Getting Started with Virtualization Using VMware ESXi

Tim Stephan, Senior Director Product Marketing

April 2010
Agenda

- Why customers are turning to VMware
  - Same datacenter, new economics
  - Reducing risk with higher application availability

- VMware ESXi Overview
  - ESXi Key Features
  - Comparing ESXi to VMware vSphere and VMware Server
- ESXi Installation and Configuration
- Next Steps: Upgrade to vSphere
VMware is the Customer Proven Market Leader

- **Company Overview**
  - $2 billion in 2009 revenue
  - $608M + 18% YoY Growth in Q4 ‘09
  - Over $2 billion in cash
  - 25%+ operating margins
  - ~7,000 employees worldwide
  - 5th largest infrastructure software company in the world

- **Proven in the Trenches**
  - 170,000+ VMware customers
  - 100% of Fortune 100
  - 100% of Fortune Global 100
  - 96% of Fortune 1000
  - 96% of Fortune Global 500
VMware is the Customer Proven Market Leader

- **Company Overview**
  - $2 billion in 2009 revenue
  - $608M + 18% YoY Growth in Q4 ‘09
  - Over $2 billion in cash
  - 25%+ operating margins
  - ~7,000 employees worldwide
  - 5th largest infrastructure software company in the world

- **Proven in the Trenches**
  - 170,000+ VMware customers
  - 100% of Fortune 100
  - 100% of Fortune Global 100
  - 96% of Fortune 1000
  - 96% of Fortune Global 500

84% of all virtualized applications in the world run on VMware.

*Gartner, December 2009*
Extensive Global Partner Ecosystem

1,300+ Technology and Consulting Partners

1,700+ vCloud Service Provider Partners

~24,000 Channel Partners
Top Distributors, Resellers, System Vendors and Integrators

48,000 VMware Certified Professionals
Today’s IT – Complex, Inefficient, Inflexible

Source: VMware Fortune 100 Customers

Cause

• Overwhelming complexity
• Reliance on brittle infrastructure

Effect

• >70% of IT budgets just “maintaining” status quo
• <30% of IT budgets goes to innovation and competitive advantage

Business Agility Depends on IT Agility

Where IT Energy Is Spent

- 42% Infrastructure Maintenance
- 23% Application Investment
- 30% Application Maintenance
- 5% Infrastructure Investment

Source: VMware Fortune 100 Customers
### Before VMware: The State of IT Infrastructure

<table>
<thead>
<tr>
<th><strong>Server Sprawl</strong></th>
<th><strong>Power &amp; Cooling</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 36M physical x86 servers by 2011— a ten-fold increase over 15 years&lt;sup&gt;1&lt;/sup&gt;</td>
<td>&gt; $1 for every $1 spent on servers&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt; $140 bn in excess server capacity - a 3-year supply&lt;sup&gt;2&lt;/sup&gt;</td>
<td>&gt; $29 bn in power and cooling industry wide&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Space Crunch Costs</strong></th>
<th><strong>Operating Cost</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; $1,000 / sqft&lt;sup&gt;2&lt;/sup&gt;</td>
<td>&gt; $8 in maintenance for every $1 spent on new infrastructure&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt; $2,400 / server&lt;sup&gt;2&lt;/sup&gt;</td>
<td>&gt; 20-30 : 1 server-to-admin ratio&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt; $40,000 / rack&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>


<sup>2</sup> IDC, Virtualization And Multicore Innovations Disrupt The Worldwide Server Market, Doc #206035, March 2007

<sup>3</sup> Source: VMware
Our Mission is Your Mission

- Reduce the Complexity
- Dramatically Lower Costs
- Enable Flexible, Agile IT Service Delivery
VMware Virtualization Technology: Definition and Properties

VMware virtualization packages hardware + OS + applications into a portable virtual machine

VMware Virtual Machine Properties:

- **Partitioning**: Separation of OS and hardware
- **Isolation**
- **Encapsulation** of OS and application into VMs
- **Hardware independence**: Increased flexibility
Partitioning

- Run multiple operating systems on one physical machine
- Divide system resources between virtual machines
Key Properties of Virtual Machines: Continued

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

**Isolation**
- Fault and security isolation at the hardware level
- Advanced resource controls preserve performance
Key Properties of Virtual Machines: Continued

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

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

Encapsulation
- Entire state of the virtual machine can be saved to files
- Move and copy virtual machines as easily as moving and copying files
Key Properties of Virtual Machines: Continued

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

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

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

Hardware Independence
- Provision or migrate any virtual machine to any similar or different physical server
Abstraction + Pooling = Reduced Complexity
Abstraction + Pooling = Reduced Complexity

Virtual Infrastructure

CPU Pool

Memory Pool

Storage Pool

Interconnect Pool

Oracle CRM

Operating System

SAP ERP

Operating System

File/Print

Operating System

Exchange

Operating System

Virtual Infrastructure

Interconnect Pool
Datacenter Becomes an Efficient and Resilient Cloud

- Shared pools of resources
- Self-optimizing
- Fault tolerant
- Self-protecting
- Automated
- Desktop or Server Workloads

Resource Pool

VMware ESX

VMware ESXi

Physical Servers
The Results are Transformational

“Organizations are looking at ways to cut costs, better utilize assets, and reduce implementation and management time and complexity. Virtualization addresses all of these concerns.”

*Gartner*

Source: Gartner Dataquest Insight: Virtualization Market Size Driven by Cost Reduction, Resource Utilization, and Management Advantages, Jan09
The Results are Transformational

- **Financial Energy**: Capital and datacenter costs
- **Human Energy**: Time spent on routine admin tasks
- **Earth’s Energy**: Average power, cooling and real estate needs
The Results are Transformational

- Capital and datacenter costs reduced by 50% - 60%
- Delayed data center expansion
- Operational costs reduced by 25%+
- Time spent on routine admin tasks reduced by 25%+
- Average power, cooling and real estate needs reduced by 25%+

Optimize Financial Energy

Get more done with less

Financial Energy

Human Energy

Earth’s Energy
The Results are Transformational

Shift Human Energy
*Shift from serving hardware to serving the business*

- Capital costs reduced by 50% - 60%
- Delayed data center expansion
- Operational costs reduced by 25%+
- Time spent on routine admin tasks: Average of 33% reduction
  E.g. provision a server in minutes
- Average power, cooling and real estate needs
The Results are Transformational

Save Earth’s Energy

*Use less, and use it more wisely*

- Capital costs reduced by 50% - 60%
- Delayed data center expansion
- Operational costs reduced by 25%+
- Average of 33% reduction in routine admin time
  - E.g. provision a server in minutes
- Up to 80% reduction in datacenter energy costs

Financial Energy

Capital and datacenter costs

Human Energy

Time spent on routine admin tasks

Earth’s Energy

Average power, cooling and real estate needs
Simplified Management Puts Time back in Your Day

8:30 AM
Fix Servers

9:00 AM
Troubleshoot Performance in Apps

10:00 AM
Conference Call about new firewalls

10:45 AM
Lunch

11:15 AM
Install New Servers

NOON

1:00 PM
Work on new laptop image

2:00 PM

2:30 PM
Change management staff meeting

3:00 PM
Fire drill

4:00 PM

5:00 PM
Strategic Projects
Simple, Low Cost Disaster Recovery

**SRM:**
- Simplifies and automates disaster recovery workflows:
  - Setup, testing, failover
- Turns manual recovery runbooks into automated recovery plans
- Provides central management of recovery plans from vCenter

---

**Site A (Primary)**
- VMware vCenter Server
- Site Recovery Manager
- VMware vSphere
- Servers

**Site B (Recovery)**
- VMware vCenter Server
- Site Recovery Manager
- VMware vSphere
- Servers
Desktop Virtualization

VMware decouples Desktop image from the PC

Desktops run in secure datacenter

Present Desktop into clients over Network

Benefits

- Streamlined and Simplified Desktop Management
- Reduced Desktop Maintenance and Support Costs
- Improved End User SLAs and Desktop Business Continuity
- Improved Security and Compliance
Agenda

• Why customers are turning to VMware
  ▪ Same datacenter, new economics
  ▪ Reducing risk with higher application availability

• VMware ESXi Overview
  ▪ ESXi Key Features
  ▪ Comparing ESXi to VMware vSphere and VMware Server

• ESXi Installation and Configuration

• Next Steps: Upgrade to vSphere
VMware ESXi: 3rd Generation Hypervisor Architecture

VMware GSX (VMware Server)
- Installs as an application
- Runs on a host OS
- Depends on OS for resource management

VMware ESX
- Installs “bare metal”
- Complete HW management
- Relies on a Linux OS (Service Console) for running agents and scripting

VMware ESXi
- Installs “bare metal”
- Complete HW management
- Management tasks are moved outside of the hypervisor (3rd party integration via APIs and CIM; scripting via vRCLI)

2001
2003
2007
VMware ESXi Overview

*Next generation of VMware’s market-leading ESX hypervisor*

- **Partitions a server into virtual machines**
  - Reduces hardware, power, and cooling with the performance and features of ESX

- **Plug-and-Play**
  - Minimal configuration. Run VMs in minutes

- **OS-Independent, thin architecture**
  - Unparalleled security and reliability

- **Full-featured**
  - Superior consolidation and scalability
  - Easy to manage with remote tools
  - Simple license upgrade to vSphere Enterprise
ESXi 4 Delivers Performance for Demanding Applications

<table>
<thead>
<tr>
<th>% of Applications</th>
<th>ESXi 3.5</th>
<th>ESXi 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>1 to 2 CPUs</td>
<td>4 VCPUs</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>&lt; 4 GB at peak</td>
<td>64 GB per VM</td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>&lt; 2.4 Mbits/s</td>
<td>9 Gb/s</td>
</tr>
<tr>
<td><strong>IOPS</strong></td>
<td>&lt; 100 at peak</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Application Performance Requirements

1. Source: VMware Capacity Planner assessments
VMware ESX / ESXi – The most proven, reliable hypervisor

Proven by customers
- Over 150,000 customers
- Over seven years of maturation
- Over 96% of customers using for production workloads
- Years of continuous uptime at customer sites

Reliable by design
- Bare metal hypervisor
- Ultra thin disk footprint = fewer bugs & patches
- No dependence on OS or arbitrary drivers

Redmondmag.com
2008 Editor’s Choice Awards
Most Reliable Category
1. VMware ESX
2. IBM mainframe
Agenda

• Why customers are turning to VMware
  ▪ Same datacenter, new economics
  ▪ Reducing risk with higher application availability
• VMware ESXi Overview
  ▪ ESXi Key Features
  ▪ Comparing ESXi to VMware vSphere and VMware Server
  • ESXi Installation and Configuration
• Next Steps: Upgrade to vSphere
Hardware Requirements

Server

CPU
- Minimum: Single socket, dual core
- Ideal: Dual-socket, 4 or more cores per CPU

Memory:
- Minimum: 2GB
- Ideal: 8+GB

Network
- Minimum: one NIC, plus one for Management interface
- Ideal: One for Management Interface plus multiple NICs for VMs

Storage

Local Storage (SATA/SAS):
- Minimum: one 80GB drive
- Ideal: 2 mirrored drives (only for ESXi Installable) plus 4 RAID5 drives for VMs
- ESXi 4.0 Installable may be installed on 1GB+ USB 2.0 flash storage device

Shared Storage
- NFS, iSCSI, Fibre Channel: for VM storage
- ESXi Installable requires local disk or 1 GB+ USB 2.0 flash storage for the hypervisor
Installing ESXi

VMware ESXi Embedded

- Installed via SD flash or USB key internal to the server
- Distributed with a new server
- No Installation -- *Just Turn It On*!

VMware ESXi Installable

- Load Installer via CD or ISO image
- Simple 2-step procedure:
  1. Accept EULA
  2. Select local drive for installation
Get up and running in Minutes

1. Power on server, which boots into hypervisor
2. Configure Admin Password
3. (optional) Modify network configuration
4. Connect via vSphere Client
   - Point your browser to the configured IP Address
   - Download & Install Windows-based vSphere Client
   - Start vSphere Client and log into host
Manage Your ESXi Host: vSphere Client
Creating Virtual Machines

Use VMware Converter
- Transfer existing physical servers into virtual machines
- Import existing VMware and 3rd party virtual images

Create from Scratch
- Specify CPUs (1-4), Memory (1-256 GB), Disks, Network interfaces
- Load OS from ISO image (over 80 supported OSes)

Import a Virtual Appliance
- Hundreds to choose from on the Virtual Appliance Marketplace
- Download directly via vSphere Client and deploy on host
Interacting with Virtual Machines

Virtual Machine Console

Or just use standard remote access, e.g. RDP, ssh, etc.
Manage Individual VMs

Control capabilities

- Power on/off
- Suspend
  - Captures state of VM to disk
  - Can resume back to same state
- Snapshot
  - Makes point-in-time copy of virtual disk(s)
  - Can have multiple snapshots in a tree
Monitor Individual VMs

![vSphere Client interface showing performance metrics for a VM](image)
Monitor Hardware Health (CIM)
Agenda

• Why customers are turning to VMware
  ▪ Same datacenter, new economics
  ▪ Reducing risk with higher application availability

• VMware ESXi Overview
  ▪ ESXi Key Features
  ▪ Comparing ESXi to VMware vSphere and VMware Server

• ESXi Installation and Configuration

• Next Steps: Upgrade to vSphere
Upgrade to VMware vSphere
Centrally Manage Multiple ESXi Hosts

**VMware ESXi**
- Single server partitioning
- Production-class hypervisor
- Advanced server resource management
- FREE

**VMware vSphere**
- Pools of computing resources
- Centralized management
- Built-in automation, availability and manageability
- All Editions include ESXi, starting at $166 per CPU socket

The hypervisor is to Virtual Infrastructure what the engine is to a car, or the BIOS to a PC – an enabling component but not the whole solution.
vSphere 4.0 – The Most Complete Virtualization Platform

Application Services:
- vMotion
- Storage vMotion
- High Availability
- Data Recovery
- Fault Tolerance

Availability

Security:
- vShield Zones
- VMsafe

Scalability:
- DRS
- Hot Add

Computing Services:
- ESX ESXi
- DRS/DPM

Compute

Storage Services:
- VMFS
- Thin Provisioning
- Volume Grow

Storage

Network Services:
- Distributed Switch

Network

Partner Ecosystem
VMware vSphere Deployment Architecture

- Deploy ESXi on each host
- Add vCenter Server to Centrally manage ESXi hosts
- Upgrade license file to vSphere
A Few VMware vSphere Features

VMware VMotion

VMware Distributed Power Management

VMware Data Recovery

VMware Fault Tolerance
VMware vSphere for Small Businesses

- vSphere Essentials Plus, an All inclusive package:
  - Licenses for 3 physical servers (up to 2 processors each)
  - License for central management server
- Package cannot be decoupled or combined
Summary

1. Virtualization reduces cost, improves high availability, and simplifies operations

2. ESXi is a high performance, enterprise-class hypervisor available for free

3. ESXi can be up and running with VMs in minutes

4. ESXi can be upgraded to VMware vSphere to deliver high availability and reduce OpEx and CapEx.

Free ESXi Deployment Scenarios

Design Factors

• Small number of physical servers to consolidate
• Simple management requirements
• Can tolerate limited hardware failures and maintenance downtime

Typical Setup

• 2 servers
• NAS
• Entry-level switch

Small Office / Department

Remote Sites

Test and Development Servers
Abstract

Getting Started with Virtualization Using VMware ESXi

This session provides a basic overview to virtualization solutions from VMware and explains how to get started with virtualization using VMware ESXi. VMware ESXi is the easiest way to get started with virtualization, delivering secure and reliable "bare-metal" virtualization that gives you the ability to run several operating systems and applications simultaneously on a single physical server. Attend this session to:

• Learn about VMware virtualization solutions such as cost savings, green IT, business continuity and disaster recovery (BCDR), and desktop virtualization.

• Understand the functionality of VMware ESXi, how it compares to other server virtualization products from VMware, and how you can leverage it to get started with VMware virtualization.

• Learn how to install and configure VMware ESXi and create virtual machines within minutes of booting your server.

• See a demo of VMware ESXi in action!