Networking Workshop

Objective

This session begins with a discussion of network layers and IP routing and ends with a hands-on exercise where the students role-play parts of the network to transfer data. The aim of this workshop is to build students' comfort and familiarity with networking concepts.

Materials

- Slide Deck on Networking
- Printouts of each Network Component (Computer, Router, Firewall, Server) in your imagined network
- Duct tape or ribbon to connect each Network component
- A diagram showing all the components of your imagined network (this can be done with paper and pencil)
- Role playing cards for each component in your network (Router, Computer, Firewall, Server)
- Printed Content (e.g. if the data requested from a search server is "Image of Space Shuttle" have a print out available to send back to the requestor, but throw in some other content as well)
- Envelopes, Paper, Pens

Preparation

Days before the Workshop

- Review the slides and prepare for talk
- Review sample network diagrams and roles (provided at same location as slides) to get some ideas
- Plan out your imagined network, using paper and pencil is fine!
- Plan how you will map your network on the floor (how far apart are the pieces, if using ribbon to simulate cables, measure it out, if possible lay it out on the floor ahead of time)
- Print out the components, overall diagram, role playing cards and content for your imagined network
- Gather enough envelopes and papers to submit multiple requests to the network

Procedures

- Layout the network on the floor
- Give the networking talk
- Describe your imagined network

- Assign roles to the students
- Have the students go to their station in the network (on the floor) for their role, if appropriate have them read their role allowed to the group
- Now ask for quiet as the "Student@Computer" initiates and explains aloud their first request
  - e.g. if the request is "image of a Space Shuttle", have them right that on a piece of paper and place the request in an envelope
  - Next, have the student write on the envelope a "To:" and "From:" IP address, "To:" might be the IP address of Google, and "From:" will be the computers own IP address
- Next they pass the envelope to the Local Router, have the router explain what is being done
  - The Local Router will look at the "To:" IP address and decide where to send the envelope next (probably another router), their choice should be the least number of hops away
- Repeat this action until the envelope reaches the Server
- The Server will open the envelope and read the request aloud
  - The Server will sift through available content (the printouts you provided) to find the appropriate content
  - The Server will place the content in a new envelope
  - The Server will address the envelope with "To:" as the IP address of the requesting computer, and "From:" as the address of itself
- Now the Server passes the envelope back to its nearest router, and the routers perform a similar task as before, but the To: and From: are different this time
- In the end, the computer should receive the correct content

Discussion Questions

1. How long do you think it took you to get back that single piece of data? Compare that to how long it takes when you perform a real Google request.
2. What would happen if a router was down? (Take alternate path or no path exists)
3. Why might there be more than one server handling search requests for Google? (LOTS of requests coming in, they need to balance that load and associated network traffic)

Extensions

- Add a firewall to your network
- Create a more complex network the second time around
- Break a single request up into multiple pieces with a sequence number on each piece. The pieces need to be reassembled at the destination. (This is closer to reality)

Links

http://www.tcpipguide.com/