Experiences using Virtualization to Teach System Administration at UNC Charlotte

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Outline

- Evolution of Lab Design
- Assignments given out to students.
- Lab Rules

Lab Design 1

- We specified specific machines to students.
  - 25 students divided onto 5 stations.
  - Each student was given two IP addresses.
  - Pros: locally copied VM, faster access to VMs.
  - Cons: students need to wait till terminals were free.
- Two physical machines:
  - 1 Server Machine – Windows 2003.
 - 1 Client Machine – Windows 2003.

Lab Design 1
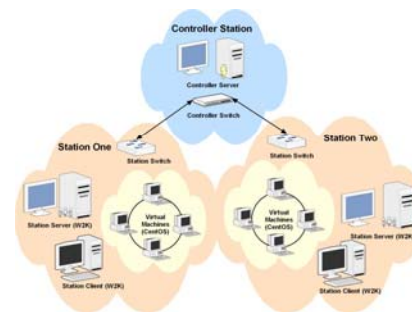
Lab Design 2

- Consolidated them onto a single machine that runs both client-server VMs:
  - Each student is assigned two VMware images.
  - Both will run CentOS 4.3.
- Due to server consolidation, more machines were available. Student: machine ratio now about 2.
- In the present semester, the design has an AFS server where students store their VMs.
  - Pros: users can use any terminal.
  - Cons: users need to download the VM and work. It takes time to complete this.
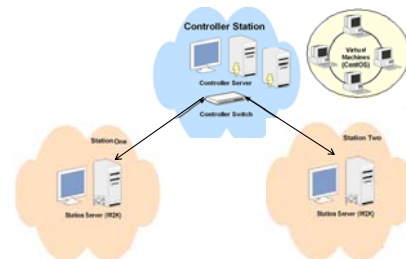
Lab Design 2
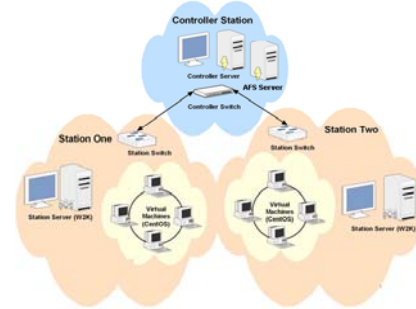
Lab Design 3

- Proposal to use Vmware ESX 3.0 server.
- Students can use browsers to connect to their VM images.
- High-end storage system with concurrent writes
  - We expect Disk IO to be high when multiple students write to the disk.

Lab Design 3

Assignments

- Assignment 1: Set up DNS.
- Assignment 2: Set up IPTables.
- Assignment 3: Set up POP3, IMAP and SMTP Server.
- Assignment 4: Set up Web Server (apache and Tomcat) with SSL certificates etc.
- Backup Assignment 5: VPN + VNC
- Each lab is based on the previous labs.
  - If something goes wrong, they would have to visit previous labs to check configuration settings.

Assignment: DNS Setup

- Students were given their own sub-domains
- They created forward and reverse zones
- They created A, MX, NS records etc.

Assignment: IP Tables

- Students learned how to setup firewall rules.
  - Allow, deny rules etc.
- They primarily used Webmin.

Assignment: POP3, IMAP, SMTP

- Students were asked to setup POP3, IMAP and SMTP Servers.
  - Dovecot, Postfix
- Secure email using SSL Authentication

Assignment: Web Server

- Set up Apache, Tomcat server
  - SSL Signed certificates
- Integration of SquirrelMail
- Integration of Webalizer

Lab Rules

- Students should not connect the computers in the lab to the UNCC campus network or to the Internet.
  - Improperly configured machines cannot be on the campus network.
- Ask around!
- Google is a System Administrator's friend.
  - We provide wireless access for students to search.

Questions?

Thanks!