

EPIC Information Solutions Inc.

WorldSkills Calgary 2009

September 30th, 2009



Agenda

- Brief overview of what is WorldSkills
- Scope of the project
- Architecture
 - Virtualization (servers and desktops)
 - Storage Area Network
 - Backup and recovery
 - Desktop, printer, and application delivery
- Challenges and solutions
- Q & A

What is WorldSkills?

- The first competition was held in Madrid Spain in 1950 and WorldSkills Calgary 2009 was the 40th competition
- WorldSkills is a not for profit membership association open to agencies or bodies which have a responsibility for promoting vocational education and training in their respective countries/regions
- WorldSkills provides a unique means of exchange and comparison of world-class competency standards in the industrial trades and service sectors of the global economy

Scope of the project

- Approximately 1000 competitors from 51 countries
- Approximately 100 WorldSkills Calgary and WorldSkills International personnel
- 45 skilled events requiring various levels of IT infrastructure
- Wired and wireless network infrastructure comprised of:
 - Approximately 200 VLANs
 - Wired and wireless infrastructure
 - Public and private network access
- Security (network, server, and desktop)
- Provide an infrastructure that will raise the IT expectations for future competitions

Scope of the project Con't

- The challenge
 - To provide an infrastructure that surpasses the previous competition
 - 2007, Shizuoka, Japan
 - IT failure
 - 60% downtime (3 out of 5 days)

Initial RFQ and response

- The initial RFQ requested a proposal which was a completely physical infrastructure
- EPIC's response include the physical but also a virtual alternative which was positioned as the preferred solution
- After EPIC was awarded the project we also started discussing a virtual desktop implementation

Physical Architecture

- 1 physical management server (HP DL360 G5)
- 4 Vmware ESX 3.5 u4 hosts (HP DL360 G5)
- 800 desktops (HP dc5800)
- 200 laptops (HP Elitebook 6930)
- 40 Mac's
- 200 Printers
- 6TB HP EVA 4400 fibre channel SAN
- 2TB HP De-duplication device
- HP MSL 2024 Tape Library

Physical Architecture con't

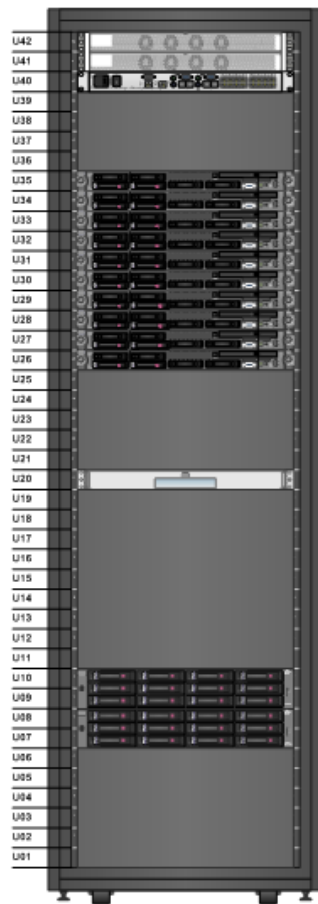
- DL360 G5
 - ESX Server 3.5 u4
 - Enterprise license
 - Dual Quad Core 2.4Ghz Processors
 - 32GB RAM
 - Two Dual port 1Gb NIC's
 - Dual port fibre Channal HBA

Physical Architecture con't

- Management server
 - DL360 G5
 - Dual Quad Core 2.4Ghz
 - 32 Gb RAM
 - Windows Server 2003 Enterprise Edition
 - Two Dual Port 1Gb NIC's
 - Dual port fibre channel HBA

Physical Architecture Con't

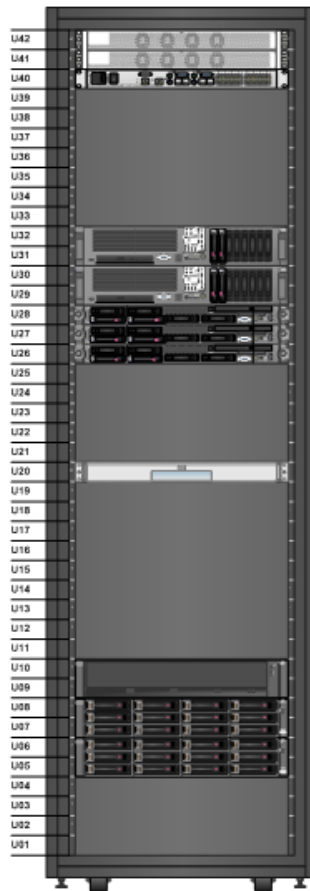
- 800 HP dc5800 desktops
 - Basic and advanced build
 - 2Gb RAM basic
 - 4GB RAM advanced
 - Quad port intel Gb NIC for Skill 39 IT / PC network support



World Skills 2009 Calgary Server Physical Infrastructure Option 1		
Symbol	Count	Description
[Rack Icon]	1	42U Rack 10642g2
[Switch Icon]	2	StorageWorks San Switch 4/16 Full License
[Server Icon]	10	HP ProLiant DL360 G5 Rack CTC Chassis (Per Server) <ul style="list-style-type: none"> VMWare ESX 3.5 Update 2 Two Quad-Core Intel® Xeon® Processor E5450 - 3.00GHz, 80 Watts Two 4 GB FBD PC2-5300 2 x 2 GB Dual Rank Kit Two embedded NC373i Multifunction Gigabit Server Adapters One HP NC373F PCI Express Multifunction Gigabit Server Adapter One HP StorageWorks FC2243 Dual Channel 4Gb PCI-X 2.0 HBA Integrated Lights-Out 2 (iLO 2) embedded 1 ProLiant Essentials Integrated Lights-Out Select Pack, 1-Server License 1 SlimLine CD-RW/DVD-ROM Combo Option Kit 1 full-length and 1 low-profile x8 PCI-Express slots 9 fans; N+1 fan redundancy Two 700W power supplies
[Disk Icon]	20	SFF SAS 146GB Disk Two HP 146GB 3G SAS 10K SFF SP HDD per Server
[Storage Array Icon]	2	HP StorageWorks Modular Storage Array 2012c 7.2TB RAW 3.6TB RAID 10
[Disk Icon]	24	MSA2000 SAS 300GB 3.5Disk
[LCD Icon]	1	TFT7600 1U LCD
[KVM Icon]	1	16 Port IP KVM

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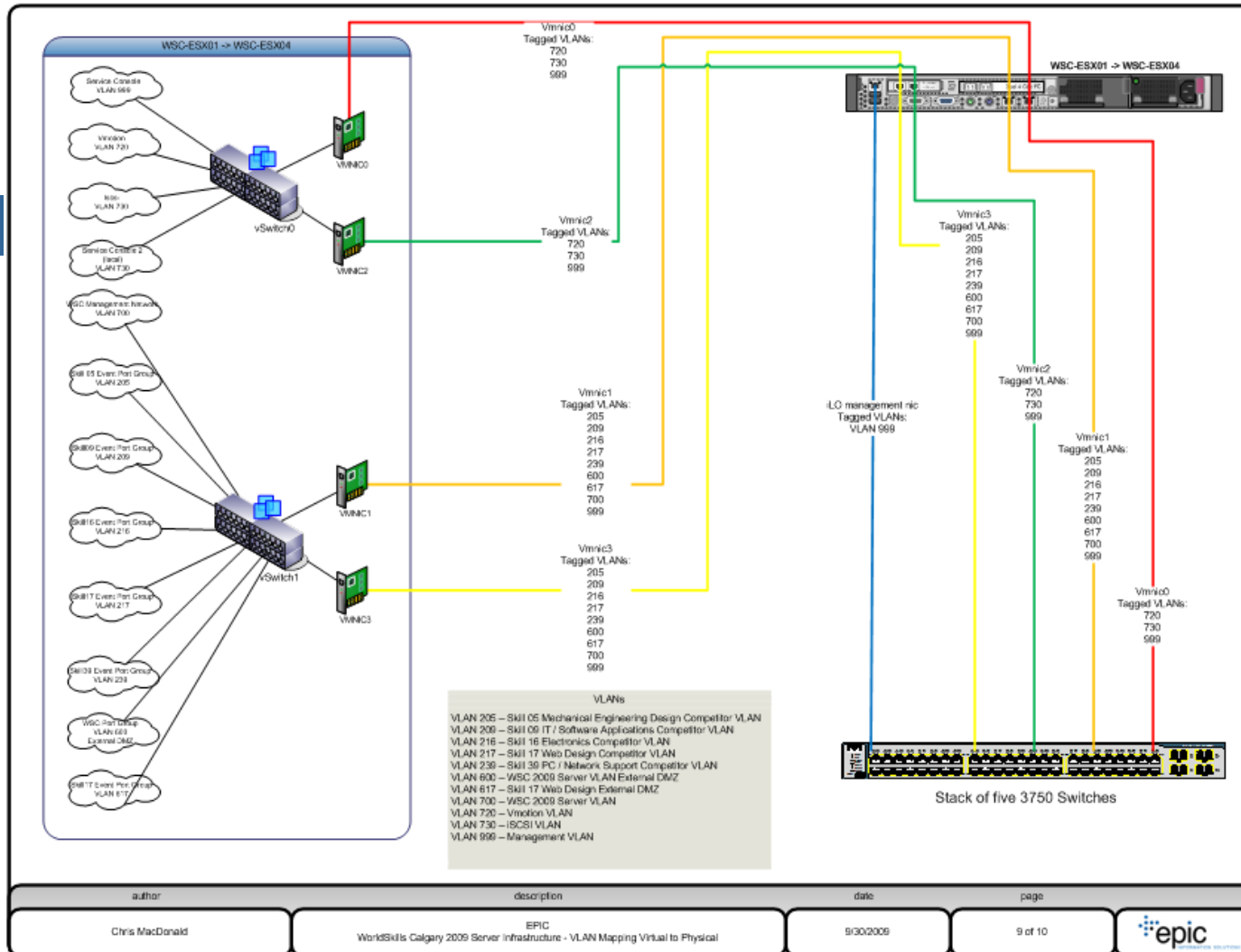




World Skills 2009 Calgary Server Physical Infrastructure Option 2		
Symbol	Count	Description
[Rack Icon]	1	42U Rack 10642g2
[Switch Icon]	2	StorageWorks San Switch 4/16 Full License
[Chassis Icon]	3	HP ProLiant DL380 G5 Rack CTO Chassis (Per Server) <ul style="list-style-type: none"> VMWare ESX 3.5 Update 2 Enterprise Edition Two Quad-Core Intel® Xeon® Processor E5450 - 3.00GHz, 80 Watts Four 8 GB FBD PC2-5300 2 x 4 GB Dual Rank Kit HP Smart Array E200 64MB FIO Cache Two embedded NC373i Multifunction Gigabit Server Adapters One HP NC380T PCI Express Dual Port Multifunction Gigabit Server Adapter One HP StorageWorks FC2243 Dual Channel 4Gb PCI-X 2.0 HBA Integrated Lights-Out 2 (iLO 2) embedded One ProLiant Essentials Integrated Lights-Out Select Pack, 1-Server License One Slimline CD-RW/DVD-ROM Combo Option Kit One full-length and 1 low-profile x8 PCI-Express slots 9 fans; N+1 fan redundancy Two 700W power supplies
[Chassis Icon]	2	HP ProLiant DL380G5 Rack CTO Chassis (Per Server) <ul style="list-style-type: none"> Windows Server 2008 Enterprise Edition 64bit Two Quad-Core Intel® Xeon® Processor E5450 - 3.00GHz, 80 Watts Four 8 GB FBD PC2-5300 2 x 4 GB Low Power Dual Rank Kit HP Smart Array P400i256 for DL380 G5/ DL385 G2 FIO Controller Two Embedded NC373i Multifunction Gigabit Server Adapters One HP NC380T PCI Express Dual Port Multifunction Gigabit Server Adapter One HP StorageWorks FC2243 Dual Channel 4Gb PCI-X 2.0 HBA PCI-Express Riser Cage One ProLiant Essentials Integrated Lights-Out Select Pack, 1-Server License One Slimline CD-RW/DVD-ROM Combo Option Kit Two 800Watt hot plug power supplies One IEC Power cord
[Disk Icon]	10	SFF SAS 146GB Disk Two HP 146GB 3G SAS 10K SFF SP HDD per Server
[KVM Icon]	1	16 Port IP KVM
[LCD Icon]	1	TFT1600 1U LCD
[Storage Icon]	1	HP StorageWorks 4400 Enterprise Virtual Array HSV300
[Storage Icon]	2	HP StorageWorks 4400 Enterprise Virtual Array M6412 Disk Enclosure
[Disk Icon]	24	HP StorageWorks 300GB 15K rpm 4Gb dual port FC EVA M6412 Hard Disk Drive

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Virtual Architecture

- VMware ESX 3.5 u4
 - Vmotion, HA, DRS, and DPM
 - VMware View 3
 - Primary, secondary, and security server
- 50 virtual servers
- 55 virtual desktops

Virtual Servers

- Windows Server 2008 Servers
 - Active Directory domain controllers (2 servers)
 - PKI infrastructure (3 servers)
 - DNS / DHCP (400 DHCP scopes on 2 DHCP servers)
 - File and Print servers
 - Windows Server 2008 DFS-R
 - Approximately 100 Group Policy objects
 - Monitoring server (Windows Server 2003)
 - HP Web JetAdmin Server
 - Ghost Server
 - Exchange 2007
 - 5 skilled event servers
- 2 Ubuntu 9.04 Servers
- 1 OpenSuse 11 Server

Storage Area Network

- HP EVA 4400
 - Dual Controller
 - 4GB Fibre Channel
 - 20 x 300GB FC drives
 - vRAID 100 with double redundancy
- 2 Brocade 4/24 4GB fibre channel switches

Backup and Recovery

- Vmware Cosolidated Backup
- Veeam Backup and Replication Software
- Windows Server 2008 backup
- HP 2503i De-duplication device (approximately 10:1 ratio)
- HP MSL 2024 LTO4 Tape Library
- 4 Veeam VCB backups per day
- 4 Windows Backups to the HP 2503i
- Daily backups from the HP 2503i to the MSL 2024 Tape Library
- Windows Volume Shadow copy twice daily

Desktop, Printer, and Application Delivery

- Desktop imaging required network connectivity but did not transfer images over the network
- All printers had predefined DHCP reservations and were deployed via Group Policy
- Application delivery was either already included in the image or virtual desktop or deployed via Group Policy or scripting

Challenges and Solutions

- Vmware view virtual desktop unresponsive after 1 hour
- Logins and file / print requests were causing the DC's to be less responsive
- Printers were not deployed as planned
- Last minute application requests
- Last minute request for additional virtual desktops
- How do we recover from a complete systems failure?
- How do we deliver printers to systems that were not part of the WSC2009 network?
- Can we do better than Shizuoka?

Solutions

- The image that was used to create the VDI desktop still had power management settings defined
- Increase the number of vCPU's and memory for the DC and added them to a high resource pool
- Competitor and judging printers were mixed up. We had to adjust the DHCP reservations and group policy to accommodate the changes
- Last minute request for additional virtual desktops simply involved expanding the defined pool
- Virtual desktops were provided to non WSC2009 users to provide access to file and print services
- Using VCB backups and advanced desktops we planned to boot the desktops with ESXi on USB key and restore the systems to the desktops (There were several discussion about this topic)
- Virtualization provided EPIC and WorldSkills Calgary with an infrastructure that wasn't down for even a minute during the competition



Q & A

- What would we do differently
- How can we improve upon the success of the competition