

# The University of Mississippi

## CSCI 354 Notes

### Useful Unix Commands for Terminal and Cmnd Prompt/ PowerShell

#### Mac

cd Change directory  
ls print all files in the current directory to screen  
pwd print pathname of current directory to screen  
sudo superuser to gain extra security privileges

chown Change ownership  
cp copy one or more files from one location to another  
rm Remove a file  
ping verify IP-level connectivity, send receive packets  
traceroute Show the Path and time for pings  
clear clears the shell of all previous commands  
history Display all command stored in memory  
exit End the current session

#### Windows

cd  
dir  
chdir  
no command, but  
you can open cmnd  
prompt as admin  
\*no equivalent  
copy  
del  
ping  
tracert (Pathping)  
cls  
doskey /h  
exit

#### Web client

vs.

#### Web server

Connect to the web when needed  
Runs a web browser  
Uses HTTP and HTTPS  
Requests pages from a server  
Receives pages

Constantly connected to web  
Runs web server software (Apache)  
Uses HTTP and HTTPS  
Receives requests for pages  
Responds to requests/sends pages

**HTTP** - Hypertext Transfer Protocol – is a set of rules for exchanging files such as text, images, audio, video, and other multimedia on the web.

**HTTPS** - Hypertext Transfer Protocol Secure – relies on **SSL** (Secure Sockets Layer) sometimes called **TLS** (Transport Layer Security) to send information back and forth between a client and server. Both agree on a “code” encryption before passing data.

**TCP** – Transmission Control Protocol – to ensure the integrity of network communications. Breaks files into packets, which contain the files destination and source. Used with IP to transmit files efficiently.

**IP** – Internet Protocol – is a set of rules that controls how data is sent between computers on the net. Passes files to next closest router until it reaches destination.

**IP Address** - Every device connected to the net gets an IP address. This is networks software for addressing. IP Addresses are associated with TCP/IP networking software.

Don't confuse IP with IP addresses, one are the rules the other is a location.

**NIC** – Network Interface Card. Is a hardware address. Essentially a computer circuit card that allows your computer to connect to a network. Every NIC has a **MAC address** (Media Access Control) hard coded when manufactured. MAC addresses are linked to the hardware of network adapters.

Both IP addresses and Mac addresses are needed to send and receive data across networks.

**IPv4** – 32 bit addressing: provides 4.3 billion individual addresses.  
Uses four 1-byte decimal numbers separated by a dot (i.e. 192.168.1.1)  
Googles DNS servers IPv4 addresses are 8.8.8.8 and 8.8.4.4  
Due to a fear that we would run out of IP addresses IPv6 was created.

**IPv6** – 128 bit addressing: Has the capacity to provide an infinite number of addresses.  
Uses hexadecimal numbers separated by colons.  
(i.e. fe80:d4a8:6435:d2d8:d9f3b11)

### **Static IP addresses**

Do not change, which is great for Businesses  
better for dedicated services like mail, FTP and VPN servers.  
good for creating or hosting computer servers.  
easier for geolocation services to accurately assess where you are.

### **VS. Dynamic IP Addresses**

Change as you change locations  
No extra cost  
Geolocation not as accurate

The University has around 50 thousand IP addresses, some are static others are dynamic. There are also public and private (not accessible from normal internet, routers use these to distinguish between different devices - laptop, desktop, phone, etc.. - like in your home) IP addresses.

An IP address can correspond to a **domain name**. They don't have to, but domain names are easier to remember than a string of numbers (E.G. Google, Amazon, etc.). Assigned by request and Costs money also known as a second-level domain name.

**DNS** – Domain Name System – servers can be thought of like a phone book. Associates the text-based domain names with the unique IP address. DNS servers use the domain name you enter to pass your request onto the appropriate IP address. There are several of these around the country and if the one in your vicinity goes down (due to power outage, etc.) it can cause internet delays or worse.

**TLD** – Top-level Domain name – the right most part of the domain name.  
Examples: .com, .gov, .edu, .org, .mil, and .pro (for accountants, physicians, and lawyers)

www is sometimes called the web host server.

The web host server (www) plus domain name (second level domain name) and TLD all together is considered to be a “fully qualified domain name” or **FQDN**

The textbook

### **File Permissions:**

Unix is relatively easy: Files have 4 attributes:

- Directory or file: 1 flag (either a d or -)

- Owner permissions: 3 flags (r, w, x: read, write, execute)

- Group permissions: 3 flags (r, w, x: read, write, execute)

- Other (world) permissions: 3 flags (r, w, x: read, write, execute)

Example: `-rwx---r-x` a file where the Owner has read, write, and execution permissions, Group has no permissions, and the world has read and execute permissions.

You can change these permissions by using the `chmod` command in one of two ways: Symbolic Mode or Absolute Permissions

Symbolic mode: uses + - and = along with the letters u g and o

- + adds the designated permissions

- removes the designated permissions

- = sets the designated permissions

- u is for owner permissions

- g is for group permissions

- o is for other or world permissions

Example: `chmod o+wx` gives the world write and execute

`chmod u-x` removes the owners execute

`chmod g = rx` sets group to read and execute,

removes group write if it had write before

`chmod o+wx, u-x, g = rx` permissions combined in one statement

Absolute Permissions: uses values 0 – 7 for each grouping

- 0 no permissions ---

- 1 execute permissions --x

- 2 write permissions -w-

- 3 execute and write permissions -wx (1 + 2)

- 4 read permissions r--

- 5 read and execute permissions r-x (4 + 1)

- 6 read and write permissions rw- (4 + 2)

- 7 all permissions rwx (4 + 2 + 1)

Example `chmod 755` owner all, group read and execute, other read and execute

### **VERY Useful documentation:**

[devdocs.io](https://devdocs.io) – can be accessed offline, not just for web, but contains multiple API docs to almost every programming language.

[developer.mozilla.org](https://developer.mozilla.org)

w3schools will appear in most google searches, but is frowned upon by many/most front-end web developers

**w3schools**

vs

**developer.mozilla**

easy to use  
quick look up and reference  
very basic concepts  
security holes  
bad practices and poor examples  
not affiliated with w3c  
run by a Norway company

easy to use  
getting better to look up  
best/more in-depth concepts  
no security holes  
proper/best practices  
affiliated with w3c  
founded by Mozilla

**DTD** – Document Type Declaration – this informs the browser that the file contains html, the version of html, and is the first line of code in a html file.

Older versions of html had long DTD's, which most people hated.

HTML4 had 3 possible doctypes: Strict, Transitional, and Frameset

```
<!DOCTYPE HTML PUBLIC  
"-//W3C//DTD HTML 4.01//EN"  
"http://www.w3.org/TR/html4/strict.dtd">
```

The other two are just as long.

It's not very likely, but you could run into a site still using an old html4 DTD

Today, HTML5 doesn't require a reference to a DTD, but simplified the declaration.

```
<!DOCTYPE html>
```

the word "doctype" doesn't have to be in caps but it is the programming convention.