Rich's lesson module checklist *Last modified 11/14/2018*

- ❑ Zoom recording named and published for previous lesson

- ❑ Slides, Lab 10 and Project posted
- ❑ Print out agenda slide and annotate page numbers

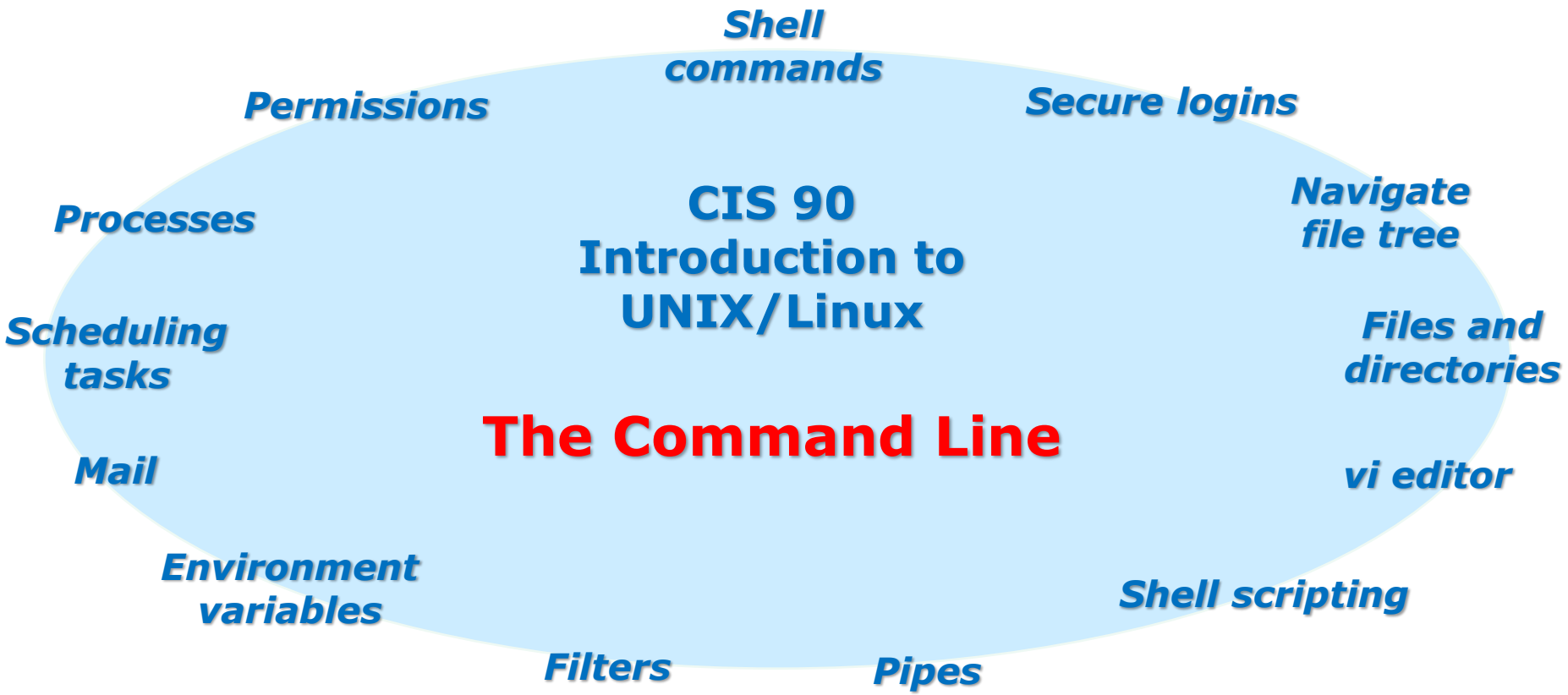
- ❑ Flash cards
- ❑ 1st minute quiz
- ❑ Web Calendar page updated

- ❑ Lock turnin directory at midnight (scripts/schedule-submit-locks)
- ❑ allscripts updated
- ❑ myscript in depot
- ❑ flowers and riddle* in bin
- ❑ sample myscripts for the doggies
- ❑ Lab 10 and final project updated and published
- ❑ riddle set to riddle1

- ❑ Backup slides, CCC info, handouts on flash drive
- ❑ Spare 9v battery for mic
- ❑ 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.

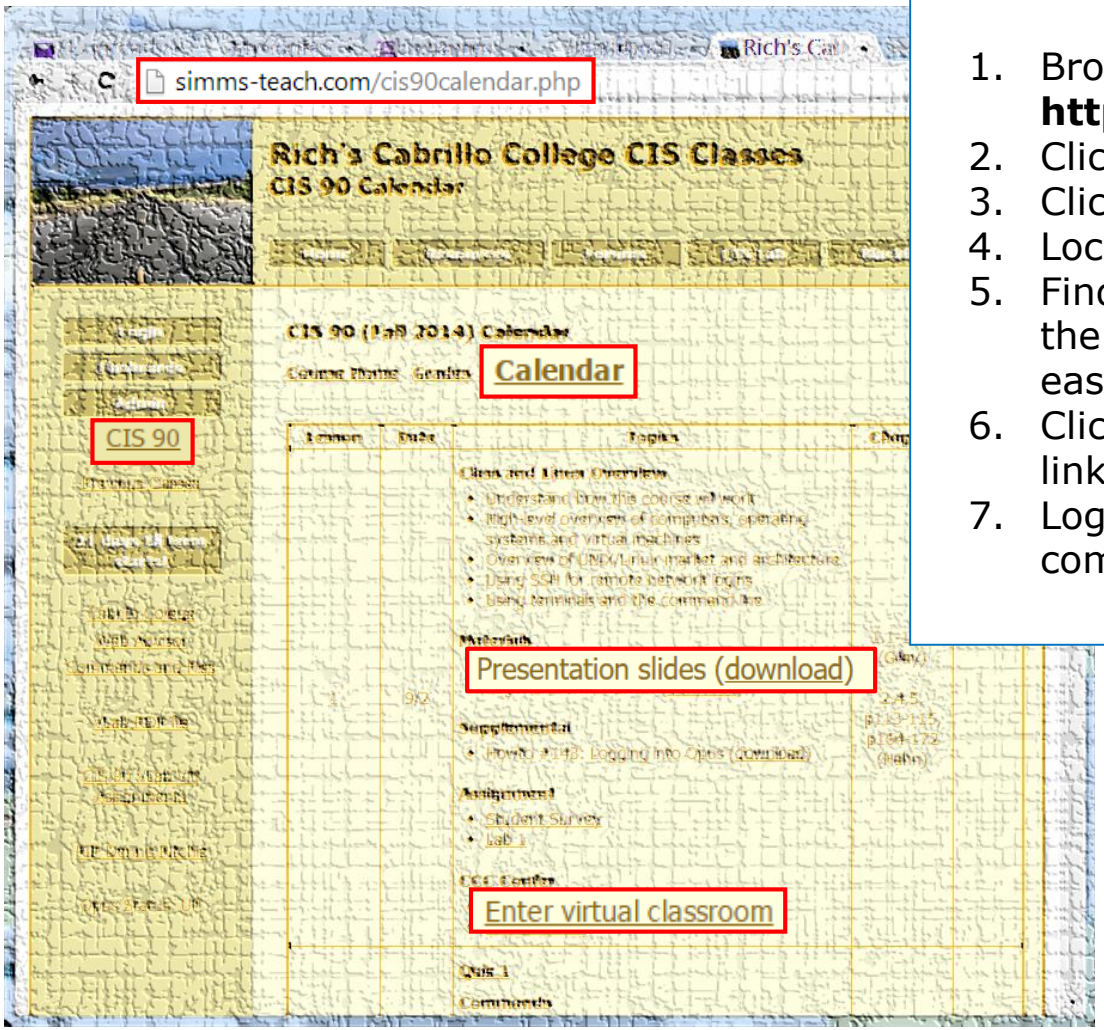
Introductions and Credits

Jim Griffin
- Created this Linux course
- Created Opus and the CIS VLab
- Jim's site: https://web.archive.org/web/20140209023942/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. John's site: http://teacherjohn.com/
- Jaclyn Kostner for many webinar best practices: e.g. mug shot page.

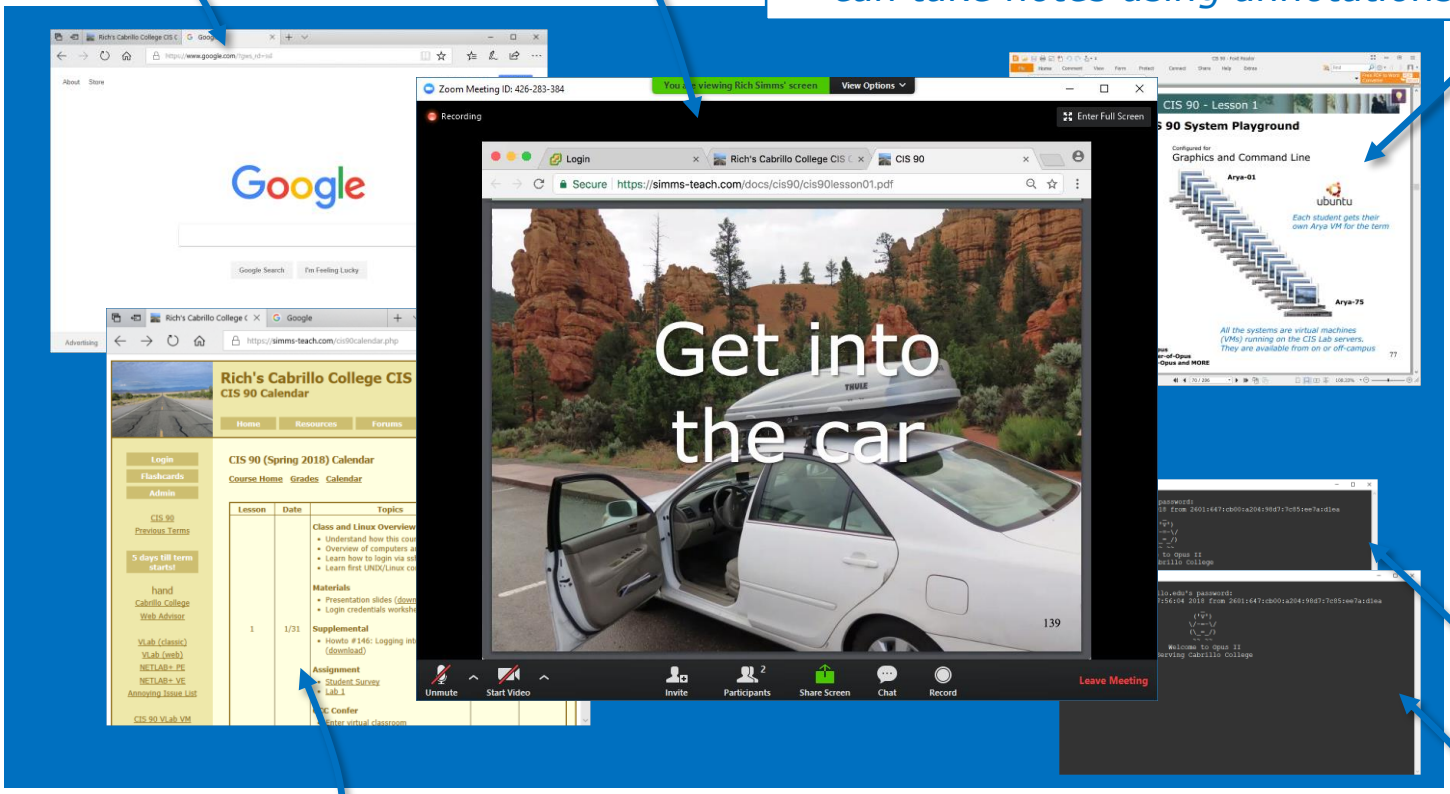
Student checklist - Before class starts



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.

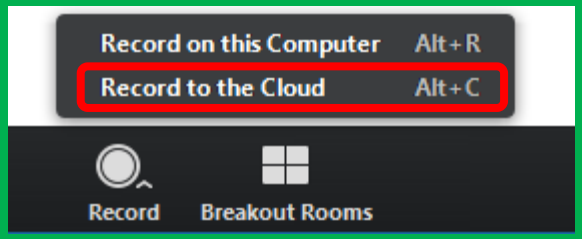
Student checklist - Before class starts

- ❑ *Google*
- ❑ *ConferZoom*
- ❑ *Downloaded PDF of Lesson Slides. I like Foxit Reader so I can take notes using annotations.*



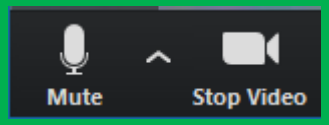
- ❑ *CIS 90 website Calendar page*
- ❑ *One or more login sessions to Opus-II*

Start



Start Recording

Audio Check



Start Recording

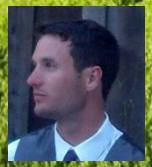
Audio & video Check

CIS 90 - Lesson 12

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


Mikey


Jona


Joseph


Tara Marie


Fredi


Carina

Isaac


Matthew

Erik


Tony

Branden

Dominic

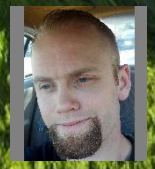
Ryan L.


Alejandra

Blair


Zari

Victor


Danny

Gabriel

Janelly


Austin


Aaron


Ryan M.

Email me (risimms@cabrillo.edu) a relatively current photo of your face for 3 points extra credit

First Minute Quiz

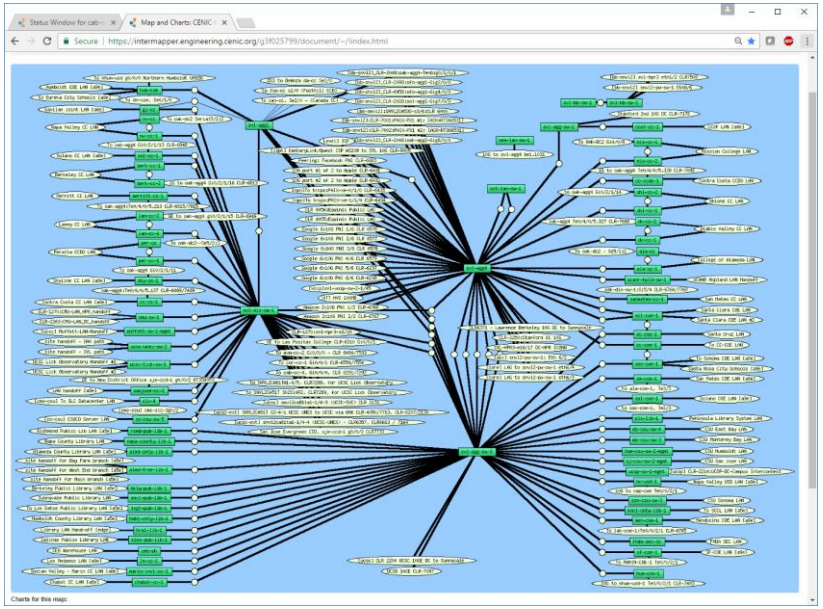
Please answer these questions **in the order** shown:

Use ConferZoom White Board

email answers to: risimms@cabrillo.edu

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

Network Check

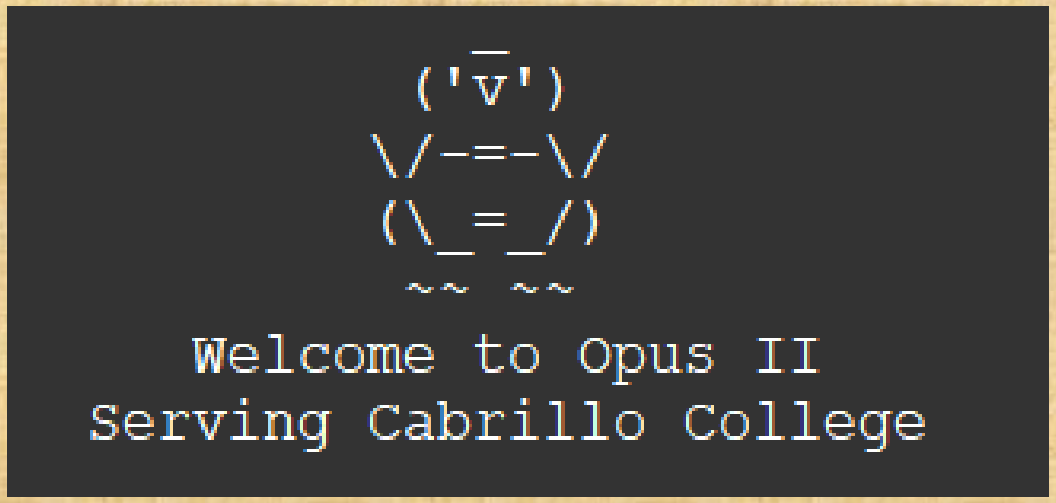


https://intermapper.engineering.cenic.org/g3f025799/document/~/!index.html

The Shell Environment

Objectives	Agenda
• Be able to set, view and unset shell variables • Describe the difference between the set and env commands • Explain the importance of the export command. • Describe three actions that are handled by the .bash_profile file • Define user-defined aliases • Explain the . (dot) command and the exec command.	• Quiz • Questions • More on vi • Submitting Lab 9 & pathnames • Tangent on spell • Personal dictionaries • Lab 9 subtle things • Housekeeping • Final project preview • Variables vs Files • Shell variables • Environment variables • Shell environment • Variables and child processes • Aliases • bash startup files • .bash_profile • .bashrc • . and exec • Grok this lesson • Assignment • Wrap up

Class Activity



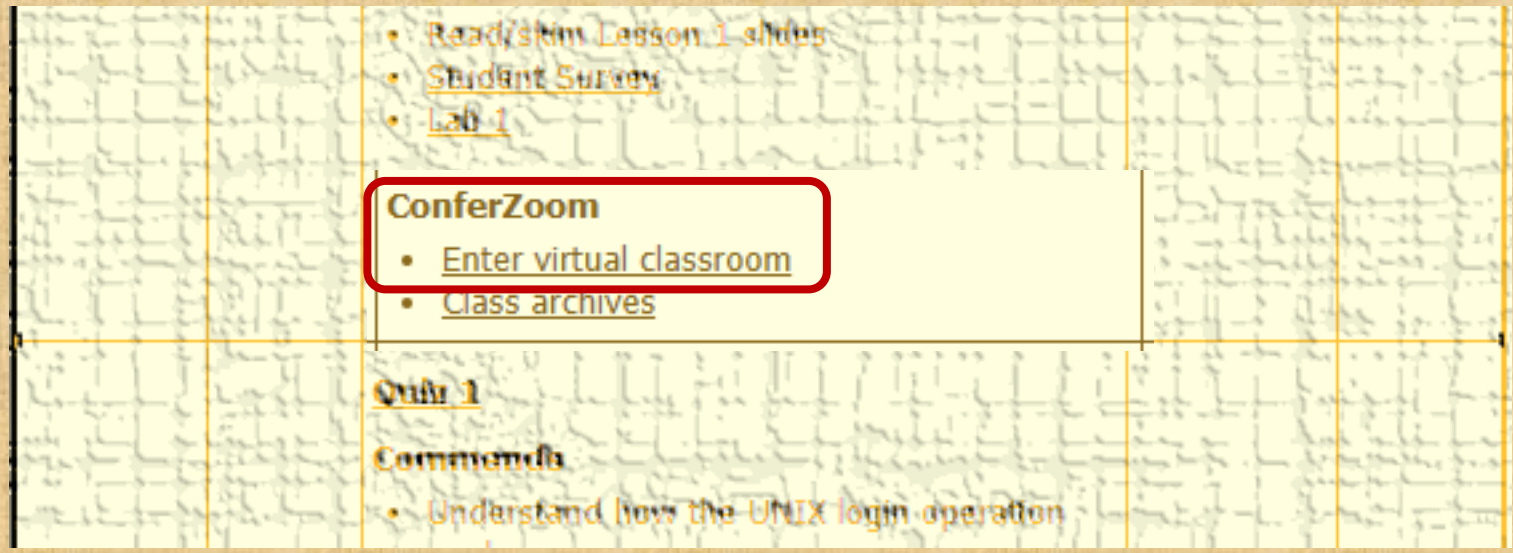
If you haven't already, log into Opus-II

Class Activity

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

If you haven't already, download the lesson slides

Class Activity



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

If you haven't already, join ConferZoom classroom

Questions

Questions?

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

Lesson material?

Labs? Tests?

How this course works?

> *Who questions much, shall learn much, and retain much.*
> - Francis Bacon

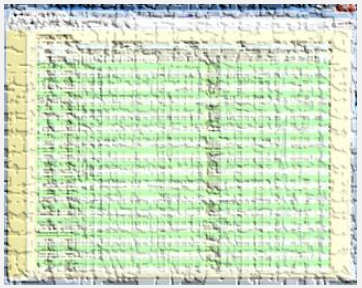
> *If you don't ask, you don't get.*
> - Mahatma Gandhi

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.*

Review your progress in the course

Check the website Grades page

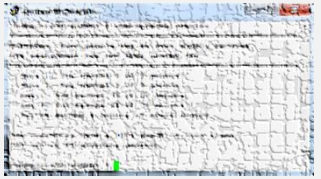
http://simms-teach.com/cis90grades.php



Or check on Opus-II

checkgrades *codename*

(where codename is your LOR codename)



Written by Jesse Warren a past CIS 90 Alumnus

- **Send me your survey to get your LOR codename.**
- **Graded labs and tests are in your home directories.**

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

Points that could have been earned:

8 quizzes:	24 points
8 labs:	240 points
2 tests:	60 points
2 forum quarters:	40 points
Total:	**364 points**

Extra Credit

On the forum

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

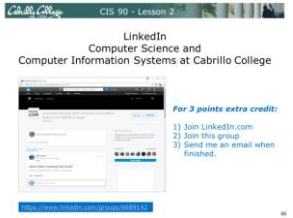
On some labs

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)

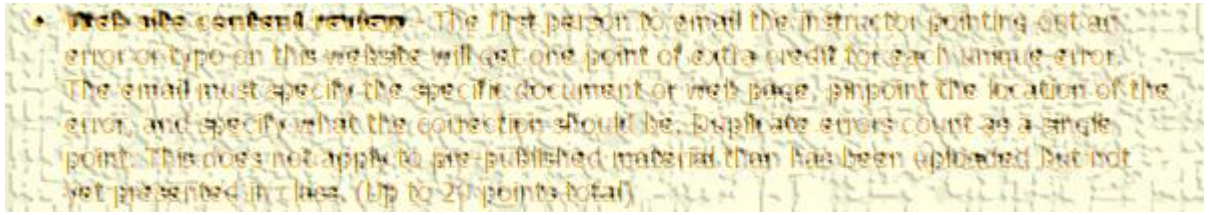


On the website

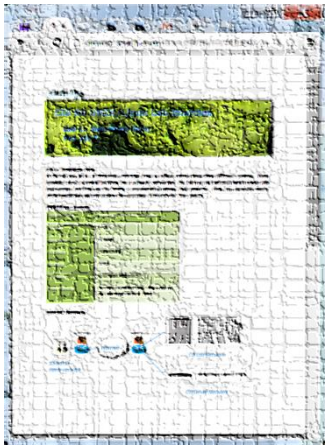
http://simms-teach.com/cis90grades.php

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



Lab Assignments -- Pearls of Wisdom



- Don't wait till the last minute to start.
- Plan for things to go wrong and give yourself time to ask questions and get answers.
- The *slower* you go the *sooner* you will be finished.
- A few minutes reading the forum can save you hour(s).
- Line up materials, references, equipment and software ahead of time.
- It's best if you fully understand each step as you do it. Use Google or refer back to lesson slides to understand the commands you are using.
- Keep a growing cheat sheet of commands and examples.
- Study groups are very productive and beneficial.
- Use the forum to collaborate, ask questions, get clarifications and share tips you learned while doing a lab.
- **Late work is not accepted** so submit what you have for partial credit.

Getting Help When Stuck on an Assignment

- Google the topic/error message.
- Search the Lesson Slides (they are PDFs) for a relevant example on how to do something.
- Check the forum. Someone else may have run into the same issue and found a way past it. If not start a new topic, 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:
  https://www.cabrillo.edu/salsa/listing.php?staffId=1426
  I'm in the CTC (room 1403) every Tuesday from 3:30-5:00 pm.
- 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!

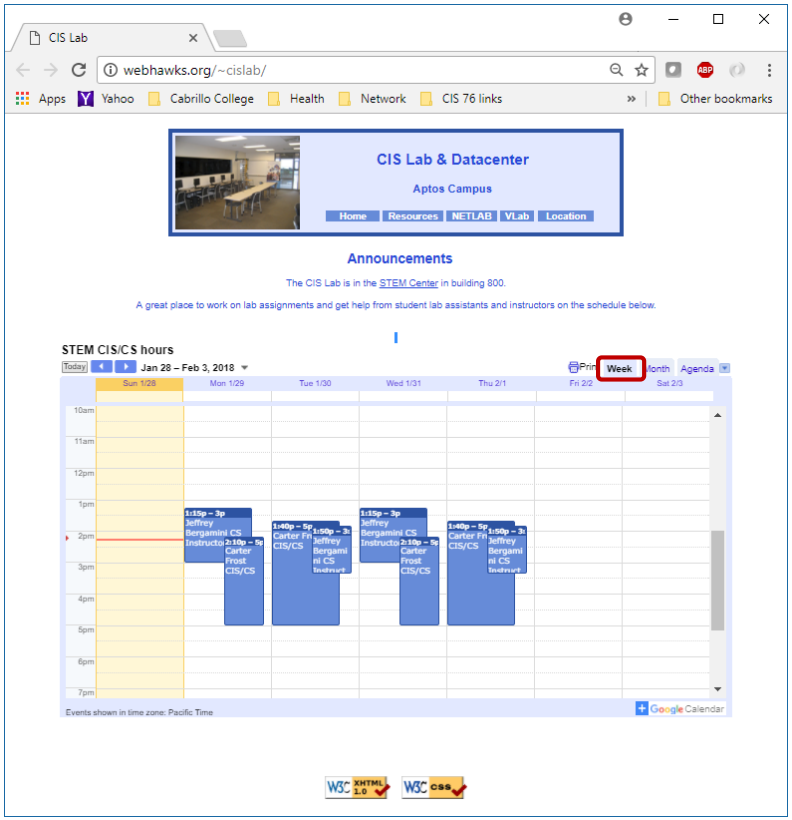
CIS Labs always involve some troubleshooting!

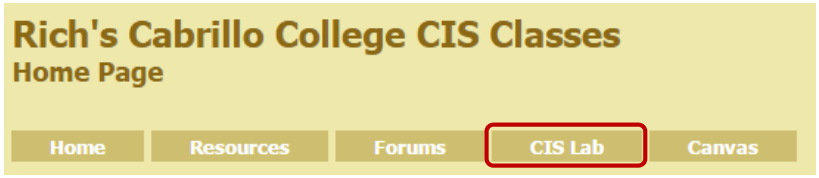
CTC - Building 1400
On lower campus

I will be in the CTC (room 1403) every Tuesday afternoon from 3:30-5:00

Help Available in the CIS Lab

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





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

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 ...

5) If you had trouble doing the last test ...

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

Email: risimms@cabrillo.edu

More on vi

Activity

What is the difference between **:q!** and **:!q** commands in vi?

```
18. KEYBOARD:           Whar ya hang the dang keys.
19. SOFTWARE:           Them dang plastic forks and knifs.
20. MOUSE:              Whut eats the grain in the barn.
21. MAINFRAME:          Holds up the barn roof.
:!q
```

```
18. KEYBOARD:           Whar ya hang the dang keys.
19. SOFTWARE:           Them dang plastic forks and knifs.
20. MOUSE:              Whut eats the grain in the barn.
21. MAINFRAME:          Holds up the barn roof.
:q!
```

Write your answer in the chat window

Esc :!q vs Esc :q!

```
18. KEYBOARD:           Whar ya hang the dang keys.
19. SOFTWARE:           Them dang plastic forks and knifs.
20. MOUSE:              Whut eats the grain in the barn.
21. MAINFRAME:          Holds up the barn roof.
:!q
```

This will attempt to run a command "q" in the bash shell

```
18. KEYBOARD:           Whar ya hang the dang keys.
19. SOFTWARE:           Them dang plastic forks and knifs.
20. MOUSE:              Whut eats the grain in the barn.
21. MAINFRAME:          Holds up the barn roof.
:q!
```

This will quit vi without saving any changes made

simben90@opus-ii:~

```
Worldwide Game of Thrones Vocabulary
Albanian: Dimri po vjen.
Chinese: 冬天来了。
Czech: Zima se blíží.
Danish: Vinteren er på vej.
Dutch: De winter komt eraan.
English: Winter is coming.
Finish: Talvi on tulossa.
French: L'hiver arrive.
German: Der Winter kommt.
Hindoi: सर्दी आ रही है।
Hungarian: Közeleg a tél.
Irish: Geimhridh ag teacht.
Italian: L'inverno sta arrivando.
Japanese: 冬が来ています。
Kazakh: Қысқы келе жатыр.
Latvian: Ziema nāk.
Lithuanian: Žiema ateina.
Polish: Zima się zbliża.
Portuguese: O inverno está chegando.
Russian: Скоро зима.
Spanish: Se acerca el invierno.
Swedish: Vintern är på väg.
Turkish: Kış geliyor.
Ukrainian: Скоро зима.
Welsh: Gaeaf yn dod.
~
"vocab" 26L, 772C
```

Editing vocab in one login session

simben90@opus-ii:~

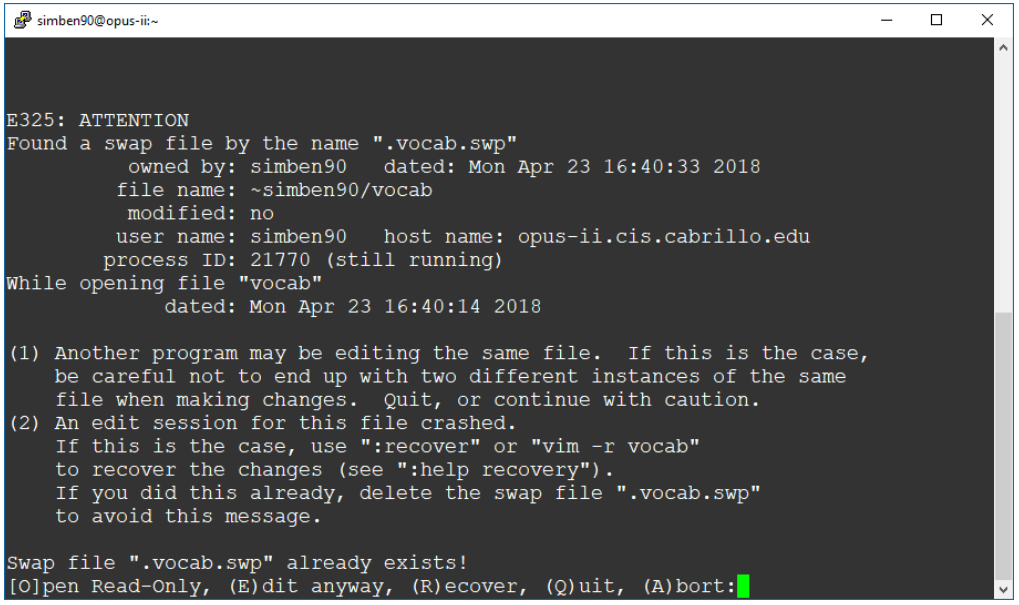
```
E325: ATTENTION
Found a swap file by the name ".vocab.swp"
          owned by: simben90   dated: Mon Apr 23 16:40:33 2018
         file name: ~simben90/vocab
          modified: no
         user name: simben90   host name: opus-ii.cis.cabrillo.edu
        process ID: 21770 (still running)
While opening file "vocab"
             dated: Mon Apr 23 16:40:14 2018

(1) Another program may be editing the same file.  If this is the case,
    be careful not to end up with two different instances of the same
    file when making changes.  Quit, or continue with caution.
(2) An edit session for this file crashed.
    If this is the case, use ":recover" or "vim -r vocab"
    to recover the changes (see ":help recovery").
    If you did this already, delete the swap file ".vocab.swp"
    to avoid this message.

Swap file ".vocab.swp" already exists!
[O]pen Read-Only, (E)dit anyway, (R)ecover, (Q)uit, (A)bort:
```

Attempting to edit vocab in another session before the original edit session was ended

the .swp file for vocab

```
/home/cis90/simben $ cd edits
/home/cis90/simben/edits $ ls -a
.    better_town   small_town   temp       text.fxd   .vocab.swp   words
..   lab09         spellk       text.err   vocab      women
/home/cis90/simben/edits $
```

When you edit a file with vi it copies your original file to a temporary *.swp* file. Any changes made happen to the .swp file instead of the original file. The **:w** command updates the contents of the original file with the contents of the *.swp* file.



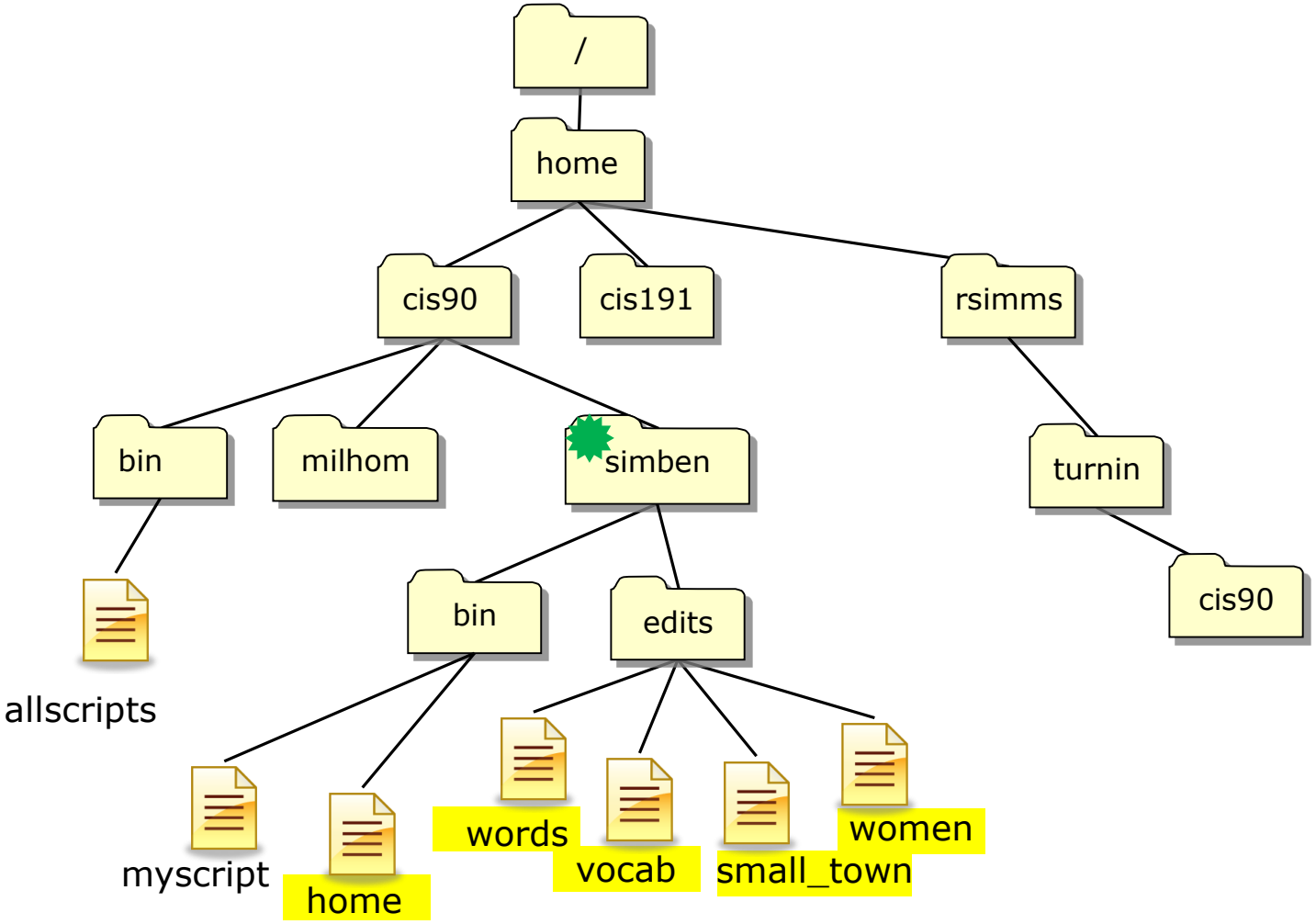
If you get this ATTENTION message it means the temporary .swp file still exists. You may be editing the same file in another session or your original editing session was disconnected before finishing. To get rid of this message you need to remove the .swp file.

Submitting Lab 9 & Pathnames!

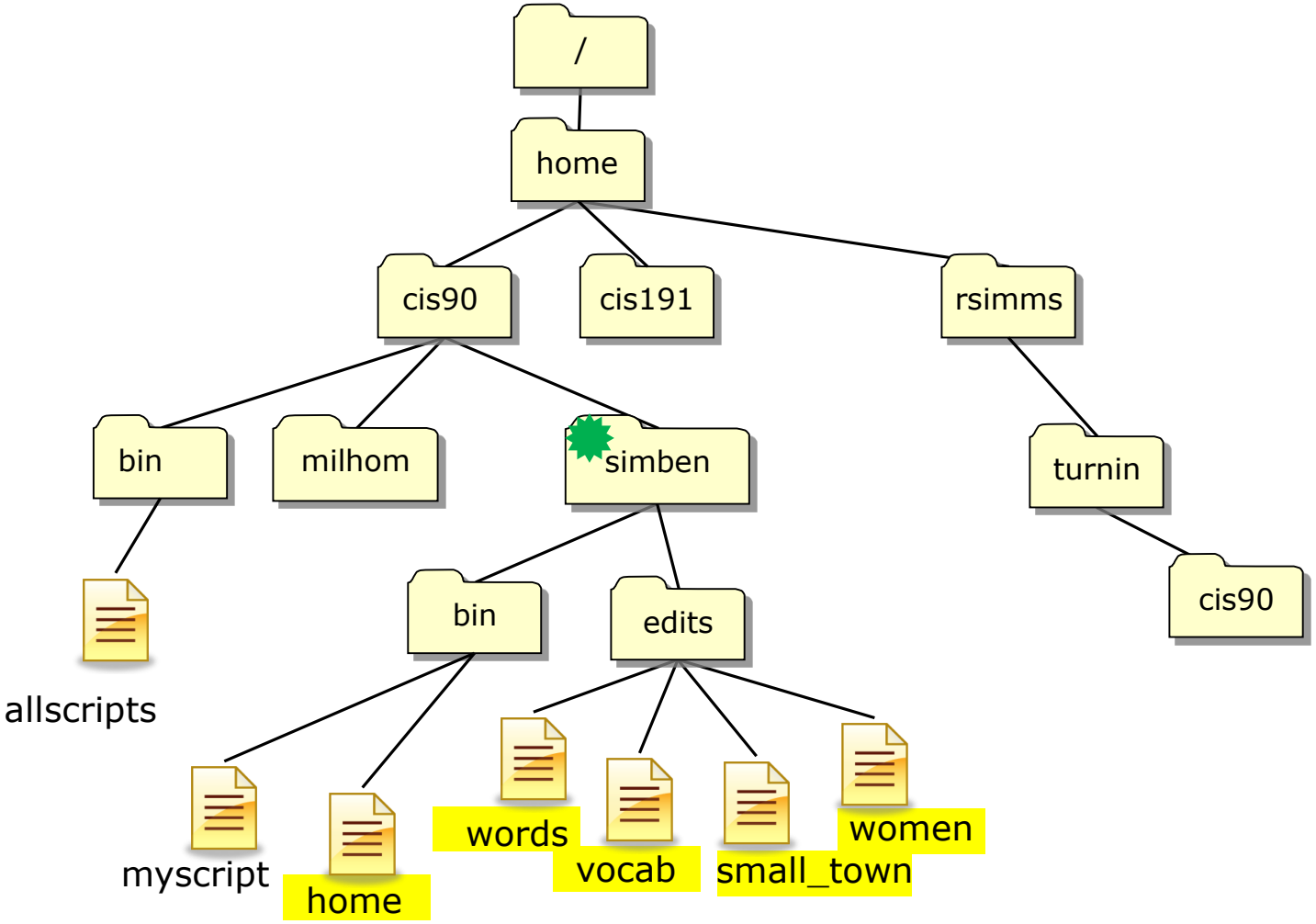
REMINDER

- You must **ALWAYS** use **VALID PATHNAMES** when specifying files as **ARGUMENTS** on a command.
- Pathnames can be relative or absolute.
- A common mistake in the past on Lab 9 is to ignore error messages and not submit all the file content requested.

One way



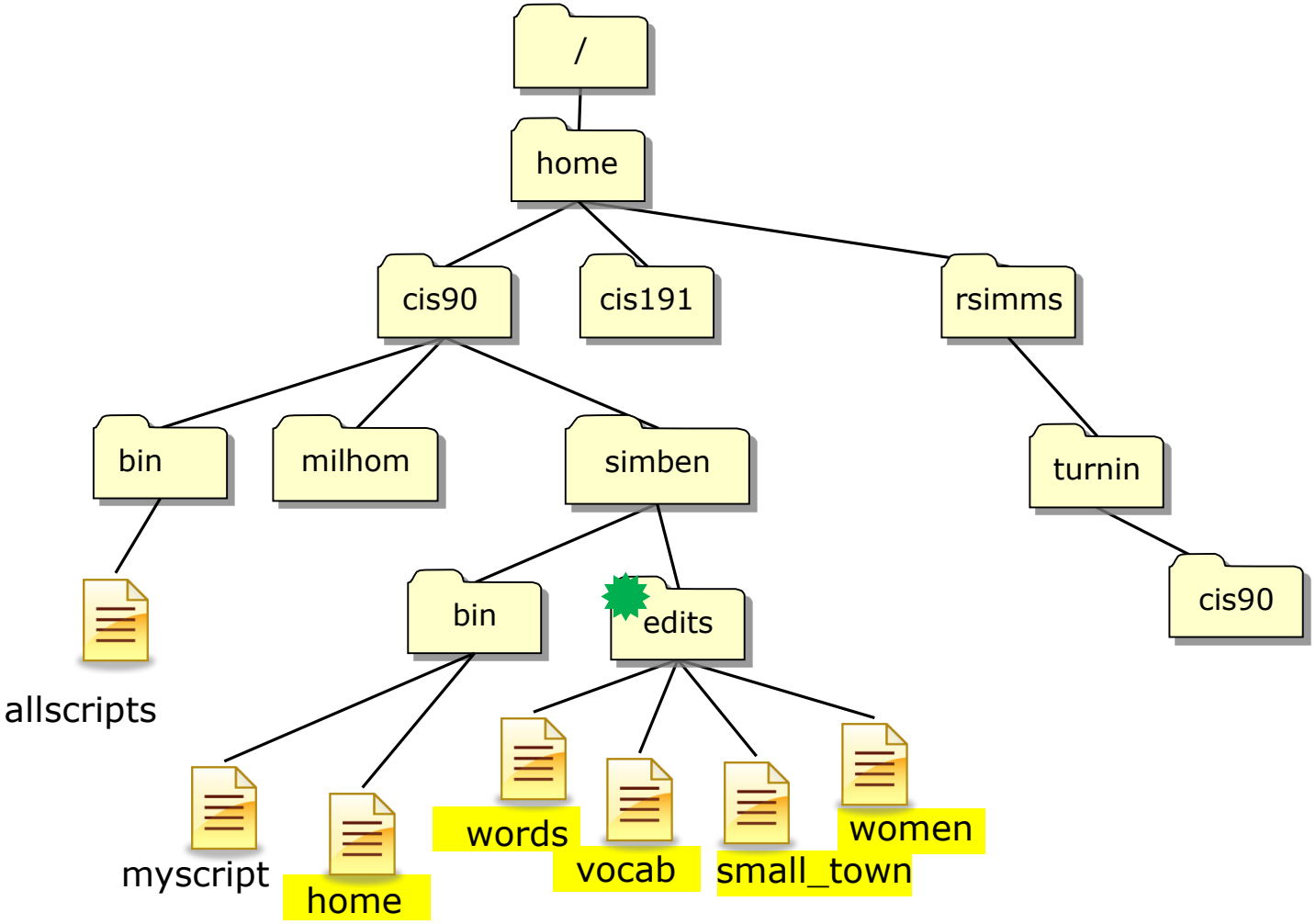
From *how could Benji concatenate the highlighted files into a file named lab09 in his home directory?*



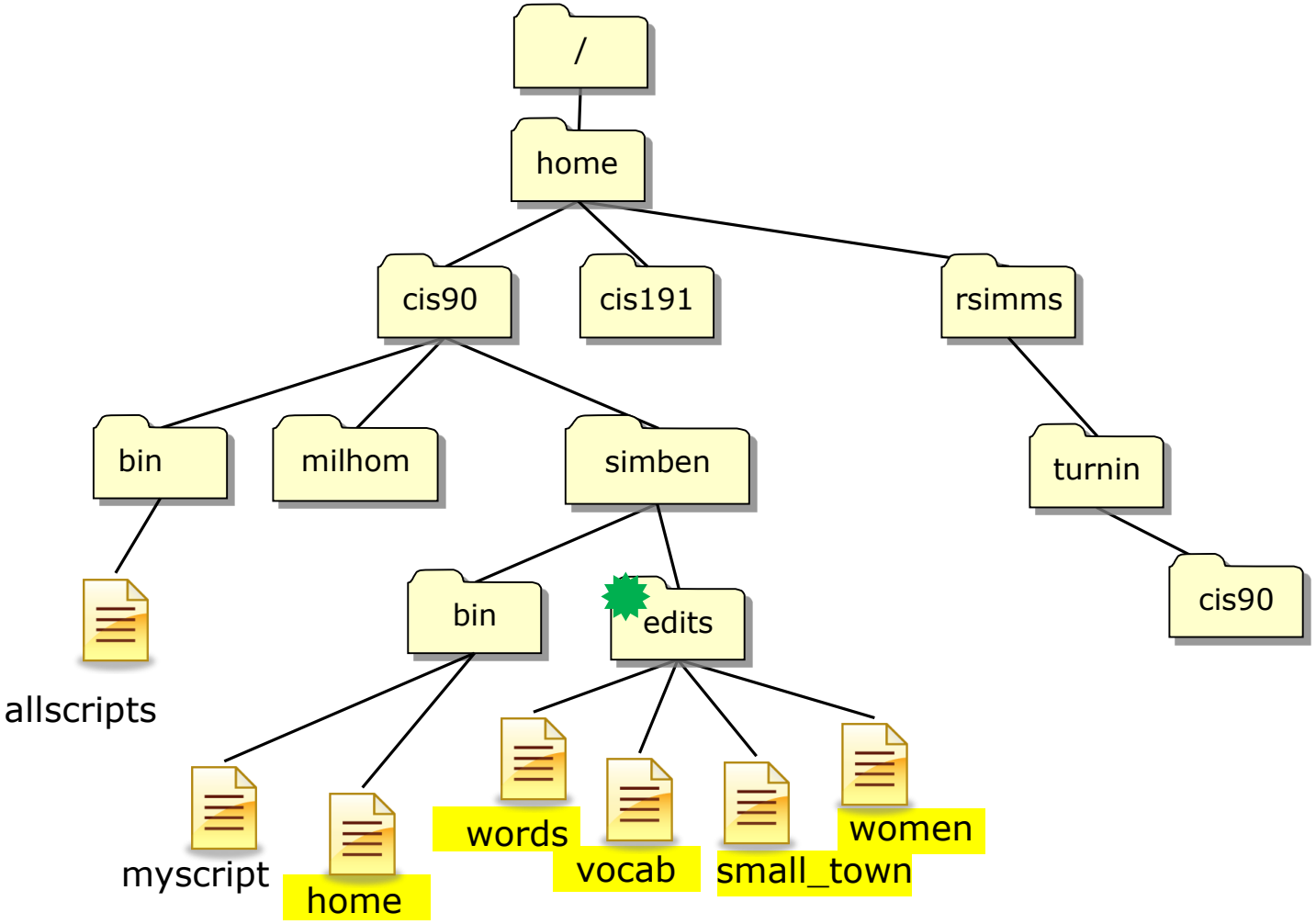
From *how could Benji concatenate the highlighted files into a file named lab09 in his home directory?*

```
cat bin/home edits/words edits/vocab edits/small_town edits/women > lab09
```

Another way



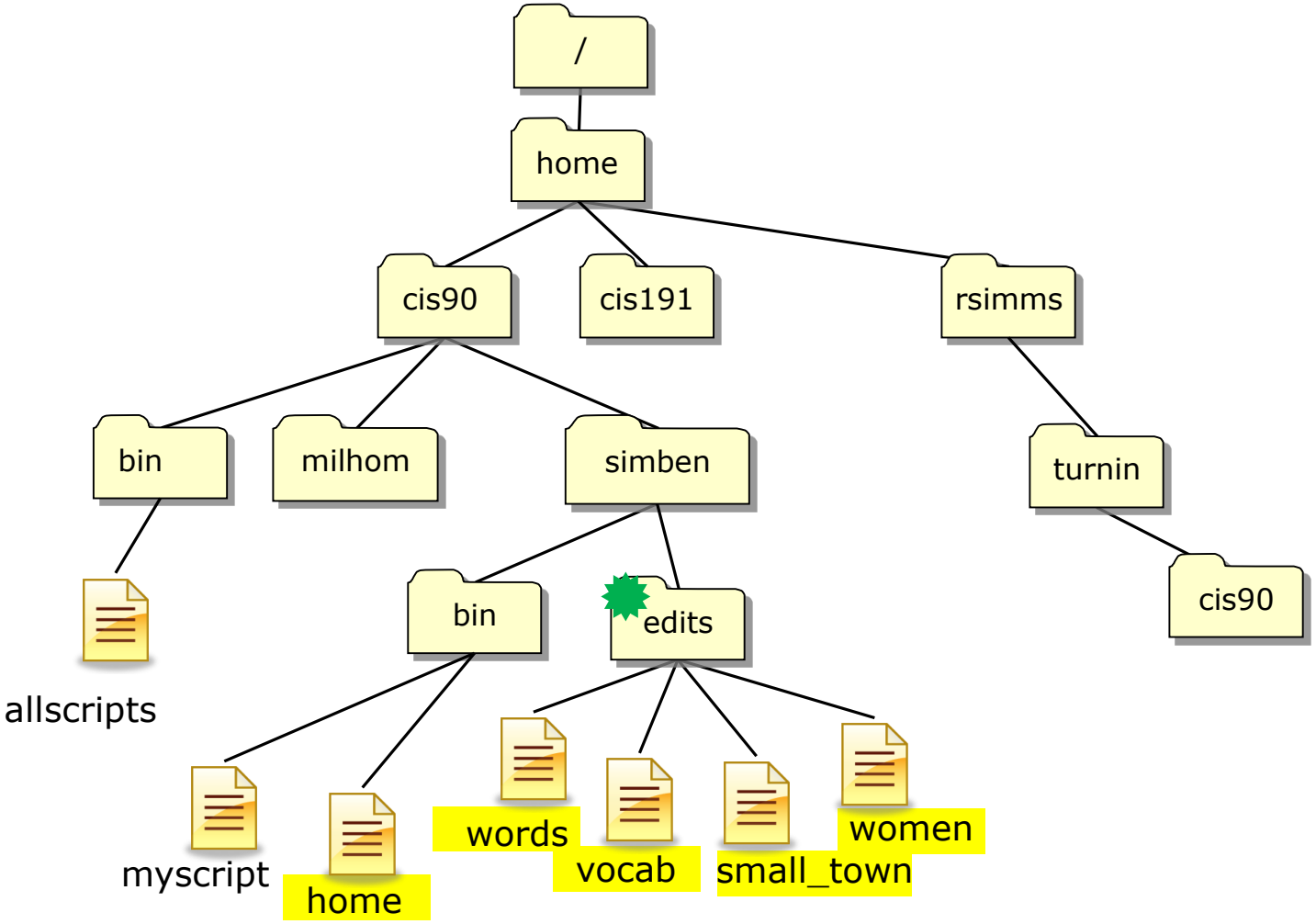
From how could Benji concatenate the highlighted files into a file named lab09 in his home directory?



From how could Benji concatenate the highlighted files into a file named lab09 in his home directory?

```
cat words vocab small_town women ../bin/home > ../lab09
```

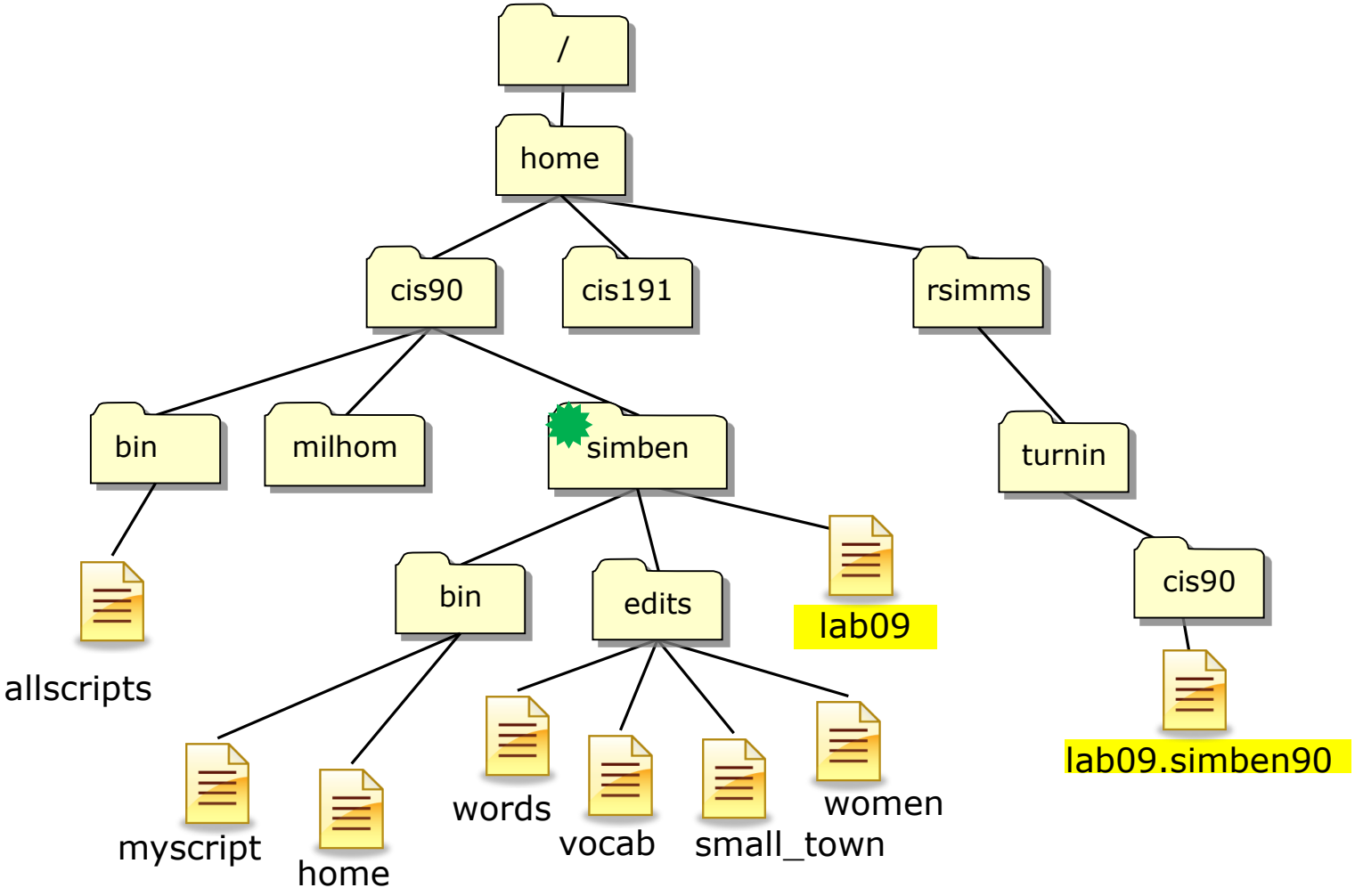
Or



From how could Benji concatenate the highlighted files into a file named lab09 in his home directory?

```
cat words vocab small_town women ~/bin/home > ~/lab09
```

Then



From how could Benji submit his work to Rich's turnin/cis90 directory

```
cp lab09 /home/rsimms/turnin/cis90/lab09.$LOGNAME
```

A Tangent on Spell (from last lesson)

Soquel is not in the UNIX dictionary

```
/home/cis90/simben $ echo Benji lives in Soquel > address
/home/cis90/simben $ cat address
Benji lives in Soquel

/home/cis90/simben $ spell address
Benji
Soquel
```

Question: How can we add Benji and Soquel to the UNIX dictionary so it is ignored in future spell checks?

Question: How can we add Soquel to the UNIX dictionary so it is ignored in future spell checks?

```
/home/cis90/simben $ man spell
No manual entry for spell
```

Hmmm. No man page for spell - weird!

```
/home/cis90/simben $ type spell
spell is /usr/bin/spell
```

Where is it on our path?

```
/home/cis90/simben $ file /usr/bin/spell
/usr/bin/spell: POSIX shell script, ASCII text executable
```

So what kind of file is it?

```
/home/cis90/simben $ cat /usr/bin/spell
#!/bin/sh

# aspell list mimicks the standard unix spell program, roughly.

cat "$@" | aspell list --mode=none | sort -u
```

Ah ha, it's a script, so lets look at it …

*Well … son of a gun, the actual command is **aspell!***

Question: How can we add Soquel to the UNIX dictionary so it is ignored in future spell checks?

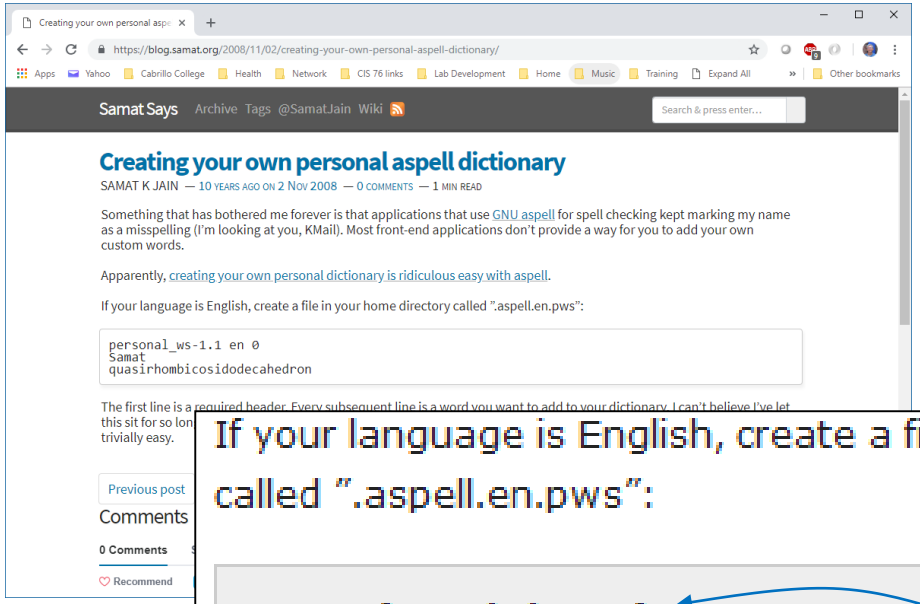
```
ASPELL(1)              Aspell Abbreviated User's Manual              ASPELL(1)

NAME
       aspell - interactive spell checker

SYNOPSIS
       aspell [options] <command>

DESCRIPTION
       aspell  is  a utility that can function as an ispell -a replacement,
       as an independent spell checker, as  a  test  utility  to  test  out
       Aspell features, and as a utility for managing dictionaries.

<snipped>

       --home-dir=<directory>
              Directory Location for personal wordlist files.

       --per-conf=<file name>
              Personal configuration file.  This file overrides options found in the
              global config file.
```

There must be a way to add Soquel … the man page indicates it is possible but has no examples … lets try google instead

Googling "linux aspell personal dictionary"

Bingo! Thank you Samat Jain!

http://blog.samat.org/2008/11/02/creating-your-own-personal-aspell-dictionary



If your language is English, create a file in your home directory called ".aspell.en.pws":

```
personal_ws-1.1 en 0
Samat
quasirhombicosidodecahedron
```

Add this line to the top

Now add any words you wish for the aspell program to ignore when doing spelling checks

Adding words to the UNIX dictionary

```
/home/cis90/simben $ echo "personal_ws-1.1 en 0" > .aspell.en.pws
/home/cis90/simben $ echo Benji >> .aspell.en.pws
/home/cis90/simben $ echo Soquel >> .aspell.en.pws

/home/cis90/simben $ spell address
/home/cis90/simben $
```

This is how you would add Benji and Soquel to your own custom dictionary to be used with the spell command

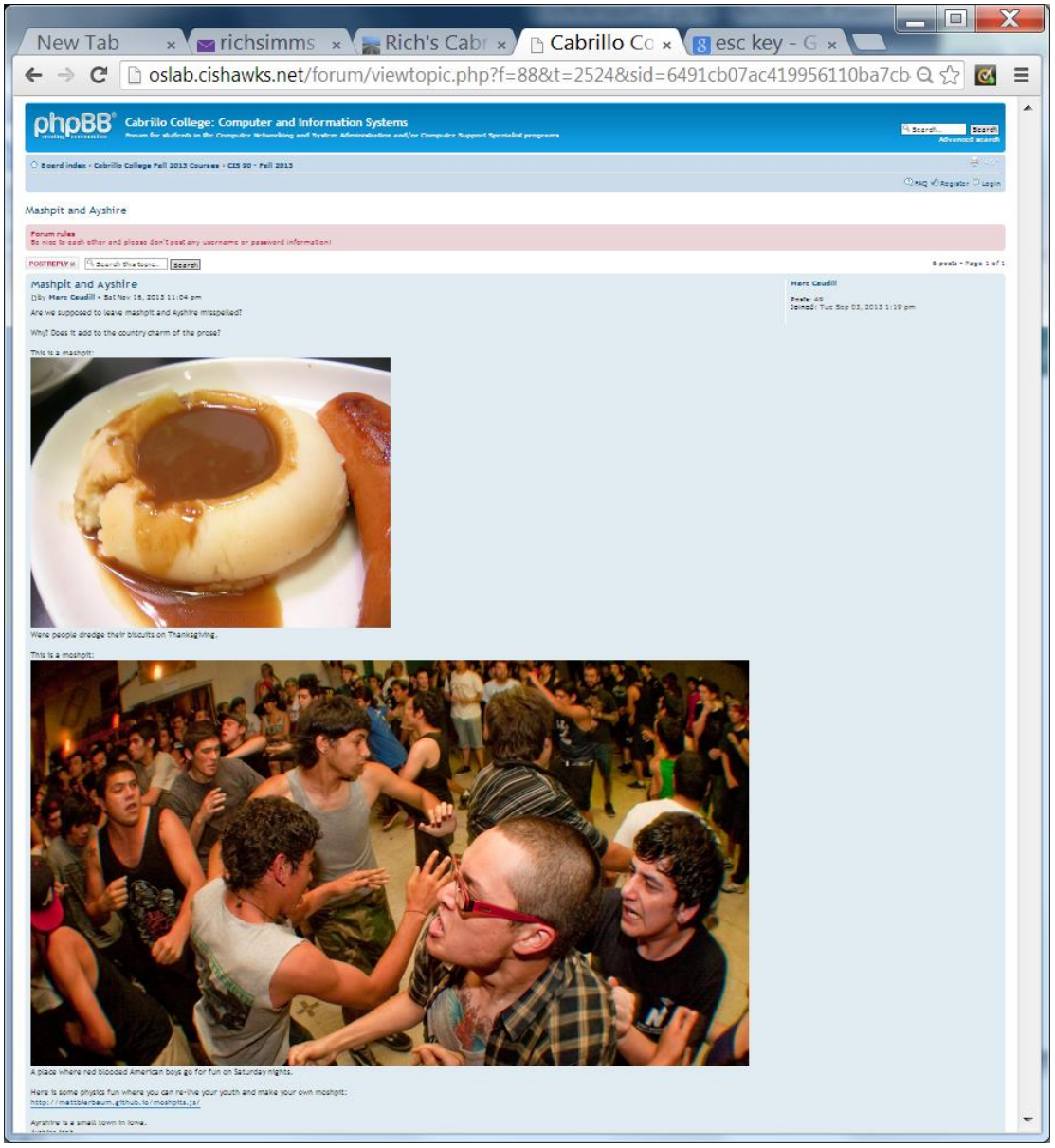
This is FYI and not required for Lab 9

```
/home/cis90/simben $ cat edits/spellk
Spell Check


Eye halve a spelling chequer
It came with my pea sea
It plainly marques four my revue
Miss steaks eye kin knot sea.
Eye strike a key and type a word
And weight four it two say
Weather eye am wrong oar write
It shows me strait a weigh.
As soon as a mist ache is maid
It nose bee fore two long
And eye can put the error rite
Its rare lea ever wrong.
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.

/home/cis90/simben $ spell edits/spellk
chequer
```

How would you add "chequer" (the British spelling) to your personal dictionary?

Copy the commands used into the chat window when finished

Ayshire moshpit and personal dictionaries


New Tab
richsimms
Rich's Cabr
Cabrillo Co
esc key - G
oslab.cishawks.net/forum/viewtopic.php?f=88&t=2524&sid=6491cb07ac419956110ba7cb
phpBB
Cabrillo College: Computer and Information Systems
Mashpit and Ayshire
Mashpit and Ayshire
Are we supposed to leave mashpit and Ayshire misspelled?
Why? Does it add to the country charm of the prose?
This is a mashpit:
Were people dredge their biscuits on Thanksgiving.
This is a mashpit:
A place where red blooded American boys go for fun on Saturday nights.
Here is some physics fun where you can re-live your youth and make your own mashpit:
http://mattblenbaum.github.io/mashpits.js/
Ayshire is a small town in Iowa.

moshpit?

Ayshire?

urban DICTIONARY

1. moshpit

a place at a gig where you can dance with however the f*** you want with a bunch of people you don't know. the dancing will often include punches aimed in the air NOT at the person nearest to you however usually results in full contact. can be dangerous however everyone with a ticket should feel welcome in the mosh pit.

bleeped

Merriam-Webster
m-w.com

mosh pit *noun*

Definition of MOSH PIT

: an area in front of a stage where very physical and rough dancing takes place at a rock concert

See mosh pit defined for English-language learners »

First Known Use of MOSH PIT

1988

Ayrshire

The Ayrshire breed originated in the County of Ayr in Scotland, prior to 1800. The county is divided into the three districts of Cunningham, in the more northern part, Kyle, which lies in the center, and Carrick, which forms the southern part of the county. During its development, it was referred to first as the Dunlop, then the Cunningham, and finally, the Ayrshire. How the different strains of cattle were crossed to form the breed known as Ayrshire is not exactly known. There is good evidence that several breeds were crossed with native cattle to create the foundation animals of the breed. In Agriculture, Ancient and Modern, published in 1866, Samual Copland describes the native cattle of the region as "diminutive in size, ill-fed, and bad milkers." Prior to 1800 many of the cattle of Ayrshire were black, although by 1775 browns and mottled colors started to appear.

Ayrshires are red and white, and purebred Ayrshires only produce red and white offspring. Actually, the red color is a reddish-brown mahogany that varies in shade from very light to very dark. On some bulls, the mahogany color is so dark that it appears almost black in contrast to the white. There is no discrimination or registry restriction on color patterns for Ayrshires. The color markings vary from nearly all red to nearly all white. The spots are usually very jagged at the edges and often small and scattered over the entire body of the cow. Usually, the spots are distinct, with a break between the red and the white hair. Some Ayrshires exhibit a speckled pattern of red pigmentation on the skin covered by white hair. Brindle and roan color patterns were once more common in Ayrshires, but these patterns are rare today. [Oklahoma State University]

Only after you finish Lab 9

```
cd
echo "moshpit" >> .aspell.en.pws
echo "Ayshire" >> .aspell.en.pws

spell edits/small_town
```

Note: Please leave just Ayshire and moshpit (or mashpit) in your *words* file when you submit Lab 9

Lab 9
Subtle Things

(but very important)

In Lab 9 you create a script named home in your edits/ directory

```
/home/cis90/simben/edits $ cat home
cd
clear
echo This is the home directory of $LOGNAME
echo ======================================
ls -F
```

The script named home that you created in Lab 9

1) Running the script fails when it's in your edits/ directory

```
/home/cis90/simben $ ls -l edits/home
-rwxrwxr-x. 1 simben90 cis90 104 Apr 23 16:49 edits/home
/home/cis90/simben $ home
-bash: home: command not found
```

2) Running the script works when it's in your bin/ directory

```
/home/cis90/simben $ mv edits/home bin
/home/cis90/simben $ ls -l bin/home
-rwxrwxr-x. 1 simben90 cis90 104 Apr 23 16:49 bin/home
/home/cis90/simben $ home
This is the home directory of simben90
=====================================
a               edits/          myletter
accounts@       errors          names
< snipped >
```

QUESTION: From your home directory, why does the home script work only after moving it from the edits/ directory to the bin/ directory?

Put your answer in the chat window

Answer: The edits/ directory is not on the path but the local bin/ directory is

1) Prompt
2) Parse
3) Search
4) Execute
5) Nap
6) Repeat

Remember the six steps of the shell

```
/home/cis90/simben $ home
-bash: home: command not found
```

If the shell is unable to locate the command on the path it prints "command not found"

Because

```
/home/cis90/simben $ echo $PATH
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/cis90/sim
ben/../bin:/home/cis90/simben/bin:.
```

By moving the script into the user's local bin directory, which is on the path, the command can now be run from anywhere on the system

Housekeeping

Housekeeping

1. Lab 9 due 11:59PM tonight.
2. Read your mail on Opus-II to verify your submission was both complete and received for grading.
3. Use **check9** to check your work.
4. Five more posts due 11:59PM tonight.

Reminder:
Only posts in the CIS 90 forum during the most recent posting period are counted. Excess posts in past quarters are not carried forward.

Housekeeping

Last Withdraw Date

This Saturday

Students who are no longer participating in the class (turning in assignments, posting on the forum, tasking quizzes or tests) ***may be dropped*** *by the instructor.*

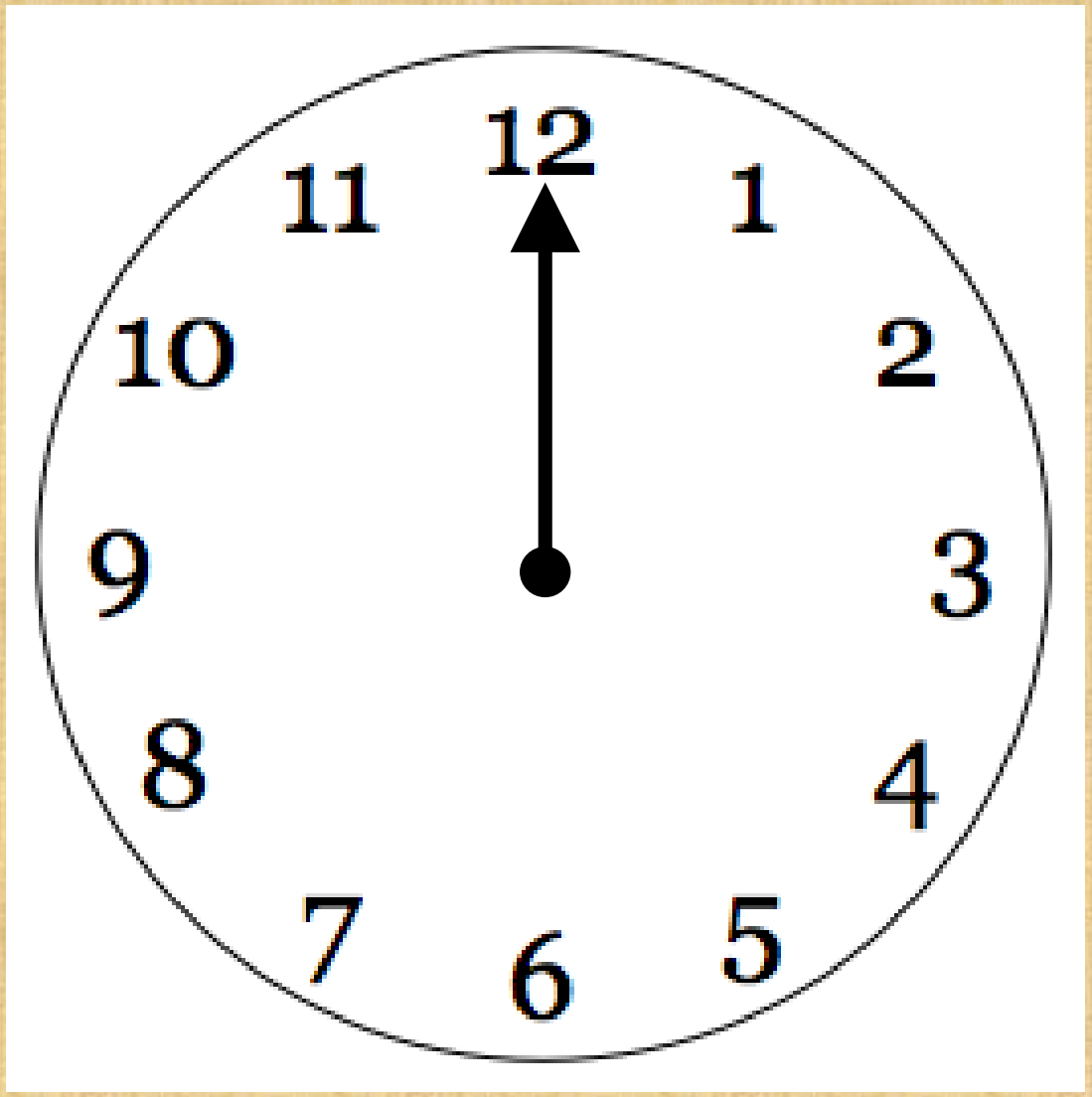
What day of the week is our final exam (Test #3)?

December

Su Mo Tu We Th Fr Sa

Use Zoom annotations to indicate the correct day

What time does our final exam (Test #3) start?



Use Zoom annotations to add the little hand of the clock

FALL 2018 FINAL EXAMINATIONS SCHEDULE
DECEMBER 10 TO DECEMBER 15

DAYTIME FINAL SCHEDULE

Daytime Classes: All times in bold refer to the beginning times of classes. **MW/Daily** means Monday alone, Wednesday alone, Monday and Wednesday **or any 3** or more days in any combination. **TTH** means Tuesday alone, Thursday alone, or Tuesday and Thursday. **Classes meeting other combinations of days and/or hours not listed must have a final schedule approved by the Division Dean.**

STARTING CLASS TIME / DAY(S)	EXAM HOUR	EXAM DATE
Classes starting between:		
6:30 am and 8:55 am, MW/Daily	7:00 am-9:50 am	Monday, December 10
9:00 am and 10:15 am, MW/Daily	7:00 am-9:50 am	Wednesday, December 12
10:20 am and 11:35 am, MW/Daily	10:00 am-12:50 pm	Monday, December 10
11:40 am and 12:55 pm, MW/Daily	10:00 am-12:50 pm	Wednesday, December 12
1:00 pm and 2:15 pm, MW/Daily	1:00 pm-3:50 pm	Monday, December 10
2:20 pm and 3:35 pm, MW/Daily	1:00 pm-3:50 pm	Wednesday, December 12
3:40 pm and 5:30 pm, MW/Daily	4:00 pm-6:50 pm	Wednesday, December 12

CIS 90 **Introduction to UNIX/Linux**

Provides a technical overview of the UNIX/Linux operating system, including hands-on experience with commands, files, and tools. Recommended Preparation: CIS 1L or CIS 72.

Transfer Credit: Transfers to CSU;UC

Section	Days	Times	Units	Instructor	Room
1	W	1:00PM-4:05PM	3.00	R.Simms	OL
&	Arr.	Arr.		R.Simms	OL

Section 1 is an ONLINE course. Meets weekly throughout the semester online during the scheduled times by remote technology with an additional 50 min online lab per week. For details, see instructor's web page at go.cabrillo.edu/online. This course has zero cost for textbooks.

2	W	1:00PM-4:05PM	3.00	R.Simms	828
&	Arr.	Arr.		R.Simms	OL

Section 2 is a Hybrid ONLINE course. Meets weekly throughout the semester at the scheduled times with an additional 50 min online lab per week. For details, see instructor's web page at go.cabrillo.edu/online. This course has zero cost for textbooks.

Heads up on Final Exam

Test #3 (final exam) is **MONDAY December 10th 1-3:50PM**

Mon	12/10	**Test #3 (the final exam)** **Time** • MONDAY 1:00PM - 3:50PM in Room 828 or online **Materials** • Presentation slides (download) • Test (canvas) **ConferZoom** • Enter virtual classroom • Class archives		5 posts Lab X1 Lab X2

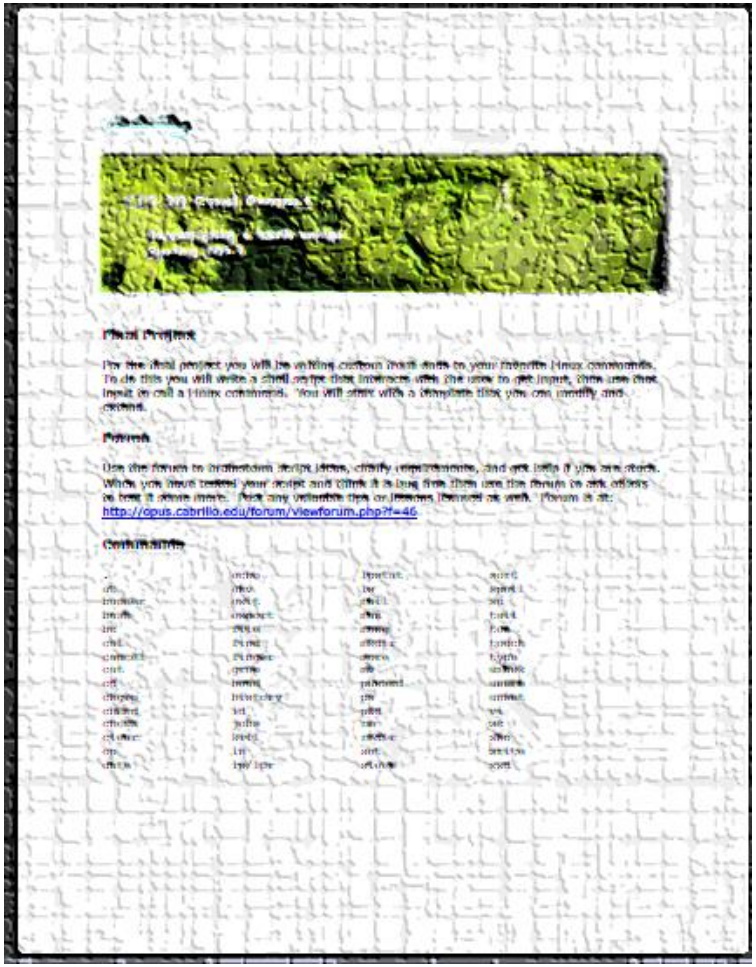
Extra credit Labs X1/X2 and final posts ***due by 11:59PM***

Final grades *available by the end of the next day*

- All students will take the test at the same time. The test must be completed by **3:50PM**.
- Working and long distance students can take the test online via ConferZoom and Canvas.
- Working students will need to plan ahead to arrange time off from work for the test.
- Test #3 is **mandatory** (even if you have all the points you want)

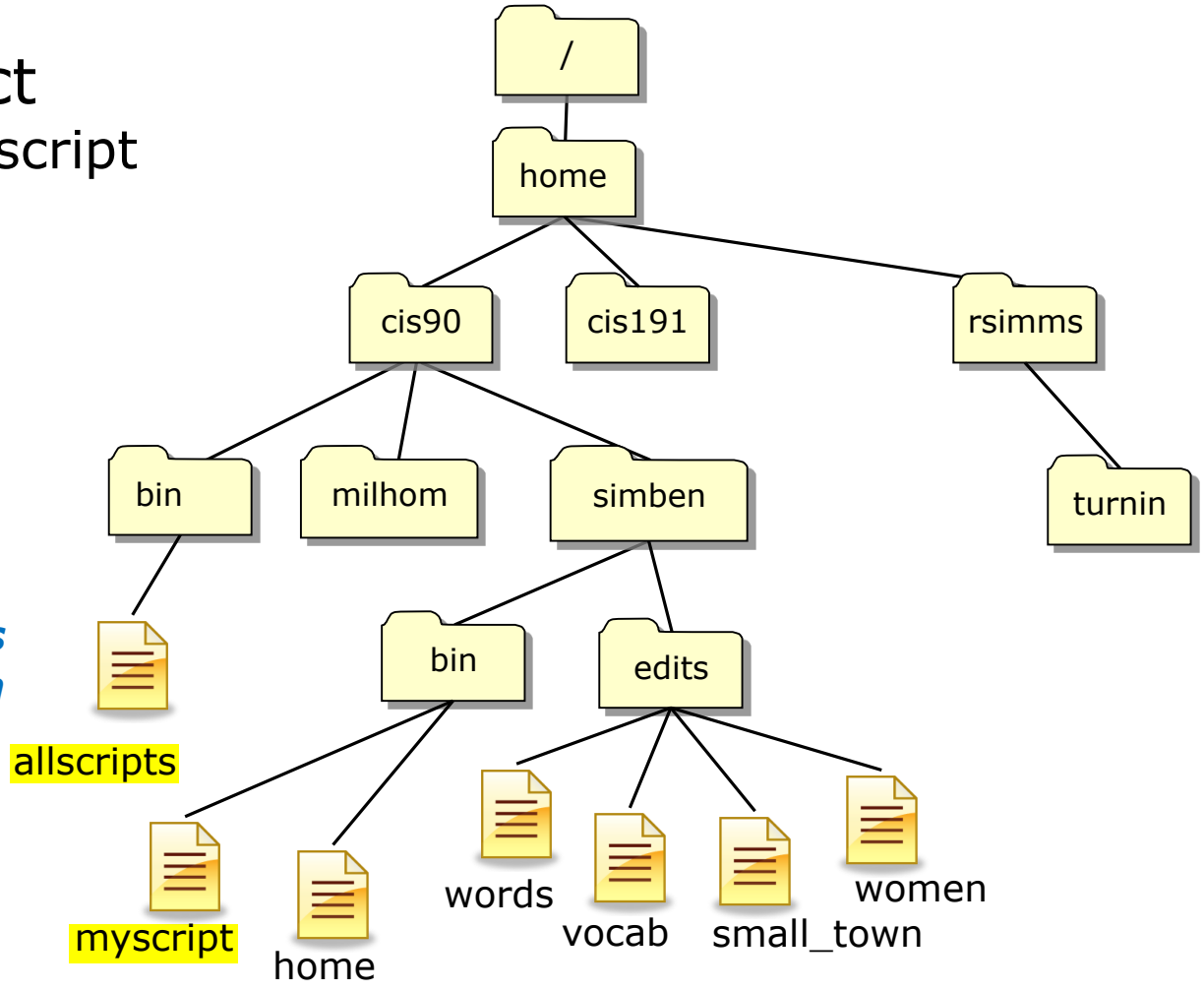
final project *preview*

Final Project



You now have the necessary skills to begin the final project!

Final Project
allscripts and myscript



*I make the **allscripts** file in /home/cis90/bin*

*You make the **myscript** file in your local bin directory*

```
/home/cis90/simben $ ls -l /home/cis90/bin/allscripts  bin/myscript
-rwxr-xr-x 1 simben90 cis90 4296 Nov 13 13:07 bin/myscript
-rwxr-xr-x 1 rsimms   staff 4381 Nov 13 18:17 /home/cis90/bin/allscripts
```

cat ../bin/allscripts

simben90@opus-ii:~

```
/home/cis90/simben $ cat ../bin/allscripts
#!/bin/bash
#
# menu: A simple menu template
#
while true
do
  clear
  echo -n "
  ********************************************************
  *          Fall 2018 CIS 90 Online Projects            *
  ********************************************************
  1) Aaron
  2) Alejandra
  3) Austin
  4) Benji
  5) Blair
  6) Branden
  7) Carina
  8) Danny
  9) Dominic
  10) Duke
  11) Erik
  12) Fredi
  13) Gabriel
  14) Homer
  15) Isaac
  16) Janelly
  17) Jona
  18) Joseph
  19) Matthew
  20) Mikey
  21) Ryan L.
  22) Ryan M.
  23) Tara
  24) Tony
  25) Victor
  26) Zari

  99) Exit

  Enter Your Choice: "
  read RESPONSE
```

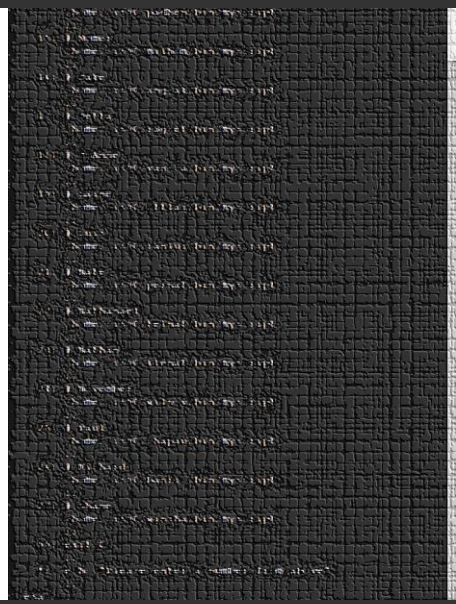
The **allscripts** bash script

*The first part of **allscripts** uses a really long **echo** command to print a selection menu of the CIS 90 students.*

cat /home/cis90/bin/allscripts

```
read response
case $response in
```

```
   2) # Benji
      /home/cis90/simben/bin/myscript
      ;;
```



```
esac
```

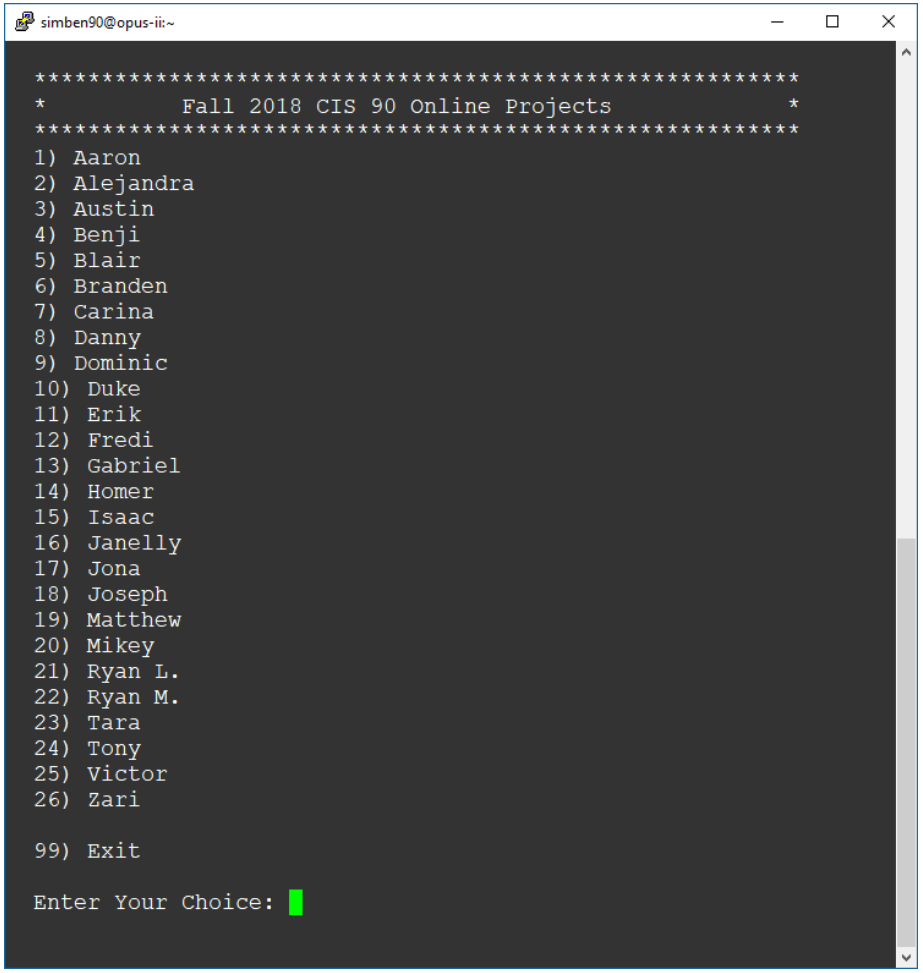
The **allscripts** bash script

*The second part of **allscripts** is a long case statement that will run the requested student's **myscript** file located in the student's bin directory.*

Note the use of an absolute path to run each students script

The **allscripts** bash script

Running **allscripts** looks like this



*This script has been updated with everyone's name and pathnames to each student's **myscript** file*

vi ~/bin/myscript

simben90@opus-ii:~

```
#!/bin/bash
#
# menu: A simple menu template
#
while true
do
        clear
        echo -n "
                CIS 90 Final Project
        1) Task 1
        2) Task 2
        3) Task 3
        4) Task 4
        5) Task 5
        6) Exit

        Enter Your Choice: "
        read response
        case $response in
          1)    # Commands for Task 1
                ;;
          2)    # Commands for Task 2
                ;;
          3)    # Commands for Task 3
                ;;
          4)    # Commands for Task 4
                ;;
          5)    # Commands for Task 5
                ;;
          6)    exit 0
                ;;
          *)    echo "Please enter a number between 1 and 6"
                ;;
        esac
        echo -n "Hit the Enter key to return to menu "
        read response
done
                                                    1,1           All
```

The **myscript** bash script

*Every student will be creating a **myscript** file in their bin directory for the final project.*

*Your initial **myscript** file will look like this in vi.*

vi understands shell scripts and will use color syntax styling.

Final Project

Make your own copy of the myscript file

Getting Started

1) On Opus-II, copy the *myscript* file in the class *depot/* directory to your *bin/* directory:
   cd ~/bin
   cp ~/../depot/myscript .

2) Give your script execute permissions with:
   chmod +x myscript

3) Run the script:
   myscript

Indicate in the chat window if it works

Final Project
Testing you can run your myscript file

vi myscript

milhom90@oslab:~/bin

```
#!/bin/bash
#
# menu: A simple menu template
#
while true
do
        clear
        echo -n "
                CIS 90 Final Project
        1) Task 1
        2) Task 2
        3) Task 3
        4) Task 4
        5) Task 5
        6) Exit

        Enter Your Choice: "
```

myscript

milhom90@oslab:~

```
                CIS 90 Final Project
        1) Task 1
        2) Task 2
        3) Task 3
        4) Task 4
        5) Task 5
        6) Exit

        Enter Your Choice:
```

Viewing and then running your myscript file (after you add execute permissions)

Final Project
Modifying your myscript file

vi myscript

```
milhom90@opus-ii:~/bin
#!/bin/bash
#
# menu: A simple menu template
#
while true
do
        clear
        echo -n "
                Rumpelstiltskin's Final Project
        1) My favorite color
        2) Task 2
        3) Task 3
        4) Task 4
        5) Task 5
        6) Exit

        Enter Your Choice: "
"myscript" 37L, 571C written
```

Edit the menu title

Edit the first option choice

Modify the menu title and the name of the first task, save and exit

myscript

```
milhom90@opus-ii:~/bin
        Rumpelstiltskin's Final Project
1) My favorite color
2) Task 2
3) Task 3
4) Task 4
5) Task 5
6) Exit

Enter Your Choice:
```

Run myscript and test your modifications

Final Project
Testing a default task

vi myscript

milhom90@oslab:~/bin

```
        Enter Your Choice: "
        read RESPONSE
        case $RESPONSE in
          1)    # Commands for Task 1
                ;;
          2)    # Commands for Task 2
                ;;
          3)    # Commands for Task 3
                ;;
          4)    # Commands for Task 4
                ;;
          5)    # Commands for Task 5
                ;;
          6)    exit 0
                ;;
          *)    echo "Please enter a numb
                ;;
```

View the first task

myscript

milhom90@opus-ii:~/bin

```
                Rumpelstiltskin's Final Project
        1) My favorite color
        2) Task 2
        3) Task 3
        4) Task 4
        5) Task 5
        6) Exit

        Enter Your Choice: 1
Hit the Enter key to return to menu
```

Running Task 1 doesn't do anything yet

Final Project
Making a simple task

vi myscript

milhom90@opus-ii:~/bin

```
        Enter Your Choice: "
        read response
        case $response in
          1)    # Make favorite color banner
                echo -n "What is your first name? "
                read name
                echo -n "What is your favorite color? "
                read color
                banner $name likes $color
                ;;
          2)    # Commands for Task 2
                ;;
          3)    # Commands for Task 3
                ;;
-- INSERT --                                    16,1          55%
```

Modify the comment line

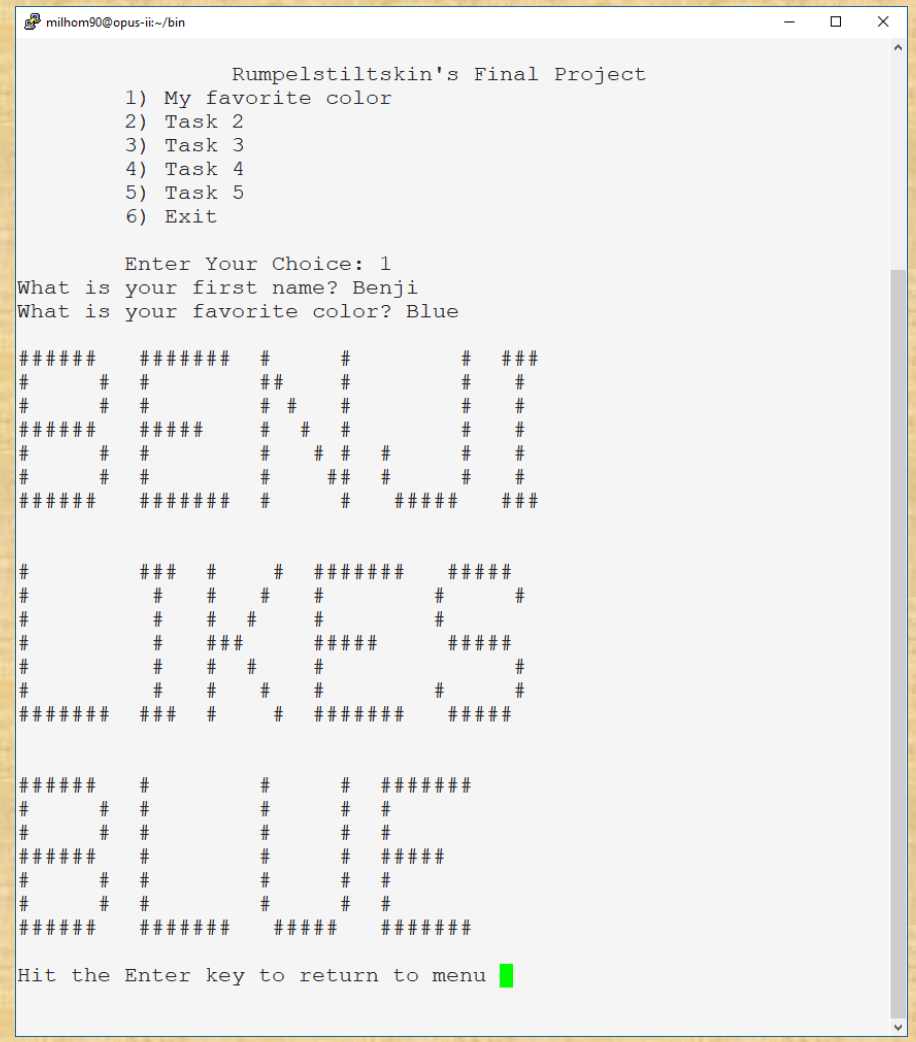
Add these lines

```
echo -n "What is your first name? "
read name
echo -n "What is your favorite color? "
read color
banner $name likes $color
```

Indicate in the chat window when you have finished modifying your myscript file.

Final Project
Making a sample task

myscript



Indicate in the chat window if your sample script works or not.

If it doesn't we will debug it.

Final Project Getting Started

A new command

read, inputs text from stdin and stores it in the variable specified as an argument.

```
read response
case $response in
  1)     # Make favorite color banner
         echo -n "What is your first name? "
         read name
         echo -n "What is your favorite color? "
         read color
         banner $name likes $color
         ;;
```

Another new command

case, allows different branches of code to be executed based on the value of the variable specified as an argument.

Final Project Getting Started

The case statement begins here

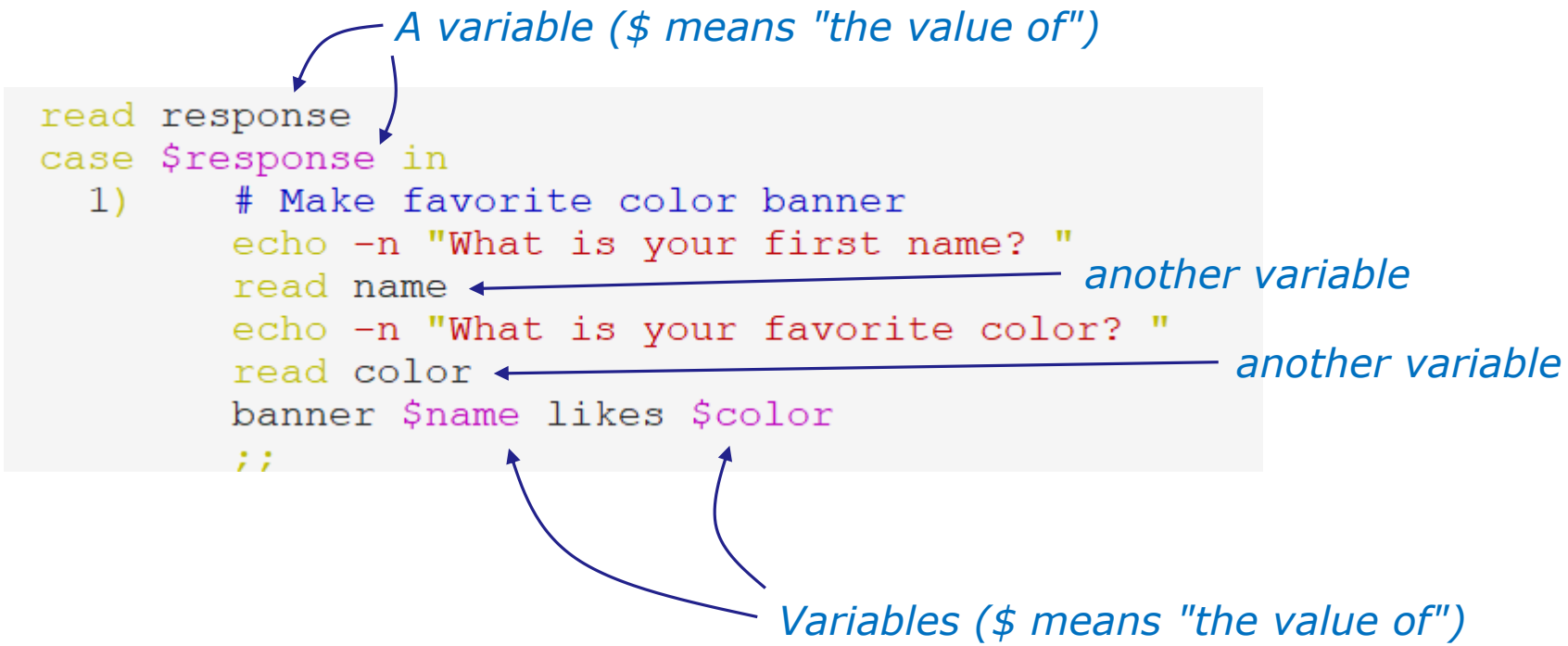
```
read response
case $response in
  1)    # Make favorite color banner
        echo -n "What is your first name? "
        read name
        echo -n "What is your favorite color? "
        read color
        banner $name likes $color
        ;;
```

First case ends here

If the user enters a "1" then these lines of script will be executed

First case of case statement starts here

Final Project Getting Started



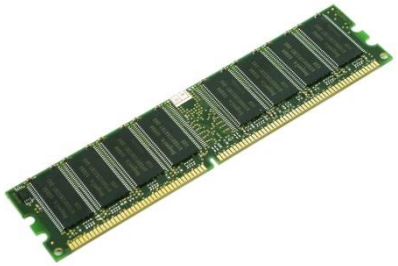
Final Project Getting Started

```
read response
case $response in
  1)     # Make favorite color banner
         echo -n "What is your first name? "
         read name
         echo -n "What is your favorite color? "
         read color
         banner $name likes $color
         ;;
```

Comments begin with a # and are used to document script code.

Variables vs Files

Variables vs Files

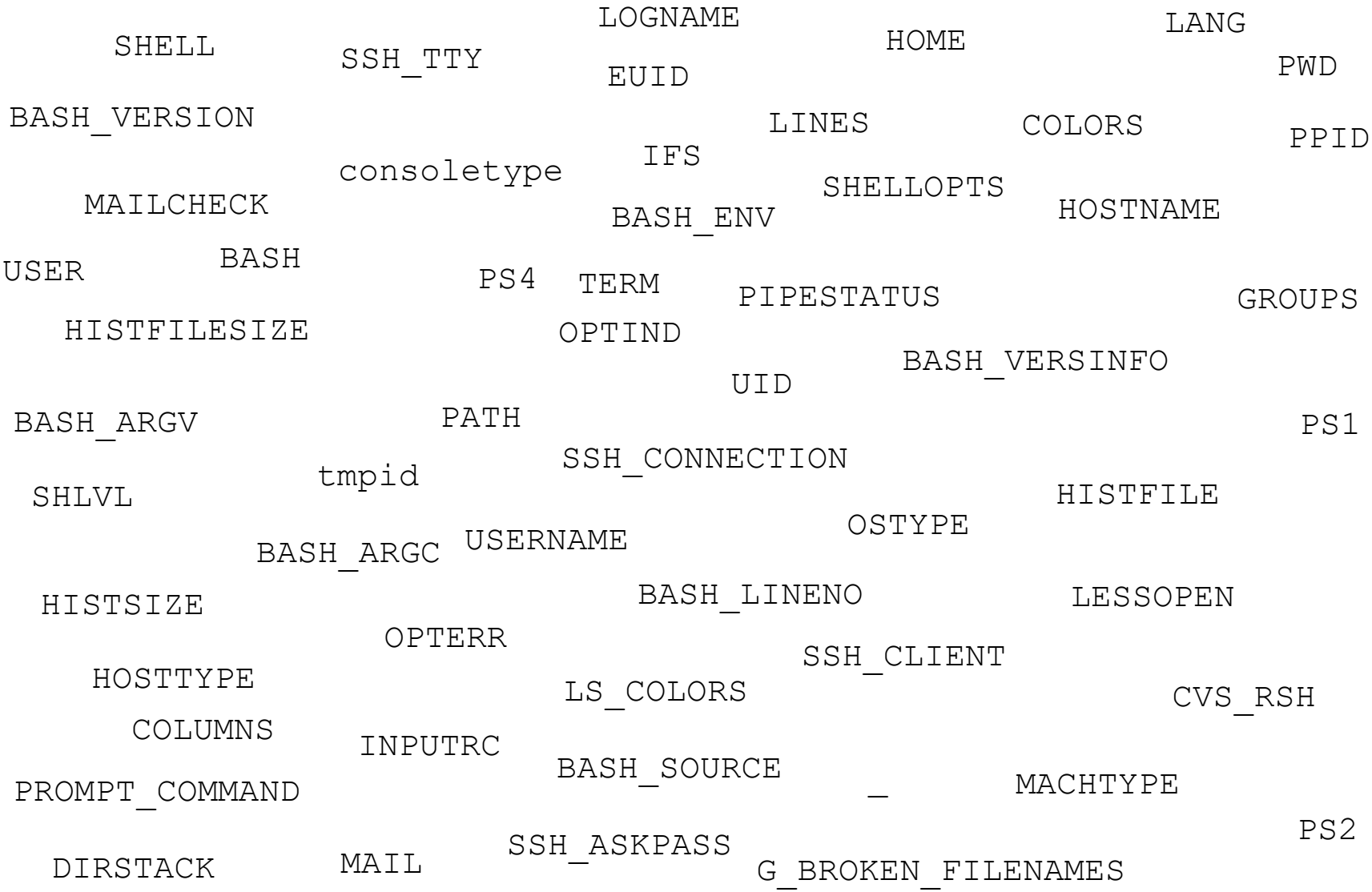


We use **variables** to reference data in memory. For example: PS1, PATH, LOGNAME, color, name

We use **filenames** to reference data on hard drives. For example: */etc/passwd, sonnet1, letter*

Shell Variables

Shell Variables



Note the convention of using upper case

View all shell variables

```
/home/cis90/simben/Poems $ set | more
BASH=/bin/bash
BASH_ARGC=()
BASH_ARGV=()
BASH_ENV=/home/cis90/simben/.bashrc
BASH_LINENO=()
BASH_SOURCE=()
BASH_VERSINFO=([0]="3" [1]="2" [2]="25" [3]="1" [4]="release"
[5]="i686-redhat-linux-gnu")
BASH_VERSION='3.2.25(1)-release'
COLORS=/etc/DIR_COLORS.xterm
COLUMNS=80
CVS_RSH=ssh
DIRSTACK=()
EUID=1160
GROUPS=()
G_BROKEN_FILENAMES=1
HISTFILE=/home/cis90/simben/.bash_history
HISTFILESIZE=1000
HISTSIZE=1000
HOME=/home/cis90/simben
HOSTNAME=opus.cabrillo.edu
HOSTTYPE=i686
IFS=$' \t\n'
IGNOREEOF=10
INPUTRC=/etc/inputrc
LANG=en_US.UTF-8
LESSOPEN='|/usr/bin/lesspipe.sh %s'
LINES=24
LOGNAME=simben
LS_COLORS='no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35
:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05;37;41:ex=
00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.ba
t=00;32:*.sh=00;32:*.csh=00;32:*.tar=00;31:*.tgz=00;31:*.a
rj=00;31:*.taz=00;31:*.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z
=00;31:*.gz=00;31:*.bz2=00;31:*.bz=00;31:*.tz=00;31:*.rpm=
00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.x
bm=00;35:*.xpm=00;35:*.png=00;35:*.tif=00;35:'
MACHTYPE=i686-redhat-linux-gnu
MAIL=/var/spool/mail/simben
MAILCHECK=60
OLDPWD=/home/cis90/simben
OPTERR=1
OPTIND=1
OSTYPE=linux-gnu
PATH=/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/
cis90/simben/../bin:/home/cis90/simben/bin:.
PIPESTATUS=([0]="0")
PPID=26514
PROMPT_COMMAND='echo -ne
"\033]0;${USER}@${HOSTNAME%%.*}:${PWD/#$HOME/~}"; echo -ne
"\007"'
PS1='$PWD $'
PS2='> '
PS4='+ '
PWD=/home/cis90/simben/Poems
SHELL=/bin/bash
SHELLOPTS=braceexpand:emacs:hashall:histexpand:ignoreeof:i
nteractive-comments:monitor
SHLVL=1
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
TERM=xterm
UID=1160
USER=simben
USERNAME=
_=env
consoletype=pty
```

*The **set** command, with no arguments, will show all shell variables and their values*

Using Shell Variables

- Shell variables names consist of alpha-numeric characters.
- Variables defined by the Operating System are uppercase, e.g. TERM, PS1, PATH
- The **set** command will display all the shell's current variables and their values.
- Shell variables are initialized using the assignment operator:
  For example: **TERM=vt100**
  Note: Quotes must be used for white space: **VALUE="any value"**
- Variables may be viewed using the echo command:
  e.g. **echo $TERM**
  The $ in front of a variable name denotes the value of that variable.
- To remove a variable, use the unset command: **unset PS1**
- Shell variables hold their values for the duration of the session i.e. until the shell is exited

Showing the values of variables

Think of the $ metacharacter as "the value of"

Use: **echo $***varname*

Example 1

```
[rsimms@nosmo ~]$ echo $PATH
/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/usr/X11R6/bin:/home/rsimms/bin
```

Example 2

```
[rsimms@nosmo ~]$ echo $TERM
xterm
```

Example 3

```
[rsimms@nosmo ~]$ echo $HOME
/home/rsimms
```

Example 4

```
[rsimms@nosmo ~]$ echo $PS1
[\u@\h \W]\$
```

Using the echo command and the $ to show the values of variables

Setting the values of variables

Use: *varname=value*
(no spaces please around the =)

Do NOT use the $ when setting a variable

Example 1

```
[rsimms@nosmo ~]$ PS1="By your command >"
By your command >
By your command >PS1="What can I do for you $LOGNAME? "
What can I do for you rsimms?
What can I do for you rsimms?
```

Example 2

```
/home/cis90/simben/bin $ river="The Amazon"
/home/cis90/simben/bin $ echo $river
The Amazon
/home/cis90/simben/bin $ echo river
river
```

Creating Shell Variables

1

```
/home/cis90/simmen/bin $ echo $defrost $ac $fan

/home/cis90/simmen/bin $
```

the value of a variable that has not been created is null

2

```
/home/cis90/simmen/bin $ defrost=on
/home/cis90/simmen/bin $ ac=off
/home/cis90/simmen/bin $ fan=medium
```

create some new shell variables and assign values

3

```
/home/cis90/simmen/bin $ echo $defrost $ac $fan
on off medium

/home/cis90/simmen/bin $ echo defrost ac fan
defrost ac fan
```

*print the **values** of the shell variables*

*print the **names** of the shell variables*

Shell Variables

```
/home/cis90/simben $ defrost=on
/home/cis90/simben $ ac=off
/home/cis90/simben $ fan=medium
/home/cis90/simben $ set
```

```
BASH=/bin/bash
BASH_ARGC=()
BASH_ARGV=()
BASH_ENV=/home/cis90/simben/.bashrc
BASH_LINENO=()
BASH_SOURCE=()
BASH_VERSINFO=([0]="3" [1]="2" [2]="25" [3]="1" [4]="release" [5]="i686-redhat-linux-gnu")
BASH_VERSION='3.2.25(1)-release'
COLORS=/etc/DIR_COLORS.xterm
COLUMNS=84
CVS_RSH=ssh
DIRSTACK=()
EUID=1156
GROUPS=()
G_BROKEN_FILENAMES=1
HISTFILE=/home/cis90/simben/.bash_history
HISTFILESIZE=1000
HISTSIZE=1000
HOME=/home/cis90/simben
HOSTNAME=opus.cabrillo.edu
HOSTTYPE=i686
IFS=$' \t\n'
IGNOREEOF=10
INPUTRC=/etc/inputrc
LANG=en_US.UTF-8
LESSOPEN='|/usr/bin/lesspipe.sh %s'
LINES=39
LOGNAME=simben
LS_COLORS='no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05;37;41:ex=00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.bat=00;32:*.sh=00;32:*.csh=00;32:*.tar=00;31:*.tgz=00;31:*.arj=00;31:*.taz=00;31:*
.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z=00;31:*.gz=00;31:*.bz2=00;31:*.bz=00;31:*.tz=00;31:*.rpm=00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.xbm=00;35:*.xpm=00;35:*.png=00;35:*.tif=00;35:'
MACHTYPE=i686-redhat-linux-gnu
MAIL=/var/spool/mail/simben
MAILCHECK=60
OLDPWD=/home/cis90/simben/edits
OPTERR=1
OPTIND=1
OSTYPE=linux-gnu
PATH=/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/cis90/simben/../bin:/home/cis90/simben/bin:.
PIPESTATUS=([0]="0")
PPID=7254
PROMPT_COMMAND='echo -ne "\033]0;${USER}@${HOSTNAME%%.*}:${PWD/#$HOME/~}"; echo -ne "\007"'
PS1='$PWD $ '
PS2='> '
PS4='+ '
PWD=/home/cis90/simben
SHELL=/bin/bash
SHELLOPTS=braceexpand:emacs:hashall:histexpand:ignoreeof:interactive-comments:monitor
SHLVL=1
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
SSH_CLIENT='63.249.103.107 19509 22'
SSH_CONNECTION='63.249.103.107 19509 207.62.186.9 22'
SSH_TTY=/dev/pts/1
TERM=xterm
UID=1156
USER=simben
USERNAME=
_=
ac=off
consoletype=pty
defrost=on
fan=medium
```

*Note: Any new variables you initialize will show up in the output of the **set** command*

font reduced for the other variables to fit on slide

Shell Variables

Using grep to find a variable in the output of the set command

```
/home/cis90/simben $ set | grep defrost
defrost=on
```

The output of the set command is piped to the grep command which displays only lines containing "defrost"

Class Activity

Create and initialize three new variables:

```
defrost=on
ac=off
fan=medium
```

Show the names of the variables:

```
echo  defrost  ac  fan
```

Show the values of the variables:

```
echo  $defrost  $ac  $fan
```

Display all variables and locate yours:

```
set
set | grep defrost
set | grep ^ac
set | grep fan
```

The ^ means look for ac starting in column 1 only

*Paste the output from **set | grep fan** in the chat window*

Removing Shell Variables

To remove a variable, use the unset command: **unset PS1**

```
/home/cis90/simben $ echo  $defrost  $ac  $fan
on off medium
```

show values

```
/home/cis90/simben $ unset defrost
/home/cis90/simben $ echo  $defrost  $ac  $fan
off medium
```

remove one of the variables

```
/home/cis90/simben $ unset ac fan
/home/cis90/simben $ echo  $defrost  $ac  $fan

/home/cis90/simben $
```

remove remaining variables

Activity

Delete your three new variables:

```
unset  defrost
unset  ac  fan
```

Show the names of the variables:

```
echo  defrost  ac  fan
```

Show the values of the variables:

```
echo  $defrost  $ac  $fan
echo "defrost=$defrost"
```

*Paste the output from **echo "defrost=$defrost"** into the chat window*

Shell Variables

Variables are often used in scripts when you need a temporary placeholder to store some data

Create a script that uses a variable named "ac" to hold the status of an air conditioner.

Prompt the user and input what they type into the this variable.

1

```
/home/cis90/simben $ vi funscript
/home/cis90/simben $ cat funscript
#!/bin/bash
echo -n "Turn the Air Conditioning on or off? "
read ac
echo "Air Conditioning set to $ac"
exit
```

2

```
/home/cis90/simben $ chmod +x funscript
```

Add execute permissions so the script can be run

3

```
/home/cis90/simben $ ./funscript
Turn the Air Conditioning on or off? off
Air Conditioning set to off
```

Run the script

Activity

Now make this little user dialog script:

vi funscript

insert the following lines then save

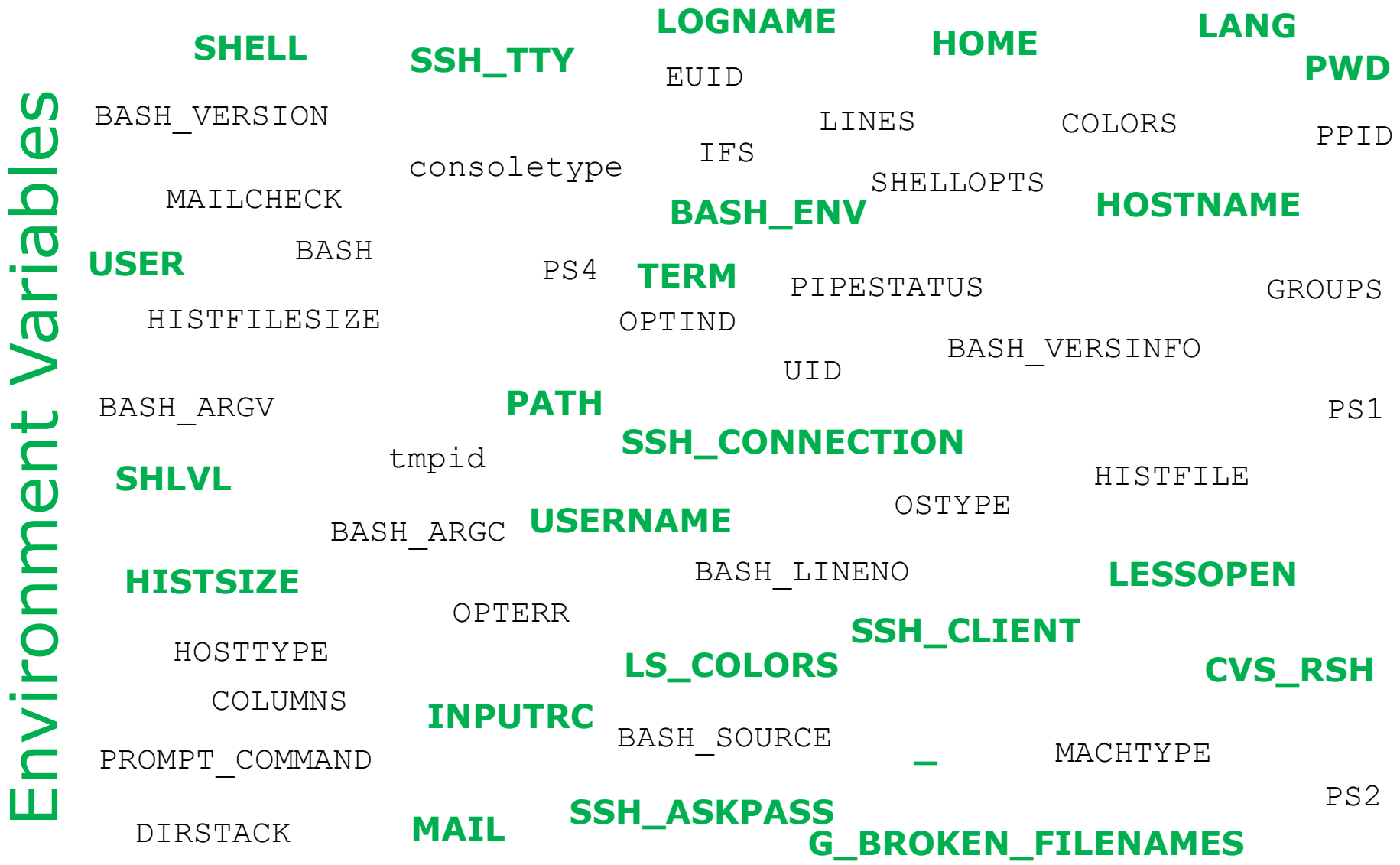
```
#!/bin/bash
echo -n "Turn the Air Conditioning on or off? "
read ac
echo "Air Conditioning set to $ac"
exit
```

chmod +x funscript

./funscript

Run: ***stat -c %a funscript*** *and paste the output into the chat window*

Environment Variables



*Use the **env** to see which of the shell variables have been exported and therefore are environment variables (shown in bold/green above)*

View all Environment (exported) Variables

```
[simben@opus ~]$ env
HOSTNAME=opus.cabrillo.edu
SHELL=/bin/bash
TERM=xterm
HISTSIZE=1000
SSH_CLIENT=63.249.103.107 20807 22
SSH_TTY=/dev/pts/0
USER=simben
LS_COLORS=no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05
;37;41:ex=00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.bat=00;32:*.sh=00;32:*.csh=00;32:*.tar=
00;31:*.tgz=00;31:*.arj=00;31:*.taz=00;31:*.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z=00;31:*.gz=00;31:*.bz2=00
;31:*.bz=00;31:*.tz=00;31:*.rpm=00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.xbm=00;35:*.xpm=
00;35:*.png=00;35:*.tif=00;35:
USERNAME=
PATH=/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/cis90/simben/../bin:/home/cis90/simben/bin:.
MAIL=/var/spool/mail/simben
PWD=/home/cis90/simben
INPUTRC=/etc/inputrc
LANG=en_US.UTF-8
fan=medium
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
HOME=/home/cis90/simben
SHLVL=2
BASH_ENV=/home/cis90/simben/.bashrc
LOGNAME=simben
CVS_RSH=ssh
SSH_CONNECTION=63.249.103.107 20807 207.62.186.9 22
LESSOPEN=|/usr/bin/lesspipe.sh %s
G_BROKEN_FILENAMES=1
_=/bin/env
```

The env command by itself will list all the environment (exported) variables

View all Environment (exported) Variables

```
[simben@opus ~]$ export
declare -x BASH_ENV="/home/cis90/simben/.bashrc"
declare -x CVS_RSH="ssh"
declare -x G_BROKEN_FILENAMES="1"
declare -x HISTSIZE="1000"
declare -x HOME="/home/cis90/simben"
declare -x HOSTNAME="opus.cabrillo.edu"
declare -x INPUTRC="/etc/inputrc"
declare -x LANG="en_US.UTF-8"
declare -x LESSOPEN="|/usr/bin/lesspipe.sh %s"
declare -x LOGNAME="simben"
declare -x
LS_COLORS="no=00:fi=00:di=00;34:ln=00;36:pi=40;33:so=00;35:bd=40;33;01:cd=40;33;01:or=01;05;37;41:mi=01;05;37
;41:ex=00;32:*.cmd=00;32:*.exe=00;32:*.com=00;32:*.btm=00;32:*.bat=00;32:*.sh=00;32:*.csh=00;32:*.tar=00;31:*
.tgz=00;31:*.arj=00;31:*.taz=00;31:*.lzh=00;31:*.zip=00;31:*.z=00;31:*.Z=00;31:*.gz=00;31:*.bz2=00;31:*.bz=00
;31:*.tz=00;31:*.rpm=00;31:*.cpio=00;31:*.jpg=00;35:*.gif=00;35:*.bmp=00;35:*.xbm=00;35:*.xpm=00;35:*.png=00;
35:*.tif=00;35:"
declare -x MAIL="/var/spool/mail/simben"
declare -x OLDPWD
declare -x
PATH="/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bin:/home/cis90/simben/../bin:/home/cis90/simben/bin:."
declare -x PWD="/home/cis90/simben"
declare -x SHELL="/bin/bash"
declare -x SHLVL="2"
declare -x SSH_ASKPASS="/usr/libexec/openssh/gnome-ssh-askpass"
declare -x SSH_CLIENT="63.249.103.107 20807 22"
declare -x SSH_CONNECTION="63.249.103.107 20807 207.62.186.9 22"
declare -x SSH_TTY="/dev/pts/0"
declare -x TERM="xterm"
declare -x USER="simben"
declare -x USERNAME=""
```

*The **export** command by itself will list all the exported (environment) variables.*

*Similar to **env** command but different output format*

Using Environment (exported) Variables

- Environment variables are a special subset of the shell variables.
- Environment variables are shell variables that have been *exported*.
- The **env** command will display the current environment variables and their values. Also using the **export** command with no arguments will show all the environment (exported) variables.
- The **export** command is used to make a shell variable into an environment variable.

  dog=benji; export dog
  or **export dog=benji**

- The **export -n** command changes an environment (exported) variable back to a normal shell variable. E.g. **export -n dog** makes dog back into a regular shell variable.

Child processes get copies of the parent's exported variables.

Any changes made by the child to these variables will not affect the parent's variables.

Environment (exported) Variables

Create, export and view

*Using **env** to show environment (exported) variables*

1

```
/home/cis90/simben $ env | wc -l
26
```

There are currently 29 environment (exported) variables

2

```
/home/cis90/simben $ fan=medium
/home/cis90/simben $ export fan
```

Create a new shell variable named fan and export it so it becomes an environment variable

3

```
/home/cis90/simben $ env | wc -l
27
```

Now there are 30 environment variables

4

```
[simben@opus ~]$ env | grep fan
fan=medium
```

use grep to show fan is an environment (exported) shell variable

```
[simben@opus ~]$ set | grep fan
fan=medium
```

use grep to show fan is a shell variable

Environment (exported) Variables

Create, export and view

Using export to create and show exported (environment) variables

1

```
/home/cis90/simben $ export | wc -l
26
```

There are currently 29 environment (exported) variables

2

```
/home/cis90/simben $ fan=medium
/home/cis90/simben $ export fan
```

Create a new shell variable named fan and export it so it becomes an environment variable

3

```
/home/cis90/simben $ export | wc -l
27
```

Now there are 30 environment variables

4

```
[simben@opus ~]$ export | grep fan
declare -x fan="medium"
```

use grep to show fan is an environment (exported) shell variable

```
[simben@opus ~]$ set | grep fan
fan=medium
```

use grep to show fan is a shell variable

Activity

Recreate the variable named fan:

fan=high

Show that fan is now one of your shell variables:

set | grep fan

Show that fan has not been exported:

env | grep fan

Now export fan and show it:

export fan
env | grep fan

*Paste the output from **env | grep fan** into the chat window*

Shell Environment

The Shell Environment

- The shell environment can be customized using the environment variables.
- Commands in the shell environment can be customized using aliases.
- Aliases and environment variable settings can be made permanent using the hidden .*bash_profile* and .*bashrc* files in the users home directory.
- Environment variables can be exported so they are available to child processes.

Shell (Environment) Variables

Some famous environment variables

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

Activity

Echo three environment variables as follows:

echo "I'm in $PWD using $SHELL and my username is $LOGNAME"

Paste the output you get into the chat window

bash shell tip

changing the prompt

Prompt Code	Meaning
\!	history command number
\#	session command number
\d	date
\h	hostname
\n	new line
\s	shell name
\t	time
\u	user name
\w	entire path of working directory
\W	only working directory
\$	$ or # (for root user)

The prompt string can have any combination of text, variables and these codes.

Customizing the shell prompt with PS1

PS1 settings	Result
PS1='$PWD $'	/home/cis90/simben/Poems $
PS1="\w $"	~/Poems $
PS1="\W $"	Poems $
PS1="\u@\h $"	simben90@opus $
PS1='\u@\h $PWD $'	simben90@opus /home/cis90/simben/Poems $
PS1='\u@\$HOSTNAME $PWD $'	simben90@opus.cabrillo.edu /home/cis90/simben/Poems $
PS1='\u \! $PWD $'	simben90 825 /home/cis90/simben/Poems $
PS1="\d [\u@\h \W/] \$ "	Mon Nov 16 [simben90@oslab Poems/] $
PS1="Enter command: "	Enter command:

Important: Use single quotes around variables that change. For example if you use $PWD with double quotes, the prompt will **not** change as you change directories!

Activity

Prompt Code	Meaning
\!	history command number
\#	session command number
\d	date
\h	hostname
\n	new line
\s	shell name
\t	time
\u	user name
\w	entire path of working directory
\W	only working directory
\$	$ or # (for root user)

Make a new prompt using one or more of the special prompt codes:

PS1="*make your own prompt here***"**

Paste your new prompt into the chat window

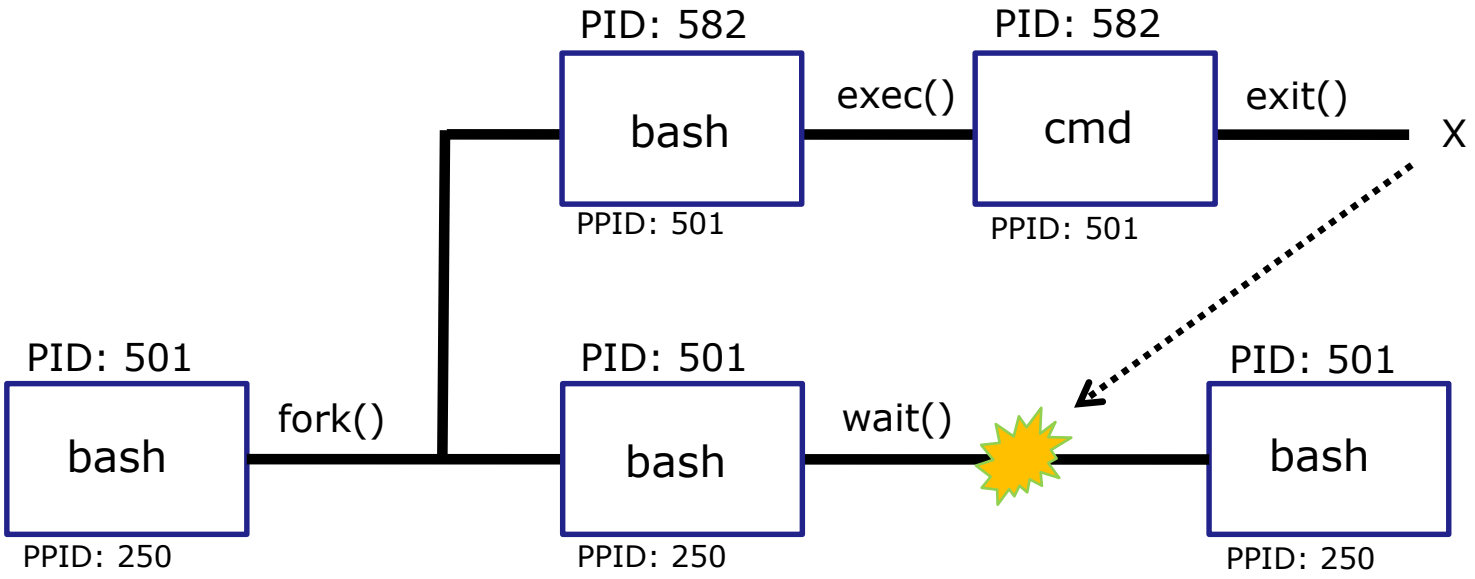
Variables and child processes

The rules of the road for variables

1. When a shell forks a child, only copies of exported variables are made available to the child.

2. A child can modify the variables it receives but those modifications will not change the parent's variables.

exporting variables



- When a shell forks a child, only copies of exported variables are made available to the child.
- A child can modify the variables it receives but those modifications will not change the parent's variables.

The rules of the road for variables

1. When a shell forks a child, only copies of exported variables are made available to the child.

2. A child can modify the variables it receives but those modifications will not change the parent's variables.

Only exported variables are available to the child

1 parent

```
/home/cis90/simben $ window=down
/home/cis90/simben $ echo $window $LOGNAME
down simben90
```

Create a new variable named window

2 parent

```
/home/cis90/simben $ env | grep window
/home/cis90/simben $ set | grep window
window=down

/home/cis90/simben $ env | grep LOGNAME
LOGNAME=simben90
/home/cis90/simben $ set | grep LOGNAME
LOGNAME=simben90
```

*window is a shell variable that has **not** been exported.*

LOGNAME is an environment variable that has been exported.

3 child

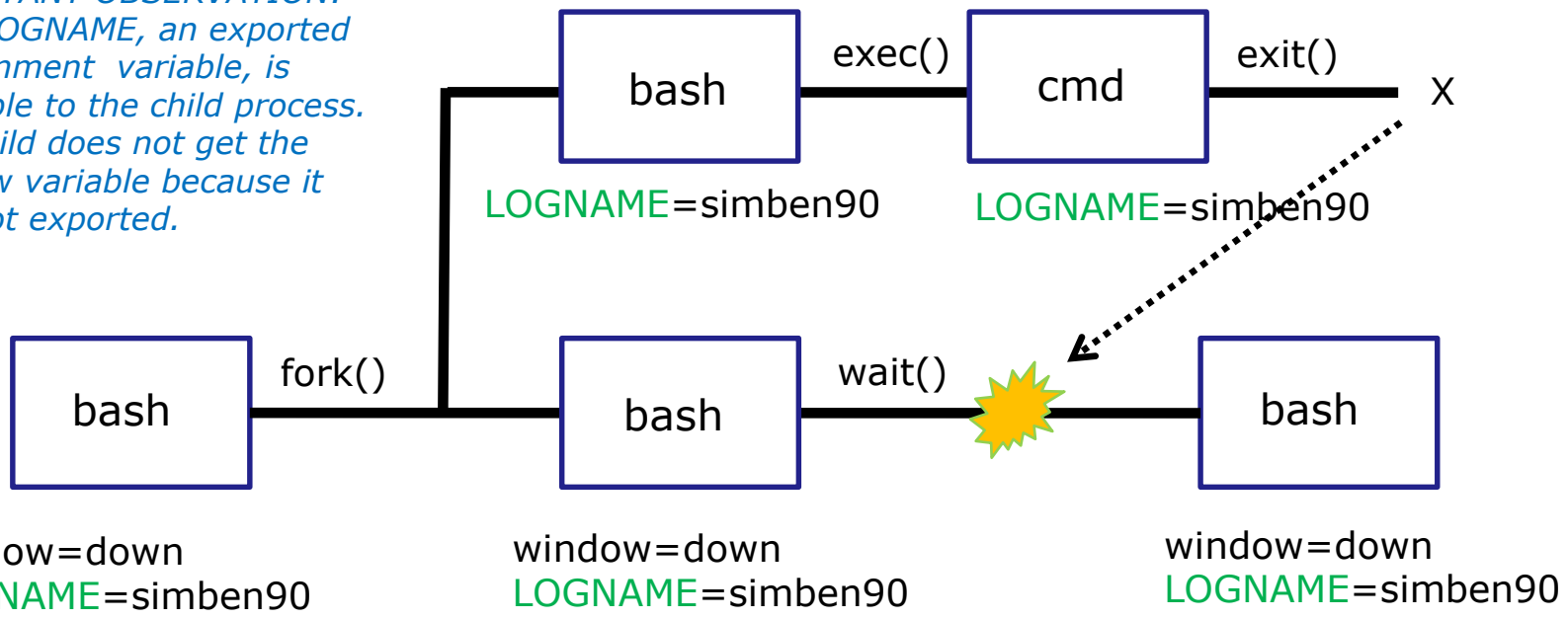
```
/home/cis90/simben $ bash
[simben@opus ~]$ echo $window $LOGNAME
simben90
[simben@opus ~]$ exit
exit
```

Running the bash command starts another bash process as a child of the current bash process. LOGNAME has a value, but there is no window variable.

IMPORTANT OBSERVATION: Only LOGNAME, an exported environment variable, is available to the child process. The child does not get the window variable because it was not exported.

Only exported variables are available to the child

IMPORTANT OBSERVATION: Only LOGNAME, an exported environment variable, is available to the child process. The child does not get the window variable because it was not exported.



- When a shell forks a child, not all of the variables are passed on to the child.
- Only copies of the parent's exported variables are passed to the child.

The rules of the road for variables

1. When a shell forks a child, only copies of exported variables are made available to the child.

2. A child can modify the variables it receives but those modifications will not change the parent's variables.

Changes made by the child do not affect the parent

1 *parent*

```
/home/cis90/simben $ echo $window
down
/home/cis90/simben $ export window
```

export window so it is available to children

2 *child*

```
/home/cis90/simben $ bash
[simben@opus ~]$ echo $window
down
```

a copy of window is now available to the child process

3 *child*

```
[simben@opus ~]$ window=up
[simben@opus ~]$ echo $window
up
[simben@opus ~]$ exit
exit
```

the child modifies the window variable

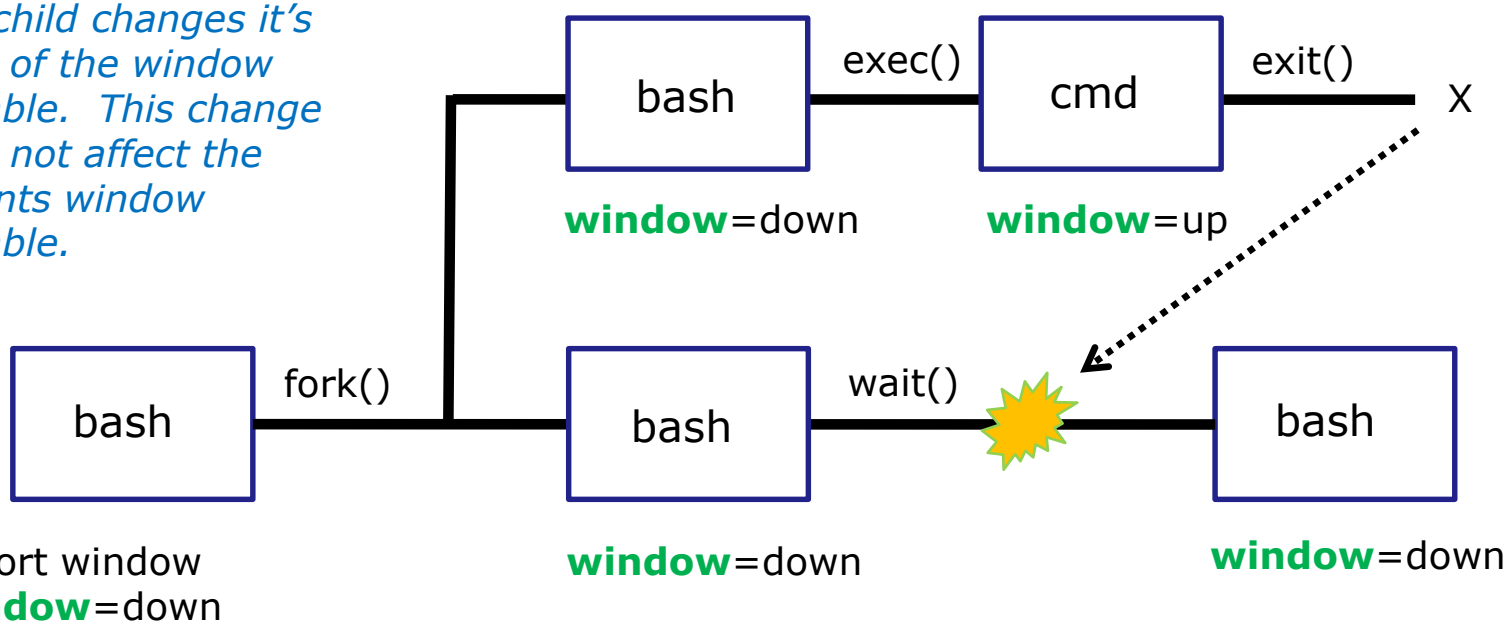
4 *parent*

```
/home/cis90/simben $ echo $window
down
```

The modifications made by the child do not affect the parent's variable

Changes made by the child do not affect the parent

The child changes it's copy of the window variable. This change does not affect the parents window variable.



- A child can modify the variables it receives but those modifications will not change the parent's variables.

Activity

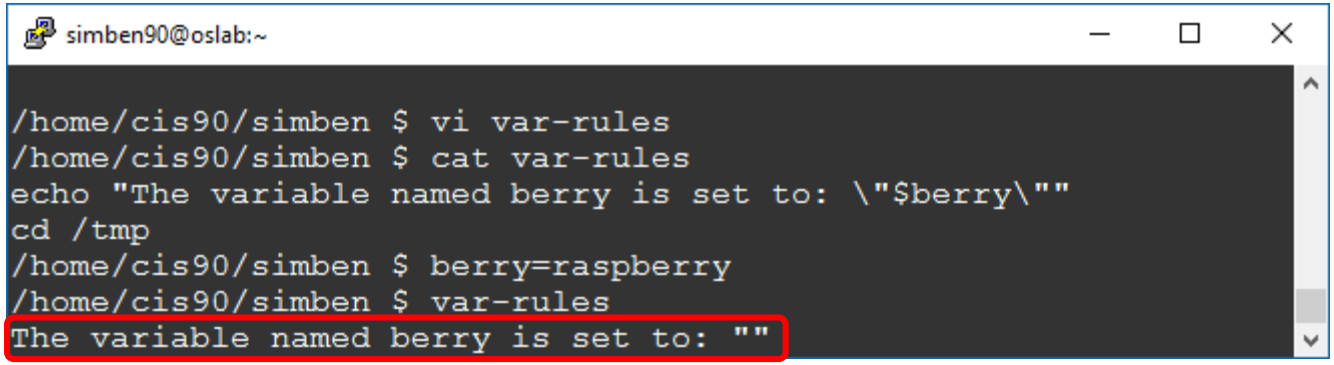
Look at the commands in this executable script:

```
/home/cis90/simben $ chmod +x var-rules
/home/cis90/simben $ cat var-rules
echo "The variable named berry is set to: \"$berry\""
cd /tmp
```

What would be the output of running the script as follows:

```
berry=raspberry
var-rules
```

Paste your answer into the chat window



A child can only see variables the parent exports and berry was NOT exported!

Activity

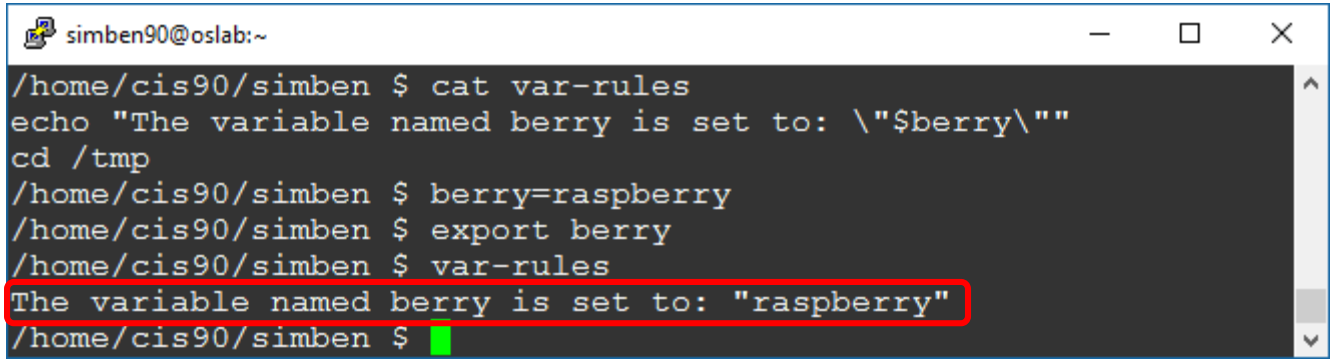
Look at the commands in this executable script:

```
/home/cis90/simben $ chmod +x var-rules
/home/cis90/simben $ cat var-rules
echo "The variable named berry is set to: \"$berry\""
cd /tmp
```

What would be the output of running the script as follows:

```
berry=raspberry
export berry
var-rules
```

Paste your answer into the chat window



A child can only see variables the parent exported and berry was exported.

Activity

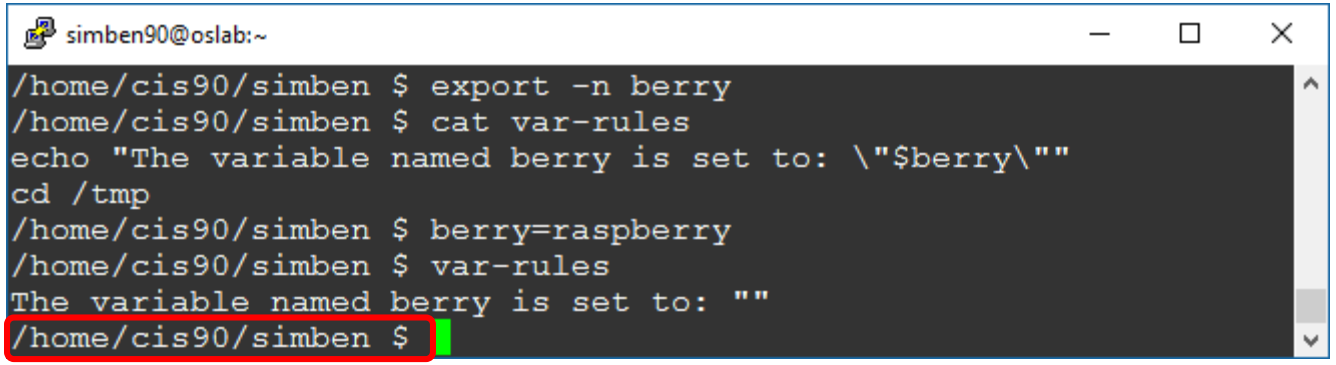
Look at the commands in this executable script:

```
/home/cis90/simben $ chmod +x var-rules
/home/cis90/simben $ cat var-rules
echo "The variable named berry is set to: \"$berry\""
cd /tmp
```

What directory would you be in after running the script as follows:

```
berry=raspberry
var-rules
```

Paste your answer into the chat window



A child cannot change parent's variables, like PWD

Aliases

alias command
(a shell builtin)

```
alias [-p] [name[=value] ...]
            Alias with no arguments or with the -p option prints the list
            of aliases in the form alias name=value on  standard  output.
            When  arguments  are  supplied,  an alias is defined for each
            name whose value is given.  A trailing space in  value causes
            the  next  word to be checked for alias substitution when the
            alias is expanded.  For each name in the  argument  list  for
            which  no  value is supplied, the name and value of the alias
            is printed.  Alias returns true unless a name  is  given  for
            which no alias has been defined.

            Note  aliases  are not expanded by default in non-interactive
            shell, and it can be enabled by  setting  the  expand_aliases
            shell option using shopt.
```

Now you can give your own name to commands!

alias command

Example: Make a new name for the cp command

1
```
/home/cis90/simben $ alias copy=cp
/home/cis90/simben $ copy lab09 /home/rsimms/turnin/cis90/lab09.$LOGNAME
/home/cis90/simben $
```

2
```
/home/cis90/simben $ type copy
copy is aliased to `cp'
/home/cis90/simben $
```

*The **type** command shows that copy is an alias*

3
```
/home/cis90/simben $ alias copy
alias copy='cp'
/home/cis90/simben $
```

*The **alias** command (without an "=" sign) shows what the alias is*

4
```
/home/cis90/simben $ unalias copy
/home/cis90/simben $ alias copy
-bash: alias: copy: not found
```

*Use **unalias** command to remove an alias*

alias command

Example: Make an alias, called s, that prints the first 5 lines of small_town

1

```
/home/cis90/simben $ alias s="clear; head -n5 ~/edits/small_town"
/home/cis90/simben $ s
HOW SMALL IS SMALL?

YOU KNOW WHEN YOU'RE IN A SMALL TOWN WHEN...
   The airport runaway is terraced.
   The polka is more popular than a moshpit on Saturday night.
/home/cis90/simben $
```

2

```
/home/cis90/simben $ type s
s is aliased to `clear; head -n5 ~/edits/small_town'
/home/cis90/simben $ alias s
alias s='clear; head -n5 ~/edits/small_town'
```

*The **type** and **alias** commands show that s is an alias*

3

```
/home/cis90/simben $ unalias s
/home/cis90/simben $
```

*Use **unalias** command to remove an alias*

alias an alias

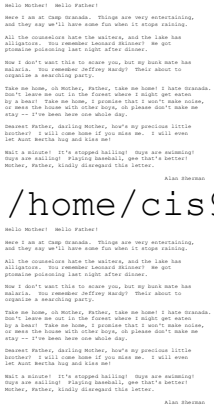
Yes, an alias can be made using another alias

1

```
/home/cis90/simben $ alias show=cat
/home/cis90/simben $ alias mira=show
```

*Make **show** an alias of **cat***
*Make **mira** an alias of **show***

```
/home/cis90/simben $ show 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? We got promotion 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

reduced size to fit on page

2

```
/home/cis90/simben $ mira letter
```

*Now, either **show letter** or **mira letter** will cat out the letter file*

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? We got promotion 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

reduced size to fit on page

3

```
/home/cis90/simben $ unalias show
/home/cis90/simben $ alias mira
alias view='show'
/home/cis90/simben $ mira letter
-bash: show: command not found
/home/cis90/simben $
```

It can be broken too

single and double quotes (**very subtle**)

You can control whether bash does filename expansion when you create the alias or ... when the alias is used

```
$ ac=on
$ fan=medium
$ defrost=off
```

double → *single*

1

```
$ alias p="echo $ac $fan $defrost"
$ alias p
alias p='echo on medium off'
```

```
$ alias p='echo $ac $fan $defrost'
$ alias p
alias p='echo $ac $fan $defrost'
```

2

```
$ p
on medium off
```

```
$ p
on medium off
```

3

```
$ ac=off
```

```
$ ac=off
```

4

```
$ p
on medium off
```

```
$ p
off medium off
```

Note: using single quotes prevents bash from expanding the variables when creating up the alias

Activity

Make some aliases

Make an alias named **showpath** that shows the shell path:

```
alias showpath="echo $PATH"
showpath
```

Make an alias named **whereonpath** that shows where on the path a command is:

```
alias whereonpath="type -a"
whereonpath ls
whereonpath tty
whereonpath bogus
```

*Paste the output of **whereonpath tty** into the chat window*

bash startup files

bash startup files

Only executed when logging in

/etc/profile (system wide)

- adds root's special path

/etc/profile.d/*.sh (system wide)

- kerberos directories added to path
- adds color, vi aliases
- language, character sets

.bash_profile or **.profile** (user specific)

- set up your path, prompt and other environment variables

.bashrc (user specific)

- add your new aliases here

Edit these files to customize your shell environment

/etc/bashrc (system wide)

- changes umask to 0002 for regular users
- sets final prompt string

Note: The Debian family (Ubuntu, Mint, Raspian, etc.) uses .profile instead of .bash_profile

.bash_profile

(Red Hat family)

.profile

(Debian family)

.bash_profile

- The .*bash_profile* is a shell script that sets up a user's shell environment.
- This script is executed each time the user logs in.
- The .*bash_profile* is used for initializing shell variables and running basic commands like umask or set -o options.
- This script also runs the user's .*bashrc* file

The Debian family uses .profile instead of .bash_profile

.bash_profile for CIS 90 (runs only at login)

```
[simben@opus ~]$ cat .bash_profile
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
        . ~/.bashrc
fi

# User specific environment and startup programs

PATH=$PATH:$HOME/../bin:$HOME/bin:.
BASH_ENV=$HOME/.bashrc
USERNAME=""
PS1='$PWD $ '
export USERNAME BASH_ENV PATH
umask 002
set -o ignoreeof
stty susp ^F
eval `tset -s -m vt100:vt100 -m :\?${TERM:-ansi} -r -Q `

[simben@opus ~]$
```

sources the .bashrc file

Appends the CIS 90 bin, the user's bin and the "current" directories to the path

The special prompt used for CIS 90 students is specified

variables are exported

umask value is set

EOF's are ignored

Suspend character redefined from Z to F

Terminal type is requested and set

.bashrc

.bashrc

- The *.bashrc* is a shell script that is executed during user login and whenever a new shell is invoked
- Good place to add user defined aliases

.bashrc

The *.bashrc* is a shell script that is executed during user login and whenever a new shell is invoked. This file usually contains the user defined aliases.

```
[simben@opus ~]$ cat .bashrc
# .bashrc

# User specific aliases and functions

# Source global definitions
if [ -f /etc/bashrc ]; then
        . /etc/bashrc
fi
alias print="echo -e"
[simben@opus ~]$
```

sources the /etc/bashrc file

creates a print alias, the -e option enables interpretation of backslash escapes

Activity

Modify .bashrc

Add a new permanent alias to your bash environment

```
alias me="finger $LOGNAME"
```

When finished logout and login again and verify the alias is permanent.

. and exec

. and exec

In normal execution of a UNIX command, shell-script or binary, the child process is unable to affect the login shell environment.

Sometimes it is desirable to run a shell script that will initialize or change shell variables in the parent environment. To do this, the shell (bash) provides a **.** (dot) or **source** command, which instructs the shell to execute the shell script itself, without spawning a child process to run the script, and then continue on where it left off.

. *myscript*
source *myscript* } *equivalent*

In this example, the commands in the file script are run by the parent shell, and therefore, any changes made to the environment will last for the duration of the login session.

If a UNIX command is run using the **exec** command, the bash code in the process is overlaid by the command code, when finished the process will terminate

exec clear

This will have the effect of clearing the screen and logging off the computer

Grok this lesson?

```
/home/cis90/simben $ vi /home/cis90/bin/flowers
```

simben90@oslab:~

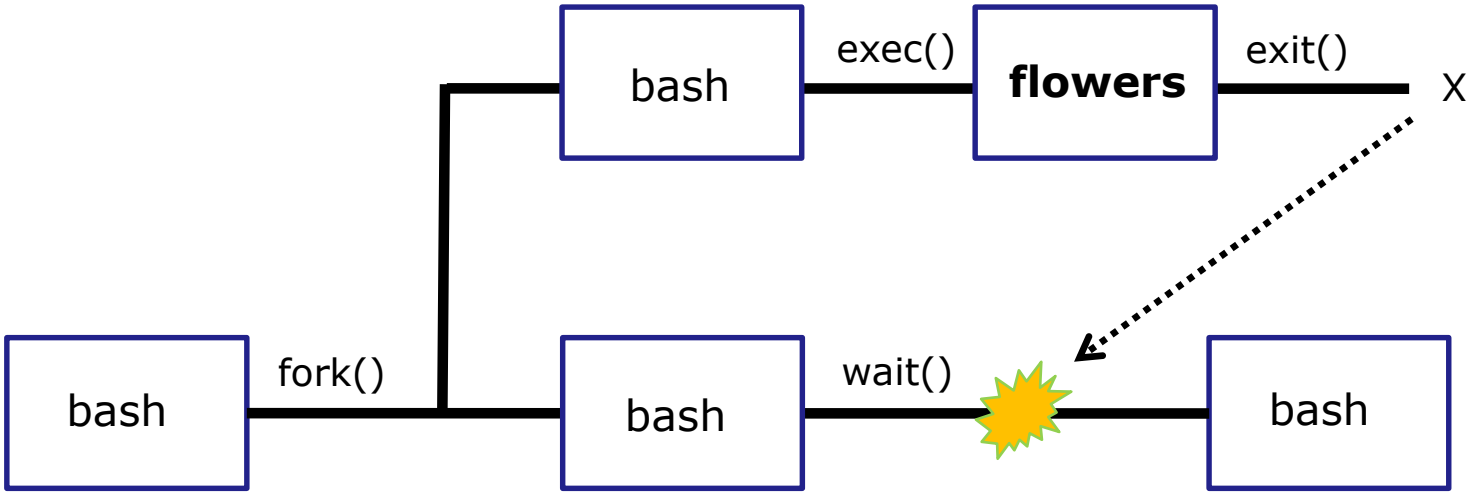
```
#!/bin/bash
#
# Useful alias:
#   alias go='echo roses are \"$roses\" and violets are \"$violets\"'
#
echo
echo "==> Entering child process <=="
ps
echo "==> showing variables in child <=="
echo "  " roses are '"'$roses'"'
echo "  " violets are '"'$violets'"'
echo "==> setting variables in child <=="
roses=black
violets=orange
echo "==> Leaving child process <=="
echo
~
~
~
~
"/home/cis90/bin/flowers" [readonly] 16L, 372C                1,1           All
```

You can copy and paste

```
/home/cis90/simben $ alias go='echo roses are \"$roses\" and violets are \"$violets\"'
/home/cis90/simben $ go
roses are "" and violets are ""
```

*The **go** alias is used to show the current values of the roses and violets variables*

running the flowers script



*Use the **flowers** script to test your understanding of how variables are handled with child processes*

As a convenience create an alias to show variable values

Note, the double quotes are escaped. We don't want bash to treat them as special metacharacters. We just want the double quotes preserved so they can be seen in the output of the echo command.

```
/home/cis90/simben $ alias go='echo roses are \"$roses\" and violets
are \"$violets\"'

/home/cis90/simben $ alias go
alias go='echo roses are \"$roses\" and violets are \"$violets\"'

/home/cis90/simben $ go
roses are "" and violets are ""
```

Since there are no shell variables named roses or violets the echo command prints nothing for them.

Create and initialize variables

```
/home/cis90/simben $ go
roses are "" and violets are ""
```

```
/home/cis90/simben $ roses=red
/home/cis90/simben $ go
roses are "red" and violets are ""
```

Now the roses variable has been created and initialized

```
/home/cis90/simben $ violets=blue
/home/cis90/simben $ go
roses are "red" and violets are "blue"
```

Now the violets variable has been created and initialized

Unset variables

```
/home/cis90/simben $ unset roses
/home/cis90/simben $ go
roses are "" and violets are "blue"
```

Now the roses variable no longer exists

```
/home/cis90/simben $ unset violets
/home/cis90/simben $ go
roses are "" and violets are ""
```

Now the violets variable no longer exists

Create and initialize variables again

```
/home/cis90/simben $ roses=red; violets=blue
/home/cis90/simben $ go
roses are "red" and violets are "blue"
```

Now both variables have been created and initialized again

Run flowers script as a child process
(variables not exported)

```
/home/cis90/simben $ go
roses are "red" and violets are "blue"

/home/cis90/simben $ flowers

==> Entering child process <==
  PID TTY          TIME CMD
28834 pts/0    00:00:00 bash
29447 pts/0    00:00:00 flowers
29454 pts/0    00:00:00 ps
==> showing variables in child <==
   roses are ""
   violets are ""
==> setting variables in child <==
==> Leaving child process <==

/home/cis90/simben $ go
roses are "red" and violets are "blue"
```

The parent sees roses and violets

The child does not see roses or violets

The variables are unchanged after running flowers script

Run flowers script as a child process
(roses variable exported)

```
/home/cis90/simben $ export roses
/home/cis90/simben $ go
roses are "red" and violets are "blue"

/home/cis90/simben $ flowers

==> Entering child process <==
  PID TTY          TIME CMD
28834 pts/0    00:00:00 bash
29457 pts/0    00:00:00 flowers
29464 pts/0    00:00:00 ps
==> showing variables in child <==
   roses are "red"
   violets are ""
==> setting variables in child <==
==> Leaving child process <==

/home/cis90/simben $ go
roses are "red" and violets are "blue"
```

The parent sees roses and violets

The child now sees roses since it was exported

The variables are unchanged after running flowers script

Run flowers script as a child process
(script sourced)

```
/home/cis90/simben $ go
roses are "red" and violets are "blue"

/home/cis90/simben $ source flowers

==> Entering child process <==
  PID TTY          TIME CMD
28834 pts/0    00:00:00 bash
29469 pts/0    00:00:00 ps
==> showing variables in child <==
   roses are "red"
   violets are "blue"
==> setting variables in child <==
==> Leaving child process <==

/home/cis90/simben $ go
roses are "black" and violets are "orange"
```

The parent sees roses and violets

script is not running as child

The script now sees roses and violets because it is running in the parent process

The variables are changed after running flowers script


Assignment

Lab 10 - the last one!

You may end up locking yourself out of Opus or seeing other strange things when doing this lab.

I'll be monitoring the forum as usual if anyone needs help.


Wrap up

Extra Credit Special

1) Why did the prompt change?

```
/home/cis90/simben $ bash
[simben@opus ~]$ exit
exit
/home/cis90/simben $
```

2) What command could be issued prior to the bash command above that would prevent the prompt from changing?

*For 2 points extra credit, email risimms@cabrillo.edu answers to **both** questions before the next class starts*

New commands:

.	- source the commands
alias	- create or show an alias
unalias	- remove an alias
set	- show all variables
env	- show environment variables
export	- export variable so child can use
exec	- replace with new code
source	- same as .

New Files and Directories:

.bash_profile	- executed at login
.bashrc	- executed at login and new shells

Next Class

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

Lab 10

Quiz questions for next class:

- How do you make an alias setting permanent?
- What must you do to a variable so a child can use it?
- How would you use an alias to make a command named copy … that would do what the cp command does?

End Meeting

Backup

vi and /bin/mail (review)

Best Practice - /bin/mail and vi

```
/home/cis90/simben $ mail rodduk90
Subject: Good bones
Hey Duke,
I really appreciate thatbone you sent me last week.
Let me knwo if you want to go mark some fench posts
this weekend.
Later,
Ben
```

You are composing a message and you spot some typos …
CRUD … what can you do?

/bin/mail and vi

```
/home/cis90/simben $ mail rodduk90
Subject: Good bones
Hey Duke,
I really appreciate thatbone you sent me last week.
Let me knwo if you want to go mark some fench posts
this weekend.
Later,
Ben
~v
```

Well … you could try the ~v command

/bin/mail and vi

The message is loaded into vi where changes or additions can be made. <Esc>:wq is used to save and quit vi

/bin/mail and vi

```
/home/cis90/simben $ mail rodduk90
Subject: Good bones
Hey Duke,
I really appreciate thatbone you sent me last week.
Let me knwo if you want to go mark some fench posts
this weekend.
Later,
Ben
~v
(continue)
.
Cc:
/home/cis90/simben $
```

The earlier text with typos is still showing, however the corrected version is what is actually sent.

/bin/mail and vi

```
/home/cis90/rodduk $ mail
Mail version 8.1 6/6/93.  Type ? for help.
"/var/spool/mail/rodduk90": 1 message 1 unread
>U  1 simben90@opus.cabril  Mon Nov 10 20:25  22/782   "Good bones"
& 1
Message 1:
From simben90@opus.cabrillo.edu  Mon Nov 10 20:25:32 2008
Date: Mon, 10 Nov 2008 20:25:32 -0800
From: Benji Simms <simben90@opus.cabrillo.edu>
To: rodduk90@opus.cabrillo.edu
Subject: Good bones

Hey Duke,
I really appreciate that bone you sent me last week.
Let me know if you want to go mark some fence posts
this weekend.
Later,
Ben

&
```

The message Duke reads has all the typos fixed!

Activity

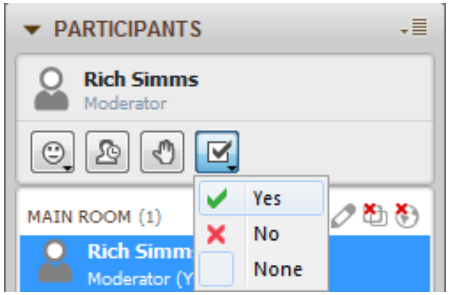
Try it!

Use /bin/mail and send yourself a message:

mail $LOGNAME

Type a few lines into the message then use the **~v** command to correct or change them.

Read the email you sent yourself to see if your changes worked.



Did it work?
Start this activity by putting a red x in CCC Confer.
If you get it to work correctly change your red x to a green checkmark