

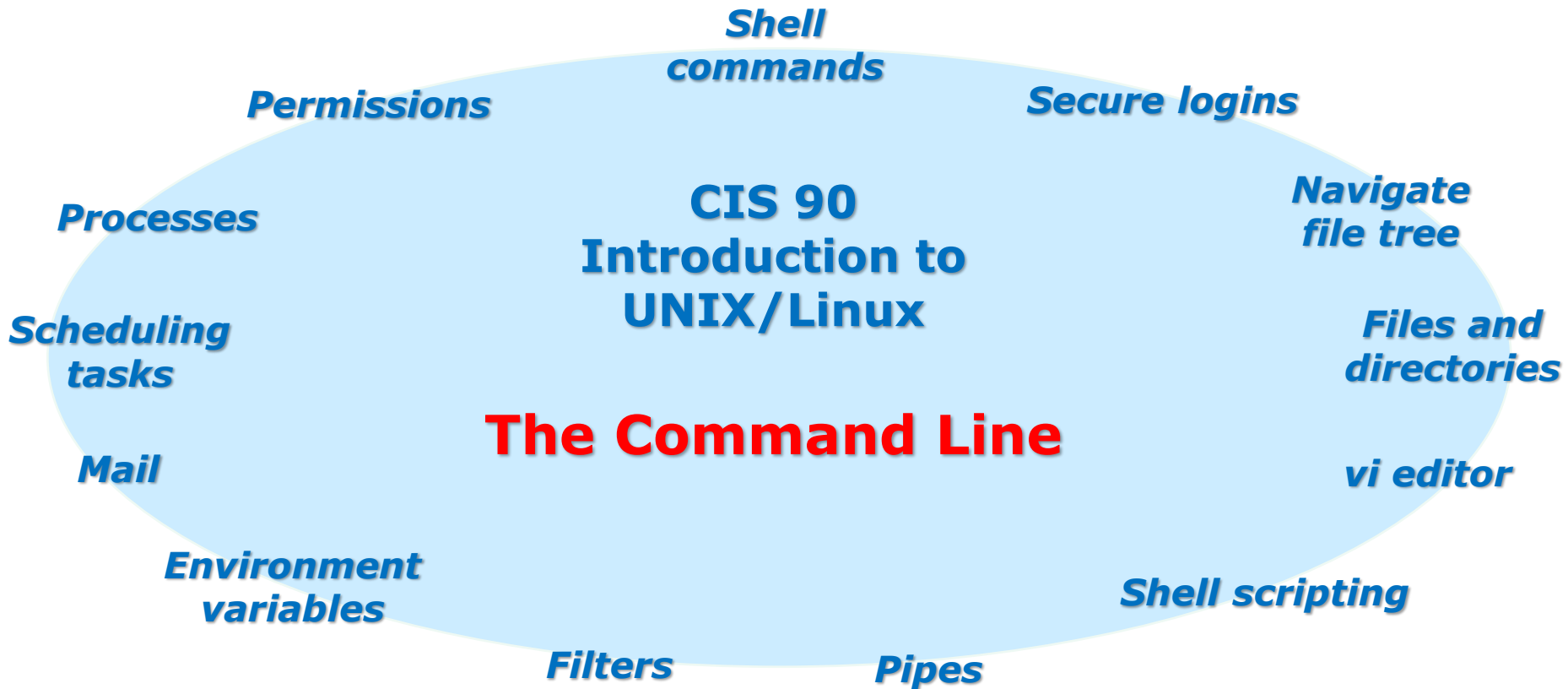


Rich's lesson module checklist

Last updated 02/20/2018

- ☐ Zoom recording named and published for previous lesson
- ☐ Slides and lab posted
- ☐ Print out agenda slide and annotate page numbers
- ☐ 1st minute quiz
- ☐ Flash cards
- ☐ Calendar page updated
- ☐ VTEA forum post
- ☐ Lab 4 tested
- ☐ check4 feedbot (update data/user-pod-map file)
- ☐ Schedule lock of turnin directory
scripts/schedule-submit-locks
- ☐ Enlightenment script tested
- ☐ Check example long file, /usr/share/doc/sudo-1.8.19p2/ChangeLog for change
- ☐ Check example kernel file for change
- ☐ 9V backup battery for microphone
- ☐ Backup slides, CCC info, handouts on flash drive
- ☐ Key card for classroom door

- ☐ <https://zoom.us>
- ☐ Putty, slides, Chrome
- ☐ Enable/Disable attendee sharing
^ > Advanced Sharing Options > Only Host
- ☐ Enable/Disable attended annotations
Share > More > Disable Attendee Sharing



Student Learner Outcomes

1. Navigate and manage the UNIX/Linux file system by viewing, copying, moving, renaming, creating, and removing files and directories.
2. Use the UNIX features of file redirection and pipelines to control the flow of data to and from various commands.
3. With the aid of online manual pages, execute UNIX system commands from either a keyboard or a shell script using correct command syntax.

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/>)



Student checklist - Before class starts

The screenshot shows the website simms-teach.com/cis90calendar.php. The page title is "Rich's Cabrillo College CIS Classes CIS 90 Calendar". On the left sidebar, the "CIS 90" link is highlighted. The main content area shows the "CIS 90 (Fall 2014) Calendar" with tabs for "Course Details", "Grades", and "Calendar". The "Calendar" tab is selected, showing a table with columns for "Lesson", "Date", "Topics", and "Link". The first row is for Lesson 1 on 9/2, titled "Class and Linux Overview". Below the table, there are links for "Presentation slides (download)", "Supplemental" (including a PDF for logging into Opus), "Assignment" (including a student survey and Lab 1), "Enter virtual classroom", "Quiz 1", and "Commands".

Lesson	Date	Topics	Link
1	9/2	Class and Linux Overview - Understand how the course will work - High-level overview of computers, operating systems, and virtual machines - Overview of UNIX/Linux market and architecture - Using SSH for remote network access - Using terminals and the command line	Presentation slides (download) Supplemental PowerPoint: Logging into Opus (download) Assignment Student Survey Lab 1 Enter virtual classroom Quiz 1 Commands

1. Browse to:
<http://simms-teach.com>
2. Click the **CIS 90** link.
3. Click the **Calendar** link.
4. Locate today's lesson.
5. Find the **Presentation slides** for the lesson and **download** for easier viewing.
6. Click the **Enter virtual classroom** link to join ConferZoom.
7. Log into Opus-II with Putty or ssh command.



Student checklist - Before class starts

☐ Google

☐ ConferZoom

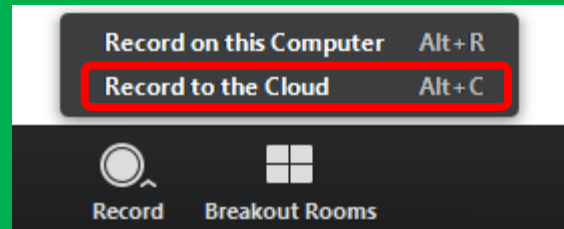
☐ Downloaded PDF of Lesson Slides. I like Foxit Reader so I can take notes using annotations.

The screenshot shows a Zoom meeting interface with several windows open. The main window displays a PDF document titled "Get into the car" with a background image of a white car. Other windows include the Google homepage, the Rich's Cabrillo College CIS 90 website, and a document titled "CIS 90 - Lesson 1" showing a stack of papers and the text "Each student gets their own Arya VM for the term". The Zoom toolbar at the bottom shows options like "Unmute", "Start Video", "Invite", "Participants", "Share Screen", "Chat", "Record", and "Leave Meeting".

☐ CIS 90 website Calendar page

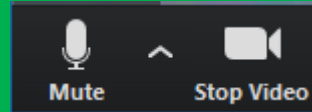
☐ One or more login sessions to Opus-II

Start



Start Recording

Audio Check



Start Recording

Audio & video Check



Instructor: **Rich Simms**
Dial-in: **408-638-0968 (toll)**
Meeting ID: **426 283 384**



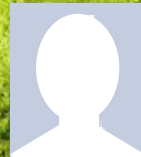
Brandon



Shane



Dan



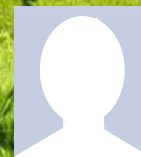
Kage



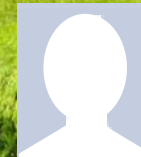
Justin



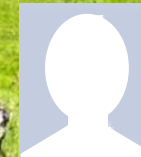
Jo Anne



Darren



Laine



Luis



Christian



Jetta



Cesar



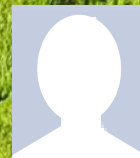
Paul



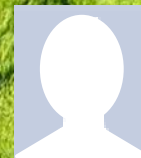
Hilary



Fritz



Jake



Richard



Fergus



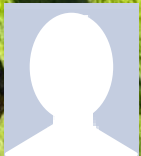
Ciarán



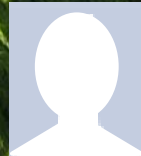
Kimi



November



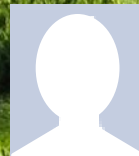
Henry



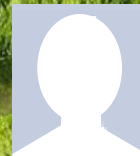
Elena



David



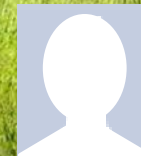
Claudius



Jose



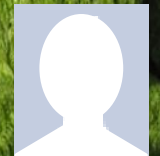
Edgar



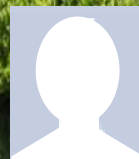
Adam



Nathanael T.



Clara

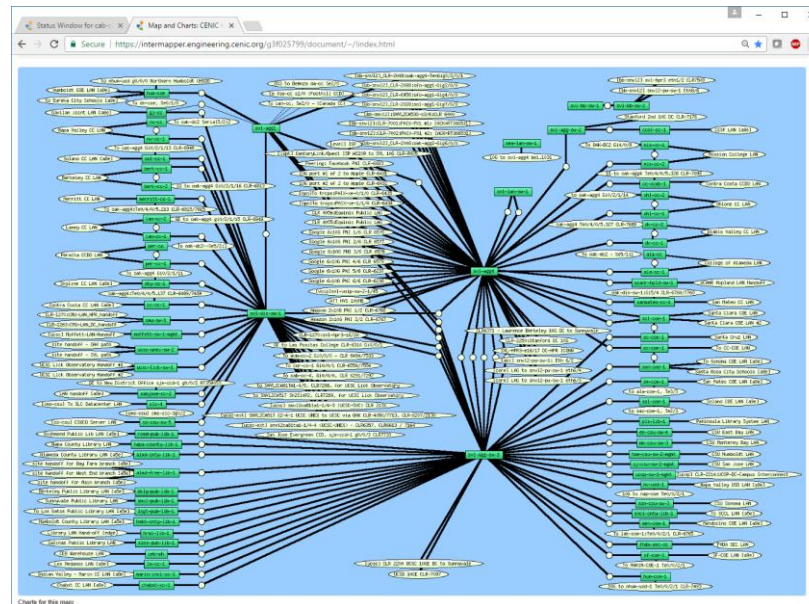


Nate P.



Nathan K.

Network Check



<https://intermapper.engineering.cenic.org/g3f025799/document/~!/index.html>

First Minute Quiz

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

Use CCC Confer White Board

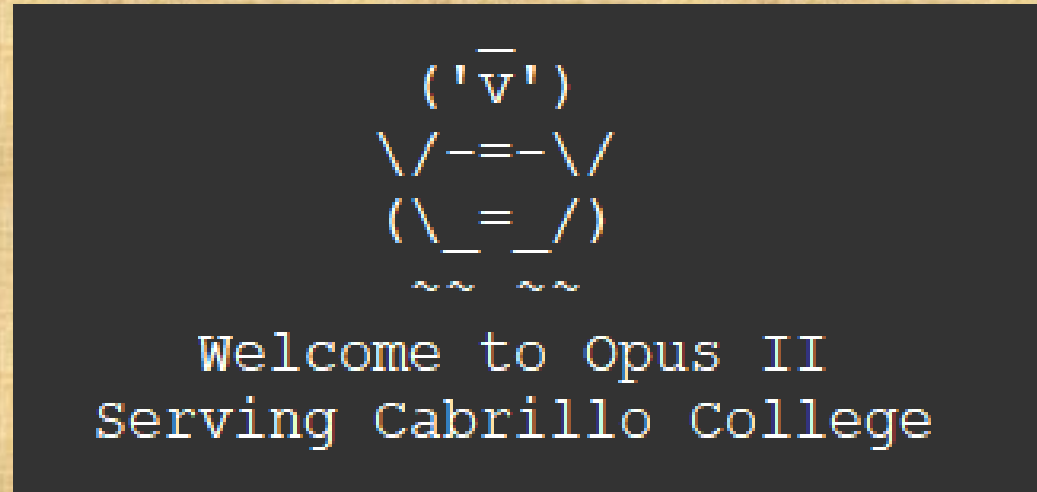
email answers to: risimms@cabrillo.edu

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

The UNIX/Linux File System

Objectives	Agenda
• Become familiar with the UNIX file hierarchy. • Be able to navigate the hierarchy using <code>cd</code>, <code>ls</code> and <code>pwd</code> commands. • Understand the key elements of a file. • Be able to distinguish the different UNIX files types. • Learn appropriate commands to view file contents.	• Quiz • Questions • Housekeeping • The UNIX file tree • Navigating the file tree • Unix files • UNIX filename conventions • Viewing text files • Viewing binary files • Basic file types • Further classification of files • Pathnames • Absolute pathnames • Relative pathnames • <code>/</code> <code>..</code> and <code>~</code> directories • Shell tips • Using pathnames as arguments • More on <code>cd</code>, <code>pwd</code> and <code>ls</code> commands • Home directories • Filename expansion with <code>*</code> • The path to enlightenment • Assignment and wrap up

Class Activity



If you haven't already,
log into Opus-II

Class Activity

3	2/19	Unit 3 Electronic Mail • Guest speaker: Denise Moore on OTC (On-The-Job) training programs • Learn how to use the LARC communication tools: write and /bin/mail • Overview on and-to and mail Materials • Presentation slides (download) Supplemental • Howto #318: Accessing vlab (download) Assignment • Read/skim Lesson 3 slides	Lab 2
---	------	--	-----------------------

<https://simms-teach.com/cis90calendar.php>

If you haven't already,
download the lesson slides

Class Activity

	• <u>Read/skim Lesson 1 slides</u> • <u>Student Survey</u> • <u>Lab 1</u>	
	ConferZoom • <u>Enter virtual classroom</u> • <u>Class archives</u>	
	Quiz 1 Commenda • Understand how the UNIX login operation	

<https://simms-teach.com/cis90calendar.php>

If you haven't already, join
ConferZoom classroom



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

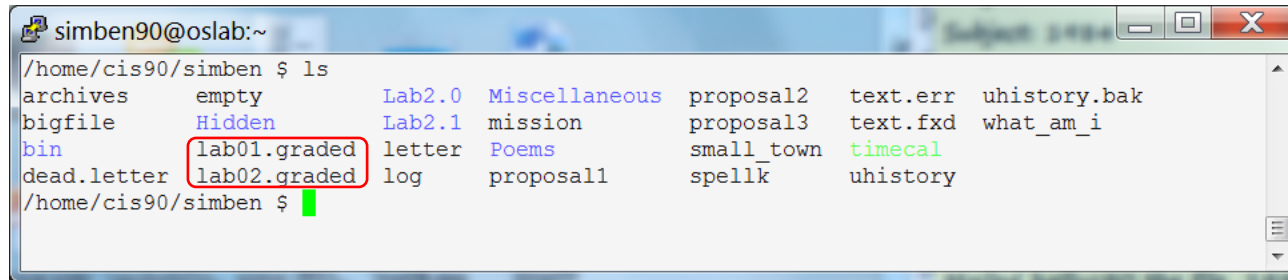
Chinese
Proverb

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.

Graded work is copied to your home directories

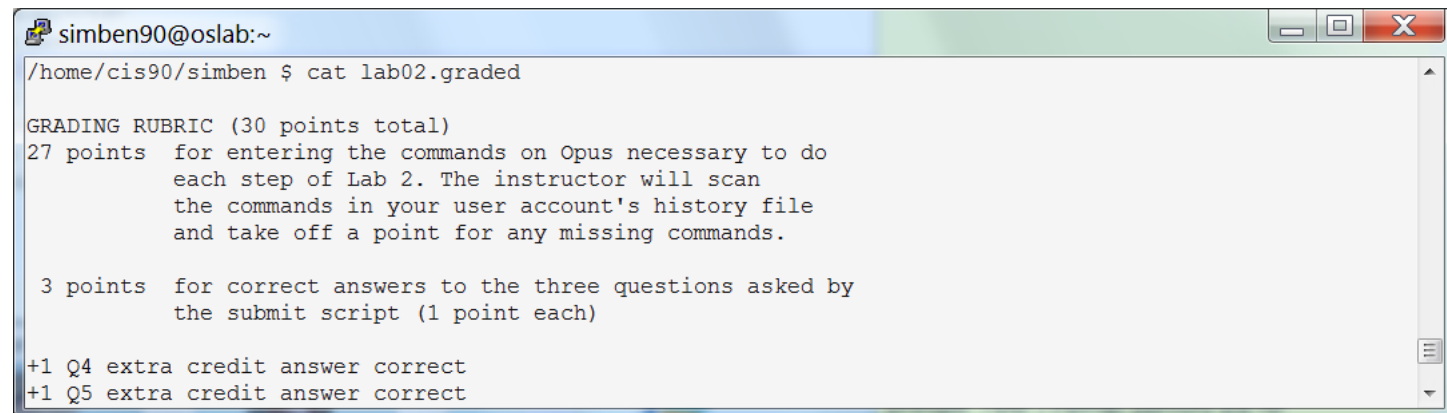
ls



```
simben90@oslab:~
/home/cis90/simben $ ls
archives      empty          Lab2.0  Miscellaneous  proposal2  text.err  uhistory.bak
bigfile       Hidden         Lab2.1  mission        proposal3  text.fxd  what_am_i
bin           lab01.graded   letter  Poems          small_town timecal    uhistory
dead.letter   lab02.graded   log     proposal1      spellk
/home/cis90/simben $
```

*Log in to Opus-II and use the **ls**, **cat**, or **more** commands to see your graded work*

cat lab02.graded



```
simben90@oslab:~
/home/cis90/simben $ cat lab02.graded

GRADING RUBRIC (30 points total)
27 points  for entering the commands on Opus necessary to do
           each step of Lab 2. The instructor will scan
           the commands in your user account's history file
           and take off a point for any missing commands.

3 points  for correct answers to the three questions asked by
           the submit script (1 point each)

+1 Q4 extra credit answer correct
+1 Q5 extra credit answer correct
```

```
cat /home/cis90/answers/quiz02
```

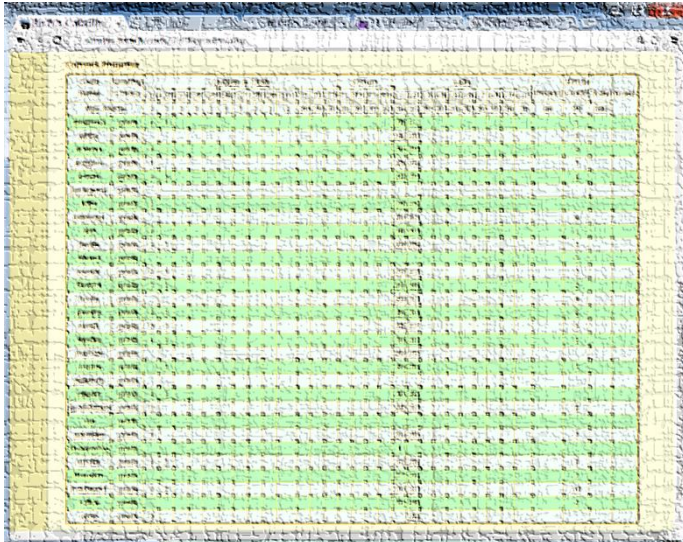
```
cat /home/cis90/answers/lab02
```

The answers to quizzes, tests and labs will be posted to the /home/cis90/answers/ directory after the due date has passed.

Where to find your grades

Send me your survey to get your LOR code name.

The CIS 90 website



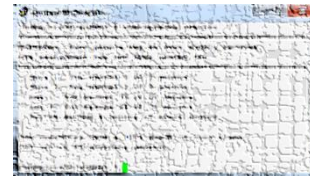
<http://simms-teach.com/cis90grades.php>

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

At the end of the term I'll add up all your points and assign you a grade using this table

On Opus-II

checkgrades *codename*
(where *codename* is your LOR codename)



Written by Jesse Warren a past CIS 90 Alumnus

Points that could have been earned to date:

2 quizzes: 6 points
2 labs: 60 points
Total: 66 points

Extra Credit

On the forum

Be sure to monitor the forum as I may post extra credit opportunities without any other notice!

On some labs

Extra credit (2 points)

For a small taste of what you would learn in CIS 191 let's add a new user to your Arya VM. Once added we will see how the new account is represented in `/etc/passwd` and `/etc/shadow`.

1. Log into your Arya VM as the cis90 user. Make sure it's your VM and not someone else's.
2. Install the latest updates:
`sudo apt-get update`
`sudo apt-get upgrade`
3. Add a new user account for yourself. You may make whatever username you wish. The example below shows how Benji would make the same username he uses on Opus:
`sudo useradd -G sudo -c "Benji Simms" -m -s /bin/bash simben90`

In lesson slides (search for extra credit)



On the website

<http://simms-teach.com/cis90grades.php>

For some flexibility, personal preferences or family emergencies there is an additional 90 points available of extra credit activities.

<http://simms-teach.com/cis90extracredit.php>

• **Website content review** - The first person to email the instructor pointing out an error or typo on this website will get one point of extra credit for each unique error. The email must specify the specific document or web page, pinpoint the location of the error, and specify what the correction should be. Duplicate errors count as a single point. This does not apply to pre-published material that has been updated but not yet presented in class. (Up to 20 points total)

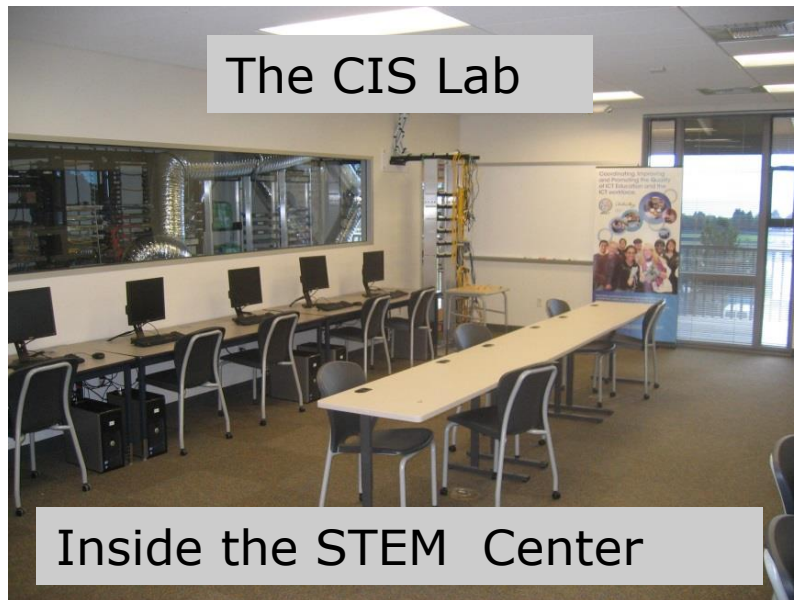
Getting Help When Stuck on a Lab Assignment

- Google the topic/error message.
- Search the Lesson Slides (they are PDFs) for a relevant example on how to do something.
- Post a question on the forum. Explain what you are trying to do and what you have tried so far.
- Talk to a STEM center tutor/assistant.
- Come see me during my office or lab hours. **I will be in the CTC (room 1403) every Wednesday afternoon from 3-5:30.**
- Make use of the Open Questions time at the start of every class.
- Make a cheat sheet of commands and examples so you never again get stuck on the same thing!

Expect to do a LOT of troubleshooting in this course!

Help Available in the CIS Lab

Instructors, lab assistants and equipment are available for CIS students to work on assignments.



Rich's Cabrillo College CIS Classes
Home Page

Home

Resources

Forums

CIS Lab

Canvas

CIS Lab & Datacenter
Aptos Campus

Home Resources NETLAB VLab Location

Announcements

The CIS Lab is in the **STEM Center** in building 800.
A great place to work on lab assignments and get help from student lab assistants and instructors on the schedule below.

STEM CIS/CS hours

Today Jan 28 - Feb 3, 2018

Week

Time	Sun 1/28	Mon 1/29	Tue 1/30	Wed 1/31	Thu 2/1	Fri 2/2	Sat 2/3
10am							
11am							
12pm							
1pm							
2pm		Jeffrey Bergamini CS Instructor 2:10p - 3p Carter Post CIS/CS	Jeffrey Bergamini CS Instructor 2:10p - 3p Carter Post CIS/CS	Jeffrey Bergamini CS Instructor 2:10p - 3p Carter Post CIS/CS	Jeffrey Bergamini CS Instructor 2:10p - 3p Carter Post CIS/CS		
3pm							
4pm							
5pm							
6pm							
7pm							

Events shown in time zone: Pacific Time

W3C XHTML 1.0 W3C CSS

To see schedule, click the CIS Lab link on the website and use the "Week" calendar view

CTC - Building 1400 On lower campus



I will be in the CTC (room 1403) every Wednesday
afternoon from 3-5:30



The slippery slope



- 1) If you didn't submit the last lab ...
- 2) If you were in class and didn't submit the last quiz ...
- 3) If you didn't send me the student survey assigned in Lesson 1 ...
- 4) If you haven't made a forum post in the last quarter of the course ...

*Please contact me by email, see me during
my office hours or when I'm in the CTC*

Email: risimms@cabrillo.edu

Housekeeping





Pause/Stop Recording

Pause Recording

Audio Check

Roll Call

If you are watching the archived video please email me to let me know you were here.

risimms@cabrillo.edu

Overlap Students

Don't forget to update the Google
Docs Log when watching the
recording

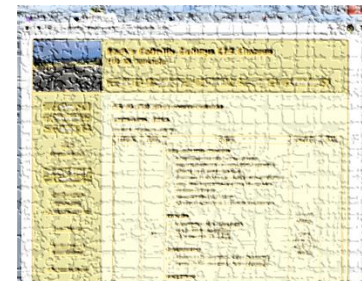


Resume/Stop Recording

Resume Recording

Audio Check

- Lab 3 due tonight at 11:59PM (Opus-II time)
 - Use **mail -f uhistory** and **check3** to review your collection.
 - Clean up duplicates before last submittal.
 - I'll grade using a variation of **check3** script.
 - Don't forget to use **submit** to turn in your work!
- Five forum posts due tonight at 11:59PM (Opus-II time).
- Reminder - all quizzes, all tests, all due dates for all work is on the website Calendar page.



phpBB Cabrillo College: Computer and Information Systems
Forum for students in the Computer Networking and System Administration and/or Computer Support Specialist programs

Board
User Control Panel
Moderator Tools

CIS 90

FORUM RULES
Be here to learn

NEW TOPICS

ANNOUNCEMENTS

TOPICS

- Lab 2 submittals
by Rich Simms • Mon Sep 13, 2010 8:26 am
- Some interesting Linux bc command/examples
by Mike Giffin • Sun Sep 12, 2010 8:09 pm
- answer to quiz question
by Dale Henry • Sun Sep 12, 2010 5:17 pm
- Watch Star Wars using Tether

1st five post deadline is 11:59PM tonight Opus-II time! (worth 20 points)

Only your posts in the **CIS 90** forum will earn points (**not** the Practice forum or other classes)

Your username must be your **full first** and **last** name to get credit on posts

Rich Simms
Mike Giffin
Dale Henry
Jacob Giffin

Perkins/VTEA Survey

The screenshot shows a forum post on the 'Cabrillo College: Computer and Information Systems' forum. The post is titled 'Carl D. Perkins Vocational and Technical Education Act' and was posted by Rich Simms on Tue Sep 22, 2014 at 1:45 pm. The post text explains that the Carl D. Perkins Vocational and Technical Education Act was originally authorized by Congress in 1966, reauthorized in 1990 and again in 2009. It provides federal funding for higher career technical education (CTE) in that the United States in order to help the economy. For Cabrillo College, it provides portions of this funding students to develop an Assessment through a survey. The survey already completed the grant funds the college will receive. The survey only needs to be completed once per year by each student. The survey can be completed online through the address: Log on to WEBAUTOR at <https://webauto.cabrillo.edu>. Select "ATTENDANCE" Click Menu (near blue bar) Under "Attendance Profile" click on "Student Update Form" The drop down list under "Select the earliest term for which you are registered" will click on the current term. Select "UPDATE". Send them to the "Career Technical Information" Answer questions by clicking on the circle to the left of your "Yes" or "No" answer. You can get details about a question by clicking on the question's phrase. After answering all questions, select "SUBMIT". There is a "GO BACK" link at the bottom of the page. The post also includes a signature for Rich Simms, with fields for posts, joined date, and contacts.

This is an important source of funding for Cabrillo College.

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

<https://opus-ii.cis.cabrillo.edu/forum/viewtopic.php?f=6&t=349>

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	

Note taker wanted

*Please contact me if you would be
interested in doing this.*

If you haven't already

Change your default password on Opus-II

```
[simben90@opus-ii ~]$ passwd
Changing password for user simben90.
Changing password for simben90.
(current) UNIX password:
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[simben90@opus-ii ~]$
```

Linux Computer Home Loans



<https://docs.google.com/a/cabrillo.edu/spreadsheets/d/1ljwkXZ7BYcCCo3UwqHz0EPm2I3OMSXYrfYv43C2MBc/edit?usp=sharing>

If interested click the Google Docs link above and request access to the sign-up sheet. Based on the number of requests I'll determine how long they can be checked out for.

Linux Certifications

Red Hat / Linux Professional Institute (LPI) / Linux Foundation

Linux Professional Institute (LPI) certifications

- **Linux Essentials** The Linux Essentials Professional Development Certificate (PDC) is a great way to show employers that you have the foundational skills required for your next job or promotion. It also serves as an ideal stepping-stone to the more advanced LPIC Professional Certification track for Linux Systems Administrators.
 - [60 minute exam](#) at PearsonVue test center
- **LPIC-1** is a junior level certification for Linux administrators. You should be able to perform maintenance tasks with the command line, install & configure a workstation and be able to configure a basic network.
 - [LX0-101](#) exam CompTIA Linux+ Powered by LPI
 - [LX0-102](#) exam CompTIA Linux+ Powered by LPI
- **LPIC-2** is aimed at advanced Linux professionals. To be awarded LPIC level 2 you should be able administer small to medium sized mixed networks and provide suggestions to upper management.
 - [LX0-103](#) exam CompTIA Linux+ Powered by LPI
 - [LX0-104](#) exam CompTIA Linux+ Powered by LPI
- **LPIC-3** is designed for senior-level Linux professionals in an enterprise environment. You should be able to concept, architect, install and troubleshoot LDAP software and integrate with Active Directory.
- LPI Certification [Mapping Matrix](#) to Cabrillo College Linux classes

LPI Linux Essentials Certificate

Linux Essentials Certificate of Achievement				
Objective	# of Questions	Cabrillo	Urban Penguin	NDG Linux Essentials
Topic 1: The Linux Community and a Career in Open Source				
1.1 Linux Evolution and Popular Operating Systems	2	CIS90 Lesson 1	1.1	Module 1
1.2 Major Open Source Applications	2	CIS90 Lesson 1	1.2	Module 2
1.3 Understanding Open Source Software and Licensing	1	CIS90 Lesson 1	1.3	Module 2
1.4 ICT Skills and Working in Linux	2	not covered	1.4	Module 3
Topic 2: Finding Your Way on a Linux System				
2.1 Command Line Basics	2	CIS90 Lesson 2	2.1	Module 4
2.2 Using the Command Line to Get Help	2	CIS90 Lesson 2	2.2	Module 5
2.3 Using Directories and Listing Files	2	CIS 90 Lesson 4	2.3	Module 6
2.4 Creating, Moving and Deleting Files	2	CIS90 Lesson 5	2.4	Module 6
Topic 3: The Power of the Command Line				
3.1 Archiving Files on the Command Line	2	CIS 90 Lesson 14	3.1	Module 7
3.2 Searching and Extracting Data from Files	4	CIS 90 Lesson 8	3.2	Module 8
3.3 Turning Commands into a Script	4	CIS 90 Lesson 13 & 14	3.3	Module 9
Topic 4: The Linux Operating System				
4.1 Choosing an Operating System	1	not covered	4.1	Module 1
4.2 Understanding Computer Hardware	2	CIS 90 Lesson 1	4.2	Module 10
4.3 Where Data is Stored	3	CIS 90 Lesson 1	4.3	Module 11
4.4 Your Computer on the Network	2	CIS 192	4.4	Module 12
Topic 5: Security and File Permissions				
5.1 Basic Security and Identifying User Types	2	CIS 191	5.1	Module 13
5.2 Creating Users and Groups	2	CIS 191	5.2	Module 14
5.3 Managing File Permissions and Ownership	2	CIS 90 Lesson 7	5.3	Module 15
5.4 Special Directories and Files	1	CIS 90 Lesson 4	5.4	Module 16



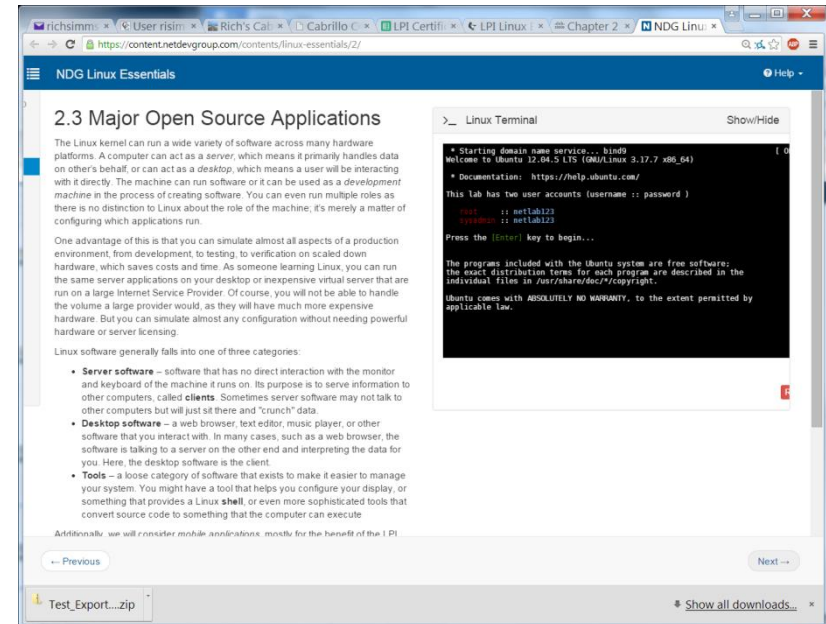
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document with all
the usernames and
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The UNIX File Tree

UNIX File Tree

/ = root of the tree

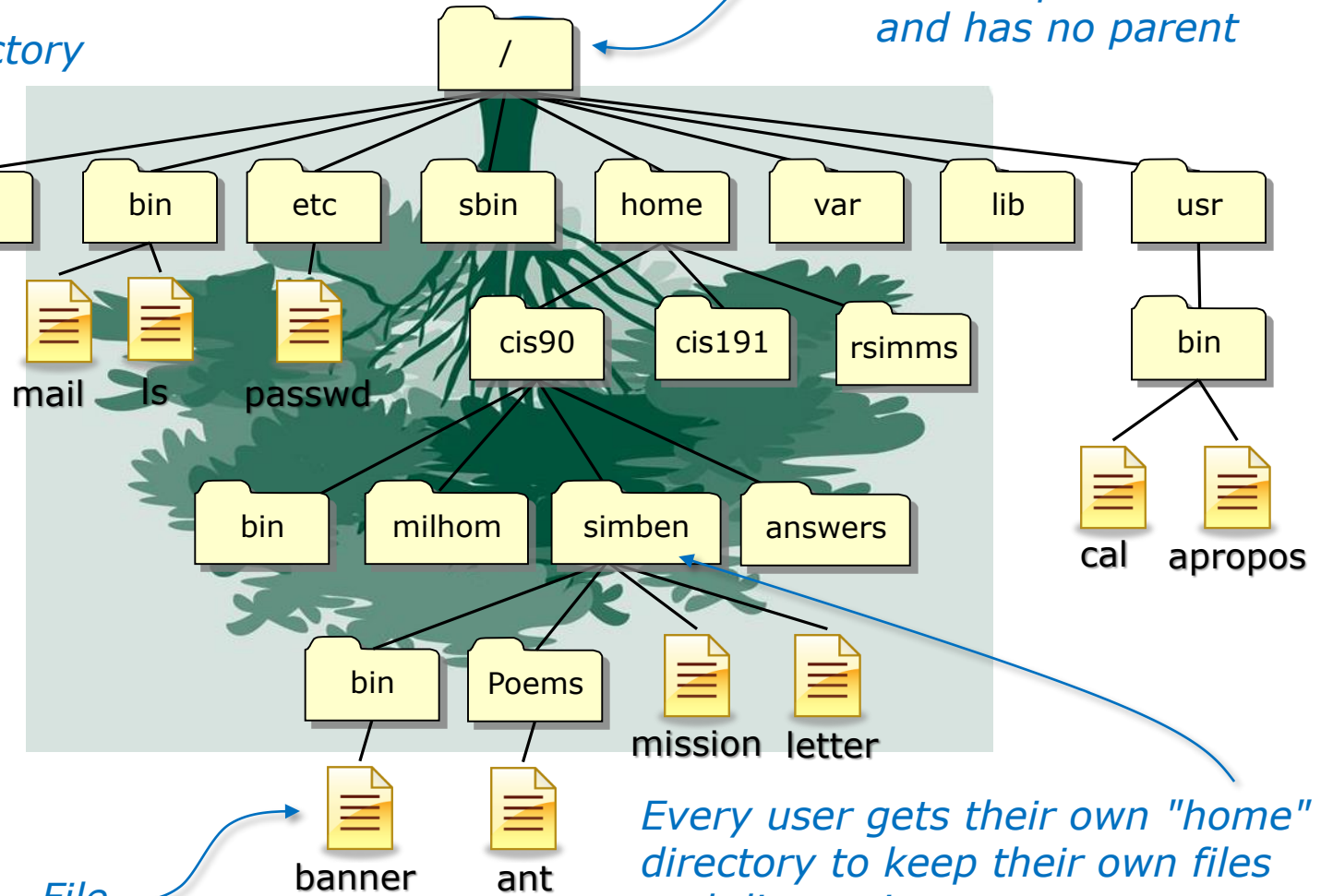


UNIX File Tree

/ = root of the tree

The / "slash" directory is the top of the tree and has no parent

Directory



Not to be confused with /, this is the root user's home directory

Every user gets their own "home" directory to keep their own files and directories

File

The UNIX/Linux File System Hierarchy

Top-Level Directory	Contents
/bin	binary files forming the commands and shells used by the system administrator and users
/boot	files used during the initial bootup process including the kernel
/dev	device files, like terminals and drives 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

The CIS 90 student home directories

```
ls /
```

```
/home/cis90/simben $ ls /
bin    dev    home  lib64  mnt    proc   run    srv    tmp    var
boot   etc    lib   media  opt    root   sbin   sys    usr
/home/cis90/simben $
```

```
ls /home
```

```
/home/cis90/simben $ ls /home
backup  cis90    ehbot02  ehbot04  rsimms
cis76   ehbot01  ehbot03  ledmgr   turnin
/home/cis90/simben $
```

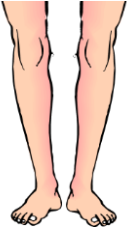
```
ls /home/cis90
```

```
/home/cis90/simben $ ls /home/cis90
angjak  bin    cis    kankin  ottlai  rocces  validos
answers brehil depot  kienat  padhen  rodrick vaniwa
airday  broada eschoe milhom  pernat  seasky  watthe
ausedy  botjus farcia monale  piatra  silcia  wilnov
banrio  chakag fuldan obapan  ragget  simben  winsha
bilfri  chular gunter olscia  sanlui  telnat
/home/cis90/simben $
```

Do you see your home directory in the /home/cis90 directory?

Navigating the UNIX file tree

Navigating the tree



- Use the **cd** command to change directories
(*your legs*)



- Use the **ls** command to list files at your current location
(*your eyes*)



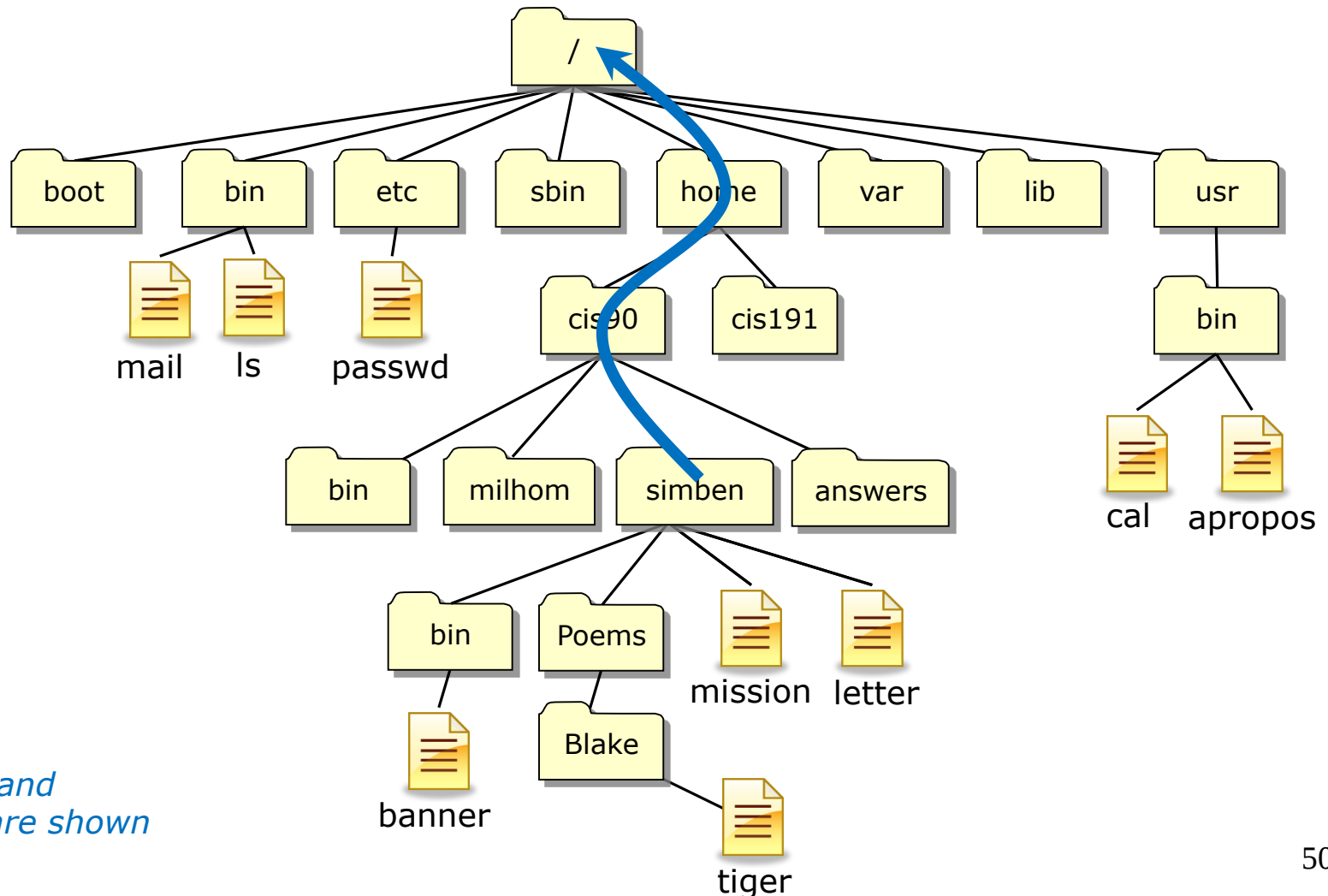
- Use the **pwd** command to show your location
(*your GPS*)

Note, as CIS 90 students your shell prompt uses the PWD variable. As you move around the tree your command prompt will change to show your current location.

*To see why compare the output of the commands: **pwd** and **echo \$PWD***

UNIX File Tree

Navigate from your home directory up to the / directory



*Not all files and
directories are shown*

Navigate from your home directory to the / directory

```
simben90@opus-ii:/home/cis90/simben $ ls
bigfile      lab02-collection  log              proposal2       text.fxd
bin          lab04-mydata      Miscellaneous    proposal3       timecal
empty        Lab2.0            mission         small_town     trash
Hidden       Lab2.1            Poems           spellk          uhistory
lab01-collection letter            proposal1       text.err       what_am_i

/home/cis90/simben $ cd ..
/home/cis90 $ ls
angjak  bilfri  chakag  farcia  milhom  padhen  rocces  telnat  winsha
answers bin      chudar  fuldan  monele  pernat  rodduk  valjos
arrdav  brehil  cis     gunfer  ohapau  plabra  seasky  vanjoa
ausedg  broada  depot   kankim  olscla  ragjet  silcla  watshe
banric  butjus  escchr  klenat  ottlai  ranlui  simben  wilnov

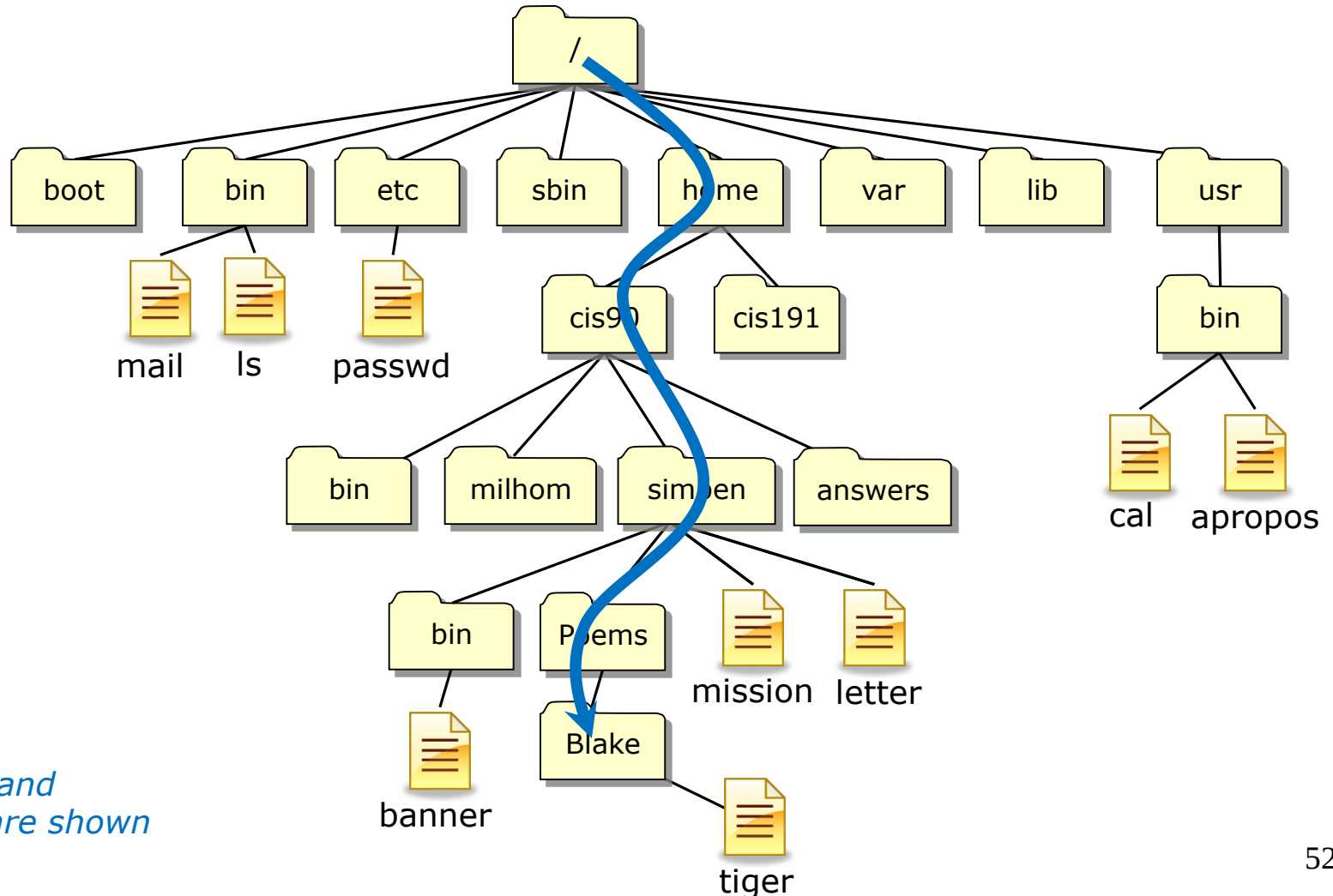
/home/cis90 $ cd ..
/home $ ls
backup  cis76  cis90  ehbot01  ehbot02  ehbot03  ehbot04  ledmgr  rsimms  turnin

/home $ cd ..
/ $ ls
bin  dev  home  lib64  mnt  proc  run  srv  tmp  var
boot etc  lib   media  opt  root  sbin sys  usr
```

Use **cd ..** to climb up to the parent directory and **ls** to view the directory contents as you go. Notice how the shell prompt reflects your current location in the tree.

UNIX File Tree

Navigate from the / directory down to your Blake directory



Navigate down to the directory of Blake's poems

```
simben90@opus-ii: ~/Poems/Blake
$ ls
bin  dev  home  lib64  mnt  proc  run  srv  tmp  var
boot  etc  lib  media  opt  root  sbin  sys  usr

$ cd home
/home $ ls
backup  cis76  cis90  ehbot01  ehbot02  ehbot03  ehbot04  ledmgr  rsimms  turnin

/home $ cd cis90
/home/cis90 $ ls
angjak  bilfri  chakag  farcia  milhom  padhen  rocces  telnat  winsha
answers  bin  chudar  fuldan  monele  pernat  rodduk  valjos
arrdav  brehil  cis  gunfer  ohapau  plabra  seasky  vanjoa
ausedg  broada  depot  kankim  olscla  ragjet  silcla  watshe
banric  butjus  escchr  klenat  ottlai  ranlui  simben  wilnov

/home/cis90 $ cd simben
/home/cis90/simben $ ls
bigfile  lab02-collection  log  proposal2  text.fxd
bin  lab04-mydata  Miscellaneous  proposal3  timecal
empty  Lab2.0  mission  small_town  trash
Hidden  Lab2.1  Poems  spellk  uhistory
lab01-collection  letter  proposal1  text.err  what_am_i

/home/cis90/simben $ cd Poems/
/home/cis90/simben/Poems $ ls
Angelou  ant  Blake  Dickenson  Neruda  nursery  Shakespeare  twister  Yeats

/home/cis90/simben/Poems $ cd Blake
/home/cis90/simben/Poems/Blake $ ls
jerusalem  tiger

/home/cis90/simben/Poems/Blake $
```

Use **cd <directory>** to climb down directory by directory. Notice how the prompt changes to show your location in the Unix file tree

Navigate back to your home directory



#Parts

```
simben90@opus-ii:~  
/home/cis90/simben/Poems/Blake $ ls 🙈  
jerusalem  tiger  
/home/cis90/simben/Poems/Blake $ cd 🙈  
/home/cis90/simben $ ls 🙈  
bigfile      lab02-collection  log          proposal2      text.fxd  
bin           lab04-mydata      Miscellaneous proposal3      timecal  
empty        Lab2.0            mission      small_town     trash  
Hidden       Lab2.1            Poems        spellk         uhistory  
lab01-collection letter            proposal1    text.err       what_am_i  
/home/cis90/simben $ █
```

*You always have the power to go home. Just use the **cd** with no arguments to change back to your home directory*

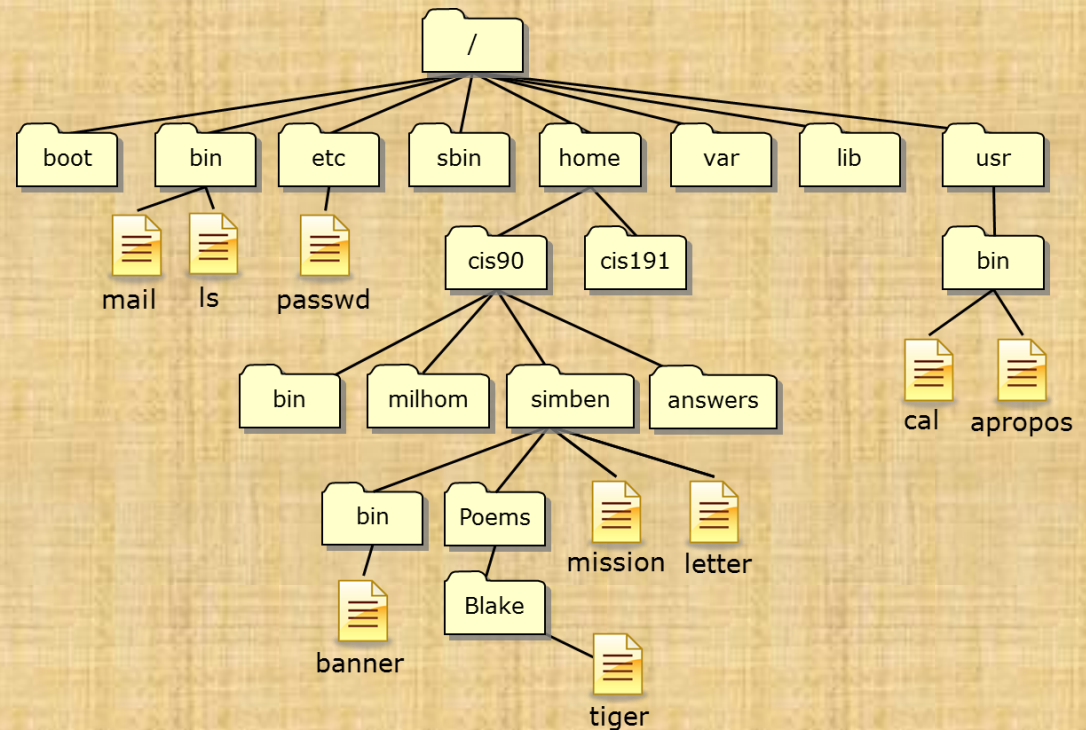


<http://vivandlarry.com/wp-content/uploads/2011/05/oz.jpg>

Dorothy: Oh, will you help me? Can you help me?
Glinda: You don't need to be helped any longer. You've always had the power to go back to Kansas.
Dorothy: I have?
Scarecrow: Then why didn't you tell her before?
Glinda: Because she wouldn't have believed me. She had to learn it for herself.

Class Field Trip

- 1) /boot
 - The kernel
- 2) /etc
 - motd
 - passwd
- 3) /var
 - mail/
 - www/html
- 4) /home/cis90/bin
 - depot
 - bin
 - answers
- 5) /home/cis90/simben/Poems
 - various poem directories





UNIX Files

File Systems

Linux

A typical hard drive



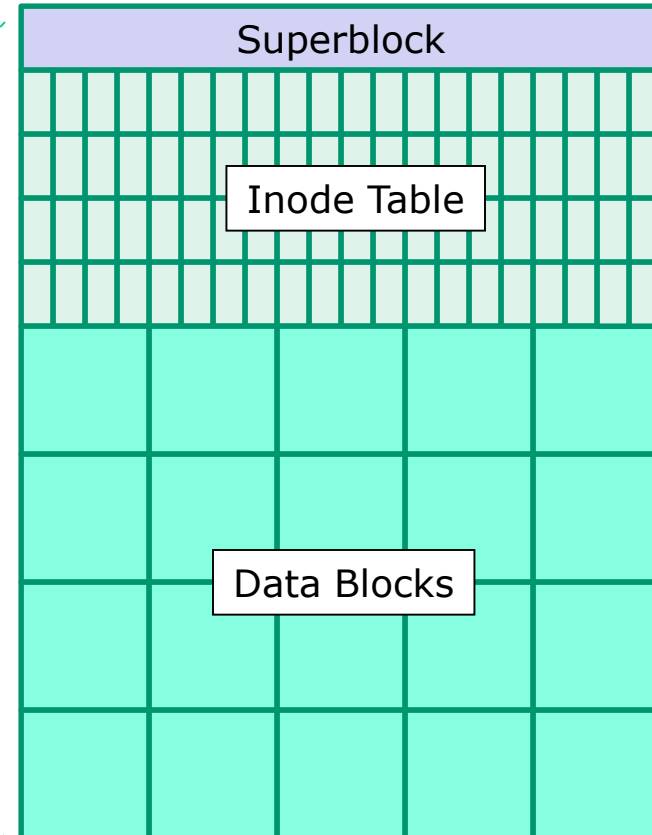
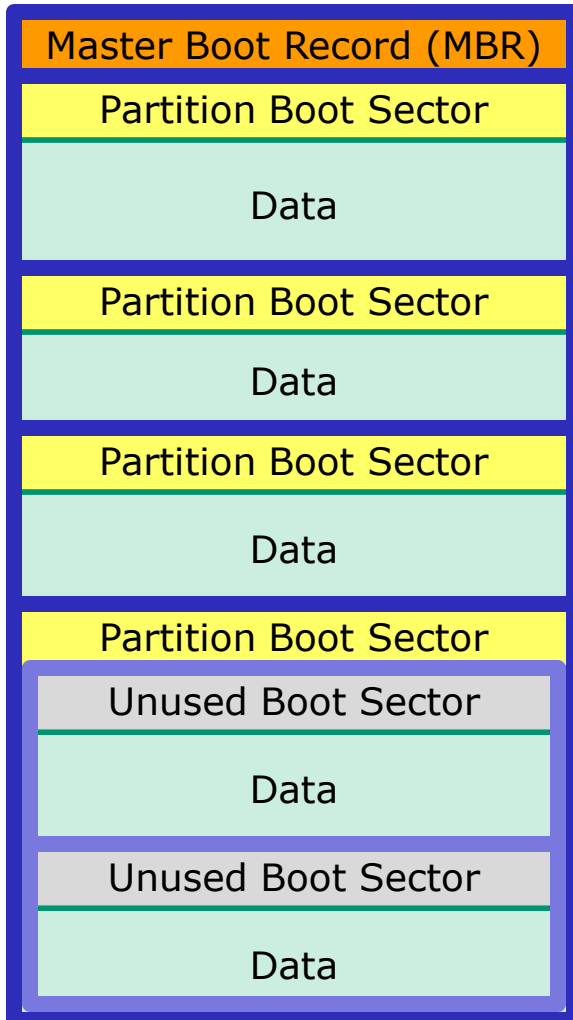
This is where your files actually reside



Linux File Systems

The hard drive is partitioned and the data areas can be formatted as a file system. Linux typically uses ext2, ext3, ext4 and xfs file systems. Windows uses FAT32 and NTFS file systems.

ext_x file system



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

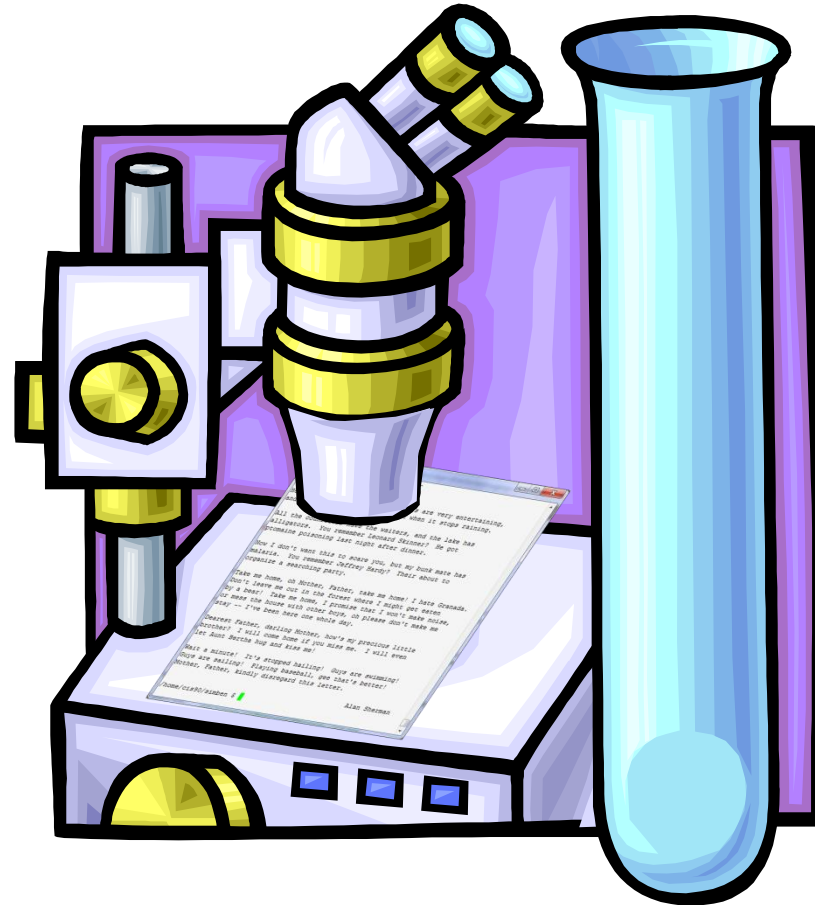
+

inode

+

data

Let's look at the file named letter in Benji's home directory



`ls -il letter` *will show the inode number and a long listing of the letter file*
`cat letter` *will show the data contents of the letter file*

```
/home/cis90/simben $ ls -li letter
```

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

filename

inode

```
/home/cis90/simben $ cat letter
```

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

data

bigfile 19470
bin 9628
letter 9662

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

/home/cis90/simben

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.

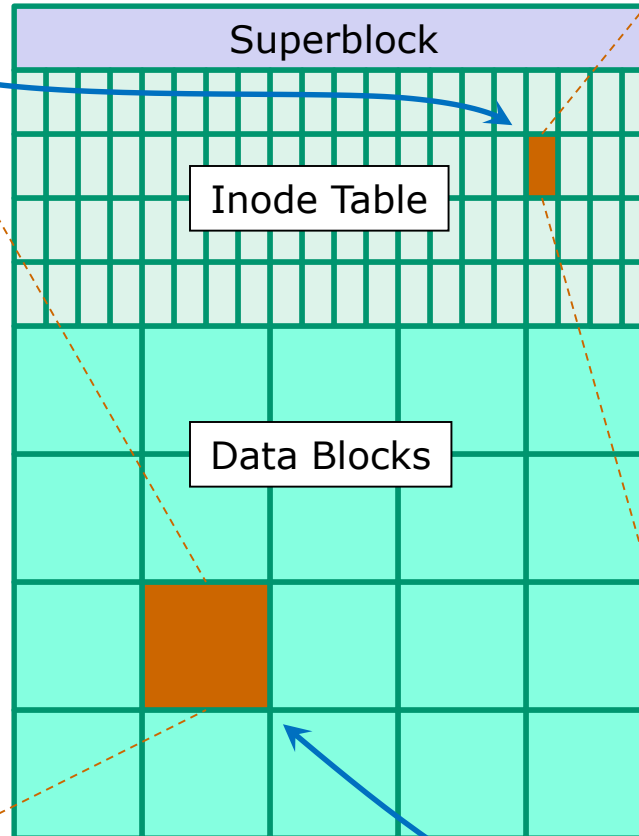
Now I don't want this to scare you, but my bunk mate has malaria. You remember Jeffrey Hardy? Their about to organize a searching party.

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
```

Directories are files too!

- Directories are implemented as files
- The data in a directory includes pairs of filenames and inode numbers (kind of like a phone book)
- Every directory can contain further sub-directories

In other operating systems like Mac and Windows, a directory is often referred to as a "folder" and represented as a office folder icon on the desktop.

Activity

Type these commands in your home directory:

```
ls -i
```

```
ls -il letter
```

```
cat letter
```

Type the inode of your letter file in the chat window

Unix Filename Conventions

UNIX file name conventions

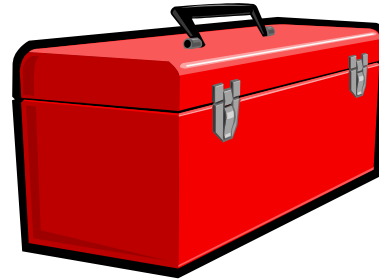
Unix filenames are case sensitive

File names can be any combination of the following:

- Upper and lower case letters: **A-Z** and **a-z**
- Numbers: **0-9**
- Periods, underscores, hyphens: **. _ -**
- Examples: letter, Lab2.1, my_files, my-files

Avoid using the following characters in filenames

- **| ; , ! @ # \$ () < > / \ " ' ` ~ { } [] = + & ^**
<space> <tab>



More commands for your toolbox

Viewing Text Files



Lesson 4 commands for your toolbox

cat

NEW **more**

NEW **less**

NEW **head**

NEW **tail**

NEW **wc**

NEW **xxd**

- view a text file
- view a large text file by scrolling down
- view a large text file by scrolling down and up
- view the beginning lines of a text file
- view the last lines of a text file
- count the lines, words and characters in a text file
- view a binary data file as a hex dump

NEW **cd**

ls

NEW **pwd**

- change to a different directory
- list files
- show name of current/working directory

file

type

- show additional file information
- show location of a command on path

Viewing **text** files:

- file *useful for identifying if a file is text or binary*
- cat *to print a file*
- more *to scroll down through a file*
- less *to scroll down and up a file*
- head *to print the beginning lines of a file*
- tail *to print the last lines of a file*
- wc *count the words and lines in a text file*

ASCII Text Files

Computers store everything as binary 0's and 1's.

ASCII = American Standard Code for Information Interchange.

ASCII defines binary patterns of 0's and 1's to represent printable text characters.

For example, the letter O is represented by 01001111, the letter z is represented by 01111010.

If a file has data that only contains ASCII text patterns then it is considered a **text file** and "printable".

If some or all of the bit patterns are not ASCII characters then the file is considered a **binary file** and unprintable.

To see all the ASCII characters use the **man ascii** command.

Thanks Hunter! See Hunter's post at
<http://oslab.cishawks.net/forum/viewtopic.php?f=88&t=2258&p=8357>

Identifying text files with the file command



#Bangalore

```
/home/cis90/simben $ file letter Poems proposal1 mission uhistory what_am_i
letter:      ASCII English text
Poems:      directory
proposal1:   ASCII English text
mission:     ASCII English text
uhistory:    ASCII mail text
what_am_i:   data
/home/cis90/simben $
```

Look for the word "text" in the output to indicate an ASCII text file

If you don't see "text" it's a binary file and unprintable. Note: what_am_i and Poems are not text files

The text viewing commands like cat, more, head, etc. only work on text files. They are not meant to be used to view binary data files or directories.

cat command

used to view a text file

```
/home/cis90/simben $ cat letter  
Hello Mother! Hello Father!
```

A single argument, letter, is given to the cat command to process

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.

< Snipped >

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

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

cat command viewing multiple text files

```
/home/cis90/simben $ cat spellk letter
```

```
Spell Check
```

```
Eye halve a spelling chequer  
It came with my pea sea  
It plainly marques four my revue  
< snipped >  
Eye have run this poem threw it  
I am shore your pleased two no  
Its letter perfect awl the weigh  
My chequer tolled me sew.
```

```
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.
```

```
< snipped >
```

```
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

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

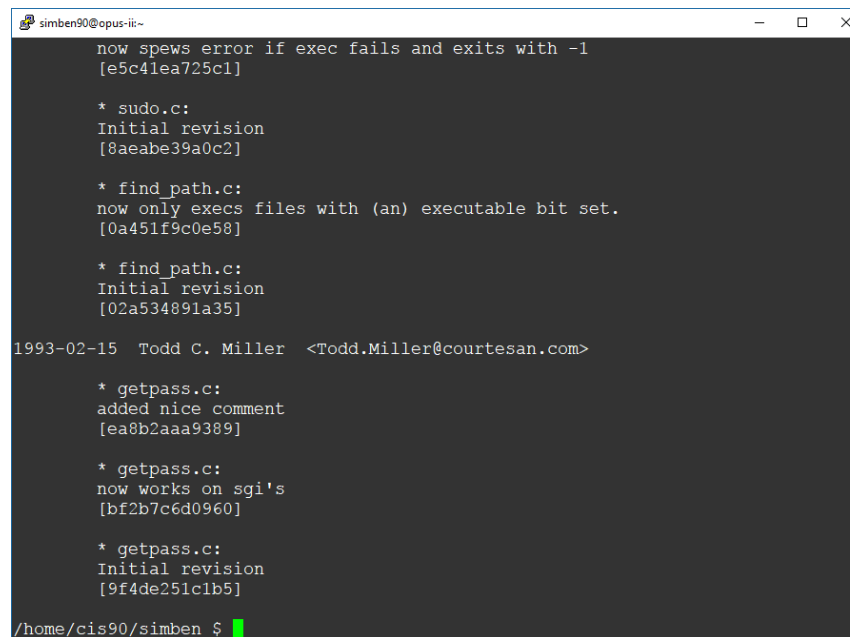
*Multiple arguments, spellk
and letter, are passed to
the cat command to
process*

spellk

letter

cat command viewing long text files

- Problem: The **cat** command doesn't work well for large files. The test prints so fast you will only see the end of the file. If the terminal buffer is not big enough you will not be able to scroll back to view the beginning of the file.
- For example: **cat /usr/share/doc/sudo-1.8.19p2/ChangeLog**



```

simben90@opus-ii-~
now spews error if exec fails and exits with -1
[e5c41ea725c1]

* sudo.c:
Initial revision
[8aeabe39a0c2]

* find_path.c:
now only execs files with (an) executable bit set.
[0a451f9c0e58]

* find_path.c:
Initial revision
[02a534891a35]

1993-02-15  Todd C. Miller  <Todd.Miller@courtesan.com>

* getpass.c:
added nice comment
[ea8b2aaa9389]

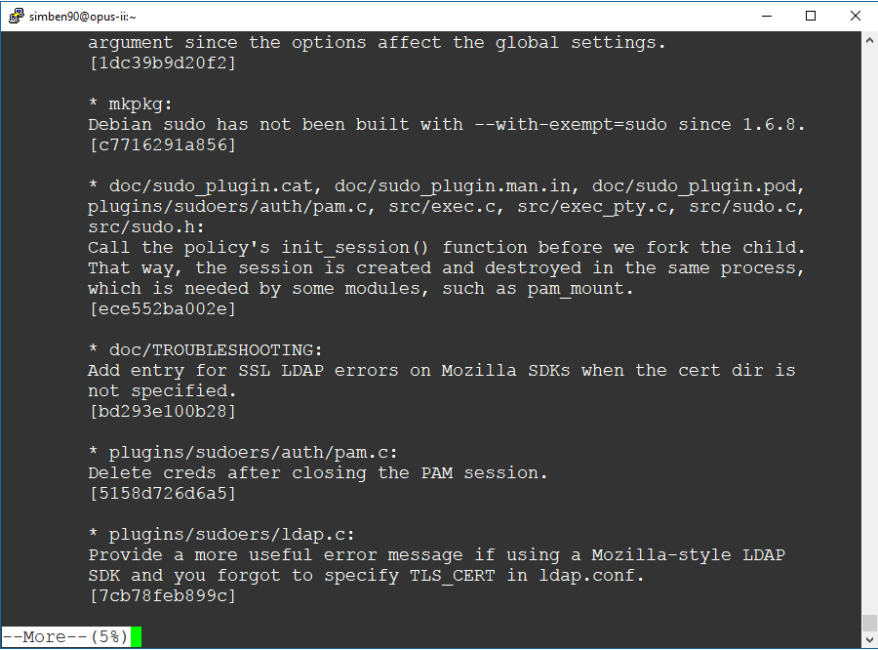
* getpass.c:
now works on sgi's
[bf2b7c6d0960]

* getpass.c:
Initial revision
[9f4de251c1b5]

/home/cis90/simben $
  
```

more command viewing long text files

- Use the **more** command for scrolling through really long text files
- For example: **more /usr/share/doc/sudo-1.8.19p2/ChangeLog**



```
simben90@opus-ii-  
argument since the options affect the global settings.  
[1dc39b9d20f2]  
  
* mkpkg:  
Debian sudo has not been built with --with-exempt=sudo since 1.6.8.  
[c7716291a856]  
  
* doc/sudo_plugin.cat, doc/sudo_plugin.man.in, doc/sudo_plugin.pod,  
plugins/sudoers/auth/pam.c, src/exec.c, src/exec_ptty.c, src/sudo.c,  
src/sudo.h:  
Call the policy's init_session() function before we fork the child.  
That way, the session is created and destroyed in the same process,  
which is needed by some modules, such as pam_mount.  
[ece552ba002e]  
  
* doc/TROUBLESHOOTING:  
Add entry for SSL LDAP errors on Mozilla SDKs when the cert dir is  
not specified.  
[bd293e100b28]  
  
* plugins/sudoers/auth/pam.c:  
Delete creds after closing the PAM session.  
[5158d726d6a5]  
  
* plugins/sudoers/ldap.c:  
Provide a more useful error message if using a Mozilla-style LDAP  
SDK and you forgot to specify TLS_CERT in ldap.conf.  
[7cb78feb899c]  
  
--More-- (5%)
```

Use the **space bar** to page forward and **q** to quit

more command viewing multiple text files

- The **more** command can take multiple arguments

```
/home/cis90/simben $ more spellk letter
```

```
:::::::::::::  
spellk  
:::::::::::::  
Spell Check
```

```
Eye halve a spelling chequer  
It came with my pea sea  
< snipped >  
Its letter perfect awl the weigh  
My chequer tolled me sew.
```

```
:::::::::::::  
letter  
:::::::::::::
```

```
Hello Mother! Hello Father!  
< snipped >  
Guys are sailing! Playing baseball, gee that's better!  
Mother, Father, kindly disregard this letter.
```

Notice with multiple files as arguments, each file has a header to separate it from the other files

Alan Sherman

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

less command viewing long text files



- Use the **less** command to scroll forward and backward through really long text files. (just like the man command works)
- For example: **less /usr/share/doc/sudo-1.8.19p2/ChangeLog**

```
simben90@opus-ii:~
plugins/sudoers/testsudoers.c, plugins/sudoers/visudo.c:
The second argument to init_parser() is now bool.
[fb727a4fb651]

* plugins/sudoers/gram.c, plugins/sudoers/gram.y:
Fix printing of parse error message to stderr.
[dea6b420b84f]

* plugins/sudoers/check.c, plugins/sudoers/defaults.c,
plugins/sudoers/match.c, plugins/sudoers/parse.c,
plugins/sudoers/parse.h, plugins/sudoers/sudoers.c,
plugins/sudoers/sudoers.h, plugins/sudoers/testsudoers.c:
If a command matches using an empty Runas_List (i.e. Runas_List is
present but empty) and the -u option was not specified, set runas_pw
to user_pw instead of using runas default. This is intended to be
used in conjunction with the Solaris Privilege Set support for rules
that grant privileges without changing the user.
[e84a081f3c11]

* doc/sudoers.cat, doc/sudoers.man.in, doc/sudoers.mdoc.in,
plugins/sudoers/gram.c, plugins/sudoers/gram.h,
plugins/sudoers/gram.y, plugins/sudoers/match.c,
plugins/sudoers/parse.c, plugins/sudoers/sudoers_version.h:
Add support for parsing an empty Runas_List, which only allows the
command to be run as the invoking user. This can be used in
conjunction with the Solaris Privilege Set support to grant
privileges without changing the user.
[dc34373792fc]
```

"less is more" 😊

Use the **pg up/dn** and up/down arrows to move through text file. Use **q** to quit. For multiple arguments use **:n** and **:p** to move between multiple text files. See the man page for many more options like searching.



head command

view the first lines in a text file

- Use the **head** command to show the first several lines of a file.
- Use the **-n <number>** option to control the number of lines printed.

```
/home/cis90/simben $ head proposal1
```

Print the first lines of the file proposal1

```
A Plan for the Improvement of English Spelling  
by Mark Twain
```

```
For example, in Year 1 that useless letter "c" would be dropped to be replased  
either by "k" or "s", and likewise "x" would no longer be part of the alphabet.  
The only kase in which "c" would be retained would be the "ch" formation, which  
will be dealt with later. Year 2 might reform "w" spelling, so that "which" and  
"one" would take the same konsonant, wile Year 3 might well abolish "y"  
replasing it with "i" and Iear 4 might fiks the "g/j" anomali wonse and for all.  
Jenerally, then, the improvement would kontinue iear bai iear with Iear 5 doing  
awai with useless double konsonants, and Iears 6-12 or so modifaiing vowlz and  
/home/cis90/simben $
```

```
/home/cis90/simben $ head -n 3 proposal1
```

Print the first 3 lines of the file proposal1

```
A Plan for the Improvement of English Spelling  
by Mark Twain
```

```
For example, in Year 1 that useless letter "c" would be dropped to be replased  
/home/cis90/simben $
```

head command

view the first lines of multiple text files

```
/home/cis90/simben $ head -n2 mission letter spellk log
```

Print the first 2 lines of each of these files

```
==> mission <==
```

```
Mission * Purpose * Values
```

```
==> letter <==
```

```
Hello Mother! Hello Father!
```

Note the small banners containing the filename which separates each file.

```
==> spellk <==
```

```
Spell Check
```

The second line of the first three files are blank.

```
==> log <==
```

```
lab01 was submitted on Wed Feb 8 16:23:35 PST 2012
```

```
lab01 was submitted on Wed Feb 8 16:58:20 PST 2012
```

tail command

view the last lines in a text file

- Use the **tail** command to show the last several lines of a file.
- Use the **-n <number>** option to control the number of lines printed.

```
/home/cis90/simben $ tail mission Print the tail end of the file
```

```
environment which aids students in their pursuit of transfer,  
career preparation, personal fulfillment, job advancement, and  
retraining goals.
```

```
Our core values are academic freedom, critical and independent  
thinking, and respect for all people and cultures. Our commitment  
is to encourage excellence, offer a balanced curriculum, promote  
teaching methods for diverse learning styles, and involve and  
enrich our community.
```

```
/home/cis90/simben $ tail -n3 mission Print the last 3 lines of the file
```

```
teaching methods for diverse learning styles, and involve and  
enrich our community.
```



#Tria

wc command

count words and lines in a text file

```
/home/cis90/simben $ wc letter
```

```
28  182 1044 letter
```

#bytes
#words
#lines

```
/home/cis90/simben $ wc -l letter
```

```
28 letter
```

Use the -l option to count just the number of lines

```
/home/cis90/simben $ wc -w letter
```

```
182 letter
```

Use the -w option to count just the number of words

```
/home/cis90/simben $ wc letter mission proposal1
```

```
28  182 1044 letter
18  107  759 mission
16  196 1074 proposal1
62  485 2877 total
```

The wc command can take multiple arguments

Class Exercise

Viewing Text Files

- Print the first 3 lines of the log file

head -n3 log

- Count the number of words in small_town

wc -w small_town

- Print the proposal1 file

cat proposal1



What happens if you use tac instead of cat? (tac is cat spelled backwards)

Viewing binary files

Viewing **binary** files:

- `file` *useful for identifying whether a file is text or binary*
- `xxd` *show the contents of a binary file as a "hex dump"*

Identifying Binary Files

binary files

```
/home/cis90/simben $ file /bin/uname what_am_i spellk bin/enlightenment
/bin/uname:          ELF 32-bit LSB executable, Intel 80386, version 1
(SYSV), dynamically linked (uses shared libs), for GNU/Linux 2.6.18,
stripped
what_am_i:          data
spellk:             ASCII English text
bin/enlightenment: POSIX shell script text executable
```

text files

*If the output of the file command does not contain
"text" then the file is most likely a binary file*



Binary Files

Binary files should not be viewed with cat, more, less, head, tail, etc.

```
/home/cis90/simben $ cat /bin/uname
ELF04`I4(4444444>>@ ( A HHH Ptd644Qtd/lib/ld-
linux.so.2GNU (B`(*K G->K y cg}Ti w)
C52L/9=@xH^fOI
G<'6?wC*YA$),K,f") ,K H. . . .
. /d8/ </ / / sii / ii w ~ w
~ w ~ w ~ w ii
) *+, $(,08 <
< snipped >
uTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTY
YPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPuTTYPu
TTYPuTTYPuTTYPuTTY
/home/cis90/simben $
```

*Tip: Use the **reset** command to fix terminal if it gets really "sick"*



Binary Files

Use xxd command to view

The file /bin/uname is viewed as a hex dump

*E=ASCII 45 at 00000001
L=ASCII 4c at 00000002
F=ASCII 46 at 00000003*

```
/home/cis90/simben $ xxd /bin/uname
00000000: 7f45 4c46 0101 0100 0000 0000 0000 0000  .ELF.....
00000010: 0200 0300 0100 0000 308b 0408 3400 0000  .....0...4...
00000020: 6049 0000 0000 0000 3400 2000 0800 2800  `I.....4. ...(.
00000030: 1f00 1e00 0600 0000 3400 0000 3480 0408  .....4...4...
00000040: 3480 0408 0001 0000 0001 0000 0500 0000  4.....
00000050: 0400 0000 0300 0000 3401 0000 3481 0408  .....4...4...
00000060: 3481 0408 1300 0000 1300 0000 0400 0000  4.....
00000070: 0100 0000 0100 0000 0000 0000 0080 0408  .....
< snipped >
0004df0: 0000 0000 0000 0000 d842 0000 6c05 0000  .....B..1...
0004e00: 0000 0000 0000 0000 0400 0000 0100 0000  .....
0004e10: 0100 0000 0300 0000 0000 0000 0000 0000  .....
0004e20: 4448 0000 1901 0000 0000 0000 0000 0000  DH.....
0004e30: 0100 0000 0000 0000
/home/cis90/simben $
```

Hexadecimal offsets into the file

The printable "ELF" above is located between hex offsets 00000000 and 00000010 shown on the left column

Class Exercise

Where is the hostname command?

```
type hostname
```

What kind of file is the hostname command?

```
file /bin/hostname
```

Try to cat the hostname command:

```
cat /bin/hostname
```

Do a hex dump of the hostname command:

```
xxd /bin/hostname
```

Basic file types



#Bombay

Understanding a Long Listing

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

The -l option on the ls command produces a "long listing" that shows more information

```
/home/cis90/simben $ ls -l letter
```

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

permissions

*owner
(the username
that owns
the file)*

group

*size
(in bytes)*

*modification
date*

filename

number of hard links

file type

Some Common File Types



Column 1 of long listing	Type	How to make one
d	Directory	mkdir
-	Regular • Programs • Text • Data (binary) • Many more ... <i>Use the file command to further classify regular files</i>	touch vi >
l	Symbolic link	ln -s
c	Character special device	mknod
b	Block special device	mknod

Every file has a specific type attribute which is stored in the inode.

*File types can be viewed in column 1 of **long listings**.*

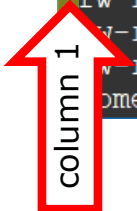
Long listing of Benji's home directory

ls -l

```
simben90@opus-ii:~  
/home/cis90/simben $ ls -l  
total 92  
-rw-r--r--. 2 simben90 cis90 10576 Jul 20 2001 bigfile  
drwxr-xr-x. 2 simben90 cis90 109 Aug 13 2017 bin  
-rw-r--r--. 1 simben90 cis90 0 Jul 20 2001 empty  
d------. 2 simben90 cis90 36 Feb 1 2002 Hidden  
-rw-r--r--. 1 simben90 cis90 373 Jan 31 12:04 lab01-collection  
-rw-r--r--. 1 simben90 cis90 5241 Feb 15 13:33 lab02-collection  
-rw-----. 1 simben90 cis90 1221 Feb 18 09:25 lab04-mydata  
drwxr-xr-x. 2 simben90 cis90 184 Feb 17 2001 Lab2.0  
drwxr-xr-x. 3 simben90 cis90 130 Feb 17 2001 Lab2.1  
-rw-r--r--. 1 simben90 cis90 1044 Jul 20 2001 letter  
-rw-r--r--. 1 simben90 cis90 364 Feb 18 09:26 log  
drwxr-xr-x. 2 simben90 cis90 97 Sep 11 2005 Miscellaneous  
-rw-r--r--. 1 simben90 cis90 759 Jun 6 2002 mission  
drwxr-xr-x. 8 simben90 cis90 138 Aug 6 2014 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-r--r--. 1 simben90 cis90 1580 Nov 16 2004 small_town  
-rw-r--r--. 1 simben90 cis90 485 Aug 26 2003 spellk  
-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 519 Aug 6 2014 timecal  
-rw-rw-r--. 1 simben90 cis90 2265 Feb 14 17:12 trash  
-rw-rw-r--. 1 simben90 cis90 10297 Feb 18 08:05 uhistory  
-rw-r--r--. 1 simben90 cis90 352 Jul 20 2001 what_am_i  
/home/cis90/simben $
```

"Total 92" indicates directory is using 92 data blocks

`sudo blockdev --getbsz /dev/sda1`
`sudo blockdev --getbsz /dev/sda2`



The **regular** files are highlighted above. Note they each have a dash "-" in column one and the names are not colored.

Long listing of the slash directory

`ls -l /`

#London

```
simben90@opus-ii:~  
/home/cis90/simben $ ls -l /  
total 24  
lrwxrwxrwx. 1 root root 7 Aug 4 2017 bin -> usr/bin  
dr-xr-xr-x. 5 root root 4096 Jan 21 09:21 boot  
drwxr-xr-x. 19 root root 3240 Jan 21 09:20 dev  
drwxr-xr-x. 102 root root 8192 Feb 15 14:27 etc  
drwxr-xr-x. 12 root root 148 Jan 7 17:24 home  
lrwxrwxrwx. 1 root root 7 Aug 4 2017 lib -> usr/lib  
lrwxrwxrwx. 1 root root 9 Aug 4 2017 lib64 -> usr/lib64  
drwxr-xr-x. 2 root root 6 Nov 5 2016 media  
drwxr-xr-x. 2 root root 6 Nov 5 2016 mnt  
drwxr-xr-x. 2 root root 6 Nov 5 2016 opt  
dr-xr-xr-x. 225 root root 0 Jan 21 09:20 proc  
dr-xr-x---. 6 root root 4096 Feb 1 17:21 root  
drwxr-xr-x. 34 root root 1000 Jan 21 09:21 run  
lrwxrwxrwx. 1 root root 8 Aug 4 2017 sbin -> usr/sbin  
drwxr-xr-x. 2 root root 6 Nov 5 2016 srv  
dr-xr-xr-x. 13 root root 0 Jan 21 09:20 sys  
drwxrwxrwt. 13 root root 4096 Feb 18 15:00 tmp  
drwxr-xr-x. 13 root root 155 Aug 4 2017 usr  
drwxr-xr-x. 20 root root 278 Aug 13 2017 var  
simben90@opus-ii:~
```

column 1

The **symbolic link** files are highlighted above. Note they each have the letter "l" in column one and an arrow "->" pointing to the linked file.

Long listing of the slash directory

#London

`ls -l /`

```
simben90@opus-ii:~  
/home/cis90/simben $ ls -l /  
total 24  
lrwxrwxrwx.  1 root root    7 Aug  4  2017 bin -> usr/bin  
dr-xr-xr-x.  5 root root 4096 Jan 21 09:21 boot  
drwxr-xr-x. 19 root root 3240 Jan 21 09:20 dev  
drwxr-xr-x. 102 root root 8192 Feb 15 14:27 etc  
drwxr-xr-x. 12 root root  148 Jan  7 17:24 home  
lrwxrwxrwx.  1 root root    7 Aug  4  2017 lib -> usr/lib  
lrwxrwxrwx.  1 root root    9 Aug  4  2017 lib64 -> usr/lib64  
drwxr-xr-x.  2 root root    6 Nov  5  2016 media  
drwxr-xr-x.  2 root root    6 Nov  5  2016 mnt  
drwxr-xr-x.  2 root root    6 Nov  5  2016 opt  
dr-xr-xr-x. 225 root root    0 Jan 21 09:20 proc  
dr-xr-x---.  6 root root 4096 Feb  1 17:21 root  
drwxr-xr-x. 34 root root 1000 Jan 21 09:21 run  
lrwxrwxrwx.  1 root root    8 Aug  4  2017/sbin -> usr/sbin  
drwxr-xr-x.  2 root root    6 Nov  5  2016 srv  
dr-xr-xr-x. 13 root root    0 Jan 21 09:20 sys  
drwxrwxrwt. 13 root root 4096 Feb 18 15:00 tmp  
drwxr-xr-x. 13 root root  155 Aug  4  2017 usr  
drwxr-xr-x. 20 root root  278 Aug 13  2017 var  
home/cis90/simben $
```

column 1

The **directories** are highlighted above. Note they each have the letter "d" in column one and the names are blue.

The /etc directory (Ubuntu)

rsimms@ulysses: /boot

Permissions	Size	Owner	Group	Size	Date	Time	File Name
-rw-r--r--	1	root	root	342	2008-06-20	11:10	popularity-contest.conf
drwxr-xr-x	4	root	root	4096	2008-04-22	13:52	power
drwxr-xr-x	8	root	dip	4096	2008-04-22	14:01	ppp
-w-r--r--	1	root	root	497	2008-04-22	13:49	profile
drwxr-xr-x	2	root	root	4096	2008-04-15	01:53	profile.d
-w-r--r--	1	root	root	2510	2007-12-03	17:04	protocols
drwxr-xr-x	2	root	root	4096	2008-04-22	14:03	pulse
drwxr-xr-x	2	root	root	4096	2008-04-22	14:03	purple
drwxr-xr-x	2	root	root	4096	2008-04-22	13:49	python
drwxr-xr-x	2	root	root	4096	2008-04-22	13:49	python2.5
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc0.d
drwxr-xr-x	2	root	root	4096	2008-04-22	14:07	rc1.d
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc2.d
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc3.d
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc4.d
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc5.d
drwxr-xr-x	2	root	root	4096	2008-06-20	11:12	rc6.d
-wxr-xr-x	1	root	root	306	2008-04-22	13:49	rc.local
drwxr-xr-x	2	root	root	4096	2008-04-22	14:05	rcS.d
drwxr-xr-x	2	root	root	4096	2008-04-22	14:03	readahead
drwxr-xr-x	3	root	root	4096	2008-04-22	13:53	resolvconf
-rw-r--r--	1	root	root	170	2008-06-24	10:44	resolv.conf
-wxr-xr-x	1	root	root	268	2008-04-04	07:07	rmt
-rw-r--r--	1	root	root	887	2007-12-03	17:04	rpc
drwxr-xr-x	2	root	root	4096	2008-06-20	11:15	samba
drwxr-xr-x	3	root	root	4096	2008-04-22	13:59	sane.d
drwxr-xr-x	2	root	root	4096	2008-04-22	14:05	scim
-w-r--r--	1	root	root	3663	2007-10-23	12:02	screenrc

Annotations:

- "-" regular files (black)
- "d" directories (blue)
- "-" regular files with x (execute) bit set (green) in cols 4,7, 10
- "-" regular file (black)

A portion of the /bin directory (Ubuntu)



rsimms@ulysses: /bin

File Edit View Terminal Tabs Help

rsimms@ulysses:/bin\$ ls -l s* z*

-rwxr-xr-x	1	root	root	40724	2007-12-04	07:50	sed
l -rwxrwxrwx	1	root	root	15	2008-06-20	11:03	setpci -> /usr/bin/setpci
-rwxr-xr-x	1	root	root	8431	2008-04-22	01:59	setupcon
l -rwxrwxrwx	1	root	root	4	2008-06-20	11:03	sh -> dash
l -rwxrwxrwx	1	root	root	4	2008-06-20	11:03	sh.distrib -> bash
-rwxr-xr-x	1	root	root	24488	2008-04-04	02:42	sleep
-rwxr-xr-x	1	root	root	48932	2008-04-04	02:42	stty
-ws -r-xr-x	1	root	root	25540	2008-04-02	21:08	su
-rwxr-xr-x	1	root	root	22312	2008-04-04	02:42	sync
-rwxr-xr-x	1	root	root	64	2007-11-15	06:49	zcat
-rwxr-xr-x	1	root	root	69	2007-11-15	06:49	zcmp
-rwxr-xr-x	1	root	root	4424	2007-11-15	06:49	zdiff
-rwxr-xr-x	1	root	root	64	2007-11-15	06:49	zegrep
-rwxr-xr-x	1	root	root	64	2007-11-15	06:49	zfgrep
-rwxr-xr-x	1	root	root	2015	2007-11-15	06:49	zforce
-wx x x x	1	root	root	4893	2007-11-15	06:49	zgrep
-rwxr-xr-x	1	root	root	1733	2007-11-15	06:49	zless
-rwxr-xr-x	1	root	root	2416	2007-11-15	06:49	zmore
-wx x x x	1	root	root	4952	2007-11-15	06:49	znew

Long listing of files with names starting with s or z (more on * later)

"l" symbolic links (light blue)

"-s" regular file with setuid bit set (red background)

"-wx" regular file with execute bit set (green)

Some special files in the /dev directory (Ubuntu)

A "b"
indicates a
Block
Special
Device

A "c"
indicates a
Character
Special
Device

```
rsimms@ulysses: ~
File Edit View Terminal Tabs Help
rsimms@ulysses:~$ ls -l /dev/sda
brw-rw---- 1 root disk 8, 0 2008-06-24 10:43 /dev/sda
rsimms@ulysses:~$ ls -l /dev/sda1
brw-rw---- 1 root disk 8, 1 2008-06-24 10:44 /dev/sda1
rsimms@ulysses:~$ ls -l /dev/tty1
crw----- 1 root root 4, 1 2008-06-24 10:44 /dev/tty1
rsimms@ulysses:~$ ls -l /dev/pts/0
crw----- 1 rsimms tty 136, 0 2008-06-24 10:53 /dev/pts/0
rsimms@ulysses:~$ clear
```

Special files (yellow
with black background)

Hard drives are **block** devices (data is transferred in large chunks for efficiency).

Terminals are **character** devices (data is transferred one character at a time).

Viewing the /boot directory (RH9)



```

root@frida:~
File Edit View Terminal Go Help
[root@frida root]# ls -l /boot
total 5127
-rw-r--r-- 1 root root 5824 Jan 24 2003 boot.b
-rw-r--r-- 1 root root 612 Jan 24 2003 chain.b
-rw-r--r-- 1 root root 44309 Feb 27 2003 config-2.4.20-6
drwxr-xr-x 2 root root 1024 Jun 5 19:10 grub
-rw-r--r-- 1 root root 254430 Jun 5 18:47 initrd-2.4.20-6.img
-rw-r--r-- 1 root root 473 Jun 5 18:47 kernel.h
drwx----- 2 root root 12288 Jun 5 11:45 lost+found
-rw-r--r-- 1 root root 23108 Feb 24 2003 message
-rw-r--r-- 1 root root 21282 Feb 24 2003 message.ja
lrwxrwxrwx 1 root root 20 Jun 5 18:47 module-info -> module-info-2.4.20-6
-rw-r--r-- 1 root root 15436 Feb 27 2003 module-info-2.4.20-6
-rw-r--r-- 1 root root 640 Jan 24 2003 os2_d.b
lrwxrwxrwx 1 root root 19 Jun 5 18:47 System.map -> System.map-2.4.20-6
-rw-r--r-- 1 root root 520099 Feb 27 2003 System.map-2.4.20-6
-rw-r--r-- 1 root root 3193468 Feb 27 2003 vmlinuz-2.4.20-6
lrwxrwxrwx 1 root root 16 Jun 5 18:47 vmlinuz -> vmlinuz-2.4.20-6
-rw-r--r-- 1 root root 1122363 Feb 27 2003 vmlinuz-2.4.20-6
[root@frida root]#

```

"-" regular files (black)

"d" directories (blue)

The kernel

Symbolic link to kernel

The kernel (compressed)

Class Exercise

Do a long listing of the /boot directory: **ls -l /boot**

- Is *grub* a directory or a regular file?
- Is *vmlinuz-3.10.0-693.11.6.el7.x86_64* a directory or a regular file?

Write your answers in the chat window

Class Exercise

Do a long listing of the /boot directory: **ls -l /boot**

- Is *grub* a directory or a regular file?
- Is *vmlinuz-3.10.0-693.11.6.el7.x86_64* a directory or a regular file?

Write your answers in the chat window



Further classification of files

file command

Provides expanded information about files

- There are many different types of regular files:
 - Programs (binary)
 - Scripts (text)
 - Text files
 - Data files (binary)
- The **file** command attempts to classify files and give you more detailed information on the file contents.

*Tip: Use the **file** command to determine if a file is a text file and can be viewed with **cat**, **more**, **less**, **tail** ... etc commands.*

file command

Examples

Use the **file** command to determine if a regular file is text or binary

*letter and
/bin/uname
are both
regular files*

```
/home/cis90/simben $ ls -l letter /bin/uname
-rwxr-xr-x. 1 root      root  26004 Dec  7  2011 /bin/uname
-rw-r--r--. 1 simben90 cis90  1044 Jul 20  2001 letter
```

```
/home/cis90/simben $ file letter
letter: ASCII English text
/home/cis90/simben $
```

*The data portion of the letter file is text and
can be viewed by cat, more, head, etc.*

```
/home/cis90/simben $ file /bin/uname
/bin/uname: ELF 32-bit LSB executable, Intel 80386, version 1
(SYSV), for GNU/Linux 2.6.9, dynamically linked (uses shared
libs), for GNU/Linux 2.6.9, stripped
/home/cis90/simben $
```

*The data portion of the /bin/uname file is binary
and can be viewed with the xxd command*

Using **file** command to further classify files



Long listings show
basic file types in
column 1
"- "=regular file
"d "=directory

```
/home/cis90/depot/filetypes $ ls -l
total 108
-rw-r--r--. 1 rsimms cis90 8983 Aug 1 18:49 Adjective.frm
-rw-r--r--. 1 rsimms cis90 5976 Aug 1 18:49 Adjective.MYD
-rw-r--r--. 1 rsimms cis90 2048 Aug 1 18:49 Adjective.MYI
-rw-r--r--. 1 rsimms cis90 10240 Aug 1 18:49 backup.tar
-rw-r-----. 1 rsimms cis90 191 Aug 1 18:49 bash_profile
-rwxr-----. 1 rsimms cis90 4846 Aug 1 18:49 cprog
-rwxr-----. 1 rsimms cis90 4846 Aug 1 18:49 go-cprog
-rw-r--r--. 1 rsimms cis90 119 Aug 1 18:49 letter
-rw-r-----. 1 rsimms cis90 2968 Aug 1 18:49 mbox
-rw-r--r--. 1 rsimms cis90 34611 Aug 1 18:49 rich-260x216.jpg
-rwxr-xr-x. 1 rsimms cis90 445 Aug 1 18:49 runit
drwxr-xr-x. 2 rsimms cis90 4096 Aug 1 18:40 travel
```

Output from the
file command
provides additional
file classification
information

```
/home/cis90/depot/filetypes $ file *
Adjective.frm:      MySQL table definition file Version 9
Adjective.MYD:      DBase 3 data file (33517822 records)
Adjective.MYI:      MySQL MISAM compressed data file Version 1
backup.tar:         POSIX tar archive (GNU)
bash_profile:       ASCII English text
cprog:              ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV),
dynamically linked (uses shared libs), for GNU/Linux 2.2.5, not stripped
go-cprog:           ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV),
dynamically linked (uses shared libs), for GNU/Linux 2.2.5, not stripped
letter:             ASCII English text
mbox:               ASCII mail text
rich-260x216.jpg:   JPEG image data, JFIF standard 1.02
runit:              POSIX shell script text executable
travel:             directory
```

Class Activity

Classify the following these files in your home directory:

- uhistory
 - letter
 - Poems
 - timecal
-
- Which is a bash script?

Write your answer in the chat window

Class Activity

Classify the files in /boot

- Which are Linux kernel files?

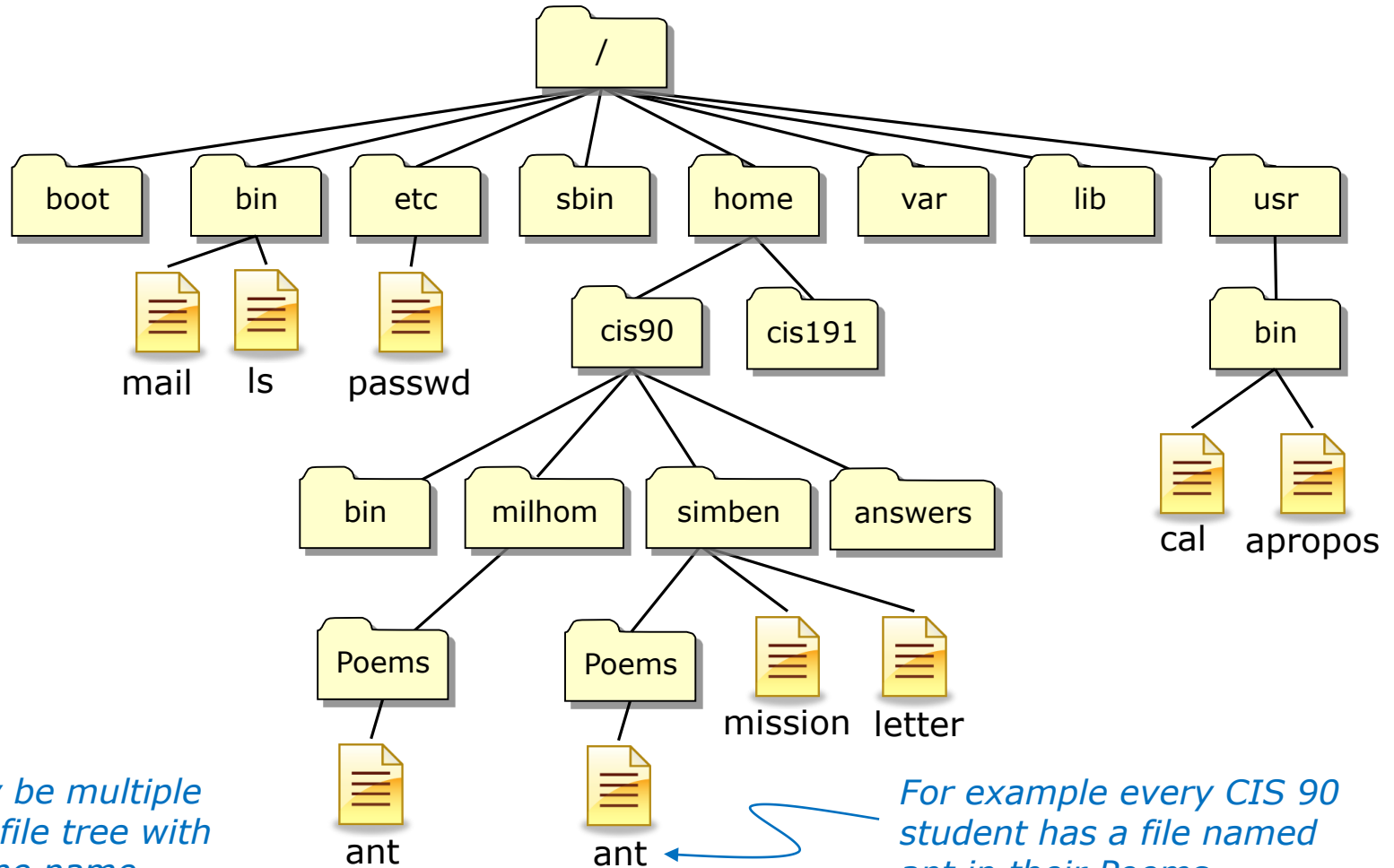
Write your answer in the chat window



Pathnames

The need for pathnames

Question: How can we unambiguously specify any file or directory in the file tree?

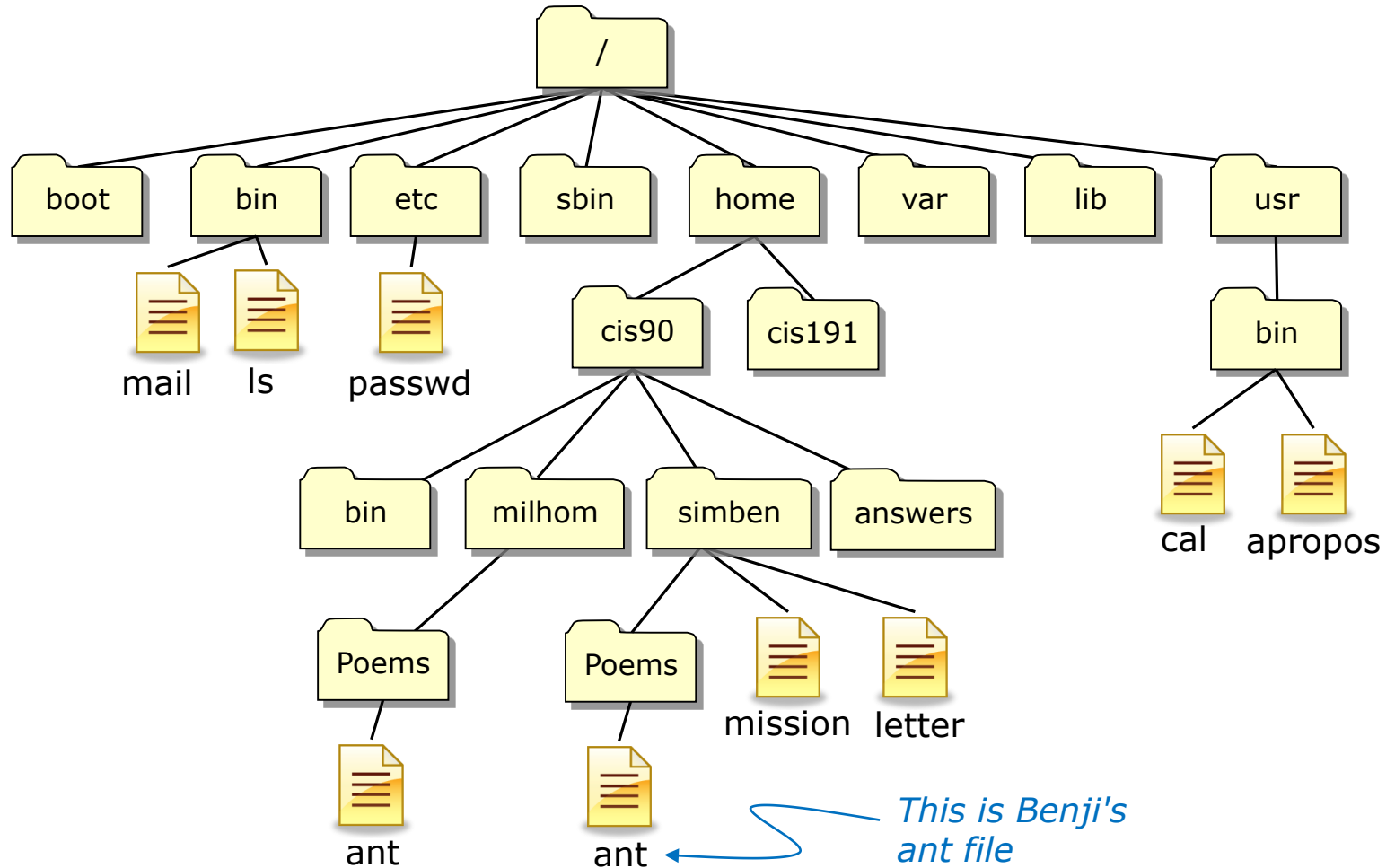


There may be multiple files in the file tree with the same name.

For example every CIS 90 student has a file named ant in their Poems directory

The need for pathnames

Answer: We use **absolute** or **relative** pathnames



Pathnames

What the heck are they?

A pathname is a precise way to specify exactly any file or directory in the file tree.

- An **absolute pathname** specifies the path from the **top of the tree** to the target directory or file.
- A **relative pathname** specifies the path from your **current location** to the target directory or file.

Understanding pathnames is critical because they are used as arguments on all commands that deal with files and directories.



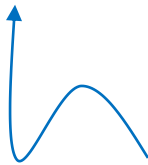
Absolute Pathnames

Absolute Pathnames

An **absolute pathname** specifies the path from the **top of the tree** to the target directory or file.

Examples:

/home/cis90/simben/Poems/ant	(file)
/boot	(directory)
/usr/bin/cal	(file)
/home/cis90/bin/	(directory)
/bin/mail	(file)

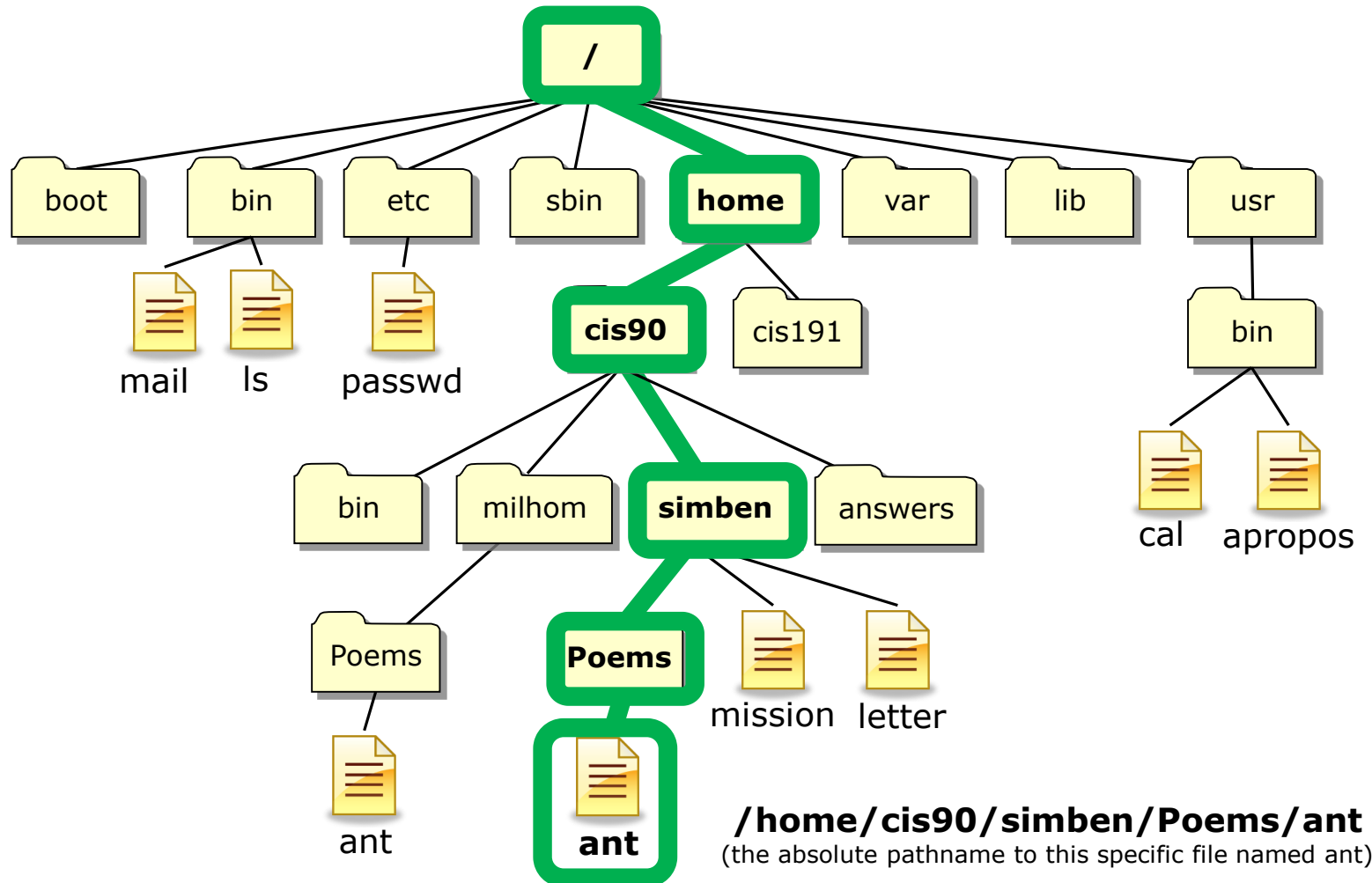


*** *Important* ***

Notice all absolute pathnames start with a / (forward slash) which represents the top of the file tree

Example Absolute Pathname

An **absolute pathname** specifies the path from the **top of the tree** to the target directory or file.

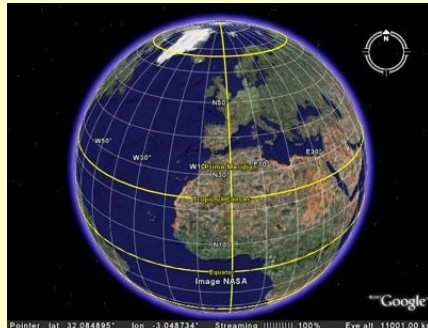


Absolute Pathname Analogy

Where is Watsonville Airport using latitude and longitude?

An analogy ...

<http://www.engineeringtoolbox.com/>



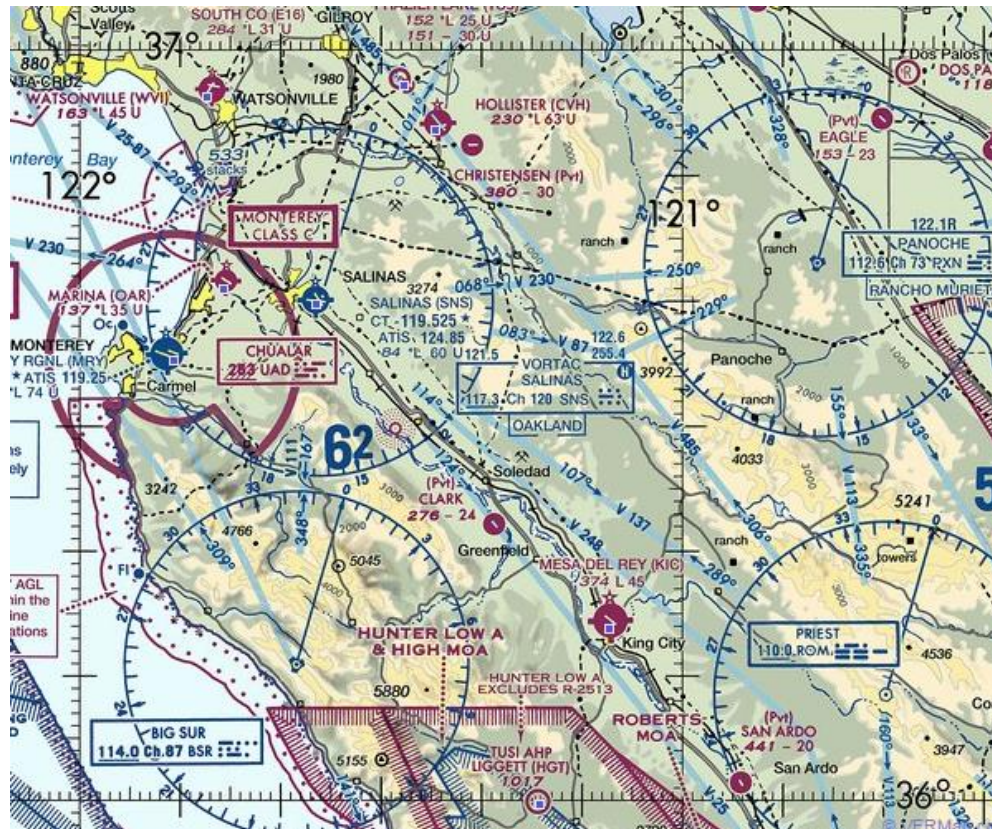
Latitude is measured in degrees north or south of the equator.

Longitude is measured in degrees east or west of the prime meridian.

Watsonville Airport

Latitude: 36-56'09" N

Longitude: 121-47'23" W



Latitude and longitude designate a target destination independent of your current location

Class Activity - absolute pathnames

Show the last two lines of your ant file using an absolute pathname

```
/home/cis90/simben $ tail -n2 /home/cis90/simben/Poems/ant  
'till one who seemed the least  
of all absorbed my whole of mind.
```

*replace with your
own home
directory name*

Show the last two lines of Homer's ant file using an absolute pathname

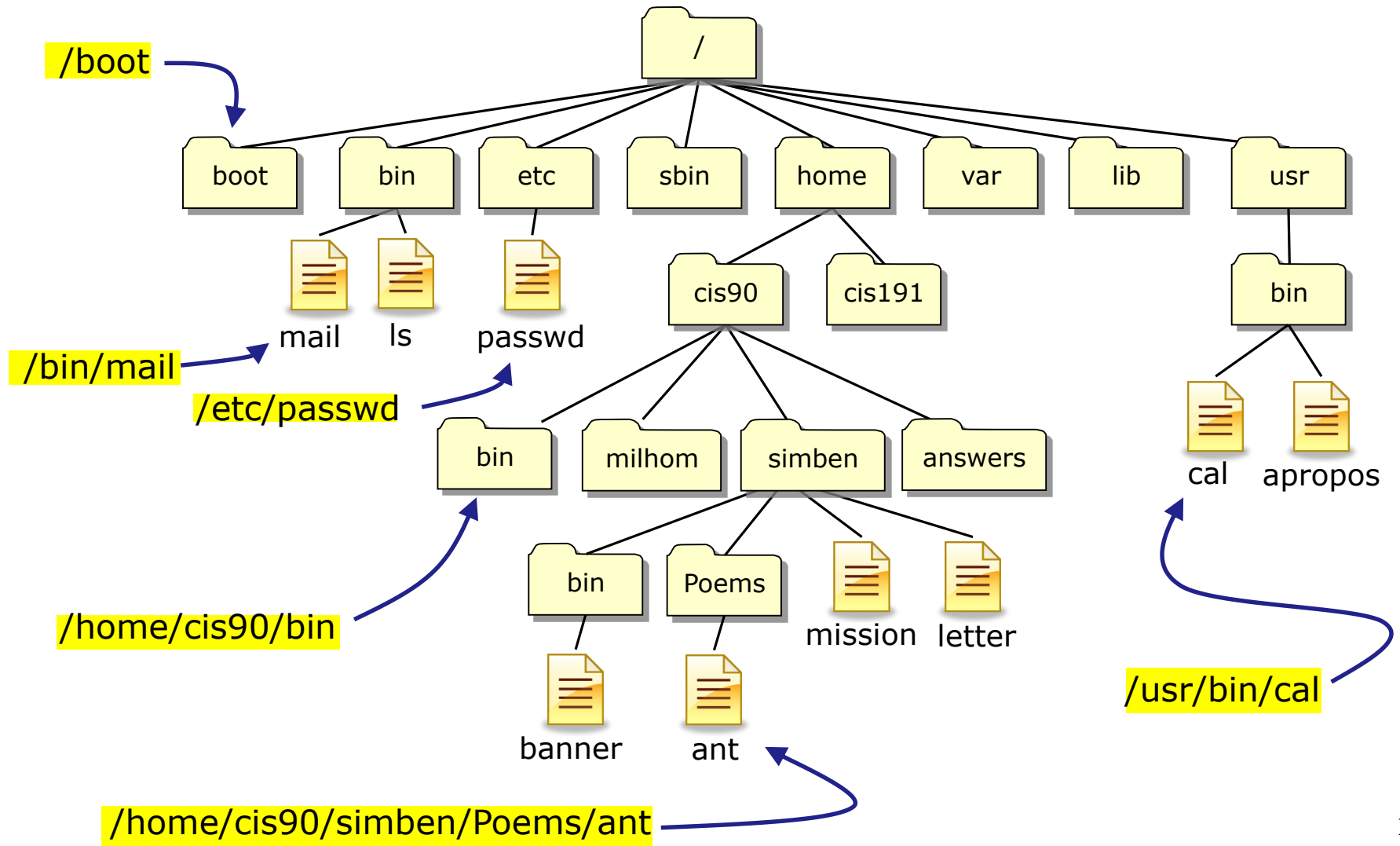
```
/home/cis90/simben $ tail -n2 /home/cis90/milhom/Poems/ant  
'till one who seemed the least  
of all absorbed my whole of mind.
```

Show the last two lines of your ant file using a variable for part of an absolute pathname

```
/home/cis90/simben $ echo $HOME/Poems/ant  
/home/cis90/simben/Poems/ant  
/home/cis90/simben $ tail -n2 $HOME/Poems/ant  
'till one who seemed the least  
of all absorbed my whole of mind.
```

Absolute Pathnames

Some more example absolute pathnames



Absolute Pathnames

Some example absolute pathnames being used as arguments

```
ls /bin /sbin /usr/bin /usr/sbin
```

```
file /usr/bin/cal
```

```
cd /home/cis90/simben/Poems/Shakespeare
```

```
tail -n1 /etc/passwd
```

```
more /home/cis90/simben/bigfile
```

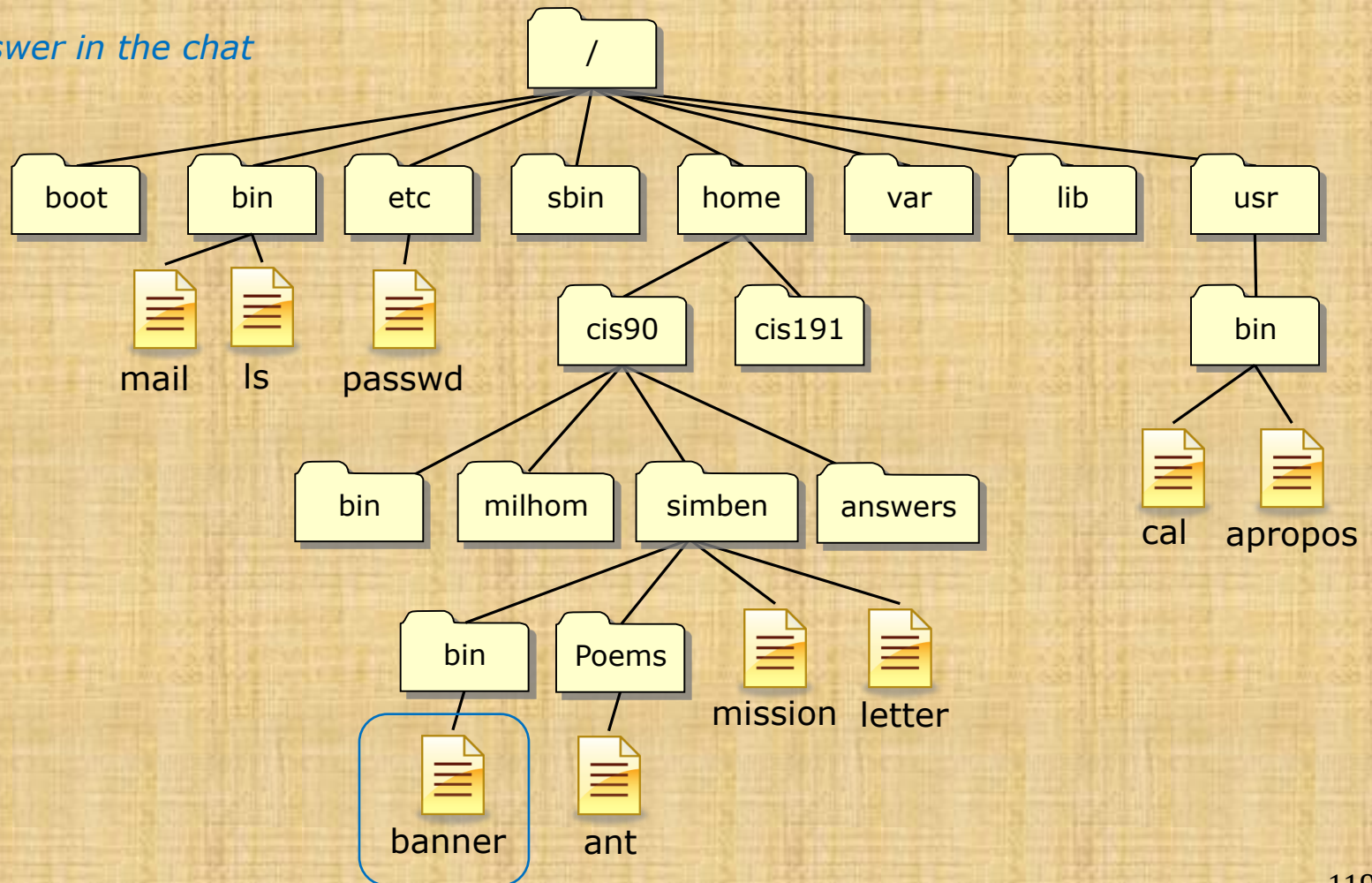
**** Important ****

Notice all absolute pathnames start with a / (forward slash) which represents the top of the file tree

Activity - identify an absolute pathname

Question: *what is the absolute pathname to Benji's banner file?*

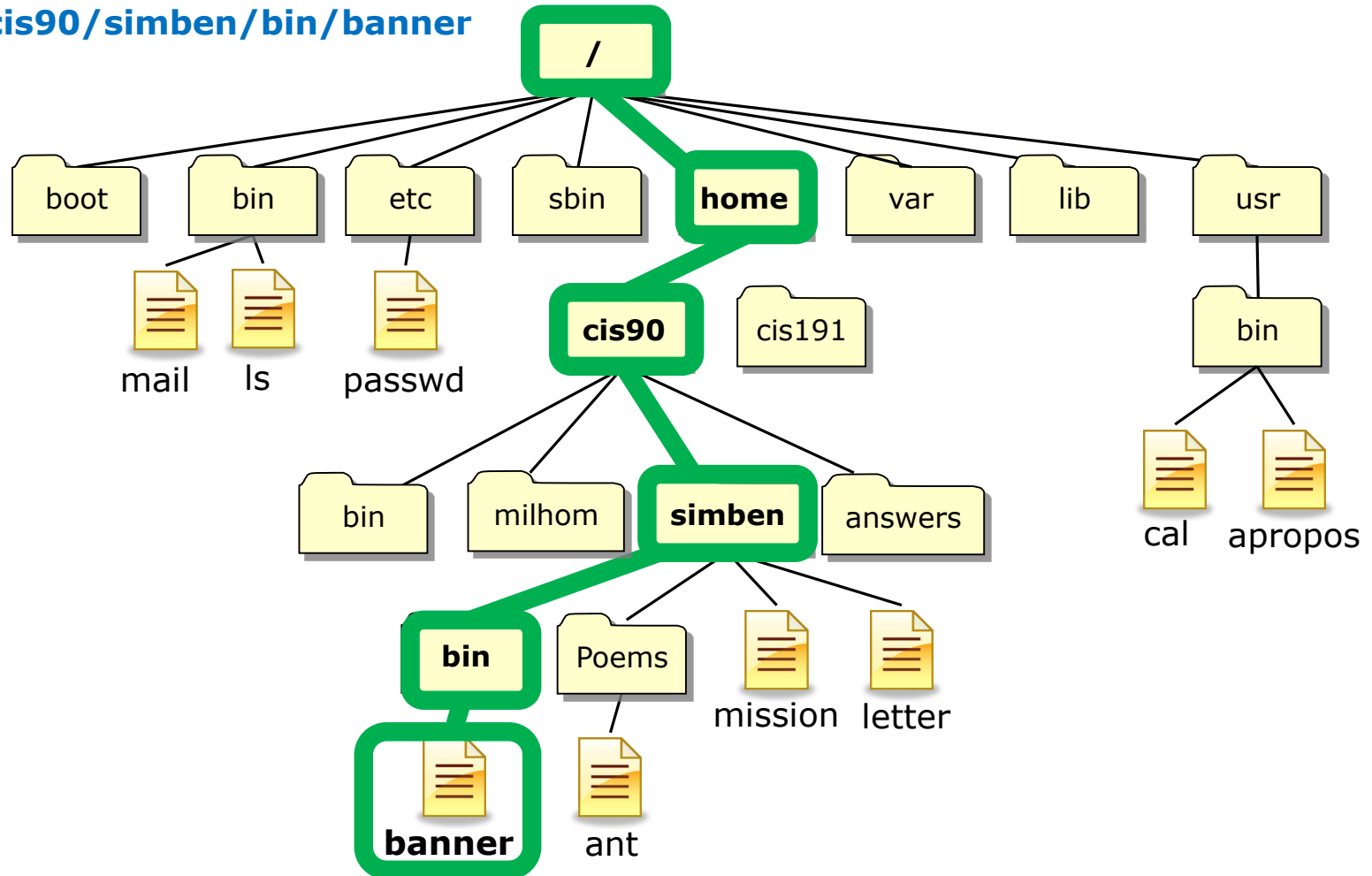
(write your answer in the chat window)



Question: what is the absolute pathname to Benji's banner file?

Answer:

/home/cis90/simben/bin/banner



/home/cis90/simben/bin/banner

Translation of this absolute pathname in English:

Start at the top of the tree and descend into the *home* directory, then descend into the *cis90* directory, then descend into the *simben* directory, then descend into the *bin* directory, there you will find the *banner* file.



Relative Pathnames

Relative Pathnames

*A **relative pathname** specifies the path from your current directory to the target directory or file.*

Examples:

ant	(file)
Poems/Shakespeare/sonnet5	(file)
../mission	(file)
../bin/	(directory)
../../boot/vmlinuz-2.6.18-164.el5	(file)

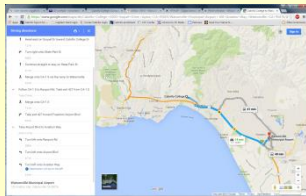
*** *Important* ***

Note that relative pathnames do NOT start with a /

Relative Pathname Analogy

How do I get from Cabrillo College to Watsonville Airport using Google Maps?

An analogy ...



Google Maps show a driving route from your current location to a target destination

Driving directions

- ↑ Head east on Soquel Dr toward Cabrillo College Dr
1.2 mi
- Turn right onto State Park Dr
423 ft
- ↑ Continue straight to stay on State Park Dr
0.1 mi
- ⤴ Merge onto CA-1 S via the ramp to Watsonville
0.2 mi
- ⤴ Follow CA-1 S to Ranport Rd. Take exit 427 from CA-1 S
7 min (7.5 mi)
- ⤴ Merge onto CA-1 S
7.3 mi
- Take exit 427 toward Freedom/Airport Blvd
0.2 mi
- ⤴ Take Airport Blvd to Aviation Way
3 min (1.0 mi)
- Turn left onto Ranport Rd
338 ft
- Turn left onto Airport Blvd
0.7 mi
- Turn left onto Aviation Way
Destination will be on the left
0.3 mi

Watsonville Municipal Airport
100 Aviation Way, Watsonville, CA 95076

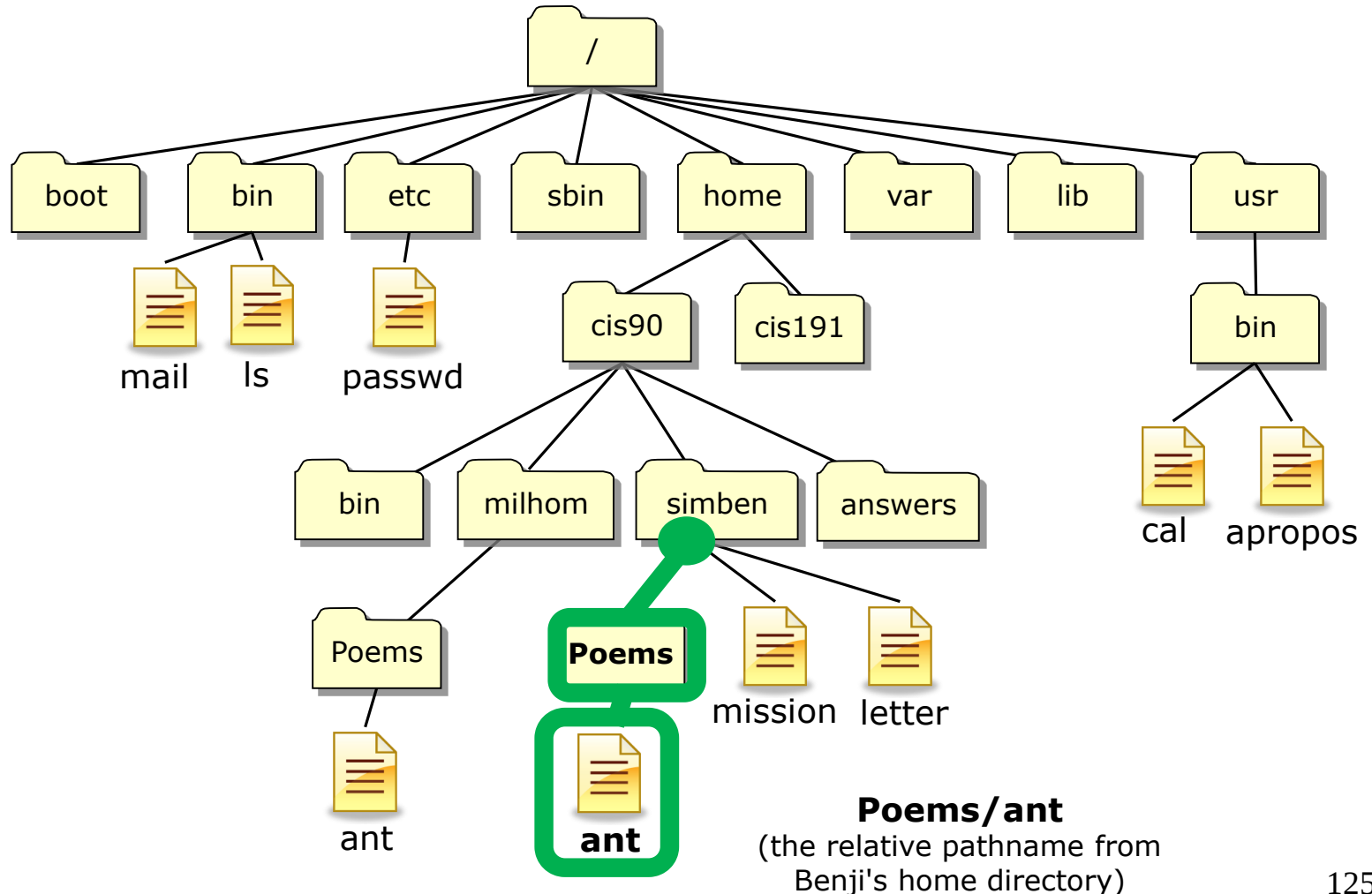
Google Maps instructions to a target destination depend on your starting location.



#Maui

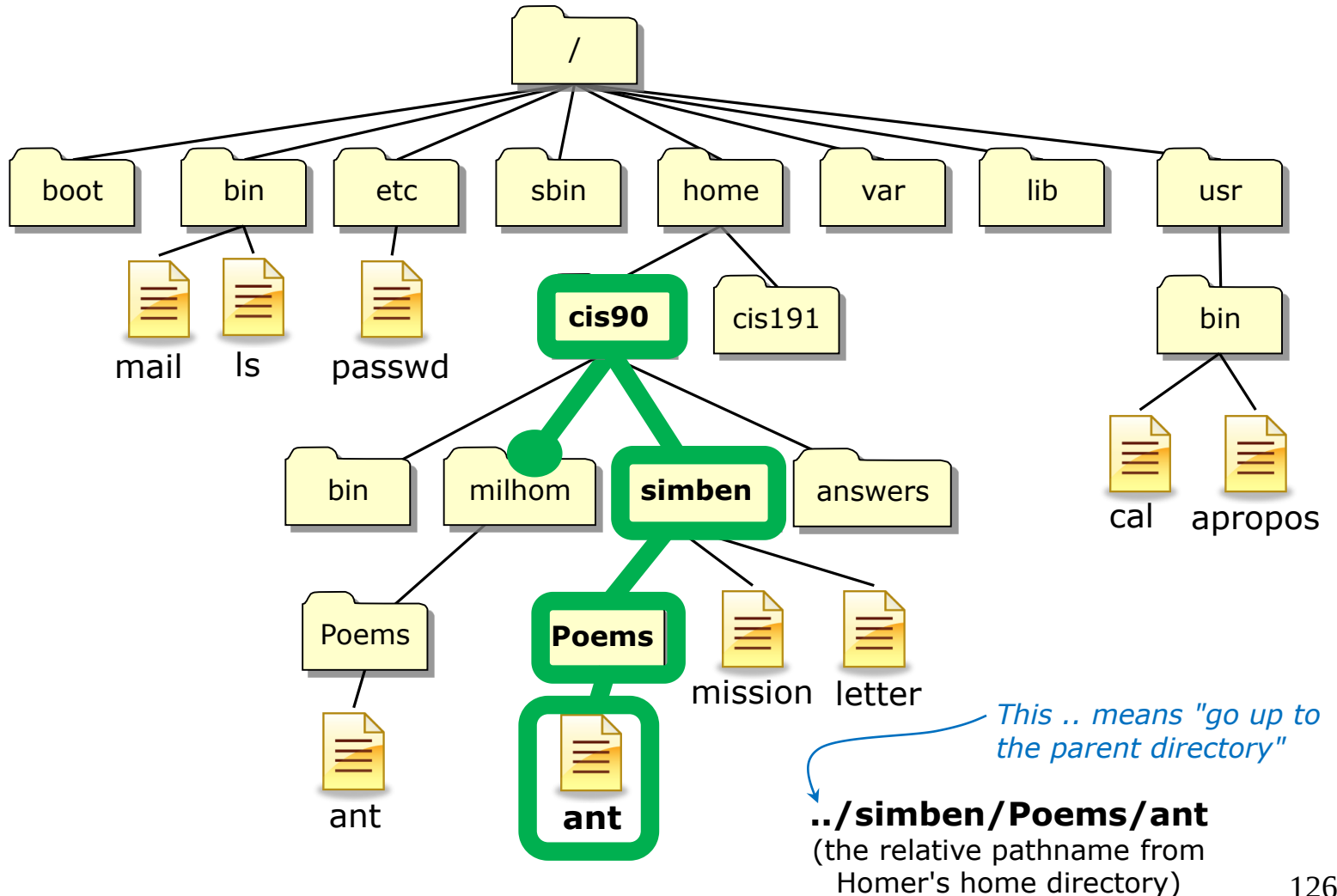
Relative Pathnames

A **relative** pathname specifies a path from our current location in the tree all the way to the specific file.



Relative Pathnames

A **relative** pathname specifies a path from our current location in the tree all the way to the specific file.



Class Activity - relative pathnames

Show the first three lines of your ant file using a relative pathname

```
/home/cis90/simben $ cd  
/home/cis90/simben $ head -n3 Poems/ant  
    Death of an Ant
```

Go to your home directory if you are not already there

With a magnifying glass

Show the first three lines of Homer's ant file using a relative pathname

```
/home/cis90/simben $ head -n3 ../milhom/Poems/ant  
    Death of an Ant
```

.. means to go up one level in the tree to the parent directory of the current working directory

With a magnifying glass

Show the first three lines of your Shakespeare sonnet5 file

```
/home/cis90/simben $ head -n3 Poems/Shakespeare/sonnet5  
Those hours that with gentle work did frame  
The lovely gaze where every eye doth dwell  
Will play the tyrants to the very same,
```

Relative Pathnames

Using relative pathnames as command arguments



#Geneva

Examples of using relative pathnames as command arguments:

ls -l ant

file ../../../../bin/mail

cd Poems/Blake

head ../bin/check3

file Poems/Shakespeare/sonnet4

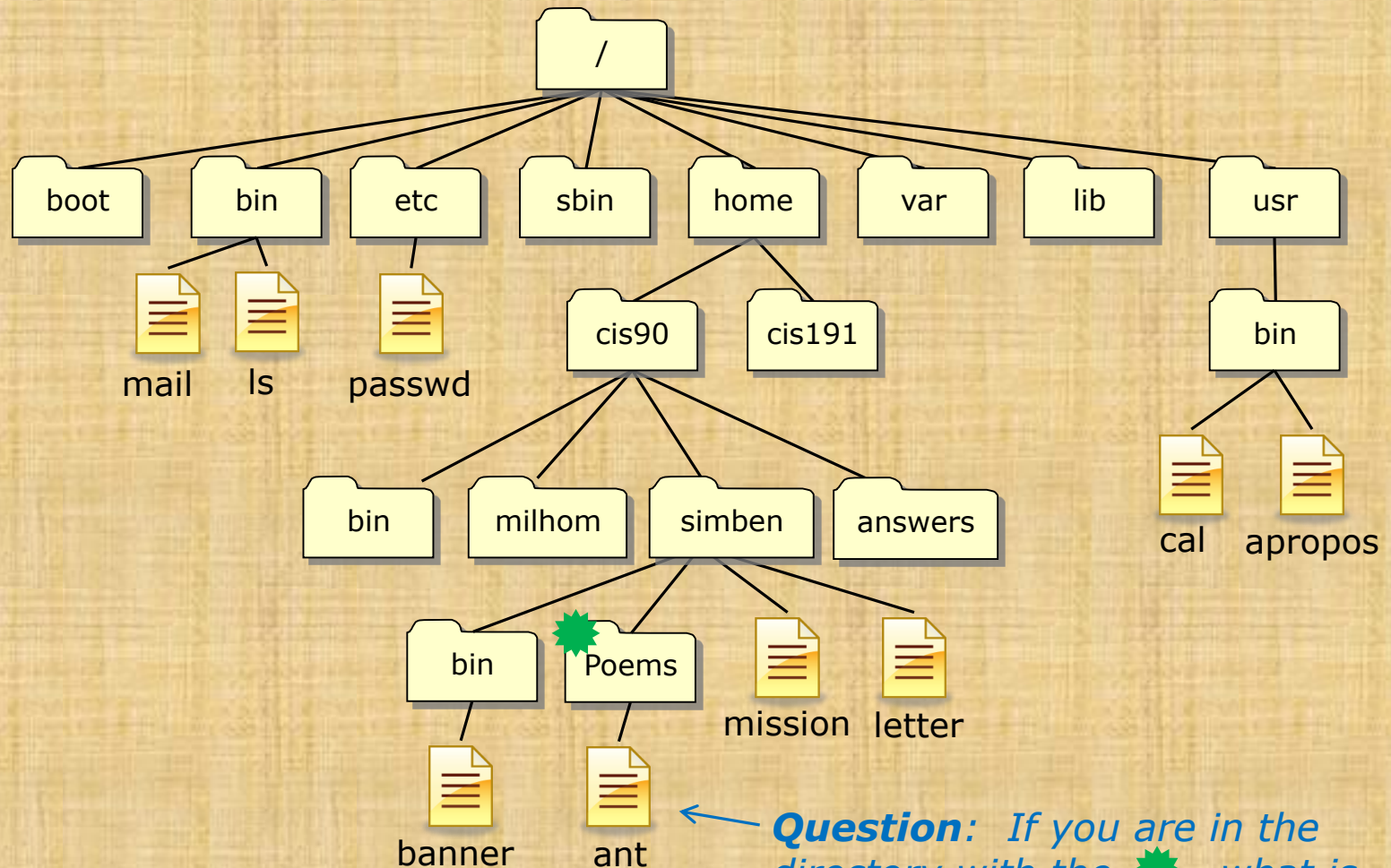
cd Poems/Shakespeare

The .. is used to represent the parent directory

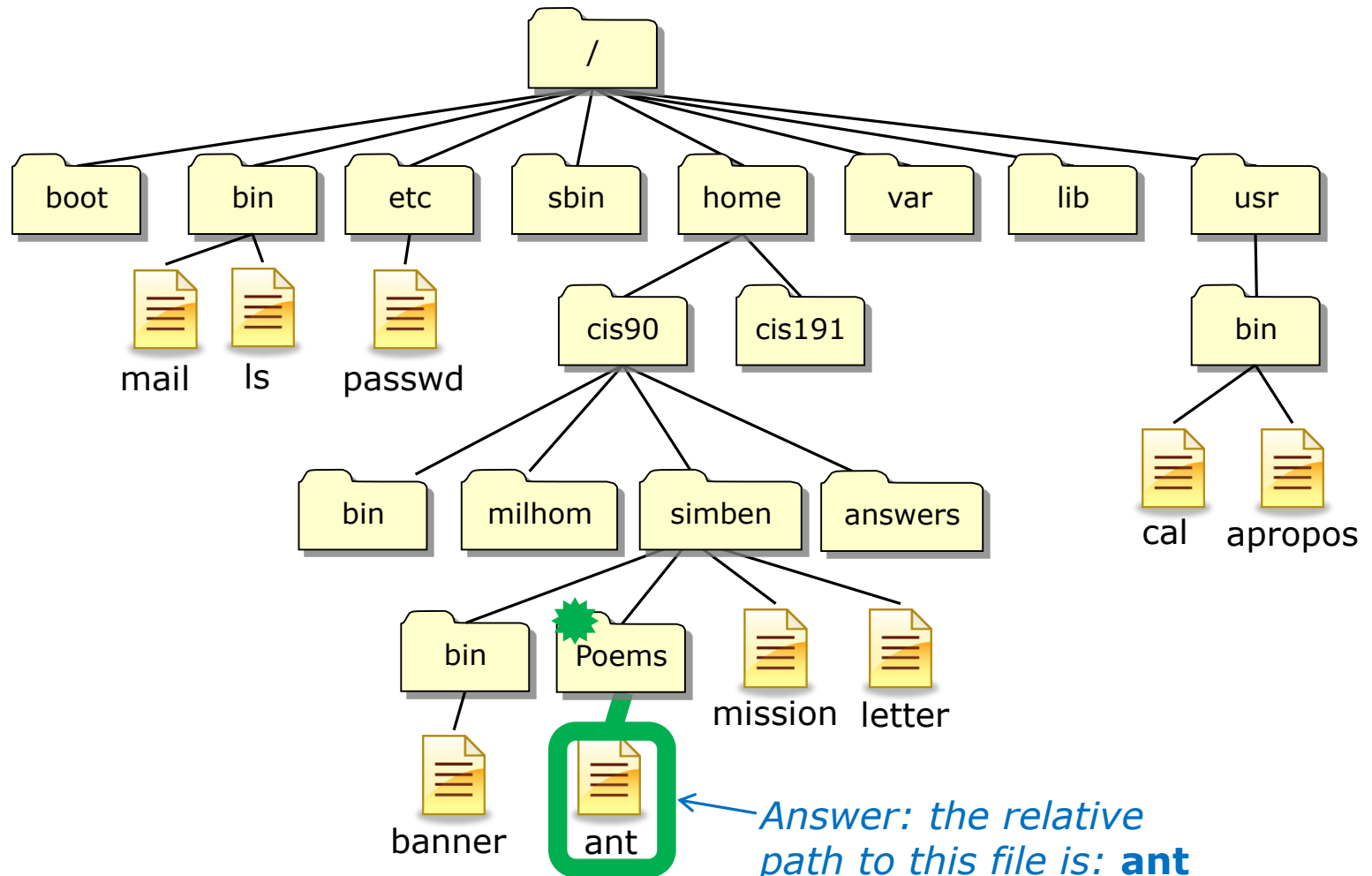
***** Important *****

Notice that these pathnames do NOT start with the /

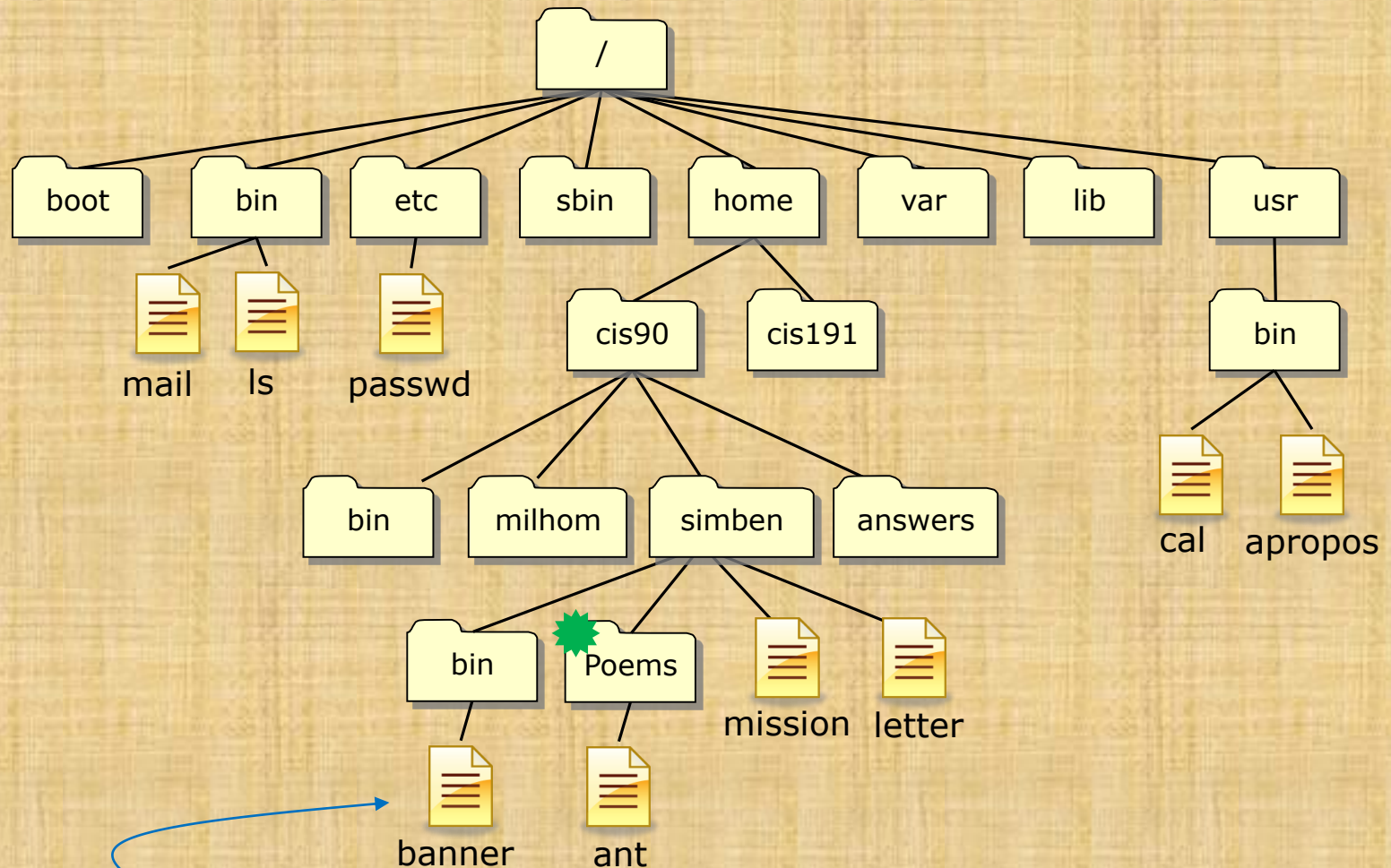
Activity - identify a relative pathname



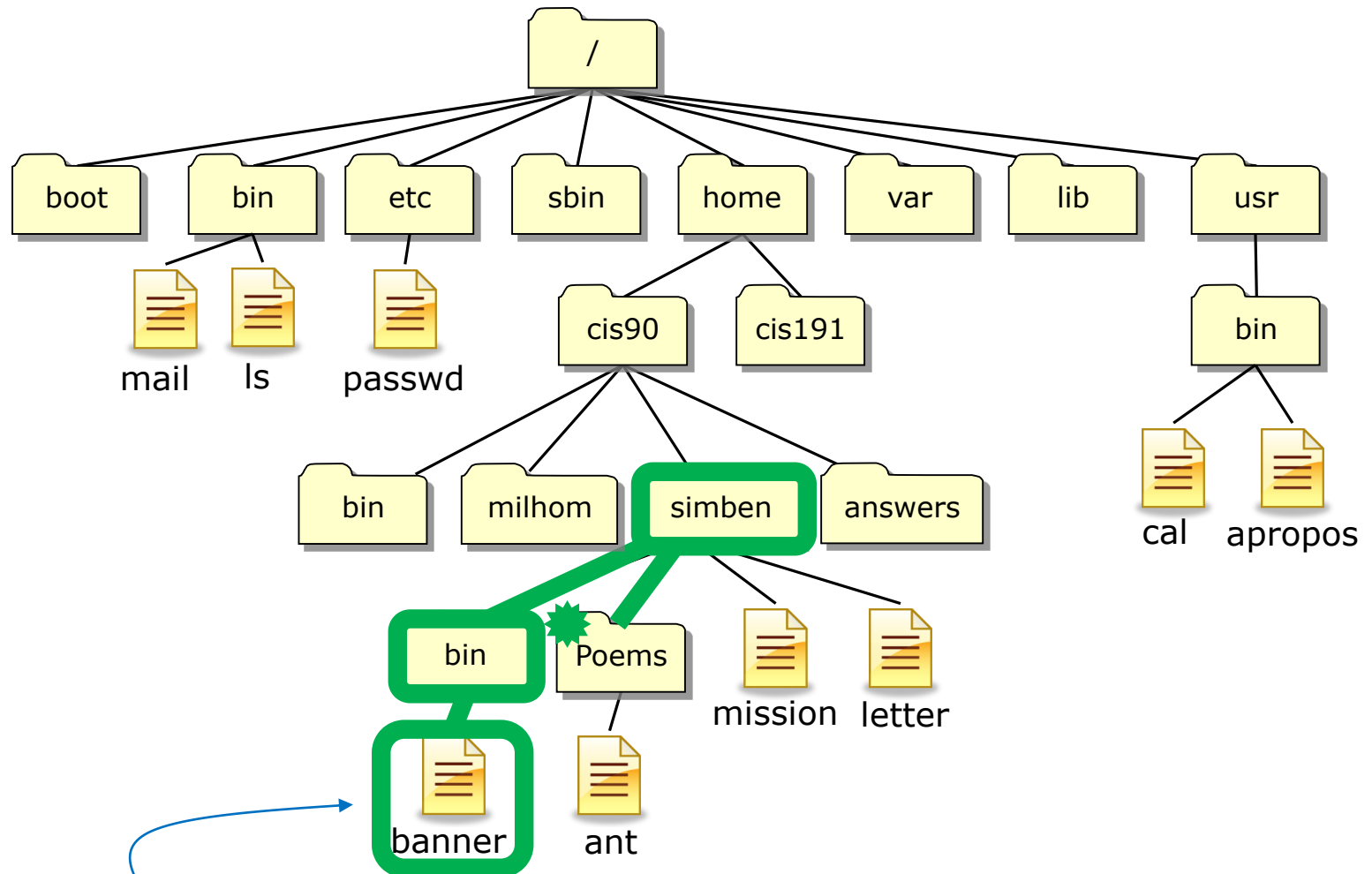
Question: If you are in the directory with the , what is the relative path to this file?



Activity - identify a relative pathname



Question: If you are in the directory with the , what is the relative path to this file?



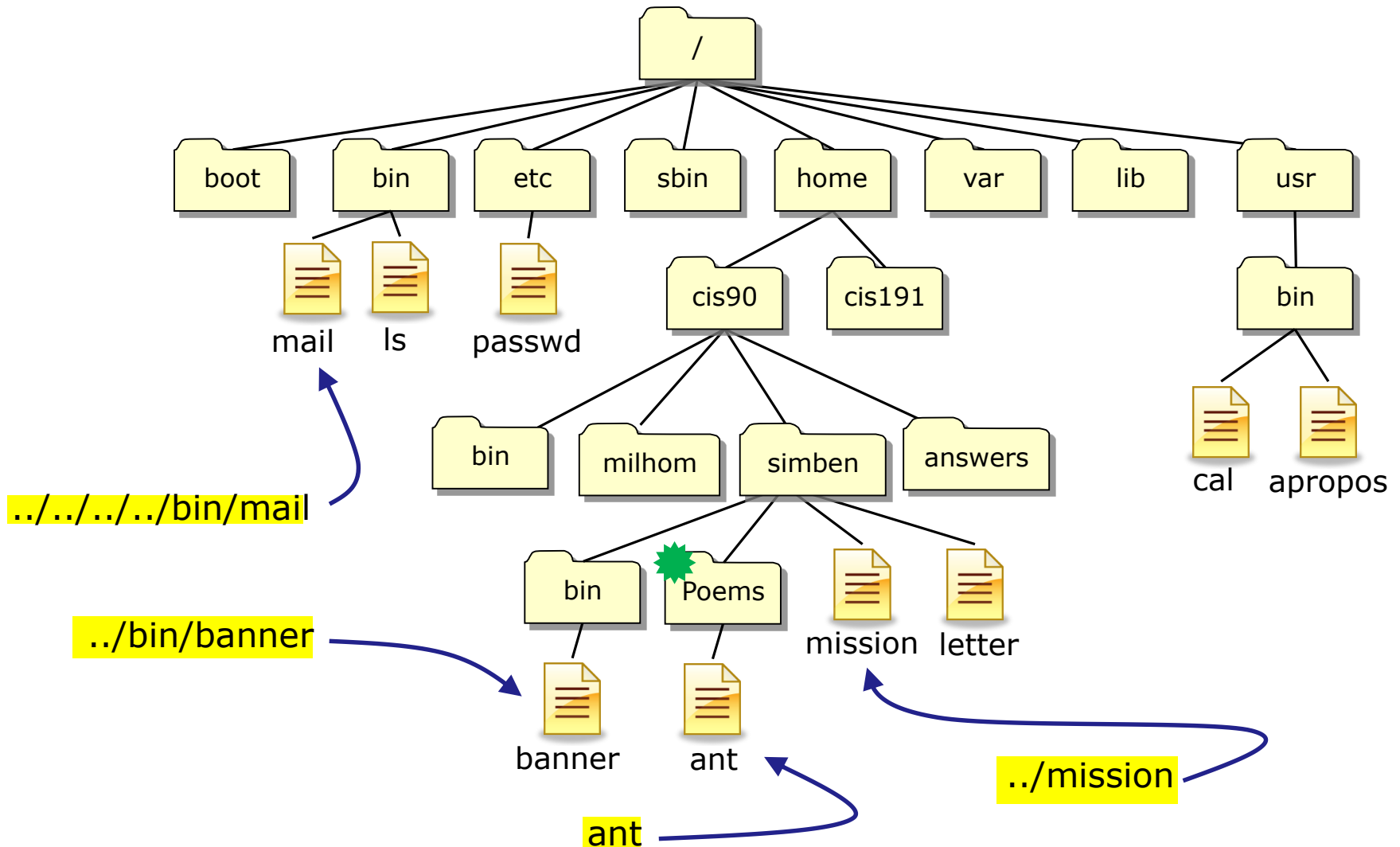
Answer: The relative path to this file is: ../bin/banner

../bin/banner

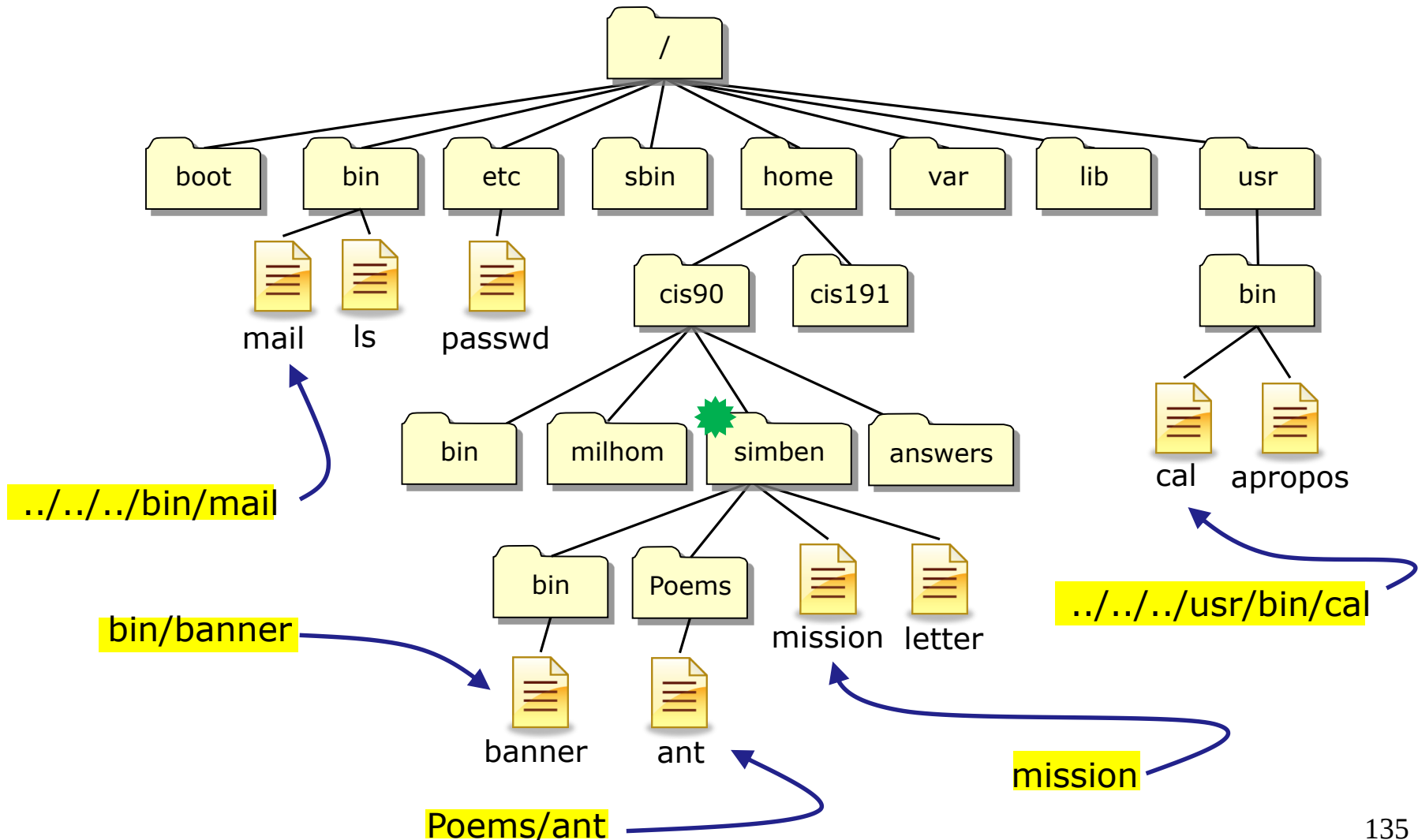
Translation of this relative pathname in English:

Starting in your current directory, go up one level to the parent directory, then descend into the *bin* directory, there you will find the *banner* file.

Some example relative pathnames (from the directory marked with a ★)



Some example relative pathnames (from the directory marked with a ★)



Class Exercise

From your home directory:

- List the */etc/passwd* file using a relative pathname

```
/home/cis90/simben $ ls -l ../../../../etc/passwd  
-rw-r--r--. 1 root root 10162 Feb 18 09:26 ../../../../etc/passwd
```

- List the */etc/passwd* file using a absolute pathname

```
/home/cis90/simben $ ls -l /etc/passwd  
-rw-r--r--. 1 root root 10162 Feb 18 09:26 /etc/passwd
```

Sometimes it's easier to specify a filename using an absolute pathname

Heads up on a future test question

Question:

What is the absolute pathname of `/etc/passwd`?

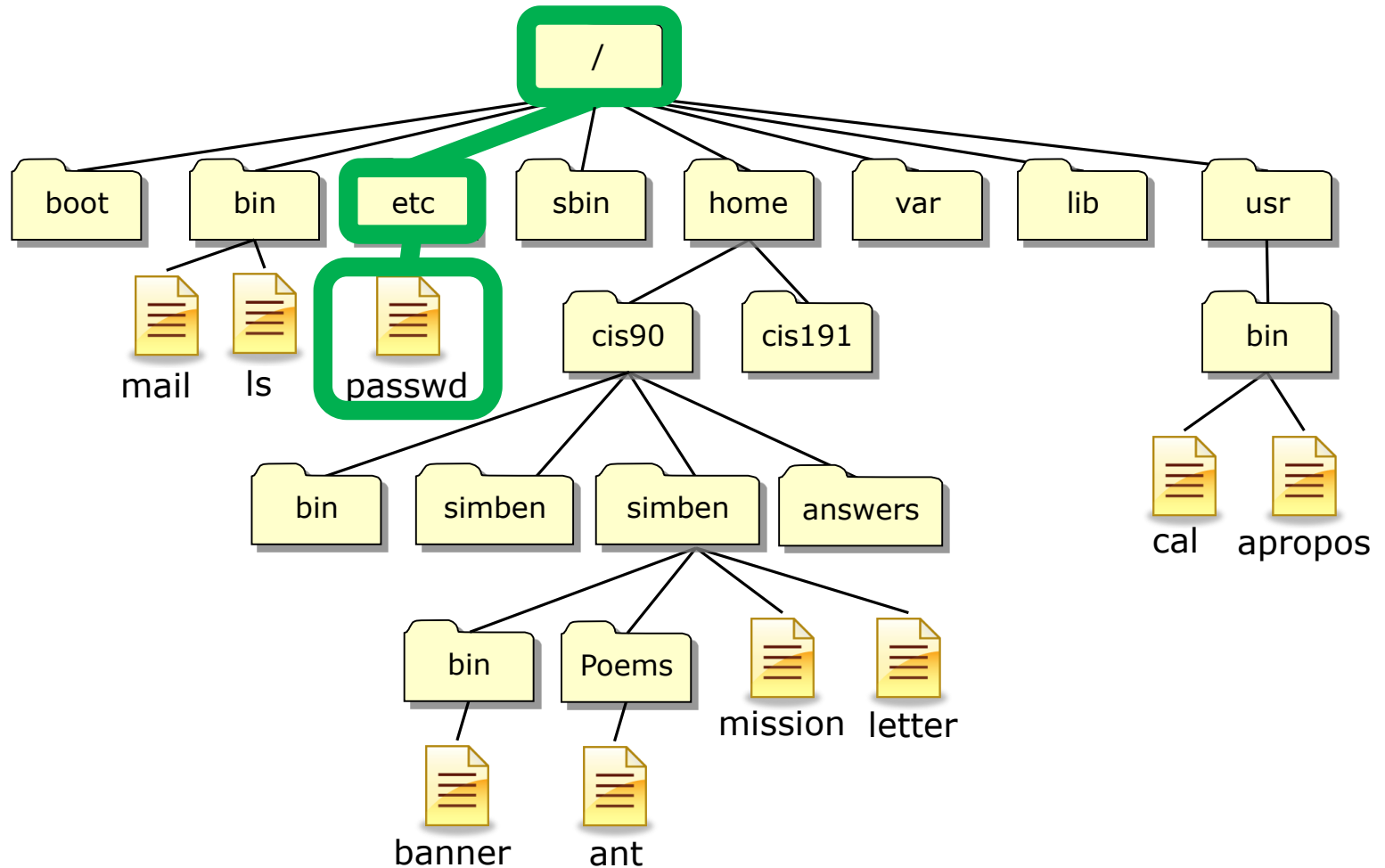
Answer:

`/etc/passwd`

What is the color of Washington's white horse?

Question: What is the absolute pathname of /etc/passwd?

Answer: /etc/passwd



/

■

■ ■

~

/ ... ~

/ by itself is the root or "slash" directory, the top of the tree, not to be confused with the root user's home directory (/root)

/ at the beginning of a pathname indicates an absolute path

/ at the end of a filename indicates it is a directory

.. is always your current **parent** directory

. is always your current directory ("here")

~ is always your home directory

Note:

. and .. are hidden files since they start with a "."

Hidden files don't show up in ls listings unless the -a option is used

Example Sequence using / . .. and ~

1. Change to your Poems/Blake directory using a relative pathname

```
/home/cis90/simben $ cd Poems/Blake/
/home/cis90/simben/Poems/Blake $
```

2. List the directories in the / directory using an absolute pathname

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

3. List the directories in your current parent directory using ..

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

4. List the directories in your current directory using .

```
/home/cis90/simben/Poems/Blake $ ls .
jerusalem  tiger
```

5. List the files in your home directory using ~

```
/home/cis90/simben/Poems/Blake $ ls ~
1976          empty          Lab2.0  Miscellaneous  proposal3  text.fxd
android       Hidden         Lab2.1  mission        scott      timecal
bigfile       lab01.graded   letter  Poems          small_town  uhistory
bin           lab01-submitted  log     proposal1     spellk      what_am_i
dead.letter   lab02.graded    mbox    proposal2     text.err
```

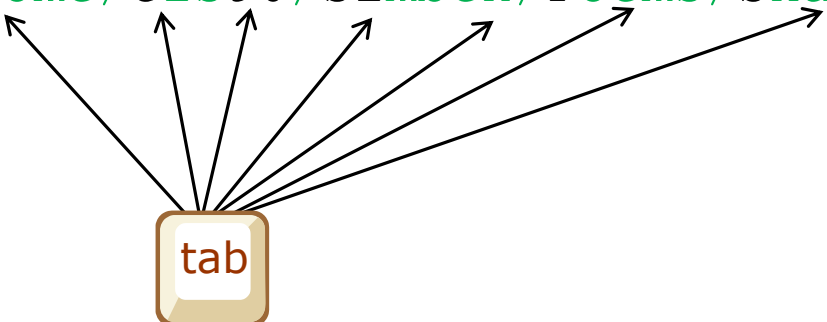
Shell tips (review)

bash shell tip

tab completes

- It can be tedious typing in long pathnames.
- Since bash knows the names of the files you only have to type just enough characters to uniquely specify a name and then the tab key can be pressed to complete them.
- Example: the black characters were typed by the user, the green ones were typed by bash:

```
ls /home/cis90/simben/Poems/Shakespeare/
```



bash shell tip

command history and editing

- It can be tedious re-typing a long command to fix a typo.
- Since bash knows the commands you have previously entered, just use the up and down arrows to re-type a previous command.
- When the command you want appears, use the home, right or left arrow keys to go where you want to make the correction. New text can be inserted and old text deleted or backspaced over.
- Example: The ls command was mis-typed as la:

```
/home/cis90/simmsben $ la /home/cis90/simmsben/Poems/Shakespeare/  
-bash: la: command not found
```

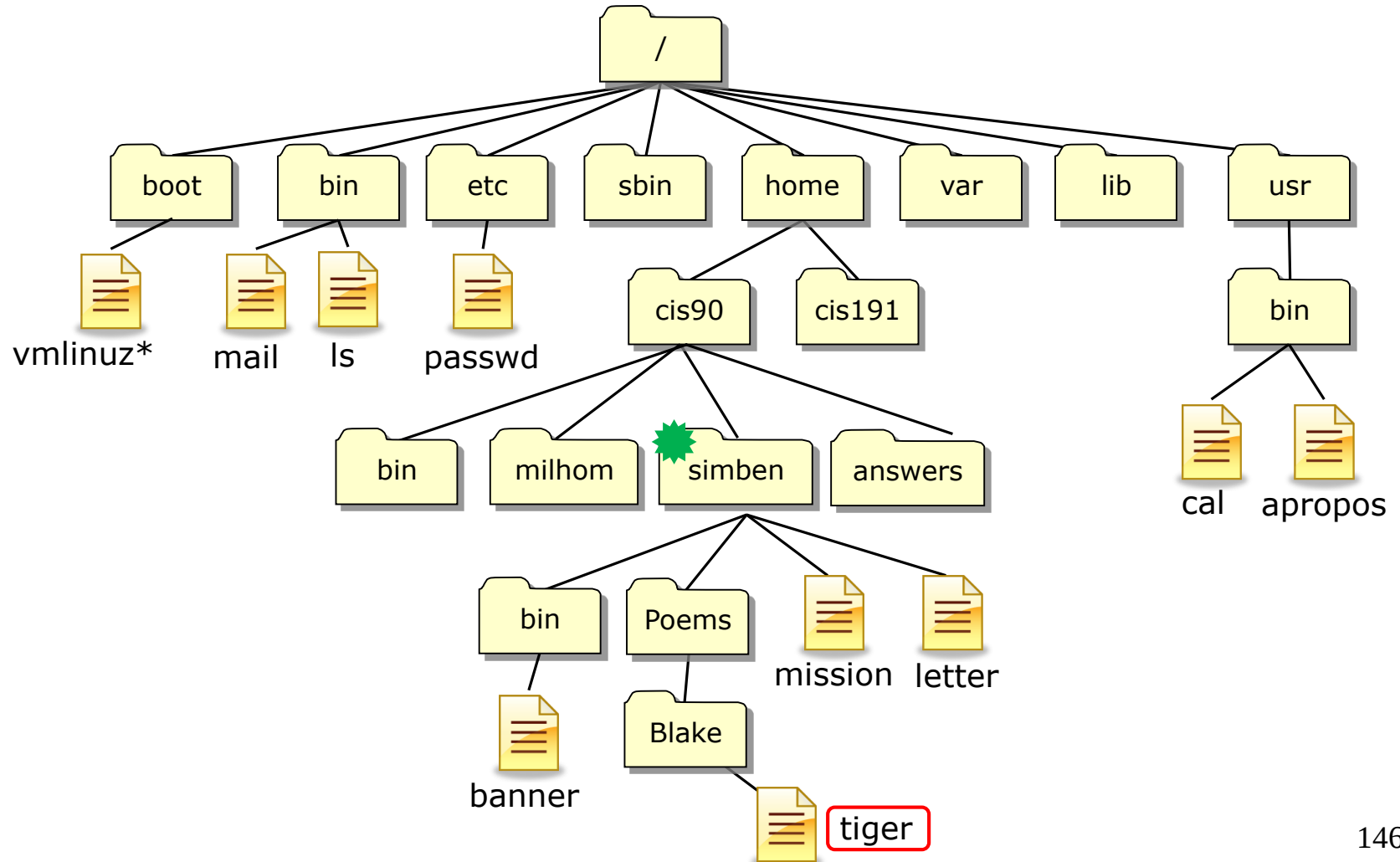
  then fix typo

```
/home/cis90/simmsben $ ls /home/cis90/simmsben/Poems/Shakespeare/  
sonnet1    sonnet11   sonnet17   sonnet26   sonnet35   sonnet5    sonnet9  
sonnet10   sonnet15   sonnet2    sonnet3    sonnet4    sonnet7  
/home/cis90/simmsben $
```

Using pathnames as arguments

Task: cat the tiger file from your home directory

How can we do this?



Task: cat the tiger file from your home directory

Option 1: “Navigate” to the directory then cat the file

```
/home/cis90/simben $ cd      start in our home directory
```

```
/home/cis90/simben $ ls      see what's there
```

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

```
/home/cis90/simben $ cd Poems/ descend into the Poems directory
```

```
/home/cis90/simben/Poems $ ls see what's there
```

```
ant  Blake  nursery  Shakespeare  twister  Yeats
```

```
/home/cis90/simben/Poems $ cd Blake/ descend into the Blake directory
```

```
/home/cis90/simben/Poems/Blake $ ls see what's there
```

```
jerusalem  tiger
```

```
/home/cis90/simben/Poems/Blake $ cat tiger
```

```
Tiger, Tiger burning bright
In the forest of the night,
What immortal hand or eye
Dare frame thy fearful symmetry?
```

Task: cat the tiger file from your home directory

Option 2: Use a relative pathname

```
/home/cis90/simben $ cat Poems/Blake/tiger  
Tiger, Tiger burning bright  
In the forest of the night,  
What immortal hand or eye  
Dare frame thy fearful symmetry?  
/home/cis90/simben $
```

Task: cat the tiger file from your home directory
Option 3: Use an absolute pathname

```
/home/cis90/simben $ cat /home/cis90/simben/Poems/Blake/tiger  
Tiger, Tiger burning bright  
In the forest of the night,  
What immortal hand or eye  
Dare frame thy fearful symmetry?  
/home/cis90/simben $
```

Task: cat the tiger file from your home directory

Option 4: communicating with the shell using ESP

```
/home/cis90/simben $ cat tiger  
cat: tiger: No such file or directory  
/home/cis90/simben $
```

ESP is not an option!

There is no tiger file in the /home/cis90/simben directory.

There are over 40 tiger files on Opus.

If you don't give the shell a correct pathname that unambiguously specifies the location of a file in the file tree you should expect this error.

Don't expect the shell to read your mind as to which file in the file tree you are thinking about!

Task: cat the tiger file from your home directory

Navigating to the directory then catting the file

```
/home/cis90/simben $ cd Poems/; cd Blake; cat tiger; cd  
Tiger, Tiger burning bright  
In the forest of the night,  
What immortal hand or eye  
Dare frame thy fearful symmetry?
```

Using a relative pathname

```
/home/cis90/simben $ cat Poems/Blake/tiger  
Tiger, Tiger burning bright  
In the forest of the night,  
What immortal hand or eye  
Dare frame thy fearful symmetry?
```

*This is the option I would
choose (fewest keystrokes)*

Using an absolute pathname

```
/home/cis90/simben $ cat /home/cis90/simben/Poems/Blake/tiger  
Tiger, Tiger burning bright  
In the forest of the night,  
What immortal hand or eye  
Dare frame thy fearful symmetry?
```

Using ESP method

```
/home/cis90/simben $ cat tiger  
cat: tiger: No such file or directory
```

cd command (your legs)

cd command

change directory

- Syntax: **cd** [*directory*]
- Changes the current working directory to the directory specified.
- Use **cd** with no arguments to return to your home directory.

*Note, users always start in their home directory after logging in.
Every user's home directory is configured in the /etc/passwd file.*

- The *directory* can be:
 - An absolute pathname, e.g. **cd /home/cis90/simben/Poems/Yeats**
 - A relative pathname, e.g. **cd Poems/Yeats**
 - A **..** for the parent of the current working directory, e.g. **cd ..**
- Note, **cd** is a Bash builtin command (part of the shell itself)

```
/home/cis90/simben $ type cd  
cd is a shell builtin
```

The .. directory

To move up the tree use: **cd ..**

.. is a hidden file located in every single directory and it is hard linked to the absolute pathname of the parent directory

cd command

change directory example

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

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

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

```
$PWD $
```

```
1 /home/cis90/simben $ cd Poems/
```

```
2 /home/cis90/simben/Poems $ cd Shakespeare/
```

```
3 /home/cis90/simben/Poems/Shakespeare $ cd ..
```

```
4 /home/cis90/simben/Poems $ cd Blake/
```

```
5 /home/cis90/simben/Poems/Blake $ cd ..
```

```
6 /home/cis90/simben/Poems $ cd ..
```

```
7 /home/cis90/simben $ cd /home
```

```
8 /home $ cd ..
```

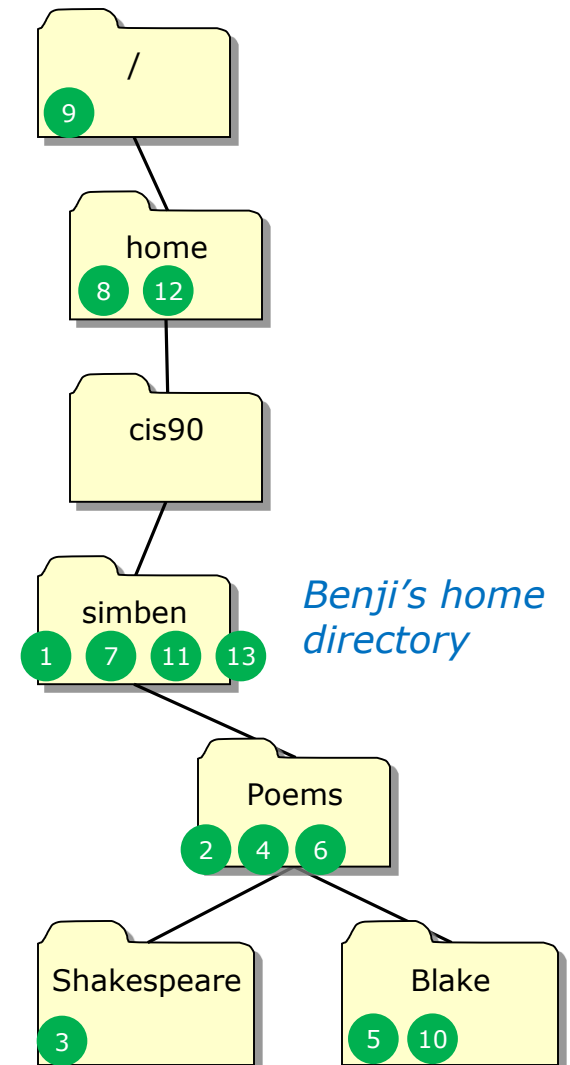
```
9 / $ cd /home/cis90/simben/Poems/Blake/
```

```
10 /home/cis90/simben/Poems/Blake $ cd
```

```
11 /home/cis90/simben $ cd ../../
```

```
12 /home $ cd
```

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



pwd command (your GPS)

pwd command

print working directory

- The **pwd** command is your “GPS” to show your current location on the UNIX file tree. Especially with more typical prompts!
- The **pwd** command is equivalent to displaying the value of the PWD environment variable

```
[rsimms@opus net]$ pwd
/lib/modules/2.6.18-164.el5/kernel/drivers/net
```

This is a UNIX command

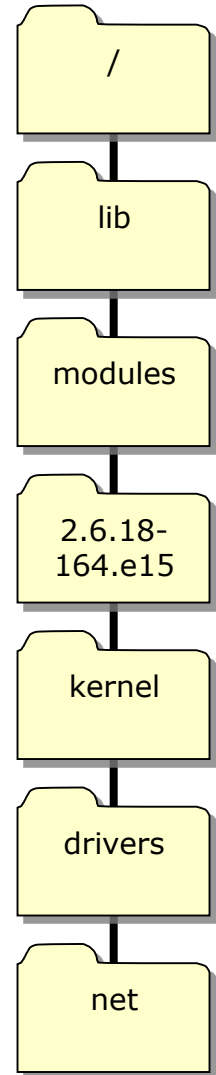
```
[rsimms@opus net]$ echo $PWD
/lib/modules/2.6.18-164.el5/kernel/drivers/net
```

This is a UNIX command

This is shell environment variable (used as an argument to the echo command)

Note: The default shell prompt CIS 90 students utilizes the PWD variable to always show the current working directory.

i.e. When CIS 90 students login this command: PS1='\$PWD \$ ' is automatically done as part of setting up their shell environment.



pwd command

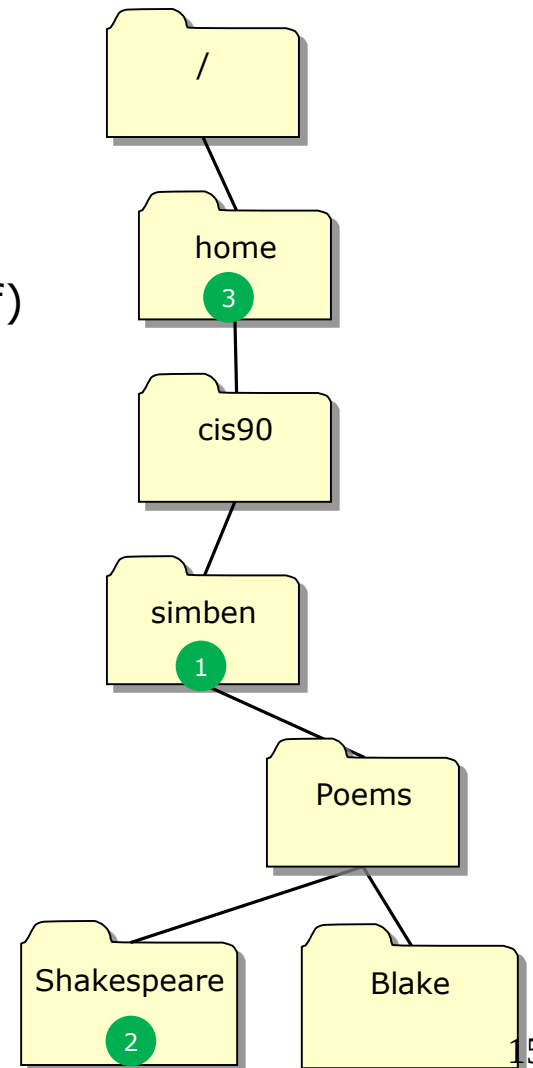
print working directory

Note: The shell prompt has been configured for CIS 90 students to always show the current working directory. This example shows the pwd command with a more typical prompt.

- Syntax: **pwd**
- Prints the current working directory.
- pwd is a BASH builtin command (part of the shell itself)
/home/cis90/simben \$ **type pwd**
pwd is a shell builtin

```

/home/cis90/simben $ PS1='[\u@\h \W]\$ '
1 [simben90@opus ~]$ pwd
/home/cis90/simben
[simben90@opus ~]$ cd Poems/Shakespeare/
2 [simben90@opus Shakespeare]$ pwd
/home/cis90/simben/Poems/Shakespeare
[simben90@opus Shakespeare]$ cd /home/
3 [simben90@opus home]$ pwd
/home
/home/cis90/simben $ PS1='$PWD $ '
/home/cis90/simben $
  
```



ls command (your eyes)

ls command

Using files vs directories as arguments

With 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
```

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

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

```
bigfile
```

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

```
ant  Blake  nursery  Shakespeare  twister  Yeats
```

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

ls command

specifying multiple directories

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

When a file is specified, just the filename is listed

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

regular file

directories

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

```
bin/:  
app banner enlightenment hi I treed tryme zoom  
  
Poems/:  
ant Blake nursery Shakespeare twister Yeats
```

Is command



- Syntax: **ls** [**options**] [**directory**]...

Option	Description
-a	Show all files, even the hidden ones with names starting with ".".
-i	Show inode numbers
-d	Show the directory itself rather than the contents of the directory
-l	Long listing (lots of inode information)
-F	Show file types (directory/, program*, link@, socket=)
-S	Sort by size
-t	Sort by date
-R	Recursive (show all sub-directories)

- The *directory* argument can be:
 An absolute pathname, e.g. **cd /home/cis90/milhom/Poems/**
 A relative pathname, e.g. **cd Poems**
 If no directory is specified, the current working directory is used.
 More than one directory can be specified
- Use **man ls** to see more information.

ls command

List Files

FYI ...

- **ls** is in /bin and has been aliased to use color on terminal output

```
[simmsben@opus ~]$ type -a ls  
ls is aliased to `ls --color=tty`  
ls is /bin/ls
```

*Using the type command to
show where a command
resides on the path*

Note: the `--color=tty` is an option on the **ls** command. Options that are fully spelled usually use two dashes -- instead of 1

We will learn about aliases later in the course

ls command example *with no options*

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

Regular files in black

Directories in blue

Executables (programs or scripts) in green

*Using the **ls** command with no arguments will list the files in the current directory*

Is command example *with the -F option*

```
/home/cis90/simmsben $ ls -F
```

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

Regular files have no suffix

Directories end with /

*Executables
(programs or scripts)
end with **

*Use the **-F** option to show file types with symbols rather than color (helpful if you are color blind)*

ls command example *with the -a option*



#Grenoble

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

cd with no arguments takes you to your home directory

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

.	.bashrc	Hidden	Miscellaneous	proposal1	text.err
..	bigfile	Lab2.0	mission	proposal2	text.fxd
.bash_history	bin	Lab2.1	.mozilla	proposal3	timecal
.bash_logout	.emacs	.lesshst	.plan	small_town	what_am_i
.bash_profile	empty	letter	Poems	spellk	.zshrc

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

Use the -a option to show hidden files (files whose names start with a ".")

.. a hidden file, is the parent directory

. a hidden file, is this the current directory, think of . as meaning "here"

ls command example *with the -S option*



#Carson

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

```
total 132
```

```
-rw-rw-r--. 1 simben90 cis90 21762 Sep 18 15:30 uhistory
-rw-r--r--. 2 simben90 cis90 10576 Jul 20 2001 bigfile
drwxr-xr-x. 2 simben90 cis90 4096 Sep 11 2005 bin
d-----.. 2 simben90 cis90 4096 Feb 1 2002 Hidden
drwxr-xr-x. 2 simben90 cis90 4096 Feb 17 2001 Lab2.0
drwxr-xr-x. 3 simben90 cis90 4096 Feb 17 2001 Lab2.1
drwxr-xr-x. 2 simben90 cis90 4096 Sep 11 2005 Miscellaneous
drwxr-xr-x. 5 simben90 cis90 4096 Sep 18 08:49 Poems
-rw-rw-r--. 1 simben90 cis90 4008 Sep 11 22:23 archives
-rw-rw-r--. 1 simben90 cis90 3766 Sep 12 18:53 mbox
-r-----. 1 simben90 staff 2780 Sep 6 13:47 lab01.graded
-rw-r--r--. 1 simben90 cis90 2175 Jul 20 2001 proposal2
-rw-r--r--. 1 simben90 cis90 2054 Sep 14 2003 proposal3
-rw-----. 1 simben90 cis90 1892 Sep 18 15:29 dead.letter
-rw-r--r--. 1 simben90 cis90 1580 Nov 16 2004 small_town
-r-----. 1 simben90 staff 1312 Sep 13 12:27 lab02.graded
-rw-rw-r--. 1 simben90 cis90 1194 Sep 12 15:19 mymessages
-rw-r--r--. 1 simben90 cis90 1074 Aug 26 2003 proposal1
-rw-r--r--. 1 simben90 cis90 1044 Jul 20 2001 letter
-rw-r--r--. 1 simben90 cis90 759 Jun 6 2002 mission
-rwxr-xr-x. 1 simben90 cis90 509 Jun 6 2002 timecal
-rw-r--r--. 1 simben90 cis90 485 Aug 26 2003 spellk
-rw-r--r--. 1 simben90 cis90 352 Jul 20 2001 what_am_i
-rw-r--r--. 1 simben90 cis90 250 Jul 20 2001 text.err
-rw-r--r--. 1 simben90 cis90 231 Jul 20 2001 text.fxd
-rw-r--r--. 1 simben90 cis90 52 Sep 3 10:03 log
-rw-r--r--. 1 simben90 cis90 0 Jul 20 2001 empty
```

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

*Note directories all
have the same
size (4096 bytes)*

*Use the -S option to
sort files by size*

ls command example *with the -i option*



/home/cis90/simmsben \$ **cd** *cd with no arguments take you to your home directory*

/home/cis90/simmsben \$ **ls -i**

9171 archives	9351 lab02.graded	12107 mission	12137 spellk
12613 bigfile	12080 Lab2.0	9233 mymessages	12138 text.err
12067 bin	12091 Lab2.1	12109 Poems	12139 text.fxd
9087 dead.letter	9662 letter	12133 proposal1	12140 timecal
12076 empty	14208 log	12134 proposal2	9249 uhistory
12077 Hidden	9142 mbox	12135 proposal3	12141 what_am_i
15725 lab01.graded	12102 Miscellaneous	12136 small_town	

Use the -i option to show the inode associated with a filename

***This command shows exactly what is kept in a directory:
filename & inode pairs (kind of like a phone book)***

ls command with the -lR options

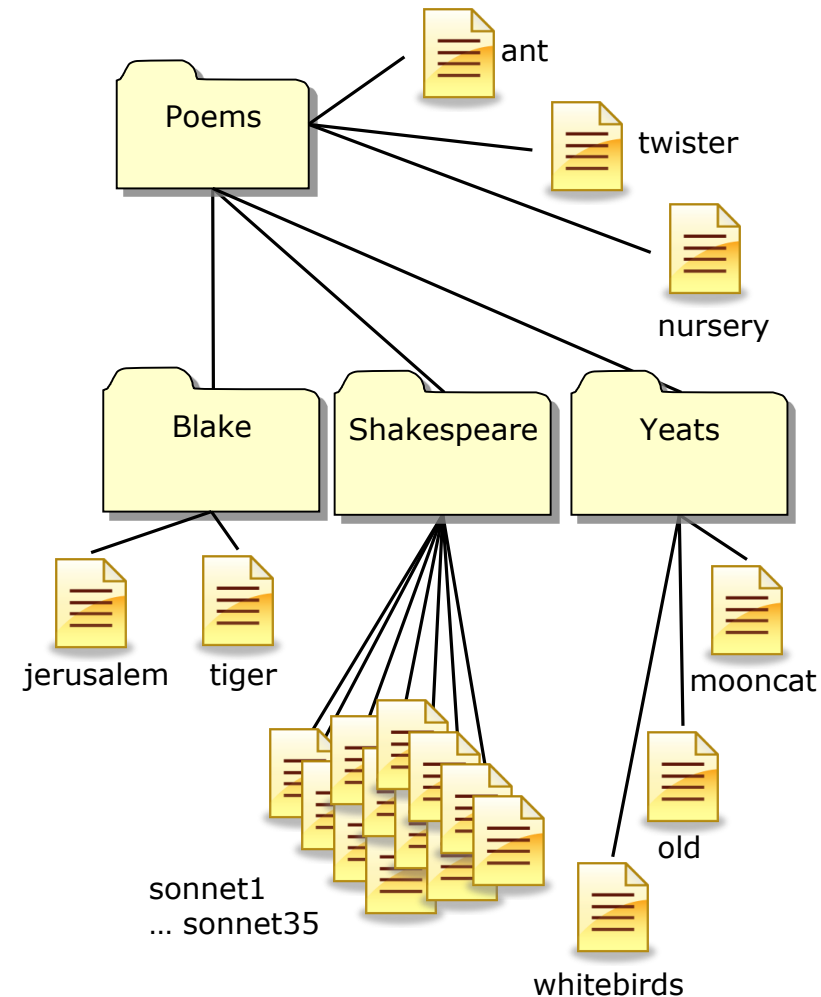
long listing and recursive

```
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]$
```



ls command *with the -d option*



#Tahiti

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

The contents of the directory are shown

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

The directory itself is shown with the -d option

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

ls command *with the -d option*



```
simben90@opus:~  
/home/cis90/simben $ ls -l bin  
total 68  
-rwxr-xr-x 1 simben90 cis90 220 Apr 22 2004 app  
-rwxr-xr-x 1 simben90 cis90 6160 Aug 28 2003 banner  
-rwxr-xr-x 1 simben90 cis90 3442 Feb 4 16:36 enlightenment  
-rwxr-xr-x 1 simben90 cis90 107 Jul 20 2001 hi  
-rwxr-x--x 1 simben90 cis90 375 Oct 20 2003 I  
-rwxr-xr-x 1 simben90 cis90 190 Jul 20 2001 treed  
-rwxr-xr-x 1 simben90 cis90 174 Mar 4 2004 tryme  
-rwxr-xr-x 1 simben90 cis90 74 Jul 20 2001 zoom  
/home/cis90/simben $  
/home/cis90/simben $ ls -ld bin  
drwxr-xr-x 2 simben90 cis90 4096 Feb 12 16:07 bin  
/home/cis90/simben $
```

*The directory
contents are
shown*

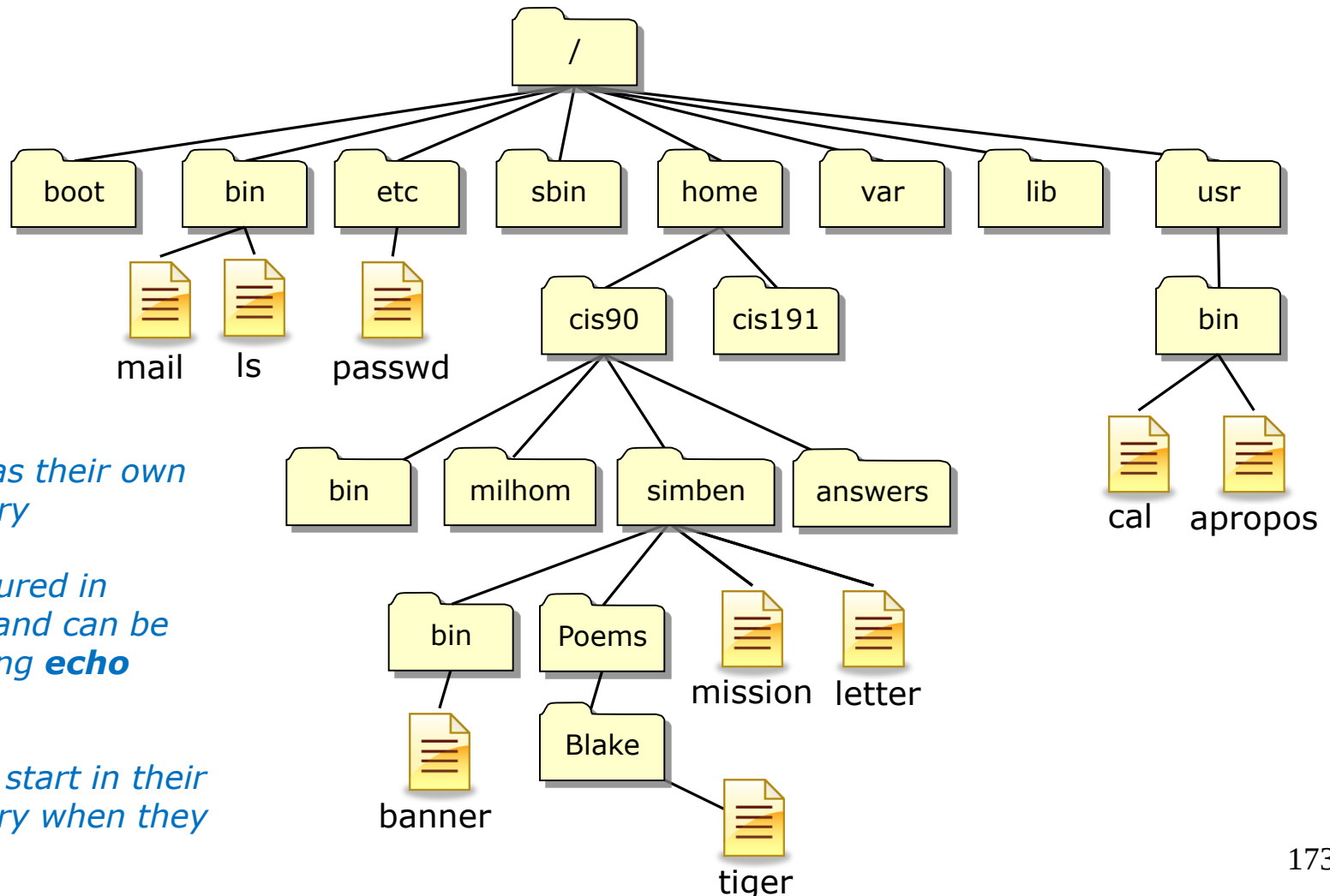
*The directory
itself is
shown with
the -d option*



Home directories

UNIX File Tree

/ = root of the tree



Every user has their own home directory

This is configured in `/etc/passwd` and can be displayed using **echo \$HOME**

Users always start in their home directory when they login

Class Activity

- 1) Find your entry (use your own logname) in /etc/passwd

```
/home/cis90/simben $ grep simben90 /etc/passwd  
simben90:x:1047:190:Benji Simms:/home/cis90/simben:/bin/bash
```

- 2) Show the contents of the HOME variable

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

- 3) List the contents of your home directory

```
/home/cis90/simben $ ls /home/cis90/simben  
archives      empty          Lab2.0  Miscellaneous  proposal2    text.err  uhistory.bak  
bigfile       Hidden         Lab2.1  mission        proposal3    text.fxd  what_am_i  
bin           lab01.graded  letter  Poems          small_town   timecal  
dead.letter   lab02.graded  log     proposal1      spellk       uhistory
```

Question:

What are some different ways to get the inode number of your home directory?



Question: What are some different ways to get the inode number of your home directory while you are in your home directory?

Answer: At least four ways:

① /home/cis90/simben \$ **ls -id /home/cis90/simben/**
9017 /home/cis90/simben/

Specify the absolute pathname of the home directory

② /home/cis90/simben \$ **ls -id .**
9017 .

Using the . if you are currently in your home directory

③ /home/cis90/simben \$ **ls -id ~**
9017 /home/cis90/simben

The ~ is always an absolute pathname to home directory

④ /home/cis90/simben \$ **ls -i /home/cis90** *Using contents of the parent directory*

13658	answers	12656	depot	9342	keljos	9605	mosmic	9559	specod
9062	beakie	9154	fahmic	9348	lefnic	9460	patcar	9635	thinic
12625	bin	9277	fitcon	9354	lehreb	9484	perste	9573	tilbuz
9074	calmic	9647	genmar	9374	lemrob	9653	ramenr	9579	vasjor
9087	casenr	11282	guest	9389	malmil	9535	ramjua	9629	vivrut
9100	casric	9283	gutemi	9641	matjon	9032	rodduk	9611	weljon
6782	cis	9297	hictre	9131	mccpat	9544	rudtro	9585	weltim
9137	daweli	9312	hormat	9023	milhom	9017	simben		

Note the use of the -d option on ls to focus on the directory itself rather than the directory contents

Filename expansion with *

The "*" metacharacter

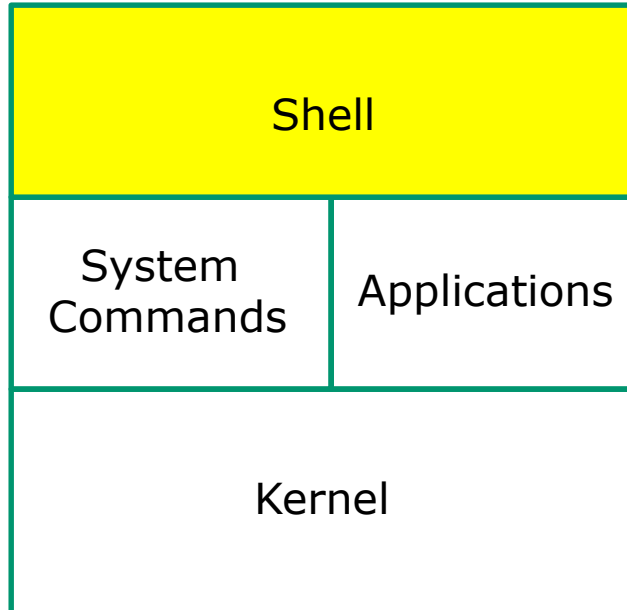


*The * is expanded by the shell and replaced with the names of all files and directories in the current directory*

```
/home/cis90/simben $ file *
archives:      ASCII mail text
bigfile:       ISO-8859 English text, with overstriking
bin:           directory
dead.letter:   ASCII text
empty:         empty
Hidden:        directory
lab01.graded:  ASCII English text
lab02.graded:  ASCII English text
Lab2.0:        directory
Lab2.1:        directory
letter:        ASCII English text
log:           ASCII text
Miscellaneous: directory
mission:       ASCII English text
Poems:         directory
proposal1:     ASCII English text
proposal2:     ASCII English text
proposal3:     ASCII English text
small_town:    ASCII English text
spellk:        ASCII English text
text.err:      ASCII text
text.fxd:      ASCII text
timecal:       Bourne-Again shell script text executable
uhistory:      ASCII mail text
uhistory.bak:  ASCII mail text
what_am_i:     data
```



Life of the Shell



1) Prompt

2) **Parse**

*Metacharacters, like the *, are processed and expanded during the Parse step*

3) Search

(before the selected command is even run)

4) Execute

5) Nap

6) Repeat

*

filename expansion metacharacter

- The * is a shell metacharacter
- During the **parse step** the shell expands * and replaces it with matching filenames in the current directory or as part of any pathnames specified as arguments.
- The commands loaded by the shell never see the *, instead then see the expanded filenames.
- The * will only match non-hidden filenames when used by itself.

*

filename expansion metacharacter

```
/home/cis90/simben/Poems/Yeats $ ls  
mooncat  old  whitebirds
```

```
/home/cis90/simben/Poems/Yeats $ file mooncat old whitebirds  
mooncat:      ASCII English text  
old:          ASCII English text  
whitebirds:   ASCII English text
```

*user manually
types in each
filename in
directory*

```
/home/cis90/simben/Poems/Yeats $ file *  
mooncat:      ASCII English text  
old:          ASCII English text  
whitebirds:   ASCII English text
```

*User let's the shell
do the work instead*

*In the second example, the shell, during the parse step, expands the * and replaces it with mooncat old whitebirds.*

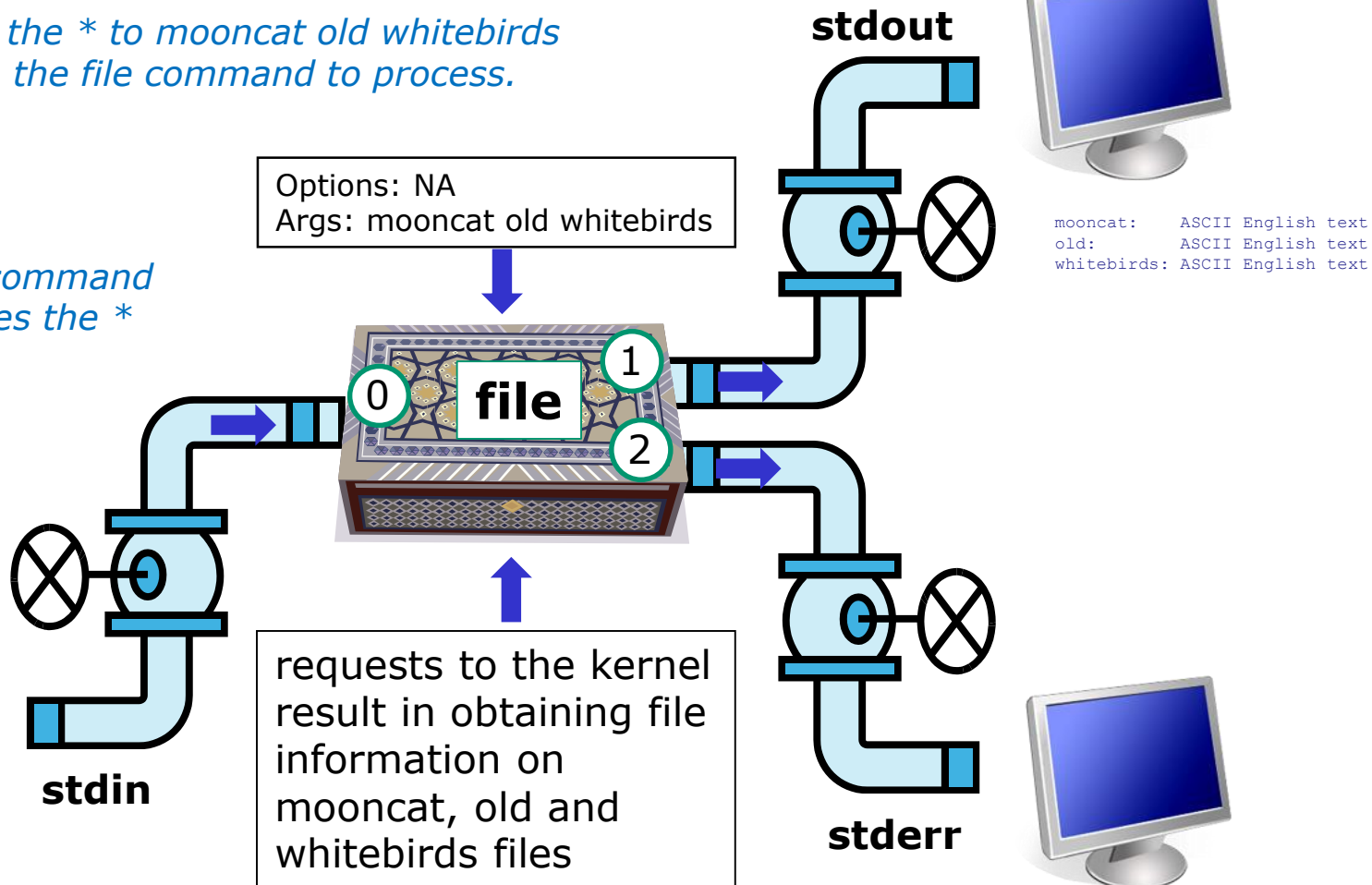
*The **file** command never sees the "*"*

Example program to process: file command

```
/home/cis90/simben/Poems/Yeats $ file *
```

*The shell expands the * to mooncat old whitebirds which is passed to the file command to process.*

*The file command never sees the **



* metacharacter used as a *prefix* character

```
/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
```

```
/home/cis90/simben $ ls *.err
text.err
```

****.err*** matches all file names ***ending*** with ***".err"***

*Shell operation question: Does the **ls** command see the "*" typed by the user?*

* metacharacter used as an *infix* character

```
/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
```

```
/home/cis90/simben $ ls *am*
what_am_i
```

am matches all file names **containing** "am"

Answer to the question on previous slide: **NO!** The shell replaced the "*.err" with the string "text.err" and that's what the **ls** command received as an argument.

* metacharacter

used as a *postfix* character

```
/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
```

```
/home/cis90/simben $ ls p*  
proposal1  proposal2  proposal3
```

p matches all file names **starting** with a "p"*

Class Activity

List all poems in the CIS 90 student home directories
whose filename contains "cat"

Type the name of these files in the chat window

```
ls ../Poems/*cat*
```

The path to enlightenment

UNIX Files

The three elements of a 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

Class Exercise Enlightenment

- **cd** to your home directory on Opus
- Run the enlightenment program: **enlightenment**
- Write down each magic word as you learn them.

Assignment





CIS 90 Lab 4 Introduction
Introduction to the UNIX File System

Lab 4: The UNIX File System
The goal of this lab is to become proficient with system commands for viewing the directories and different file types that make up a UNIX file system.

Prerequisites

1. Find and skim Lesson 4 slides: <http://simms-teach.com/cis90calendar.php>
2. Check the forum for news on this lab: <http://cislab.cis.cabrillo.edu/forum/>
3. For additional assistance come to the CIS Lab: <http://webhawks.org/~cislab/>

Overview (not graded)

Log on to the Open server so that you have a command line shell at your service. The first you are in your home directory to start this lab. You do not need to submit or submit your answers for this section.

- o Display a listing of the files in your home directory. Are they in any special order?
- o Use `ls -la` to display the contents of directory `lab2.0`. Which filenames do not follow the UNIX file naming conventions?
- o Use `ls -lF` to determine what kind of files you have in your home directory. Do all directories begin with an uppercase letter?
- o Use the `cd` command to change the following files: `binaries`, `programs`, `unixtext`, and `empty`.
- o Display the contents of the `mission` file on your screen.
- o Display the contents of the `lab2.0` file on your screen. Is it more appropriate to use `cat` or `more`?
- o List the filenames stored under the root (`/`) directory. Are these files or subdirectories or both?
- o Determine the absolute pathname of your home directory. Use this pathname as an argument to the `ls` command. What are two other ways of getting the same listing?
- o List the contents of your `binaries` directory using a relative pathname.
- o Do the same thing using an absolute pathname, i.e. beginning with a slash (`/`).
- o Display the contents of the `dir1` stored under the `angelica` directory, which is under the `binaries` directory.
- o Use a single `pwd` or `ls` command to browse all of the files stored under the `binaries` subdirectory. Why did you choose the command you used? How can you tell where the files end and the next begins?
- o Use the `head` and `tail` commands to look at the top and bottom ten lines of `dir1`.
- o Use the `ls` command to see what is stored in the `/bin` directory.

Lab 4

If you get stuck, please ask questions on the forum or ask one of the lab assistants in the CIS Lab.

A full-page background image showing a sunset over a beach. The sky is filled with vibrant orange, pink, and purple clouds. The sun is low on the horizon, casting a warm glow. To the right, a dark, silhouetted cliff rises from the beach. The foreground shows the wet sand of the beach reflecting the colors of the sky, with some dark rocks scattered about.

Wrap up

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	Hex dump of a binary file

New Files and Directories:

/	"slash" directory, the root of the file tree
/home	User home directories
/home/cis90	CIS 90 class home directories
/home/cis90/ <i>username</i>	The home directory for CIS 90 student <i>username (without the 90)</i>
/etc/passwd	The absolute pathname of the passwd file in the /etc/ directory

Next Class

Assignment: Check Calendar Page on web site to see what is due next week.

Lab 4

Quiz questions for next class:

- 1) What are two commands you can use to read through long text files?
- 2) How do you distinguish between relative and absolute pathnames?
- 3) What are the three elements of a UNIX file?

End Meeting

End Meeting

Backup

Parsing & 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/simben $
/home/cis90/simben $ ls
/home/cis90/simben $ ls -l
/home/cis90/simben $ ls -l -t
/home/cis90/simben $ ls -li Poems/
/home/cis90/simben $ ls -a Poems/ bin/
/home/cis90/simben $ ls -d Poems/ bin/ > mylist
  
```

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