Rich's lesson module checklist

Last updated 1/31/2017

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

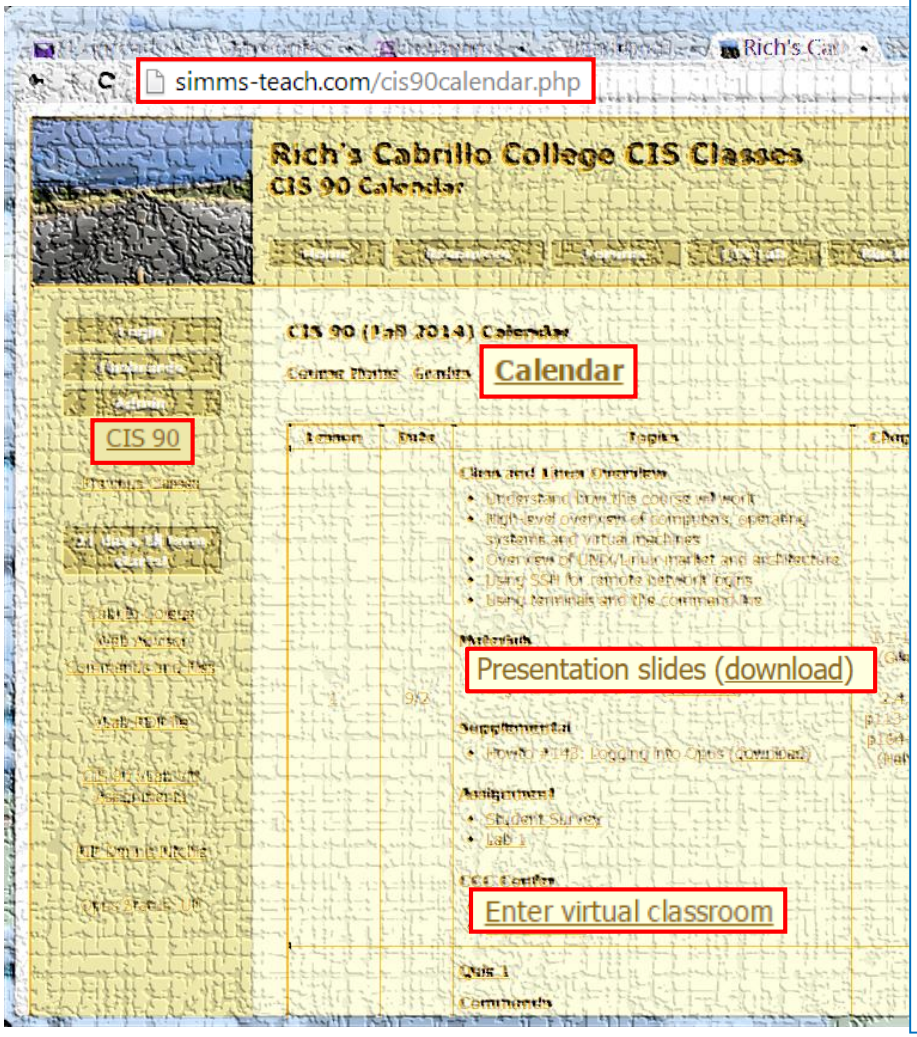
- ❑ Flash cards
- ❑ Properties
- ❑ Page numbers
- ❑ 1st minute quiz
- ❑ Web Calendar summary
- ❑ Web book pages
- ❑ Commands

- ❑ Opus accounts made (with TBDs for walk-ins) and populated
- ❑ Accounts made: Aryas, Scavenger Hunt systems, Lights XC
- ❑ Last forum archived, new forum created with welcome post
- ❑ Canvas LMS setup with website links and welcome letter
- ❑ Scavenger Hunt Lab 1 tested (fix Mac Freedom and log rotate issues)
- ❑ Lesson 1 supplemental videos updated and posted
- ❑ CIS 90 VMs created and configured
- ❑ Surveys and PW sheet posted
- ❑ Login credentials document updated and secured

- ❑ Welcome letter sent in advance of first class
- ❑ Rosters printed
- ❑ Add codes printed

- ❑ Backup slides, whiteboard slides, CCC info, handouts on flash drive
- ❑ Spare 9v battery for mic
- ❑ Key card for classroom door

Student checklist for attending class



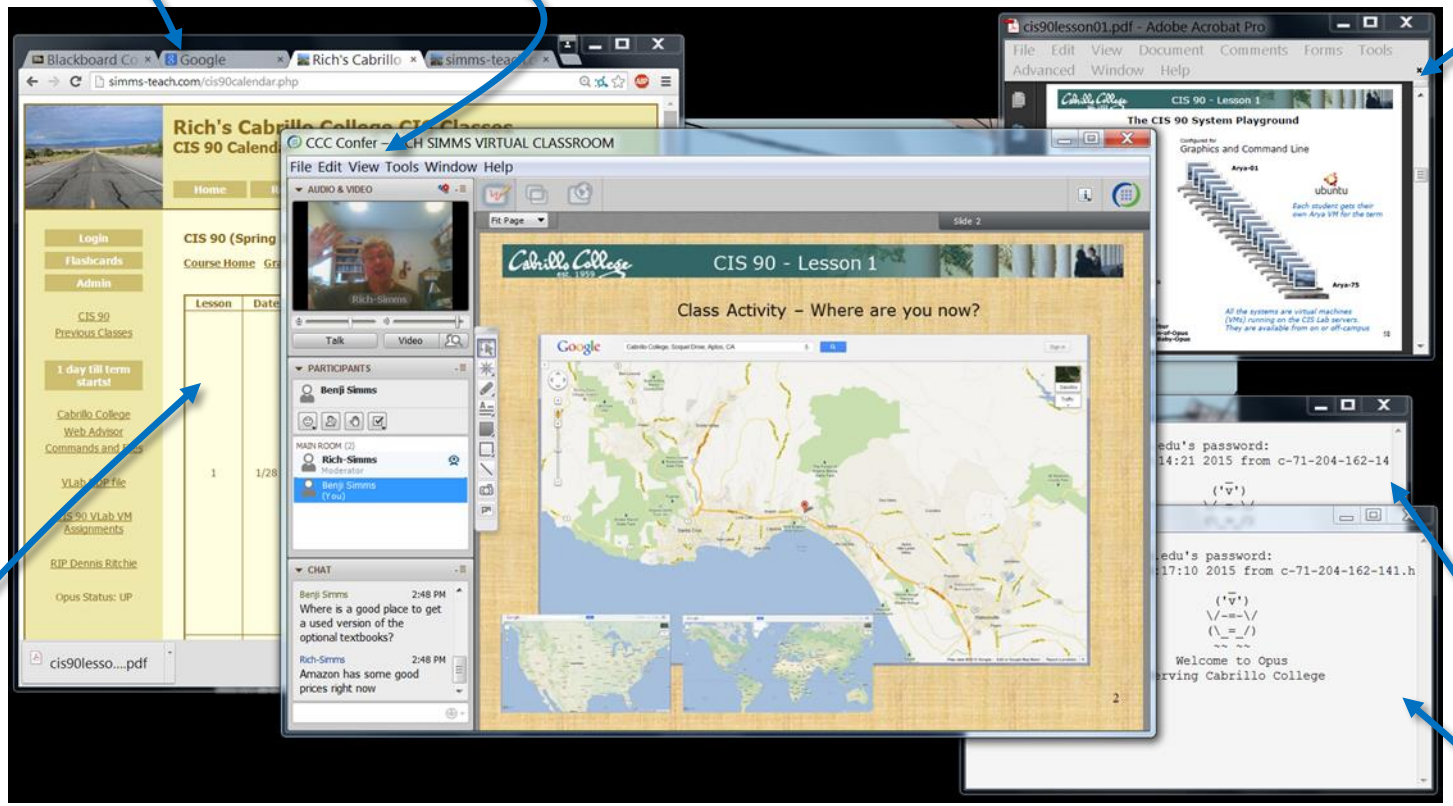
1. Browse to: **http://simms-teach.com**
2. Click the **CIS 90** link.
3. Click the **Calendar** link.
4. Locate today's lesson.
5. Find the **Presentation slides** for the lesson and **download** for easier viewing.
6. Click the **Enter virtual classroom** link to join CCC Confer*
7. Log into Opus with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

* First time online students should use: http://www.cccconfer.org/support/Readiness to verify their computer is ready for CCC Confer.

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

Student checklist for suggested screen layout

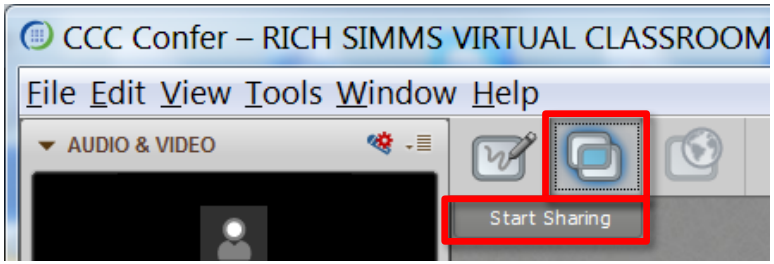
- ❑ *Google*
- ❑ *CCC Confer*
- ❑ *Downloaded PDF of Lesson Slides*



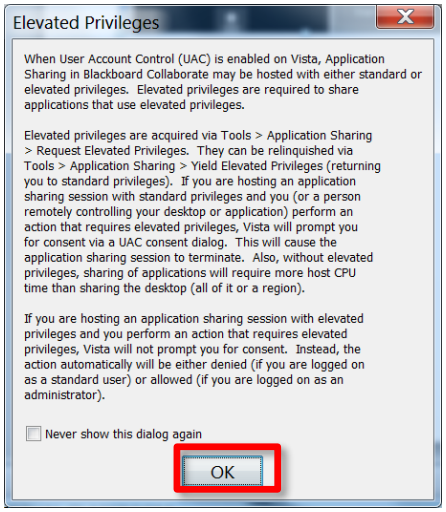
- ❑ *CIS 90 website Calendar page*
- ❑ *One or more login sessions to Opus*

Student checklist for sharing desktop with classmates

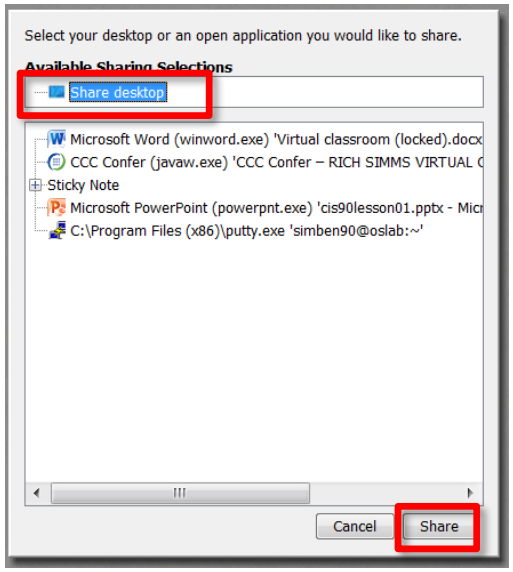
1) Instructor gives you sharing privileges.



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



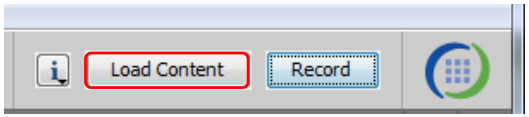
3) Click OK button.



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

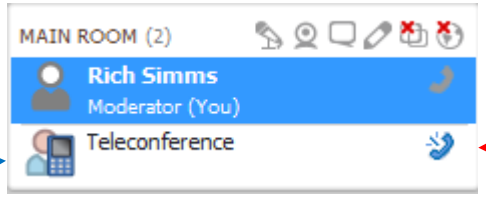
Rich's CCC Confer checklist - setup

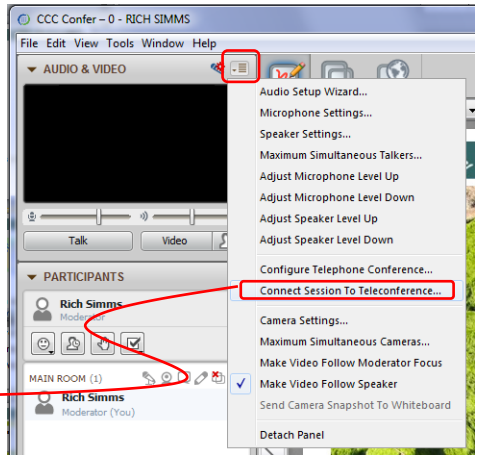
[ ] Preload White Board



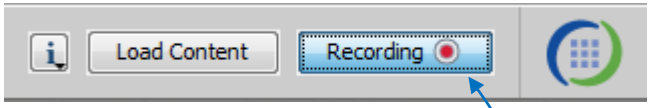
[ ] Connect session to Teleconference

Session now connected to teleconference





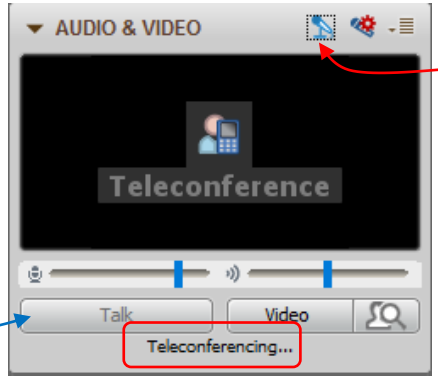
[ ] Is recording on?



Red dot means recording

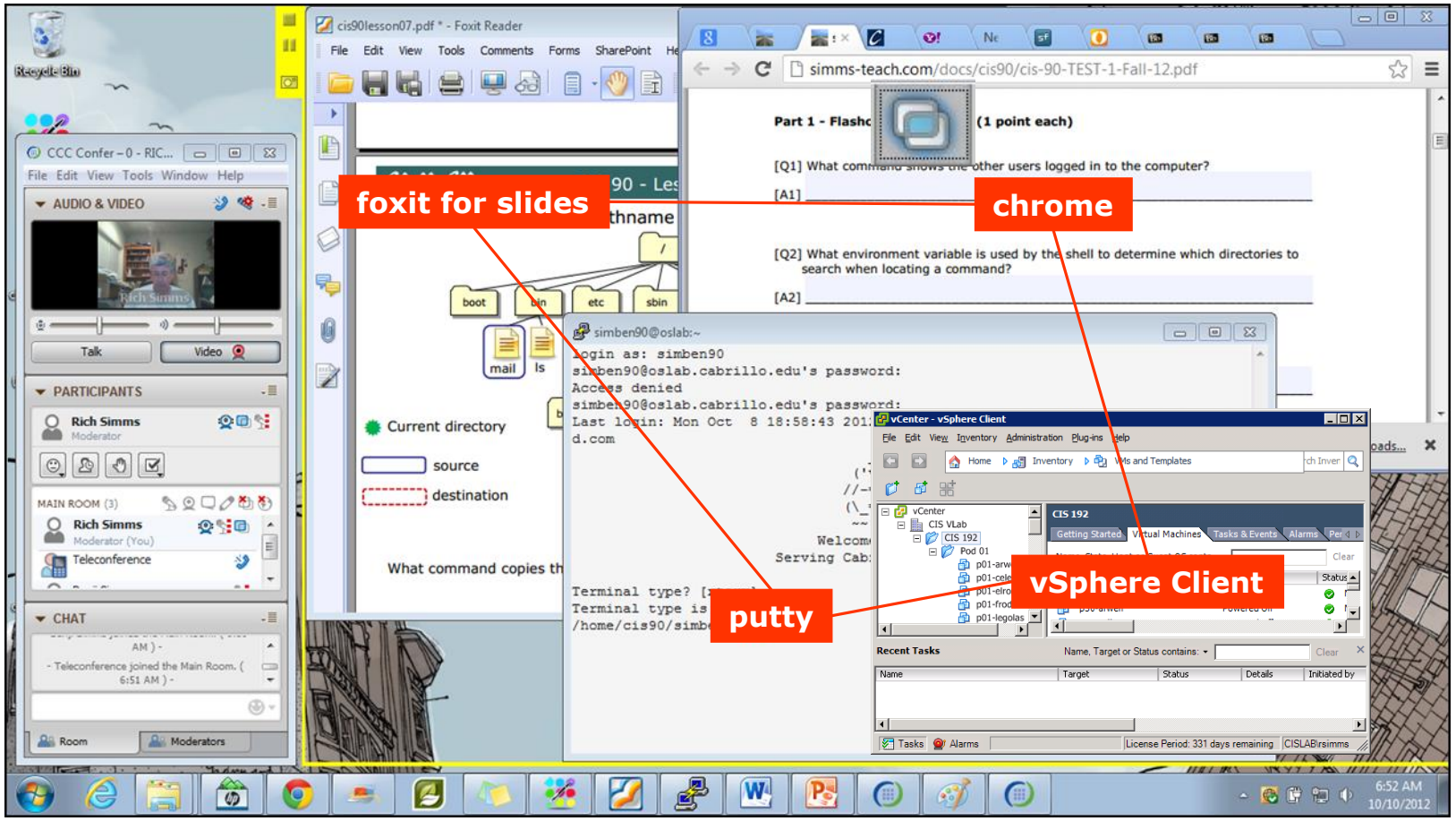
[ ] Use teleconferencing, not mic

Should be grayed out



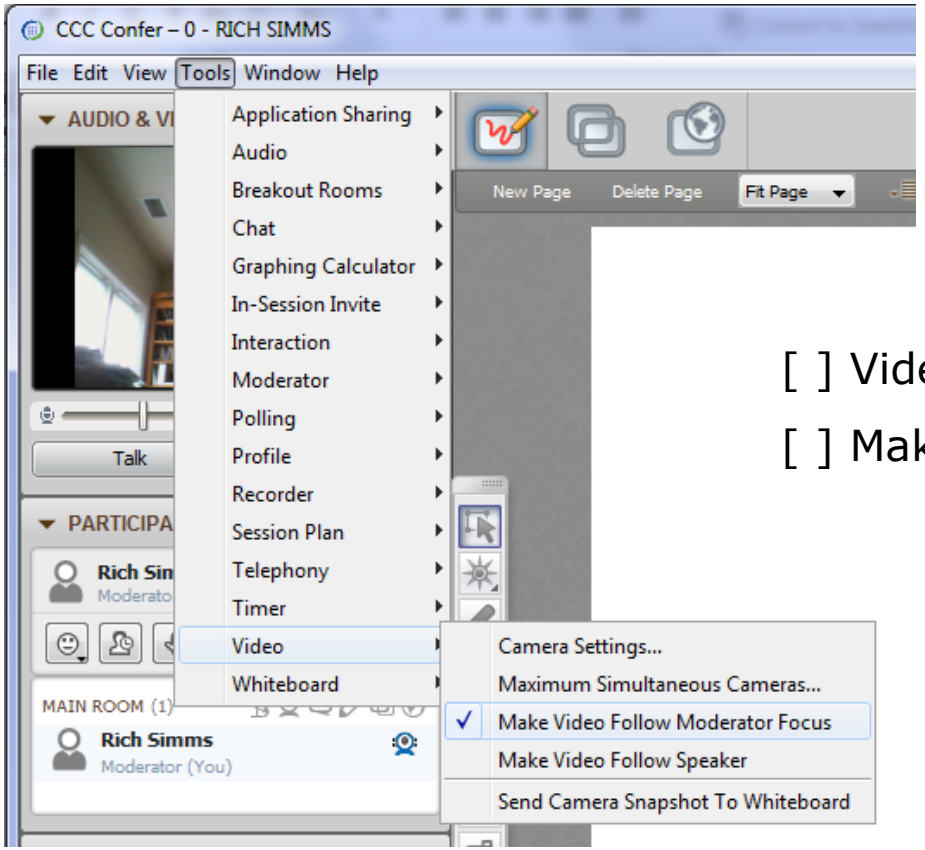
Should change from phone handset icon to little Microphone icon and the Teleconferencing … message displayed

Rich's CCC Confer checklist - screen layout



[ ] layout and share apps

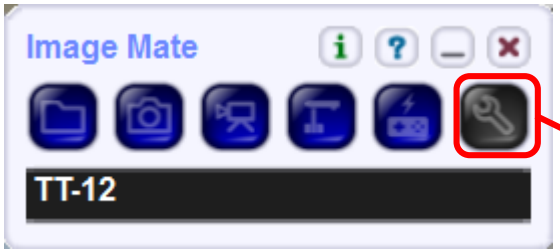
Rich's CCC Confer checklist - webcam setup

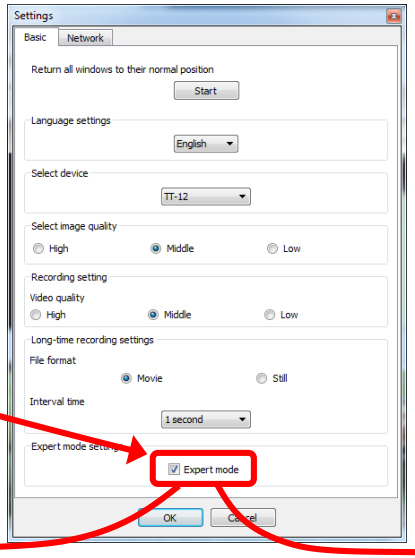


[ ] Video (webcam)

[ ] Make Video Follow Moderator Focus

Rich's CCC Confer checklist - Elmo



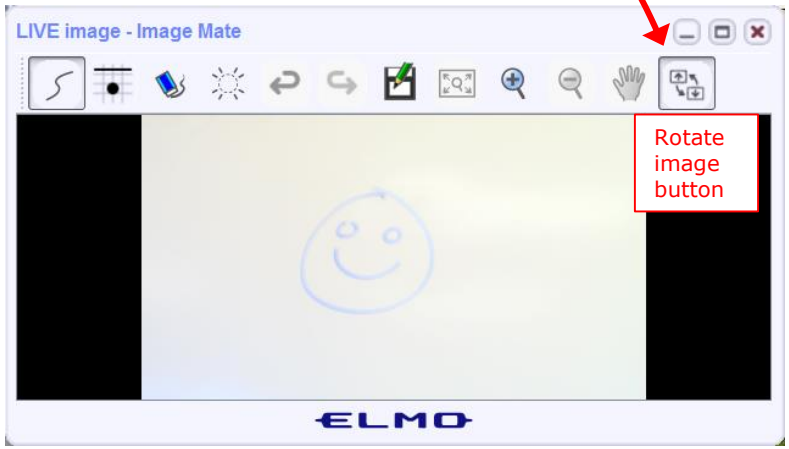


The "rotate image" button is necessary if you use both the side table and the white board.

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

Elmo rotated down to view side table

Elmo rotated up to view white board



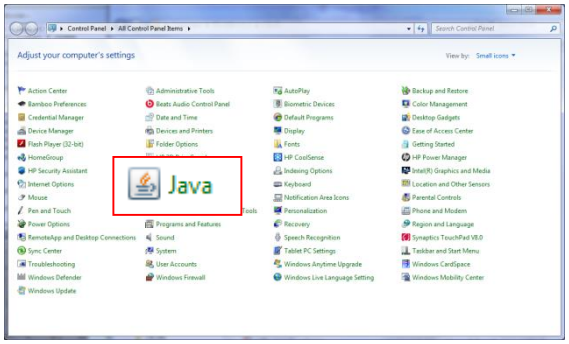
Run and share the Image Mate program just as you would any other app with CCC Confer

Rich's CCC Confer checklist - universal fixes

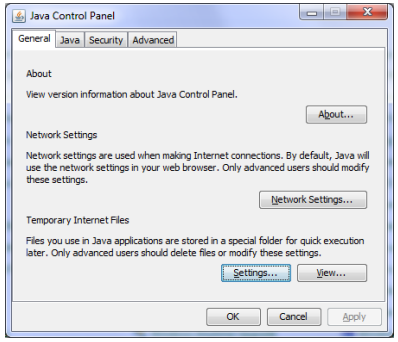
Universal Fix for CCC Confer:

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

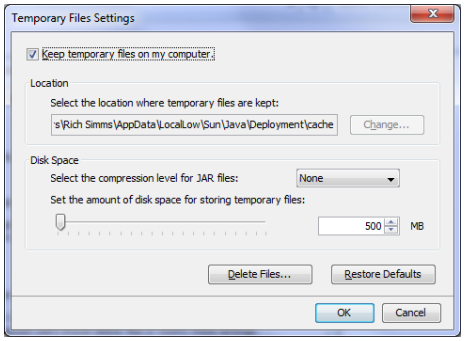
Control Panel (small icons)



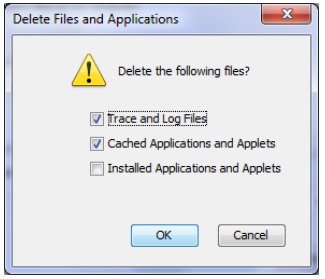
General Tab > Settings…



500MB cache size



Delete these



Google Java download

Start

Sound Check

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

*Instructor can use *96 to mute all student lines.*

Volume
**4 - increase conference volume.*
**7 - decrease conference volume.*
**5 - increase your voice volume.*
**8 - decrease your voice volume.*

Introductions

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 1

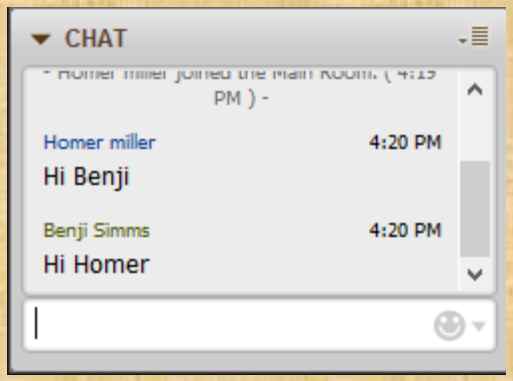
Instructor: **Rich Simms**
Dial-in: **888-886-3951**
Passcode: **136690**

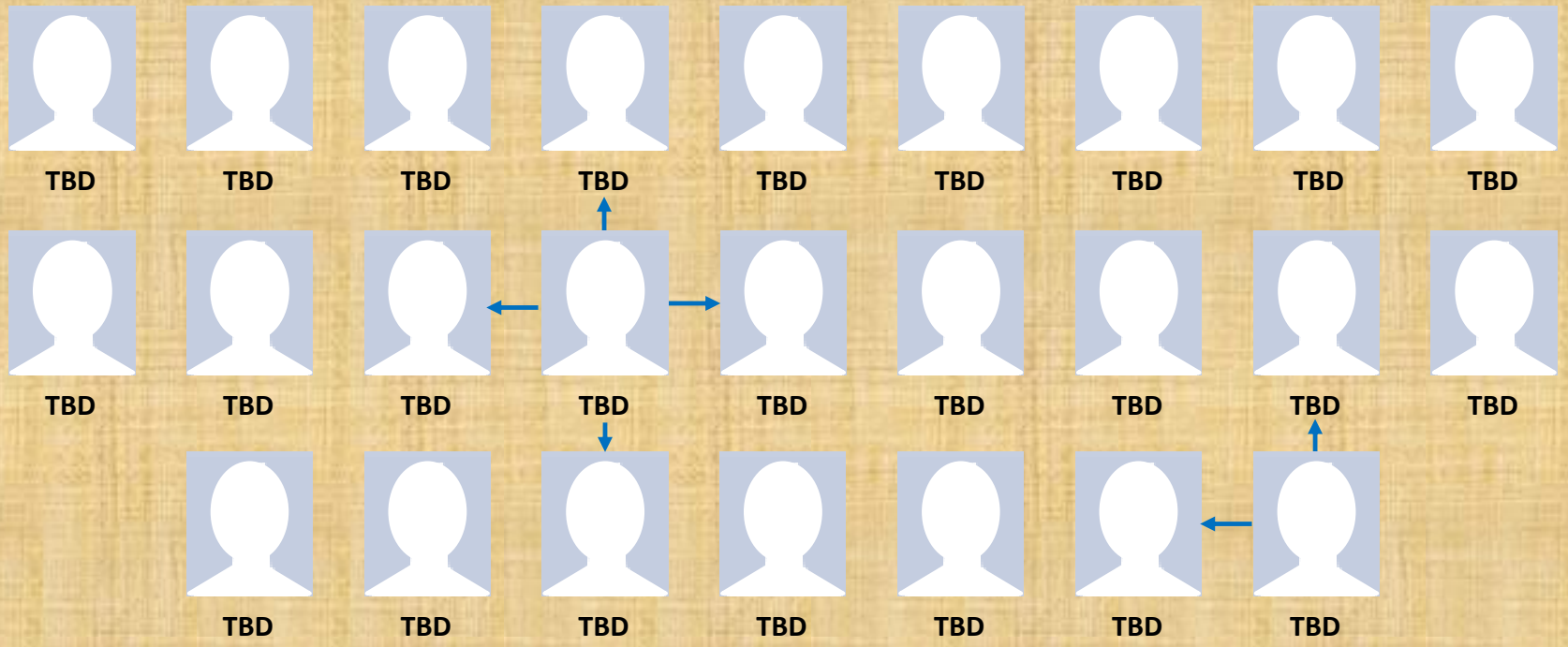
Gabriel	Melissa	Tess	Alex	Daniel	Ian J.	Harold	Victor	Jasen	Dillon
Sam	Steven	Cameron	Roberto	Hans	Cristian	MacKinzie	Christopher	Luis	Nigel
Philip	Joshua M.	Ian K.	Gracie	James	Julian	Ken	Joshua V.	Samantha	Justin
Ryan	Nicholas	Ian C.	tbd	tbd	tbd	tbd	tbd	tbd	tbd

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

First Activity

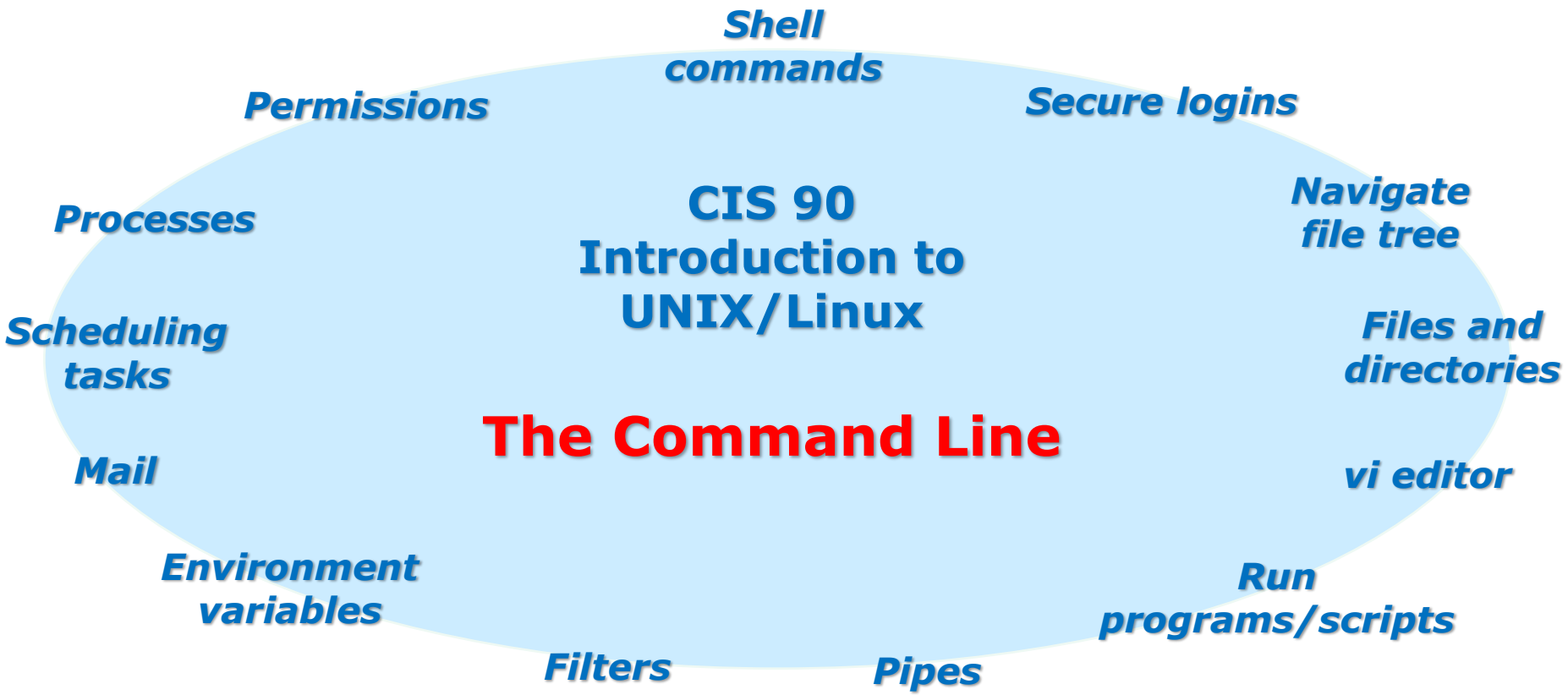
Use the chat window in CCC Confer to say Hi to your adjacent "virtual classmates"





If your name is not listed above you can chat Hi to anyone you want!

Why take this class

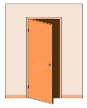


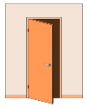
Student Learner Outcomes

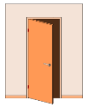
1. Navigate and manage the UNIX/Linux file system by viewing, copying, moving, renaming, creating, and removing files and directories.
2. Use the UNIX features of file redirection and pipelines to control the flow of data to and from various commands.
3. With the aid of online manual pages, execute UNIX system commands from either a keyboard or a shell script using correct command syntax.

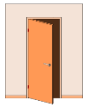
Why learn the UNIX/Linux command line?
Answer: Opens up more career path options

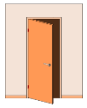
CIS 90
Introduction to
UNIX/Linux

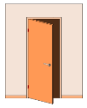

System administration

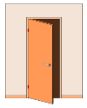

Cyber security


Entrepreneur


Technical sales and/or services


Help desk (technical support)


Software developer (programmer)


Many more

Class and Linux Overview

Objectives	Agenda
• Understand how this course works • Overview of computers and UNIX/Linux • Learn how to login via ssh • Learn first UNIX/Linux commands	• Introductions • Why take this class • How this class works • Lab resources • Computers • UNIX/Linux Overview • Logging in via SSH • First login • First commands • Housekeeping • Navigating systems • Assignment • Wrap up

How this class works

Attending class

How to attend class each week

Wednesdays - 9:00AM to 12:05PM

- Section 95746 meets online in this virtual classroom
- Section 95747 meets simultaneously in room 828 on the Aptos Main Campus

Option 1: **Online "synchronous"** - from anywhere connect online to the "live" virtual classroom using CCC Confer. Use the "Enter virtual classroom" link on:
http://simms-teach.com/cis90calendar.php

Option 2: **Traditional** - drive to campus, find parking, walk to the 800 building and take a seat in the classroom.

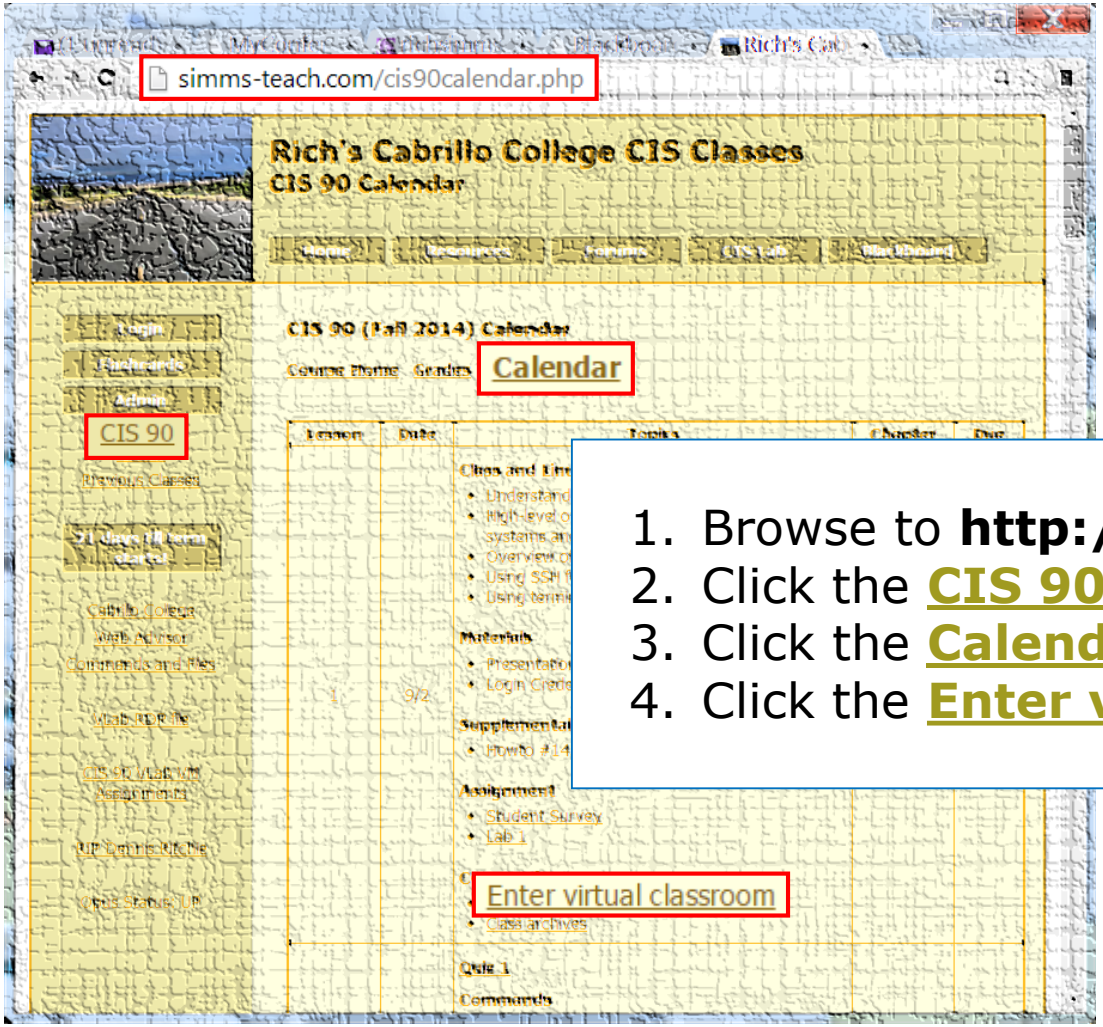
Option 3: **Online archives "asynchronous"** - watch the archived class recording online using CCC Confer at a time that works for you. Use the "Class archives" link on:
http://simms-teach.com/cis90calendar.php

*It doesn't matter which section you enrolled in. You can use **any** method of attending for **any** of the classes.*

Attending Class

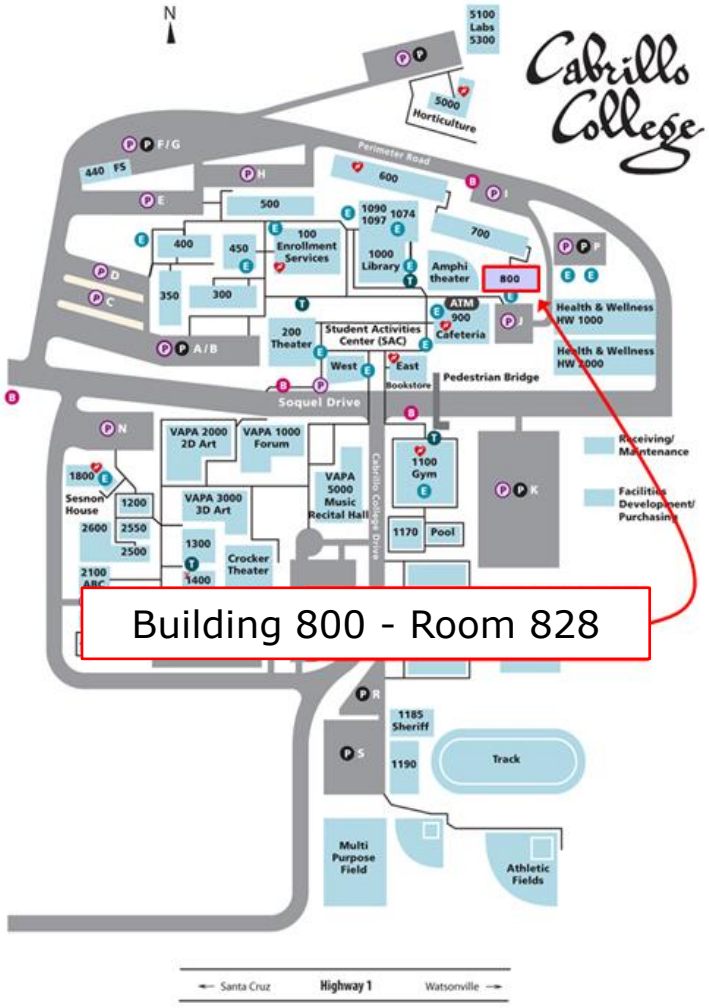
(supplemental)

Option 1: **Online (synchronous)** - from anywhere connect online to the "live" virtual classroom using CCC Confer.



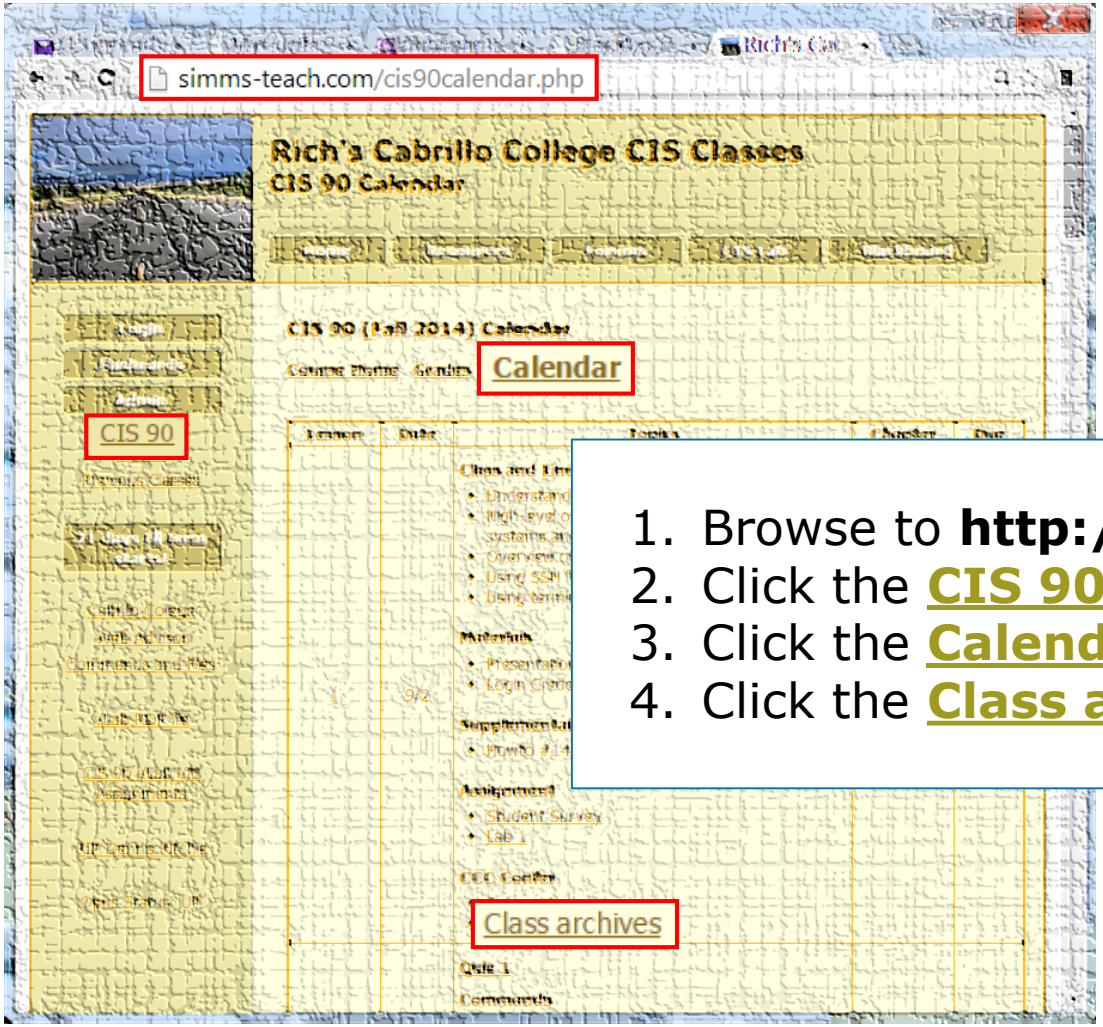
1. Browse to **http://simms-teach.com**
2. Click the **CIS 90** link
3. Click the **Calendar** link
4. Click the **Enter virtual classroom** link

Option 2: **Traditional** - drive to campus, find parking, walk to the 800 building and take a seat in the classroom.



Enjoy the ocean view from the classroom windows!

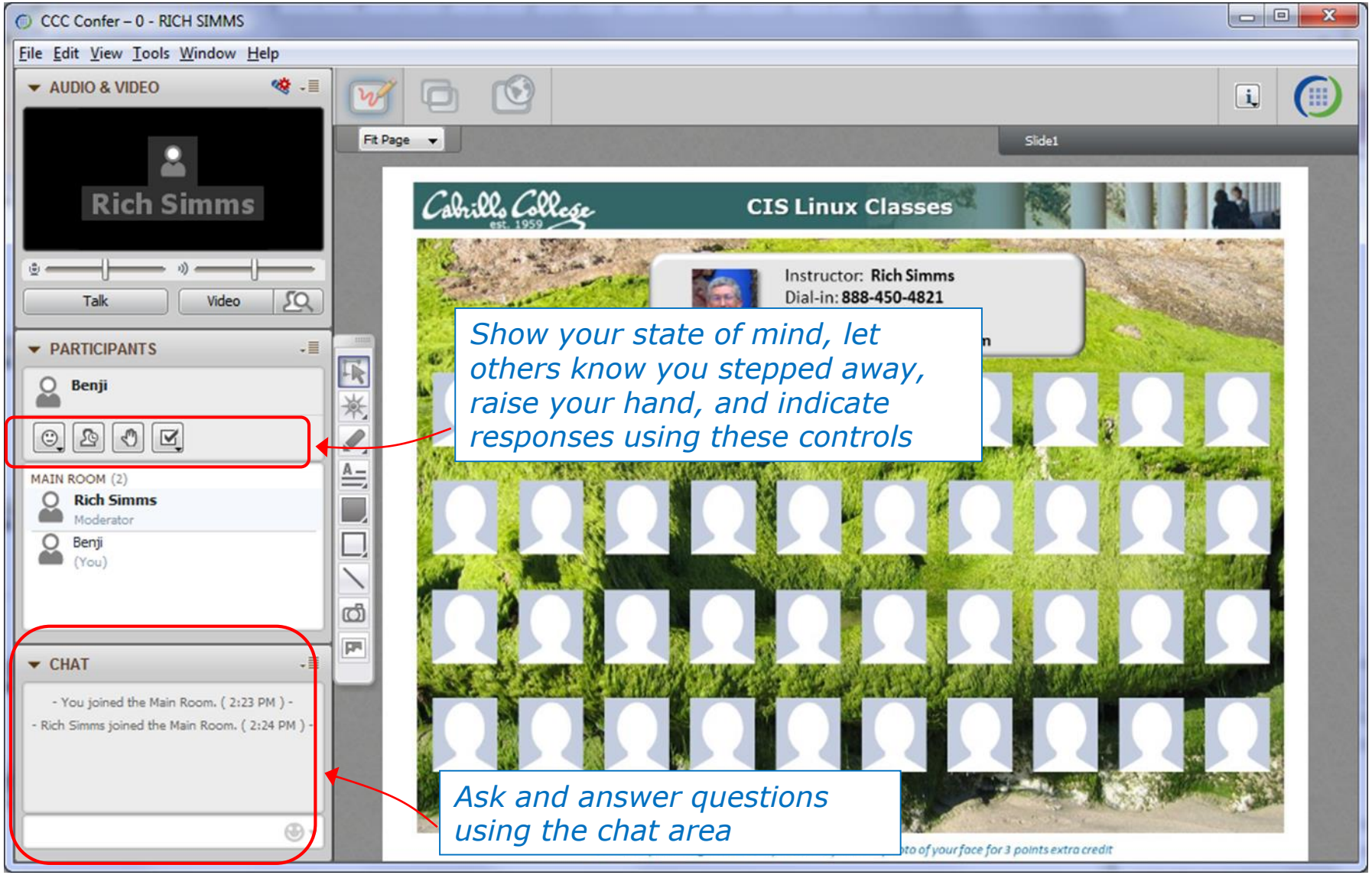
Option 3: **Online archives (asynchronous)** - watch the archived class recording online using CCC Confer at a time that works for you.



1. Browse to **http://simms-teach.com**
2. Click the **CIS 90** link
3. Click the **Calendar** link
4. Click the **Class archives** link

CCC Confer

CCC Confer - Attending class online



CCC Confer - Attending class online

When dialed in by phone you can use:

*0 Contact the operator for assistance.

*6 Mute/unmute your individual line with a private announcement.

This only applies if you dialed in using a phone

Help the Instructor with CCC Confer

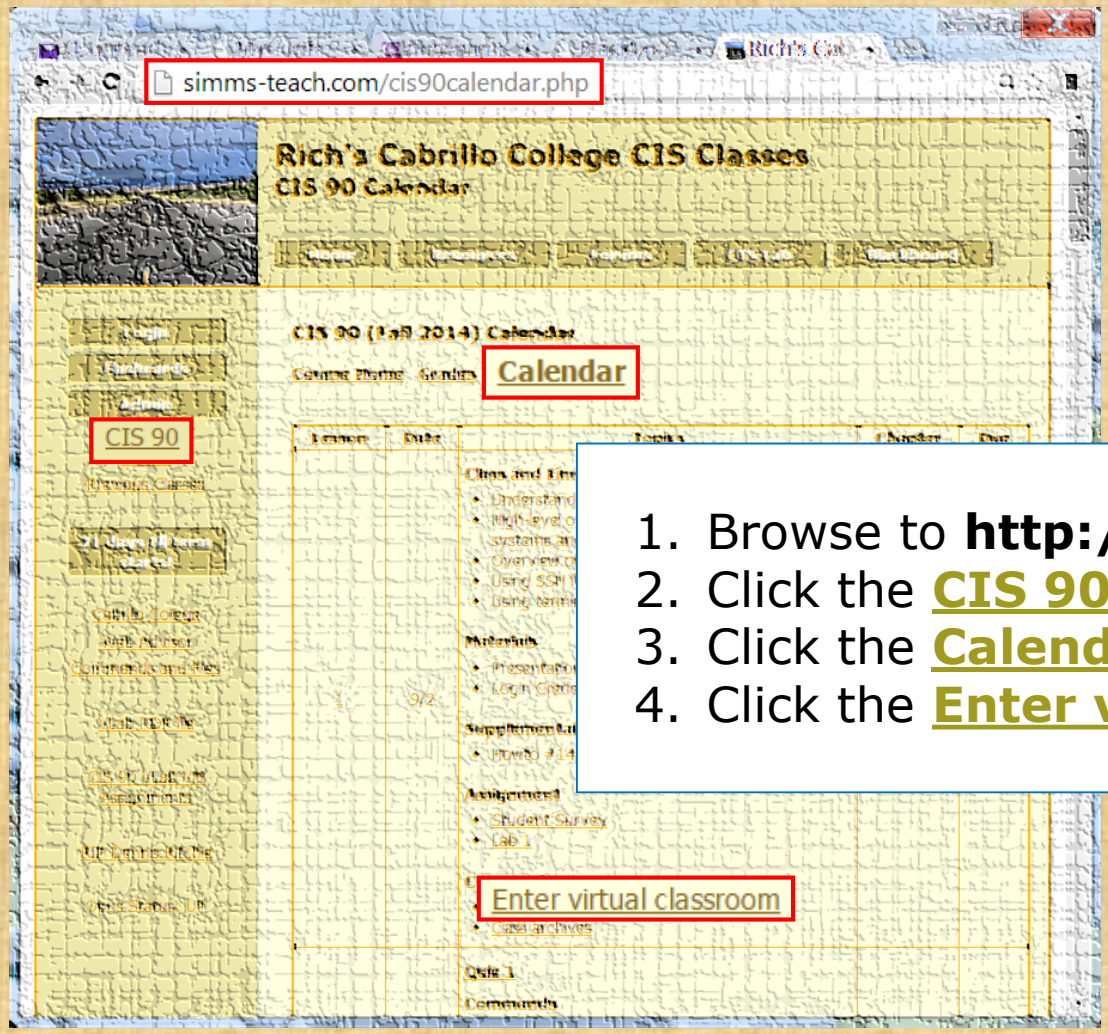
Students who attend class on the Aptos campus should still use CCC Confer.

- If you notice **an online student with their electronic hand up that the instructor missed** please let the instructor know.
- If you notice the instructor **forgot to Share the presentation** material please let the instructor know.
- If you notice the instructor **forgot to turn on recording** please jump up and down and wave your arms to let the instructor know!

CCC Confer

(supplemental)

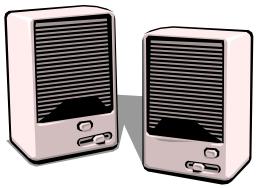
Enter the CCC Confer virtual room



1. Browse to **http://simms-teach.com**
2. Click the **CIS 90** link
3. Click the **Calendar** link
4. Click the **Enter virtual classroom** link

CCC Confer

- Listen using your computer's speakers/headset or with your phone using the dial-in number

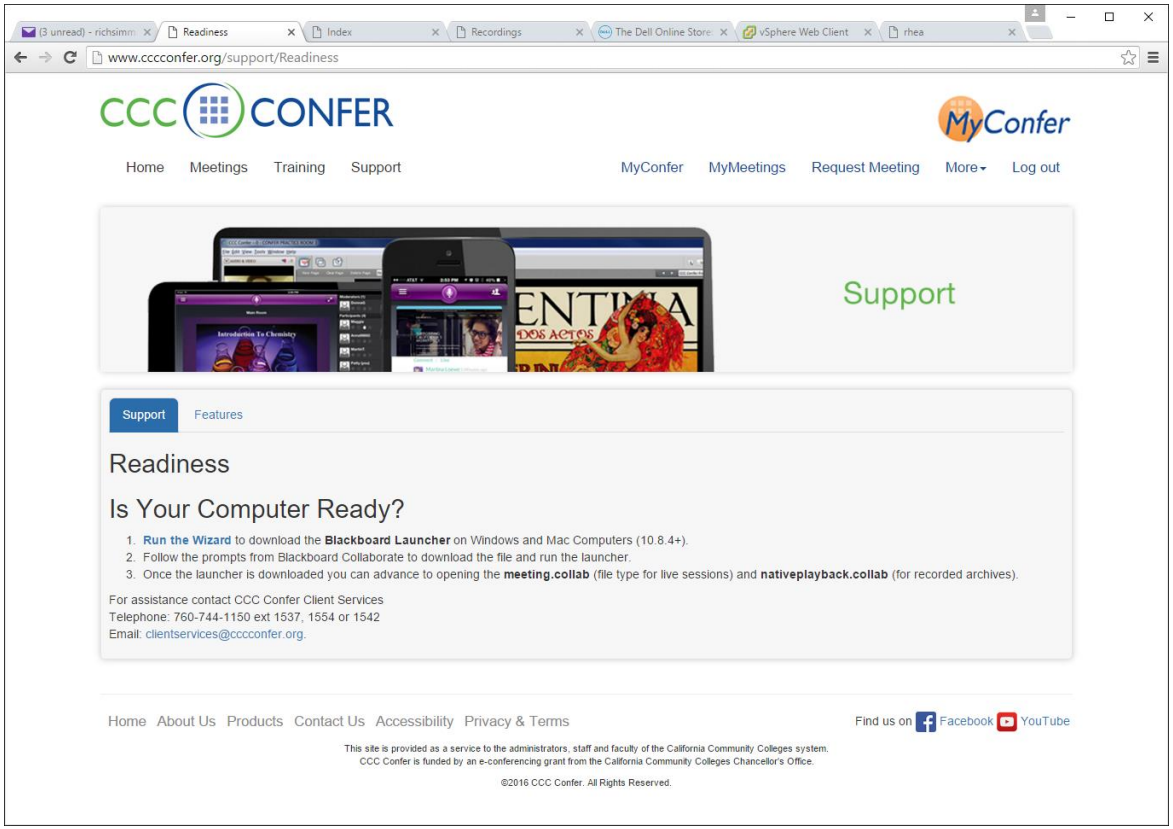


- Ask questions using the chat window or just speak if dialed in with your phone (or Skype)

Dialing in by phone (or Skype) is best because you can ask and answer questions by speaking rather than use the chat window

CCC Confer - Is your computer ready?

http://www.cccconfer.org/support/Readiness



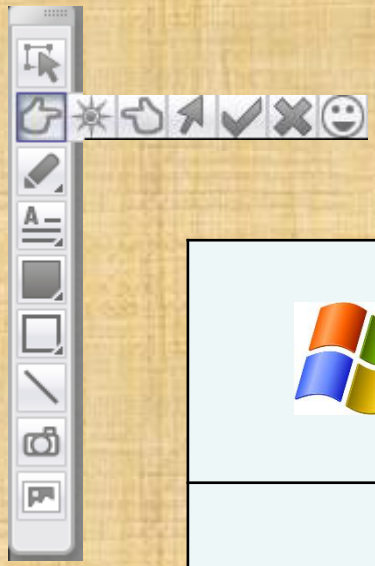
Browse to the link above anytime before the first class. The first time setup for CCC Confer can take several minutes!

CCC Confer - Java may be downloaded the first time you use CCC Confer

CCC Confer uses Java which requires a download and installation of the Java Runtime Environment from java.com (Oracle)

Instructor Note:

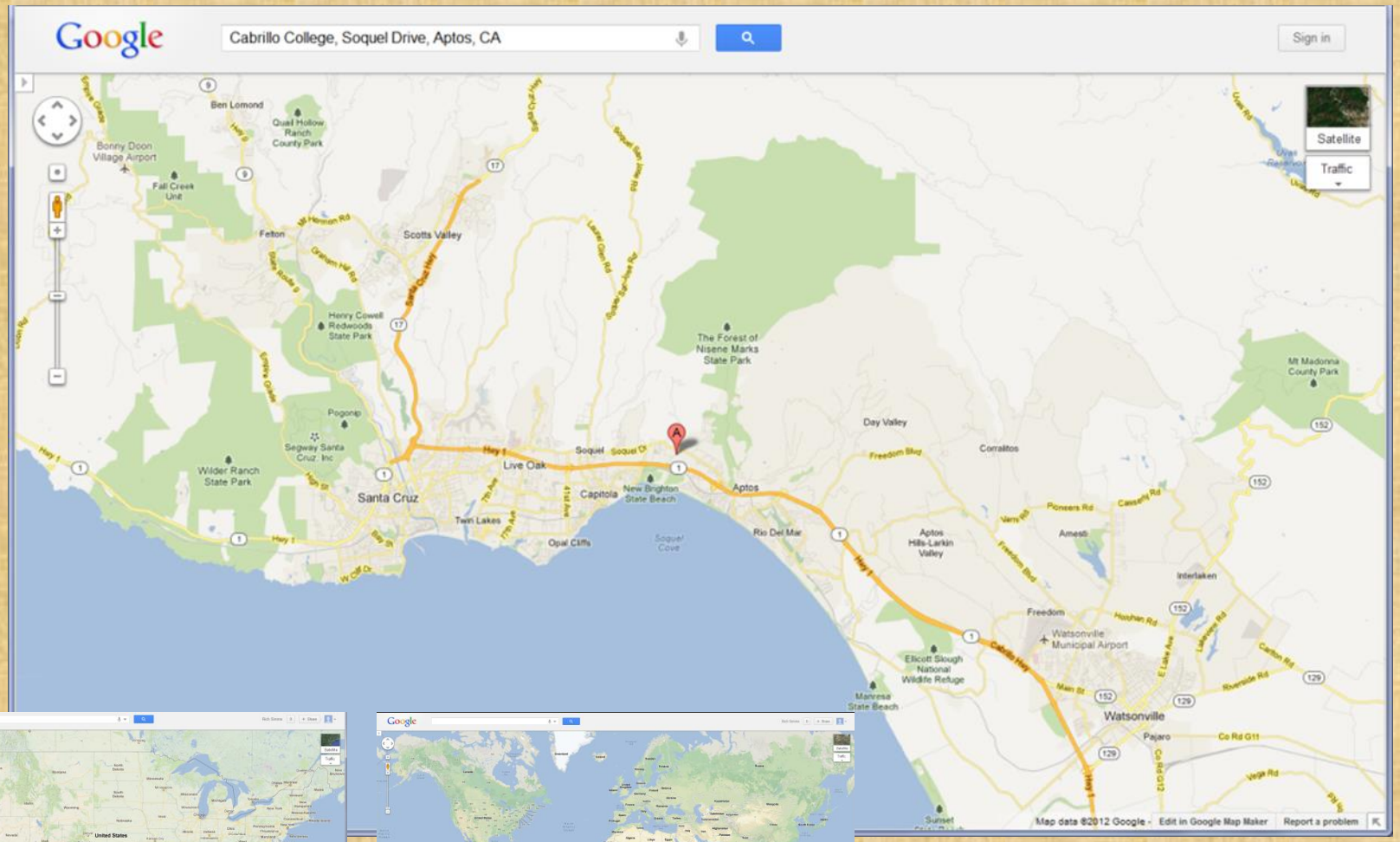
Switch to preloaded whiteboard

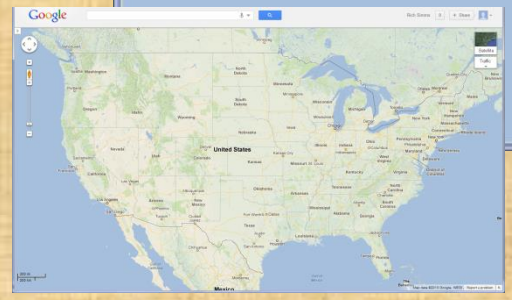


Class Activity
What kind of computer did you use to join CCC Confer?

			Other

Class Activity – Where are you now?





Roll Call

If you are attending class by watching the recordings in the archives email the instructor at: risimms@cabrillo.edu to provide roll call attendance.

Login Credentials

Usernames and passwords

The Login Credentials slides are not included in these lesson slides. To locate a copy:

1) See the Welcome email sent by the instructor to registered and wait-listed students.

2) Or login into Canvas (https://cabrillo.instructure.com) and read the Welcome announcement.

Instructor Note:

Turn Recording On
Switch back to shared slides

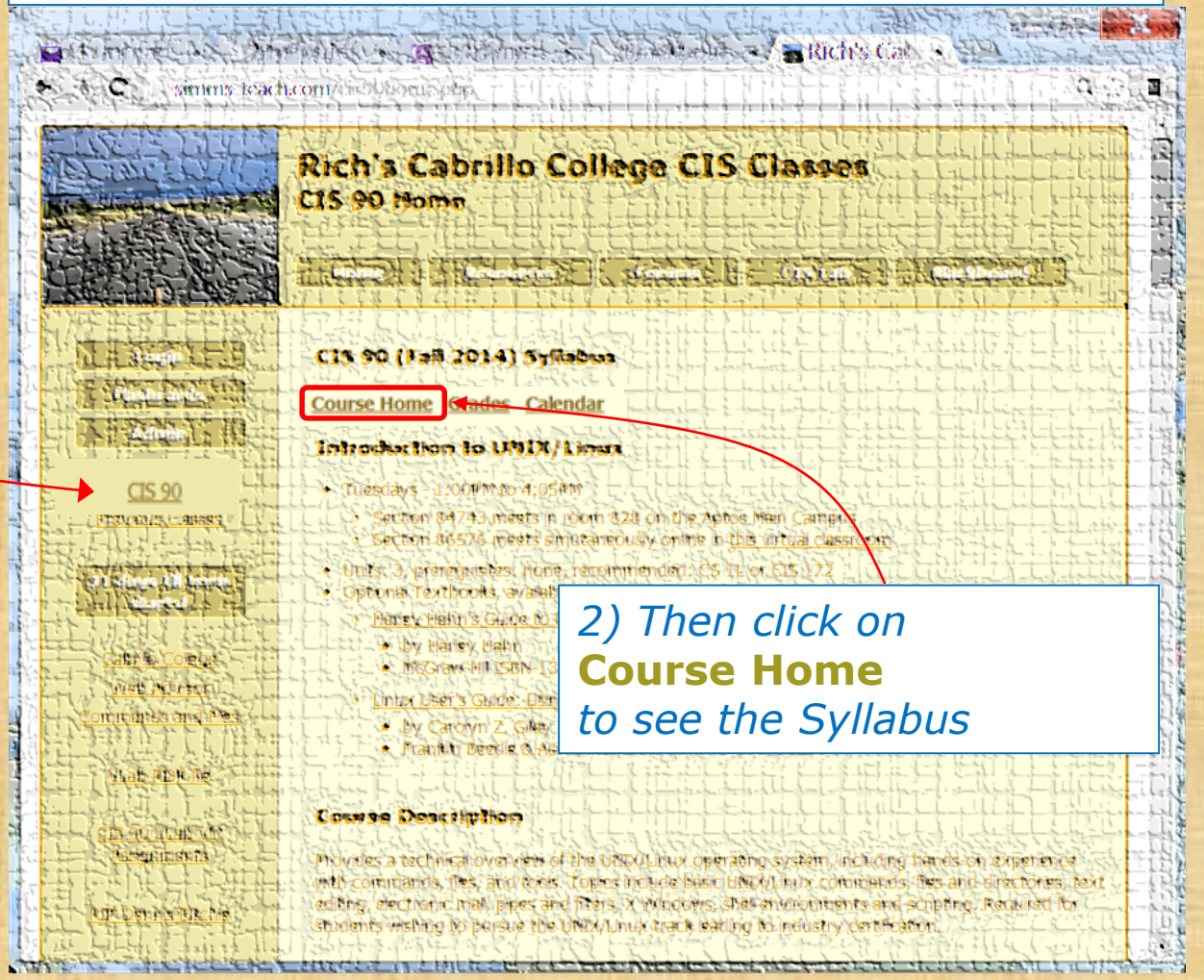
Syllabus, Calendar and Grades

Activity

Find the syllabus

Browse to: ***http://simms-teach.com***

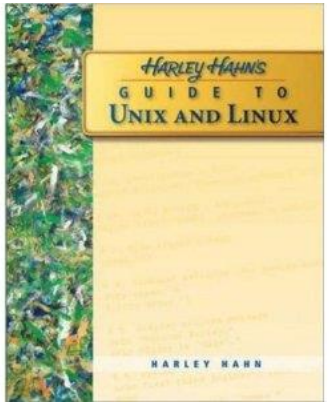
1) Click on **CIS 90** *on left panel*



2) Then click on **Course Home** *to see the Syllabus*

Optional CIS 90 Textbook

*This textbook is **optional** but nice to have if you want to dig deeper into the material provided by the lesson slides.*



I really like the very first sentence in Harley Hahn's book:

"This book will change your life."

Optional Textbook:

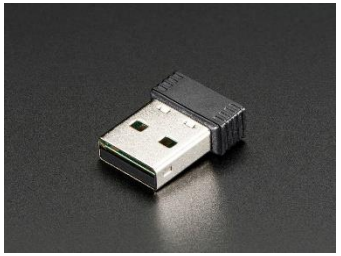
Harley Hahn's Guide to Unix and Linux
by Harley Hahn
McGraw-Hill ISBN: 0073133612

Optional CIS 90 Gear

If you like "hands-on" you will love a Raspberry Pi

If you find your really enjoy learning UNIX/Linux and want your own private server then you should consider:





$39.95	Raspberry Pi 2 - Model B - ARMv7 with 1G RAM
$7.95	5V 2A Switching Power Supply w/ 20AWG 6' MicroUSB Cable
$11.95	8GB Card with NOOBS 1.4
$11.95	Miniature WiFi (802.11b/g/n) Module

CIS 90 Spring 2016

Class meets in room **828** and **online** every **Wednesday morning**:

- 15 lessons: **9:00AM-12:05 PM**, from **Jan 25th** to **May 10th**
- Final exam: **7:00AM-9:50AM**, on **Monday** **May 15th**, in room **828**

January

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

April

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

May

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

STARTING CLASS TIME/DAY(S)	EXAM HOUR	EXAM DATE
Classes starting between:		
6:30 am and 8:55 am, MW/Daily	7:00 am-9:50 am	Wednesday, May 17
9:00 am and 10:15 am, MW/Daily	7:00 am-9:50 am	Monday, May 15

The typical week

http://simms-teach.com

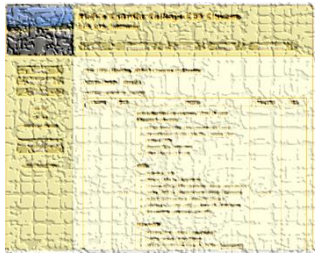
Use the

Forum

to collaborate with classmates at any time

Wednesday

"First minute" quiz
Lecture on new lesson material
Class activities
Previous week lab assignments due 11:59PM (Opus time)

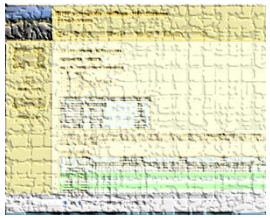


Calendar

All due dates are found here

Thursday

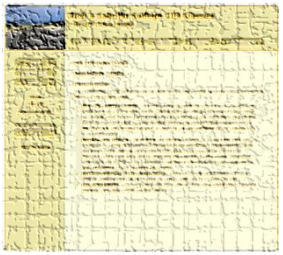
is grading day



Check the **Grades** *page to see grades on labs, quizzes and tests*

Work on labs or practice tests during the week.

All assignments and due dates are on the **Calendar** *page*



Peek at the **Extra Credit** *page if you need more points*

Contacting the instructor

- Use the forum for the fastest response on technical or class related questions.
- Use email for personal matters. If it's not personal I will probably encourage you to post your question on the forum so I can answer it there. This is preferable because your other classmates can benefit from the answer.
- Weekly office hours: http://babyface.cabrillo.edu/salsa/listing.jsp?staffId=1426

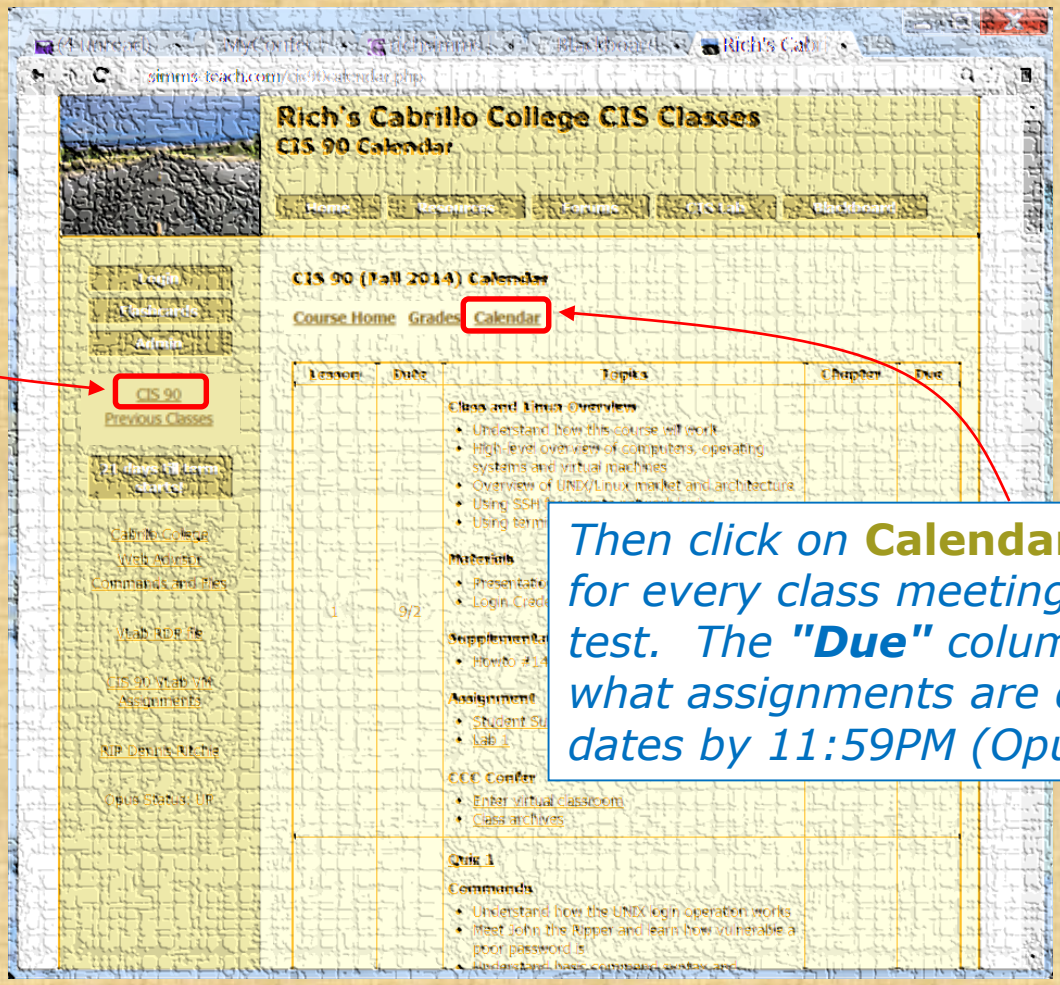
- Avoid leaving a message on voice mail. Checked rarely so don't expect a fast response (if any)!

Activity

Find the Calendar page

Please browse to: http://simms-teach.com

*Click on **CIS 90** on left panel*



*Then click on **Calendar** to see dates for every class meeting, quiz, and test. The **"Due"** column indicates what assignments are due on those dates by 11:59PM (Opus time).*

Course Calendar

Lesson	Date	Topics	Chapter	Due*
5	3/10	**Quiz 4** **Review** • Review lessons 1-4 • Practice skills • Learn about filename expansion characters **Materials** • Presentation slides (download) • Practice test (download) **Assignment** • NA **CCC Confer** • Enter virtual classroom • Class archives		Lab 4
6	3/17	**Managing Files** • Creating • Copying • Moving • Renaming • Removing • Linking **Materials** • Presentation slides (download) **Test #1** • Test (download) **Assignment** • Lab 5 **CCC Confer** • Enter virtual classroom • Class archives	5 8.13-8.16 (Gillay) 25 p715-729 (Hahn)	

First minute quiz

Lesson # and Date

What is due by 11:59PM (Opus time) on that date (LATE WORK IS NOT ACCEPTED)

Lesson slides, feel free to download during class for local viewing

Links to virtual classroom and archived recordings

References to material in the textbook

Lab assignment

CCC Confer links to join class online or review archives

Test

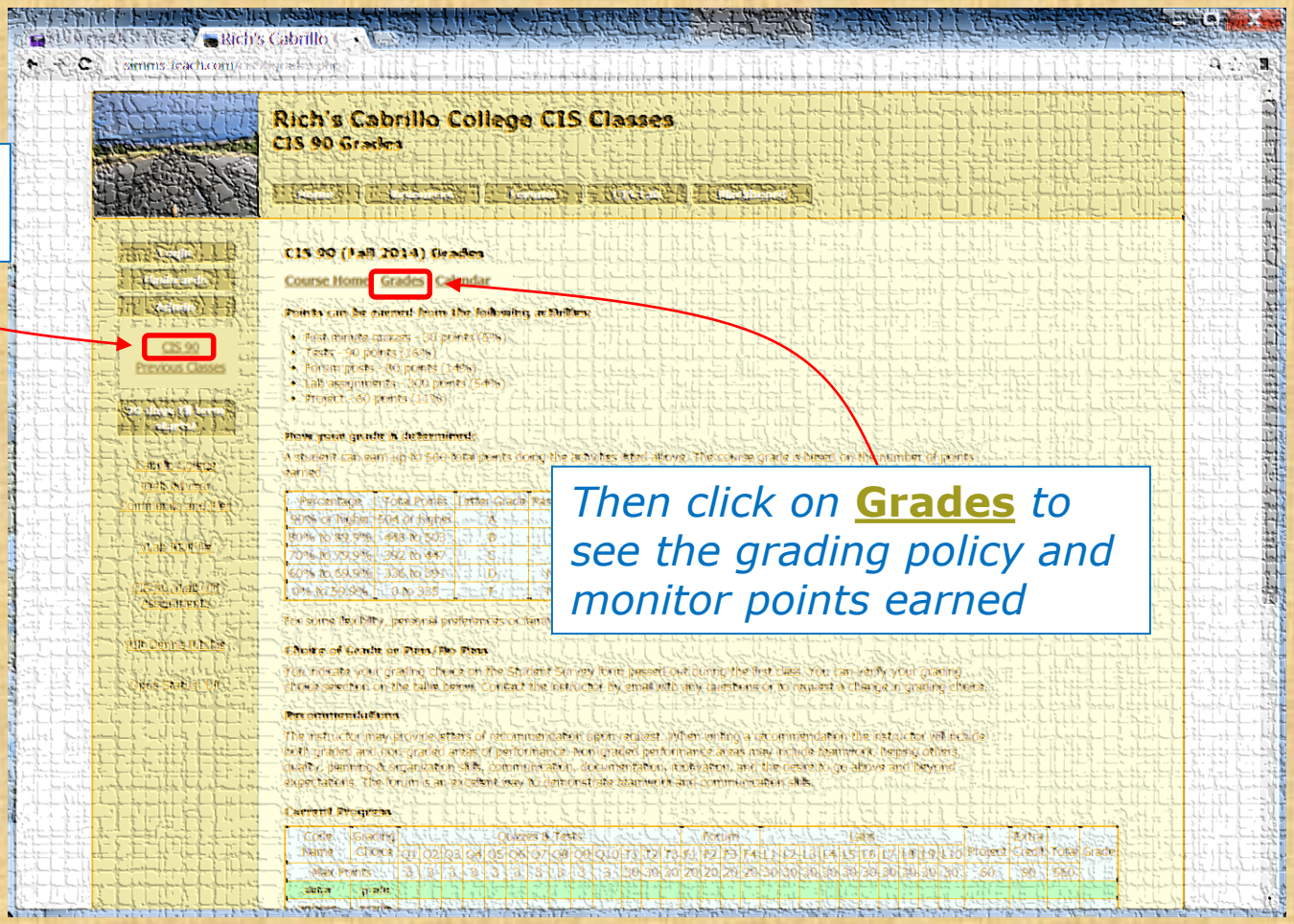
http://simms-teach.com/cis90calendar.php

Activity

Find the Grades page

Please browse to: http://simms-teach.com

*Click on **CIS 90** on left panel*



*Then click on **Grades** to see the grading policy and monitor points earned*

Course Grading

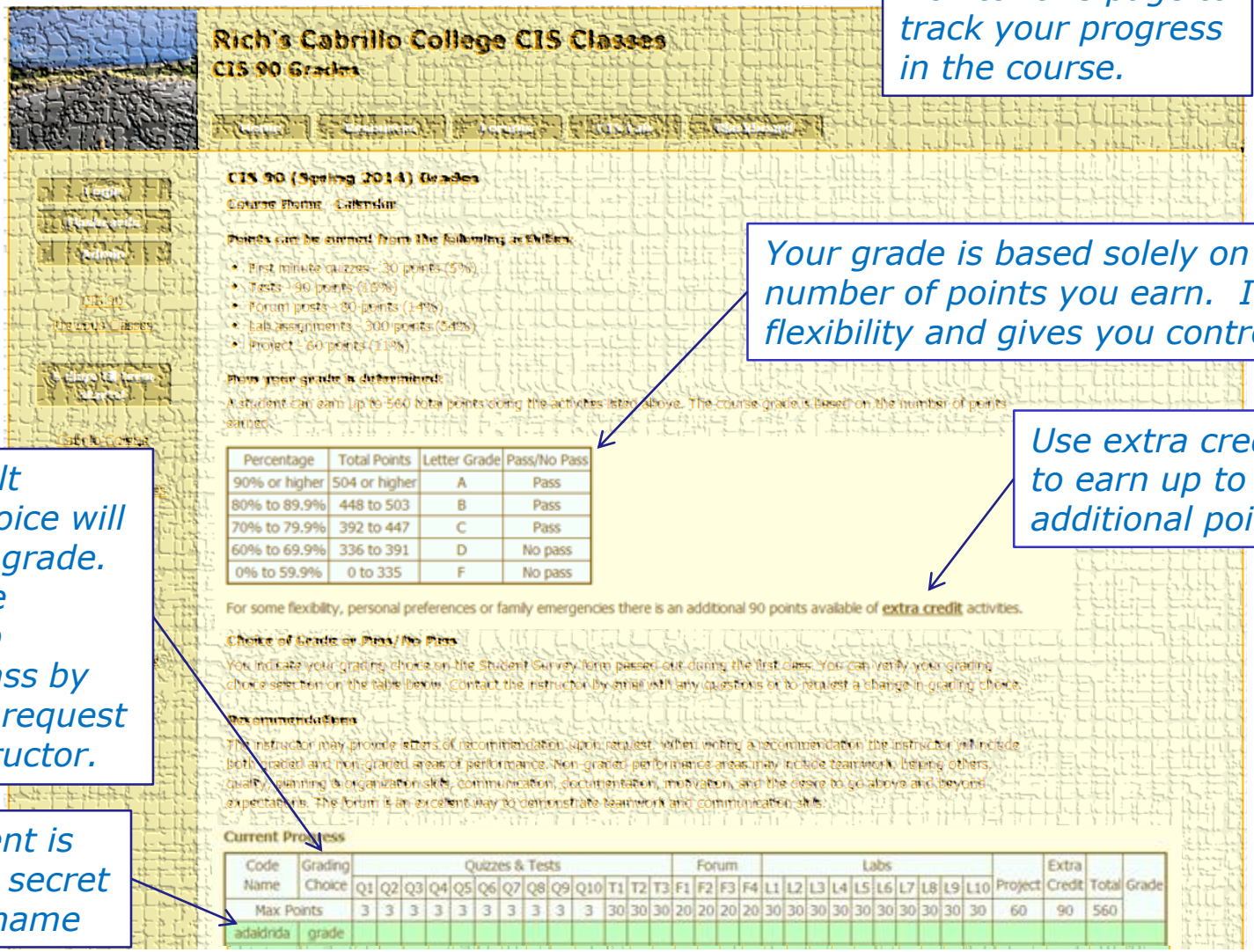
Monitor this page to track your progress in the course.

Your grade is based solely on the number of points you earn. It offers flexibility and gives you control.

Use extra credit to earn up to 90 additional points

Your default grading choice will be a letter grade. This can be changed to Pass/No Pass by emailing a request to the instructor.

Each student is assigned a secret LOR code name



Rich's Cabrillo College CIS Classes

CIS 90 Grades

CIS 90 (Spring 2014) Grades

Course Home Calendar

Points can be earned from the following activities:

- First minute quizzes - 30 points (5%)
- Tests - 90 points (16%)
- Forum posts - 80 points (14%)
- Lab assignments - 300 points (54%)
- Project - 60 points (11%)

How your grade is determined:

A student can earn up to 560 total points doing the activities listed above. The course grade is based on the number of points earned.

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

For some flexibility, personal preferences or family emergencies there is an additional 90 points available of extra credit activities.

Choice of Grade or Pass/No Pass

You indicate your grading choice on the Student Survey form passed out during the first class. You can verify your grading choice selection on the table below. Contact the instructor by email with any questions or to request a change in grading choice.

Recommendations

The instructor may provide letters of recommendation upon request. When writing a recommendation the instructor will include both graded and non-graded areas of performance. Non-graded performance areas may include teamwork, helping others, quality, planning & organization skills, communication, documentation, motivation, and the desire to go above and beyond expectations. The forum is an excellent way to demonstrate teamwork and communication skills.

Current Progress

Code Name	Grading Choice	Quizzes & Tests													Forum				Labs										Project	Extra Credit	Total	Grade
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	T1	T2	T3	F1	F2	F3	F4	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10				
Max Points		3	3	3	3	3	3	3	3	3	3	30	30	30	20	20	20	20	30	30	30	30	30	30	30	30	30	30	60	90	560	
adaldrida	grade																															

More on Grading

Course Home Calendar

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0% to 59.9%	0 to 335	F	No pass

For some flexibility, personal preferences or family emergencies there is an additional 90 points available of **extra credit** activities.

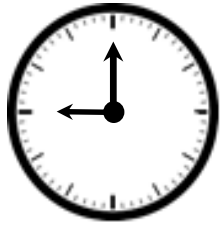
You control your grade. The more points you earn the higher your grade will be.

Grading - Lab Assignments

- 10 labs, 30 points each
- Due at 11:59PM (Opus time) on the date shown on the course Calendar.
- Late work is not accepted. There is no credit for any work turned in after the deadline. If you don't complete a lab assignment, please turn in what you have, by the due date, for partial credit.
- Students may work together and collaborate on labs but they must submit their own work to get credit.
- Lab resources, instructors, and assistants are available in the CIS lab. In addition the Linux Opus server and the CIS VLab may be accessed from anywhere over the Internet.

*A lab assignment due at 11:59PM will get **no credit** if turned in **one minute late** at 12:00AM which is midnight the next day!*

Grading - First Minute Quizzes



- 10 quizzes, 3 points each
- The quiz questions are shown on CCC Confer at 9:00AM sharp. Answers are emailed to the instructor. The order of the questions will not be known until the quiz is given! Emailed answers that are not in order will be marked as incorrect.
- The quiz questions are given out in advance and students can use the forum to collaborate on answers prior to class.
- Quizzes are open book/notes. Students may not give or ask others for assistance while taking a quiz.
- There are no makeup's for these quizzes and they must be taken and turned in within the first few minutes of class.
- Students that attend by watching the archives can do some extra credit work instead. In the past many working students have joined the class briefly at the start just to take the quiz and then return to work.

An incentive to start class on time

Grading - Tests

- 3 tests, 30 points each
- Tests are timed. 
- A practice test will be made available a week before the actual test. 
- Test 1 and 2 will be held during the last hour of class on the days shown on the Calendar.
- Working students have the option to take test 1 and test 2 later in the day but they must be completed no later than 11:59PM (Opus time) on the day of the test.
- Test 3 is the final exam and is mandatory. The time of the final exam is shown on the Calendar.
- Tests are open notes, open book, and open computer.
- Students may not give or ask others for assistance while taking a test.
- Tests may be taken remotely online.

Timed tests are more difficult due to the time pressure! They do help me understand what you have learned so I can adjust the course as needed.

If you get anxious, freeze up, or your mind just doesn't work on timed tests then come see me. I'll be happy to work with you on how to successfully take them.

Grading - Forum Posts

- 4 points per post, up to 20 points maximum per "posting quarter".
- The end date for each posting quarter is shown on the course calendar.
- The posts for the quarter will be due at 11:59PM (Opus time) on the date shown on the course Calendar.
- Extra posts in one quarter do not carry over to the next quarter.
- Only posts in the CIS 90 class forum will be counted.

As far as earning points, forum posts are "low hanging fruit" !!

Grading - Extra Credit

- Up to 90 points
- You need to attend to a family emergency and can't turn in a lab assignment on time … don't worry!
- Your schedule/commute doesn't allow you to take any of the "first minute" quizzes …. don't worry!
- You get anxious, panic and forget everything you know on a test … don't worry!
- You just don't like making forum posts … don't worry!

There are ample extra credit opportunities which provide you with the flexibility to get the grade you want.

There is a cap on extra credit points so plan carefully!

Making the fine print LARGE (and red)

Please remember:

1) NO makeup's for missed quizzes

2) Quiz answers in the wrong order or not emailed in the first few minutes will not be accepted

3) Late work will not be accepted. For example, a lab assignment due at 11:59PM will get no credit if turned in **one minute late** at 12:00AM (midnight) the next day

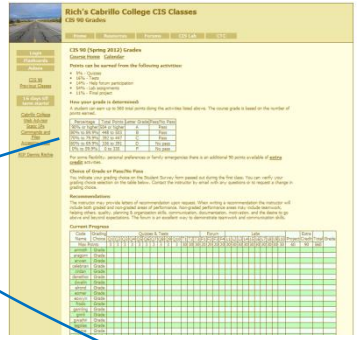
Tip: if you have not completed a lab assignment, **please turn in what you have done for partial credit.**

Don't panic though -- there are ample extra credit opportunities for students wanting or needing any extra points.

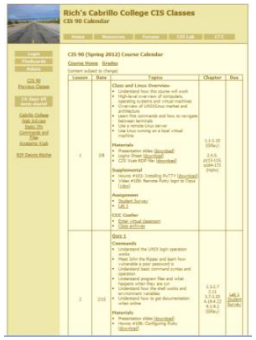
Final word on Grading

- You control your grade for this course!
- Use the **Grades** web page to plan for the grade you wish to receive and track your progress.
- Use the **Calendar** web page to see due dates for ALL lab assignments, extra credit labs and forum posts. See when EVERY quiz and test is scheduled.

Grades



Calendar



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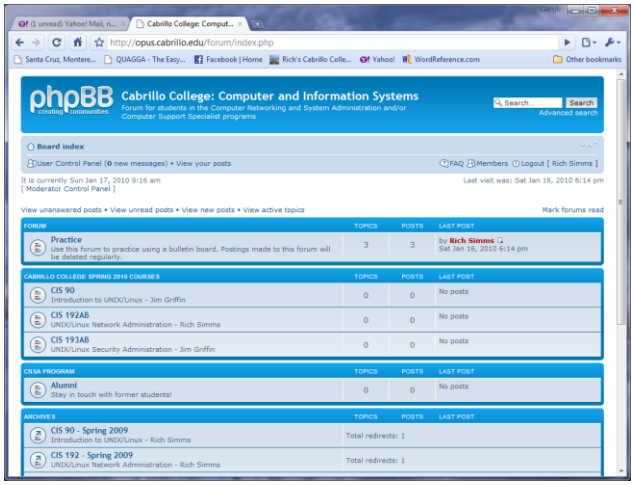
60% to 69.9%	336 to 391	D	No pass
0% to 59.9%	0 to 335	F	No pass

At the end of the course the instructor will count the number of points you have earned and use this table on the Grades web page to determine your grade.

Help Forum

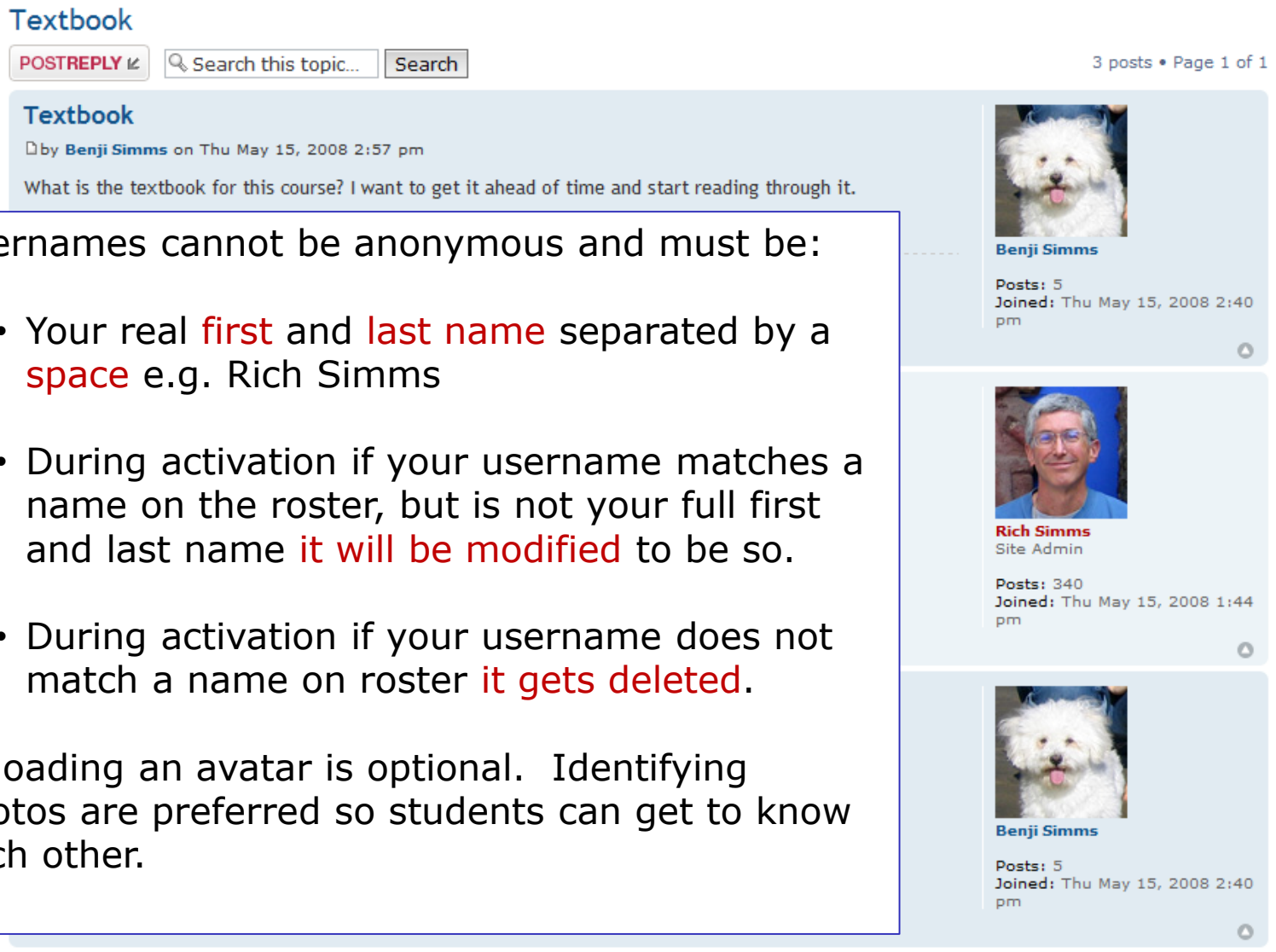
Online Help Forum



- Post questions and answers
- Get clarifications on assignments
- Collaborate with classmates on assignments, quizzes and practice tests.
- Share UNIX/Linux information and ideas
- Post class notes for classmates who miss class
- Since this is a public forum on the Internet:
  - Never post passwords!
  - Be nice, be respectful, be professional.

As an incentive to use the forum - students can earn 4 points per CIS 90 forum post (capped at 20 points for each posting period)

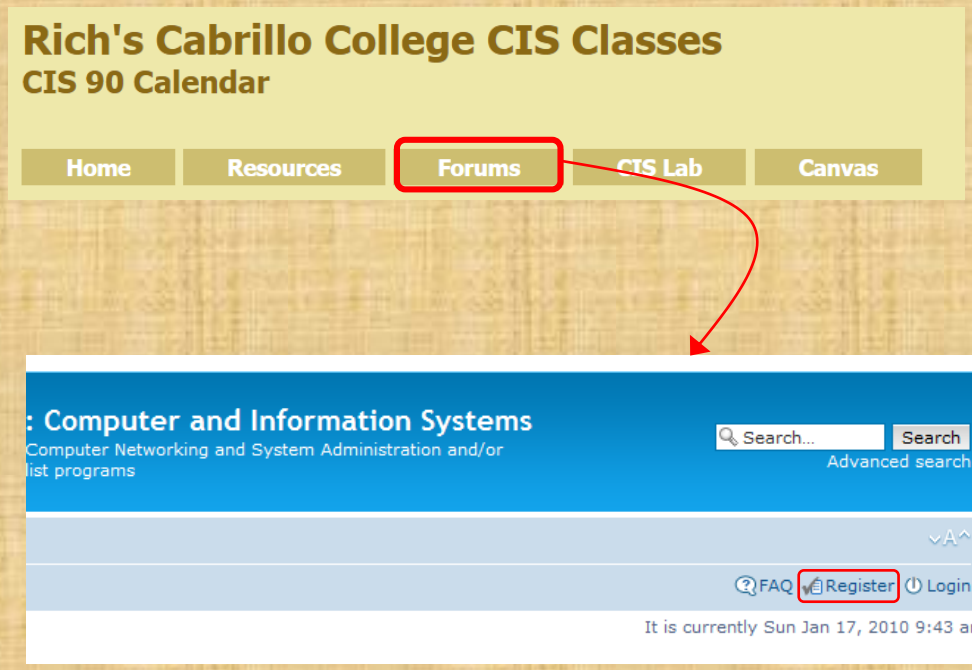
Class Forum



- Usernames cannot be anonymous and must be:
  - Your real first and last name separated by a space e.g. Rich Simms
  - During activation if your username matches a name on the roster, but is not your full first and last name it will be modified to be so.
  - During activation if your username does not match a name on roster it gets deleted.
- Uploading an avatar is optional. Identifying photos are preferred so students can get to know each other.

Class Activity
Forum Registration

Click the Forums link on http://**simms-teach.com**



To Register:

1. Browse to the forum
2. Click on Register
3. Review and agree to terms
4. Your **Username** must:
   - be your first and last name separated by a space
   - e.g. Benji Simms
   - match a name on the class roster

Note: If you have already registered for a previous CIS course you don't need to do it again.

Note: All registrations are manually approved by the instructor. If your username is incomplete or does not match a name of the class roster it will be modified or deleted.

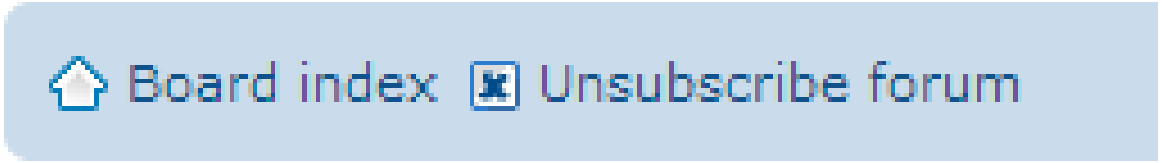
Class Forum

Subscribe to the forum to get email notifications of new posts

After logging in:

1. Go to the CIS90 class forum.
2. Click the "Subscribe forum" box at the lower left. When subscribed you get email notifications when new posts are made.
3. To unsubscribe, click it again.

Unsubscribed looks like this



Subscribed looks like this

Lab Resources

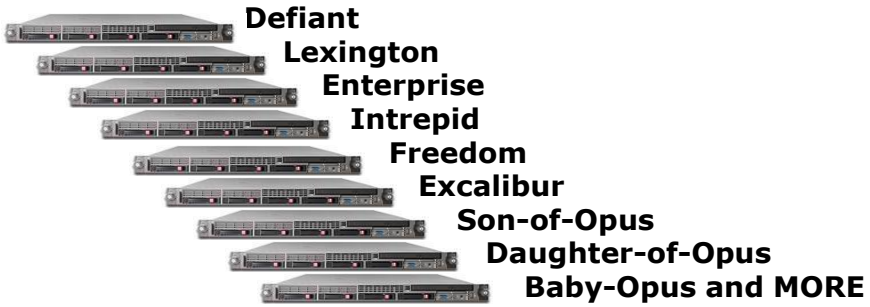
The CIS 90 System Playground

Configured for
Command Line Only

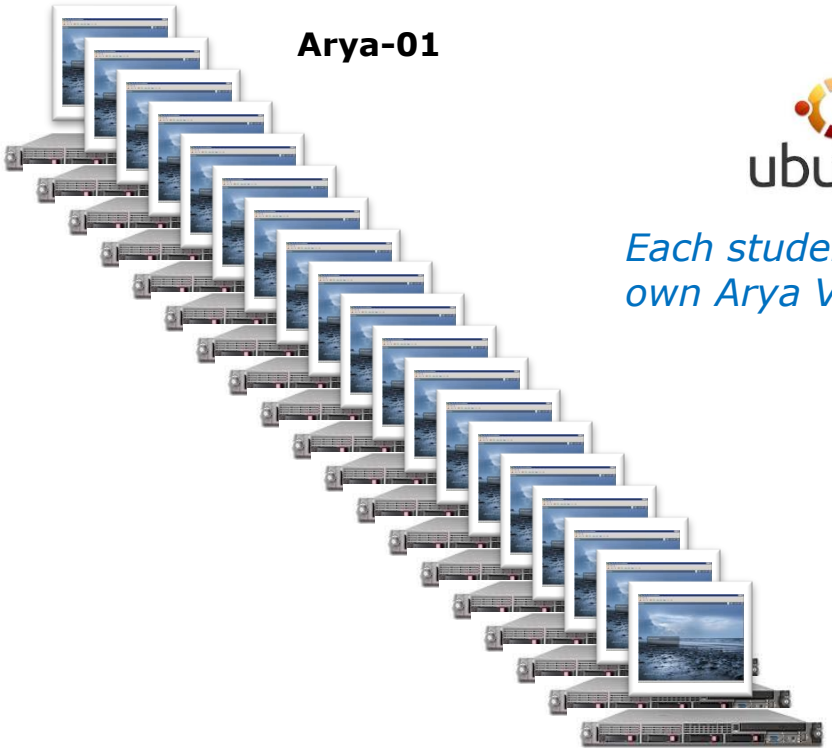
Opus

Sun-Hwa-XX servers for tests

Other UNIX/Linux servers



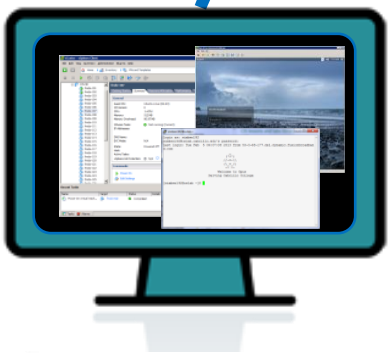
Configured for
Graphics and Command Line



Each student gets their own Arya VM for the term

All the systems are virtual machines (VMs) running on the CIS Lab servers. They are available from on or off-campus

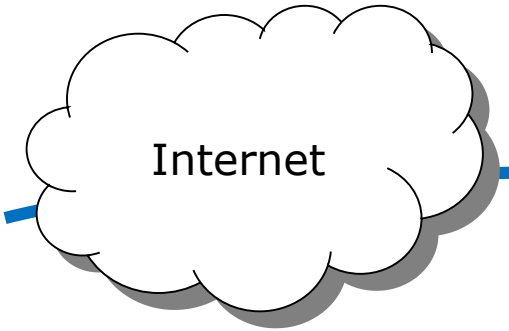
Option 1: Work on assignments online from anywhere



Home

School

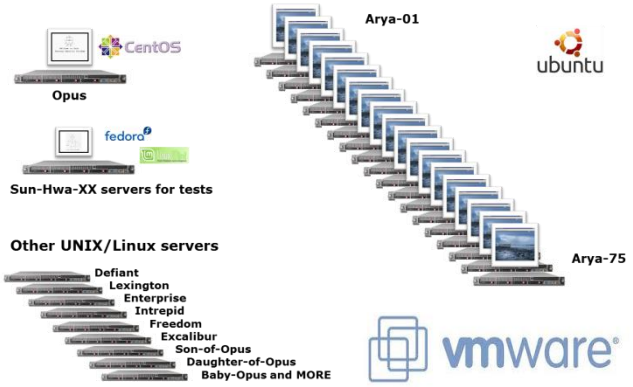
Travel



Cabrillo College est. 1959

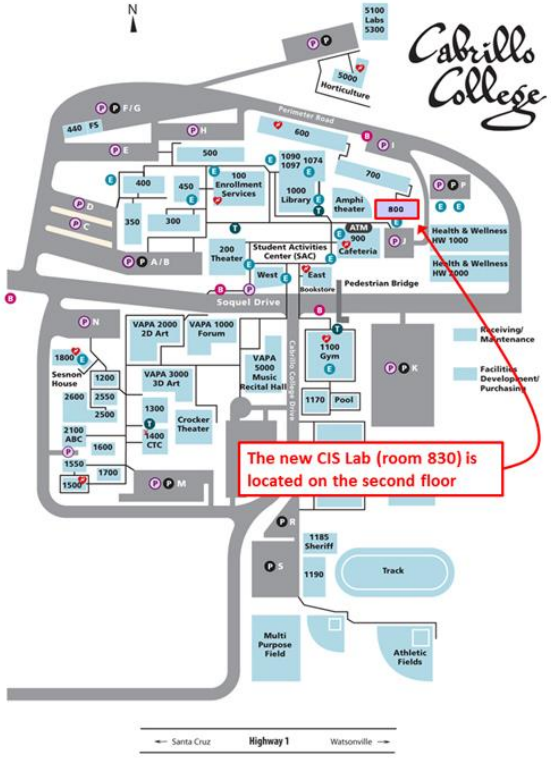
CIS Lab servers on the Aptos campus

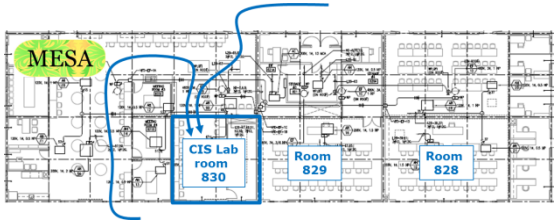
The CIS 90 systems, e.g. Opus and Sun-Hwa, are virtual machines hosted on physical servers in the CIS Lab



Option 2: Work on assignments in the CIS Lab

Building 800 - Room 830 (in the STEM Center)



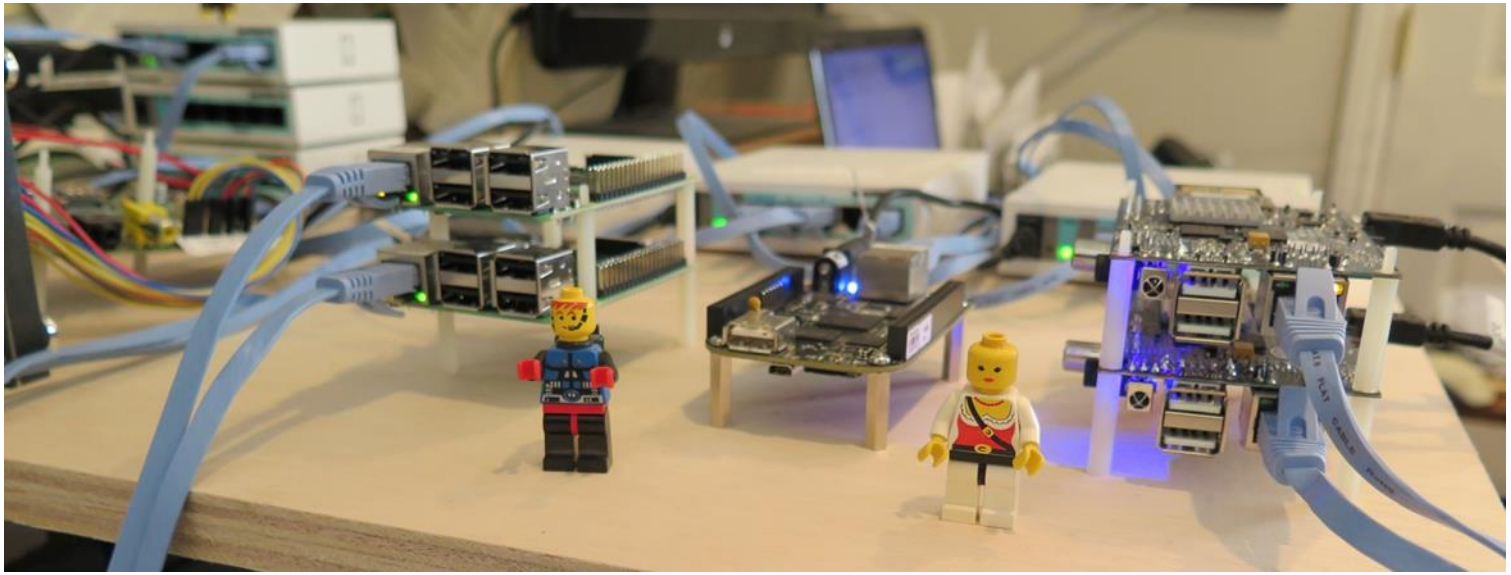


Instructors, lab assistants and equipment are available CIS students.

Great place to collaborate with classmates and a place for study groups to meet.

Use this link to see the schedule and location

The CIS 90 System Playground

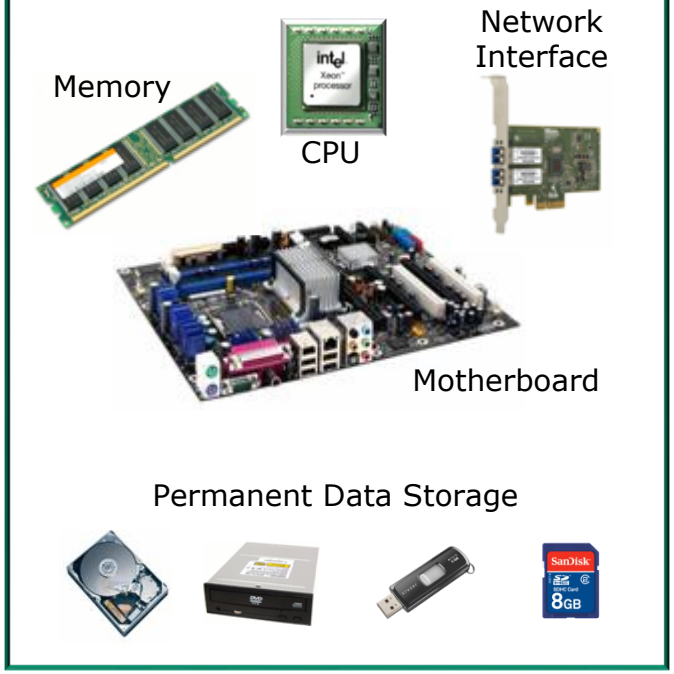


My micro lab on my desk at home. Watch the forum for an extra credit activity using this tiny lab.

Computers

What is a computer?

Hardware



Software

Applications "Apps" (programs)

Operating System

At a high level all computers have the same basic hardware and software components


Hardware

Computer hardware has many form factors


smart phone


tablet


Raspberry Pi


desktop


mobile "laptop"


supercomputer


blade server


"heavy iron" server


Virtual Machine


"pizza box" 1U rack server


smart watch

Computers come in a wide variety of form factors


Office
Outlook 2010


App Store


The Apache Software Foundation


Office
Word 2010


SAP

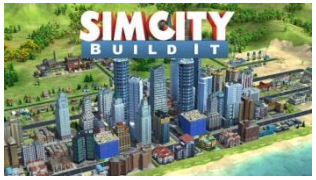

Norton
from symantec

Software


redhat


Adobe

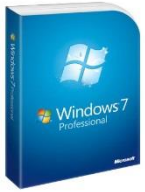

ORACLE


SIMCITY
BUILD IT


AVG


Office
PowerPoint 2010


GNU


Windows 7
Professional


Google Docs


Play Store
APPS
GAMES
MOVIES & TV
MUSIC
BOOKS
NEWSSTAND


McAfee

Software can be divided into programs (apps) and operating systems

Users

Applications "Apps" (programs)

- Interface to users via graphics (GUI) or command line (CLI)
- Use the OS for all access to hardware resources

Examples: word processors, spreadsheets, smartphone apps, web servers, compilers, games, email, web browsers, media players, databases, CAD/CAM, contact management, anti-virus, accounting, enterprise applications, custom software, and millions more!

Operating System (OS)

- Shares hardware resources
- Loads and executes programs
- Manages processes (running programs)
- Manages memory
- Manages the file system
- Provides input/output services
- Monitors the system
- Network stack services

Examples: Windows, Mac, Linux, Unix

Hardware

Software Licensing

Public Domain (paid for by the taxpayer)

- Source code is available
- No license, no copyright, maybe modified and redistributed
- Examples: USGS mapping software, NASA aerodynamics software

Open Source

- See: http://opensource.org
- Source code is available
- Community of developers doing online collaboration
- Pragmatic redistribution licenses
- Examples: Apache, Firefox, Android, OpenOffice, OpenBSD, LibreOffice

Free Software Foundation

- See: https://www.fsf.org
- Source code is available
- GNU ("GNU is not UNIX") General Public License, COPYLEFT
- Examples: GNU/Linux, gimp, emacs, nano, gcc, zebra, Files

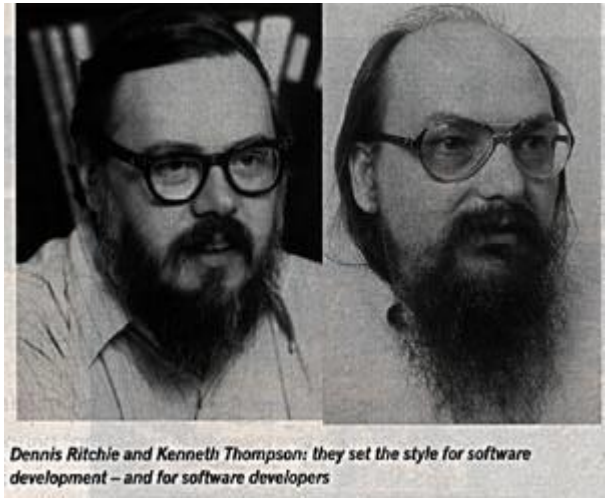
Proprietary (closed source)

- Source code is not available
- Considered intellectual property
- Must be licensed to use
- Examples: Adobe Photoshop, Microsoft Windows, Mac OS X, AT&T UNIX System V, Cisco IOS

UNIX/Linux overview

In 1971 Ken Thompson and Dennis Ritchie developed Unix at AT&T's Bell Labs

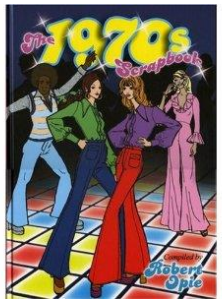
In 1971 Ken Thompson and Dennis Ritchie developed Unix at AT&T's Bell Labs

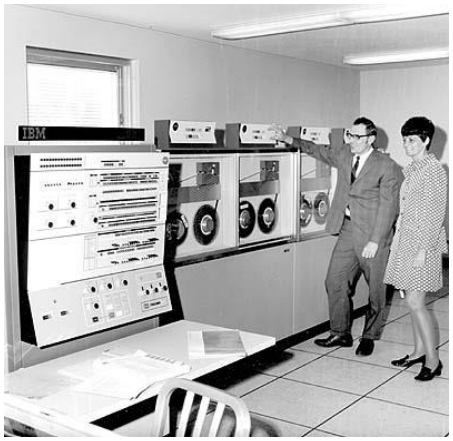


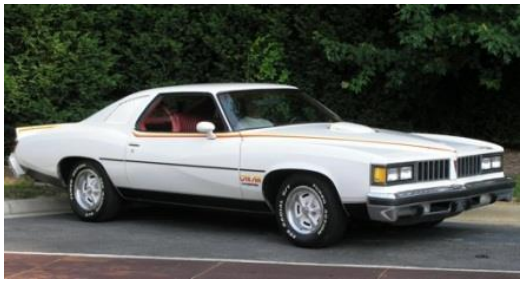
Dennis Ritchie and Kenneth Thompson: they set the style for software development – and for software developers

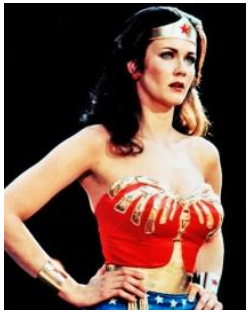
Bell Laboratories

Isn't UNIX/Linux an antique Operating System dating back to the early 70's that belongs in a museum?









Heck NO !!

UNIX/Linux is widely used, constantly improved and growing fast!

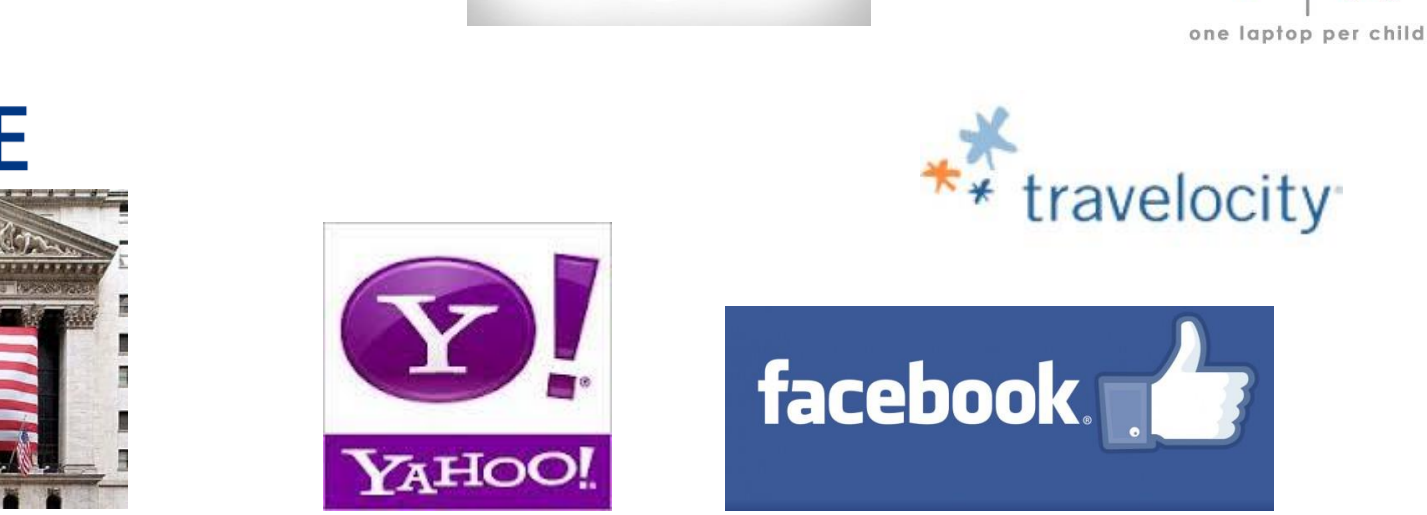
- Cloud infrastructure – Amazon AWS, OpenStack, etc.
- Embedded in smartphones, tablets and many other appliances.
- Internet services - Web, DNS, DHCP, Net News, Mail, etc.
- Enterprise and mission critical applications - Large databases, Enterprise Resource Management (ERM), Customer Relationship Management (CRM), data warehouse, manufacturing, supply chain management, etc.
- Hollywood - feature animation, visual effects, rendering farms.
- Number-crunching super computers for research.
- Businesses like Amazon, Paypal, Facebook, NYSE, Google, Home Depot run their businesses on UNIX/Linux

http://www.comparebusinessproducts.com/fyi/50-places-linux-running-you-might-not-expect

UNIX/Linux Overview

Supplemental

Businesses and organizations that run on Linux



http://www.comparebusinessproducts.com/fyi/50-places-linux-running-you-might-not-expect

Internet service providers use UNIX/Linux to provide web, DNS, DHCP, Mail, etc. services to their customers.

Film Studios

Film studios like DreamWorks have huge Linux "rendering farms" to produce the animation and special effects

The Open-Source Car

Summary: *Toyota is joining the Linux Foundation.*

By Steven J. Vaughan-Nichols for Linux and Open Source | July 5, 2011 -- 10:13 GMT (03:13 PDT)

Follow @sjvn

Besides a V6 as your engine, your car is very likely to soon be running Linux under the hood. The Linux Foundation will be announcing today that Toyota is joining the Foundation.

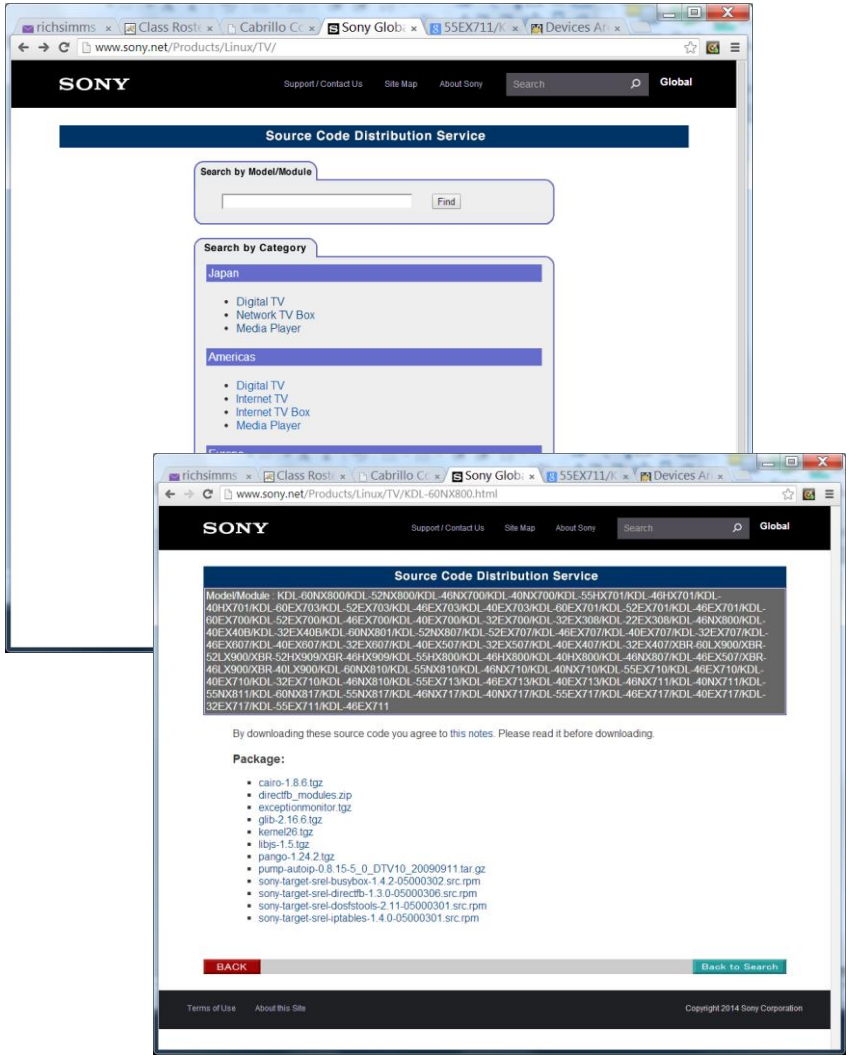
Some of you may be wondering, "What the heck is a car company doing joining the Linux Foundation?" The answer is easy. As the Foundation puts it, "A major shift is underway in the automotive industry. Car-makers are using new technologies to deliver on consumer expectations for the same connectivity in their cars as they've come to expect in their homes and offices. From dashboard computing to In-Vehicle-Infotainment (IVI), automobiles are becoming the latest wireless devices - on wheels."

And, what's one of the most popular systems for dashboard computing, heads-up driving displays and IVI? It's Linux, of course.

< snipped >

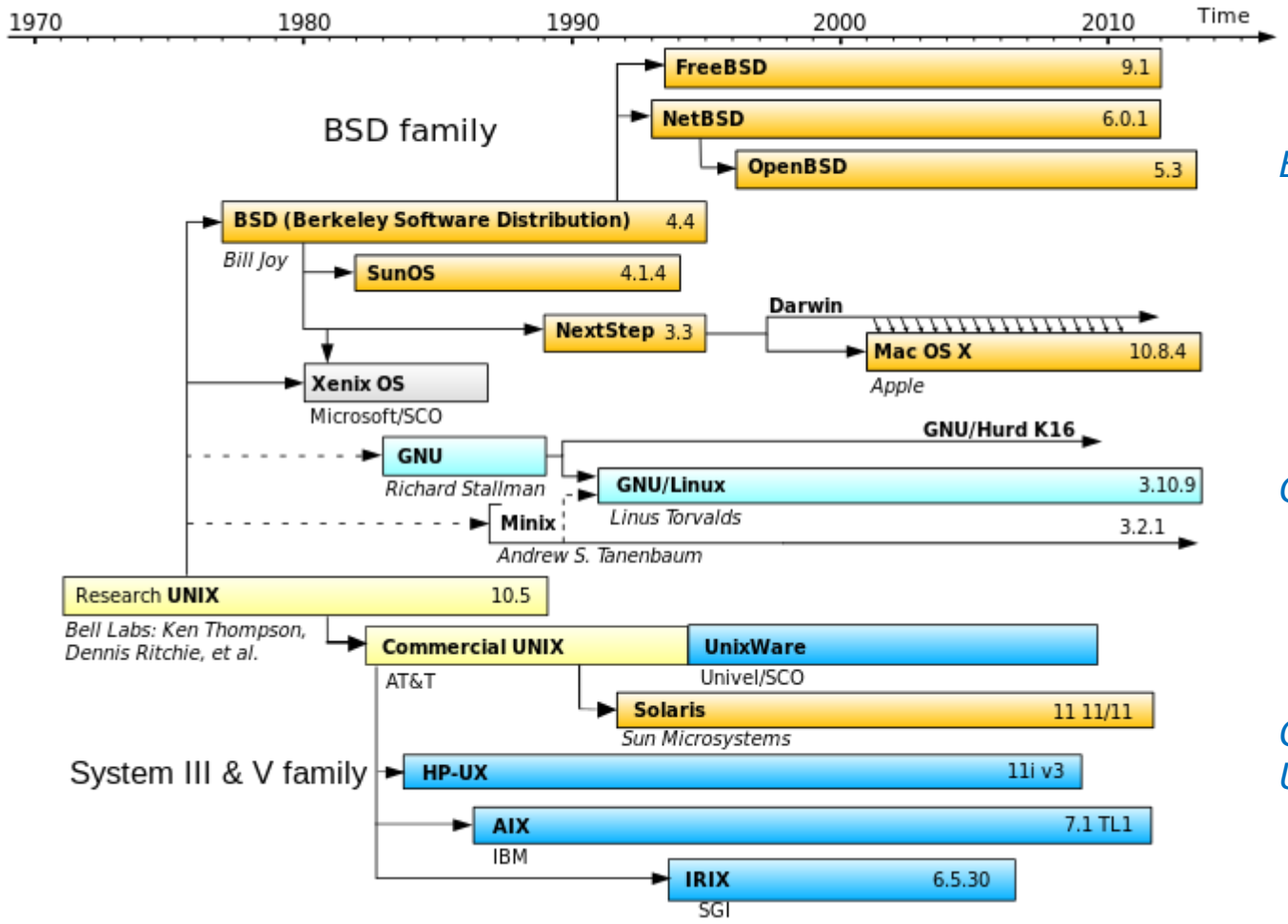
http://www.zdnet.com/blog/open-source/the-open-source-car/9193

Televisions



http://www.sony.net/Products/Linux/common/search.html


Unix
family
trees



BSD family

GNU/Linux

Commercial UNIX family

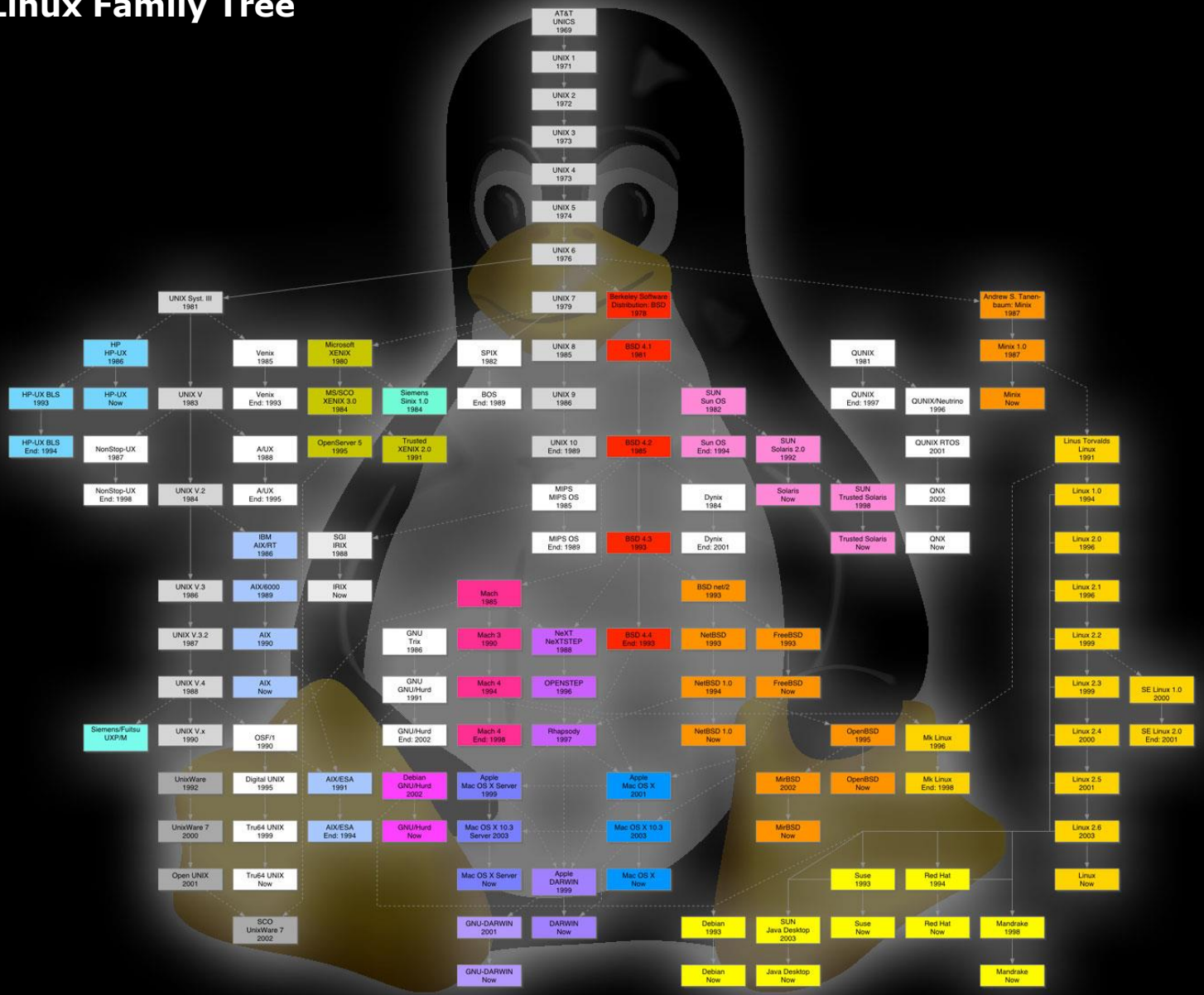
It all started at Bell Labs

Source: http://upload.wikimedia.org/wikipedia/commons/thumb/5/51/Unix_history.svg/705px-Unix_history.svg.png

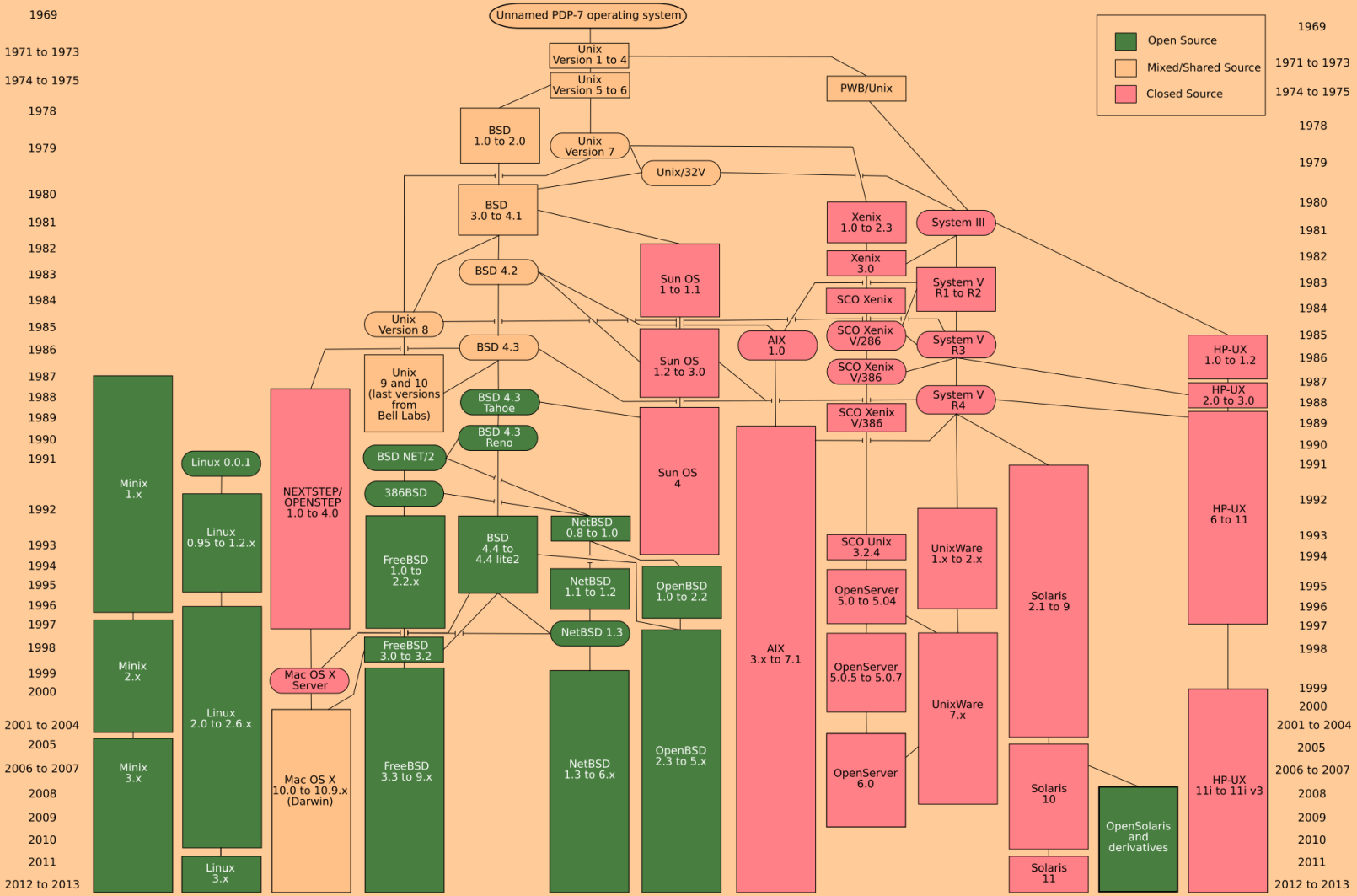
Unix family Trees

Supplemental

UNIX/Linux Family Tree

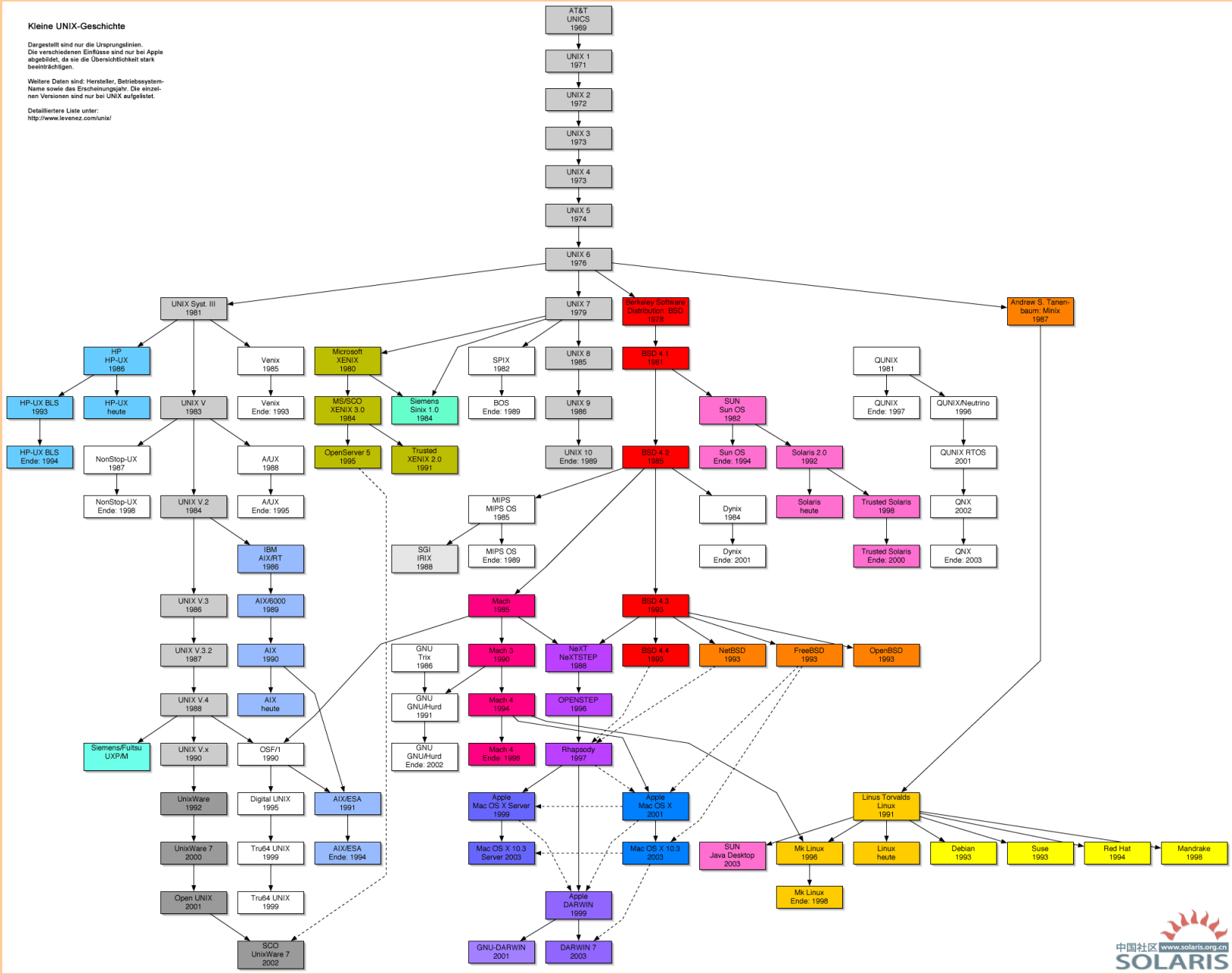


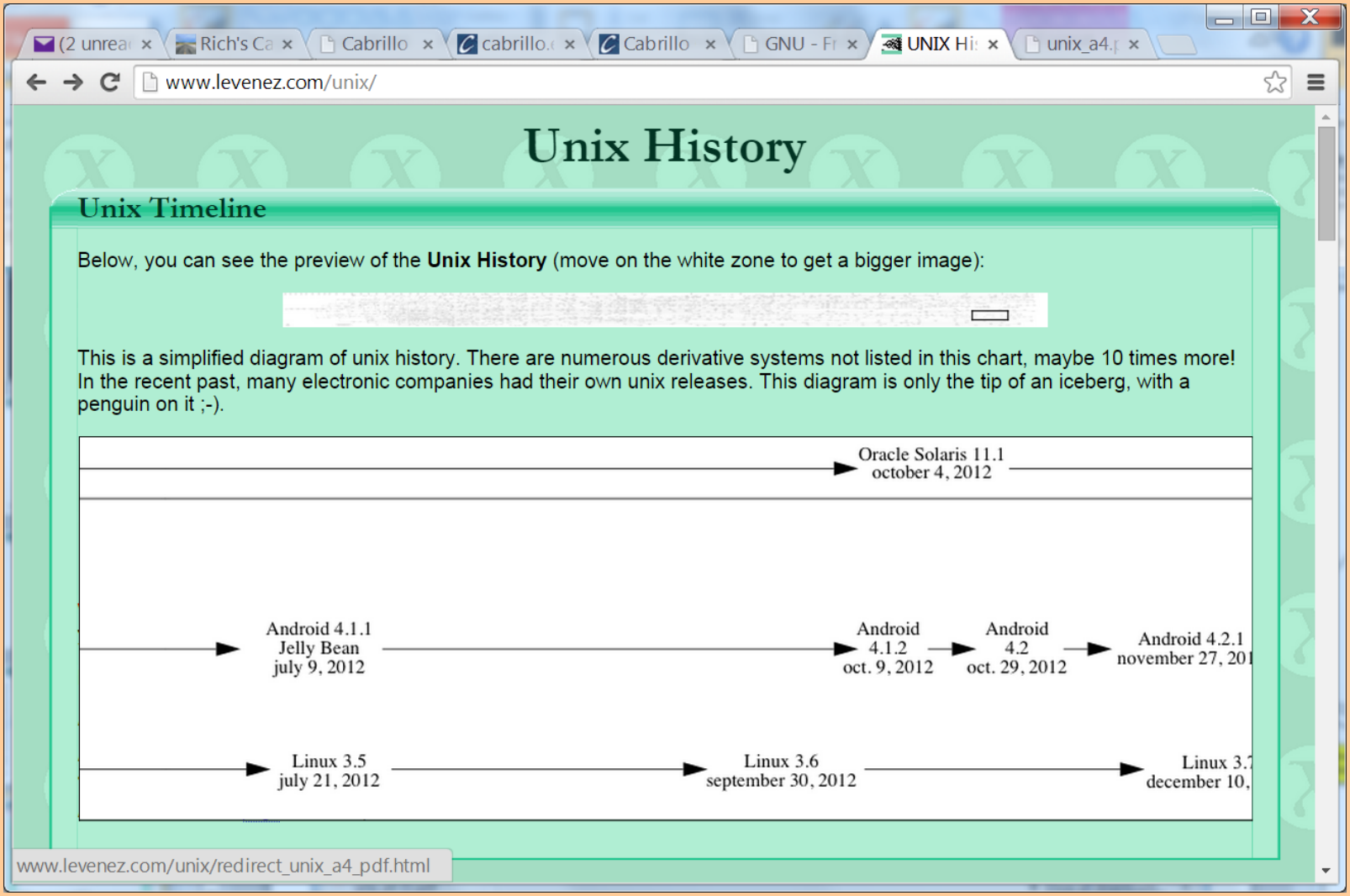
Source: http://www.freebsdnews.net/wp-content/uploads/unix_family_history_tree_1600x1200.jpg



Source: http://en.wikipedia.org/wiki/Unix#mediaviewer/File:Unix_history-simple.svg

Source: http://www.mike.org.cn/wp-content/f2/attachments/200906/6740791750.gif





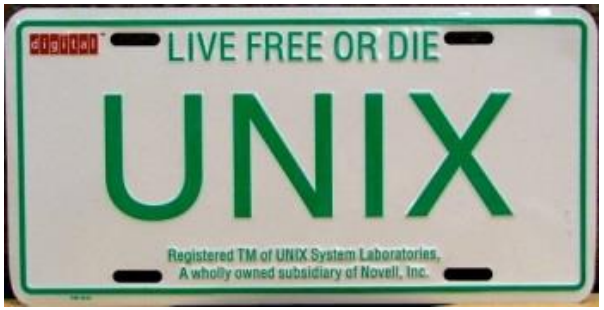
http://www.levenez.com/unix/

UNIX

Commercial UNIX

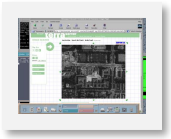
The commercial "UNIX" descendants

The UNIX trademark is owned and managed by The Open Group on behalf of the industry to signify products that are certified to conform to the Single UNIX Specification.

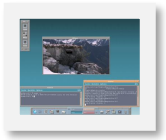


SCO UNIX
PC servers

Sun Solaris
Servers and workstations



IBM AIX
Servers, mainframes and workstations



HP HP-UX
Servers and workstations

Apple OS X
Mac computers

BSD

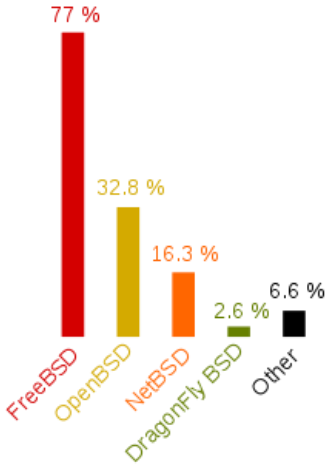
Berkeley

Software

Distribution

BSD Unix and its "UNIX-like" Descendants

UC Berkeley had a source license from AT&T so they could make their own modifications and additions like TCP/IP which enabled Unix for the Internet. BSD Unix was very popular with university and government users.



Because the original BSD Unix was based on ATT's UNIX code it had to be re-written from scratch so it could be distributed freely as open source. These "UNIX-like" descendants are not allowed to used the UNIX trademark.

Source: http://en.wikipedia.org/wiki/OpenBSD

Apple iOS

The Apple iOS, internally known as Darwin, like Mac OS X, runs on a Unix-like kernel (Mach kernel + BSD components)

Sources: http://en.wikipedia.org/wiki/Darwin_(operating_system)
http://en.wikipedia.org/wiki/IOS_(Apple)

GNU/Linux

GNU is **N**ot **U**nix

GNU/Linux

Shells
System commands
Utilities
Libraries
Much more …

Richard Stallman started the GNU project in 1983 to create a free UNIX-like OS. He founded the Free Software Foundation in 1985. In 1989 he wrote the first version of the GNU General Public License

Kernel

Linus Torvalds, as a student, initially conceived and assembled the Linux kernel in 1991. The kernel was later re-licensed under the GNU General Public License in 1992.

Various GNU/Linux "Distros" (Distributions)

Red Hat Enterprise Linux

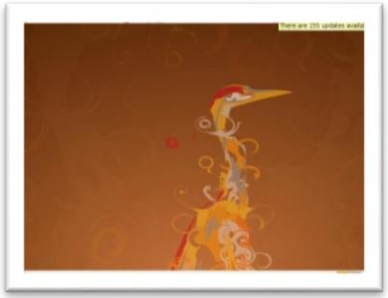
CentOS

Fedora

OpenSUSE

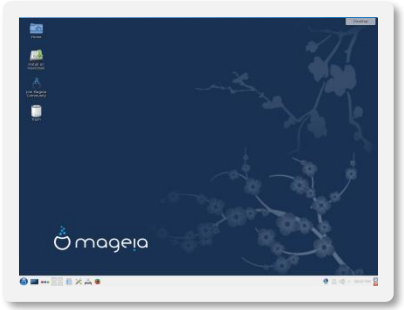
Debian

Ubuntu



Mint

Mageia



*Note: A distribution is built by a company or organization. They start with the **Linux kernel** then add a custom mix of open source components. They may then add some of their own unique software to differentiate their distribution.*

Tux, the penguin, is the Linux kernel mascot

iso.linuxquestions.org

15 Most Popular Linux Distro Downloads

15 Most Downloaded Distribution Versions (last 30 Days)	15 Most Downloaded Distributions (Ever)
1. BackTrack 5 R3 (563598)	1. Fedora
2. CentOS 6.5 (24485)	2. Red Hat Enterprise Linux
3. Linux Mint 17.1 (10509)	3. Mandriva
4. Fedora 20 (7214)	4. Ubuntu
5. Wifislax 4.9 (6778)	5. SUSE
6. Puppy Linux 6.0 "Tahrpup" (4429)	6. CentOS
7. CentOS 7.0-1406 (4029)	7. Damn Small Linux
8. KNOPPIX 7.4.2 (3455)	8. Knoppix
9. linuX-gamers Live 0.9.7 (2675)	9. BackTrack
10. FreeBSD 9.3 (2312)	10. Debian
11. Puppy Linux 4.3.1 (1912)	11. Slackware
12. Ubuntu 12.04.4 (1584)	12. Linux Mint
13. Damn Small Linux 4.4.10 (1207)	13. PCLinuxOS
14. Xubuntu 14.04.1 (1052)	14. Puppy Linux
15. Zorin OS 6 "Lite" (968)	15. MEPIS

Jan 21, 2015

There are hundreds of Linux distributions. The one thing they have in common is they all use the Linux kernel.

Embedded Linux (just a few)

Katana Robotic Arm

Erle-Copter drone

Nest Cam

Amazon Kindle

Stir smart desk

Asus RT-AC66U wireless router

Tivo

Yamaha Disklavier Mark IV

Android Cell Phones

Some TomTom GPS models

Garmin Nuvi 5000

Buffalo NAS storage

Virgin America Personal Entertainment

TripBPX Phone System

MikroTik Routers

Sony TVs

Android Tablets

Raspberry Pi

Polycom VOIP Phone

For more see: http://linuxgizmos.com/category/devices/


Unix/Linux
Architecture
simplified

UNIX/Linux Architecture
Simplified View

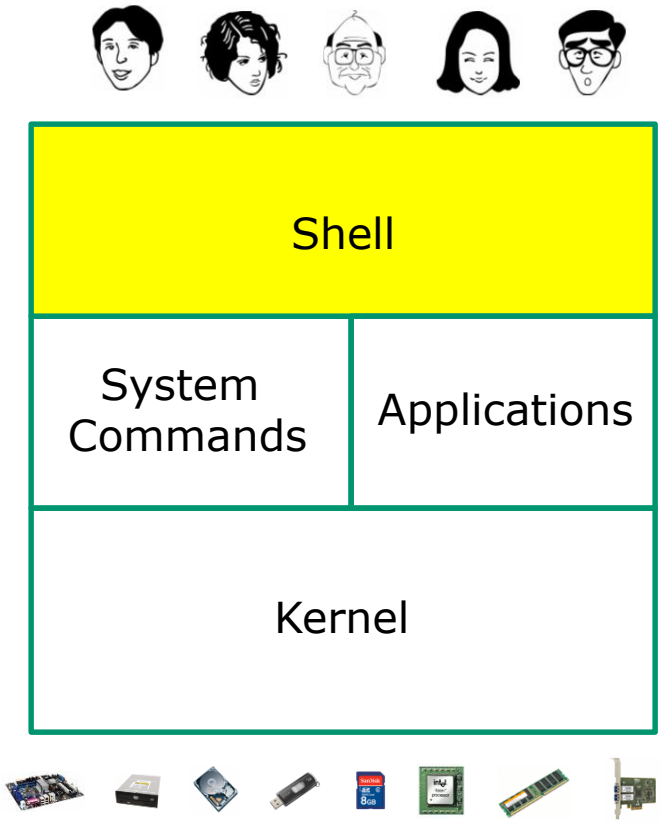
Users

Software

Shell (a program)	
System Commands (programs)	Applications (programs)
Kernel (low level operating system functions)	

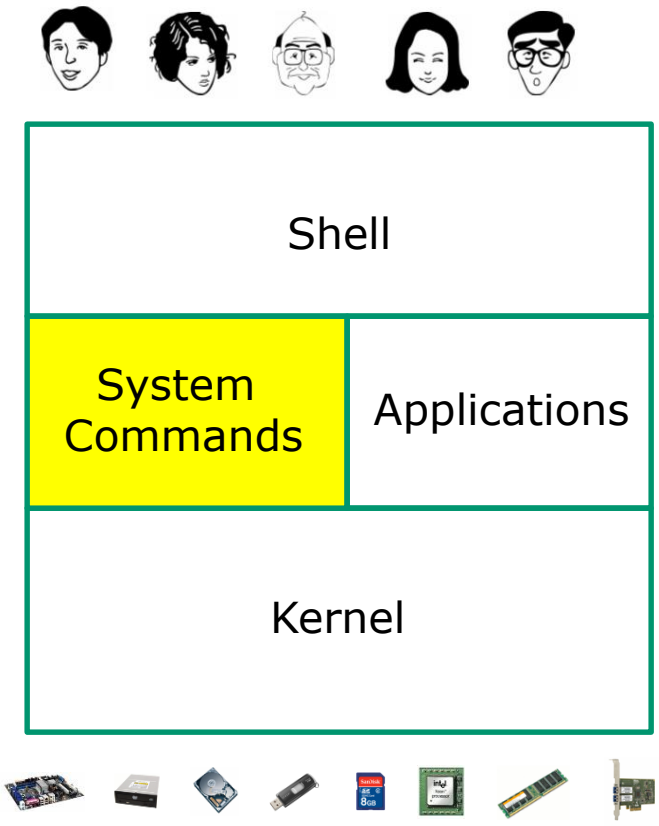
Hardware

The Shell (Command Line)



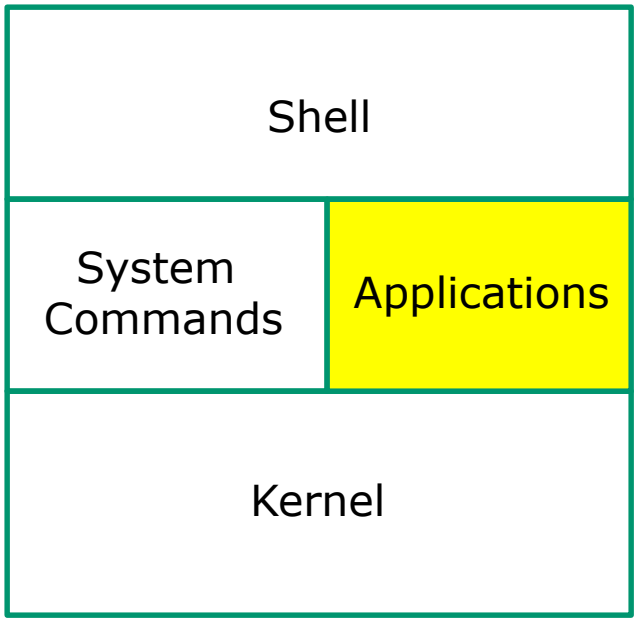
- Allows users to interact with the computer
- Called a "shell" because it hides the underlying operating system.
- Prompts user for a command, parses the command, then locates the command (a program or script) and runs it.
- Many shell programs are available: sh (Bourne shell), bash (Bourne Again shell), csh (C shell), ksh (Korn shell).
- The shell is a user interface and a programming language (scripts).
- GNOME and KDE desktops could be called graphical shells.

System Commands



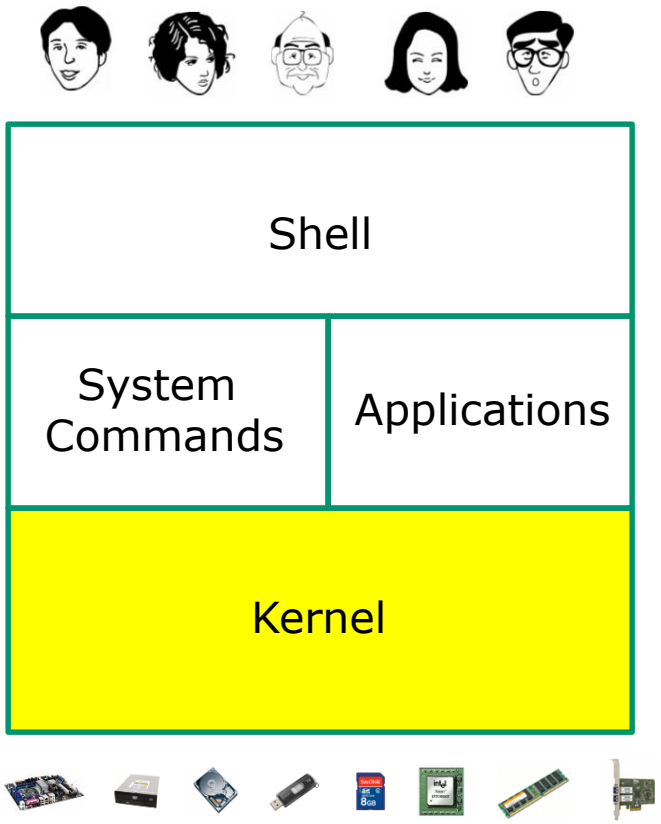
- 100's of system commands and utilities.
- We will learn how to use the following commands in this lesson:
  - cal
  - clear
  - date
  - exit
  - hostname
  - id
  - ps
  - ssh
  - tty
  - uname

UNIX/Linux Architecture
Applications



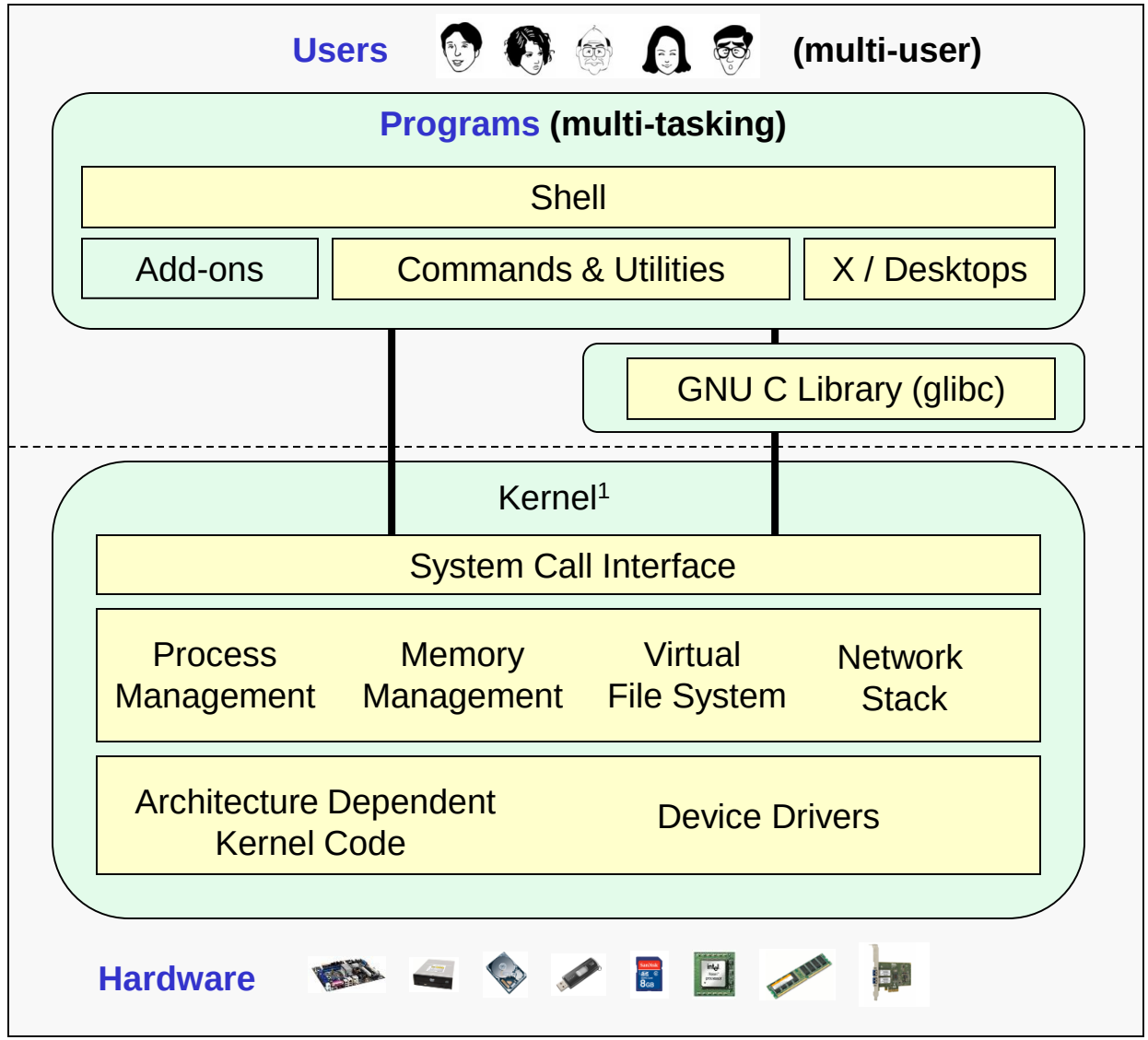
- Could be included in the distribution or optionally installed.
- Could be an add-on program developed by an ISV (Independent Software Vendor) or Open Source organization.
- Could be an in-house developed custom application.
- Examples are **Apache** (web server), **GIMP** (GNU image manipulation program), **OpenOffice** (word processing, spreadsheets, presentations), **Oracle** (commercial database), … etc.

The Kernel



- Lowest level, inner-most core of the operating system.
  - Process management - what programs are called when they are loaded and running.
  - Memory management - handles all the reads and writes to memory (RAM and virtual memory).
  - File System - handle all the reads and writes to files on drives.
  - Network stack - provides the communication layers to exchange packets with other computers.

GNU/Linux Operating System Architecture



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Linus Torvalds, as a student, initially conceived and assembled the Linux kernel in 1991. The kernel was later re-licensed under the GNU General Public License in 1992.

[1]See "Anatomy of the Linux kernel" by M. Tim Jones at http://www-128.ibm.com/developerworks/linux/library/l-linux-kernel/

UNIX/Linux Design "Observations"

- Multi-tasking and multi-user capabilities
- Unlike Windows, the GUI does not run in the kernel (adds stability)
- Unlike Windows, multiple graphical desktops available
- Linux kernel is "monolithic", not a modular "microkernel"
- Dynamic - can load and unload modules on the fly
- Programs restricted to the privileges of the user running them (more secure)
- Scalable - scales up to handle the largest enterprise and mission-critical applications
- Portable - runs on a variety of hardware platforms
- Reliable and robust
- Powerful, but NOT friendly !!


Market
Share


Worldwide Server Market

FRAMINGHAM, Mass., June 1, 2016 – According to the International Data Corporation (**IDC**) **Worldwide Quarterly Server Tracker**, vendor revenue in the worldwide server market decreased 3.6% year over year to $12.4 billion in the first quarter of 2016 (1Q16). This ended a seven quarter streak of year-over-year revenue growth as server market demand slowed due to a pause in hyperscale server deployments as well as a clear end to the enterprise refresh cycle. Worldwide server shipments decreased 3.0% to 2.2 million units in 1Q16 when compared with the same year-ago period.

Source: IDC, https://www.idc.com/getdoc.jsp?containerId=prUS41424716

Quarter	2012Q1	2012Q2	2012Q3	2012Q4	2013Q1	2013Q2	2013Q3	2013Q4	2014Q1	2014Q2	2014Q3	2014Q4	2015Q1	2015Q2	2015Q3
OS	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units
i5/OS	376	376	479	560	348	303	394	452	172	201	220	278	317	154	171
Linux	552,776	580,481	704,734	731,987	633,291	748,081	764,935	882,012	755,867	821,566	953,219	995,669	867,441	881,780	1,019,325
NetWare															
OpenVMS	121	302	238	275	193	230	209	94	46	103	103	98	29	37	43
Others	1,260	1,099	1,010	1,013	1,071	911	1,039	825	696	469	535	580	417	300	360
Unix	44,831	45,290	40,209	41,593	31,063	34,446	31,035	32,064	24,739	27,022	25,303	26,571	19,969	22,855	21,994
Windows	1,434,667	1,444,014	1,524,330	1,520,144	1,367,995	1,413,723	1,456,832	1,557,954	1,295,665	1,373,838	1,404,824	1,519,288	1,365,814	1,391,140	1,448,711
z/OS	441	452	401	998	646	688	678	911	541	940	486	713	819	1,148	687
TOTAL	**2,034,470**	**2,072,014**	**2,271,402**	**2,296,570**	**2,034,607**	**2,198,382**	**2,255,122**	**2,474,312**	**2,077,727**	**2,224,138**	**2,384,688**	**2,543,197**	**2,254,806**	**2,297,414**	**2,491,291**

Source: Jorge Vela at IDC

Website hits by browser OS

Jul 2010[1]

Operating Systems		
1	Windows XP	48.17%
2	Windows 7	17.02%
3	Windows Vista	16.60%
4	Mac OS X	4.84%
5	Linux	1.45%
6	Windows 2003	1.02%
7	iPhone OSX	0.56%
8	Windows 2000	0.31%
9	WAP	0.12%
10	Android	0.08%

6.9%

Jan 2013[2]

Operating Systems		
1	Windows 7	44.13%
2	Windows XP	23.70%
3	iOS	8.79%
4	Apple OS X	8.52%
5	Windows Vista	5.48%
6	Android	3.75%
7	Windows 8	2.28%
8	Linux	1.74%
9	BlackBerry	0.61%
10	SymbianOS	0.23%

22.8%

Jun 2016[3]

Top 10 Platforms		
1	Windows 7	23.72%
2	iOS 9	14.16%
3	Android 4	12.16%
4	Windows 10	12.16%
5	Android 5	10.59%
6	Windows 8.1	5.10%
7	Android 6	4.41%
8	Mac OS X	3.82%
9	Windows XP	2.83%
10	Linux	2.48%

47.5%

1-This report was generated 07/31/2010 based on the last 15,000 page views to each website tracked by W3Counter. W3Counter's sample currently includes 38,996 websites. The browser market share graph includes data from all versions of the named browser families, not only the top 10 as listed below.

2-This report was generated 01/31/2013 based on the last 15,000 page views to each website tracked by W3Counter. W3Counter's sample currently includes 63,187 websites. The browser market share graph includes data from all versions of the named browser families, not only the top 10 as listed below.

3-This report was generated 06/30/2016 based on the past month's traffic to all websites that use W3Counter's free web stats.

W3Counter

Source: http://www.w3counter.com/globalstats.php

```
Frame 181: 357 bytes on wire (2856 bits), 357 bytes captured (2856 bits) on interface 0
Ethernet II, Src: Vmware_bb:31:58 (00:0c:29:bb:31:58), Dst: AsustekC_85:3e:e8 (2c:56:dc:85:3e:e8)
Internet Protocol Version 4, Src: 192.168.1.56, Dst: 208.113.154.64
Transmission Control Protocol, Src Port: 46618 (46618), Dst Port: 80 (80), Seq: 1, Ack: 1, Len: 303
Hypertext Transfer Protocol
  GET / HTTP/1.1\r\n
  Host: smilesantacruz.com\r\n
  User-Agent: Mozilla/5.0 (X11; Linux i686; rv:44.0) Gecko/20100101 Firefox/44.0 Iceweasel/44.0.2\r\n
  Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
  Accept-Language: en-US,en;q=0.5\r\n
  Accept-Encoding: gzip, deflate\r\n
  Connection: keep-alive\r\n
```

Kali Linux (Iceweasel)

```
Frame 655: 627 bytes on wire (5016 bits), 627 bytes captured (5016 bits) on interface 0
Ethernet II, Src: Apple_b2:aa:8b (ac:bc:32:b2:aa:8b), Dst: Netgear_5c:a7:cc (2c:30:33:5c:a7:cc)
Internet Protocol Version 4, Src: 172.30.1.55, Dst: 208.113.154.64
Transmission Control Protocol, Src Port: 49428, Dst Port: 80, Seq: 1, Ack: 1, Len: 573
Hypertext Transfer Protocol
  GET / HTTP/1.1\r\n
  Host: smilesantacruz.com\r\n
  Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
  Upgrade-Insecure-Requests: 1\r\n
  Cookie: __utma=222560537.1964456004.1485290514.1485290514.1485297432.2; __utmb=222560537.1.10.1485297432; __utmc=222560537; __utmt=1;
  User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_2) AppleWebKit/602.3.12 (KHTML, like Gecko) Version/10.0.2 Safari/602.3.12\r
  Accept-Language: en-us\r\n
  Accept-Encoding: gzip, deflate\r\n
  Connection: keep-alive\r\n
  \r\n
  [Full request URI: http://smilesantacruz.com/]
```

Mac OS X 10.12 (Safari)

When you surf websites you leave information such as your IP address, operating system and browser app.

```
Frame 169: 591 bytes on wire (4728 bits), 591 bytes captured (4728 bits) on interface 0
Ethernet II, Src: GoodWayI_7f:66:04 (00:50:b6:7f:66:04), Dst: AsustekC_85:3e:e8 (2c:56:dc:85:3e:e8)
Internet Protocol Version 4, Src: 192.168.1.237, Dst: 208.113.154.64
Transmission Control Protocol, Src Port: 58706, Dst Port: 80, Seq: 1, Ack: 1, Len: 537
Hypertext Transfer Protocol
  GET / HTTP/1.1\r\n
  Accept: text/html, application/xhtml+xml, image/jxr, */*\r\n
  Accept-Language: en-US\r\n
  User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/51.0.2704.79 Safari/537.36 Edge/14.14393\r\n
  Accept-Encoding: gzip, deflate\r\n
  Host: smilesantacruz.com\r\n
  Connection: Keep-Alive\r\n
  Cookie: __utma=222560537.1126876212.1485282896.1485282896.1485282896.1; __utmb=222560537.2.10.1485282896; __utmc=222560537; __utmz=222560537.1485282896.1.1
  \r\n
  [Full request URI: http://smilesantacruz.com/]
  [HTTP request 1/2]
  [Response in frame: 191]
  [Next request in frame: 247]
```

Windows 10 (Edge)

How does the W3counter count Operating Systems? Browsers provide the information.

Smartphones

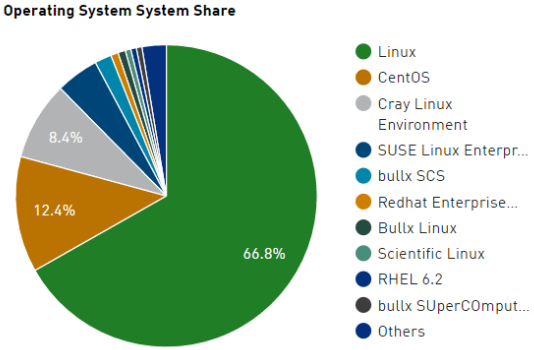
Worldwide Smartphone Sales to End Users by Operating System in 2Q16 (Thousands of Units)

Operating System	2Q16 Units	2Q16 Market Share (%)	2Q15 Units	2Q15 Market Share (%)
Android	296,912.8	86.2	271,647.0	82.2
iOS	44,395.0	12.9	48,085.5	14.6
Windows	1,971.0	0.6	8,198.2	2.5
Blackberry	400.4	0.1	1,153.2	0.3
Others	680.6	0.2	1,229.0	0.4
Total	**344,359.7**	**100.0**	**330,312.9**	**100.0**

Source: Gartner (August 2016)

Source: http://www.gartner.com/newsroom/id/3415117

Operating System Share June 2016



Linux dominates the Supercomputer market

TOP500® SUPERCOMPUTER SITES

Operating System	Count	System Share (%)	Rmax (GFlops)	Rpeak (GFlops)	Cores
Linux	334	66.8	247,434,891	385,940,626	18,527,451
CentOS	62	12.4	31,454,947	62,160,954	2,223,160
Cray Linux Environment	42	8.4	96,620,820	130,337,966	3,637,996
SUSE Linux Enterprise Server 11	23	4.6	30,651,690	42,727,804	1,203,092
bullx SCS	9	1.8	8,579,333	10,641,317	308,072
Redhat Enterprise Linux 6.4	4	0.8	3,668,262	5,040,438	132,410
Bullx Linux	4	0.8	5,912,187	7,642,599	218,112
Scientific Linux	3	0.6	1,714,761	2,031,552	73,384
RHEL 6.2	3	0.6	1,453,100	1,796,454	86,368
bullx SUperCOmputer Suite A.E.2.1	3	0.6	2,942,070	3,583,180	165,888
Redhat Enterprise Linux 6.5	3	0.6	3,393,110	4,528,051	122,416
AIX	3	0.6	1,201,135	1,405,914	49,504
Redhat Enterprise Linux 6	2	0.4	2,433,470	3,032,783	295,656
Kylin Linux	2	0.4	35,934,090	57,976,934	3,294,720
SUSE Linux Enterprise Server 12 SP1	1	0.2	609,779	669,760	16,100
Sunway RaiseOS 2.0.5	1	0.2	93,014,594	125,435,904	10,649,600
Redhat Enterprise Linux 7.2	1	0.2	334,800	534,097	11,184

Source: http://www.top500.org/statistics/list/

Tianhe-2 supercomputer in China

Cray XK7 Titan at Oak Ridge National Lab

Sequoia, IBM BlueGene/Q at Lawrence Livermore Lab

Fujitsu K computer in Japan

Mira, IBM BlueGene/Q at Argonne Lab

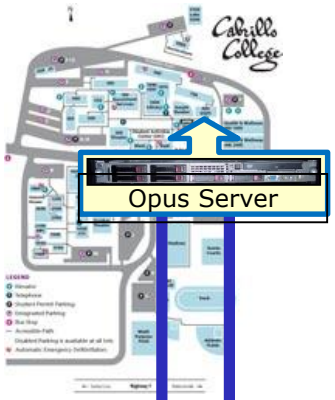
Logging in via ssh

SSH
(secure shell)

Getting the car keys

Problem: We need a secure (encrypted) way to login and enter commands to a remote server over the network.

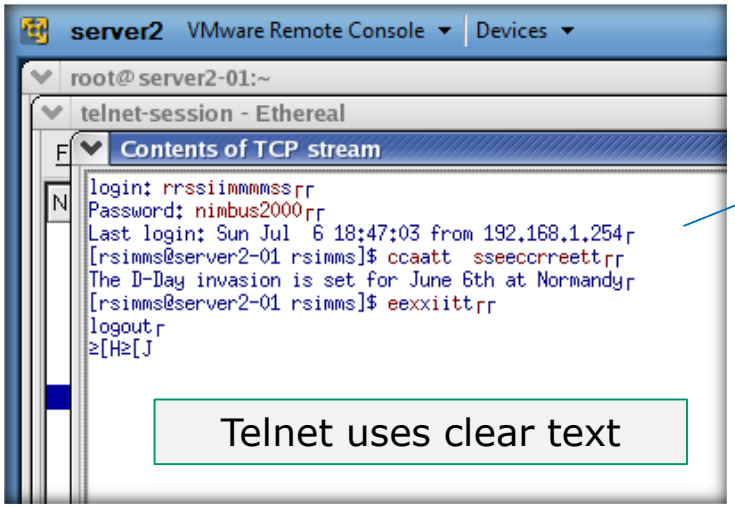
Remote Server



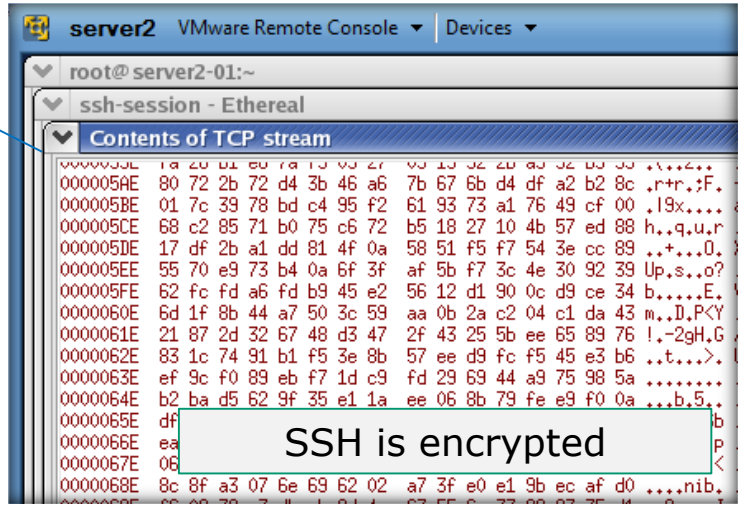
Solution: SSH is a network protocol that enables secure connections between computers

Picture credit: http://www.cs.umd.edu/faq/ssh.html

Old way: **telnet**
Sniffer view of a Telnet session



New way: **ssh**
Sniffer view of a SSH session

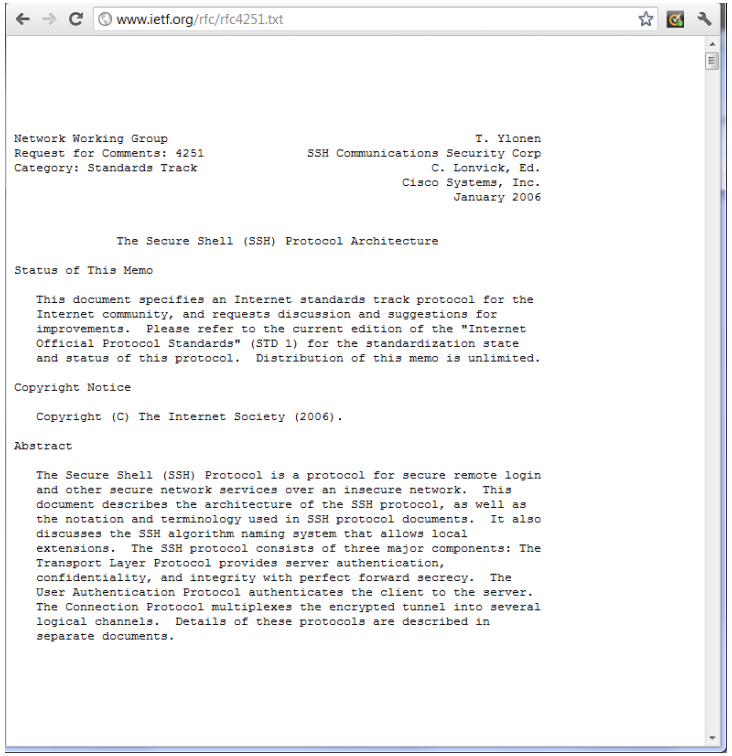


With telnet, everything is transferred in clear text over the network (not good!)

With ssh, everything is encrypted. This is how we will access all UNIX/Linux systems in CIS 90.

Local computer at home or on campus

SSH (secure shell) is a standards based protocol. We will use it for remotely logging into and running commands on UNIX/Linux systems.



www.ietf.org/rfc/rfc4251.txt

Network Working Group T. Ylonen
Request for Comments: 4251 SSH Communications Security Corp
Category: Standards Track C. Lonvick, Ed.
Cisco Systems, Inc.
January 2006

The Secure Shell (SSH) Protocol Architecture

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Copyright Notice

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Abstract

The Secure Shell (SSH) Protocol is a protocol for secure remote login and other secure network services over an insecure network. This document describes the architecture of the SSH protocol, as well as the notation and terminology used in SSH protocol documents. It also discusses the SSH algorithm naming system that allows local extensions. The SSH protocol consists of three major components: The Transport Layer Protocol provides server authentication, confidentiality, and integrity with perfect forward secrecy. The User Authentication Protocol authenticates the client to the server. The Connection Protocol multiplexes the encrypted tunnel into several logical channels. Details of these protocols are described in separate documents.

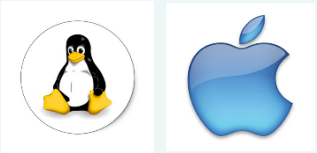
- See RFCs 4250 to 4254 at www.ietf.org for the gory details
- “RFC” = Request for Comment
- “IETF” = Internet Engineering Task Force

SSH apps may need to be installed

- ✓ Linux and Mac already have SSH built in (i.e. the **ssh** command)
- ❑ Android smartphones and tablets can use SSH apps such as the free **ConnectBot** or **Juice** apps
- ❑ Apple iPhones and iPads can use ssh apps such as the **iSSH** app
- ❑ Windows users can download and install the **Putty** program

Putty is written and maintained primarily by Simon Tatham.
http://www.chiark.greenend.org.uk/~sgtatham/
Thank you Simon!

Class Activity – Install SSH software if necessary

Operating System	 **Students in the classroom**	 **Students at home**
 Windows	 • Find and run the Putty program	 • Google "putty download" • Download the putty.exe binary to your desktop • Run the downloaded putty.exe program http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
 Linux or Mac		• Search for and run the terminal app

First Login


Get into
the car
THULE

SSH connection to a UNIX/Linux Server

To connect and login to a remote system you must know:

- The **hostname** or **IP Address** of the remote server (hostnames must be *fully qualified domain names* when going over the Internet)
- The **port** number the SSH service is listening on (the default is port 22)
- Your login credentials (**username** and **password**) on the remote server

How people get into another home

http://modernwarpoetry.com/wp-content/uploads/2014/09/Vertical-Siding-Brick-wall-white-house-with-a-big-house.jpg

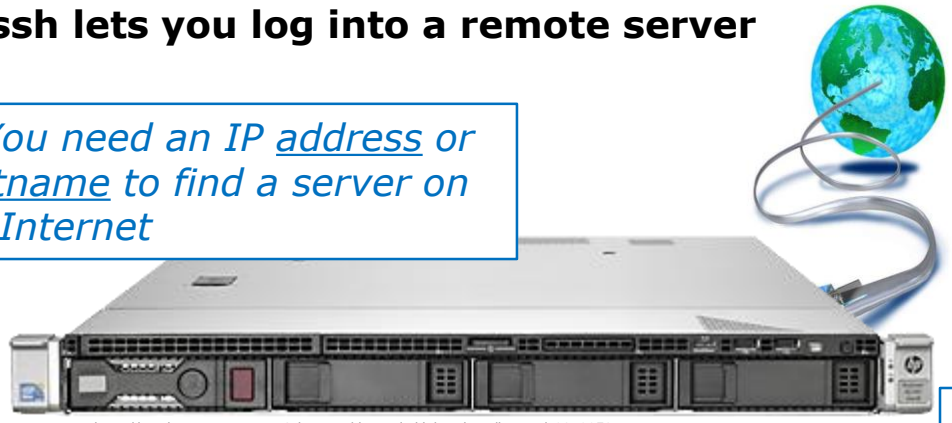
1) You need an address to find someone's home

2) Some doors are locked and some are open. You can only enter if the door is open.

3) Homer owner: Who the heck are you?
4) Visitor: My name is Rich and I live next door in the small shack

How ssh lets you log into a remote server

1) You need an IP address or hostname to find a server on the Internet



http://product-images.www8-hp.com/digmedialib/prodimg/lowres/c03120597.png

2) Some ports are locked and some are open. You can only connect if the port is open.

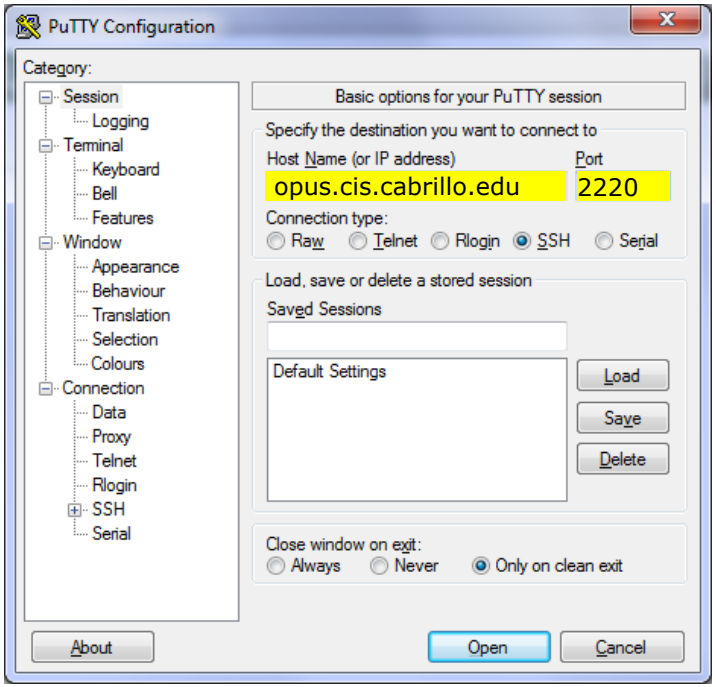
3) Server: Enter username & password
4) Visiting user: rsimms & <secret>

SSH connection to a UNIX/Linux Server - from Windows

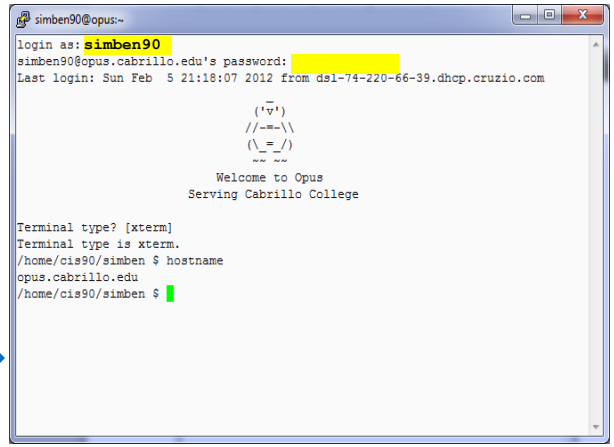
(specify hostname, username, password and port)

Opus

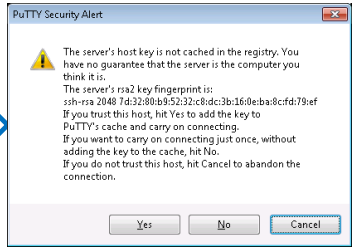
On Windows run Putty



Click Open



The password is not echoed (printed) as you type it



Click Yes

The first time a connection is made to a server this warning is displayed.

SSH connection to a UNIX/Linux Server - from Linux/Mac

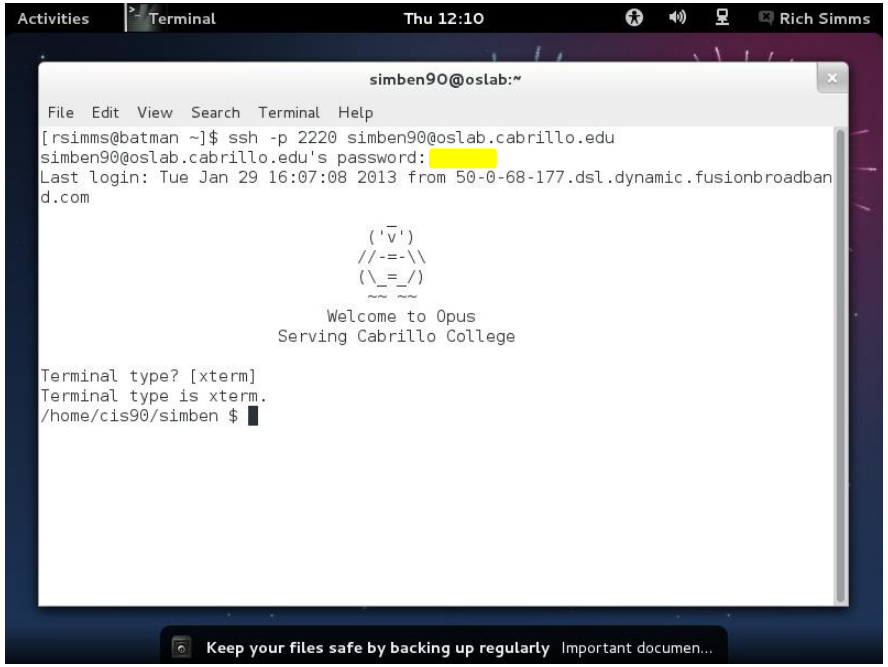
(specify hostname, username, password and port)

Opus

On a Mac or Linux terminal type:

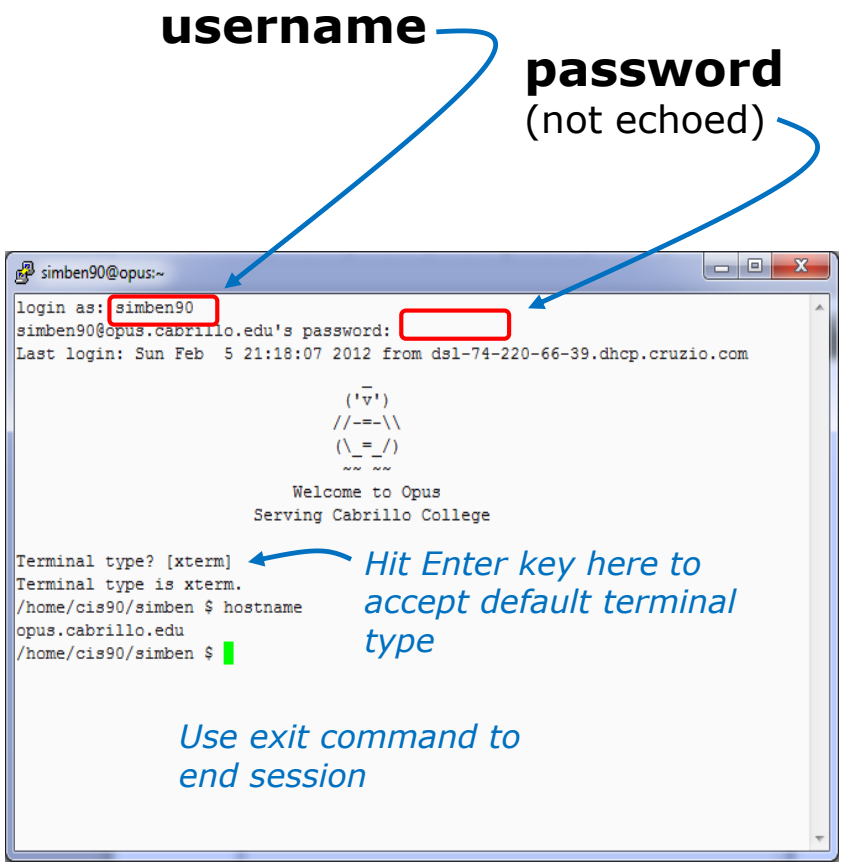
ssh -p 2220 *username*@**opus.cis.cabrillo.edu**

```
The authenticity of host '[opus.cis.cabrillo.edu]:2220
([2607:f380:80f:f425::230]:2220)' can't be established.
RSA key fingerprint is 7d:32:80:b9:52:32:c8:dc:3b:16:0e:ba:8c:fd:79:ef.
Are you sure you want to continue connecting (yes/no)? yes
```



Enter yes if you get this authenticity warning

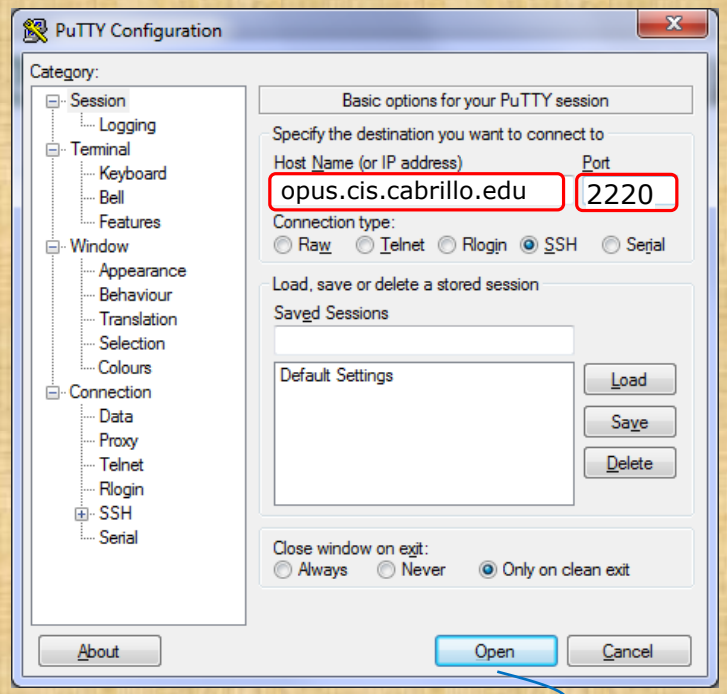
SSH login to a UNIX/Linux Server



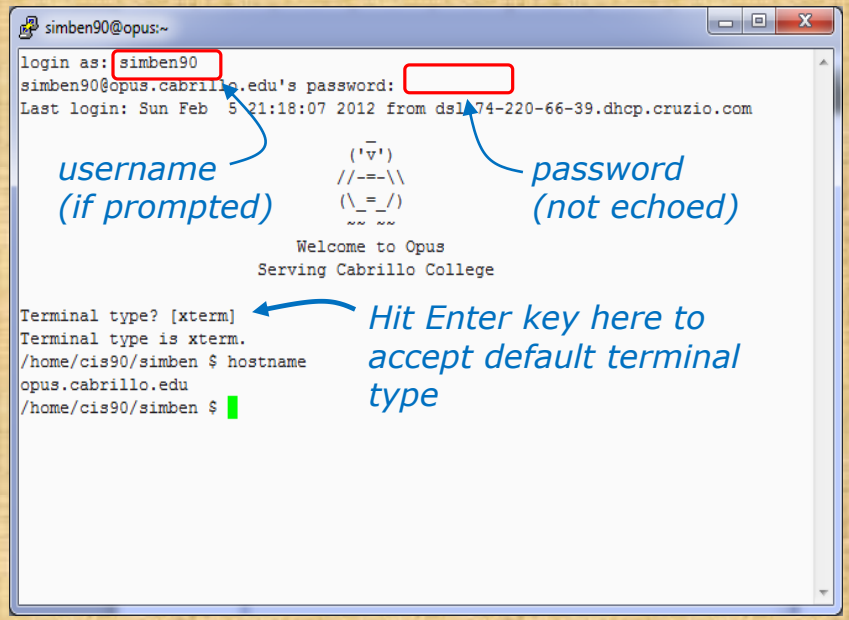
Note: If you specified the username in Putty or on the ssh command you will not be prompted for the username again.

Class Activity
Log into Opus using SSH
(specify hostname, username, password, and port)

1) On Windows run Putty:



2) Enter your credentials (not Benji's)

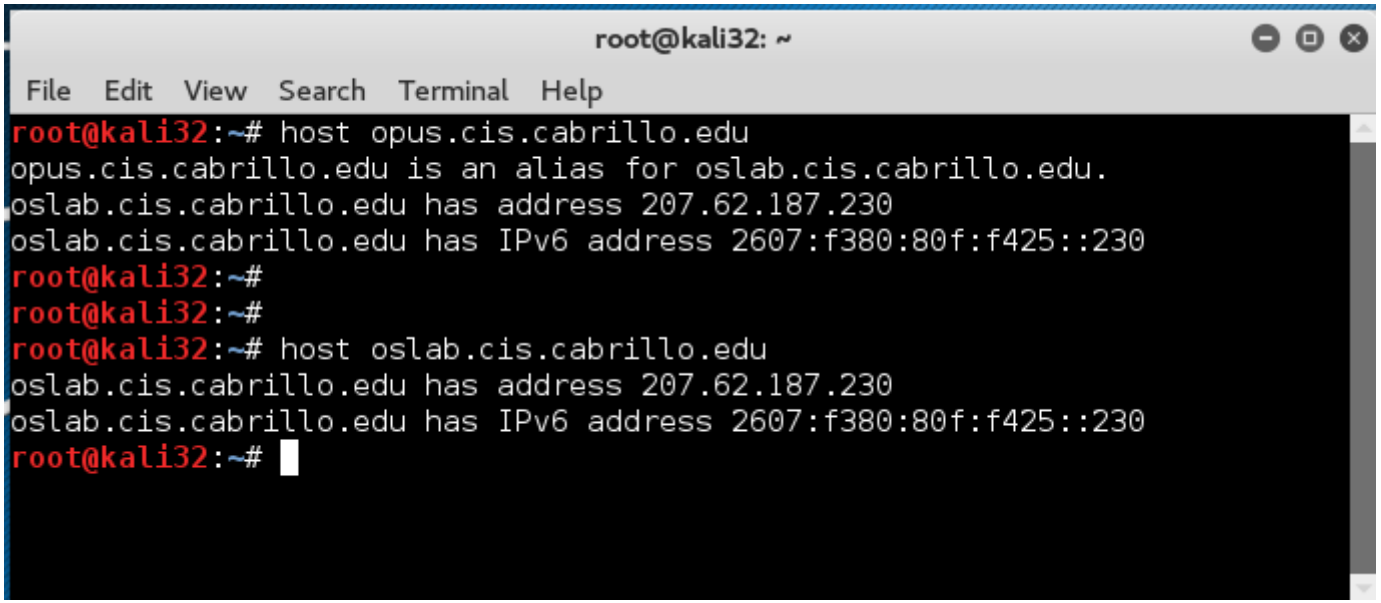


Respond "yes" to authenticity warning if it appears

1) On a Mac or Linux terminal type:
ssh -p 2220 *username*@**opus.cis.cabrillo.edu**

opus or oslab?

It doesn't matter. The Opus server has more than one name. It is also known as oslab.



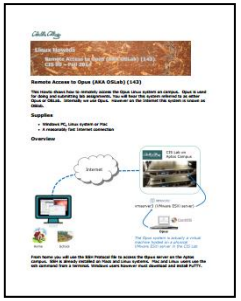
Additional Resources

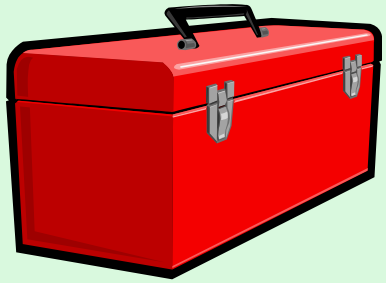
- How to open the terminal window on a mac

  https://www.youtube.com/watch?v=zw7Nd67_aFw

- Howto #144: Logging into Opus

  https://simms-teach.com/howtos/144-opus-access.pdf





First Commands


First driving lesson

Lesson 1 commands for your toolbox

cal	- show calendar
date	- show current time and date
clear	- clear the terminal screen
hostname	- show the host name of the computer being accessed
ps	- show processes, including the name of the shell being run
uname	- show the kernel name
cat /etc/issue	- usually shows distro (distribution) name
cat /etc/*-release	- usually shows distro (distribution) name
who	- shows current login sessions
who am i	- identifies which login session you are using
tty	- shows your terminal device
id	- show user info including username/UID and group/GID
history	- show previous commands
ssh	**-** Connect and login to remote system
exit	- terminate your shell and log off

Terminal type

```
login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Sun Aug 26 08:54:09 41-3-21-105.dsl.fusion.com

                          _
                         ('v')
                        //-=-\\
                        (\_=_/)
                         ~~ ~~
                    Welcome to Opus
                 Serving Cabrillo College

Terminal type? [xterm]
Terminal type is xterm.
/home/cis90/simben $
```

Hit Enter key here to accept default terminal type

The terminal type in this case is "xterm". The terminal type is different than the terminal device (more on this later)

Shell Prompt

```
login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Sun Aug 26 08:54:09 41-3-21-105.dsl.fusion.com

                    _
                   ('v')
                  //-=-\\
                  (\_=_/)
                   ~~ ~~
              Welcome to Opus
          Serving Cabrillo College

Terminal type? [xterm]
Terminal type is xterm.
/home/cis90/simben $
/home/cis90/simben $
```

Hit Enter key here to accept default terminal type

Shell prompt - used by the shell to prompt the user to enter a command. The shell will display this prompt every time you hit the Enter key.

Question: What is your exact prompt string on this system?
Answer: /home/cis90/simben $

First Commands

supplemental

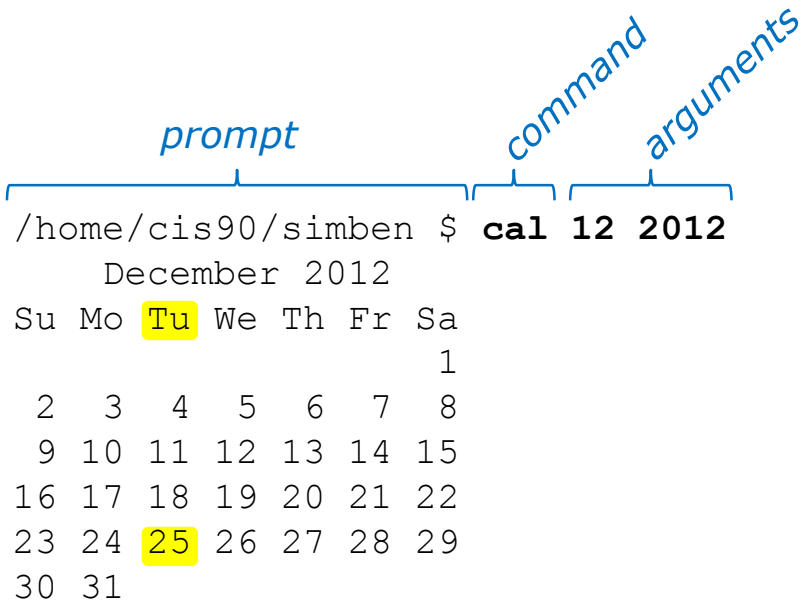
cal command

prompt *command*

```
/home/cis90/simben $ cal
     August 2012
Su Mo Tu We Th Fr Sa
           1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
```

*The **cal** command outputs the calendar for the current month.*

cal command continued



*Adding the month and year arguments to the **cal** command lets you specify a specific month and year*

Question: What day of the week (e.g Su Mo, Tu ...) was December 25, 2012?
Answer: Tu

date command

*The **date** command outputs the current date and time.*

Day-of-the-week Month Day-of-the-month Hours:Minutes:Seconds Time-Zone Year

Question: What time is it on this system? (use HH:MM format and don't dawdle!)
Answer: 08:11

Command Line Interface (CLI) terminology

*This portion is the shell **prompt***

```
/home/cis90/simben $ cal 12 2012
    December 2012
Su Mo Tu We Th Fr Sa
                   1
 2  3  4  5  6  7  8
 9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31
```

*This is the **command** which includes two **arguments** 12 and 2012*

```
/home/cis90/simben $ cal 12 2012
    December 2012
Su Mo Tu We Th Fr Sa
                   1
 2  3  4  5  6  7  8
 9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31
```

*These are **arguments** for the command to process*

*This is the **output** of the command*

```
/home/cis90/simben $ cal 12 2012
    December 2012
Su Mo Tu We Th Fr Sa
                   1
 2  3  4  5  6  7  8
 9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31
```

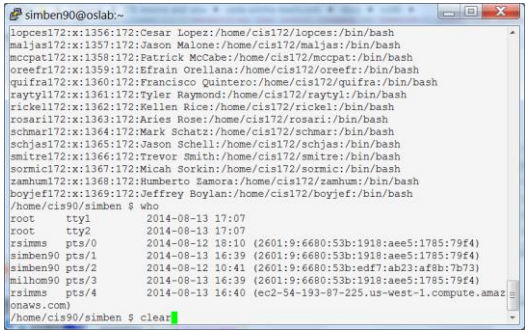
clear command

prompt *command*

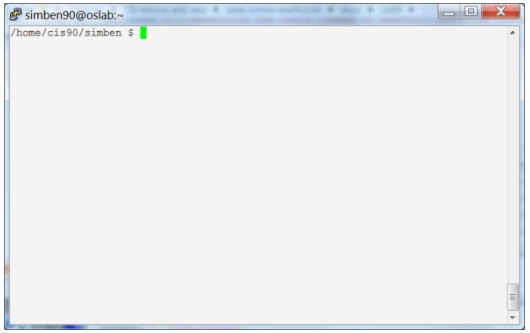
```
/home/cis90/simben $ clear
```

The clear command will clear the screen.

(On scrollable terminals you are still able to scroll back to see previous commands entered)



before



after

Question: **What happens when you use the clear command?**
Answer: **The terminal window is cleared (scrolled up and out of sight)**

hostname command

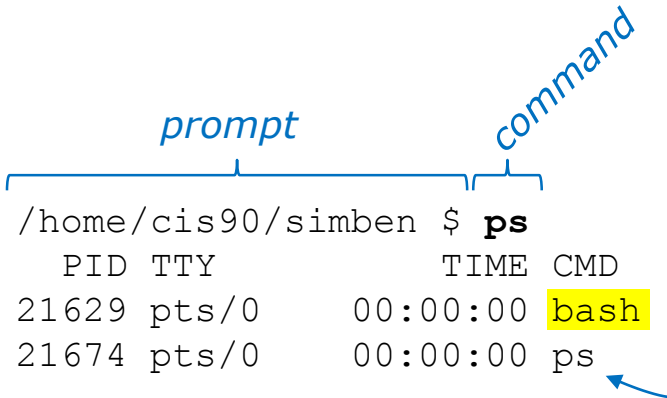
prompt *command*

```
/home/cis90/simben $ hostname
oslab.cishawks.net
```

*The **hostname** command outputs the hostname of the system you are interacting with.*

Question: What is the hostname of this system?
Answer: oslab.cishawks.net

ps command



*The **ps** command outputs the processes (programs loaded into memory and running) belonging to your username.*

name of the shell being run

name of the ps command running that produces this output

*There are a number of differnet shells such as **bash** (Bourne Again shell), **sh** (original Bourne shell), **ksh** (Korn shell), **dash** (Debian Almquist shell), **tcsh** (TENEX C Shell) and **csh** (C shell).*

Question: What is the name of the shell running on this system?
Answer: bash

uname command

```
/home/cis90/simben $ uname
Linux
```

*The **uname** command outputs the name of the kernel being used.*

Question: What is the name of the kernel running on this system?
Answer: Linux

cat command (to show the name of the distribution)

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

Name of distro

Version of distro

*These two **cat** commands will usually (but not always) output something that contains the name of the distribution being used.*

```
/home/cis90/simben $ cat /etc/*-release
CentOS release 6.2 (Final)
CentOS release 6.2 (Final)
CentOS release 6.2 (Final)
```

Question: Which distro has been installed on this system?
(single word answer only please)
Answer: CentOS

cat command (to show the name of the distribution)

```
simben90@doc:~$ cat /etc/issue
Ubuntu 13.04 \n \l
```

Name of distro

Version of distro

*These two **cat** commands will usually (but not always) output something that contains the name of the distribution being used.*

```
simben90@doc:~$ cat /etc/*-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=13.04
DISTRIB_CODENAME=raring
DISTRIB_DESCRIPTION="Ubuntu 13.04"
NAME="Ubuntu"
VERSION="13.04, Raring Ringtail"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 13.04"
VERSION_ID="13.04"
HOME_URL="http://www.ubuntu.com/"
SUPPORT_URL="http://help.ubuntu.com/"
BUG_REPORT_URL="http://bugs.launchpad.net/ubuntu/"
```

Question: **Which distro has been installed on this system? (single word answer only please)**

Answer: **Ubuntu**

who command

```
/home/cis90/simben $ who
root     tty1         2014-08-13 17:07
root     tty2         2014-08-13 17:07
rsimms   pts/0        2014-08-12 18:10 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/1        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/2        2014-08-12 10:41 (2601:9:6680:53b:edf7:ab23:af8b:7b73)
milhom90 pts/3        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
rsimms   pts/4        2014-08-13 16:40 (ec2-54-193-87-225.us-west-1.compute.amazonaws.com)
```

username

terminal device used for login session

date and time of login

where user logged in from (remote hostname or IP address) . If empty the user logged on locally rather than over the network.

Show information about current login sessions

who command

```
/home/cis90/simben $ who
root     tty1         2014-08-13 17:07
root     tty2         2014-08-13 17:07
rsimms   pts/0        2014-08-12 18:10 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/1        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/2        2014-08-12 10:41 (2601:9:6680:53b:edf7:ab23:af8b:7b73)
milhom90 pts/3        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
rsimms   pts/4        2014-08-13 16:40 (ec2-54-193-87-225.us-west-1.compute.amazonaws.com)
```

local — root tty1, root tty2

remote — rsimms pts/0, simben90 pts/1, simben90 pts/2, milhom90 pts/3, rsimms pts/4

Users in the same room as the system can login locally. Everyone else must login remotely over the network. The IP address or hostname in the last column indicates a remote login session.

who command

```
/home/cis90/simben $ who
root     tty1         2014-08-13 17:07
root     tty2         2014-08-13 17:07
rsimms   pts/0        2014-08-12 18:10 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/1        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
simben90 pts/2        2014-08-12 10:41 (2601:9:6680:53b:edf7:ab23:af8b:7b73)
milhom90 pts/3        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
rsimms   pts/4        2014-08-13 16:40 (ec2-54-193-87-225.us-west-1.compute.amazonaws.com)
```

Question: How many login sessions (including yours) are there on this system?
Answer: 7

Question: Regarding the users logged in REMOTELY (over the network rather than local). Who has been logged in the longest?
Answer: simben90

Question: Where did that REMOTE user (the one logged in longest) login from?
Answer: 2601:9:6680:53b:edf7:ab23:af8b:7b73 (this is an IPv6 address)

who am i command

*The **who am i** command lists just the session you are using*

```
/home/cis90/simben $ who am i
simben90 pts/1        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
```

username — *terminal device used for login session* — *date and time of login* — *where user logged in from (remote hostname or IP address) . If empty the user logged on locally rather than over the network.*

This is a good way to distinguish which session you are currently interacting with when you have logged in more than once on the same system.

tty command

```
/home/cis90/simben $ tty
/dev/pts/0
```

*The **tty** command shows the terminal device being used for the login session.*

Every login session uses a unique terminal device.

The terminal device is different than the terminal type you accepted during login.

Question: **Which terminal device are you using to connect to this system?**
Answer: **/dev/pts/0**

tty command

```
/home/cis90/simben $ who am i
simben90 pts/1        2014-08-13 16:39 (2601:9:6680:53b:1918:aee5:1785:79f4)
/home/cis90/simben $
/home/cis90/simben $
/home/cis90/simben $ tty
/dev/pts/1
```

*The terminal device is abbreviated in **who** output. The **tty** command on the other hand shows the entire terminal device.*

Question: Run the who am i and tty commands.
What portion of the output from these commands is identical?
Answer: pts/1

id command

*The **id** command outputs information about the user*

```
/home/cis90/simben $ id
uid=1201(simben90) gid=190(cis90) groups=190(cis90),100(users)
context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
```

Question: What is your uid (user ID) number on oslab?
Answer: 1201

Question: What is your username on oslab?
Answer: simben90

Question: What is your gid (group ID) number on oslab?
Answer: 190

history command

```
/home/cis90/simben $ history
< snipped>
   54  cal
   55  cal 12 2012
   56  date
   57  clear
   58  hostname
   59  ps
   60  uname
   61  cat /etc/issue
   62  cat /etc/*-release
   63  who
   64  who am i
   65  tty
   66  id
   67  id milhome90
   68  id milhom90
   69  id rsimms
   70  history
```

*The **history** command shows all previously entered commands.*

The list can span multiple login sessions.

Question: **What happens when you use the history command?**
Answer: **Shows previously entered commands**

ssh command
(to securely log into a remote UNIX/Linux system)

Basic command syntax:

Optional. Specifies the port on the remote system. The default is port 22.

If a username is specified the "@" is used to separate the username from the hostname.

ssh -p *nnnn username*@*hostname*

Optional. Specifies the account username on the remote system. The default is the username on the local system.

Required. This can be the hostname or IP address of the remote system. If a hostname is used for a server on the Internet it must be the entire fully qualified domain name (FQDN).

Example **ssh** command
Logging into a P*xx*-Arwen system from Opus

username → **cis90** ← *short hostname* (**arya-03**)

```
/home/cis90/simben $ ssh cis90@arya-03
The authenticity of host 'arya-03 (172.20.90.3)' can't be established.
RSA key fingerprint is 8b:a0:ef:d2:52:e4:f3:a3:c2:41:b5:93:89:c3:1d:58.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'arya-03,172.20.90.3' (RSA) to the list of known
hosts.
cis90@arya-03's password:
Welcome to Linux Mint 15 Olivia (GNU/Linux 3.8.0-26-generic x86_64)

Welcome to Linux Mint
 * Documentation:  http://www.linuxmint.com
Last login: Mon Jan 27 17:13:33 2014 from opus.cis.cabrillo.edu
cis90@arya-03:~ > exit
logout
Connection to arya-03 closed.
/home/cis90/simben $
```

password is typed but not echoed

Note how the prompt changes (highlighted above) when on a different system

Example **ssh** command
Logging into son-of-opus from Opus

non-standard ssh port *username* *FQDN hostname*

```
/home/cis90/simben $ ssh -p 2220 simben90@son-of-opus.simms-teach.com
simben90@son-of-opus.simms-teach.com's password:
Last login: Mon Jan 27 18:14:32 2014 from oslab.cis.cabrillo.edu

                    _
                   ('v')
                  //-=-\\
                  (\_=_/)
                   ~~ ~~
          Welcome to Son of Opus
          Serving Cabrillo College


[simben90@son-of-opus ~]$ exit
logout
Connection to son-of-opus.simms-teach.com closed.
/home/cis90/simben $
```

password is typed

Note how the prompt changes (highlighted above) when on different systems

exit command

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

*The **exit** command logs out and ends the session.*

Housekeeping

Add Codes

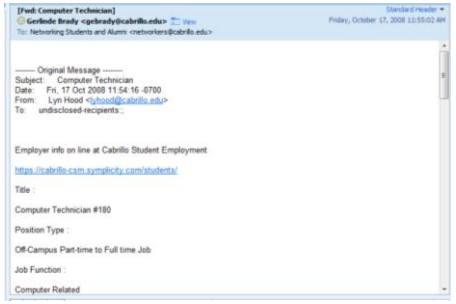
- Available after class (stop by or email me).
- Please use them online ASAP!
- If you missed the first class obtaining an Add code will be conditional on catching up before the next class:
    a) making a forum post.
    b) answering one of the "first minute" quiz questions.
    c) submitting the survey (part of the first assignment).
    d) collecting at least one item on the scavenger hunt.

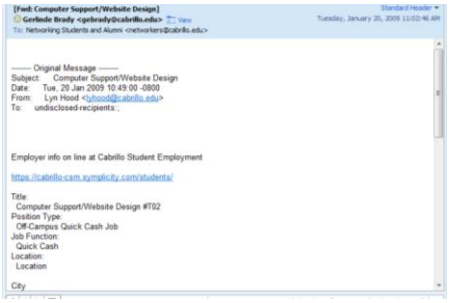
Cabrillo Networking Program Mailing list

Subscribe by sending an email (no subject or body) to:

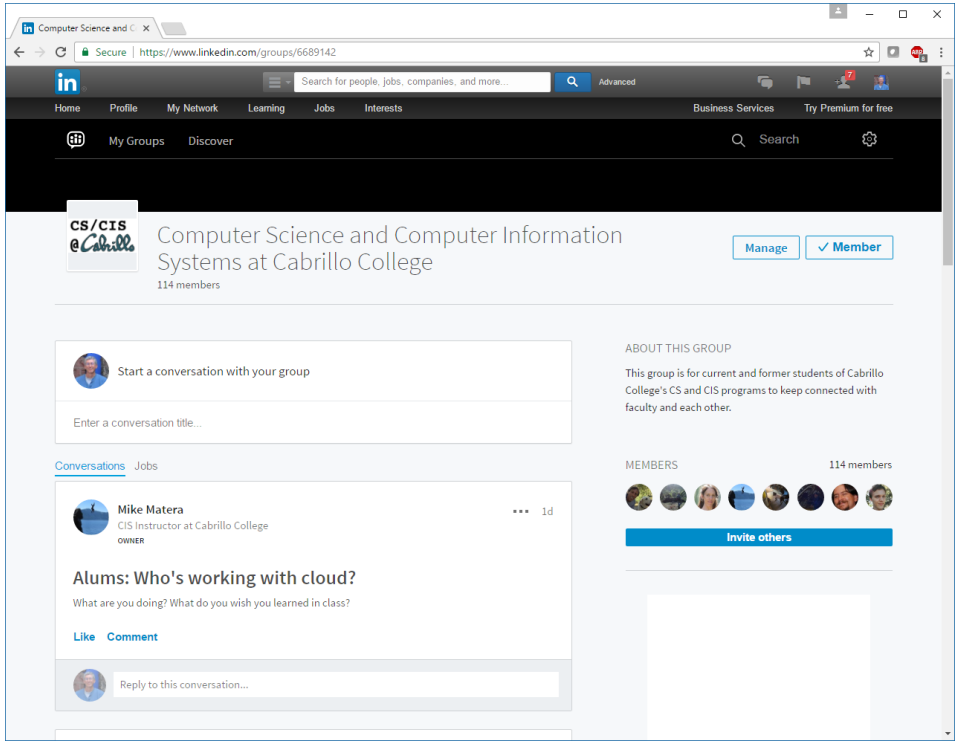
networkers-subscribe@cabrillo.edu

- Program information
- Certification information
- Career and job information
- Short-term classes, events, lectures, tours, etc.
- Surveys
- Networking info and links





LinkedIn
Computer Science and
Computer Information Systems at Cabrillo College

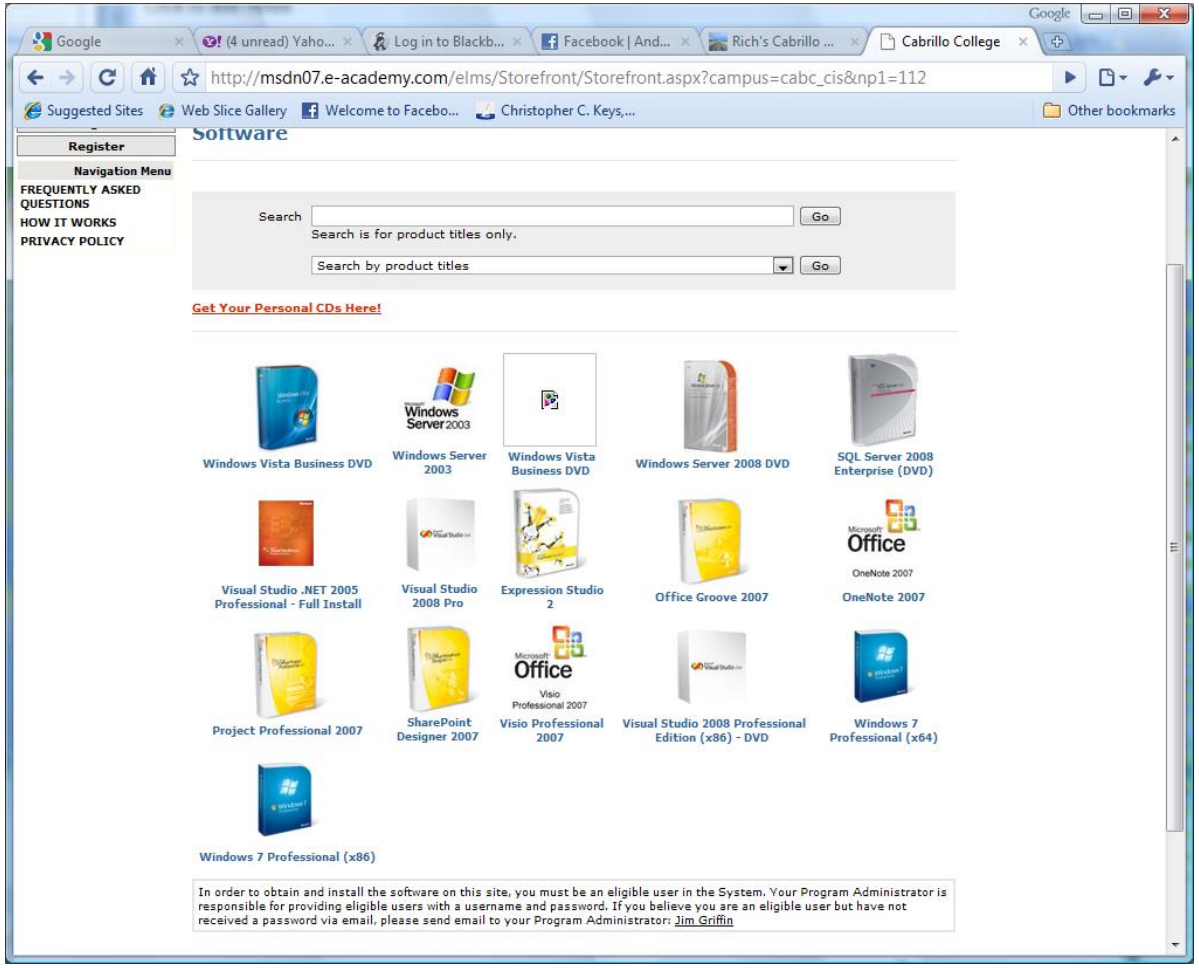


For 3 points extra credit:

1) Join LinkedIn.com
2) Join this group
3) Send me an email when finished.

https://www.linkedin.com/groups/6689142

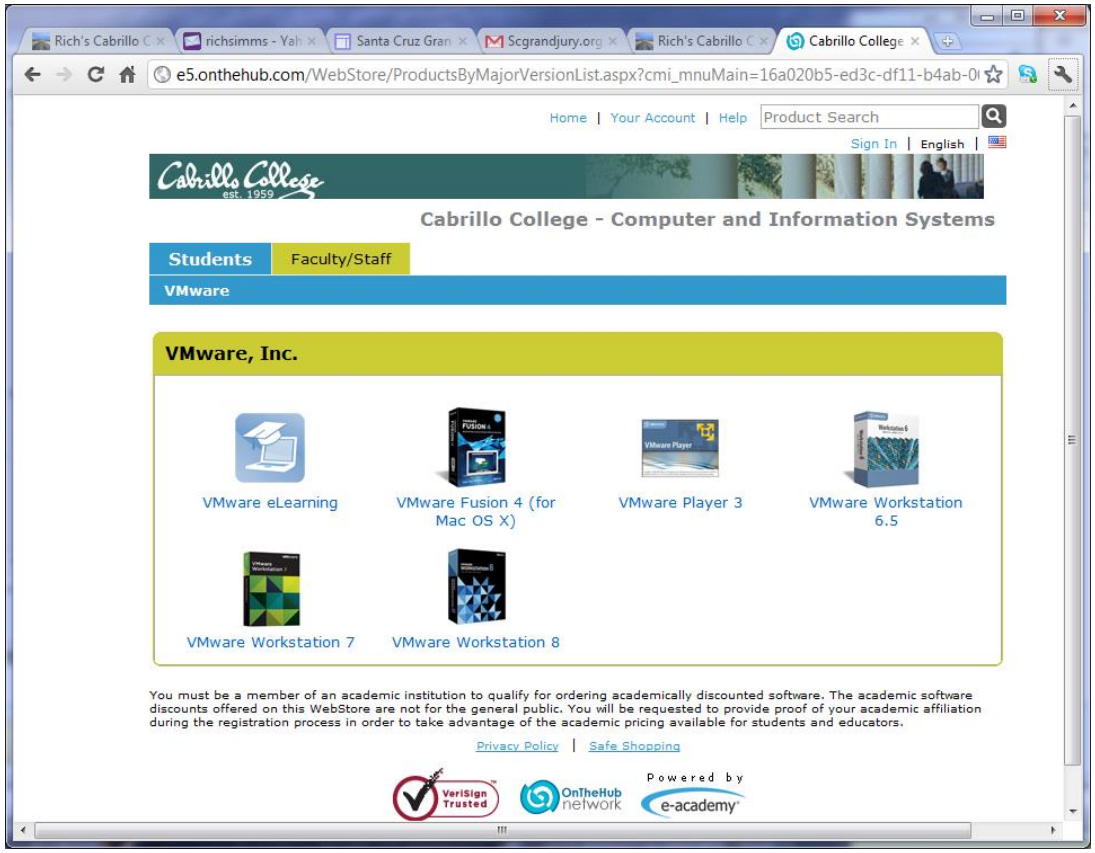
MSDN Academic Alliance



- Microsoft software for students registered in a CIS or CS class at Cabrillo
- Available after registration is final (two weeks after first class)

To get to this page, go to **http://simms-teach.com/resources** and click on the appropriate link in the Tools and Software section

VMware e-academy

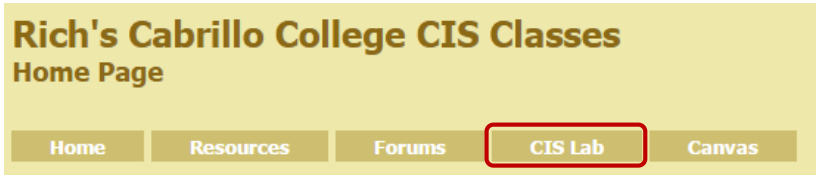


- VMware software for students registered in a CIS or CS class at Cabrillo
- Available after registration is final (two weeks after first class)

To get to this page, go to **http://simms-teach.com/resources** and click on the appropriate link in the Tools and Software section

Help Available in the CIS Lab

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



CIS 90 Student Lab Assistants

Kevin
T/Th 1:30-4:30
W 12:30-4:30

Roberto
T/Th 3:30-7:30

Tess
T/F 2-6:30
W/Th 12-5

Linux Instructors

Rich Simms
M 9-11:30

Mike Matera

Study Groups

- Two heads are better than one!
- Great way to work lab assignments and prepare for tests.
- Excellent way to learn.
- Less time being in the "I'm stuck" zone.
- A great way to develop teamwork skills.
- Improves scheduling and organization skills.
- Let me know on the student survey if you are interested and would like my help finding study partners.

Additional Resources

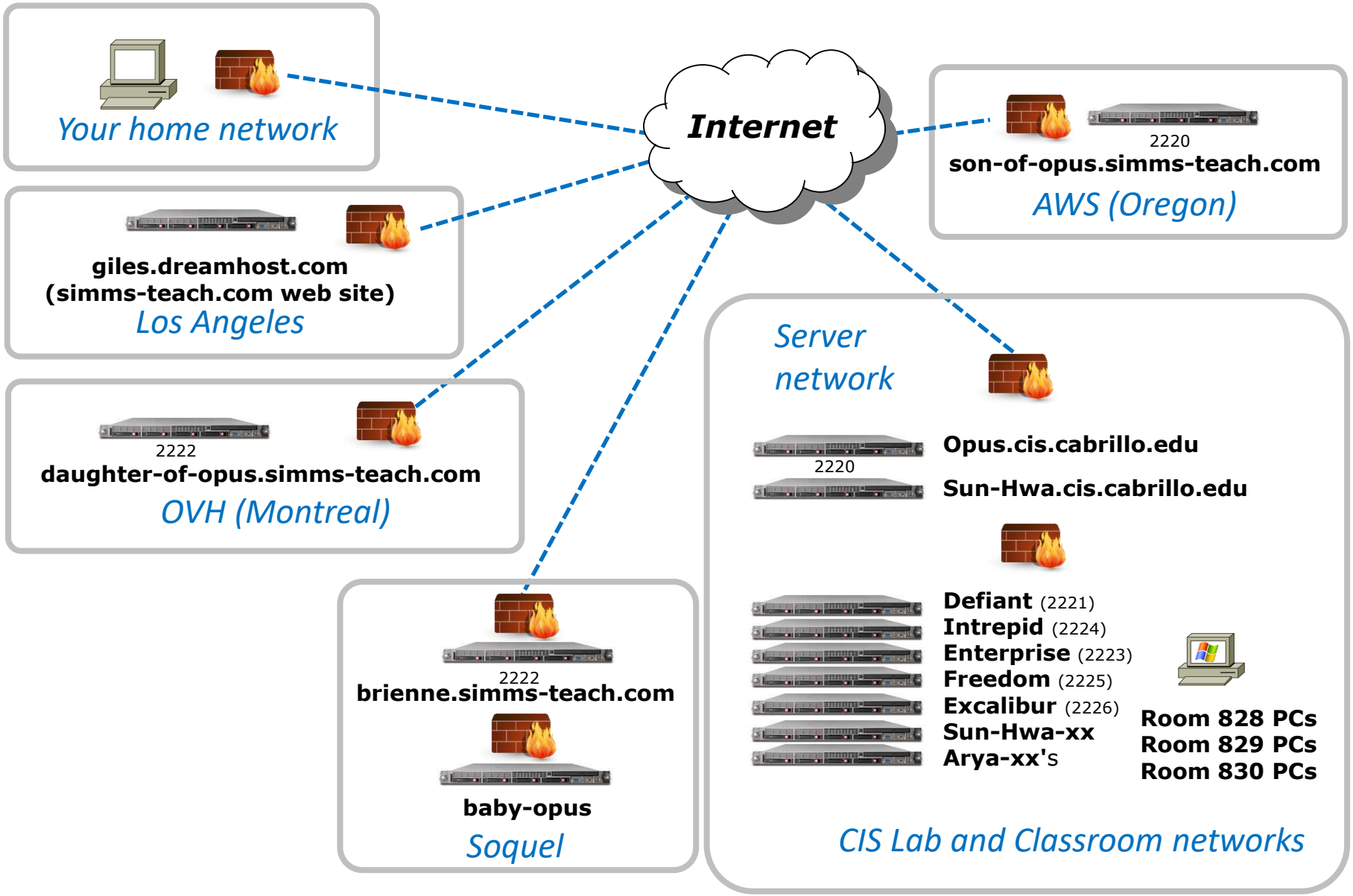
- My office hours for additional hands-on help, feedback and development planning.

- Cabrillo CS/CIS LinkedIn group for students and alumni
  http://www.linkedin.com/groups/Computer-Science-Computer-Information-Systems-6689142

- Society of Women Engineers (SWE) Facebook page
  https://www.facebook.com/SWEorg

- Systers Listserv
  http://anitaborg.org/get-involved/systers/

CIS 90 systems Roadmap

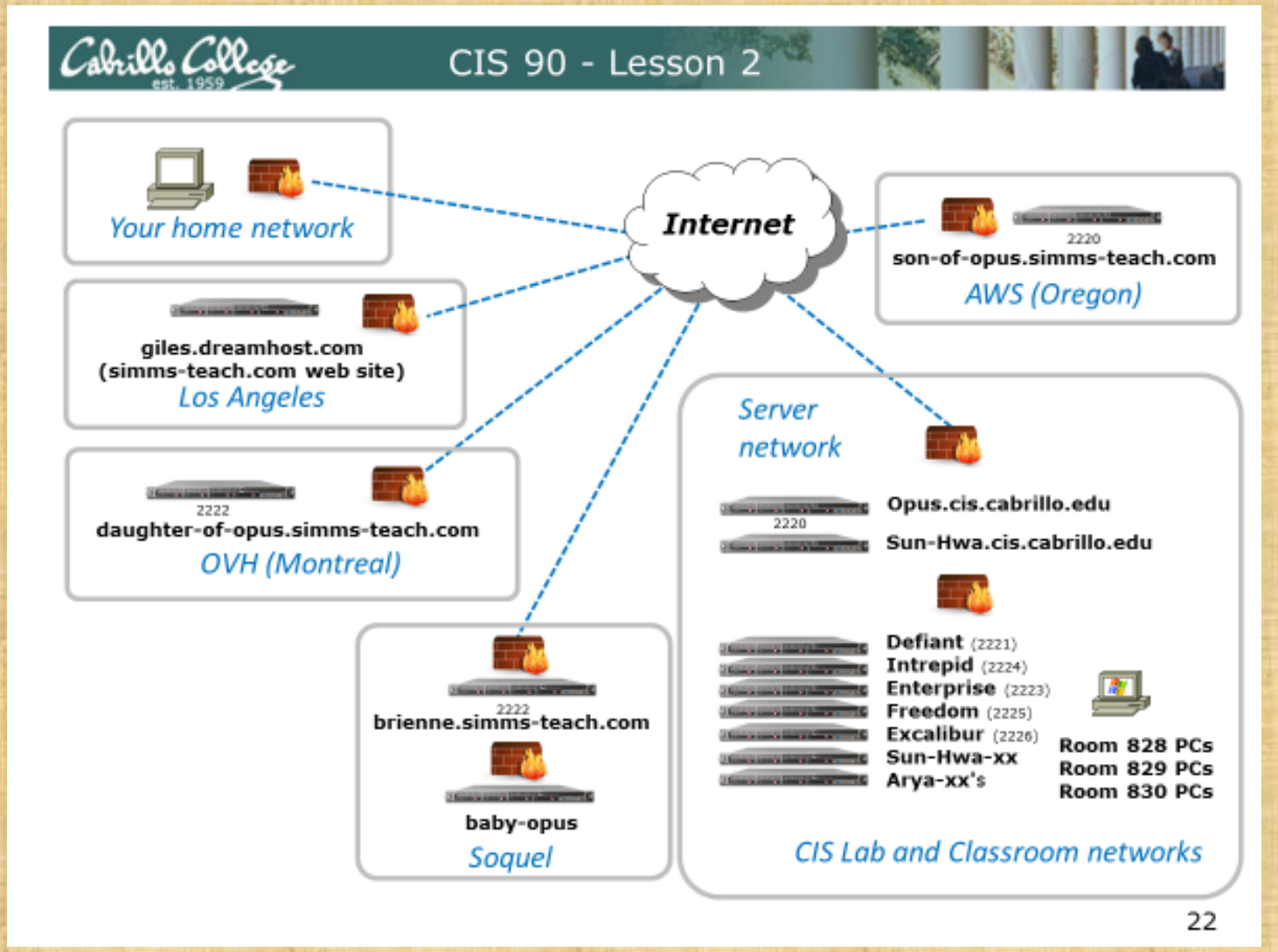

Your home network
Internet
2220
son-of-opus.simms-teach.com
AWS (Oregon)
giles.dreamhost.com
(simms-teach.com web site)
Los Angeles
Server
network
2220
Opus.cis.cabrillo.edu
Sun-Hwa.cis.cabrillo.edu
2222
daughter-of-opus.simms-teach.com
OVH (Montreal)
Defiant (2221)
Intrepid (2224)
Enterprise (2223)
Freedom (2225)
Excalibur (2226)
Sun-Hwa-xx
Arya-xx's
Room 828 PCs
Room 829 PCs
Room 830 PCs
2222
brienne.simms-teach.com
baby-opus
Soquel
CIS Lab and Classroom networks

Navigating the Internet using SSH

Second driving lesson

Class Activity

Follow me if you can!



Navigating the Internet using SSH

supplemental

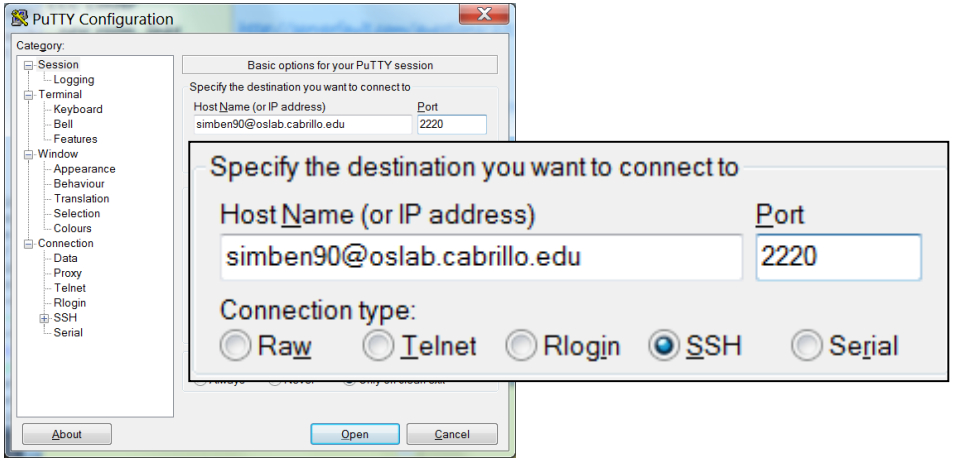
Benji takes on a long walk

Note: hostnames are not case sensitive (any portion can be upper or lower case)

1. Putty or `ssh -p 2220 simben90@oslab.cis.cabrillo.edu`
2. `ssh -p 2221 simben90@defiant.cis.cabrillo.edu`
3. `ssh -p 2222 simben90@brienne.simms-teach.com`
4. `ssh -p 2220 simben90@son-of-opus.simms-teach.com`
5. `ssh simben90@giles.dreamhost.com`
6. `exit`
7. `exit`
8. `exit`
9. `exit`
10. `exit`

Benji takes on a long walk

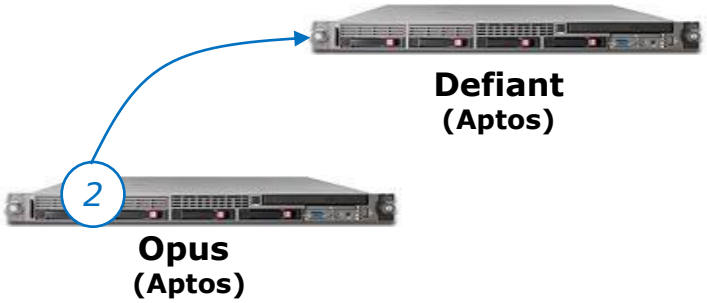
Opus (oslab)
(Aptos)




```
Using username "simben90".
simben90@oslab.cabrillo.edu's password:
Last login: Mon Aug 18 09:09:14 2014 from 2601:9:6680:53b:93f:8df2:6592:a958

                                   _
                                  ('v')
                                 \/-=-\/
                                 (\_=_/)
                                  ~~ ~~
                            Welcome to Opus
                         Serving Cabrillo College

Terminal type? [xterm]
Terminal type is xterm.
/home/cis90/simben $ hostname
oslab.cis.cabrillo.edu
/home/cis90/simben $
```

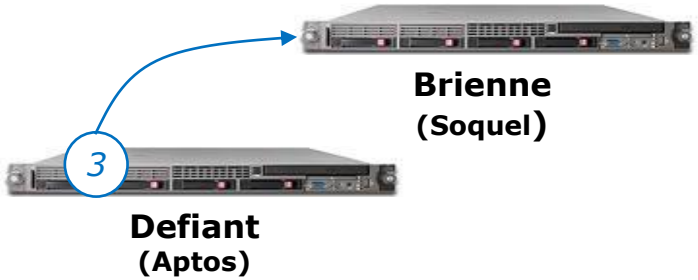
Note: usernames and passwords are case sensitive

Benji takes on a long walk



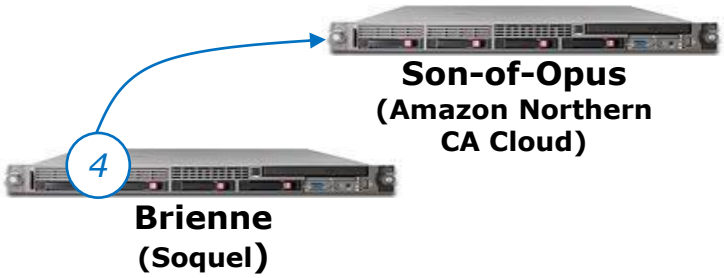

```
/home/cis90/simben $ ssh -p 2221 simben90@defiant.cis.cabrillo.edu
The authenticity of host '[defiant.cis.cabrillo.edu]:2221 ([172.20.90.51]:2221)' can't
be established.
RSA key fingerprint is 98:09:e7:d3:b2:89:e5:3a:57:b0:59:ff:86:7e:8e:50.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[defiant.cis.cabrillo.edu]:2221' (RSA) to the list of known
hosts.
simben90@defiant.cis.cabrillo.edu's password:
Welcome to Linux Mint 17 Qiana (GNU/Linux 3.13.0-24-generic x86_64)

Welcome to Linux Mint
 * Documentation:  http://www.linuxmint.com
_________           _____.__                 __
\_______ \   _____/ ____\__|____    _____/  |_
 |    |  \_/ __ \   __\|  \__  \  /    \   __\
 |    `   \  ___/|  |  |  |/ __ \|   |  \  |
/_______  /\___  >__|  |__(____  /___|  /__|
        \/     \/              \/     \/

Last login: Fri Aug 15 07:07:25 2014 from opus.cis.cabrillo.edu
[defiant] $ hostname
defiant.cis.cabrillo.edu
[defiant] $
```

Benji takes on a long walk



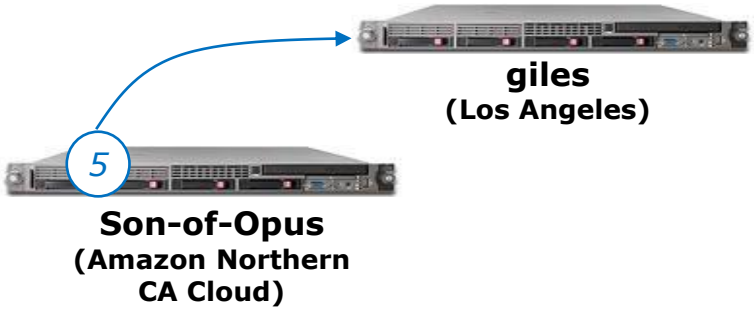

```
[defiant] $ ssh -p 2222 simben90@brienne.simms-teach.com
The authenticity of host '[brienne.simms-teach.com]:2222 ([50.174.12.192]:2222)' can't be established.
ECDSA key fingerprint is 22:f1:74:fb:3c:36:01:8a:21:f0:00:e1:37:56:00:5f.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[brienne.simms-teach.com]:2222,[50.174.12.192]:2222' (ECDSA) to the list of
known hosts.
simben90@brienne.simms-teach.com's password:
Welcome to Linux Mint 17.2 Rafaela (GNU/Linux 3.16.0-38-generic x86_64)

Welcome to Linux Mint
 * Documentation:  http://www.linuxmint.com
___________          .__
\_____   \_____  |__| ____   ____   ____   ____
 |     |  _/\_  __ \  |/ __ \ /    \ /    \_/ __ \
 |     |   \ |  | \/  \  ___/|   |  \   |  \  ___/
 |_____  / |__|  |__|\___  >___|  /___|  /\___  >
       \/                \/     \/     \/     \/
simben90@brienne ~ $
```

Benji takes on a long walk



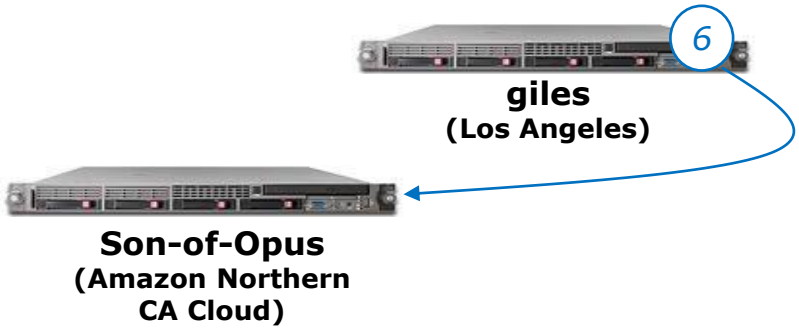

```
[simben90@brienne ~]$ ssh -p 2220 simben90@son-of-opus.simms-teach.com
The authenticity of host '[son-of-opus.simms-teach.com]:2220 ([54.193.87.225]:2220)' can't
be established.
RSA key fingerprint is 05:02:f7:48:00:e6:af:a9:dd:47:33:c3:82:80:29:4d.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[son-of-opus.simms-teach.com]:2220,[54.193.87.225]:2220' (RSA)
to the list of known hosts.
simben90@son-of-opus.simms-teach.com's password:
Permission denied, please try again.
simben90@son-of-opus.simms-teach.com's password:
Last login: Mon Aug 18 12:55:04 2014 from 207.62.187.227

                                   _
                                  ('v')
                                 //-=-\\
                                 (\_=_/)
                                  ~~ ~~
                          Welcome to Son-of-Opus
                         Serving Cabrillo College

[simben90@son-of-opus ~]$
```

Benji takes on a long walk




```
[simben90@son-of-opus ~]$ ssh simben90@giles.dreamhost.com
The authenticity of host 'giles.dreamhost.com (208.113.153.233)' can't be established.
RSA key fingerprint is d8:3c:65:de:d3:43:ef:aa:76:13:d9:16:85:b9:36:9a.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'giles.dreamhost.com,208.113.153.233' (RSA) to the list of known
hosts.
simben90@giles.dreamhost.com's password:

        _ _
   __ _(_)  | ___   ___
  / _` | | |/ _ \ / __|
 | (_| | | |  __/\__ \
  \__, |_|_|\___||___/
  |___/
 Welcome to giles.dreamhost.com

Any malicious and/or unauthorized activity is strictly forbidden.
All activity may be logged by DreamHost Web Hosting.

[giles]$ hostname
giles
```

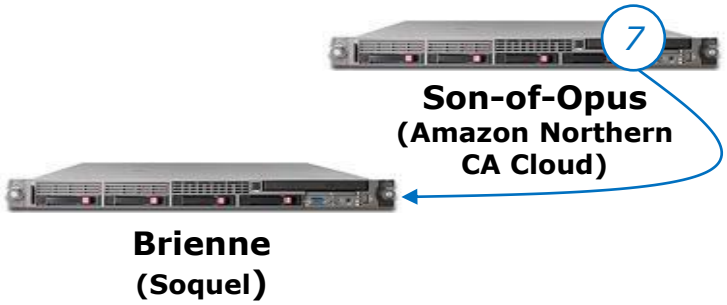
Benji takes on a long walk




```
[giles]$ exit
logout
Connection to giles.dreamhost.com closed.
[simben90@son-of-opus ~]$ hostname
son-of-opus.simms-teach.com
[simben90@son-of-opus ~]$
```

*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*

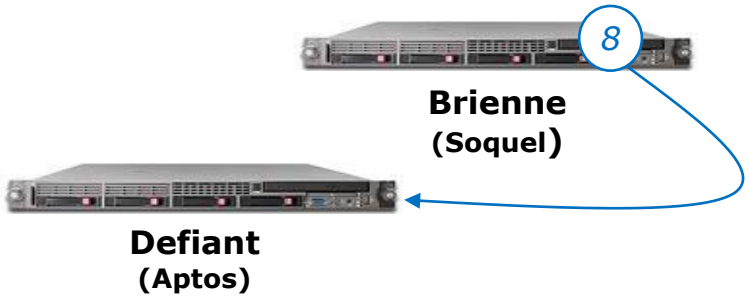
Benji takes on a long walk




```
[simben90@son-of-opus ~]$ exit
logout
Connection to son-of-opus.simms-teach.com closed.
[simben90@brienne ~]$ hostname
brienne.simms-teach.com
[simben90@brienne ~]$
```

*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*

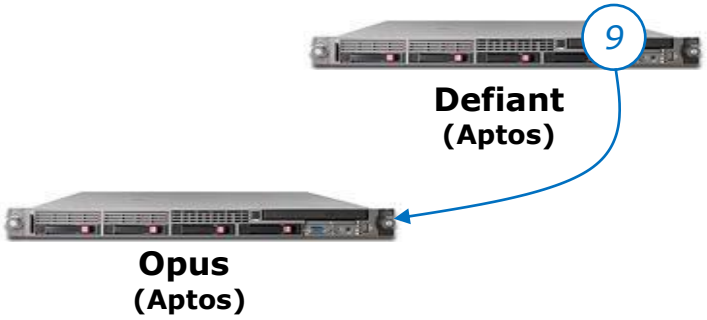
Benji takes on a long walk



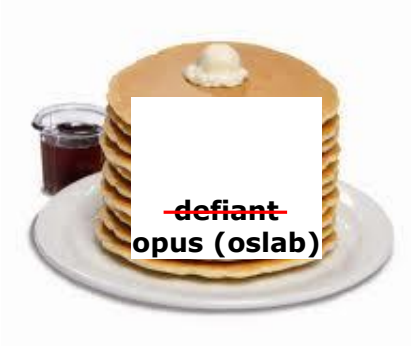

```
[simben90@brienne ~]$ exit
logout
Connection to brienne.simms-teach.com closed.
[defiant] $ hostname
defiant.cis.cabrillo.edu
[defiant] $
```

*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*

Benji takes on a long walk

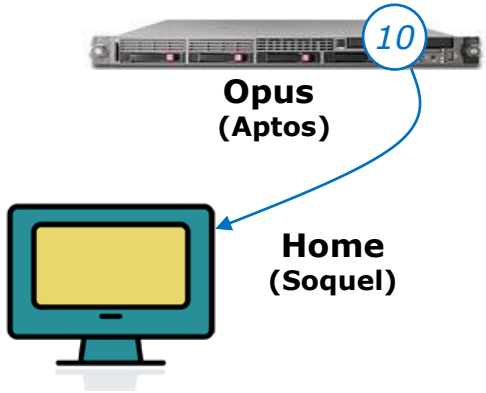



```
[defiant] $ exit
Connection to defiant.cis.cabrillo.edu closed.
/home/cis90/simben $ hostname
oslab.cis.cabrillo.edu
/home/cis90/simben $
```



*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*

Benji takes on a long walk




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

And the Putty terminal program closes

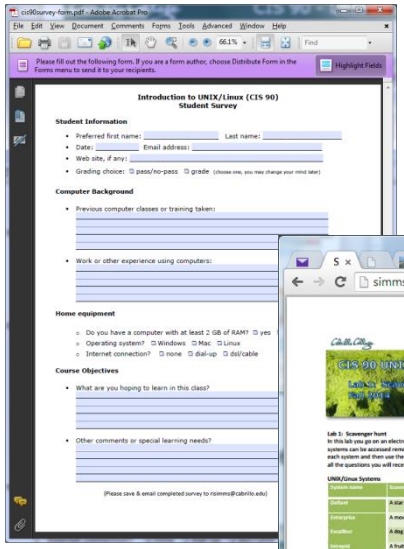
*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*


Assignment

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

Lesson	Date	Topics	Chapter	Due*
1	1/25	**Class and Linux Overview** • Understand how this course will work • Linux **Materials** • Presentation slides (download) • Login Credentials Sheet (download) **Supplemental** • Howto #144: Logging into Opus (download) **Assignment** • Student Survey • Lab 1 **CCC Confer** • Enter virtual classroom • Class archives	1.1-1.15 (Gillay) 2,4,5, p113-115, p164-172 (Hahn)	
2	2/1	**Quiz 1** **Commands** • Understand how the UNIX login operation works • Meet John the Ripper and learn how vulnerable a poor password is • Understand basic command syntax and operation • Understand program files and what happens when they are run • Understand how the shell works and environment variables • Understand how to get online documentation **Materials** • Presentation slides (download) • Howto #106: Configuring Putty (download) **Assignment** • Lab 2 **CCC Confer** • Enter virtual classroom • Class archives	2.3-2.7 2.11 3.7-3.20 4.19-4.22 9.1-9.2 (Gillay)	Lab 1 Student Survey

Assigned on 1/25



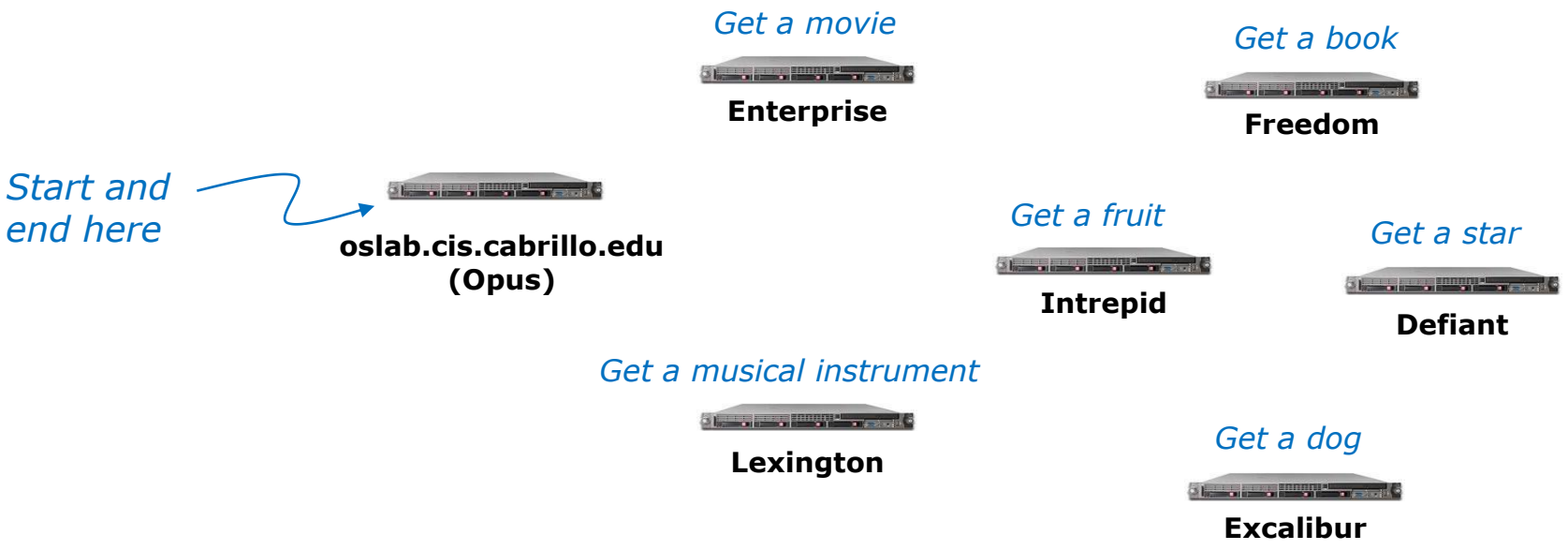
Survey

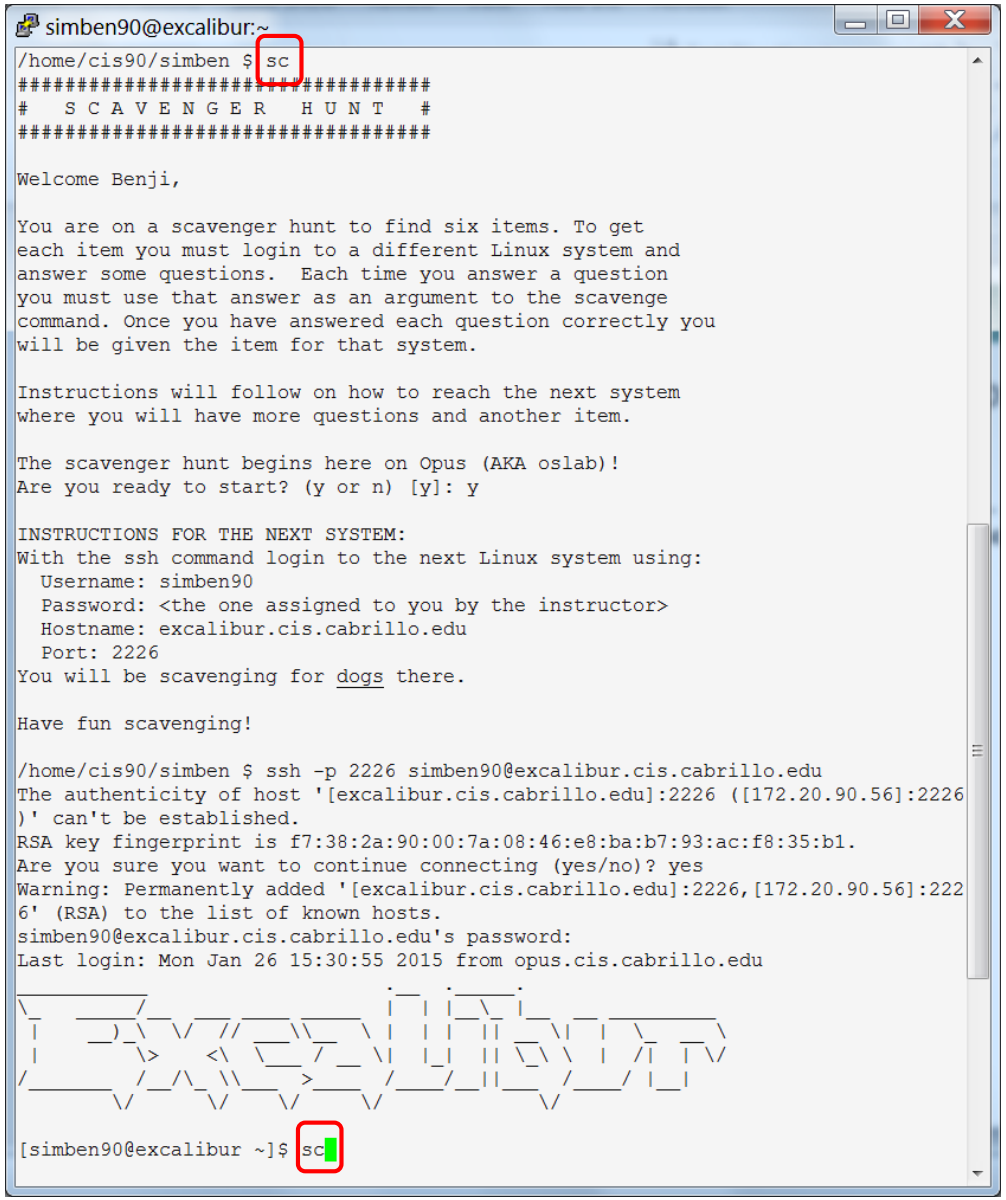
Lab 1 Scavenger Hunt

Both due by 11:59PM on Wednesday 2/1

Lab 1 - Scavenger Hunt

Starting on Opus you will log into several systems using ssh. On each system you will collect an item after answering correctly a series of questions.

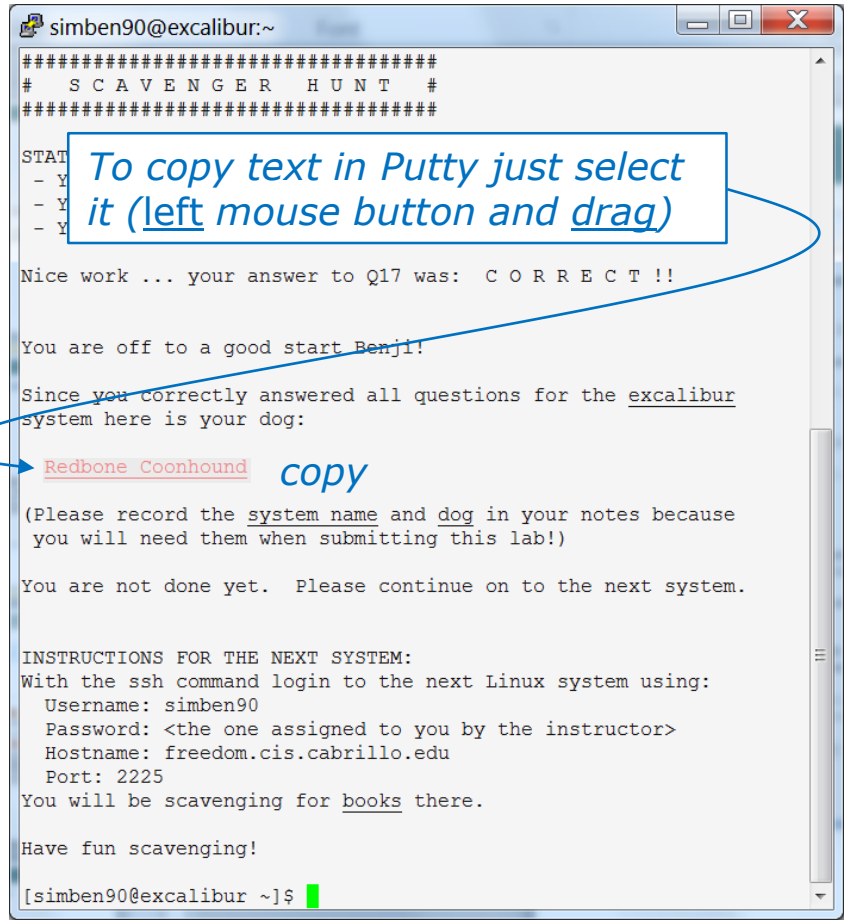




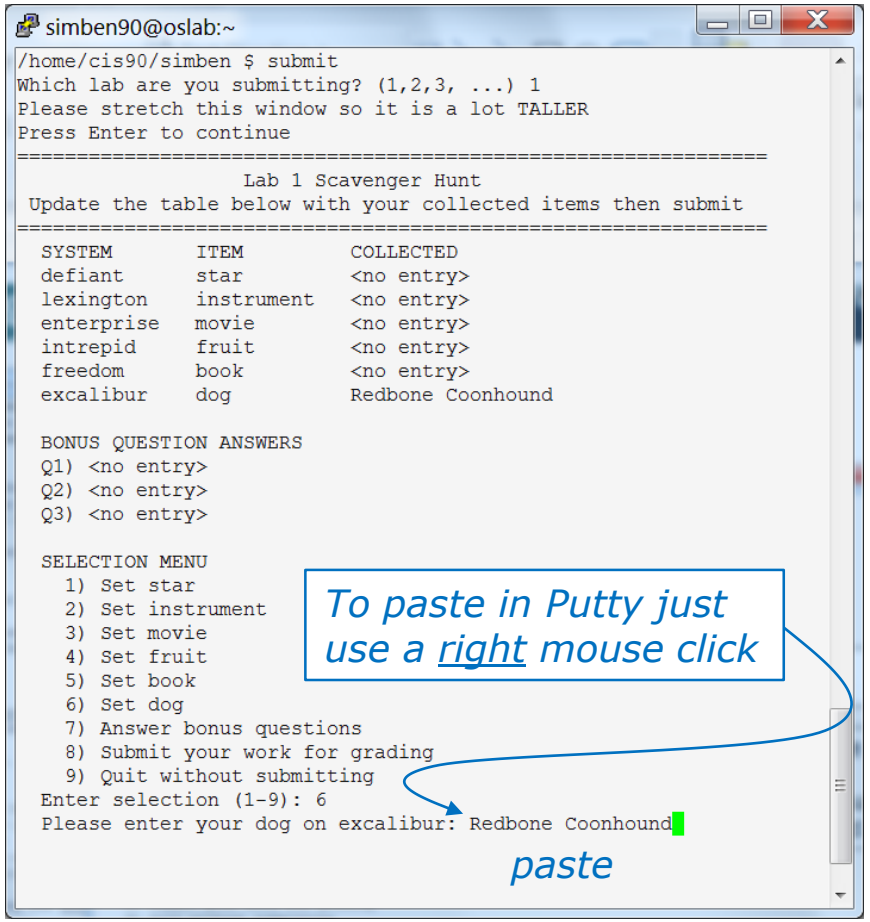
Lab 1 - Tips

Tip - as a shortcut, use **sc** instead of typing the full **scavenge** each time.

Lab 1 - Tips




```
##################################
#   S C A V E N G E R   H U N T  #
##################################

STAT
 - Y
 - Y
 - Y

Nice work ... your answer to Q17 was:  C O R R E C T !!


You are off to a good start Benji!

Since you correctly answered all questions for the excalibur
system here is your dog:

  Redbone Coonhound

(Please record the system name and dog in your notes because
 you will need them when submitting this lab!)

You are not done yet.  Please continue on to the next system.


INSTRUCTIONS FOR THE NEXT SYSTEM:
With the ssh command login to the next Linux system using:
  Username: simben90
  Password: <the one assigned to you by the instructor>
  Hostname: freedom.cis.cabrillo.edu
  Port: 2225
You will be scavenging for books there.

Have fun scavenging!

[simben90@excalibur ~]$
```




```
/home/cis90/simben $ submit
Which lab are you submitting? (1,2,3, ...) 1
Please stretch this window so it is a lot TALLER
Press Enter to continue
================================================================
                    Lab 1 Scavenger Hunt
 Update the table below with your collected items then submit
================================================================
  SYSTEM       ITEM         COLLECTED
  defiant      star         <no entry>
  lexington    instrument   <no entry>
  enterprise   movie        <no entry>
  intrepid     fruit        <no entry>
  freedom      book         <no entry>
  excalibur    dog          Redbone Coonhound

  BONUS QUESTION ANSWERS
  Q1) <no entry>
  Q2) <no entry>
  Q3) <no entry>

  SELECTION MENU
    1) Set star
    2) Set instrument
    3) Set movie
    4) Set fruit
    5) Set book
    6) Set dog
    7) Answer bonus questions
    8) Submit your work for grading
    9) Quit without submitting
  Enter selection (1-9): 6
  Please enter your dog on excalibur: Redbone Coonhound
```

Tip - use two login sessions. Use one to collect scavenger hunt items and the other to record your work using the **submit** script. Submit as many times as you wish. Only the last submittal will be graded.

Lab Assignments

Pearls of Wisdom:

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


Wrap up

New shell commands:

cal	- show calendar
cat /etc/issue	- usually shows distro (distribution) name
cat /etc/*-release	- usually shows distro (distribution) name
clear	- clear the terminal screen
date	- show current time and date
exit	- terminate your shell and log off
history	- show previous commands
hostname	- show the name of the computer being accessed
id	- show user and group id information
ps	- show processes (loaded programs) being run
ssh	- secure login to a remote system
uname	- show kernel name
tty	- show terminal device
who	- show everyone logged in
who am i	- identifies which login session you are using

New Files and Directories:

VMware:

Next Class

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

Lab 1 & Survey

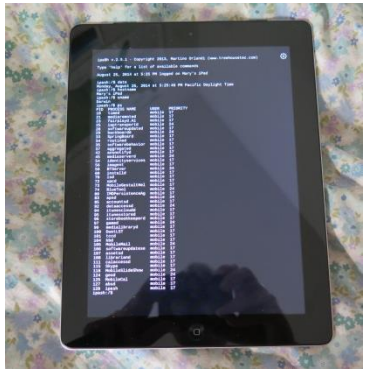
Quiz questions for next class:

- What part of UNIX/Linux is both a user interface and a programming language?
- What is the lowest level, inner-most component of a UNIX/Linux Operating System called?
- What command shows the other users logged in to the computer?

Backup

UNIX/Linux Commands on various systems

Apple iPad



```
ipa$h v.2.5.1 - Copyright 2013, Martino Orlandi (www.treehousetec.com)

Type 'help' for a list of available commands

August 25, 2014 at 5:25 PM logged on Mary's iPad

ipash:/$ date
Monday, August 25, 2014 at 5:25:49 PM Pacific Daylight Time
ipash:/$ hostname
Mary's iPad
ipash:/$ uname
Darwin
ipash:/$ ps
PID  PROCESS NAME      USER    PRIORITY
18   timed             mobile  17
21   mediaremoted      mobile  17
23   fairplayd.A1      mobile  17
25   iaptransportd     mobile  24
28   softwareupdated   mobile  17
29   backboardd        mobile  24
33   SpringBoard       mobile  17
34   routined          mobile  17
35   softwarebehavior  mobile  17
37   aggregated        mobile  17
42   aosnotifyd        mobile  17
45   mediaserverd      mobile  24
54   identityservices  mobile  17
56   imagent           mobile  17
59   BTServer          mobile  24
60   installd          mobile  17
70   lsd               mobile  17
72   xpcd              mobile  17
73   MobileGestaltHel  mobile  17
74   BlueTool          mobile  24
80   IMDPersistenceAg  mobile  17
83   apsd              mobile  24
85   accountsd         mobile  17
92   dataaccessd       mobile  24
94   itunescloudd      mobile  17
95   itunesstored      mobile  17
96   storebookkeeperd  mobile  17
97   gamed             mobile  24
99   medialibraryd     mobile  17
100  DuetLST           mobile  17
101  tccd              mobile  17
104  kbd               mobile  17
105  MobileMail        mobile  24
106  softwareupdatese  mobile  17
107  assetsd           mobile  17
108  librariand        mobile  17
111  calaccessd        mobile  17
115  Skype             mobile  17
118  MobileSlideShow   mobile  24
124  geod              mobile  24
125  MobileCal         mobile  17
127  absd              mobile  17
128  ipash             mobile  17
ipash:/$
```

Asus Router

172.30.1.1 - PuTTY

```
admin@RT-AC66U:/tmp/home/root# uname
Linux
admin@RT-AC66U:/tmp/home/root# date
Mon Aug 25 18:13:02 DST 2014
admin@RT-AC66U:/tmp/home/root# ps
  PID USER       VSZ STAT COMMAND
    1 admin     2360 S    /sbin/init
    2 admin        0 SW<  [kthreadd]
    3 admin        0 SWN  [ksoftirqd/0]
    4 admin        0 SW<  [events/0]
    5 admin        0 SW<  [khelper]
   18 admin        0 SW<  [kblockd/0]
   49 admin        0 SW   [pdflush]
   50 admin        0 SW   [pdflush]
   51 admin        0 SW<  [kswapd0]
   52 admin        0 SW<  [aio/0]
   96 admin        0 SW<  [mtdblockd]
  125 admin        0 SW<  [kmmcd]
  129 admin      608 S    hotplug2 --persistent --no-coldplug
  162 admin     2344 S    console
  166 admin     1552 S    /bin/sh
  168 admin     1540 S    syslogd -m 0 -S -O /tmp/syslog.log -s 256 -l 6
  170 admin     1540 S    /sbin/klogd
  172 admin        0 SW<  [khubd]
  248 admin     2352 S    usbled
  320 admin     2352 S    /sbin/wanduck
  327 admin     1544 R    telnetd
  330 admin     1056 S    /bin/eapd
  335 admin     1492 S    nas
  336 admin     1860 S    /bin/wps_monitor
  337 admin     2352 S    wpsaide
  340 nobody    1100 S    dnsmasq --log-async
  341 admin     4356 S    httpd
  343 admin     1552 S    crond
  344 admin     1028 S    /usr/sbin/infosvr br0
  347 admin     3700 S    watchdog
  348 admin     2352 S    ots
  351 admin     1240 S    rstats
  365 admin     1072 S    lld2d br0
  375 admin     1376 S    /usr/sbin/acsd
  386 admin     2052 S    u2ec
  388 admin     1128 S    lpd
  391 admin     2052 S    u2ec
  395 admin     2052 S    u2ec
  412 admin     1016 S    rdnssd -u admin -i eth0
  413 admin     1084 S    rdnssd -u admin -i eth0
  461 admin     2352 S    ntp
  468 admin      748 S    dhcp6c -T LL eth0
  472 admin      744 S    dhcp6s -c /etc/dhcp6s.conf br0
  474 admin      768 S    radvd -u admin
  476 admin      768 S    radvd -u admin
  477 admin     1556 S    udhcpc -i eth0 -p /var/run/udhcpc0.pid -s /tmp/udhcp
  485 admin      760 S    miniupnpd -f /etc/upnp/config
  486 admin     2352 S    disk_monitor
  884 admin     1308 S    networkmap
 2734 admin     1692 S    -sh
 2794 admin     1544 R    ps
admin@RT-AC66U:/tmp/home/root#
```

Samsung Galaxy smartphone

172.30.1.1 - PuTTY

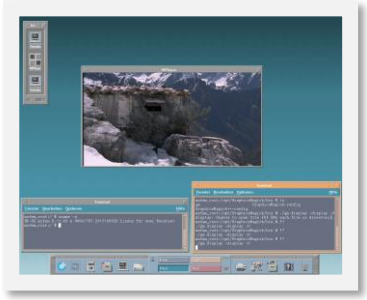
```
u0_a61@d2vmu:/ $ clear
u0_a61@d2vmu:/ $ date
Wed Aug 27 17:52:55 PDT 2014
u0_a61@d2vmu:/ $ echo $SHELL
/system/bin/sh
u0_a61@d2vmu:/ $ id
uid=10061(u0_a61) gid=10061(u0_a61) groups=1015(sdcard_rw),1028(sdcard_r),3003(inet),50061(all_a61) context=u:
r:untrusted_app:s0
u0_a61@d2vmu:/ $ cat /proc/version
Linux version 3.4.0-1368792 (dpi@SWDD5612) (gcc version 4.7 (GCC) ) #1 SMP PREEMPT Wed Apr 30 20:46:12 KST 201
4
u0_a61@d2vmu:/ $ ps
USER      PID   PPID  VSIZE  RSS     WCHAN    PC         NAME
root      1     0     1372   888   ffffffff 00000000 S /init
root      2     0     0      0     ffffffff 00000000 S kthreadd
root      3     2     0      0     ffffffff 00000000 S ksoftirqd/0
root      6     2     0      0     ffffffff 00000000 S migration/0
root      7     2     0      0     ffffffff 00000000 S watchdog/0
root      12    2     0      0     ffffffff 00000000 S khelper
root      13    2     0      0     ffffffff 00000000 S suspend_sys_syn
root      14    2     0      0     ffffffff 00000000 S suspend
root      17    2     0      0     ffffffff 00000000 S irq/203-msmdata
root      18    2     0      0     ffffffff 00000000 S sync_supers
root      19    2     0      0     ffffffff 00000000 S bdi-default
root      20    2     0      0     ffffffff 00000000 S kblockd
root      21    2     0      0     ffffffff 00000000 S khubd
root      22    2     0      0     ffffffff 00000000 S l2cap
root      23    2     0      0     ffffffff 00000000 S a2mp
root      24    2     0      0     ffffffff 00000000 S cfg80211
root      25    2     0      0     ffffffff 00000000 S rpciod
root      26    2     0      0     ffffffff 00000000 S modem_notifier
root      27    2     0      0     ffffffff 00000000 S smd_channel_clo
root      28    2     0      0     ffffffff 00000000 S smsm_cb_wq
root      30    2     0      0     ffffffff 00000000 S qmi
root      31    2     0      0     ffffffff 00000000 S nmea
root      32    2     0      0     ffffffff 00000000 S msm_ipc_router
root      33    2     0      0     ffffffff 00000000 S apr_driver
root      34    2     0      0     ffffffff 00000000 S khungtaskd
root      35    2     0      0     ffffffff 00000000 S kswapd0
root      36    2     0      0     ffffffff 00000000 S fsnotify_mark
root      37    2     0      0     ffffffff 00000000 S ecryptfs-kthrea
root      38    2     0      0     ffffffff 00000000 S nfsiod
root      39    2     0      0     ffffffff 00000000 S cifsiod
root      40    2     0      0     ffffffff 00000000 S crypto
root      58    2     0      0     ffffffff 00000000 S mdp_dma_wq
```

VMware ESXi server

simben90@excalibur:~

```
~ # clear
~ # date
Thu Aug 28 00:59:38 UTC 2014
~ # hostname
vmserver3.cis.cabrillo.edu
~ # who
root             char/pty/t0      00:00   Aug 28 00:57:54  excalibur.cis.cabrillo.edu
~ # uname
VMkernel
~ # ps | head
WID  CID  World Name             Command

32769      idle1
32770      idle2
32771      idle3
32772      idle4
32773      idle5
32774      idle6
32775      idle7
32776      idle8
~ # ps | grep sh
32786      tlbflushcount
32787      tlbflushcounttryflush
32788      vaSpaceTLBFlush
32873      pshare-est
32901      OCFlush
32903      BCFlush-0
33273 33273 sh                    /bin/sh
33315 33315 sh                    /bin/sh
33479 33479 sh                    /bin/sh
33743 33743 sh                    /bin/sh
33780 33780 sh                    /bin/sh
33818 33818 sh                    /bin/sh
33871 33871 sh                    /bin/sh
33911 33911 sh                    /bin/sh
33947 33947 sh                    /bin/sh
33990 33990 sh                    /bin/sh
34064 34064 sh                    /bin/sh
34115 34115 sh                    /bin/sh
34217 34217 sh                    /bin/sh
34260 34260 sh                    /bin/sh
34297 34297 sh                    /bin/sh
34333 34333 sh                    /bin/sh
34539 34539 sh                    /bin/sh
34613 34613 sh                    /bin/sh
34706 34706 sh                    /bin/sh
35049 35049 sh                    /bin/sh
4197333 4197333 sshd                  sshd
4197376 4197376 sh                    -sh
~ #
```

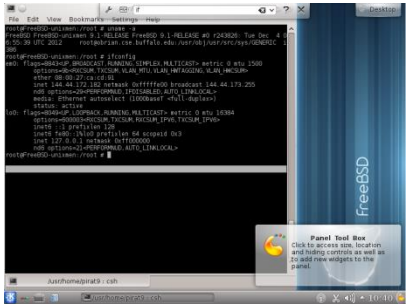
HP-UX



cupsim98.cup.hp.com - PuTTY

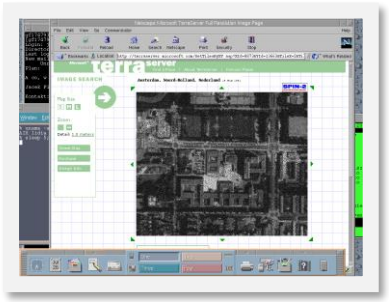
```
restrictions as set forth in sub-paragraph (c)(1)(ii) of the Rights in
Technical Data and Computer Software clause in DFARS 252.227-7013.


                Hewlett-Packard Company
                3000 Hanover Street
                Palo Alto, CA 94304 U.S.A.

Rights for non-DOD U.S. Government Departments and Agencies are as set
forth in FAR 52.227-19(c)(1,2).
You have mail.

Value of TERM has been set to "xterm".
WARNING:  YOU ARE SUPERUSER !!

# ls /
.mozilla          .sw               home              sbin
.mozilla-license  bin               lib               stand
.profile          core              lost+found        tmp
.rnd              dev               net               usr
.ssh              etc               opt               var
# uname -a
HP-UX cupsim98 B.11.23 U ia64 0564465391 unlimited-user license
#
```

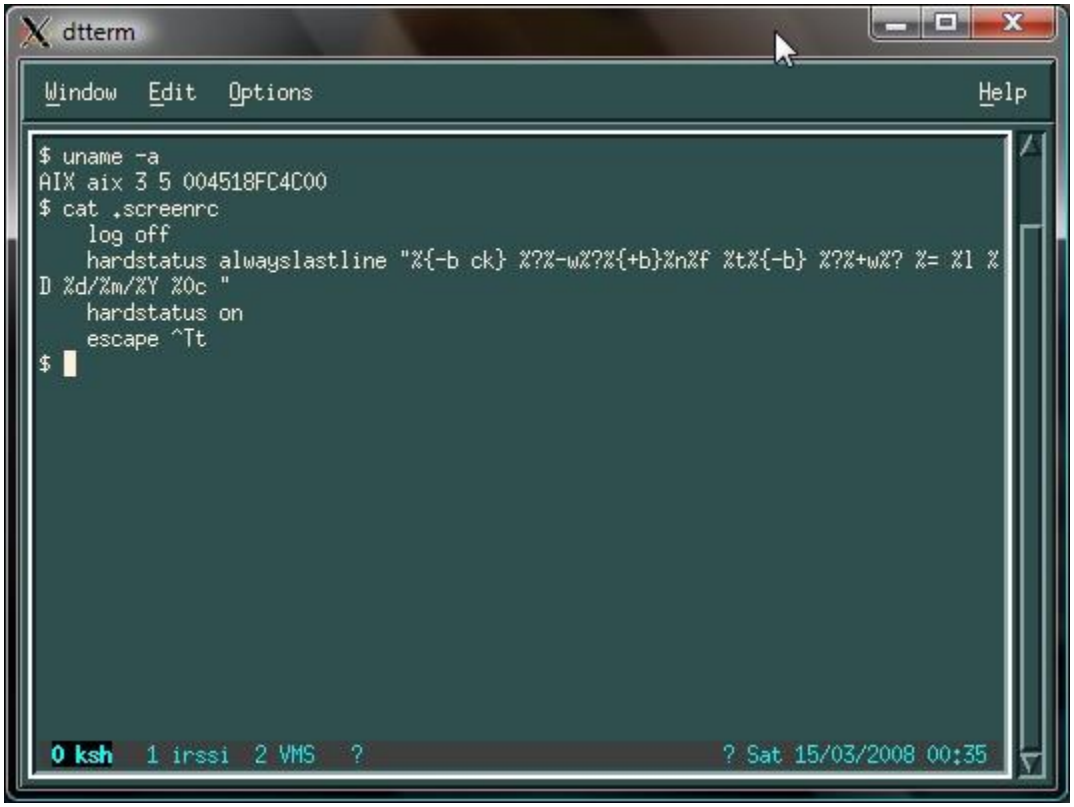
BSD Unix



```
root@FreeBSD-unixmen:/root # uname -a
FreeBSD FreeBSD-unixmen 9.1-RELEASE FreeBSD 9.1-RELEASE #0 r243826: Tue Dec  4 0
6:55:39 UTC 2012     root@obrian.cse.buffalo.edu:/usr/obj/usr/src/sys/GENERIC  i
386
root@FreeBSD-unixmen:/root # ifconfig
em0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> metric 0 mtu 1500
        options=9b<RXCSUM,TXCSUM,VLAN_MTU,VLAN_HWTAGGING,VLAN_HWCSUM>
        ether 08:00:27:ca:cd:91
        inet 144.44.172.182 netmask 0xfffffe00 broadcast 144.44.173.255
        nd6 options=29<PERFORMNUD,IFDISABLED,AUTO_LINKLOCAL>
        media: Ethernet autoselect (1000baseT <full-duplex>)
        status: active
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> metric 0 mtu 16384
        options=600003<RXCSUM,TXCSUM,RXCSUM_IPV6,TXCSUM_IPV6>
        inet6 ::1 prefixlen 128
        inet6 fe80::1%lo0 prefixlen 64 scopeid 0x3
        inet 127.0.0.1 netmask 0xff000000
        nd6 options=21<PERFORMNUD,AUTO_LINKLOCAL>
root@FreeBSD-unixmen:/root #
```

IBM AIX




dtterm
Window Edit Options Help
$ uname -a
AIX aix 3 5 004518FC4C00
$ cat .screenrc
log off
hardstatus alwayslastline "%{-b ck} %?%-w%?%{+b}%n%f %t%{-b} %?%+w%? %= %l %
D %d/%m/%Y %0c "
hardstatus on
escape ^Tt
$
0 ksh 1 irssi 2 VMS ? ? Sat 15/03/2008 00:35