Virtual Infrastructure Implementation
Best Practices From A to Z

Edward Aractingi
About me

- Edward Aractingi
- Marshall University
- Computing Services Systems Administration
- MS, MCSE, RHCT, Security+, A+
- http://edward.aractingi.net
Agenda

- Marshall University, Data Center & RTI
- Virtualization Decision & Planning
- Planning Best Practice
  - Hardware & Network Upgrade
  - Storage and Network Infrastructure
- Implementation Best Practice
  - Deployment and Unattended installation
  - Virtual Server High Availability Architecture
  - Upgrade to VI 3
- Operation Best Practice
  - SNMP Management and Monitoring
  - Backup Strategies
About Marshall University

- State Funded University
- Huntington, WV
- 24 associate programs,
- 44 baccalaureate
- 46 graduate programs
- Enrolls 16,000 students including 4,000 graduate and medical students
MU Data Center

- Almost 200 Server
- Dell PowerEdge Servers
- EMC CLARiiON SAN arrays
- Microsoft Windows Server 2003
- RedHat Enterprise Linux
Rehall Transportation Institute

- Staff over 50 professors, graduate students and full time employees
- Transportation and Economic development in the Appalachian region
- Database, GIS and Web Apps
- TEDIS Servers environment hosted in MU Data Center
Planning Best Practice for Virtual Infrastructure Implementation
TEDIS before VMware

- 8 Dell PowerEdge 2650 with 4G RAM
- 2 Dell PowerEdge 1750 with 4G RAM
- 11 TB of Storage on SAN Arrays
- Windows™, Oracle®, SQL Server,
- ESRI© GIS applications
- Centralized Administration
Virtualization Decision

- The growing need for more servers
- End-of-life / Warranty physical servers
- Extremely dynamic OS, DB, Web platforms environment
- Server consolidation and resource optimization.
- Faster server provisioning (3-4 weeks → 5-10 mins)
- Target……. 100% virtualized environment
- Effective implementation now is 92%
VMware Documentation

- Use what VMWare provides
- Docs / Whitepaper
- User Forums

Resources are available, look for them

VMWORLD 2006
Measure twice, cut once
Change Management

- Staging the upgrade
- Targeting powerful servers
- Application and Web servers
- Used TEDISLOG
- Give users access to VMs

Involve users!... don’t involve users!
Hardware Expansion

- Part of the plan, we needed more hardware
- Spend on maxing existing server resources rather than buying new servers
- Bumped the memory to 12 GB on every server
- Added two-port NIC card to every server
- Total is 64 GB of memory and 12 CPUs
- Result: Able to go from 8 servers to 36 VMs with minimum cost and maximum flexibility
Prepare Configuration Sheets

- Network configurations example

<table>
<thead>
<tr>
<th>Start IP</th>
<th>End IP</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.10.10.11</td>
<td>10.10.10.20</td>
<td>ESX Service console</td>
</tr>
<tr>
<td>10.10.10.111</td>
<td>10.10.10.120</td>
<td>DRAC</td>
</tr>
<tr>
<td>192.168.0.11</td>
<td>192.168.0.20</td>
<td>Vmotion</td>
</tr>
<tr>
<td>10.10.20.3</td>
<td>10.10.20.254</td>
<td>Virtual Machines</td>
</tr>
<tr>
<td>192.168.10.3</td>
<td>192.168.10.254</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- DHCP Scopes
- SAN Storage Groups
Logical Network Architecture

INTERNET

MU

UCS Systems

MU PIX

MU VPN

TEDIS VPN

RTI

TEDIS PIX

TEDIS Production VLAN3

TEDIS Management VLAN 2

10.5.2.*/24

10.5.1.*/24

10.101.16.*

RTI Users

SAN storage arrays
ESX Service Console
Digital KVM
Zero external network access!

Consider securing service console

VMWORLD 2006
The best security practice is at the network layer
Configure network equipments to block external access to service console’s network COMPLETELY

No better security than Zero External Access
Storage Area Network

- EMC CLARiiON CX700 (10 Terabytes)
- EMC CLARiiON CX200 (1 Terabyte)
- SAN Management with EMC Navisphere
- 8 servers connected to CX700 with production data
- A specific storage group for all ESX Servers LUNs
- EMC documentation includes extensive support for ESX
Unattended Installation

- Scripted Installation
- Using one ESX to host the installation files
- NFS Share
- DHCP reservation
- Recommended for:
  - 5 or more servers
  - Planning to replace hardware
  - Staff got hit by a bus
Dell OpenManage

- Dell Remote Access Card (DRAC)
- TFTP Server
- Remote floppy disk image
- No server room access
KickStart CD

- Looking for faster methods of ESX Deployment
- Facilitate replacement of failed or retired hardware
- Once CD to recover and install ESX unattended
- Integrated with PXE *
# This file is used for VMware ESX Server Scripted Install Deployment
# Installation Method
cdrom
# root Password
rootpw --iscrypted "setenv rootpw $1$Tu9KnNa6$WfZlSItUisH/

# Authconfig
auth --enablesshadow --enablemd5

# BootLoader (The user has to use grub by default)
bootloader --location=mbr

# Timezone
timezone America/Los_Angeles

# X windowing System
skipx

# Install or Upgrade
install

# Text Mode
text

# Network install type
network --bootproto static --ip 10.5.1.73 --netmask 255.255.255.0 --gateway 10.5.1.2 --nameserver 10.5.2.12 --hostname rtisex03.tedis.local --addvmportgroup=1 --vlanid=0

# Language
lang en_US

# Language Support
langsSupport --default en_US
P2V Utilization

- Physical Machine connected directly to LUNs with over a terabyte of data.
- Use Raw Device Mapping (RDM)
- Deployed in few hours
- Saved many days
Upgrade to VI3

- Created a new LUN for VMFS v3
- Migrated all VMs from ESX01 before upgrade
- Used two environments for a while
- VMotion for minimum VM downtime
- Migrating other ESX servers
- Destroy old VMFS 2
VirtualCenter Servers

- Distributed, clustered redundant servers
- Two Cross-host clustered SQL DB servers
- Two Cross-host clustered VC service servers
- 2 SQL Servers
- 2 VCenter servers
Virtual Center Security

- Role-based
- Active Directory
- Across domain
- Extremely flexible

- No host SSH access
- No remote root
- Subnet restrictions
- SSL for http access

C:\Documents and Settings\All Users\Application Data\VMware\VMware VirtualCenter\SSL\etc/vmware/ssl
Operation Best Practice for Virtual Infrastructure

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Third Party Tools

- Dell OpenManage Server Administrator
- EMC Navisphere Agent for Linux
- Commvault iDataAgent for Linux
- Changed fstab, sshd and other linux services
- IPSwitch’s Whatsup Pro for monitoring SNMP
- Centralized log management: Splunk, Syslog-ng *

VMWORLD 2006
Install Dell OpenManage

- ./srvadmin-openipmi.sh install-force dkms install --force -m openipmi --v 35.13.RHEL3
- ./srvadmin-install.sh
- esxcfg-firewall -o 1311,tcp,in,OpenManageRequest
- srvadmin-services.sh start
- Centralized management with ITA
Dell OM Server Administrator

- Installed on the client
- Provide Hardware info
- Update firmware drivers
- Send alerts
Use SNMP for Remote Management

- **Edit snmpd.conf**
  
  ```
  # vi /etc/snmp/snmpd.conf
  
  Configure it to point to the management server IP address
  use a community name (here it’s public)
  trapsink *.*.*.* trapcommunity public
  
  Then start snmpd service
  # service snmpd start
  
  Configure it to autostart
  # chkconfig snmpd on
  
  Test it on local machine
  #snmpwalk -v 1 -c public localhost system
  
  Test it on another system (x.x.x.x is the esx server's IP)
  #snmpwalk -v 1 -c public x.x.x.x system
  Compile ESX MIBs from ESX CD media
  Configure your management server to receive SNMP and act upon.
Register MIBs

- /usr/lib/vmware/snmp/mibs/ on ESX
  - VMWARE-ESX-MIB.mib
  - VMWARE-RESOURCES-MIB.mib
  - VMWARE-ROOT-MIB.mib
  - VMWARE-SYSTEM-MIB.mib
  - VMWARE-TRAPS-MIB.mib
  - VMWARE-VMINFO-MIB.mib
IPSwitch Whatsup Pro

Monitoring
Send alerts
Forward
SNMP
Log history
Reporting
Shortcuts
Monitors:
Ping
Http
902
VC service

Leverage existing management tools
EMC Navisphere Agent

- `# esxcfg-firewall -o 6389,tcp,in,EMCNaviAgent`
- `# esxcfg-firewall -o 6389,tcp,out,EMCNaviAgent`
Patch Management

- Hardware Drivers and Firmware
  - Dell OpenManage IT Assistant
- ESX Servers updates
  - esxupdate (Setup local depot) *
- VMs OS updates
  - WSUS server and RedhatUp2date
Backup Strategies

- Commvault host agent to backup the entire VMFS volume
- SnapView clones for off-network backup
- Individual backup agents on VMs
- Consolidated backup on a physical machine
Install Commvault Agent on VI 3

- Install Commvault Agent for Linux
- Open Commvault Static and dynamic ports
- Configure subclient for pre/post-backup scripts
SAN Clone

- Commvault iDataAgent with Pre-backup and Post-backup scripts
- Use SnapView to clone the entire VMFS volume
- Minimize recovery time and scheduled downtime
- Reduce network traffic for backup
- Creating frequent point-in-time images
- Use clone on a different machine to backup the LUN
Consolidated Backup with VI3

- Used our Commvault Media Agent
- Has HBA and connected to the SAN
- Hosts the magnetic store for our D2D2T
- Minimize network traffic
- Optimize storage utilization

SAN LUN / VMFS

Backup Media Agent (Windows)

VMware Host

VMware Host

VMware Host
VCB SAN and Backup Configuration

- Backup VMs at file level.
- Save Backup Agents
- Used Commvault Media Agent as VCB Proxy
- Subclient for every VM
Challenges Summary

- User involvement at early stages might be a barrier
- In some cases, there is a need to rearchitect the data center
- Network performance is as important as other resources
- Securing the hosts is very critical
- The risk for proliferating number of VMs
- Misuse features (clone VM as backup instead of Snapshot)
- Licensing issues (OS, Backup Agent, Apps)
- SAN Disk usage (vmdk files are partially used)
80% Planning/Project Management with 20% implementation
Leverage existing management tools
Automate any possible activity
Spare resources are VERY useful
Remember ESX implements Linux commands and concepts
VMware VI provides many features, use them when possible
Virtualization is an exciting technology, enjoy it!
Presentation Download

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Password: cbvfor9v9r