Rich's lesson module checklist

Last updated 04/29/2018

- ❑ First day of term
  - ❑ Publish updated Canvas course with links and announcement

- ❑ 24 hours before first class
  - ❑ Login credentials document updated and secured
  - ❑ Send out welcome email

- ❑ Opus-II 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
- ❑ Scavenger Hunt Lab 1
  - ❑ tested (fix Mac Freedom and log rotate issues)
  - ❑ Scavenger systems last/who sync check (Opus-ii:login-monitor) cronjob
  - ❑ VlLab health check (Monitor:monitor-27.py) cronjob
- ❑ Lesson 1 supplemental videos updated and posted
- ❑ CIS 90 VLab VMs created and configured
- ❑ Surveys and PW sheet posted

- ❑ Rosters printed
- ❑ Add codes printed

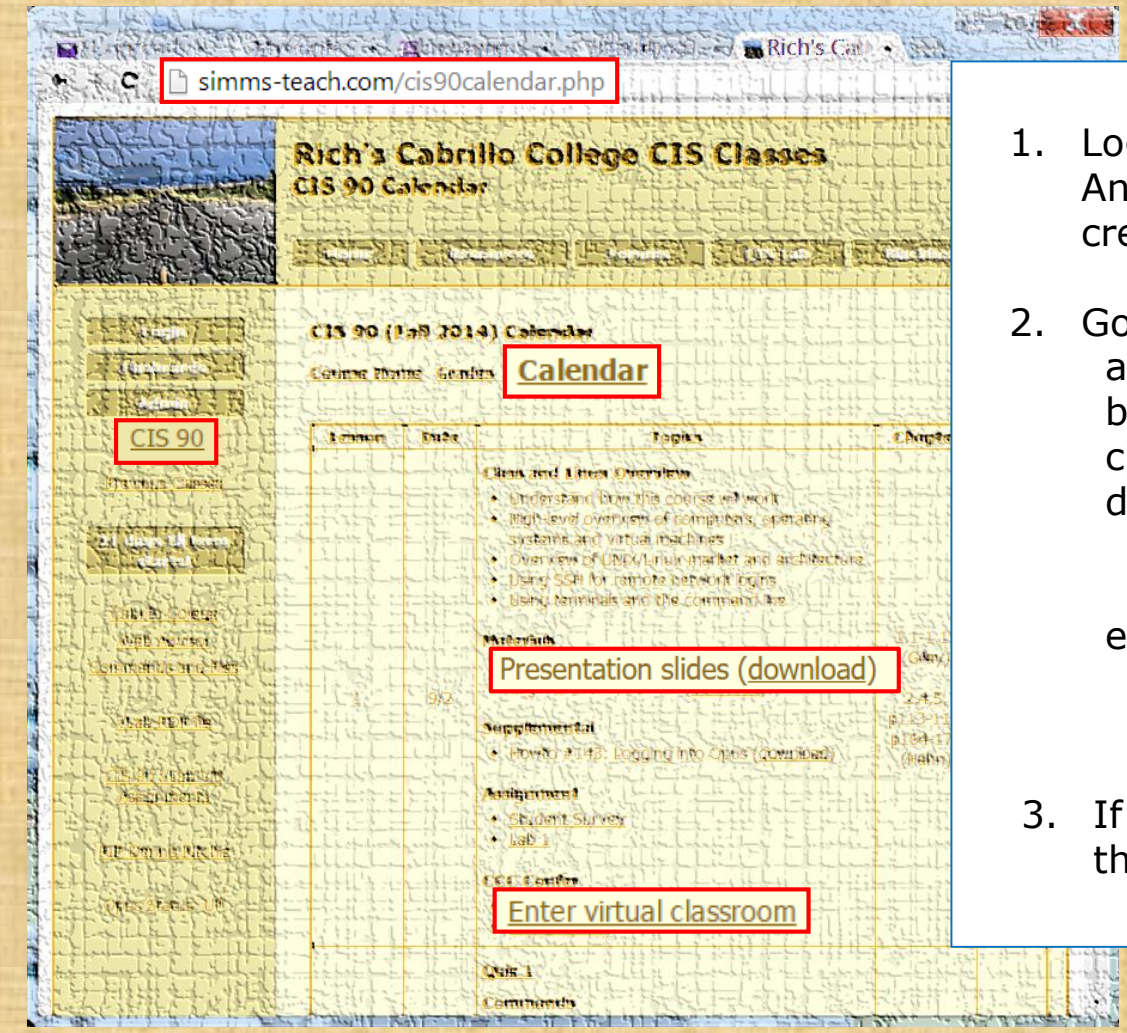
- ❑ Slides and lab posted
- ❑ Print out agenda slide and annotate page numbers

- ❑ Flash cards
- ❑ 1st minute quiz
- ❑ Update Calendar page

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

- ❑ https://zoom.us
  - ❑ Putty + Slides + Chrome
  - ❑ Enable/Disable attendee sharing
    ^ > Advanced Sharing Options > Only Host
  - ❑ Enable/Disable attended annotations
    Share > More > Disable Attendee Sharing

Before first class starts
Everyone into the virtual room!



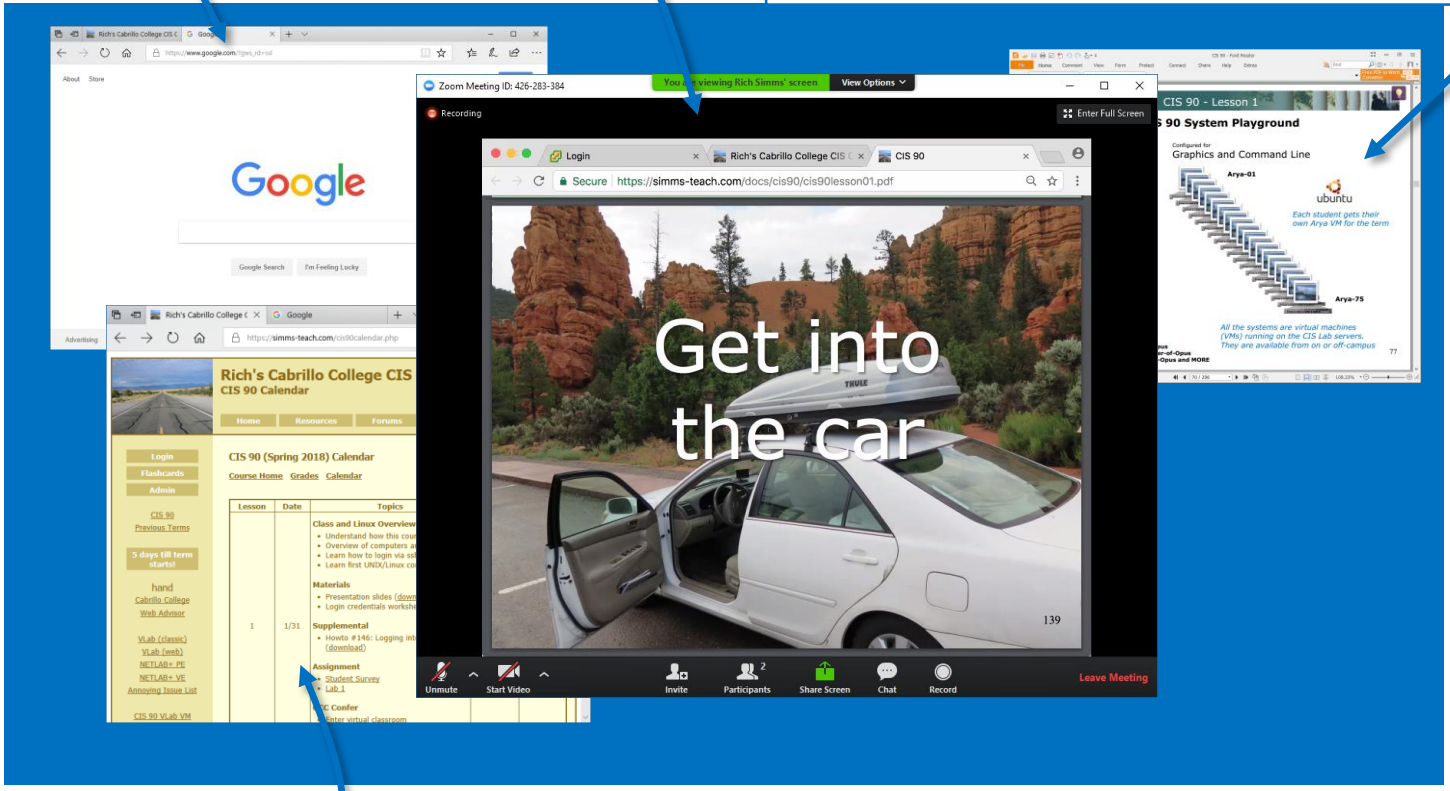
1. Log into **Canvas**, read my Announcement and review the credentials document.

2. Go to: **http://simms-teach.com**
   a) Click the **CIS 90** link.
   b) Click the **Calendar** link.
   c) Locate today's lesson.
   d) Find the **Presentation slides** for Lesson 1 and **download** them for easier viewing.
   e) Click the **Enter virtual classroom** link to join ConferZoom meeting.

3. If successful help another student in the room till everyone gets in!

Before first class starts

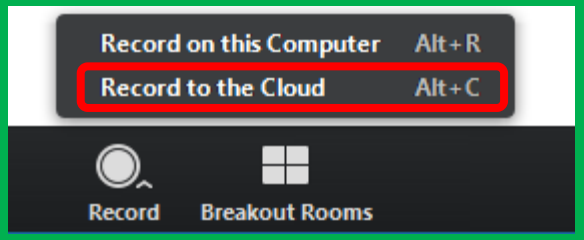
- ❑ *Google*
- ❑ *ConferZoom*
- ❑ *Downloaded PDF of Lesson Slides. I like Foxit Reader so I can take notes by annotating the downloaded slides.*



- ❑ *CIS 90 website Calendar page*

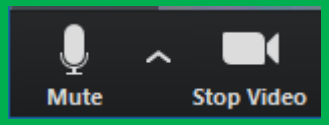
Set up your computer as shown above

Start



Start Recording

Audio Check



Start Recording

Audio & video Check

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

Introductions

Introductions and Credits

Jim Griffin
- Created this Linux course
- Created Opus and the CIS VLab
- Jim's site: https://web.archive.org/web/20140209023942/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. John's site: http://teacherjohn.com/
- Jaclyn Kostner for many webinar best practices: e.g. mug shot page.

CIS 90 - Lesson 1

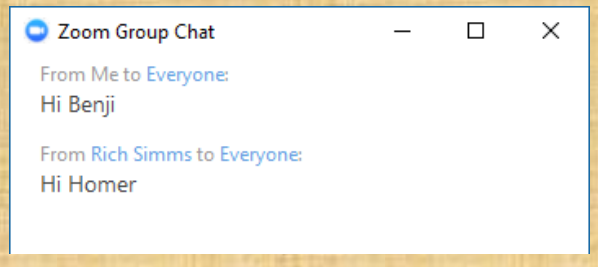
Instructor: **Rich Simms**
Dial-in: **408-638-0968 (toll)**
Meeting ID: **426 283 384**

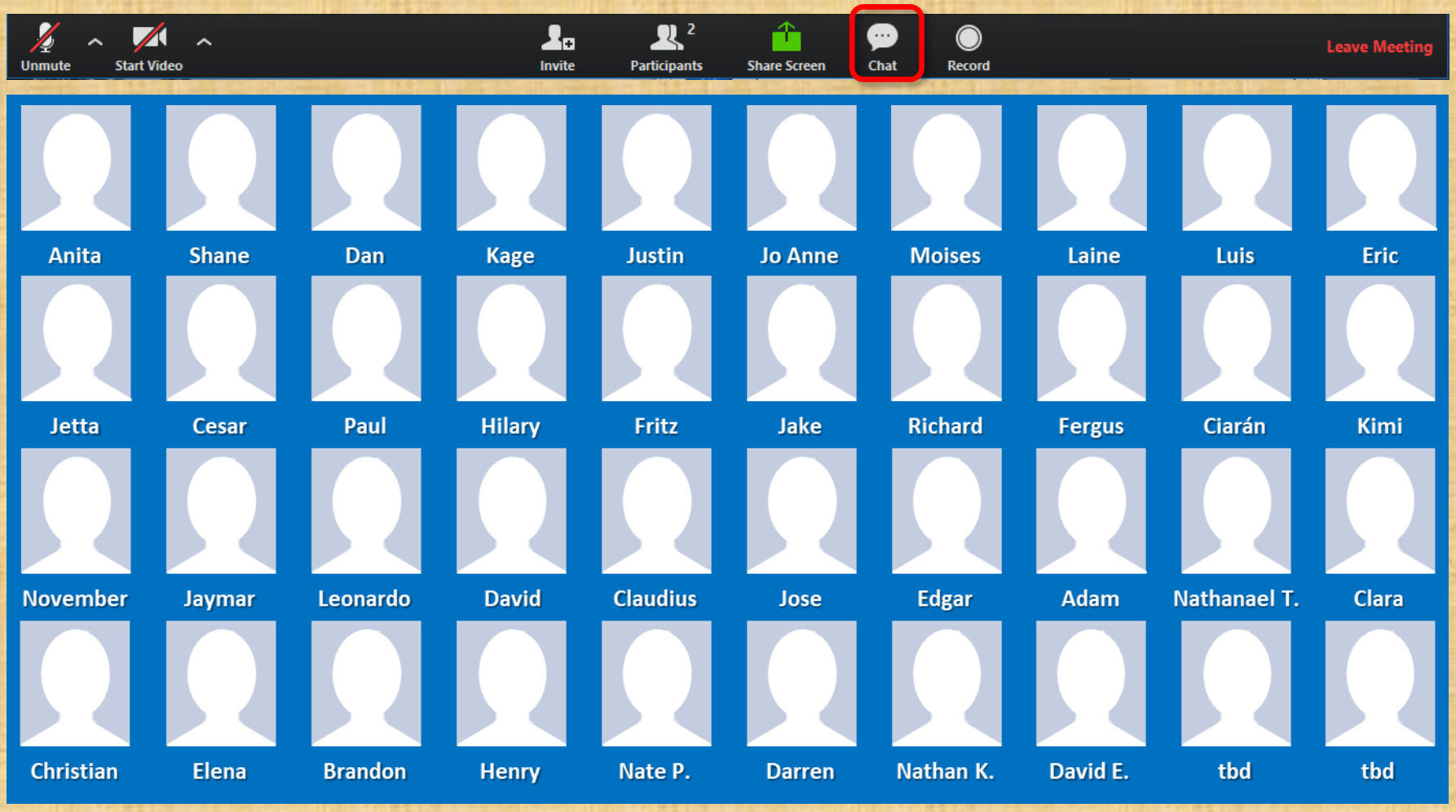
Anita	Shane	Dan	Kage	Justin	Jo Anne	Moises	Laine	Luis	Christian
Jetta	Cesar	Paul	Hilary	Fritz	Jake	Richard	Fergus	Ciarán	Kimi
November	Jaymar	Elena	David	Claudius	Jose	Edgar	Adam	Nathanael T.	Clara
		Brandon	Henry	Nate P.	Darren	Nathan K.	David E.		

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

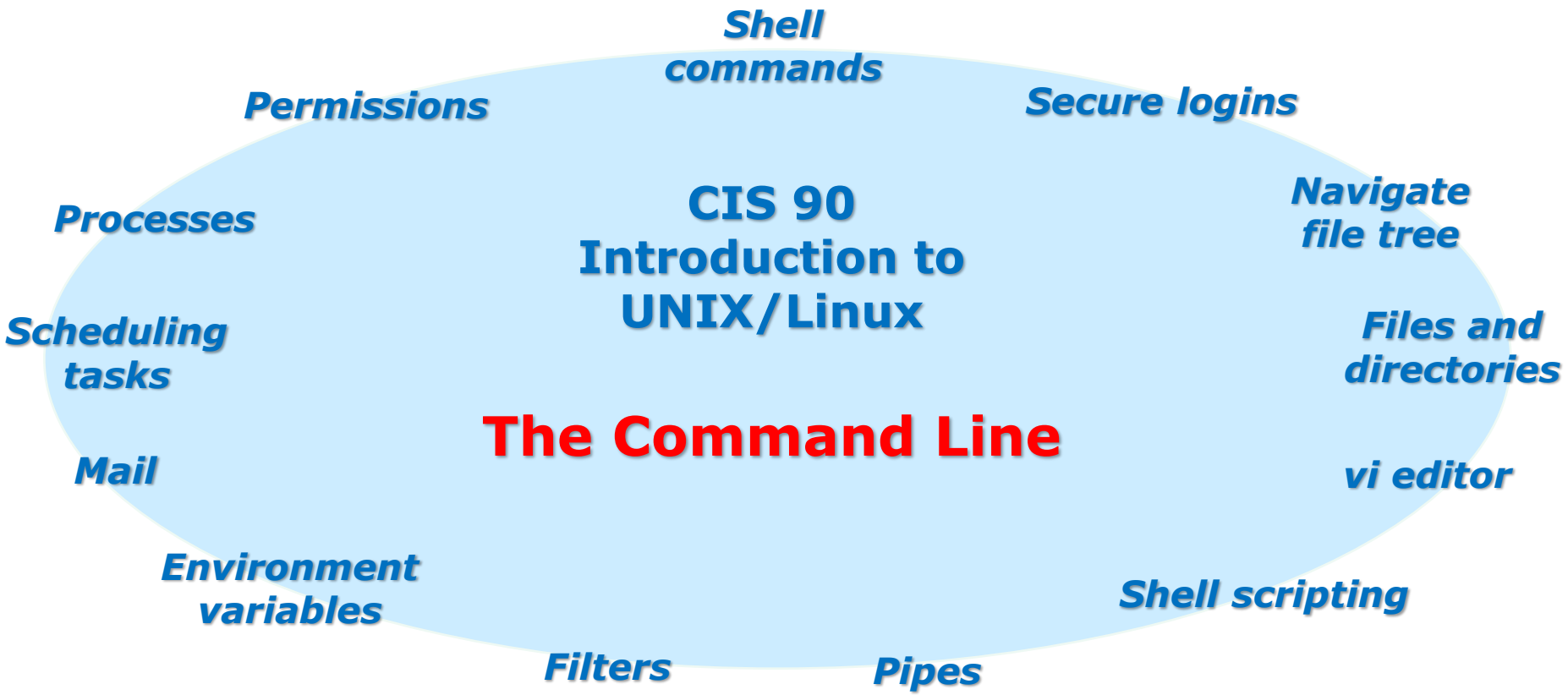
ConferZoom Activity

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





What is this class about?



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.

How this class works

Attending class

How to attend class each week

Wednesdays - 9:00AM to 12:05PM

- Section 1 meets online in this virtual classroom
- Section 2 meets simultaneously in room 828 on the Aptos Main Campus

Option 1: **Online "synchronous"** - from anywhere connect online to the "live" virtual classroom using ConferZoom. 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.

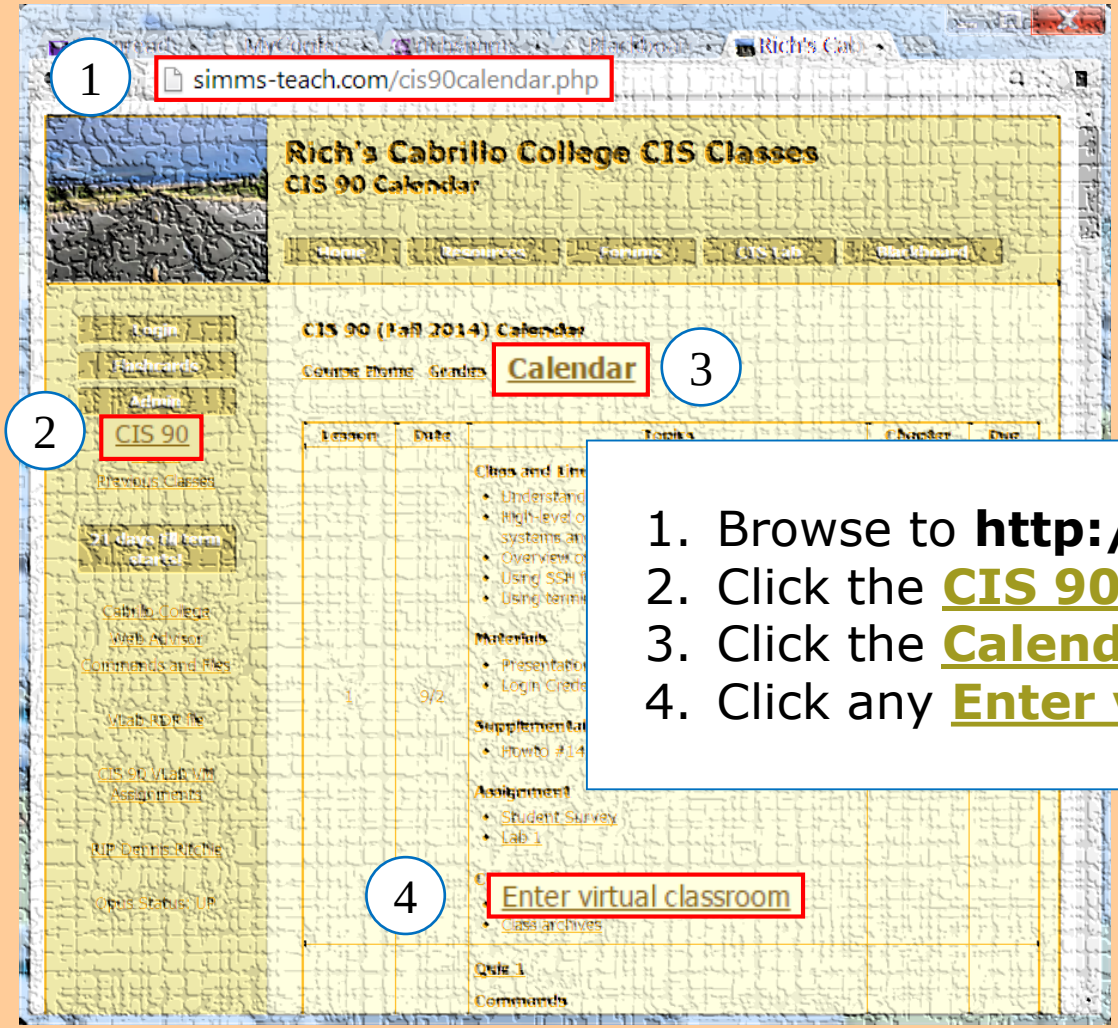
Option 3: **Online archives "asynchronous"** - watch the archived class recording online using ConferZoom at a time that works for you. Use the "Class archives" link on: http://simms-teach.com/cis90calendar.php

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

Attending Class

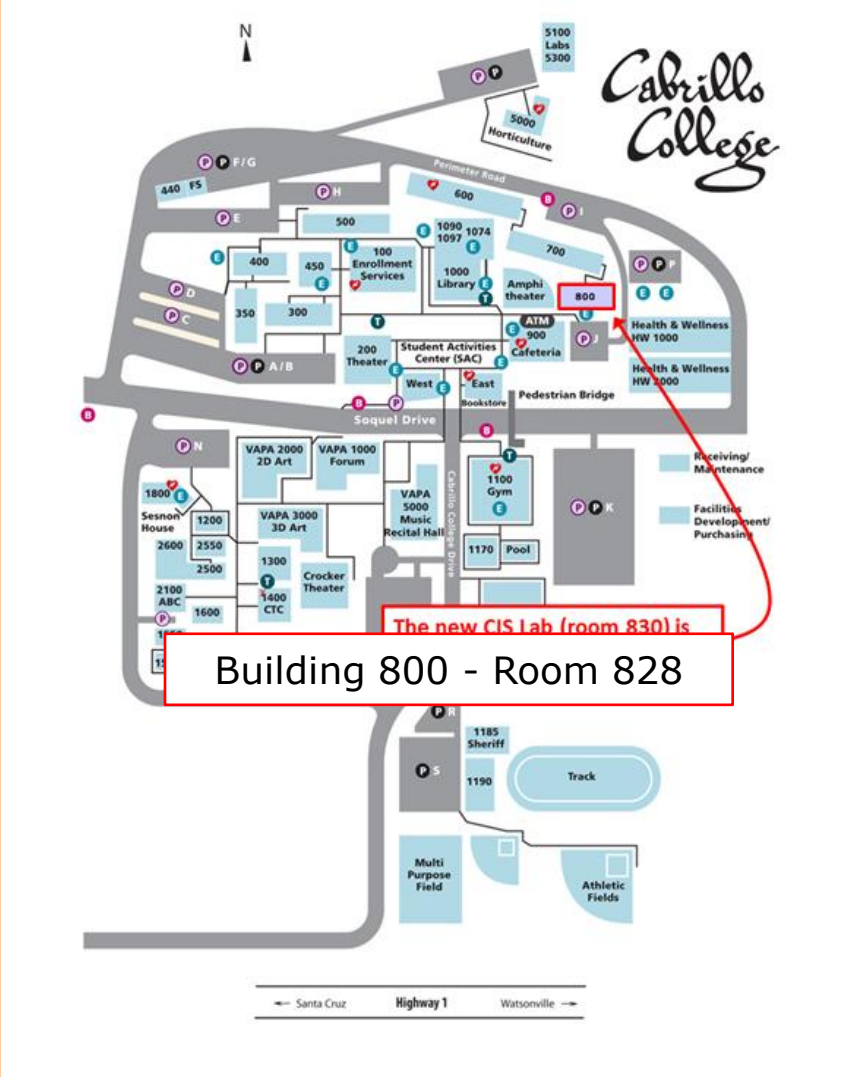
(supplemental)

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



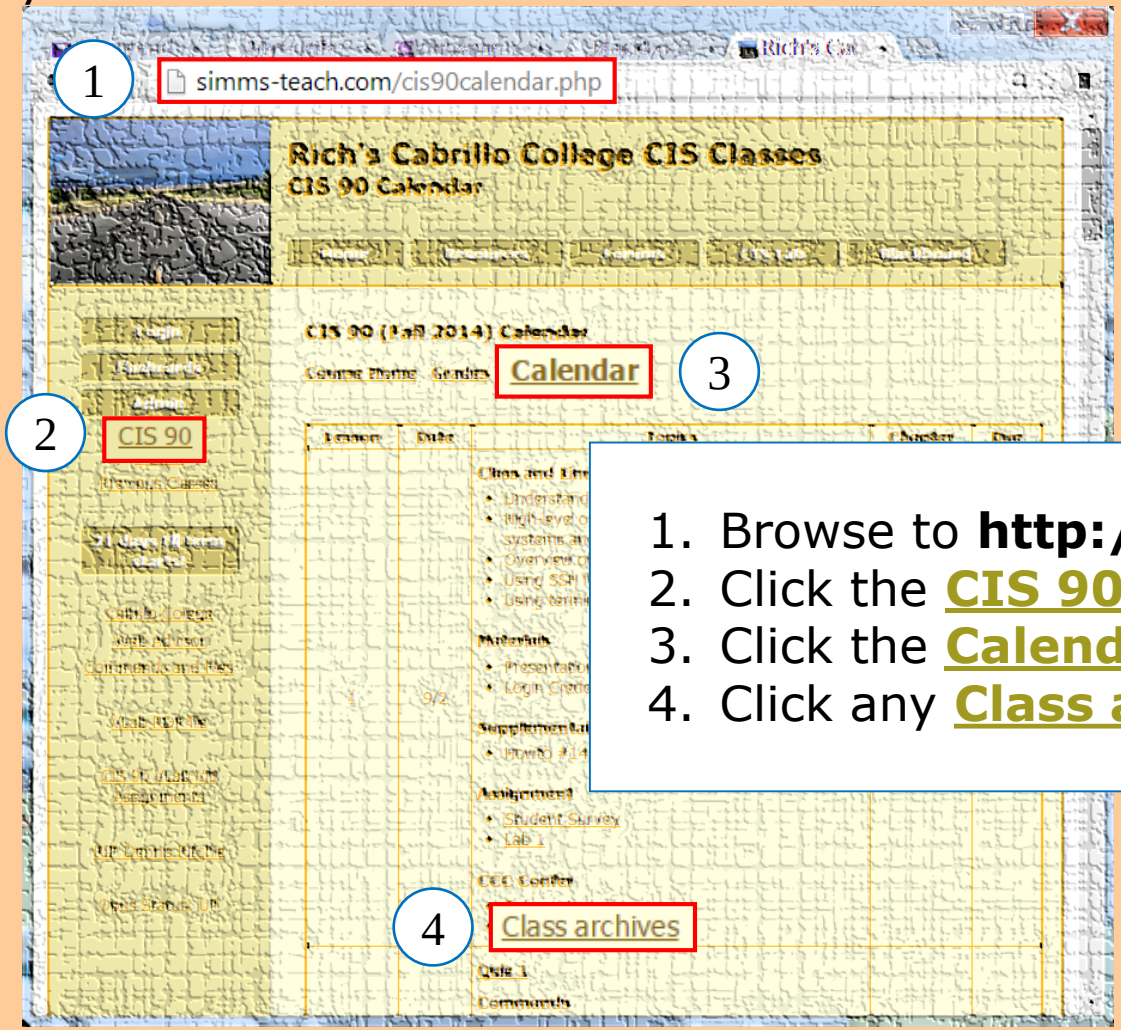
1. Browse to **http://simms-teach.com**
2. Click the **CIS 90** link
3. Click the **Calendar** link
4. Click any **Enter virtual classroom** link

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!

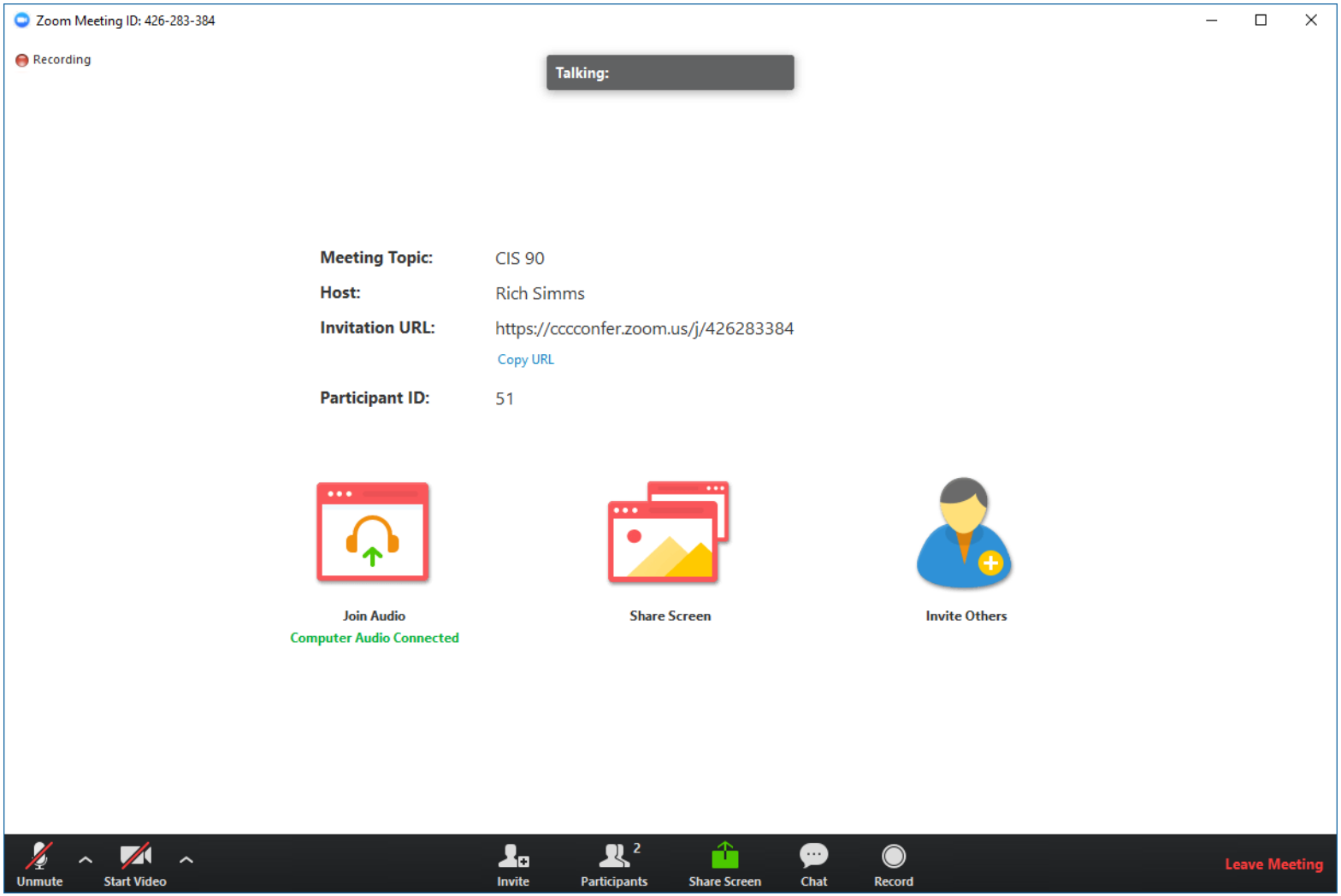
Option 3: **Online archives (asynchronous)** - watch the archived class recording online using ConferZoom at a time that works for you.



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

ConferZoom

ConferZoom - Attending class online

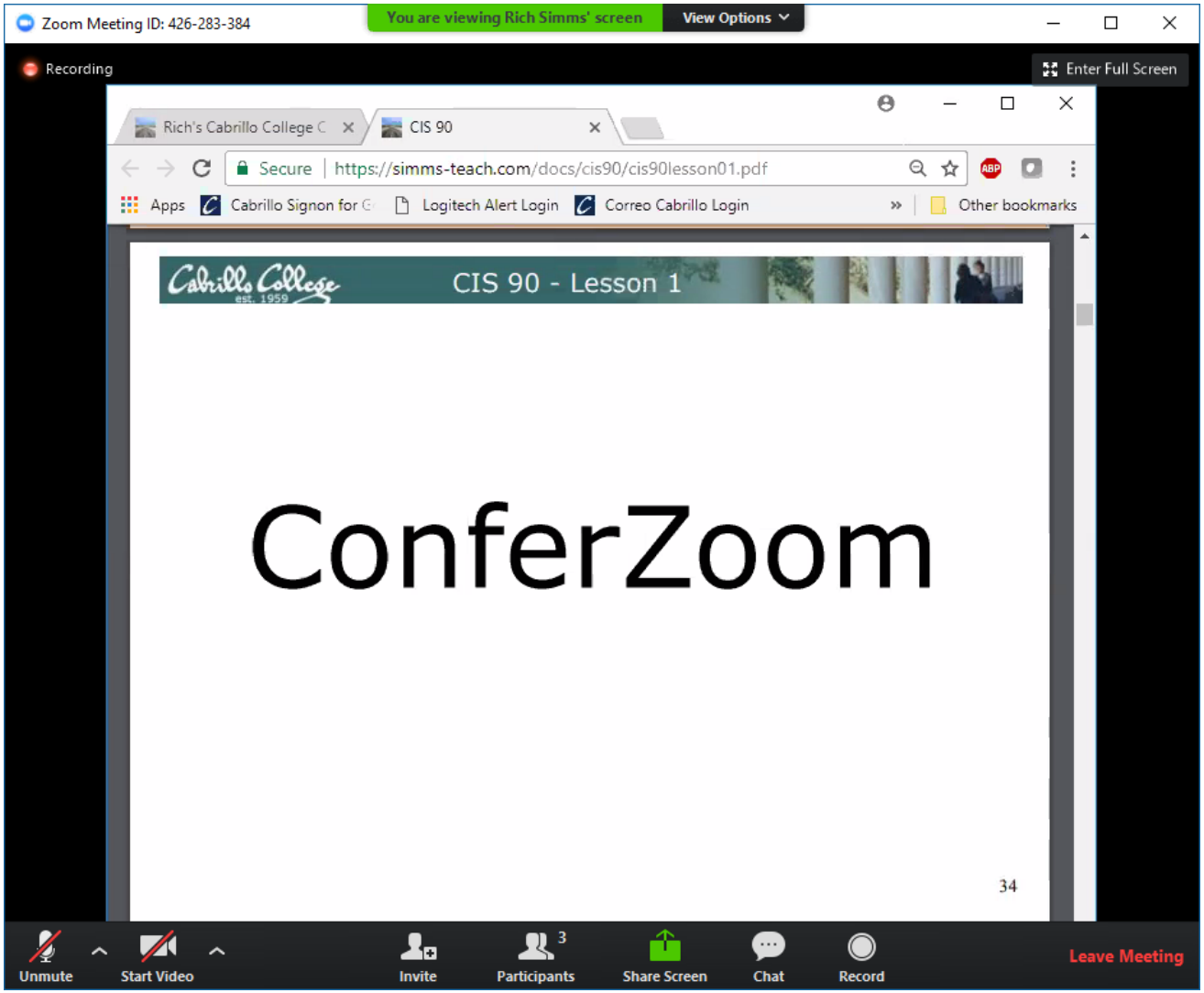


Zoom application, host is not sharing anything

Help the Instructor with ConferZoom

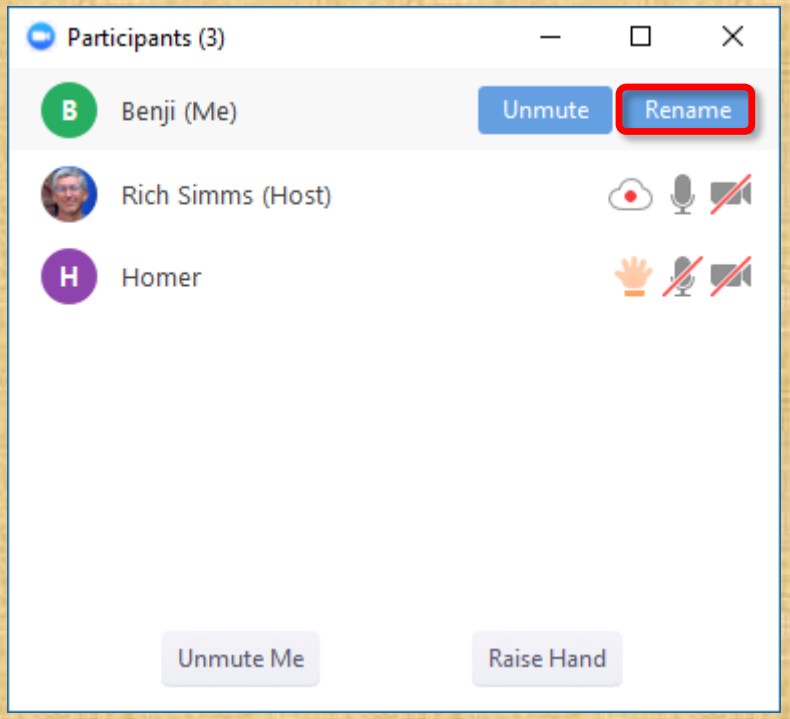
Students who attend class on the Aptos campus should still use ConferZoom.

- If you notice **an online student with an unanswered question** 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!

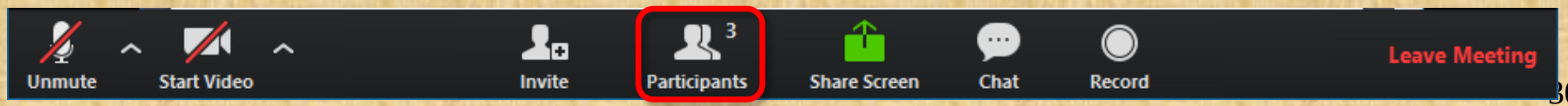


Zoom application, host is sharing lesson slides

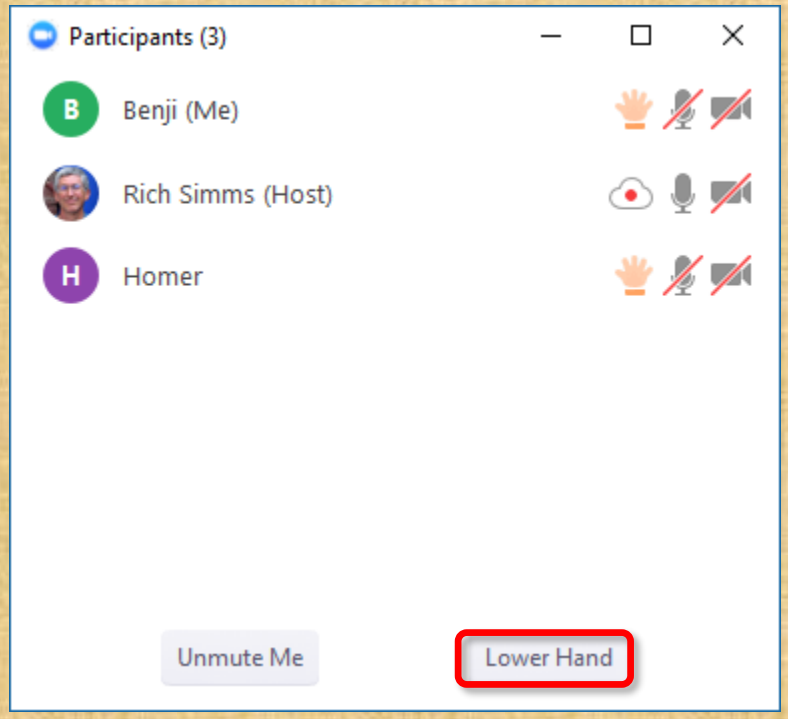
ConferZoom Activity



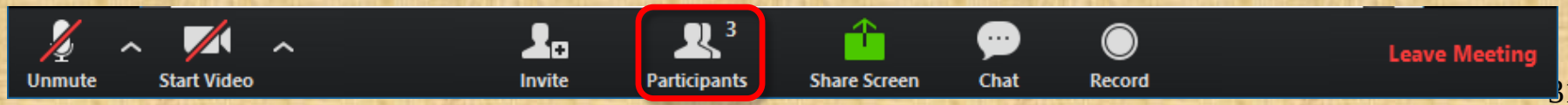
Change your name to be your preferred first name.



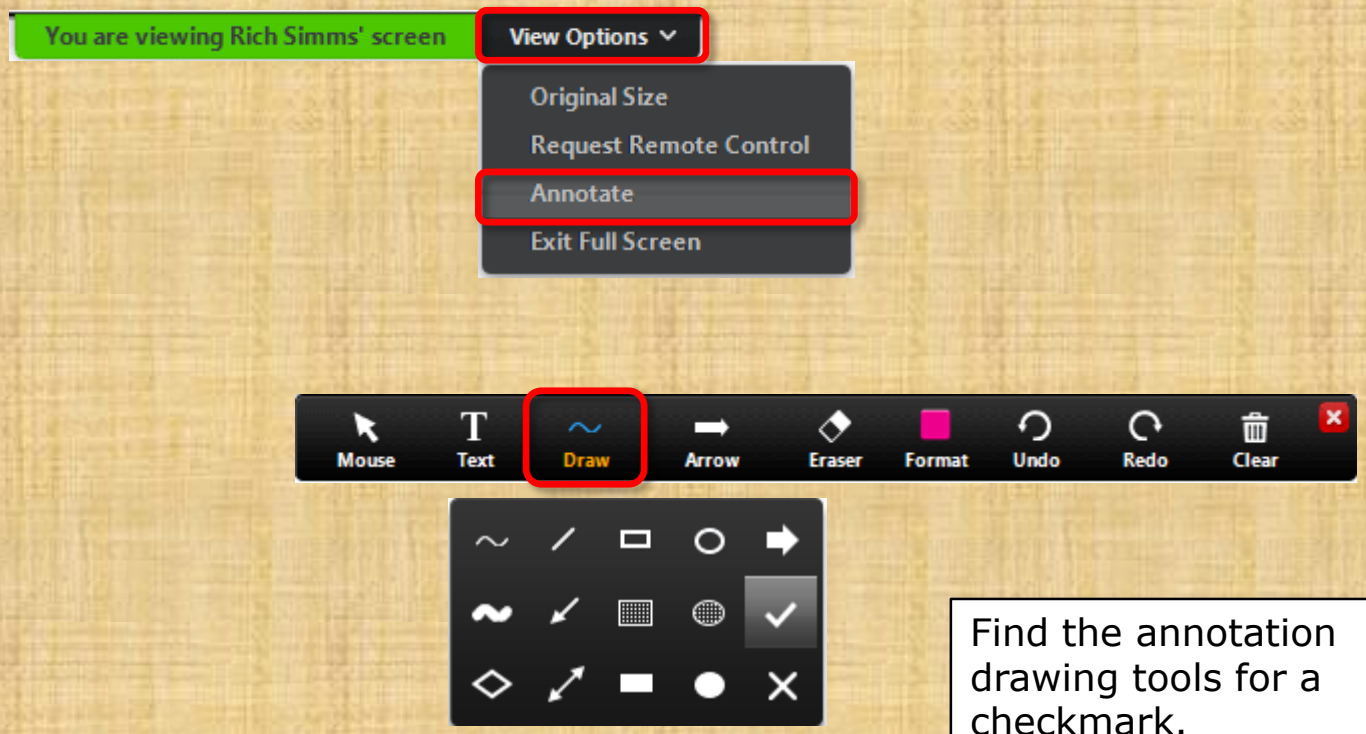
ConferZoom Activity



Raise and lower your hand.



ConferZoom Annotations



Find the annotation drawing tools for a checkmark.

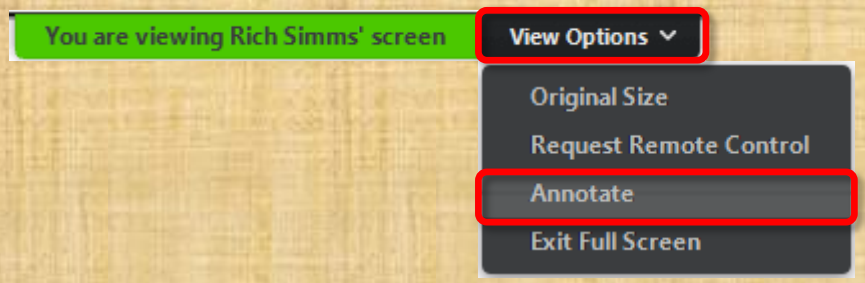
View Options > Annotate Draw > "✓"

ConferZoom Activity

			Other

Place an ✓ to indicate the operating system is your computer running.
(View Options > Annotate > Draw > ✓)

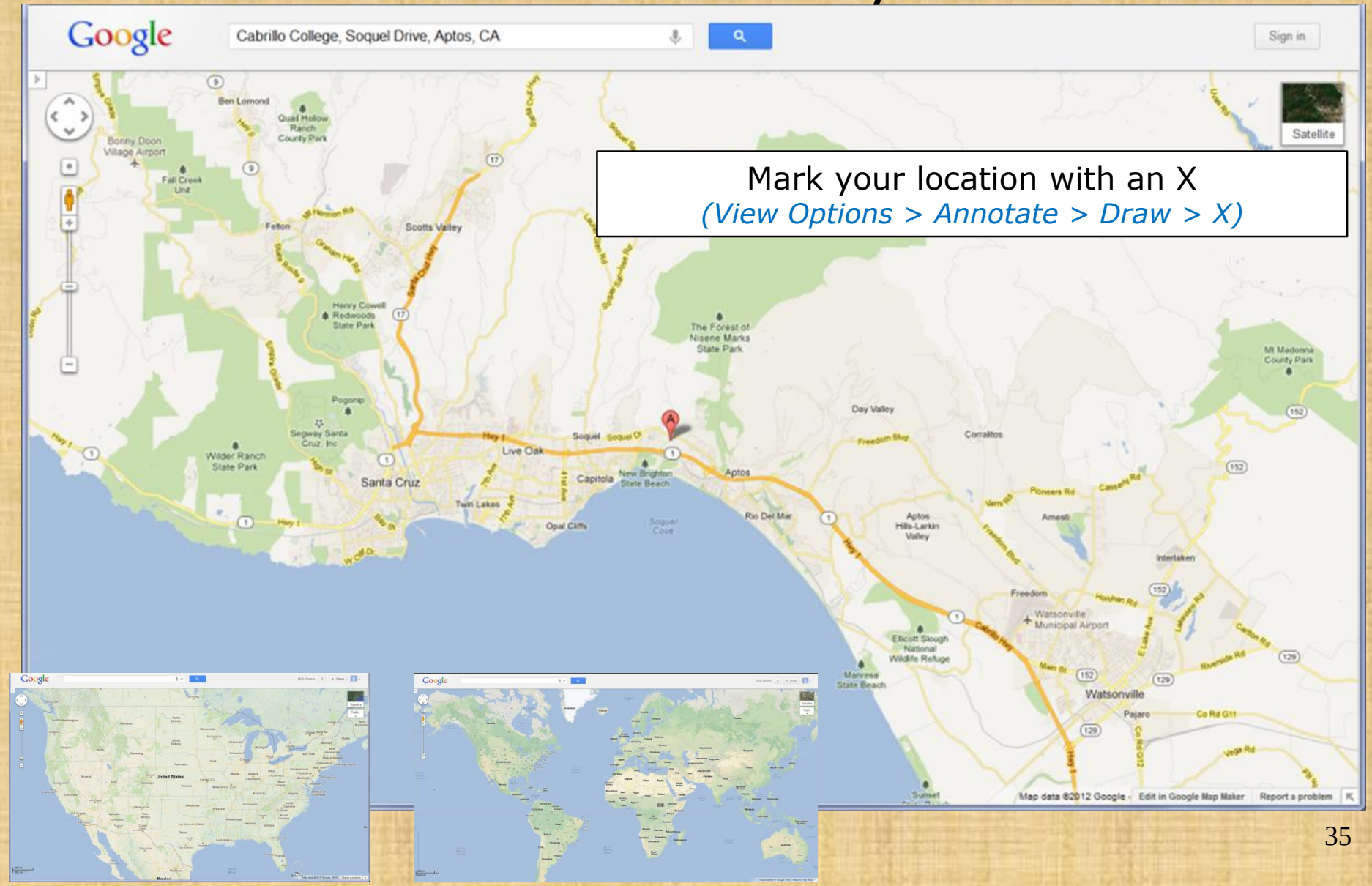
ConferZoom Annotations



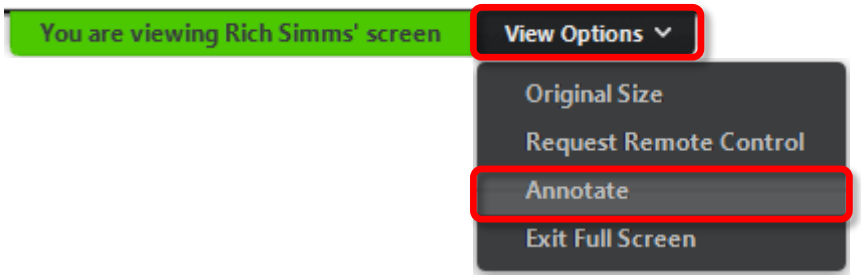
Find the annotation drawing tools for an "X".

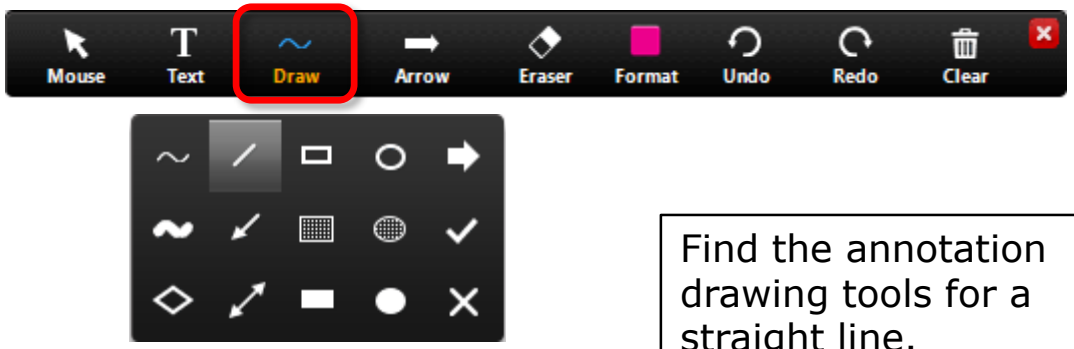
View Options > Annotate Draw > X

ConferZoom Activity



ConferZoom Annotations

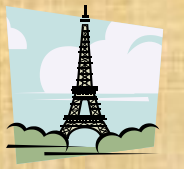




Find the annotation drawing tools for a straight line.

View Options > Annotate Draw > /

ConferZoom Activity






Connect the matching images with a straight line using your favorite color.
(View Options > Annotate > Draw > /)

Instructor Note:

PAUSE Recording, Switch to Canvas announcement and credentials documents

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, login into Canvas and read my Welcome to CIS 90 announcement.

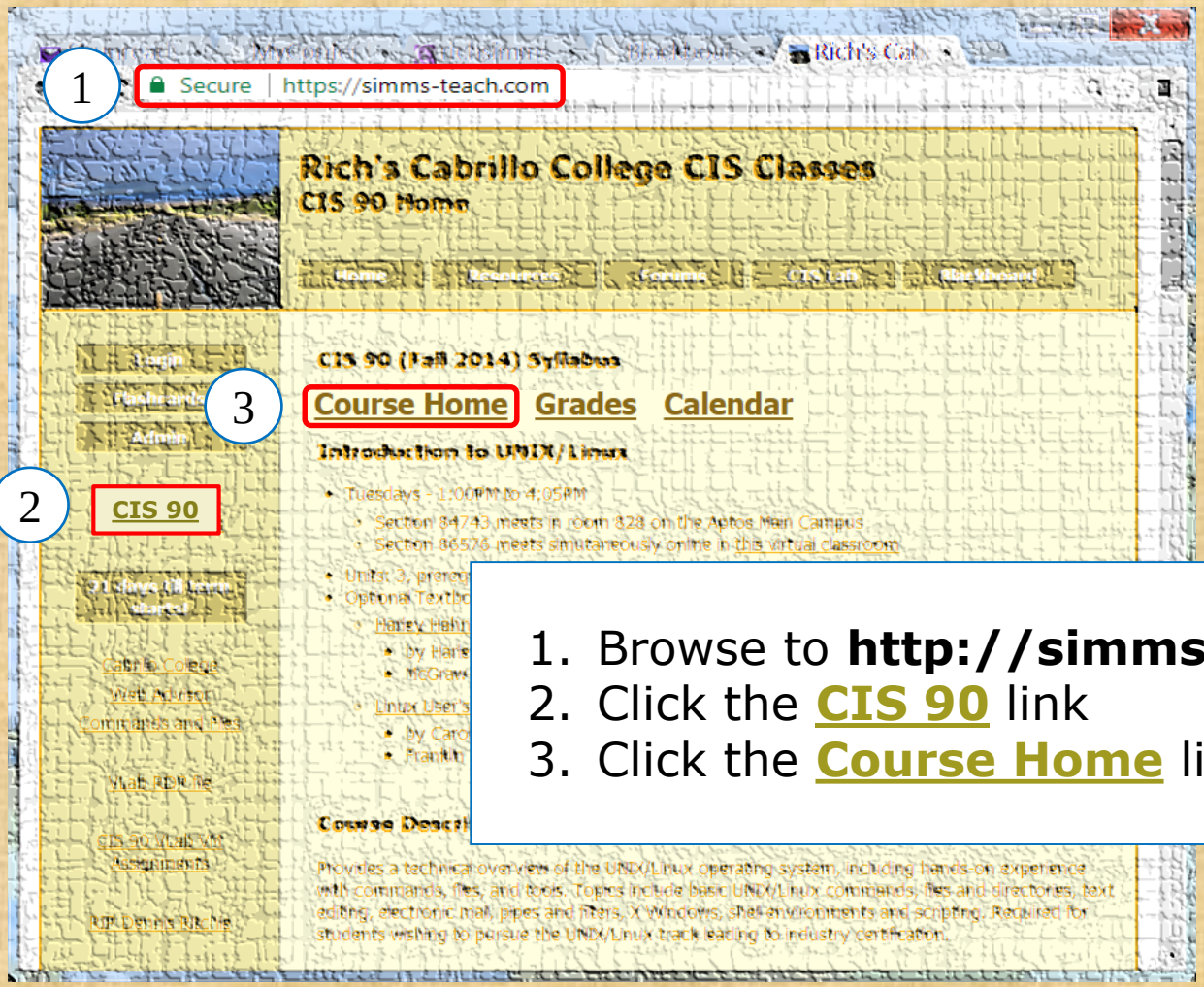
Instructor Note:

RESUME Recording, continue with lesson slides

Syllabus, Calendar and Grades

simms-teach.com

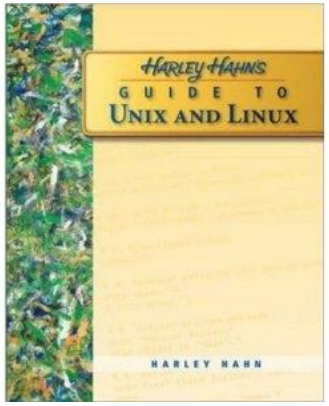
Find the syllabus



1. Browse to **http://simms-teach.com**
2. Click the **CIS 90** link
3. Click the **Course Home** link

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."

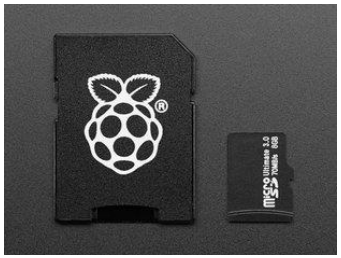
Optional Textbook:

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:



$35.00	Raspberry Pi 3 - Model B - ARMv8 with 1G RAM
$7.50	5V 2.4A Switching Power Supply with 20AWG MicroUSB Cable
$14.95	16GB Card with NOOBS 2.1

CIS 90 Spring 2018

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

- 15 lessons: **9:00AM-12:05PM**, from **Jan 31st** to **May 16th**
- Final exam: **7:00AM-9:50AM**, on **WEDNESDAY** **May 23rd**, in room **828**

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	Monday, May 21
9:00 am and 10:15 am, MW/Daily	7:00 am-9:50 am	Wednesday, May 23

SPRING 2018 FINAL EXAMINATIONS SCHEDULE
MAY 21 TO MAY 26

DAYTIME FINAL SCHEDULE

Daytime Classes: All times in bold refer to the beginning times of classes. **MW/Daily** means Monday alone, Wednesday alone, Monday and Wednesday **or any 3** or more days in any combination. **TTH** means Tuesday alone, Thursday alone, or Tuesday and Thursday. **Classes meeting other combinations of days and/or hours not listed must have a final schedule approved by the Division Dean.**

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	Monday, May 21
9:00 am and 10:15 am, MW/Daily	7:00 am-9:50 am	Wednesday, May 23

The typical week

http://simms-teach.com

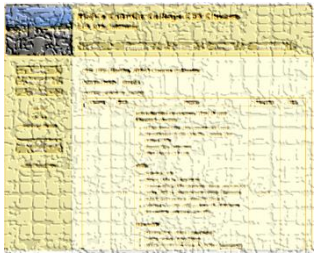
Use the

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-II time)

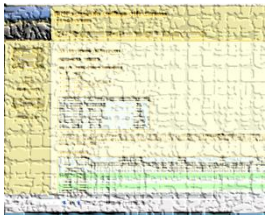


Calendar

All due dates are found here

Thursday

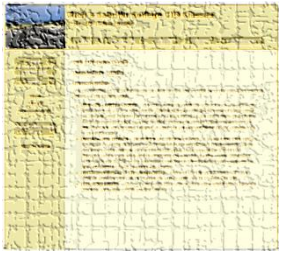
is grading day



*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*

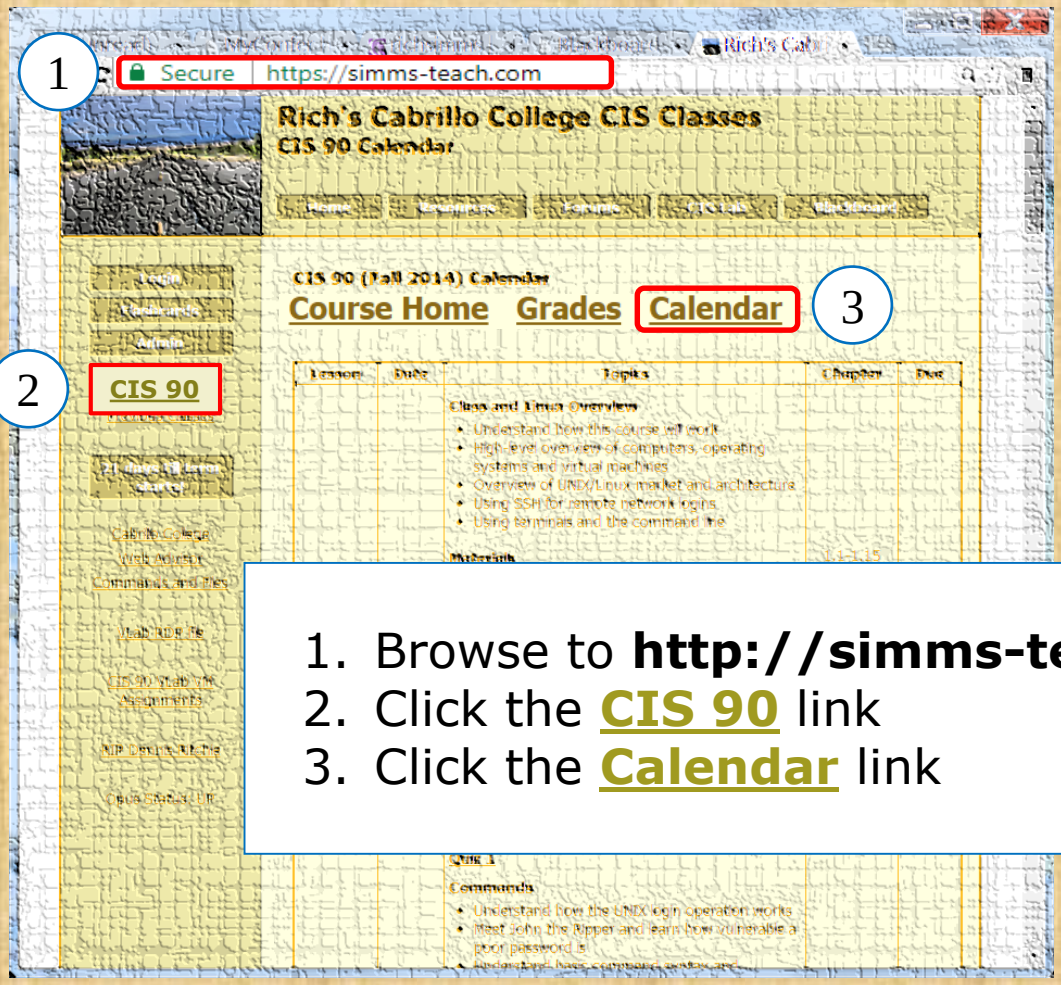
Contacting the instructor

- 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 on Cabrillo A-Z Directory website:
  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)!

simms-teach.com

Find the Calendar page



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

Course Calendar

Lesson	Date	Topics	Chapter	Due*
5	2/28	**Quiz 4** **Review** • Review lessons 1-4 • Practice skills • Learn about filename expansion characters **Materials** • Presentation slides (download) **Assignment** • Read/skim Lesson 5 slides • Practice Test 1 (canvas) **ConferZoom** • Enter virtual classroom • Class archives		Lab 4
6	3/7	**Test #1** **Managing Files** • Creating • Copying • Moving • Renaming • Removing • Linking **Materials** • Presentation slides (download) • Test 1 (canvas) **Assignment** • Read/skim Lesson 6 slides • Lab 5 **ConferZoom** • Enter virtual classroom • Class archives	5 8.4 8.13-8.16 (Gillay) 25 p715-729 p740-746 (Hahn)	

First minute quiz

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

Lesson # and Date

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

Links to virtual classroom and archived recordings

Test

Assignment for next class

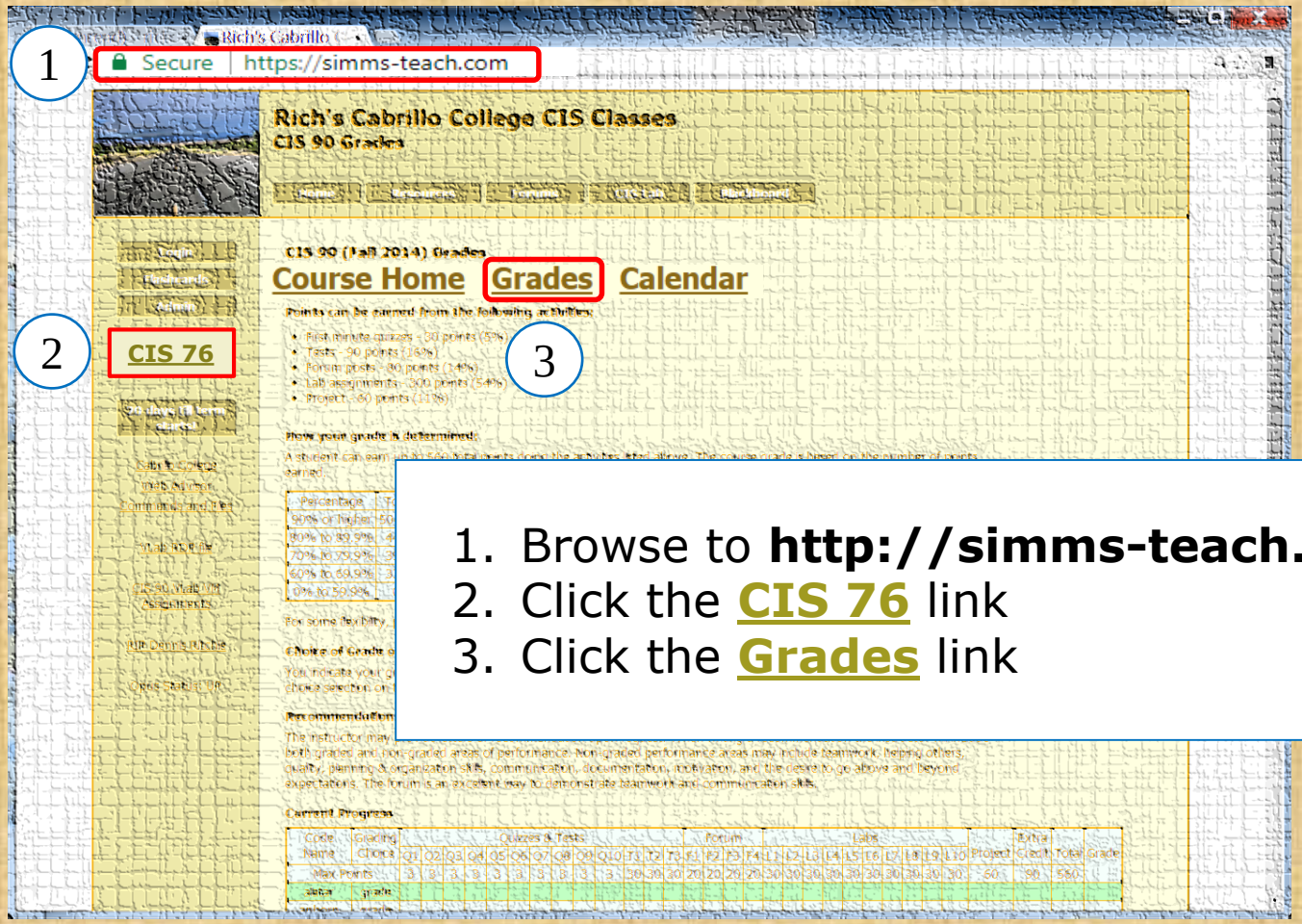
Supplemental references to material in the Gillay and Hahn textbooks

ConferZoom links to join class online or watch archived recordings

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

simms-teach.com

Find the Grades page



1. Browse to **http://simms-teach.com**
2. Click the **CIS 76** link
3. Click the **Grades** link

Course Grading

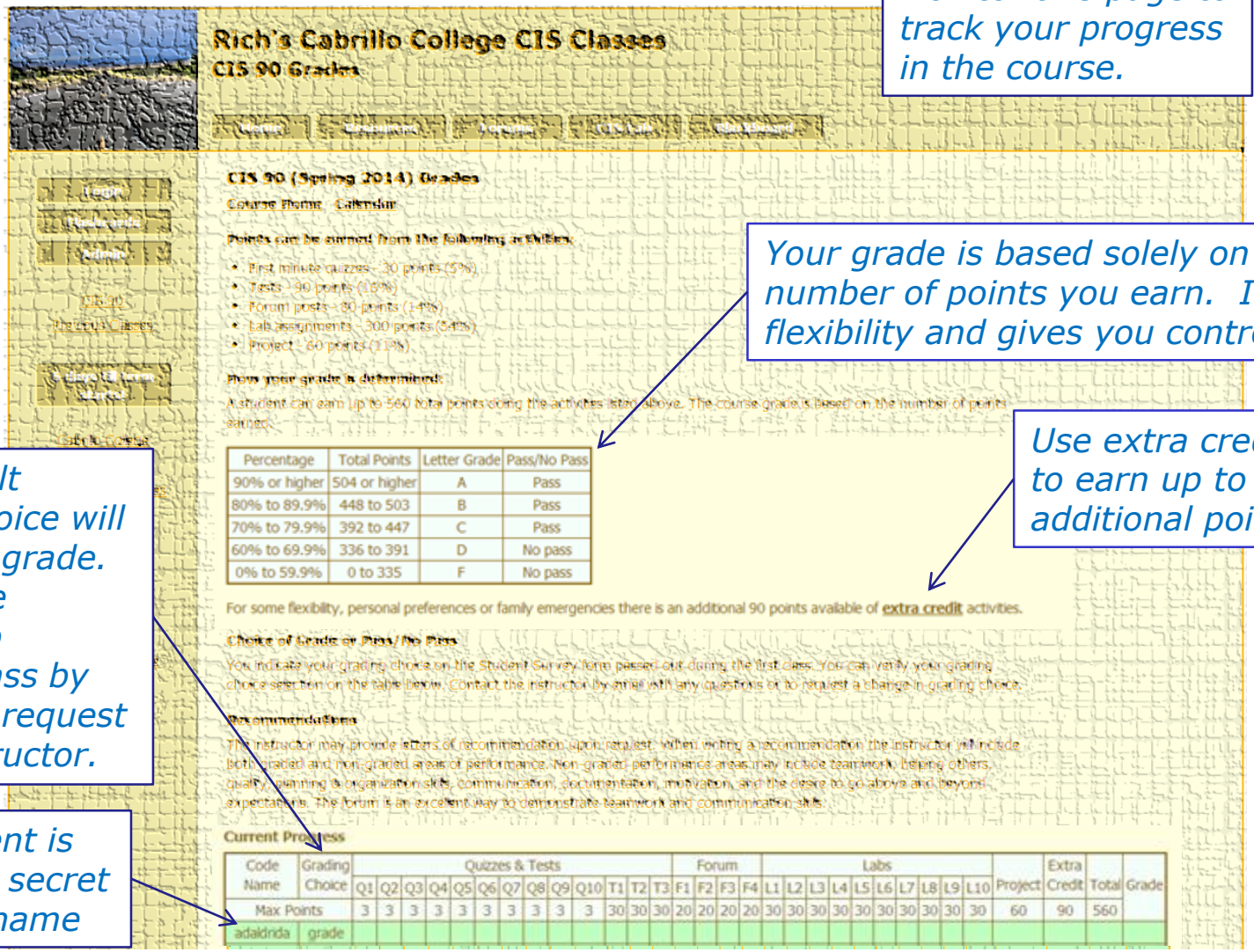
Monitor this page to track your progress in the course.

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

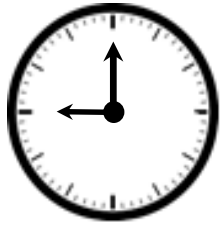
You control your grade. The more points you earn the higher your grade will be.

Grading - Lab Assignments

- 10 labs, 30 points each
- Due at **11:59PM** (Opus-II 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-II 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 ConferZoom 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. Answers emailed **after** the first few minutes of class **will not get credit**.
- 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-II 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-II 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.

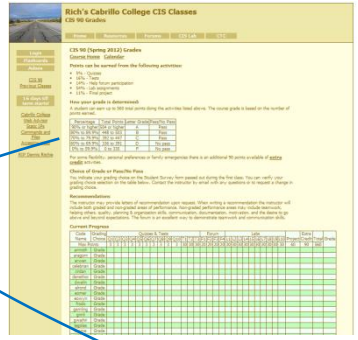
Tip: if you have not completed a lab assignment, **please turn in what you have done for partial credit.**

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

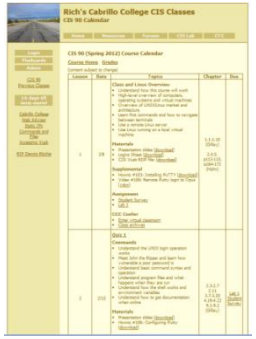
Final word on Grading

- 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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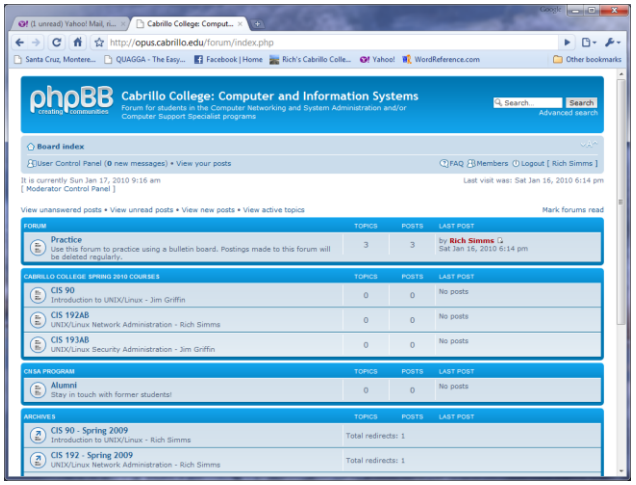
0% to 59.9%	0 to 335	F	No pass

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

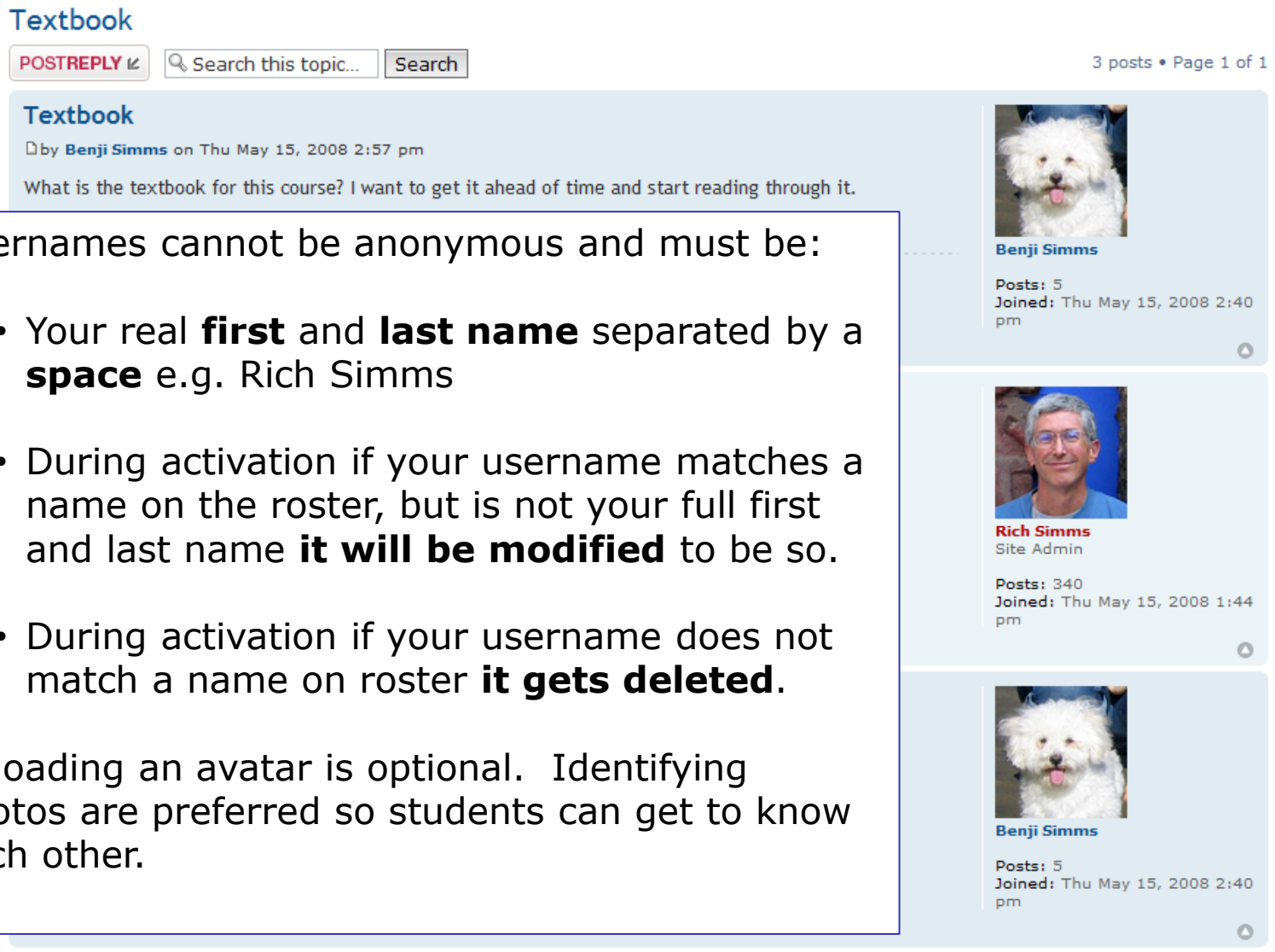
Online Help Forum



- 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, respectful, supportive and 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)

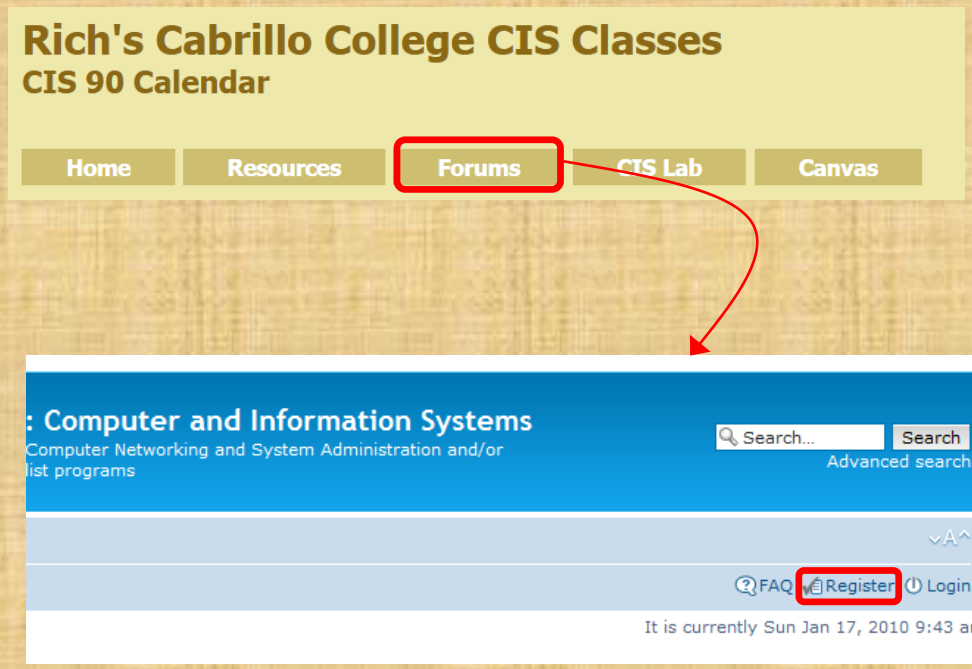
Class Forum



- 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 in 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.

To get notifications of new forum posts

Subscribe to the forum to get email notifications of new posts

After logging in:

1. Go to the CIS 90 class forum.
2. At the bottom of the page, click the "Subscribe forum" link on 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

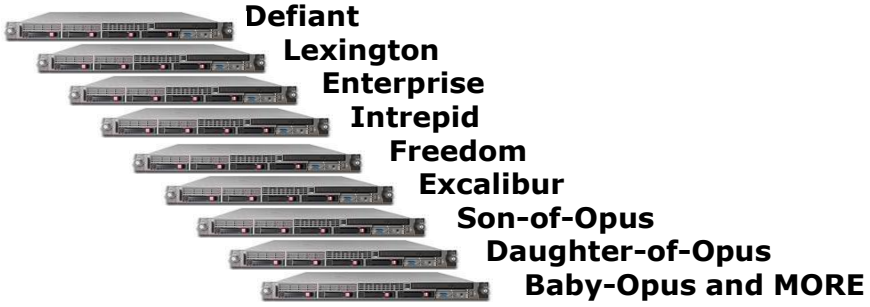
The CIS 90 System Playground

Configured for
Command Line Only

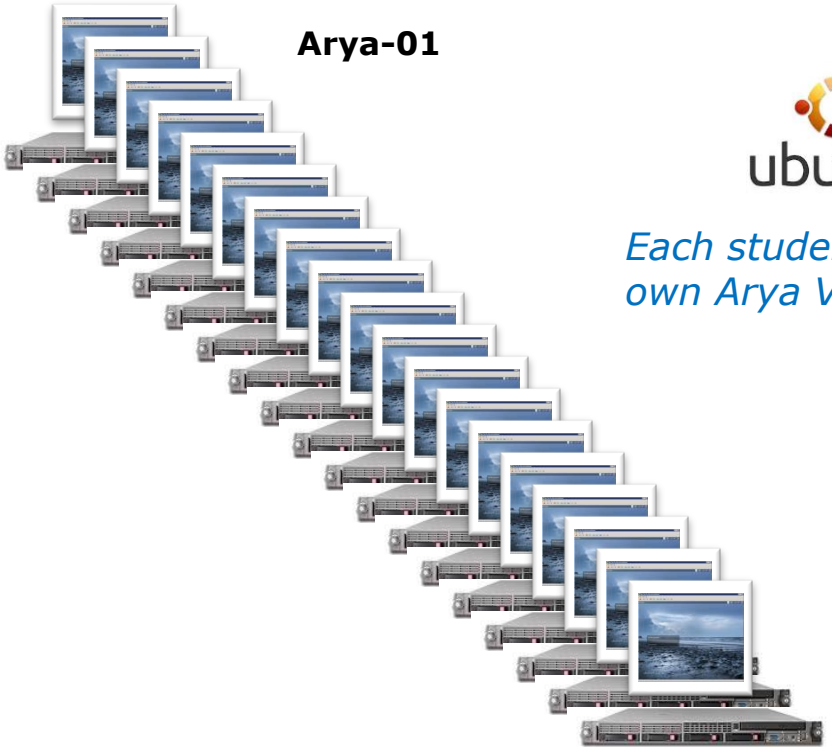
Opus-II

Sun-Hwa-XX servers for tests

Other UNIX/Linux servers



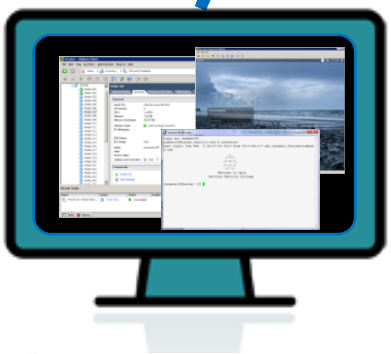
Configured for
Graphics and Command Line



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

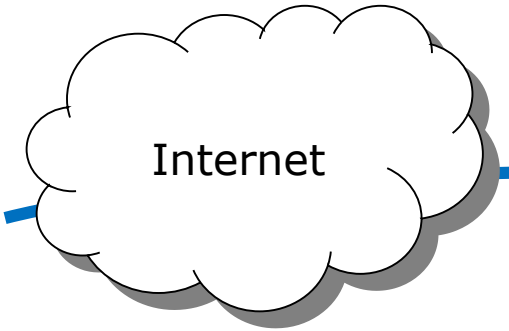
Option 1: Work on assignments online from anywhere



Home

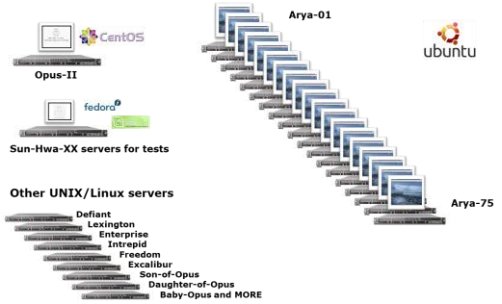
School

Travel



CIS Lab servers on the Aptos campus

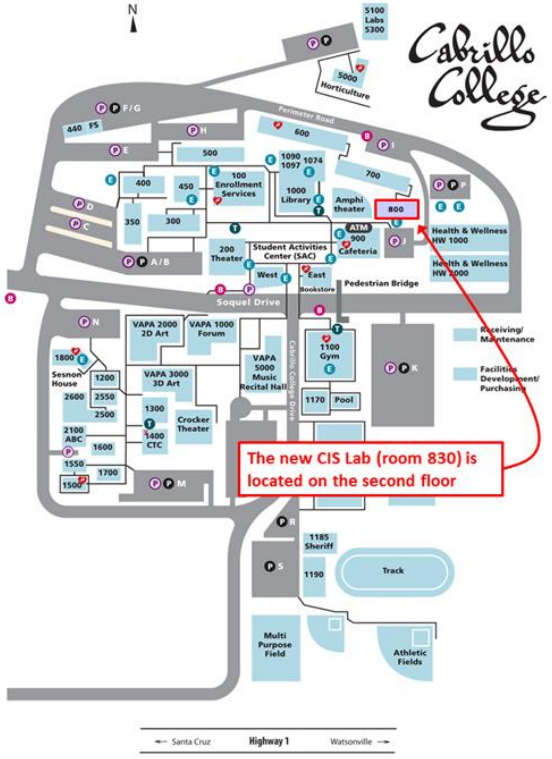
The CIS 90 systems, e.g. Opus-II and Sun-Hwa, are virtual machines hosted on physical servers in the CIS Lab

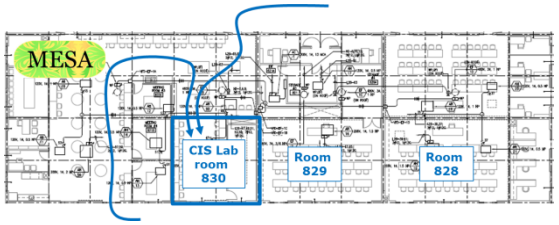


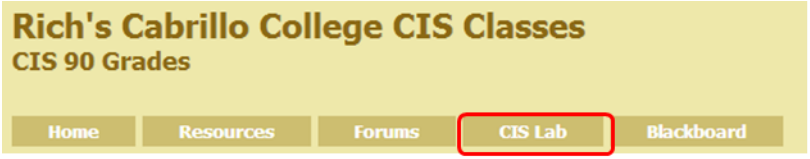
vmware

Option 2: Work on assignments in the CIS Lab

Building 800 - Room 830 (in the STEM Center)





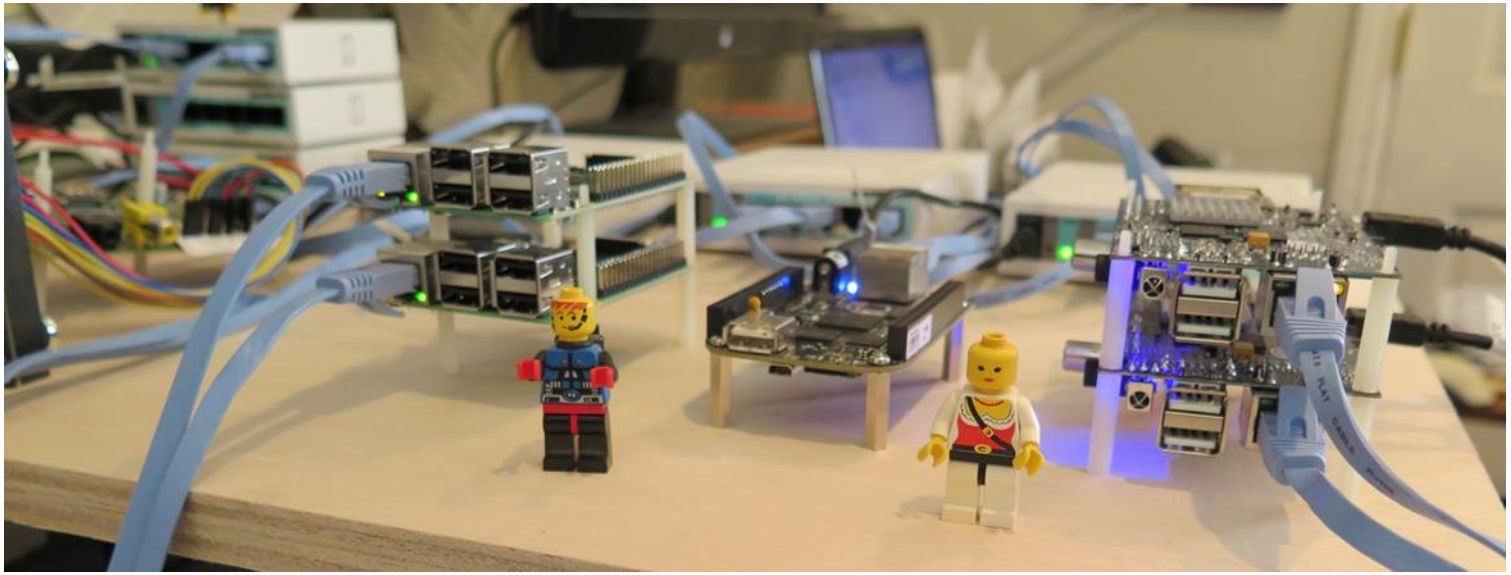


Instructors, lab assistants and equipment are available CIS students.

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

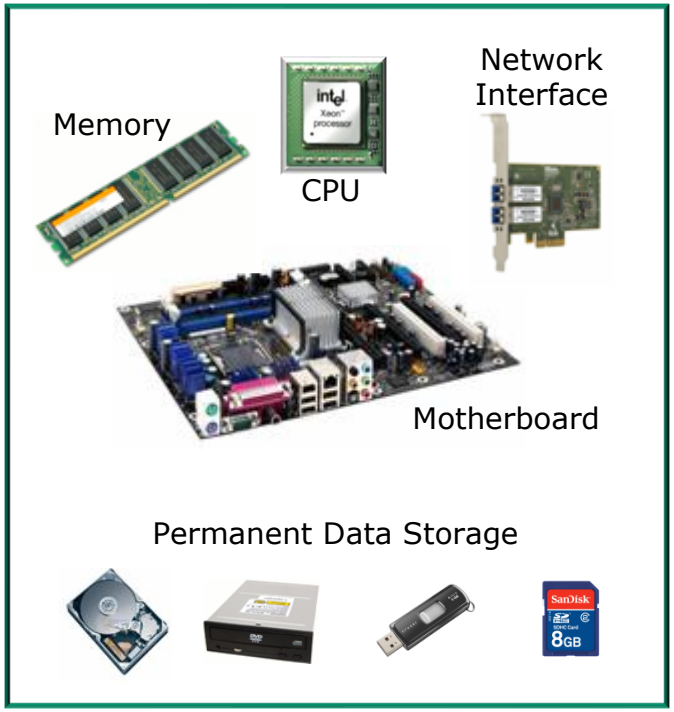


My micro lab on my desk at home. Watch the forum for an extra credit activity using this tiny lab.

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

App Store

The Apache Software Foundation

SAP

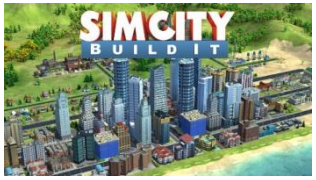
Norton from symantec

Software

redhat

ORACLE

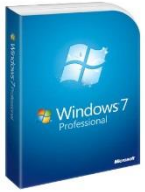
Adobe



AVG

GNU

McAfee



Google Docs

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

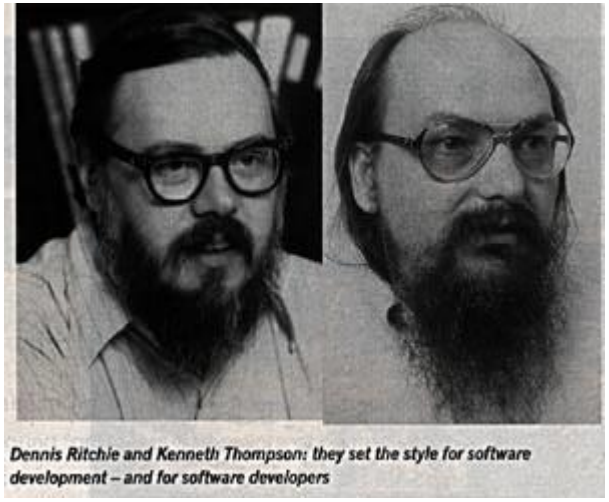
Proprietary (closed source)

- 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

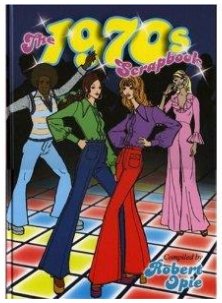
In 1971 Ken Thompson and Dennis Ritchie developed Unix at AT&T's Bell Labs

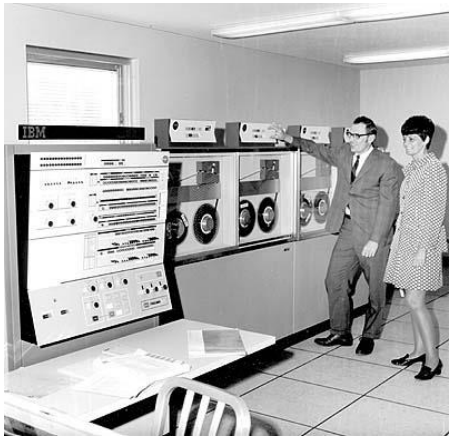


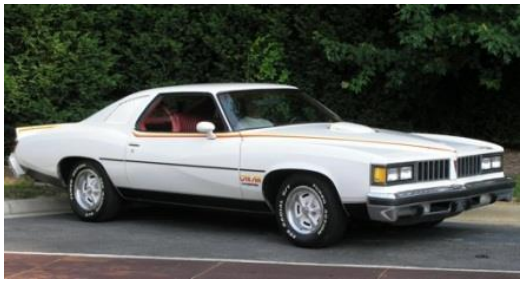
Dennis Ritchie and Kenneth Thompson: they set the style for software development – and for software developers

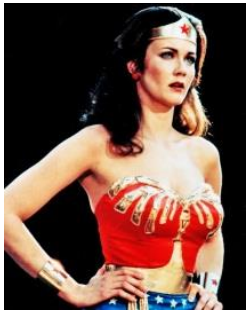
Bell Laboratories

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

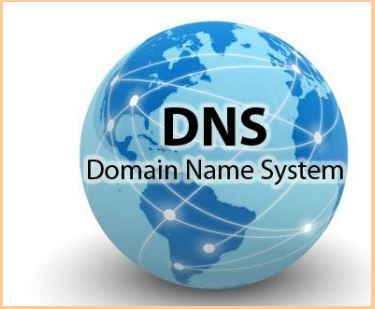
UNIX/Linux Overview

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.

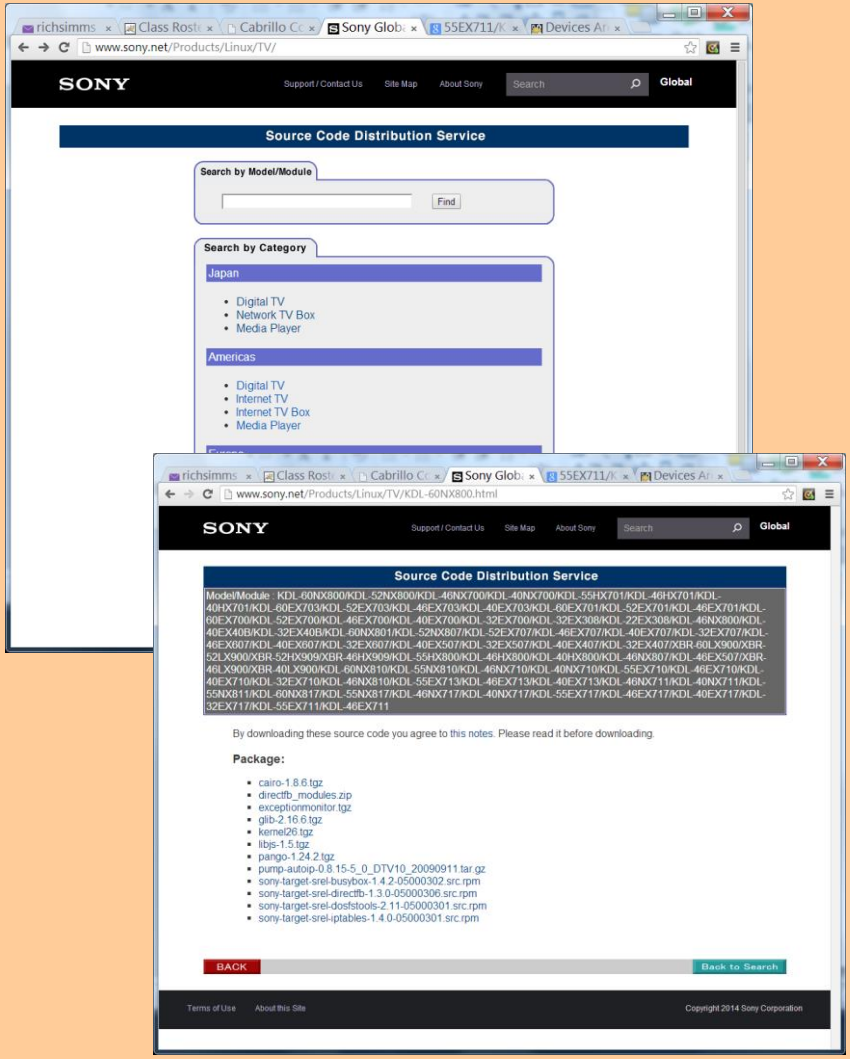
Some of you may be wondering, "What the heck is a car company doing joining the Linux Foundation?" The answer is easy. As the Foundation puts it, "A major shift is underway in the automotive industry. Car-makers are using new technologies to deliver on consumer expectations for the same connectivity 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 >

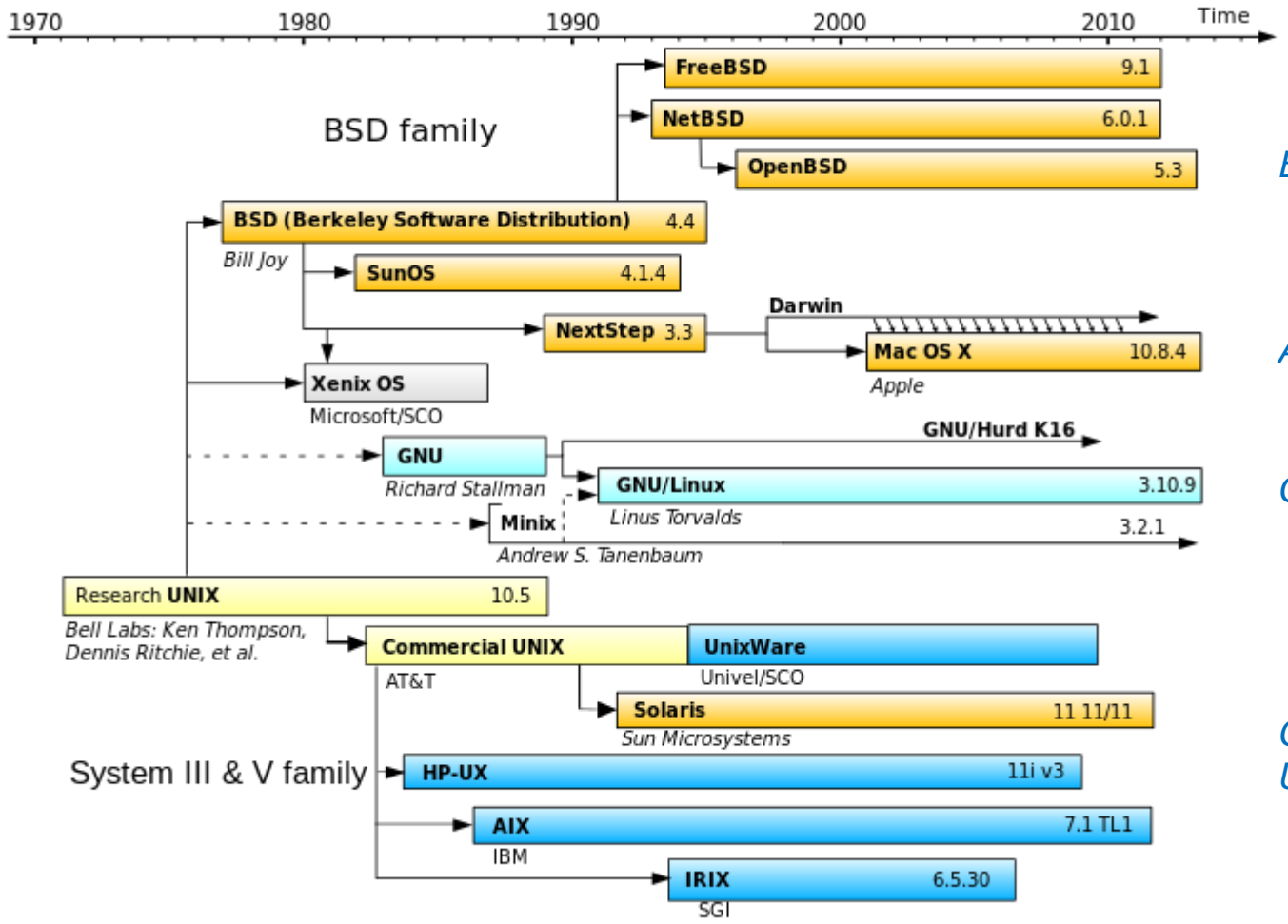
http://www.zdnet.com/blog/open-source/the-open-source-car/9193

Televisions



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


Unix
family
trees



BSD family

Apple family

GNU/Linux

Commercial UNIX family

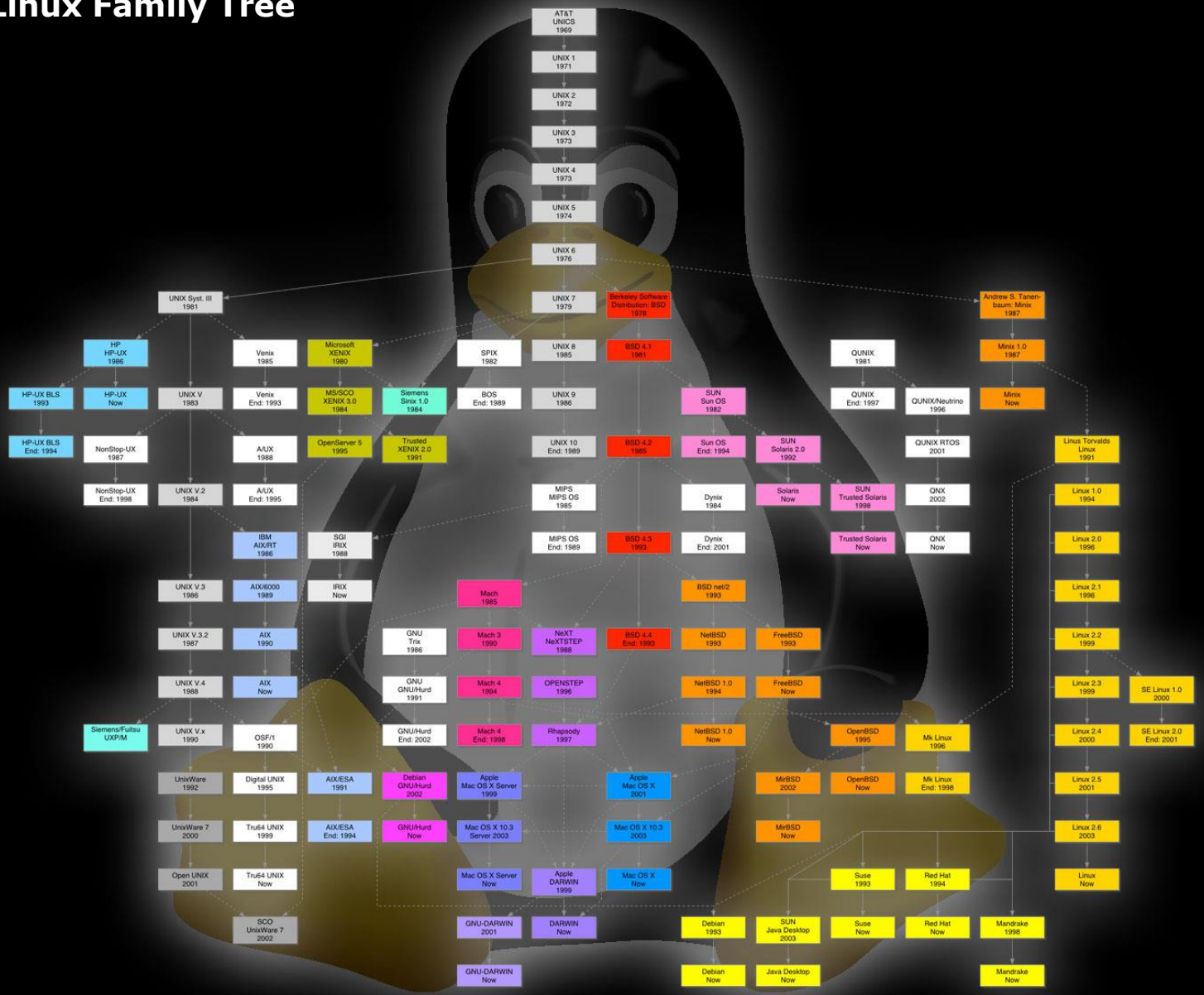
It all started at Bell Labs

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

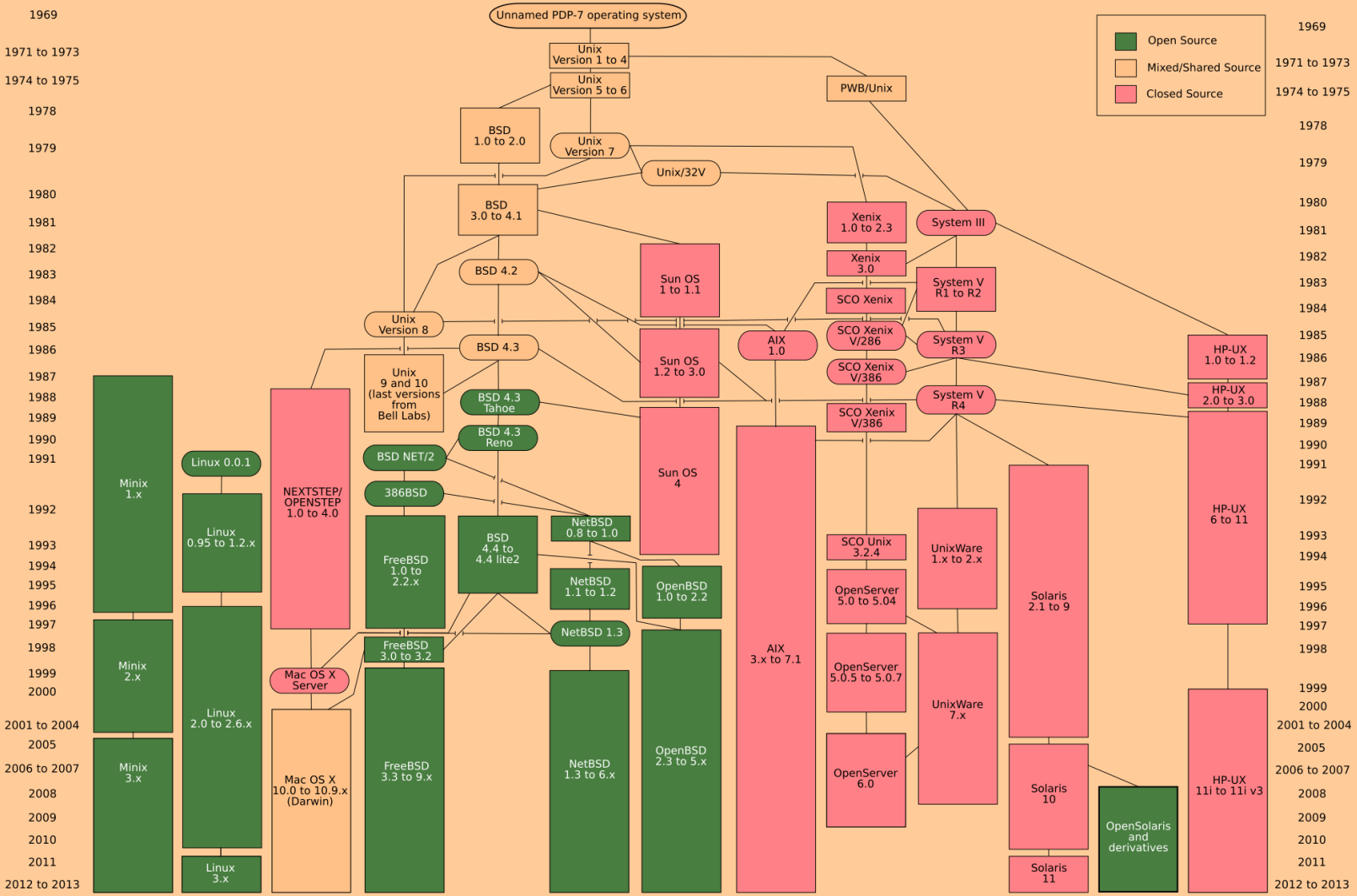
Unix family Trees

Supplemental

UNIX/Linux Family Tree

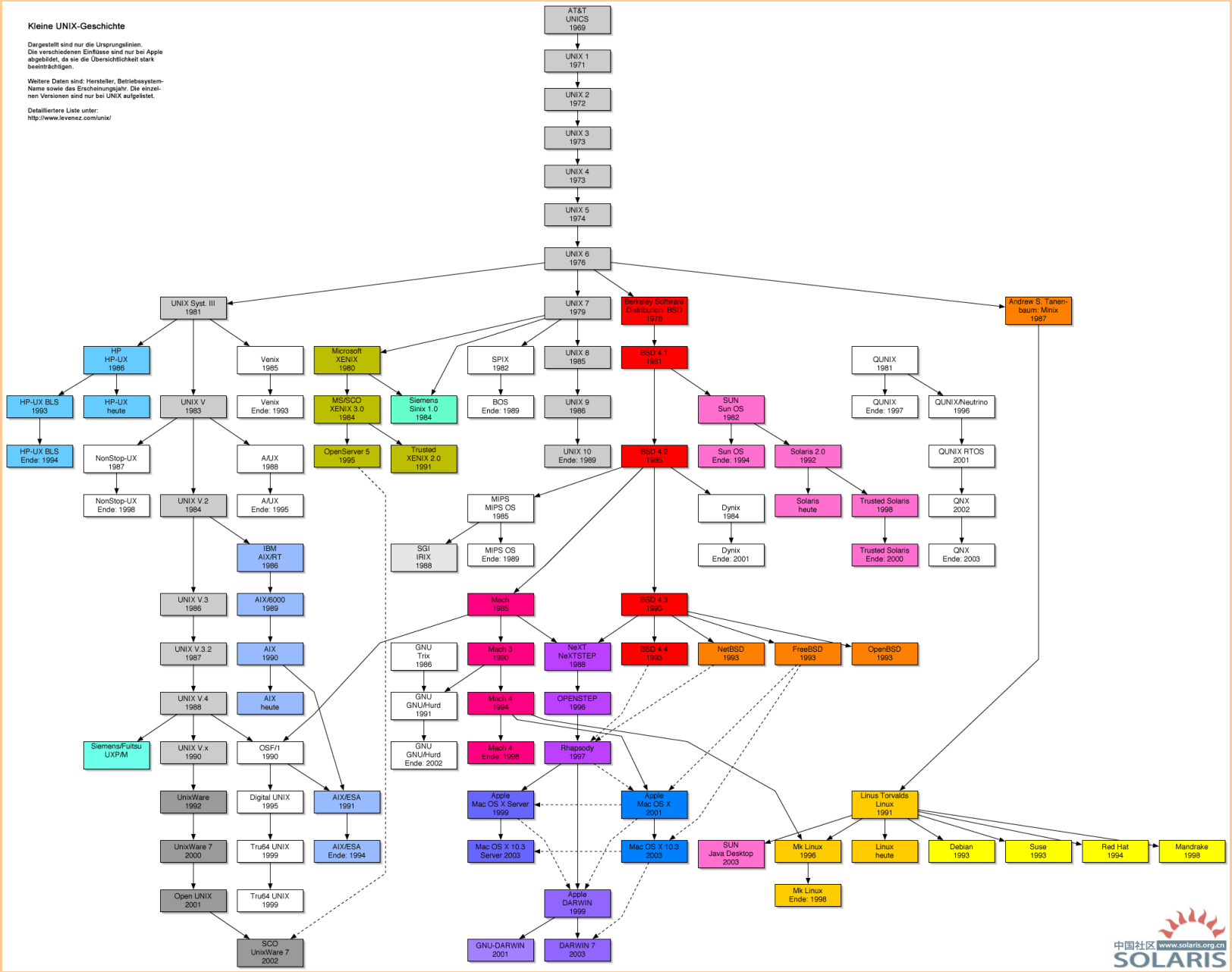


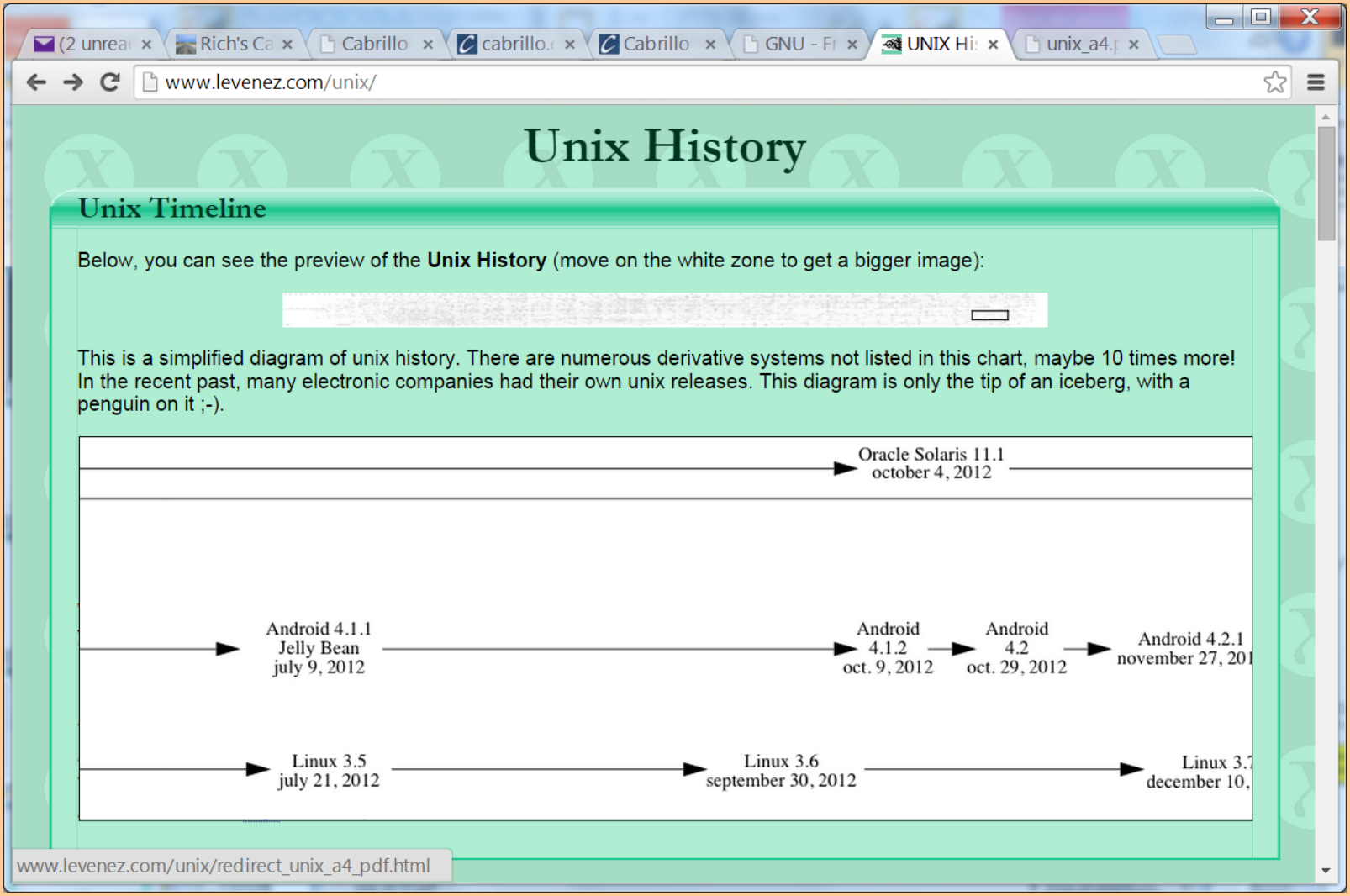
Source: http://www.freebsdnews.net/wp-content/uploads/unix_family_history_tree_1600x1200.jpg



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





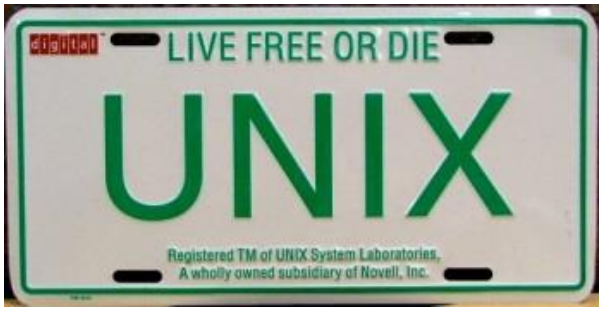
http://www.levenez.com/unix/

UNIX

Commercial UNIX

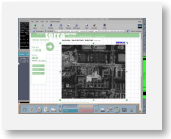
The commercial "UNIX" descendants

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.

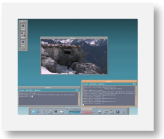


SCO UNIX
PC servers

Sun Solaris
Servers and workstations



IBM AIX
Servers, mainframes and workstations



HP HP-UX
Servers and workstations

Apple OS X
Mac computers

BSD

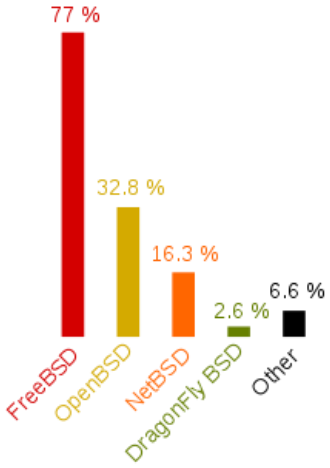
Berkeley

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

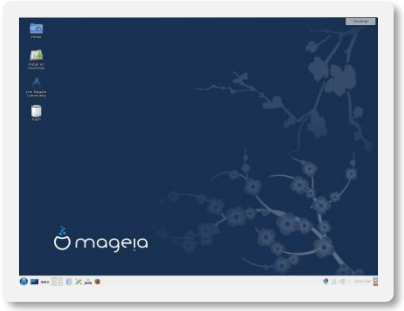
OpenSUSE

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

15 Most Popular Linux Distro Downloads

15 Most Downloaded Distribution Versions (last 30 Days)	15 Most Downloaded Distributions (Ever)
1. Puppy Linux 6.0 "Tahrpup" (20242)	1. Red Hat Enterprise Linux
2. Damn Small Linux 4.4.10 (1038)	2. Fedora
3. Oracle Linux 7.4 (902)	3. Ubuntu
4. Oracle Linux 7.3 (751)	4. Mandriva
5. Linspire 7.0, Freespire 3 (634)	5. CentOS
6. BackBox Linux 4.7 (588)	6. SUSE
7. Oracle Linux 6.9 (320)	7. BackTrack
8. KNOPPIX 8.1 (293)	8. Damn Small Linux
9. Quirky 8.2 (218)	9. Linux Mint
10. Ubuntu Rescue Remix 12.04 (204)	10. Knoppix
11. Kali Linux 2017.3 (185)	11. Debian
12. Wifislax 4.9 (174)	12. Puppy Linux
13. Mandrake Linux 10.1 Official (164)	13. Slackware
14. Kali Linux 2.0 (152)	14. PCLinuxOS
15. ClearOS 7.1.0 (134)	15. MEPIS

Jan 27, 2018

iso.linuxquestions.org

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)

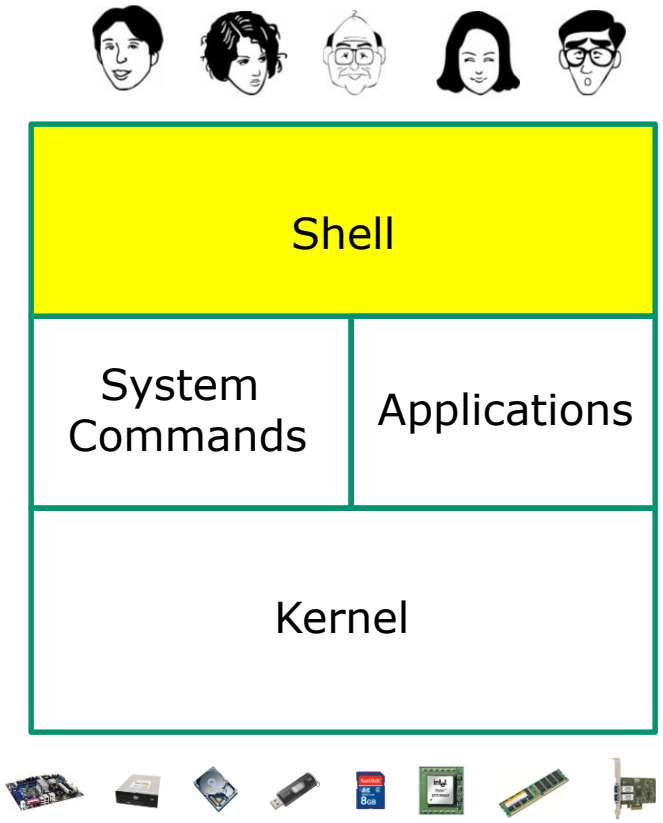
System Commands
(programs)

Applications
(programs)

Kernel
(low level operating system functions)

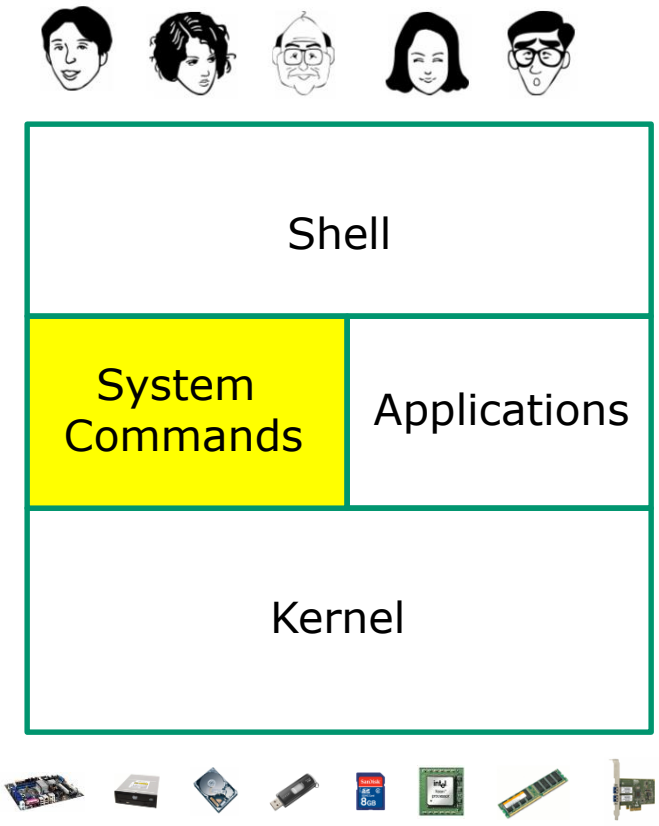
Hardware

The Shell (Command Line)



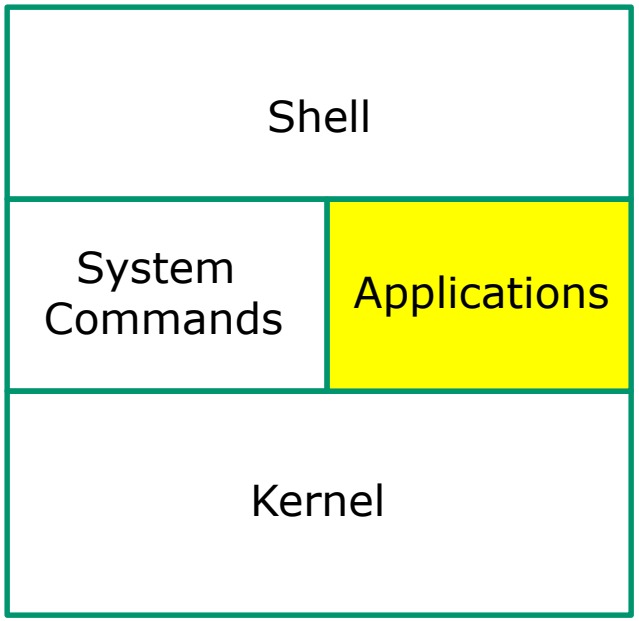
- Allows users to interact with the computer
- Called a "shell" because it hides the underlying operating system.
- Prompts user for a command, parses the command, then locates the command (a program or script) and runs it.
- Many shell programs are available: sh (Bourne shell), bash (Bourne Again shell), 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



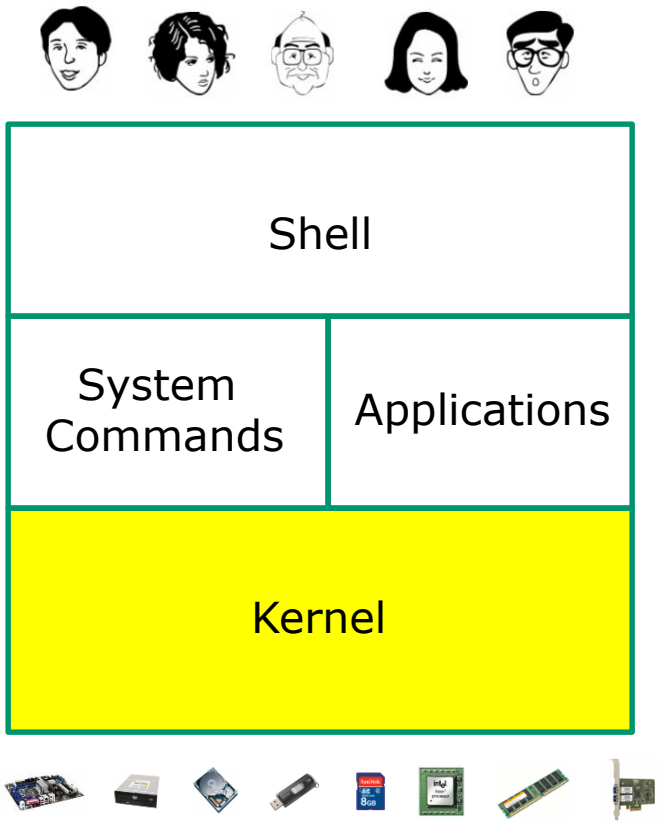
- 100's of system commands and utilities.
- We will learn how to use the following commands in this lesson:
  - cal
  - clear
  - date
  - exit
  - hostname
  - id
  - ps
  - ssh
  - tty
  - uname

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

User Space

Kernel Space

Users (multi-user)

Programs (multi-tasking)

Shell

Add-ons | Commands & Utilities | X / Desktops

GNU C Library (glibc)

Kernel[1]

System Call Interface

Process Management | Memory Management | Virtual File System | Network Stack

Architecture Dependent Kernel Code | Device Drivers

Hardware

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

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

Market Share

Supplemental


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%

Dec 2017[3]

Top 10 Platforms

1	Windows 7	17.56%
2	Windows 10	17.08%
3	Android 7	10.50%
4	Android 6	9.88%
5	iOS 11	9.83%
6	Android 5	7.87%
7	Android 4	4.96%
8	Mac OS X	4.37%
9	iOS 10	3.52%
10	Windows 8.1	3.39%

50.93%

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 12/31/2017 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

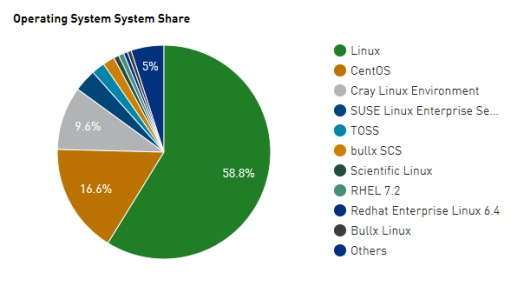
Table 2. Worldwide Smartphone Sales to End Users by Operating System in 1Q17 (Thousands of Units)

Operating System	1Q17 Units	1Q17 Market Share (%)	1Q16 Units	1Q16 Market Share (%)
Android	327,163.6	86.1	292,746.9	84.1
iOS	51,992.5	13.7	51,629.5	14.8
Other OS	821.2	0.2	3,847.8	1.1
Total	**379,977.3**	**100.0**	**348,224.2**	**100.0**

Source: Gartner (May 2017)

Source: http://www.gartner.com/newsroom/id/3725117

Operating System Share June 2017



Linux dominates the Supercomputer market

Operating System	Count	System Share (%)	Rmax (GFlops)	Rpeak (GFlops)	Cores
Linux	294	58.8	295,077,397	468,341,453	18,458,180
CentOS	83	16.6	68,234,142	126,617,437	6,455,356
Cray Linux Environment	48	9.6	147,748,346	210,095,979	5,363,588
SUSE Linux Enterprise Server 11	17	3.4	31,380,602	43,168,669	1,188,944
TOSS	10	2	14,228,087	16,573,455	496,584
bullx SCS	9	1.8	12,939,575	16,288,430	435,548
Scientific Linux	4	0.8	2,993,488	4,203,277	98,552
RHEL 7.2	4	0.8	4,738,901	5,395,687	149,300
Redhat Enterprise Linux 6.4	3	0.6	2,039,492	2,937,808	81,866
Bullx Linux	3	0.6	5,911,620	7,935,130	204,000
Ubuntu 14.04	3	0.6	4,434,300	6,712,960	82,960
SUSE Linux Enterprise Server 12 SP1	3	0.6	7,395,969	9,209,709	197,288
AIX	2	0.4	869,600	1,017,856	35,840
RHEL 6.8	2	0.4	1,384,140	1,556,890	46,336
bullx SUperCOmputer Suite A.E.2.1	2	0.4	2,596,000	3,191,270	147,744
Redhat Enterprise Linux 6	2	0.4	2,433,470	3,032,783	295,656
Redhat Enterprise Linux 6.5	2	0.4	2,987,745	4,115,251	105,216
Kylin Linux	2	0.4	35,934,090	57,976,934	3,294,720
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	459,830	508,032	15,120
Redhat Linux	1	0.2	460,200	694,886	4,736
RHEL 6.2	1	0.2	773,700	961,126	46,208
RHEL 7.3	1	0.2	802,400	1,417,152	17,760
Ubuntu Linux	1	0.2	3,307,000	4,896,512	60,512
SUSE Linux	1	0.2	6,227,200	9,957,427	148,176

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

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

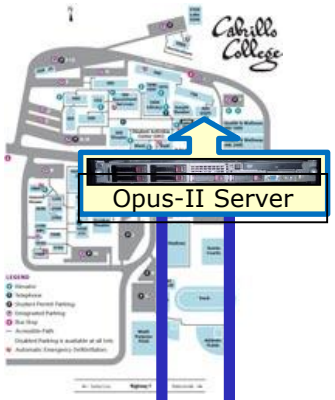
Logging in via ssh

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.

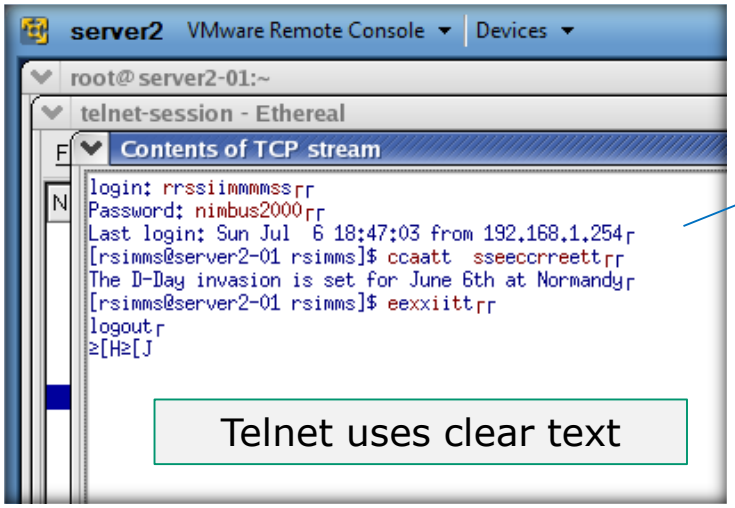
Remote Server



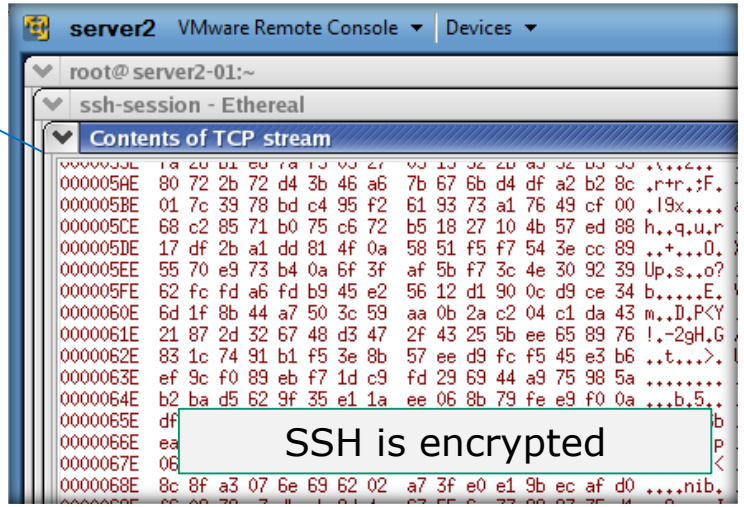
Solution: SSH is a network protocol that enables secure connections between computers

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

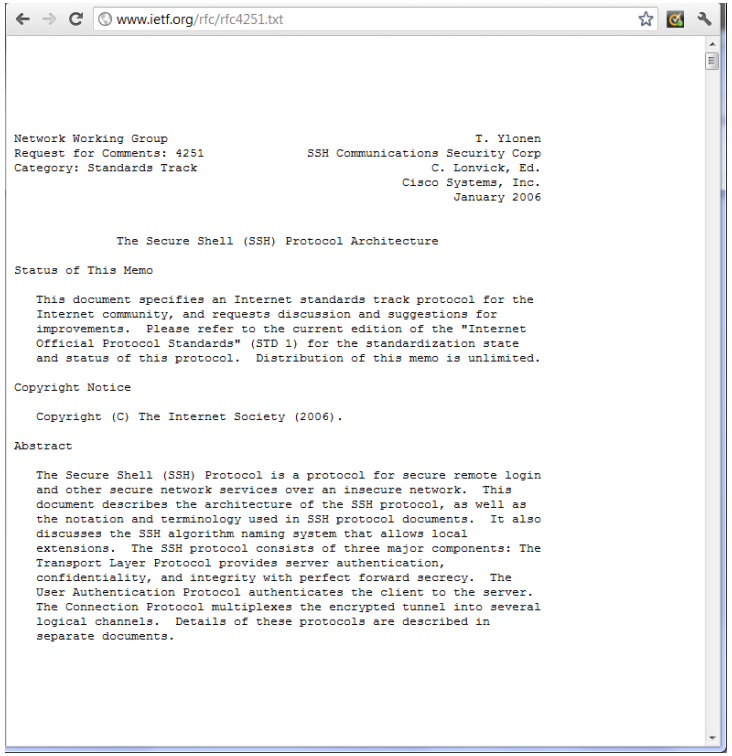


With telnet, everything is transferred in clear text over the network (not good!)

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.

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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.

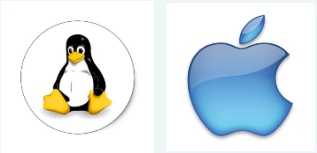
- See RFCs 4250 to 4254 at www.ietf.org for the gory details
- “RFC” = Request for Comment
- “IETF” = Internet Engineering Task Force

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

You will need your login credentials for this module. To get them see my "Welcome to CISA 90" announcement in Canvas.

How people access a home somewhere

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

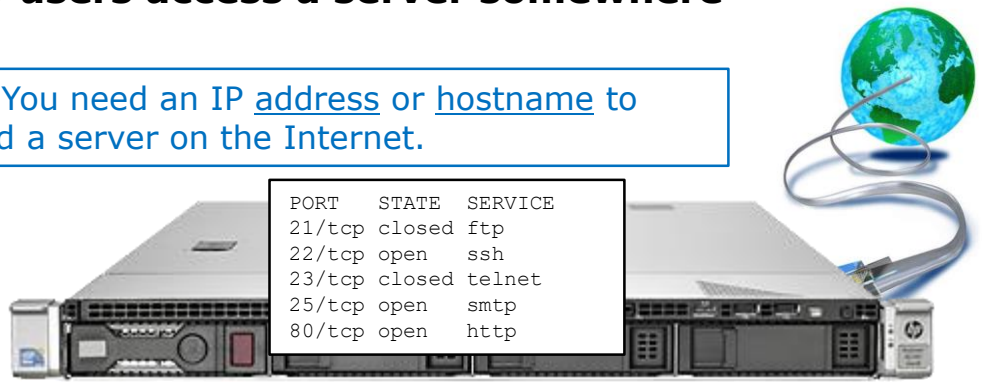
1) You need an address to find someone's home on a map.

2) When you get there some doors are open and some are closed. You can only enter if the door is open.

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

How users access a server somewhere

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

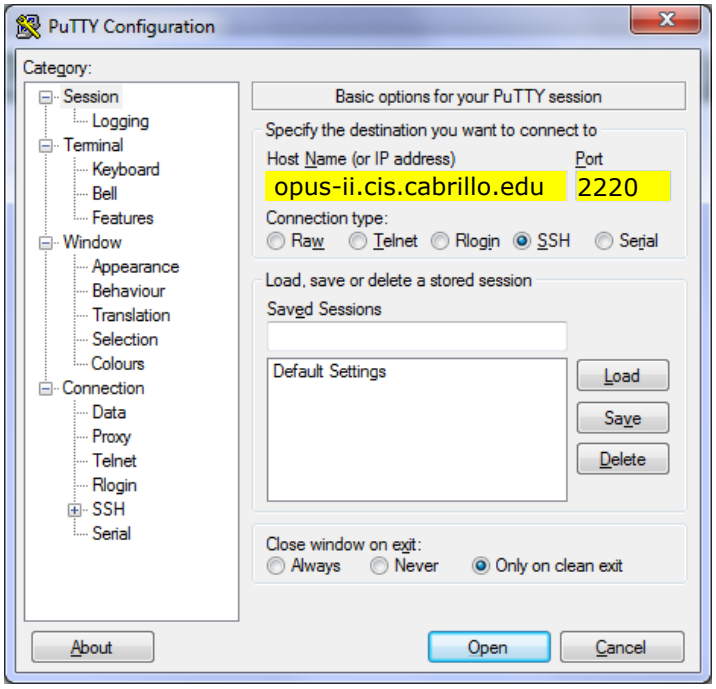
2) When you get there some ports are open and some are closed. You can only connect if the port is open.

3) Authentication is required for access:
Server: Enter username & password
Visiting user: rsimms & <secret>

SSH connection to a UNIX/Linux Server - from Windows

(specify hostname, username, password and port)

On Windows run Putty



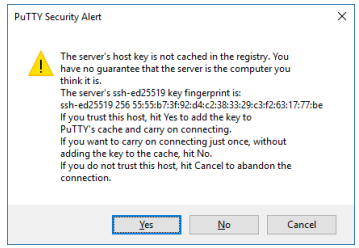
Click Open

Enter username (if prompted)

Enter password (not echoed)

Hit Enter to accept default terminal type

Enter exit command to end session



Click Yes

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

SSH connection to a UNIX/Linux Server - from Windows

Use your own username, not Benji's!

Enter username (if prompted)

Enter password (not echoed)

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

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

(specify hostname, username, password and port)

Opus

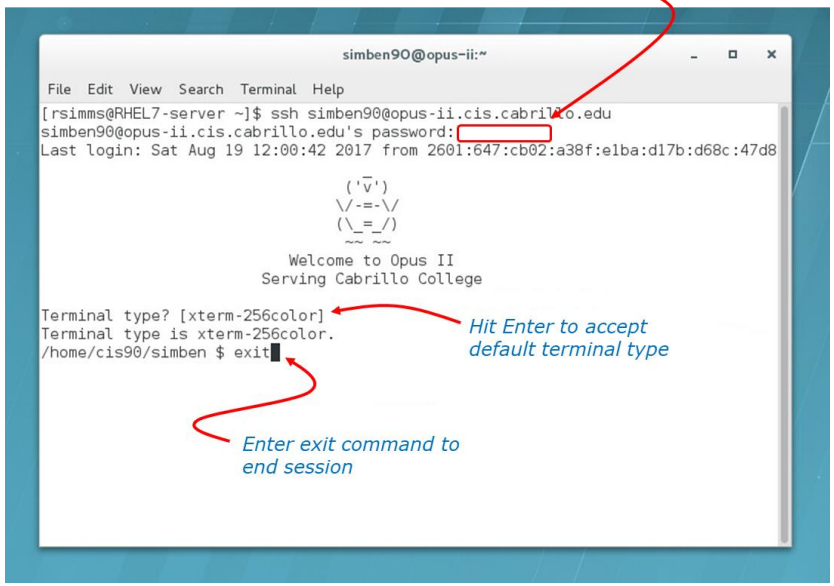
On a Mac or Linux terminal type:

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

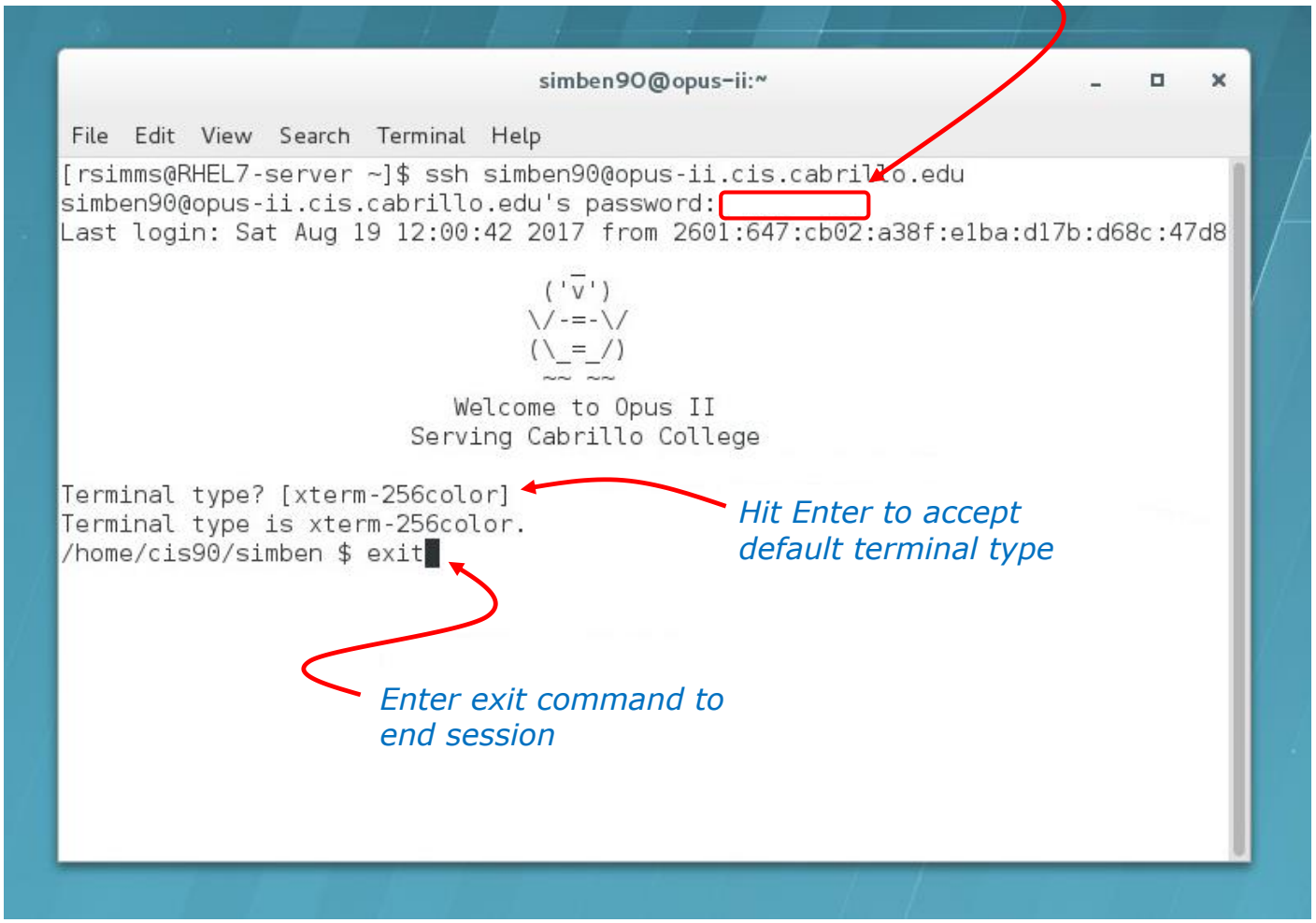
An RSA fingerprint is a cryptographic hash of the server's public key.

```
The authenticity of host '[opus-ii.cis.cabrillo.edu]:2220
([2607:f380:80f:f425::244]:2220)' can't be established.
RSA key fingerprint is 00:51:a2:ca:8a:08:30:9c:09:2e:e4:8a:bb:1f:94:b1.
Are you sure you want to continue connecting (yes/no)? yes
```

Enter yes if you get this authenticity warning on the first connection.

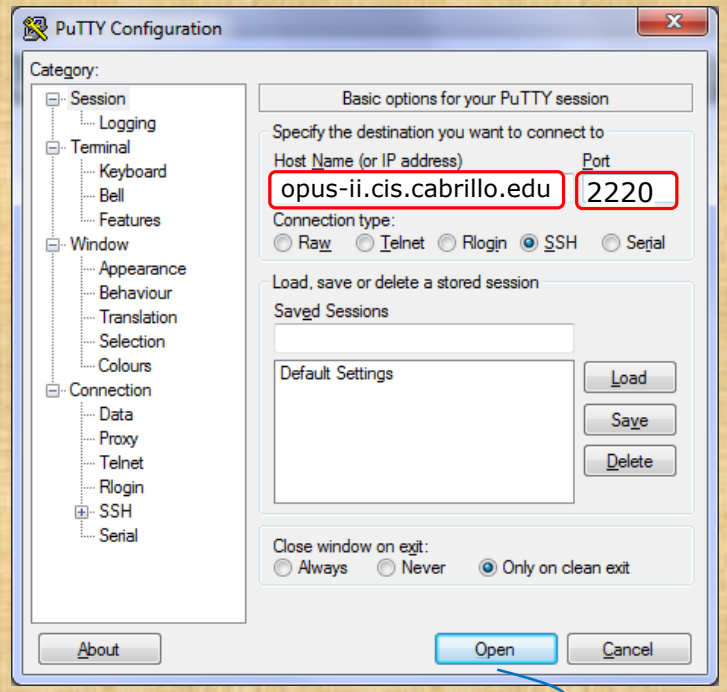


SSH connection to a UNIX/Linux Server - from Linux or Mac



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

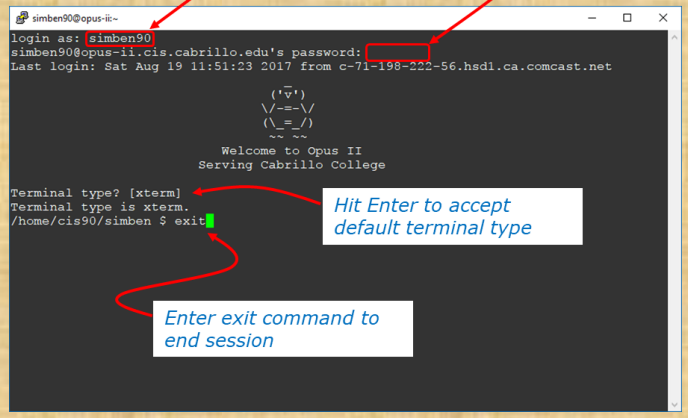
1) On Windows run Putty:



2) Enter your credentials (not Benji's)

username
(if prompted)

password
(not echoed)



Respond "yes" to authenticity warning if it appears

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

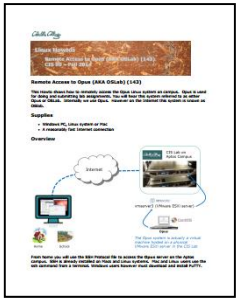
Additional Resources

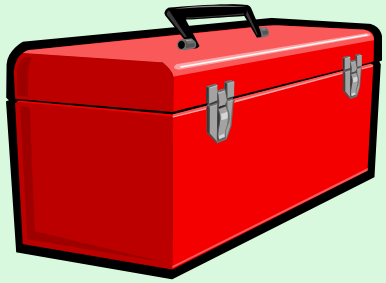
- How to open the terminal window on a mac

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

- Howto #146: Logging into Opus-II

  https://simms-teach.com/howtos/146-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: Sat Aug 19 11:02:46 2017 from oslab.cis.cabrillo.edu

                    _
                   ('v')
                  \/-=-\/
                  (\_=_/)
                   ~~ ~~
              Welcome to Opus II
            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: Sat Aug 19 11:02:46 2017 from oslab.cis.cabrillo.edu

                    _
                   ('v')
                  \/-=-\/
                  (\_=_/)
                   ~~ ~~
              Welcome to Opus II
            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 examples

cal command

prompt *command*

```
/home/cis90/simben $ cal
     August 2017
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


```
/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
```

*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
```

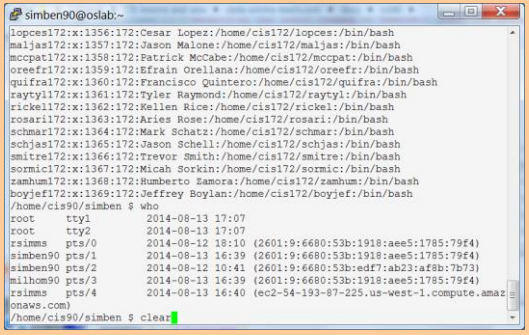
clear command

prompt *command*

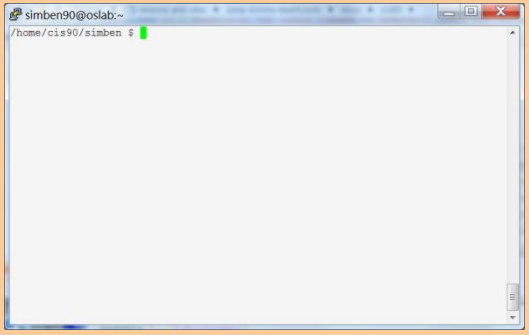
```
/home/cis90/simben $ clear
```

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

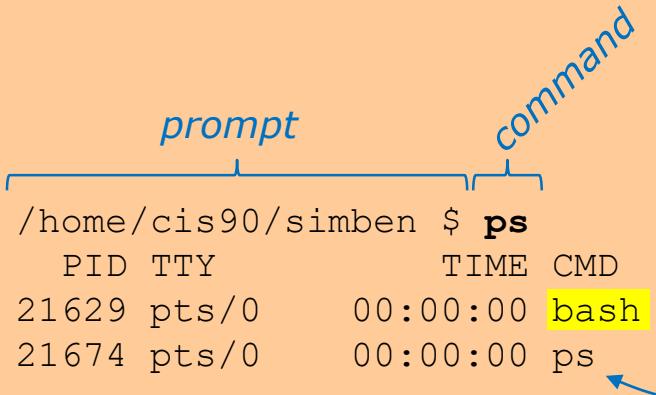
prompt *command*

```
/home/cis90/simben $ hostname
opus-ii.cis.cabrillo.edu
```

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

Question: What is the hostname of this system?
Answer: opus-ii.cis.cabrillo.edu

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
\S
Kernel \r on an \m
```

*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 Linux release 7.3.1611 (Core)
NAME="CentOS Linux"
VERSION="7 (Core)"
ID="centos"
ID_LIKE="rhel fedora"
VERSION_ID="7"
PRETTY_NAME="CentOS Linux 7 (Core)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:centos:centos:7"
HOME_URL="https://www.centos.org/"
BUG_REPORT_URL="https://bugs.centos.org/"

CENTOS_MANTISBT_PROJECT="CentOS-7"
CENTOS_MANTISBT_PROJECT_VERSION="7"
REDHAT_SUPPORT_PRODUCT="centos"
REDHAT_SUPPORT_PRODUCT_VERSION="7"

CentOS Linux release 7.3.1611 (Core)
CentOS Linux release 7.3.1611 (Core)
```

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

cat command (to show the name of the distribution)

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

*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 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
```

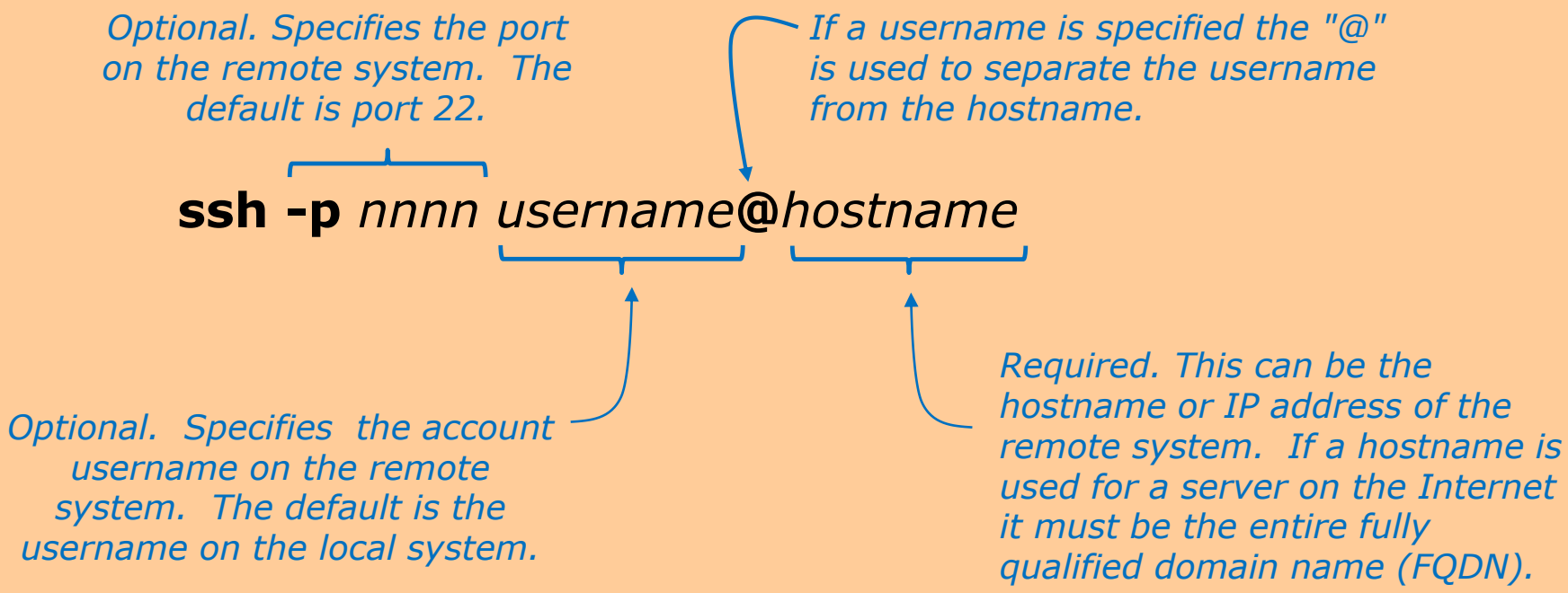
*The **history** command shows all previously entered commands.*

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:



Example **ssh** command
Logging into a Arya-xx system from Opus-II

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-II

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

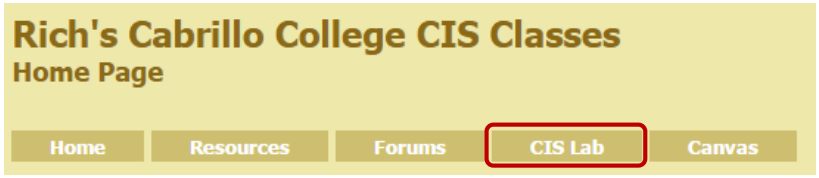
Getting Help When Stuck on a Lab Assignment

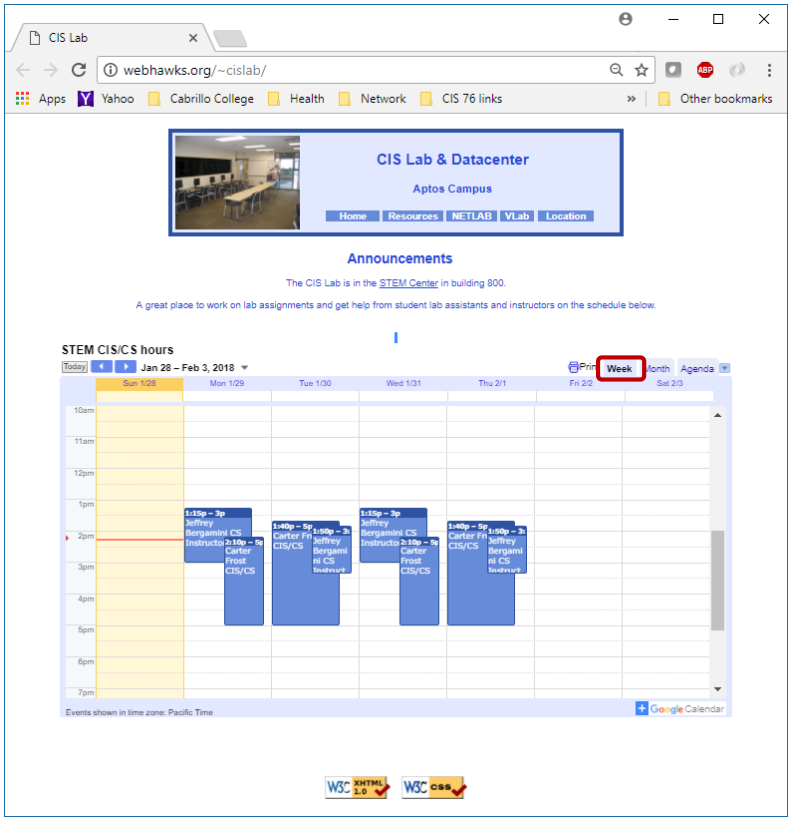
- Google the topic/error message.
- Search the Lesson Slides (they are PDFs) for a relevant example on how to do something.
- Post a question on the forum. Explain what you are trying to do and what you have tried so far.
- Talk to a STEM center tutor/assistant.
- Come see me during my office or lab hours. **I will be in the CTC (room 1403) every Wednesday afternoon from 3-5:30**.
- Make use of the Open Questions time at the start of every class.
- Make a cheat sheet of commands and examples so you never again get stuck on the same thing!

Expect to do a LOT of troubleshooting in this course!

Help Available in the CIS Lab

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





To see schedule, click the CIS Lab link on the website and use the "Week" calendar view

CTC - Building 1400
On lower campus

I will be in the CTC (room 1403) every Wednesday afternoon from 3-5:30

Add Codes

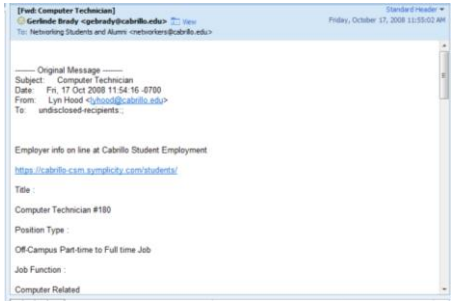
- Available after class (stop by or email me).
- Please use them online ASAP!
- If you missed the first class, obtaining an Add code will be conditional on catching up before the next class:
    a) making a forum post.
    b) answering one of the "first minute" quiz questions.
    c) submitting the survey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

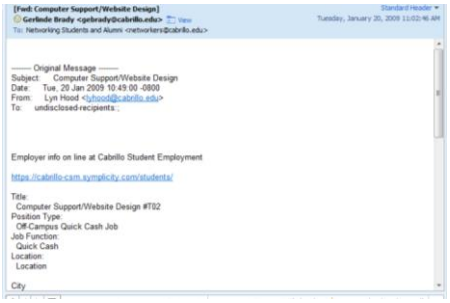
Cabrillo Networking Program Mailing list

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

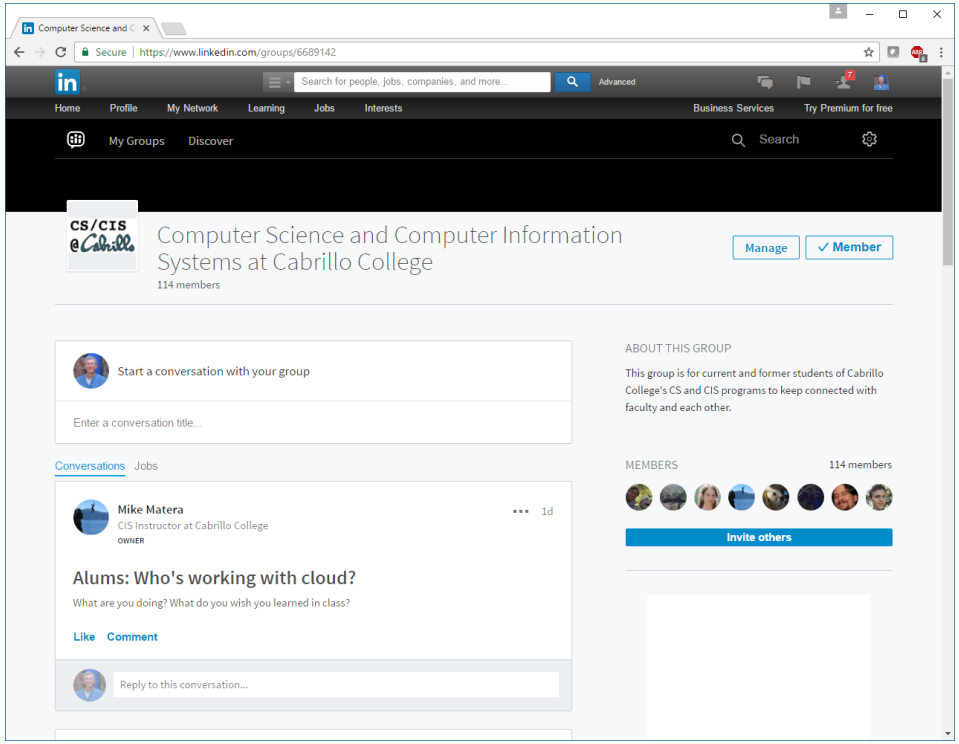
networkers-subscribe@cabrillo.edu

- 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

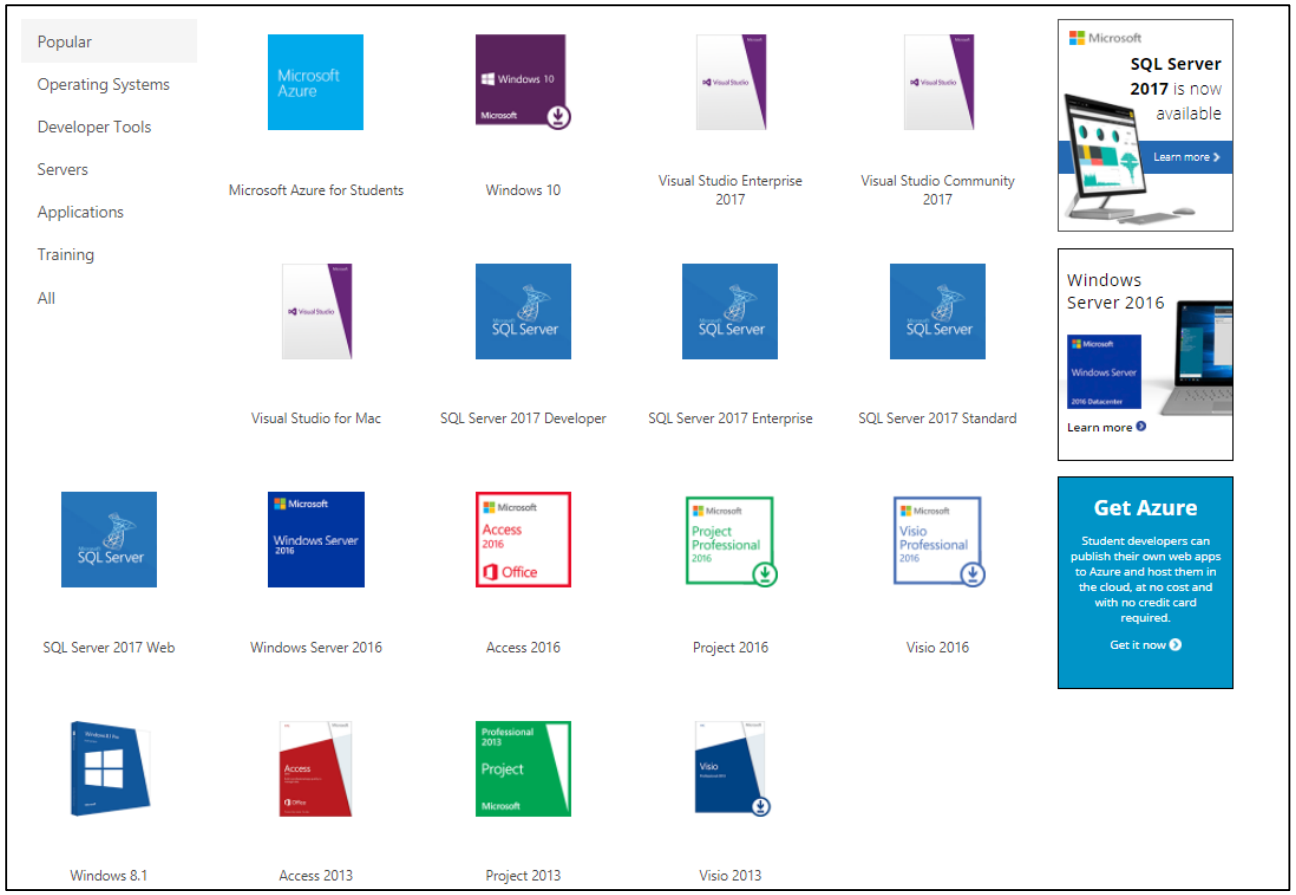


For 3 points extra credit:

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

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

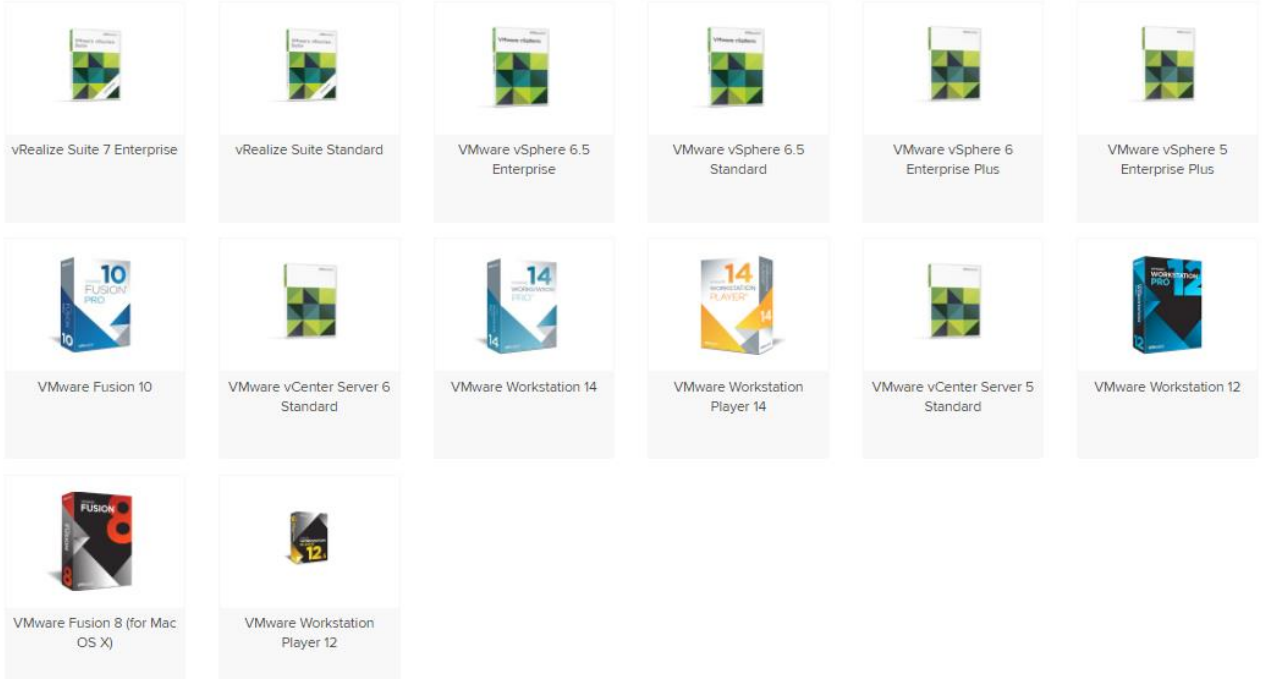
Microsoft Academic Webstore



- 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 *Academic Software for CIS Students* section.

VMware Academic Webstore



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

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Help Available in the CIS Lab

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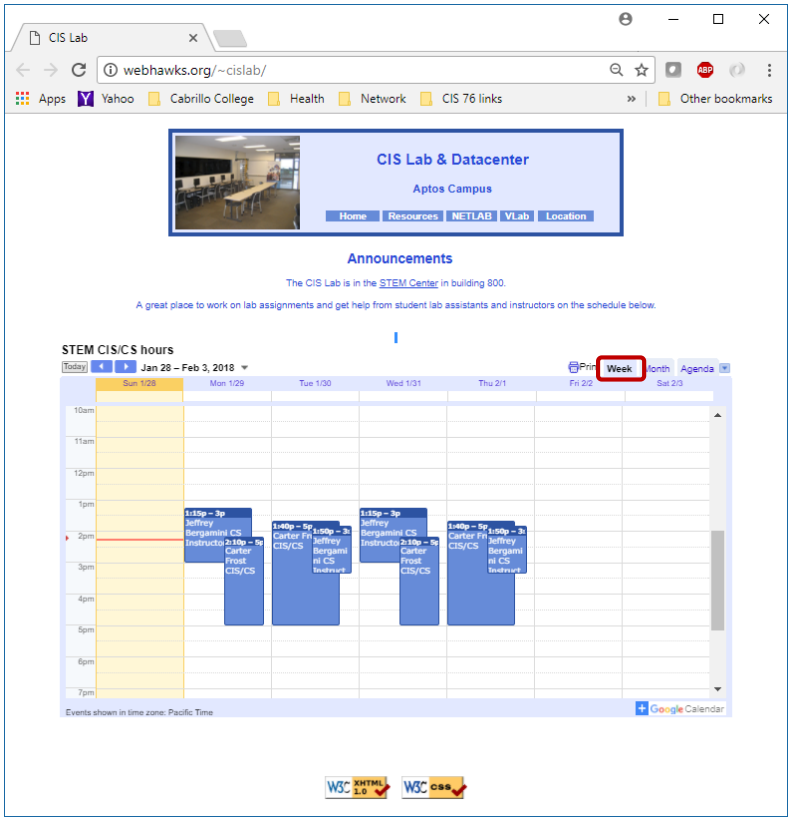
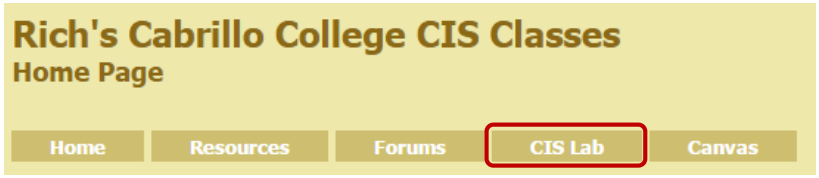




To see schedule, click the CIS Lab link on the website and use the "Week" calendar view

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.

Getting Help When Stuck on a Lab Assignment

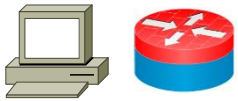
- Google the topic/error message.
- Search the Lesson Slides (they are PDFs) for a relevant example on how to do something.
- Post a question on the forum. Explain what you are trying to do and what you have tried so far.
- Talk to a STEM center tutor/assistant.
- Come see me during my office or lab hours.

Expect to do a LOT of troubleshooting in this course!

Navigating the Internet using SSH

Second driving lesson

CIS 90 systems Roadmap



Your home (private)

Internet

2220
son-of-opus.simms-teach.com
AWS (Oregon, public)

simms-teach.com
DreamHost
(Los Angeles, public)

2220
daughter-of-opus.simms-teach.com
OVH (Montreal, public)

You cannot access servers with private IP addresses directly from the Internet.

Instead you must enter via server with a public address that is also connected to the private network.

2225
brienne.simms-teach.com

baby-opus
(Soquel, private)

CIS Server network (Aptos, public)

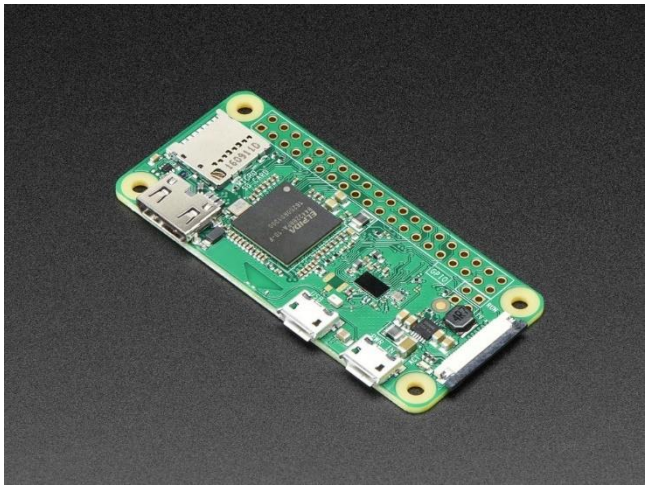
2220
Opus-II.cis.cabrillo.edu

Defiant (2221)
Intrepid (2224)
Enterprise (2223)
Freedom (2225)
Excalibur (2226)
Lexington (2222)
Sun-Hwa-xx
Arya-xx's
Home-ZeroW

uLab devices
Room 828 PCs
Room 829 PCs
Room 830 PCs

CIS Lab and Classroom networks (Aptos, private)

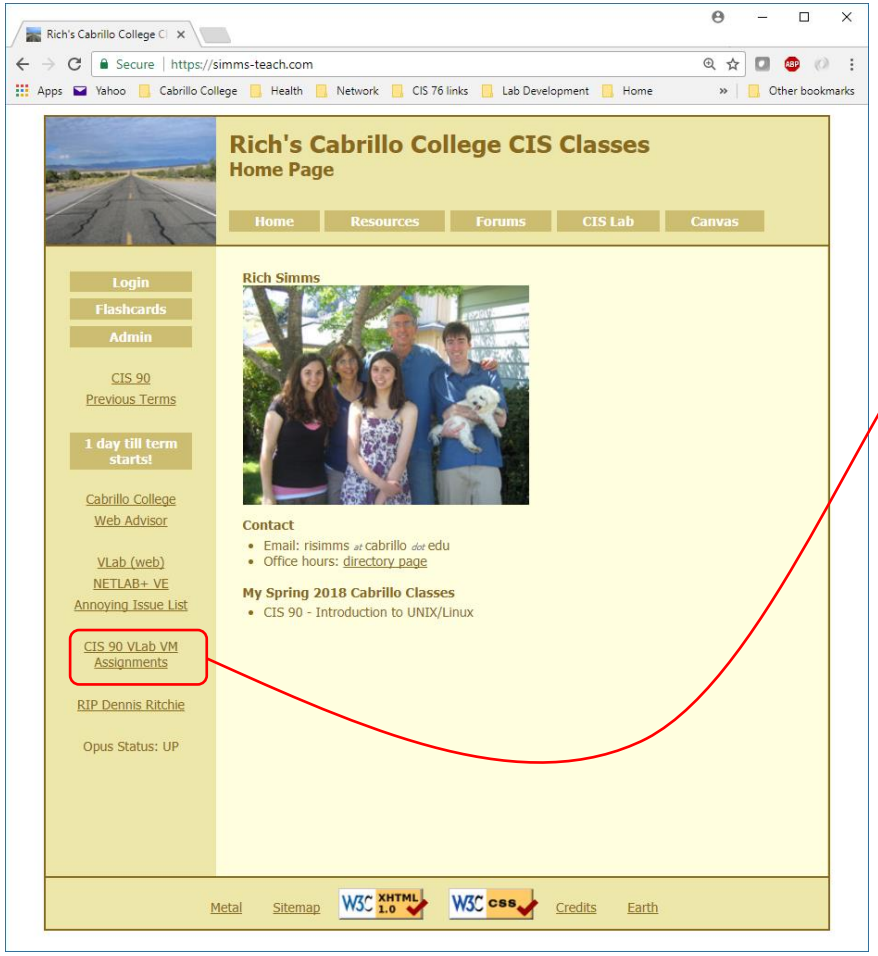
Raspberry Pi

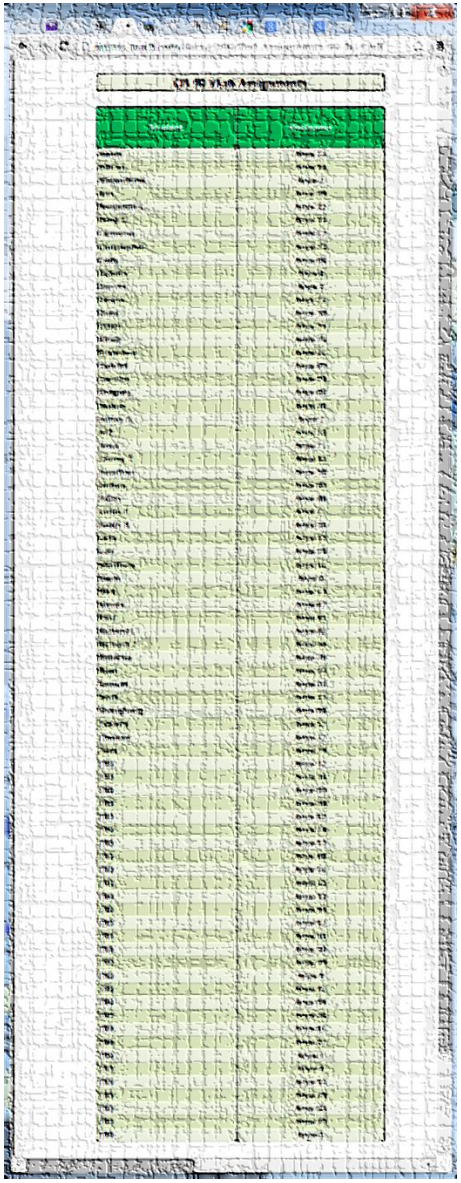


Raspberry Pi Zero W

https://www.adafruit.com/products/3400

http://simms-teach.com/





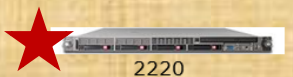
To see which Arya VM is yours use the link on the class website

Class Activity

Follow me if you can!

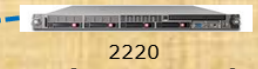
Your home (private)

simms-teach.com
DreamHost
(Los Angeles, public)



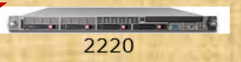
2220
daughter-of-opus.simms-teach.com
OVH (Montreal, public)

Internet



2220
son-of-opus.simms-teach.com
AWS (Oregon, public)

CIS Server network (Aptos, public)



2220
Opus-II.cis.cabrillo.edu ← *Start here*

Defiant (2221)
Intrepid (2224)
Enterprise (2223)
Freedom (2225)
Excalibur (2226)
Lexington (2222)
Sun-Hwa-xx
Arya-xx's
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uLab devices
Room 828 PCs
Room 829 PCs
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CIS Lab and Classroom networks (Aptos, private)

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brienne.simms-teach.com

baby-opus
(Soquel, private)

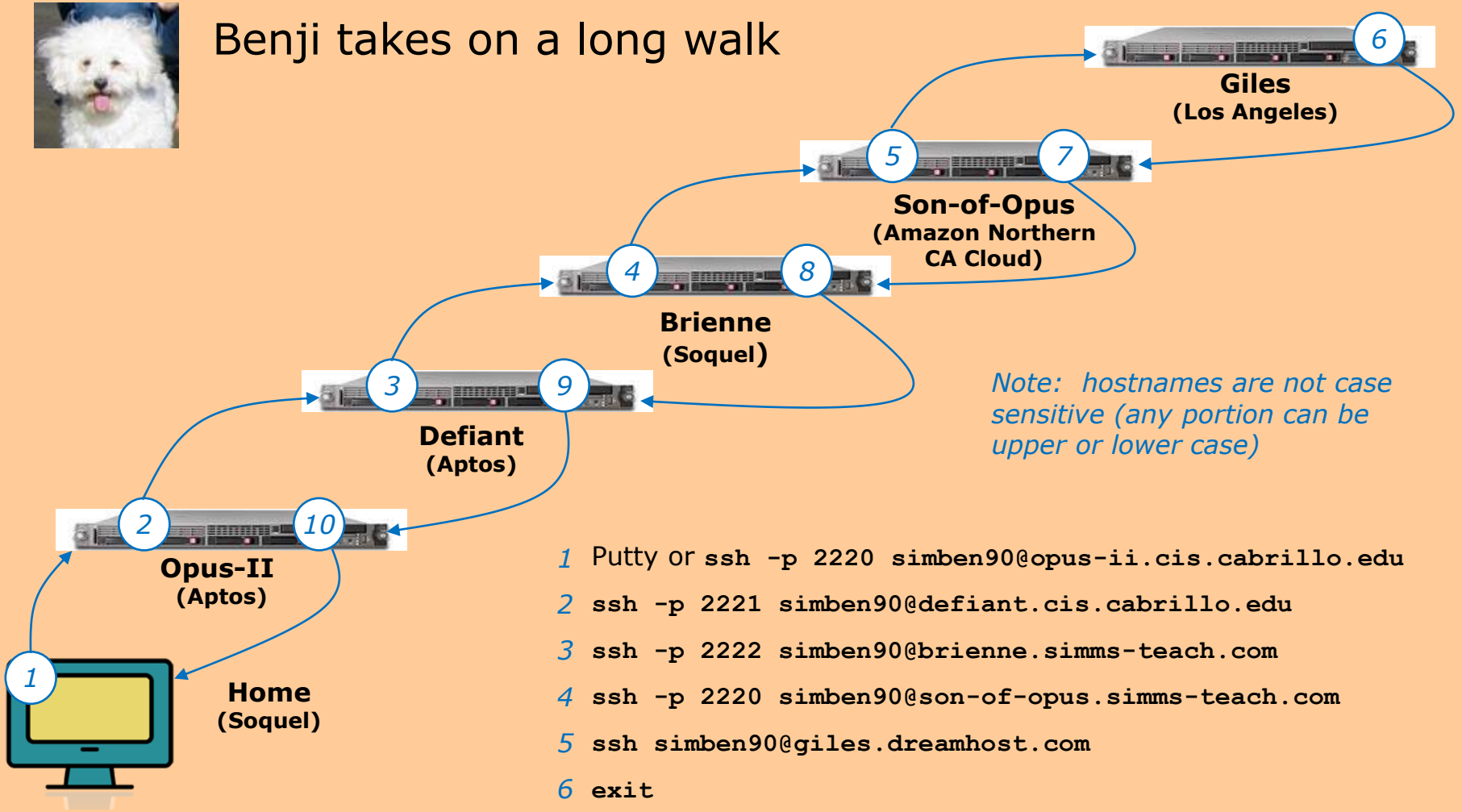
You cannot access servers with private IP addresses directly from the Internet.

Instead you must enter via server with a public address that is also connected to the private network.

Navigating the Internet using SSH

supplemental

Benji takes on a long walk

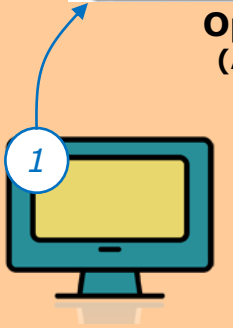


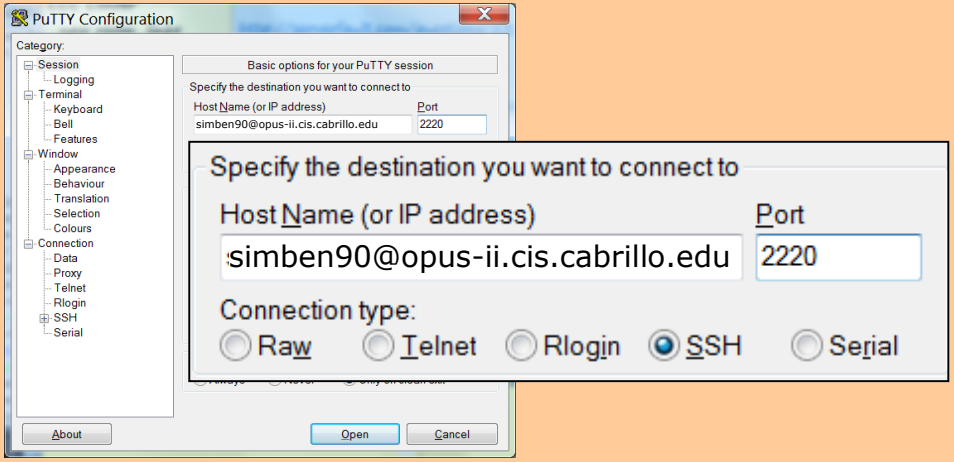
Note: hostnames are not case sensitive (any portion can be upper or lower case)

1. Putty or `ssh -p 2220 simben90@opus-ii.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-II
(Aptos)





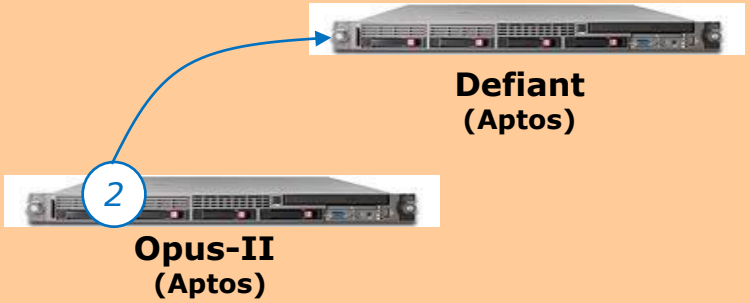

```
login as: simben90
simben90@opus-ii.cis.cabrillo.edu's password:
Last login: Sat Aug 19 11:02:46 2017 from oslab.cis.cabrillo.edu

                                    _
                                   ('v')
                                  \/-=-\/
                                  (\_=_/)
                                   ~~ ~~
                              Welcome to Opus II
                           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

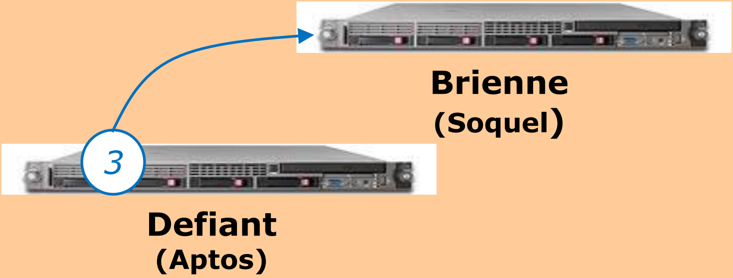



```
/home/cis90/simben $ ssh -p 2221 simben90@defiant.cis.cabrillo.edu
The authenticity of host '[defiant.cis.cabrillo.edu]:2221 ([172.20.90.51]:2221)' can't
be established.
RSA key fingerprint is 98:09:e7:d3:b2:89:e5:3a:57:b0:59:ff:86:7e:8e:50.
Are you sure you want to continue connecting (yes/no)? 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-ii.cis.cabrillo.edu
[defiant] $ hostname
defiant.cis.cabrillo.edu
[defiant] $
```

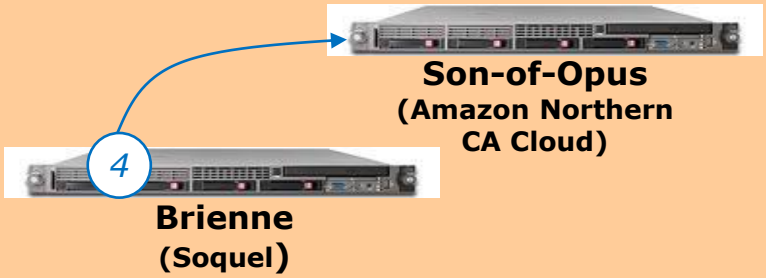
Benji takes on a long walk




```
[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

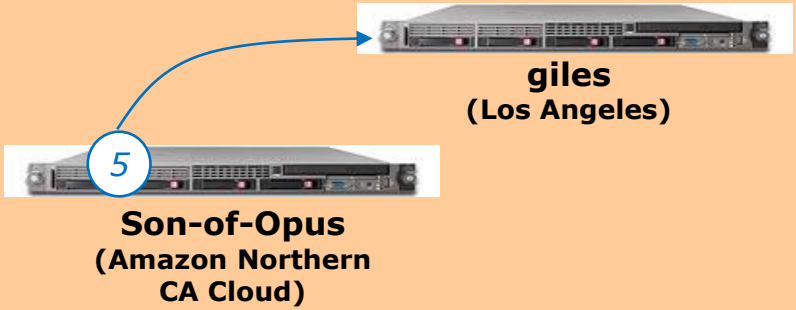



```
[simben90@brienne ~]$ ssh -p 2220 simben90@son-of-opus.simms-teach.com
The authenticity of host '[son-of-opus.simms-teach.com]:2220 ([54.193.87.225]:2220)' can't
be established.
RSA key fingerprint is 05:02:f7:48:00:e6:af:a9:dd:47:33:c3:82:80:29:4d.
Are you sure you want to continue connecting (yes/no)? 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



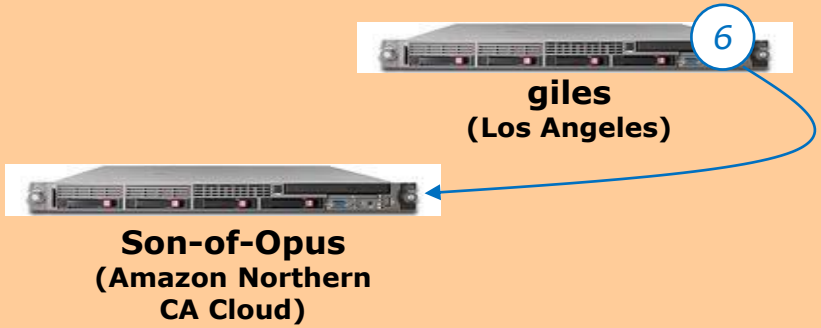

```
[simben90@son-of-opus ~]$ ssh simben90@giles.dreamhost.com
The authenticity of host 'giles.dreamhost.com (208.113.153.233)' can't be established.
RSA key fingerprint is d8:3c:65:de:d3:43:ef:aa:76:13:d9:16:85:b9:36:9a.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently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

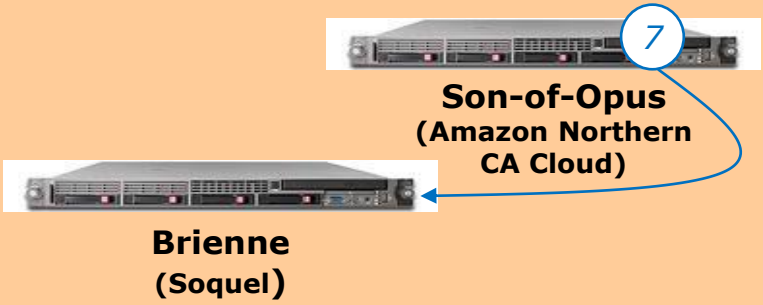
Benji takes on a long walk




```
[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*

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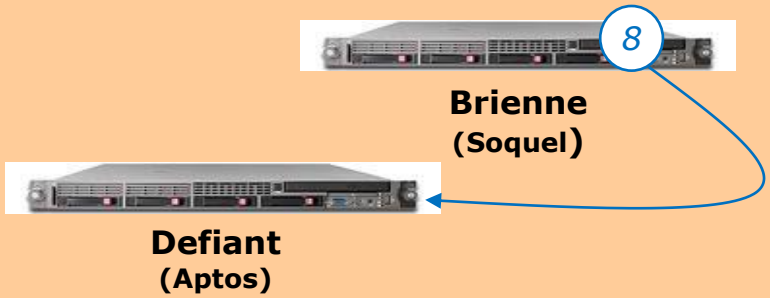
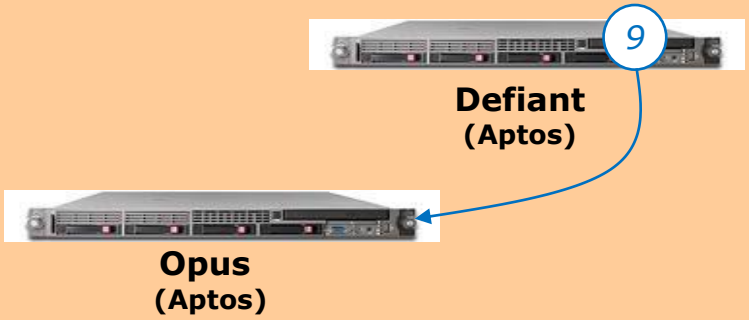



```
[simben90@brienne ~]$ exit
logout
Connection to brienne.simms-teach.com closed.
[defiant] $ hostname
defiant.cis.cabrillo.edu
[defiant] $
```

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

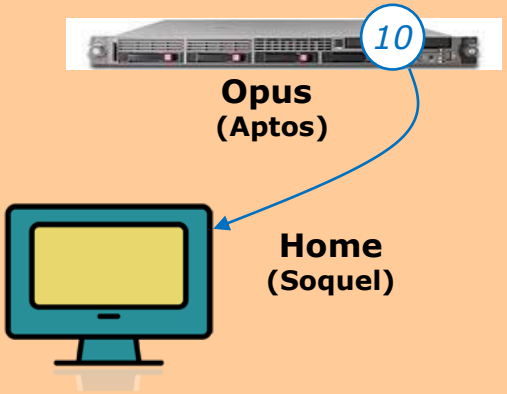
Benji takes on a long walk




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

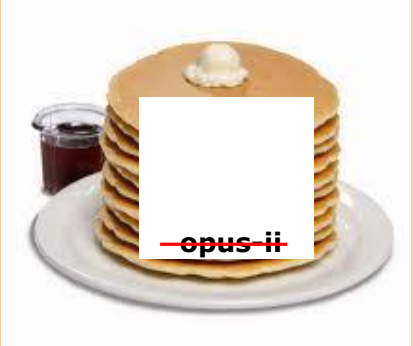
*When you **exit** a server it's like you pop it off the top of a stack and return to the previous server underneath*

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*

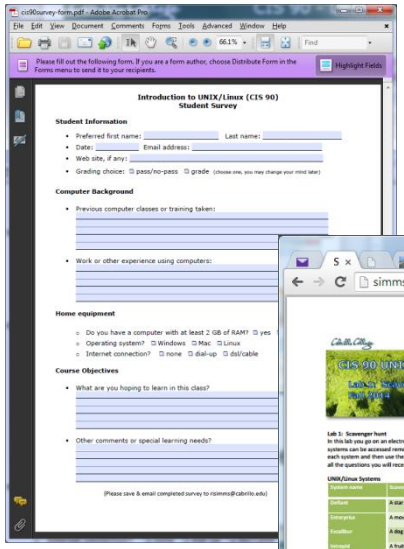

Assignment

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

1) Reading the Lesson slides first will help you with the lab

Lesson	Date	Topics	Chapter	Due*
1	1/31	**Class and Linux Overview** • Understand how this course will work **Materials** • Presentation slides (download) • Login credentials worksheet (download) **Supplemental** • Howto #146: Logging into Opus (download) **Assignment** • Read/skim Lesson 1 slides • Student Survey • Lab 1 **ConferZoom** • Enter virtual classroom • Class archives	1.1-1.15 (Gillay) 2,4,5, p113-115, p164-172 (Hahn)	
2	2/7	**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** • Read/skim Lesson 2 slides • Lab 2 **ConferZoom** • 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 1/31



2) Survey

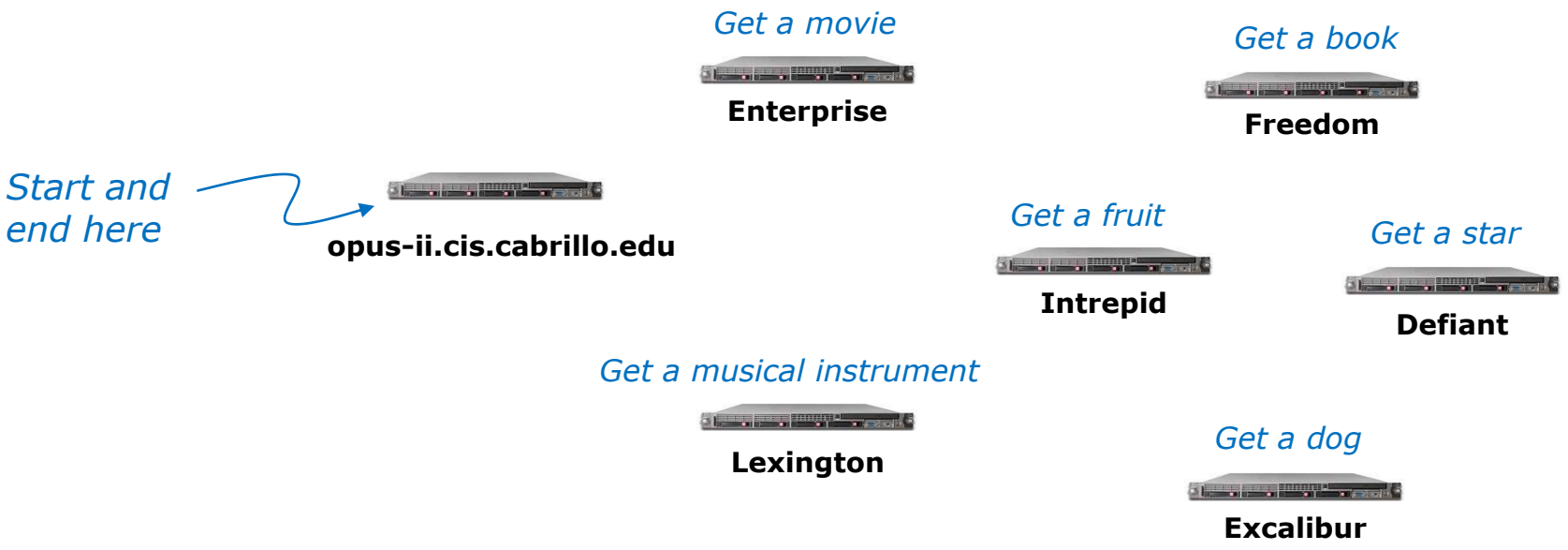
3) Lab 1 Scavenger Hunt

Both deliverables are due by 11:59:59 PM (Opus-II time) on Wednesday 2/7.

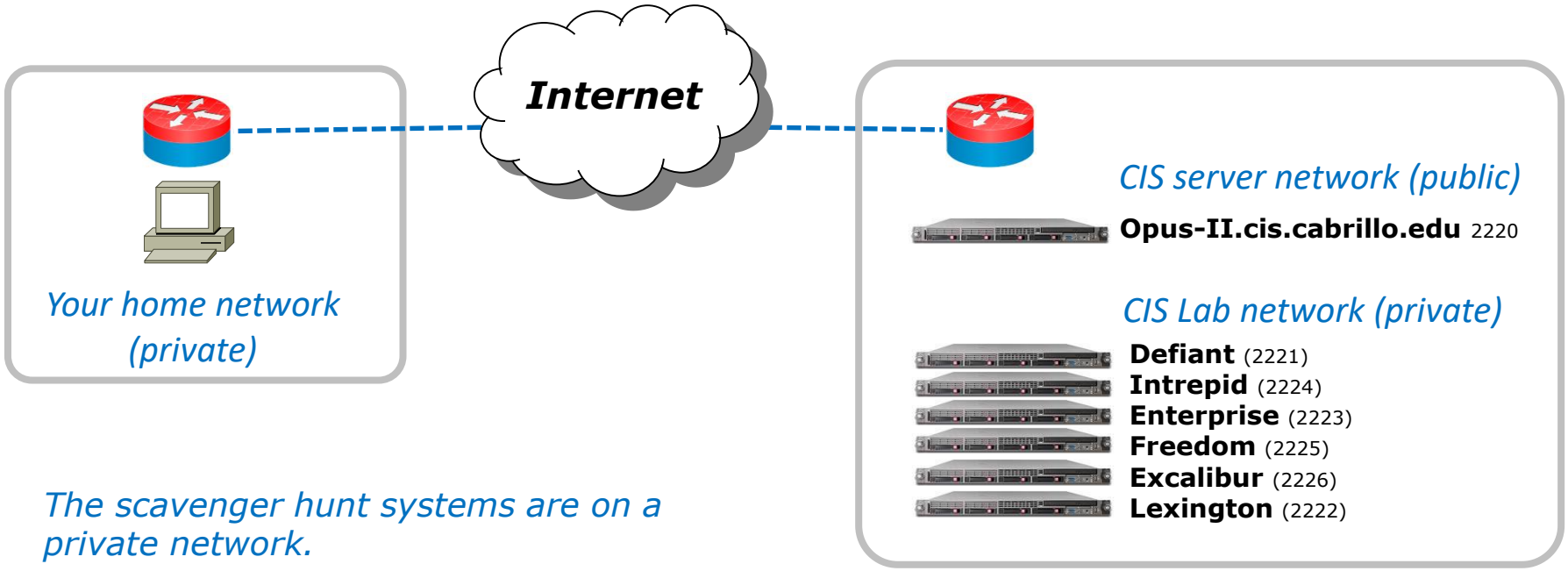
Remember late work, even one second late, is not accepted. If you wait till the last minute to work the lab and run out of time submit any partial work by the deadline.

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.

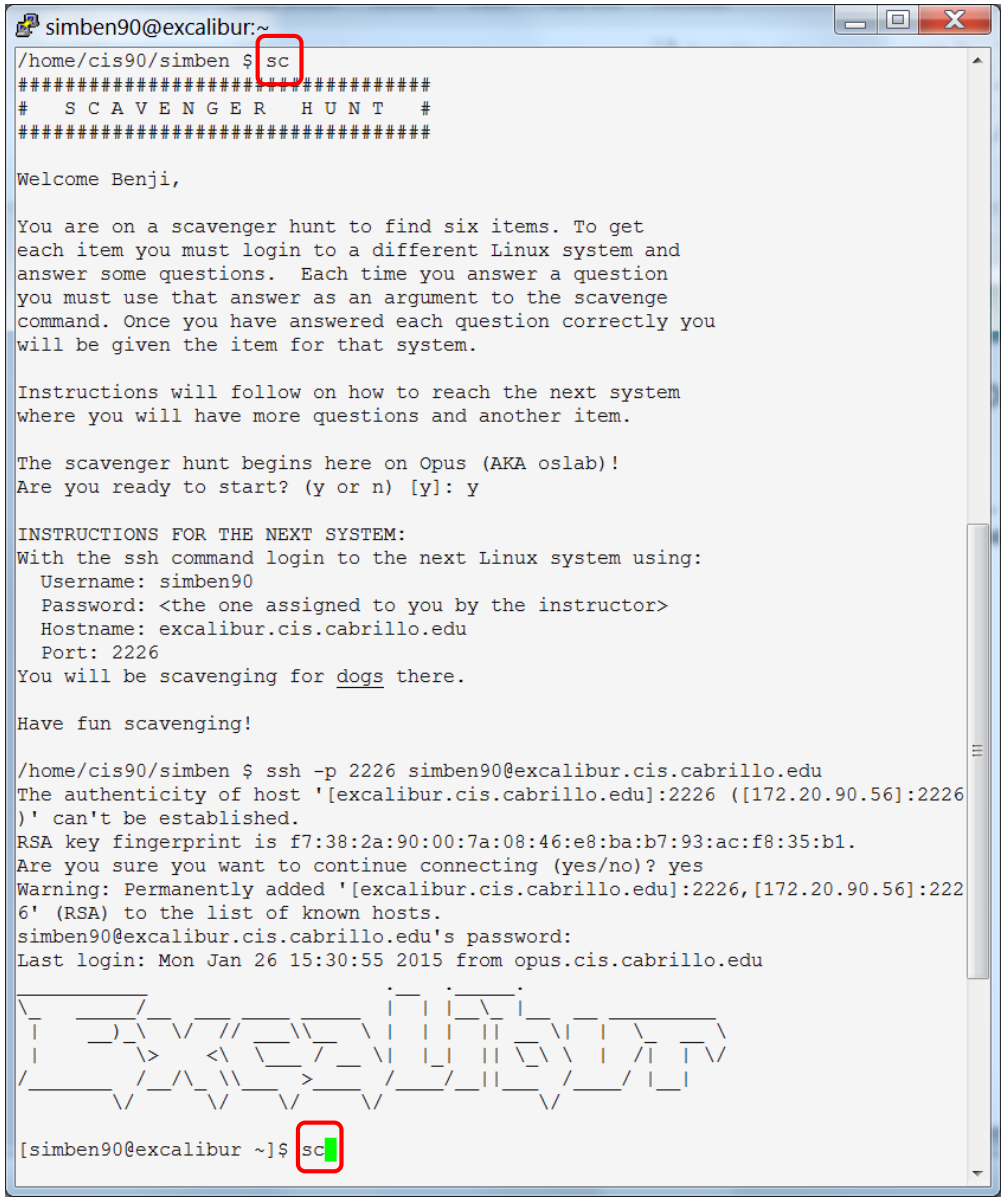


Lab 1 - Simplified Network Map



The scavenger hunt systems are on a private network.

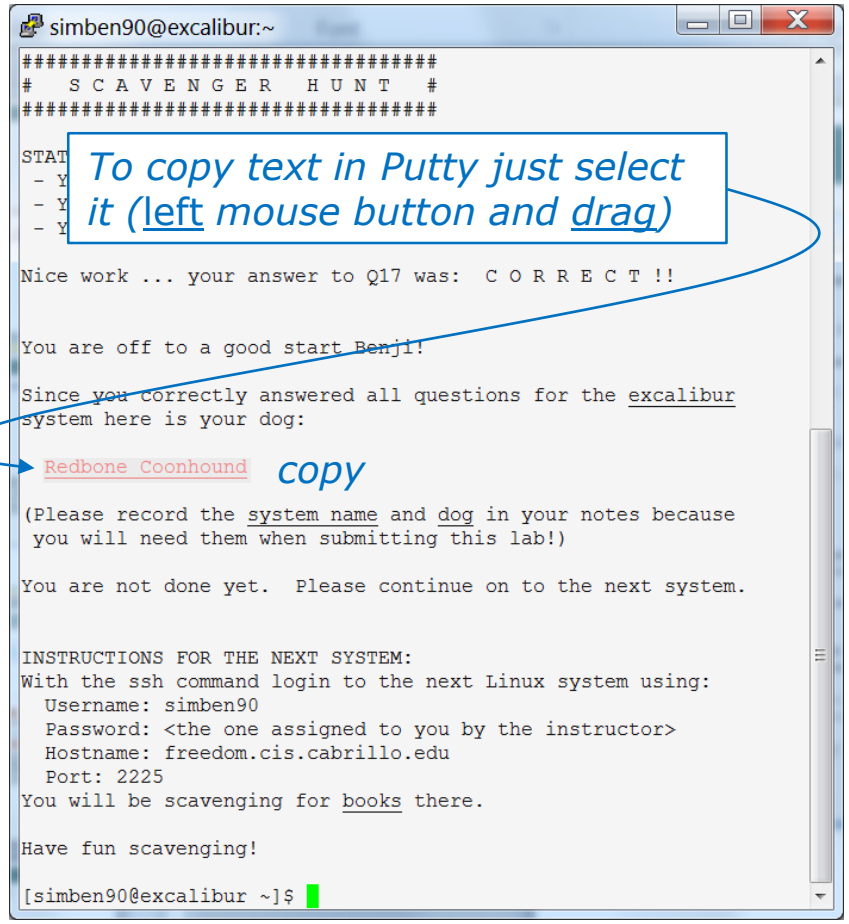
Remote users must log into Opus-II first and from there access the scavenger hunt systems.



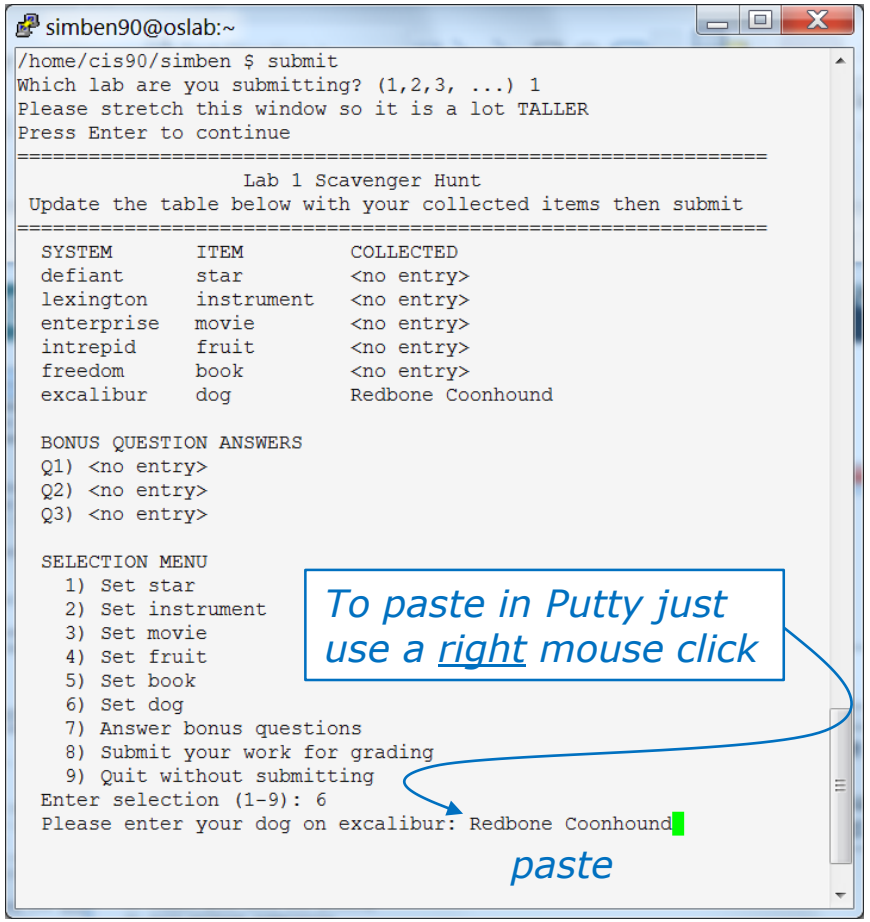
Lab 1 - Tips

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:

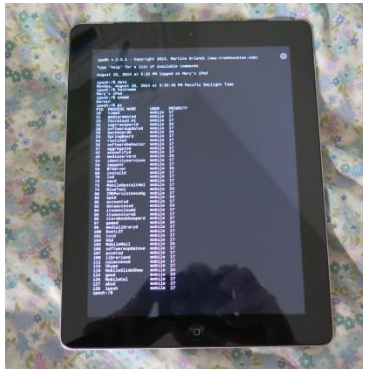
- What part of UNIX/Linux is both a user interface and a programming language?
- What is the lowest level, inner-most component of a UNIX/Linux Operating System called?
- What command shows the other users logged in to the computer?

End Meeting

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

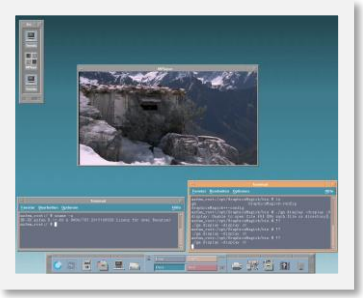
```
u0_a61@d2vmu:/ $ clear
u0_a61@d2vmu:/ $ date
Wed Aug 27 17:52:55 PDT 2014
u0_a61@d2vmu:/ $ echo $SHELL
/system/bin/sh
u0_a61@d2vmu:/ $ id
uid=10061(u0_a61) gid=10061(u0_a61) groups=1015(sdcard_rw),1028(sdcard_r),3003(inet),50061(all_a61) context=u:
r:untrusted_app:s0
u0_a61@d2vmu:/ $ cat /proc/version
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.


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                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
#
```
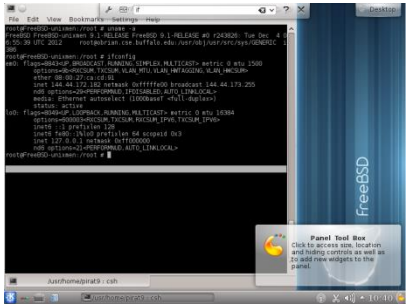
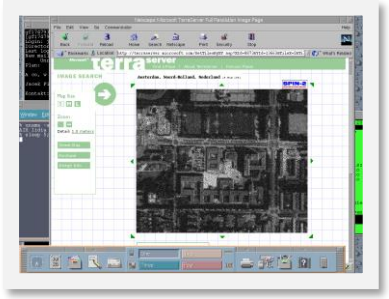
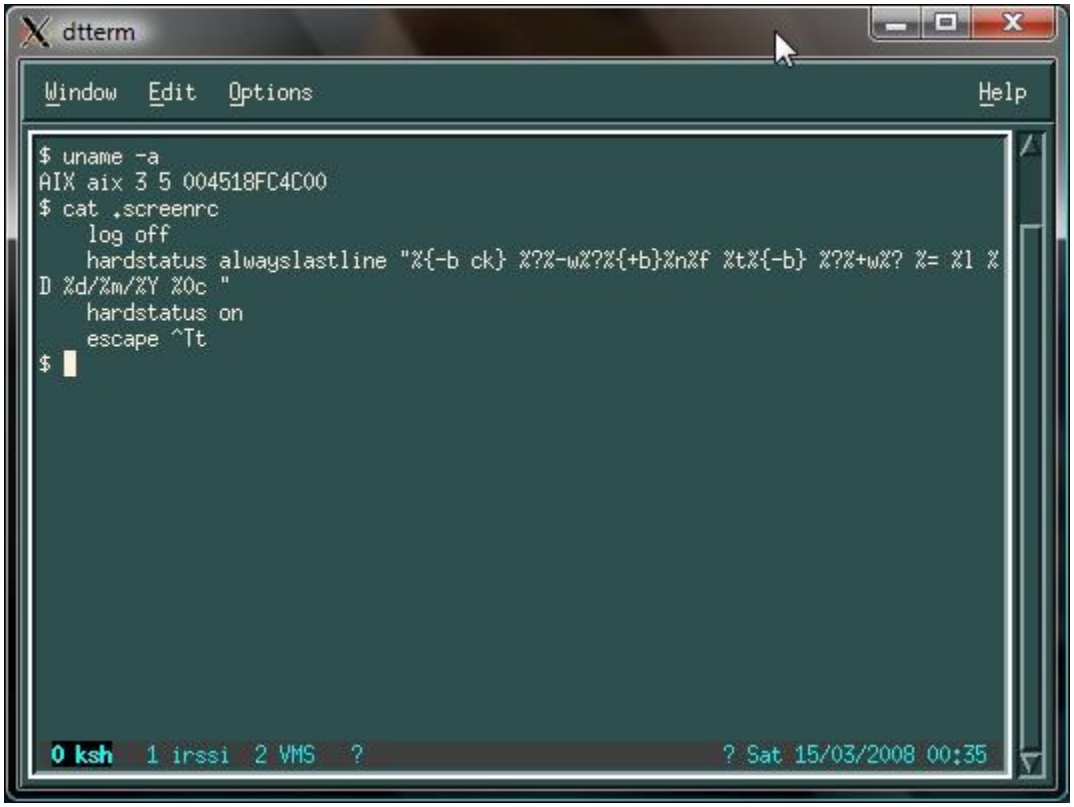

BSD Unix



```
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