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

Introductions and Credits

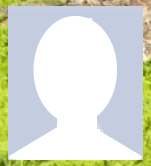
Jim Griffin
- Created this Linux course
- Created Opus and the CIS VLab
- Jim's site: http://cabrillo.edu/~jgriffin/

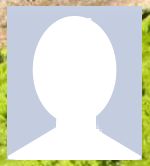
Rich Simms
- HP Alumnus
- Started teaching this course in 2008 when Jim went on sabbatical
- Rich's site: http://simms-teach.com

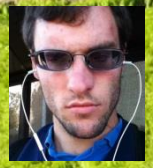
And thanks to:
- John Govsky for many teaching best practices: e.g. the First Minute quizzes, the online forum, and the point grading system (http://teacherjohn.com/)

CIS 90 - Lesson 7

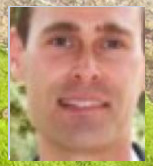
Instructor: **Rich Simms**
Dial-in: **888-450-4821**
Passcode: **761867**


Aaron


Andrew B.


Andrew C.


Arthur

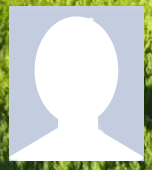

Brian


Cory

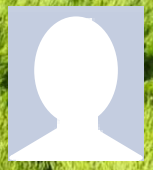

Daniel


David G.


Dave L.

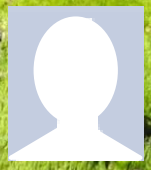

David P.


Debbie

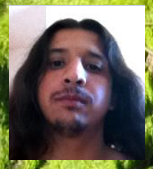

Edtson


Fidel

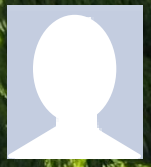

Humberto


Hunter


Imara


Ismael


Jessica


Joseph


Juliana

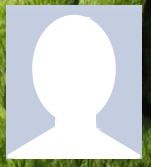

Lucie


Marc


Marty


Matt


Michael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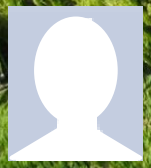
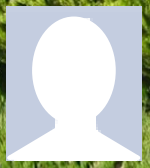
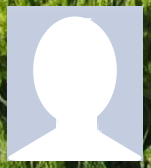

Shawn


Tabitha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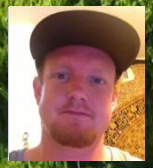
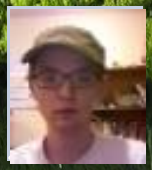
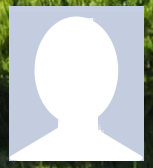

Tyler


Will


Zachary


Zsolt

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

Quiz

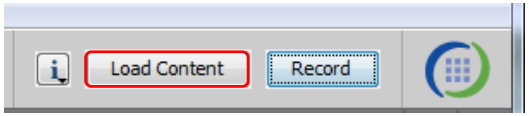
Please answer these questions **in the order** shown:

See electronic white board

email answers to: risimms@cabrillo.edu

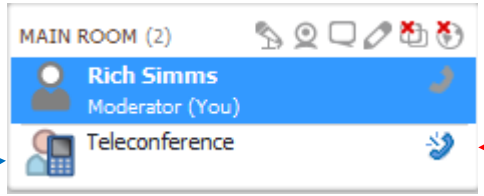
(answers must be emailed within the first few minutes of class for credit)

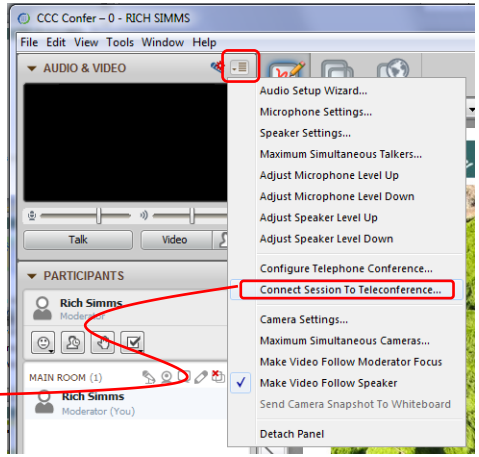
[ ] Preload White Board with *cis*lesson??*-WB*



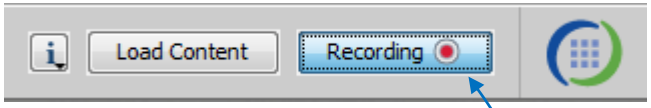
[ ] Connect session to Teleconference

Session now connected to teleconference





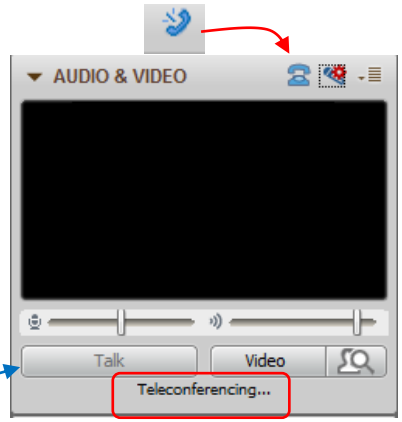
[ ] Is recording on?



Red dot means recording

[ ] Use teleconferencing, not mic

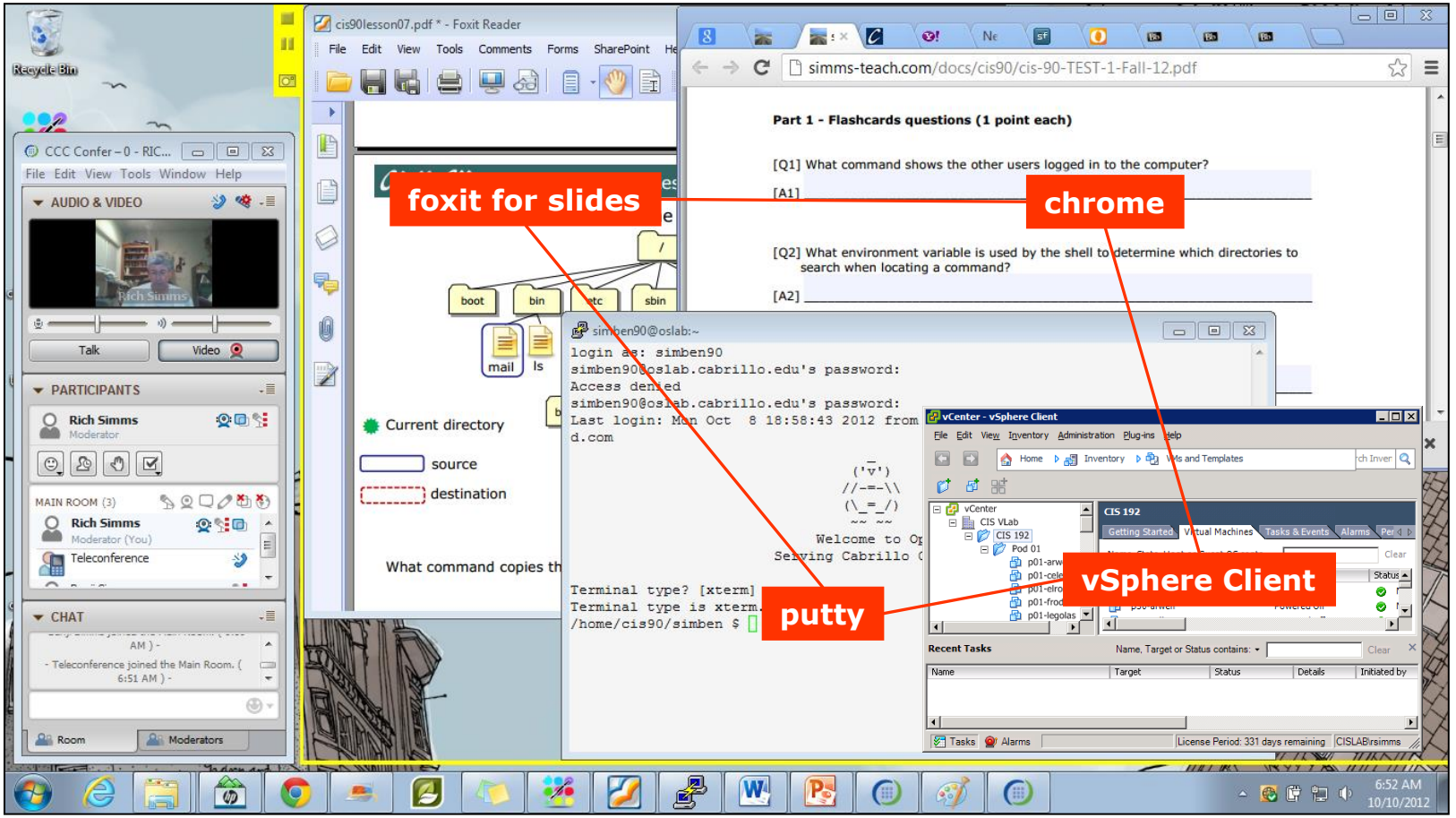
Should be greyed out



CCC Confer

Don't Forget

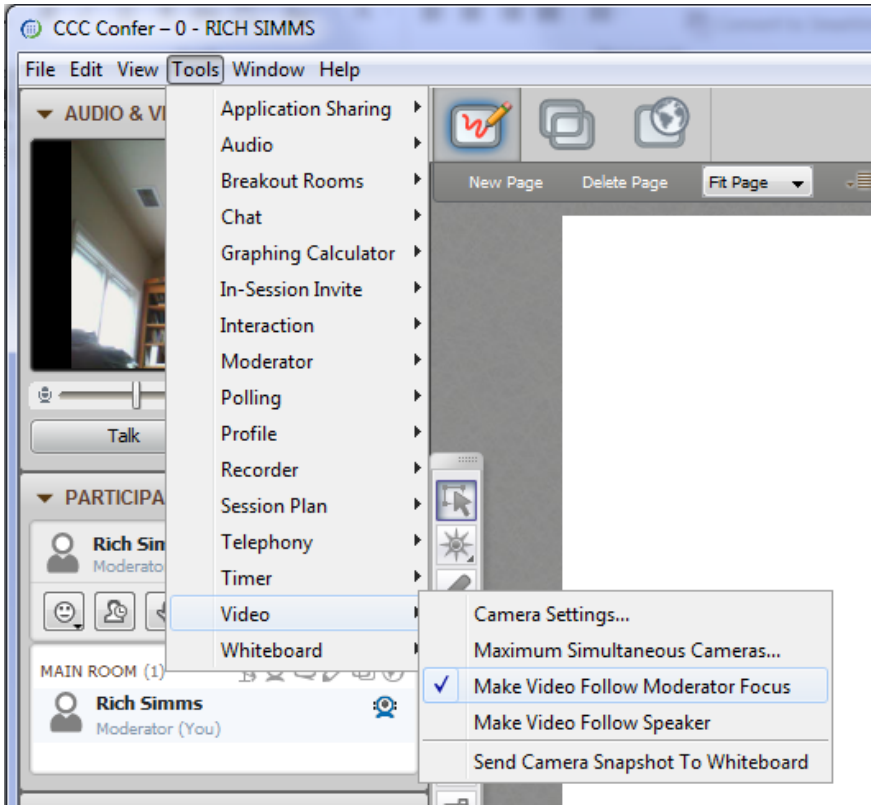
- [ ] **Video (webcam) optional**
- [ ] **layout and share apps**



[ ] Video (webcam) optional

[ ] Follow moderator

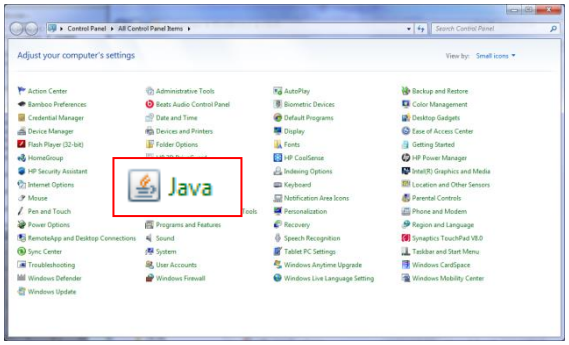
[ ] Double-click on postages stamps



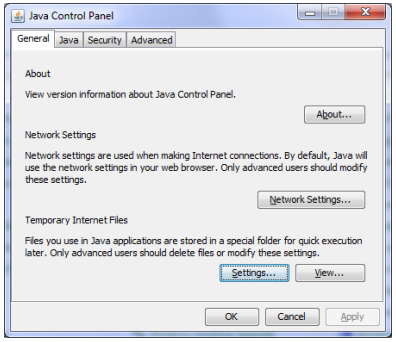
Universal Fix for CCC Confer:

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

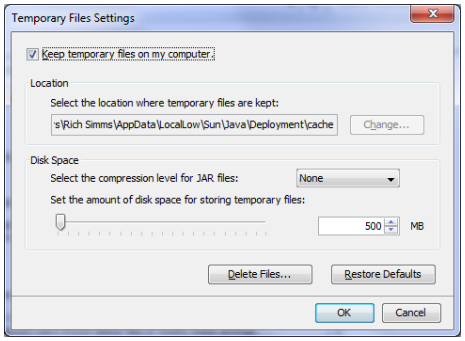
Control Panel (small icons)



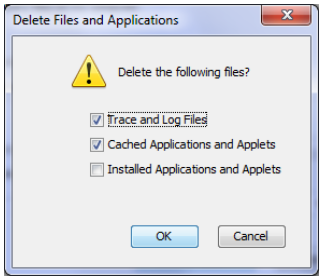
General Tab > Settings…



500MB cache size



Delete these



Google Java download

File Permissions

Objectives	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?

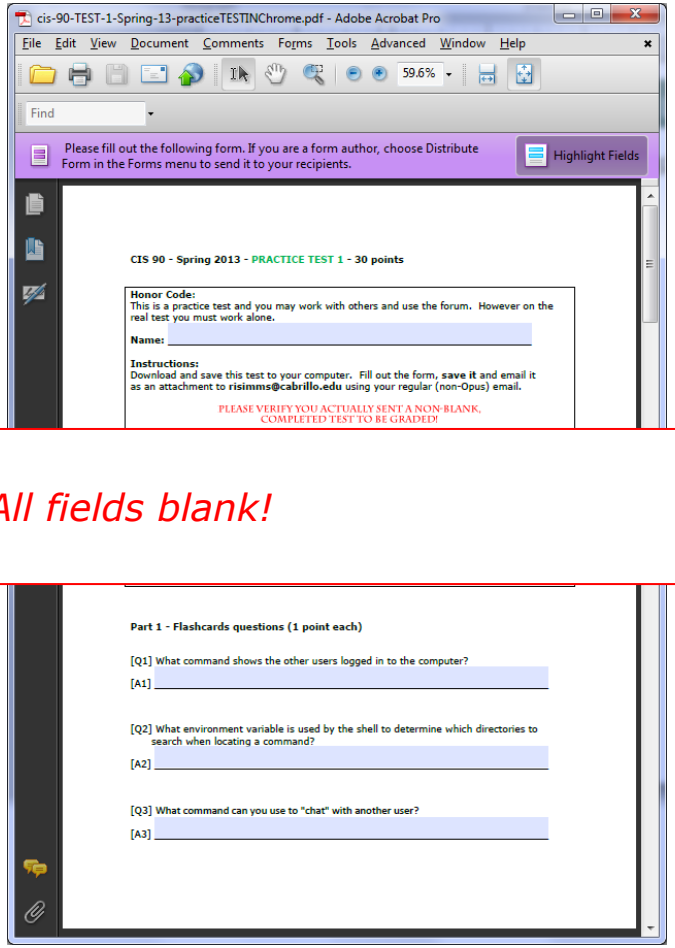
How this course works?

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

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

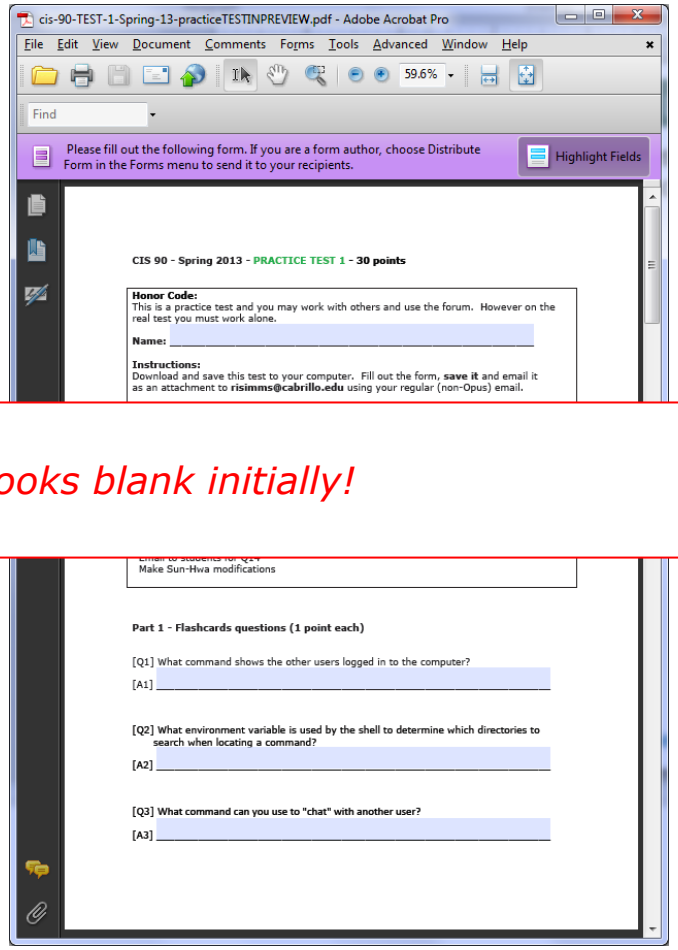
Jay's Mac testing of PDF Forms
Chrome Browser



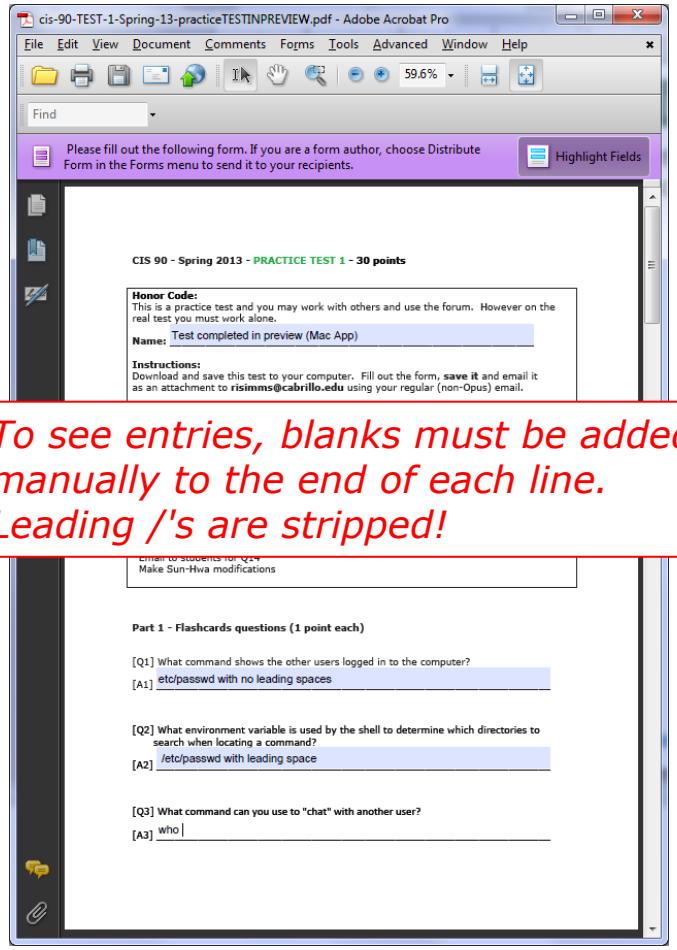
All fields blank!

Don't use the Chrome Browser to fill out your PDF test!

Jay's testing of PDF Forms
Mac Preview



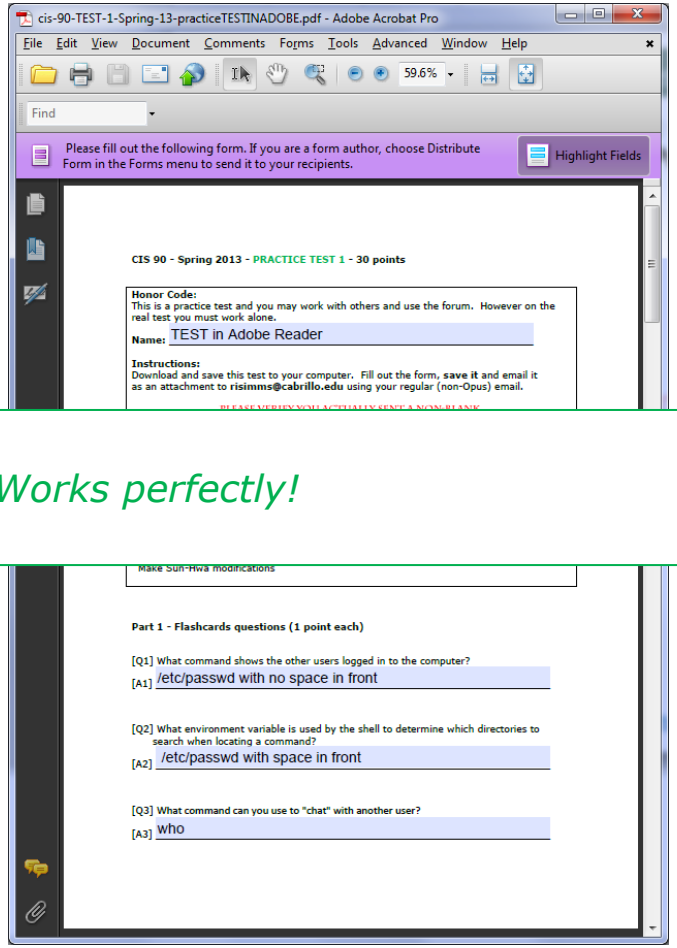
Looks blank initially!



To see entries, blanks must be added manually to the end of each line. Leading /'s are stripped!

Don't use the Mac Preview to fill out your PDF test!

Jay's Mac testing of PDF Forms
Adobe Reader



Works perfectly!

Always use Adobe Reader to fill out your tests

Foxit Reader also works!

Use Adobe or Foxit Reader to fill out your PDF test!

Test 1 – Results

Missed Q27 = 19
Missed Q16 = 15
Missed Q33 = 14
Missed Q23 = 13
Missed Q20 = 13
Missed Q31 = 12
Missed Q29 = 12
Missed Q12 = 12
Missed Q17 = 11
Missed Q32 = 10
Missed Q26 = 10
Missed Q21 = 10
Missed Q18 = 10
Missed Q14 = 10
Missed Q8 = 9
Missed Q30 = 8

Missed Q19 = 8
Missed Q25 = 7
Missed Q11 = 7
Missed Q5 = 6
Missed Q3 = 6
Missed Q22 = 6
Missed Q28 = 5
Missed Q24 = 5
Missed Q9 = 4
Missed Q7 = 4
Missed Q1 = 4
Missed Q6 = 3
Missed Q4 = 3
Missed Q13 = 3
Missed Q10 = 2
Missed Q2 = 1
Missed Q15 = 0

29 tests submitted

4 tests not submitted

Correct answers are in /home/cis90/answers

[Q27] What is the inode number of the file */bin/mail* is linked to?

Correct answer:

394189

One way to answer it (lesson 4):

```
/home/cis90/simben $ ls -li /bin/mail
394597 lrwxrwxrwx. 1 root root 5 Jun 19  2012 /bin/mail -> mailx

/home/cis90/simben $ ls -li /bin/mailx
394189 -rwxr-xr-x. 1 root root 375252 Aug 22  2010 /bin/mailx
/home/cis90/simben $
```

[Q16] From your home directory, using a relative pathname and single filename expansion metacharacter, what command would print the first line of all *sonnet5* files belonging to students enrolled in CIS 90?

Correct answer:

head -n1 ../*/Poems/Shakespeare/sonnet5

To check answer (lesson 4):

```
/home/cis90/simben $ head -n1 ../*/Poems/Shakespeare/sonnet5
==> ../adasha/Poems/Shakespeare/sonnet5 <==
Those hours that with gentle work did frame
< snipped >
==> ../wootyl/Poems/Shakespeare/sonnet5 <==
Those hours that with gentle work did frame

==> ../zamhum/Poems/Shakespeare/sonnet5 <==
Those hours that with gentle work did frame
/home/cis90/simben $
```

[Q33] On Sun-Hwa-II, which shell program will be started for user sawyer (uid=1235) when that user logs into Sun-Hwa-II?

Correct answer: /bin/csh

One way to answer (lesson 2):

```
Benji-on-sun-hwa-ii ~ ==> cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
< snipped >
cis90:x:1234:1234:CIS 90 student:/home/cis90:/bin/bash
sawyer:x:1235:1235:James Ford:/home/sawyer:/bin/csh
kate:x:1236:1236:Kate Austen:/home/kate:/bin/sh
hugo:x:1237:1237:Hugo Reyes:/home/hugo:/bin/ksh
igneous:x:1238:1238:Igneous Rocks:/home/igneous:/bin/bash
sedimentary:x:1239:1239:Sedimentary Rocks:/home/sedimentary:/bin/bash
romeo:x:1240:1240:Romeo, son of Montague:/home/romeo:/bin/bash
juliet:x:1241:1241:Juliet, daughter of Capulet:/home/juliet:/bin/bash
jimg:x:752:1242:Jim Griffin:/home/jimg:/bin/bash
ntp:x:38:38::/etc/ntp:/sbin/nologin
Benji-on-sun-hwa-ii ~ ==>
```

[Q23] When the **head /usr/bin/[lady]*deb*** command is issued on Opus, what is the third argument the shell passes to the **head** command to process?

Correct answer:

/usr/bin/yum-debug-restore

One way to answer (lesson 4):

```
/home/cis90/simben $ echo /usr/bin/[lady]*deb*
/usr/bin/abrt-action-install-debuginfo /usr/bin/yum-debug-dump
/usr/bin/yum-debug-restore
/home/cis90/simben $
```

[Q20] Which files in the */boot* directory on Opus are Linux kernels?

Correct answer:

vmlinuz-2.6.32-220.23.1.el6.i686 , vmlinuz-2.6.32-71.el6.i686

One way to answer (lesson 2):

```
/home/cis90/simben $ file /boot/*
/boot/config-2.6.32-220.23.1.el6.i686:        ASCII English text
/boot/config-2.6.32-71.el6.i686:              ASCII English text
/boot/efi:                                    directory
/boot/grub:                                   directory
< snipped >
/boot/System.map-2.6.32-71.el6.i686:          ASCII text
/boot/vmlinuz-2.6.32-220.23.1.el6.i686:       Linux kernel x86 boot
executable bzImage, version  2.6.32-220.23.1.el6.i686 (mockb, RO-rootFS,
swap_dev 0x3, Normal VGA
/boot/vmlinuz-2.6.32-71.el6.i686:             Linux kernel x86 boot
executable bzImage, version  2.6.32-71.el6.i686 (mockbuild@c, RO-rootFS,
swap_dev 0x3, Normal VGA
/home/cis90/simben $
```

[Q31] Back on Sun-Hwa-II, the uname command has been compromised by forces on the island! What single command can you issue to fix this annoying behavior so you don't have to type name of the command backwards for it to work?

Correct answer:

PATH=/bin

One way to answer (lesson 2):

```
Benji-on-sun-hwa-ii ~ ==> type uname
uname is /etc/.trouble/bin/T1/uname
Benji-on-sun-hwa-ii ~ ==> file /etc/.trouble/bin/T1/uname
/etc/.trouble/bin/T1/uname: Bourne-Again shell script, ASCII
text executable
Benji-on-sun-hwa-ii ~ ==> echo $PATH
/etc/.trouble/bin/T1/:/usr/local/bin:/bin:/usr/bin:/usr/local/sb
in:/usr/sbin:/home/CISLAB/simben90/.local/bin:/home/CISLAB/simbe
n90/bin
Benji-on-sun-hwa-ii ~ ==> PATH=/bin
Benji-on-sun-hwa-ii ~ ==> uname
Linux
```

[Q29] Which distribution of Linux is being run on Opus?

Correct answer:

CentOS

One way to answer (lesson 1)

```
/home/cis90/simben $ cat /etc/issue
CentOS release 6.2 (Final)
Kernel \r on \l

/home/cis90/simben $
```

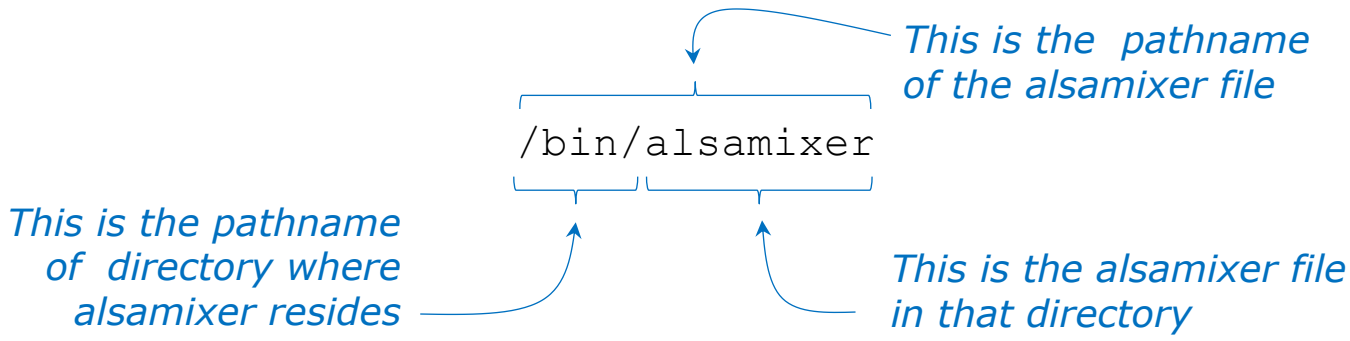
[Q12] On Sun-Hwa-II, what is the absolute pathname of the directory where the **alsamixer** command resides?

Correct answer:

/bin

One way to answer (lesson 2):

```
Benji-on-sun-hwa-ii ~ ==> type alsamixer
alsamixer is /bin/alsamixer
```



[Q17] Starting in */u* and descending down to the deepest sub-folder, what is name of the file whose inode is 394684?

Correct answer:

.Lion

One way to answer (lesson 4)

```
/u/r/far/away/in/the/land/of/oz $ ls /u
krb  money  named.conf  notes  ntab  ntp  r  update
```

(r is a sub-directory)

```
/home/cis90/simben $ cd /u/r/far/away/in/the/land/of/oz/
/u/r/far/away/in/the/land/of/oz $ ls -i *
394146 dorothy  394148 toto
```

(use tab completes)

```
/u/r/far/away/in/the/land/of/oz $ ls -id .*
394142 .  394141 ..  394684 .Lion  394283 .Scarecrow  394263 .TinMan
```

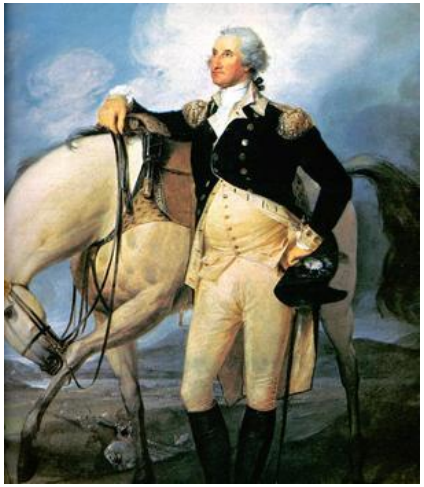
(check hidden files too)

[Q9] 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

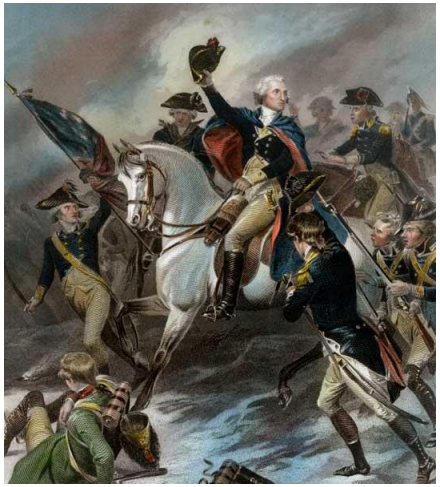
To check your answer (lesson 4)

```
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

What other test questions would you like to better understand?

In case you encounter them again on a future test! [muhaha]

Housekeeping

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

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

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

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

5) For long forum posts showing session outputs, use the code tags.

6) You can subscribe to the forum to be notified of new posts.

Perkins/VTEA Survey
Last Chance

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"

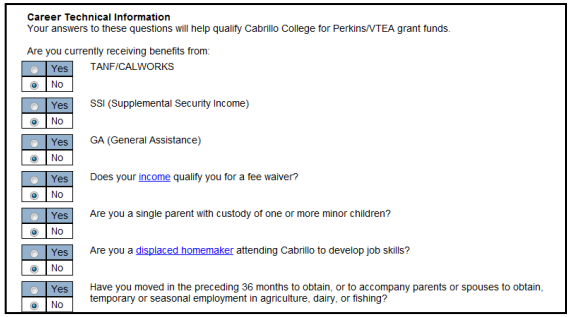
Then "LOG OUT"

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!***



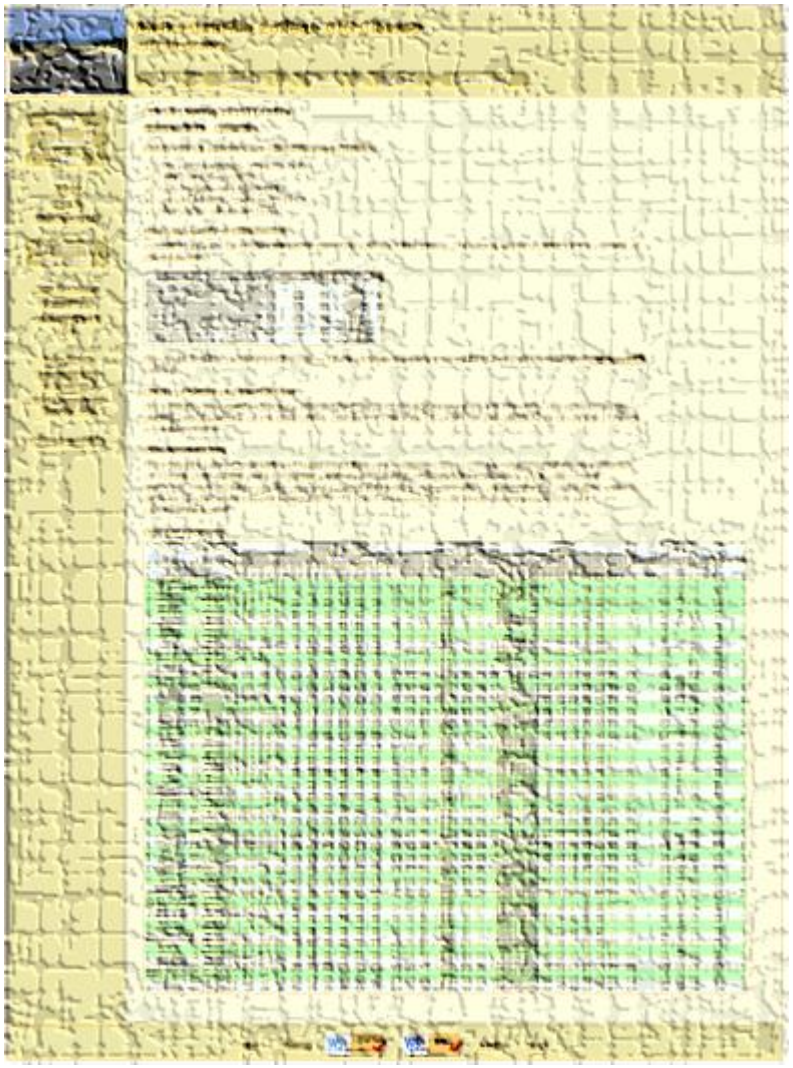
Career Technical Information
Your answers to these questions will help qualify Cabrillo College for Perkins/VTEA grant funds.

Are you currently receiving benefits from:

○ Yes ◉ 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.cabrillo.edu/forum/viewtopic.php?f=88&t=2285

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 10/11/2013

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

adaldrida: 101% (184 of 182 points)
anborn: 0% (0 of 182 points)
aragorn: 98% (180 of 182 points)
arwen: 76% (139 of 182 points)
balrog: 51% (94 of 182 points)
barliman: 2% (4 of 182 points)
beregond: 71% (130 of 182 points)
boromir: 4% (8 of 182 points)
celebrian: 76% (140 of 182 points)
dori: 80% (146 of 182 points)
dwalin: 91% (167 of 182 points)
elrond: 97% (178 of 182 points)
eomer: 81% (148 of 182 points)
faramir: 102% (187 of 182 points)
frodo: 96% (175 of 182 points)
gimli: 97% (177 of 182 points)
goldberry: 108% (198 of 182 points)
huan: 46% (85 of 182 points)
ingold: 100% (183 of 182 points)
ioreth: 70% (128 of 182 points)
legolas: 65% (119 of 182 points)
marhari: 101% (184 of 182 points)
pallando: 105% (192 of 182 points)
pippen: 98% (180 of 182 points)
quickbeam: 54% (99 of 182 points)
samwise: 79% (144 of 182 points)
sauron: 102% (187 of 182 points)
shadowfax: 60% (110 of 182 points)
strider: 85% (155 of 182 points)
theoden: 102% (186 of 182 points)
treebeard: 87% (160 of 182 points)
tulkas: 100% (182 of 182 points)
ulmo: 61% (112 of 182 points)

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.

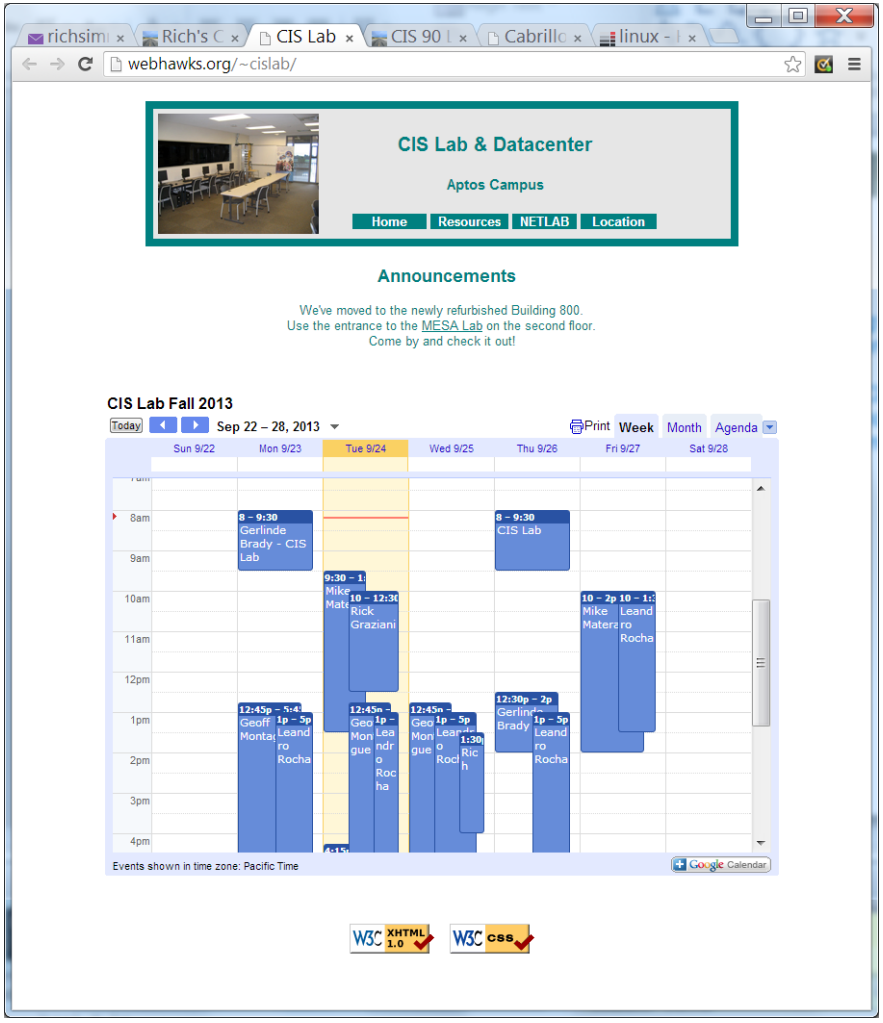
Lab 1: You earned 30 points out of a possible 30.
Lab 2: You earned 30 points out of a possible 30.
Lab 3: You earned 30 points out of a possible 30.
Lab 4: You earned 29 points out of a possible 30.


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.



CIS Lab Schedule
http://webhawks.org/~cislab/

Work on assignments together with other classmates

Get help from instructors and student lab assistants

MESA grant funding requires student assistants to log everyone they help.

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

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
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
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-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)*

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
drwxrwxr-x. 2 simben90 cis90    4096 Oct  5 10:30 edits
drwxrwxr-x. 2 simben90 cis90    4096 Oct  5 10:41 etc
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-r--------. 1 simben90 staff    2780 Sep  6 13:47 lab01.graded
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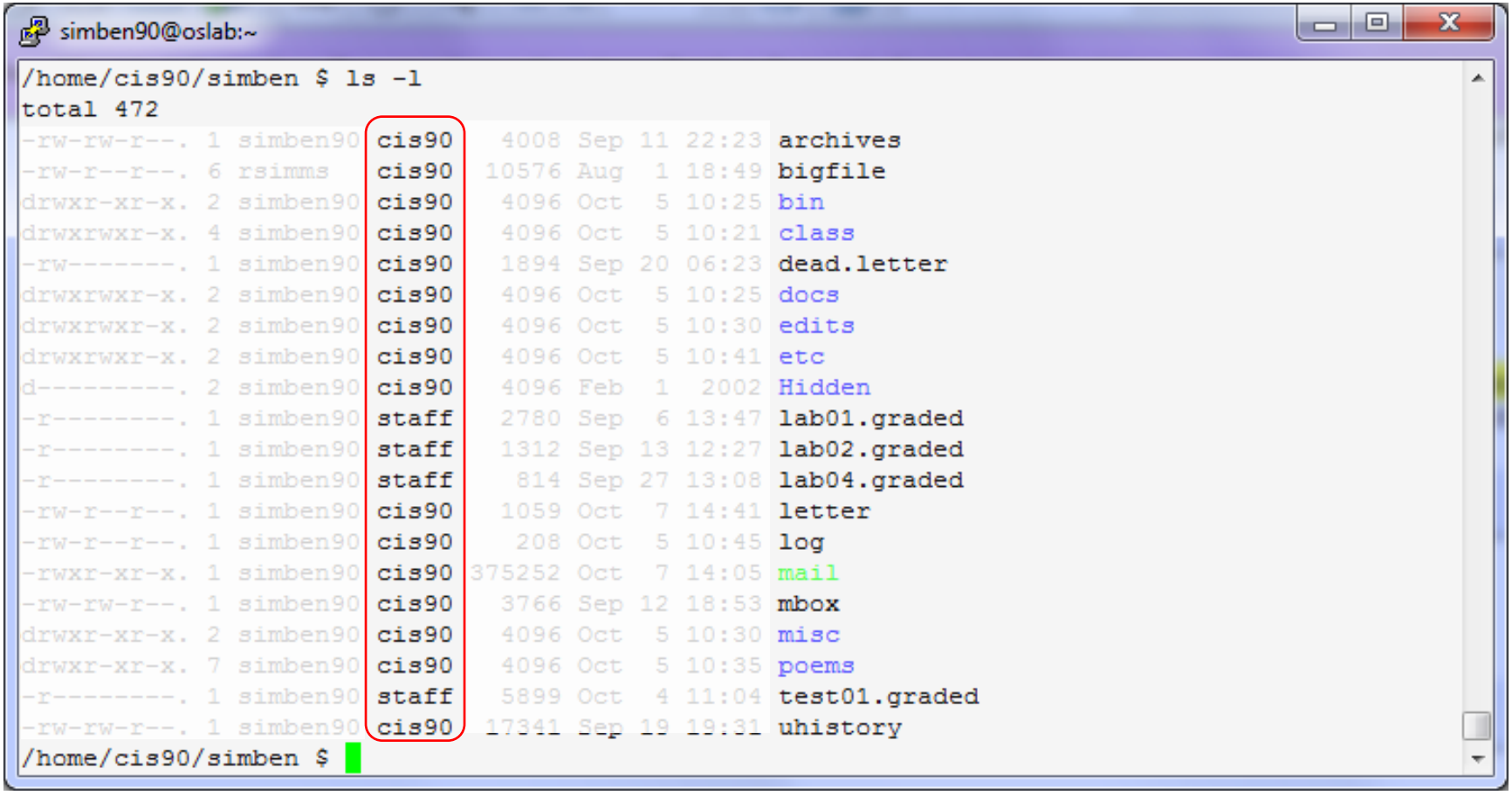
-r--------. 1 simben90 staff     814 Sep 27 13:08 lab04.graded
-rw-r--r--. 1 simben90 cis90    1059 Oct  7 14:41 letter
-rw-r--r--. 1 simben90 cis90     208 Oct  5 10:45 log
-rwxr-xr-x. 1 simben90 cis90  375252 Oct  7 14:05 mail
-rw-rw-r--. 1 simben90 cis90    3766 Sep 12 18:53 mbox
drwxr-xr-x. 2 simben90 cis90    4096 Oct  5 10:30 misc
drwxr-xr-x. 7 simben90 cis90    4096 Oct  5 10:35 poems
-r--------. 1 simben90 staff    5899 Oct  4 11:04 test01.graded
-rw-rw-r--. 1 simben90 cis90   17341 Sep 19 19:31 uhistory
/home/cis90/simben $
```

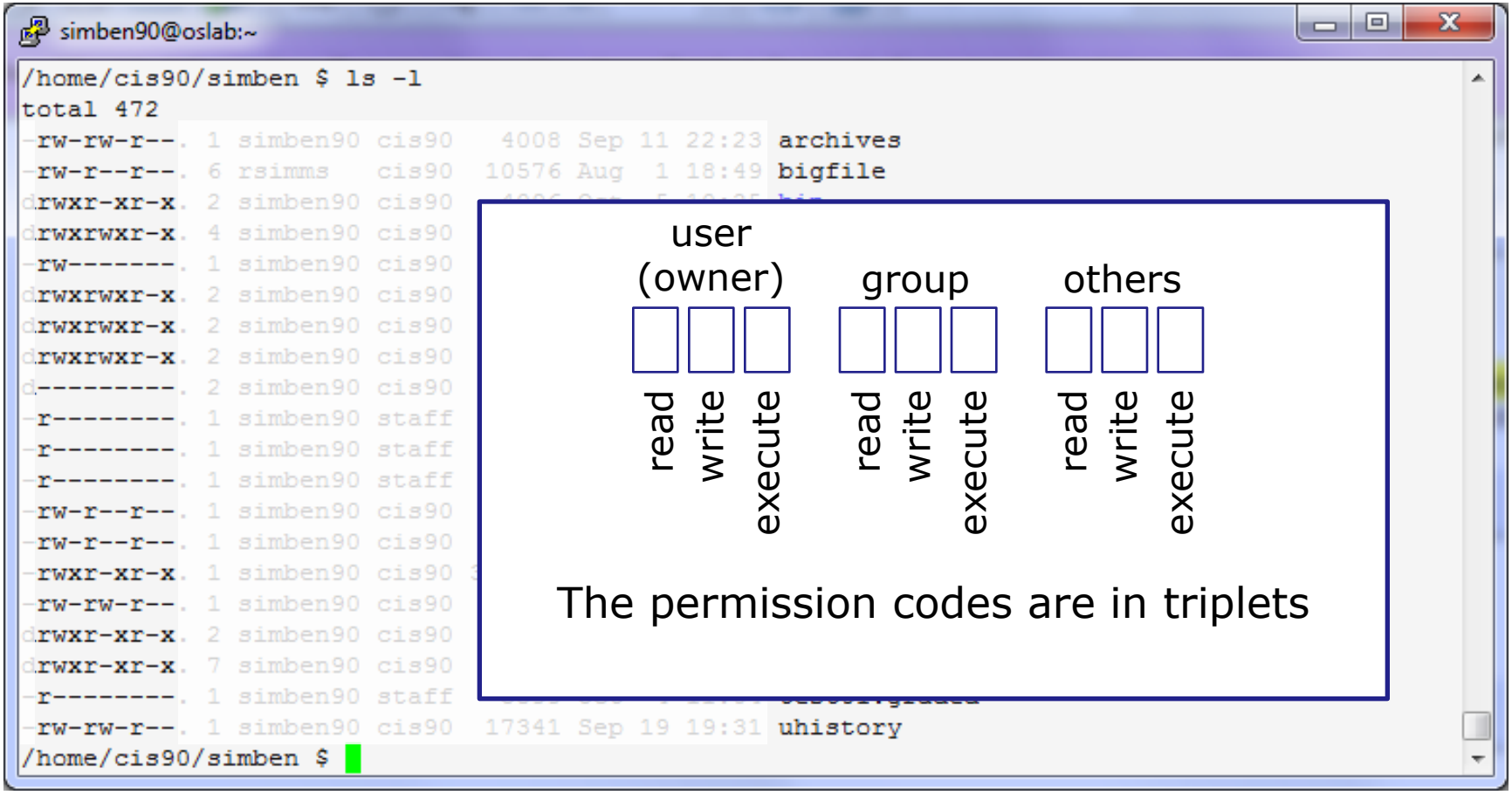
*This column shows the **username** that **owns** the file*

File Permissions



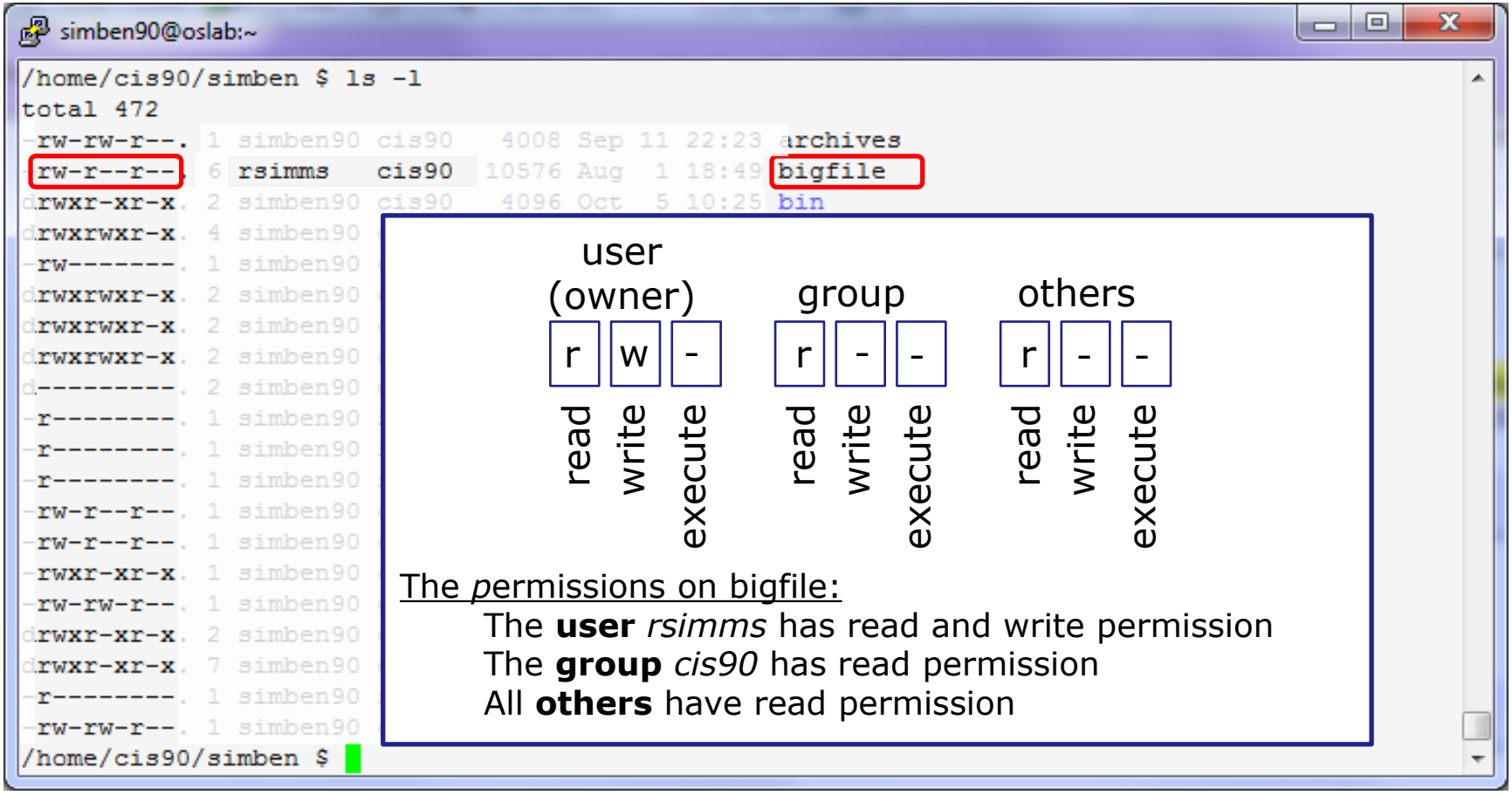
*This column shows the **group** each file belong to*

File Permissions



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

File Permissions



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 on 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 write 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
----------. 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 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---x. 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*

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

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

*simben90's primary group is **cis90***

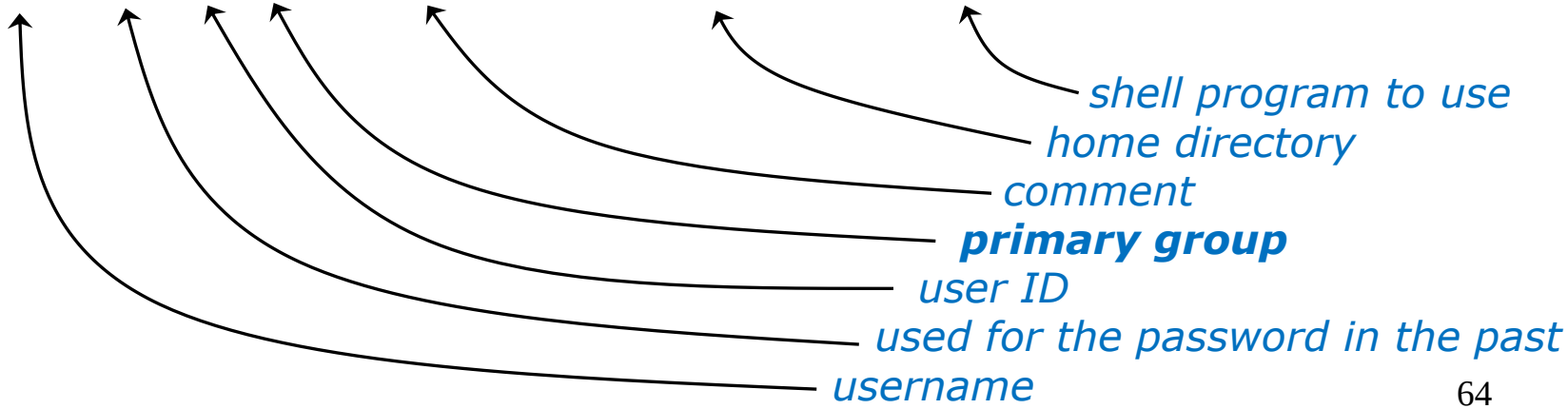
*simben90's secondary group is **users***

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: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
```



Secondary groups recorded in /etc/group

Secondary group membership is recorded in /etc/group

Excerpts from **/etc/group**

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

Activity

What is your primary group?

(Write you answer in the chat window)

Activity

What other groups do you belong to?

(Write you answer in the chat window)

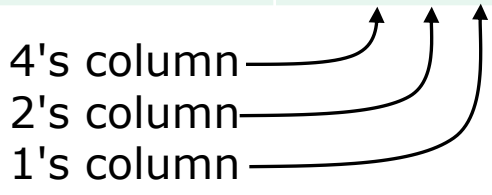
Specifying Numerical Permissions

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



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)

= 110 or 4+2+0 = 6

binary *decimal* *decimal*

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)

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

Practice converting to numerical

File Permissions

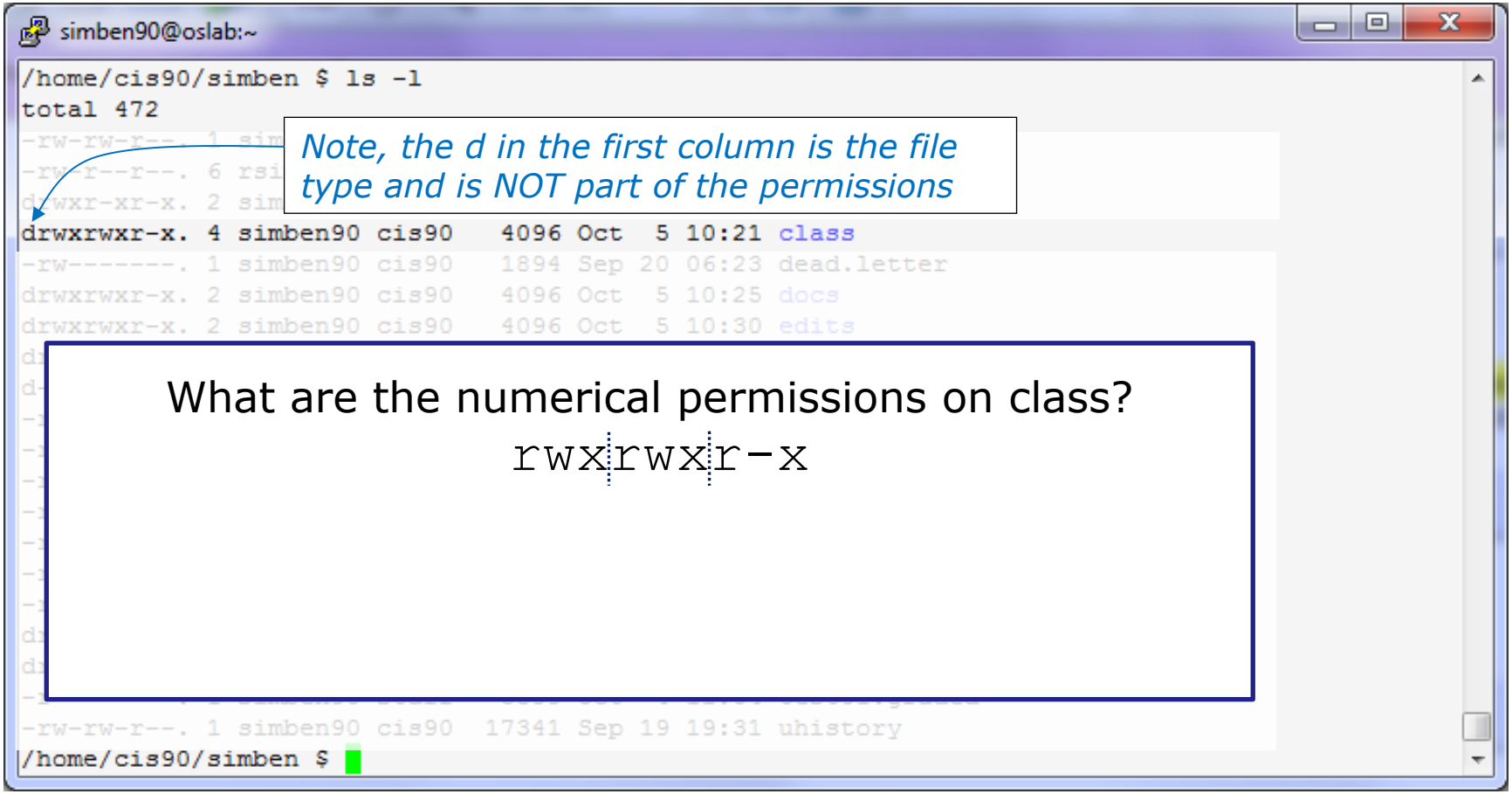
simben90@oslab:~

```
/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

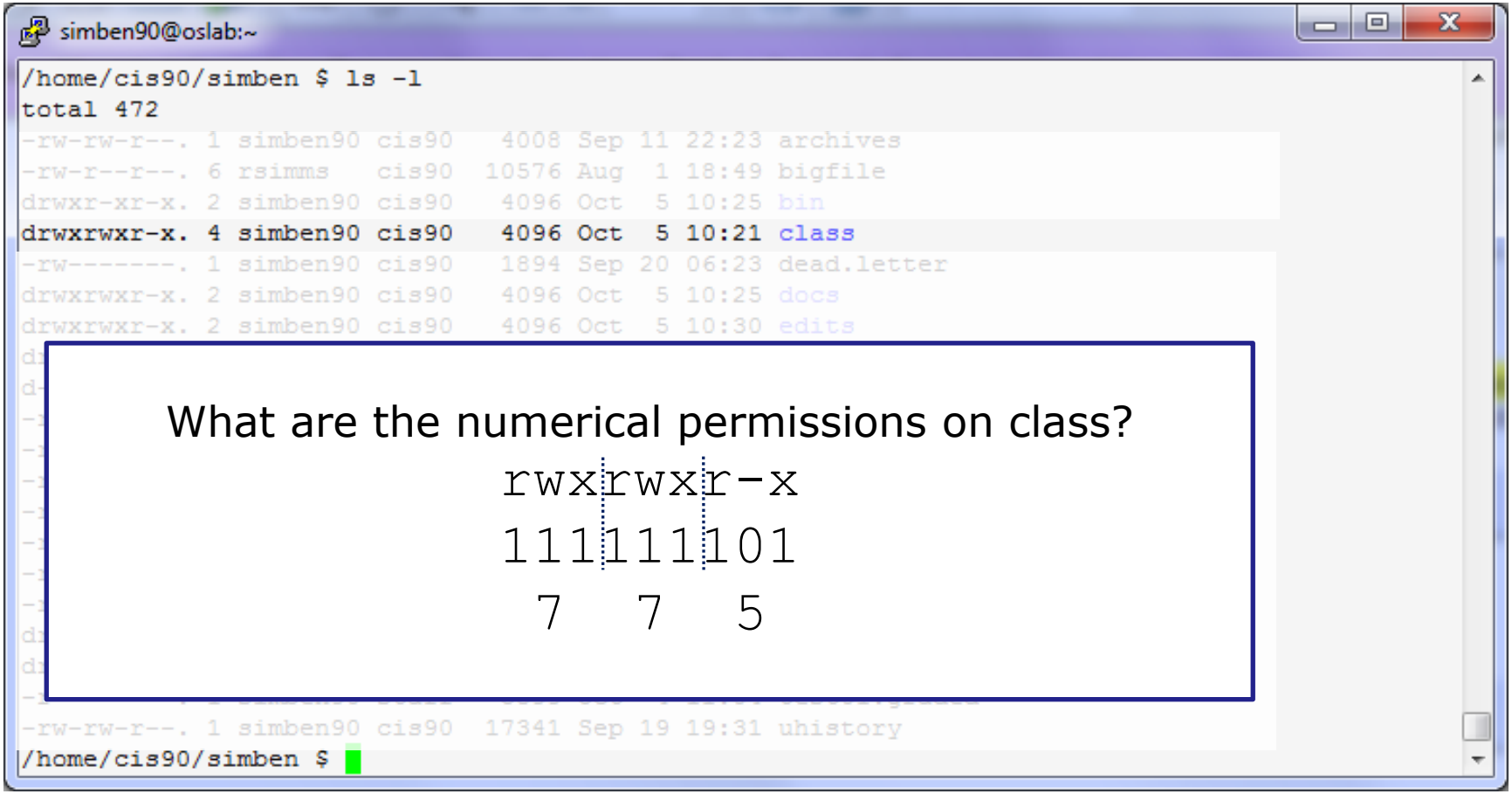
Example 1

Converting mnemonic permissions to numeric



Example 1

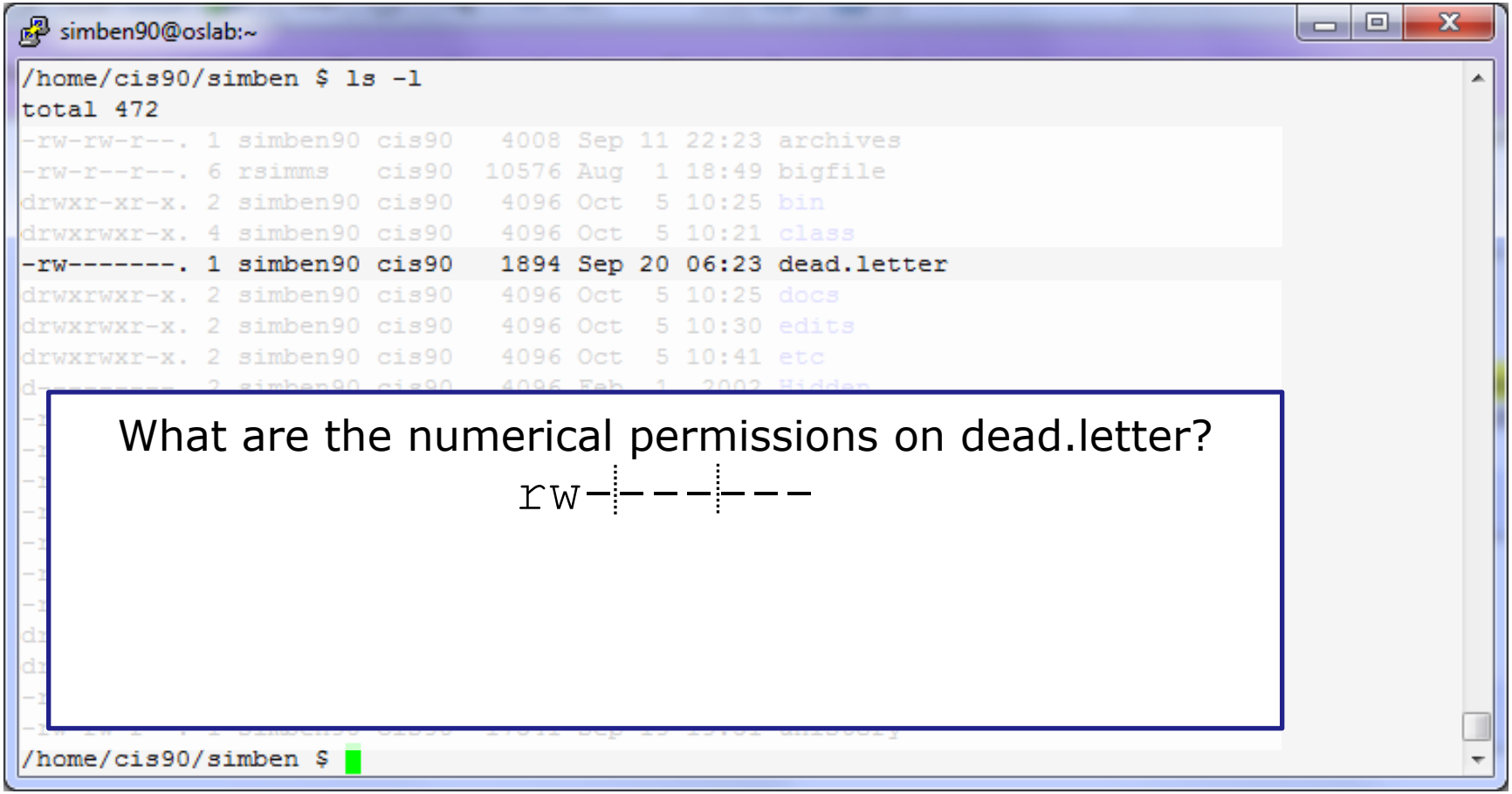
Converting mnemonic permissions to numeric



Benji's class (directory) permissions are 775

Example 2

Converting mnemonic permissions to numeric



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
/home/cis90/simben $
```

What are the numerical permissions on dead.letter?

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

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

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)

Example 3

Converting mnemonic permissions to numeric

simben90@oslab:~

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

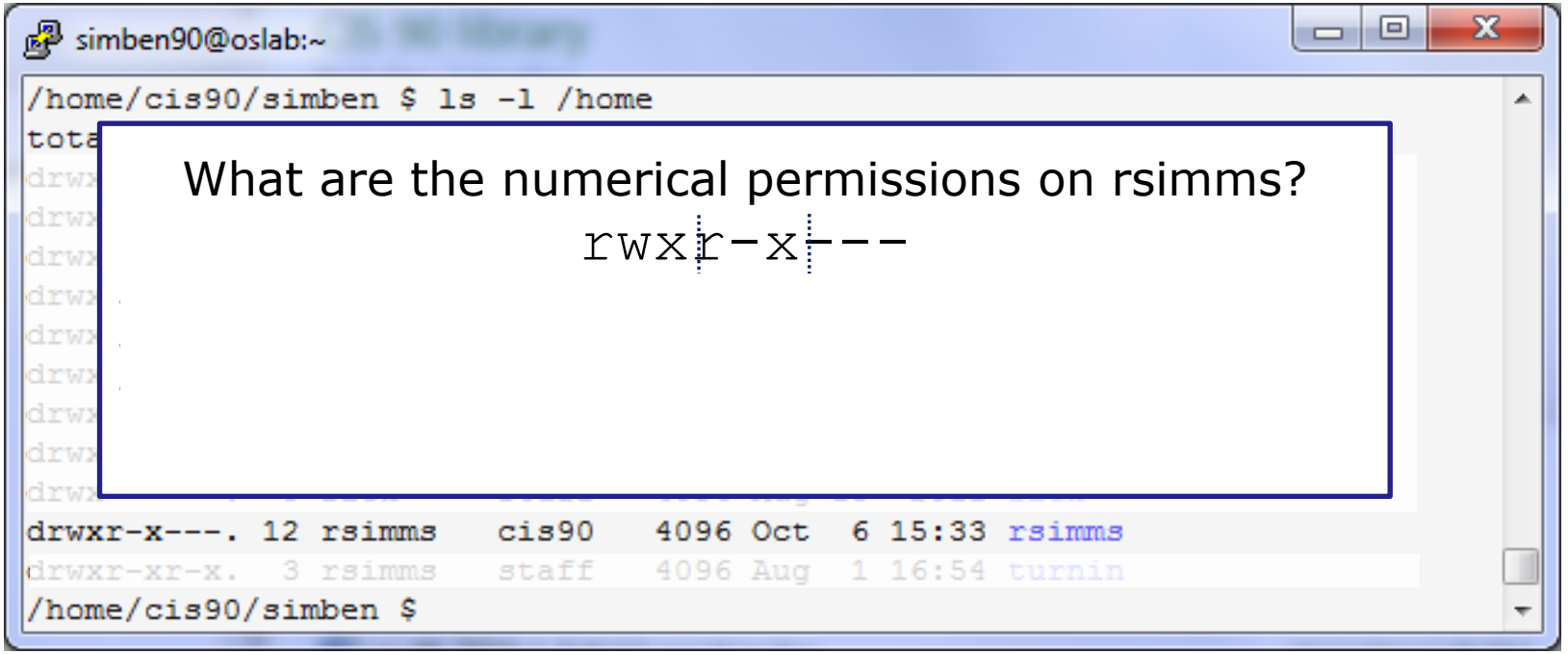
What are the numerical permissions on test01.graded?

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

Benji's test01.graded permissions are 400

Example 4

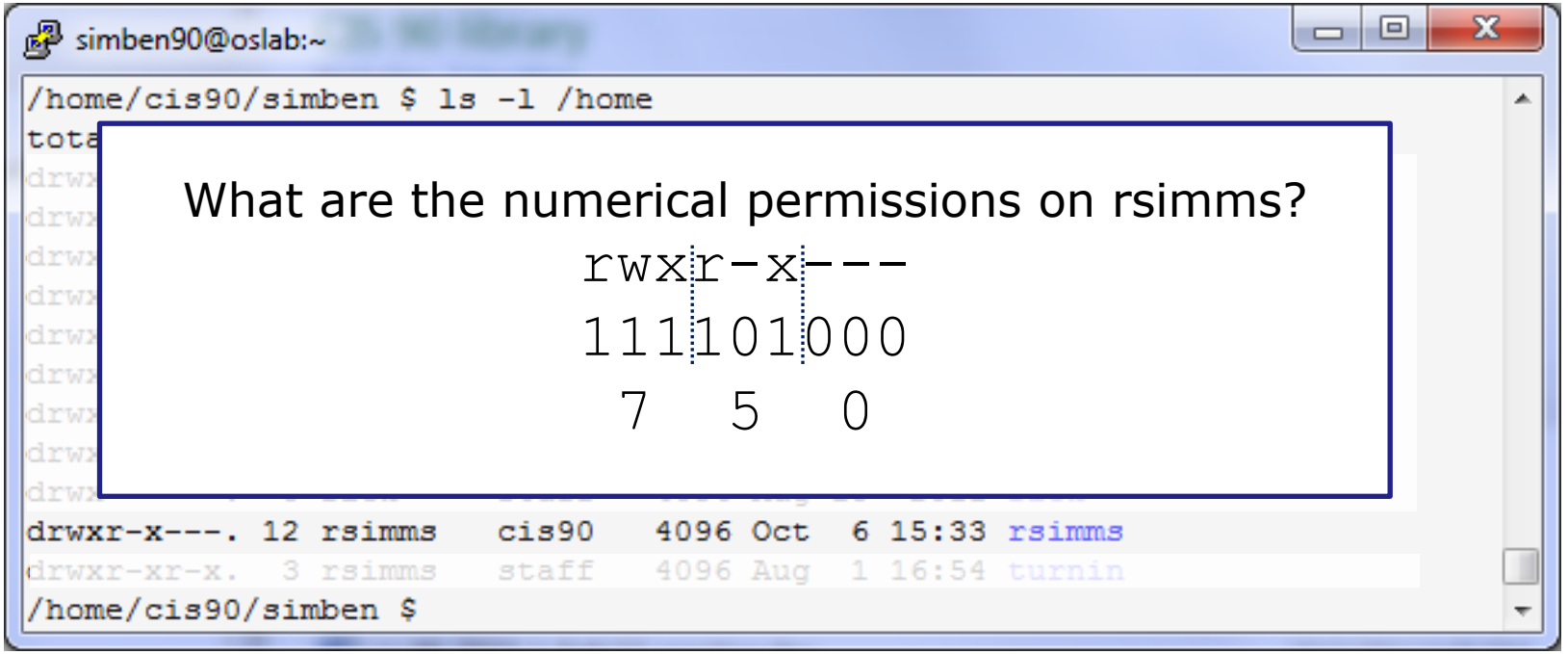
Converting mnemonic permissions to numeric



/home/rsimms (Rich's home directory)

Example 4

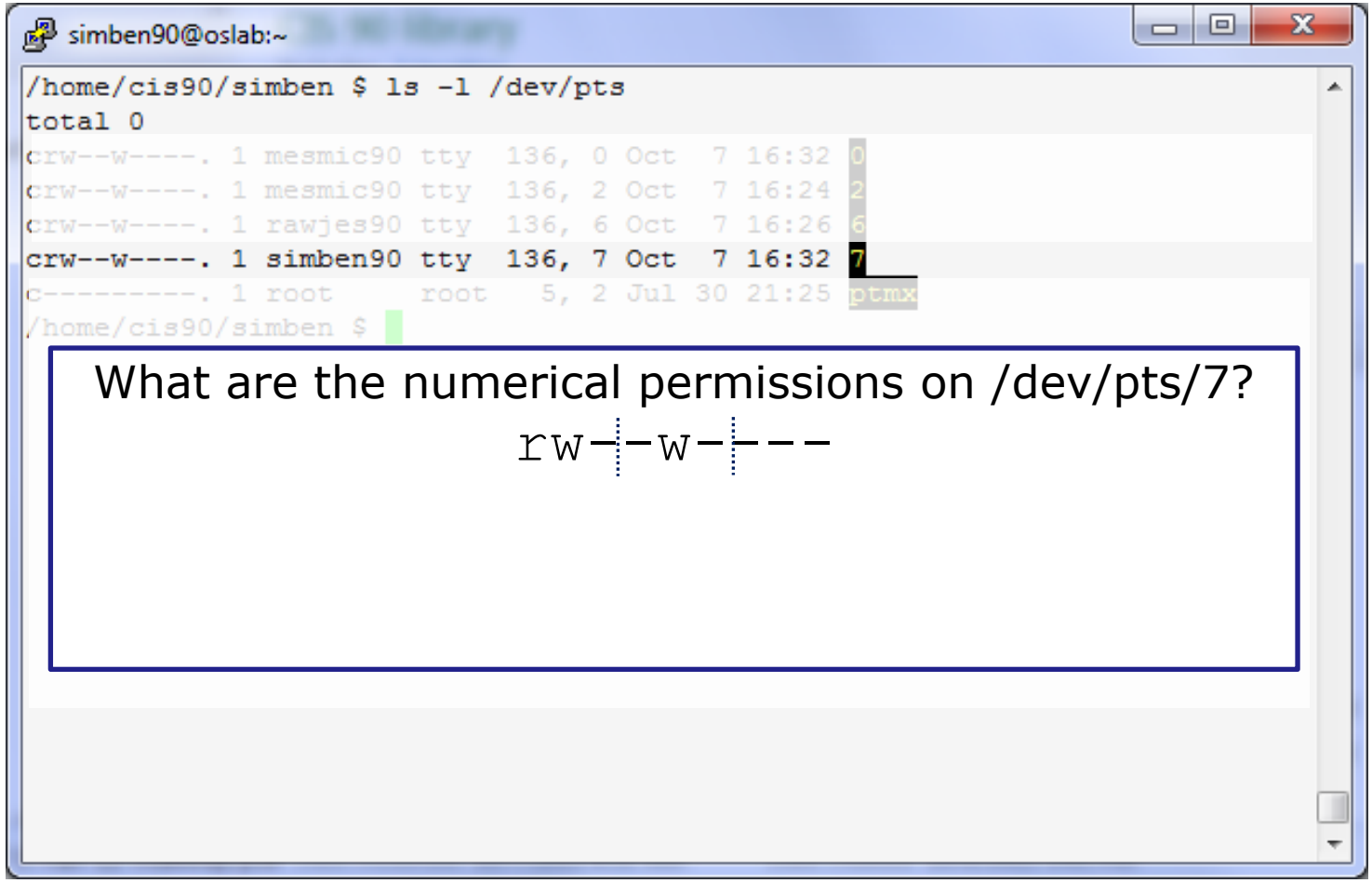
Converting mnemonic permissions to numeric



/home/rsimms permissions are 750

Example 5

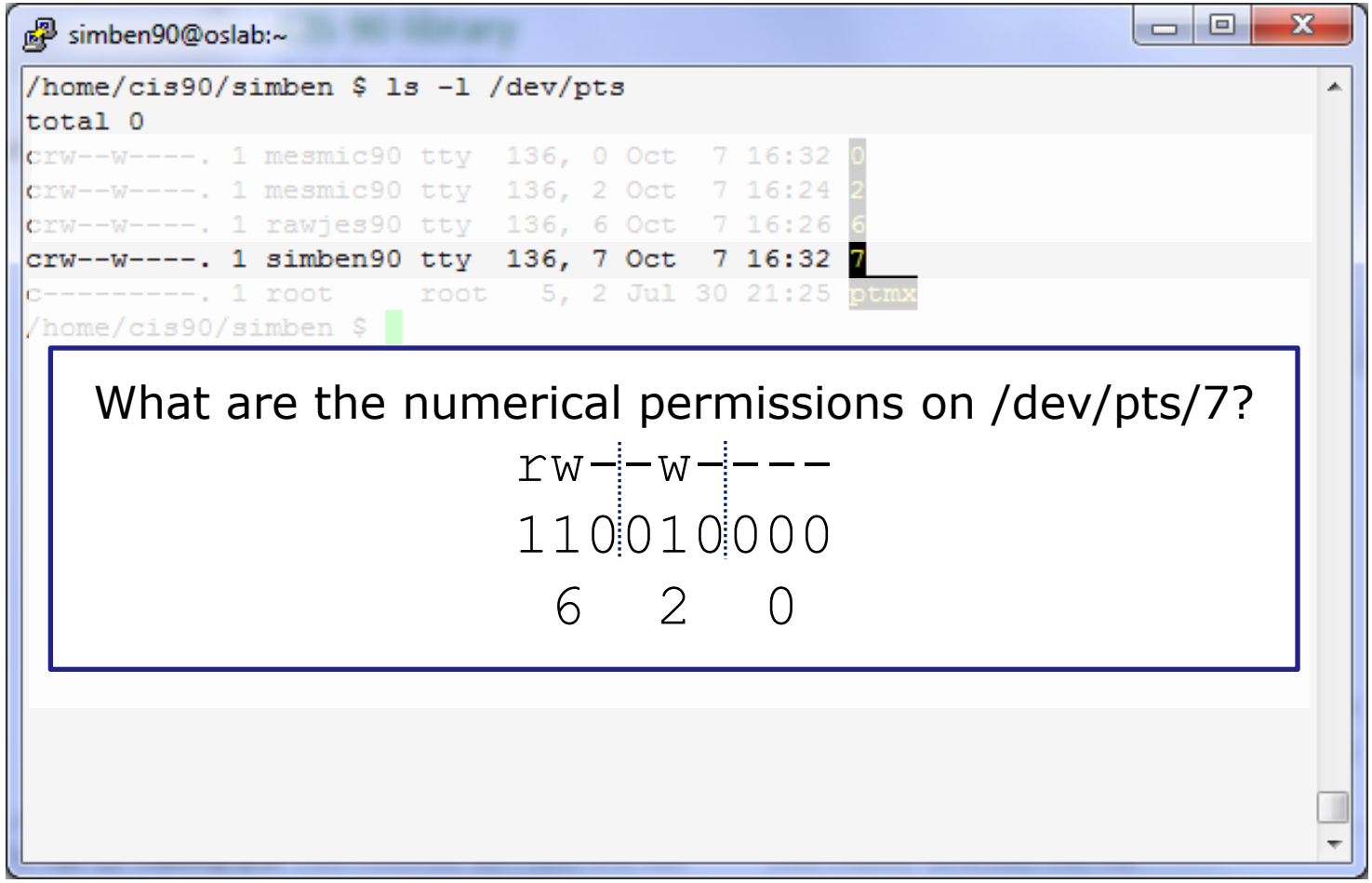
Converting mnemonic permissions to numeric



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

Example 5

Converting mnemonic permissions to numeric



/dev/pts/7 permissions are 620

Recap

File Permissions

Summary

How do we control access to files and directories?

How do we control access to files and directories?

Answer: **file permissions**

File Permissions
Summary

What permissions are there?

File Permissions
Summary

What permissions are there?

Answer: **read, write and execute**

File Permissions
Summary

Who do permissions apply to?

File Permissions
Summary

Who do permissions apply to?

Answer:

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

Letter file in detail

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
```

Permissions *Owner* *Group*

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

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

File Permissions

Relevant fields from the inode

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

Permissions *Owner* *Group*

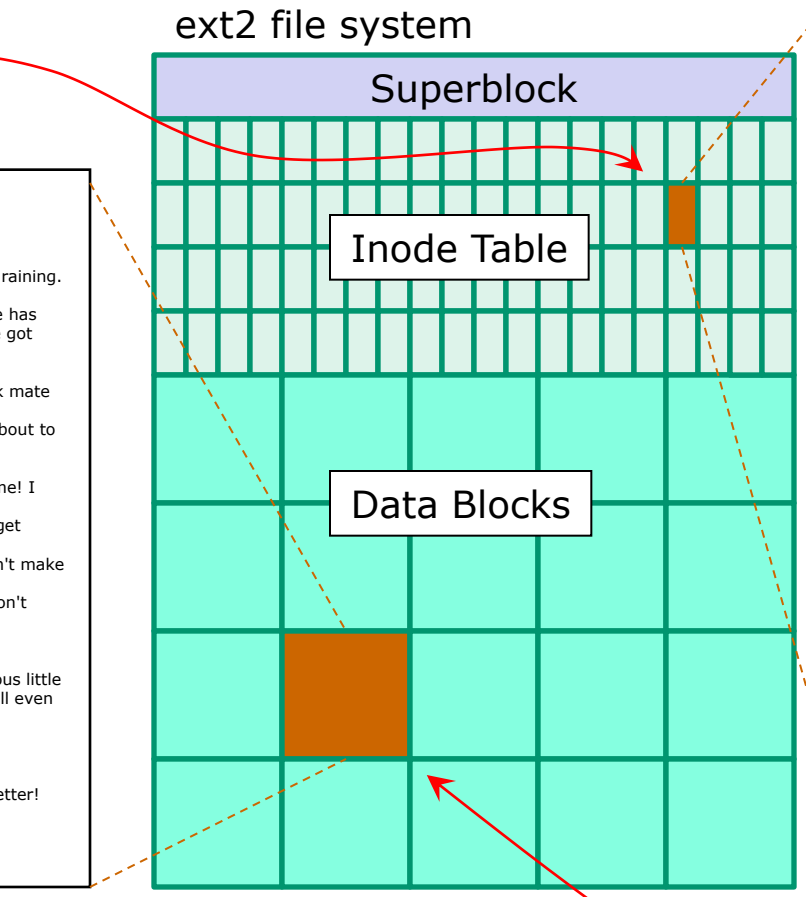
The owner of letter is simben90 and the group is cis90

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

The filename is kept in the directory

bigfile 12687
bin 12067
letter 10574

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



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

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

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

File Permissions

Example: letter file

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

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

numeric form

110100100

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

owner has read and write

group has only read

others have only read

More Practice

File Permissions

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

File Permissions

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

```
r--r-----
100100000
 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
rwx|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 `rwxrw-r--`?

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

Answer: 764

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

File Permissions

What are the mnemonic permissions are 644?

File Permissions

What are the mnemonic permissions are 644?

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

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

owner has read and write
group has read
others have read

File Permissions

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

File Permissions

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

Answer: yes

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

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

Configuring Permissions

Tools for your toolbox

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

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

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

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

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

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

chown

chown – change owner

Syntax:

chown *newowner pathname(s)*

Examples:

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

chown – change owner

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

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

Make a test file and try to change the owner

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

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

chgrp

chgrp – change group

Syntax:

chgrp *group pathname(s)*

Examples:

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

chgrp – change group

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

change group to users

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

change group back to cis90

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

You can only change the group to one you belong to

chmod

chmod – change permissions

Syntax:

chmod permissions *pathname(s)*

may be specified numerically or mnemonically

Examples:

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

numeric

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

mnemonic

chmod (mnemonic)

Mnemonic permission specifications

Relative changes to existing permissions

Examples:

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

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

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

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

uo+w = add write permission to user and others

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

Definitions:

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

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

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

Using chmod to change permissions (mnemonic)

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

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

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

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

add execute permission for user (owner)

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

add execute permission for group

Using chmod to change permissions (mnemonic)

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

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

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

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

remove execute from all

add execute to others and group

remove read, write, execute from groups and others

chmod (numerical)

chmod using numerical method

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

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

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

chmod using numerical method

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

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

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

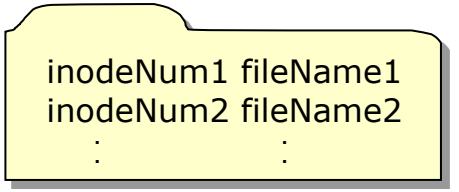
/home/cis90/milhom $ chmod 644 myfile
/home/cis90/milhom $ ls -l myfile
-rw-r--r--. 1 milhom90 cis90 0 Oct  9 10:23 myfile
```

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

File Permissions in action

File Permissions

Commands that use file permissions



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

read permission is required whenever file contents must be accessed

Read Permission

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

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

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

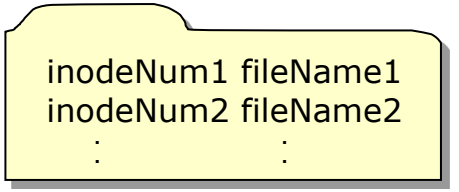
```
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
/home/cis90/simmsben/Directory3 $ cat myfile
Blah Blah Blah
/home/cis90/simmsben/Directory3 $ chmod u-r myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
--w-r--r-- 1 simmsben cis90 15 Oct 13 08:50 myfile
/home/cis90/simmsben/Directory3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

removes read permission for user owning the file

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

File Permissions

Commands that use file permissions



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

write permission is required whenever file contents are written

Write Permission

Start with a fresh version of myfile:

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

Add some data to myfile :

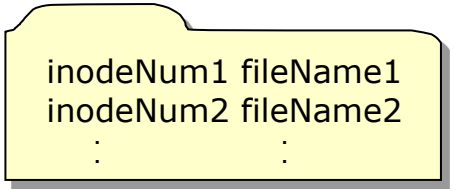
```
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
/home/cis90/simmsben/Directory3 $ chmod 444 myfile
/home/cis90/simmsben/Directory3 $ ls -l myfile
-r--r--r-- 1 simmsben cis90 15 Oct 13 09:02 myfile
/home/cis90/simmsben/Directory3 $ echo Blah Blah Blah > myfile
-bash: myfile: Permission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

write permission removed

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

File Permissions

Commands that use file permissions



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

execute permission is required to load and run a file

Execute Permission

Start with a fresh version of myfile:

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

Make a little script and give it execute permission:

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

add execute permission for all users

What happens now when you type myfile?

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

With no argument, the current umask setting is shown

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

this umask setting will strip write permission from Others

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

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

File Permissions

umask - examples

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

Change umask to 000

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

default system permissions for a file

umask setting (strips these permissions from default)

result after masking

File Permissions

umask - examples

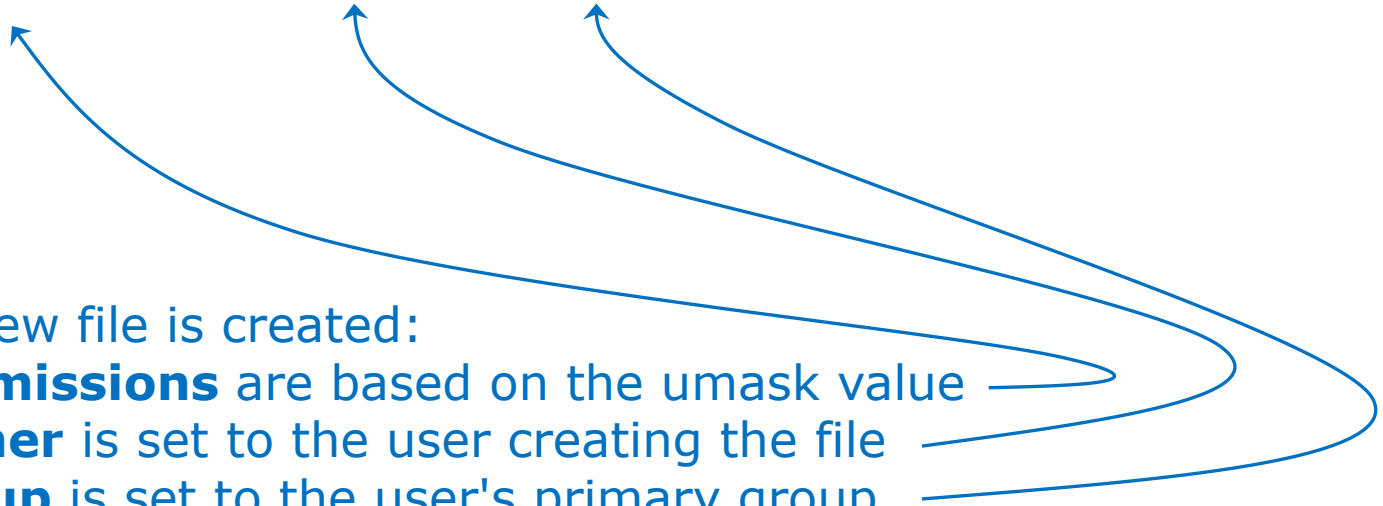
```
[simmsben@opus Directory3]$ umask 022
[simmsben@opus Directory3]$ rm myfile
[simmsben@opus Directory3]$ touch myfile
[simmsben@opus Directory3]$ ls -l
total 4
-rw-r--r-- 1 simmsben cis90 0 Oct 15 15:00 myfile
```

Change umask to 022

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

When new files are created

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

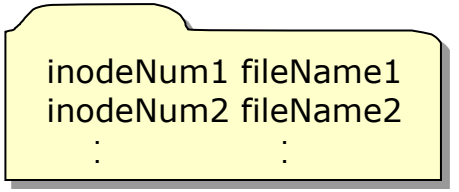


When a new file is created:

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

The effect of permissions when removing files

Directory Write Permission



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

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

Directory with no write permission

example 1

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

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

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

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

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

Benji has read and write permission on myfile

Benji (and everyone else) has all permissions.

So why can't Benji remove his own file?

Answer:

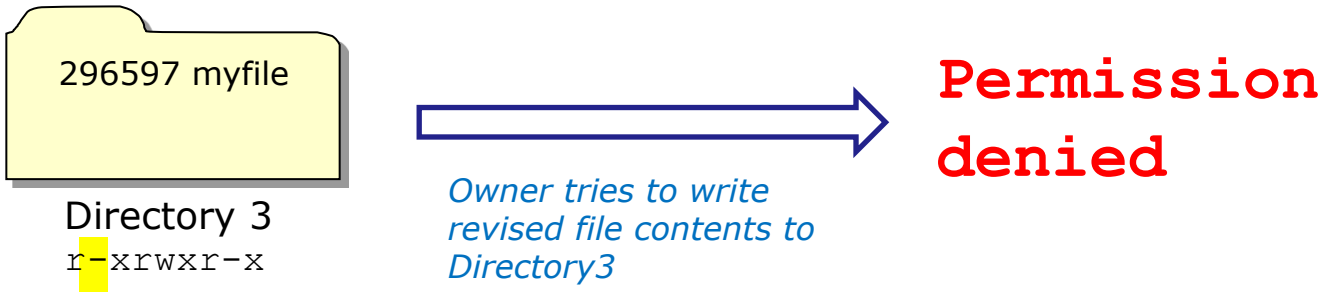
Removing a file requires write permission on the directory containing the file.

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

The permissions on the file being removed do not apply!

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

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



Directory with write permission
example 2

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

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

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

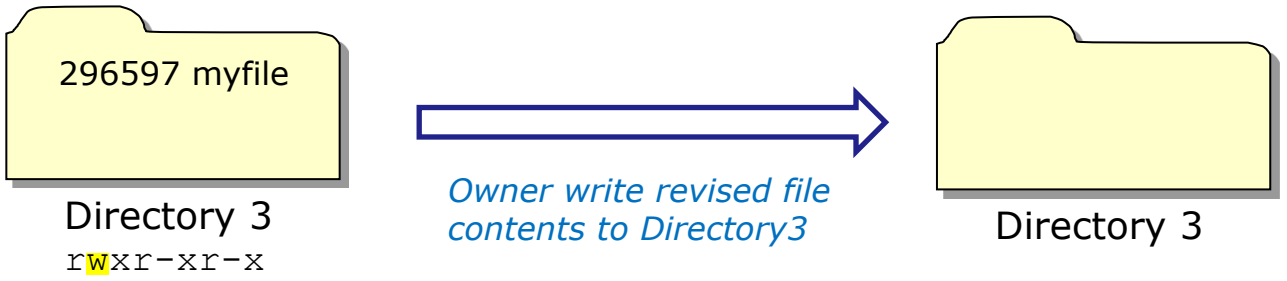
Now Benji has no permissions on this file

So how come he can delete it?

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

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

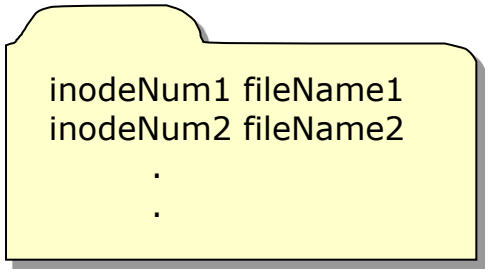
With write permission, Benji can remove any of the files from this directory … even the ones he does not have read & write permission for.



Directory Permissions

Directory Read Permission

rwx



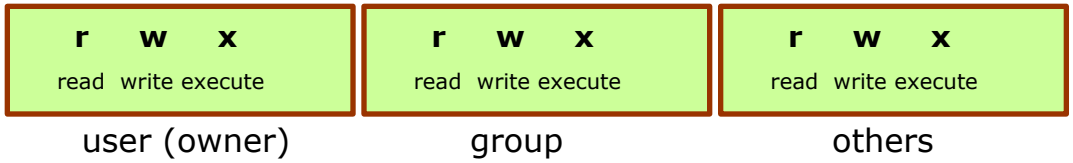
rwx

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

Removing directory READ permission

- can't list files in directory

Directory Read Permission



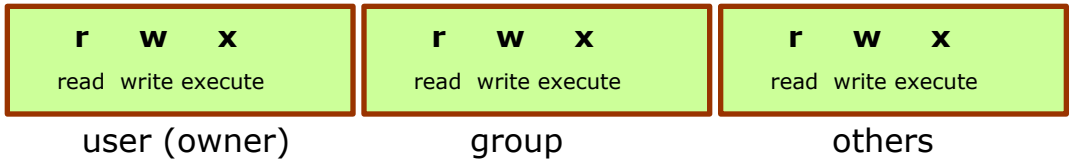
Start with normal directory permissions:

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

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

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

Directory Read Permission



Remove read permission and confirm it's gone

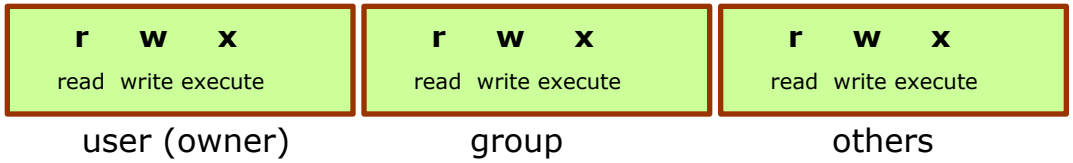
```
/home/cis90/roddyduk $ chmod u-r examples
/home/cis90/roddyduk $ ls -ld examples
d-wxrwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples
```

Can we still list the directory contents?

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

NO!

Directory Read Permission



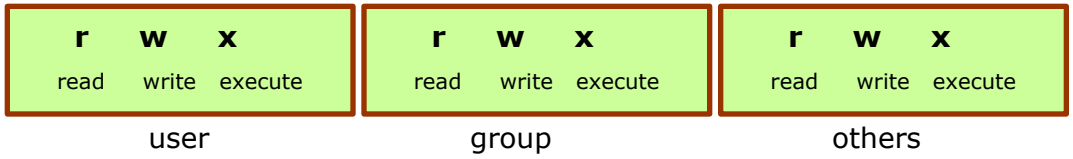
Start with normal directory permissions:

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

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

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

Directory Read Permission



Remove read permission and confirm it's gone

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

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

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

Yes, but ...

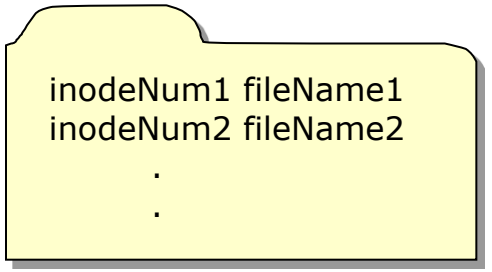
- *we still can't list the contents,*
- *yet we can still access anything in the directory!*

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

The effect of WRITE permission on directories

Directory Write Permission

rwx



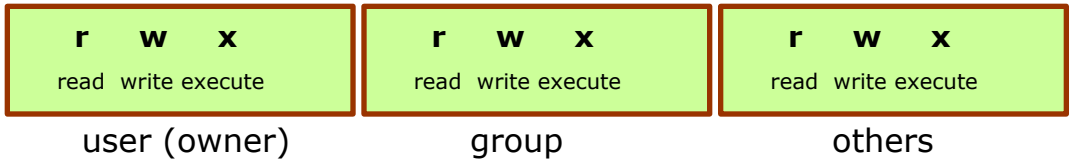
rwx

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

Removing directory WRITE permission

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

Directory Write Permission



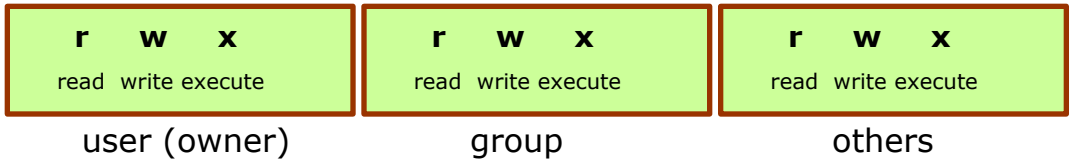
Start with normal directory permissions:

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

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

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

Directory Write Permission



Remove write permission and confirm it's gone

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

Can we remove files from the directory?

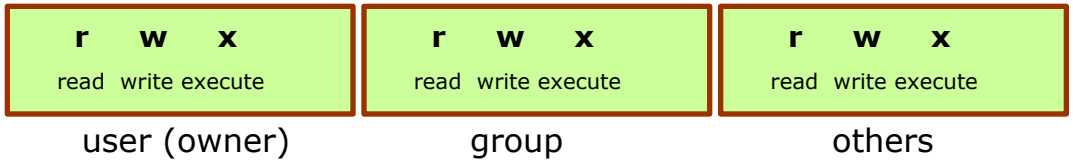
```
/home/cis90/roddyduk/examples $ rmdir dogs
rmdir: dogs: Permission denied
```

NO!

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

Yet we can still cd into and list directory contents

Directory Write Permission



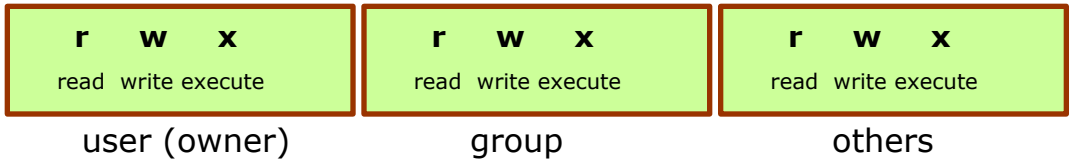
Start with normal directory permissions:

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

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

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

Directory Write Permission



Remove write permission and confirm it's gone

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

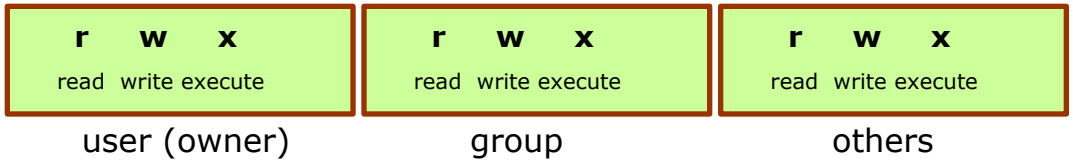
Can we create new files or copy/move files into the directory?

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

NO!

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

Directory Write Permission



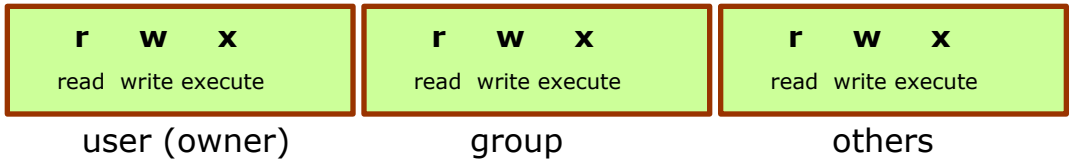
Start with normal directory permissions:

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

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

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

Directory Write Permission



Remove write permission and confirm it's gone

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

Can we move files out of the directory?

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

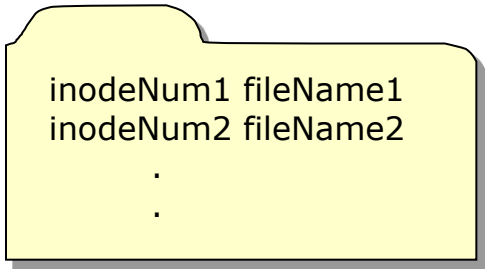
NO!

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



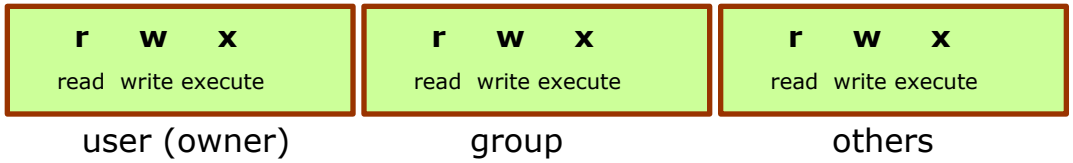
rwx

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



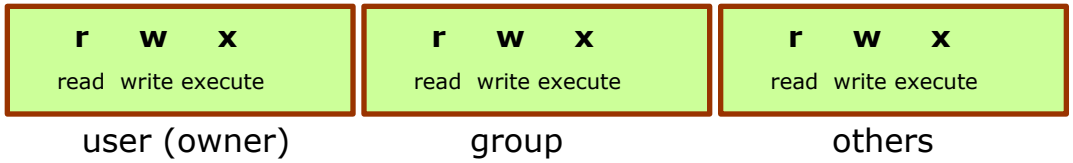
Start with normal directory permissions:

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

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

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

Directory Execute Permission



Remove execute permission and confirm it's gone

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

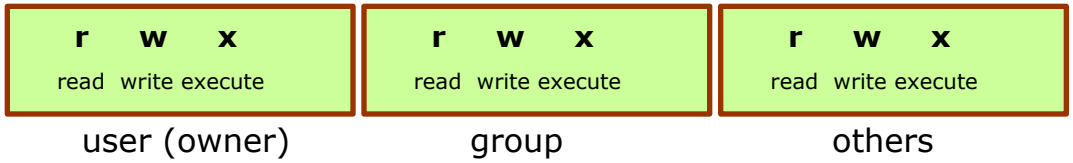
Can we change into (cd) the directory?

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

NO!

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

Directory Execute Permission



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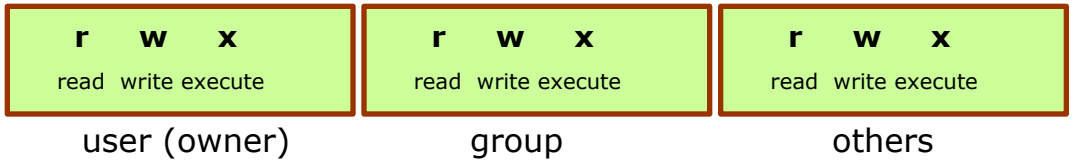
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

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

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

Directory Execute Permission



Remove execute permission and confirm it's gone

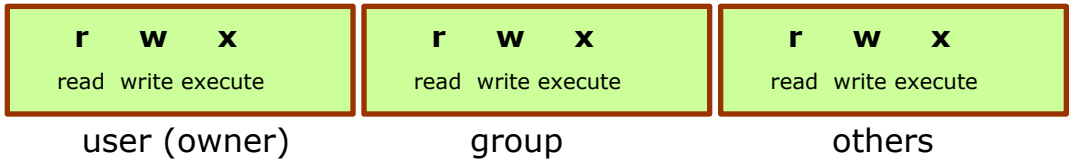
```
/home/cis90/roddyduk $ chmod u-x examples
/home/cis90/roddyduk $ ls -ld examples
drw-rwxr-x 4 roddyduk cis90 4096 Oct 19 13:59 examples/
```

Can list directory contents?

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

Yes

Directory Execute Permission



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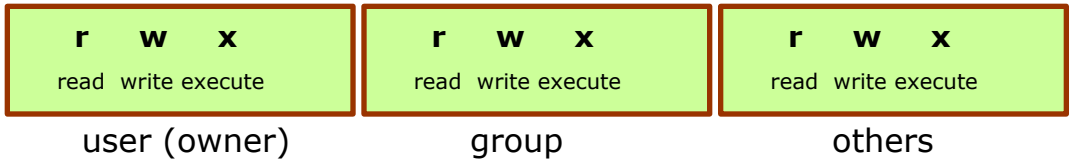
```
/home/cis90/roddyduk $ ls -ld examples/
drwxrwxr-x 5 roddyduk cis90 4096 Oct 19 13:49 examples/

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

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

Directory Execute Permission



Remove execute permission and confirm it's gone

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

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

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

Incomplete!

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

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

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.

Lab 6 Five Posts

Quiz questions for next class:

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

Backup