

Virtual Computing Lab (VCL) Concepts and Use

1 May 2012

Agenda

- What is a VCL?
- How could a VCL be used?
- What problems does a VCL address?
- How does the VCL work now?
- How will the VCL work?
- What are limitations of VCLs?
- When can one use our VCLs?

What is a VCL?

- Pool of computers
 - Remotely accessible (screen, keyboard, mouse)
 - Reusable
 - Real or virtual
 - Provisionable (ideally)
- NCSU and IBM popularized concept
 - Software is being open-sourced
- Applies mainly to CSS/ITS programs
 - Use in CES program would require more thought

How Could a VCL Be Used?

- Reserve computers for classroom exercise
 - E.g., every Tuesday from 2-4pm, need 30 computers with Windows XP and SQL Server installed
- Reserve computer for assignments/projects
 - E.g., student would reserve at a time convenient to them, and might request admin privileges
- Reserve several computers for demonstration/class use
 - E.g., Map-Reduce running on 10 computers
- Make expensive/complex software available remotely
 - Predefined OS and application that students can request to reserve (e.g., Clementine, Enterprise Architect)
- Network needs to be isolated
 - E.g., students studying malware attacks and defenses in a safe environment

What Problems Does a VCL Address?

- Lab computers are expensive to upgrade
 - Often underused and overpowered
 - Admin privileges sometimes not possible
- Students prefer using laptops
 - Inconsistent or inadequate computing environments
 - Varying skill levels for installing/configuring
- Classroom computers are largely inadequate
 - Inadequate and inconsistent capabilities
 - Installations must be scheduled weeks in advance
 - Admin privileges not possible

What Problems Does a VCL Address?

- Software licensing is restricted
 - Only installable on university-owned equip
 - Number of licenses is limited
 - Licenses limited to department-only use
- No short-term research/teaching computers
- Distance learning not possible if labs required
- Vulnerable computers for security classes
- Safely configuring network services

How Does the VCL Work Now?

- Faculty or students in senior project (i.e., “requester”):
 - Requests VCs
 - Describes desired operating systems, application(s) and network accessibility
- Institute Lab staff:
 - Prepares the virtual computers as desired
 - Notifies requester when request is complete
- Requester:
 - Uses manage_vc app on Windows to:
 - Retrieve specific information for her VC(s)
 - Start VC(s)
 - Connect to VC (which opens display)
 - Use VC as a real computer, logging in, entering commands and information via the keyboard, and possibly moving/clicking mouse
 - Ultimately logs off or indicates that the VC(s) are no longer needed
 - Stop VC(s) if desired
 - Could also use rdesktop on Mac OS X or Linux
 - But it’s much more difficult

How Will the VCL Work?

- Using web
 - Person reserves computer at a time for a duration
 - Individual or Class
 - Ultimately, also requests what software is installed, etc.
 - Remote computer is prepared or restored by system
 - Person receives IP address and port
- Using remote display software
 - Person connects to remote computer via IP and port
 - Uses remote computer until:
 - Quits session
 - Session duration time expires
 - System saves copy of remote computer

What Are Limitations of VCLs?

- Short-term use
 - Want to exploit reusability to minimize costs
- Resource intensity
 - CPU: probably okay with multicore CPUs
 - Disk: problem unless multiple real disks installed
 - Network: problem unless virtual network used
 - Dynamic Graphics
 - problem unless special software purchased
- Number of available computers
- Disk image load/store performance
- Users exchanging massive data with remote system

When Can One Use Our VCLs?

- Status
 - Hardware (started in 2009)
 - VCL 1: 10 blades (dual quadcore processors per blade)
 - VCL 2: 20 workstations (single quadcore processor)
 - VCL 3: 30 workstations (single quadcore processor)
 - Storage system installed but not configured
 - Virtual switch under investigation
 - Manual provisioning of VCs
- Reservation system was installed but is no longer
- Automatic provisioning still not done