Network Controls & Configuration

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Bob Paterson  P. Eng
Technology Manager,
Simulator Operations, OPG
Toronto, Canada
OPG Nuclear Training Simulators
77 Trainers use OPG simulators

- 19 Pickering 1-4 Authorization Trainers
- 20 Pickering 5-8 Authorization Trainers
- 26 Darlington 1-4 Authorization Trainers
- 6 Darlington Unit 0 Authorization Trainers
- 6 Fuel Handling Trainers
Simulator Background - OPEX

- Low Simulator Training Availability: 98%
- Originally each Full Scope Simulator had local disk drive & removable drive failures
- Backup data for removable disk drives was a loss control issue
- Instructor left keys at home to locked cabinet for removable disk drive – had to cut lock off with hacksaw delaying start of simulator regulatory licensing examination
Modern Training Requirements

Trainers require simulator configuration including any newly developed initial conditions and lesson plans to be available instantly everywhere on:

- Full Scope Simulator [at DLC and PLC for Darlington]
- Glass Touch Screen Simulators at Pickering Learning Centre [PLC] or Darlington Learning Centre [DLC]
- On projection screens or big screen TVs in any classroom
- Desktop IT business office PC via MS-windows 7 at any building location anywhere in OPG
Modern Training Requirements

• Trainers require ability to create new lesson plans and initial conditions: at home, in the office, in the classroom & on full scope simulators

• Simulator technology Maintainers require desktop simulators at work or at home since full scope simulators must be available for training 24 hours per day
Nuclear Regulator
Simulator Exams / Re-Qual Testing

- Regulator – *Canadian Nuclear Safety Commission* – require confidentiality for simulator initial licensing exams and continuing re-qualification testing for licensed authorized nuclear operators and shift supervisors

- Software security and physical security required for simulators and for exam/test development on desktop

- Quote Nuclear Regulatory Requirements to negotiate with OPG Corporate IT to use business network for simulator software access

- Desktop & Classroom simulators via network required to improve success rate in Regulatory Licensing Exams
How to meet requirements?

• Make *same* Simulator Software Configuration Executable, Initial Conditions and Lesson Plans available to run everywhere *via the network*: office, home, classroom and full scope simulator
Central Disk Storage System Hardware

• HP EVA6400 - Enterprise Virtual Array of disks – failures transparent to user since 2005
• Scalable low end IT enterprise system
• redundant RAID disk controllers
• O/S independent: Linux, Unix, MS-Windows
• Software mirrored or copied automatically to second storage system via the network
Central Server

- **Linux Simulator and Account Cluster Server**
- Triplicated Server for high availability
- Network File System server - access all simulators’ software on storage system
- Server to manage user accounts for all simulators
- Print server
- Tape Backups
Cyber Security

• IT Business requirement: Removable Media [Disk Drives & USB drive] require encryption + password protection and be scanned for malware

• A lot of malware, virus, ransom-ware, etc. target MS-windows for maximum damage & gain $$

• Internet login from home via VPN [FOB with random# plus password] then second login to Citrix Server for Business IT account & another password before third login to Desktop Simulator account & different password
Cyber Security

• Rely on OPG IT Business Network Firewall and Security updates and patches to protect from internet security threats
• We use Linux for our simulators & install Linux Security updates & patches
• Control with Linux User accounts + strong passwords + file protections for groups of Training Instructors / Users
• Linux email not used & do not use removable media on Linux simulators
Darlington Learning Centre DLC

IT Business PCs for Classroom Simulators or KIOSK

Corporate Rollout PC's MSwindows with Quad Screen VGA card(s)

IT Business Office PCs

25 miles away

OPG IT Business Network 1GB Uplink

OPG IT Business Fibre External Network

OPG IT Business Firewall

Internet - VPN

Server (LINSACS Linux Simulation Account Cluster File Server, Data, etc...)

Desktop Linux Simulator CPU PC pool

Home PCs over VPN

Pickering Learning Centre PLC

IT Business Office PCs

Corporate Rollout PC's MSwindows with Quad Screen VGA card(s)

OPG IT Business Network 1GB Uplink

OPG IT Business Fibre External Network

OPG IT Business Firewall

Internet - VPN

Server (LINSACS Linux Simulation Account Cluster File Server, Data, etc...)

Desktop Linux Simulator CPU PC pool

3 Glass Simulators

5 PLC Glass Simulators
Issues

• If network or server fails – all simulators down
• Enterprise Disk Storage System is expensive yet essential to mission critical application with large number of Users
• Call vendor maintenance support for disk controller replacement when fails – expensive
• Delete file [ie: lesson plan] – mirror deletion – must still recover from tape if required
Benefits

• High simulator training availability: 99.9%
• Meets requirements: 24hrs/day - 7days/week
• Effective & efficient training/exam development & delivery/test on simulators
• Data backed up for disaster recovery
• Hardware failures invisible to user due to redundancy / fault tolerance
Questions