

IT 105 – Principles of Programming

Day 05

1. Binary Numbers.
2. Web-based code, so we need to understand the web.
3. The Internet is the network.
 - a. Arpanet, 1969, 4 computers
 - b. federally funded by the Dept of Defense
 - c. connected government labs and research universities
 - d. designed to be robust and decentralized
4. Many applications on the Internet, including the World Wide Web (WWW).
5. Terminal:
 - a. Microsoft: Start → Command .
 - b. MAC
 - i. Open a Terminal window
 - ii. Command+Space → Open Spotlight → type Terminal .
<https://www.businessinsider.com/how-to-open-terminal-on-mac>
 - c. Command prompts are analogous to windows operations:
 - i. Drive name, C:
 - ii. cd, “change directory”
 - iii. more *filename*
6. Protocols
 - a. Terminal Control Protocol / Internet Protocol (TCP/IP)
packets (email, web pages, file transfers)
 - b. Hyper Text Transfer Protocol (HTTP)
 - c. IP addresses “dotted-quad” 8 bits each, all 0’s or all 1’s = 255
 - d. $8 \times 4 = 32$ bits → 4 billion IP addresses, running out? IPv4 “version 4”
 - e. IPv6 uses 128 bit addresses, many devices are transitioning to...
 - f. Envelope analogy for packets (in-class demo):
 - i. Source IP address
 - ii. Destination IP address
 - iii. sequence #
 - iv. message
 - v. approx. 1500 bytes per packet

g. Port number

| Ports | |
|---------|------|
| Service | Port |
| FTP | 21 |
| SMTP | 25 |
| HTTP | 80 |
| ... | ... |

- h. 1.2.3.4:80 would be a webpage to the IP address 1.2.3.4
- i. In a terminal window:
 - i. ping
 - ii. **Windows:** ipconfig **MAC OS:** ifconfig
- j. URL translates to IP address via a Domain Name Server (DNS)
 - i. DNS servers all around internet
- k. So, inside the packet, a request might look like:
 - i. GET / HTTP/1.1 (or HTTP/2, version 1.1 vs. version 2)
 - ii. Host: www.example.com
- l. And the response might look like:
 - i. HTTP/1.1 200 OK 200 is a status code
 - ii. Where it is resolved, with an **OK**
 - iii. Content-Type: text/html the response that comes back is HTML

| HTTP Status Codes | |
|-------------------|-----------------------|
| Status Code | Description |
| 200 | OK |
| 301 | Moved Permanently |
| 403 | Forbidden |
| 404 | Not Found |
| 500 | Internal Server Error |

Open Google Chrome, and open the Developer Tools panel.

In the Network tab, we can load a site, and see lots of requests.

At the very top, we can see the original request for google.com, and we'll see the Request Headers that we sent, and the Response Headers we got back, the 200 OK code.

iv. For a given page, Developer Tools → Network Tab → load a page → click on a page in the “Name” tab, then look at the tabs:

1. Headers
2. Preview
3. Response

The screenshot shows the Google homepage with the Chrome Developer Tools Network tab active. The Network tab displays a list of network requests. The 'General' tab is selected, showing details for the main request to `www.google.com`. The request URL is `https://www.google.com`, method is GET, status code is 200, and remote address is 172.217.5.228:443. The response headers include `alt-svc`, `cache-control`, `content-length`, `content-type`, `date`, `expires`, `server`, and `set-cookie`. The bottom right corner of the screenshot shows a 'Highlights from the Chrome 88 update' box.

7. Languages

- a. Hyper Text Markup Language (HTML), which is an example of a hypertext language
- b. Cascading Style Sheets (CSS)
- c. Javascript
8. GitHub Repository setup.
9. Scratch lab time for A02.