Lesson Module Checklist
- Slides
- Converted WB

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

- Lock turnin directory at midnight
- Lab 6 updated and tested
- Put uhistory in /home/rsimms/uhistory

- 9V backup battery for microphone
- Backup slides, CCC info, handouts on flash drive

Student checklist

1) Browse to the CIS 90 website Calendar page
   - http://simms-teach.com
   - Click CIS 90 link on left panel
   - Click Calendar link near top of content area
   - Locate today's lesson on the Calendar

2) Download the presentation slides for today's lesson for easier viewing

3) Click Enter virtual classroom to join CCC Confer session

4) Connect to Opus using Putty or ssh command

Introductions and Credits

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

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

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

CIS 90 - Lesson 7

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

Francisco · Leila · Justin · Jesus · Shenghong · Paul · Roberto · Sam · Navin · Jimmy
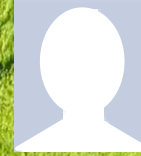
Luis · Tommy · Adrian · Ann · Cameron · Cody · Alejandrino · Deane · Nadia · Richard Z.

Gabriel · Ryan · Takashi · Jeff · Nick · Jonathan · Shea · Dylan · Joshua · Richard I.
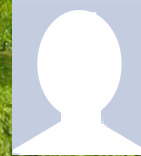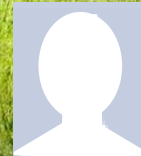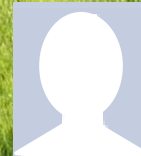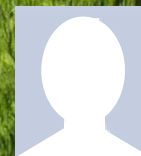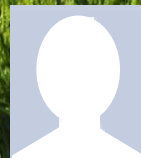
Aaron · Nicole · James · Matthew · Abraham · Chris · Ronald · Scott
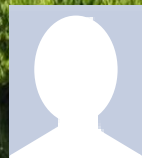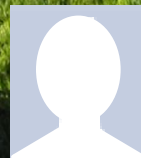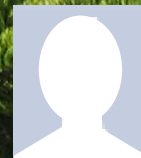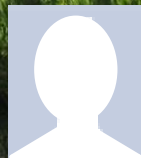
Email me (risimms@cabrillo.edu) a relatively current photo of your face for 3 points extra credit

Instructor CCC Confer checklist

[ ] Preload White Board
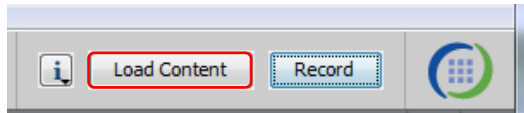
[ ] Connect session to Teleconference

Session now connected to teleconference
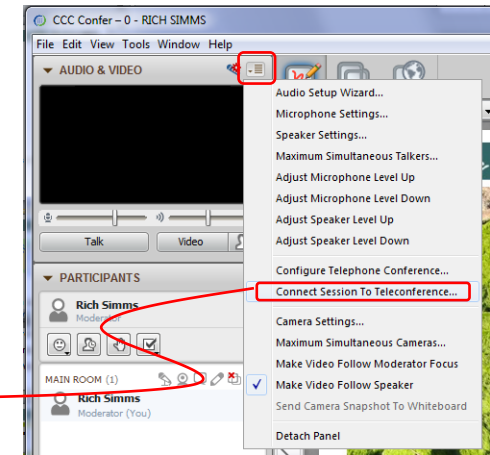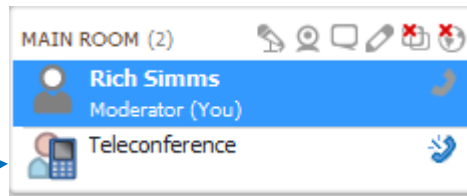
[ ] Is recording on?

Red dot means recording

[ ] Use teleconferencing, not mic

Should be greyed out
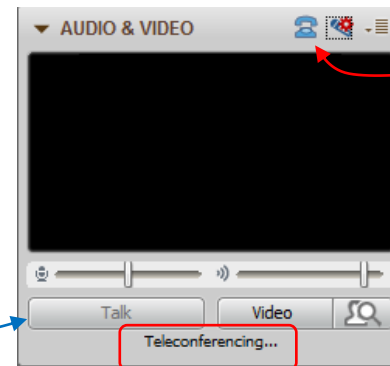
Should show as this live "off hook" telephone handset icon and the Teleconferencing … message displayed

5

Instructor CCC Confer checklist

[ ] layout and share apps

Instructor CCC Confer checklist
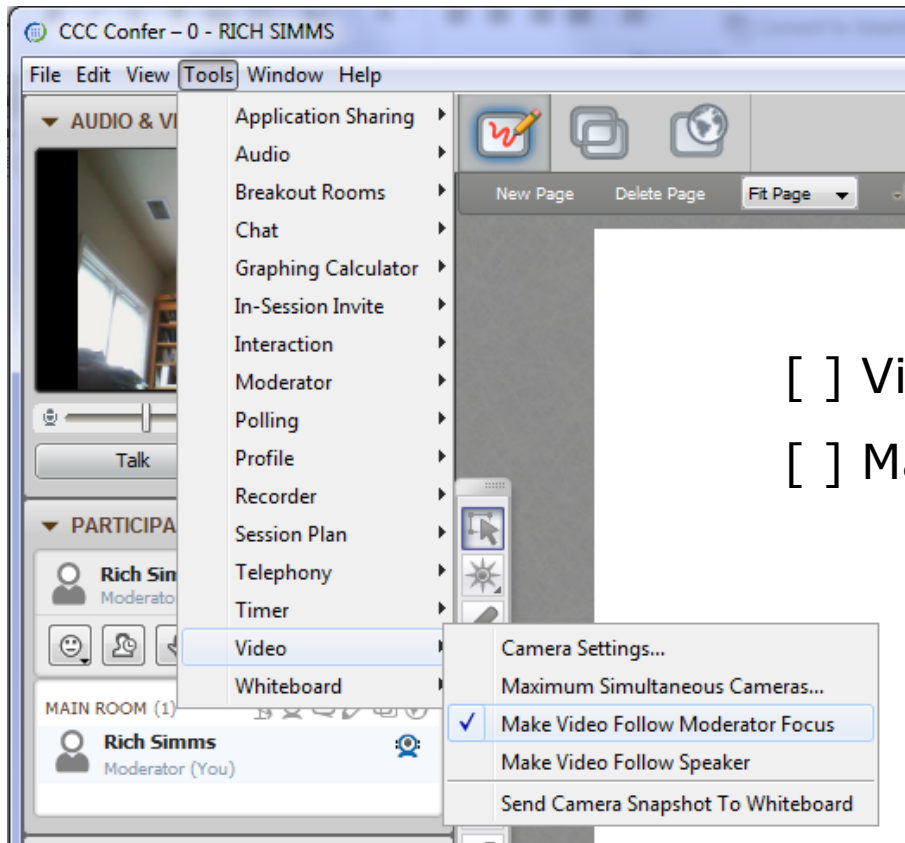
[ ] Video (webcam)

[ ] Make Video Follow Moderator Focus

Using Elmo with CCC Confer

Image Mate

TT-12

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!

Settings

Basic | Network

Return all windows to their normal position
Start

Language settings
English

Select device
TT-12

Select image quality
High   ● Middle   Low

Recording setting
Video quality
High   ● Middle   Low

Long-time recording settings
File format
● Movie   Still

Interval time
1 second

Expert mode setting
☑ Expert mode

OK   Cancel

Elmo rotated down to view side table

LIVE image - Image Mate

Rotate image button

ELMO

Elmo rotated up to view white board

LIVE image - Image Mate

Rotate image button

ELMO

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

8
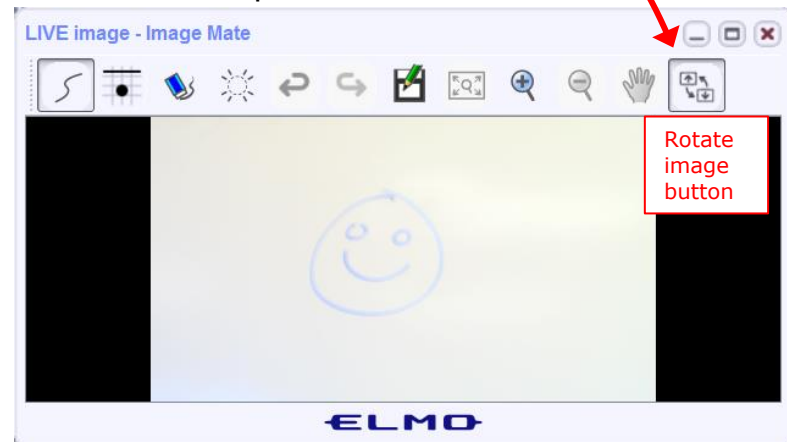
Instructor CCC Confer checklist

Universal Fix for CCC Confer:
1) Shrink (500 MB) and delete Java cache
2) Uninstall and reinstall latest Java runtime

Control Panel (small icons)

General Tab > Settings...
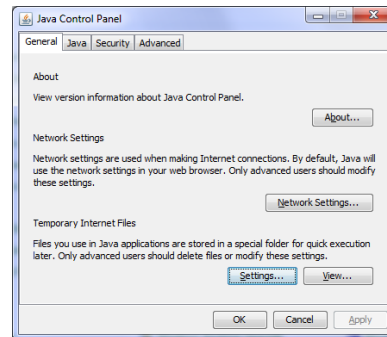
500MB cache size
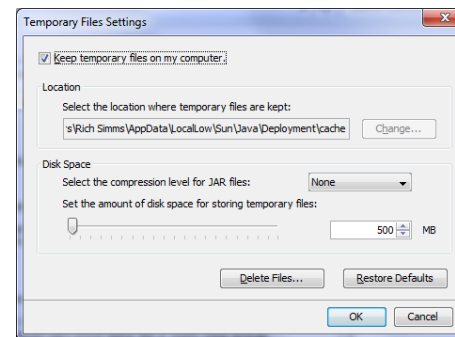
Delete these
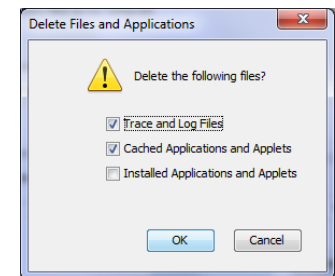
Google Java download

9
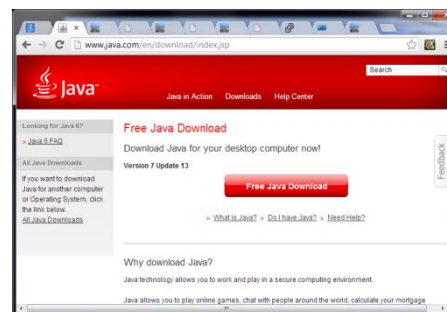
Quiz

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

See electronic white board

email answers to: risimms@cabrillo.edu

(answers must be emailed within the first few minutes of class for credit) 10

File Permissions

Objectives	Agenda
• Be able to reassign user and group file ownerships • Identify permissions for ordinary and directory files • Use chmod to set and change file permissions • Define the default permissions for new files	• Quiz • Questions • Review test results • File permissions • 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 Q28 = 25
Missed Q25 = 22
Missed Q24 = 20
Missed Q23 = 19
Missed Q10 = 19
Missed Q22 = 17
Missed Q19 = 17
Missed Q30 = 15
Missed Q15 = 15
Missed Q11 = 15
Missed Q12 = 14
Missed Q27 = 13
Missed Q9 = 11
Missed Q3 = 11
Missed Q21 = 11

Missed Q26 = 10
Missed Q2 = 10
Missed Q16 = 10
Missed Q18 = 9
Missed Q14 = 9
Missed Q7 = 8
Missed Q8 = 6
Missed Q6 = 6
Missed Q5 = 6
Missed Q29 = 6
Missed Q20 = 6
Missed Q13 = 6
Missed Q17 = 4
Missed Q1 = 3
Missed Q4 = 2

Extra Credit
Missed Q33 = 28
Missed Q32 = 26
Missed Q31 = 25

31 tests submitted

5 tests not submitted

15

See test01.graded in your home directory for correct answers

Q16) 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/
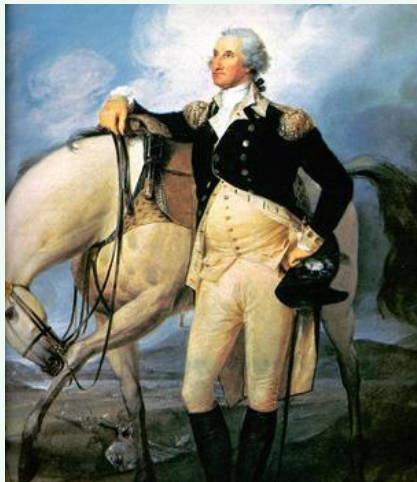
CIS 90 - Lesson 4

Heads up on a future test question

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

Answer: /etc/passwd

What is the color of Washington's white horse?

119

Slide from Lesson 4

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

16
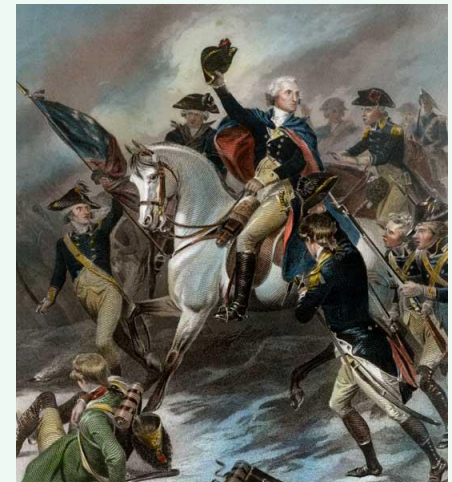
More questions?

On any part of Test 1?

Ask them now in case the most missed questions appear on the next test! (muhaha)

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

CIS Lab Schedule
http://webhawks.org/~cislab/
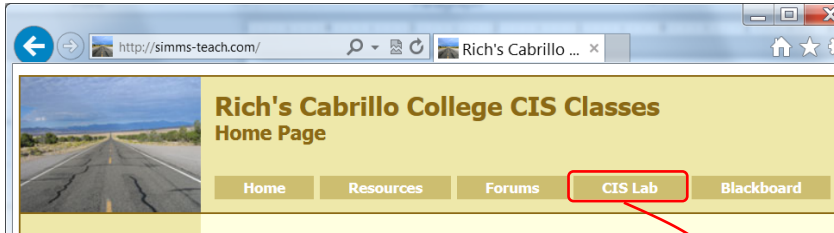
Not submitting tests or lab work?

If you would like some additional help come over to the CIS Lab.

Leandro and Geoff are both CIS 90 Alumni.

Michael is the other Linux instructor.
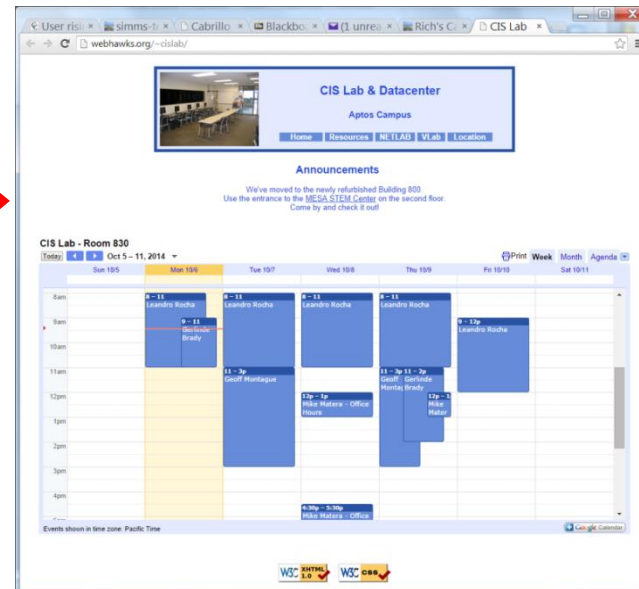
Or hang around after class. Rich has his office hours right after each class in Room 828.

18

CIS 90 Tutoring Available

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

Matt Smithey

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

The tutoring will take place at the STEM center.

19

Managing Files (review)

Tools to manage files:

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

Redirecting stdout:

> *filename*   *redirecting stdout to create/empty a file*

21

Common newbie 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!

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

23

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

<u>From your *bin* directory</u>

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*

Housekeeping

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

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

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

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

Perkins/VTEA Survey
It may already be too late … but just in case

Carl D. Perkins Vocational and Technical Education Act

POSTREPLY | Search this topic... | Search

2 posts • Page 1 of 1

Carl D. Perkins Vocational and Technical Education Act
by **Rich Simms** » Wed Sep 24, 2014 7:24 am

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

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

This survey can be completed online using web advisor:

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

Select "STUDENTS: Click Here" (navy blue bar)
• Under "Academic Profile" Click on "Student Update Form"
• Use drop down list under "Select the earliest term for which you are registered" and click on the current term.
• Select "SUBMIT"

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

Then "LOG OUT"

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

- Rich

Rich Simms

Posts: 1401
Joined: Sat Jan 16, 2010 6:47 pm

This is an important source of funding for Cabrillo College.

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

Career Technical Information
Your answers to these questions will help qualify Cabrillo College for Perkins/VTEA grant funds.

Are you currently receiving benefits from:

Yes / No	TANF/CALWORKS
Yes / No	SSI (Supplemental Security Income)
Yes / No	GA (General Assistance)
Yes / No	Does your income qualify you for a fee waiver?
Yes / No	Are you a single parent with custody of one or more minor children?
Yes / No	Are you a displaced homemaker attending Cabrillo to develop job skills?
Yes / No	Have you moved in the preceding 36 months to obtain, or to accompany parents or spouses to obtain, temporary or seasonal employment in agriculture, dairy, or fishing?

http://oslab.cis.cabrillo.edu/forum/viewtopic.php?f=101&t=3191

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

GRADES

- Check your progress on the Grades page

- Send me a student survey to get your LOR secret code name

- Graded work placed in your Opus home directories

- Answers to labs, tests and quizzes in /home/cis90/answers directory on Opus
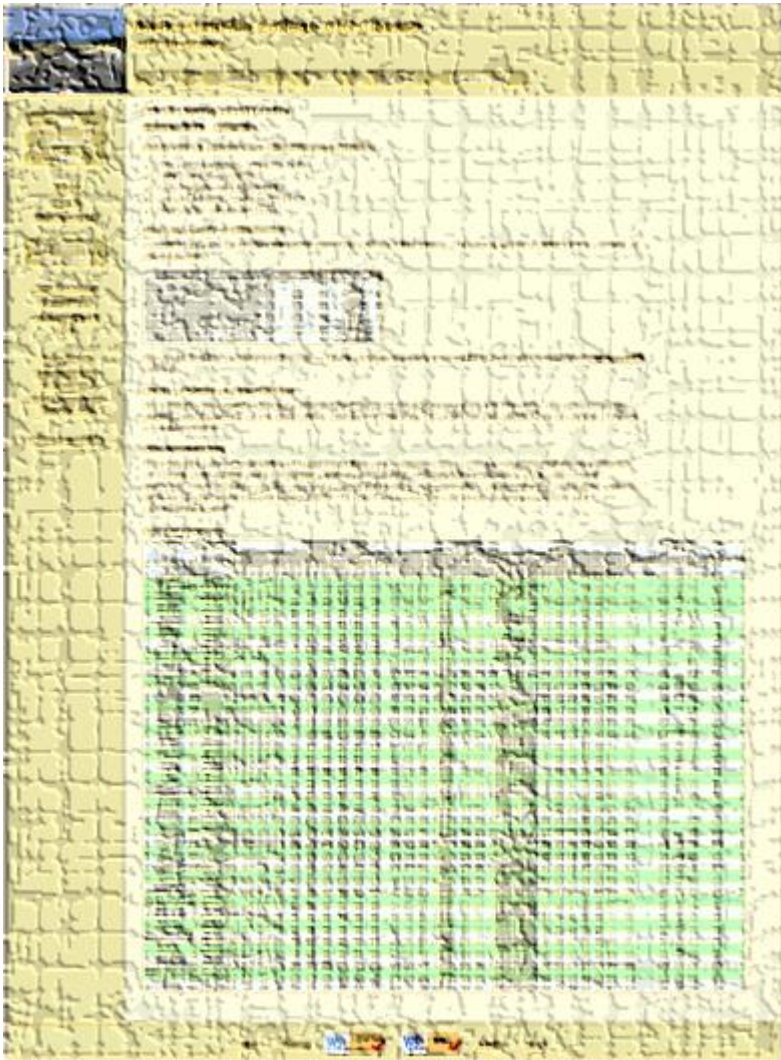
Current Point Tally

As of 10/13/2014

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

If you are not happy with your current standing contact the instructor ASAP

Jesse's checkgrades python script

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

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

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

Quiz 1: You earned 3 points out of a possible 3.
Quiz 2: You earned 3 points out of a possible 3.
Quiz 3: You earned 3 points out of a possible 3.
Quiz 4: You earned 3 points out of a possible 3.


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

Lab 1: You earned 30 points out of a possible 30.
Lab 2: You earned 30 points out of a possible 30.
Lab 3: You earned 30 points out of a possible 30.
Lab 4: You earned 29 points out of a possible 30.


You've earned 15 points of extra credit.

You currently have a 109% grade in this class. (166 out of
152 possible points.)
```

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

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

33

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:~                                                    — □ X

/home/cis90/simben $ ls -l
total 472                    Use the -l (little letter l) option to get a long listing
-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 **long listings** to view file permissions*

36

The 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 $
```

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

__r__ (read), __w__ (write), __x__ (execute) or __–__ (no permission)

37

The user that owns a file

*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*

39

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 Membership

cis90	cis172	users
simben90 bincam90	bincam172	simben90 bincam90 bincam172

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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?

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 $
/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 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

44

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

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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

```
simben90@oslab:~

/home/cis90/simben $ ls -ld bigfile letter bin/datecal edits/* poems docs
-rw-r--r--. 21 rsimms    cis90 10576 Aug  1  2012 bigfile
-rwxr-xr-x.  1 simben90 cis90   519 Aug  6 11:53 bin/datecal
drwxrwxr-x.  2 simben90 cis90  4096 Oct  6 14:33 docs
-rw-r--r--.  1 simben90 cis90  1382 Feb  1  2002 edits/better_town
-rw-r--r--.  1 simben90 cis90  1580 Nov 16  2004 edits/small_town
-rw-r--r--.  1 simben90 cis90   485 Aug 26  2003 edits/spellk
-rw-r--r--.  1 simben90 cis90   250 Jul 20  2001 edits/text.err
-rw-r--r--.  1 simben90 cis90   231 Jul 20  2001 edits/text.fxd
-rw-r--r--.  1 simben90 cis90  1044 Jul 20  2001 letter
drwxr-xr-x.  9 simben90 cis90  4096 Oct  6 14:46 poems
/home/cis90/simben $
```

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

green

Write your answer in the chat window

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R=Read Permission

Read Permission

<u>Read</u> 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?

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?

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.

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Permissions

W=Write

Write Permission

<u>Write</u> 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?

56

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 has write access to his letter file

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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?

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 does not have write access to Homer's letter file

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Permissions

X=eXecute
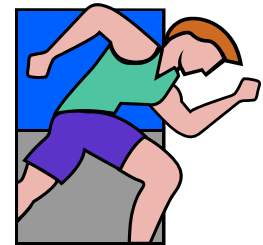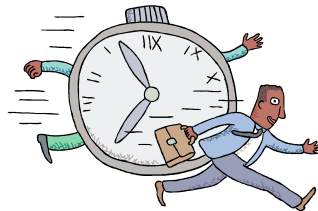
Execute Permission

Both <u>read</u> and <u>execute</u> 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/check7
-rwxrw----. 1 rsimms   staff 8718 Aug  1 18:37 ../bin/check7
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme


/home/cis90/simben $ check7
```

Can the simben90 execute the check7 file in the /cis90/bin directory?

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/check7
-rwxr-x--. 1 rsimms   staff 8718 Apr 15  2013 ../bin/check7
-rwxr-xr-x. 1 simben90 cis90  174 Mar  4  2004 bin/tryme


/home/cis90/simben $ check7
-bash: /home/cis90/simben/../bin/check7: Permission denied
```

No, simben90 falls under the "other" category which does not have read or execute permission on check7

Execute Permission

```
/home/cis90/simben $ ls -l bin/tryme ../bin/check7
-rwxr-x---. 1 rsimms    staff 8718 Apr 15  2013 ../bin/check7
-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/check7
-rwxr-x---. 1 rsimms   staff 8718 Apr 15  2013 ../bin/check7
-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

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Owner and group on new files

More tools for your toolbox

NEW **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*

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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
calsea90:x:1006:190:Sean Callahan:/home/cis90/calsea:/bin/bash
davdon90:x:1007:190:Don Davis:/home/cis90/davdon:/bin/bash
ellcar90:x:1008:190:Carlile Ellis:/home/cis90/ellcar:/bin/bash
frocar90:x:1009:190:Carter Frost:/home/cis90/frocar:/bin/bash
hendaj90:x:1010:190:Dajan Henk:/home/cis90/hendaj:/bin/bash
kanbry90:x:1011:190:Bryn Kanar:/home/cis90/kanbry:/bin/bash
kenrit90:x:1012:190:Rita Kennedy:/home/cis90/kenrit:/bin/bash
```

shell program to use
home directory
comment
primary group
user ID
used for the password in the past
username

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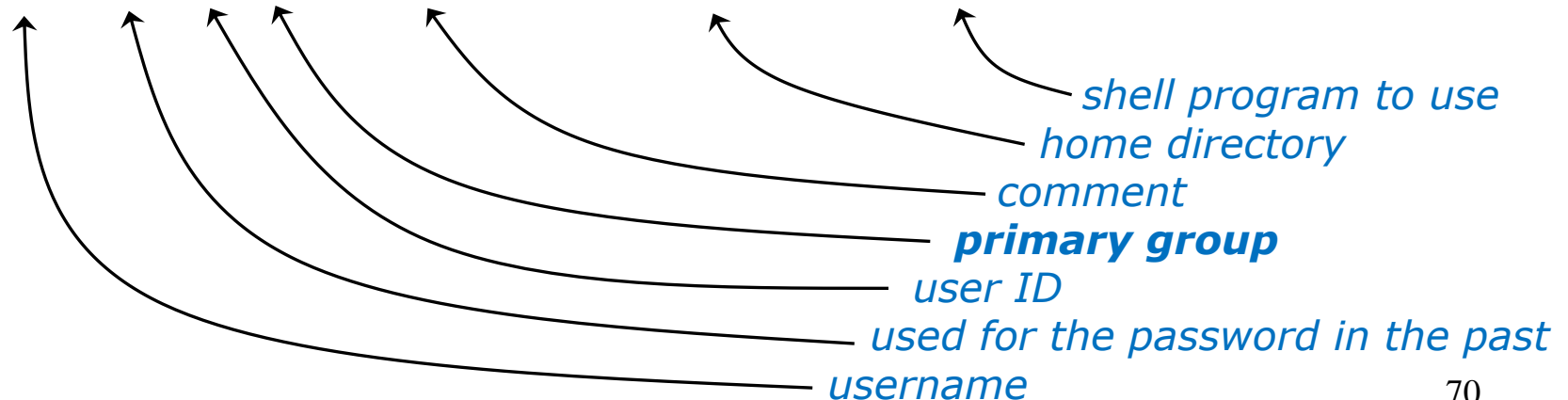
Secondary groups recorded in /etc/group

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
```

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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 Numerical 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

4's column
2's column
1's column

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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   or   0+2+1   =   3
   binary   *decimal*   *decimal*

Practice converting to numerical

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 $ 
```

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Example 1
Converting mnemonic permissions to numeric

```
simben90@oslab:~

/home/cis90/simben $ ls -l
total 472
-rw-rw-r--. 1 sim
-rw-r--r--. 6 rsi
drwxr-xr-x. 2 sim
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
```

Note, the d in the first column is the file type and is NOT part of the permissions

What are the numerical permissions on class?

rwx rwx r-x

```
-rw-rw-r--. 1 simben90 cis90   17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

Example 1
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
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
```

What are the numerical permissions on class?

rwxrwxr-x

111111101

  7   7   5

```
-rw-rw-r--. 1 simben90 cis90   17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

Benji's class (directory) permissions are 775

Example 2
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
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
```

What are the numerical permissions on dead.letter?

rw- --- ---

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

Benji's dead.letter (regular file)

82

Example 2
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
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
```

What are the numerical permissions on dead.letter?

```
rw-------
110000000
 6  0  0
```

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

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

83

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--------`

Benji's test01.graded (regular file)

84

Example 3
Converting mnemonic permissions to numeric

```
simben90@oslab:~                                                    _ □ X
/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   What are the numerical permissions on test01.graded?
drwx                          r--------
d---
-r--                          100000000
-r--
-r--                            4  0  0
-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 $
```

Benji's test01.graded permissions are 400

Example 4
Converting mnemonic permissions to numeric


```
simben90@oslab:~                                         ─  □  ✕

/home/cis90/simben $ ls -l /home
tota
drwx
drwx        What are the numerical permissions on rsimms?
drwx                        rwxr-x---
drwx
drwx
drwx
drwx
drwx
drwx
drwxr-x---. 12 rsimms    cis90    4096 Oct  6 15:33 rsimms
drwxr-xr-x.  3 rsimms    staff    4096 Aug  1 16:54 turnin
/home/cis90/simben $
```

/home/rsimms (Rich's home directory)

86

Example 4
Converting mnemonic permissions to numeric

```
simben90@oslab:~
/home/cis90/simben $ ls -l /home
tota
drwx
drwx
drwx      What are the numerical permissions on rsimms?
drwx                      rwxr-x---
drwx
drwx                      111101000
drwx
drwx                        7   5   0
drwx
drwx
drwxr-x---. 12 rsimms    cis90    4096 Oct  6 15:33 rsimms
drwxr-xr-x.  3 rsimms    staff    4096 Aug  1 16:54 turnin
/home/cis90/simben $
```

/home/rsimms permissions are 750

Example 5
Converting mnemonic permissions to numeric

```
simben90@oslab:~

/home/cis90/simben $ ls -l /dev/pts
total 0
crw--w----. 1 mesmic90 tty  136, 0 Oct  7 16:32 0
crw--w----. 1 mesmic90 tty  136, 2 Oct  7 16:24 2
crw--w----. 1 rawjes90 tty  136, 6 Oct  7 16:26 6
crw--w----. 1 simben90 tty  136, 7 Oct  7 16:32 7
c---------. 1 root     root   5, 2 Jul 30 21:25 ptmx
/home/cis90/simben $
```

What are the numerical permissions on /dev/pts/7?

rw--w----

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

88

Example 5
Converting mnemonic permissions to numeric

```
simben90@oslab:~
/home/cis90/simben $ ls -l /dev/pts
total 0
crw--w----. 1 mesmic90 tty   136, 0 Oct  7 16:32 0
crw--w----. 1 mesmic90 tty   136, 2 Oct  7 16:24 2
crw--w----. 1 rawjes90 tty   136, 6 Oct  7 16:26 6
crw--w----. 1 simben90 tty   136, 7 Oct  7 16:32 7
c---------. 1 root     root    5, 2 Jul 30 21:25 ptmx
/home/cis90/simben $
```

What are the numerical permissions on /dev/pts/7?

rw--w----
110010000
  6 2 0

/dev/pts/7 permissions are 620

89

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

Tools 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
```

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

Permissions → *Owner* → ↵ *Group*

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
```

The owner of letter is simben90 and the group is cis90

Permissions ↱ *Owner* ↱ ↱ *Group*

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

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The filename is kept in the directory

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

bigfile 12687
bin 12067
letter 10574

ext2 file system

Superblock

Inode Table

Data Blocks

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
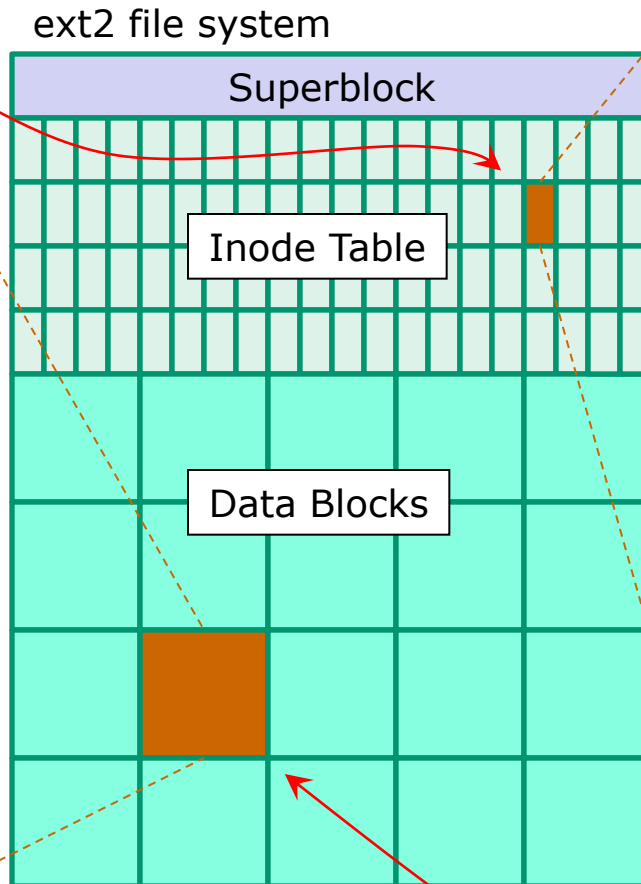
Value	Field
10574	inode number
-	Type
rw-r—r--	Permissions
1	Number of links
simben90	User
cis90	Group
1059	Size
2012-10-07	Modification time
2012-10-07	Access Time
2012-10-07	Change time
Pointer(s) to data blocks	Pointer(s) to data blocks

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

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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

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More Practice

File Permissions

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

File Permissions

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

100 100 000

4   4   0

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
111 101 101
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--`?

111 110 100

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

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Configuring Permissions

Tools for your toolbox

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

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

NEW **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

NEW **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
```

*Make a test file
and try to change
the owner*

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

*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
```

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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

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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!*

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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

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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    remove execute from all
/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    add execute to others and group
/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    remove read, write, execute
/home/cis90/milhom $ ls -l myfile           from groups and others
-rw-------. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

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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

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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*

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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

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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?

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File Permissions
Commands that use file permissions

inodeNum1 fileName1
inodeNum2 fileName2
:   :

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

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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         write permission
                                                           removed
/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
```

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

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File Permissions
Commands that use file permissions

inodeNum1 fileName1
inodeNum2 fileName2
:   :

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

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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?

137

permissions fun

Go slowly and follow all directions

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!*

139

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      Change umask to 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
```

```
666   rw-rw-rw-    default system permissions for a file
000   ---------    umask setting (strips these permissions from default)
666   rw-rw-rw-    result after masking
```

144

File Permissions
umask - examples

```
[simmsben@opus Directory3]$ umask 022    Change umask to 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
```

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

145

# 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

146

The effect of permissions when removing files

Directory Write Permission
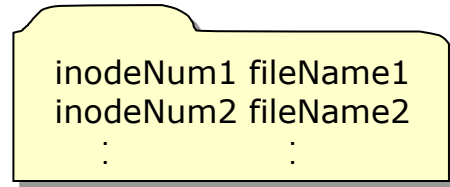
inodeNum1 fileName1
inodeNum2 fileName2
:   :

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.*

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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?

149

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

296597 myfile

Directory 3
r-xrwxr-x
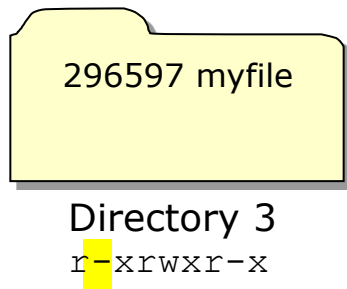
Owner tries to write revised file contents to Directory3

Permission denied

150

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?

151

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.

296597 myfile

Directory 3
rwxr-xr-x

Owner write revised file contents to Directory3

Directory 3

152
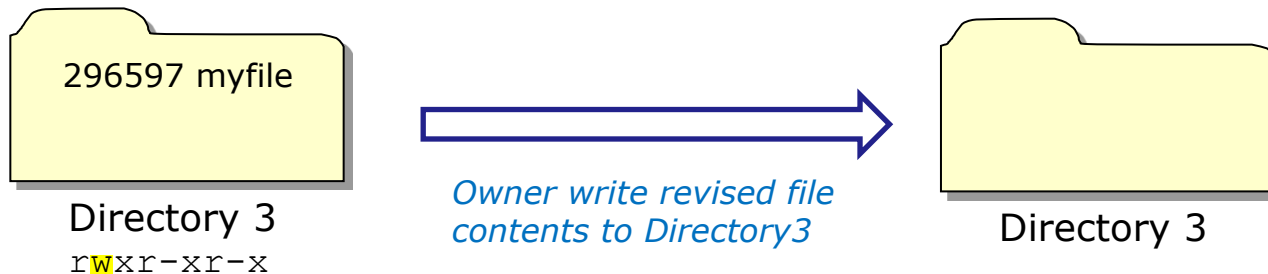
Directory Permissions

Directory Read Permission

rwx

inodeNum1 fileName1
inodeNum2 fileName2
.
.

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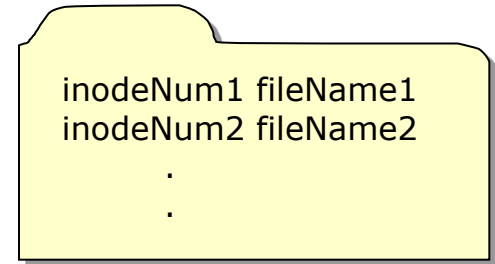
Permission	File	Directory
Read (4)	cat, more, file, head, tail, cp (from)	ls
Write (2)	cp (into), vi, saving mail	cp (into), mv, rm, ln
Execute (1)	$ command	cd, ls -l, find

Removing directory READ permission

• can't list files in directory

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Directory Read Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute
user (owner)	group	others

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
```

2525532 birds
2525533 dogs

examples

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

155

Directory Read Permission

r	w	x
read	write	execute

user (owner)

r	w	x
read	write	execute

group

r	w	x
read	write	execute

others

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
```

2525532 birds
2525533 dogs

examples

Can we still list the directory contents?

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

NO!

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Directory Read Permission

r	w	x
read	write	execute

user (owner)

r	w	x
read	write	execute

group

r	w	x
read	write	execute

others

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
```
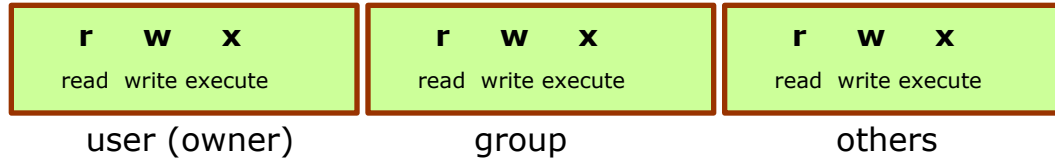
2525532 birds
2525533 dogs

examples

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

Directory Read Permission

r	w	x
read	write	execute

user

r	w	x
read	write	execute

group

r	w	x
read	write	execute

others

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
```
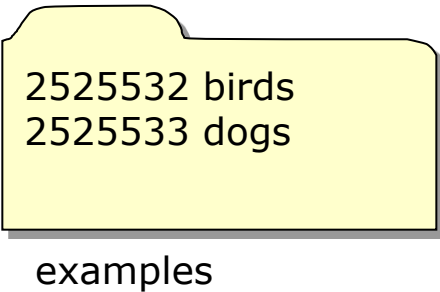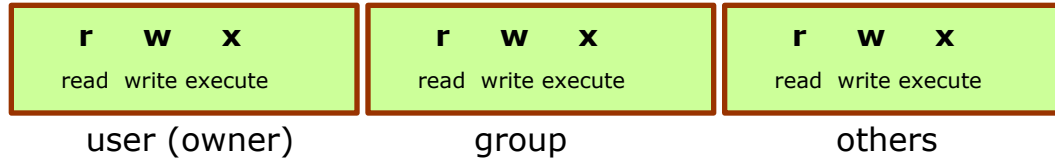
2525532 birds
2525533 dogs

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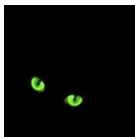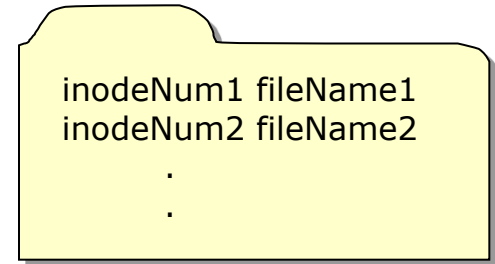
It's like walking into a pitch black room. You can't see anything, but if you know where things are you can still use them.

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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

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Directory Write Permission

r w x read write execute	**r w x** read write execute	**r w x** read write execute
user (owner)	group	others

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
```
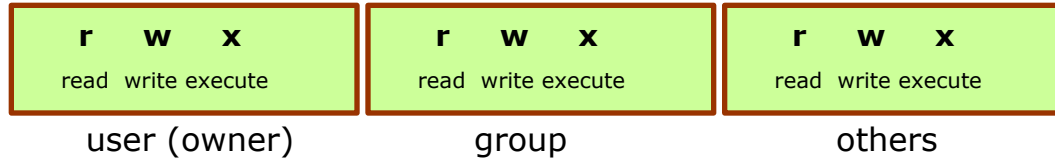
2525532 birds
2525533 dogs

examples

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

Directory Write Permission

r	**w**	**x**
read	write	execute

user (owner)

r	**w**	**x**
read	write	execute

group

r	**w**	**x**
read	write	execute

others

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/
```

2525532 birds
2525533 dogs

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

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Directory Write Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute

| user (owner) | group | others |

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
```
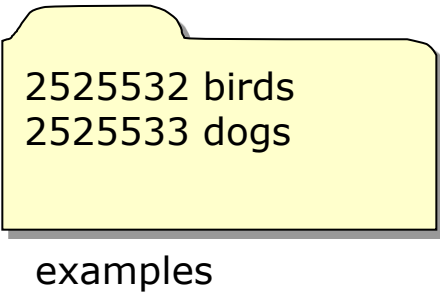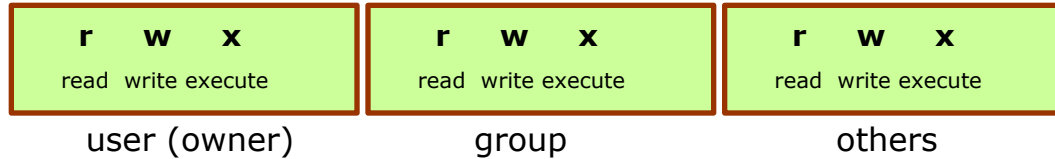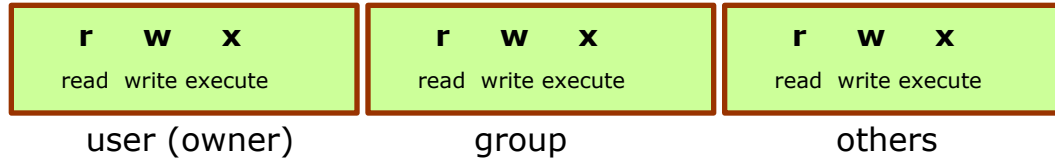
2525532 birds
2525533 dogs

examples

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

Directory Write Permission

r	w	x
read	write	execute

user (owner)

r	w	x
read	write	execute

group

r	w	x
read	write	execute

others

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/
```

2525532 birds
2525533 dogs

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

164

Directory Write Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute

user (owner)   group   others

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
```

2525532 birds
2525533 dogs

examples

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

Directory Write Permission

r	w	x		r	w	x		r	w	x
read	write	execute		read	write	execute		read	write	execute

user (owner)　　　　　　group　　　　　　others

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/
```
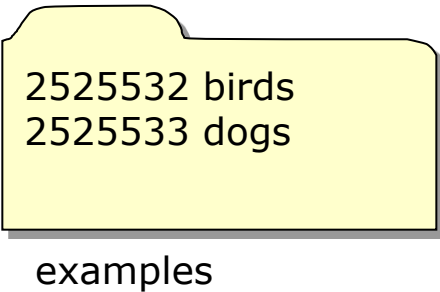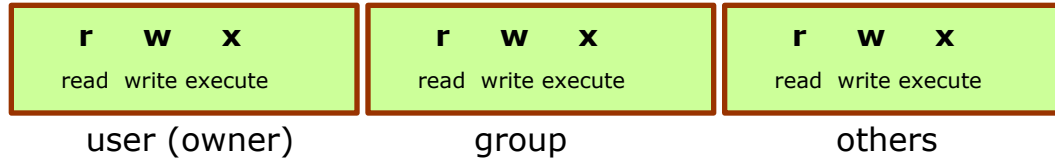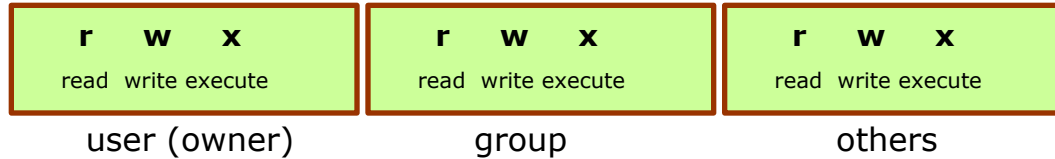
2525532 birds
2525533 dogs

examples

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

166

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

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Directory Execute Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute
user (owner)	group	others

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
```
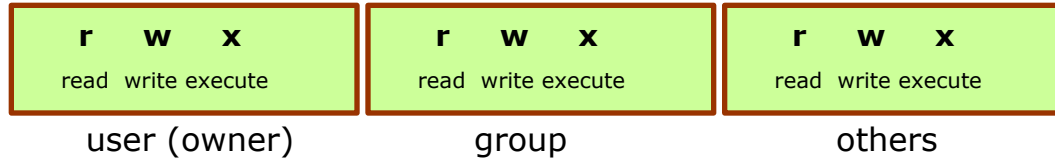
2525532 birds
2525533 dogs

examples

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

169

Directory Execute Permission

r w x	**r w x**	**r w x**
read write execute	read write execute	read write execute
user (owner)	group	others

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/
```

2525532 birds
2525533 dogs

examples

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.*

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Directory Execute Permission

r **w** **x**	**r** **w** **x**	**r** **w** **x**
read write execute	read write execute	read write execute
user (owner)	group	others

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
```

2525532 birds
2525533 dogs

examples

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

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Directory Execute Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute

user (owner)   group   others

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/
```

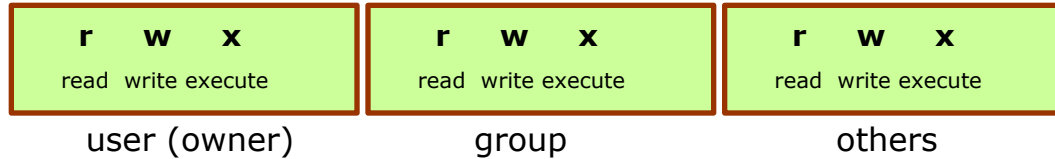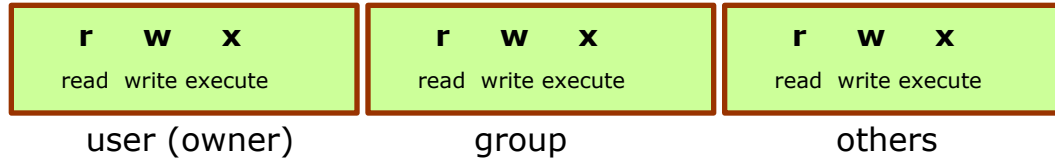2525532 birds
2525533 dogs

examples

Can list directory contents?

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

Yes

Directory Execute Permission

r **w** **x** read write execute	**r** **w** **x** read write execute	**r** **w** **x** read write execute
user (owner)	group	others

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
```

2525532 birds
2525533 dogs

examples

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

Directory Execute Permission

r w x	r w x	r w x
read write execute	read write execute	read write execute

user (owner)　　　　　group　　　　　others

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/
```
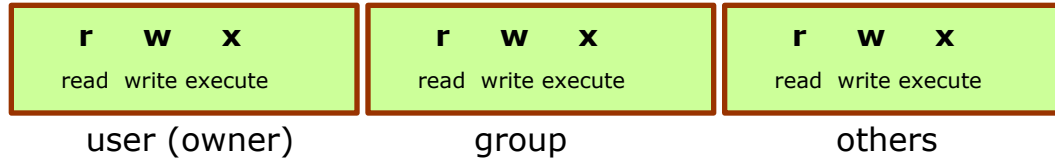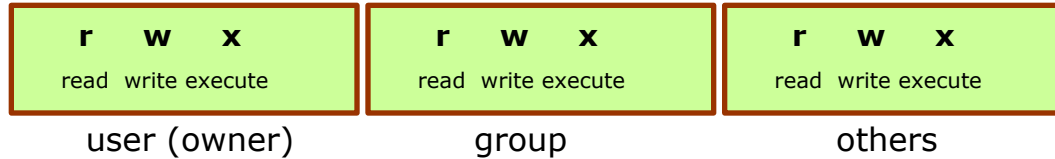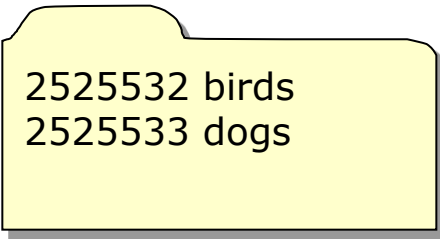
2525532 birds
2525533 dogs

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

Lab 6

Cabrillo College

CIS 90 Linux Lab Exercise

Lab 6: File Permissions

Spring 2012

Lab 6: File Permissions

In this lab you will learn how to assign permissions to files and directories to provide a measure of security and privacy to your files on a multiuser system.

Forum

Browse to: http://opus.cabrillo.edu/forum/viewforum.php?f=46

Check the forum for any late breaking news about this lab. The forum is also the place to go if you get stuck, have a question or want to share something you have learned about this lab.

Procedure

Log on to Opus so that you have a command line shell at your service. Be sure you are in your home directory to start this lab. Using the **chgrp**, and **chmod** commands, you will modify the permissions on files and subdirectories in your home directory.

Part I - Making Directories

1. From your home directory, do a long listing with the **ls -l** command.
   Who owns these files? To which group do they belong?
   How can you distinguish file entries from directory entries?
2. Do a long listing of the file, */home/rsimms/uhistory*. Who owns it?
   Can you move the file to your home directory? Why or why not?
   Can you copy the file to your home directory? Why or why not?
3. Now that you have copied the file *uhistory* to your home directory,
   who owns it? What are the permissions?
4. Display the contents of the file *uhistory* on your screen.
   Now take away read permission using the command:
   chmod -r uhistory
   Try to display the contents of the file as you did above. Does it work?
5. Now give read permission back but take away write permission:
   chmod 444 uhistory
   Verify the success of the above command.
6. Take away execute (search) permission from the *misc* directory:
   chmod -x misc
   Do short and long listings of the *misc* directory using the **ls** and **ls -l** commands.

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.

Quiz questions for next class:

Lab 6

Five Posts

- 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