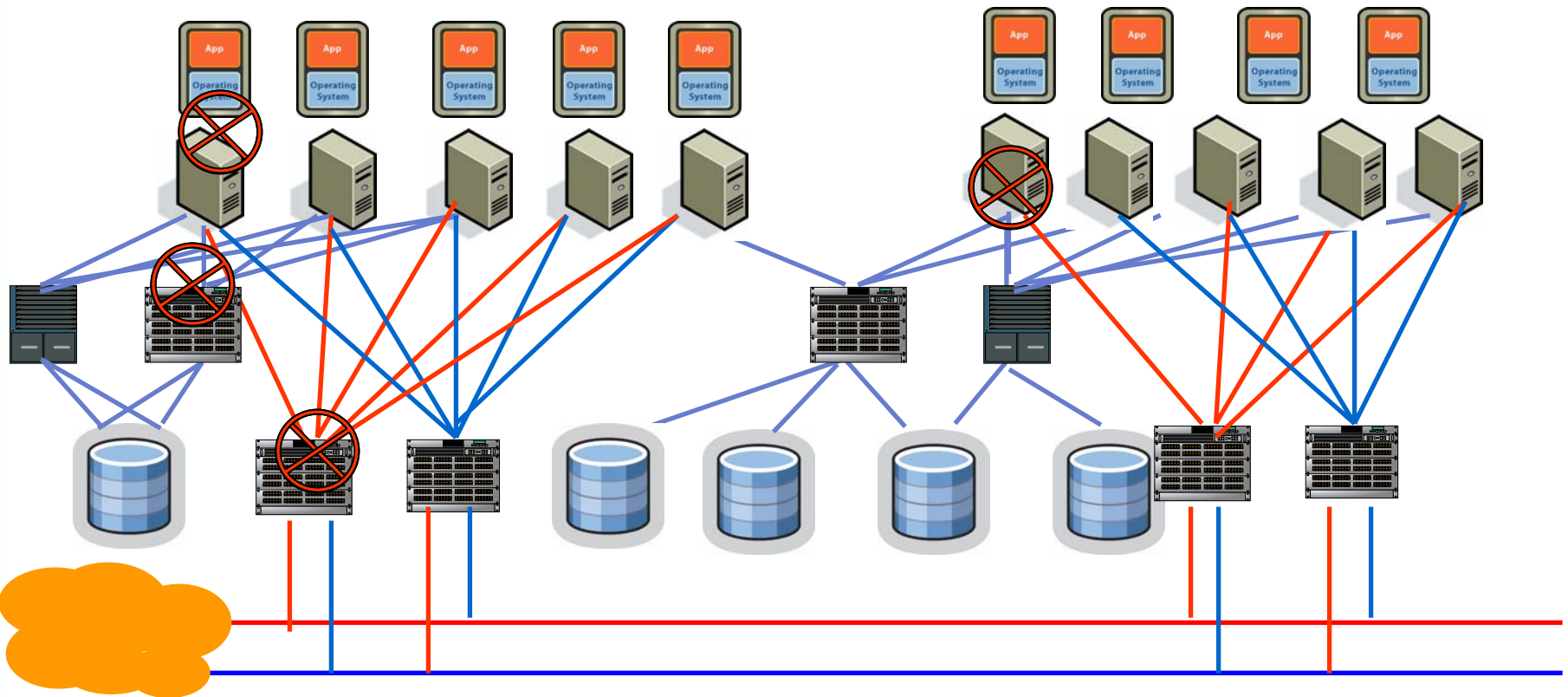
- Dramatic increases in dedicated, under-utilized IT assets
- Management of servers is costly and complex: maintaining this 'server sprawl' infrastructure can consume up to 65% of IT budgets
- Inflexibility makes it hard to meet business needs

“Through 2007, organizations with more than 200 servers will waste between \$500,000 and \$720,000 annually supporting underutilized application/server combinations”

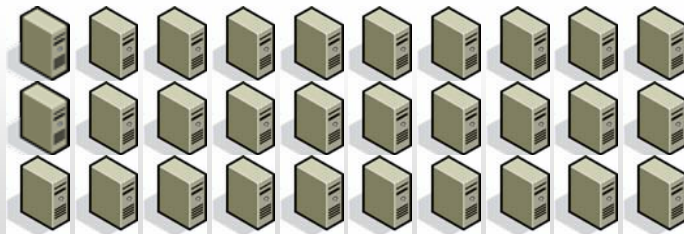
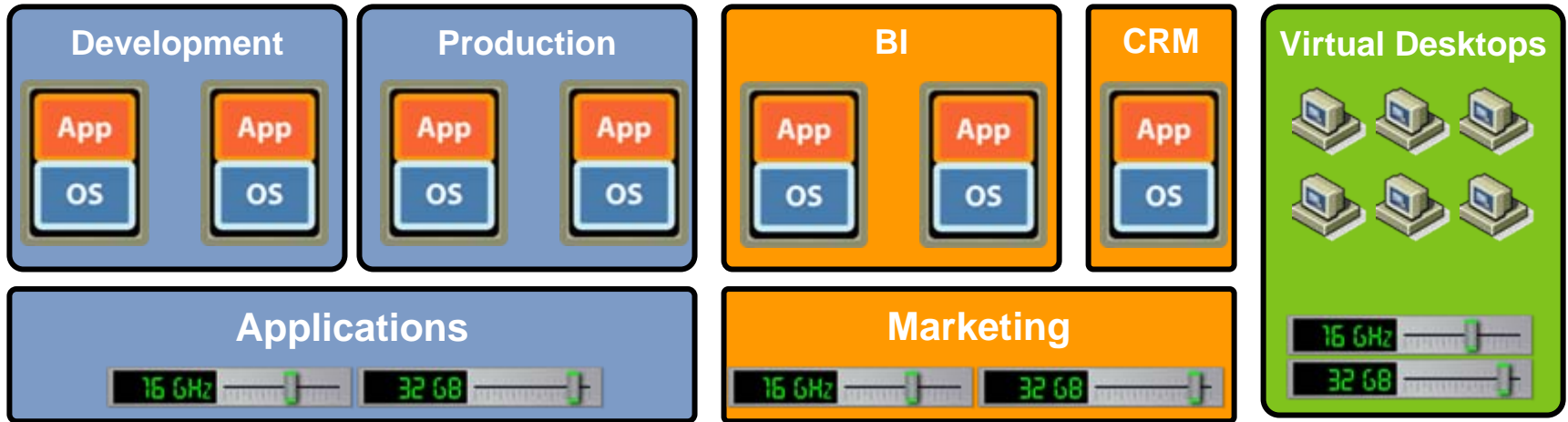
Gartner Research, December 2004

Current Datacenter Scaling : Multiple Bottlenecks

OS and app coupled to physical network, storage, D/C layout



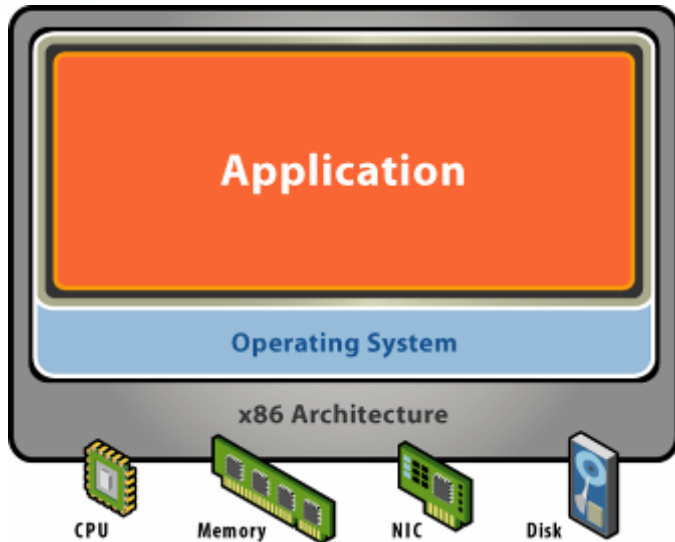
Manage Capacity, Not Servers



SHARED HARDWARE INFRASTRUCTURE

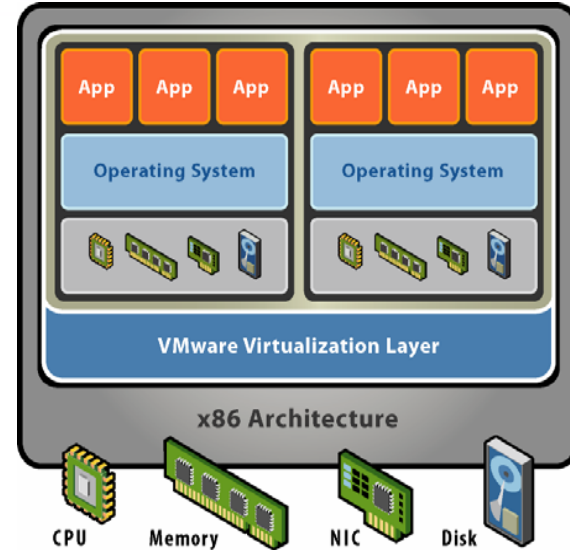
Aggregate capacity:
 $30 \times (3\text{GHz}, 16\text{GB}) = 90\text{GHz}, 480\text{GB}$

Server Virtualization Basics



Before Virtualization:

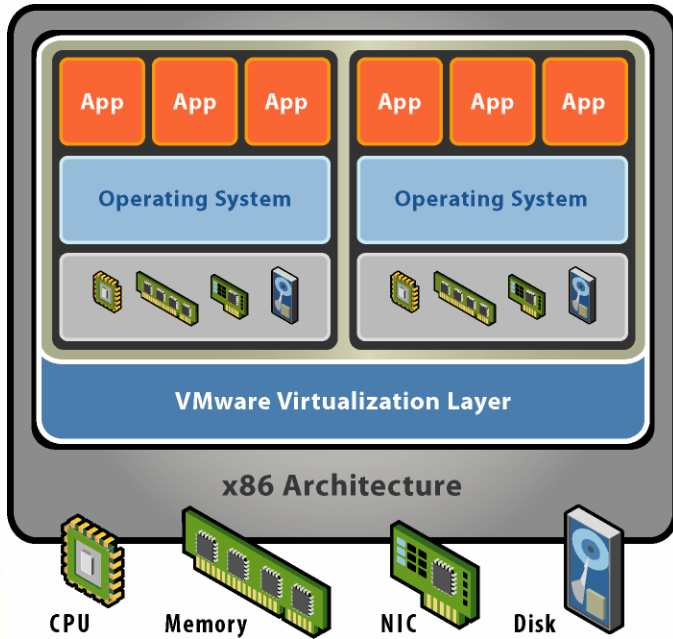
- Single OS image per machine
- Software and hardware tightly coupled
- Running multiple applications on same machine often creates conflict
- Underutilized resources
- Inflexible and costly infrastructure



After Virtualization:

- **Break dependencies** between OS and hardware
- Manage OS and application as single unit by **encapsulating** them into VMs
- Strong fault and security **isolation**
- VM's are **hardware-independent**: they can be provisioned anywhere

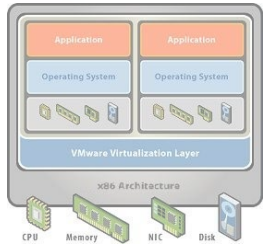
Key Properties of Virtual Machines



•Partitioning

- Run multiple operating systems on one physical machine
- Divide system resources between virtual machines

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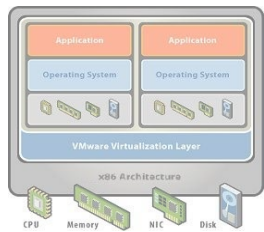
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•Isolation

- Fault and security isolation at the hardware level
- Advanced resource controls preserve performance

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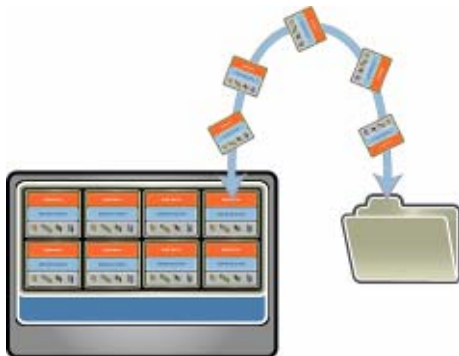
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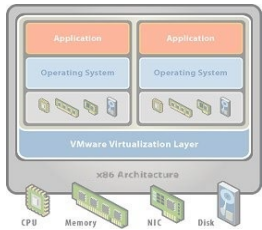
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•Encapsulation

- Entire state of the virtual machine can be saved to files
- Move and copy virtual machines as easily as moving and copying files

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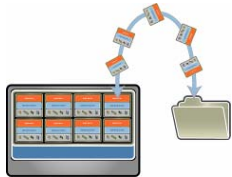
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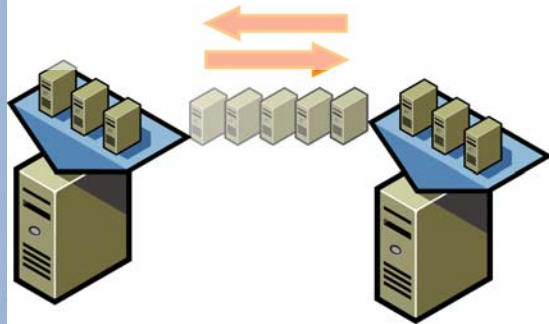
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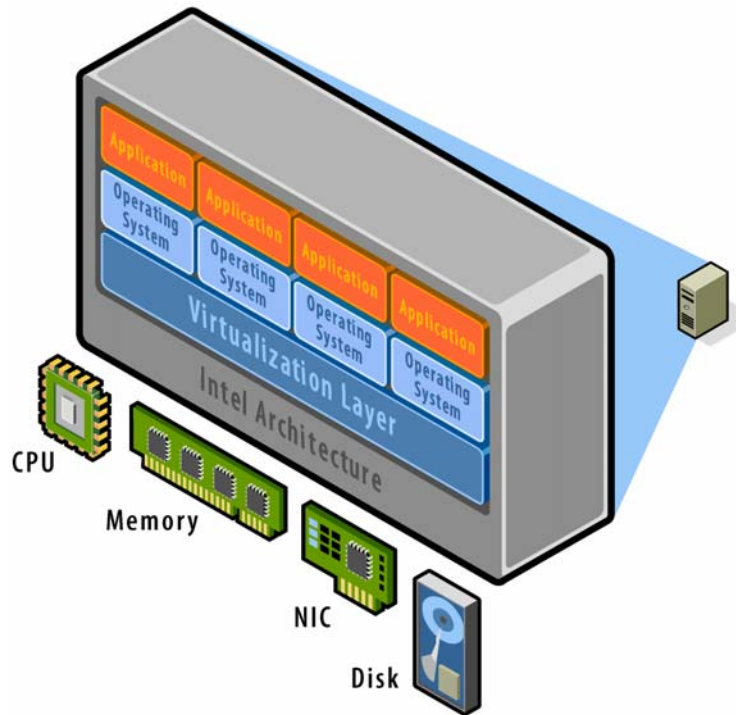
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Hardware-Independence

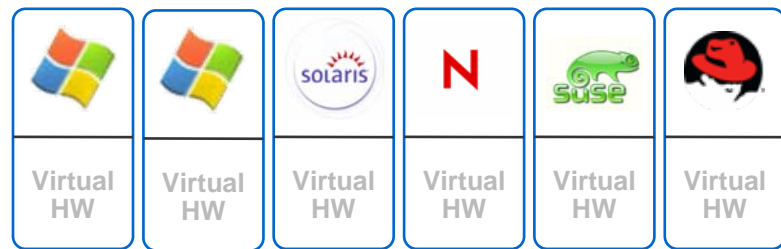
- Provision or migrate any virtual machine to any similar or different physical server

Virtualization Benefits

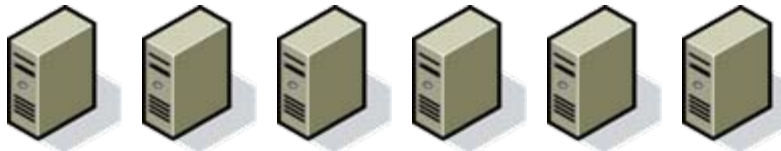


- **Software/Hardware Independence**
Dynamic, cross-system re-mapping of software to hardware resources
- **Multi-Platform Flexibility**
Maintain flexibility of choice in operating systems and software
- **Transparency**
No rewrites and no changes in end-user environment
- **Instant provisioning**
Provision servers from templates in under 10 minutes

VMware Infrastructure – Freedom of OS Choice

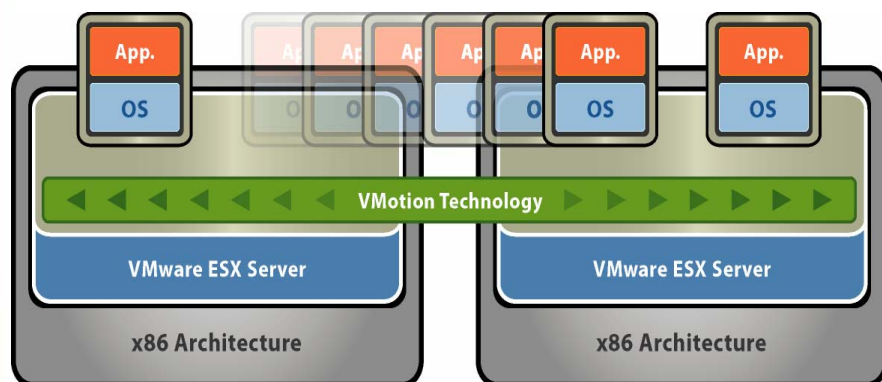


Resource Pool



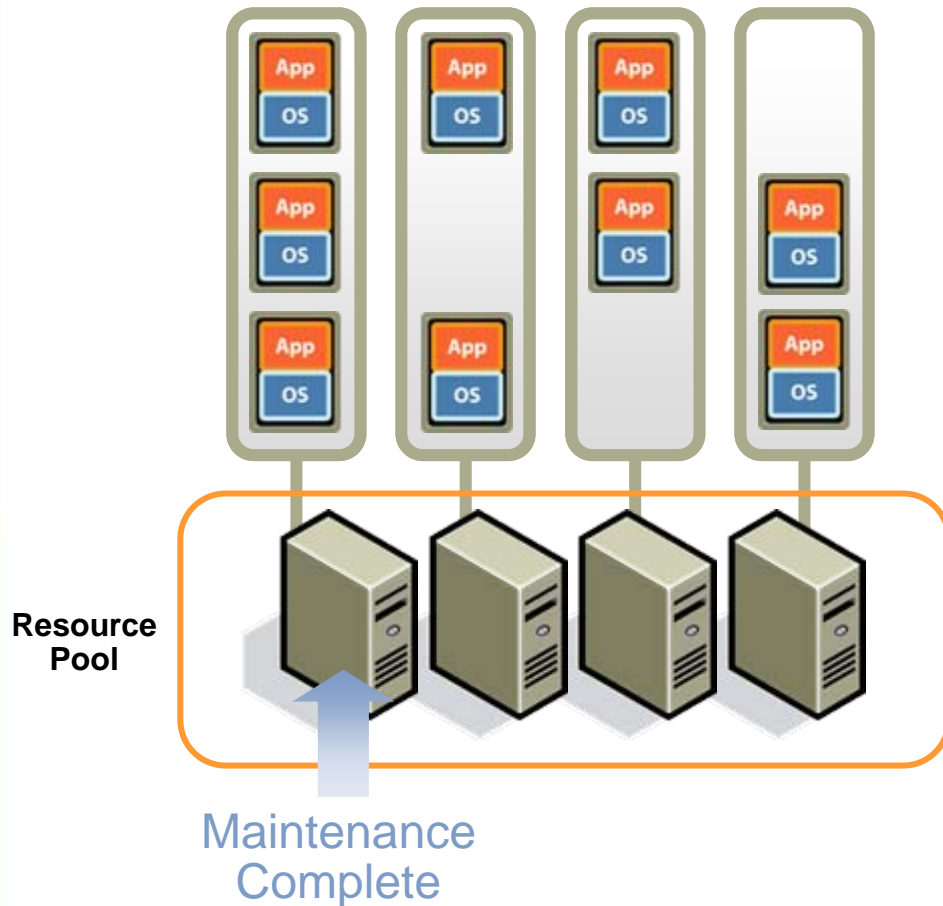
- ← Choose any operating system that is best suited for an application
- ← Optimized to run all major OS unmodified

Live Migration Of Virtual Machines with VMotion



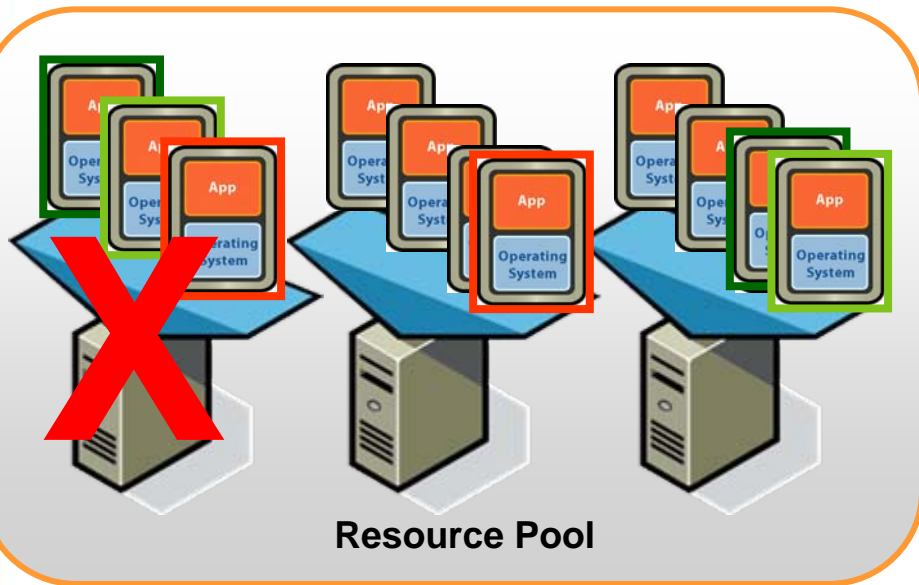
- ← **What is it?**
- Migrate running virtual machines between hosts
- ← **Customer Impact**
- Zero downtime
- Continuous service availability
- Complete transaction integrity
- Supported on Fibre Channel and iSCSI SAN and NAS

Zero Downtime Maintenance with VMware DRS



- ← **Maintenance mode feature moves virtual machines to alternate hosts in pool**
- ← **No application outage**
- ← **No user impact**
- ← **No server configuration changes**
- ← ***Eliminate planned downtime!***

Simple High Availability with VMware HA



← What is it?

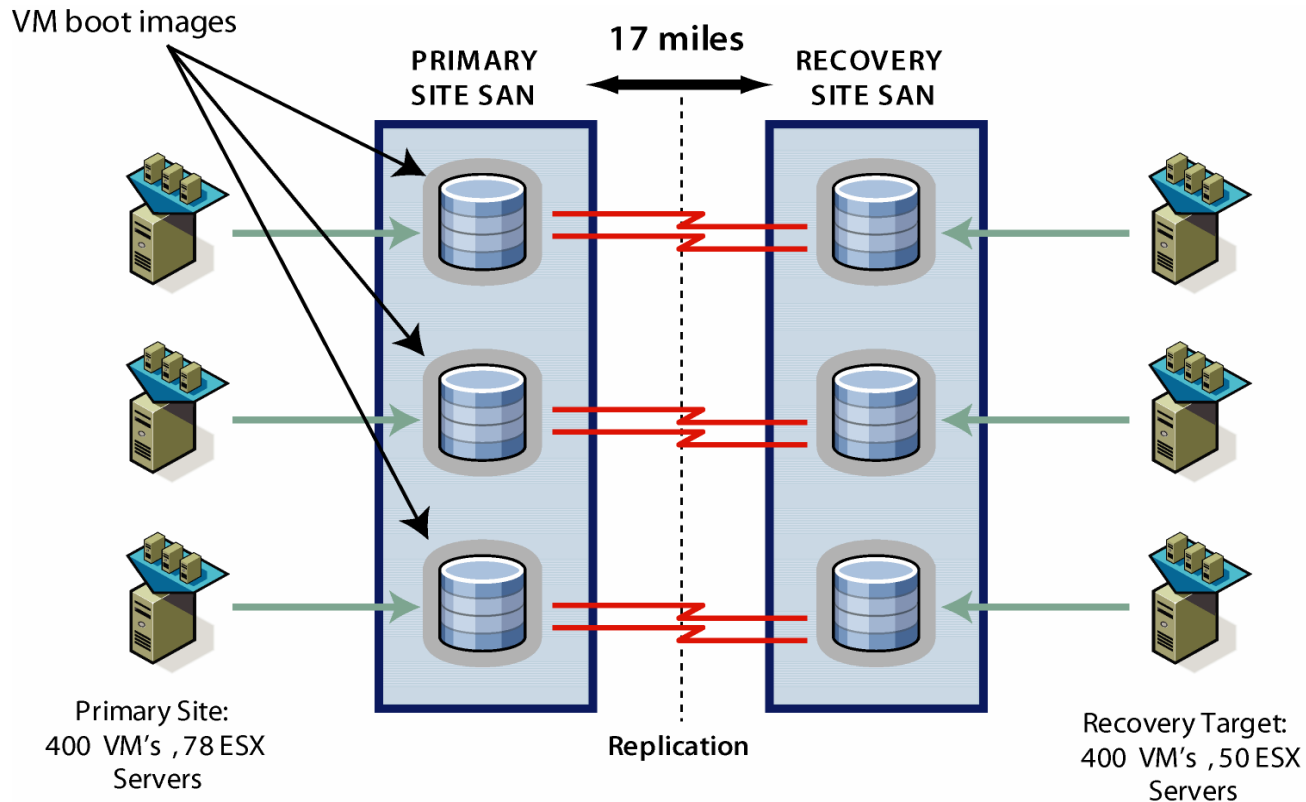
- Automatic restart of virtual machines in case of server failure

← Customer Impact

- Cost effective high availability for all applications
- No need for dedicated stand-by hardware
- None of the cost and complexity of clustering

Universal DR – Integral Part of the Architecture

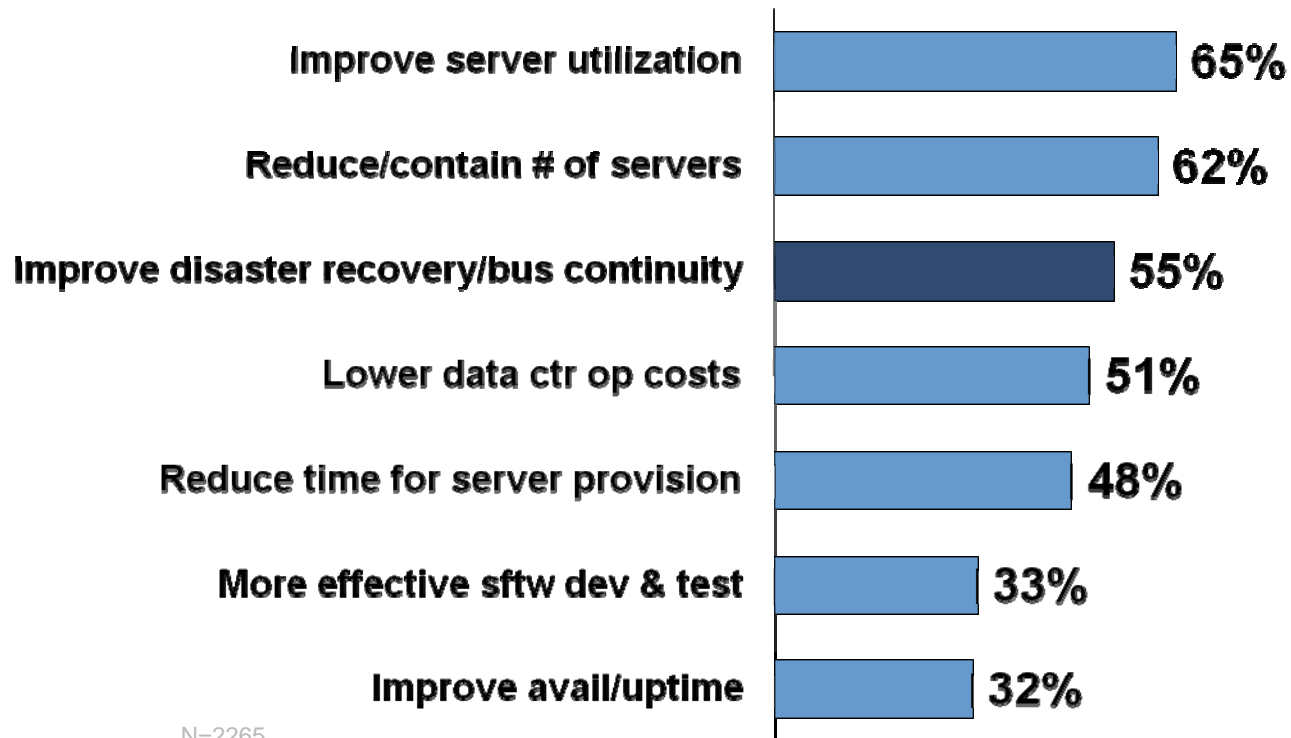
Result: 16.5 minutes to failover!



Virtual Infrastructure

DR Deployments

More than half of customers deploy virtualization for business continuity and disaster recovery purposes



N=2265

Source: Comprehensive survey of VMware customers conducted in September 2006.
N= 2265 respondents

The Enterprise PC Challenge



**IT: Are We
Having Fun
Yet?**



What IT Administrators Want

Control

- > PCs with sensitive data outside of the country or on laptops
- > Employee-owned laptops
- > Remote users accessing the network
- > Outsourcing partners needing full desktops and working with intellectual property or personal data

Manageability

- > Remote PCs breaking down
- > IT staff stretched across the globe to support fully configured PCs
- > Support and ongoing maintenance of many PC/device configurations
- > Desktop backups or disaster recovery hard to implement

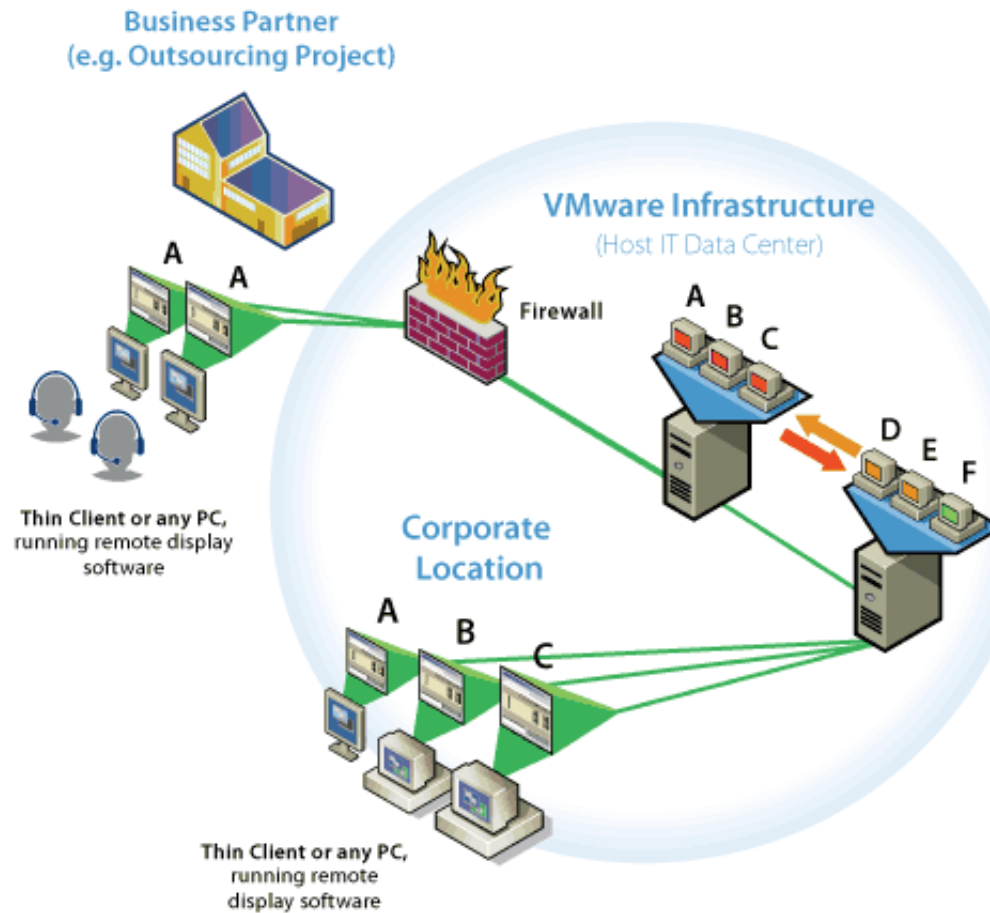


What End Users Want

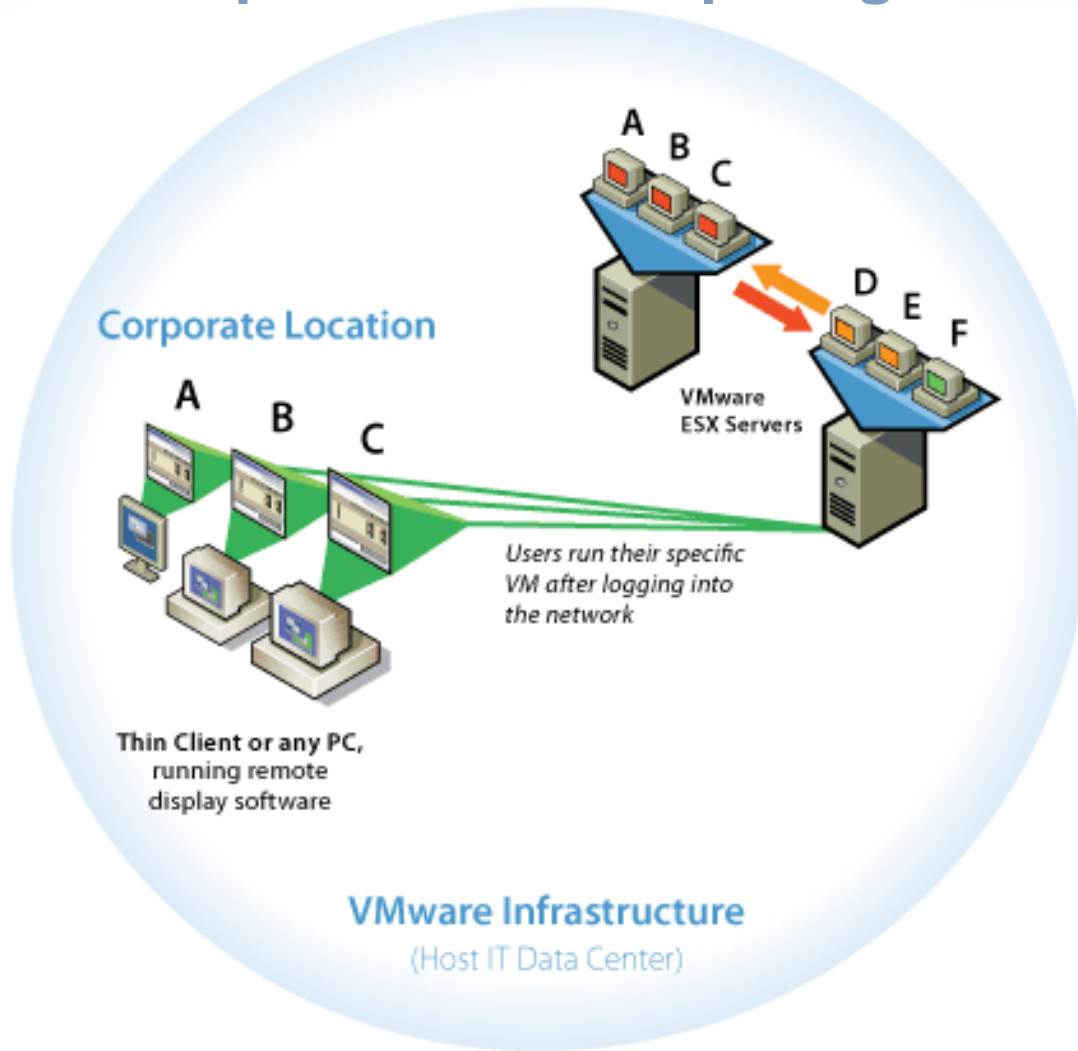
- > A complete desktop: *their* desktop!
 - Control over user settings
 - Ability to install applications
 - A PC that's updated regularly & painlessly
 - A PC that works!
- > The flexibility to take it on the road
- > Support that can rescue them when they get in trouble



Virtual Desktop Infrastructure (VDI)



Enterprise Thin Computing



Enterprise Thin Computing

- > Remote desktops within a firewall
- > Users need access to their own desktop (not shared)
- > Thin clients offer improved reliability and economics
- > Reduced mgmt & support problems

Enterprise Thin Computing

← The Components:

- VMware VI3 Enterprise
- Thin Client (Typically)
- Connection Broker (Optional)
 - VMware Virtual Desktop Manager (VDM)
 - 1:1 mapping (1 user / desktop virtual machine) to unique desktop image

VDI Flash Demo

http://download3.vmware.com/demos/vdi/VMware_VDI.html

How is the State of Michigan using VMware

- ← **Hosting over 40 VMware servers on 7 physical servers with 5 different OS configurations.**
- ← **Majority of the servers are test and development.**
- ← **Used P to V for a critical server with hardware issues created a VM hosting solution in less than two hours with no interruption to the client.**
- ← **Pilot project for Virtualization of Desktop within application development teams to provide multiple development WS for each developer.**
- ← **X86 server virtualization Policy was created and approved on 4/25/2007 VMware is the state standard.**
- ← **Potential 8400 servers could be consolidated, 10% 850Vm to 85 physical will produce Hundred of Thousands in hosting cost.**
- ← **We also envision that the flexible and efficient virtual infrastructure will allow even greater disaster recovery options, virtual labs, training, and desktop portability.**