

Lesson Module Checklist

- Slides
- WB
- Flash cards
- Page numbers
- 1st minute quiz
- Web Calendar summary
- Web book pages
- Commands
- Practice test tested
- Submit clock set - NA
- Opus email test (receive from Internet)
- 9V backup battery for microphone
- Backup slides, CCC info, handouts on flash drive

Student checklist

- 1) Browse to the CIS 90 website Calendar page
 - <http://simms-teach.com>
 - Click CIS 90 link on left panel
 - Click Calendar link near top of content area
 - Locate today's lesson on the Calendar
- 2) Download the presentation slides for today's lesson for easier viewing
- 3) Click Enter virtual classroom to join CCC Confer session
- 4) Connect to Opus using Putty or ssh command

Introductions and Credits



Jim Griffin

- Created this Linux course
- Created Opus and the CIS VLab
- Jim's site: <http://cabrillo.edu/~jgriffin/>



Rich Simms

- HP Alumnus
- Started teaching this course in 2008 when Jim went on sabbatical
- Rich's site: <http://simms-teach.com>

And thanks to:

- John Govsky for many teaching best practices: e.g. the First Minute quizzes, the online forum, and the point grading system (<http://teacherjohn.com/>)



Instructor: **Rich Simms**

Dial-in: **888-450-4821**

Passcode: **761867**



Buzz



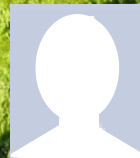
Carlos



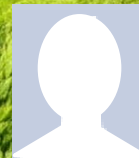
Cody



Elijah



Emily



Enrique C.



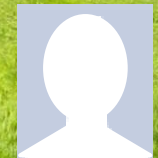
Enrique R.



Jon M.



Jon W.



Jordan



Joseph



JJ



Kiernan



Maria



Mathew



Mike C.



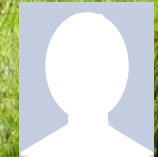
Michael F.



Mike M.



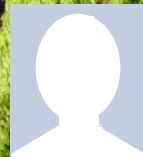
Nick L.



Nicholas T.



Patrick



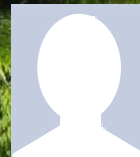
Rebecca



Ricardo



Robert



Ruth



Steve



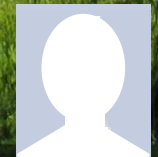
Tess



Tim



Trevor



Troy

Quiz

Please answer these questions **in the order** shown:

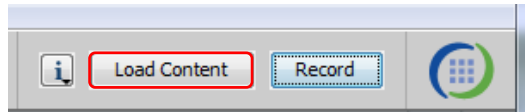
See electronic white board

email answers to: risimms@cabrillo.edu

(answers must be emailed within the first few minutes of class for credit)

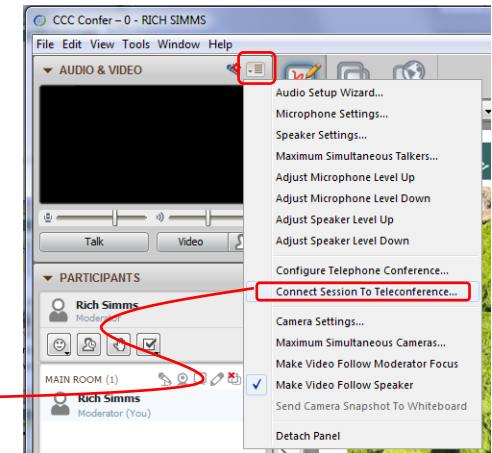
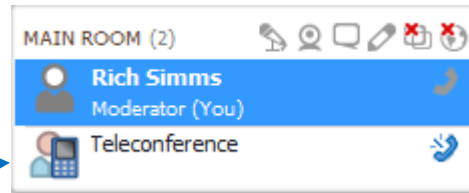


[] Preload White Board with *cis*lesson??*-WB*



[] Connect session to Teleconference

Session now connected to teleconference



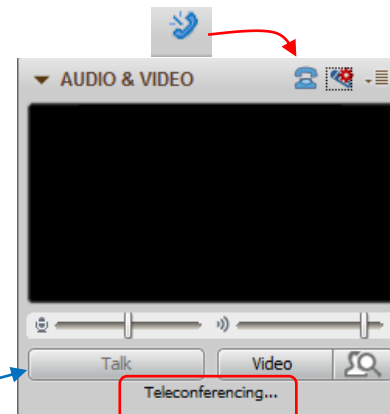
[] Is recording on?



Red dot means recording

[] Use teleconferencing, not mic

Should be greyed out





[] layout and share apps

The screenshot displays a Windows desktop environment with several applications open. The taskbar at the bottom shows icons for Internet Explorer, File Explorer, and other standard Windows applications. The desktop background is a light blue gradient.

Applications and their content:

- CCC Confer**: A video conferencing application window on the left side of the screen. It shows a video feed of a person and a list of participants.
- foxit for slides**: A Foxit Reader window in the center, displaying a PDF document titled "cis90lesson07.pdf". The document content includes a directory listing and a terminal window. A red box labeled "foxit for slides" points to the PDF window.
- chrome**: A Google Chrome browser window on the right, displaying a webpage from "simms-teach.com/docs/cis90/cis-90-TEST-1-Fall-12.pdf". The page contains flashcard questions. A red box labeled "chrome" points to the browser window.
- putty**: A terminal window in the center, showing a login prompt and a terminal session. A red box labeled "putty" points to the terminal window.
- vSphere Client**: A vSphere Client window on the right, displaying a virtual machine inventory. A red box labeled "vSphere Client" points to the vSphere Client window.

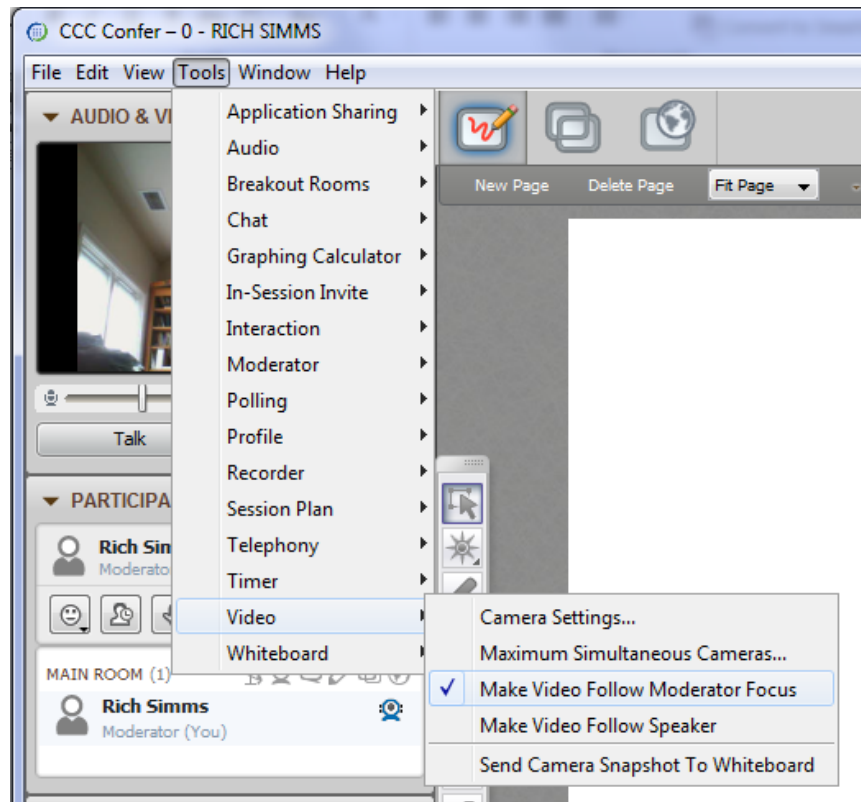
Red lines connect the labels to the corresponding application windows.



[] Video (webcam) optional

[] Follow moderator

[] Double-click on postages stamps



Universal Fix for CCC Confer:

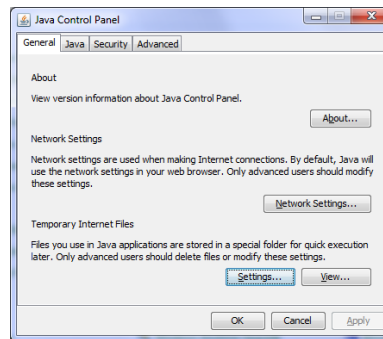
- 1) Shrink (500 MB) and delete Java cache
- 2) Uninstall and reinstall latest Java runtime



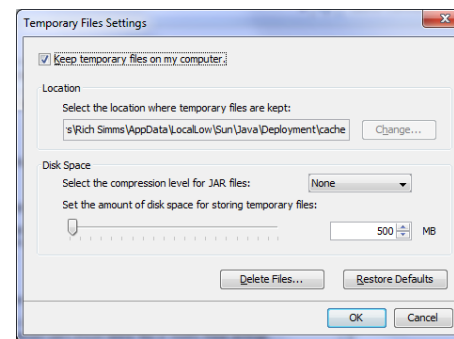
Control Panel (small icons)



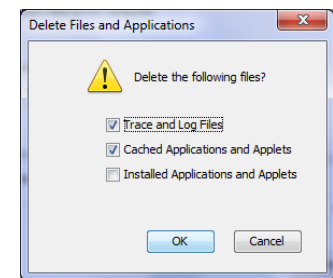
General Tab > Settings...



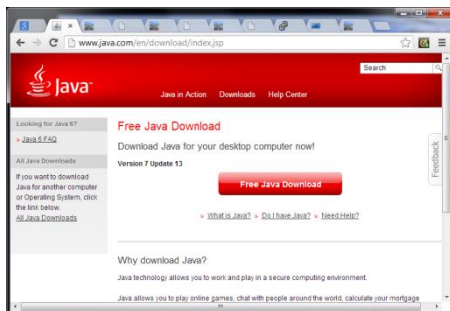
500MB cache size



Delete these



Google Java download



Review

Objectives	Agenda
• Review Lessons 1-4 • Practice skills • Learn about filename expansion characters	• Quiz • Questions • Trouble on the island • Everything is a file • More filename expansion characters • Lots of review • Test tips • Wrap up

Questions

Questions?

Lesson material?

Labs? Tests?

How this course works?

- Graded work in home directories
- Answers in /home/cis90/answers

Who questions much, shall learn much, and retain much.

- Francis Bacon

If you don't ask, you don't get.

- Mahatma Gandhi

Chinese
Proverb

他問一個問題，五分鐘是個傻子，他不問一個問題仍然是一個傻瓜永遠。

He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.

Questions

Lesson material?

Labs?

How this course works?

Are you enlightened yet?



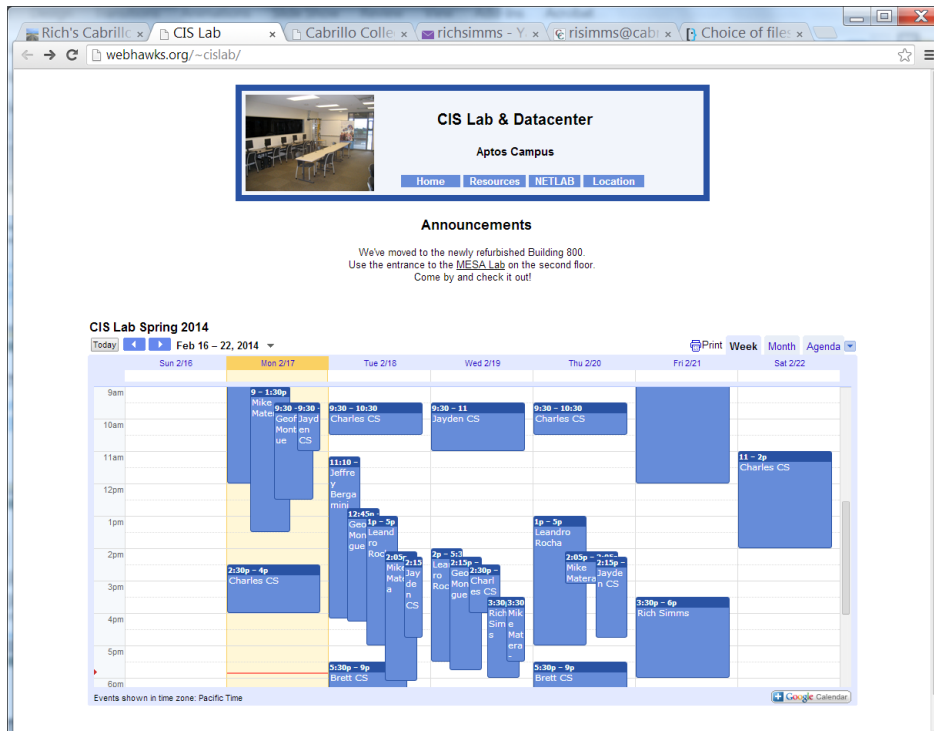
Chinese
Proverb

他問一個問題，五分鐘是個傻子，他不問一個問題仍然是一個傻瓜永遠。

He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.

CIS Lab Schedule

<http://webhawks.org/~cislab/>



*Not submitting lab work?
Would like some help?*

*Come to the CIS Lab to work
with classmates, lab assistants
and instructors on Lab
assignments.*

CIS 90 Tutoring Available

<http://www.cabrillo.edu/services/tutorials/>

TUTORIALS

ANNOUNCEMENTS & DEADLINES

- New subjects for Spring 2014:
- American Sign Language
- Computer Applications/Business Technology (CABT)
- Computer and Information Systems (CIS)
- History 17A

Welcome to the Tutorials Center!

We offer FREE peer tutoring to Cabrillo students who are enrolled in the course/s for which they need help.

- Tutoring is by appointment. The days and times of tutoring sessions are established by the office.
- Sessions are weekly and for the duration of the semester.
- Tutoring sessions are scheduled in small groups. Sessions last 1-2 hours depending on the class. Occasionally, sessions may be one to one but that is not guaranteed.
- Come directly to the TC office to schedule (second floor of library).

The following classes are being tutored for Spring 2014:

- Accounting 1A, 1B, 6, 54A, 151A, 159, 163
- American Sign Language (ASL) 1, 2
- Biology 4, 5, 6
- Computer Applications/Business Technology (CABT) 31, 38, 41, 101, 157, 160
- Computer and Information Systems (CIS) 81, 90, 172**
- Chemistry 1A, 1B, 2, 30A, 30B, 32

CONTACT INFORMATION

Tutorials Center

Location Room 1080A - Learning Resource Center

Phone 831.479.6470

Email tutorialscenter@cabrillo.edu

Coordinator Lori Chavez

Phone 831.479.6126

Email lochavez@cabrillo.edu

Hours Monday - Thursday: 9am - 5pm
Friday: 9am - 1pm

MAP, DIRECTIONS, & PARKING

DEPARTMENT STAFF & FACULTY DIRECTORY



Matt Smithey

All students interested in tutoring in CIS 90, 172, and 81 classes need to come directly to the Tutorials Center to schedule, register and fill out some paperwork. This is just a one-time visit.

The tutoring will take place at the STEM center and they will log in and log out on a computer you have designated (I will figure out exactly what that means).

Matt is available M: 9:00-5:00, T: 9-11 and 2-5, Wed: 9-12 and Th: 9-11 and 3-5.

Don't wait too long to sign up! Tutoring hours are limited!

Trouble on the island today



*Reminder to instructor:
On Sun-Hwa, run trouble-L5 as root*

Can you cat a file?

Warm-up Activity

From Opus, login to Sun-Hwa-III as follows:

ssh \$LOGNAME@sun-hwa-iii

After logging in, try to cat this file: /etc/mensaje

If successful:

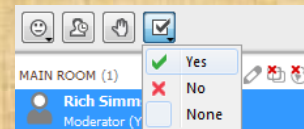
then

click green "yes" check on CCC Confer

Help your neighbor

else

Start TROUBLESHOOTING!



Hint: Lesson 2

Everything
is a file
(new)

Everything is a file in UNIX (even a terminal)

- A terminal
- A file
- A directory
- A hard drive
- A hard drive partition
- A CD
- A partition on a USB flash drive
- Kernel run-time information

*Implemented as
files in UNIX*

Everything is a file in UNIX (even a terminal)

- A terminal *e.g. /dev/pts/2*
- A file *e.g. /home/cis90/simben/letter*
- A directory *e.g. /home/cis90/*
- A hard drive *e.g. /dev/sda*
- A hard drive partition *e.g. /dev/sda1*
- A CD *e.g. /dev/cdrom*
- A partition on a USB flash drive *e.g. /dev/sdb2*
- Kernel run-time information *e.g. /proc/sys/kernel/hostname*

Everything is a file in UNIX (even a terminal)

```
[rsimms@oslab ~]$ ls -l /dev/pts/3
```

```
crw--w----. 1 leebri90 tty 136, 3 Sep 30 16:33 /dev/pts/3
```

terminal

```
[rsimms@oslab ~]$ ls -l /home/cis90/simben/letter
```

```
-rw-r--r--. 1 simben90 cis90 1044 Jul 20 2001 /home/cis90/simben/letter
```

file

```
[rsimms@oslab ~]$ ls -ld /home/cis90/
```

```
drwxr-x---. 43 rsimms cis90 4096 Sep 16 15:00 /home/cis90/
```

directory

```
[rsimms@oslab ~]$ ls -l /dev/sda
```

```
brw-rw----. 1 root disk 8, 0 Sep 13 17:47 /dev/sda
```

hard drive

```
[rsimms@oslab ~]$ ls -l /dev/sda1
```

```
brw-rw----. 1 root disk 8, 1 Sep 13 17:47 /dev/sda1
```

partition

```
[rsimms@oslab ~]$ ls -l /dev/cdrom
```

```
lrwxrwxrwx. 1 root root 3 Sep 13 17:46 /dev/cdrom -> sr0
```

CD drive

```
[rsimms@oslab ~]$ ls -l /dev/sr0
```

```
brw-rw----. 1 root cdrom 11, 0 Sep 13 17:46 /dev/sr0
```

*Kernel
runtime info*

```
[rsimms@oslab ~]$ ls -l /proc/sys/kernel/hostname
```

```
-rw-r--r-- 1 root root 0 Sep 24 15:45 /proc/sys/kernel/hostname
```


File Types

Long listing code (ls -l)	Type	How to make one
d	directory	mkdir
-	regular • Programs • Text • Data (binary)	touch
l	symbolic link	ln -s
c	character device files	mknod
b	block device files	mknod

Common file types in a Linux ext**n** file system

Everything is a file in UNIX (even a terminal)

Nice things about files

- you can write to them

```
[rsimms@opus ~]$ echo "Rich was here" > myfile
```

- and read from them

```
[rsimms@opus ~]$ cat myfile  
Rich was here
```

Class Activity

- Write to a file

```
echo "Rumpelstiltskin was here" > myfile
```

- Read the file

```
cat myfile
```

Everything is a file (even a terminal)

```
/home/cis90/simmsben $ tty  
/dev/pts/1
```

*Use the **tty** command to identify the specific terminal device being used*

Note this device is identified using an absolute pathname

Everything is a file (even a terminal)

```
/home/cis90/simmsben $ tty  
/dev/pts/1
```

Show which terminal you are using

```
/home/cis90/simmsben $ who  
simmsben pts/1      2010-09-29 07:38 (dsl-49-64-10-90.dhcp.cruzio.com)  
srecklau pts/2      2010-09-29 06:06 (62.143.60.194)  
rsimms   pts/4      2010-09-29 06:47 (dsl-49-64-10-90.dhcp.cruzio.com)
```

Use who to see who is logged in

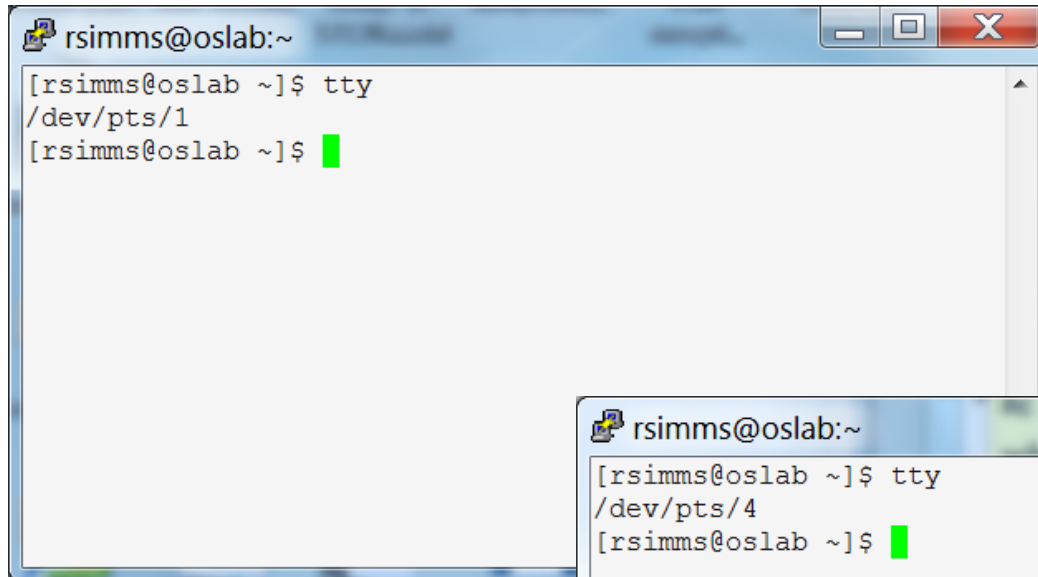
```
/home/cis90/simmsben $ ls -l /dev/pts/*  
crw--w---- 1 simmsben tty 136, 1 Sep 29 07:45 /dev/pts/1  
crw--w---- 1 srecklau tty 136, 2 Sep 29 07:44 /dev/pts/2  
crw--w---- 1 rsimms   tty 136, 4 Sep 29 06:48 /dev/pts/4
```

*Do a long listing to see
all the terminal devices
in use*

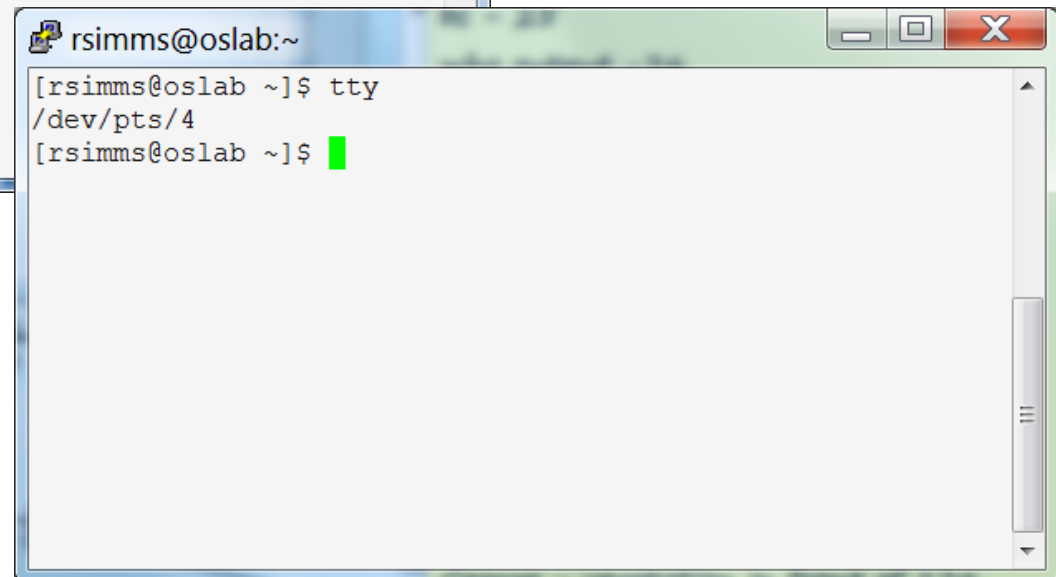
Notice the owner is someone who has logged in

Notice the file type is "c" which is a character device file

Everything is a file (even a terminal)



```
rsimms@oslab:~  
[rsimms@oslab ~]$ tty  
/dev/pts/1  
[rsimms@oslab ~]$
```

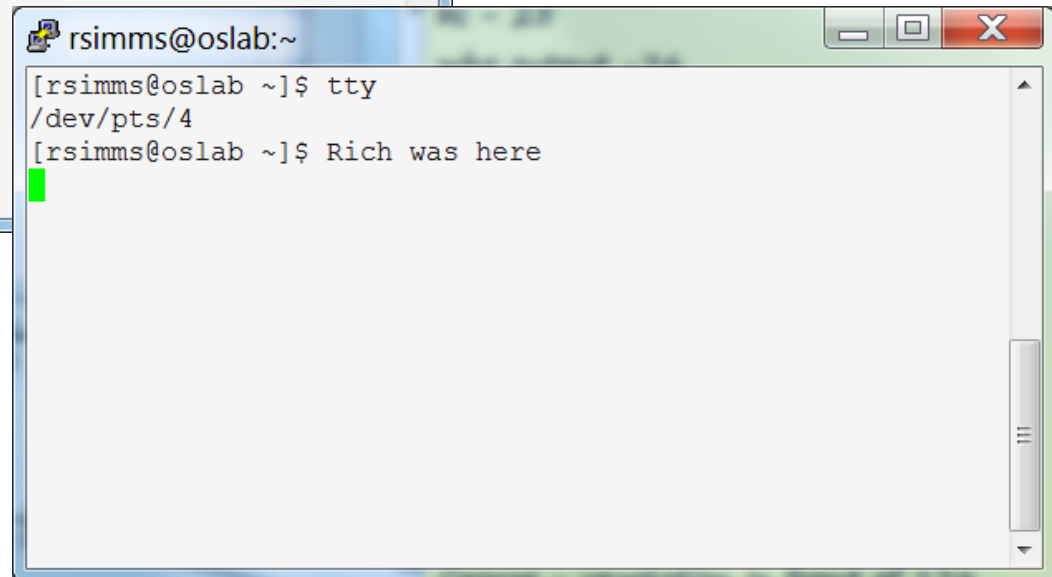


```
rsimms@oslab:~  
[rsimms@oslab ~]$ tty  
/dev/pts/4  
[rsimms@oslab ~]$
```


Everything is a file (even a terminal)

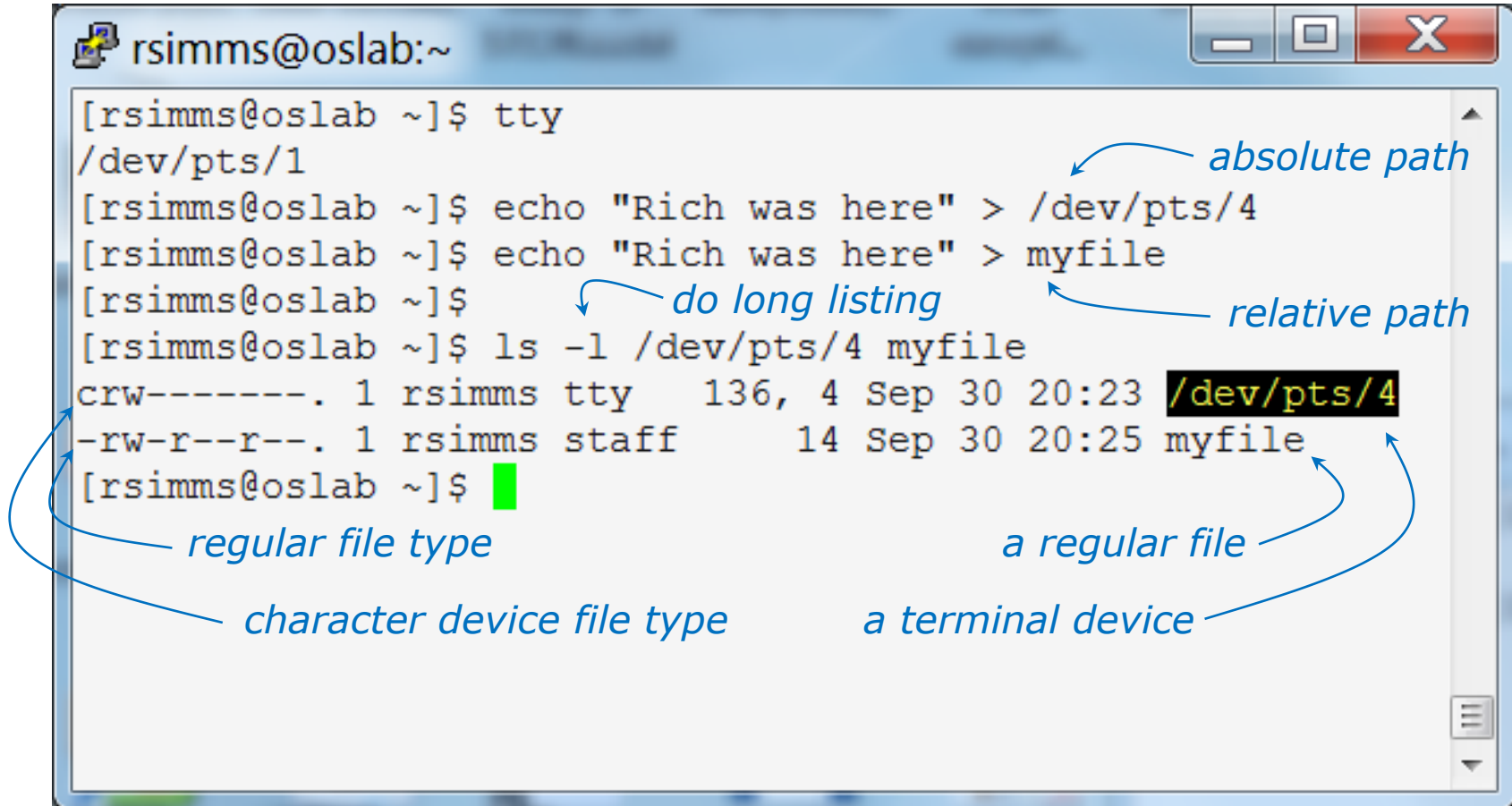


```
rsimms@oslab:~  
[rsimms@oslab ~]$ tty  
/dev/pts/1  
[rsimms@oslab ~]$ echo "Rich was here" > /dev/pts/4  
[rsimms@oslab ~]$
```



```
rsimms@oslab:~  
[rsimms@oslab ~]$ tty  
/dev/pts/4  
[rsimms@oslab ~]$ Rich was here
```

Everything is a file (even a terminal)



```

rsimms@oslab:~
[rsimms@oslab ~]$ tty
/dev/pts/1
[rsimms@oslab ~]$ echo "Rich was here" > /dev/pts/4
[rsimms@oslab ~]$ echo "Rich was here" > myfile
[rsimms@oslab ~]$
[rsimms@oslab ~]$ ls -l /dev/pts/4 myfile
crw-----. 1 rsimms tty    136, 4 Sep 30 20:23 /dev/pts/4
-rw-r--r--. 1 rsimms staff   14 Sep 30 20:25 myfile
[rsimms@oslab ~]$
  
```

absolute path (points to `/dev/pts/4`)

relative path (points to `myfile`)

do long listing (points to `ls -l`)

regular file type (points to the permissions `-rw-r--r--` of `myfile`)

character device file type (points to the permissions `crw-----` of `/dev/pts/4`)

a regular file (points to `myfile`)

a terminal device (points to `/dev/pts/4`)

Class Exercise

Part I

- Login into Opus using Putty
- Use **echo "I can do it" > myfile**
- Print your new file with **cat myfile**

Part II

- Open a second session on Opus
- You should have two terminals now
- Use **tty** to identify your terminals
- In one terminal use **echo "I can do it" > /dev/pts/xx** where xx is your other terminal



Housekeeping

Submit Lab 4 by emailing it to my email address on Opus:



rsimms@oslab.cis.cabrillo.edu



*send it from your
regular non-Opus
email*

*Note, this is my email
address on Opus which is
different than my regular
Cabrillo address*

*or send it from Opus
using the mail command
for extra credit*

- Text only. Use the template. No attachments please!
- Include yourself on the distribution list so you have a record of your submittal and can see what will be graded.
- Don't guess. Test your answers on Opus.
- Maximize your points by reading the Lab's Grading Rubric before submitting

Test #1 is next week

Practice test available now

Test #1 is next week

Practice test available now

**Test #1 is next
week**

**Practice test
available now**

Test next week

30 points, plus some extra credit:

- Open book, open notes, open computer
- To be taken during the last hour of class
- Should take about 45-60 minutes, however if you need extra time or have a scheduling issue, you can turn it in no later than 11:59PM.

Perkins/VTEA Survey

Carl D. Perkins Career and Technical Education Act

By **Rich Simms** » Sun Sep 22, 2013 3:21 pm

The Carl D. Perkins Vocational and Technical Education Act was originally authorized by Congress in 1984. It was reauthorized in 1998 and again in 2006. This act provides federal funding for improving career technical education (CTE) within the United States in order to help the economy.

For Cabrillo College to receive a portion of this funding students in technical classes must fill out a survey. The more surveys completed the more funds the college will receive. The survey only needs to be completed once per term by each student.

This survey can be completed online using web advisor:

Log on to WEBADVISOR at <https://wave.cabrillo.edu>

Select "STUDENTS: Click Here" (navy blue bar)

- Under "Academic Profile" Click on "Student Update Form"
- Use drop down list under "Select the earliest term for which you are registered" and click on the current term.
- Select "SUBMIT"

Scroll down to the "Career Technical Information"

- Answer questions by clicking on the circle to the left of your "Yes" or "No" answers
- You can get details about a question by clicking on blue underlined phrase
- After answering all questions Select "SUBMIT"

Then "LOG OUT"

Thank you for taking a few minutes to help Cabrillo College CS/CIS programs!

- Rich

This is an important source of funding for Cabrillo College.

*Send me an email stating you completed this survey for **three points extra credit!***

Career Technical Information	
Your answers to these questions will help qualify Cabrillo College for Perkins/VTEA grant funds.	
Are you currently receiving benefits from:	
☐ Yes	TANF/CALWORKS
☐ No	
☐ Yes	SSI (Supplemental Security Income)
☐ No	
☐ Yes	GA (General Assistance)
☐ No	
☐ Yes	Does your <u>income</u> qualify you for a fee waiver?
☐ No	
☐ Yes	Are you a single parent with custody of one or more minor children?
☐ No	
☐ Yes	Are you a <u>displaced homemaker</u> attending Cabrillo to develop job skills?
☐ No	
☐ Yes	Have you moved in the preceding 36 months to obtain, or to accompany parents or spouses to obtain, temporary or seasonal employment in agriculture, dairy, or fishing?
☐ No	

<http://oslab.cabrillo.edu/forum/viewtopic.php?f=93&t=2751>

GRADES

Send me a student survey if you haven't already to get your LOR secret code name.

Current Point Tally

As of 2/25/2014

Points that could have been earned:

3 quizzes: 9 points
3 labs: 90 points
1 forum quarter: 20 points
Total: 119 points

Percentage	Total Points	Letter Grade	Pass/No Pass
90% or higher	504 or higher	A	Pass
80% to 89.9%	448 to 503	B	Pass
70% to 79.9%	392 to 447	C	Pass
60% to 69.9%	336 to 391	D	No pass
0% to 59.9%	0 to 335	F	No pass

adaldrida: 41% (49 of 119 points)
alatar: 70% (84 of 119 points)
anborn: 92% (110 of 119 points)
aragorn: 89% (106 of 119 points)
arwen: 97% (116 of 119 points)
beregond: 0% (0 of 119 points)
bilbo: 64% (77 of 119 points)
celebrian: 90% (108 of 119 points)
dori: 42% (51 of 119 points)
dwalin: 95% (114 of 119 points)
elrond: 0% (0 of 119 points)
eomer: 91% (109 of 119 points)
faramir: 89% (106 of 119 points)
frodo: 93% (111 of 119 points)
gwaihir: 100% (119 of 119 points)

ioareth: 94% (112 of 119 points)
legolas: 91% (109 of 119 points)
marhari: 71% (85 of 119 points)
orome: 76% (91 of 119 points)
pallando: 0% (0 of 119 points)
pippen: 74% (89 of 119 points)
quickbeam: 95% (114 of 119 points)
rian: 0% (0 of 119 points)
samwise: 92% (110 of 119 points)
shadowfax: 0% (0 of 119 points)
strider: 81% (97 of 119 points)
theoden: 44% (53 of 119 points)
treebeard: 99% (118 of 119 points)
tulkas: 73% (88 of 119 points)
ulmo: 68% (81 of 119 points)

Jesse's checkgrades python script

<http://oslab.cabrillo.edu/forum/viewtopic.php?f=31&t=773&p=2966>

```
/home/cis90/simben $ checkgrades smeagol
```

Remember, your points may be zero simply because the assignment has not been graded yet.

Quiz 1: You earned 3 points out of a possible 3.
Quiz 2: You earned 3 points out of a possible 3.
Quiz 3: You earned 3 points out of a possible 3.

Forum Post 1: You earned 20 points out of a possible 20.

Lab 1: You earned 28 points out of a possible 30.
Lab 2: You earned 30 points out of a possible 30.
Lab 3: You earned 30 points out of a possible 30.

You've earned 6 points of extra credit.

You currently have a 103% grade in this class. (123 out of 119 possible points.)

*Use your LOR
code name as
an argument on
the checkgrades
command*

Jesse is a CIS 90 Alumnus. He wrote this python script when taking the course. It mines data from the website to check how many of the available points have been earned so far.

Spring Cybersession 2014 Online Classes (March 24th–May 24th)

<http://www.cabrillo.edu/services/disted/online.html>

The screenshot shows a web browser window displaying the Cabrillo College website. The browser's address bar shows the URL www.cabrillo.edu/services/disted/online.html. The website header features the Cabrillo College logo and navigation links for Campus Life, Learning Resources, Student Services, and Directories A-Z. Below the header is a horizontal menu with links for ABOUT, ACADEMICS/CAREERS, ADMISSIONS, CLASS SCHEDULES, REGISTRATION, and WEBADVISOR. The main content area is titled "DISTANCE EDUCATION" and includes a Blackboard Login section with links for "Trouble logging in?", "Blackboard Orientation", and "Browser check, Java, and popup troubleshooting". Below this is an iTunesU section and a "Resources for Students" list containing links for "How to Apply", "Online Orientation to Cabrillo", "Online Advising", "WebAdvisor", "Adding a Course and Waitlists", and "Dropping a Course". The central part of the page features a large image of a campus building and a section titled "Distance Education Schedule". This section states that "REGISTRATION IS NOW OPEN for Spring 2014 Cybersession (8 weeks) begins Monday, March 24, 2014." and provides information about on-campus orientation, prerequisites, and assessment requirements. It also includes a link to the "Assessment Center's webpage" and a link to "Resources for Students". At the bottom, there is a section titled "Spring Cybersession 2014 Online Classes (March 24th-May 24th)" with a dropdown menu for "Courses and Descriptions by Department".

File Name Expansion (new)

Filename Expansion Metacharacters

matches all non-hidden filenames in the current directory when used alone or zero or more characters when used as a prefix, infix or postfix.

?

matches any single character in any of your current directory's filenames.

[]

matches any single character contained within the brackets.



Shell Parse Step

Filename expansion happens during the shell parsing step, before the command is even located or executed.

- 1) Prompt
- 2) Parse**
- 3) Search for program (along the path)
- 4) Execute program
- 5) Nap (wait till process is done)
- 6) Repeat

*The commands never see *, ?, and [] expansion characters. These characters get replaced by the shell before the command is even located and executed.*

The * Filename Expansion Metacharacter

Example: **text.*** will be expanded by the shell to match any files that start with "text."

```
/home/cis90/simben $ echo text.*  
text.err text.fxd
```

```
/home/cis90/simben $ ls -i text.*  
19496 text.err 19497 text.fxd
```

```
/home/cis90/simben $ file text.*  
text.err: ASCII text  
text.fxd: ASCII text
```

```
/home/cis90/simben $ wc -l /home/cis90/mahtab/text.*  
11 /home/cis90/mahtab/text.err  
10 /home/cis90/mahtab/text.fxd  
21 total
```

```
/home/cis90/simben $ tail -n1 ../mahtab/text.*  
==> ../mahtab/text.err <==  
number10.
```

```
==> ../mahtab/text.fxd <==  
This is line number 10.
```

The * Filename Expansion Metacharacter

Example: * is expanded to match all directories in /home/cis90 and **ti*** to match all files starting with "ti"

```
/home/cis90/simben $ ls -l ../*/Poems/Blake/ti*
-rw-r--r--. 1 beakie90 cis90 115 Jul 20 2001 ../beakie/Poems/Blake/tiger
-rw-r--r--. 1 calmic90 cis90 115 Jul 20 2001 ../calmic/Poems/Blake/tiger
-rw-r--r--. 1 casenr90 cis90 115 Jul 20 2001 ../casenr/Poems/Blake/tiger
-rw-r--r--. 1 casric90 cis90 115 Jul 20 2001 ../casric/Poems/Blake/tiger
-rw-r--r--. 1 cis90     cis90 115 Jul 20 2001 ../cis/Poems/Blake/tiger
-rw-r--r--. 1 daweli90 cis90 115 Jul 20 2001 ../daweli/Poems/Blake/tiger
-rw-r--r--. 1 fahmic90 cis90 115 Jul 20 2001 ../fahmic/Poems/Blake/tiger
-rw-r--r--. 1 fitcon90 cis90 115 Jul 20 2001 ../fitcon/Poems/Blake/tiger
< snipped >
-rw-r--r--. 1 simben90 cis90 115 Jul 20 2001 ../simben/Poems/Blake/tiger
-rw-r--r--. 1 specod90 cis90 115 Jul 20 2001 ../specod/Poems/Blake/tiger
-rw-r--r--. 1 thinic90 cis90 115 Jul 20 2001 ../thinic/Poems/Blake/tiger
-rw-r--r--. 1 tilbuz90 cis90 115 Jul 20 2001 ../tilbuz/Poems/Blake/tiger
-rw-r--r--. 1 vasjor90 cis90 115 Jul 20 2001 ../vasjor/Poems/Blake/tiger
-rw-r--r--. 1 vivrut90 cis90 115 Jul 20 2001 ../vivrut/Poems/Blake/tiger
-rw-r--r--. 1 weljon90 cis90 115 Jul 20 2001 ../weljon/Poems/Blake/tiger
-rw-r--r--. 1 weltim90 cis90 115 Jul 20 2001 ../weltim/Poems/Blake/tiger
/home/cis90/simben $
```

The * Filename Expansion Metacharacter

Note, DOS uses *.* to match all files.

BUT, this is NOT true in UNIX

```
/home/cis90/simmsben $ echo *.*  
Lab2.0 Lab2.1 text.err text.fxd
```

*Instead, *.* is expanded to match all files in the current directory containing a "."*

The * Filename Expansion Metacharacter

*Note the * metacharacter by itself does not match any hidden files in your current working directory*

```
/home/cis90/simmsben $ echo *
bigfile bin delete empty Hidden Lab2.0 Lab2.1 letter Miscellaneous mission
Poems proposal1 proposal2 proposal3 small_town spellk text.err text.fxd
timecal what_am_i
```

```
/home/cis90/simmsben $ ls -a
.          .bashrc   empty     letter    Poems     spellk
.zshrc
..         bigfile   Hidden    Miscellane proposal1  text.err
.bash_history bin       Lab2.0    mission   proposal2  text.fxd
.bash_logout delete    Lab2.1    .mozilla  proposal3  timecal
.bash_profile .emacs   .lessht   .plan     small_town what_am_i
```


The ? Filename Expansion Metacharacter

Example: **???** will match any three character file name

```
/home/cis90/simben $ echo ???  
bin log
```

```
/home/cis90/simben $ ls bin/???  
bin/app
```

```
/home/cis90/simben $ ls /bin/???  
/bin/awk /bin/csh /bin/env /bin/pwd /bin/red /bin/rvi /bin/tar  
/bin/cat /bin/cut /bin/ksh /bin/raw /bin/rpm /bin/sed
```

```
/home/cis90/simben $ tail -n3 /home/cis90/grodav/bin/???  
while :  
do sleep 1  
done
```

```
/home/cis90/simben $ file /home/cis90/grodav/Poems/*/???  
/home/cis90/grodav/Poems/Yeats/old: ASCII English text
```

The [] Filename Expansion Metacharacter

Example: **[12]** will match a "1" or a "2"

```
/home/cis90/simben $ head -n1 Poems/Shakespeare/sonnet[12]
```

```
==> Poems/Shakespeare/sonnet1 <==
```

```
From fairest creatures we desire increase,
```

```
==> Poems/Shakespeare/sonnet2 <==
```

```
When forty winters shall besiege thy brow,
```

```
/home/cis90/simben $ wc ../balcor/Poems/Shakespeare/sonnet[12]
```

```
14 105 614 ../balcor/Poems/Shakespeare/sonnet1
```

```
14 114 631 ../balcor/Poems/Shakespeare/sonnet2
```

```
28 219 1245 total
```

```
/home/cis90/simben $ ls -d /etc/*[12]*
```

```
/etc/dbus-1 /etc/iproute2 /etc/pnm2ppa.conf /etc/rc2.d
```

```
/etc/DIR_COLORS.256color /etc/mke2fs.conf /etc/polkit-1 /etc/sasl2
```

```
/etc/gtk-2.0 /etc/pbm2ppa.conf /etc/rc1.d /etc/X11
```

The * Filename Expansion Metacharacter

Your turn now

What command would classify all files in the parent directory that start with m?

The * Filename Expansion Metacharacter

Answer

What command would classify all files in the parent directory that start with m?

```
/home/cis90/simben $ file ../m*  
../mahtab: directory  
../medism: directory  
../menfid: directory  
../milhom: directory  
/home/cis90/simben $
```

The ? Filename Expansion Metacharacter



A ? matches exactly one character which could be anything

What command would list all 13 character filenames in /bin

The ? Filename Expansion Metacharacter

What command would list all 13 character filenames in /bin

Answer

```
/home/cis90/simben $ ls /bin/??????????????  
/bin/dnsdomainname  /bin/nisdomainname  /bin/unicode_start
```

The [] Filename Expansion Metacharacter



A [] will match any character between the brackets

From your home directory, what command would print the first line of all Shakespeare sonnets ending in a 2 or 5?

The [] Filename Expansion Metacharacter

From your home directory, what command would print the first line of all Shakespeare sonnets ending in a 2 or 5?

Answer

```
/home/cis90/simben $ head -n 1 Poems/Shakespeare/*[25]
```

```
==> Poems/Shakespeare/sonnet15 <==
```

```
When I consider every thing that grows
```

```
==> Poems/Shakespeare/sonnet2 <==
```

```
When forty winters shall besiege thy brow,
```

```
==> Poems/Shakespeare/sonnet35 <==
```

```
Whoever hath her wish, thou hast thy Will,
```

```
==> Poems/Shakespeare/sonnet5 <==
```

```
Those hours that with gentle work did frame
```

```
/home/cis90/simben $
```

Filename Expansion Metacharacters

* ? []

What commands are there in /usr/bin that start with a "n" or "m", are 5 letters long and end with a "p"?

Hint: Use a combination of filename expansion metacharacters

Filename Expansion Metacharacters

* ? []

What commands are there in /usr/bin that start with a "n" or "m", are 5 letters long and end with a "p"?

Answer

```
/home/cis90/simben $ echo /usr/bin/[nm]???p  
/usr/bin/nohup
```

Filename Expansion Metacharacters

* ? []

For the command:

```
file /usr/share/man/*/ [ap]?? .8.gz
```

What arguments are actually getting passed to the **file** command to process?

Filename Expansion Metacharacters

* ? []

For the command:

```
file /usr/share/man/*/ [ap]?? .8.gz
```

What arguments are actually getting passed to the **file** command to process?

```
/home/cis90/simben $ echo /usr/share/man/*/ [ap]?? .8.gz  
/usr/share/man/man8/arp.8.gz /usr/share/man/man8/atd.8.gz  
/usr/share/man/man8/pam.8.gz /usr/share/man/man8/pvs.8.gz
```

Tip: Use echo to expand complicated filenames containing multiple filename expansion characters

Command Review

*Use the **man** command or google for the details*

New commands:

cal	- show calendars
clear	- clear the terminal screen
exit	- terminate your shell and log off
history	- show previous commands
hostname	- show the name of the computer being accessed
id	- show user and group id information
ps	- show processes (loaded programs) being run
ssh	- secure login to a remote system
uname	- shows kernel information
tty	- show terminal information
who	- show who else is logged on
who am i	- Identifies which login session you are using
Ctrl-Alt-F1 to Ctrl-Alt-F7	- Change between terminals and X windows (graphics)

New Files and Directories:

VMware:

Ctrl-Alt	- to move mouse cursor out of VM
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*Use the **man** command or google for the details*

New commands:

apropos	- search for string in whatis database
bc	- binary calculator
cat	- print file(s)
cd	- change directory
echo	- print text
env	- show shell environment variables
info	- online documentation with hot links
file	- show file information
ls	- show directory contents
passwd	- change password
set	- show (or set) shell variables
type	- show command location in path
man	- manual page for a command
whatis	- command summary

New Files and Directories:

/etc/passwd	- user accounts
/etc/shadow	- encrypted passwords
/bin	- directory of commands
/sbin	- directory of superuser commands
/usr/bin	- directory of commands, tools and utilities
/usr/sbin	- directory of superuser commands, tools and utilities

New commands:

mail

?	print these commands
p <message list>	print messages
n	goto and print next message
e <message list>	edit messages
d <message list>	delete messages
s <message list> file	save (append) messages to file
u <message list>	undelete messages
R <message list>	reply to sender(s)
r <message list>	reply to all
m <user list>	mail to specific users
q	quit, saving read messages to local mbox file
x	quit, mark all mail as unread and undeleted.
h	print out active message headers

mesg

- Enable or disable writes to your terminal

write

- Write message to another user

New Files and Directories:

/var/mail

- Message store for mail

/var/mail/*username*

- Incoming mailbox for *username*

mbox

- File in users home directory where read messages are archived to

Use the **man** command or google for the details

Use the **man** command or google for the details

Commands:

cat	Print a file on the screen
cd	Change directory
file	Classify a file
head	View first several lines of a file
less	Scroll up and down long files
ls	List files
more	Scroll down long files
pwd	Print working directory
reset	Use to reset terminal window
tail	View last several lines of a file
wc	Count the words, lines or characters in a file
xxd	View (hex dump) binary/data files

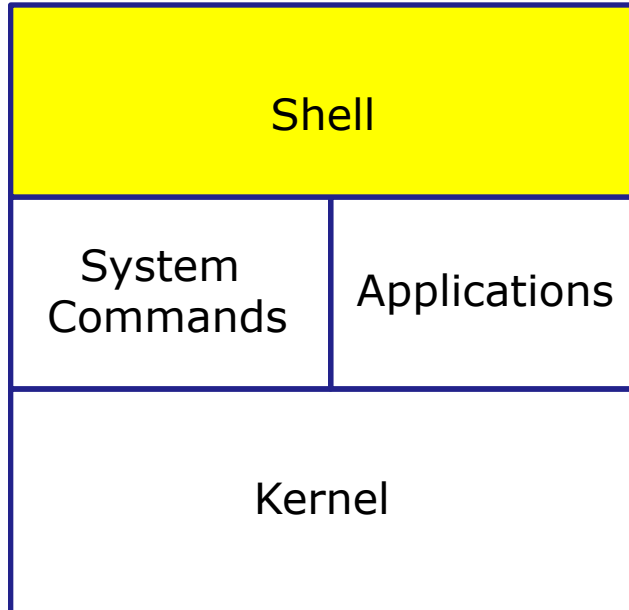
New Files and Directories:

/	Root of the file tree
/home	Opus home directories
/home/cis90	CIS 90 class home directories
/home/cis90/ <i>username</i>	The home directory for CIS 90 student <i>username</i>

Command line Prompt Parse (review)



Life of the Shell



- 1) **Prompt** for a command
- 2) **Parse** (interpret metacharacters, expand file names and dissect command line into options and arguments)
- 3) **Search** for program (along the path)
- 4) **Execute** program by loading into memory (becomes a process), hookup input and outputs, and pass along command line options and arguments.
- 5) **Nap** (wait till process is done)
- 6) **Repeat**

Command Syntax

Command**Options****Arguments****Redirection**

Command – is the name of an executable program file.

Options – various options which control how the program will operate.

Arguments – the objects the command is directed to work upon.

Redirection – The default input stream (stdin) is from the console keyboard, the default output (stdout) and error (stderr) streams go to the console screen. Redirection can modify these streams to other files or devices.

Command Syntax

*Shell prints
this to prompt
user to enter a
command*

Shell parses this command line



Examples

Options modify the
behavior of the command

Arguments are what the
command works upon

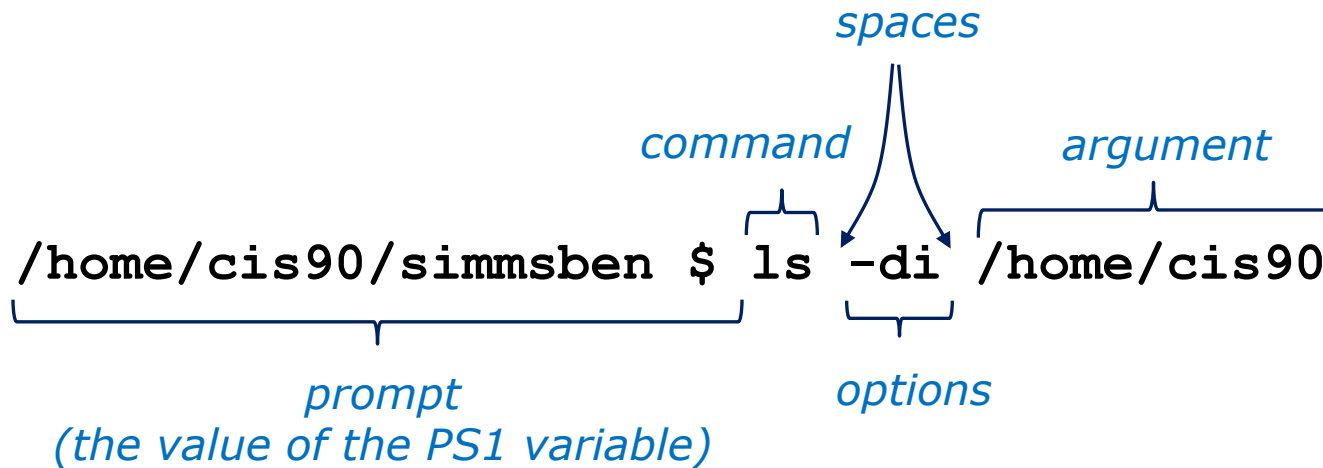
Redirection is covered
later in the course

```

/home/cis90/simmsben $
/home/cis90/simmsben $ ls
/home/cis90/simmsben $ ls -l
/home/cis90/simmsben $ ls -lt
/home/cis90/simmsben $ ls -lt Poems/
/home/cis90/simmsben $ ls -lt Poems/ bin/
/home/cis90/simmsben $ ls -lt Poems/ bin/ > mylist
  
```

Spaces (blanks) are used to separate the command,
options and arguments.

Command Line Syntax Review



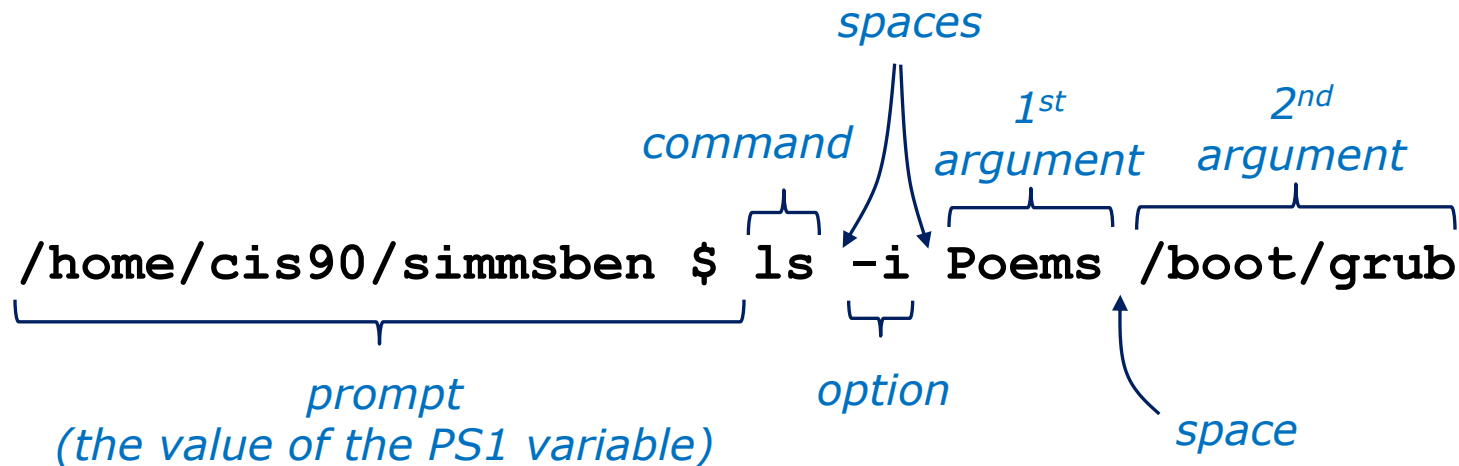
Parsing the command line above yields:

One command: **ls**

Two options: **d** and **i**

One argument: **/home/cis90** (an absolute pathname to a directory)

Command Line Syntax Review



Parsing the command line above yields:

One command: **ls**

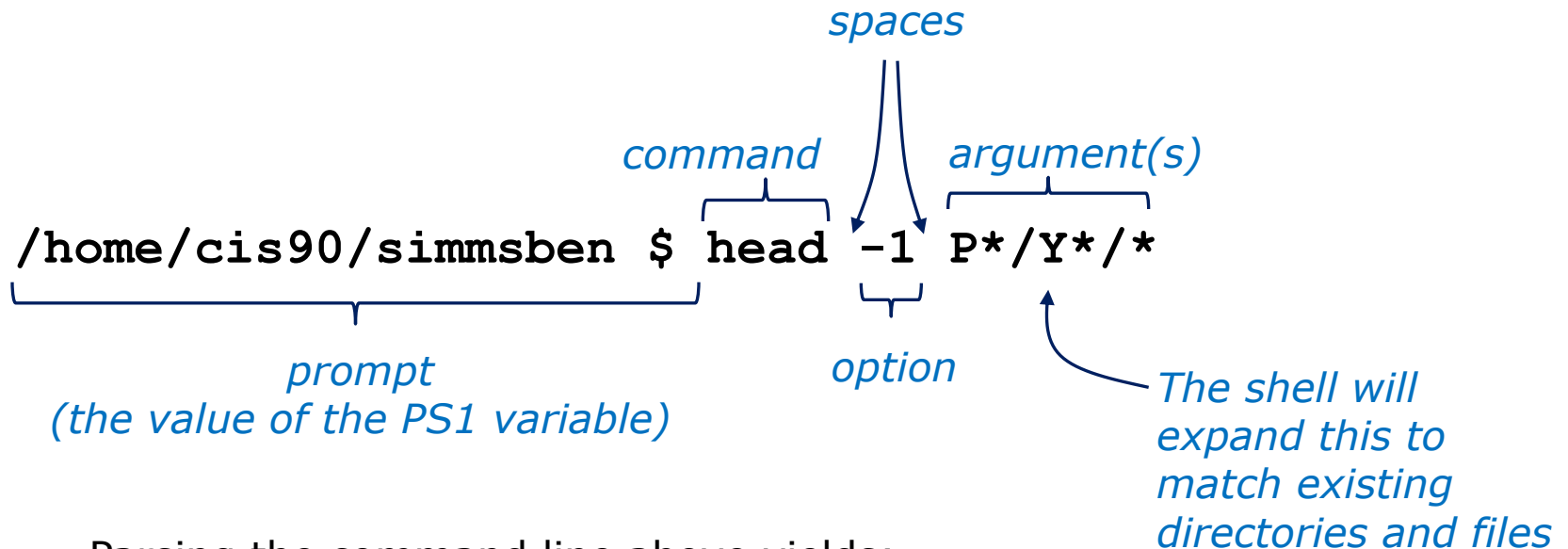
One options: **i**

Two arguments:

Poems (a relative pathname to a directory)

/boot/grub (an absolute pathname to a directory)

Command Line Syntax Review



Parsing the command line above yields:

One command: **head**

One option: **1**

Three arguments:

Poems/Yeats/mooncat (a relative pathname to a file)

Poems/Yeats/old (a relative pathname to a file)

Poems/Yeats/whitebirds (a relative pathname to a file)

Your turn now!

```
/home/cis90ol/simmsben $ ls -ls /usr/bin/ls*
```

- 1) What portion of the line above is the shell prompt?
- 2) Parse the command the user typed and identify:

The name of the program/script to run:

options:

arguments:

Your turn now!

```
/home/cis90ol/simmsben $ ls -ls /usr/bin/ls*
```

1) What portion of the line above is the shell prompt?

```
/home/cis90ol/simmsben $
```

2) Parse the command the user typed and identify:

The name of the program/script to run: `ls`

options: There are 2 options: `l` and `s` (long and size in blocks)

arguments: there are 7 arguments:

```
/usr/bin/lsattr  
/usr/bin/lsb_release  
/usr/bin/lscpu  
/usr/bin/lsdiff  
/usr/bin/lshal  
/usr/bin/lsusb  
/usr/bin/lsusb.py
```

Meta Characters (review)

Metacharacters

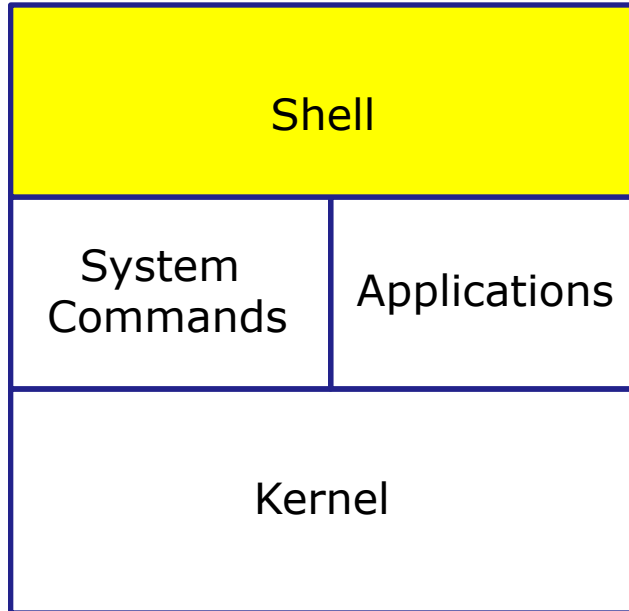
Have special interpretation by the shell

Char	Description
\	Treat the following metacharacter as a plain character. Also called "escaping" the next character.
\$	The following text is a shell (environment) variable and the value should be used.
<cr>	Carriage return marks the end of the command
;	Separates multiple commands on one line
'	used to enclose a string that the shell will not do further interpretation
"	Used to enclose a string that the shell will do further interpretation.
>	Redirects stdout (<i>more in Lesson 8</i>)
2>	Redirects stderr (<i>more in Lesson 8</i>)
*	Matches all non-hidden file names when used alone or zero or more characters when used as prefix, infix or postfix
?	Matches any single character of a file name
[]	Matches any single character contained within the brackets
#	Not an official metacharacter, but any text following the # is ignored by the shell



Life of the Shell

*The shell processes metacharacters during the **Parse** step*



- 1) **Prompt** for a command
- 2) **Parse** (interpret metacharacters, expand file names and dissect command line into options and arguments)
- 3) **Search** for program (along the path)
- 4) **Execute** program by loading into memory (becomes a process), hookup input and outputs, and pass along command line options and arguments.
- 5) **Nap** (wait till process is done)
- 6) **Repeat**

Metacharacters

#

has the ability to make everything that follows the # be ignored by the shell. Good for adding comments in scripts

```
/home/cis90/simmsben $ #OK lets escape the carriage return in next example  
/home/cis90/simmsben $
```

Note there is no error message because everything after the # is ignored

Metacharacters

\$

\$ metacharacter has the ability to "show the value of"

```
/home/cis90/simmsben $ EYES=brown  
/home/cis90/simmsben $ echo EYES  
EYES  
/home/cis90/simmsben $ echo $EYES  
brown  
  
/home/cis90/simmsben $ echo $LOGNAME  
simmsben  
/home/cis90/simmsben $
```

echo the string EYES

echo the value of the variable EYES

echo the value of the predefined environment variable LOGNAME

Metacharacters

" and '

Weak "double" quotes allow the shell to process \$ metacharacters inside the quoted string

```
/home/cis90/simmsben $ echo "I am in $PWD"  
I am in /home/cis90/simmsben
```

```
/home/cis90/simmsben $ echo 'I am in $PWD'  
I am in $PWD  
/home/cis90/simmsben $
```

Strong "single" quotes block the shell from processing \$ metacharacters inside the quoted string

Metacharacters

;

```
/home/cis90/simmsben $ #Lets put two commands on one line  
/home/cis90/simmsben $ echo "This is my terminal device:"; tty  
This is my terminal device:  
/dev/pts/2  
/home/cis90/simmsben $
```

the ; metachacter lets you combine several commands on one line

Metacharacters

\

```
/home/cis90/simmsben $ #OK lets escape the carriage return in next example
/home/cis90/simmsben $ echo Lets start line 1 here \
> and finish it here
Lets start line 1 here and finish it here
/home/cis90/simmsben $
```

The \ is used to escape the next character typed. Use an escape to disable the special abilities of a metacharacter.

Escaping a carriage return (the Enter key) tells the shell to keep inputting more characters from the next line for the current command being entered.

Metacharacters

\

Escaping the # means it is no longer treated as comment

```
/home/cis90/simmsben $ \#OK lets put a comment here
```

```
-bash: #OK: command not found
```

```
/home/cis90/simmsben $
```

```
/home/cis90/simmsben $
```

```
/home/cis90/simmsben $ echo $PS1
```

```
$PWD $
```

```
/home/cis90/simmsben $ echo \ $PS1
```

```
$PS1
```

```
/home/cis90/simmsben $
```

and you get an error when the shell processes your comment

Escaping the \$ means \$ is no longer treated "the value of"

Environment Variables

(review)

Shell (Environment) Variables

common environment variables

Shell Variable	Description
HOME	Users home directory (starts here after logging in and returns with a <code>cd</code> command (with no arguments)
LOGNAME	User's username for logging in with.
PATH	List of directories, separated by <code>:</code> 's, for the Shell to search for commands (which are program files) .
PS1	The prompt string.
PWD	Current working directory
SHELL	Name of the Shell program being used.
TERM	Type of terminal device , e.g. <code>dumb</code> , <code>vt100</code> , <code>xterm</code> , <code>ansi</code> , etc.

Shell (Environment) Variables

Show variable values

```
/home/cis90/simben $ echo $HOME  
/home/cis90/simben
```

```
/home/cis90/simben $ echo $LOGNAME  
simben90
```

```
/home/cis90/simben $ echo $PS1  
$PWD $
```

*Use echo to show the
values of variables*

```
/home/cis90/simben $ echo $PWD  
/home/cis90/simben
```

```
/home/cis90/simben $ echo $SHELL  
/bin/bash
```

```
/home/cis90/simben $ echo $TERM  
xterm
```

Shell (Environment) Variables

PATH

```
/home/cis90/simben $ echo $PATH  
/usr/lib/qt-  
3.3/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbi  
n:/sbin:/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

These are the directories in Benji's PATH in the order they will be searched:

1st: /usr/lib/qt-3.3/bin
2nd: /usr/local/bin
3rd: /bin
4th: /usr/bin
5th: /usr/local/sbin
6th: /usr/sbin
7th: /sbin
8th: /home/cis90/simben/../../bin
9th: /home/cis90/simben/bin
10th: .

The PATH variable is used by the shell to locate commands

Shell (Environment) Variables

Set variable values

Use an "=" with no spaces to set values of variables

```
/home/cis90/simben $ # Change the prompt variable
/home/cis90/simben $ PS1='[\u@\h \W]\$ '
[simben90@opus ~]$ echo $PS1
[\u@\h \W]\$
[simben90@opus ~]$
```

```
[simben90@opus ~]$ # Change it back again
[simben90@opus ~]$ PS1='$PWD $ '
/home/cis90/simben $ echo $PS1
$PWD $
/home/cis90/simben $
```

Shell Variables

Set variable values

If the variable has never been used before then it is created

```
/home/cis90/simben $ myfavoritedog="Benji"  
/home/cis90/simben $ echo $myfavoritedog  
Benji
```

Shell (Environment) Variables

env command – show all environment variables

```
/home/cis90/simmsben/Poems $ env
HOSTNAME=opus.cabrillo.edu
SHELL=/bin/bash
TERM=xterm
HISTSIZE=1000
USER=simmsben
LS_COLORS=no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05;37;41:ex=00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.bat=00;32:*.sh=00;32:*.csh=00;32:*.tar=00;31:*.tgz=00;31:*.arj=00;31:*.taz=00;31:*.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z=00;31:*.gz=00;31:*.bz2=00;31:*.bz=00;31:*.tz=00;31:*.rpm=00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.xbm=00;35:*.xpm=00;35:*.png=00;35:*.tif=00;35:
USERNAME=
MAIL=/var/spool/mail/simmsben
PATH=/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/cis90/simmsben/../../bin:/home/cis90/simmsben/bin:
INPUTRC=/etc/inputrc
PWD=/home/cis90/simmsben/Poems
LANG=en_US.UTF-8
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
SHLVL=1
HOME=/home/cis90/simmsben
BASH_ENV=/home/cis90/simmsben/.bashrc
LOGNAME=simmsben
CVS_RSH=ssh
LESSOPEN=|/usr/bin/lesspipe.sh %s
G_BROKEN_FILENAMES=1
_=/bin/env
OLDPWD=/home/cis90/simmsben
/home/cis90/simmsben/Poems $
```

*Use the **env** command to show all environment variables (a subset of the shell variables)*

Shell Variables

set command – show all shell variables

/home/cis90/simmsben/Poems \$ **set**

```
BASH=/bin/bash
BASH_ARGC=()
BASH_ARGV=()
BASH_ENV=/home/cis90/simmsben/.bashrc
BASH_LINENO=()
BASH_SOURCE=()
BASH_VERSINFO=([0]="3" [1]="2" [2]="25" [3]="1"
[4]="release" [5]="i686-redhat-linux-gnu")
BASH_VERSION='3.2.25(1)-release'
COLORS=/etc/DIR_COLORS.xterm
COLUMNS=80
CVS_RSH=ssh
DIRSTACK=()
EUID=1160
GROUPS=()
G_BROKEN_FILENAMES=1
HISTFILE=/home/cis90/simmsben/.bash_history
HISTFILESIZE=1000
HISTSIZE=1000
HOME=/home/cis90/simmsben
HOSTNAME=opus.cabrillo.edu
HOSTTYPE=i686
IFS=$' \t\n'
IGNOREEOF=10
INPUTRC=/etc/inputrc
LANG=en_US.UTF-8
LESSOPEN='|/usr/bin/lesspipe.sh %s'
LINES=24
LOGNAME=simmsben
```

```
LS_COLORS='no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35
:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05;37;41:ex=
00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.ba
t=00;32:*.sh=00;32:*.csh=00;32:*.tar=00;31:*.tgz=00;31:*.a
rj=00;31:*.taz=00;31:*.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z
=00;31:*.gz=00;31:*.bz2=00;31:*.bz=00;31:*.tz=00;31:*.rpm=
00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.x
bm=00;35:*.xpm=00;35:*.png=00;35:*.tif=00;35:'
MACHTYPE=i686-redhat-linux-gnu
MAIL=/var/spool/mail/simmsben
MAILCHECK=60
OLDPWD=/home/cis90/simmsben
OPTERR=1
OPTIND=1
OSTYPE=linux-gnu
PATH=/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/
cis90/simmsben/..bin:/home/cis90/simmsben/bin:.
PIPESTATUS=([0]="0")
PPID=26514
PROMPT_COMMAND='echo -ne
"\033]0;${USER}@${HOSTNAME%%.*}:${PWD/#$HOME/~}"; echo -ne
"\007"'
PS1='$PWD $'
PS2='> '
PS4='+ '
PWD=/home/cis90/simmsben/Poems
SHELL=/bin/bash
SHELLOPTS=braceexpand:emacs:hashall:histexpand:ignoreeof:i
nteractive-comments:monitor
SHLVL=1
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
TERM=xterm
UID=1160
USER=simmsben
USERNAME=
_=env
consoletype=pty
```

*Use the **set** command to show all shell variables (which includes the environment variables)*

Class Exercise

- Change your prompt with:
PS1='\$LOGNAME, command please: '
- Change your prompt with:
PS1='[\u@\h \W]\\$ '
- Change your prompt with:
PS1="\$PWD \$ "
Now change directories using **cd**, what happened?
- Restore original prompt with:
PS1='\$PWD \$ '

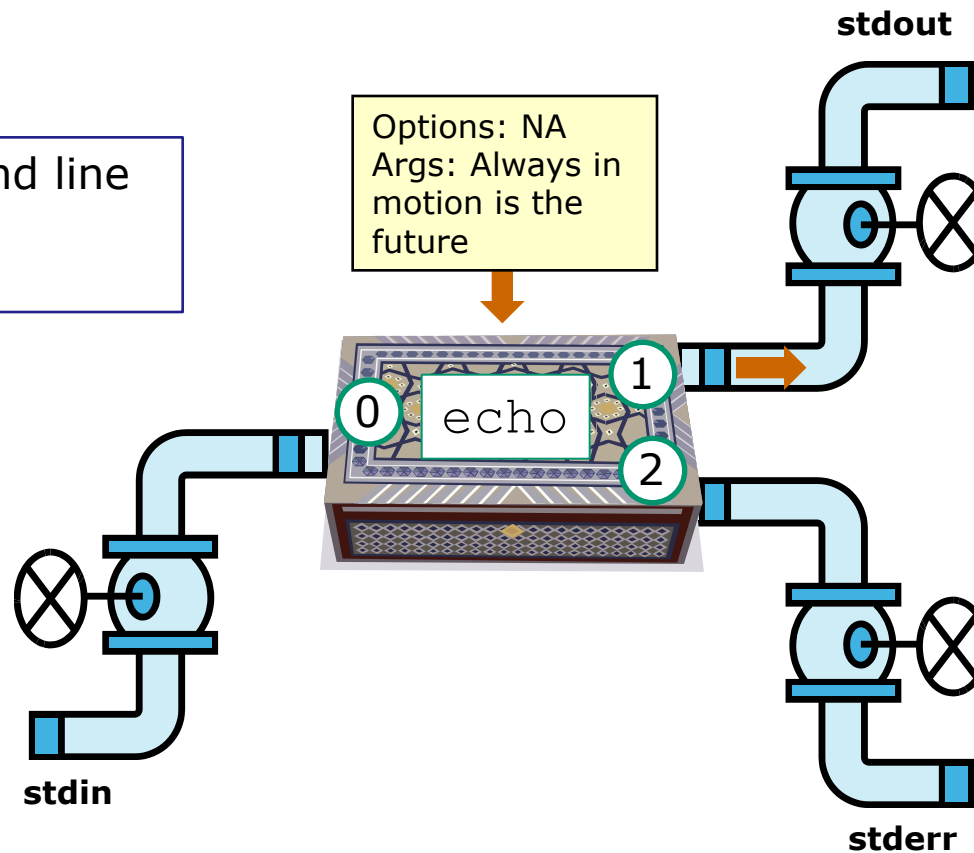
Program to Process (continuing)

Example program to process: echo command

```
[rsimms@opus ~]$ echo Always in motion is the future
Always in motion is the future
[rsimms@opus ~]$
```

Inputs: Command line

Outputs: stdout



`/dev/pts/1`



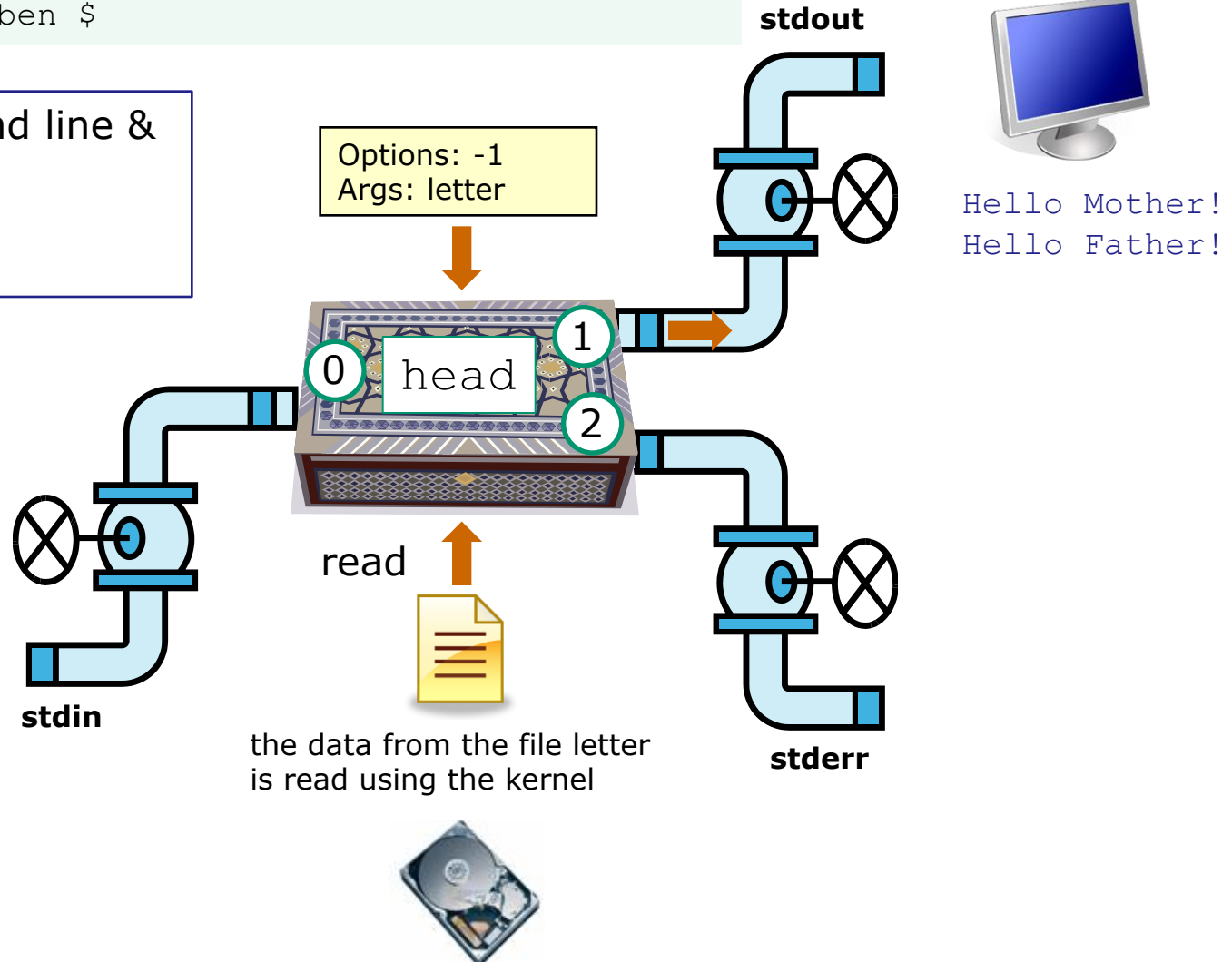
Always in
motion is
the future

Example program to process: head command

```
/home/cis90/simmsben $ head -1 letter
Hello Mother! Hello Father!
/home/cis90/simmsben $
```

Inputs: Command line & Operating System

Outputs: stdout

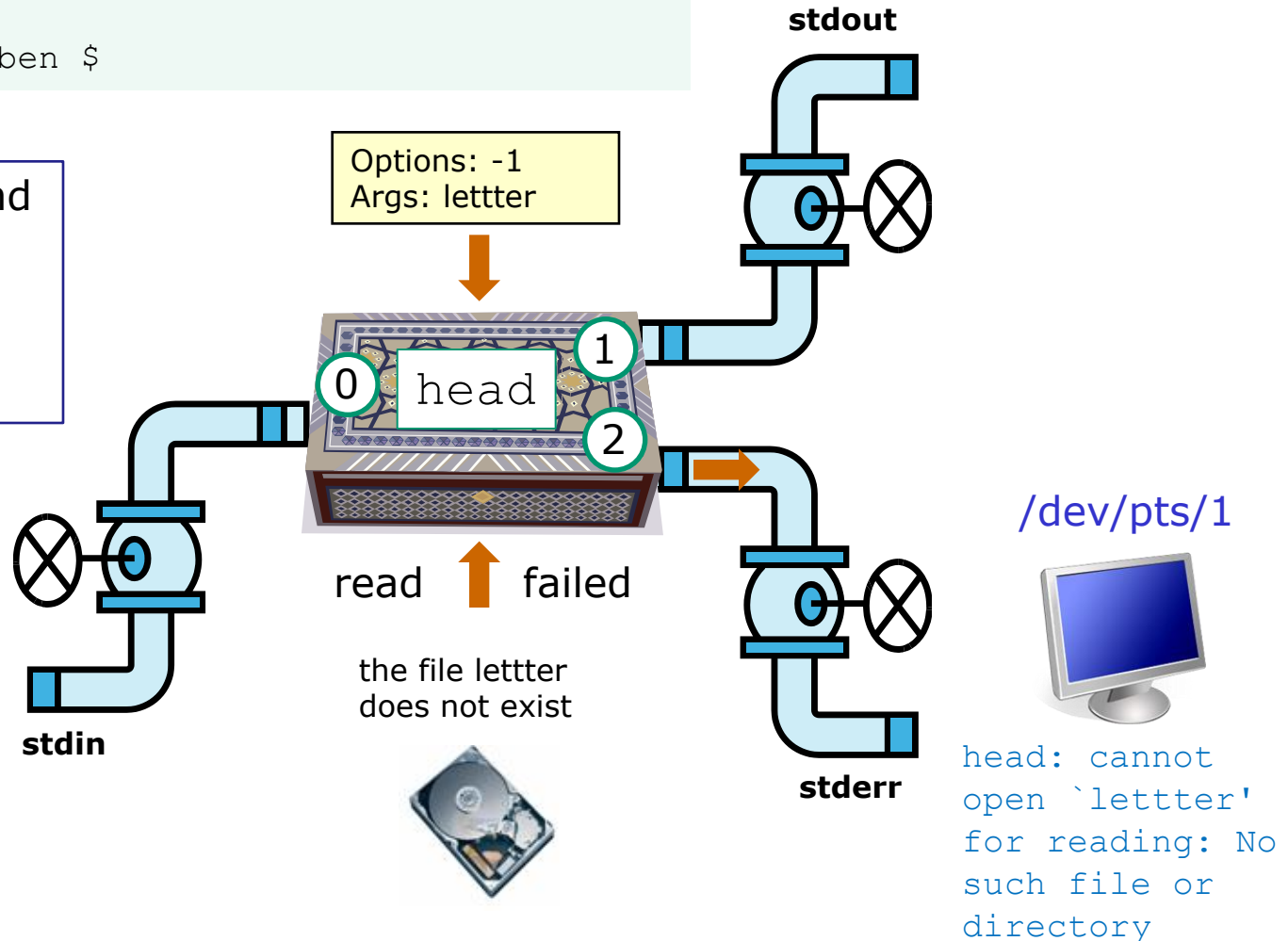


Example program to process: head command

```
/home/cis90/simmsben $ head -1 lettter
head: cannot open `lettter' for reading: No such
file or directory
/home/cis90/simmsben $
```

Inputs: Command
line & Operating
System

Outputs: stderr

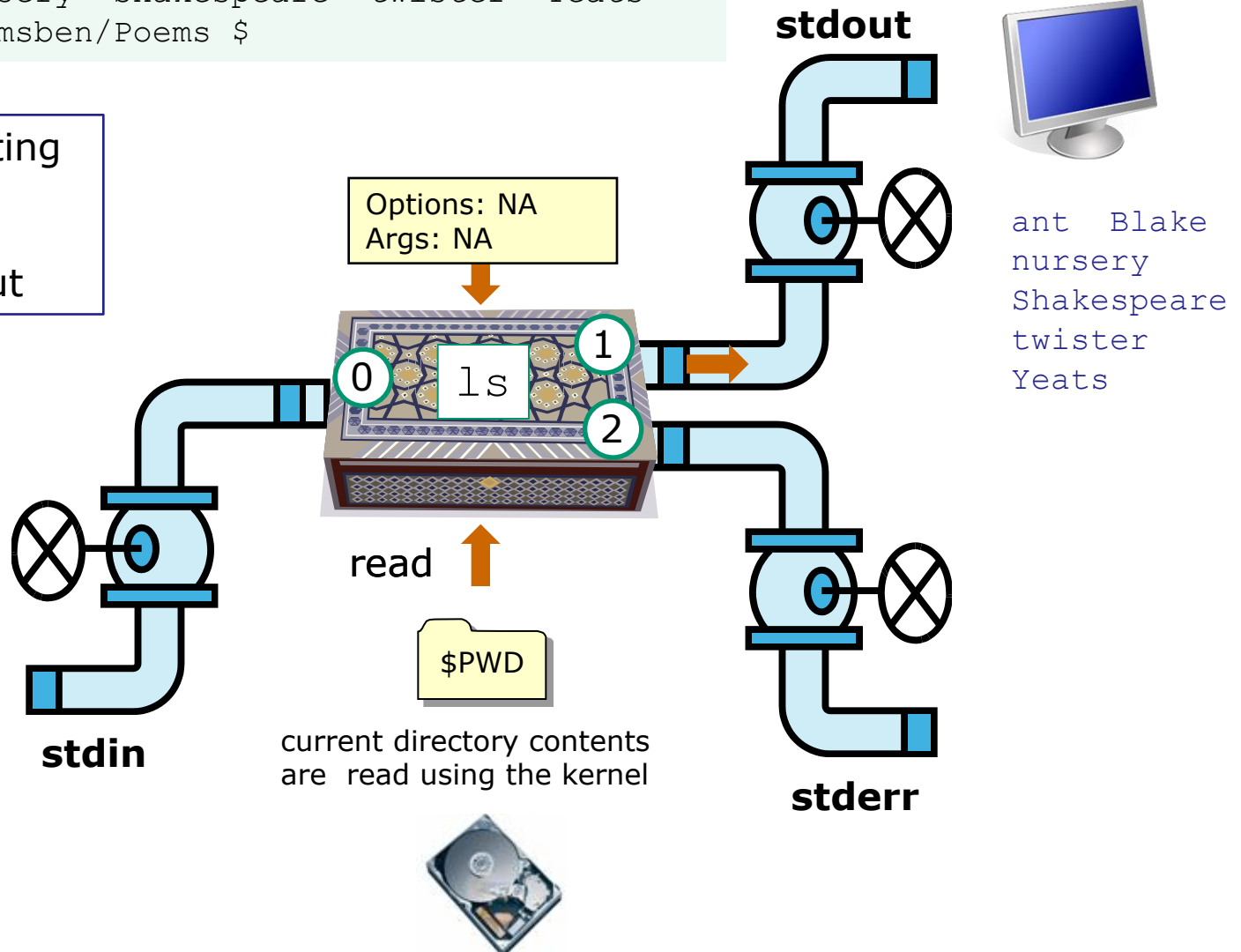


Example program to process: ls command

```
/home/cis90/simmsben/Poems $ ls
ant Blake nursery Shakespeare twister Yeats
/home/cis90/simmsben/Poems $
```

Inputs: Operating System

Outputs: stdout



Example program to process: bc command

```
/home/cis90/simmsben $ bc
bc 1.06
Copyright 1991-1994, 1997, 1998, 2000 Free Software
Foundation, Inc.
This is free software with ABSOLUTELY NO WARRANTY.
For details type `warranty'.
2+2
4
```

/dev/pts/1

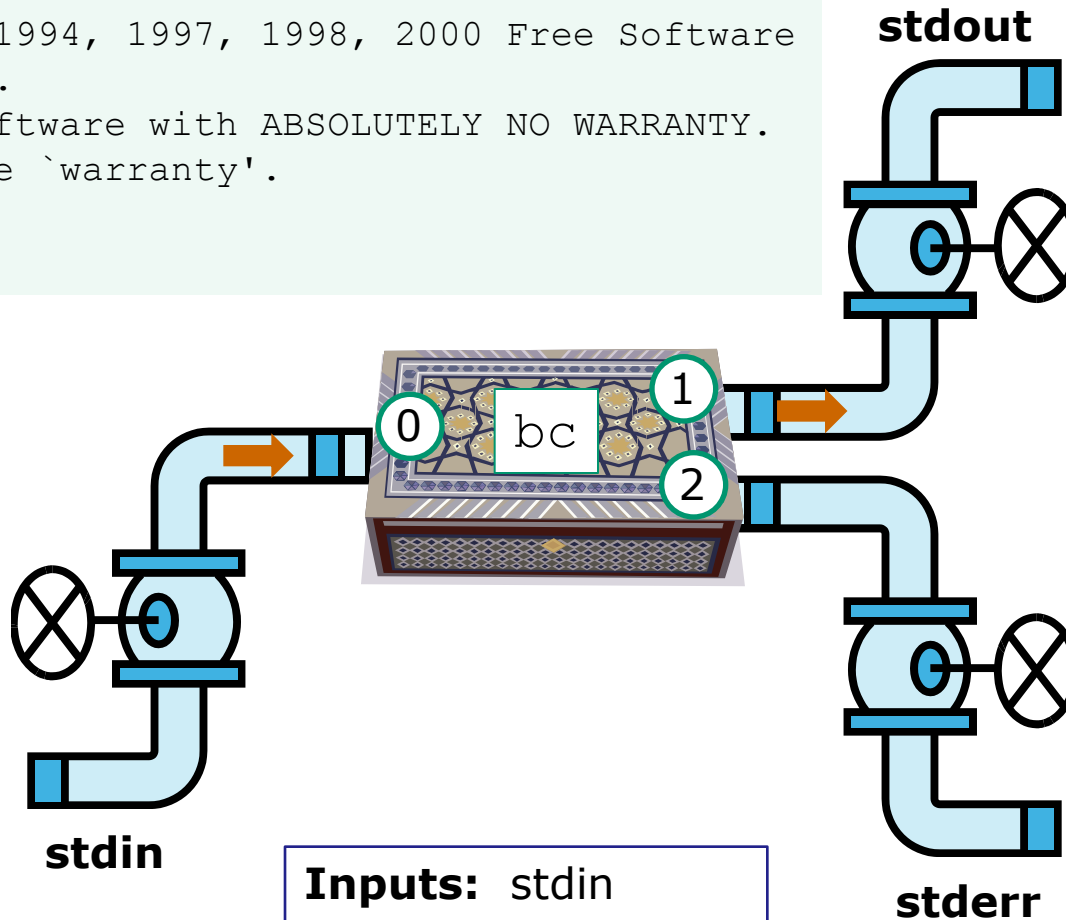


```
bc 1.06
Copyright 1991-
1994, 1997,
1998, 2000 Free
Software
Foundation, Inc.
This is free
software with
ABSOLUTELY NO
WARRANTY.
For details type
`warranty'.
4
```

/dev/pts/1



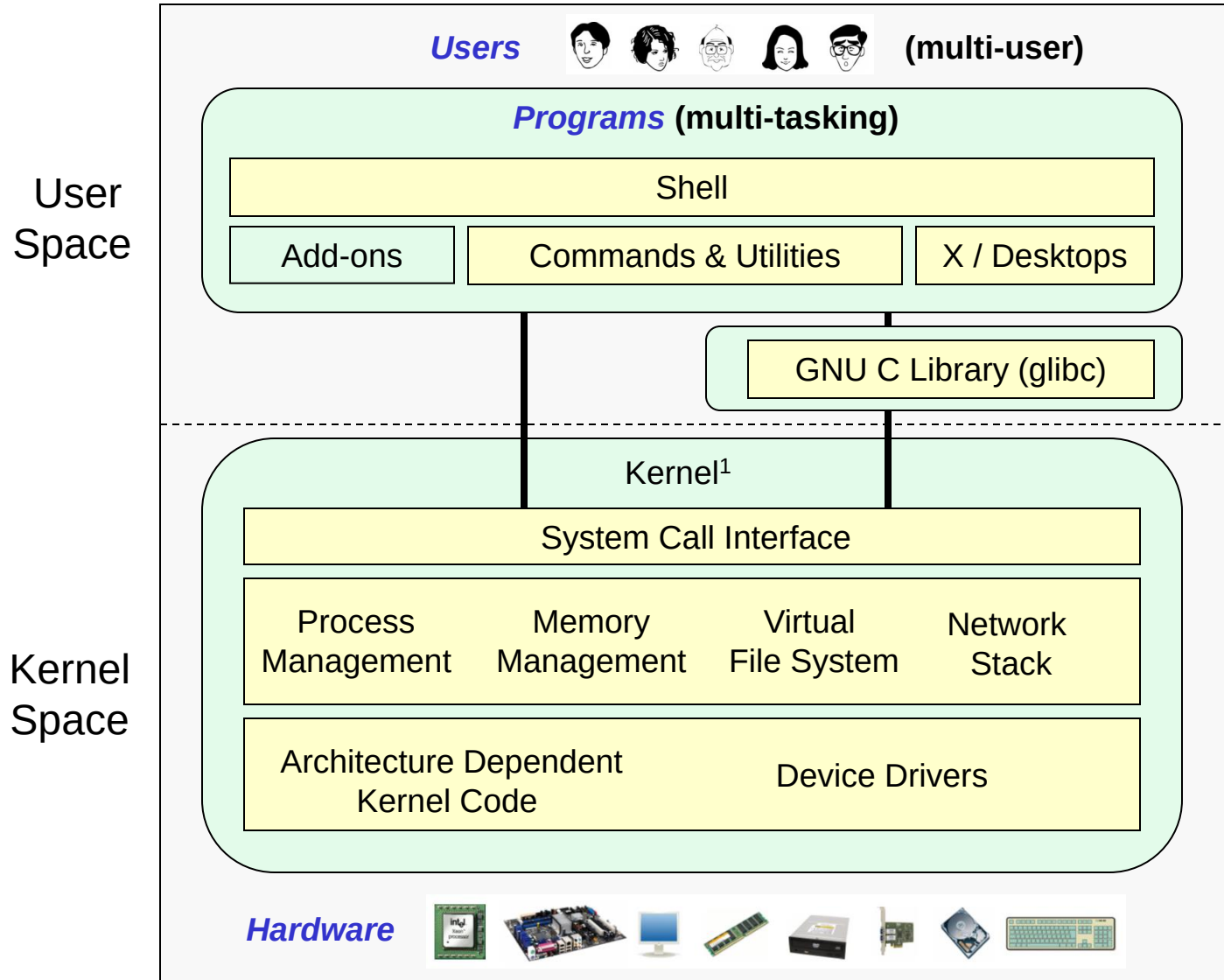
2+2



Architecture (review)



GNU/Linux Operating System Architecture



Richard Stallman started the GNU project in 1983 to create a free UNIX-like OS. He Founded the Free Software Foundation in 1985. In 1989 he wrote the first version of the GNU General Public License



Linus Torvalds, as a student, initially conceived and assembled the Linux kernel in 1991. The kernel was later re-licensed under the GNU General Public License in 1992.

¹See "Anatomy of the Linux kernel" by M. Tim Jones at <http://www-128.ibm.com/developerworks/linux/library/l-linux-kernel/>

The Source for Linux Kernels

<https://www.kernel.org/>

The Linux Kernel Archives

About Contact us FAQ Releases Signatures Site news

Protocol	Location
HTTP	https://www.kernel.org/pub/
FTP	ftp://ftp.kernel.org/pub/
RSYNC	rsync://rsync.kernel.org/pub/

Latest Stable Kernel:
3.13.5

Kernel	Date	tar.xz	pgp	patch	view patch	view inc	cgkit	changelog
mainline: 3.14-rc4	2014-02-24	[tar.xz]	[pgp]	[patch]	[view patch]		[cgkit]	
stable: 3.13.5	2014-02-22	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
stable: 3.11.10 [EOL]	2013-11-29	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 3.12.13	2014-02-22	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 3.10.32	2014-02-22	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 3.4.82	2014-02-22	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 3.2.55	2014-02-15	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 2.6.34.15 [EOL]	2014-02-10	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
longterm: 2.6.32.61	2013-06-10	[tar.xz]	[pgp]	[patch]	[view patch]	[view inc]	[cgkit]	[changelog]
linux-next: next-20140226	2014-02-26						[cgkit]	

Other resources

- Cgit
- Patchwork
- Linux.com
- Wikis
- Kernel Mailing Lists
- Linux Foundation
- Bugzilla
- Mirrors
- Kernel Planet

Social

- Site Atom feed
- Releases Atom Feed
- Linux on Google+

This site is operated by the Linux Kernel Organization, Inc., a 501(c)(3) nonprofit corporation, with support from the following sponsors.

```
[rsimms@oslab ~]$ uname -r
2.6.32-220.23.1.el6.i686
```

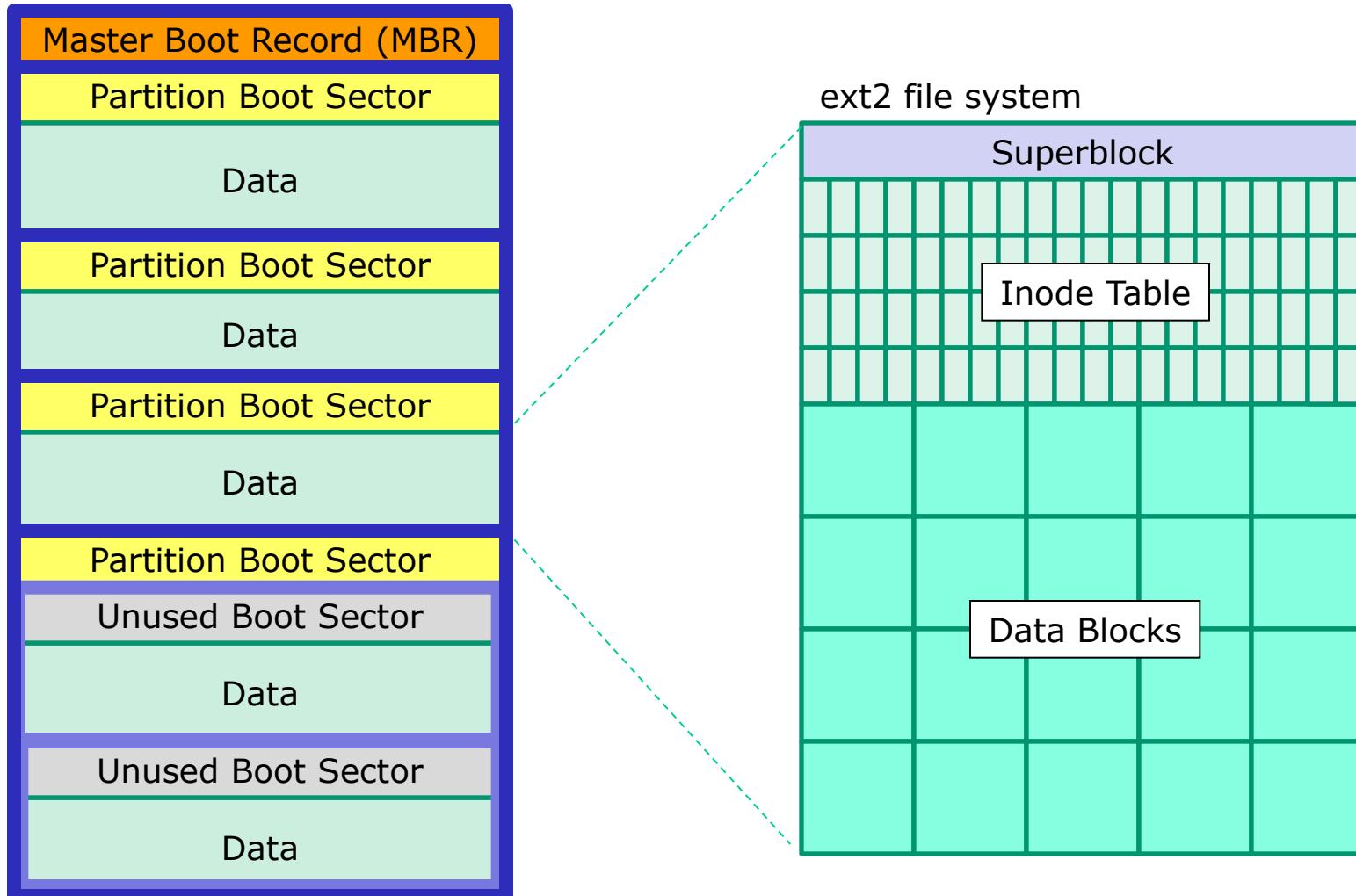
*Use the **-r** option on **uname** to see which release of the kernel is running on your system*

File System (review)



File Systems

Linux



The three elements of a UNIX file

```
/home/cis90/simben/Poems $ ls  
ant Blake nursery Shakespeare twister Yeats
```

```
/home/cis90/simben/Poems $ ls -li twister  
102625 -rw-r--r-- 1 simben90 cis90 151 Jul 20 2001 twister
```

```
/home/cis90/simben/Poems $ cat twister  
A tutor who tooted the flute,  
tried to tutor two tooters to toot.  
Said the two to the tutor,  
"is it harder to toot? Or to  
tutor two tooters to toot?"
```

filename

+

inode

+

data

filenames are stored in directories, **not** in inodes

bigfile 19470
bin 9628
letter 9662

Hello Mother! Hello Father!

Here I am at Camp Granada. Things are very entertaining, and they say we'll have some fun when it stops raining.

All the counselors hate the waiters, and the lake has alligators. You remember Leonard Skinner? He got ptomaine poisoning last night after dinner.

Now I don't want this to scare you, but my bunk mate has malaria. You remember Jeffrey Hardy? Their about to organize a searching party.

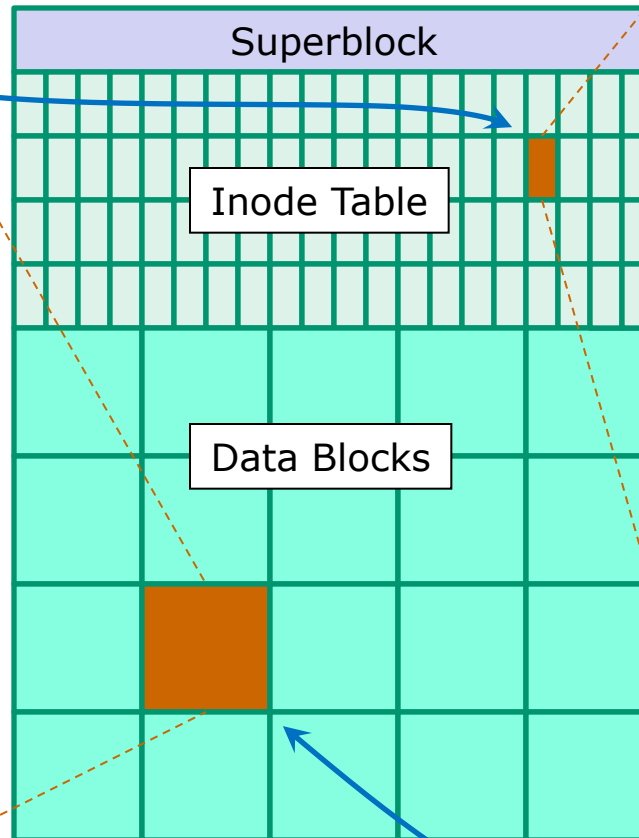
Take me home, oh Mother, Father, take me home! I hate Granada.
Don't leave me out in the forest where I might get eaten by a bear! Take me home, I promise that I won't make noise, or mess the house with other boys, oh please don't make me stay -- I've been here one whole day.

Dearest Father, darling Mother, how's my precious little brother? I will come home if you miss me. I will even let Aunt Bertha hug and kiss me!

Wait a minute! It's stopped hailing! Guys are swimming!
Guys are sailing! Playing baseball, gee that's better!
Mother, Father, kindly disregard this letter.

Alan Sherman

ext2 file system



9662	inode number
-	Type
rw-r--r--	Permissions
1	Number of links
simben90	User
cis90	Group
1044	Size
2001-07-20	Modification time
2012-09-17	Access Time
2012-08-01	Change time
Pointer(s) to data blocks	Pointer(s) to data blocks

```
/home/cis90/simmsben $ ls -il letter
```

```
9662 -rw-r--r--. 1 simben90 cis90 1044 Jul 20 2001 letter
```

Basic File Types and Commands

Long listing code (ls -l)	Type	How to make one
d	directory	mkdir
-	regular • Programs • Text • Data (binary) <i>Use the file command to further classify files</i>	touch
l	symbolic link	ln -s
c	character device files	mknod
b	block device files	mknod

Note: Other files types includes sockets (s) and named pipes (p)

Interpreting a long listing file types

The terminal window shows the output of the command `ls -la` in the directory `/home/cis90/simmsben`. The output lists various files and directories with their permissions, owner, group, size, date, and name. Annotations on the right explain the meaning of the first character in the permission string (column 1) and the color of the file name.

File Type	File Name	Color
Directory	<code>.</code>	Blue
Directory	<code>..</code>	Blue
Regular File	<code>.bash_history</code>	Blue
Regular File	<code>.bash_logout</code>	Blue
Regular File	<code>.bash_profile</code>	Blue
Regular File	<code>.bashrc</code>	Blue
Regular File	<code>bcommands</code>	Blue
Regular File	<code>bigfile</code>	Blue
Regular File	<code>bin</code>	Blue
Regular File	<code>deleteme</code>	Blue
Regular File	<code>.emacs</code>	Blue
Regular File	<code>empty</code>	Blue
Directory	<code>Hidden</code>	Blue
Regular File	<code>Lab2.0</code>	Blue
Regular File	<code>Lab2.1</code>	Blue
Regular File	<code>.lessht</code>	Blue
Regular File	<code>letter</code>	Blue
Regular File	<code>mbox</code>	Blue
Regular File	<code>Miscellaneous</code>	Blue
Regular File	<code>mission</code>	Blue
Regular File	<code>.mozilla</code>	Blue
Regular File	<code>.plan</code>	Blue
Regular File	<code>Poems</code>	Blue
Regular File	<code>proposal1</code>	Blue
Regular File	<code>proposal2</code>	Blue
Regular File	<code>proposal3</code>	Blue
Regular File	<code>results-el</code>	Blue
Regular File	<code>results-ela</code>	Blue
Regular File	<code>salsa</code>	Blue
Regular File	<code>small_town</code>	Blue
Regular File	<code>spellk</code>	Blue
Regular File	<code>text.err</code>	Blue
Regular File	<code>text.fxd</code>	Blue
Regular File	<code>timecal</code>	Green
Regular File	<code>.viminfo</code>	Green
Regular File	<code>what_am_i</code>	Blue
Regular File	<code>.Xauthority</code>	Blue
Regular File	<code>.zshrc</code>	Blue

Annotations:

- All directories in the UNIX file tree contain these two hidden `.` and `..` directories (d in column 1)
- A regular file (- in column 1) Its hidden because it starts with a `.`
- A directory (d in column 1) Color is blue because it's a directory
- A hidden directory (d in column 1, name starts with `.`)
- Regular file (- in column 1)
- regular file (- in column 1) Color is green because with execute bits are set

Symbolic links

*A symbolic link file
(l in column 1)*

```
/home/cis90/simben $ ls -l accounts /etc/passwd
lrwxrwxrwx 1 simben90 cis90 11 Mar 7 08:52 accounts -> /etc/passwd
-rw-r--r-- 1 root root 7183 Mar 6 08:17 /etc/passwd
/home/cis90/simben $
```

```
/home/cis90/simben $ head -5 /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
```

The accounts file in Benji's directory is a symbolic link to the /etc/passwd file.

```
/home/cis90/simben $ head -5 accounts
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
```

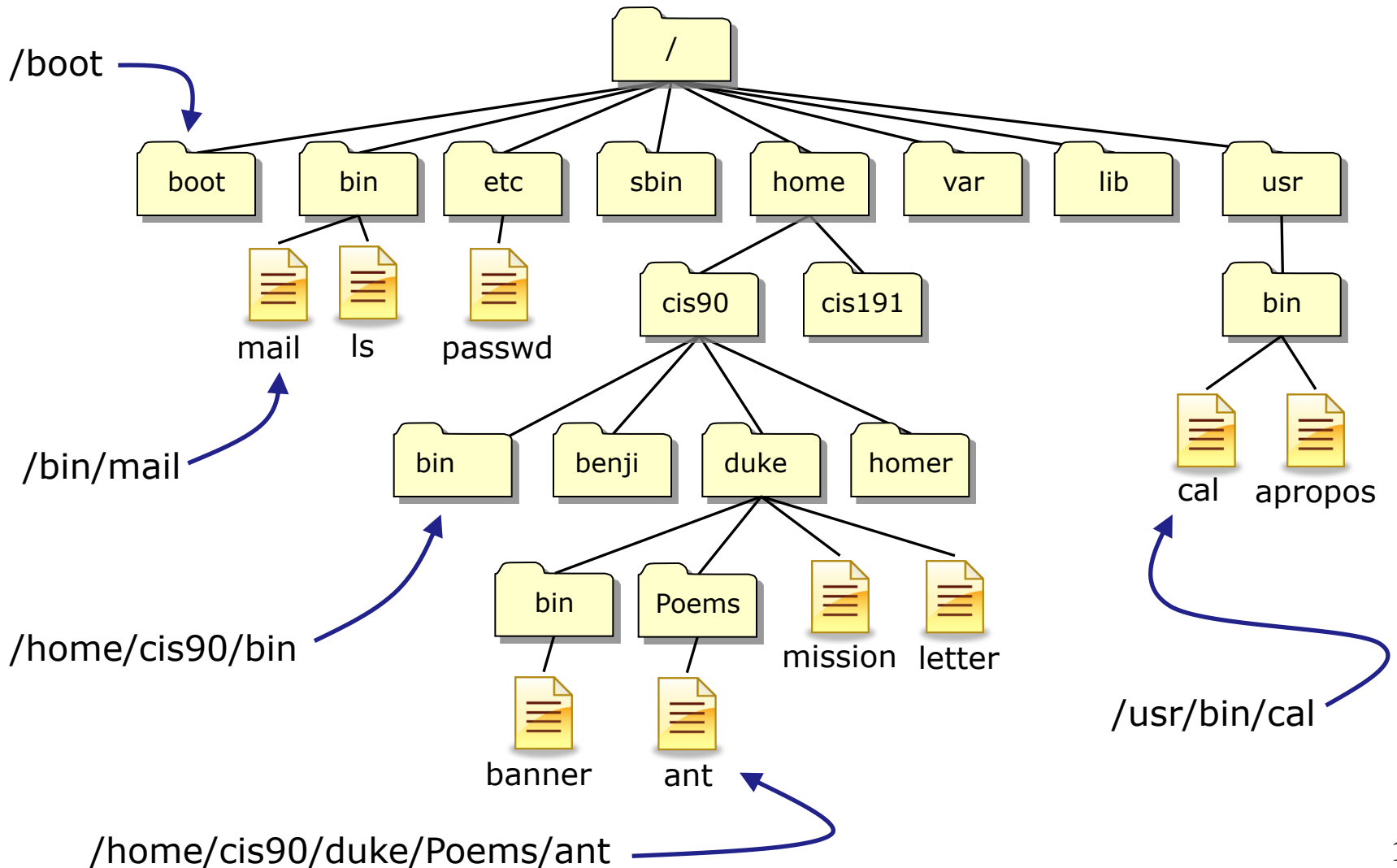
These "shortcuts" can be used for convenience

```
/home/cis90/simben $ ls -li accounts /etc/passwd
99983 accounts 1280173 /etc/passwd
/home/cis90/simben $
```

Note they have different inodes

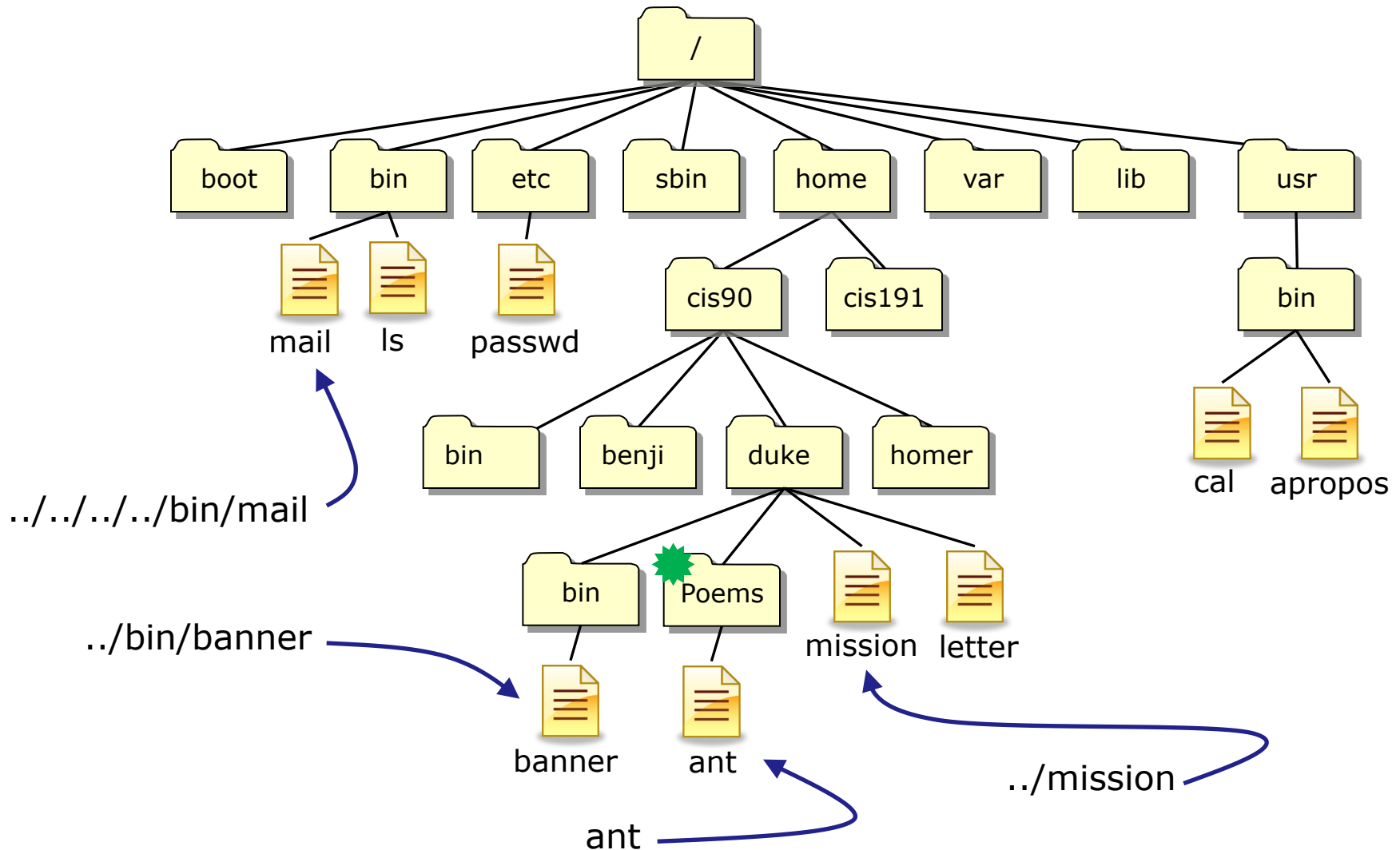
Absolute Pathnames

Start with from /



Relative Pathnames

Start from your current location in the tree



Top Level Directories

Directory	Contents
/bin	binary files forming the commands and shells used by the system administrator and users
/boot	files used during the initial boot-up process including the kernel
/dev	device files for connected hardware
/etc	system configuration files
/home	individual directories owned by each user
/lib	shared libraries needed to boot the system and run the commands in the root filesystem (i.e. commands in /bin and /sbin)
/lost+found	recovered files that were corrupted by power failures or system crashes
/mnt	mount points for floppies, cds, or other file systems
/opt	add-on software packages and/or commercial applications
/proc	kernel level process information
/root	home directory for the root user
/sbin	system administration commands reserved for the superuser (root)
/tmp	temporary files that are deleted when the system is rebooted or started
/usr	program files and related files for use by all users
/var	log files, print spool files, and mail queues

Relative/Absolute Pathname Target Practice



```
/home/cis90/bin/randomFile
```

```
# From ...
```

```
# What is absolute/relative pathname to ...
```

Type your answers in the chat window

CCC Confer

CCC Confer Breakout Rooms Test



Room 1



Room 2



Room 3



Room 4



Room 5



Room 6

*Everyone needs to be on CCC Confer today,
please use your Opus username.*

The screenshot shows a virtual breakout room interface titled "CCC Confer - 0 - RICH SIMMS". The interface includes a top menu bar (File, Edit, View, Tools, Window, Help), a toolbar with icons for drawing, erasing, and screen capture, and a main display area. On the left, there is a sidebar with sections for "AUDIO & VIDEO", "PARTICIPANTS", and "CHAT".

Annotations with blue arrows point to specific features:

- Use this to put a green check next to your name:** Points to the "PARTICIPANTS" list, specifically to the "ROOM 1" section where a green checkmark is visible next to the name "Benji".
- Use the camera icon to do screen captures:** Points to the camera icon in the toolbar on the left side of the interface.
- Use normal copy and paste as well from your desktop:** Points to the main display area, which shows a terminal window with the command `echo $LOGNAME` and its output `simben90`, a photo of a roasted chicken, a photo of a stack of cookies, and a photo of various colorful donuts.

I'll be sending you into virtual breakout rooms today so you can work together on various activities

CCC Confer Activity



Room 1



Room 2



Room 3



Room 4



Room 5



Room 6

1. Download the presentation slides for Lesson 5 from the Calendar page of the web site.
2. Locate this slide.
3. Put a green check next to your name when you have done steps 1-2.

When I see the green checks I'll distribute you the different rooms

1. In your breakout room, see if you can do the following:
 - Introduce yourselves using room chat window.
 - Use whiteboard camera icon to copy your Linux logo above. Note you can resize the screen rectangle that is copied.
 - Each student use the **echo \$LOGNAME** command in a Putty/MAC terminal and then paste a copy of their ssh session on the whiteboard.
 - Decorate your room with anything else so you will recognize it when you return.
 - Return to the main room when finished (drag your name from the breakout room back to the main room)

Flashcards

Lessons L1-L5 random



Flashcards
Deck size " "
L1=18
L2=22
L3=5
L4=26
L5=4
Total=75

Rules

- Chat window belongs to team that is up (no one else can use)
- "Final Answer" must be from someone on team that hasn't answered yet
- All team members can help each other and suggest answers

Flash Cards

Click on Flashcards in left panel

Rich's Cabrillo College CIS Classes Login Page

Home Resources Forums CIS Lab CTC

Please Login
You need to login first

Username:
Password:

Login

New users click [here](#)

Metal Sitemap W3C XHTML 1.0 W3C CSS Credits Earth

Register if this is the first time using Flashcards

Rich's Cabrillo College CIS Classes Registration

Home Resources Forums CIS Lab CTC

Registration

First Name:
Last Name:
Email:

Create your login credentials

Username:
Password:
Password again:

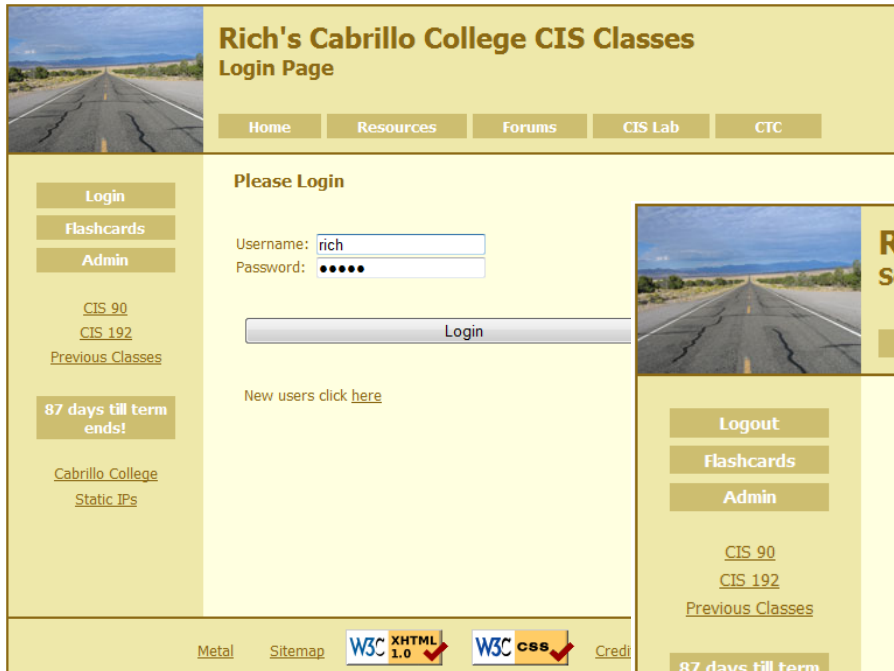
Submit

Metal Sitemap W3C XHTML 1.0 W3C CSS Credits Earth

Register and choose a username and password of your choice

Logging in and using Flashcards

Login with your username and password



Rich's Cabrillo College CIS Classes
Login Page

Home Resources Forums CIS Lab CTC

Please Login

Username:
Password:

Login

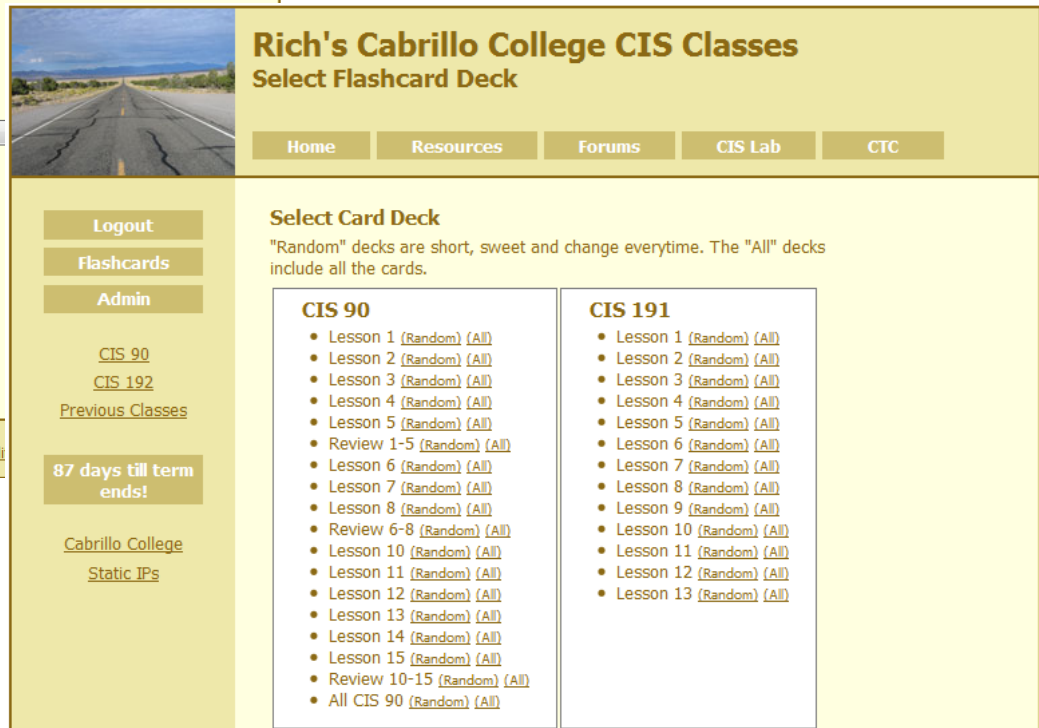
New users click [here](#)

87 days till term ends!

[Cabrillo College](#)
[Static IPs](#)

Metal Sitemap W3C XHTML 1.0 W3C CSS Credit

Select deck of cards



Rich's Cabrillo College CIS Classes
Select Flashcard Deck

Home Resources Forums CIS Lab CTC

Select Card Deck

"Random" decks are short, sweet and change everytime. The "All" decks include all the cards.

CIS 90	CIS 191
• Lesson 1 (Random) (All)	• Lesson 1 (Random) (All)
• Lesson 2 (Random) (All)	• Lesson 2 (Random) (All)
• Lesson 3 (Random) (All)	• Lesson 3 (Random) (All)
• Lesson 4 (Random) (All)	• Lesson 4 (Random) (All)
• Lesson 5 (Random) (All)	• Lesson 5 (Random) (All)
• Review 1-5 (Random) (All)	• Lesson 6 (Random) (All)
• Lesson 6 (Random) (All)	• Lesson 7 (Random) (All)
• Lesson 7 (Random) (All)	• Lesson 8 (Random) (All)
• Lesson 8 (Random) (All)	• Lesson 9 (Random) (All)
• Review 6-8 (Random) (All)	• Lesson 10 (Random) (All)
• Lesson 10 (Random) (All)	• Lesson 11 (Random) (All)
• Lesson 11 (Random) (All)	• Lesson 12 (Random) (All)
• Lesson 12 (Random) (All)	• Lesson 13 (Random) (All)
• Lesson 13 (Random) (All)	
• Lesson 14 (Random) (All)	
• Lesson 15 (Random) (All)	
• Review 10-15 (Random) (All)	
• All CIS 90 (Random) (All)	

Class Exercise

Flashcards

- Browse to simms-teach.com
- Register with a username and password of your choice
- Verify you can login and use the flash cards.

Test Prep



run ./trouble-p1 on sun-hwa as root

Reminder to instructor:

On Sun-Hwa, run trouble-P1 as root for practice test
on Opus, /home/rsimms/cis90/test01/q29/mail-q29-practice

Reminder to students:

Be sure to logout of Sun-Hwa after doing last exercise before
logging in again to work on practice test



How to prepare for the test:

- Review slides for Lessons 1-5 (download and make sure you know how to electronically search PDFs)
- DO THE PRACTICE TEST
- Compare your practice test answers with others and discuss on the forum
- DO THE PRACTICE TEST
- Note the steps you take to answer each question so you can use them again on the real test
- DO THE PRACTICE TEST
- Go through the Lesson 1-5 flashcards till you feel comfortable with the material
- DO THE PRACTICE TEST
- Practice, practice, practice ... repeating Labs 1-4 never hurts!

Practice Test

```

CIS 90 - Spring 2014 - PRACTICE TEST 1 - 30 points

HONOR CODE:
This is a practice test and you may work with others on it. However on the real test you
must work alone. Submit the practice test even though it's not graded to verify you know
how to do it correctly. Feel free to compare and discuss answers to the practice test on
the forum.

NAME: <<< please replace this text with your name >>>

INSTRUCTIONS:
Download or copy and paste this page from your web browser into a text file on your
computer. Don't use a word processor like MS Word! Instead use a text editor like
Notepad (Windows) or TextWrangler (Mac) to add your answers to the questions below.

Linux servers used for this test:
1) oslab.cishawks.net (port 2220) - this server is also called Opus
2) sun-hwa.cishawks.net (port 22)
3) son-of-opus.simms-teach.com (port 2220)
4) pxx-arwen.cishawks.net (port 22) - used for an extra credit question

All servers are accessible using ssh from Opus. For Sun-Hwa and Son-of-Opus login using
your original Opus credentials. For Arwen, use the generic cis90 account.

Please KEEP YOUR ANSWERS TO A SINGLE LINE ONLY and preserve the tags, e.g. "A1)", "A2)",
etc. used to label the answers.

[ ----- ]
[ Use the Son-of-Opus server to answer the following questions ]
[ ----- ]

Q1) Let's plant the flag on Son-of-Opus. Login to Son-of-Opus and run the flag command.
What is the output of this command?

A1)

Q2) In March 2003, the kernel release for the popular Red Hat 9 distro was 2.4.20-8. The
kernel release on Opus is 2.6.32-220.23.1.el6.i686. You can download the source code for
any release from www.kernel.org. What kernel release is running on Son-of-Opus?

A2)

Q3) Running the flag command creates a new file called geocache. View the contents of
this file to discover the name of a mystery file assigned to you. Examine your mystery
file. How many LINES does your mystery file have?
  
```

A practice test is available on the web site Calendar page.

Download it, open with Adobe Reader, fill in with your answers, and save it.

Make sure you can email it as an attachment to yourself to verify your answers were saved.

You may need to download the latest version of Adobe Reader if you have problems filling it out.

What command ... ?

Tips on how to answer questions on lab assignments and tests

What command will do “blah, blah, blah” questions:

Examples:

- What **ls** command allows you to see the permissions of your home directory while you are in your home directory?
- What command will give you a prompt showing your current working directory path and a \$?
- What command allows you to see hidden files in your current directory?

*Tip: Always use Opus (or the appropriate VM) to test your answers for these kinds of questions. **I will!** If your command doesn't work it won't be the right answer!*

Practice Question

What **ls** command allows you to see the permissions of your home directory while you are in your home directory?

Practice Question

What **ls** command allows you to see the permissions of your home directory while you are in your home directory?

```
/home/cis90/simben $ ls -l
total 392
-rw-r--r-- 2 simben90 cis90 10576 Jul 20 2001 bigfile
drwxr-xr-x 2 simben90 cis90 4096 Feb 12 16:07 bin
-rw----- 1 simben90 cis90 606 Feb 29 22:17 dead.letter
-rw-r--r-- 1 simben90 cis90 0 Jul 20 2001 empty
d----- 2 simben90 cis90 4096 Feb 1 2002 Hidden
< snipped >
-rw-r--r-- 1 simben90 cis90 250 Jul 20 2001 text.err
-rw-r--r-- 1 simben90 cis90 231 Jul 20 2001 text.fxd
-rwxr-xr-x 1 simben90 cis90 509 Jun 6 2002 timecal
-rw-rw-r-- 1 simben90 cis90 25390 Feb 29 22:18 uhistory

-rw-r--r-- 1 simben90 cis90 352 Mar 5 08:24 what_am_i
/home/cis90/simben $
```

Nope, that didn't work. We got permissions of all the files in the directory but we didn't get the permissions of the directory itself!

Practice Question

What **ls** command allows you to see the permissions of your home directory while you are in your home directory?

```
/home/cis90/simben $ ls -dl /home/cis90/simben  
drwxr-xr-x 10 simben90 cis90 4096 Mar  1 10:15
```

```
/home/cis90/simben $ ls -dl ~  
drwxr-xr-x 10 simben90 cis90 4096 Mar  1 10:15
```

```
/home/cis90/simben $ ls -dl .  
drwxr-xr-x 10 simben90 cis90 4096 Mar  1 10:15 .
```

```
/home/cis90/simben $ ls -dl $HOME  
drwxr-xr-x 10 simben90 cis90 4096 Mar  1 10:15
```

```
/home/cis90/simben $ ls -dl  
drwxr-xr-x 10 simben90 cis90 4096 Mar  1 10:15 .
```

Yep, that worked! The *-d* option instructs the *ls* command not to descend into the directory. Any of the commands above would be correct.

Practice Question

What command will give you a prompt showing your current working directory path and a \$?

Practice Question

What command will give you a prompt showing your current working directory path and a \$?

```
/home/cis90/simben $ PS1=blah
blah
blahPS1="/home/cis90/simben $ "
```

```
/home/cis90/simben $
/home/cis90/simben $ cd ..
/home/cis90/simben $ cd
/home/cis90/simben $
/home/cis90/simben $ echo $PS1
/home/cis90/simben $
```

Nope, that didn't work. The prompt doesn't change after changing to another directory

Practice Question

What command will give you a prompt showing your current working directory path and a \$?

```
/home/cis90/simben $ PS1=blah
blah
blahPS1="PWD $ "
PWD $
PWD $ echo $PS1
PWD $
```

Nope, that didn't work either. A \$ in front of the variable name is required to use its value.

Practice Question

What command will give you a prompt showing your current working directory path and a \$?

```
PWD $ PS1=blah
blah
blahPS1="$PWD $ "
/home/cis90/simben $ cd ..
/home/cis90/simben $ cd
/home/cis90/simben $
/home/cis90/simben $ echo $PS1
/home/cis90/simben $
```

Better, but still didn't work. The prompt is still not changing after cd'ing to another directory.

We need to block bash from expanding the \$PWD variable when it's being set.

Practice Question

What command will give you a prompt showing your current working directory path and a \$?

```
/home/cis90/simben $ PS1=blah
blah
blahPS1='$PWD $ '
/home/cis90/simben $ cd ..
/home/cis90 $ cd
/home/cis90/simben $
/home/cis90/simben $ echo $PS1
$PWD $
```

Touchdown! That worked!

The single quotes prevent bash from expanding \$PWD when setting the PS1 variable.

It is not expanded till the prompt is actually generated for the next command.

Practice Question

What command allows you to see hidden files in your current directory?

Practice Question

What command allows you to see hidden files in your current directory?

```
/home/cis90/simben $ ls
```

bigfile	lab01.graded	Lab2.1	mission	small_town	uhistory
bin	lab01-submitted	letter	Poems	spellk	what_am_i
dead.letter	lab02.graded	log	proposal1	text.err	
empty	lab03.graded	mbox	proposal2	text.fxd	
Hidden	Lab2.0	Miscellaneous	proposal3	timecal	

Nope, that didn't work! Hidden files start with a "." and note of these start with a "." (period)

Practice Question

What command allows you to see hidden files in your current directory?

```
/home/cis90/simben $ ls -a
```

.	dead.letter	Lab2.0	.mozilla	.ssh
..	.emacs	Lab2.1	.plan	text.err
.bash_history	empty	.lesshst	Poems	text.fxd
.bash_logout	Hidden	letter	proposal1	timecal
.bash_profile	lab01.graded	log	proposal2	uhistory
.bashrc	lab01-submitted	mbox	proposal3	.viminfo
bigfile	lab02.graded	Miscellaneous	small_town	what_am_i
bin	lab03.graded	mission	spellk	

Bingo, that worked! Hidden files and directories start with a "." (period)

How many arguments
or “parse this
command” questions

Tips on how to answer questions on lab assignments and tests

How many arguments or “parse this command” questions

Example: The shell performs file name expansion during the Parse step. When a user types the command: **file /v*/l??/*o*.[14]** on Opus, how many arguments get passed to the **file** command? What specifically are those arguments?

Tip: Use the echo command to preview how the shell will expand arguments containing metacharacters.

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Practice Question

The shell performs file name expansion during the Parse step. When a user types the command: **file /v*/l??/*o*[14]** on Opus, how many arguments get passed to the **file** command? What specifically are those arguments?

```
/home/cis90/simben $ echo /v*/l??/*o*[14]  
/var/lib/polkit-1 /var/log/dracut.log-20130101 /var/log/yum.log-20130101
```

*Answer: The shell will expand **/v*/l??/*o*[14]** into the 3 arguments shown above*

Practice Question

Parse the following command on Opus:

```
wc -wl /home/cis90/d*t/*w*
```

what is the second argument passed to the **wc** command?

Practice Question

Parse the following command on Opus:

```
wc -wl /home/cis90/d*t/*w*
```

what is the second argument passed to the **wc** command?

command: **wc**

options: **w** and **l**

arguments:

```
[rsimms@oslab ~]$ echo /home/cis90/d*t/*w*
```

```
/home/cis90/depot/network /home/cis90/depot/newfile /home/cis90/depot/randomwords
```

*3 arguments, the
second argument is* 

Answer: /home/cis90/depot/newfile

Practice Question

Parse the following command on Opus:

```
wc -wl /home/cis90/d*t/*w*
```

Regarding the options passed to the wc command, how many and what are they?

Practice Question

Parse the following command on Opus:

```
wc -wl /home/cis90/d*t/*w*
```

Regarding the options passed to the wc command, how many and what are they?

command: `wc`

options: `w` and `l`

arguments:

`/home/cis90/depot/network`

`/home/cis90/depot/newfile`

`/home/cis90/depot/randomwords`

Answer: there are two options, w and l

Absolute/relative pathname questions:

Tips on how to answer questions on lab assignments and tests

Absolute/relative pathname questions:

Examples:

- What is the relative pathname from your home directory to the **date** command?
- What is the absolute path to the sonnet1 file in your Shakespeare directory?

*Tip: Use the **ls** command with tab completion to verify your absolute or relative pathnames*

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Tip: Use the **ls** command with tab completion to verify your absolute or relative pathnames

Practice

What is the relative pathname from your home directory to the **date** command?

Practice

What is the relative pathname from your home directory to the **date** command?

First, use the type command to find where the date command is

```
/home/cis90/simmsben $ type date
date is /bin/date
```

```
/home/cis90/simben $ ls ../
ahrmatt/      colabd/      huljef/      olscam/      rodduk/
answers/      deltas/      jimmel/      pacnan/      shidev/
.bash_profile depot/      lowmic/      phacha/      simben/
bin/          doucor/      macrya/      plajos/      varana/
blerav/       flamat/      maxsco/      plajua/      veleli/
bodian/       gueous/      mcidar/      porjon/
bunsol/       guest/       milhen/      pummas/
cheken/       helrog/      milhom/      rafdav/
cofcol/       hovdav/      milmic/      reedie/

/home/cis90/simben $ ls ../../
backup/      cis191/      cis90/      guest/      rick/      turnin/
cis164/      cis192/      cis98/      jimg/      rsimms/    .Xauthority
cis172/      cis193/      gerlinde/   mikki/      ryan/

/home/cis90/simben $ ls ../../../../
.autofsck  etc/      media/      opt/      selinux/  tmp/
bin/       home/     misc/      proc/     srv/      u/
boot/      lib/      mnt/      root/     sys/      usr/
dev/       lost+found/ net/      sbin/     tftpboot/ var/

/home/cis90/simben $ ls ../../../../bin/date
../../../../bin/date
```

Tap tab key twice to see what is in that directory

No errors so this relative pathname is GOOD!

Answer: ../../../../bin/date

Example

What is the absolute path to the sonnet1 file in your Shakespeare directory?

Practice

What is the absolute path to the sonnet1 file in your Shakespeare directory?

```

/home/cis90/simben $ ls /
.autofsck  etc/      media/    opt/      selinux/  tmp/
bin/       home/     misc/     proc/     srv/       u/
< snipped >
/home/cis90/simben $ ls /home/
backup/    cis191/    cis90/    guest/    rick/      turnin/
< snipped >
/home/cis90/simben $ ls /home/cis90/
ahrmat/    colabd/    huljef/    olscam/    rodduk/
answers/    deltas/    jimmel/    pacnan/    shidev/
.bash_profile depot/    lowmic/    phacha/    simben/
< snipped >
cofcol/    hovdav/    milmic/    reedie/
/home/cis90/simben $ ls /home/cis90/simben/
.bash_history lab01.graded Miscellaneous/ .ssh/
< snipped >
.bashrc      lab03.graded .plan      timecal
bigfile      Lab2.0/       Poems/     uhistory
< snipped >
Hidden/      mbox        spellk
/home/cis90/simben $ ls /home/cis90/simben/Poems/
ant          Blake/      nursery    Shakespeare/ twister    Yeats/
/home/cis90/simben $ ls /home/cis90/simben/Poems/Shakespeare/sonnet
sonnet1  sonnet11  sonnet17  sonnet26  sonnet35  sonnet5  sonnet9
sonnet10 sonnet15  sonnet2   sonnet3   sonnet4   sonnet7
/home/cis90/simben $ ls /home/cis90/simben/Poems/Shakespeare/sonnet1
/home/cis90/simben/Poems/Shakespeare/sonnet1

```

*Tap tab key
twice to see
what is in that
directory*

No errors so this absolute pathname is GOOD!

Wrap up

New commands:

NA

NA

New metacharacters:

?

Matches any single character

[]

Matches any character in the brackets

New Files and Directories:

NA

NA

Next Class

Assignment: Check Calendar Page on web site to see what is coming up.

No Quiz
No Lab due
Test !

Backup

ls command review

ls command

Use the -l option for a "long listing"

```

1 2 3 4 5 6 7 8
simben90@opus:~
/home/cis90/simben $ ls -l
total 308
-rw-rw-r-- 1 simben90 cis90 1870 Feb 24 15:37 1976
-rw-rw-r-- 1 simben90 cis90 880 Feb 22 22:32 android
-rw-r--r-- 2 simben90 cis90 10576 Jul 20 2001 bigfile
drwxr-xr-x 2 simben90 cis90 4096 Feb 12 16:07 bin
-rw----- 1 simben90 cis90 355 Feb 24 15:40 dead.letter
-rw-r--r-- 1 simben90 cis90 0 Jul 20 2001 empty
d----- 2 simben90 cis90 4096 Feb 1 2002 Hidden
-r----- 1 simben90 staff 1182 Feb 16 13:17 lab01.graded
-rw-r--r-- 1 simben90 cis90 494 Feb 12 16:39 lab01-submitted
-r----- 1 simben90 staff 1873 Feb 23 11:58 lab02.graded
drwxr-xr-x 2 simben90 cis90 4096 Feb 17 2001 Lab2.0
drwxr-xr-x 3 simben90 cis90 4096 Feb 17 2001 Lab2.1
-rw-r--r-- 1 simben90 cis90 1044 Jul 20 2001 letter
-rw-r--r-- 1 simben90 cis90 572 Feb 22 16:07 log
-rw----- 1 simben90 cis90 65469 Feb 26 14:44 mbox
drwxr-xr-x 2 simben90 cis90 4096 Sep 11 2005 Miscellaneous
-rw-r--r-- 1 simben90 cis90 759 Jun 6 2002 mission
drwxr-xr-x 5 simben90 cis90 4096 Jan 18 2004 Poems
-rw-r--r-- 1 simben90 cis90 1074 Aug 26 2003 proposal1
-rw-r--r-- 1 simben90 cis90 2175 Jul 20 2001 proposal2
-rw-r--r-- 1 simben90 cis90 2054 Sep 14 2003 proposal3
-rw-rw-r-- 1 simben90 cis90 657 Feb 22 16:05 scott
  
```

total size of all
files in blocks

*On Opus,
1 block = 1024 bytes*

1. file type
 - = regular
 - d = directory
 - l = symbolic link
2. permissions
3. number of hard links
4. owner
5. group
6. size (in bytes)
7. last modified
8. filename

ls command

Using files vs directories as arguments

*Case 1: **No arguments** specified, all files in the current directory will be listed*

```
/home/cis90/simben $ ls  
bigfile    Lab2.0          mission        proposal3      text.fxd  
bin        Lab2.1          Poems          small_town     timecal  
empty      letter          proposal1      spellk         what_am_i  
Hidden     Miscellaneous    proposal2      text.err
```

*Case 2: With a **filename** specified as an argument, just that file will be listed*

```
/home/cis90/simben $ ls bigfile  
bigfile
```

*Case 3: With a **directory** specified as an argument, the contents of the directory will be listed*

```
/home/cis90/simben $ ls Poems/  
ant    Blake    nursery    Shakespeare    twister    Yeats
```

ls command

specifying multiple directories

*The **ls** command can take multiple arguments*

When a file is specified, just the filename is listed

When a directory is specified, the contents of the directory are listed

```
/home/cis90/simben $ ls Poems/ bin/ letter
letter
```

regular file

directories

```
bin/:
app  banner  enlightenment  hi  I  treed  tryme  zoom
```

```
Poems/:
ant  Blake  nursery  Shakespeare  twister  Yeats
```


ls command example

*The * is expanded by the shell and replaced with the names of all files and directories in the current directory*

```
/home/cis90/simmsben $ ls *
bigfile  letter  proposal1  proposal3  spellk  text.fxd  what_am_i  Files listed
empty    mission proposal2  small_town  text.err  timecal   first

bin:
app  banner  enlightenment  hi  I  treed  tryme  zoom  Then the contents of
ls: Hidden: Permission denied  each directory are
                                   listed

Lab2.0:
386  A_long_name  file.9  READNAME  this_years_annual_report
afile  annual report  junk.old.bak  sTrAnGeNeSs

Lab2.1:
1.1  filename  junk  letter  more  old  Proposal3  Proposal.old  xyz

Miscellaneous:
better_town  file.dos  fruit  manpage  mystery  salad

Poems:
ant  Blake  nursery  Shakespeare  twister  Yeats
```

Do you see the error message? ... permission issue (more in future lessons)
Do you see the symbolic link? ... in light blue (more in future lessons)

ls command

How to override showing directory contents

The contents of the directory are shown

```
/home/cis90/simben $ ls bin  
app  banner  enlightenment  hi  I  treed  tryme  zoom
```

The directory itself is shown with the -d option

```
/home/cis90/simben $ ls -d bin  
bin
```

*Use the **d** option to list the directory itself. Without the **d** the directory contents are listed instead.*

ls command

How to override showing directory contents

The directory contents are shown

```
/home/cis90/simben $ ls -i bin  
9634 app 9635 banner 9636 enlightenment 9630 hi 9632 I  
9631 treed 9633 tryme 9629 zoom
```

The directory itself is shown with the -d option

```
/home/cis90/simben $ ls -id bin  
9628 bin
```

*Use the **d** option to list the directory itself.*

ls command

Recursively list subdirectories (-R)

ls -lR

```

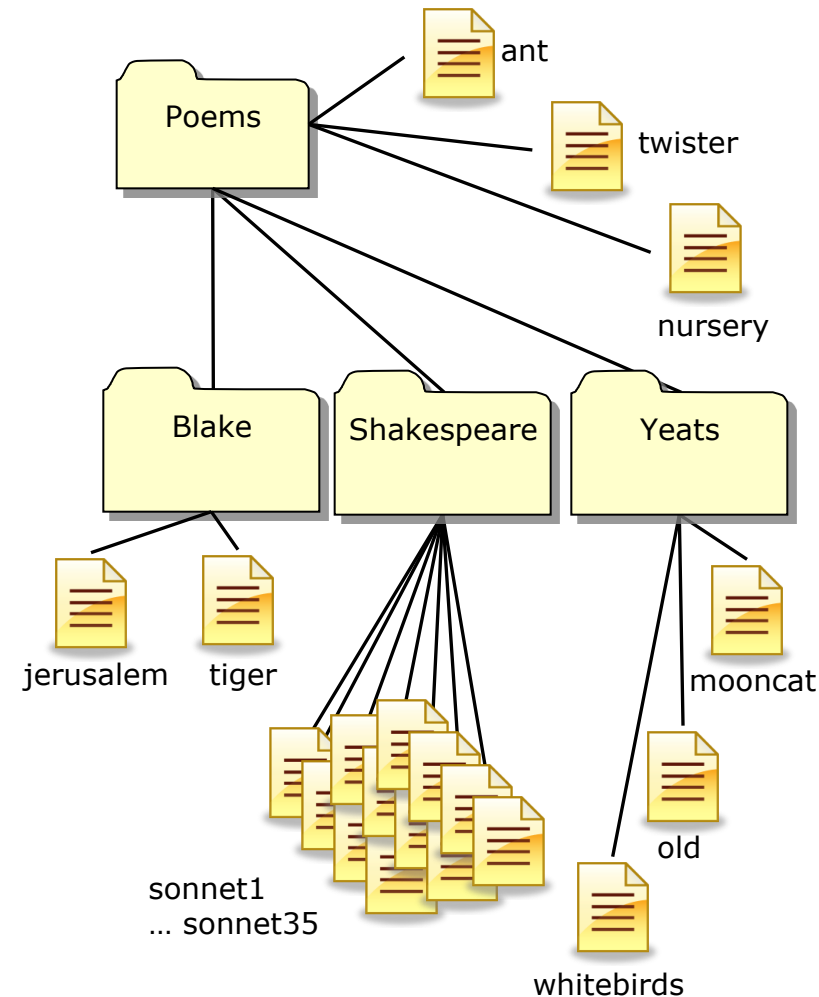
simmsben@opus:~/Poems
[simmsben@opus Poems]$ls -lR
.:
total 48
-rw-r--r-- 1 simmsben cis90 237 Aug 26 2003 ant
drwxr-xr-x 2 simmsben cis90 4096 Jul 20 2001 Blake
-rw-r--r-- 1 simmsben cis90 779 Oct 12 2003 nursery
drwxr-xr-x 2 simmsben cis90 4096 Oct 31 2004 Shakespeare
-rw-r--r-- 1 simmsben cis90 151 Jul 20 2001 twister
drwxr-xr-x 2 simmsben cis90 4096 Jul 20 2001 Yeats

./Blake:
total 16
-rw-r--r-- 1 simmsben cis90 582 Jul 20 2001 jerusalem
-rw-r--r-- 1 simmsben cis90 115 Jul 20 2001 tiger

./Shakespeare:
total 104
-rw-r--r-- 1 simmsben cis90 614 Jul 20 2001 sonnet1
-rw-r--r-- 1 simmsben cis90 620 Jul 20 2001 sonnet10
-rw-r--r-- 1 simmsben cis90 689 Oct 31 2004 sonnet11
-rw-r--r-- 1 simmsben cis90 618 Jul 20 2001 sonnet15
-rw-r--r-- 1 simmsben cis90 647 Jul 20 2001 sonnet17
-rw-r--r-- 1 simmsben cis90 631 Jul 20 2001 sonnet2
-rw-r--r-- 1 simmsben cis90 601 Jul 20 2001 sonnet26
-rw-r--r-- 1 simmsben cis90 615 Jul 20 2001 sonnet3
-rw-r--r-- 1 simmsben cis90 598 Jul 20 2001 sonnet35
-rw-r--r-- 1 simmsben cis90 588 Jul 20 2001 sonnet4
-rw-r--r-- 1 simmsben cis90 622 Jul 20 2001 sonnet5
-rw-r--r-- 1 simmsben cis90 581 Jul 20 2001 sonnet7
-rw-r--r-- 1 simmsben cis90 620 Jul 20 2001 sonnet9

./Yeats:
total 24
-rw-r--r-- 1 simmsben cis90 855 Jul 20 2001 mooncat
-rw-r--r-- 1 simmsben cis90 520 Jul 20 2001 old
-rw-r--r-- 1 simmsben cis90 863 Jul 20 2001 whitebirds
[simmsben@opus Poems]$

```



Class Exercise

- Go to your home directory, type: **cd**
- Do a long listing of every file in your home directory and sub-directories and include inode numbers

ls -l Miscellaneous/

ls -ld Miscellaneous/

ls -lR