07-131 Great Practical Ideas in Computer Science

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

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

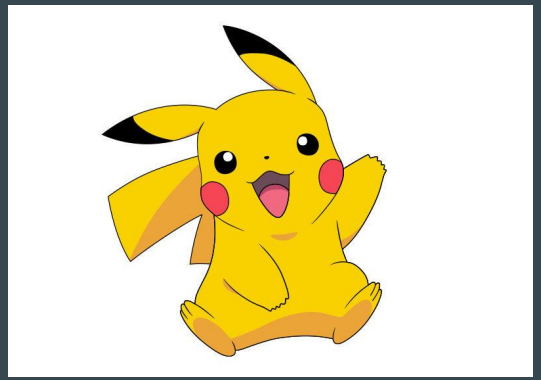
Our job is to help you learn how to use the **tools** to succeed in life...not to make you more stressed!

Class Time

- ▶️ < 20 minute lectures (usually)
- ▶️ Work on the labs!

Labs

- Mostly unix puzzles (they're themed!)
- Distributed through git
- Submitted on autolab
- Late policy: send us an email.. 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 lab

Exams

- ▶️ In class, written and multiple choice
- ▶️ One midterm and a comprehensive final

Extratations

▶️ Extra lectures on the weekends about miscellaneous topics

▶️ Room and times will be posted on Piazza

▶️ If you attend at least three extratations, you can use your midterm grade as your final grade (or vice versa). This means you can get out of taking the final!

Grading

- ▶️ 80% homework (...which will be done in class)
- ▶️ 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!)

QUESTIONS?

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Website and Autolab tour

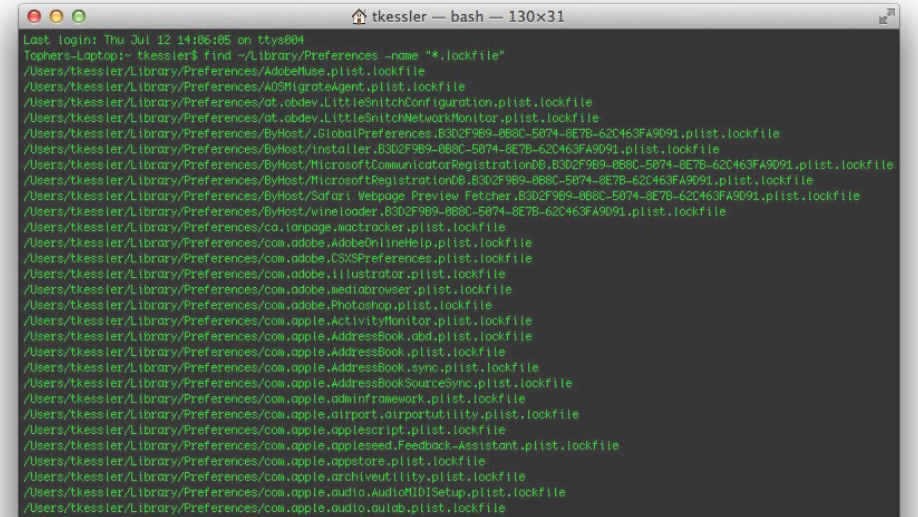
Bash 101

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 envrionment



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 dhashe@unix.andrew.cmu.edu
```

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

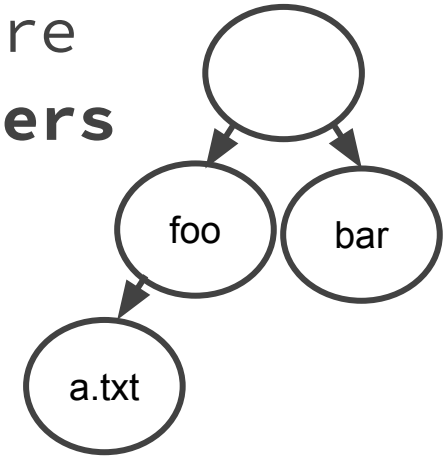
Wait, what is SSH?

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 leafs, and **folders** may be either leafs or not.

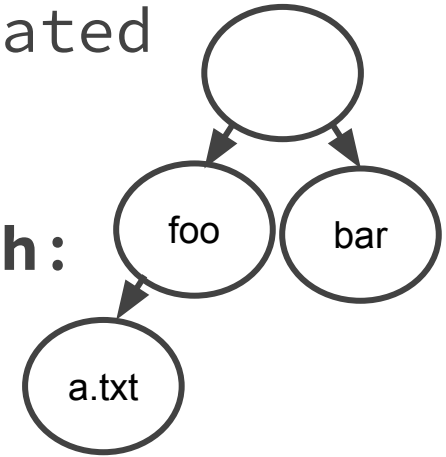


The Filesystem

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

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

/foo/a.txt

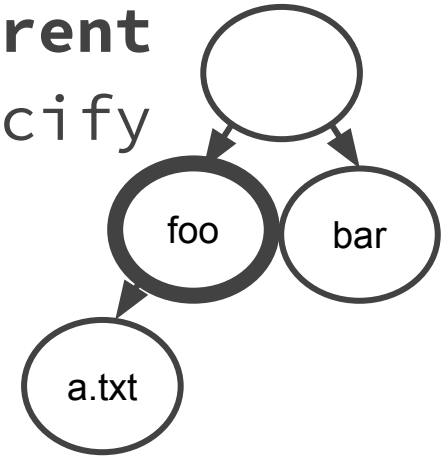


The Filesystem

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

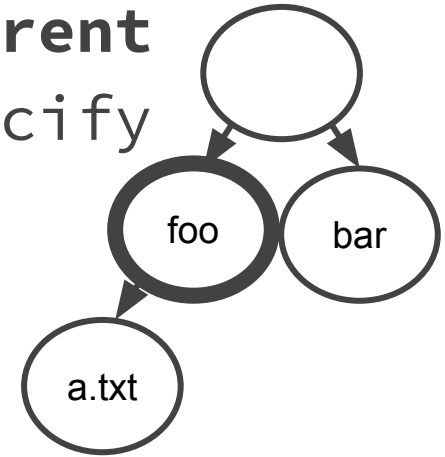


The Filesystem

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

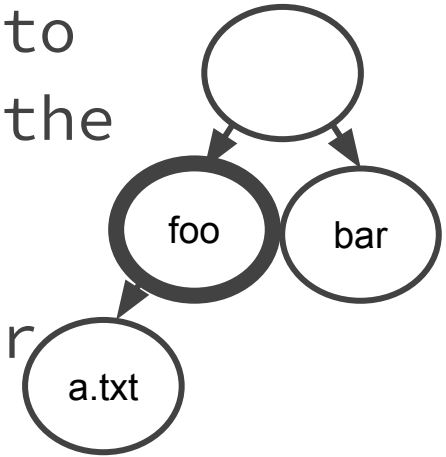


The Filesystem

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

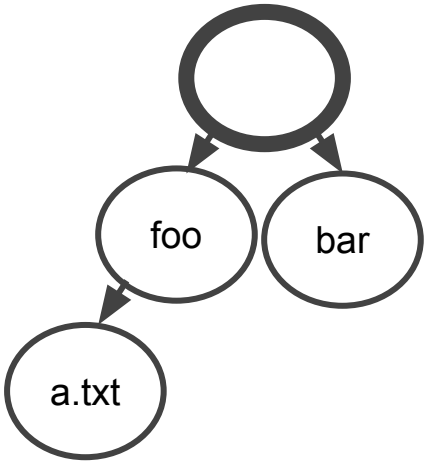
As a shortcut, .. is short for ./..

~ is a shortcut for your home directory



Seeing where you are in the Filesystem

```
---
/ $ ls
foo  bar
/ $ tree
.
├── bar
└── foo
    └── a.txt
```



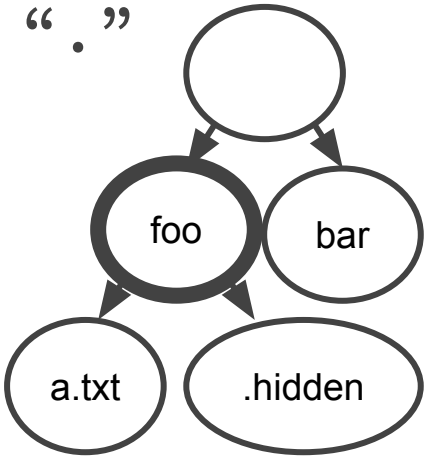
Hidden Files

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
```

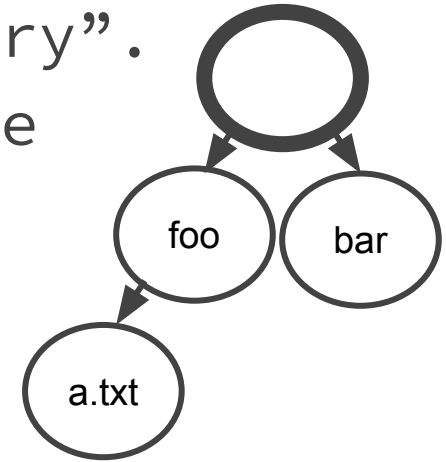


Moving around in the Filesystem

---

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

/ $ cd ./bar



Moving around in the Filesystem

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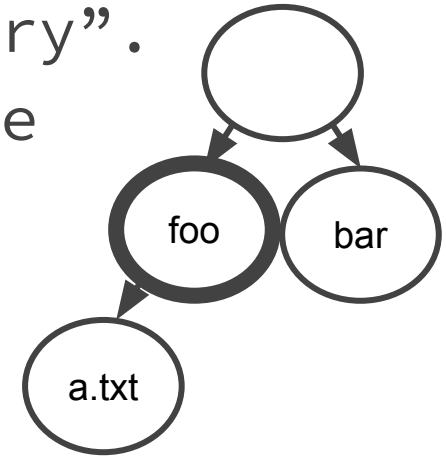
cd stands for “change directory”.
Give it a relative or absolute
path to change where you are.

/bar $



Interacting with Files and Directories

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	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!!!

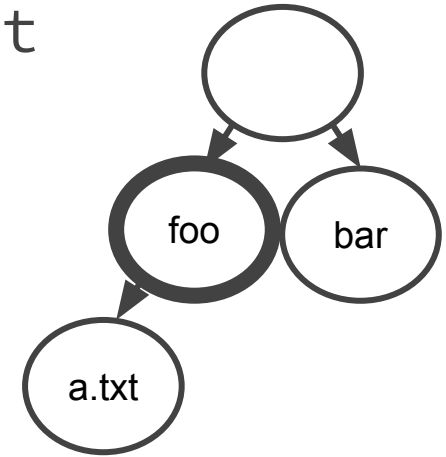
Unix is like a honey badger, **it don’t care** if you make a mistake.

There is no undo.

Please “rm -r” responsibly.

Example: Copying a file

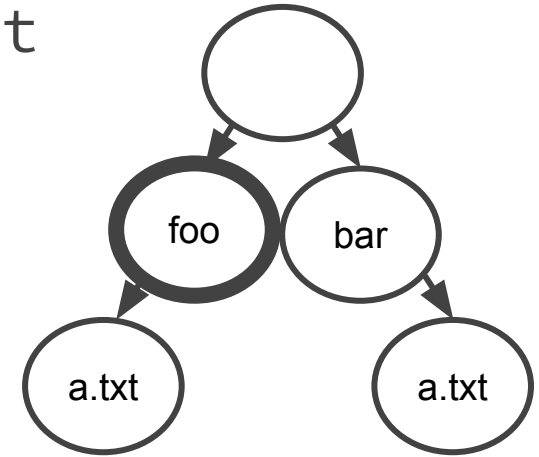
```
/foo $ cp ./a.txt ../bar/a.txt
```



Example: Copying a file

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

‘./a.txt’ -> ‘../bar/a.txt’
```



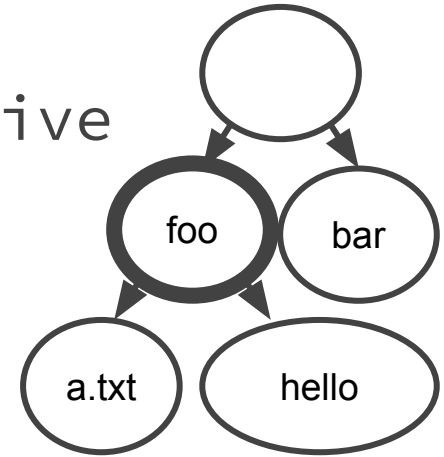
Executing programs

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

```
/foo $ ./hello

hello world!
```

NOTE: The ./ is required.

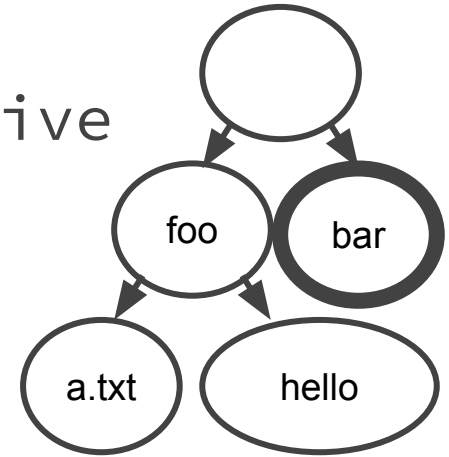


Executing programs

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