What is New in VMware Infrastructure 3

"The Dynamic Data Center"

Rasmus H. Thomsen
Systems Engineer Manager, Nordic

The Virtualization Market Has Matured

1999 - 2001	2003 - 2005	2006 +

Third Generation

Infrastructure-wide Virtualization

Automation
Aggregation
Availability
Optimization

Second Generation

Virtual Infrastructure
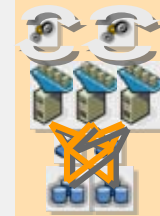
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Centralized Management

Centralized Management

Enterprise-Class Virtualization

Enterprise-Class Virtualization

First Generation

Single System Hypervisor-based Stack

System Partitioning

System Partitioning

System Partitioning

Virtualization Market Maturity →

25 Products of 25 Years

7

VMware x86 virtualization
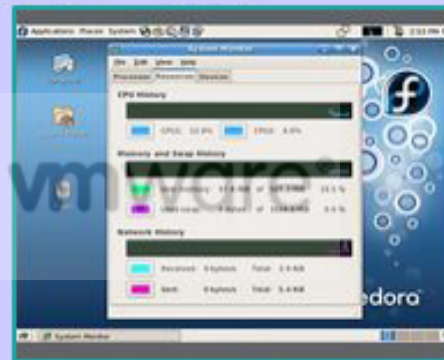
Building on Intel's bare-bones foundation, VMware brought new levels of manageability to PC-based technology and redefined the enterprise data center.

eWEEK.com

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Introducing VMware Infrastructure 3
Industry first suite for infrastructure-wide virtualization

| Transform Service Levels	**Automation** **Aggregation** **Availability** **Optimization**	**VMotion** **Resource Pools** **DRS** **HA** **Consolidated Backup** **NEW**
Simplify & Automate	**Centralized Management**	**VirtualCenter 2** **NEW**
Virtualize Everywhere	**Enterprise-Class Virtualization** **System Partitioning**	**Virtual SMP** **VMFS** **ESX Server 3** **NEW**

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VMware Infrastructure 3 –
The Industry's First Infrastructure Virtualization Suite
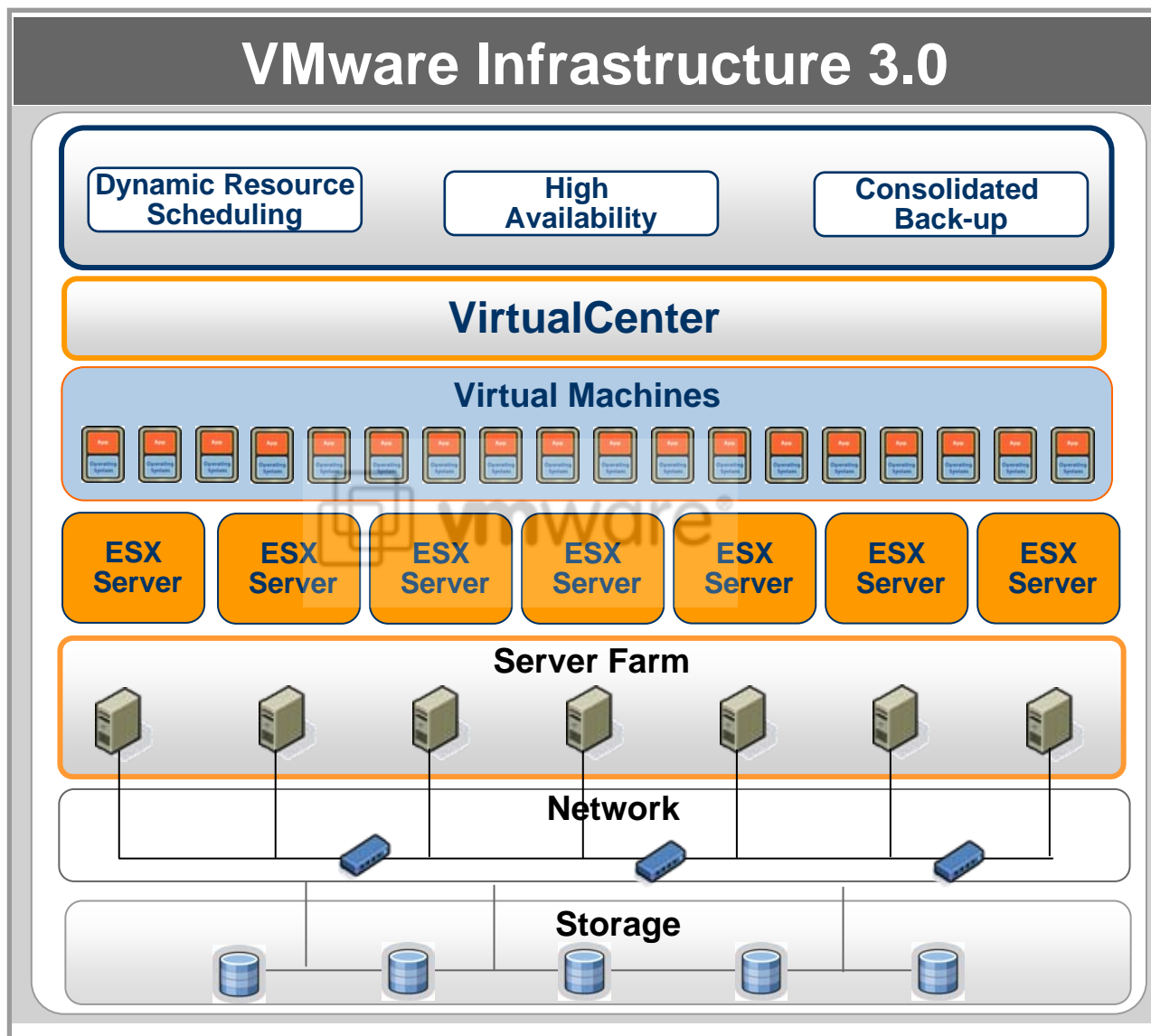
Virtualize Everywhere
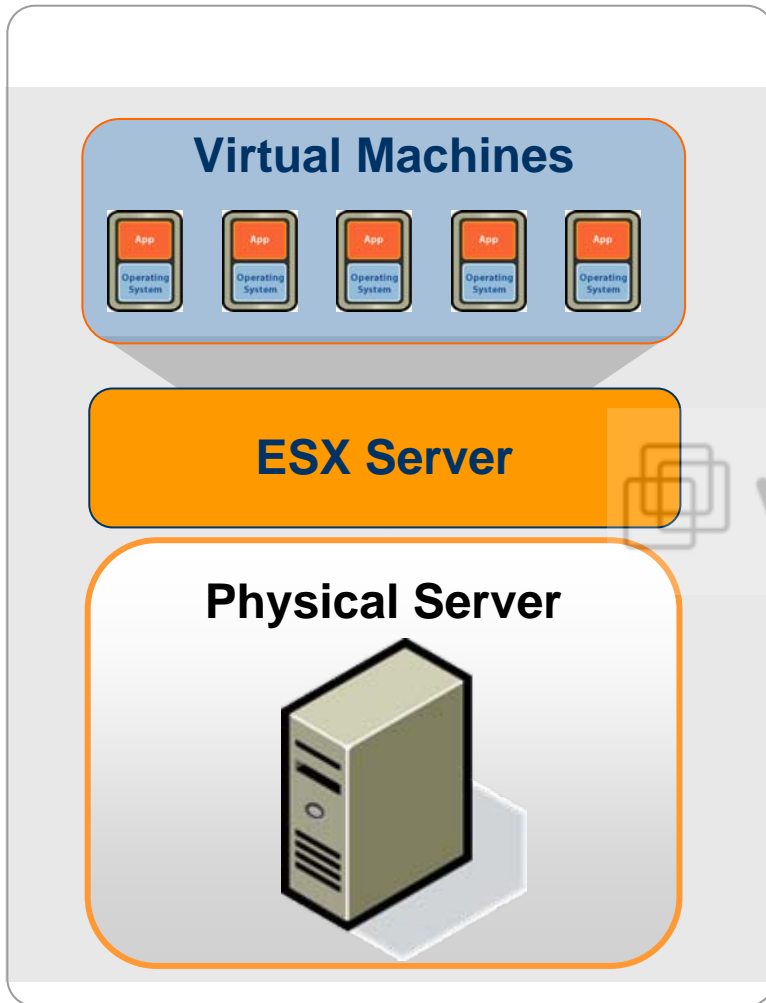
Enterprise-Class Virtualization

**System Partitioning**

Virtual SMP
VMFS
ESX Server 3

Expanded Hardware Support

Virtual Machines

App
Operating System

App
Operating System

App
Operating System

App
Operating System

App
Operating System

ESX Server

Physical Server

- Support for powerful physical servers for large scale server consolidation and DR projects
  - up to **32 logical CPUs** per server
  - **64GB RAM** per server
- Support for Sun Microsystems and Unisys hardware systems.
- Support for Intel White-Box standard specifications

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Support for NAS and iSCSI SAN

Extend the benefits of virtualization to cost sensitive "edge" environments like remote office

Data Center

Fibre Channel SAN

+

Remote Office

- **NAS**
- **iSCSI SAN**
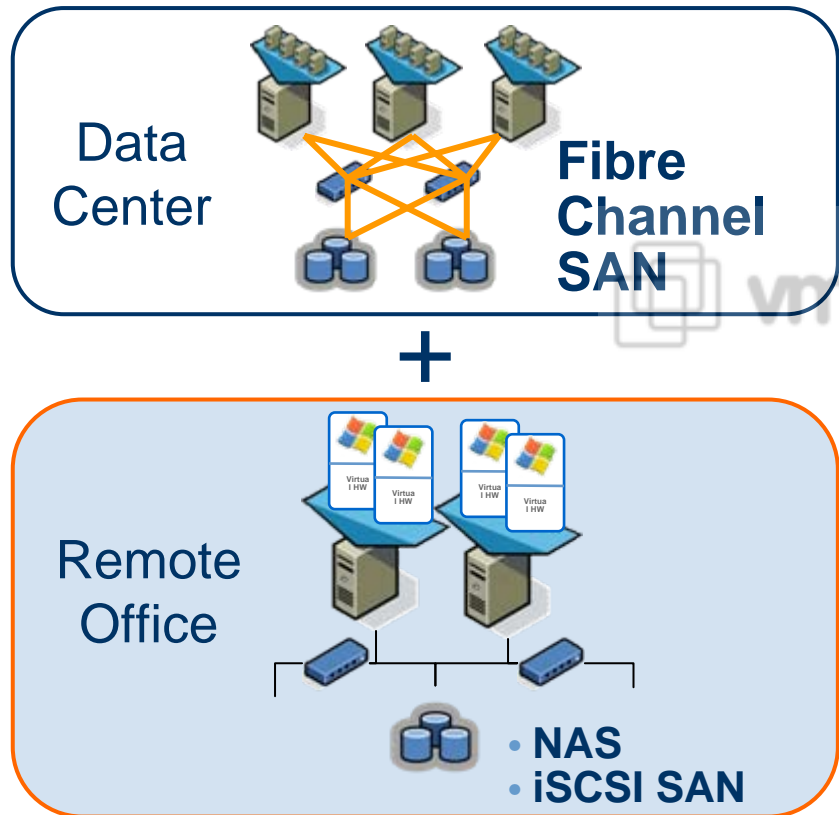
- 4GB Fibre Channel SAN support

- Extensions for cost-sensitive environments: NAS, iSCSI SAN

- VMotion, HA, DRS supported on NAS and iSCSI SAN

Heterogeneous Operating System Support

Freedom to choose the most appropriate OS for any application

Windows .NET Server 2003	Windows Server 2003 Standard, Enterprise, Web Editions, and Small Business Server
Windows 2000	Windows 2000 Server and Advanced Server
Microsoft Windows NT	Windows NT : 4.0 Server
Windows XP	Windows XP Professional
Red Hat Linux	Red Hat Linux 7.2, 7.3, 8.0, & 9.0 Red Hat Enterprise Linux 2.1 & 3
solaris	Solaris 10 (on x86) **NEW**
suse	SUSE Linux 8.2, 9.0 and 9.1 SUSE Linux Enterprise Server 8
Novell.	Novell NetWare 5.1, 6.0 and 6.5
FreeBSD	FreeBSD 4.9

- Rigorously tested to run 28 versions of all major operating systems
- Experimental 64-bit operating system support

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Enhanced CPU and Memory Virtualization

Run any workload in enterprise class virtual machines
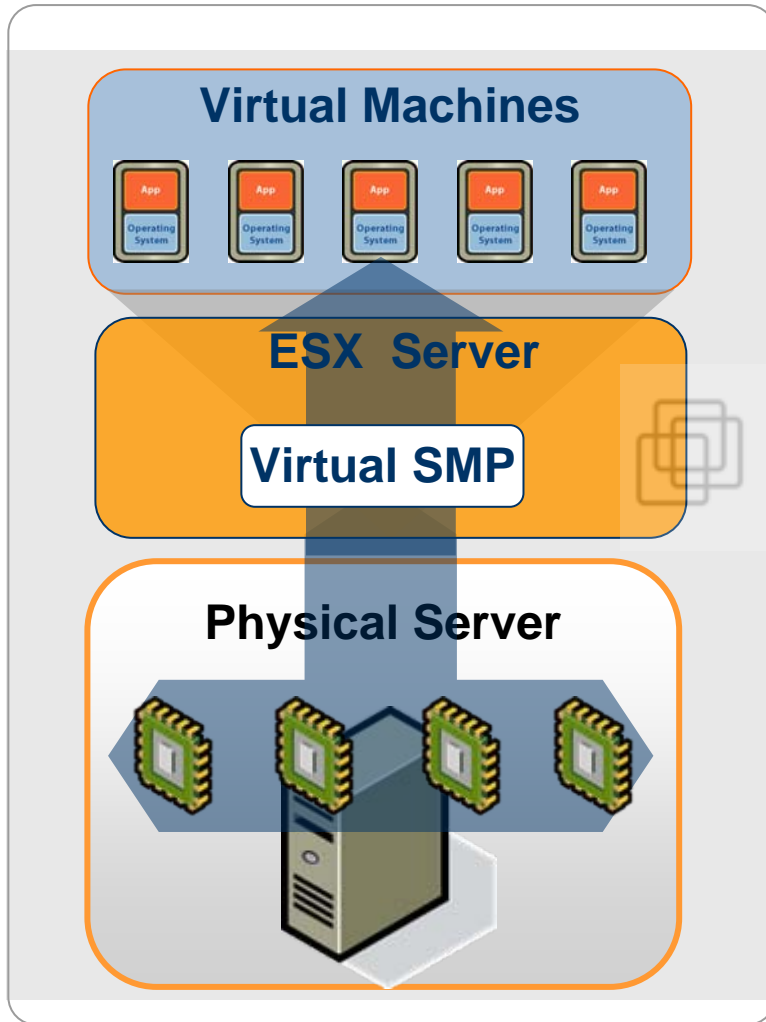
Virtual Machines
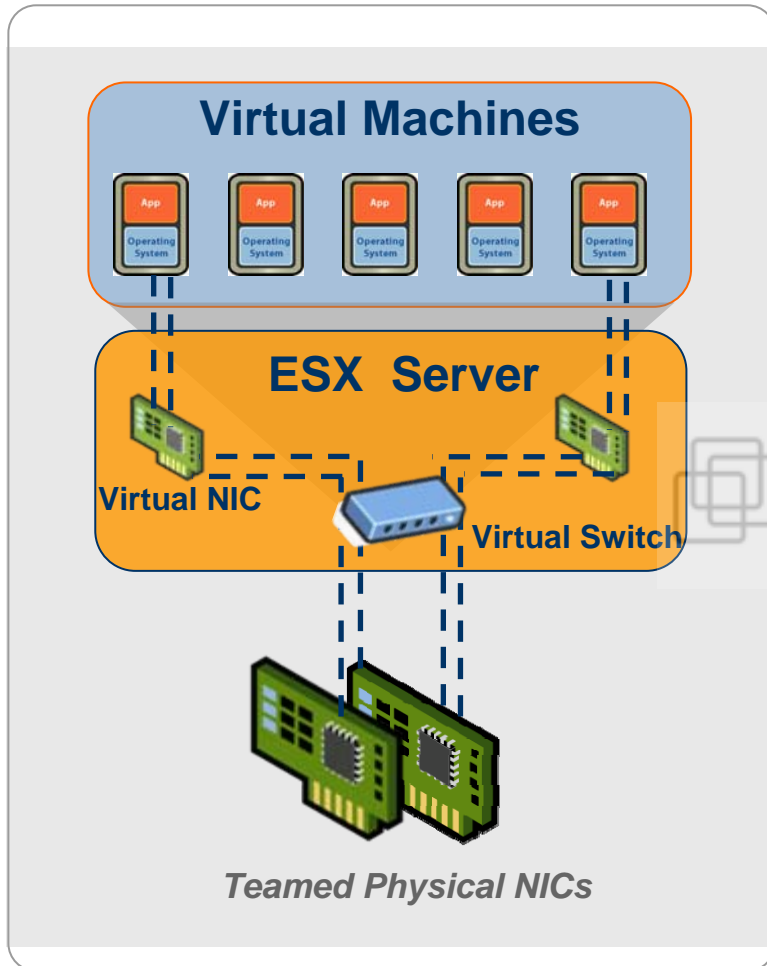
App / Operating System (×5)

ESX Server

Virtual SMP

Physical Server

- 4-way Virtual SMP allows single virtual machine to use up to **four processors** simultaneously

- Extended memory for virtual machines
  – *up to 16GB RAM per VM*

- Performance improvements across the board - up to 50% better for targeted workloads

Network Virtualization

Virtual Machines

App
Operating System

App
Operating System

App
Operating System

App
Operating System

App
Operating System

ESX Server

Virtual NIC

**Virtual Switch**

Teamed Physical NICs

- Simplify port configuration by utilizing a single configuration object across large groups of ports

- Expanded port configuration policies including:
  - NIC teaming policy *(now per port instead of per virtual switch)*
  - VLAN tagging
  - Layer 2 security
  - Traffic shaping

- Flexible virtual switches.
  - Create Virtual switches with any number of ports from 8 to 1016
  - Max number of virtual switches has been raised from 128 to 248
  - Scale up to handle more virtual machines

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Storage Virtualization – VMFS 3

- **Adaptive block sizing**
  - Uses large block sizes favored by virtual disk I/O.
  - Uses sub-block allocator for small files and directories.

- **Extended block size and file limits**
  - Run even the most data intensive production applications such as databases, ERP and CRM in virtual machines
    - Maximum volume size: **64 TB**
    - Maximum virtual disk size: **2 TB**
    - Maximum file size: **2 TB** max
    - Block size: 1 MB to **8 MB**

- **Dynamic increase of VMFS volume size**
  - Increase a VMFS volume on the fly.
  - Create new virtual machines without relying on a storage administrator

- **Improved performance through Caching**
  - VMFS uses volume, device, object and buffer caching to improve performance

Simplify & Automate

Centralized Management

VirtualCenter 2

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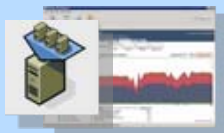
Better Management of Large Scale IT Environments

- **Large-scale management with VirtualCenter 2**
  - 3x scalability improvement. Manage hundreds of servers and thousands of VMs to handle the largest IT environments

- **Enhanced object model**
  - Consistent object model covering all entities such as virtual machines, physical servers, and resource pools

- **Improved deployment flexibility**

  - With centralized storage of virtual machine configuration files

- **Wake-on LAN**
  - Enable higher consolidation ratios by allowing virtual machines to go on stand-by mode when not used

- **Improved power management**
  - Lower the data center utility bill with improved power management. ESX Server enters a low power "halt" state when a CPU is not scheduled

# VMware Infrastructure User Interfaces
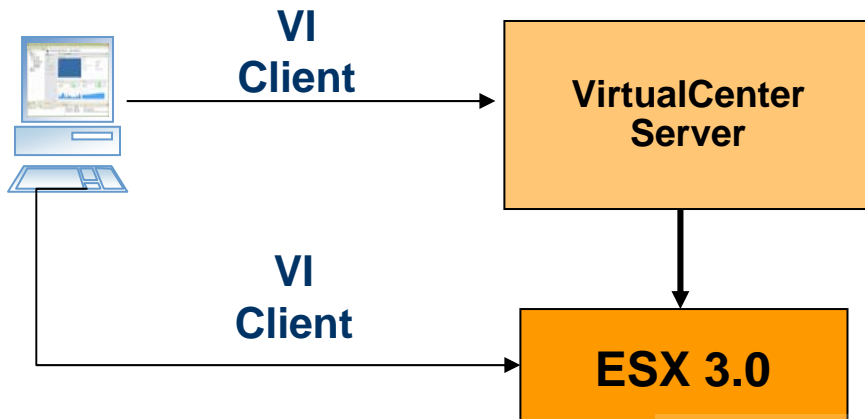
- **Virtual Infrastructure (VI) Client**
  - **Access to VirtualCenter**
    - Full VC functionality
  - **Access directly to host**
    - Single host management
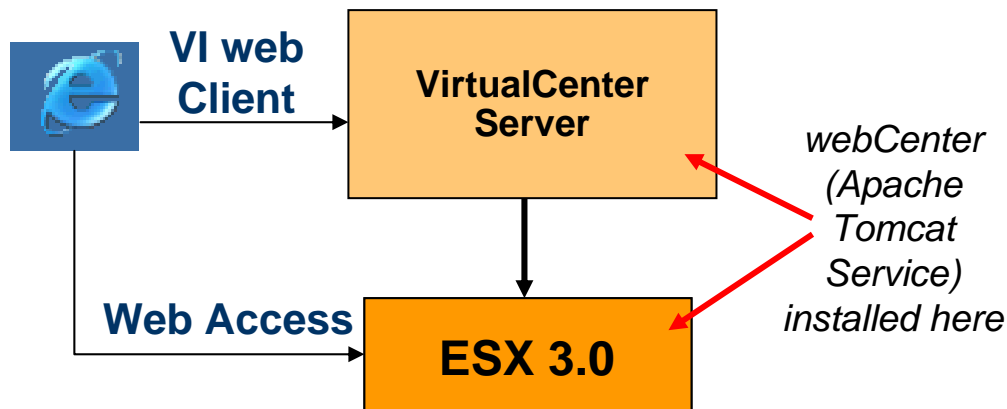
- **Web Access Client**
  - **Access to VirtualCenter**
    - Manage multiple VMs
  - **Access directly to host**
    - Manage only VMs on that host

*webCenter (Apache Tomcat Service) installed here*

VirtualCenter Usability Enhancements
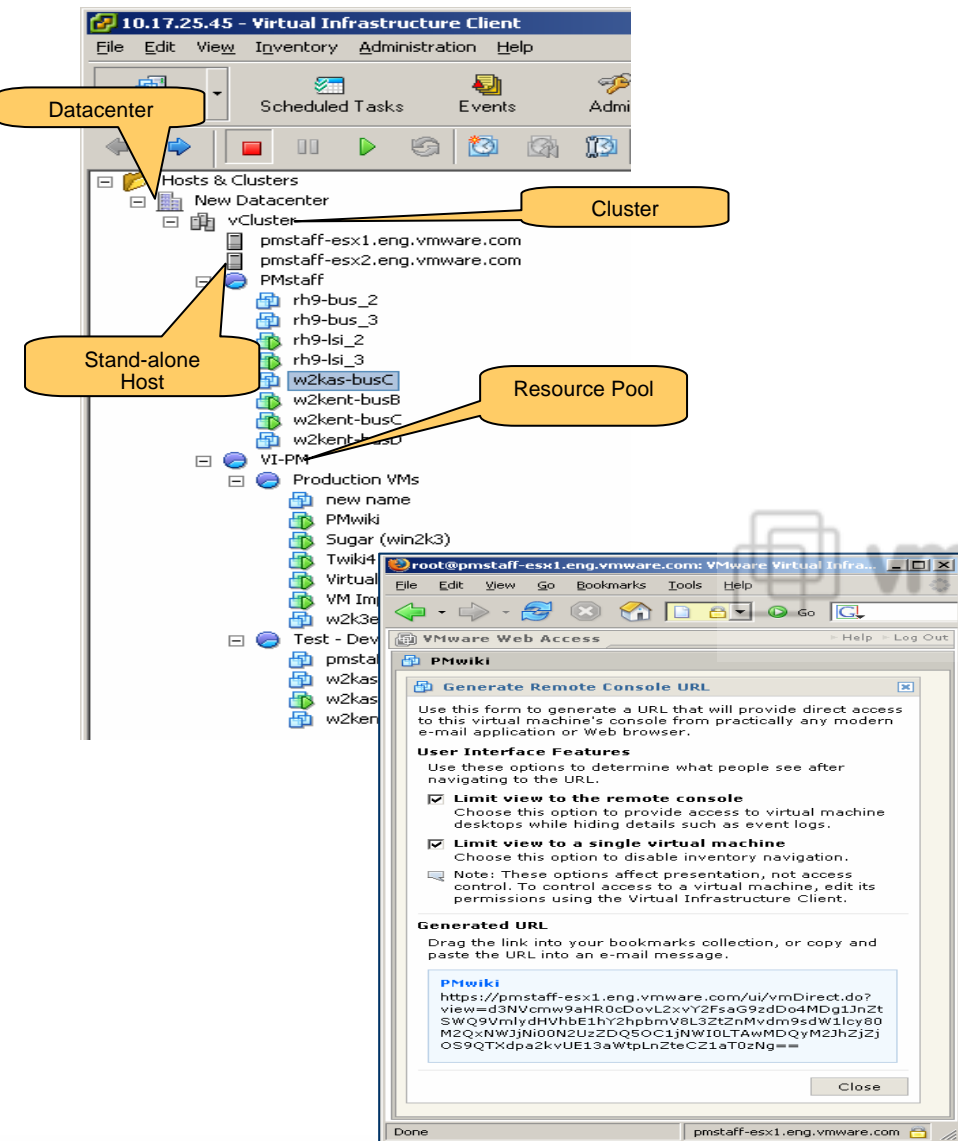
- **Enhanced Inventory Model**
  - More natural organization of VMs, resource pools and servers
  - More visibility into hierarchical object relationships
  - Greater flexibility in organizing VC objects into folders

- **Virtual Machine Shortcuts**
  - Enable self-help for end users with direct access to virtual machines through a Web browser

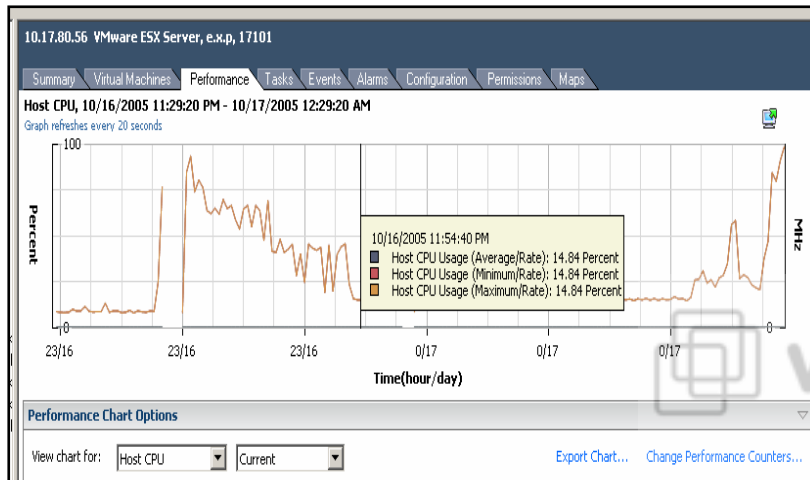**Drag-and-drop control of large-scale virtualized infrastructure**
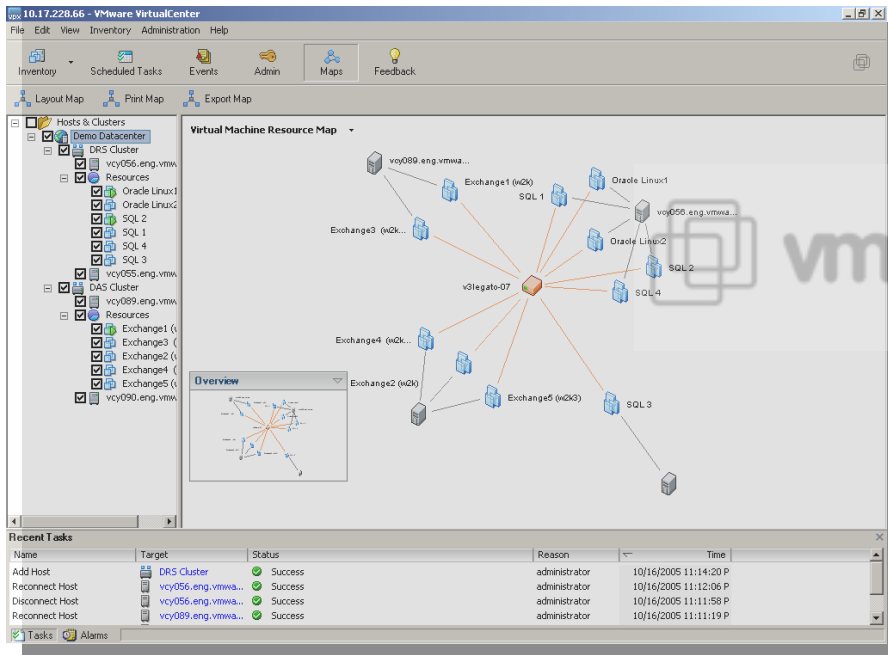
- Interactive Resource Maps & Topologies
- Visualize graphical relationships between physical servers, virtual machines, networks and storage.
- Topology maps allow to easily verify correct configuration for distributed services such as VMotion, DRS and HA

Greater Ease of Provisioning and Migration

- **Re-designed virtual machine templates**

  - Supports easy virtual machine patching and updating

  - Templates are stored on shared storage for greater reliability

- **Ease of virtual machine administration with file directories**

  - Enable easy virtual machine administration with file directories. All files for a virtual machine are stored in a separate directory

- **Remote device support**

  - Install software in a virtual machine running on a server from the CD-ROM of a desktop without leaving your desk

System Monitoring

- **Enhanced performance graphs**
  - Monitor and analyze virtual machines, resource pools, server utilization and availability with detailed perf. graphs
  - Performance metrics can be defined with several levels of granularity
  - View performance data in real time, or across a specified time interval

- **SMI-S-compliant management interfaces**.
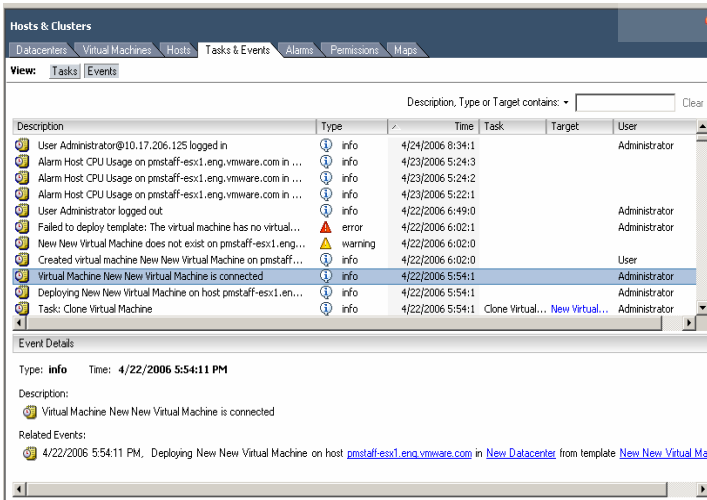 - Monitor virtual storage using any standard SMI-S-aware storage management tool

Programmatic Interfaces

**A robust SDK with well-defined APIs facilitates
Integration and Customization**

- **VMware Infrastructure SDK**

- **Provides Web Services APIs to access the functionality and data**

- **Enables integration with 3rd party and in-house systems**

- **Enables extension and customization of existing functionality**

- **Easy to use through graphical user Interfaces**

Security and Access Control
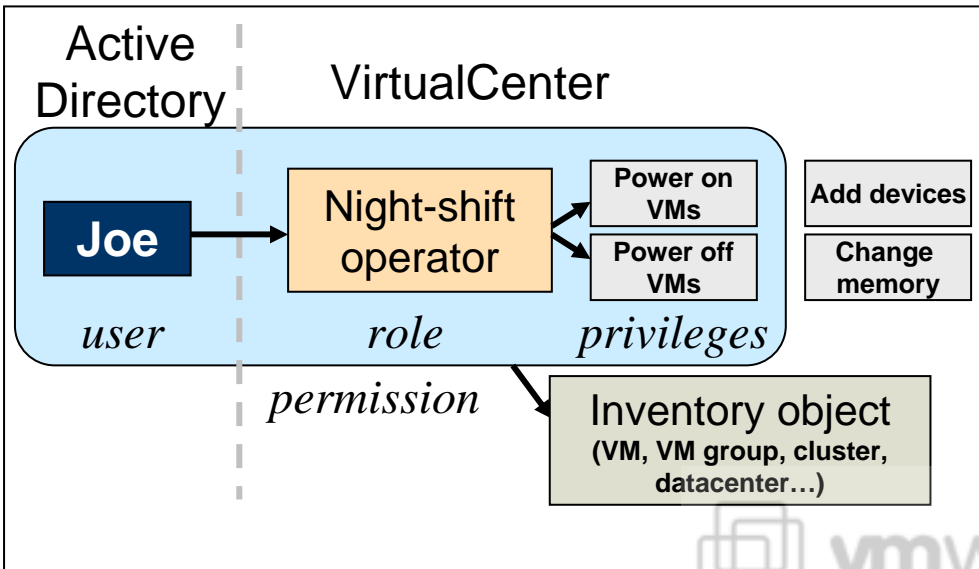
- **User-defined roles & permissions**
  - Fine-grain control over user groups and privileges
  - Create custom roles such as *night shift operator or backup administrator*

- **Improved access control**
  - Roles-based access to the entire inventory of virtual machines, resource pools and servers

- **Maintain audit trails**
  - Maintain a record of significant configuration changes by users
  - Export reports for event tracking.

- **Session management**
  - Discover and, if necessary, terminate VirtualCenter user sessions.

Transform
Service Levels

Automation
Aggregation
Availability
Optimization

VMotion
Resource Pools
DRS
HA
Consolidated Backup

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Aggregate collections of disparate hardware resources into unified logical resource pools

Business Unit

Department A

Department B

Resource Pool 2
CPU 36GHz, Mem 58GB
Priority HIGH

Resource Pool 3
CPU 12GHz, Mem 22GB
Priority LOW

Aggregate Resources

CPU 48 GHz, Mem 80GB

Servers, Storage, Networking
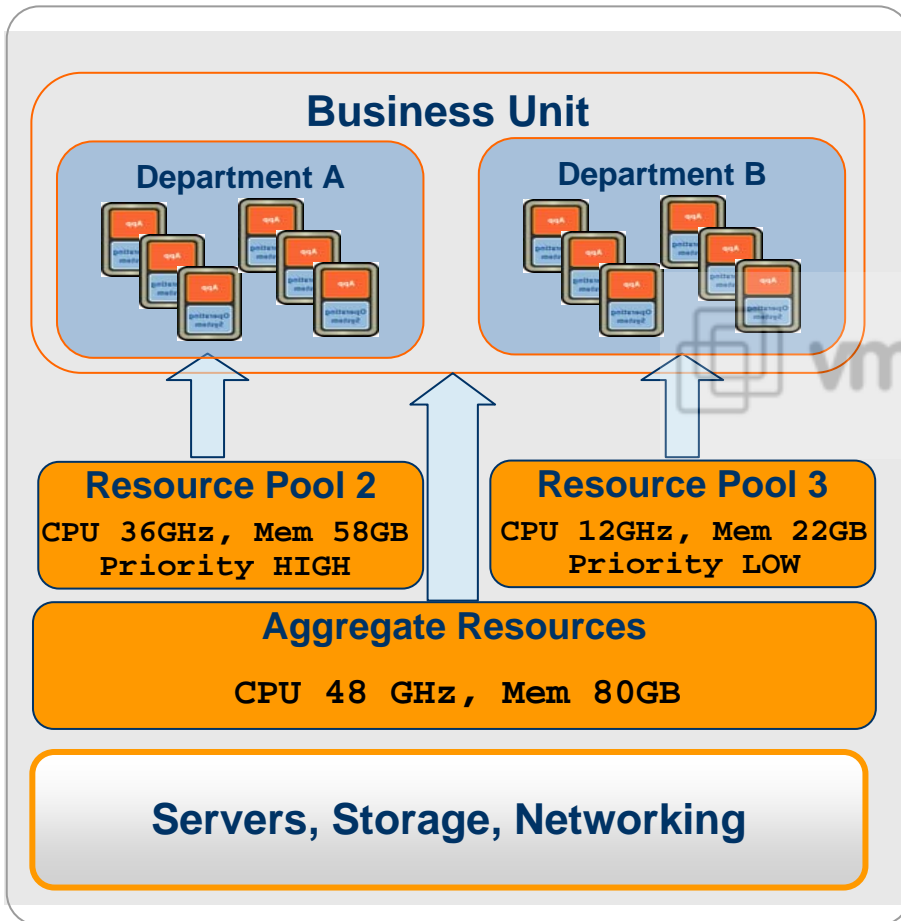
- Failed server mean less resources not a failed application

- Dedicated (virtual) infrastructure for each business unit; central IT retains control over hardware

- Delegation of resource and virtual machine management down to the business unit

- Management of an entire SOA application stack as a single entity

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Resource Optimization with VMware DRS

Dynamic and intelligent allocation of hardware resources to ensure optimal alignment between business and IT


Business Demand
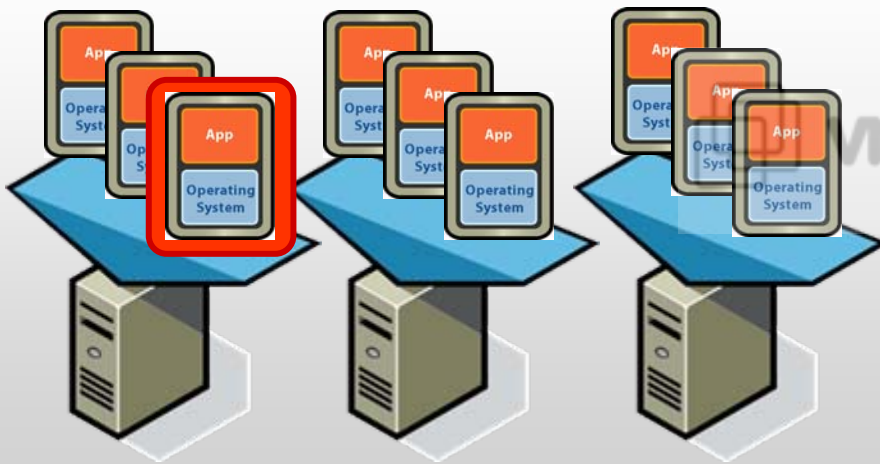
Resource Pool

- Intelligent allocation of resources based on pre-defined rules and policies

- Monitor utilization across resource pools

- Optimize data center resources

  - Dynamically adjust supply based on changing demand for resources

  - Prioritize resources to the highest value applications

  - Conduct zero-downtime server maintenance

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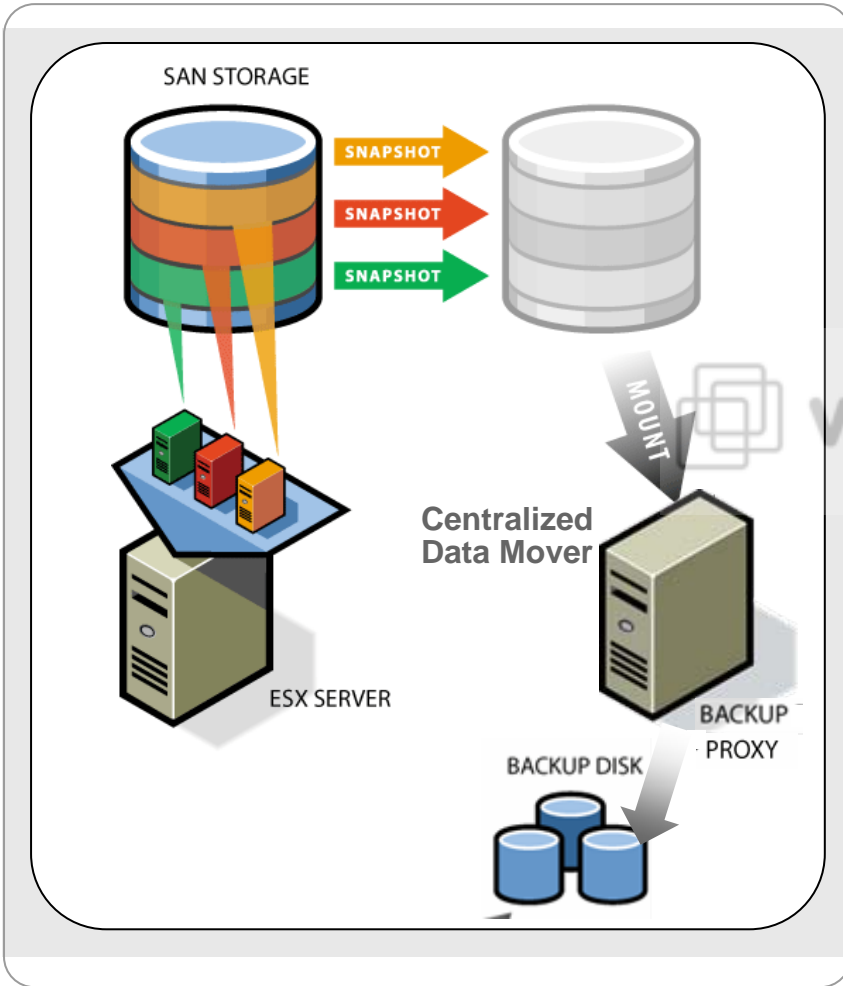
Ensure High Availability with VMware HA

VMware HA enables cost-effective high availability for all servers

Resource Pool
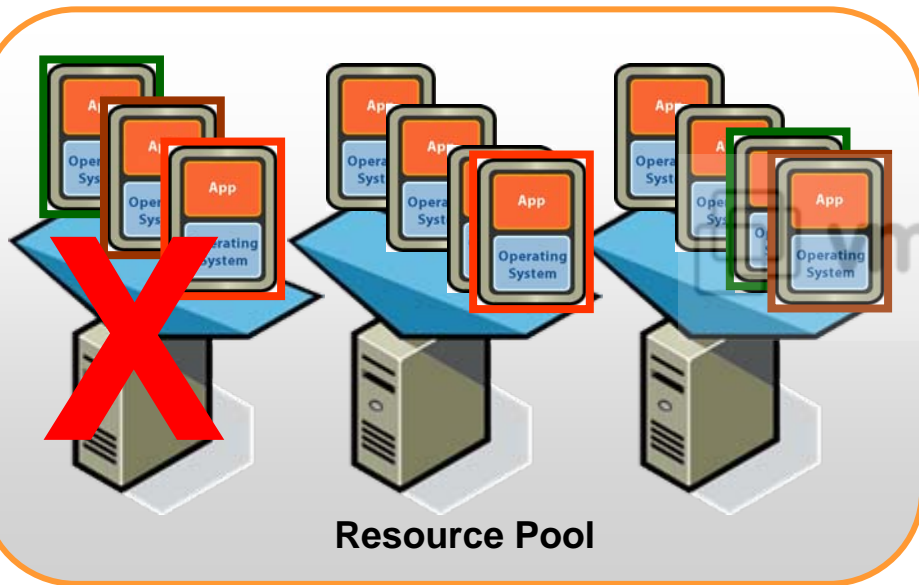
- Automatic restart of virtual machines in case of server failure

- No need for dedicated stand-by hardware

- None of the cost and complexity of clustering

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Protect data with VMware Consolidated Backup

Perform back up any time

- **Centralized agentless backup for virtual machines**
  - Move backup out of the VM
  - Eliminate backup traffic on the LAN
- **Pre-integrated with major 3rd-party backup products**

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If it's there and you can see it - It's REAL

If it's there and you can't see it - It's TRANSPARENT

If it's not there and you can see it - It's VIRTUAL

If it's not there and you can't see it - It's GONE!

(Roy Wilks, 1983)

SAP Software on VMware Virtual Infrastructure

VMware at a Glance

Founded	**1998**
Total Employees	**1600+**
Number of Users	**3+ Million**
Key OEM Partnerships	**Dell, HP, IBM**
Key ISV Partnerships	**IBM SWG, BEA, Oracle, SAP**
Channel Partners	**2,000+**
Customer Profile	**90+% of the Fortune 100**
Operating Structure	**Independent EMC Subsidiary**

VMware Mission

Transform industry standard server and desktop computing through virtualization.
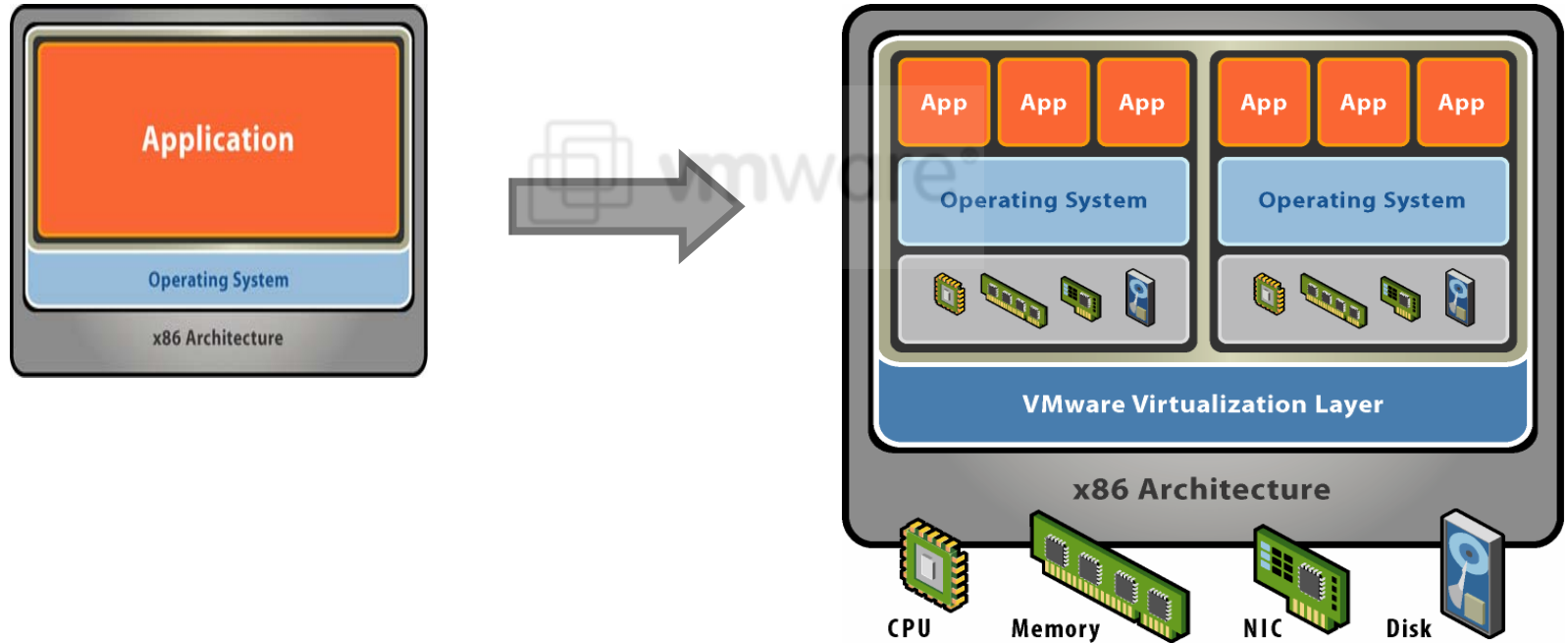
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What The Analysts Say About VMware

Illuminata

"…VMware is one of the very few who have the <u>deep experience needed to create, harden, and optimize</u> complex, sophisticated virtualization products."

Gartner

"Enterprises that do not leverage virtualization technologies will <u>spend 25 percent more annually</u> for hardware, software, labor and space for Intel servers…"

Forrester

"Forrester believes that Intel's economies of scale will eventually shift most computing workloads to Intel- or AMD- based servers. And VMware now makes it possible to bring the Organic IT benefit of <u>high utilization to underutilized Intel Servers</u>."

Meta

"There is very strong market momentum for VMware within META Group's Global 2000 client base. <u>VMware has become the de facto standard</u> for Intel server virtualization."

Customers running ISV Applications on VMware
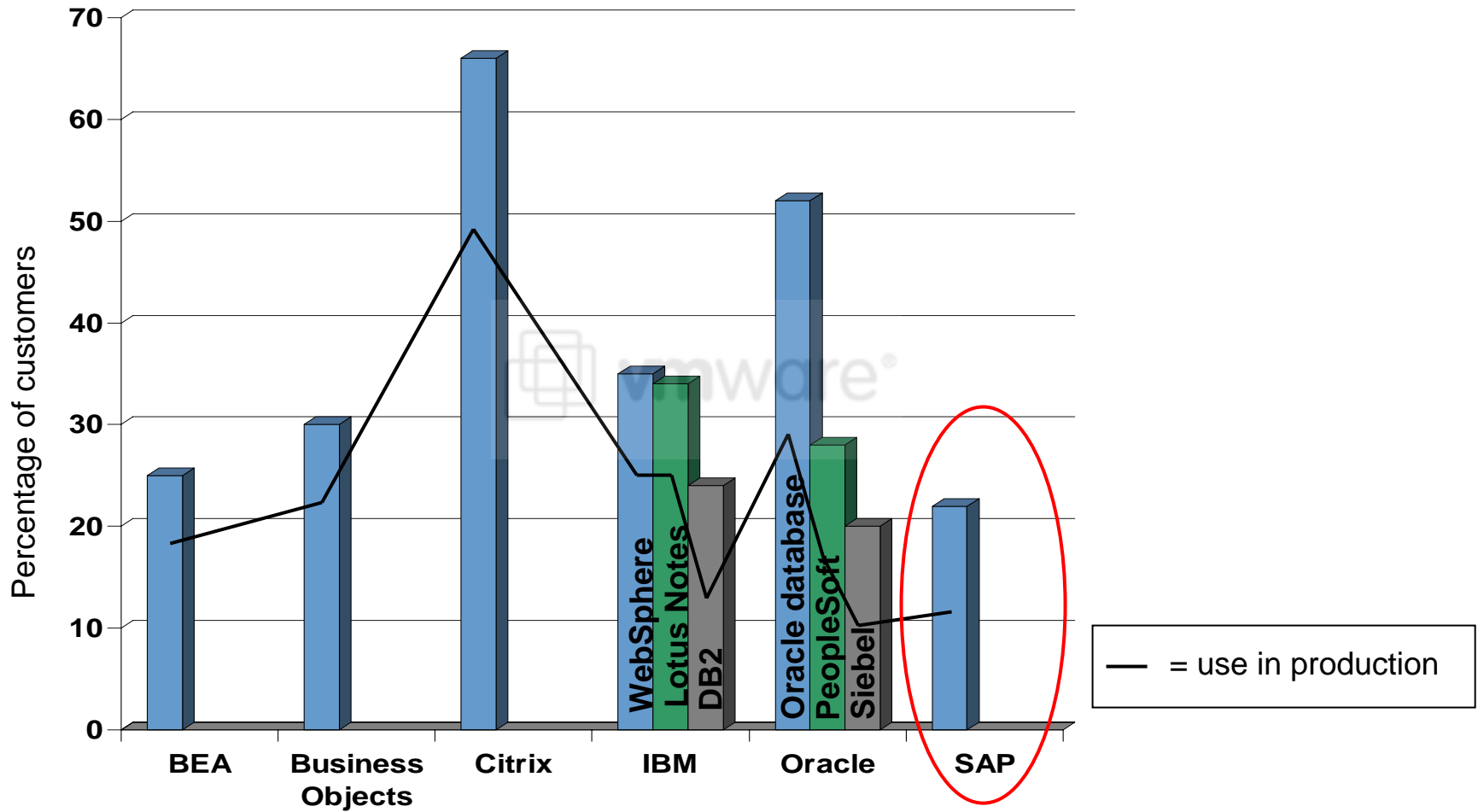
Source: VMworld 2005 customer survey (ESX Workloads)

Benefits of Running SAP on VMware Virtual Infrastructure

- Decreased system and management costs

- Improved availability

- Increased manageability

- Ease of support

- Increased velocity of test and development

- Expedited ability to adopt new technology

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Some Companies running SAP on VMware Virtual Infrastructure

- Alstom

- Bobst SA

- Brose Fahrzeugteile GmbH & Co.

- Business Objects UK

- Conseco Finance
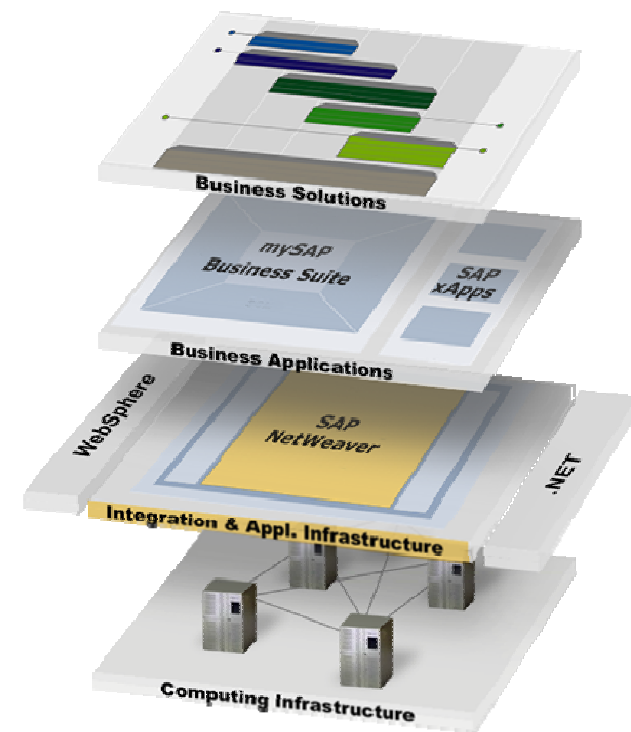
- Moen

- Nexans

- T-Systems

The Business:

- SAP outsourcing (largest SAP Outsourcer in Germany)
- Support for R/3 V3.1 till mySAP ERP
- 1300+ SAP Instances
- >500,000 productive SAP end-users WW

The Challenges:

- Reduce cost - HW Resources not used optimally
- Gain speed & flexibility to meet changing customer demand
- Reduce complexity
- Increase quality

The Solution:

- Running more than 300 VMware virtual machines
- Used for SAP development and test systems
- Used in SAP production environments
- Windows & Linux environments

The Challenge

Moen had about 150 servers and would need to buy more to keep up with business growth. The servers were also becoming difficult to manage.

The VMware Solution

VMware Workstation, ESX Server, P2V Assistant and VirtualCenter reduces costs and increases IT responsiveness.

"The results we've been able to achieve with VMware software give business units confidence in our ability to deliver and help them work more efficiently."

Robert Buchwald
Technical Lead
Systems Assurance Team
Moen

- **Saved $250,000 in hardware expenses**
- **10:1 server consolidation**
- **Monthly hardware support costs decreased by 27%**
- **Better CPU utilization**
- **Employees work more efficiently with stable, reliable servers**

Server Consolidation

CONSECO.
Step up.™

"The cost model of deploying virtual machine servers versus physical servers brought a much better ROI, so we decided to base our deployment on virtual machine servers."

Rod Lucero
Chief Architect
Conseco Finance

The Challenge

Quickly and inexpensively roll out Citrix MetaFrame XP, shortening the time to ROI

The VMware Solution

ESX Server and GSX Server provides a secure, easily managed platform to deploy, manage and remotely control servers

- **Delivered ROI in three months**

- **Hardware cost savings: used virtual machines on 12 servers instead of 100**

- **Supported 1,400 users on virtual machines**

- **Used SAN and NAS storage for archiving virtual machines**

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Support Status

- SAP fully supports customers running SAP in Linux environments on VMware

- SAP fully endorses customers running SAP test/pre-production environments on Windows on VMware