

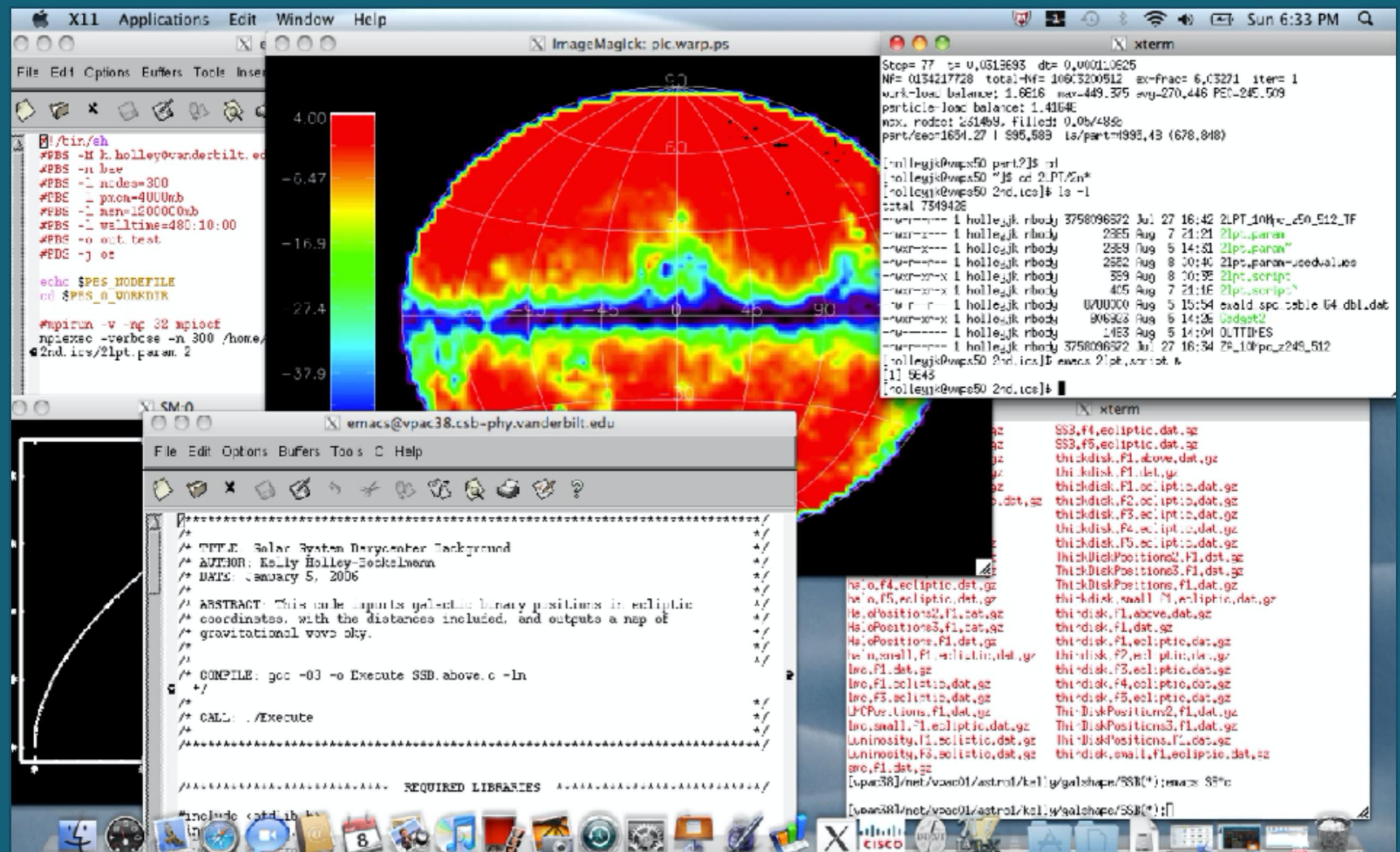
# Unix tips and tricks



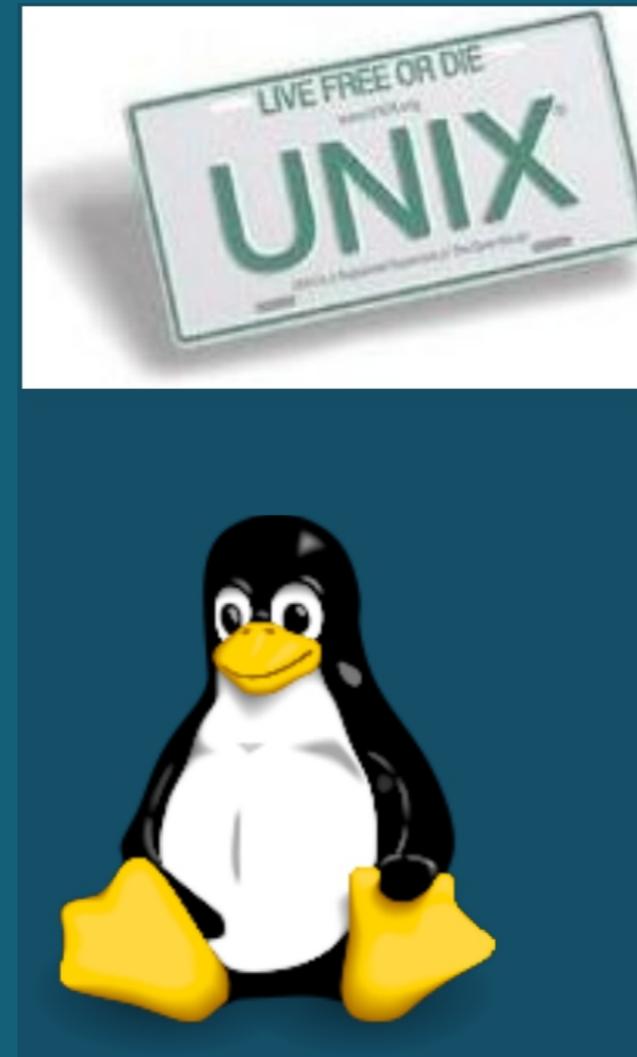
# Most real science is not done by GUI



# A typical science session



# Scientific workstations use a UNIX-based operating system



# Bash shell

Program whose primary purpose is to read commands and run other programs.

Pros: high action-to-keystroke ratio,  
automating repetitive tasks, accessing  
network machines

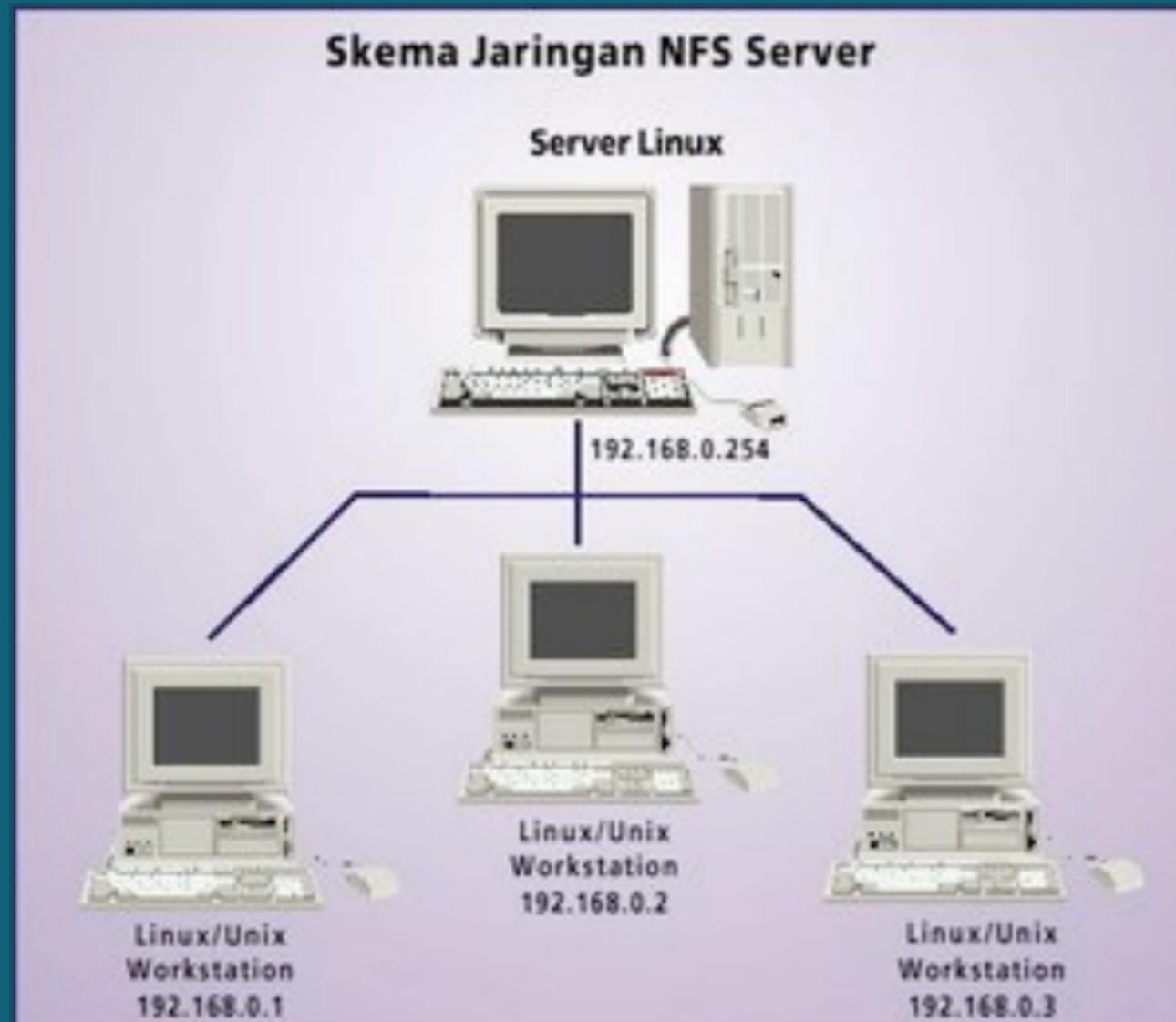
Cons: Cryptic commands

# Bash shell

It all starts with a \$

If the shell can't find a program whose name is  
the command you typed the error message  
will read 'command not found'

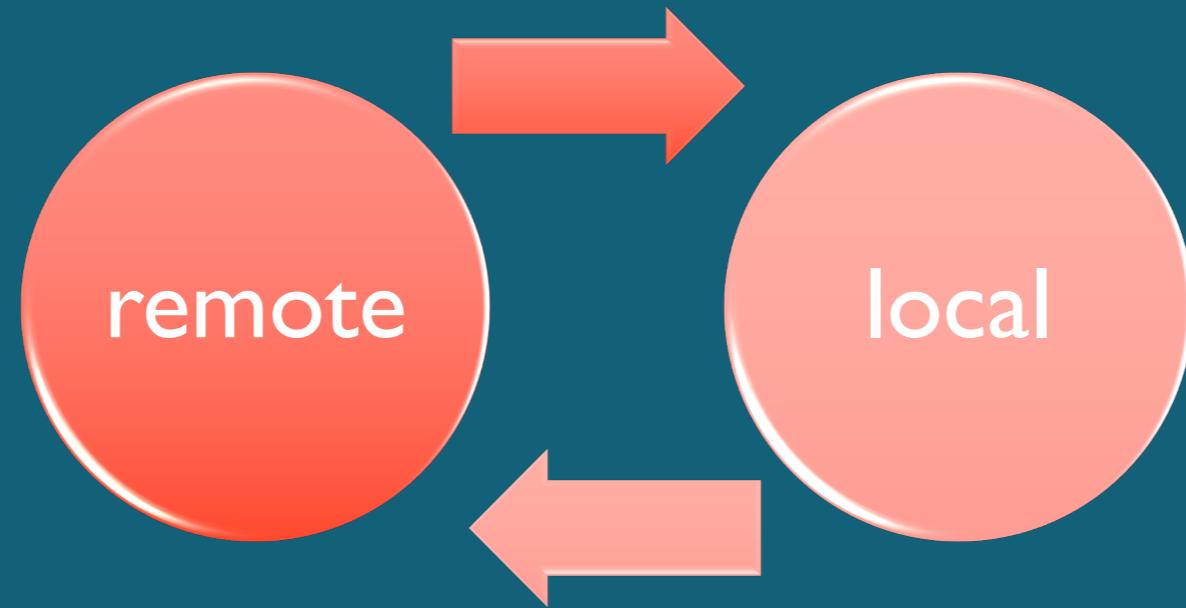




When you ssh into the vpac/accre network, you go to your home directory. Your directory can be accessed through any of these network machines. And, you can (theoretically) access data on other user's accounts, too.

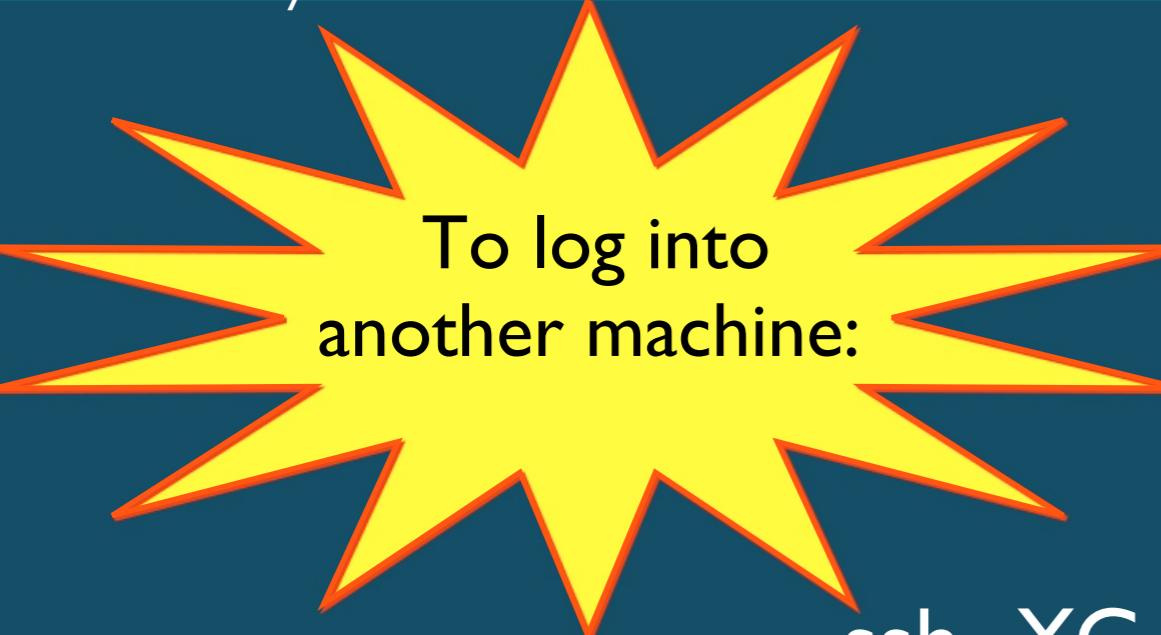
# SCP

## secure copy protocol



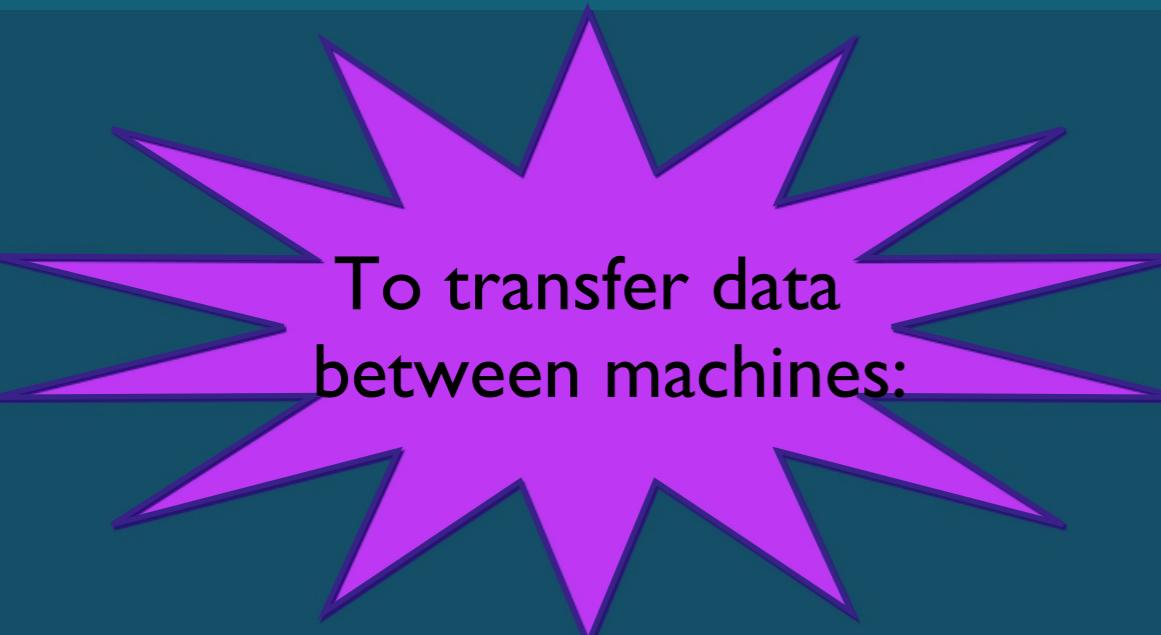
~ stands for home dir (make sure you're in the right place!)

Use \* wildcard to grab multiple files that meet some condition



To log into  
another machine:

ssh -YC username@computer's whole address  
example: ssh -YC holleyjk@vpac03.phy.vanderbilt.edu



To transfer data  
between machines:

scp -pr complete path of file you  
want to move complete path  
describing where you want to put it

example 1: scp -pr holleyjk@vpac03.phy.vanderbilt.edu:/home/holleyjk/superfile  
/Users/kelly/Desktop/superfile.moo

example 2: scp -pr /Users/kelly/awesomefile  
holleyjk@vmplogin.accre.vanderbilt.edu:/home/holleyjk/.

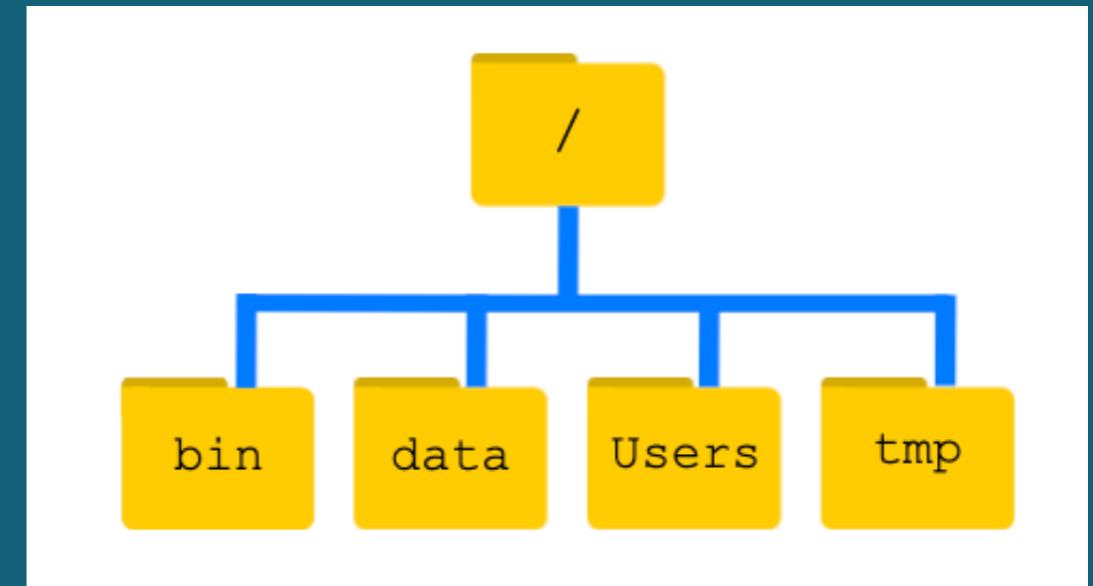
# Bash shell

/ is the root dir

Otherwise it's a path  
separator (opposite of  
Windows)

Absolute (from root) vs  
relative path (from  
current location)

.. & . are special dirs.



# Getting around the directory tree

- `ls` → lists content of directory
- `pwd` → reports current directory
- `cd 'blah'` → change directory to ‘blah’
- `mkdir 'blah'` → make directory ‘blah’
- `rmdir 'blah'` → remove directory ‘blah’

*Practice: make a subdirectory ‘bootcamp’ on vpac38 and scp your laptop’s awesomefile1.mp4 into it.*

*Practice: copy /home/holleyjk/bootcamp/2016/Cheatsheet to your vpac home directory*

Feel the power: adding tags to your command can customize it.

**ls** → lists content of directory

**ls -l** long format

**ls -a** list all files

**ls -lhS** long format, file size is ‘human readable’, sorted by file size

```
total 101M
-rw-r--r-- 1 holleyjk astro 58M May 17 10:30 hdf5-1.8.4-patch1.tar
-rw----- 1 holleyjk astro 6.7M May 17 11:11 king_snap.dat
-rw----- 1 holleyjk astro 6.3M Aug 10 2009 mri.pdf
-rw----- 1 holleyjk astro 3.4M Jul 21 18:24 100719_Yaqiongcareerproposal.doc
-rw----- 1 holleyjk astro 2.6M Jan 1 2010 merger_44_20_2366.png
```

*Practice: Find out when holleyjk last modified the file .cshrc on in their home directory.*

# But how do I know the secret tags for each command?

man command

man intro is a good  
place to start!

```
LS(1) User Commands LS(1)

NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the files (the current directory by default),
    Sort entries alphabetically if none of -rflvSUX nor --sort.

    Mandatory arguments to long options are mandatory for short options too.

    -a, --all
        do not ignore entries starting with .

    -A, --almost-all
        do not list implied . and ..

    --author
        with -l, print the author of each file

    -b, --escape
        print octal escapes for nongraphic characters

    -block-size=SIZE
        use SIZE-byte blocks

    -B, --ignore-backups
        do not list implied entries ending with ~

    -c            with -ltt sort by, and show, ctime (time of last modification of
                 file status information) with l: show ctime and sort by name
                 otherwise: sort by ctime

    -C            list entries by columns
```

# Manipulating files

- `cp file1 file2` → copy ‘file1’ to ‘file2’
- `mv file1 file2` → move ‘file1’ to ‘file2’
- `rm ‘blah’` → remove file ‘blah’

\*Terminal has no trash bin!

Remember:

~ means /home/username/

. means the current directory

.. means go back 1 directory

\* means wildcard

# Some more commands

- `rm -rf` for directories (careful!)
- Maybe make `rm` interactive using `rm -i` in `~/.aliases`
- `history`
- Unpack files from arXiv : `tar -xvf <filename>`

Translate this:

- cp ~/\*.sm ..
- mv ..density.sm ~/bootcamp/dense.s
- rm \*

*Practice: Copy the file ‘cshrc.play’ from the home directory for user holleyjk and put it in your home directory, but call it cshrc.holleyjk*

*Also copy alias from user holleyjk’s bootcamp directory, and rename it alias.holleyjk*

# Your data is protected by file permissions

Aside: How did I get this list?

user  
permissions  
r=Read  
w=Write  
x=eXecute

xterm

-rw-----	1	holleyjk	astro	28672	Oct 14	2009	sesaps 09	program.xls
drwxr-xr-x	3	holleyjk	astro	4096	May 17	10:42	share	
-rw-r--r--	1	holleyjk	astro	14176	Jul 6	16:42	sig.khb.jpeg	
-rw-r--r--	1	holleyjk	astro	13717	Jul 6	16:46	sig.khb.pdf	
-rw-----	1	holleyjk	astro	21470	Jun 10	14:56	sinha_69.pdf	
-rw-----	1	holleyjk	astro	230880	May 28	15:08	SMD-10-1678_Holley-Bokelmann	.pdf
drwx-----	4	holleyjk	astro	4096	May 13	2009	smooth.2.01	
-rw-ruxrwx	1	holleyjk	astro	407473	Jan 25	2010	starcounts.dat.gz	
-rw-----	1	holleyjk	astro	407478	Jan 23	2010	starcounts.orig.dat.gz	
-rw-----	1	holleyjk	astro	79428	Jun 15	13:30	stassun_career_report_2009.P	df
-rw-r--r--	1	holleyjk	astro	8	Jun 1	14:16	TAR.proposal.aux	
-rw-r--r--	1	holleyjk	astro	7436	Jun 1	14:16	TAR.proposal.dvi	
-rw-r--r--	1	holleyjk	astro	3674	Jun 1	14:16	TAR.proposal.log	
-rw-r--r--	1	holleyjk	astro	26545	Jun 1	14:16	TAR.proposal.pdf	
-rw-r--r--	1	holleyjk	astro	72587	Jun 1	14:16	TAR.proposal.ps	
-rw-----	1	holleyjk	astro	6086	Jun 1	14:16	TAR.proposal.tex	
drwx-----	6	holleyjk	astro	4096	Sep 21	2007	tibs2107	
drwx-----	5	holleyjk	astro	4096	Feb 2	2009	tipsy-2.2.3c	
drwx-----	2	holleyjk	astro	4096	Mar 27	2008	TRS	
drwx-----	3	holleyjk	astro	4096	Mar 5	2008	web	
-rw-----	1	holleyjk	astro	33280	Jul 21	18:23	YaqiongSummary.doc	
drwxr-xr-x	15	holleyjk	astro	4096	May 17	16:48	yt	
-rw-----	1	holleyjk	astro	798679	Jun 14	11:03	Zampieri,2009,MNRAS,400,677.	pdf
drwxr-xr-x	12	holleyjk	astro	4096	May 17	10:42	zlib-1.2.5	

# Your data is protected by file permissions

group  
permissions  
r=Read  
w=Write  
x=eXecute

xterm

-rw-----	1	holleyjk	astro	28672	Oct 14	2009	sesaps 09	program.xls
drwxr-xr-x	3	holleyjk	astro	4096	May 17	10:42	share	
-rw-r--r--	1	holleyjk	astro	14176	Jul 6	16:42	sig.khb.jpeg	
-rw-r--r--	1	holleyjk	astro	13717	Jul 6	16:46	sig.khb.pdf	
-rw-----	1	holleyjk	astro	21470	Jun 10	14:56	sinha_69.pdf	
-rw-----	1	holleyjk	astro	230880	May 28	15:08	SMD-10-1678_Holley-Bokelmann	.pdf
drwx-----	4	holleyjk	astro	4096	May 13	2009	smooth.2.01	
-rw-ruxrwx	1	holleyjk	astro	407473	Jan 25	2010	starcounts.dat.gz	
-rw-----	1	holleyjk	astro	407478	Jan 23	2010	starcounts.orig.dat.gz	
df	1	holleyjk	astro	79428	Jun 15	13:30	stassun_career_report_2009.P	
-rw-r--r--	1	holleyjk	astro	8	Jun 1	14:16	TAR.proposal.aux	
-rw-r--r--	1	holleyjk	astro	7436	Jun 1	14:16	TAR.proposal.dvi	
-rw-r--r--	1	holleyjk	astro	3674	Jun 1	14:16	TAR.proposal.log	
-rw-r--r--	1	holleyjk	astro	26545	Jun 1	14:16	TAR.proposal.pdf	
-rw-r--r--	1	holleyjk	astro	72587	Jun 1	14:16	TAR.proposal.ps	
-rw-----	1	holleyjk	astro	6086	Jun 1	14:16	TAR.proposal.tex	
drwx-----	6	holleyjk	astro	4096	Sep 21	2007	tibs2107	
drwx-----	5	holleyjk	astro	4096	Feb 2	2009	tipsy-2.2.3c	
drwx-----	2	holleyjk	astro	4096	Mar 27	2008	TRS	
drwx-----	3	holleyjk	astro	4096	Mar 5	2008	web	
-rw-----	1	holleyjk	astro	33280	Jul 21	18:23	YaqiongSummary.doc	
drwxr-xr-x	15	holleyjk	astro	4096	May 17	16:48	yt	
-rw-----	1	holleyjk	astro	798679	Jun 14	11:03	Zampieri,2009,MNRAS,400,677.	.pdf
drwxr-xr-x	12	holleyjk	astro	4096	May 17	10:42	zlib-1.2.5	

# Your data is protected by file permissions

other  
permissions  
r=Read  
w=Write  
x=eXecute

xterm			
-rw-----	1	holleyjk astro	28672 Oct 14 2009 sesaps 09 program.xls
drwxr-xr-x	3	holleyjk astro	4096 May 17 10:42 share
-rw-r--r--	1	holleyjk astro	14176 Jul 6 16:42 sig.khb.jpeg
-rw-r--r--	1	holleyjk astro	13717 Jul 6 16:46 sig.khb.pdf
-rw-----	1	holleyjk astro	21470 Jun 10 14:56 sinha_69.pdf
-rw-----	1	holleyjk astro	230880 May 28 15:08 SMD-10-1678_Holley-Bokelmann.pdf
drwx-----	4	holleyjk astro	4096 May 13 2009 smooth.2.01
-rw-ruxrwx	1	holleyjk astro	407473 Jan 25 2010 starcounts.dat.gz
-rw-----	1	holleyjk astro	407478 Jan 23 2010 starcounts.orig.dat.gz
-rw-----	1	holleyjk astro	79428 Jun 15 13:30 stassun_career_report_2009.PDF
-rw-r--r--	1	holleyjk astro	8 Jun 1 14:16 TAR.proposal.aux
-rw-r--r--	1	holleyjk astro	7436 Jun 1 14:16 TAR.proposal.dvi
-rw-r--r--	1	holleyjk astro	3674 Jun 1 14:16 TAR.proposal.log
-rw-r--r--	1	holleyjk astro	26545 Jun 1 14:16 TAR.proposal.pdf
-rw-r--r--	1	holleyjk astro	72587 Jun 1 14:16 TAR.proposal.ps
-rw-----	1	holleyjk astro	6086 Jun 1 14:16 TAR.proposal.tex
drwx-----	6	holleyjk astro	4096 Sep 21 2007 tibs2107
drwx-----	5	holleyjk astro	4096 Feb 2 2009 tipsy-2.2.3c
drwx-----	2	holleyjk astro	4096 Mar 27 2008 TRS
drwx-----	3	holleyjk astro	4096 Mar 5 2008 web
-rw-----	1	holleyjk astro	33280 Jul 21 18:23 YaqiongSummary.doc
drwxr-xr-x	15	holleyjk astro	4096 May 17 16:48 yt
-rw-----	1	holleyjk astro	798679 Jun 14 11:03 Zampieri,2009,MNRAS,400,677.pdf
drwxr-xr-x	12	holleyjk astro	4096 May 17 10:42 zlib-1.2.5

# To change permissions:

`chmod ugo+/-rwx filename`

Example: `chmod go+r pro*.dat`

Advanced: `chgrp -R <group> <directory>`

changes the group ownership of a directory (R=recursively).  
Have to be admin or be member of both groups

## Taking a peek at a file:

- `head -n50 file` → displays first 50 lines of file
- `tail -n12 file` → displays last 12 lines of file
- `more file` → scrolls through file page by page
  - Enter to scroll line by line or Spacebar to scroll "page by page"
- `less file` → a better version of more

*Practice: figure out what is the last line in  
~/.alias.holleyjk*

Is the file compressed? **gunzip file**

Looking for a file? Try **find . -iname file**

What jobs are running in your shell? **ps**  
...on your machine? **htop**

Need to kill a job? **kill -9 PID**

Need to count lines in a file? **wc -l file**

Smoosh files into | **cat file1 file2 > smooshfile**

Split file into many of N bytes **split -b N file**

# String commands together with pipes :

try these:

```
ls -l /home/holleyjk | less
```

```
ps aux | grep username
```

the possibilities are huge!

**Q. List the first 5 most recently modified files in a directory in human readable format**

**Steps:**

1. list all the files in the directory
2. list them by modification time, most recent first
3. display that list in human readable format
4. display only the top 5 in that list

**Q. List the first 5 most recently modified files in a directory  
in human readable format**

Steps:

1. list all the files in the directory      `ls -al`
2. list them by modification time, most recent first
3. display that list in human readable format
4. display only the top 5 in that list

**Q. List the first 5 most recently modified files in a directory in human readable format**

**Steps:**

1. list all the files in the directory      `ls -al`
2. list them by modification time, most recent first    `ls -alt`
3. display that list in human readable format
4. display only the top 5 in that list

**Q. List the first 5 most recently modified files in a directory in human readable format**

Steps:

1. list all the files in the directory      `ls -al`
2. list them by modification time, most recent first    `ls -alt`
3. display that list in human readable format    `ls -hadt`
4. display only the top 5 in that list

**Q. List the first 5 most recently modified files in a directory in human readable format**

**Steps:**

1. list all the files in the directory      `ls -al`
2. list them by modification time, most recent first    `ls -alt`
3. display that list in human readable format    `ls -halt`
4. display only the top 5 in that list      `ls -halt | head -n5`

**Q. List the first 5 most recently modified files in a directory in human readable format**

**Steps:**

1. list all the files in the directory      `ls -al`
2. list them by modification time, most recent first    `ls -alt`
3. display that list in human readable format    `ls -hadt`
4. display only the top 5 in that list      `ls -hadt | head -n6 | tail -n5`

**Q. List the first 10 most space-hogging files in a directory in human readable format**

**Q. List the first 10 most space-hogging files in a directory in human readable format**

```
ls -halS | head -n11 | tail -n10
```

last - tells you the people who logged in, arranged chronologically

w - shows you who are logged in currently

date - gives you the current date (time-stamp)

du - shows you the disk usage of given directory (and sub-dirs)

sort - sorts data file/piped output based on specified column

diff - finds differences between two files

> - redirects result to a file

>> - appends data to a file

history – returns history of commands executed in terminal

ping - attempts to open a line of communication with a network host

wget - download a file from the Internet

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?  
first, ssh into vpac38 then... `last | head -n5`
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?  
first, ssh into vpac01 , then...  
`last | grep hoffmare > dummy ; wc -l dummy`
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.  
`sort -n -k2,2 < wang.merritt.dat > sorted.wang.merritt.dat`
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?  
first, ssh into vpac02 then...  
`w | sort`
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?

`du -h`

6. How many files does Kelly have in her \$HOME/bootcamp dir ?

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?
2. How many times did ‘hoffmare’ login to vpac01 ?
3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.
4. How many people are on vpac02 right now ?
5. How many bytes are you using on your home directory ?
6. How many files does Kelly have in her \$HOME/bootcamp dir ?

`ls -a | wc -l`

## Exercises:

1. Who are the last 5 people that logged in to vpac38 today ?  
first, ssh into vpac38 then...

`last | head -n6 | tail -n5`

2. How many times did ‘hoffmare’ login to vpac01 ?  
first, ssh into vpac01 , then...

`last | grep hoffmare > dummy ; wc -l dummy`

3. Copy wang.merritt.dat from the 2015 bootcamp directory to your laptop and sort on the black hole mass. Dump results to a file.

`sort -n -k2,2 < wang.merritt.dat > sorted.wang.merritt.dat`

4. How many people are on vpac02 right now ?  
first, ssh into vpac02 then...

`w | sort`

5. How many bytes are you using on your home directory ?  
`du -h`

6. How many files does Kelly have in her \$HOME/bootcamp dir ?

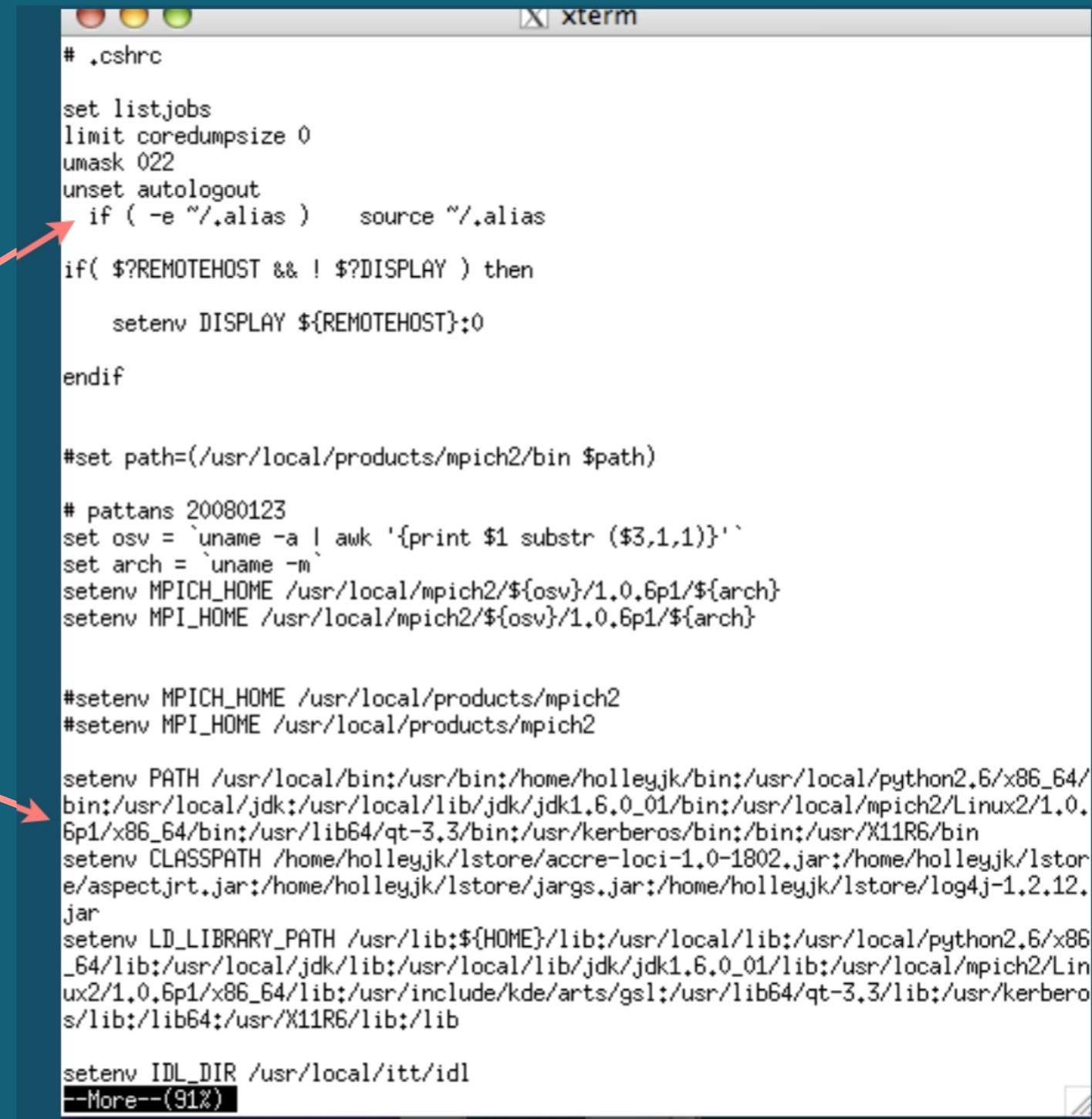
`ls -a | wc -l`

# Setting your shell (how you interface with your operating system)

do a less on  
`cshrc.holleyjk`

execute an alias file that  
nicknames unix commands

tells your system where to look  
for external commands, like  
graphics programs



The image shows a terminal window titled "xterm" displaying the contents of a file named ".cshrc". The file contains several lines of shell script code. Two red arrows point from the explanatory text on the left to specific parts of the code: one arrow points to the "source ~/.alias" line, and another points to the "setenv" lines for MPICH\_HOME and MPI\_HOME.

```
# .cshrc
#
# set listjobs
# limit coredumpsize 0
# umask 022
# unset autologout
# if ( -e ~/.alias )    source ~/.alias
if( $?REMOTEHOST && ! $?DISPLAY ) then
    setenv DISPLAY ${REMOTEHOST}:0
endif

#set path=(/usr/local/products/mpich2/bin $path)
# pattans 20080123
set osv = `uname -a | awk '{print $1 substr ($3,1,1)}'`
set arch = `uname -m`
setenv MPICH_HOME /usr/local/mpich2/${osv}/1.0.6p1/${arch}
setenv MPI_HOME /usr/local/mpich2/${osv}/1.0.6p1/${arch}

#setenv MPICH_HOME /usr/local/products/mpich2
#setenv MPI_HOME /usr/local/products/mpich2

setenv PATH /usr/local/bin:/usr/bin:/home/holleyjk/bin:/usr/local/python2.6/x86_64/bin:/usr/local/jdk:/usr/local/lib/jdk/jdk1.6.0_01/bin:/usr/local/mpich2/Linux2/1.0.6p1/x86_64/bin:/usr/lib64/qt-3.3/bin:/usr/kerberos/bin:/bin:/usr/X11R6/bin
setenv CLASSPATH /home/holleyjk/lstore/accre-loci-1.0-1802.jar:/home/holleyjk/lstore/aspectjrt.jar:/home/holleyjk/lstore/jargs.jar:/home/holleyjk/lstore/log4j-1.2.12.jar
setenv LD_LIBRARY_PATH /usr/lib:${HOME}/lib:/usr/local/lib:/usr/local/python2.6/x86_64/lib:/usr/local/jdk/lib:/usr/local/lib/jdk/jdk1.6.0_01/lib:/usr/local/mpich2/Linux2/1.0.6p1/x86_64/lib:/usr/include/kde/arts/gsl:/usr/lib64/qt-3.3/lib:/usr/kerberos/lib:/lib64:/usr/X11R6/lib:/lib
setenv IDL_DIR /usr/local/itt/idl
--More--(91%)
```

## Setting your shell (how you interface with your operating system)

Open a web browser to [github.com/djsissom](https://github.com/djsissom)

Go to bootcamp repository

Click "Clone or Download" button, and choose  
"Download Zip"

Scp the zip file to your vpac home directory

Unzip the file on your laptop (Mac) and on VPAC

## Setting your shell (how you interface with your operating system)

What does `echo \$SHELL` return?

Mv bashrc to ~/.bashrc (if it doesn't exist yet...)

Less .bashrc to read it

source .bashrc

will run the file and install your commands

To change your .bashrc , you need a text editor

emacs <filename> &

- Ctl-v -- page up
- Esc-v -- page down
- Ctl-n -- next line
- Ctl-p -- previous line
- Esc-< -- top of file
- Esc -> -- bottom of file
- Esc-Esc-Esc -- get out of hotkey
- Ctl-X-S -- save file
- Ctl-X-C -- quit

- Ctl-k -- kill a line
- Ctl-y -- paste line
- Esc -% -- query replace
- Ctl-x ( -- start macro
- Ctl-x ) -- end macro

Example: Ctl-x( Ctl-n Ctl-n Ctl-x)

- Ctl-x e -- execute macro
- Esc-num -- do num times
- Ctl-/ -- undo

*Practice: Open a new file called ‘motivation’ and write ‘I love emacs with my whole heart!’  $2^{16}$  times. Then, replace ‘heart’ with ‘mind’ on every other line.*

## Editing text files with Vim

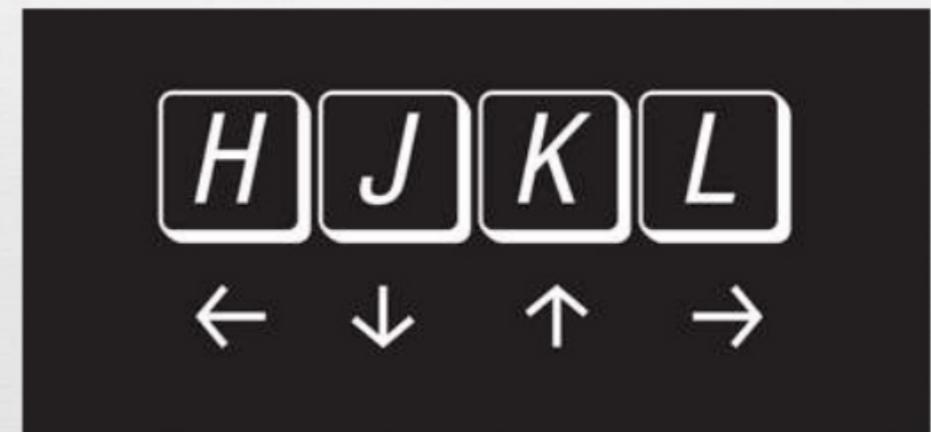
Set up vim files (dark terminal recommended)

\$ vim .bashrc

More slides at [https://www.slideshare.net/  
brandonliu/introduction-to-vim](https://www.slideshare.net/brandonliu/introduction-to-vim) →

/ - to search and n/N to  
navigate search results

### Surviving in Vim



- ☞ **i** – Gets you into insertion mode
- ☞ **<ESC>** – Always gets you back to normal mode
- ☞ **:wq<Enter>** – Saves and quits Vim

# Vim walkthrough

<https://www.openvim.com/>

# Remember the cheat sheet

[http://cheatsheetworld.com/programm](http://cheatsheetworld.com/programming/unix-linux-cheat-sheet/)  
ing/unix-linux-cheat-  
sheet/

For homework:

Add your own nicknames for unix commands -- most useful aliases win a prize!

Add aliases to make rm, mv, and cp safer (check the man pages for the interactive option for each)

Practice with your text editor of choice

## Unix Challenge!

-- Find a file with cereal in its name

(hint: it's in a vpac directory involving /home/holleyjk...)

-- copy it to your home directory, add your name to the filename, and change permissions so that you can read and write to it, but group/other can only read it

-- write the name of your favorite cereal in the file

-- copy it to Kelly's bootcamp/2017 directory and tell me when you've done it. First one wins a prize!!