Section 1

Introduction
This Class

- email: bendercommandline@gmail.com
- website: www.cs.umd.edu/command_line
- Meets Fridays from 2-3 in CSIC 3118
- No office hours, but I’m reachable through email
Introduction

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- Faster workflow - typing commands is faster than clicking if you know what you’re doing.
- Composable - small, single-purpose commands can be combined to do powerful things.
Composable Commands

Suppose we have a file called server.log:

72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
128.8.128.160 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
64.4.8.94 "GET /projects/p1.html HTTP/1.0"
72.30.61.37 "GET /projects/p1.html HTTP/1.0"
128.8.128.160 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
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We can combine several Linux commands to do so.
Composable Commands

First, we use the `fgrep` command to choose only lines with the IP address we care about:

```
$ fgrep "72.30.61.37" server.log
```

```
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /projects/p1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw2.html HTTP/1.0"
```
Composable Commands

However, we still have duplicates. We can remove these by first sorting the lines to group identical ones:

```
$ fgrep "72.30.61.37" server.log | sort
```

```
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
72.30.61.37 "GET /hw/hw1.html HTTP/1.0"
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72.30.61.37 "GET /hw/hw2.html HTTP/1.0"
72.30.61.37 "GET /projects/p1.html HTTP/1.0"
```
Composable Commands

Now we just need to remove the duplicates, which is easy using the `uniq` command:

```bash
$ fgrep "72.30.61.37" server.log | sort | uniq

72.30.61.37  "GET /hw/hw1.html HTTP/1.0"
72.30.61.37  "GET /hw/hw2.html HTTP/1.0"
72.30.61.37  "GET /projects/p1.html HTTP/1.0"
```
Section 2

Getting Set Up
Getting to a CLI

There are several ways you can work on a terminal.
Linux: just open up your terminal emulator.
Mac: open the Terminal application. (Some programs may be slightly different).
Windows: download and install Cygwin. (Some programs and behavior may be different).
Getting to a Linux CLI

Use a VM: Download VirtualBox, get a Linux image and install. If you have a Grace/Linuxlab account, or access to a different Linux server, you can SSH into it.

Linux and Mac: use the `ssh` command
Windows: download and install PuTTY

More detailed instructions are on the website.
Section 3

Getting Started
Shells

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There are many different shells, the most common of which is called bash. A shell waits for you to type in commands, and then takes an action or launches a program for you. Any output from the commands is printed back to you. Shells provide extra features to help you do exactly what you want.
Basic Commands

- **date** - output the current date and time
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- `date` - output the current date and time
- `cal` - show a calendar

Commands can take arguments and options: the `-3` option can be added telling `cal` to output the previous, current, and next month. An argument can be passed like `1999` to tell `cal` to show all of 1999. Options and arguments are passed in the same way - adding them to the command - `cal -3` or `cal 1999`
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Section 4

Basic Filesystem Commands
Computers need a way to organize their files
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- When working on the command line, you are in a directory. This is called your "working directory".
Basic Filesystem Commands

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- **ls** - list the files in the given directory, or the current directory if none is given.
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- **ls** - list the files in the given directory, or the current directory if none is given.
- **cd** - change directory - move to a different directory
Referring to files and directories by their full name is inconvenient.
Filesystem Shortcuts

- Referring to files and directories by their full name is inconvenient.
- You can also refer to them by their name relative to your current directory. If you are in `/home/bender/`, then the files `/home/bender/file.txt` and `file.txt` will refer to the same file.
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- There are also special directory names:
  - `/` is the root directory
  - `.` is the current directory
  - `..` is the current directory's parent
  - `~` is your home directory - this is where your current directory starts when you start a shell.
  - `~bender` is user bender’s home directory

As a side note, `/`, `.` and `..` are actual directory names. `~` is a character recognized by your shell, which then replaces it with the home directory of a user or you.
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And if you can’t figure out how to use the man pages, run `man man`. 
Creating Files

There are many ways to create and edit files via the command line. For now, we will briefly cover text editors.

There are many text editors, such as emacs and vim, but the easiest to use is probably nano.

Open a file with `$ nano file.txt`, edit it, and save it. There are much better text editors out there, but for now this is the simplest.
More Basic Commands - `cat`

`cat` - **catenate** file - prints the contents of a file
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```bash
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If no arguments are given, `cat` reads the user’s input and outputs that
Basic Filesystem Commands

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`cat` - *concatenate* file - prints the contents of a file

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The `-n` option to `cat` adds line numbers to the output
More Basic Commands - `cp`

`cp` - copy file to make a duplicate

```bash
$ cp source.txt dest.txt
```

If `dest.txt` already exists, then it will be overwritten, unless the `-n` (no clobber) flag is set, in which case no copy happens, or the `-i` (interactive) flag is given, in which case `cp` will ask what you want to do.

The `-r` will recursively copy a directory and all files and subdirectories:

```bash
$ cp -r source-dir dest-dir
```
More Basic Commands - `cp`

`cp` - **copy** file to make a duplicate

```bash
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copies the file `source.txt` to the file `dest.txt` if `dest.txt` already exists, then it will be overwritten, unless the `-n` (no clobber) flag is set, in which case no copy happens, or the `-i` (interactive) flag is given, in which case `cp` will ask what you want to do.

The `-r` will recursively copy a directory and all files and subdirectories rooted there:

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Matthew Bender (2015)
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**More Basic Commands - mv**

`mv` - move or rename files

Like `cp`, `mv` supports the `-n` and `-i` options to deal with existing destination files.

Unlike `cp`, no `-r` flag is needed to deal with directories. Just do `$ mv source-dir dest-dir`, but note different things will happen based on if `dest-dir` already exists!
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Unlike cp, no -r flag is needed to deal with directories. Just do $ mv source-dir dest-dir, but note different things will happen based on if dest-dir already exists!
rm - remove files

$ rm file1 file2 file3

Remove each file given as an argument. Be careful! Once you do this, they are gone forever. rm supports the -i flag to ask if you're sure before you delete the file. It also supports the -f flag to force removal of a file, overriding an earlier -i flag.

rm also supports the -r flag to recursively delete a directory and all its contents. BE VERY CAREFUL WITH THIS:

rm -rf dir will completely remove dir and all of its contents without asking - this is very dangerous.
More Basic Commands - `rm`

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