

07-131 Great Practical Ideas in Computer Science

...

<https://www.cs.cmu.edu/~07131>

Slides by beloved previous head TA David Hashe

Dog tax



GOALS

- ▶ To teach you about all the awesome things you can do with your computer.
- ▶ To make you super comfortable using Unix systems and the tools you'll use in future courses
- ▶ ...and in future internships
- ▶ To be a **fun** break from your other classes



CMU CS IS... NON TRIVIAL

Our job is to help you learn how to use the **tools** to succeed in life...not to make you more stressed!

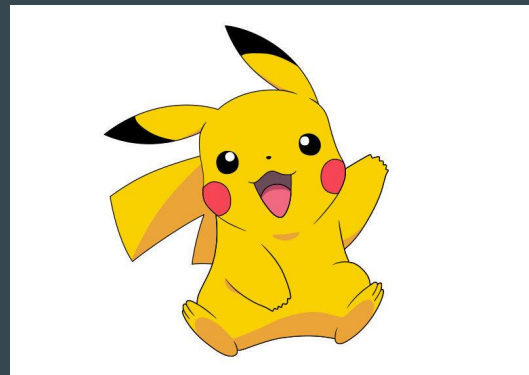


Class Time

- ▶ < 20 minute lectures (usually)
- ▶ Work on the labs **in class** in breakout rooms with TA's help!
- ▶ Labs are due in a week, but most people finish in class!

Labs

- ▶ Mostly unix interactive themed puzzles!
- ▶ Distributed through git  **git**
- ▶ Each lab is released at class time
- ▶ Submitted on autolab 
- ▶ Late policy: make a private post on Piazza. We're extremely lenient.



Collaboration Policy

You may:

- use manual (man) pages for commands in question.
- use Google to learn how to use a command/solve a problem.
- ask TAs for help.
- post on Piazza

You may not:

- Ask your neighbor how to do the (entire) lab

Exams

- ▶ TBD: Will let you know as we approach them
- ▶ One midterm and a comprehensive final

Extratations

- ▶ Extra lectures on weekends about miscellaneous **fun** topics
- ▶ Room and times will be posted on Piazza. Attend online or in-person
- ▶ If you attend at least three extratations, you can use your midterm grade as your final grade (or vice versa) you can get out of taking an extra final!



Grading

- ▶ 80% labs (...which will be done in class)
 - Each lab includes several tasks
 - Complete all tasks to receive full points
 - No late work penalty, but must let us know beforehand!
- ▶ 10% midterm
- ▶ 10% final

Do the assignments!

 There will be around 8 assignments with equal weight, so each assignment is 10% of your total grade

Getting Help

- ▶ Piazza
- ▶ Course Website (<https://www.cs.cmu.edu/~07131>)
- ▶ Office hours - we don't bite!
- ▶ Lecture make-up sessions for those in different timezones.

QUESTIONS?



Website and Autolab tour

Terminal 101

What is a terminal?

Used to be a solid hunk of hardware

Program that captures input, and displays output from commands

It's a text input/output environment



```
kessler — bash — 130x31
Last login: Thu Jul 12 14:06:05 on ttys004
Tophers-Laptop:~ kessler% find ~/Library/Preferences -name "*.lockfile"
/Users/kessler/Library/Preferences/AdobeUse.plist.lockfile
/Users/kessler/Library/Preferences/ADSHigrateAgent.plist.lockfile
/Users/kessler/Library/Preferences/at.obdev.LittleSnitchConfiguration.plist.lockfile
/Users/kessler/Library/Preferences/at.obdev.LittleSnitchNetworkMonitor.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/.GlobalPreferences.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/Installer.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/MicrosoftCommunicatorRegistrationDB.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/MicrosoftRegistrationDB.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/Safari Webpage Preview Fetcher.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/ByHost/vine.loader.B3D2F9B9-0B8C-5074-8E7B-62C463FA9D91.plist.lockfile
/Users/kessler/Library/Preferences/com.tanogage.mactracker.plist.lockfile
/Users/kessler/Library/Preferences/com.adobe.AdobeOnlineHelp.plist.lockfile
/Users/kessler/Library/Preferences/com.adobe.CSXPReferences.plist.lockfile
/Users/kessler/Library/Preferences/com.adobe.illustrator.plist.lockfile
/Users/kessler/Library/Preferences/com.adobe.mediabrowser.plist.lockfile
/Users/kessler/Library/Preferences/com.adobe.Photoshop.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.ActivityMonitor.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.AddressBook.abd.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.AddressBook.plist.lockfile
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/Users/kessler/Library/Preferences/com.apple.AddressBookSourceSync.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.adminframework.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.airport.airportutility.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.applescript.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.applesseed.Feedback-Assistant.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.appstore.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.archiveutility.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.audio.AudioMIDISetup.plist.lockfile
/Users/kessler/Library/Preferences/com.apple.audio.audlab.plist.lockfile
```


What is a shell?

A terminal interacts directly with the **shell**.

A shell is an interface that executes **custom commands** which directly affect the computer. (file/process management, processing, monitoring)

Most computers use **bash**.



What are commands?

You can start programs, move files around, and a lot more with the shell using **commands**.

A typical command structure:

Command_name <flags/options> <arguments>

Demo

1. Just command name **cal**
 - a. Enter to run the command
2. With options **cal -h**
3. With options **cal -3**
4. With arguments **cal 1997**

For Info

man fortune

SSH'ing into the Andrew Machines

This is also covered in the initial setup directions:

<http://www.cs.cmu.edu/~07131/f19/initial-setup/>

```
~ $ ssh andrew
```

```
~ $ ssh ashekar1@unix.andrew.cmu.edu
```

Enter password when prompted. Same password you use to log into SIO, Gmail, etc.

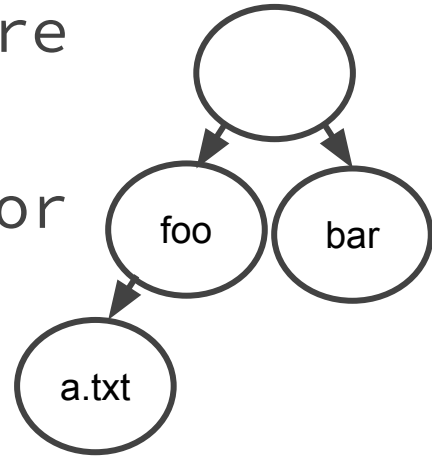
Wait, what is SSH?

SSH stands for “Secure SHell”. It’s a fancy way to get a shell on a computer over the internet.

When you use SSH, you are running commands on a computer that is not your laptop.

The Filesystem

The filesystem is a **tree**, where all **files** are leaves, and **folders** may be either leaves or not.

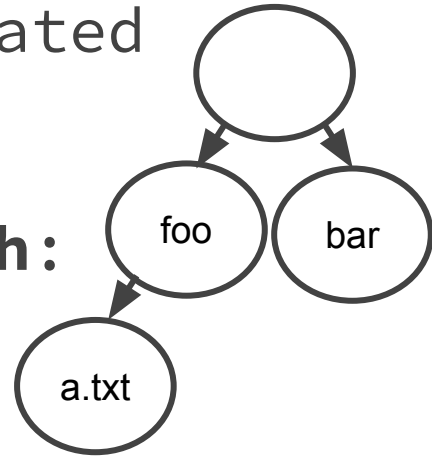


The Filesystem

In Unix, file paths are separated with the **forward slash**, “/”.

So a.txt has the **absolute path**:

/foo/a.txt

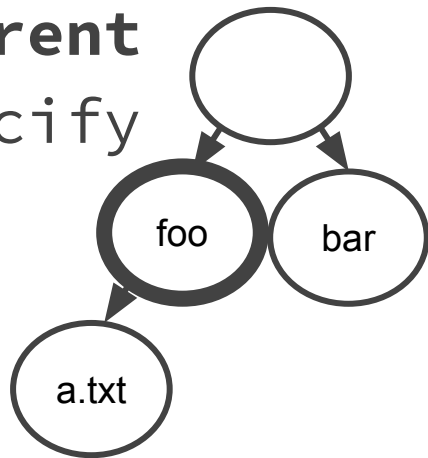


The Filesystem

In Unix, we also have the **current working directory**. We can specify **relative paths** around this.

If the CWD is `/foo`, `a.txt` is at:

`./a.txt`

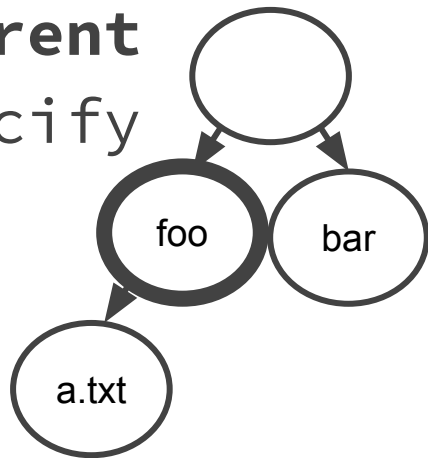


The Filesystem

In Unix, we also have the **current working directory**. We can specify **relative paths** around this.

If the CWD is `/foo`, `bar` is at:

`../bar`

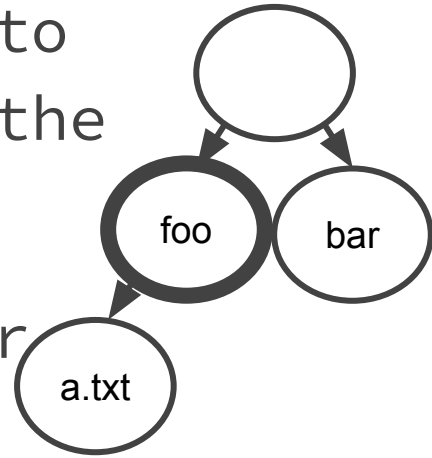


The Filesystem

For relative paths, `.` refers to the CWD, and `..` means “go to the parent”.

As a shortcut, `..` is short for `./..`.

`~` is a shortcut for your home directory



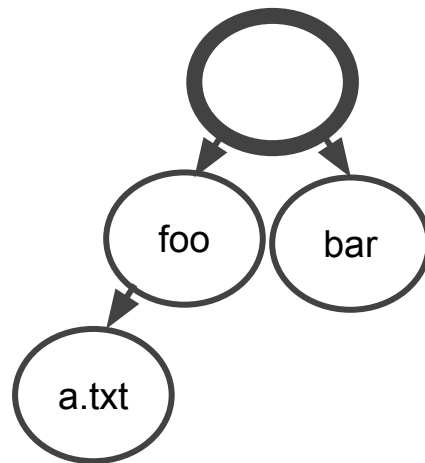
Seeing where you are in the Filesystem

```
/ $ ls
```

```
foo bar
```

```
/ $ tree
```

```
.  
├── bar  
└── foo  
    └── a.txt
```



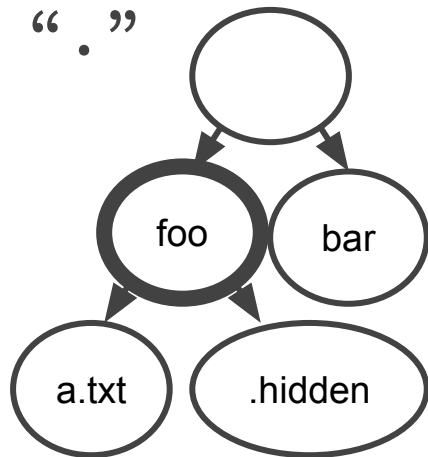
Hidden Files

In Unix, files beginning with “.” are considered “hidden”, and don’t show up by default.

Use the `-a` flag to `ls` to see hidden files:

```
/foo $ ls -a
```

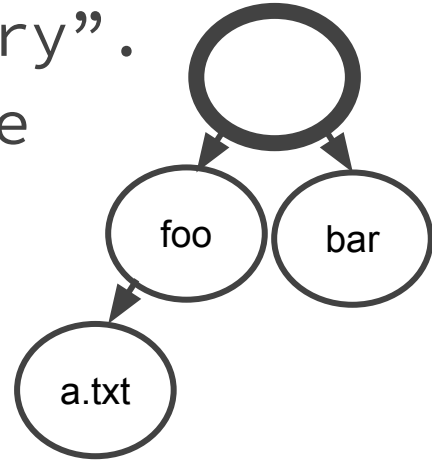
```
a.txt  .hidden
```



Moving around in the Filesystem

cd stands for “change directory”.
Give it a relative or absolute
path to change where you are.

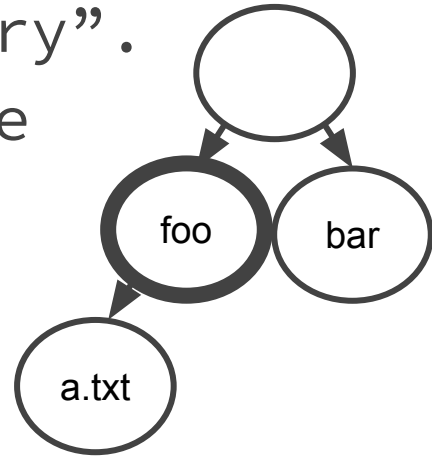
```
/ $ cd ./bar
```



Moving around in the Filesystem

`cd` stands for “change directory”.
Give it a relative or absolute
path to change where you are.

`/bar $`



Interacting with Files and Directories

	file	directory	
create/make	touch	mkdir	<target>
copy	cp	cp -r	<src> <dst>
rename/move	mv	mv	<src> <dst>
delete/remove	rm	rm -r	<target>

IMPORTANT!!!

Unix is like a honey badger, **it don't care** if you make a mistake.

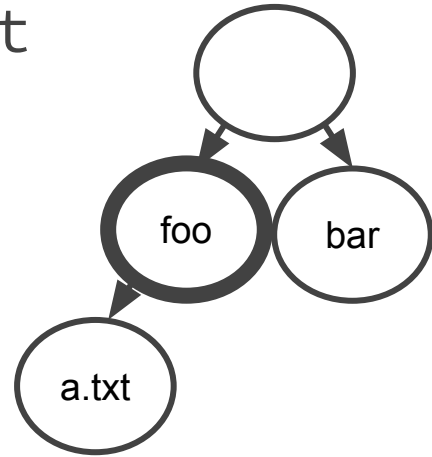
There is no undo.

Please “`rm -r`” responsibly.



Example: Copying a file

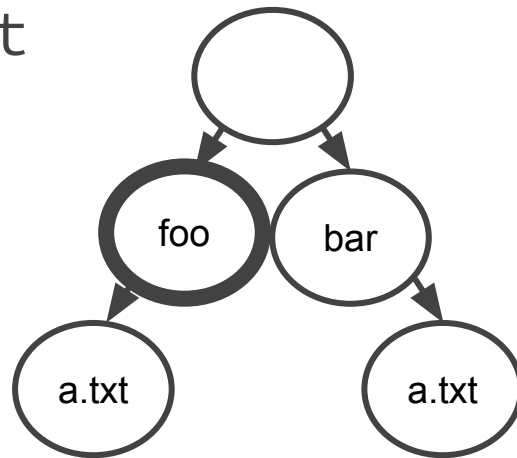
```
/foo $ cp ./a.txt ../bar/a.txt
```



Example: Copying a file

```
/foo $ cp ./a.txt ../bar/a.txt
```

‘./a.txt’ → ‘../bar/a.txt’



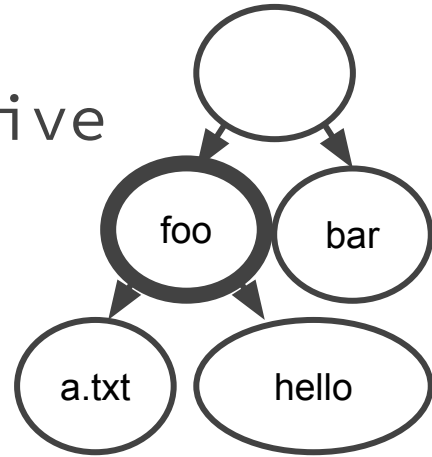
Executing programs

You can run programs by just using their absolute or relative path.

```
/foo $ ./hello
```

```
hello world!
```

NOTE: The `./` is required.

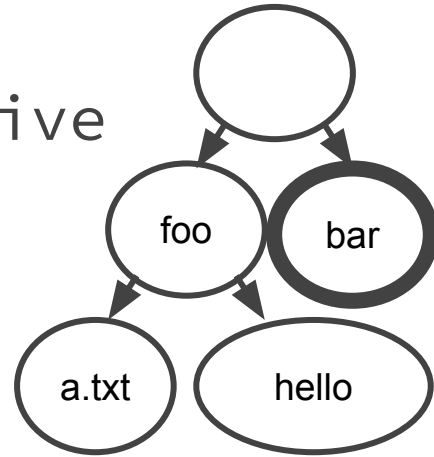


Executing programs

You can run programs by just using their absolute or relative path.

```
/bar $ ../foo/hello
```

```
hello world!
```



Why use a text-based terminal instead of a GUI?

Lots of reasons:

More efficient!

Moving batch stuff around!

Street cred!

Only way to do 15-122,15-150,...

Recap

The shell is cool, don't be scared

It's a way to interact with the underlying system

Common Questions from Last Year

— — —

- Make sure you capture pokemon with your pokeball....not yourself. Pokeballs don't work on humans
- Be careful! If you `mv <src> <dst>` and if `<dst>` is not a directory, it will rename the file.
- What can do to make pidgey unhidden? What makes a file hidden? Maybe try renaming?
- When you finish the lab, make sure to run the `scp` command from your local computer, not Andrew. You can exit the Andrew machine by typing the command 'exit' or pressing `ctrl-d`
- When you run the ``make`` command, make sure you current working directory is `trainerlab`, not `gates-hillman-center`
- If you're using Ubuntu for Windows the Downloads folder on your local drive is `/mnt/c/Users/<username>/Downloads`
 - You would have to `cp` it again so that it is accessible