

Lesson Module Checklist

- Slides
- WB
- Flash cards
- Page numbers
- 1st minute quiz
- Web Calendar summary
- Web book pages
- Commands
- Lab 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/>)



Instructor: **Rich Simms**

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

Passcode: **761867**



Buzz



Carlos



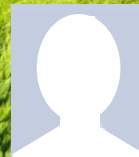
Elijah



Emily



Enrique C.



Enrique R.



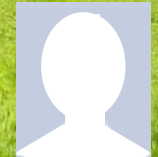
Jon M.



Jon W.



Jordan



Joseph



JJ



Kiernan



Maria



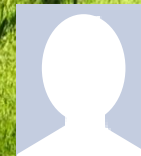
Mathew



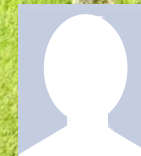
Mike C.



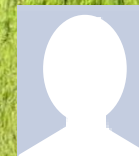
Michael F.



Mike M.



Nick L.



Patrick



Rebecca



Ricardo



Robert



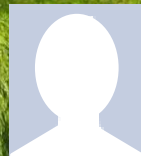
Ruth



Steve



Tess



Tim



Troy

Quiz

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

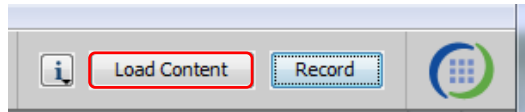
See electronic white board

email answers to: risimms@cabrillo.edu

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

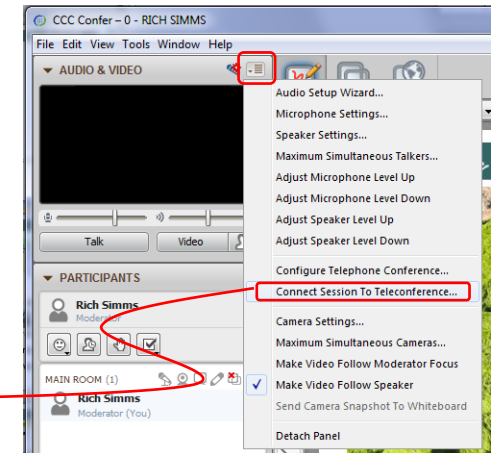
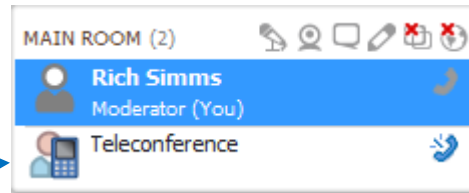


[] Preload White Board with *cis*lesson??*-WB*



[] Connect session to Teleconference

Session now connected to teleconference



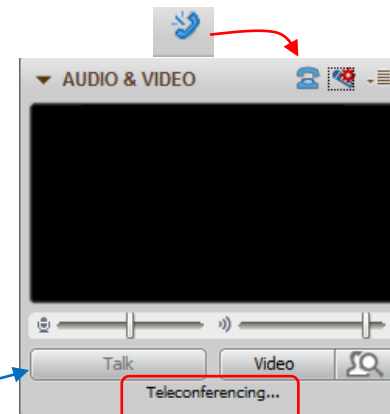
[] Is recording on?



Red dot means recording

[] Use teleconferencing, not mic

Should be greyed out





[] layout and share apps

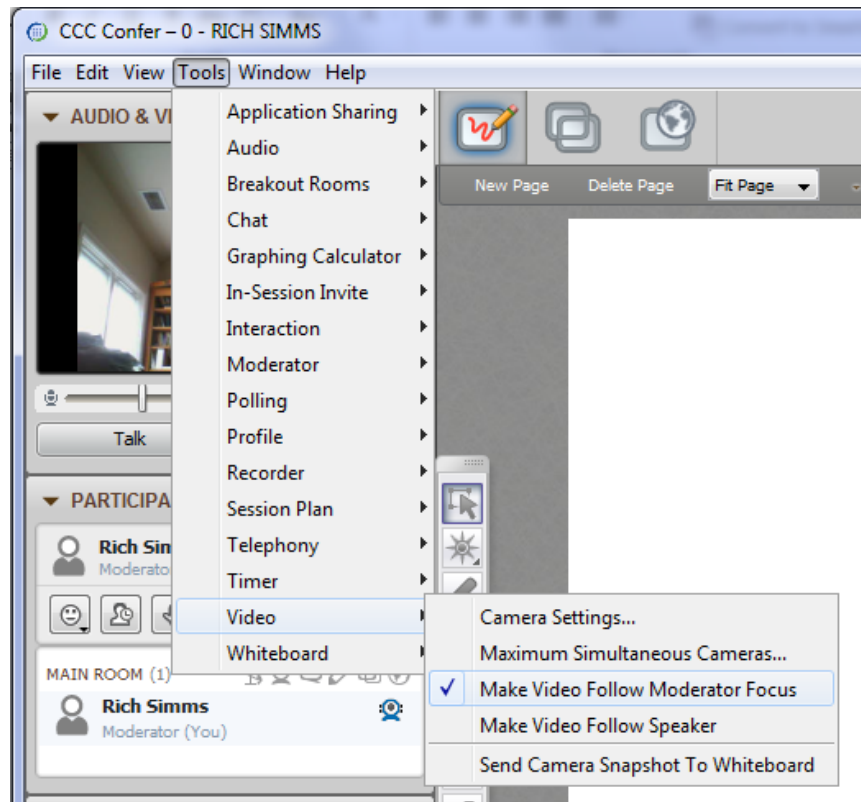
The screenshot displays a desktop environment with several applications open. A video conference window (CCC Confer) is on the left, showing a participant named Rich Simms. In the center, a Foxit Reader window displays a PDF document titled "cis90lesson07.pdf". A web browser window (Chrome) is open to the URL "simms-teach.com/docs/cis90/cis-90-TEST-1-Fall-12.pdf", showing a section titled "Part 1 - Flashcards questions (1 point each)". A terminal window (Putty) is open, showing a login session for "simben90@oslab:~". A vSphere Client window is also open, showing the vCenter inventory. Red boxes and arrows highlight specific elements: "foxit for slides" points to the Foxit Reader window; "chrome" points to the Chrome browser window; "putty" points to the terminal window; and "vSphere Client" points to the vSphere Client window. The desktop taskbar at the bottom shows various application icons, and the system clock indicates 6:52 AM on 10/10/2012.



[] Video (webcam) optional

[] Follow moderator

[] Double-click on postages stamps



Universal Fix for CCC Confer:

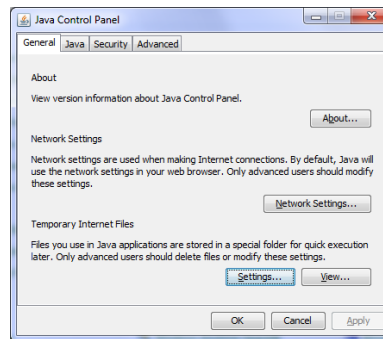
- 1) Shrink (500 MB) and delete Java cache
- 2) Uninstall and reinstall latest Java runtime



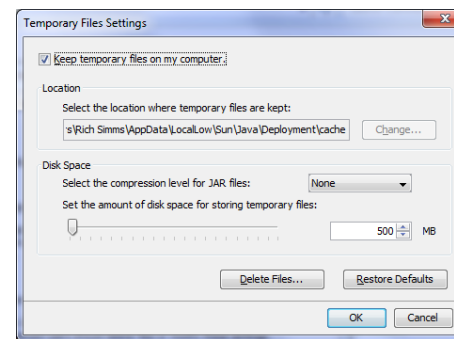
Control Panel (small icons)



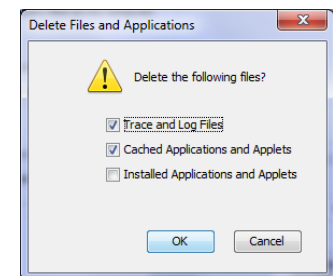
General Tab > Settings...



500MB cache size



Delete these



Google Java download



File Permissions

Objectives

- 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

Agenda

- 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 Q24 = 16
Missed Q10 = 15
Missed Q26 = 12
Missed Q25 = 11
Missed Q28 = 10
Missed Q19 = 8
Missed Q15 = 8
Missed Q5 = 7
Missed Q27 = 7
Missed Q12 = 7
Missed Q9 = 6
Missed Q2 = 6
Missed Q16 = 6
Missed Q3 = 5
Missed Q7 = 4

Missed Q6 = 4
Missed Q30 = 4
Missed Q23 = 4
Missed Q18 = 4
Missed Q14 = 4
Missed Q11 = 4
Missed Q21 = 3
Missed Q8 = 2
Missed Q29 = 2
Missed Q20 = 2
Missed Q1 = 2
Missed Q4 = 1
Missed Q22 = 1
Missed Q17 = 1
Missed Q13 = 1

Extra Credit

Missed Q33 = 15
Missed Q31 = 15
Missed Q32 = 9

22 tests
submitted

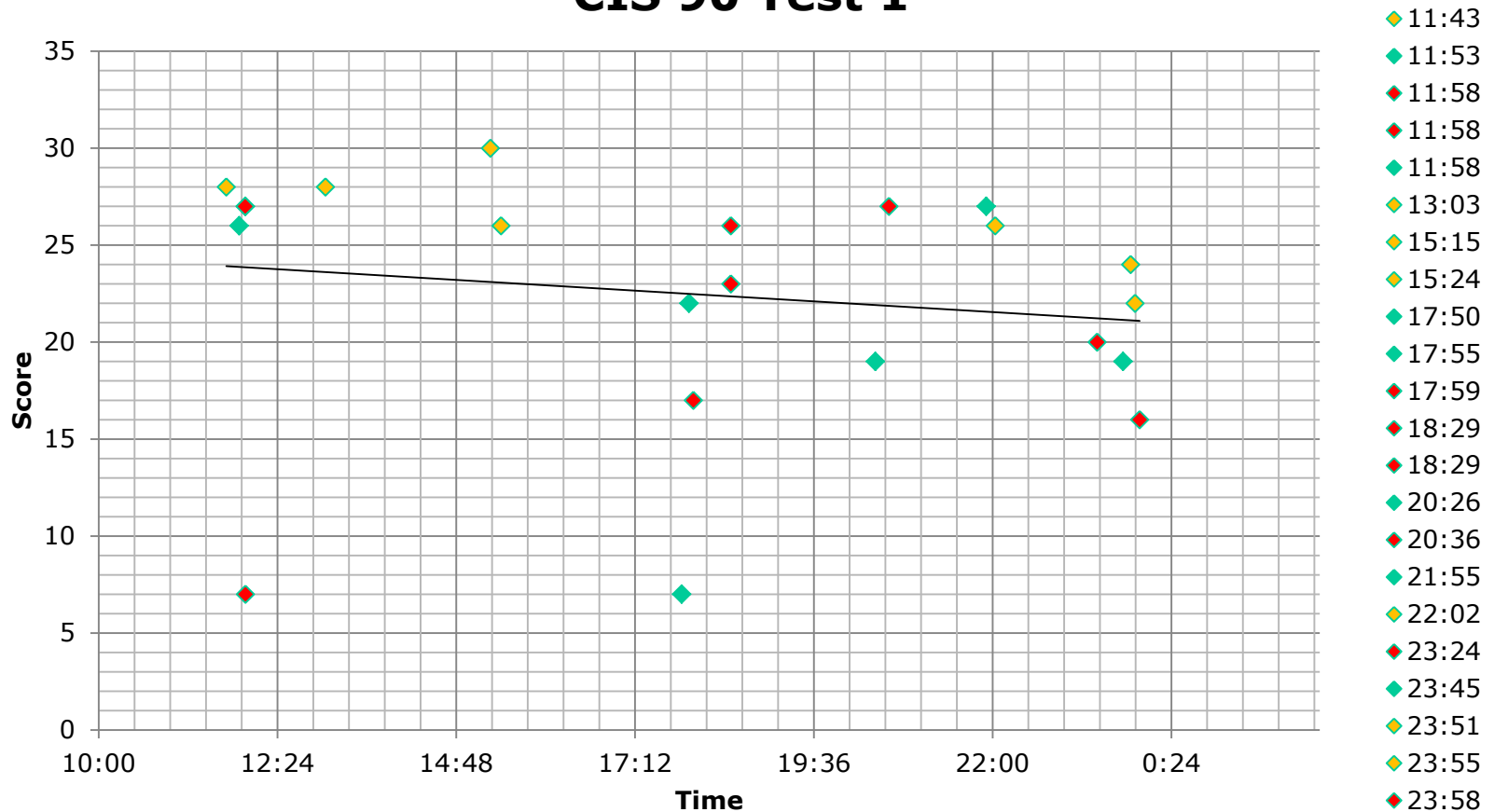


6 tests not
submitted



Correct answers are in /home/cis90/answers on Opus

CIS 90 Test 1

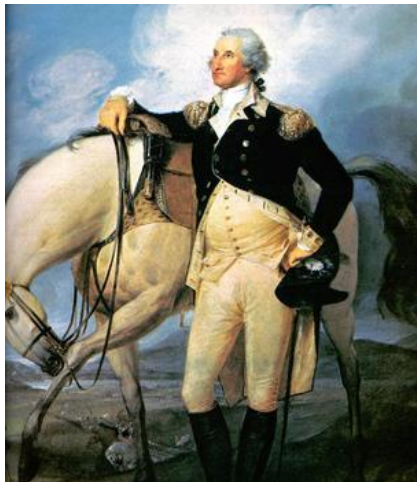


Q16) On Sun-Hwa-II, there is a file named passwd which resides in the /etc directory. What is the ABSOLUTE pathname of this file?

Correct answer:
/etc/passwd

To check your answer (lesson 4)

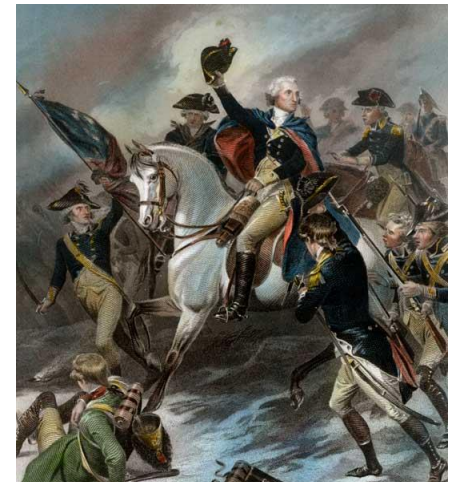
Benji-on-sun-hwa-ii ~ ==> **ls /etc/passwd**
/etc/passwd



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



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



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



More questions?

On any part of Test 1?

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

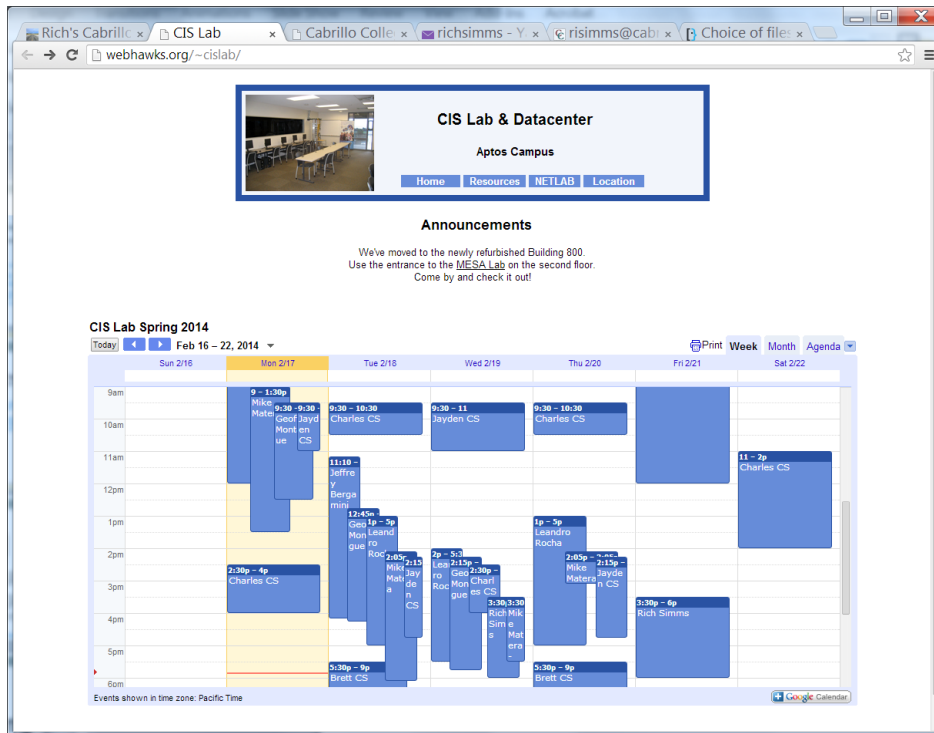
Chinese Proverb

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?

Would like some help?

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

Rich is in the lab Wednesdays and Fridays from 3:30 - 6:00 PM

Free CIS 90 Tutoring Available

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

TUTORIALS

ANNOUNCEMENTS & DEADLINES

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

Welcome to the Tutorials Center!

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

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

The following classes are being tutored for Spring 2014:

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

CONTACT INFORMATION

Tutorials Center

Location Room 1080A - Learning Resource Center

Phone 831.479.6470

Email tutorialscenter@cabrillo.edu

Coordinator Lori Chavez

Phone 831.479.6126

Email lochavez@cabrillo.edu

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

MAP, DIRECTIONS, & PARKING

DEPARTMENT STAFF & FACULTY DIRECTORY



Matt Smithey

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

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

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

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



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 Career and Technical Education Act

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

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

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

This survey can be completed online using web advisor:

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

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

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

Scroll down to the "Career Technical Information"

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

Then "LOG OUT"

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

- Rich

This is an important source of funding for Cabrillo College.

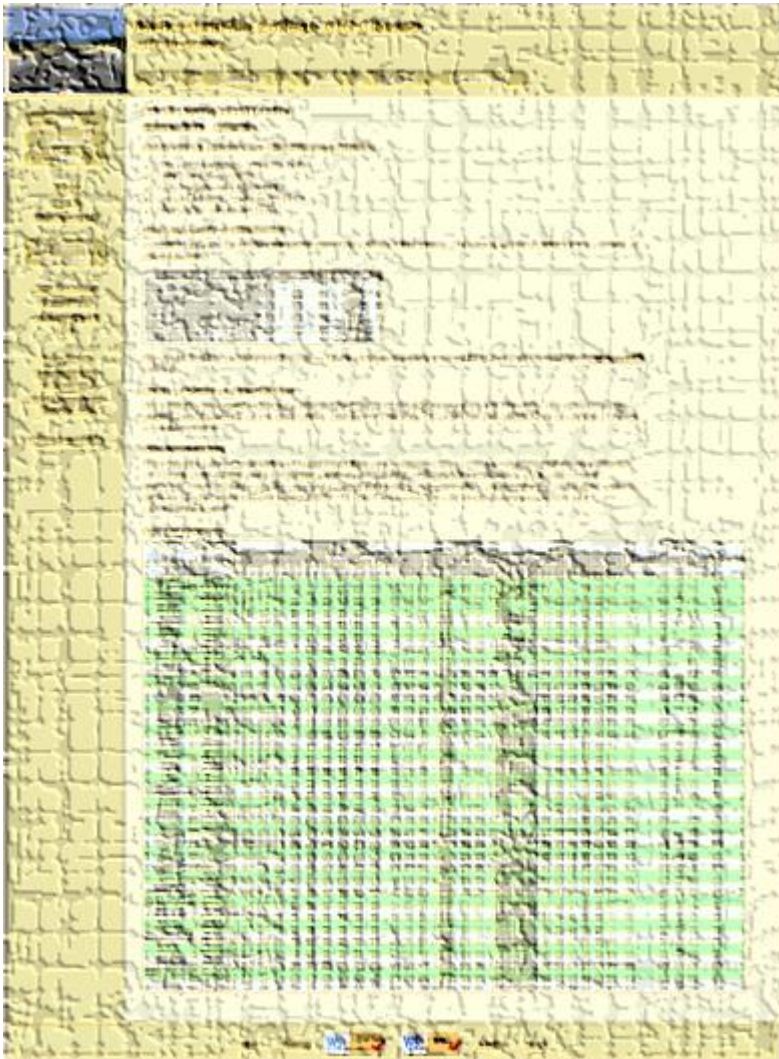
*Send me an email stating you completed this survey for **three points extra credit!***

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

<http://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 3/11/2014

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

alatar: 51% (93 of 182 points)
 anborn: 96% (175 of 182 points)
 aragorn: 87% (159 of 182 points)
 arwen: 98% (180 of 182 points)
 beregond: 0% (0 of 182 points)
 bilbo: 53% (97 of 182 points)
 celebrian: 101% (185 of 182 points)
 dwalin: 95% (173 of 182 points)
 elrond: 1% (3 of 182 points)
 eomer: 93% (171 of 182 points)
 faramir: 94% (172 of 182 points)
 frodo: 94% (172 of 182 points)
 gwaihir: 109% (199 of 182 points)
 ioreth: 97% (178 of 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

legolas: 89% (163 of 182 points)
 marhari: 56% (102 of 182 points)
 orome: 76% (140 of 182 points)
 pallando: 0% (0 of 182 points)
 pippen: 73% (133 of 182 points)
 quickbeam: 103% (188 of 182 points)
 rian: 0% (0 of 182 points)
 samwise: 82% (151 of 182 points)
 shadowfax: 0% (0 of 182 points)
 strider: 92% (168 of 182 points)
 theoden: 53% (98 of 182 points)
 treebeard: 109% (199 of 182 points)
 tulkas: 82% (151 of 182 points)
 ulmo: 73% (133 of 182 points)

Jesse's checkgrades python script

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

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

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

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

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

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

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.

Permissions

R=Read

W=Write

X=Execute

File Permissions

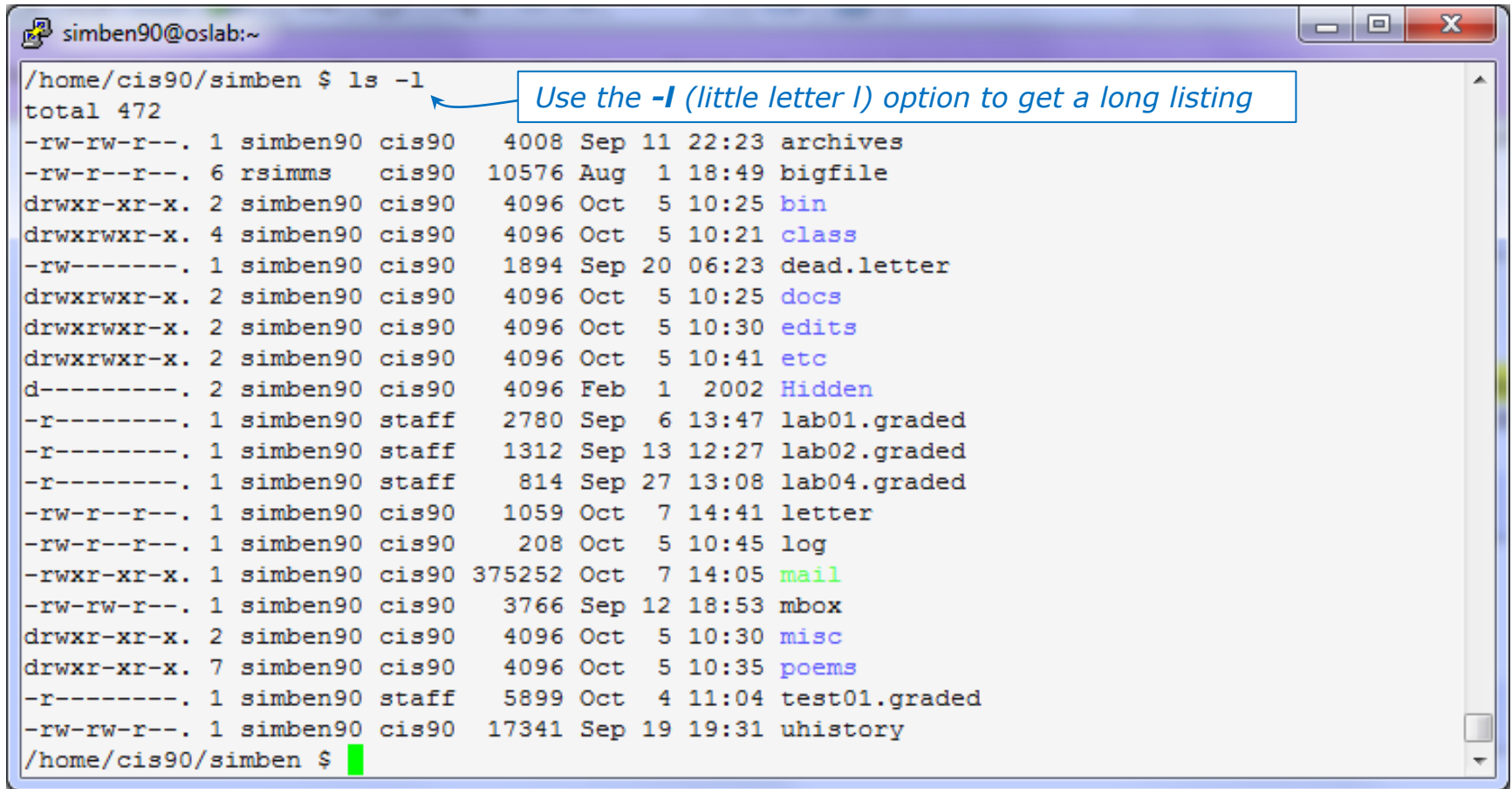
File permissions are used to control access to files and directories

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

Which can be applied to:

- 1) The **user (owner)** of the file
- 2) A **group** of users
- 3) Everyone else (**others**)

File Permissions



A terminal window titled 'simben90@oslab:~' showing the output of the command 'ls -l' in the directory '/home/cis90/simben'. The output is a long listing of files and directories with their permissions, owner, group, size, date, and name. A blue callout box with an arrow points to the '-l' option in the command, containing the text 'Use the -l (little letter l) option to get a long listing'.

```

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*

File 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  
-rwxr-xr-x. 2 simben90 cis90 4096 Oct 5 10:25 bin  
-rwxrwxr-x. 4 simben90 cis90 4096 Oct 5 10:21 class  
-rw-----. 1 simben90 cis90 1894 Sep 20 06:23 dead.letter  
-rwxrwxr-x. 2 simben90 cis90 4096 Oct 5 10:25 docs  
-rwxrwxr-x. 2 simben90 cis90 4096 Oct 5 10:30 edits  
-rwxrwxr-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  
-rwxr-xr-x. 2 simben90 cis90 4096 Oct 5 10:30 misc  
-rwxr-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)

File 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  
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drwxrwxr-x. 2 simben90 cis90 4096 Oct 5 10:25 docs  
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-r-----. 1 simben90 staff 2780 Sep 6 13:47 lab01.graded  
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-rwxr-xr-x. 1 simben90 cis90 375252 Oct 7 14:05 mail  
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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*

File 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  
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drwxrwxr-x. 4 simben90 cis90 4096 Oct 5 10:21 class  
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drwxrwxr-x. 2 simben90 cis90 4096 Oct 5 10:25 docs  
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-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*

File 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  
drwxrwxr-x. 4 simben90 cis90  
-rw-----. 1 simben90 cis90  
drwxrwxr-x. 2 simben90 cis90  
drwxrwxr-x. 2 simben90 cis90  
drwxrwxr-x. 2 simben90 cis90  
d-----. 2 simben90 cis90  
-r-----. 1 simben90 staff  
-r-----. 1 simben90 staff  
-r-----. 1 simben90 staff  
-rw-r--r--. 1 simben90 cis90  
-rw-r--r--. 1 simben90 cis90  
-rwxr-xr-x. 1 simben90 cis90  
-rw-rw-r--. 1 simben90 cis90  
drwxr-xr-x. 2 simben90 cis90  
drwxr-xr-x. 7 simben90 cis90  
-r-----. 1 simben90 staff  
-rw-rw-r--. 1 simben90 cis90 17341 Sep 19 19:31 uhistory  
/home/cis90/simben $
```

user
(owner) group others

read	write	execute	read	write	execute	read	write	execute

The permission codes are in triplets

*The nine permission bits are grouped by **user** (owner), **group** and all **others***

File 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  
-rw-----. 1 simben90  
drwxrwxr-x. 2 simben90  
drwxrwxr-x. 2 simben90  
drwxrwxr-x. 2 simben90  
d-----. 2 simben90  
-r-----. 1 simben90  
-r-----. 1 simben90  
-r-----. 1 simben90  
-rw-r--r--. 1 simben90  
-rw-r--r--. 1 simben90  
-rwxr-xr-x. 1 simben90  
-rw-rw-r--. 1 simben90  
drwxr-xr-x. 2 simben90  
drwxr-xr-x. 7 simben90  
-r-----. 1 simben90  
-rw-rw-r--. 1 simben90  
/home/cis90/simben $
```

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

The permissions on bigfile:

The **user** *rsimms* has read and write permission
The **group** *cis90* has read permission
All **others** have read permission

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

Activity

```
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 $
```

What are the permissions for the owner of the docs directory?

Activity

```
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 $
```

What are the permissions for the group cis90 on lab02.graded?

Activity

```
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 $
```

Who has write permission on dead.letter?

Activity

```
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 $
```

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

Permissions

R=Read



File Permissions Read



Read permission is necessary to read a file

```
/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
```

Can the simben90 user read the /etc/passwd file?



File Permissions Read



Read permission is necessary to read a file

```
/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
```

YES, Benji (simben90) is considered as "other" and has read permission to /etc/passwd

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



File Permissions Read



Read permission is necessary to read a file

```
/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
```

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



File Permissions Read



Read permission is necessary to read a file

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

Both these files are owned by root and are in the root group

No, as "other" he does not have read permission to /etc/shadow!

```
/home/cis90/simben $ head -3 /etc/shadow
```

```
head: cannot open `/etc/shadow' for reading: Permission denied
```

Permissions

W=Write



File Permissions Write



Write permission is necessary to write to a file

```
/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
```

These files have different owners but are in the same group

Benji, as "owner", has write permission to his own letter file

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

Alan Sherman

Benji was here

But as a member of group cis90, does not have write permission to Homer's letter file!

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

Permissions

X=eXecute



File Permissions Execute



**Execute permission is necessary to execute (run)
a file (command, program or script)**

```
/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
```

But as "other", he does not have execute permission on check7

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

Benji, as "owner", has execute permission on his tryme script

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

Groups and new files



More tools for your toolbox



groups – displays file inode information (status) and more

id – displays information about a user

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*

Groups

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

*simben90's
primary
group is
cis90*

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

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

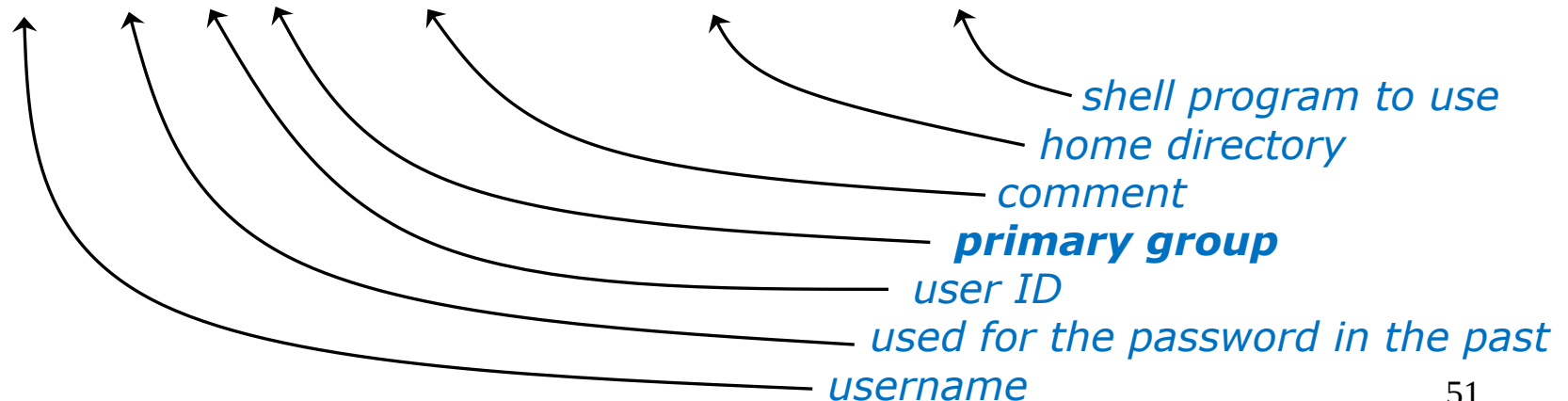
```
/home/cis90/simben $ groups simben90  
simben90 : cis90 users
```

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:Carille Ellis:/home/cis90/ellcar:/bin/bash
frocar90:x:1009:190:Arter 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
```



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,perstel172,rodchr172,rutsam172,schjon172,weltod172
,wiltyr172,wismar172,bramar172,172,acctes172,bermic172,lejmich172,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 you answer in the chat window)

Activity

*What other groups do you
belong to?*

(Write you answer in the chat window)

Specifying Numerical Permissions

File Permissions

Binary

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 ———→

File Permissions

Binary

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)

$$\begin{array}{ccccc}
 = 110 & \text{or} & 4+2+0 & = & 6 \\
 \text{binary} & & \text{decimal} & & \text{decimal}
 \end{array}$$

File Permissions

Binary

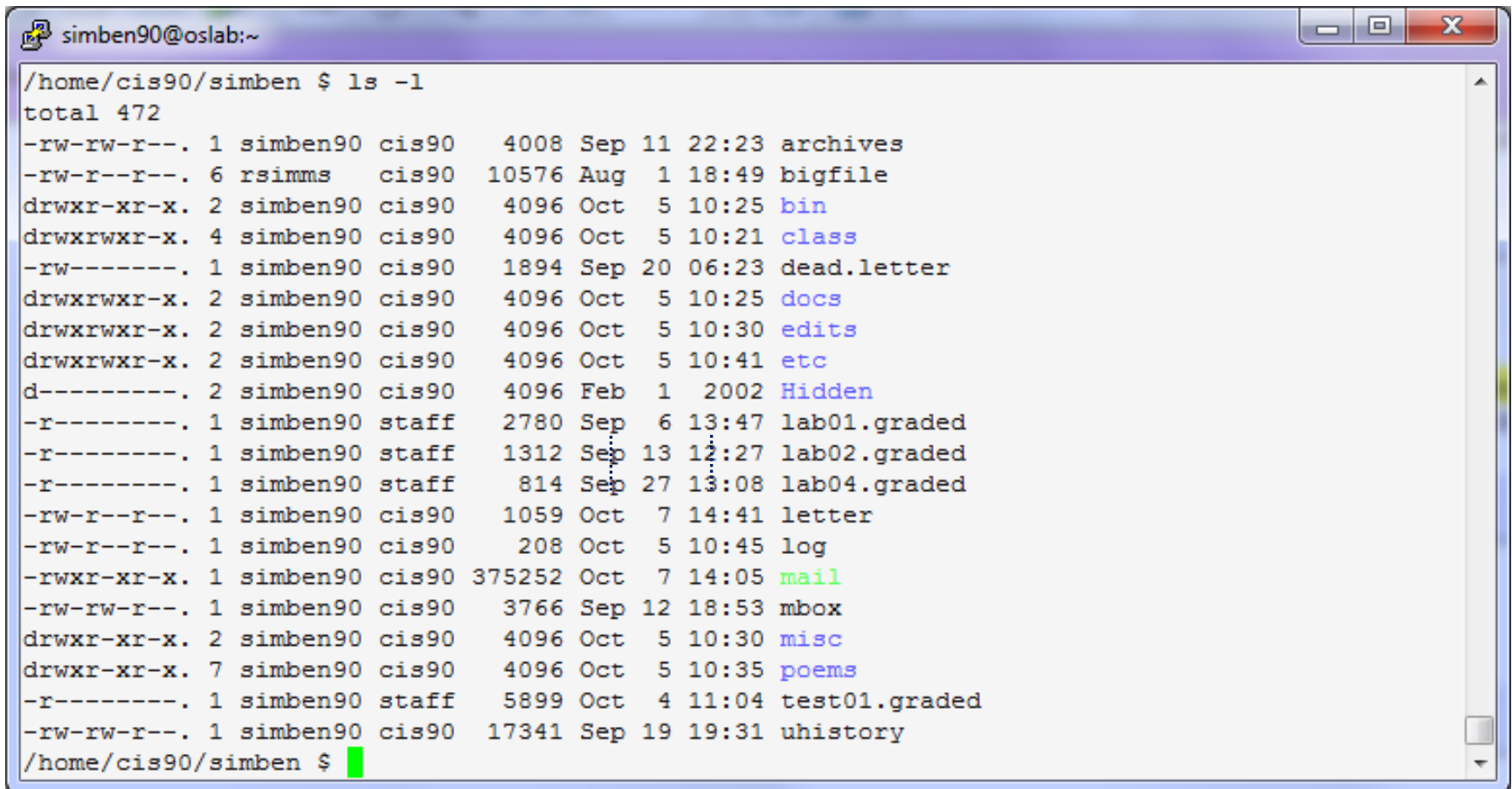
rwX	Binary	Convert	Decimal
— — —	0 0 0	0 + 0 + 0	0
— — x	0 0 1	0 + 0 + 1	1
— w —	0 1 0	0 + 2 + 0	2
— w x	0 1 1	0 + 2 + 1	3
r — —	1 0 0	4 + 0 + 0	4
r — x	1 0 1	4 + 0 + 1	5
r w —	1 1 0	4 + 2 + 0	6
r w x	1 1 1	4 + 2 + 1	7

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

$$\begin{array}{ccccc}
 = 011 & \text{or} & 0+2+1 & = & 3 \\
 \text{binary} & & \text{decimal} & & \text{decimal}
 \end{array}$$

Practice converting to numerical

File 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 $
```

This is a long listing of Benji's home directory

Example 1

Converting mnemonic permissions to numeric

A screenshot of a terminal window titled "simben90@oslab:~". The prompt is "/home/cis90/simben \$ ls -l". The output shows several files. A blue callout box points to the first column of the listing, containing the text: "Note, the d in the first column is the file type and is NOT part of the permissions". Below this, a large white box with a black border contains the question "What are the numerical permissions on class?" followed by the permissions "rwxrwxr-x" where each character has vertical dashed lines underneath it.

```
/home/cis90/simben $ ls -l
total 472
-rw-rw-r-- 1 simben90 cis90 4096 Oct 5 10:21 class
-rw-r--r-- 6 simben90 cis90 1894 Sep 20 06:23 dead.letter
drwxr-xr-x 2 simben90 cis90 4096 Oct 5 10:25 docs
drwxrwxr-x 2 simben90 cis90 4096 Oct 5 10:30 edits
d:
d:
-rw-rw-r-- 1 simben90 cis90 17341 Sep 19 19:31 uhistory
```

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?

rwxrwxr-x

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

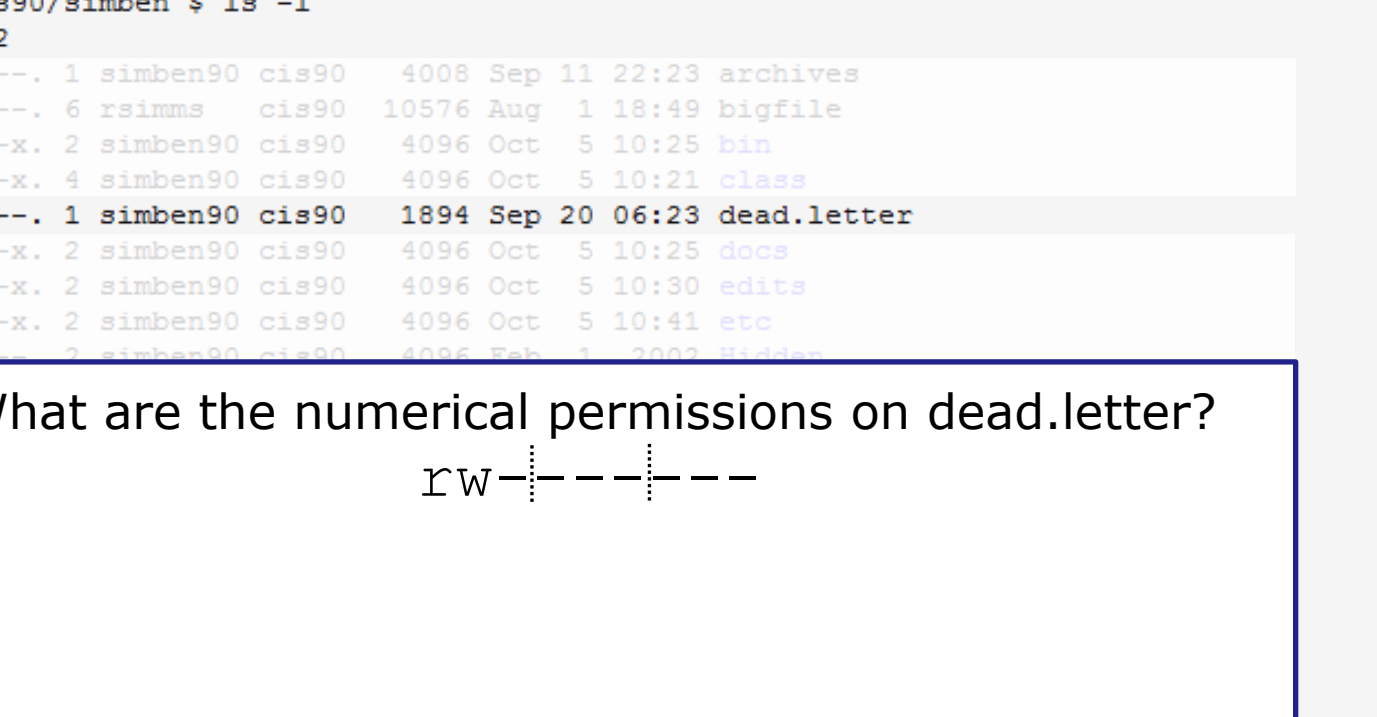
What are the numerical permissions on class?

rwx	rwx	r-x
111	111	101
7	7	5

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
drwxrwxr-x. 2 simben90 cis90  4096 Feb  1 2002 hidden
-rw-rw-r--. 1 simben90 cis90  4096 Sep 19 15:02 library
```

What are the numerical permissions on dead.letter?

rw-|---|---

/home/cis90/simben \$

Benji's dead.letter (regular file)

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  
drwxrwxr-x. 2 simben90 cis90 4096 Feb 1 2002 hidden
```

What are the numerical permissions on dead.letter?

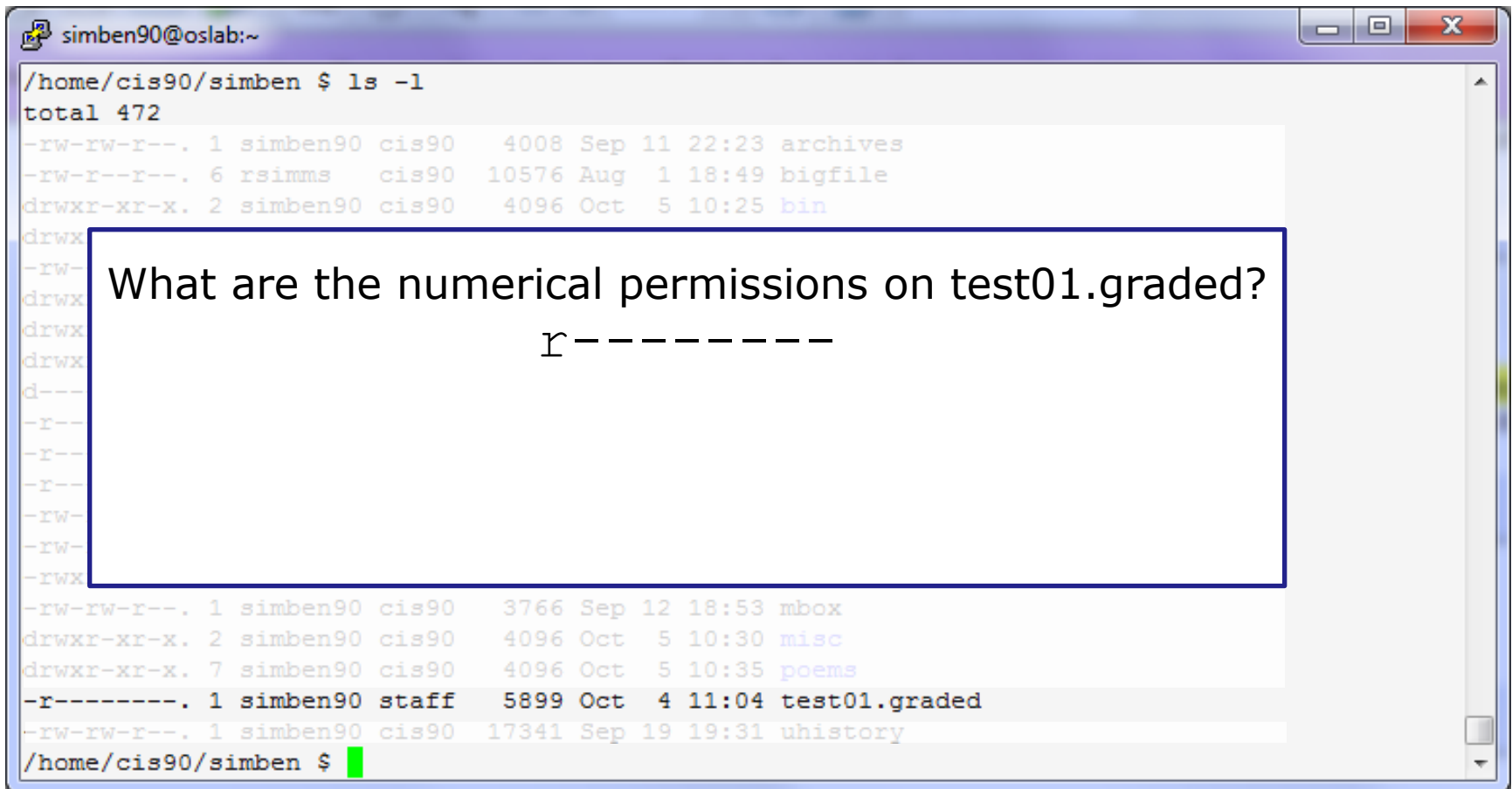
rw	-	-	-	-	-
1	1	0	0	0	0
6		0		0	

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

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

Example 3

Converting mnemonic permissions to numeric



A terminal window titled 'simben90@oslab:~' showing the output of the command 'ls -l'. The output lists several files and directories. A blue box highlights the line for 'test01.graded' and the question 'What are the numerical permissions on test01.graded?'. Below the question, the mnemonic permissions 'r-----' are shown.

```

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
drwxr-xr-x. 2 simben90 cis90  4096 Oct  5 10:25 misc
-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)

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  
drwxr-xr-x. 1 simben90 cis90  4096 Oct  5 10:25 misc  
-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 $
```

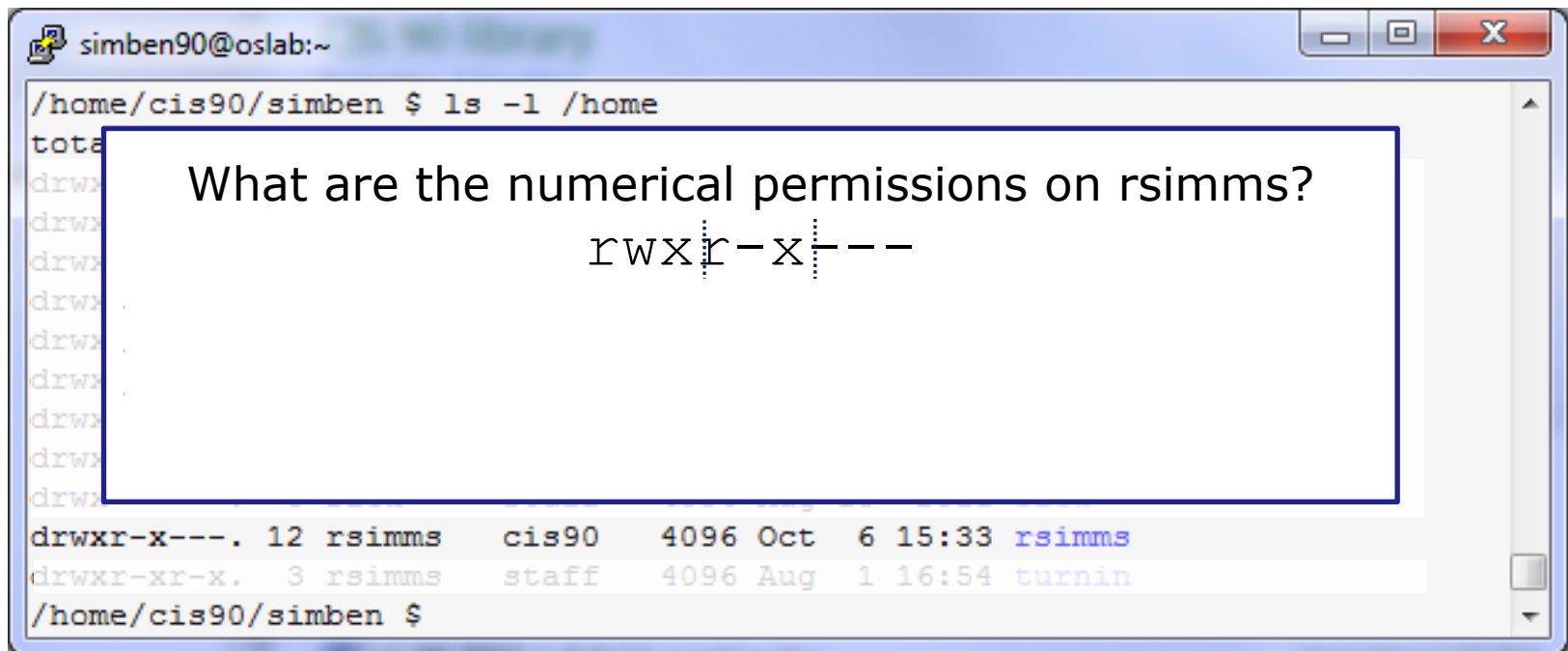
What are the numerical permissions on test01.graded?

r	-	-	-	-	-	-
1	0	0	0	0	0	0
4	0	0				

Benji's test01.graded permissions are 400

Example 4

Converting mnemonic permissions to numeric



The terminal window shows the command `ls -l /home` being executed. The output lists several directories, including `rsimms` and `turnin`. A callout box highlights the `rsimms` entry and asks for its numerical permissions.

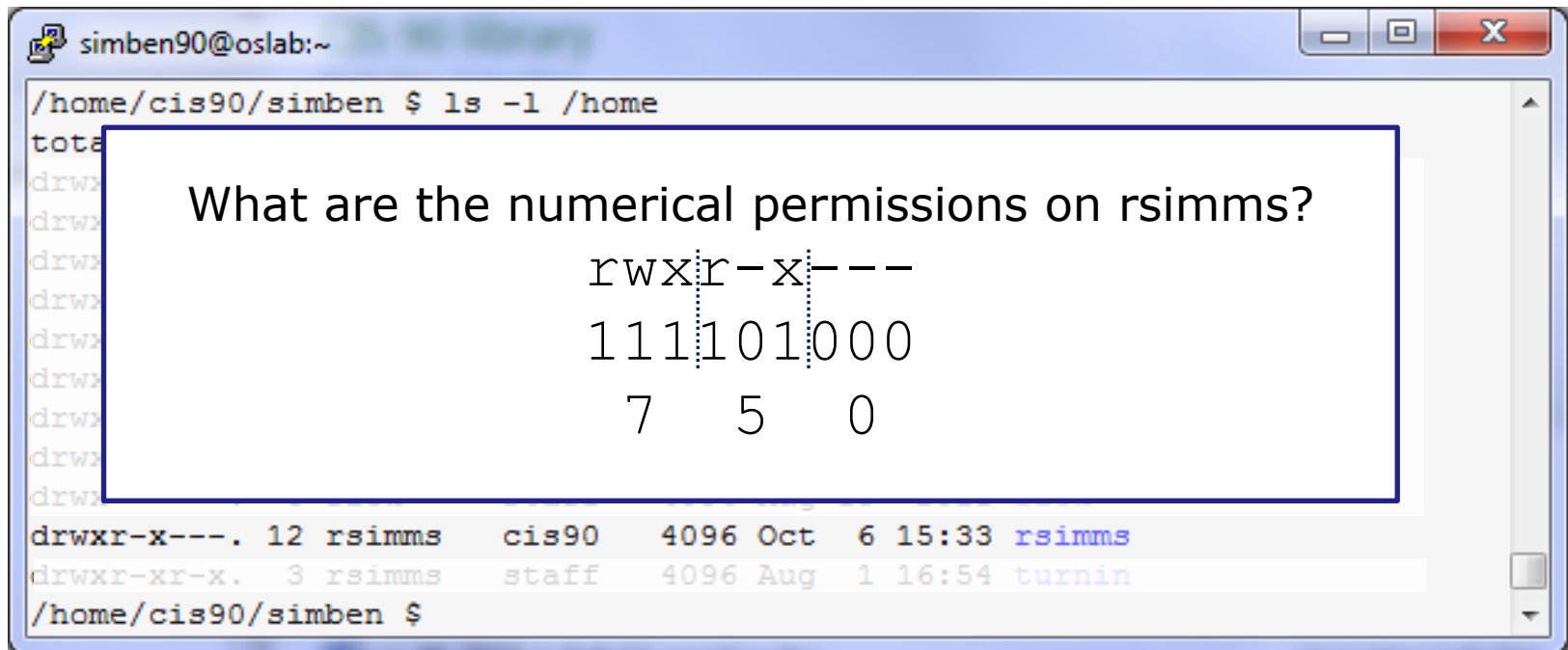
```
simben90@oslab:~  
/home/cis90/simben $ ls -l /home  
total  
drwxr-xr-x. 12 rsimms  cis90  4096 Oct  6 15:33 rsimms  
drwxr-xr-x.  3 rsimms  staff  4096 Aug  1 16:54 turnin  
/home/cis90/simben $
```

What are the numerical permissions on rsimms?
rwxr-xr-x

/home/rsimms (Rich's home directory)

Example 4

Converting mnemonic permissions to numeric



A terminal window titled 'simben90@oslab:~' showing the command `ls -l /home`. The output lists several files, including `rsimms` with permissions `drwxr-x---`. A blue box highlights the conversion of these permissions to numeric form:

```

What are the numerical permissions on rsimms?
  rwx|r-x|---
  111|01|000
    7  5  0
  
```

Below the box, the terminal output shows the full `ls -l` output for `/home`:

```

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)

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?

r	w	-	-	w	-	-	-	-
1	1	0	0	1	0	0	0	0
6				2				0

/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



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**

The filename is kept in the directory

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

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

ext2 file system

Superblock

Inode Table

Data Blocks

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

The actual content is kept in a data block

```
/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 $
```

The permissions on letter are 110100100
rw-r--r-- or 644

owner has read and write

group has only read

others have only read

numeric form

More Practice

File Permissions

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

File Permissions

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

100100000
 $4 \quad 4 \quad 0$

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
rw	r-x	r-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 `rwX|rw-|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?

```
110100100  
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



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
```

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 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
```

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  
-rw-rwxrwx. 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



```
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

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



```
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

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?

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

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?

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!*

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

[simmsben@opus Directory3]\$ **umask** *With no argument, the current umask setting is shown*
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-	<i>default system permissions for a file</i>
002	-----w-	<i>umask setting (strips these permissions from default)</i>
664	rw-rw-r--	<i>result after masking</i>

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

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-	<i>default system permissions for a file</i>
022	---w--w-	<i>umask setting (strips these permissions from default)</i>
644	rw-r--r--	<i>result after masking</i>

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



```
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.*

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
```

*Benji has read and
write permission
on 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
```

*Benji (and
everyone else) has
all permissions.*

```
[simmsben@opus Directory3]$ rm myfile
```

```
rm: cannot remove `myfile': Permission denied
```

So why can't Benji remove his own file?



Answer:

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

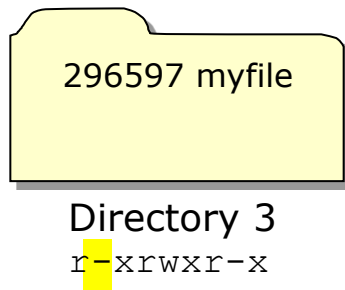
This is so you can write the revised file contents (with the file removed) to the directory. Remember that directories are like phone books and only contain file names and inode numbers.

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



Owner tries to write revised file contents to Directory3

**Permission
denied**

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
```

*Now Benji has
no permissions
on this file*

```
[simmsben@opus Directory3]$ rm myfile
```

```
rm: remove write-protected regular empty file `myfile'? yes
```

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

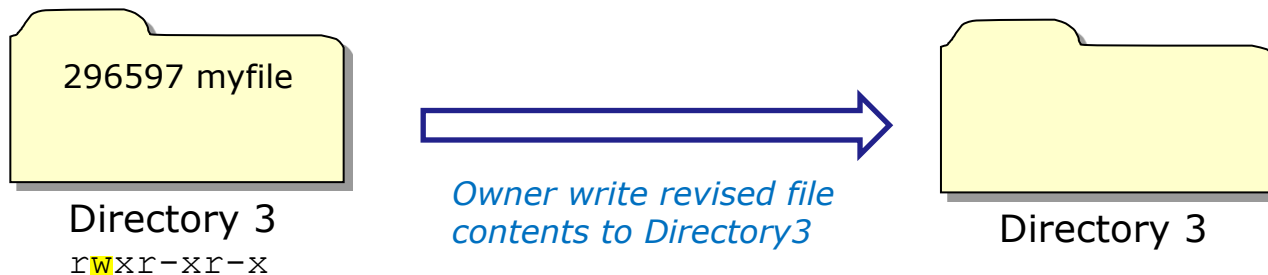
So how come he can delete it?



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.

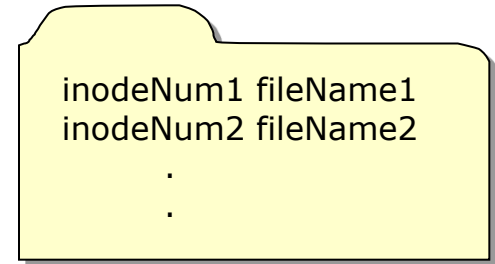


Directory Permissions

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

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

Directory Read Permission

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

Directory Read 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 -li 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	r	w	x	r	w	x
read	write	execute	read	write	execute	read	write	execute
user			group			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!*



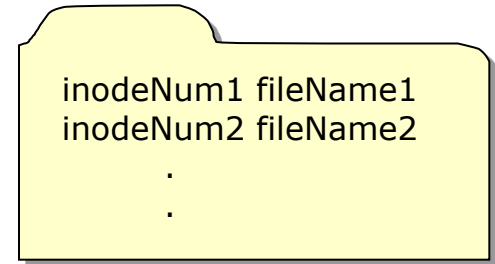
It's like walking into a pitch black room. You can't see anything, but if you know where things are you can still use them.

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

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 -li 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	r w x read write execute	r w x 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 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

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 -li 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	r w x read write execute	r w x 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 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

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 -li 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 read write execute	r w x read write execute	r w x 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!

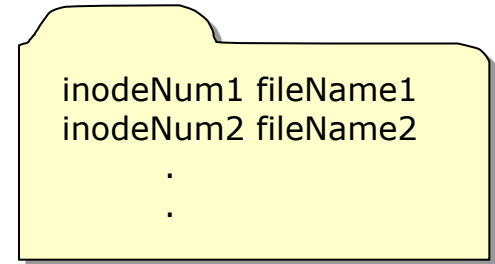
To change the contents of a directory (either add or remove files) requires write permission

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

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 -li 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?*

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

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.

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 -li examples/
2525532 birds 2525533 dogs
```

2525532 birds
2525533 dogs

examples

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

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

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 -li 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 read write execute	r w x read write execute	r w x 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



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

chmod

chown

groups

stat

umask

change file's group

change file permissions

change file owner (superuser only)

show group membership

show all file inode information

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