

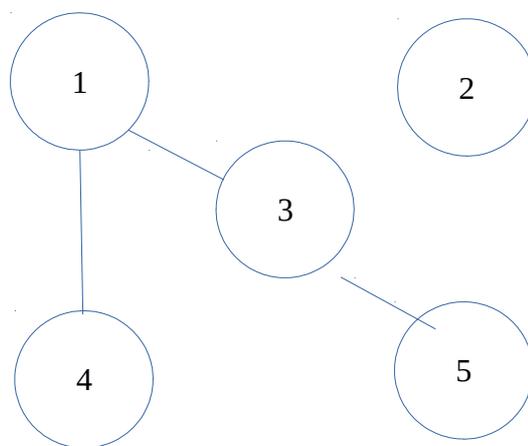
Lesson Plan 2 | Form 2 | Intro to Networking

Objective

Students will be introduced to a high-level overview of how the Internet works, along with some names of core Internet systems.

Warm-up

Have the students arrange themselves in five groups, one in each corner of the classroom and a fifth in the middle. On the board, draw five circles representing each group's location in the room, write the numbers 1 through 5 in the circles, and arbitrarily draw lines between some of the circles, representing a network diagram. Some groups should be more connected than others, i.e.:



Tear off a piece of paper and fold it in half. Write a message inside the fold, and on the outside write the number of the group the message is intended for. Tell everyone that their group can only open the message if their group number matches the one on the paper; otherwise, they are responsible for getting it to the destination group via one of the groups they are connected to. Do this several times, modifying the initial group the message is given to and the diagram on the board to illustrate different connectivity scenarios.

Presentation

Explain that, at a very high-level, the actions and decisions they made mirror those made by the devices comprising the Internet. Talk about the global nature of the Internet, how links are being added all the time, the ability for me to send information to other countries even as links are removed, and the implications of censorship (have a group open a message not intended for them and modify it to say something else before passing it on to its destination).

Talk about the numbers each group received, and how they acted as addresses. Ask whether this is suitable for a network with billions of people and devices. Introduce the term “IP address” and give an example of one (i.e., 192.168.1.1). Explain that IP stands for “Internet Protocol,” and ask students what the word “protocol” means.

Since all students should have experience using the Internet, ask them whether they typed IP addresses into their web browser when they last used the Internet. As the discussion moves toward URLs and domain names, introduce DNS, what it stands for, and its ability to map easy-to-

remember names like “google.com” to IP addresses. Ask for and mention other domain names (wikipedia.org, etc.) and domains (.org, .net, etc.).

Guided Practice

Have the students move to the computer lab and open the Terminal application. Ask them to run the “ifconfig” application, similar to how they have run their own Python programs in the past. Give them a few minutes to review the output, pointing out familiar terms like bytes, and have them look for examples of an IP address. They should all see the loopback address 127.0.0.1.

Next, turn on a router or Wi-Fi hotspot and have them connect to the network, then re-run the ifconfig command. Ask them to point out what’s different about the output now, with the key difference being the new IP address assigned to them by the access point. Ask them to compare IP addresses with each other to see if they all got the same address, or different ones. Explain that they can now talk with the access point, which talks with the cell tower visible in the distance, which talks to other towers, links, etc.

If there’s time remaining, have them run “man dnsmasq” to display information about the dnsmasq application to 1) familiarize them with how to obtain extra information about programs on the computer and 2) give them an example of a program that makes DNS more real to them.

Independent Practice

Interspersed with Guided Practice; ideally give students enough time to read on their own and/or experiment with the terminal, although in reality only a few students will feel comfortable doing the latter.

Closing

Emphasize to students how things like IP and DNS play an important, if hard-to-see, role in how easily they are able to use the Internet to send and receive information to/from anywhere in the world.

In Hindsight

01/18/2017: Students enjoyed the group activity at the beginning, and the censorship demonstration resulted in some interesting conversation. I decided not to present lots of terminology, such as the OSI model, because I think it’s too easy to lose them there; some clearly zoned out when IP and DNS were presented. Placing them in front of a terminal in the lab and having them run commands themselves was a good idea, because it’s something they can do independently and which gives them more experience with the command line, above and beyond running their own Python programs.