Virtualized Development & Deployment
Driving Efficiencies and Cost
Agenda

• Virtualization Overview
• Benefits / Issues of Virtualization
• Future Trends
• Development Environment
• Deployment Experience
Virtual Categories

• Server virtualization (Common Reference)
  – Hypervisor Type 1 (Native / Bare metal)
  – Hypervisor Type 2 (Hosted)
• Desktop virtualization (Next Wave)
• Cloud (Future Wave)
BENEFITS
# Why Virtual – Client Perspective

## State of Infrastructure Today

### Server Sprawl
- **36M** physical x86 servers by 2011\(^1\) – a ten-fold increase in 15 years\(^1\)
- **$140 bn** in excess server capacity - a 3-year supply\(^2\)

### Power & Cooling
- **50c** for every $1 spent on servers\(^2\)
- **$29 bn** in power and cooling industry wide\(^2\)

### Space Crunch
- **$1,000** / sqft\(^2\)
- **$2,400** / server\(^2\)
- **$40,000** / rack\(^2\)

### Operating Cost
- **$8** in maintenance for every $1 spent on new infrastructure\(^2\)
- **20-30 : 1** server-to-admin ratio\(^3\)

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3. Source: VMware
## Why Virtual – Client Perspective

### State of Infrastructure with Virtualization

<table>
<thead>
<tr>
<th></th>
<th>BEFORE VMware</th>
<th>AFTER VMware</th>
<th>SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servers</td>
<td>1000</td>
<td>80</td>
<td>$5,816</td>
</tr>
<tr>
<td>Network Switches</td>
<td>84</td>
<td>10</td>
<td>$296</td>
</tr>
<tr>
<td>Power (kWh)</td>
<td>407</td>
<td>52</td>
<td>$759</td>
</tr>
<tr>
<td>Cooling (kWh)</td>
<td>509</td>
<td>64</td>
<td>$949</td>
</tr>
<tr>
<td>Real Estate (Sq ft)</td>
<td>2053</td>
<td>257</td>
<td>$431</td>
</tr>
<tr>
<td><strong>Total Savings</strong> (Over 3 years)</td>
<td></td>
<td></td>
<td><strong>$8,251</strong>*</td>
</tr>
</tbody>
</table>

*Note: Savings include estimated cost of VMware licenses, Support and Subscription*
Why Virtual – Integrator Perspective

Instant Provisioning

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEFORE VMware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procure hardware</td>
<td>Configure hardware</td>
<td>Install OS</td>
<td>Configure OS &amp; Tools</td>
<td>Assign IP Addr</td>
<td>Configure Network</td>
</tr>
<tr>
<td><strong>WITH VMware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deploy from Template</td>
<td>Power on VM</td>
<td><strong>&lt;1 hour of work</strong></td>
<td><strong>1-2 days lead time</strong></td>
<td><strong>20-40 hrs of work</strong></td>
<td><strong>4-6 week lead time</strong></td>
</tr>
</tbody>
</table>
## Comparison

**Virtual Server**
- Supports Green objectives
- Enables Space Management
- Flexibility / Share Resources
- More Complex / Costly for Smaller Solutions?
- Difficulty in Monitoring / Management
- Vendor “Support”

**Virtual Desktop**
- Thin Client Support
- Quick Desktop Provisioning / Replacement
- Centralized App Mgmt.
- High Reliability / Quick Recovery
- Built-in Redundancy
- HMI Sharing
Comparison

Virtual Server
• Consolidation
• Self Hosted & Self Managed
• Highly Secure and Compliant

“Private” Cloud
• Elastic / Self-Service Platforms
• Self-hosted
• Catalog Based Services
• Chargeback Models
• More secure than Hybrid or Public / Shared Clouds
• ? Compliant ?
Vendor Support

Is accurate timing important?

The virtualized system clock is directly affected by resource utilization on the physical host system. The more heavily-utilized the physical system is, the less reliable the virtualized system clock becomes. The result is a virtual system clock that slows and accelerates relative to real-time.
Vendor Support

<vendor>Technical Support will not require clients running on VMWare ESX to recreate and troubleshoot every issue in a non-virtualized environment; however, <vendor> does reserve the right to request customers to diagnose certain issues in a native operating system environment, operating without the virtual environment. <vendor> will only make this request when there is reason to believe that the virtual environment is a contributing factor to the issue.
DEVELOPMENT ENVIRONMENT
Collaborative Development
Small Projects
VMware ESX Server Instances:
- 16 GB RAM (Min >=)
- 1 GB NIC’s
- 6 SATA drives mirrored, or
- iSCSI SAN(s)

Wonderware InTouch View Clients

Web/Report Server
(Wonderware Information Server
SQL Server Reporting Services)

Historian
(Wonderware Historian,
GR Database, SQL Server)

NIC 1

NIC 2

NIC 3

Plant Ethernet Network

AOS
(WW Application Server)

AOS
(WW Application Server)

Terminal Server
(Windows Terminal Services,
ACP ThinManager) w/5 clients

VMware ESX Server (B)

Development/Configuration Workstation
(Wonderware ArchesRA IDE, InTouch WindowMaker, Operations Configurator)

Machine Control Network Segment

PLC

PLC

PLC

PLC

Virtual Server Images:
- Windows 2003 Server Enterprise (no additional cost with virtualization)
- SQL Server 2005 Standard (1, 2 & 3)
- 8 GB RAM (2)
- 4 GB RAM (5 & 6)
- 6-8 GB RAM (4 & 7)
- 2 GB RAM (1 & 3)