Rich's lesson module checklist *Last updated 10/12/2016*

- ❑ Slides and lab posted
- ❑ WB converted from PowerPoint
- ❑ Print out agenda slide and annotate page numbers

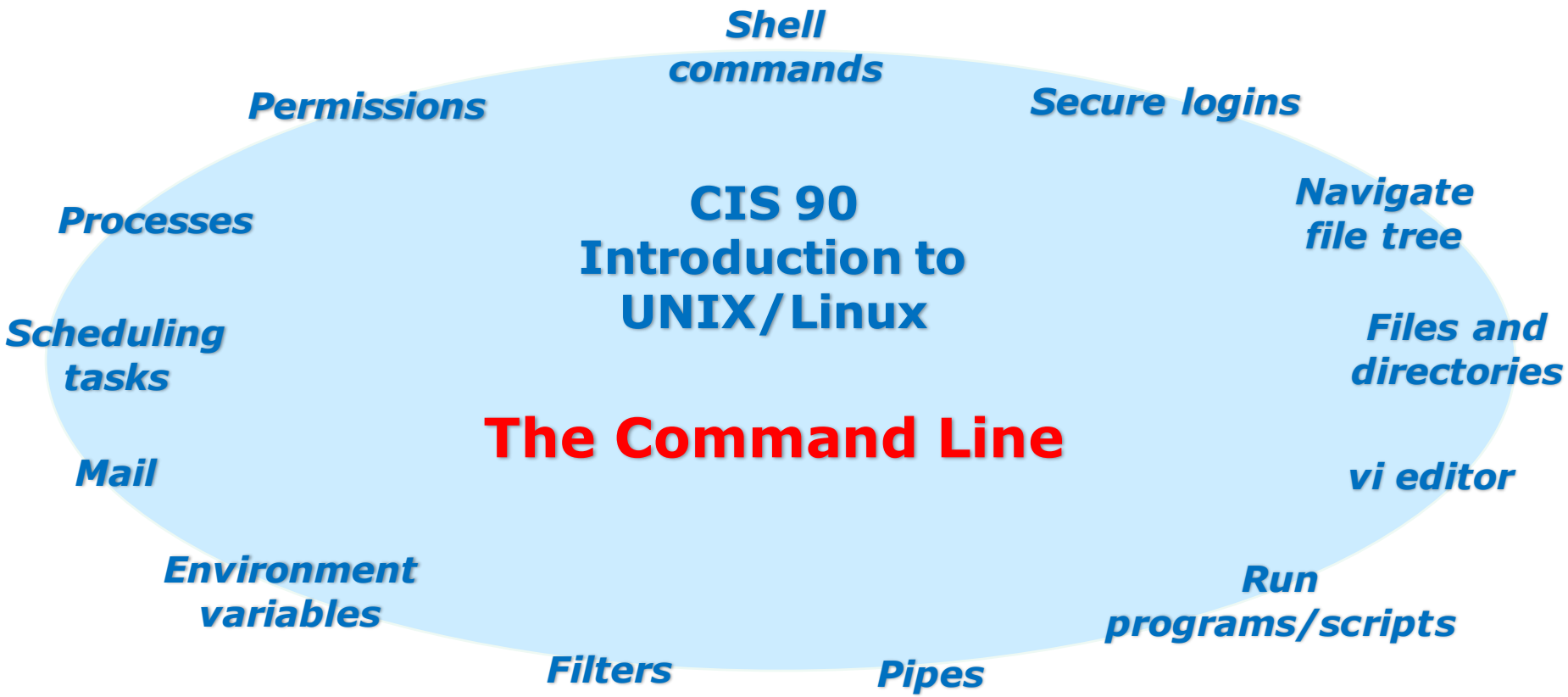
- ❑ Flash cards
- ❑ Page numbers
- ❑ 1st minute quiz
- ❑ Web Calendar summary
- ❑ Web book pages
- ❑ Commands

- ❑ Lock turnin directory at midnight

```
at 12:00 am thursday
chmod 700 /home/cis90/bin/submit
chmod 700 /home/turnin/cis90
ctrl d

at 9:00 am thursday
chmod 750 /home/cis90/bin/submit
chmod 755 /home/turnin/cis90
ctrl d
```

- ❑ Lab 6 updated and tested
- ❑ Put uhistory in /home/rsimms/uhistory

- ❑ 9V backup battery for microphone
- ❑ Backup slides, CCC info, handouts on flash drive
- ❑ Key card for classroom door



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.

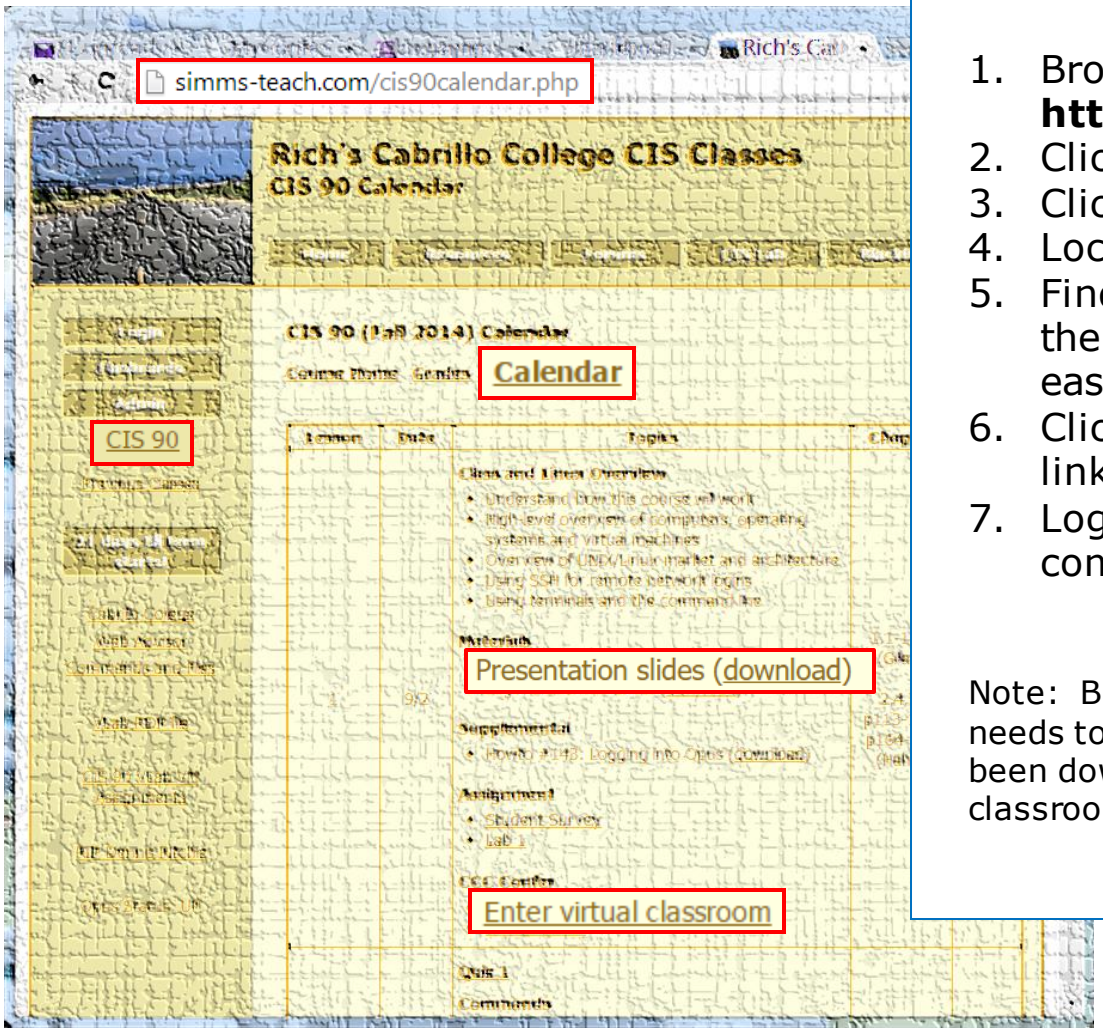
Introductions and Credits

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 for attending class

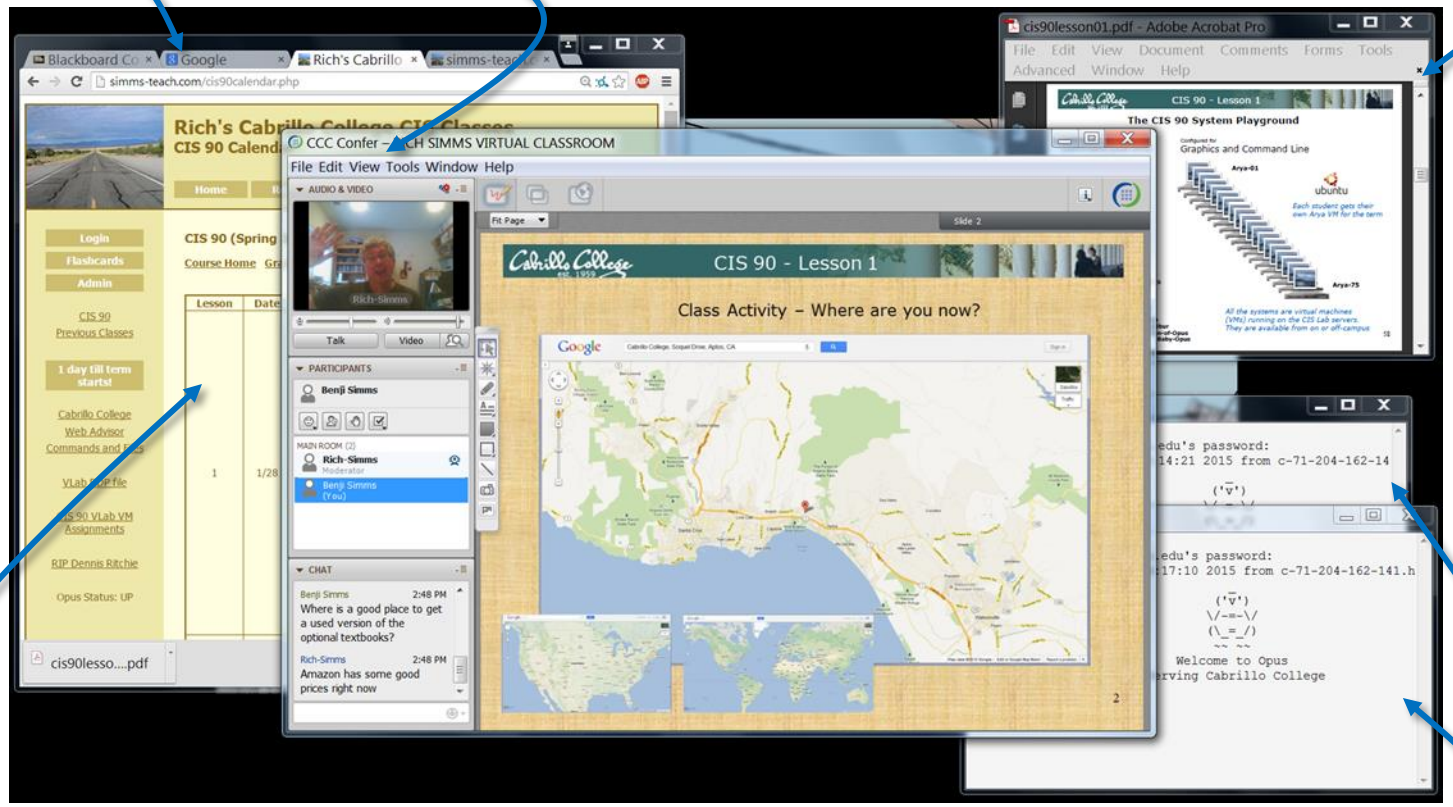


1. Browse to: **http://simms-teach.com**
2. Click the **CIS 90** link.
3. Click the **Calendar** link.
4. Locate today's lesson.
5. Find the **Presentation slides** for the lesson and **download** for easier viewing.
6. Click the **Enter virtual classroom** link to join CCC Confer.
7. Log into Opus with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

Note: Blackboard Collaborate Launcher only needs to be installed once. It has already been downloaded and installed on the classroom PC's.

Student checklist for suggested screen layout

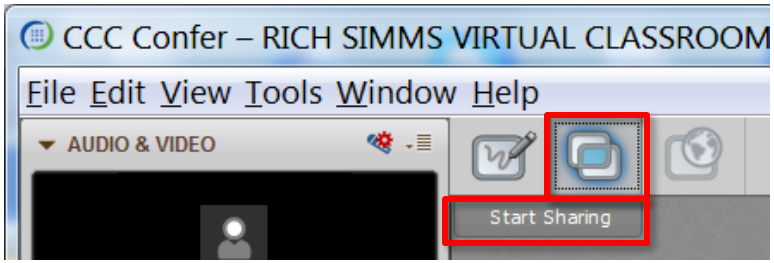
- ❑ *Google*
- ❑ *CCC Confer*
- ❑ *Downloaded PDF of Lesson Slides*



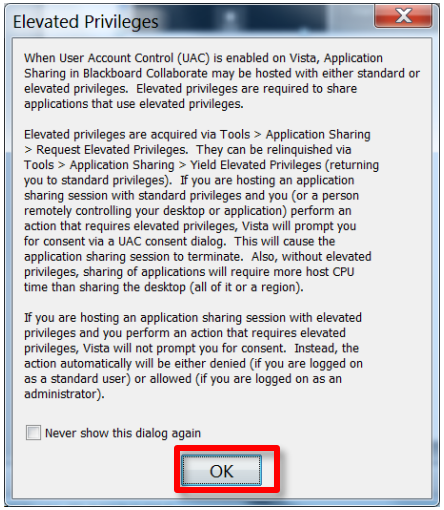
- ❑ *CIS 90 website Calendar page*
- ❑ *One or more login sessions to Opus*

Student checklist for sharing desktop with classmates

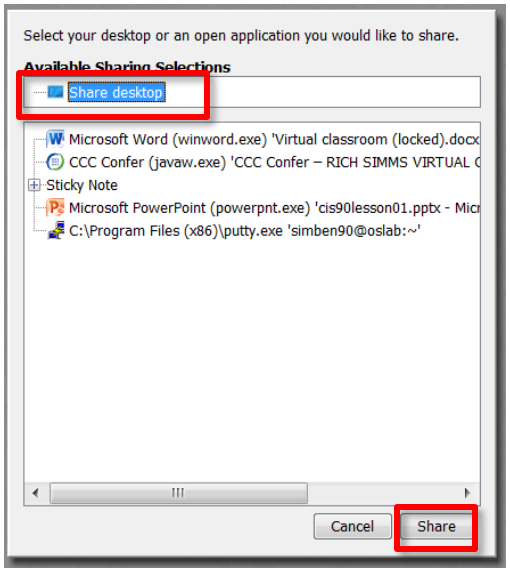
1) Instructor gives you sharing privileges



2) Click overlapping rectangles icon. If white "Start Sharing" text is present then click it as well.



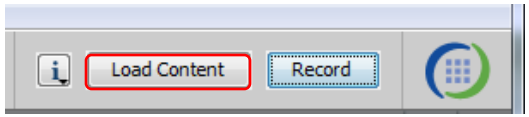
3) Click OK button.



4) Select "Share desktop" and click Share button.

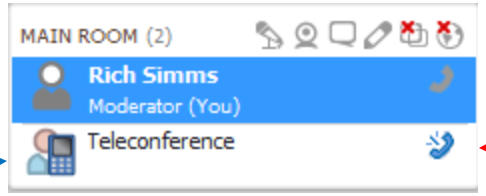
Rich's CCC Confer checklist - setup

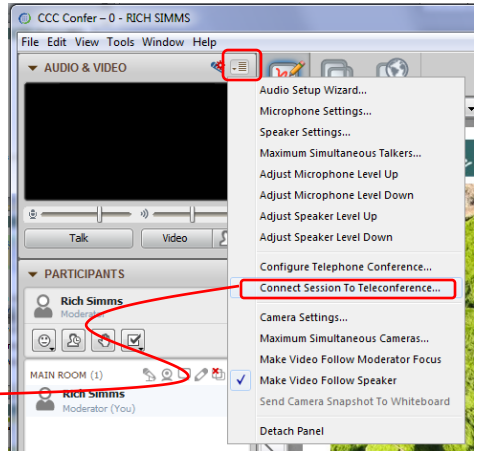
[ ] Preload White Board



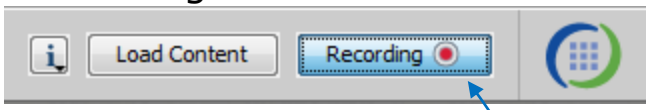
[ ] Connect session to Teleconference

Session now connected to teleconference





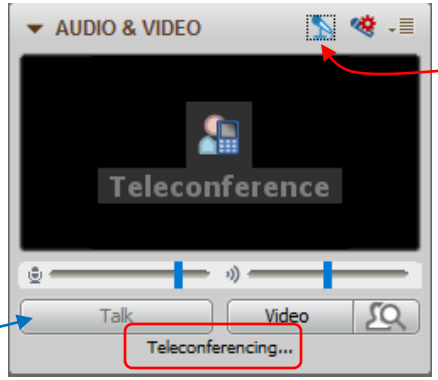
[ ] Is recording on?



Red dot means recording

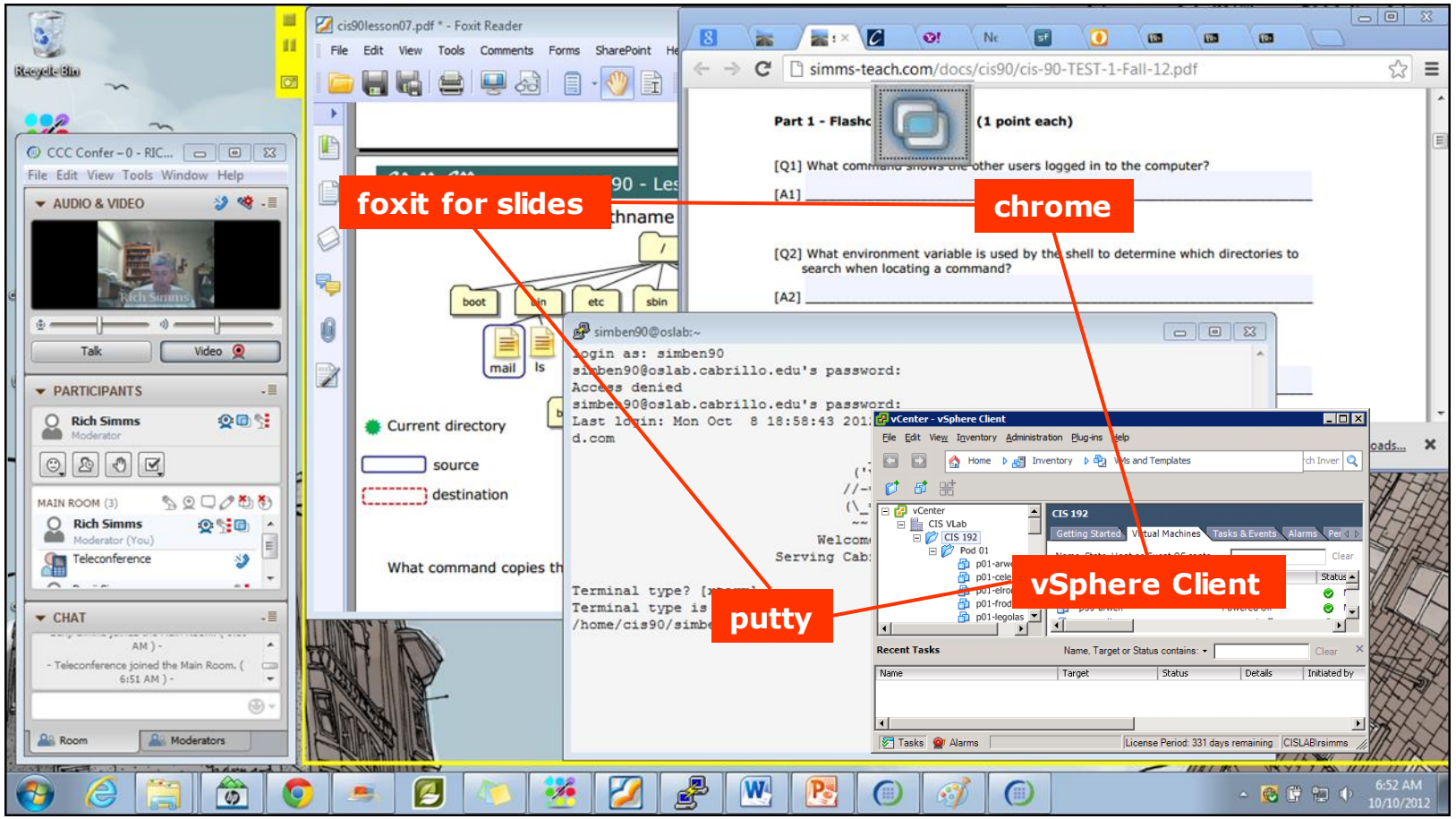
[ ] Use teleconferencing, not mic

Should be grayed out



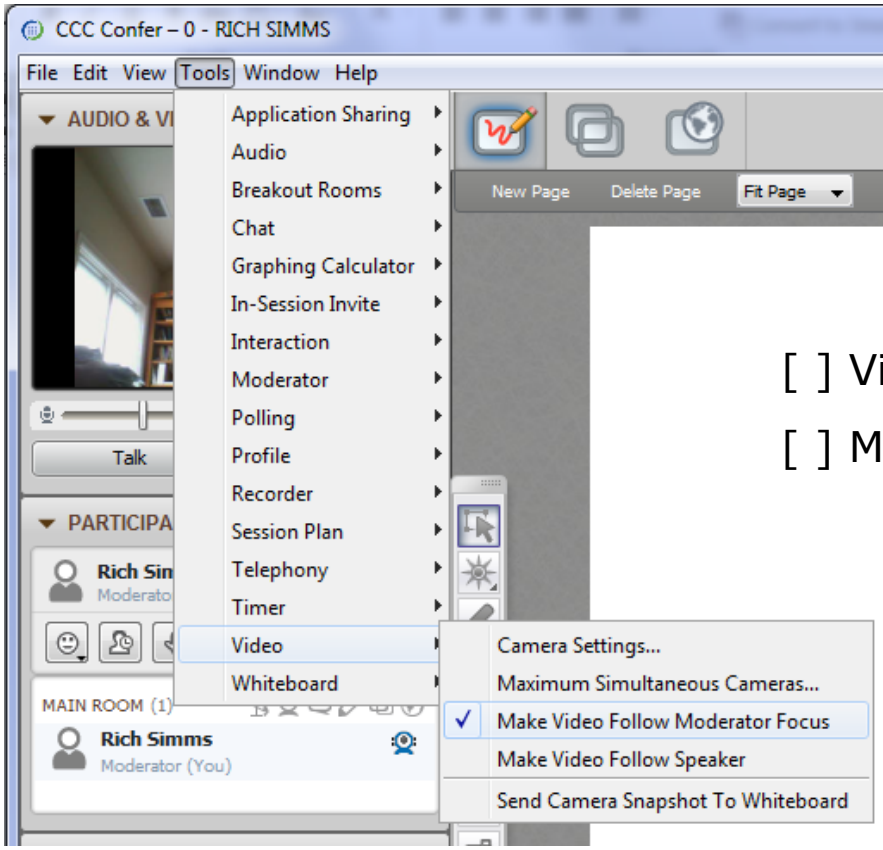
Should change from phone handset icon to little Microphone icon and the Teleconferencing … message displayed

Rich's CCC Confer checklist - screen layout



[ ] layout and share apps

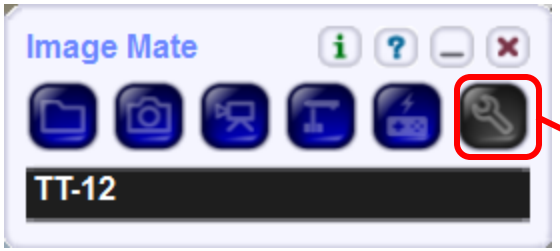
Rich's CCC Confer checklist - webcam setup

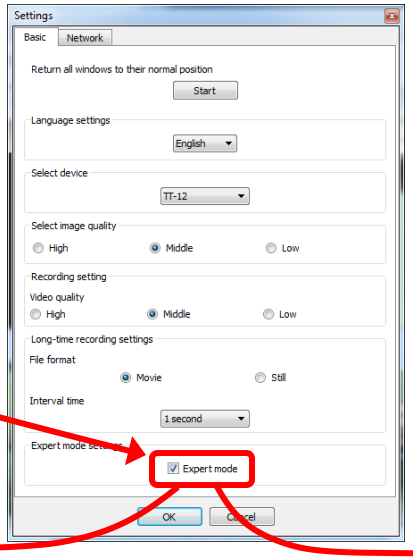


[ ] Video (webcam)

[ ] Make Video Follow Moderator Focus

Rich's CCC Confer checklist - Elmo



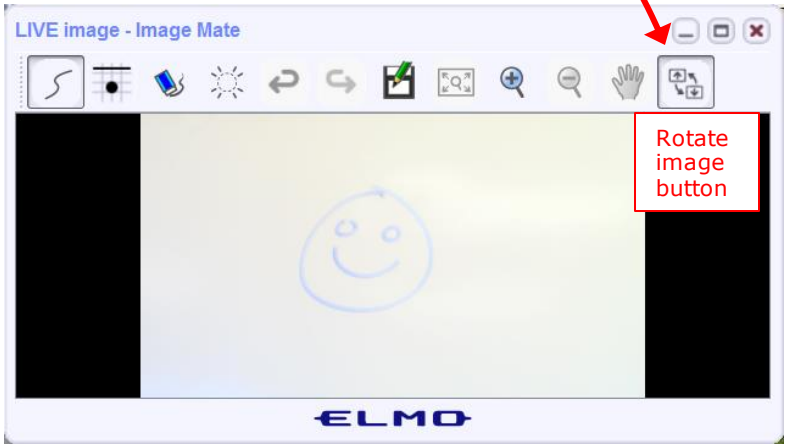


The "rotate image" button is necessary if you use both the side table and the white board.

Quite interesting that they consider you to be an "expert" in order to use this button!

Elmo rotated down to view side table

Elmo rotated up to view white board



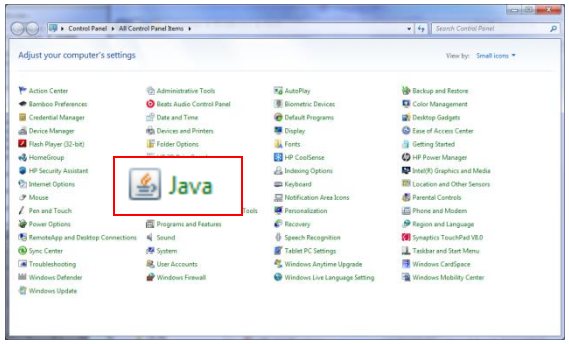
Run and share the Image Mate program just as you would any other app with CCC Confer

Rich's CCC Confer checklist - universal fixes

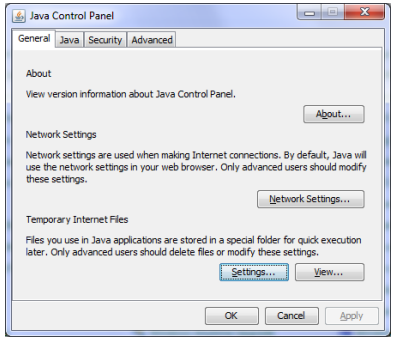
Universal Fix for CCC Confer:

1) Shrink (500 MB) and delete Java cache
2) Uninstall and reinstall latest Java runtime
3) http://www.cccconfer.org/support/technicalSupport.aspx

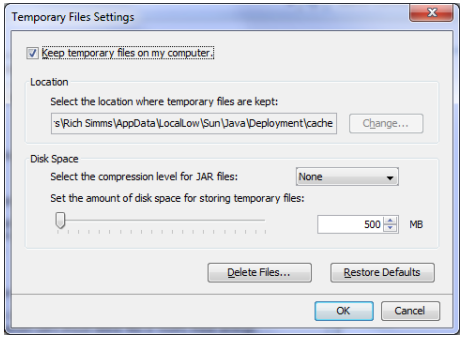
Control Panel (small icons)



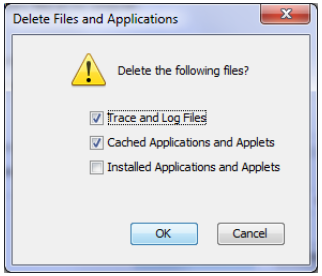
General Tab > Settings…



500MB cache size



Delete these



Google Java download

Start

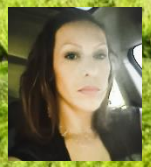
Sound Check

*Students that dial-in should mute their line using *6 to prevent unintended noises distracting the web conference.*

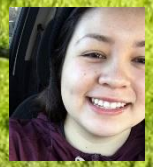
Instructor can use
**5 to boost audio input from phone*
**96 to mute all student lines.*

CIS 90 - Lesson 7

Instructor: **Rich Simms**
Dial-in: **888-886-3951**
Passcode: **136690**


Victoria

Oscar G.


Jesselle


Alex

Mitchel


Colin


Izzy

Luis C.

Cameron

Brandon

Dillon


Joseph

Steve

Bruno

Joshua

Vance

Adrian


Raul


Matt


Mike

Rodney

Sam


Kevin

Allen

Zane

Diego

Dustin

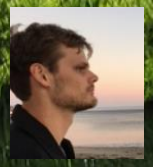

Martin

Zack

Ted

Eriberto

Dylan


Kyle


Nestor

Oscar N.

Ian

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 CCC Confer White Board

email answers to: `risimms@cabrillo.edu`

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

File Permissions

Objectives	Agenda
• Identify permissions for ordinary and directory files • Be able to reassign user and group file ownerships • Use chmod to set and change file permissions • Define the default permissions for new files • Understand the effect of permissions on directories	• Quiz • Questions • Test 1 Post Mortem • Managing files • Theme and variations & Follow Me • Housekeeping • Permissions • r = read permission • w = write permission • x = execute permission • New file ownership & group membership • Specifying numeric permissions • Practice converting to numeric permissions • Recap • Letter file in detail • More practice • Configuring permissions • File permissions in action • POLP and the Hidden treasure • umask • The effect of permissions when removing files • Directory permissions • The effect of WRITE permission on directories • The effect of EXECUTE permission on directories • Assignment • Wrap up

Questions

Questions?

Lesson material?

Labs? Tests?

How this course works?

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

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

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

Chinese Proverb	他問一個問題，五分鐘是個傻子，他不問一個問題仍然是一個傻瓜永遠。 *He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.*

Test 1 Post Mortem

Test 1 – Results

Missed Q16 = 25
Missed Q11 = 25
Missed Q28 = 23
Missed Q25 = 23
Missed Q4 = 22
Missed Q20 = 20
Missed Q6 = 18
Missed Q24 = 18
Missed Q13 = 16
Missed Q30 = 15
Missed Q27 = 15
Missed Q12 = 15
Missed Q26 = 14
Missed Q22 = 14
Missed Q23 = 13

Missed Q10 = 13
Missed Q7 = 12
Missed Q3 = 12
Missed Q29 = 11
Missed Q8 = 9
Missed Q17 = 8
Missed Q15 = 8
Missed Q14 = 8
Missed Q19 = 7
Missed Q9 = 6
Missed Q2 = 6
Missed Q18 = 6
Missed Q21 = 5
Missed Q5 = 2
Missed Q1 = 1

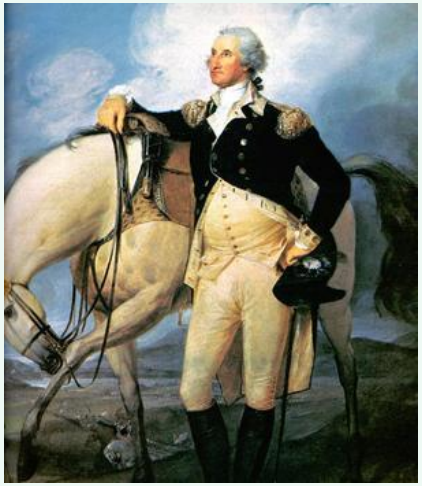
Extra Credit
Missed Q33 = 24
Missed Q31 = 24
Missed Q32 = 19

See test01.graded in your home directory for correct answers

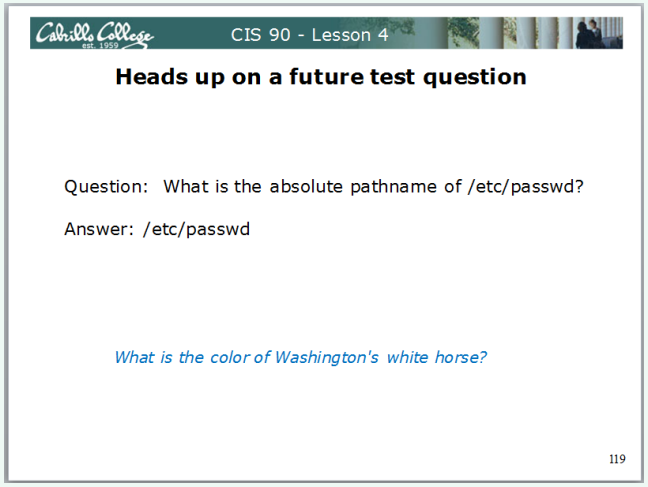
Q17) On sun-hwa-vii, there is a file named *passwd* which resides in the */etc* directory. Cat this file and look at it. Both the file and this question should ring a bell. What is the ABSOLUTE pathname of this file?

Correct answer: */etc/passwd*

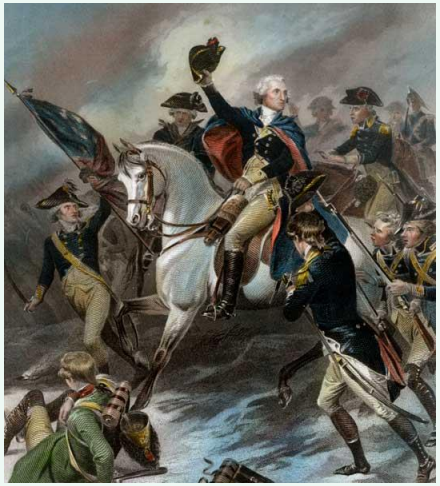
http://kids.britannica.com/comptons/art-55428/General-George-Washington-and-his-staff-welcoming-a-provision-train



http://www.sodahead.com/united-states/what-color-was-george-washingtons-white-horse/question-636725/



Slide from Lesson 4



http://www.mountvernon.org/content/revolutionary-war-princeton-white-horse

More questions?

On any part of Test 1 or lab 5?

Ask them now as the most missed questions could appear on the next test!

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.*

Managing Files (review)

Review of lesson 6 commands for your toolbox:

touch	- make a file (or update the timestamp)
mkdir	- make a directory
cp	- copy a file
mv	- move or rename a file
rmdir	- remove a directory
rm	- remove a file
ln	- create a link
tree	- visual list a directory

Redirecting stdout:

> filename	- redirecting stdout to create/empty a file

Common mistakes on Lab 5

1) Not using a **relative** or **absolute** pathname as an argument on the mv, cp touch, rm, mkdir, rmdir etc. commands.

The ESP method of specifying a file or directory does not work!

2) Not distinguishing system directories like /bin and /etc from local directories with the same names.

A pathname that starts with a / is absolute and starts from the top of the UNIX file tree not your home directory!

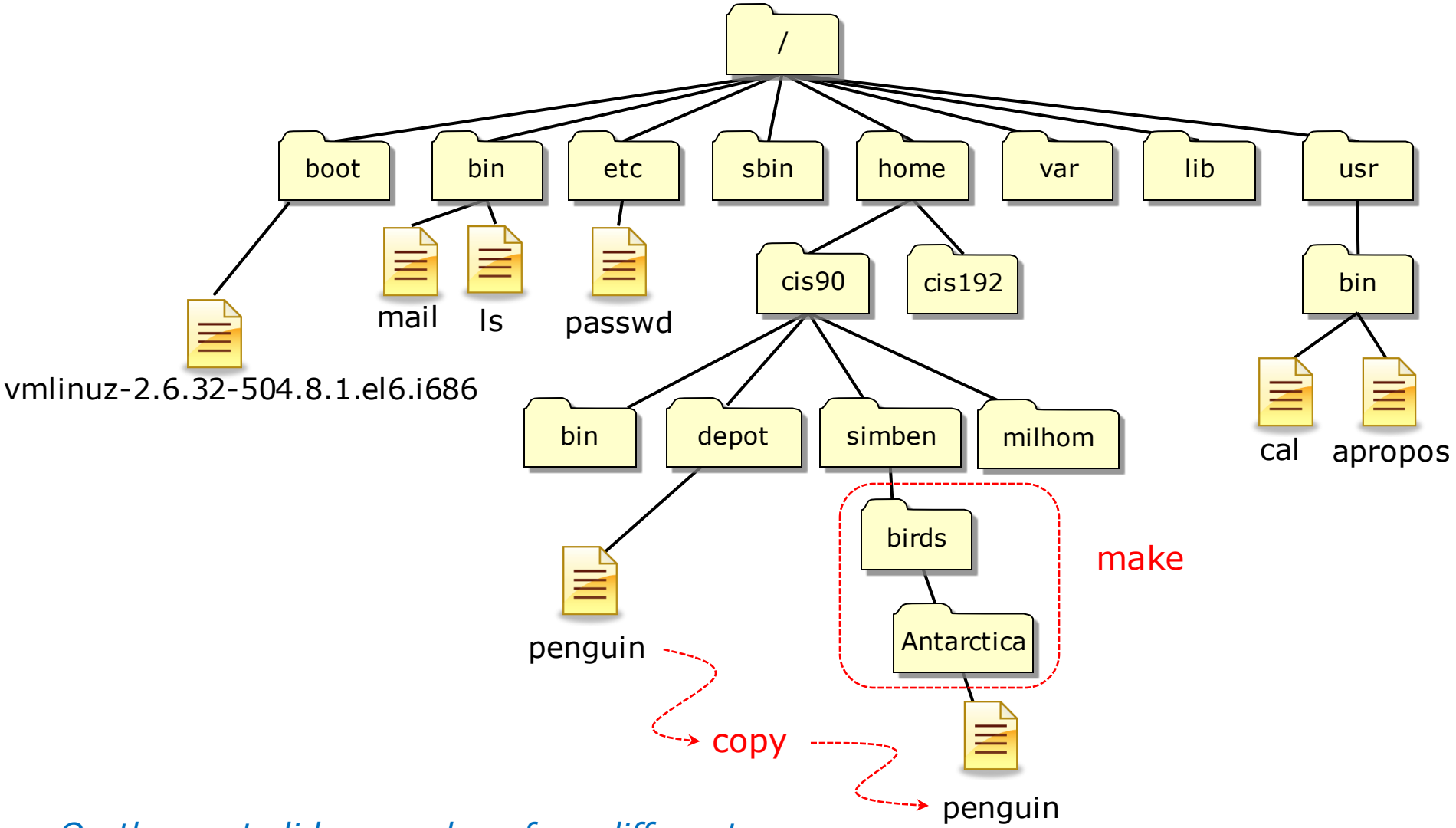
3) Not using . to refer to the current working directory.

Short and sweet!

4) Not reading the forum and missing out on the **check5** script!

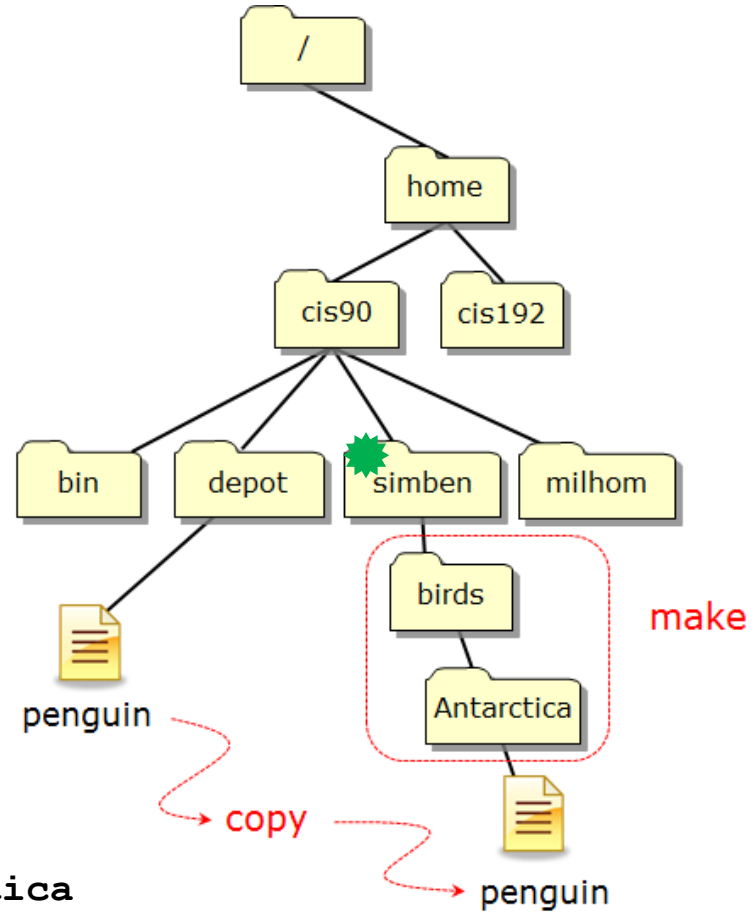
Theme and variations

Many ways to do the same things



On the next slides we show four different ways to make the nested birds/Antarctica directory and copy the penguin file to it

One way



From the home directory make the two new nested directories using the -p option.

```
/home/cis90/simben $ cd
/home/cis90/simben $ mkdir -p birds/Antarctica
```

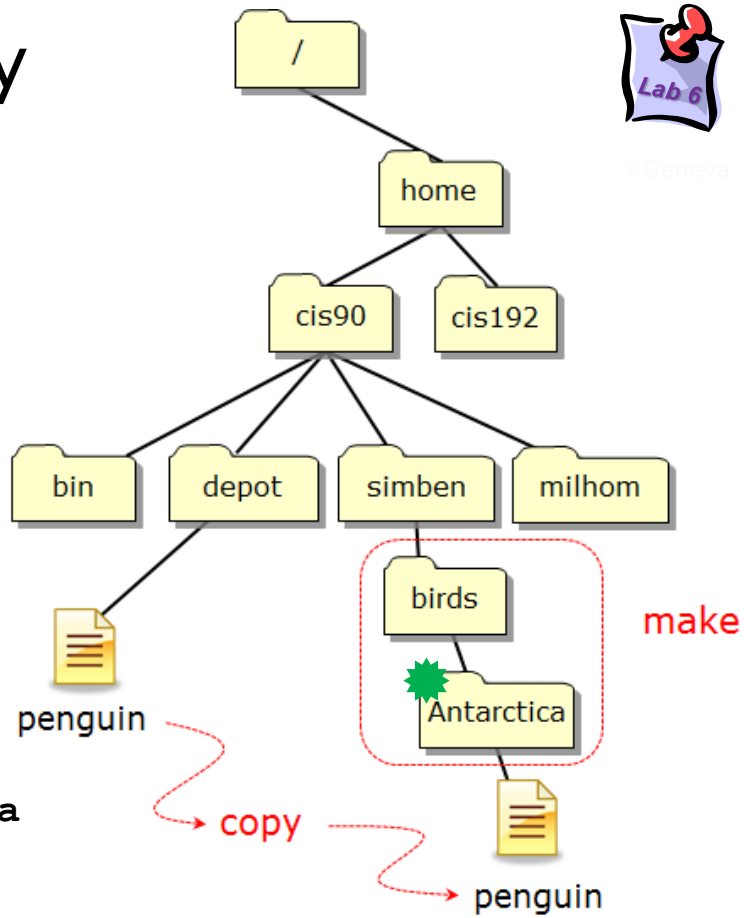
From the home directory copy the penguin file using relative pathnames.

```
/home/cis90/simben $ cp ../depot/penguin birds/Antarctica/
```

First argument is a relative pathname to the penguin file

Second argument is a relative pathname to the Antarctica directory

Another way



Making the two new nested directories individually.

```
/home/cis90/simben $ cd
/home/cis90/simben $ mkdir birds
/home/cis90/simben $ cd birds
/home/cis90/simben/birds $ mkdir Antarctica
/home/cis90/simben/birds $ cd Antarctica
```

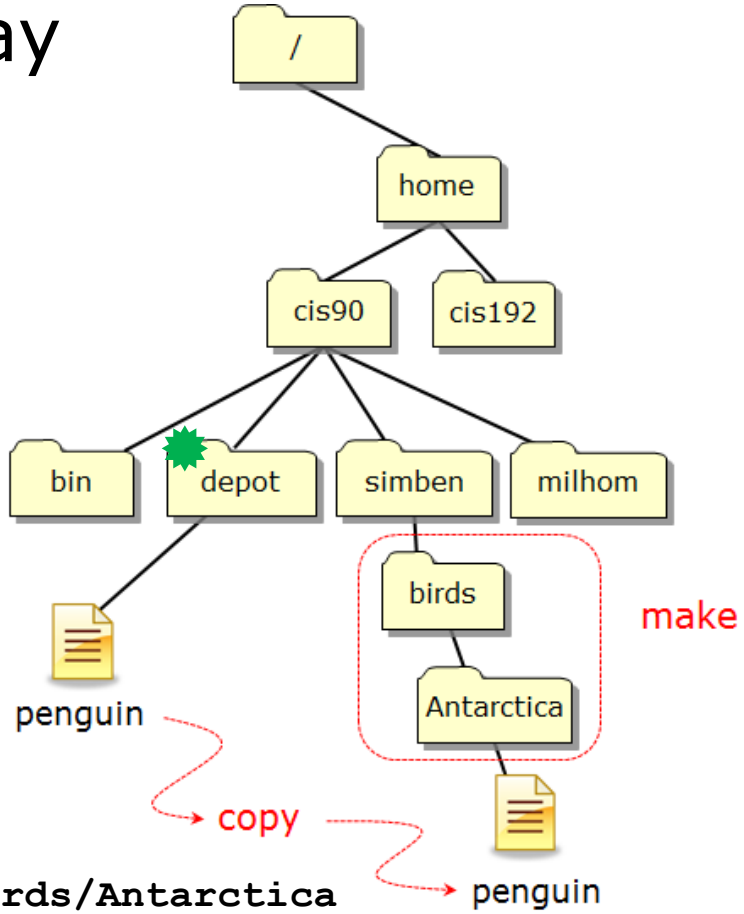
From the Antarctica directory copy the penguin file using an absolute pathname and the . "here" directory.

```
/home/cis90/simben/birds/Antarctica $ cp /home/cis90/depot/penguin .
```

First argument is an absolute pathname to the penguin file

Second argument is the "." directory for "here"

And another way



Make the nested directories from the depot directory.

```
/home/cis90/depot $ cd /home/cis90/depot/
/home/cis90/depot $ mkdir -p ../simben/birds/Antarctica
```

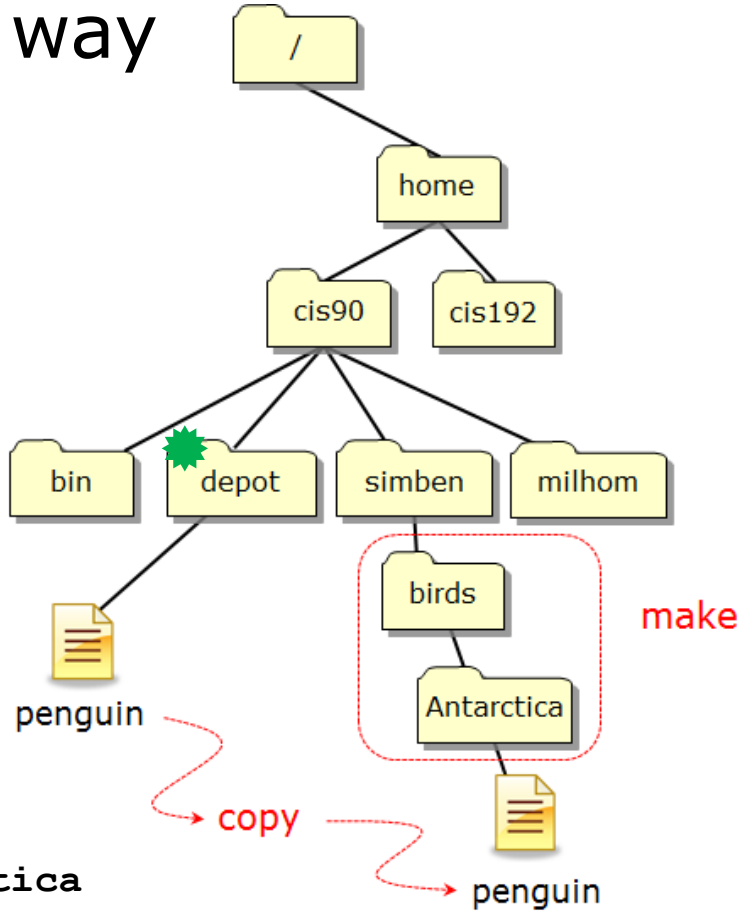
Copy the penguin file to the Antarctica directory.

```
/home/cis90/depot $ cp penguin ../simben/birds/Antarctica/
```

First argument is a relative pathname to the penguin file.

Second argument is a relative pathname to the Antarctica directory.

And yet another way



Make the new nested directories from the depot directory.

```
/home/cis90/depot $ cd
/home/cis90/depot $ cd ../depot/
/home/cis90/depot $ mkdir -p ~/birds/Antarctica
```

Copy the penguin from the depot directory to the Antarctica directory.

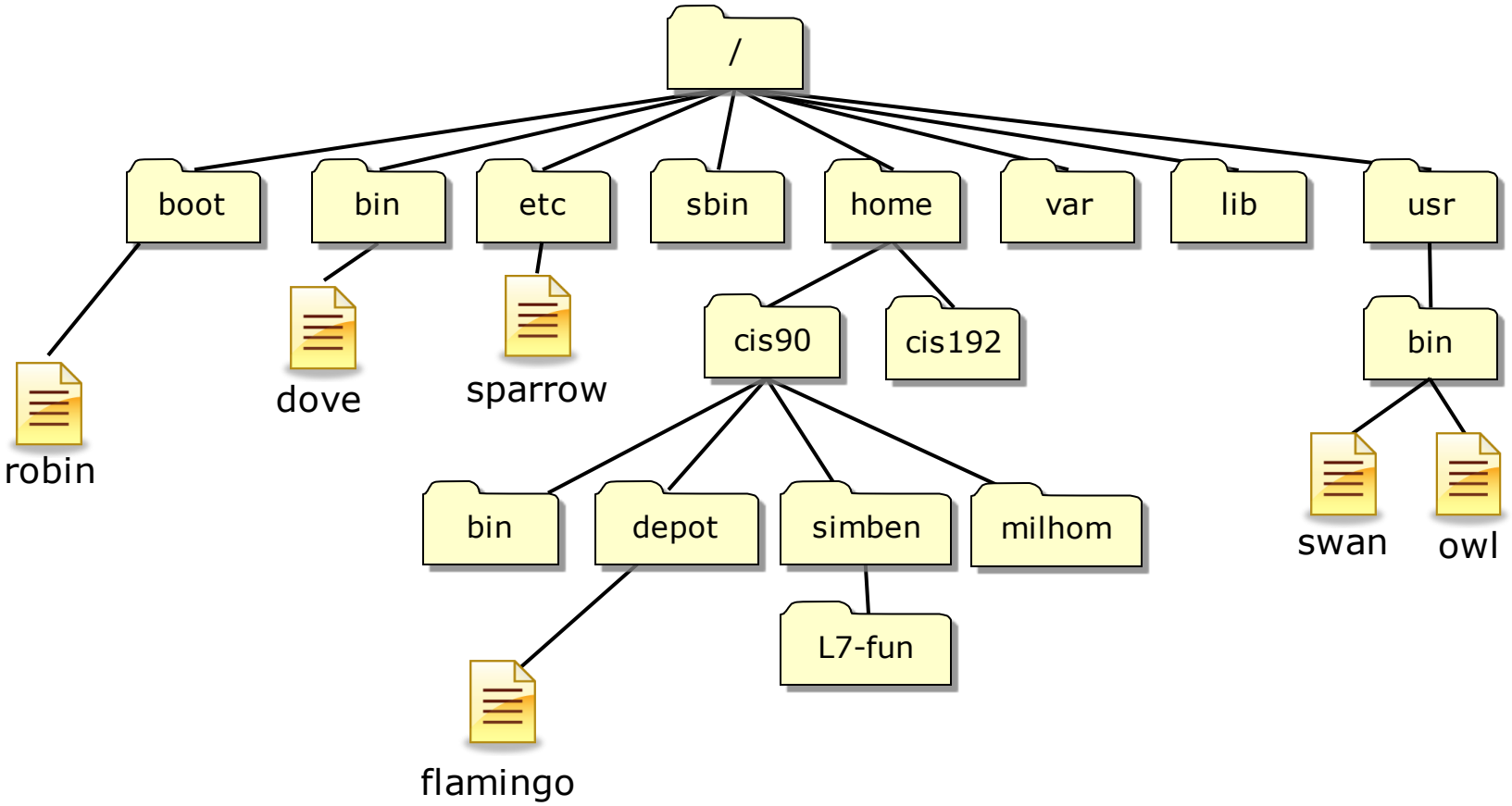
```
/home/cis90/depot $ cp penguin ~/birds/Antarctica/
```

First argument is a relative pathname to the penguin file.

Second argument is a pathname to the Antarctica directory. The "~" is shorthand for the home directory.

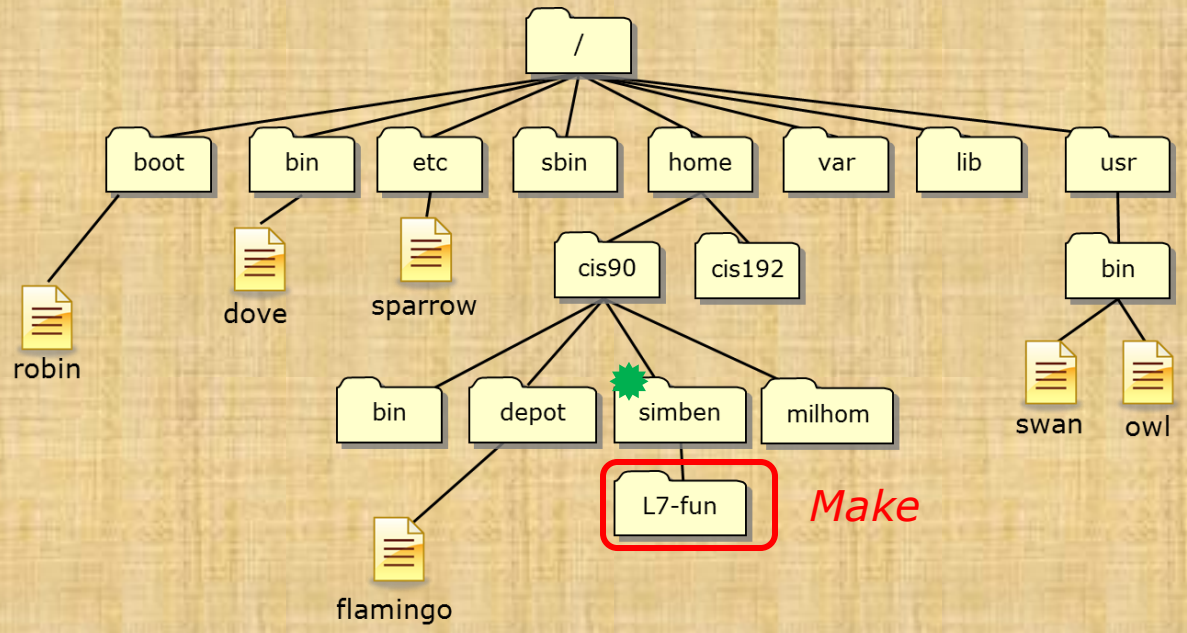
Follow Me

More practice managing files



I've scattered some files named after birds around Opus

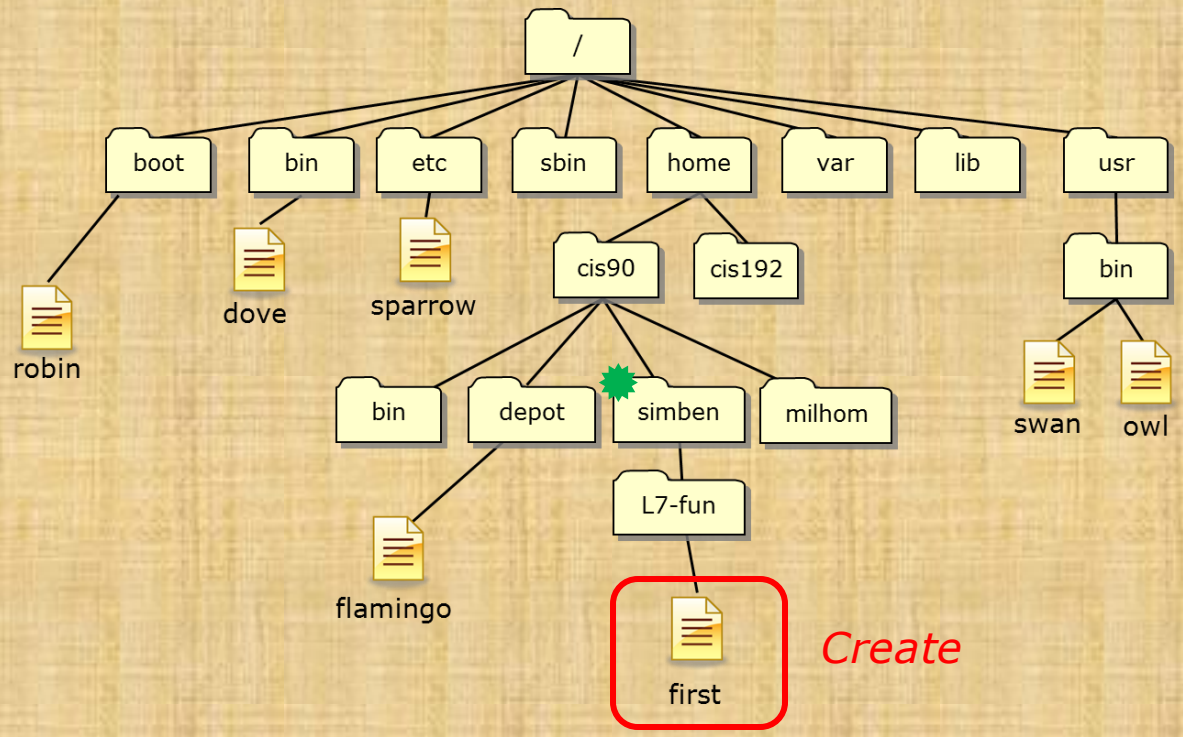
Follow Me



In your home directory make a new directory named L7-fun. Verify it worked.

```
/home/cis90/simben $ mkdir L7-fun
/home/cis90/simben $ ls -dl L7-fun/
```

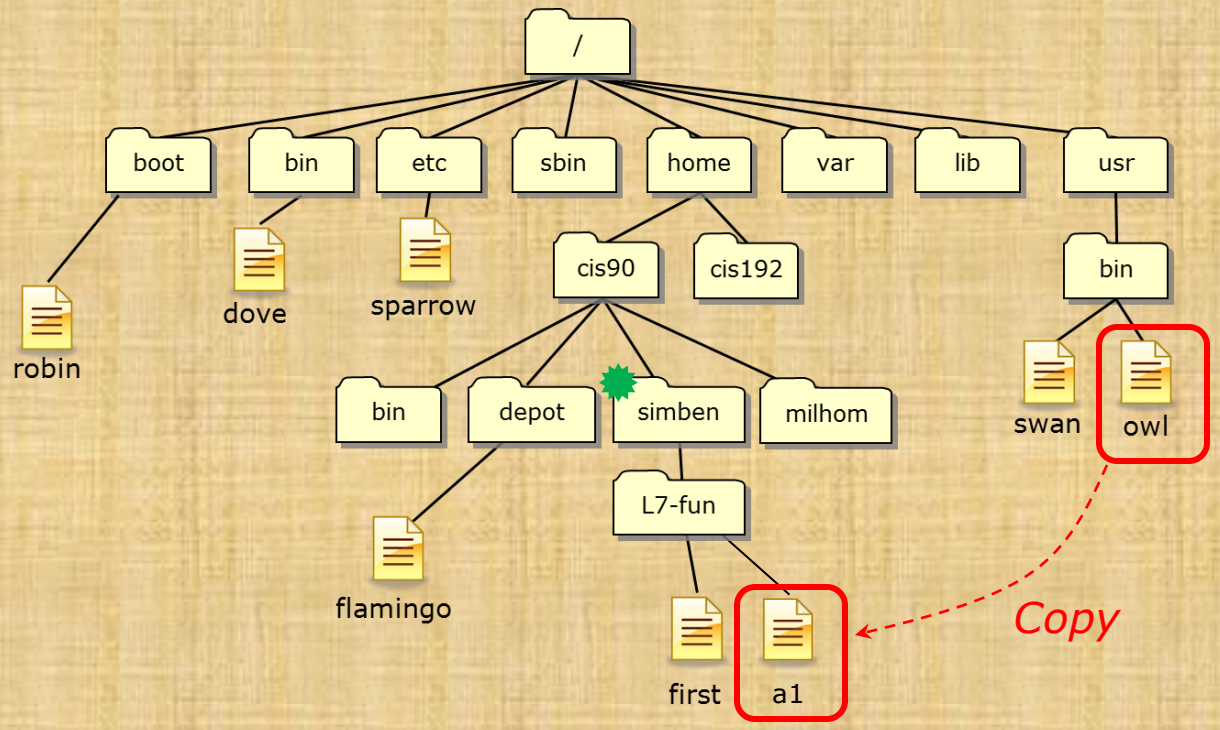
Follow Me



Create new file named first in your L7-fun directory containing a banner version of your name. Verify it worked.

```
/home/cis90/simben $ banner Benji > L7-fun/first
/home/cis90/simben $ ls L7-fun/
```

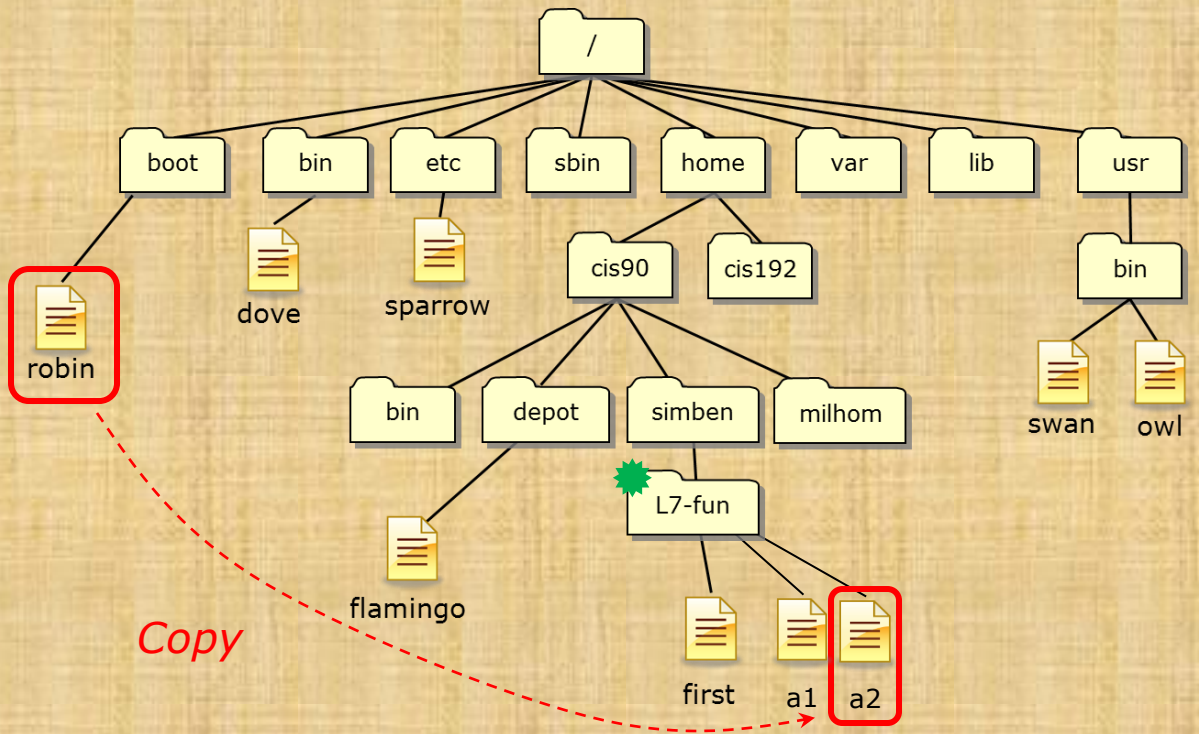
Follow Me



Copy the owl file to your new directory and rename it to a1. Verify it worked.

```
/home/cis90/simben $ cp /usr/bin/owl L7-fun/a1
/home/cis90/simben $ ls L7-fun/
```

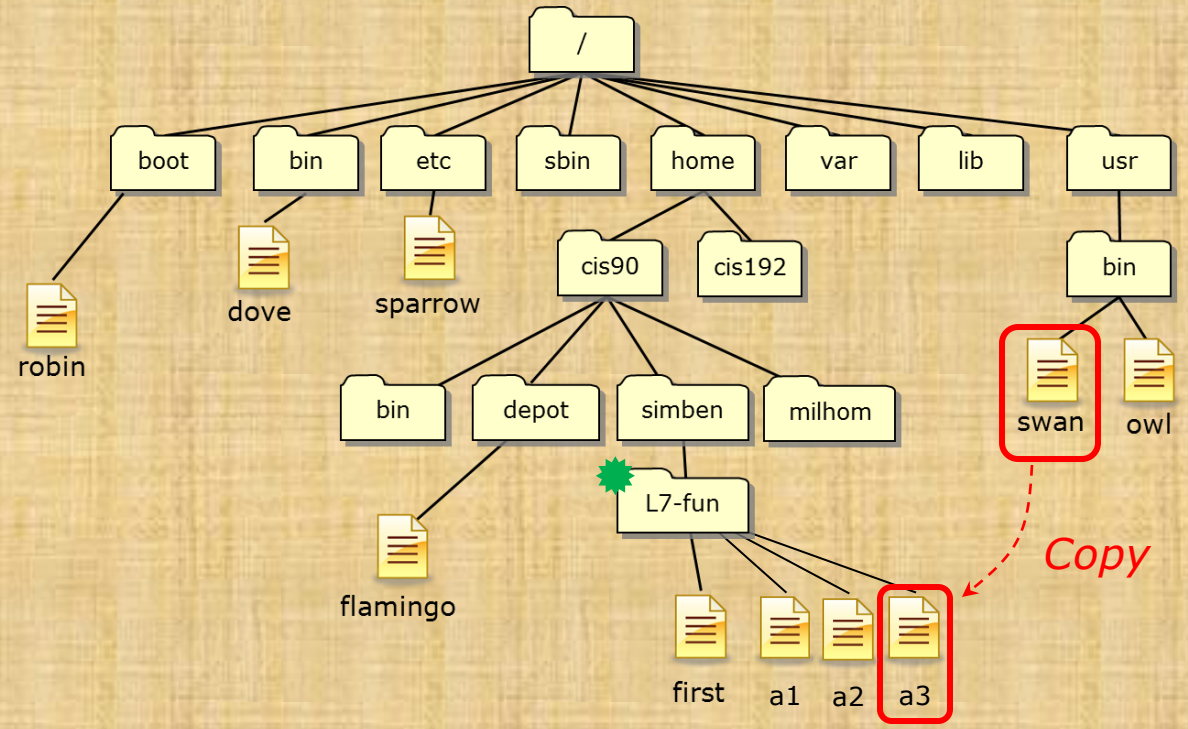
Follow Me



Change to your L7-fun directory. From there copy the robin file renaming it a2. Verify it worked.

```
/home/cis90/simben $ cd L7-fun/
/home/cis90/simben/L7-fun $ cp /boot/robin a2
/home/cis90/simben/L7-fun $ ls
```

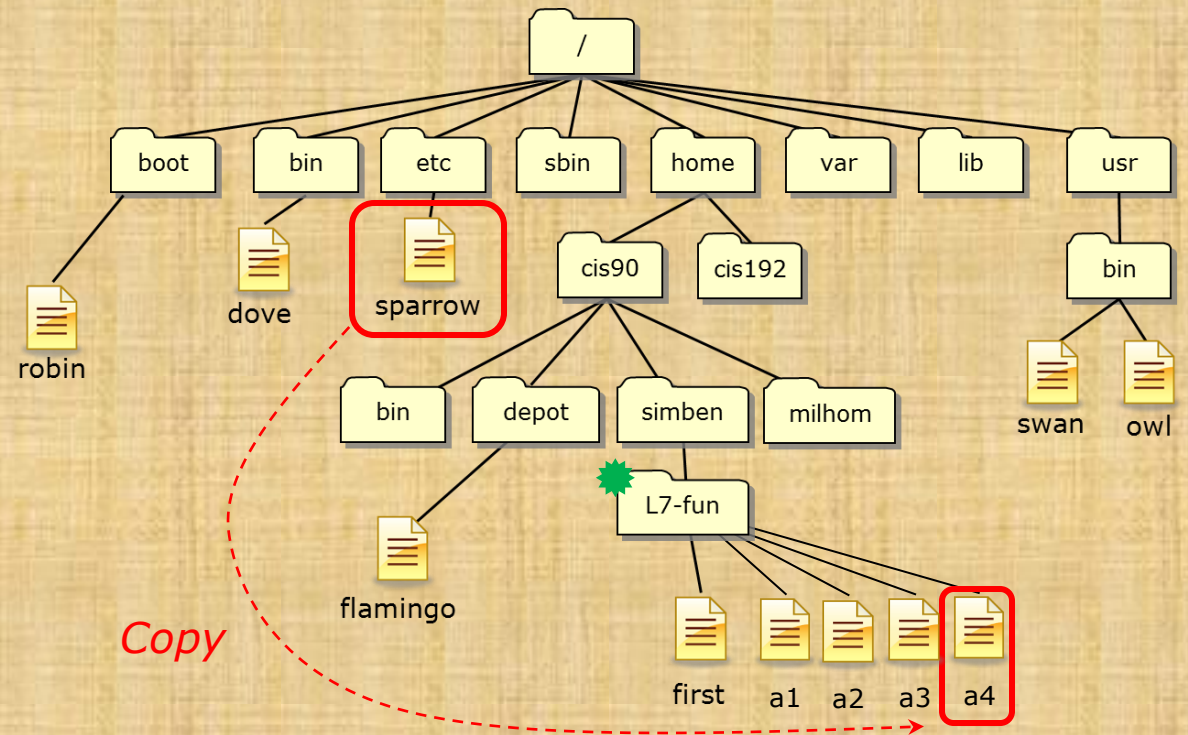
Follow Me



Copy the swan file to your L7-fun directory. Then rename it to a3 and verify it worked.

```
/home/cis90/simben/L7-fun $ cp /usr/bin/swan .
/home/cis90/simben/L7-fun $ mv swan a3
/home/cis90/simben/L7-fun $ ls
```

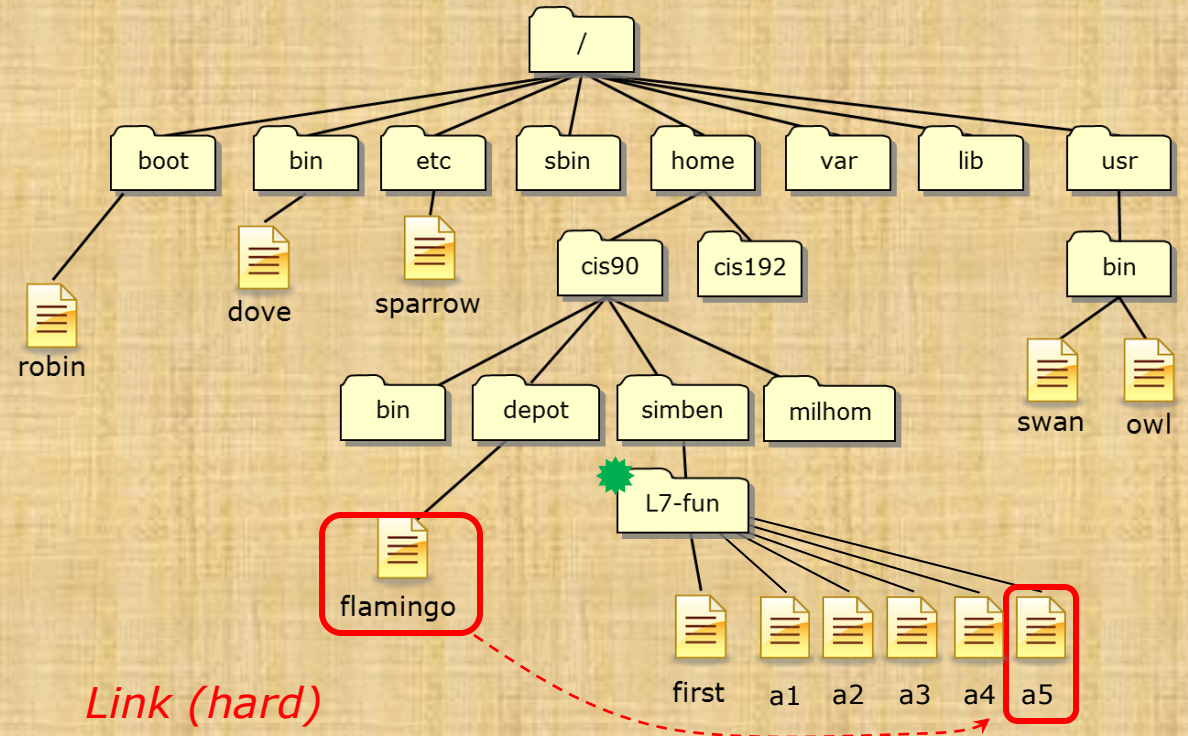
Follow Me



Copy the sparrow file to your L7-fun directory renaming it to a4. Verify it worked.

```
/home/cis90/simben/L7-fun $ cp /etc/sparrow a4
/home/cis90/simben/L7-fun $ ls
```

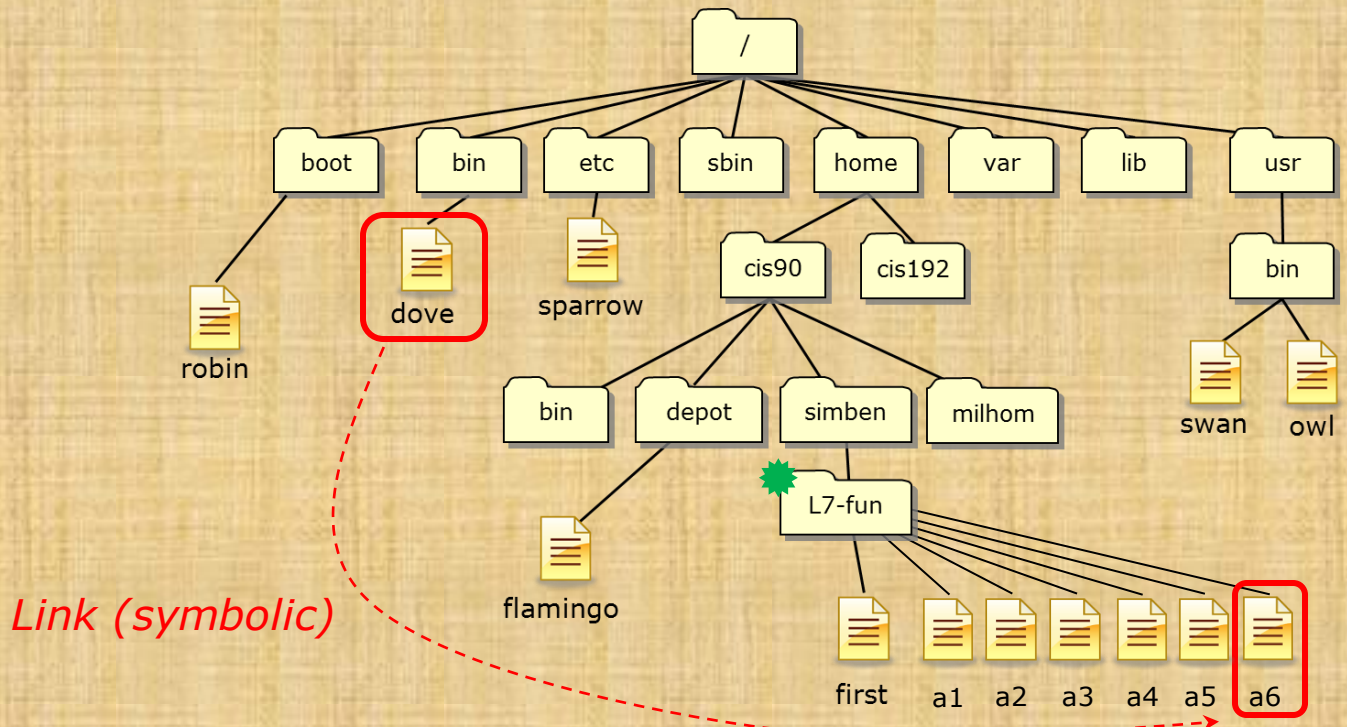
Follow Me



Create a new hard link named a5 to the flamingo file. Verify it worked.

```
/home/cis90/simben/L7-fun $ ln ../../depot/flamingo a5
/home/cis90/simben/L7-fun $ ls
/home/cis90/simben/L7-fun $ ls -l
```

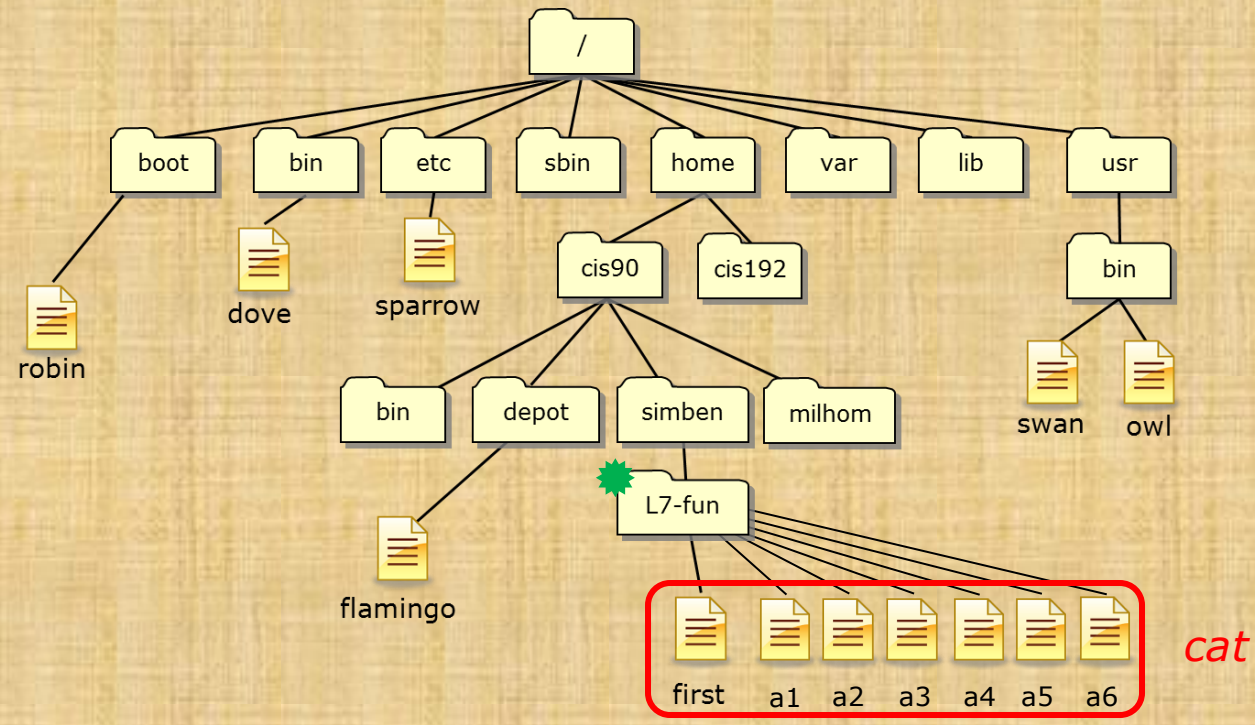
Follow Me

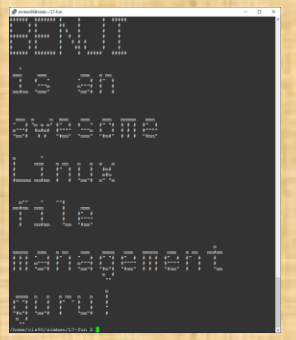


Create a symbolic link file named a6 which references the dove file. Verify it worked.

```
/home/cis90/simben/L7-fun $ ln -s /bin/dove a6
/home/cis90/simben/L7-fun $ ls
/home/cis90/simben/L7-fun $ ls -l
```

Follow Me





Did you do each step correctly?

```
/home/cis90/simben/L7-fun $ cat first a*
```

Use the chat window to indicate what happened

Housekeeping

1) Lab 5 is due tonight at 11:59PM.

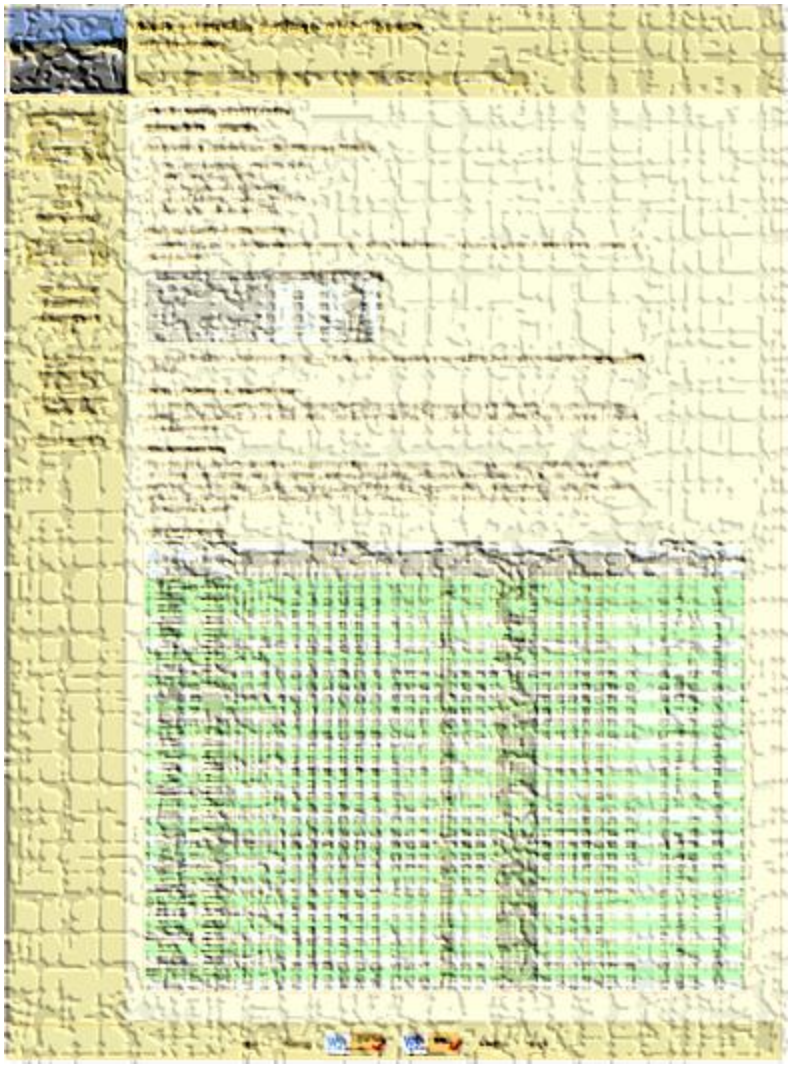
2) A **check5** script is available (see forum).

3) Don't forget to use the **submit** command to submit your Lab 5 work for grading.

4) Finished Lab 5 already? Please monitor the forum and help anyone with questions.

5) Next week five forum posts are due!

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



GRADES

Be sure and check your progress on the Grades page as the course continues on.

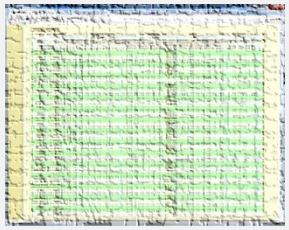
Send me a student survey if you haven't already to get your LOR secret code name.

Where to find your grades

Send me your survey to get your LOR code name.

The CIS 90 website Grades page

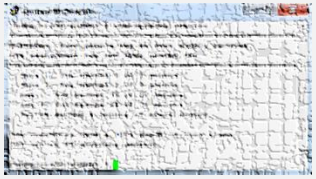
http://simms-teach.com/cis90grades.php



Or check on Opus

`checkgrades` *`codename`*

(where codename is your LOR codename)



Written by Jesse Warren a past CIS 90 Alumnus

Points that could have been earned:

4 quizzes:	12 points
4 labs:	120 points
1 test:	30 points
1 forum quarter:	20 points
Total:	**182 points**

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

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

Permissions

R=Read
W=Write
X=Execute

File Permissions

File permissions are used to control access to files and directories

There are three basic permissions: **read, write and execute**

Which can be applied to:

1) a **user** - the owner of the file
2) a **group** of users
3) **others** - everyone else

Use a long listing to see file permissions, user and group information

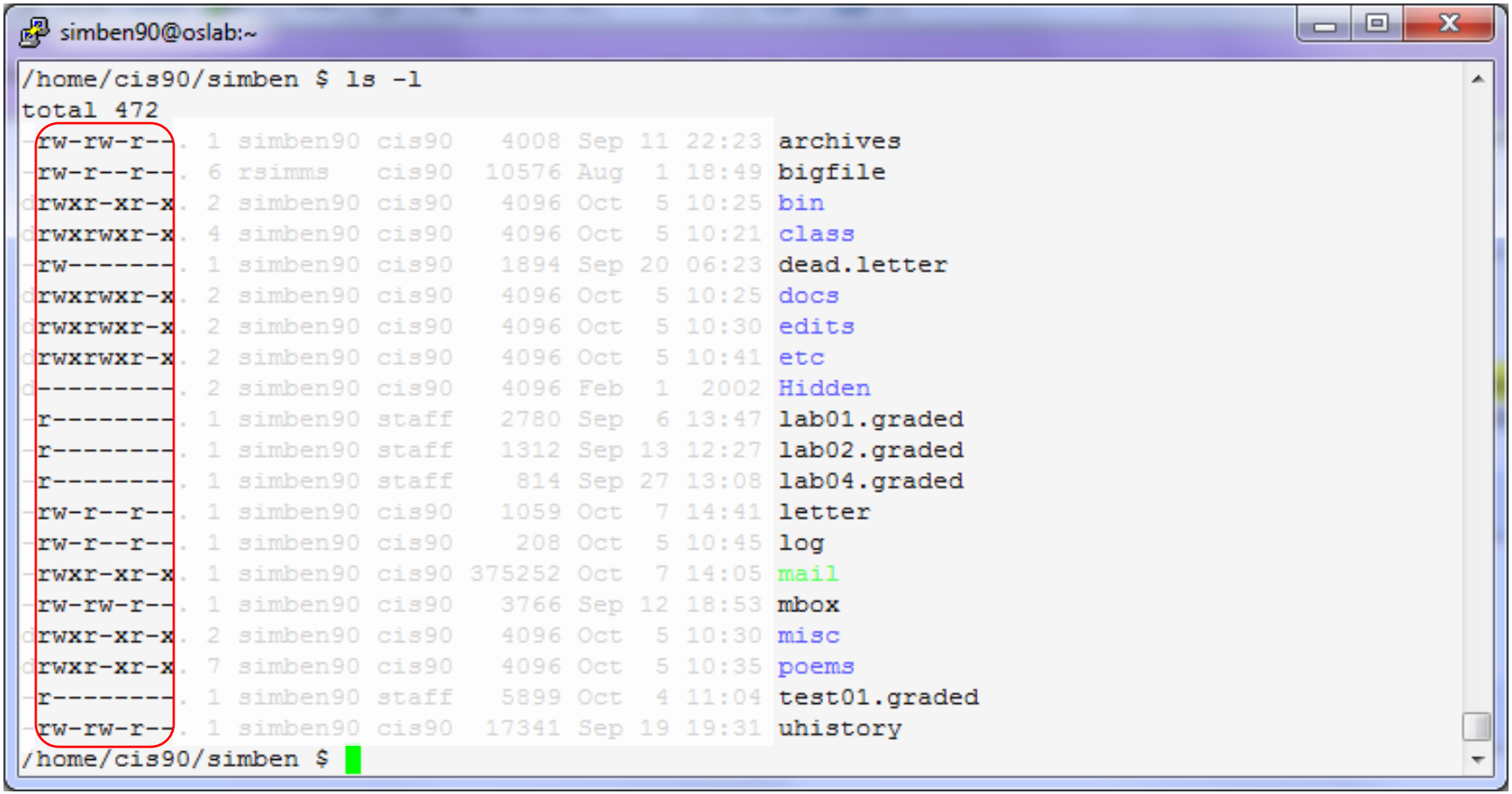
simben90@oslab:~

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90   4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90   1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90   4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff   2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff   1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff    814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90   1059 Oct  7 14:41 letter
-rw-r--r--. 1 simben90 cis90    208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90 375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

*Use the **-l** (little letter l) option to get a long listing*

*Use **long listings** to view file permissions*

The permissions



*Columns 2-10 of a long listing show the **permissions***

***r** (read), **w** (write), **x** (execute) or **–** (no permission)*

The user that owns a file

simben90@oslab:~

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 simben90 cis90    4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90   10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90    4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90    4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90    1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90    4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90    4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90    4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90    4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff    2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff    1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff     814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90    1059 Oct  7 14:41 letter
-rw-r--r--. 1 simben90 cis90     208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90  375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90    3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90    4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90    4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff    5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90   17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

*This column shows the **username** that **owns** the file*

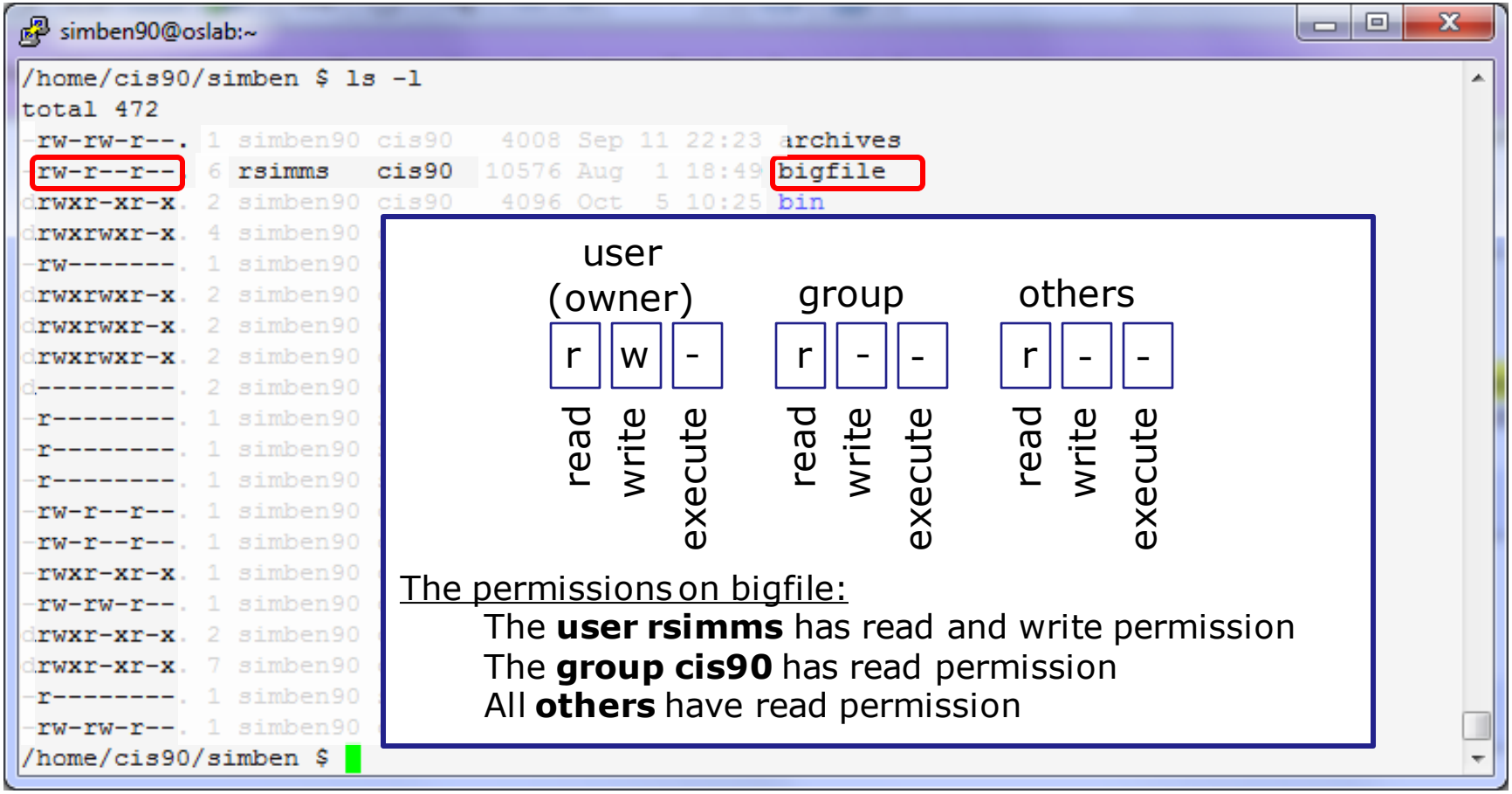
The group a file belongs to

simben90@oslab:~

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90   4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90   1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90   4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff   2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff   1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff    814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90   1059 Oct  7 14:41 letter
-rw-r--r--. 1 simben90 cis90    208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90 375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

*This column shows the **group** each file belong to*

The file permissions are broken down into permissions for the user, the group and others



The permissions on bigfile are shown in columns 2-10 of the long listing

Three users on Opus

```
/home/cis90/simben $ id simben90
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)

/home/cis90/simben $ id bincam90
uid=1244(bincam90) gid=190(cis90) groups=190(cis90),100(users)

/home/cis90/simben $ id bincam172
uid=1425(bincam172) gid=172(cis172) groups=172(cis172),100(users)
```

Group	cis90	cis172	users
Members	simben90 bincam90	bincam172	simben90 bincam90 bincam172

Activity

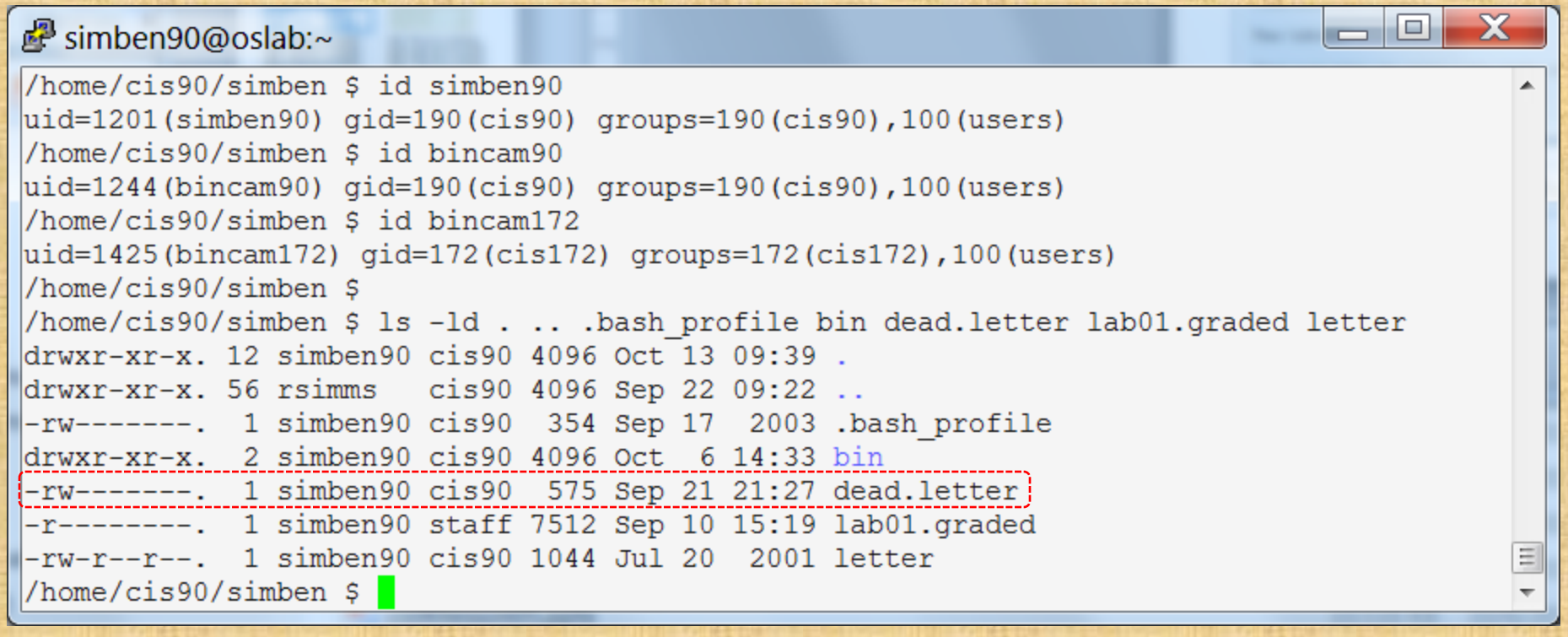
simben90@oslab:~

```
/home/cis90/simben $ id simben90
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam90
uid=1244(bincam90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam172
uid=1425(bincam172) gid=172(cis172) groups=172(cis172),100(users)
/home/cis90/simben $
/home/cis90/simben $ ls -ld . .. .bash_profile bin dead.letter lab01.graded letter
drwxr-xr-x. 12 simben90 cis90 4096 Oct 13 09:39 .
drwxr-xr-x. 56 rsimms   cis90 4096 Sep 22 09:22 ..
-rw-------.  1 simben90 cis90  354 Sep 17  2003 .bash_profile
drwxr-xr-x.  2 simben90 cis90 4096 Oct  6 14:33 bin
-rw-------.  1 simben90 cis90  575 Sep 21 21:27 dead.letter
-r--------.  1 simben90 staff 7512 Sep 10 15:19 lab01.graded
-rw-r--r--.  1 simben90 cis90 1044 Jul 20  2001 letter
/home/cis90/simben $
```

Which user owns the .. directory above?

Write your answer in the chat window

Activity



Which group does the dead.letter file belong to?

Write your answer in the chat window

Activity

simben90@oslab:~

```
/home/cis90/simben $ id simben90
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam90
uid=1244(bincam90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam172
uid=1425(bincam172) gid=172(cis172) groups=172(cis172),100(users)
/home/cis90/simben $ ls -ld . .. .bash_profile bin dead.letter lab01.graded letter cruz
drwxr-xr-x. 12 simben90 cis90 4096 Oct 13 10:11 .
drwxr-xr-x. 56 rsimms   cis90 4096 Sep 22 09:22 ..
-rw-------.  1 simben90 cis90  354 Sep 17  2003 .bash_profile
drwxr-xr-x.  2 simben90 cis90 4096 Oct  6 14:33 bin
-rw-r-----.  1 simben90 cis90   29 Oct 13 10:10 cruz
-rw-------.  1 simben90 cis90  575 Sep 21 21:27 dead.letter
-r--------.  1 simben90 staff 7512 Sep 10 15:19 lab01.graded
-rw-r--r--.  1 simben90 cis90 1044 Jul 20  2001 letter
/home/cis90/simben $
```

What are the permissions for the user simben90 on the *cruz* file

Write your answer in the chat window

Activity

simben90@oslab:~

```
/home/cis90/simben $ id simben90
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam90
uid=1244(bincam90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam172
uid=1425(bincam172) gid=172(cis172) groups=172(cis172),100(users)
/home/cis90/simben $ ls -ld . .. .bash_profile bin dead.letter lab01.graded letter cruz
drwxr-xr-x. 12 simben90 cis90 4096 Oct 13 10:11 .
drwxr-xr-x. 56 rsimms   cis90 4096 Sep 22 09:22 ..
-rw-------.  1 simben90 cis90  354 Sep 17  2003 .bash_profile
drwxr-xr-x.  2 simben90 cis90 4096 Oct  6 14:33 bin
-rw-r-----.  1 simben90 cis90   29 Oct 13 10:10 cruz
-rw-------.  1 simben90 cis90  575 Sep 21 21:27 dead.letter
-r--------.  1 simben90 staff 7512 Sep 10 15:19 lab01.graded
-rw-r--r--.  1 simben90 cis90 1044 Jul 20  2001 letter
/home/cis90/simben $
```

What are the permissions for the user bincam90 on the *cruz* file

Write your answer in the chat window

Activity

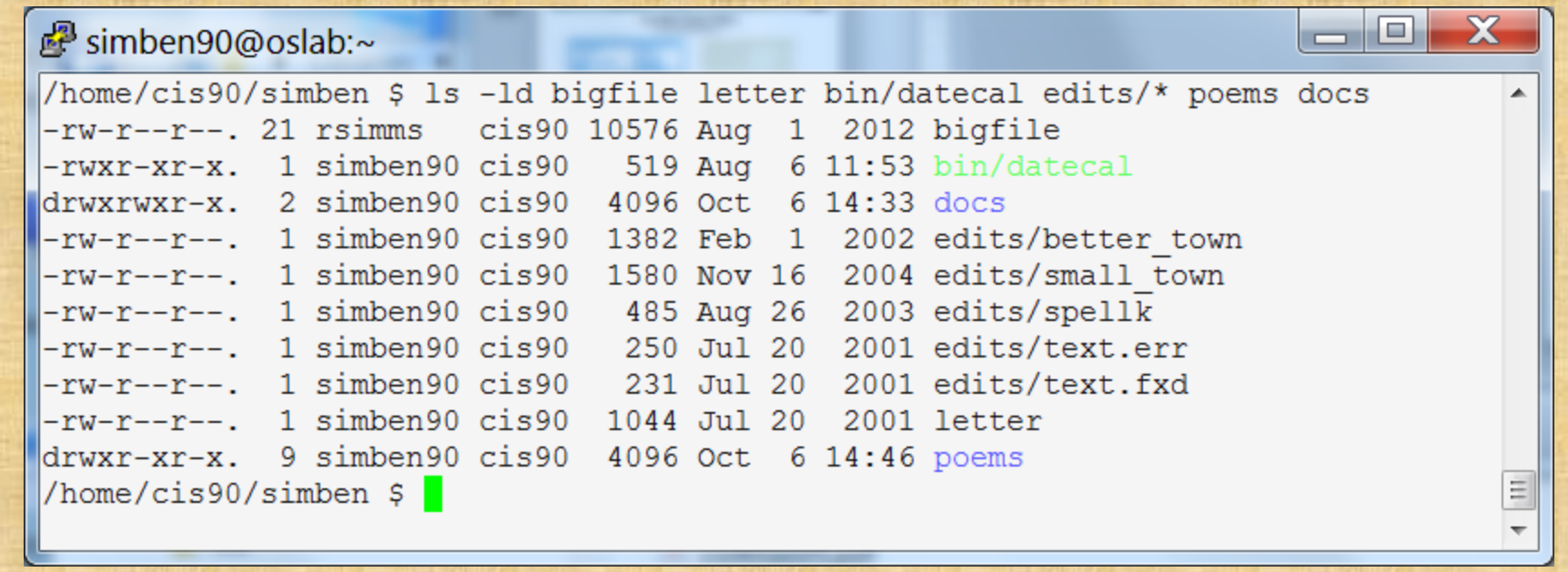
simben90@oslab:~

```
/home/cis90/simben $ id simben90
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam90
uid=1244(bincam90) gid=190(cis90) groups=190(cis90),100(users)
/home/cis90/simben $ id bincam172
uid=1425(bincam172) gid=172(cis172) groups=172(cis172),100(users)
/home/cis90/simben $ ls -ld . .. .bash_profile bin dead.letter lab01.graded letter cruz
drwxr-xr-x. 12 simben90 cis90 4096 Oct 13 10:11 .
drwxr-xr-x. 56 rsimms   cis90 4096 Sep 22 09:22 ..
-rw-------.  1 simben90 cis90  354 Sep 17  2003 .bash_profile
drwxr-xr-x.  2 simben90 cis90 4096 Oct  6 14:33 bin
-rw-r-----.  1 simben90 cis90   29 Oct 13 10:10 cruz
-rw-------.  1 simben90 cis90  575 Sep 21 21:27 dead.letter
-r--------.  1 simben90 staff 7512 Sep 10 15:19 lab01.graded
-rw-r--r--.  1 simben90 cis90 1044 Jul 20  2001 letter
/home/cis90/simben $
```

What are the permissions for the user bincam172 on the *cruz* file

Write your answer in the chat window

Activity



When a regular file has execute permissions what color is used by the ls command to show the filename?

Write your answer in the chat window

green

R=Read Permission

Read Permission

Read permission is necessary …

to read the data contents of a file.

The following example commands would require read permission on the file named *myfile*

```
cat myfile
head myfile
tail myfile
xxd myfile
less myfile
more myfile
cp myfile myfile.bak
mail -f myfile
```

Read Permission

```
/home/cis90/simben $ ls -l /etc/passwd /etc/shadow
-rw-r--r--. 1 root root  7990 Oct  4 08:02 /etc/passwd
----------. 1 root root 11944 Oct  3 11:48 /etc/shadow

/home/cis90/simben $ head -n3 /etc/passwd
```

Can the simben90 user print the first three lines of the /etc/passwd file?

Put your answer in the chat window

Read Permission

```
/home/cis90/simben $ ls -l /etc/passwd /etc/shadow
-rw-r--r--. 1 root root  7990 Oct  4 08:02 /etc/passwd
----------. 1 root root 11944 Oct  3 11:48 /etc/shadow

/home/cis90/simben $ head -n3 /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
```

Yes, the simben90 user would fall under the "Other" category which has read permission on /etc/passwd.

Read Permission

```
/home/cis90/simben $ ls -l /etc/passwd /etc/shadow
-rw-r--r--. 1 root root  7990 Oct  4 08:02 /etc/passwd
----------. 1 root root 11944 Oct  3 11:48 /etc/shadow

/home/cis90/simben $ cat /etc/shadow
```

Can the simben90 user cat the /etc/shadow file?

Put your answer in the chat window

Read Permission

```
/home/cis90/simben $ ls -l /etc/passwd /etc/shadow
-rw-r--r--. 1 root root  7990 Oct  4 08:02 /etc/passwd
-------r--. 1 root root 11944 Oct  3 11:48 /etc/shadow
```

```
/home/cis90/simben $ cat /etc/shadow
cat: /etc/shadow: Permission denied
```

No, the simben90 user would fall under the "Other" category which does not have read permission on /etc/shadow.

Permissions

W=Write




Write Permission

Write permission is necessary …

to write the contents of a file

The following example commands would require write permission on the file named *myfile*

echo "I Love Linux" > myfile
cp myfile.bak myfile

Write Permission

```
/home/cis90/simben $ ls -l letter ../milhom/letter
-rw-r--r--. 1 simben90 cis90 1059 Oct  7 15:05 letter
-rw-r--r--. 1 milhom90 cis90 1044 Jul 20  2001 ../milhom/letter

/home/cis90/simben $ echo "Benji was here" >> letter
```

Can the simben90 user write to his own letter file?

Put your answer in the chat window

Write Permission

```
/home/cis90/simben $ ls -l letter ../milhom/letter
-rw-r--r--. 1 simben90 cis90 1059 Oct  7 15:05 letter
-rw-r--r--. 1 milhom90 cis90 1044 Jul 20  2001 ../milhom/letter


/home/cis90/simben $ echo "Benji was here" >> letter
/home/cis90/simben $ tail -n2 letter
                                                Alan Sherman

Benji was here
```

Yes, Benji S. has write access to his letter file

Write Permission

```
/home/cis90/simben $ ls -l letter ../milhom/letter
-rw-r--r--. 1 simben90 cis90 1059 Oct  7 15:05 letter
-rw-r--r--. 1 milhom90 cis90 1044 Jul 20  2001 ../milhom/letter

/home/cis90/simben $ echo "Benji was here" >> ../milhom/letter
```

Can the simben90 user write to Homer's letter file?

Put your answer in the chat window

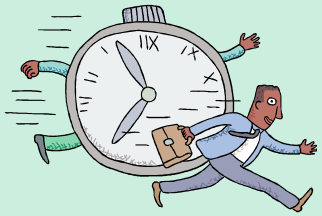
Write Permission

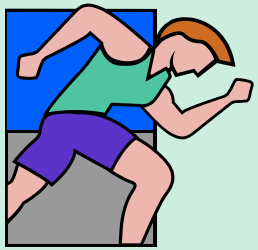
```
/home/cis90/simben $ ls -l letter ../milhom/letter
-rw-r--r--. 1 simben90 cis90 1059 Oct  7 15:05 letter
-rw-r--r--. 1 milhom90 cis90 1044 Jul 20  2001 ../milhom/letter

/home/cis90/simben $ echo "Benji was here" >> ../milhom/letter
-bash: ../milhom/letter: Permission denied
```

No, Benji S. does not have write access to Homer's letter file

Permissions

X=eXecute



Execute Permission

Both read and execute permissions are necessary …

to run a file (i.e. a program, command or script)

The following example command would require read and execute permission on the file named *myfile*

myfile

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/randomFile
-rwx------. 1 rsimms   cis90 1162 Sep 30  2014 ../bin/randomFile
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme

/home/cis90/simben $ randomFile
```

Can the simben90 execute the randomFile file in the /home/cis90/bin directory?

Put your answer in the chat window

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/randomFile
-rwx---r-x. 1 rsimms  cis90 1162 Sep 30  2014 ../bin/randomFile
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme

/home/cis90/simben $ randomFile
-bash: /home/cis90/simben/../bin/randomFile: Permission denied
```

No, simben90 falls under the "group" category which does not have read or execute permission on randomFile

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/randomFile
-rwx------. 1 rsimms   cis90 1162 Sep 30  2014 ../bin/randomFile
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme

/home/cis90/simben $ tryme
```

Can the simben90 execute the tryme file in his own bin directory?

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/randomFile
-rwx------. 1 rsimms   cis90 1162 Sep 30  2014 ../bin/randomFile
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme

/home/cis90/simben $ tryme
My name is "tryme"
I am pleased to make your acquaintance, Benji Simms
/tmp
```

Yes, simben90 has both read and execute permissions on tryme

New files

ownership & group membership

Lesson 7 commands for your toolbox

groups – displays file inode information (status) and more

id – displays information about a user

Group Membership

*Use either **id** or **groups** command to determine what groups a user belongs to*

```
/home/cis90/simben $ id simben90
uid=1001(simben90) gid=190(cis90) groups=190(cis90),100(users)
```

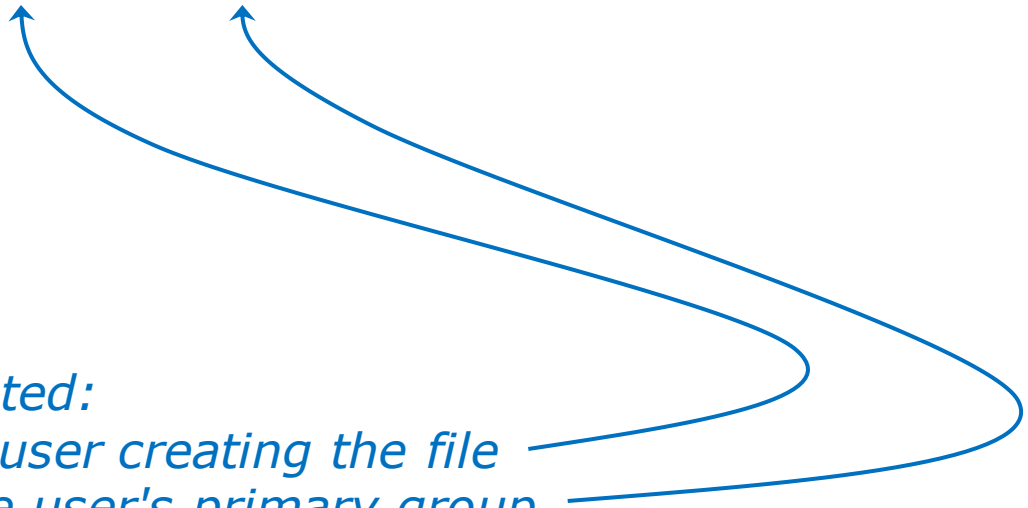
*simben90's primary group (GID) is **cis90***

```
/home/cis90/simben $ groups simben90
simben90 : cis90 users
```

*simben90's secondary group is **users***

Groups

```
/home/cis90/simben $ touch mydogs
/home/cis90/simben $ ls -l mydogs
-rw-rw-r--. 1 simben90 cis90 0 Oct  7 15:12 mydogs
```



When a new file is created:

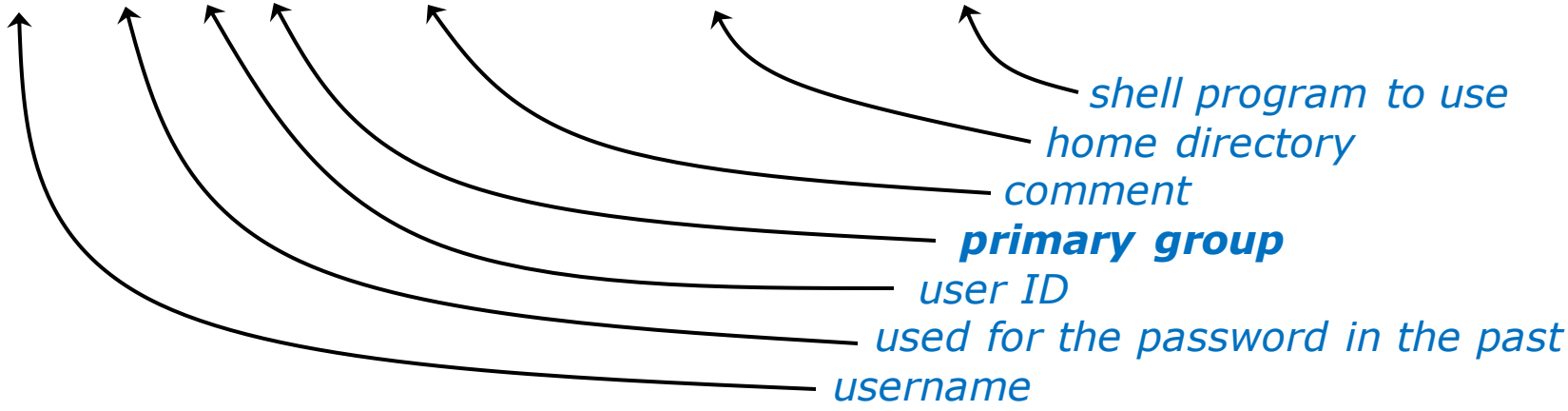
- *the user is set to the user creating the file*
- *the group is set to the user's primary group*

Primary group recorded in /etc/passwd

The user's primary group is stored in the 4th field of /etc/passwd

Excerpt from **/etc/passwd**

```
cis90:x:1000:190:CIS 90 Student:/home/cis90/cis:/bin/bash
simben90:x:1001:190:Benji Simms:/home/cis90/simben:/bin/bash
milhom90:x:1002:190:Homer Miller:/home/cis90/milhom:/bin/bash
rodduk90:x:1003:190:Duke Roddy:/home/cis90/rodduk:/bin/bash
```



Secondary groups recorded in /etc/group

Secondary group membership is recorded in /etc/group

Excerpts from **/etc/group**

```
audio:x:63:
nobody:x:99:
users:x:100:guest,jimg,rsimms,gerlinde,cis90,simben90,milhom90,rodduk90,calsea90,davd
on90,ellcar90,frocar90,hendaj90,kanbry90,kenrit90,libkel90,lyoben90,marray90,menfid90
,mesmic90,noreva90,potjos90,ramgus90,wiljac90,zamhum90,fyosea90,verevi90,rawjes90,mes
cha90,evaand90,ahrmat98,calsea98,capchr98,colabd98,dinchr98,doucor98,drybry98,flamat9
8,goothe98,lewzar98,mccmic98,roclea98,shidev98,sonely98,srelau98,syljos98,thepat98,va
rana98,veleli98,wildan98,alvdes98,musdav98,luztas98,visgab98,fareli98,ramcar90,chiand
98,farsha90,arcmat172,balcor172,bodian172,deddil172,dusaar172,evaand172,sha172,galgwy
172,gilgab172,hilsco172,juarub172,mic172,lemrya172,maradr172,matmar172,melale172,menf
id172,monlui172,mordav172,pallar172,perste172,rodchr172,rutsam172,schjon172,weltod172
,wiltyr172,wismar172,bramar172,172,acctes172,bermic172,lejmic172,farsha172,ianbod172
dbus:x:81:
utmp:x:22:
< snipped >
guest:x:506:
staff:x:503:rsimms,gerlinde,jimg,rick
cis90:x:190:guest,rsimms,jimg
cis98:x:130:jimg,rsimms
cis172:x:172:gerlinde
cis191:x:191:rsimms,jimg
cis192:x:192:rsimms,jimg
```

Activity

What is your primary group?

(Write your answer in the chat window)

Activity

What other groups do you belong to?

(Write your answer in the chat window)

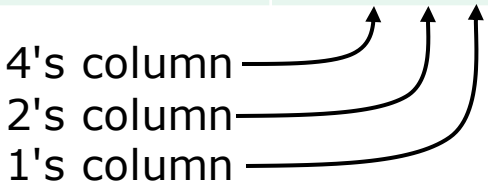
Specifying Numeric Permissions

File Permissions

Binary and Decimal

Permissions are stored internally using binary numbers and they can be specified using decimal numbers

rwx	Binary	Convert	Decimal
_ _ _	0 0 0	0 + 0 + 0	0
_ _ x	0 0 1	0 + 0 + 1	1
_ w _	0 1 0	0 + 2 + 0	2
_ w x	0 1 1	0 + 2 + 1	3
r _ _	1 0 0	4 + 0 + 0	4
r _ x	1 0 1	4 + 0 + 1	5
r w _	1 1 0	4 + 2 + 0	6
r w x	1 1 1	4 + 2 + 1	7



File Permissions

Example: rw-

rwx	Binary	Convert	Decimal
_ _ _	0 0 0	0 + 0 + 0	0
_ _ x	0 0 1	0 + 0 + 1	1
_ w _	0 1 0	0 + 2 + 0	2
_ w x	0 1 1	0 + 2 + 1	3
r _ _	1 0 0	4 + 0 + 0	4
r _ x	1 0 1	4 + 0 + 1	5
r w _	1 1 0	4 + 2 + 0	6
r w x	1 1 1	4 + 2 + 1	7

Example: **rw-** (read, write, no execute)

= 110 or 4+2+0 = 6

binary *decimal* *decimal*

File Permissions

Example: -wx

rwx	Binary	Convert	Decimal
_ _ _	0 0 0	0 + 0 + 0	0
_ _ x	0 0 1	0 + 0 + 1	1
_ w _	0 1 0	0 + 2 + 0	2
_ w x	0 1 1	0 + 2 + 1	3
r _ _	1 0 0	4 + 0 + 0	4
r _ x	1 0 1	4 + 0 + 1	5
r w _	1 1 0	4 + 2 + 0	6
r w x	1 1 1	4 + 2 + 1	7

Example: **-wx** (no read, write, execute)

= 011 (*binary*) or 0+2+1 (*decimal*) = 3 (*decimal*)

Practice converting to numeric permissions

File Permissions

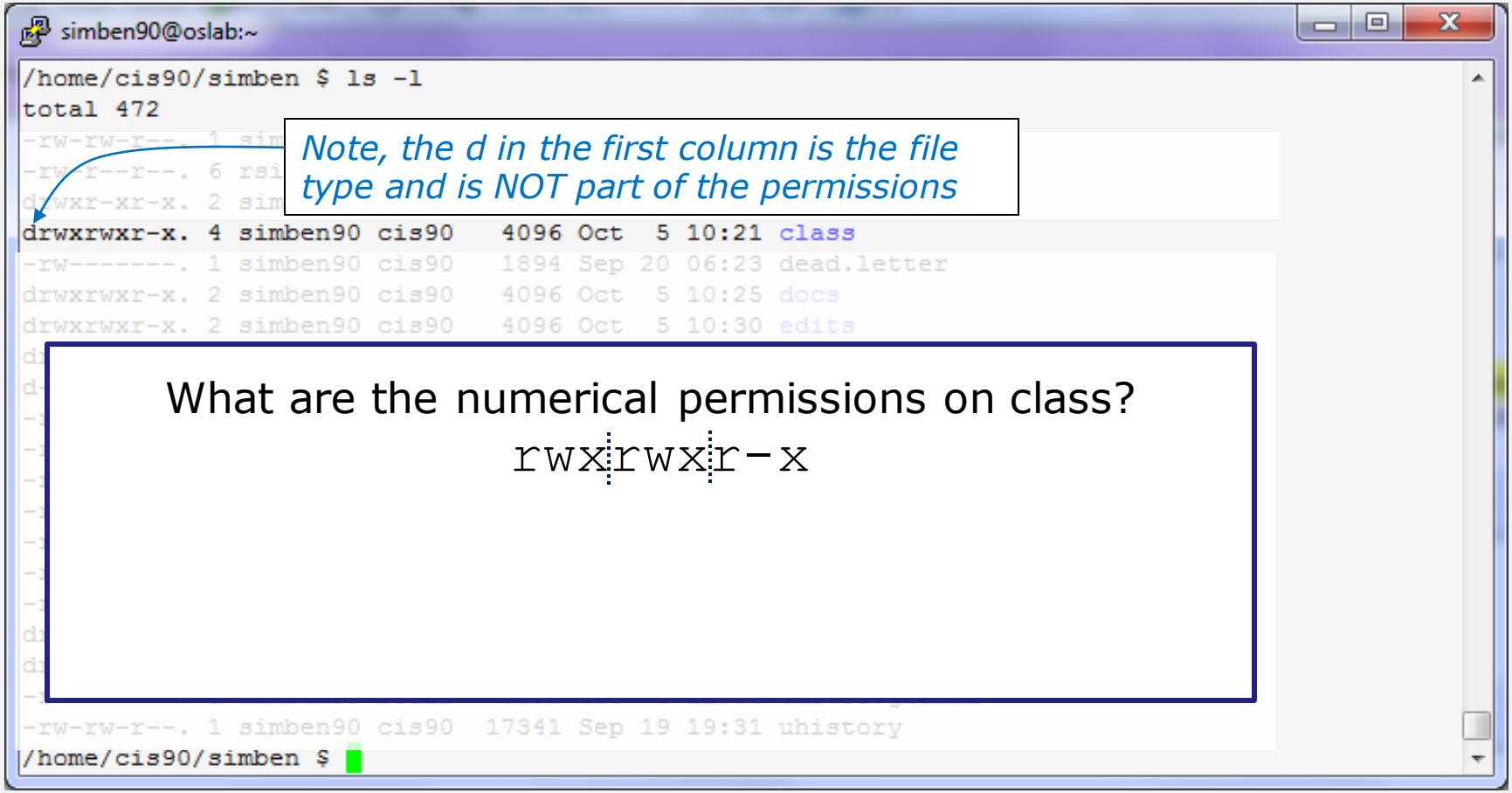
Use long Listings to show permissions

simben90@oslab:~

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90   4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90   1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90   4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff   2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff   1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff    814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90   1059 Oct  7 14:41 letter
-rw-r--r--. 1 simben90 cis90    208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90 375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

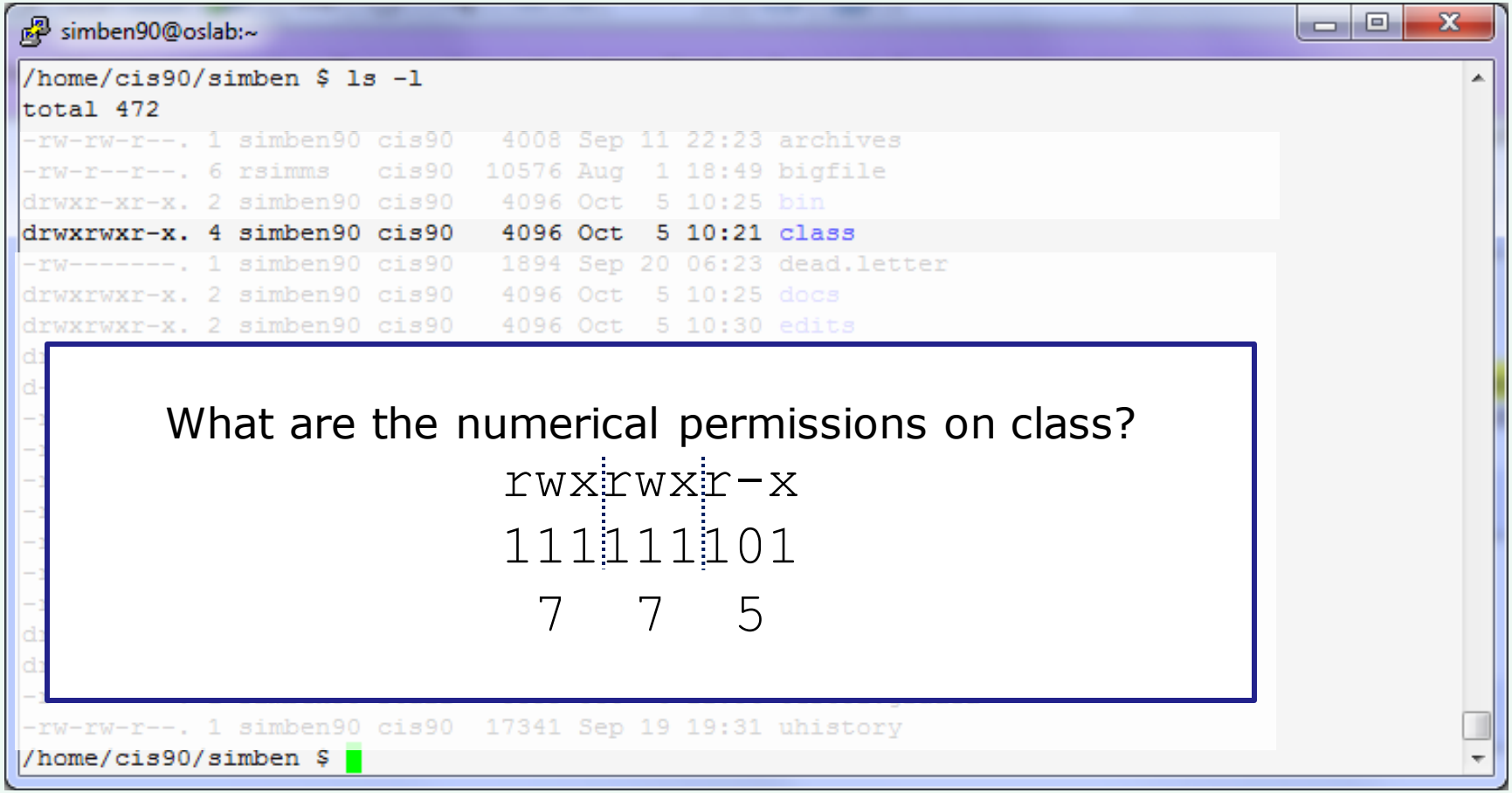
Example 1

Converting mnemonic permissions to numeric



Example 1

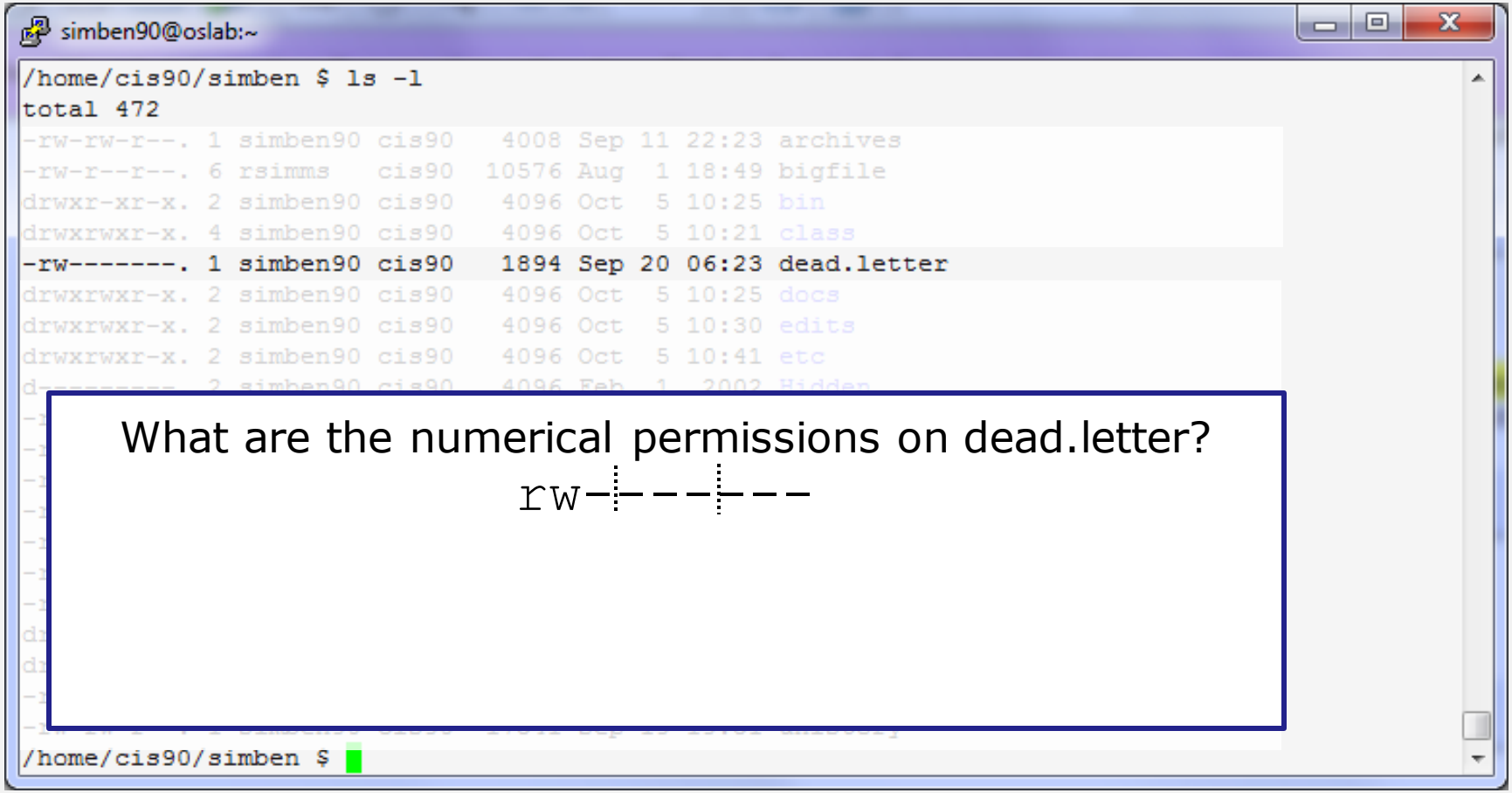
Converting mnemonic permissions to numeric



simben90's class (directory) permissions are 775

Example 2

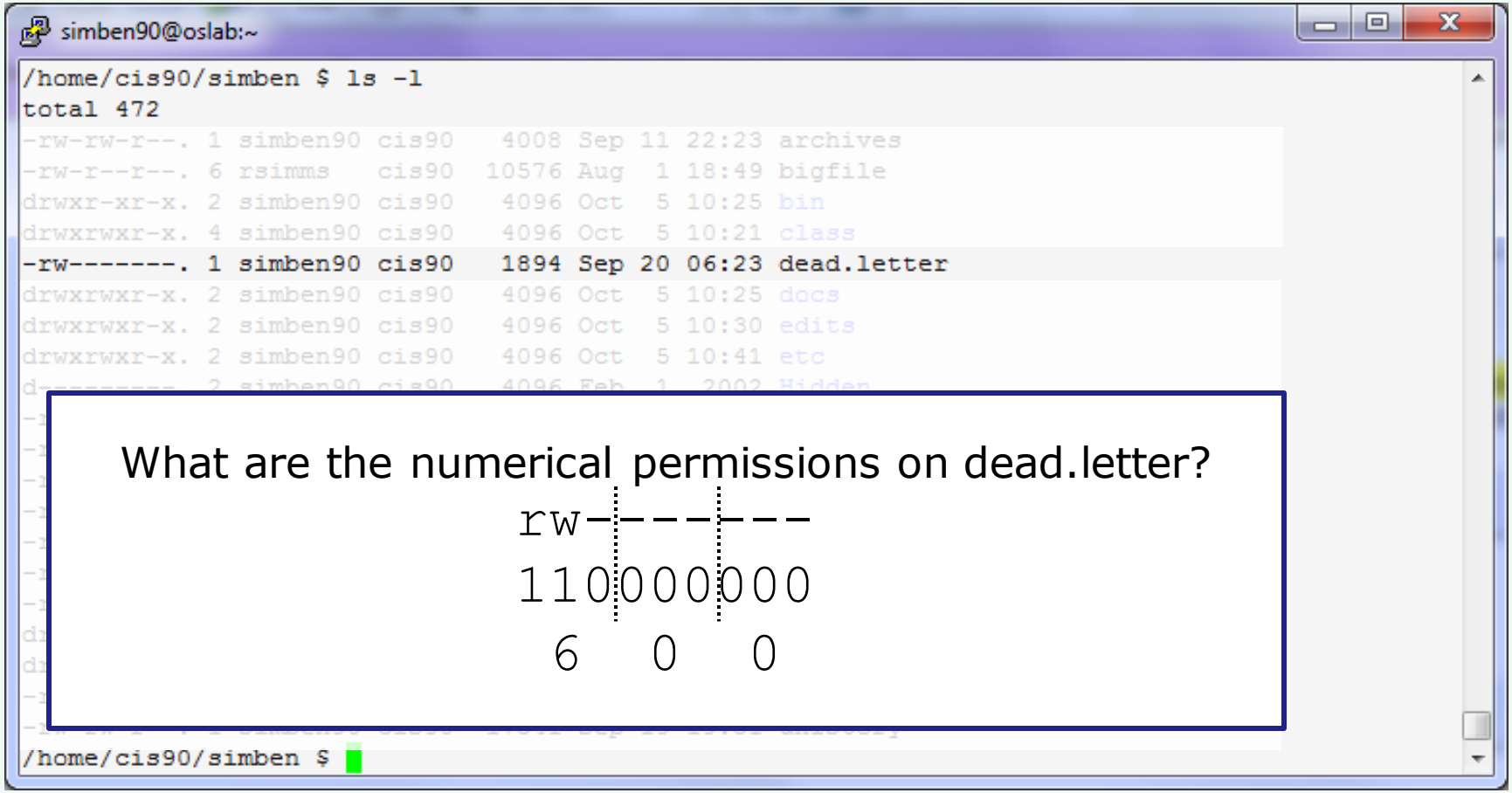
Converting mnemonic permissions to numeric



simben90's dead.letter (regular file)

Example 2

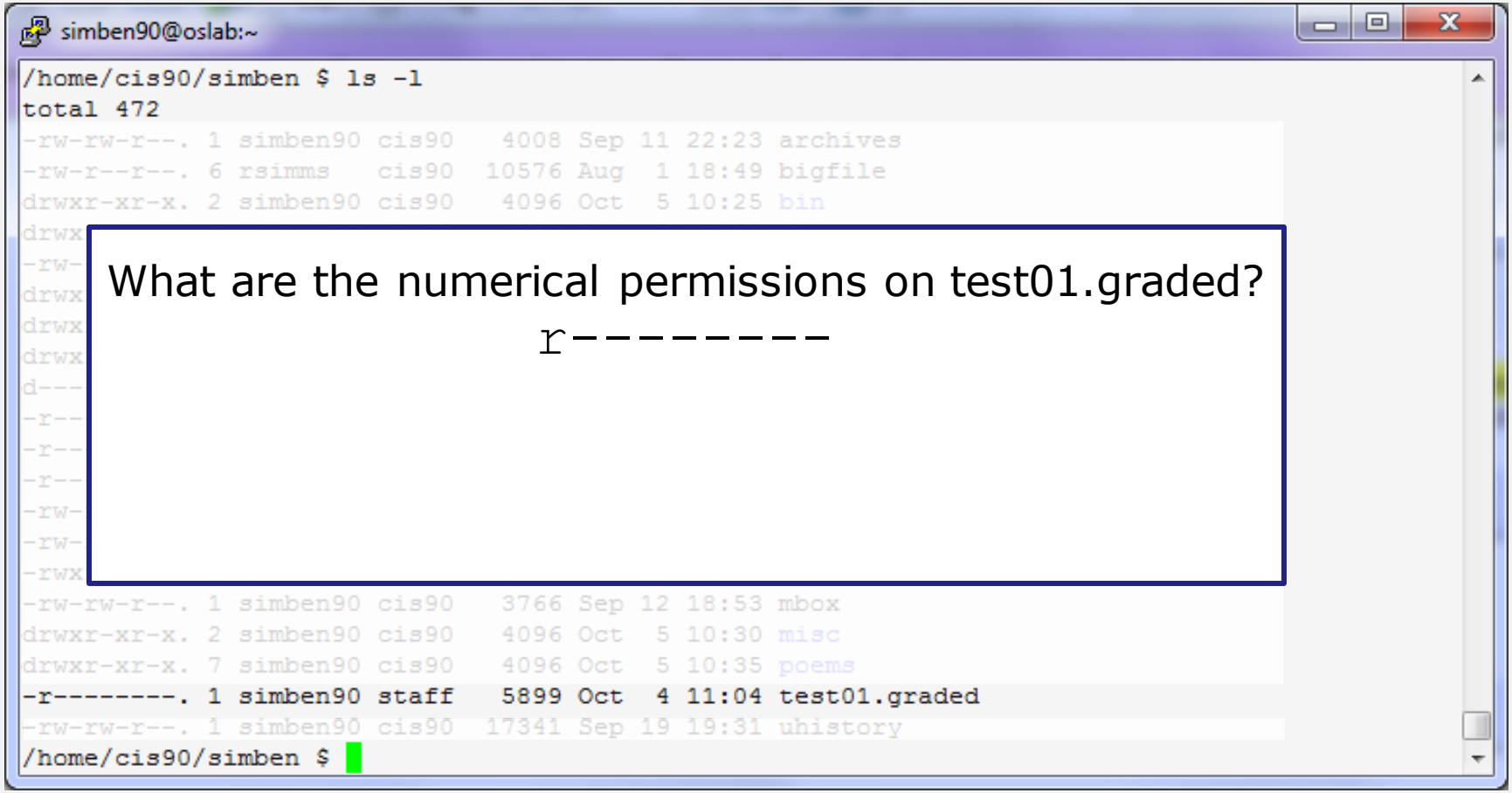
Converting mnemonic permissions to numeric



simben90's dead.letter (regular file) permissions are 600

Example 3

Converting mnemonic permissions to numeric



simben90's test01.graded (regular file)

Example 3

Converting mnemonic permissions to numeric

simben90@oslab:~

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwx
-rw-
drwx
drwx
drwx
d---
-r--
-r--
-r--
-rw-
-rw-
-rwx
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

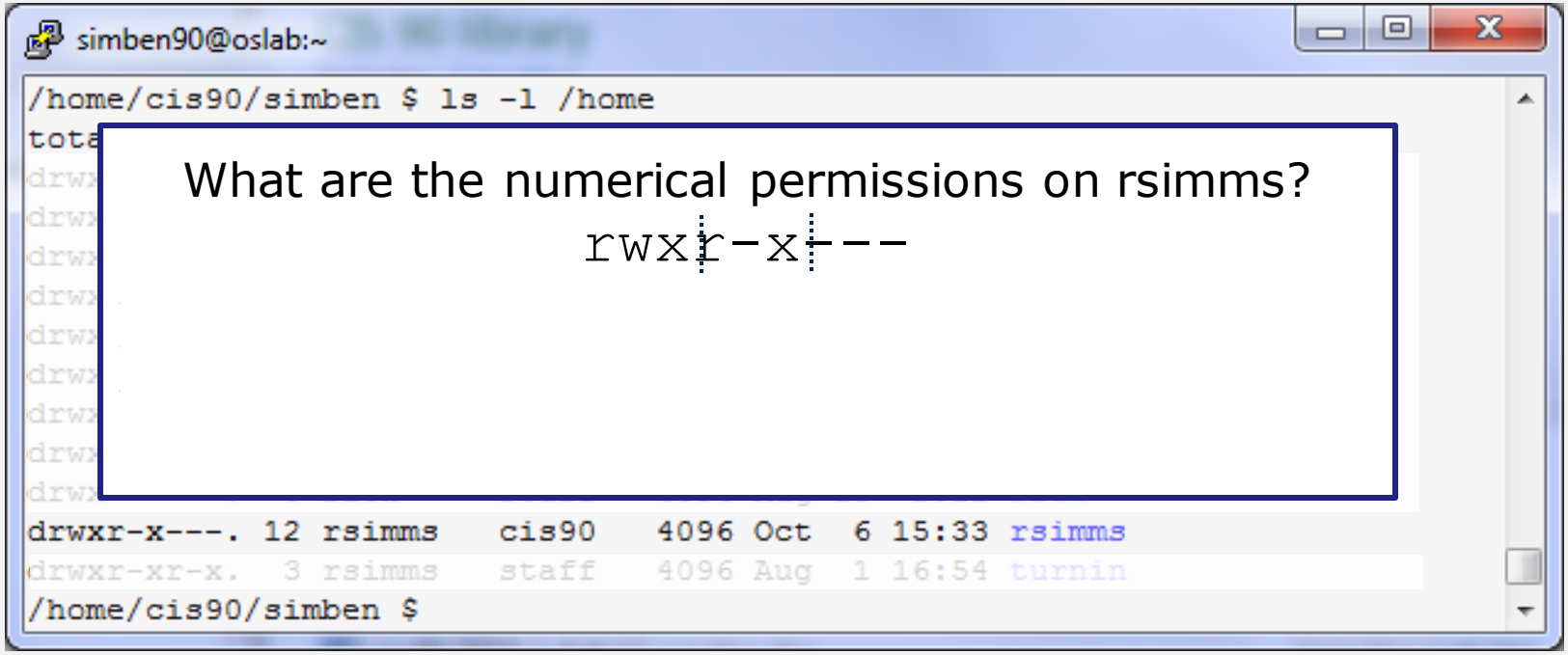
What are the numerical permissions on test01.graded?

```
r--|---|---
100|000|000
 4 |  0|  0
```

simben90's test01.graded permissions are 400

Example 4

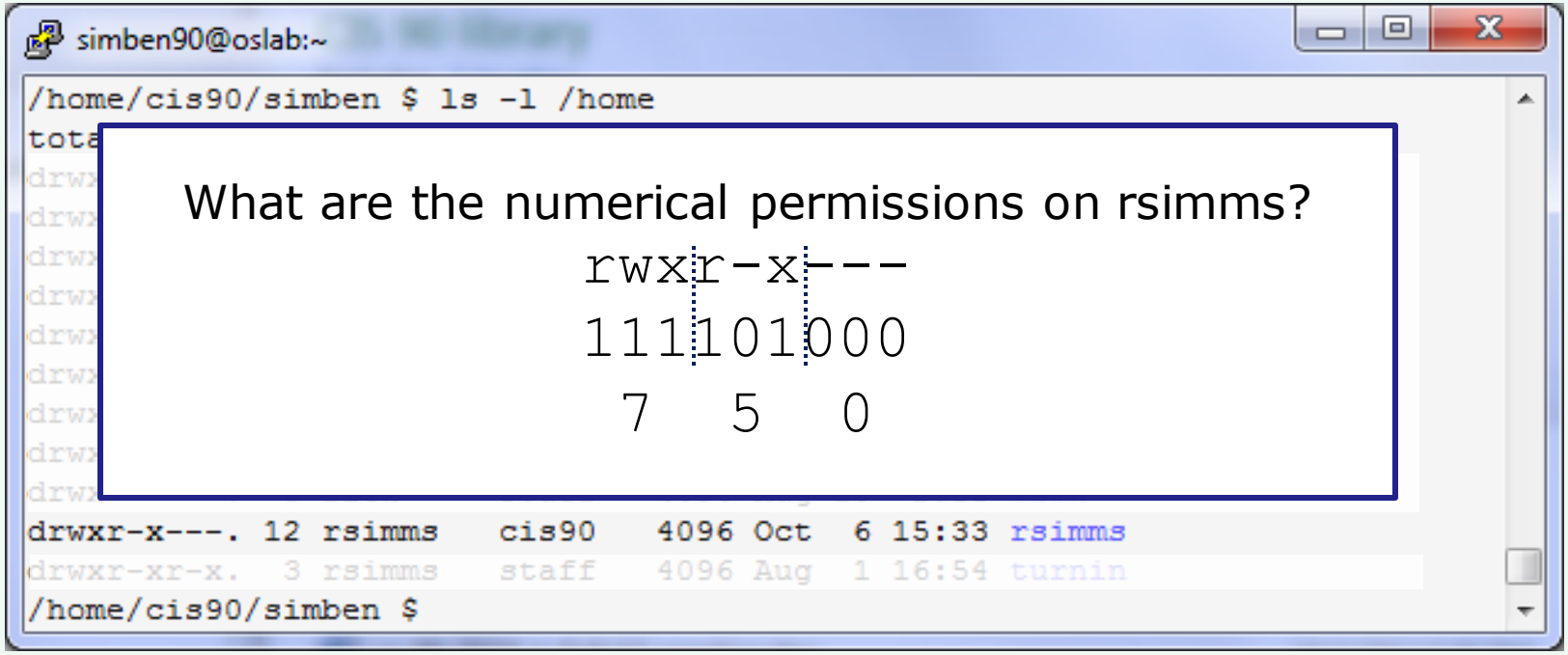
Converting mnemonic permissions to numeric



/home/rsimms (Rich's home directory)

Example 4

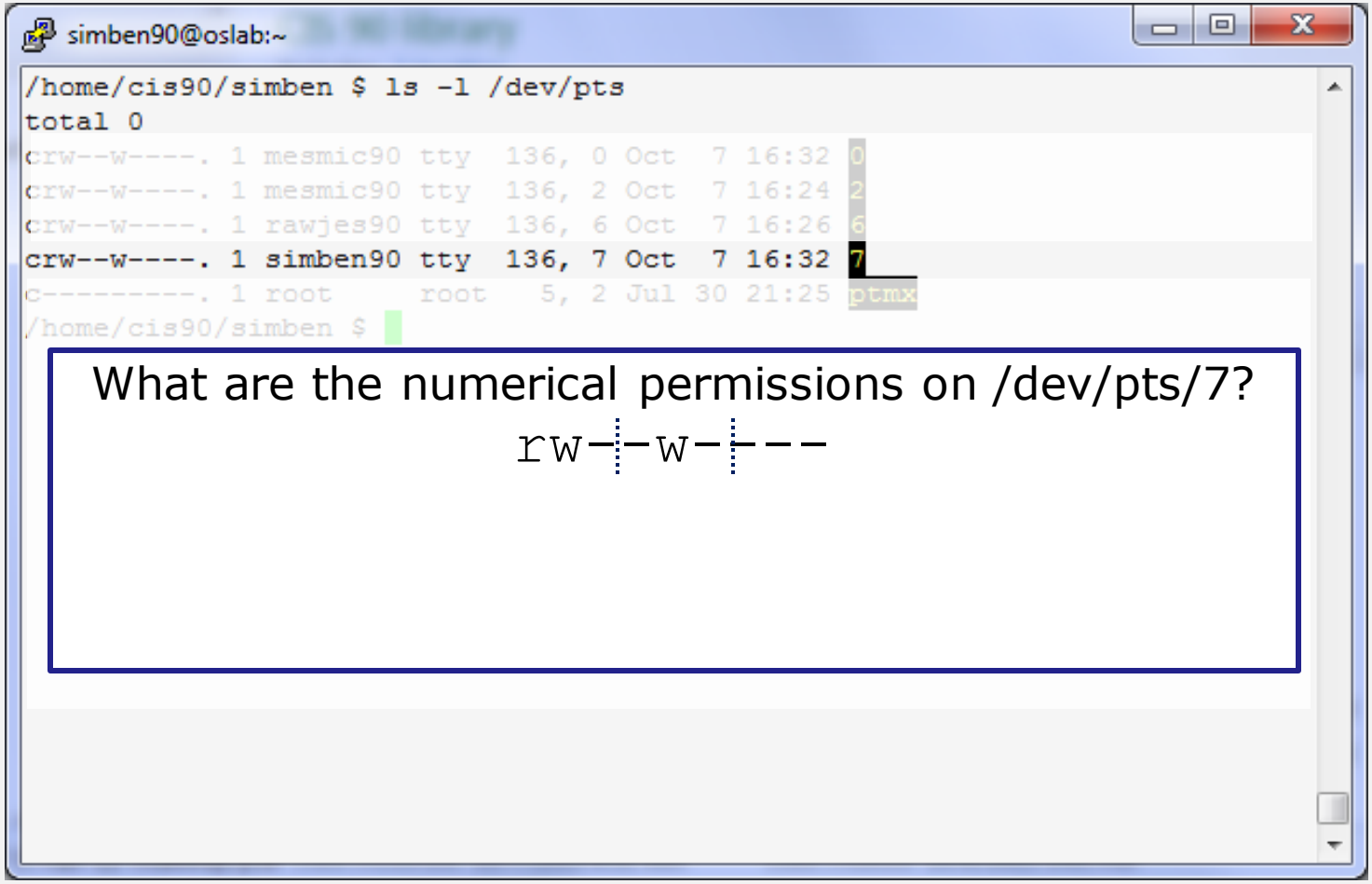
Converting mnemonic permissions to numeric



/home/rsimms permissions are 750

Example 5

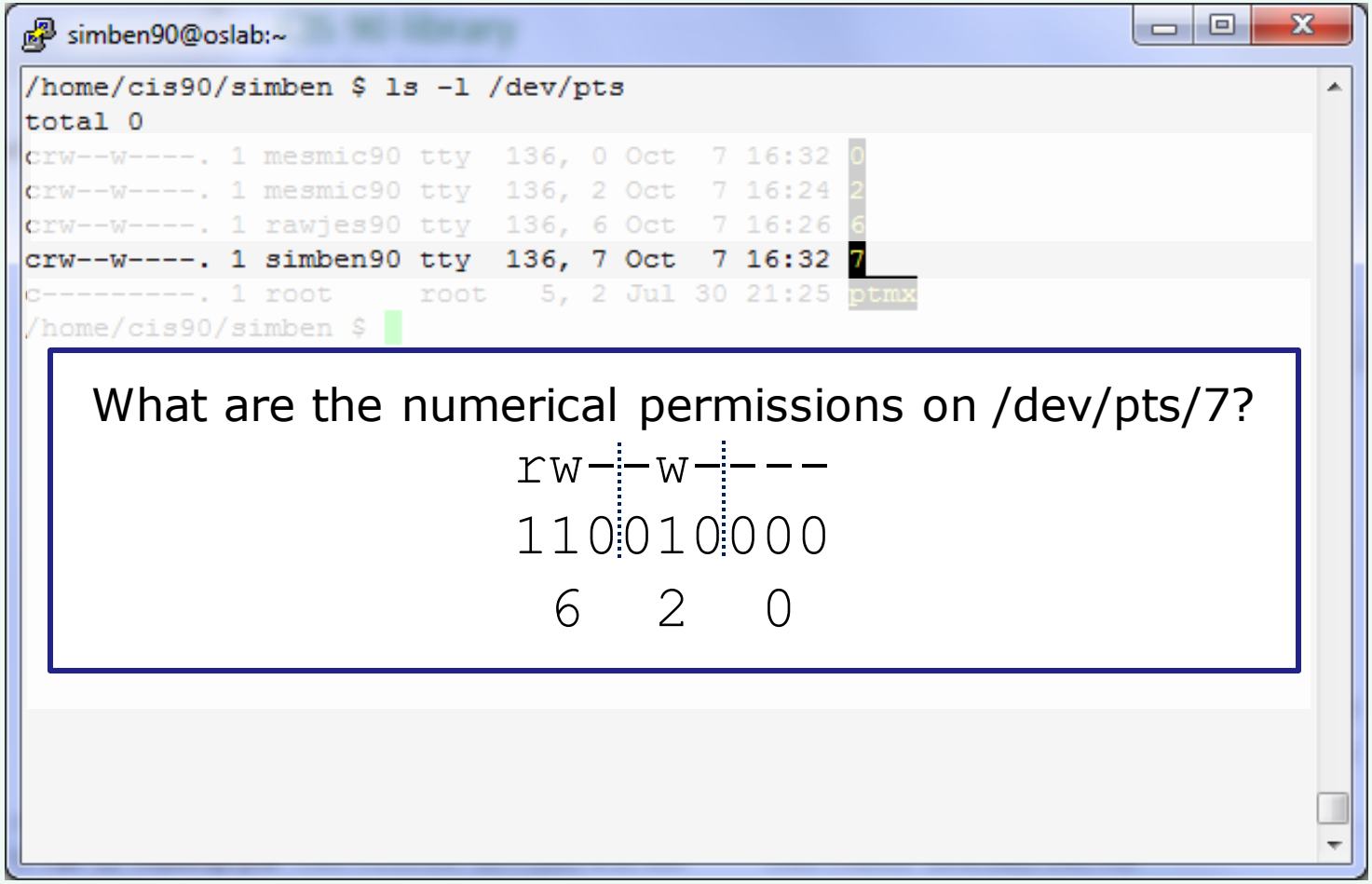
Converting mnemonic permissions to numeric



/dev/pts/7 (character special device file)

Example 5

Converting mnemonic permissions to numeric



/dev/pts/7 permissions are 620

Recap

File Permissions
Summary

How do we control access to files and directories?

How do we control access to files and directories?

Answer: **file permissions**

File Permissions
Summary

What permissions are there?

File Permissions
Summary

What permissions are there?

Answer: **read, write and execute**

File Permissions
Summary

Who do permissions apply to?

File Permissions
Summary

Who do permissions apply to?

Answer:

The **user** (owner) of the file
The **group** the file belongs to
and everyone else (**others**)

Letter file in detail

More Lesson 7 commands for your toolbox

ls -l – produces a "long listing" showing some of the inode information

stat – file "status" which displays additional inode information and more

File Permissions

Relevant fields from the inode

```
/home/cis90/simmsben $ ls -l
total 176
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90   4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90   1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90   4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff   2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff   1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff    814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90   1059 Oct  7 15:05 letter
-rw-r--r--. 1 simben90 cis90    208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90 375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
-rw-rw-r--. 1 simben90 cis90      0 Oct  7 15:12 mydogs
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
```

Permissions *Owner* *Group*

FYI:
In newer distros, GNU ls uses a '.' character to indicate a file with an SELinux security context, but no other alternate access method.

http://www.gnu.org/software/coreutils/manual/html_node/What-information-is-listed.html#What-information-is-listed

File Permissions

Relevant fields from the inode

```
/home/cis90/simmsben $ ls -l
total 176
total 472
-rw-rw-r--. 1 simben90 cis90   4008 Sep 11 22:23 archives
-rw-r--r--. 6 rsimms   cis90  10576 Aug  1 18:49 bigfile
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:25 bin
drwxrwxr-x. 4 simben90 cis90   4096 Oct  5 10:21 class
-rw-------. 1 simben90 cis90   1894 Sep 20 06:23 dead.letter
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:25 docs
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90   4096 Oct  5 10:41 etc
d---------. 2 simben90 cis90   4096 Feb  1  2002 Hidden
-r--------. 1 simben90 staff   2780 Sep  6 13:47 lab01.graded
-r--------. 1 simben90 staff   1312 Sep 13 12:27 lab02.graded
-r--------. 1 simben90 staff    814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90   1059 Oct  7 15:05 letter
-rw-r--r--. 1 simben90 cis90    208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90 375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90   3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90   4096 Oct  5 10:30 misc
-rw-rw-r--. 1 simben90 cis90      0 Oct  7 15:12 mydogs
drwxr-xr-x. 7 simben90 cis90   4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff   5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90  17341 Sep 19 19:31 uhistory
```

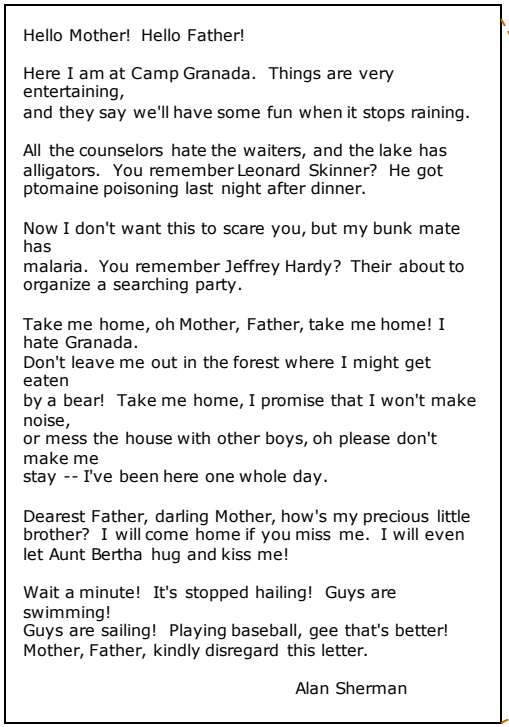
Permissions *Owner* *Group*

The owner of letter is simben90 and the group is cis90

The permissions on letter are `rw-r--r--` or **110 100 100** or **644**

The filename is kept in the directory

bigfile 12687
bin 12067
letter 10574



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.

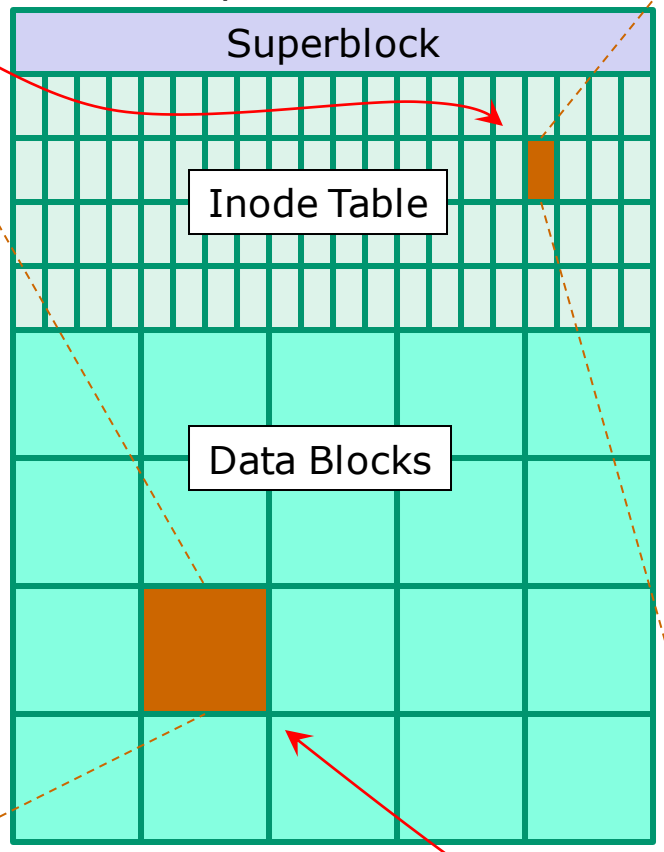
Take me home, oh Mother, Father, take me home! I hate Granada.
Don't leave me out in the forest where I might get eaten
by a bear! Take me home, I promise that I won't make noise,
or mess the house with other boys, oh please don't make me
stay -- I've been here one whole day.

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!

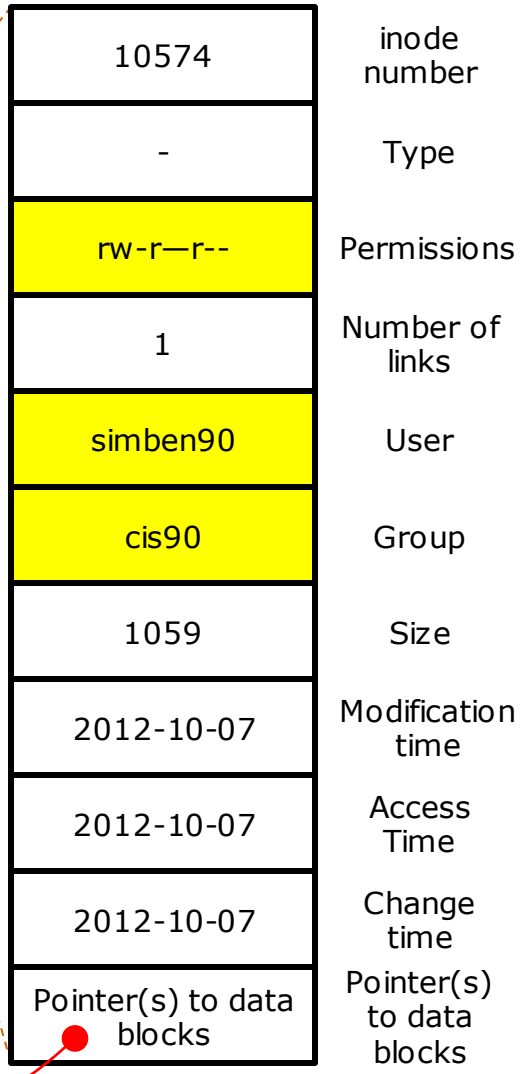
Wait a minute! It's stopped hailing! Guys are swimming!
Guys are sailing! Playing baseball, gee that's better!
Mother, Father, kindly disregard this letter.

Alan Sherman

The actual content is kept in a data block



Permissions, owner, group, etc. are kept in the inode




```
/home/cis90/simmsben $ ls -il letter
10574 -rw-r--r--. 1 simben90 cis90  1059 Oct  7 15:05 letter
```

File Permissions

Example: letter file

*The **stat** command shows permissions in both formats*

```
/home/cis90/simben $ stat letter
  File: `letter'
  Size: 1059            Blocks: 8          IO Block:
    4096   regular file
Device: 805h/2053d      Inode: 10574       Links: 1
Access: (0644/-rw-r--r--)  Uid: ( 1001/simben90)   Gid:
    (  190/   cis90)
Access: 2012-10-07 15:06:09.922703386 -0700
Modify: 2012-10-07 15:05:57.856733896 -0700
Change: 2012-10-07 15:05:57.856733896 -0700
/home/cis90/simben $
```

numeric form

110100100

The permissions on letter are rw-r--r-- or 644

owner has read and write

group has only read

others have only read

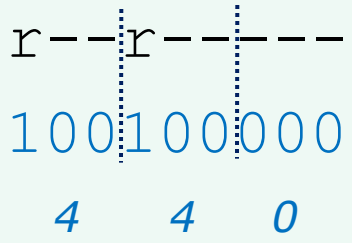
More Practice

File Permissions

What is the numeric form of `r--r-----`?

File Permissions

What is the numeric form of `r--r-----`?



Answer: 440

Owner has read
Group has read
Others have no permissions

File Permissions

What is the mnemonic form of 755?

File Permissions

What is the mnemonic form of 755?

```
 7  5  5
111101101
rwxr-xr-x
```

Answer: `rwxr-xr-x`

Owner has read, write and execute
Group has read and execute
Others have read and execute

File Permissions

What is the numeric form of `rwxrw-r--`?

File Permissions

What is the numeric form of `rwxrw-r--`?

```
rwxrw-r--
111110100
 7  6  4
```

Answer: 764

Owner has read, write and execute
Group has read and write
Others have read only

File Permissions

What are the mnemonic permissions are 644?

File Permissions

What are the mnemonic permissions are 644?

```
110 100 100
rw- r-- r--
```

Answer: `rw-r--r--`

owner has read and write
group has read
others have read

File Permissions

Does the simben90 user have read access to /etc/samba/smb.conf?

File Permissions

Does the simben90 user have read access to /etc/samba/smb.conf?

Answer: yes

```
/home/cis90/simben $ ls -l /etc/samba/smb.conf
-rw-r--r--. 1 root root 9778 Apr 30 11:35 /etc/samba/smb.conf
```

root has read & write
root group has read
all other users, including simben90, have read

Configuring Permissions

More Lesson 7 commands for your toolbox

chown - Changes the ownership of a file. (Only the superuser has this privilege)

chgrp - Changes the group of a file. (Only groups that you belong to)

chmod - Changes the file mode "permission" bits of a file.

- Numeric: **chmod 640 letter** (sets the permissions)
- Mnemonic: **chmod ug+rw letter** (changes the permissions)

u=user(owner), **g**=group, **o**=other
r=read, **w**=write, **x**=execute

umask – Allows you to fully control the permissions new files and directories are created with

chown

chown – change owner

Syntax:

chown *newowner pathname(s)*

Examples:

- **`chown rsimms letter`**
- **`chown simben90 lab*.graded`**
- **`chown rsimms /home/cis90/bin/*`**

chown – change owner

```
/home/cis90/milhom $ touch myfile
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chown simben90 myfile
chown: changing ownership of `myfile': Operation not permitted
```

Make a test file and try to change the owner

*Only root can use the **chown** command*

```
/home/cis90/milhom $ su -
Password:
[root@oslab ~]# chown simben90 /home/cis90/milhom/myfile
[root@oslab ~]# ls -l /home/cis90/milhom/myfile
-rw-rw-r--. 1 simben90 cis90 0 Oct  9 10:23 /home/cis90/milhom/myfile
```

chgrp

chgrp – change group

Syntax:

chgrp *group pathname(s)*

Examples:

- **`chgrp users letter`**
- **`chgrp cis90 /home/cis90/bin/*`**

chgrp – change group

```
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

change group to users

```
/home/cis90/milhom $ chgrp users myfile
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 users 0 Oct  9 10:23 myfile
```

change group back to cis90

```
/home/cis90/milhom $ chgrp cis90 myfile
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

You can only change the group to one you belong to

chmod

chmod – change permissions

Syntax:

chmod permissions *pathname(s)*

may be specified numerically or mnemonically

Examples:

- **chmod 750 check5 check6**
- **chmod 644 poems/*/***

numeric

- **chmod +x myscript**
- **chmod g+rw share/***

mnemonic

chmod (mnemonic)

Mnemonic permission specifications

Relative changes to existing permissions

Examples:

u+w = add write permission to user
u-w = remove write permission from user
u+wx = add write and execute permission to user

g+r = add read permission to group
g-rwx – remove read, write, execute permissions from group

o+rw = add read, write permissions to others
o-r = remove read permission from others

+x = add execute permission to user, group and others
+rw = add read & write permissions to user, group and others

uo+w = add write permission to user and others

u+rwx,o-rwx = add read, write, execute permissions to user but remove them from others

Definitions:

u=user (owner)
g=group
o=other

r=read permission
w=write permission
x=execute permission

*combinations allowed but **no blanks** around the commas!*

Using chmod to change permissions (mnemonic)

The file does not currently have execute permission for the user or group

```
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

With chmod command use "u" for user (owner), "g" for group and "o" for others

```
/home/cis90/milhom $ chmod u+x myfile
/home/cis90/milhom $ ls -l myfile
-rwxrw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

add execute permission for user (owner)

```
/home/cis90/milhom $ chmod g+x myfile
/home/cis90/milhom $ ls -l myfile
-rwxrwxr--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

add execute permission for group

Using chmod to change permissions (mnemonic)

```
/home/cis90/milhom $ ls -l myfile
-rwxrwxr--. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod -x myfile
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod go+x myfile
/home/cis90/milhom $ ls -l myfile
-rw-rwxr-x. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod go-rwx myfile
/home/cis90/milhom $ ls -l myfile
-rw-------. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

remove execute from all

add execute to others and group

remove read, write, execute from groups and others

chmod (numerical)

chmod using numerical method

```
/home/cis90/milhom $ ls -l myfile
-rw-------. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod 664 myfile
/home/cis90/milhom $ ls -l myfile
-rw-rw-r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

You can also specify each permission directly using the numeric mode of the command

chmod using numerical method

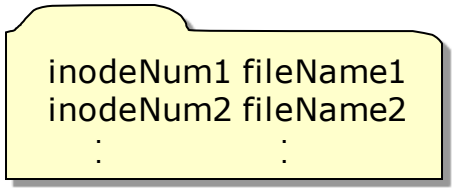
```
/home/cis90/milhom $ chmod 777 myfile
/home/cis90/milhom $ ls -l myfile
-rwxrwxrwx. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod 640 myfile
/home/cis90/milhom $ ls -l myfile
-rw-r-----. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod 000 myfile
/home/cis90/milhom $ ls -l myfile
----------. 1 milhom90 cis90 0 Oct  9 10:23 myfile

/home/cis90/milhom $ chmod 644 myfile
/home/cis90/milhom $ ls -l myfile
-rw-r--r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

*More examples using the numeric mode of the **chmod** command*

File Permissions in action

File Permissions

Commands that use file permissions



Permission	File	Directory
Read (4)	cat, more, head, tail, cp (from)	ls
Write (2)	cp (into), vi, saving mail	cp (into), mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

read permission is required whenever file contents must be accessed

Read Permission

Make a directory named Directory3, cd into it, and create myfile:

```
/home/cis90/simmsben $ mkdir Directory3
/home/cis90/simmsben $ cd Directory3/
/home/cis90/simmsben/Directory3 $ touch myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-rw-r--r-- 1 simmsben cis90 0 Oct 13 07:16 myfile
```

Add some data to myfile and try reading with and without read permission:

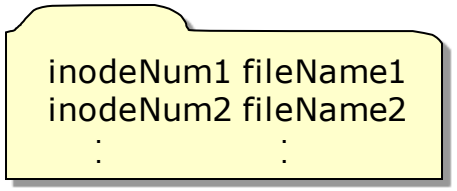
```
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
/home/cis90/simmsben/Directory3 $ cat myfile
Blah Blah Blah
/home/cis90/simmsben/Directory3 $ chmod u-r myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
--w-r--r-- 1 simmsben cis90 15 Oct 13 08:50 myfile
/home/cis90/simmsben/Directory3 $ cat myfile
cat: myfile: Permission denied
```

removes read permission for user owning the file

Can you fix this so you can read your own file again?

File Permissions

Commands that use file permissions



Permission	File	Directory
Read (4)	cat, more, head, tail, cp (from)	ls
Write (2)	cp (into), vi, saving mail	cp (into), mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

write permission is required whenever file contents are written

Write Permission

Start with a fresh version of myfile:

```
/home/cis90/simmsben/Directory3 $ rm myfile
/home/cis90/simmsben/Directory3 $ touch myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-rw-rw-r-- 1 simmsben cis90 0 Oct 13 08:58 myfile
```

Add some data to myfile :

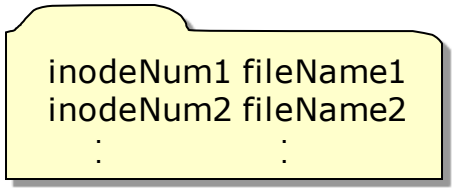
```
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
/home/cis90/simmsben/Directory3 $ chmod 444 myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-r--r--r-- 1 simmsben cis90 15 Oct 13 09:02 myfile
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
-bash: myfile: Permission denied
```

write permission removed

Can you fix this so you can write to your own file again?

File Permissions

Commands that use file permissions



Permission	File	Directory
Read (4)	cat, more, head, tail, cp (from)	ls
Write (2)	cp (into), vi, saving mail	cp (into), mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

execute permission is required to load and run a file

Execute Permission

Start with a fresh version of myfile:

```
/home/cis90/simmsben/Directory3 $ rm myfile
rm: remove write-protected regular file `myfile'? yes
/home/cis90/simmsben/Directory3 $ touch myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-rw-rw-r-- 1 simmsben cis90 0 Oct 13 09:12 myfile
```

Make a little script and give it execute permission:

```
/home/cis90/simmsben/Directory3 $ echo 'banner $LOGNAME is cool' > myfile
/home/cis90/simmsben/Directory3 $ cat myfile
banner $LOGNAME is cool
/home/cis90/simmsben/Directory3 $ myfile
-bash: ./myfile: Permission denied
/home/cis90/simmsben/Directory3 $ chmod +x myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-rwxrwxr-x 1 simmsben cis90 24 Oct 13 09:27 myfile
/home/cis90/simmsben/Directory3 $ myfile
```

add execute permission for all users

What happens now when you type myfile?

POLP and hidden treasure fun

Go slowly and follow all directions

principle of least privilege (POLP)

Posted by
Margaret Rouse
WhatIs.com

The principle of least privilege (POLP) is the practice of limiting access to the minimal level that will allow normal functioning. Applied to employees, the principle of least privilege translates to giving people the lowest level of user rights that they can have and still do their jobs.

http://searchsecurity.techtarget.com/definition/principle-of-least-privilege-POLP

Permissions Exercise

Find the hidden treasure trove

- Find the buried treasure in your Hidden folder.
- Beware! - once you find it, make sure you set permissions to protect your treasure from *everyone!*

To play again:

```
/home/cis90/simben $ chmod 700 Hidden/
/home/cis90/simben $ tar xf ../depot/Hidden.tar
/home/cis90/simben $ ls Hidden/
ls: cannot open directory Hidden/: Permission denied
```

umask

Used for setting the default permissions on new files and directories

umask – user file-creation mask

Syntax:

umask [*mask*]

a bitmask used to strip permission bits off newly created files and directories

Examples:

- **umask**
- **umask 002**
- **umask 777**

If the mask is not specified, the current umask setting is displayed

File Permissions

Default Permissions

Default system permissions

- Default permissions for an ordinary file: `rw-rw-rw-` 666
- Default permissions for directories: `rwxrwxrwx` 777

When new files or directories are created they start with the default permissions above, then the current setting of the umask is applied to strip away any unwanted permissions.

For example, if the umask setting is:

777 – then all permissions are stripped off the default
000 – then no permissions are stripped off the default
022 - strips off just the write permissions from group and other users from the default

File Permissions

umask - examples

With no argument, the current umask setting is shown

```
[simmsben@opus Directory3]$ umask
0002
```

this umask setting will strip write permission from Others

```
[simmsben@opus Directory3]$ rm myfile
[simmsben@opus Directory3]$ touch myfile
[simmsben@opus Directory3]$ ls -l
total 4
-rw-rw-r-- 1 simmsben cis90 0 Oct 15 14:59 myfile
```

666	rw-rw-rw-	*default system permissions for a file*
002	-------w-	*umask setting (strips these permissions from default)*
664	rw-rw-r--	*result after masking*

File Permissions

umask - examples

```
[simmsben@opus Directory3]$ umask 000
[simmsben@opus Directory3]$ rm myfile
[simmsben@opus Directory3]$ touch myfile
[simmsben@opus Directory3]$ ls -l
total 4
-rw-rw-rw- 1 simmsben cis90 0 Oct 15 15:00 myfile
```

Change umask to 000

```
666   rw-rw-rw-
000   ---------
666   rw-rw-rw-
```

default system permissions for a file
umask setting (strips these permissions from default)
result after masking

File Permissions

umask - examples

```
[simmsben@opus Directory3]$ umask 022
[simmsben@opus Directory3]$ rm myfile
[simmsben@opus Directory3]$ touch myfile
[simmsben@opus Directory3]$ ls -l
total 4
-rw-r--r-- 1 simmsben cis90 0 Oct 15 15:00 myfile
```

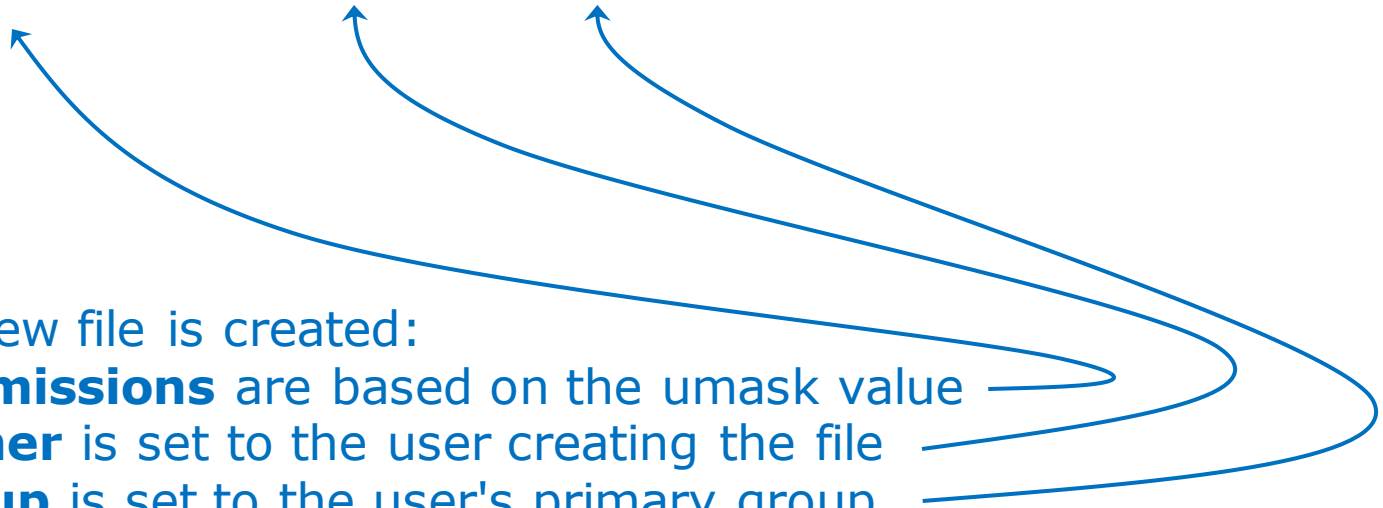
Change umask to 022

```
 666   rw-rw-rw-
 022   ----w--w-
 644   rw-r--r--
```

default system permissions for a file
umask setting (strips these permissions from default)
result after masking

When new files are created

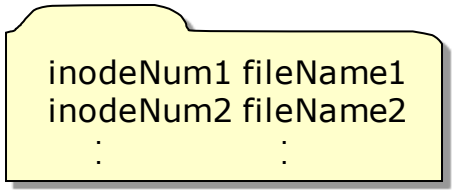
```
/home/cis90/roddyduk $ touch mydogs
/home/cis90/roddyduk $ ls -l mydogs
-rw-rw-r-- 1 roddyduk cis90 0 Oct 19 13:16 mydogs
```



When a new file is created:
- the **permissions** are based on the umask value
- the **owner** is set to the user creating the file
- the **group** is set to the user's primary group

The effect of permissions when removing files

Directory Write Permission



Permission	File	Directory
Read (4)	cat, more, file, head, tail, cp	ls
Write (2)	vi, saving mail	cp, mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

*Removing a file requires write permission on the **directory** that contains the file. The permissions on the file itself do not apply.*

Directory with no write permission
example 1

```
[simben@opus ~]$ ls -ld Directory3
dr-xrwxr-x 2 simmsben cis90 4096 Oct 15 15:00 Directory3

[simmsben@opus ~]$ cd Directory3
[simmsben@opus Directory3]$ ls -l myfile
-rw-r--r-- 1 simmsben cis90 0 Oct 15 15:00 myfile

[simmsben@opus Directory3]$ rm myfile
rm: cannot remove `myfile': Permission denied

[simmsben@opus Directory3]$ chmod 777 myfile
[simmsben@opus Directory3]$ ls -l myfile
-rwxrwxrwx 1 simmsben cis90 0 Oct 15 15:00 myfile

[simmsben@opus Directory3]$ rm myfile
rm: cannot remove `myfile': Permission denied
```

Benji has read and write permission on myfile

Benji (and everyone else) has all permissions.

So why can't Benji remove his own file?

Answer:

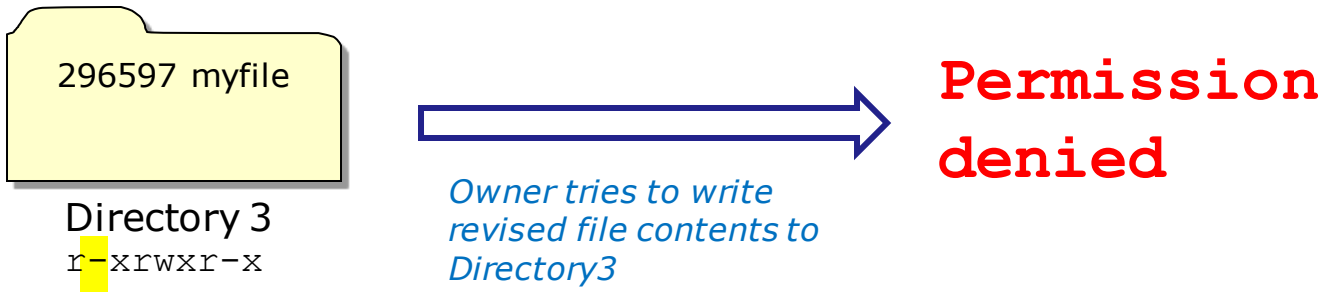
Removing a file requires write permission on the directory containing the file.

This is so you can write the revised file contents (with the file removed) to the directory. Remember that directories are like phone books and only contain file names and inode numbers.

The permissions on the file being removed do not apply!

```
[simmsben@opus ~]$ ls -ld Directory3
dr-xrwxr-x 2 simmsben cis90 4096 Oct 15 15:00 Directory3
```

Without write permission, Benji cannot remove any files from this directory



Directory with write permission
example 2

```
[simmsben@opus ~]$ ls -ld Directory3
drwxr-xr-x 2 simmsben cis90 4096 Oct 15 15:00 Directory3

[simmsben@opus ~]$ cd Directory3
[simmsben@opus Directory3]$ chmod 000 myfile
[simmsben@opus Directory3]$ ls -l myfile
---------- 1 simmsben cis90 0 Oct 15 15:00 myfile

[simmsben@opus Directory3]$ rm myfile
rm: remove write-protected regular empty file `myfile'? yes
[simmsben@opus Directory3]$
```

Now Benji has no permissions on this file

So how come he can delete it?

Answer: Removing a file requires write permission on the directory that contains the file. The permissions on the file itself do not apply.

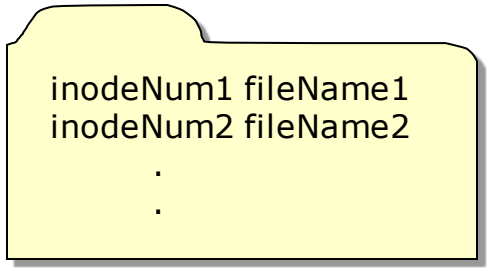
```
[simmsben@opus ~]$ ls -ld Directory3
drwxr-xr-x 2 simmsben cis90 4096 Oct 15 15:00 Directory3
```

With write permission, Benji can remove any of the files from this directory … even the ones he does not have read & write permission for.

Directory Permissions

Directory Read Permission

rwx



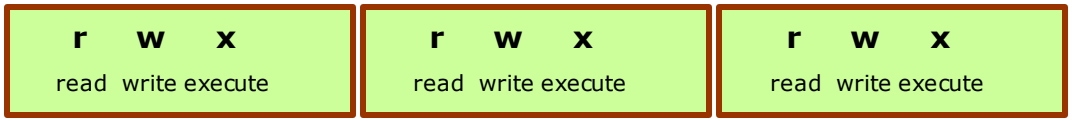
rwx

Permission	File	Directory
Read (4)	cat, more, file, head, tail, cp (from)	ls
Write (2)	cp (into), vi, saving mail	cp (into), mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

Removing directory READ permission

- can't list files in directory

Directory Read Permission

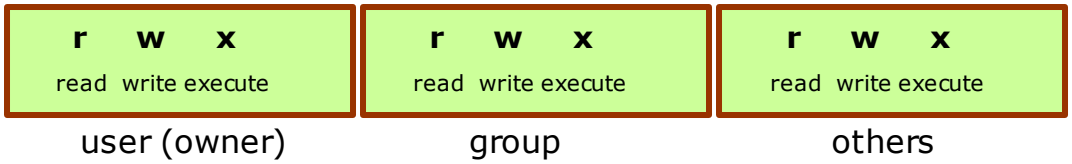


Start with normal directory permissions:

```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

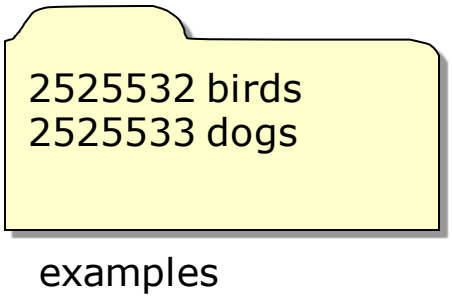
If read permission is removed from the directory … can we still list the directory contents?

Directory Read Permission



Remove read permission and confirm it's gone

```
/home/cis90/roddyduk $ chmod u-r examples
/home/cis90/roddyduk $ ls -ld examples
d-wxrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples
```

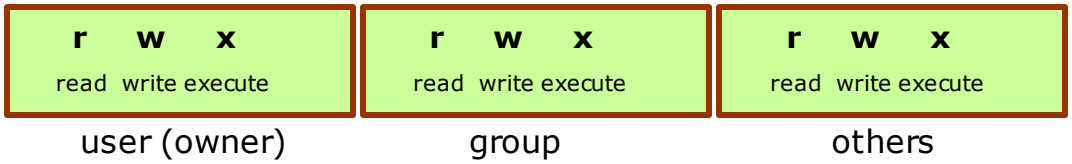


Can we still list the directory contents?

```
/home/cis90/roddyduk $ ls -l examples/
ls: examples/: Permission denied
/home/cis90/roddyduk $
```

NO!

Directory Read Permission

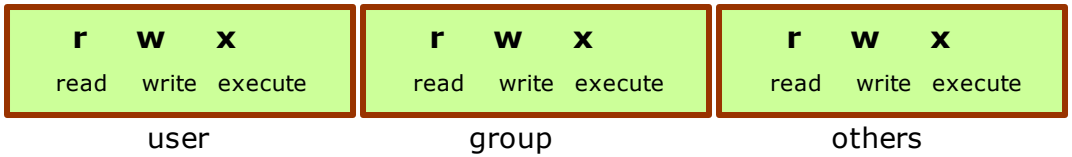


Start with normal directory permissions:

```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

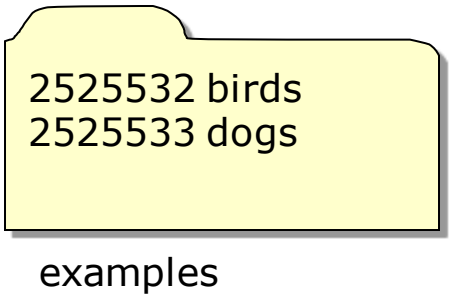
*If read permission is removed from the directory … can we still **cd** into the directory?*

Directory Read Permission



Remove read permission and confirm it's gone

```
/home/cis90/roddyduk $ chmod u-r examples
/home/cis90/roddyduk $ ls -ld examples
d-wxrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples
```



*Can we still **cd** into the directory?*

```
/home/cis90/roddyduk $ cd examples/
/home/cis90/roddyduk/examples $ ls
ls: .: Permission denied
/home/cis90/roddyduk/examples $ ls birds
abby  nibbie
```

Yes, but ...

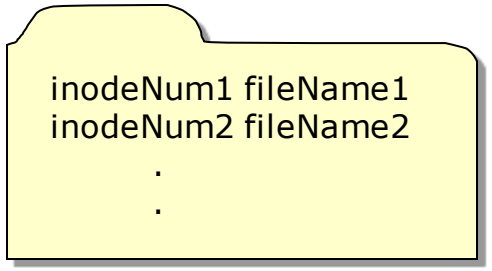
- *we still can't list the contents,*
- *yet we can still access anything in the directory!*

It's like walking into a pitch black room. You can't see anything, but if you know where things are you can still use them.

The effect of WRITE permission on directories

Directory Write Permission

rwx



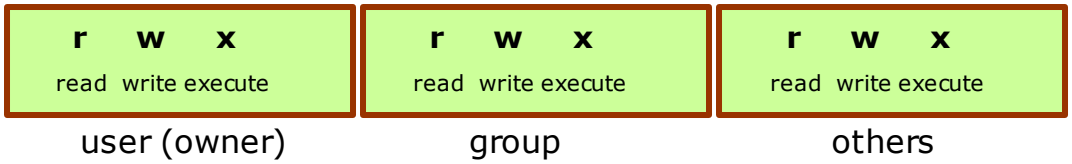
rwx

Permission	File	Directory
Read (4)	cat, more, file, head, tail, cp	ls
Write (2)	vi, saving mail	cp, mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

Removing directory WRITE permission

- can't copy files to it
- can't remove files from it
- can't move files out of it
- can't add links to it

Directory Write Permission

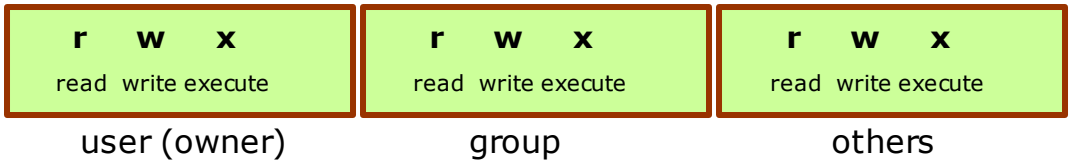


Start with normal directory permissions:

```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

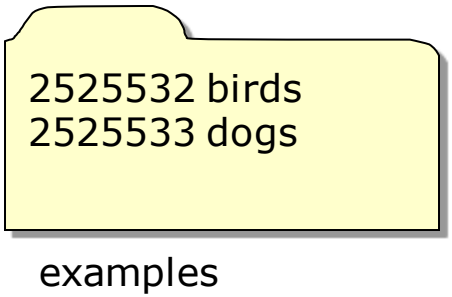
*If write permission is removed from the directory … can we **remove files** from the directory?*

Directory Write Permission



Remove write permission and confirm it's gone

```
/home/cis90/roddyduk $ chmod u-w examples
/home/cis90/roddyduk $ ls -ld examples
dr-xrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
```



Can we remove files from the directory?

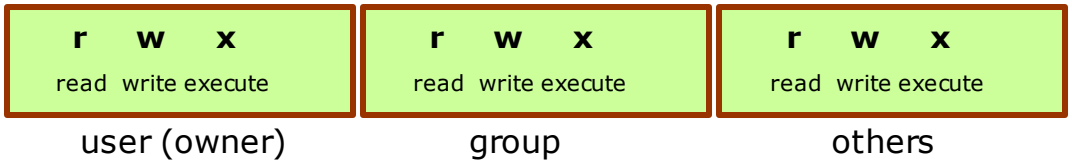
```
/home/cis90/roddyduk/examples $ rmdir dogs
rmdir: dogs: Permission denied
```

NO!

```
/home/cis90/roddyduk $ cd examples/
/home/cis90/roddyduk/examples $ ls
birds  dogs
```

Yet we can still cd into and list directory contents

Directory Write Permission

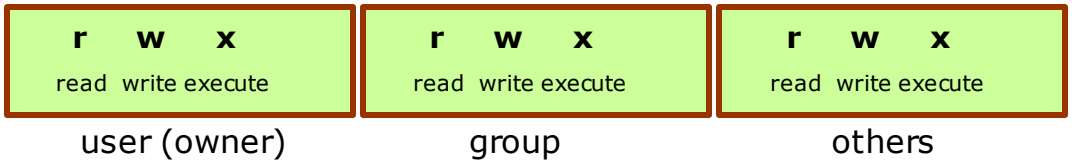


Start with normal directory permissions:

```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

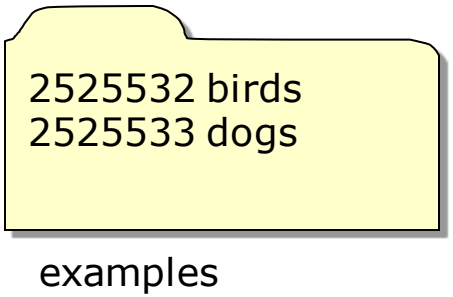
*If write permission is removed from the directory … can we **create new files or copy/move files** into the directory?*

Directory Write Permission



Remove write permission and confirm it's gone

```
/home/cis90/roddyduk $ chmod u-w examples
/home/cis90/roddyduk $ ls -ld examples
dr-xrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
```



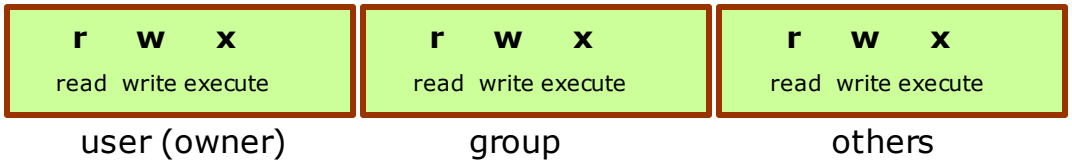
Can we create new files or copy/move files into the directory?

```
/home/cis90/roddyduk $ cp letter examples/
cp: cannot create regular file `examples/letter': Permission denied
/home/cis90/roddyduk $ mv letter examples/
mv: cannot move `letter' to `examples/letter': Permission denied
/home/cis90/roddyduk $ touch examples/newfile
touch: cannot touch `examples/newfile': Permission denied
/home/cis90/roddyduk $
```

NO!

To change the contents of a directory (either add or remove files) requires write permission

Directory Write Permission

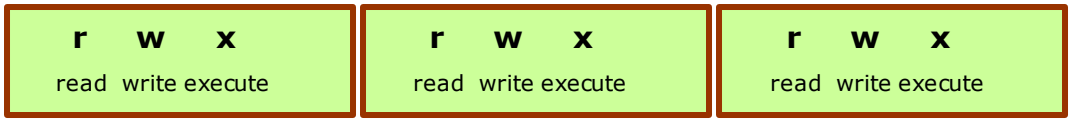


Start with normal directory permissions:

```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

If write permission is removed from the directory … can we move files out of the directory?

Directory Write Permission



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/home/cis90/roddyduk $ ls -ld examples
dr-xrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
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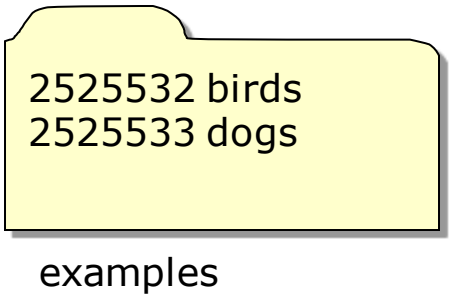


Can we move files out of the directory?

```
/home/cis90/roddyduk $ mv examples/birds .
mv: cannot move `examples/birds' to `./birds': Permission denied
```

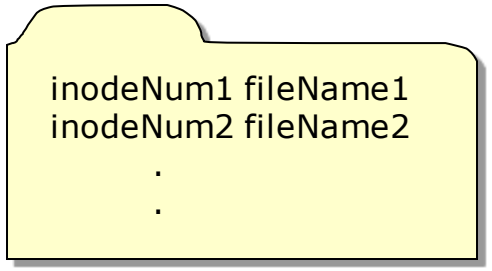
NO!

To change the contents of a directory (either add or remove files) requires write permission

The effect of EXECUTE permission on directories

Directory Execute Permission

rwx



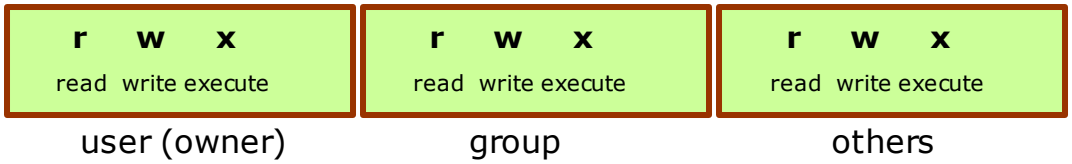
rwx

Permission	File	Directory
Read (4)	cat, more, file, head, tail, cp	ls
Write (2)	vi, saving mail	cp, mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

Removing directory EXECUTE permission

- can't retrieve inode information (long listing) or data (content)
- can't cd into directory

Directory Execute Permission



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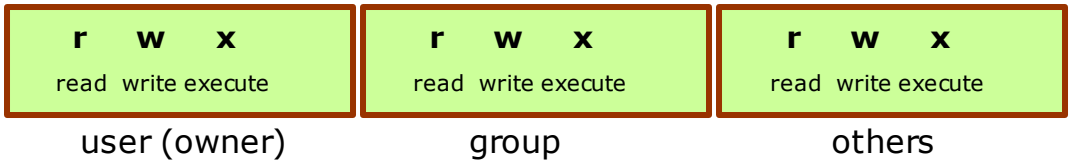
/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```

If execute permission is removed from the directory … can we change into (cd) the directory?

Directory Execute Permission



Remove execute permission and confirm it's gone

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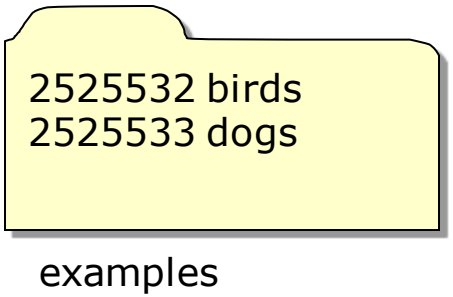


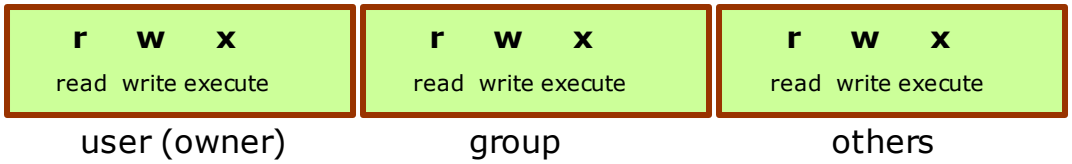
Can we change into (cd) the directory?

```
/home/cis90/roddyduk $ cd examples/
-bash: cd: examples/: Permission denied
/home/cis90/roddyduk $
```

NO!

Execute permission is required to change into a directory or to get inode based information for any of the files in the directory. Note, without inode information you can't get to a file's data.

Directory Execute Permission



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/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```
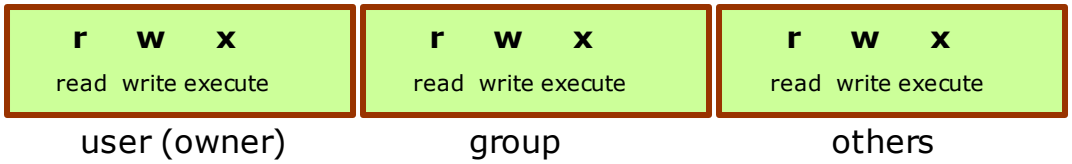

If execute permission is removed from the directory … can we list directory contents?

Directory Execute Permission



Remove execute permission and confirm it's gone

```
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/home/cis90/roddyduk $ ls -ld examples
drw-rwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
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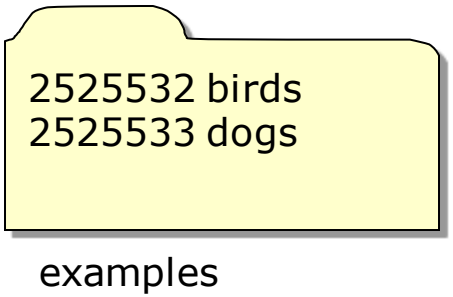
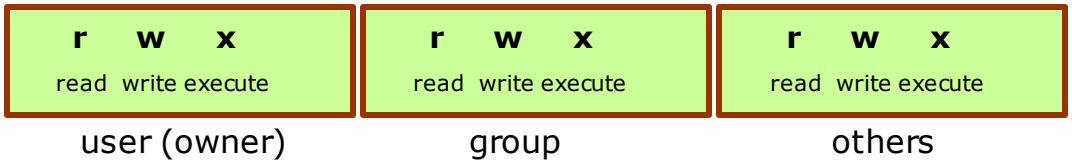


Can list directory contents?

```
/home/cis90/roddyduk $ ls examples/
birds  dogs
```

Yes

Directory Execute Permission



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drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

/home/cis90/roddyduk $ ls -i examples/
2525532 birds  2525533 dogs
```
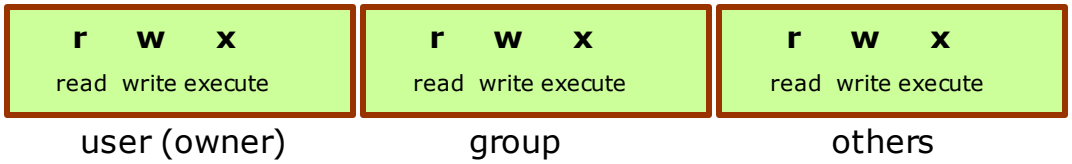
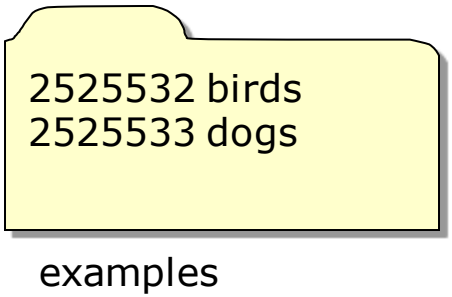

If execute permission is removed from the directory … can we do a long listing of the directory?

Directory Execute Permission



Remove execute permission and confirm it's gone

```
/home/cis90/roddyduk $ chmod u-x examples
/home/cis90/roddyduk $ ls -ld examples
drw-rwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
```



Can we do a long listing (show inode information) of the directory?

```
/home/cis90/roddyduk $ ls -l examples/
total 0
?--------- ? ? ? ?            ? birds
?--------- ? ? ? ?            ? dogs
```

Incomplete!

Only file names. No information kept in the file's inode is shown!

We can read the filenames, but without execute permission we can't retrieve information from the inode


Assignment

Lab 6

In this lab you will assign permissions to your files to provide a measure of security

Be sure and finish Lab 5 before starting Lab 6!


Wrap up

New commands:

chgrp	change file's group
chmod	change file permissions
chown	change file owner (superuser only)
groups	show group membership
stat	show all file inode information
umask	change permission mask

New Files and Directories:

/etc/group

Next Class

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

Lab 6 Five Posts

Quiz questions for next class:

- With a umask of 002 what permissions would a newly created file have?
- What is the numeric permission equivalent of `rwxr-xr--` ?
- Does **chmod o+w** give write permission to the *owner* or to *other* users?

Backup

Activity

From your home directory

How would you copy the *stage1* and *stage2* files in the */boot/grub* directory to your *bin* directory?

Write your answer in the chat window

cp /boot/grub/stage[12] bin

Activity

From your *bin* directory

How would you remove the *stage1* and *stage2* files you just copied to your *bin* directory?

Write your answer in the chat window

rm bin/stage[12]

Activity

From your *bin* directory

How would you copy the *stage1* and *stage2* files in the */boot/grub* directory to your *bin* directory?

Write your answer in the chat window

```
cp /boot/grub/stage* .
```

Activity

From the /home/cis90 directory

How would you do a binary dump of the *stage1* file you just copied to your *bin* directory?

Write your answer in the chat window

xxd simben/bin/stage1

Activity

From Benji's *poems* directory

How would you remove the *stage1 and stage2* files you copied to your *bin* directory using a filename expansion character?

Write your answer in the chat window

rm ../../simben/bin/stage*