

## Lesson Module Checklist

- Final slides published
- Flash cards
- First minute quiz
- Web calendar summary
- Web book pages
- Commands
- Howtos
  
- Lab tested
- Supplemental videos uploaded
  
- Forum created and registration tested
- Opus accounts made (with TBDs for walk-ins) and populated
- CIS 90 VMs created and configured
- Surveys and PW sheet posted
  
- Rosters printed
- Add codes printed
  
- Backup slides on flash drive
- Wireless lapel mic + 9v spares
- Key card for door



Instructor: **Rich Simms**

Dial-in: **888-886-3951**

Passcode: **136690**



Francisco



Leila



Justin



Jesus



Shenghong



Paul



Roberto



Sam



Navin



Jimmy



Luis



Thomas



Adrian



Ann



Cameron



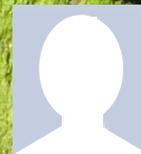
Cody



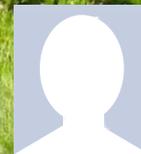
Alejandrino



Deane



Jazzelle



Richard Z.



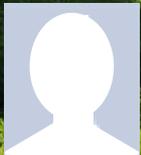
Gabriel



Ryan



Takashi



Zane



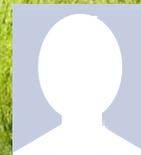
Nick



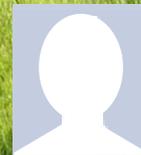
Jonathan



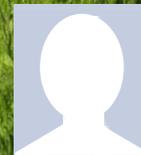
Dakota



Dylan



Joshua



Scott



Aaron



Nicole



James



Matthew



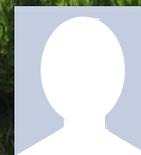
Richard I.



Christopher



Darren

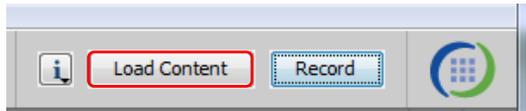


Jeff



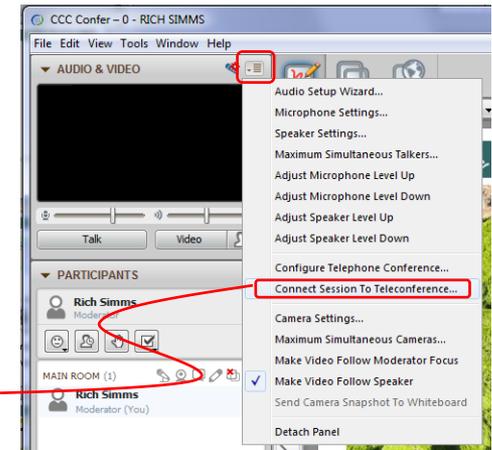
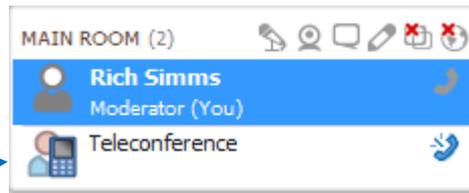
# Instructor CCC Confer checklist

[ ] Preload White Board

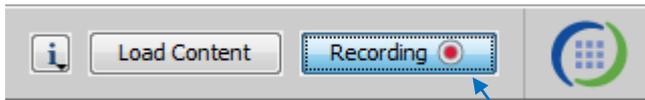


[ ] Connect session to Teleconference

*Session now connected to teleconference*



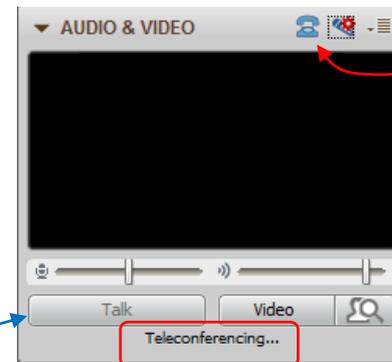
[ ] Is recording on?



*Red dot means recording*

[ ] Use teleconferencing, not mic

*Should be greyed out*



*Should show as this live "off hook" telephone handset icon and the Teleconferencing ... message displayed*



## Instructor CCC Confer checklist

The screenshot displays a Windows desktop with several applications open:

- CCC Confer**: A video conferencing window on the left showing a participant named Rich Simms.
- foxit for slides**: A Foxit Reader window displaying a PDF document titled 'cis90lesson07.pdf'.
- chrome**: A Google Chrome browser window showing a webpage from 'simms-teach.com/docs/cis90/cis-90-TEST-1-Fall-12.pdf'. The page contains flashcard questions and answers:

```
Part 1 - Flashcards questions (1 point each)

[Q1] What command shows the other users logged in to the computer?
[A1] _____

[Q2] What environment variable is used by the shell to determine which directories to search when locating a command?
[A2] _____
```
- putty**: A terminal window showing a login session for 'simben90@oslab:~'. The prompt is '/home/cis90/simben \$'.
- vSphere Client**: A vCenter console window showing the vSphere interface for 'CIS 192'.

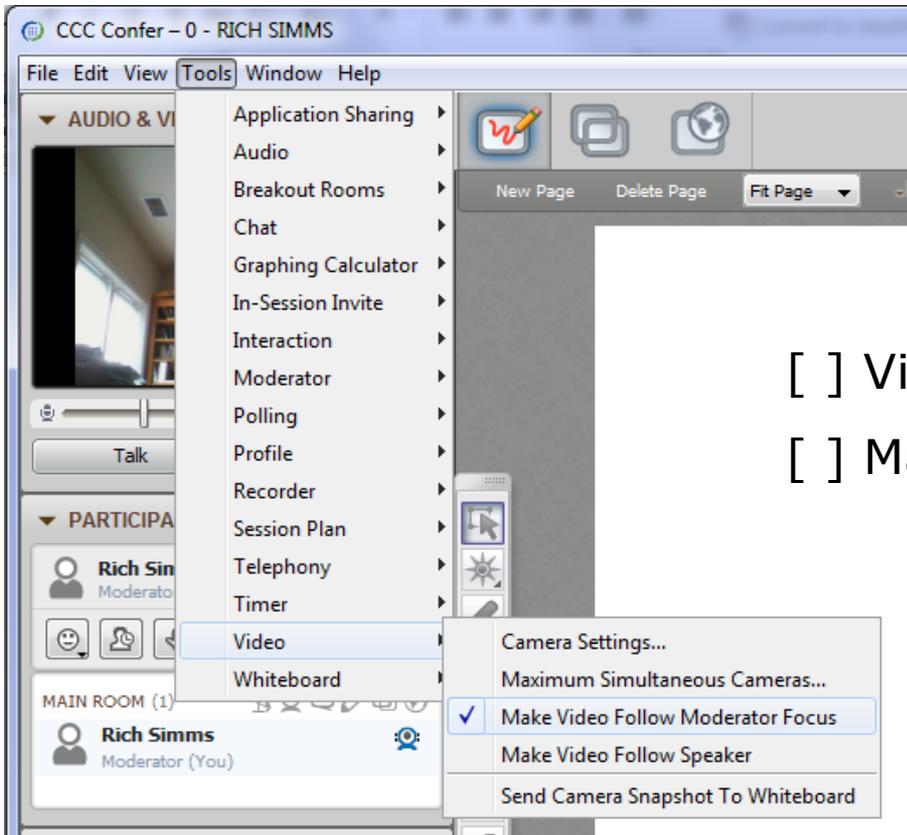
Red boxes with arrows point from the labels 'foxit for slides', 'chrome', and 'vSphere Client' to their respective application windows. A yellow border highlights the desktop area.

[ ] layout and share apps





## Instructor CCC Confer checklist



[ ] Video (webcam)

[ ] Make Video Follow Moderator Focus

## Instructor CCC Confer checklist

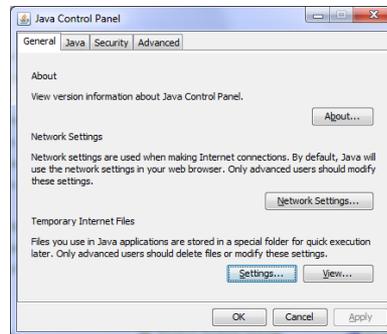
Universal Fix for CCC Confer:

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

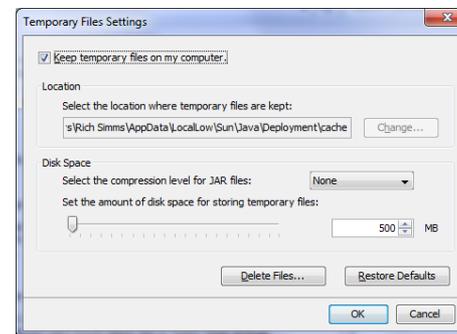
Control Panel (small icons)



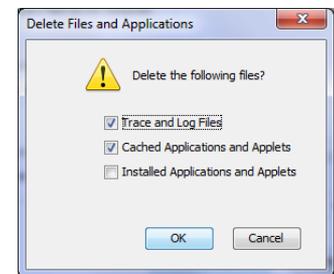
General Tab > Settings...



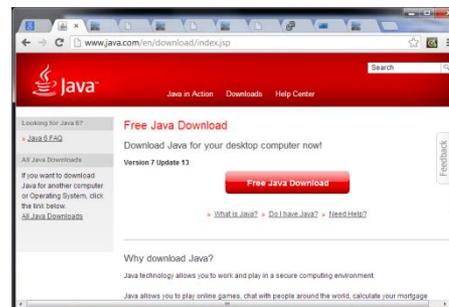
500MB cache size

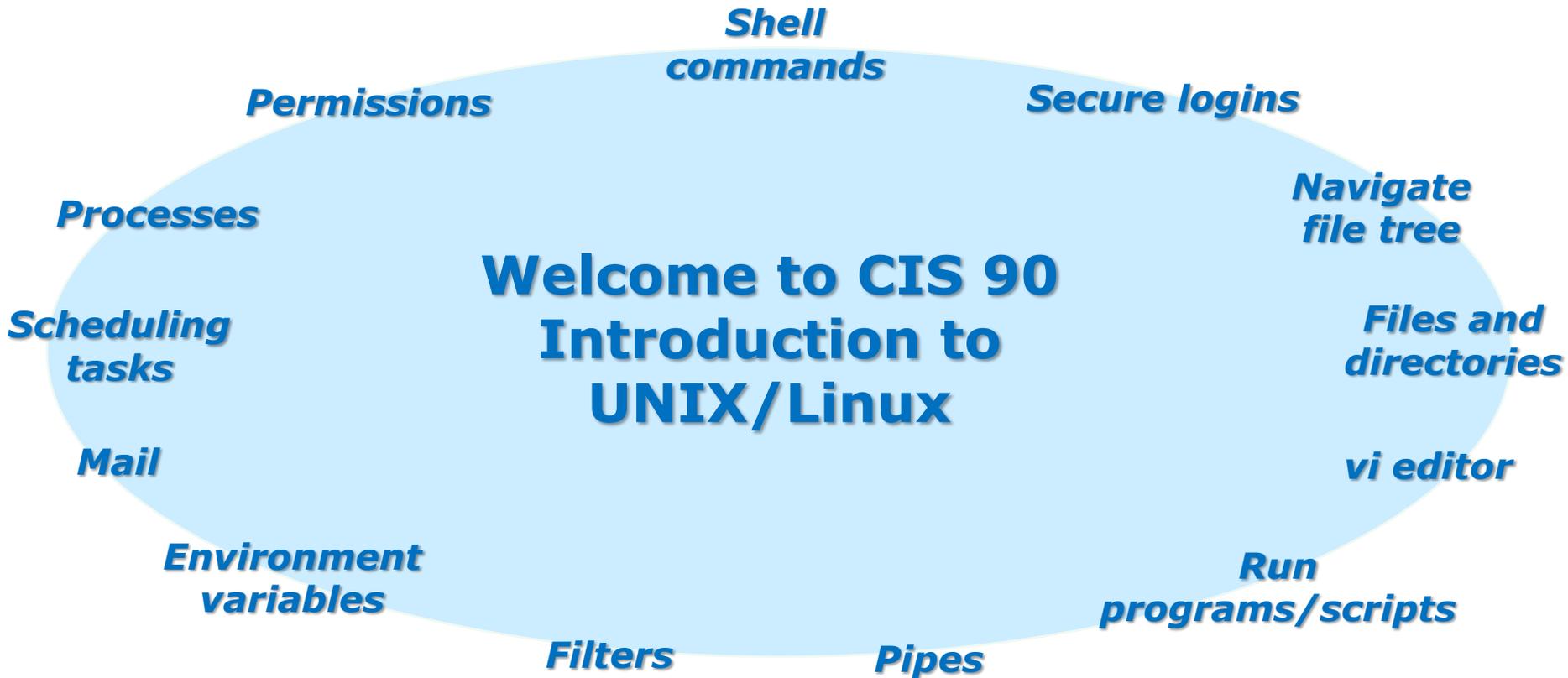


Delete these



Google Java download





### **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.

# Introductions

## Introductions and Credits



Jim Griffin

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



Rich Simms

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

And thanks to:

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

## Class and Linux Overview

### Objectives

- Understand how this course works
- Learn how to login via ssh
- Learn first UNIX/Linux commands

### Agenda

- Introductions
- How this class works
- Lab resources
- What is a computer
- Software overview
- UNIX/Linux Overview
- First Commands
- Housekeeping
- SSH (secure shell)
- Navigating systems
- Lab 1
- Wrap up

# Attending class

## CIS 90 is available online

Tuesdays - 1:00PM to 4:05PM

- Section 84743 meets in room 828 on the Aptos Main Campus
- Section 86576 meets simultaneously online in [this virtual classroom](#)

How to attend class each week:

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

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

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

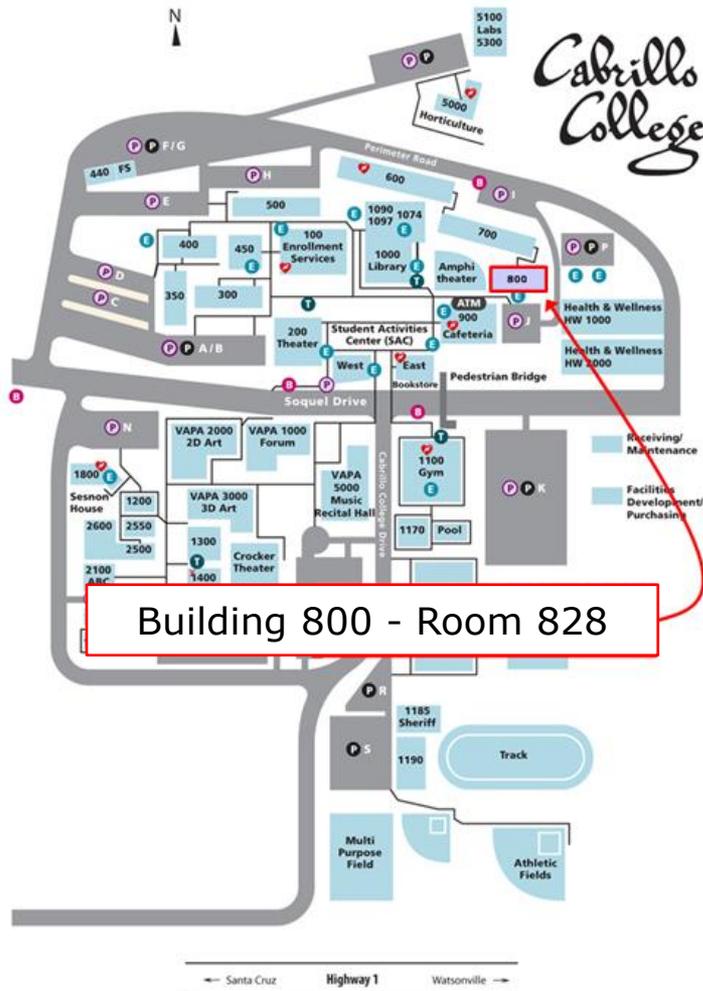
*It doesn't matter which section you enrolled in. You can use **any** method of attending for **any** of the classes.*

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

The screenshot shows a web browser window with the URL `simms-teach.com/cis90calendar.php`. The page title is "Rich's Cabrillo College CIS Classes CIS 90 Calendar". The main content area features a table with columns for Lesson, Date, Topics, Chapter, and Due. The first row of the table is highlighted, showing Lesson 1 on 9/2. A callout box with a blue border and white background contains a numbered list of steps: 1. Browse to `http://simms-teach.com`, 2. Click the **CIS 90** link, 3. Click the **Calendar** link, and 4. Click the **Enter virtual classroom** link. The "Calendar" link in the navigation menu and the "Enter virtual classroom" link in the "CCC Confer" section are circled in red in the original image.

Lesson	Date	Topics	Chapter	Due
1	9/2	<ul style="list-style-type: none"> <li>Class and Link</li> <li>Understand</li> <li>High-level o</li> <li>systems an</li> <li>Overview of</li> <li>Using SSH f</li> <li>Using termi</li> </ul>		
		<ul style="list-style-type: none"> <li>Materials</li> <li>Presentation</li> <li>Login Creden</li> </ul>		
		<ul style="list-style-type: none"> <li>Supplemental</li> <li>Howto #14</li> </ul>		
		<ul style="list-style-type: none"> <li>Assignment</li> <li>Student Survey</li> <li>Lab 1</li> </ul>		
		<ul style="list-style-type: none"> <li>CCC Confer</li> <li>Enter virtual classroom</li> <li>Class archives</li> </ul>		
		<ul style="list-style-type: none"> <li>Quiz 1</li> </ul>		
		<ul style="list-style-type: none"> <li>Commands</li> </ul>		

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



Enjoy the ocean view from the classroom windows!

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

The screenshot shows a web browser window with the URL `simms-teach.com/cis90calendar.php`. The page title is "Rich's Cabrillo College CIS Classes CIS 90 Calendar". The main content area features a table with columns for "Lesson", "Date", and "Content". The "Content" column lists various resources for Lesson 1 on 9/2, including "Class and Linux Overview", "Materials", "Supplemental", "Assignment", "CCC Confer", and "Quiz 1". The "CCC Confer" section includes links for "Enter virtual classroom" and "Class archives", with the latter being highlighted by a red box. A sidebar on the left contains navigation links such as "Login", "Flashcards", "Admin", "CIS 90", and "Previous Classes".

Lesson	Date	Content
1	9/2	<p><b>Class and Linux Overview</b></p> <ul style="list-style-type: none"> <li>Understand how</li> <li>High-level overview of systems and virtual</li> <li>Overview of UNIX</li> <li>Using SSH for remote</li> <li>Using terminals a</li> </ul> <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>Presentation slides</li> <li>Login Credentials</li> </ul> <p><b>Supplemental</b></p> <ul style="list-style-type: none"> <li>Howto #143: Local</li> </ul> <p><b>Assignment</b></p> <ul style="list-style-type: none"> <li>Student Survey</li> <li>Lab 1</li> </ul> <p><b>CCC Confer</b></p> <ul style="list-style-type: none"> <li>Enter virtual classroom</li> <li>Class archives</li> </ul> <p><b>Quiz 1</b></p> <p>Commands</p>

1. Browse to **`http://simms-teach.com`**
2. Click the ***CIS 90*** link
3. Click the ***Calendar*** link
4. Click the ***Class archives*** link and locate the recording you want to watch

# CCC Confer



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



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

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

## CCC Confer - Is your computer ready?

<http://www.cccconfer.org/support/supportReadiness.aspx>

The screenshot shows a web browser window displaying the CCC Confer support page. The browser's address bar shows the URL [www.cccconfer.org/support/supportReadiness.aspx](http://www.cccconfer.org/support/supportReadiness.aspx). The page features a navigation menu with links for HOME, ABOUT US, MEETINGS, TRAINING CENTER, PRODUCTS, ARCHIVES, SUPPORT (highlighted), and CONTACT US. Below the navigation is the CCC Confer logo. A sidebar on the left contains the MyConfer logo and a 'Support Page' section with an image of a woman using a laptop. The main content area is titled 'Is Your Computer Ready?' and includes a 'TECHNICAL SUPPORT' tab, 'QUICK REFERENCE GUIDES', 'FEATURES', and 'FAQs' tabs. The text provides instructions for verifying Java installation, running the wizard, and contacting client services. A 'Run the Wizard' button and a link for 'Important Information for Windows 8 Users' are also visible. The footer contains 'ACCESSIBILITY' and 'PRIVACY' links, along with a disclaimer about the site's purpose and funding.

www.cccconfer.org/support/supportReadiness.aspx

HOME ABOUT US MEETINGS TRAINING CENTER PRODUCTS ARCHIVES **SUPPORT** CONTACT US

CCC Confer

MyConfer

Support Page

Is Your Computer Ready?

TECHNICAL SUPPORT QUICK REFERENCE GUIDES FEATURES FAQs

- Click [here](#) to verify **Java** is installed on your computer; follow the prompts to download Java if needed.
- Return to this page and click **Run the Wizard**; enter your name on the session login page to connect to our test room.
- Accept and run downloads from Blackboard Collaborate.
- For assistance contact CCC Confer Client Services  
Telephone: 760-744-1150 ext 1537, 1554 or 1542  
Email: [clientservices@cccconfer.org](mailto:clientservices@cccconfer.org).

**Run the Wizard**

[Important Information for Windows 8 Users](#)

ACCESSIBILITY This site is provided as a service to the administrators, staff and faculty of the California Community Colleges system. CCC Confer is funded by an e-conferencing grant from the California Community Colleges Chancellor's Office. PRIVACY

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



*CCC Confer uses Java which requires a download  
and installation of the Java Runtime Environment  
from [java.com](http://java.com) (Oracle)*

# CCC Confer - Attending class online

CCC Confer - 0 - RICH SIMMS

File Edit View Tools Window Help

AUDIO & VIDEO

Rich Simms

Talk Video

PARTICIPANTS

Benji

MAIN ROOM (2)

Rich Simms  
Moderator

Benji  
(You)

CHAT

- You joined the Main Room. ( 2:23 PM ) -  
- Rich Simms joined the Main Room. ( 2:24 PM ) -

Cabrillo College est. 1959

CIS Linux Classes

Instructor: Rich Simms  
Dial-in: 888-450-4821

Show your state of mind, let others know you stepped away, raise your hand, and indicate responses using these controls

Ask and answer questions using the chat area

## CCC Confer - Attending class online

When dialed in by phone you can use:

- \*0 Contact the operator for assistance.
- \*6 Mute/unmute your individual line with a private announcement.

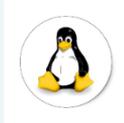
*Instructor Note:*

*Switch to preloaded whiteboard*

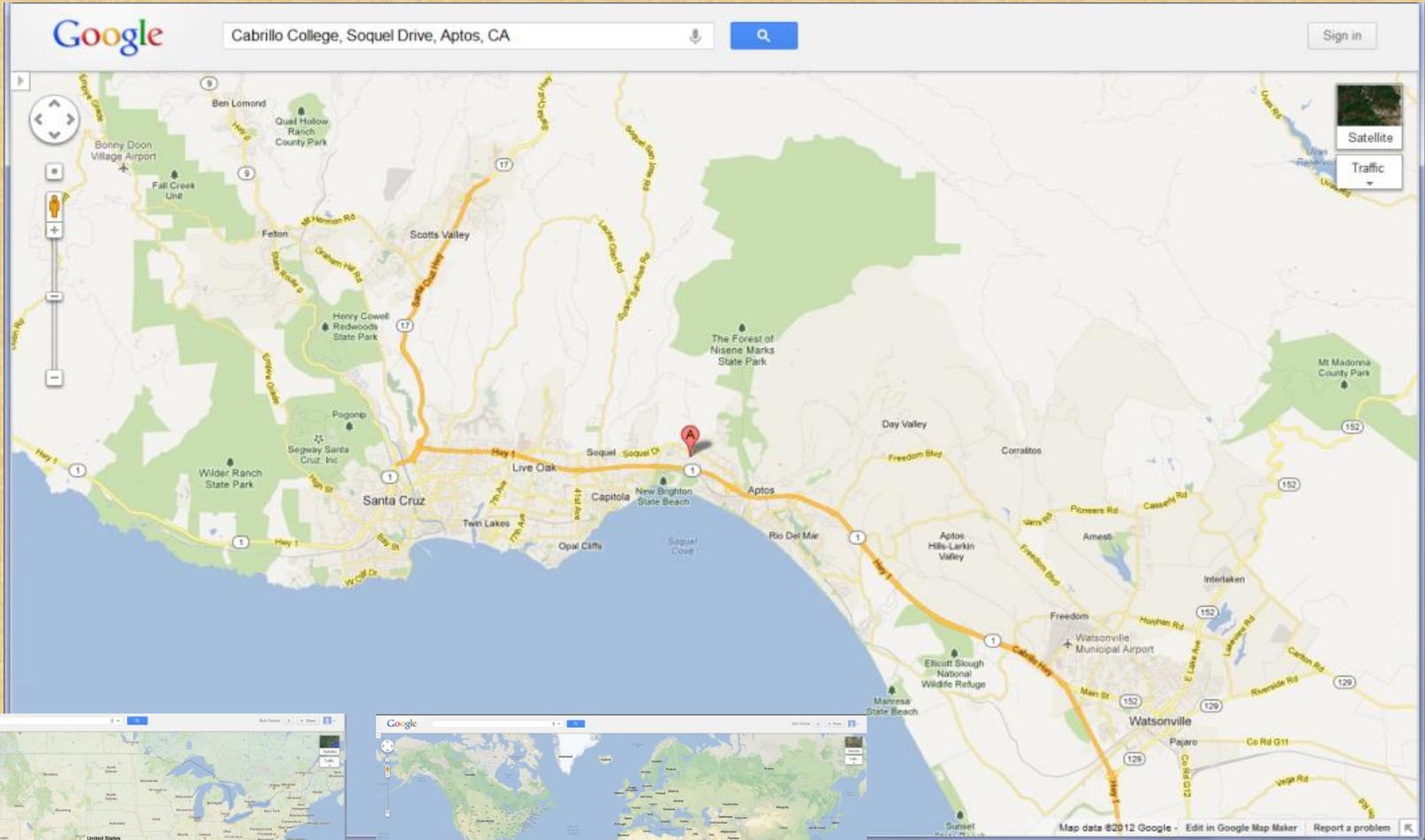
### Class Activity

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



			Other

## Class Activity – Where are you now?



# Roll Call

*If you are attending class by watching the recordings in the archives contact the instructor at: [risimms@cabrillo.edu](mailto:risimms@cabrillo.edu) to provide roll call attendance.*

# Login Credentials

Username and passwords

*If you are attending class by watching the recordings in the archives contact the instructor at: [risimms@cabrillo.edu](mailto:risimms@cabrillo.edu) to request the slides on login credentials.*

*Instructor Note:*

*Turn Recording On  
Switch back to shared slides*

# How this class works

# CIS 90 Fall 2014

Class meets in room **828** and **online** every **Tuesday afternoon**:

- **\*1:00-4:05 PM**, from **Sep 2<sup>nd</sup>** to **Dec 9<sup>th</sup>**
- 15 lessons (class meetings) total
- Final exam at **1:00-3:50PM**, on Thursday **Dec 18<sup>th</sup>**, in room **828**

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

**FINAL EXAMINATIONS SCHEDULE: FALL 2014: December 15-December 20**

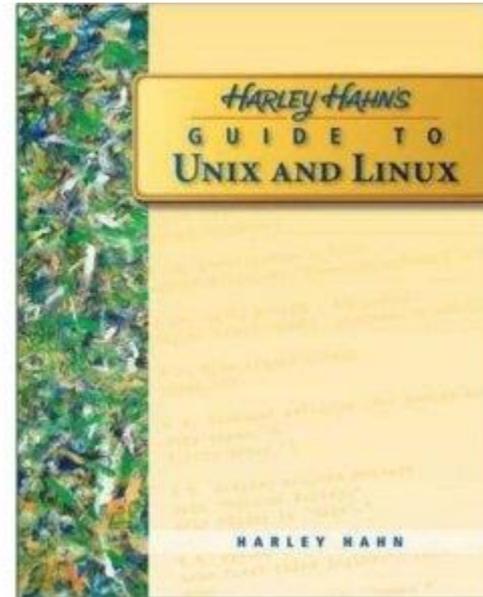
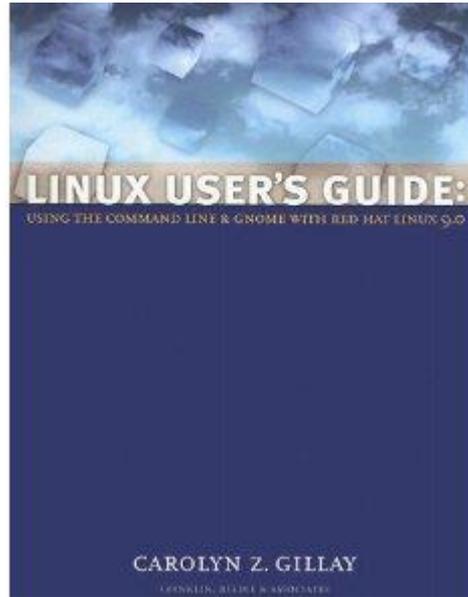
**Daytime Classes:** All times in bold refer to the beginning times of classes. MW/Daily means Monday alone, Wednesday alone, Monday and Wednesday or any 2 for more days in any combination. TH means Tuesday alone, Thursday alone, or Tuesday and Thursday. Classes meeting other combinations of days and/or hours not listed must have a final schedule approved by their Division Dean.

STARTING CLASS TIME(DAYS)	EXAM HOUR	EXAM DATE
6:30 am and 8:00 am, MW/Daily	7:00 am-9:00 am	Wednesday, December 17
8:00 am and 10:15 am, MW/Daily	7:00 am-9:00 am	Monday, December 15
10:00 am and 11:00 am, MW/Daily	10:00 am-12:00 pm	Wednesday, December 17
11:00 am and 12:00 pm, MW/Daily	10:00 am-12:00 pm	Monday, December 15
1:00 pm and 2:15 pm, MW/Daily	1:00 pm-3:00 pm	Wednesday, December 17
2:00 pm and 3:00 pm, MW/Daily	1:00 pm-3:00 pm	Monday, December 15
2:45 pm and 3:30 pm, MW/Daily	4:00 pm-6:00 pm	Wednesday, December 17
3:00 pm and 4:00 pm, TH	7:00 am-9:00 am	Thursday, December 18
8:00 am and 10:15 am, TH	7:00 am-9:00 am	Tuesday, December 16
10:00 am and 11:00 am, TH	10:00 am-12:00 pm	Thursday, December 18
11:00 am and 12:00 pm, TH	10:00 am-12:00 pm	Tuesday, December 16
1:00 pm and 2:15 pm, TH	1:00 pm-3:00 pm	Thursday, December 18
2:00 pm and 3:00 pm, TH	1:00 pm-3:00 pm	Tuesday, December 16
3:45 pm and 5:00 pm, TH	4:00 pm-6:00 pm	Thursday, December 18
Friday am	9:00 am-11:00 am	Friday, December 19
Friday pm	1:00 pm-3:00 pm	Friday, December 19
Saturday am	9:00 am-11:00 am	Saturday, December 20
Saturday pm	1:00 pm-3:00 pm	Saturday, December 20

**Evening Classes:** For the final exam schedule. **Evening Classes** are those that begin at 5:05 pm or later. Also, "M & W" means the class meets on BOTH Monday and Wednesday. "T & TH" means the class meets on BOTH Tuesday and Thursday. The listing schedule applies to all Evening Classes.

**EVENING FINAL SCHEDULE:**

Classes beginning at 6:00 pm or later	6:00 pm-8:00 pm	Monday, December 15
Monday Only OR "M & W"	6:00 pm-8:00 pm	Wednesday, December 16
Wednesday Only	7:00 pm-9:00 pm	Wednesday, December 17
Thursday Only	7:00 pm-9:00 pm	Thursday, December 18
Friday Only	6:00 pm-8:00 pm	Friday, December 19



## Optional Textbooks:

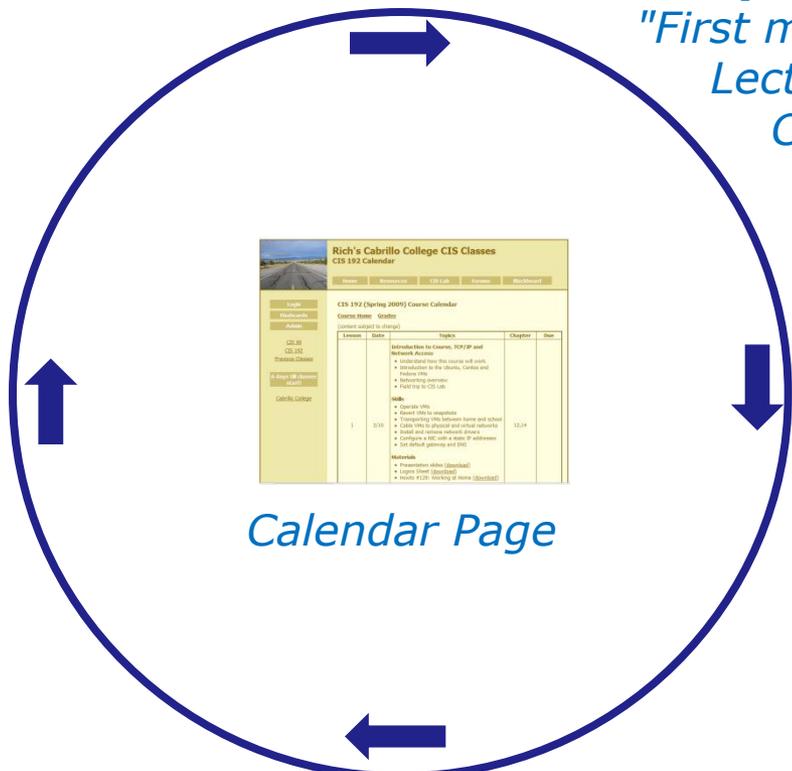
Linux User's Guide: Using the Command Line and GNOME with Red Hat Linux 9.0  
by Carolyn Z. Gillay  
Franklin Beedle & Associates ISBN: 1887902988

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

**The typical week**  
http://simms-teach.com

**Tuesday**

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

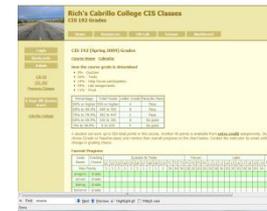


Calendar Page

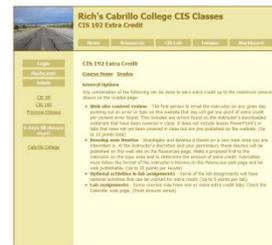


**Wednesday**  
is grading day

Check progress  
on the Grades  
Page



Check Extra Credit Page  
if you need some more  
points



Use Forum to  
collaborate with  
classmates



Work Lab Assignments  
in the CIS Lab or from home

## Contacting the instructor

- Use the forum for the fastest response on technical or class related questions.
- Use email for personal matters only. If it's NOT personal I will most likely ask you to post your question on the forum and will answer it there instead so other students may benefit from the answer.
- Weekly office hours:  
<http://babyface.cabrillo.edu/salsa/listing.jsp?staffId=1426>
- Avoid leaving a message on voice mail. Checked rarely so don't expect a fast response!



## Class Exercise (Syllabus)

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

Rich's Cabrillo College CIS Classes  
CIS 90 Home

Home Resources Forums CIS Lab Blackboard

Login  
Flashcards  
Admin  
**CIS 90**  
[Previous Classes](#)

21 days till term starts!

[Cabrillo College](#)  
[Web Advisor](#)  
[Commands and Files](#)  
[VLab RDP file](#)  
[CIS 90 VLab VM Assignments](#)  
[RIP Dennis Ritchie](#)

**CIS 90 (Fall 2014) Syllabus**  
**Course Home** [Grades](#) [Calendar](#)

**Introduction to UNIX/Linux**

- Tuesdays - 1:00PM to 4:05PM
  - Section 84743 meets in room 828 on the Aptos Main Campus
  - Section 86576 meets simultaneously online in [this virtual classroom](#)
- Units: 3, prerequisites: none, recommended: CS 1L or CIS 172
- Optional Textbooks, available:
  - [Harley Hahn's Guide to UNIX](#)
    - by Harley Hahn
    - McGraw-Hill ISBN-13: 0-07-070494-9
  - [Linux User's Guide: Using Linux](#)
    - by Carolyn Z. Gillay
    - Franklin Beedle & Associates ISBN-13: 978-1887902984

**Course Description**

Provides a technical overview of the UNIX/Linux operating system, including hands-on experience with commands, files, and tools. Topics include basic UNIX/Linux commands, files and directories, text editing, electronic mail, pipes and filters, X Windows, shell environments and scripting. Required for students wishing to pursue the UNIX/Linux track leading to industry certification.

Click on **CIS 90**  
on left panel

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

## Class Exercise (Calendar)

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

Click on **CIS 90**  
on left panel

**Rich's Cabrillo College CIS Classes**  
**CIS 90 Calendar**

Home Resources Forums CIS Lab Blackboard

Login  
Flashcards  
Admin

**CIS 90**  
Previous Classes

**21 days till term starts!**

Cabrillo College  
Web Advisor  
Commands and Files

VLab RDP file

CIS 90 VLab VM Assignments

RIP Dennis Ritchie

Opus Status: UP

**CIS 90 (Fall 2014) Calendar**  
Course Home Grades **Calendar**

Lesson	Date	Topics	Chapter	Due
1	9/2	<b>Class and Linux Overview</b> <ul style="list-style-type: none"> <li>Understand how this course will work</li> <li>High-level overview of computers, operating systems and virtual machines</li> <li>Overview of UNIX/Linux market and architecture</li> <li>Using SSH for remote work</li> <li>Using term</li> </ul> <b>Materials</b> <ul style="list-style-type: none"> <li>Presentation</li> <li>Login Credentials</li> </ul> <b>Supplemental</b> <ul style="list-style-type: none"> <li>Howto #14</li> </ul> <b>Assignment</b> <ul style="list-style-type: none"> <li>Student Survey</li> <li>Lab 1</li> </ul> <b>CCC Confer</b> <ul style="list-style-type: none"> <li>Enter virtual classroom</li> <li>Class archives</li> </ul>		
		<b>Quiz 1</b> <b>Commands</b> <ul style="list-style-type: none"> <li>Understand how the UNIX login operation works</li> <li>Meet John the Ripper and learn how vulnerable a poor password is</li> <li>Understand basic command syntax and</li> </ul>		

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

# Course Calendar

First minute quiz

Lesson # and Date

What is due by 11:59PM (Opus time) that date

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

Links to virtual classroom and archived recordings

Lab assignment

References to material in the textbook

CCC Confer links to join class online or review archives

Test

5	3/10	<p><b>Quiz 4</b></p> <p><b>Review</b></p> <ul style="list-style-type: none"> <li>Review lessons 1-4</li> <li>Practice skills</li> <li>Learn about filename expansion characters</li> </ul> <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>Presentation slides (<a href="#">download</a>)</li> <li>Practice test (<a href="#">download</a>)</li> </ul> <p><b>Assignment</b></p> <ul style="list-style-type: none"> <li>NA</li> </ul> <p><b>CCC Confer</b></p> <ul style="list-style-type: none"> <li><a href="#">Enter virtual classroom</a></li> <li><a href="#">Class archives</a></li> </ul>	Lab 4
6	3/17	<p><b>Managing Files</b></p> <ul style="list-style-type: none"> <li>Creating</li> <li>Copying</li> <li>Moving</li> <li>Renaming</li> <li>Removing</li> <li>Linking</li> </ul> <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>Presentation slides (<a href="#">download</a>)</li> </ul> <p><b>Test #1</b></p> <ul style="list-style-type: none"> <li>Test (<a href="#">download</a>)</li> </ul> <p><b>Assignment</b></p> <ul style="list-style-type: none"> <li>Lab 5</li> </ul> <p><b>CCC Confer</b></p> <ul style="list-style-type: none"> <li><a href="#">Enter virtual classroom</a></li> <li><a href="#">Class archives</a></li> </ul>	<p>5 8.13-8.16 (Gillay)</p> <p>25 p715-729 (Hahn)</p>

## Class Exercise (Grades)

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

**Rich's Cabrillo College CIS Classes**  
CIS 90 Grades

Home Resources Forums CIS Lab Blackboard

**CIS 90 (Fall 2014) Grades**

Course Home **Grades** 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
90% or higher	504 or higher	A	
80% to 89.9%	448 to 503	B	
70% to 79.9%	392 to 447	C	
60% to 69.9%	336 to 391	D	
0% to 59.9%	0 to 335	F	

For some flexibility, personal preferences or family

**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	30	60	90	560	
alatar	grade																																
anborn	grade																																

Click on **CIS 90** on left panel

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

## Course Grading

Monitor this page to track your progress in the course.

### Rich's Cabrillo College CIS Classes CIS 90 Grades

Home Resources Forums CIS Lab Blackboard

#### 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%)
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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 both graded and non-graded areas of performance. Non-graded performance areas may include team quality, planning & organization skills, communication, documentation, motivation, and the desire to meet 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
adaldrida	grade	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	

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

Use extra credit to earn 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

Don't forget to post! Racking up points the forum is "low hanging fruit"

## More on Grading

### 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%)
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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.**

*The student can decide the grade they want and how they want to earn it*

## More on Grading

### Lab Assignments (10 labs, 30 points each)

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

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

## More on Grading



### "First Minute" quizzes (10 quizzes, 3 points each)

*As an incentive to start class on time*

- The quiz questions are shown on CCC Confer at **1:00PM** 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 turned in within the first few minutes of class.**
- Students that attend by watching the archives can do some extra credit work instead. In the past working students have joined the class briefly at the start just to take the quiz and then return to work.

## More on Grading



### **Tests** (3 tests, 30 points each)

- A practice test will be made available a week before the actual test.
- Tests will start during the last hour of the class.
- Test 3 is the final exam.
- 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.

*See the archived courses for an idea of what these tests are like*

## More on Grading

### **Forum Posts** (4 quarters, up to 20 points per quarter)

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

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

## More on 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 crash and burn 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

Please remember:

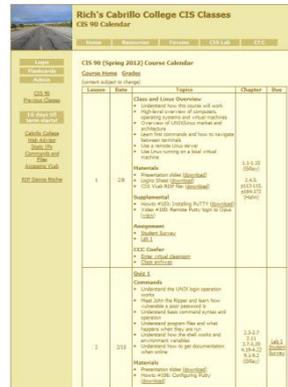
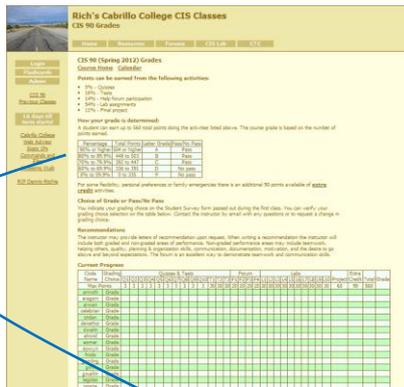
- 1) No makeup's for missed quizzes
- 2) Quiz answers in the wrong order or not emailed in the first few minutes will not be accepted
- 3) Late work (lab assignments) will not be accepted. For example, a lab assignment due at 11:59PM will get no credit if turned in **one minute late** at 12:00AM (midnight) 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 assignments, when forum posts are due and when tests will be given.



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

*At the end of the course the instructor will use this table on the Grades web page to determine your grade*

# Help Forum

## Online Help Forum

The screenshot shows a web browser window displaying the phpBB forum for Cabrillo College. The forum is titled 'Cabrillo College: Computer and Information Systems' and is described as a forum for students in the Computer Networking and System Administration and/or Computer Support Specialist programs. The page includes a search bar, a board index, and a user control panel. The main content area displays a forum index with the following data:

FORUM	TOPICS	POSTS	LAST POST
<b>Practice</b> Use this forum to practice using a bulletin board. Postings made to this forum will be deleted regularly.	3	3	by Rich Simms Sat Jan 16, 2010 6:14 pm
<b>CABRILLO COLLEGE: SPRING 2010 COURSES</b>			
CIS 90 Introduction to UNIX/Linux - Jim Griffin	0	0	No posts
CIS 192AB UNIX/Linux Network Administration - Rich Simms	0	0	No posts
CIS 193AB UNIX/Linux Security Administration - Jim Griffin	0	0	No posts
<b>CISA PROGRAM</b>			
Alumni Stay in touch with former students!	0	0	No posts
<b>ARCHIVES</b>			
CIS 90 - Spring 2009 Introduction to UNIX/Linux - Rich Simms	Total redirects: 1		
CIS 192 - Spring 2009 UNIX/Linux Network Administration - Rich Simms	Total redirects: 1		

- 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
- **Please don't post passwords!**



*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

### Textbook

POSTREPLY ↩

Search this topic...

Search

3 posts • Page 1 of 1

### Textbook

by Benji Simms on Thu May 15, 2008 2:57 pm

What is the textbook for this course? I want to get it ahead of time and start reading through it.

- 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.



Benji Simms

Posts: 5  
Joined: Thu May 15, 2008 2:40 pm



Rich Simms  
Site Admin

Posts: 340  
Joined: Thu May 15, 2008 1:44 pm



Benji Simms

Posts: 5  
Joined: Thu May 15, 2008 2:40 pm

## Class Activity Forum Registration

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

**Rich's Cabrillo College CIS Classes**  
Home Page

Home Resources **Forums** CIS Lab CTC

**: Computer and Information Systems**  
Computer Networking and System Administration and/or  
list programs

Search... Search  
Advanced search

FAQ **Register** Login

It is currently Sun Jan 17, 2010 9:43 am

To Register:

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

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

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

## Class Forum

Optional, but handy is to subscribe to a forum.

After logging in:

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

 Board index  Subscribe forum

*Unsubscribed  
looks like this*

 Board index  Unsubscribe forum

*Subscribed  
looks like this*



# Lab Resources

# The CIS 90 System Playground

Configured for  
Command Line Only



**Opus**

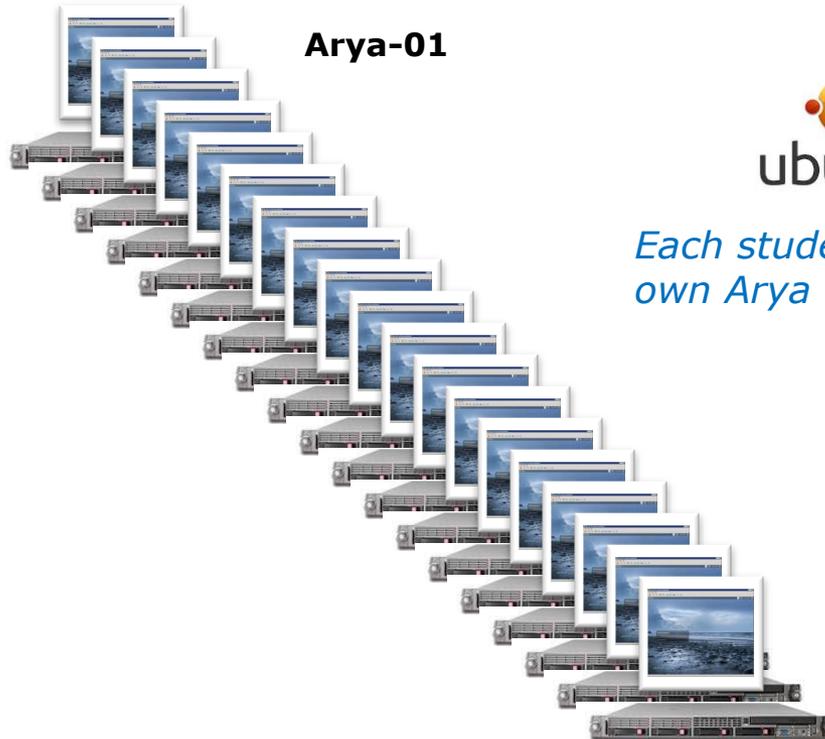


**Sun-Hwa and Sun-Hwa-II**

**Other UNIX/Linux servers**



Configured for  
Graphics and Command Line



**Arya-01**

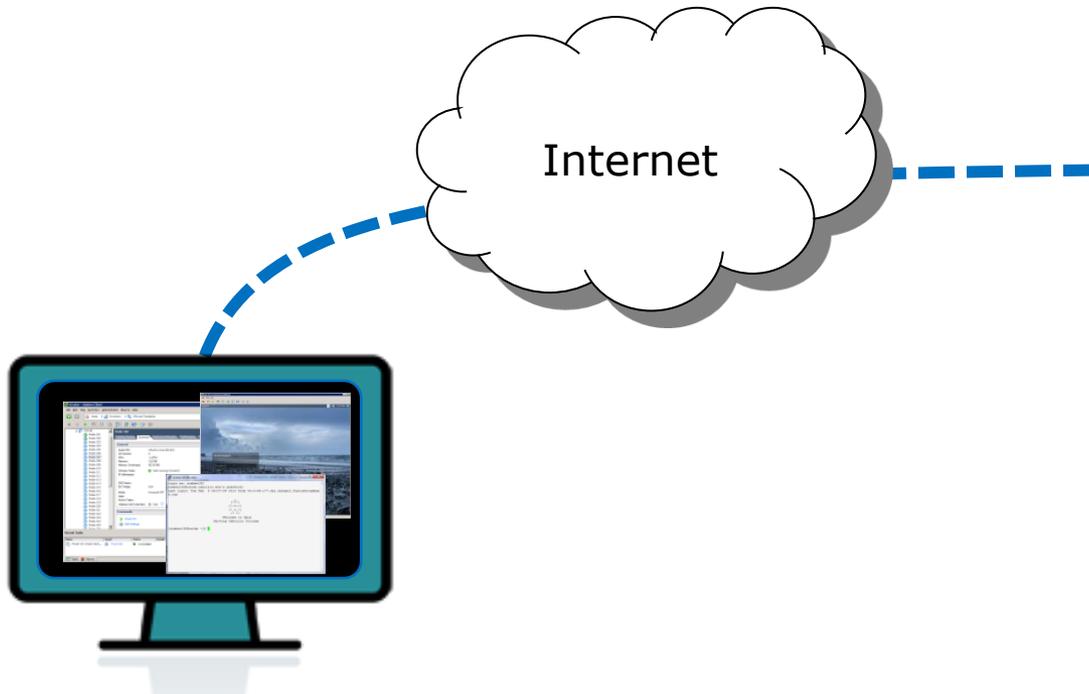
**Arya-75**



*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 and Sun-Hwa, are virtual machines hosted on physical servers in the CIS Lab*



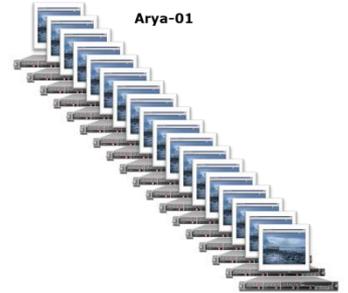
Opus



Sun-Hwa and Sun-Hwa-II

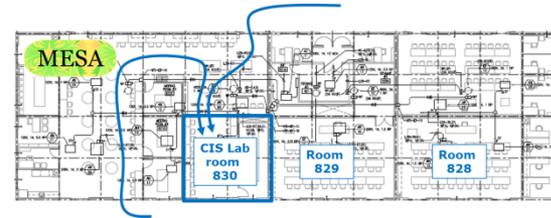
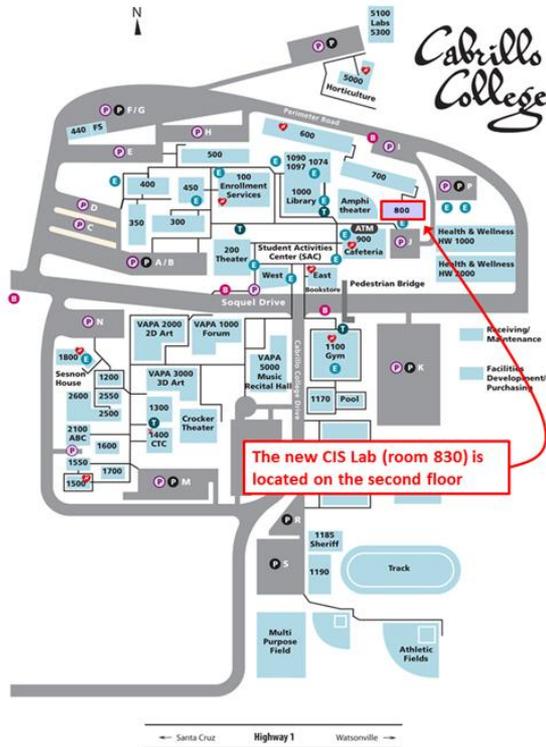
Other UNIX/Linux servers

- Defiant
- Lexington
- Enterprise
- Intrepid
- Freedom
- Excalibur
- Son-of-Opus
- Baby-Opus



## Option 2: Work on assignments in the CIS Lab

Building 800 - Room 830 (in MESA)



**Rich's Cabrillo College CIS Classes**  
CIS 90 Grades

Home	Resources	Forums	<b>CIS Lab</b>	Blackboard
------	-----------	--------	----------------	------------

*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*



# What is a computer

# What is a computer?



smart phone



tablet



mobile "laptop"



desktop



blade server



"heavy iron" server



Virtual Machine



supercomputer



"pizza box" 1U rack server



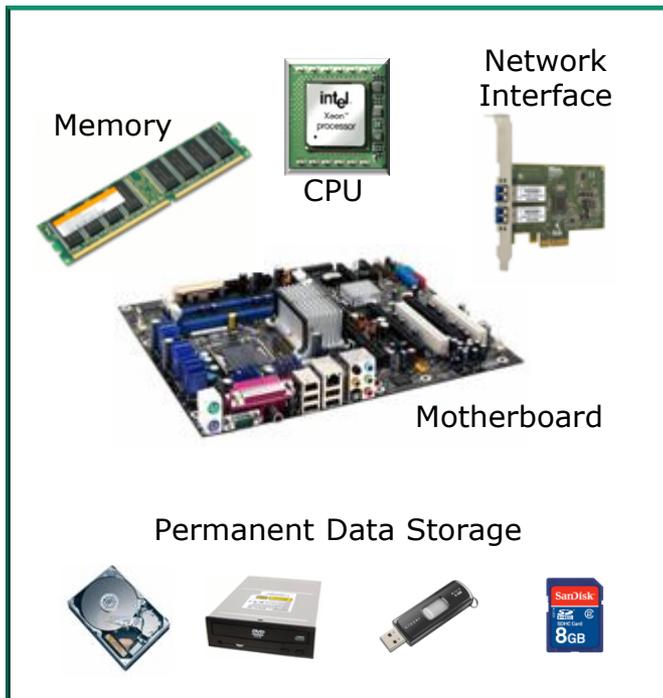
Raspberry Pi

*Computers come in a wide variety of form factors*

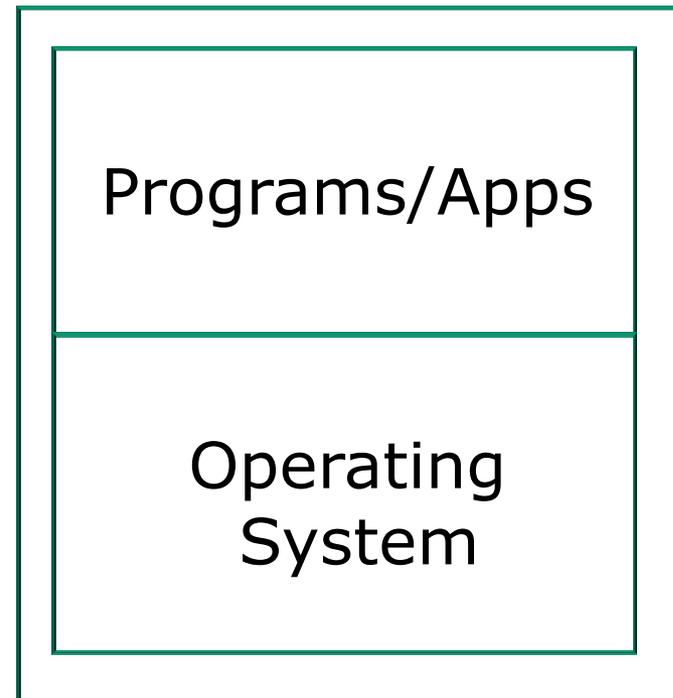
# What is a computer?



## Hardware



## Software



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

# Software

# Software

## Users



### Software: Programs/Apps

- Interface to users via graphics (GUI) or command line (CLI)
- Some programs come with the OS
- Additional programs can be purchased or downloaded
- Programs use the OS for all access hardware resources

Examples: office apps, utilities, network services, games, email, web browsers, graphics, media players, databases, command line shells, CAD/CAM, contact management, accounting, enterprise applications, custom software, etc.

### Software: 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, 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

- Source code is available
- Community of developers doing online collaboration
- Pragmatic redistribution licenses
- Examples: Apache, Firefox, Android, OpenOffice

### Free Software Movement

- Source code is available
- GNU (“GNU is not UNIX”) General Public License, COPyleft
- Examples: GNU/Linux, gimp, emacs, nano, gcc, zebra

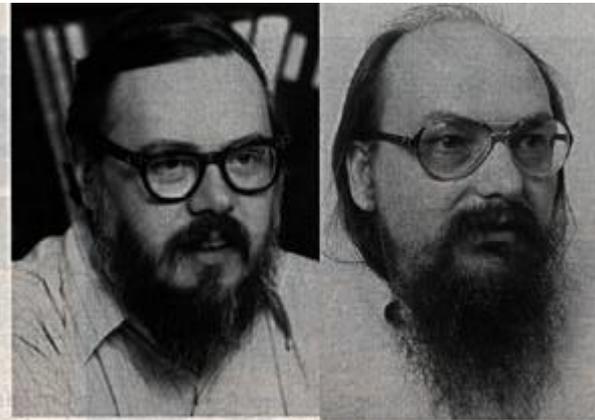
### Proprietary

- 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

# Why Study Unix/Linux?

# 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

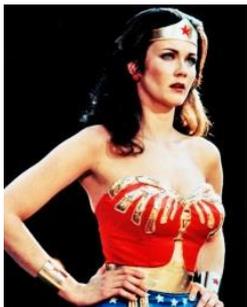
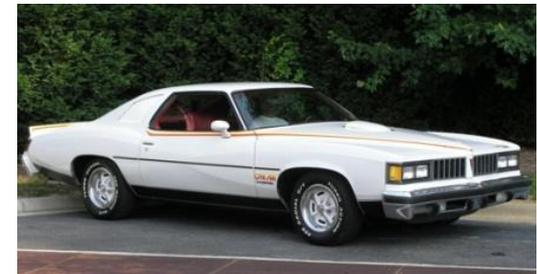
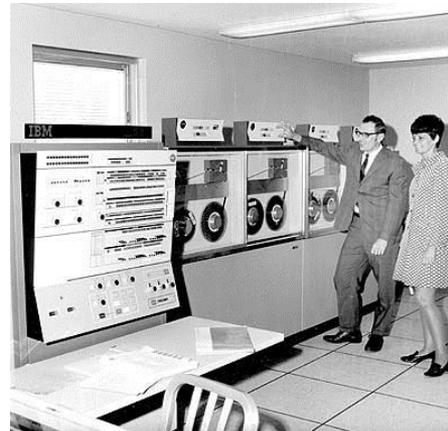
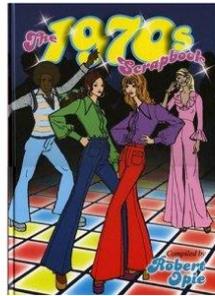


*Dennis Ritchie and Kenneth Thompson: they set the style for software development – and for software developers*





# 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!

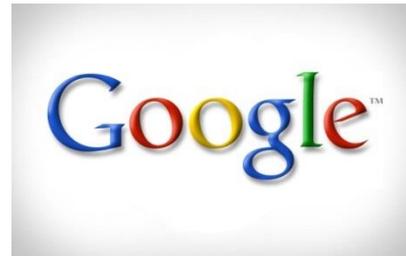
- Cloud infrastructure
- Embedded in smartphones, tablets and many other appliances.
- Internet servers - Web, DNS, DHCP, Net News, Mail, etc.
- Enterprise and mission critical applications - Large databases, Enterprise Resource Management (ERM), Customer Relationship Management (CRM), data warehouse, manufacturing, supply chain management, etc.
- Hollywood - feature animation, visual effects, rendering farms.
- Number-crunching super computers for research.
- Companies like Google, Amazon, Facebook, PayPal, Yahoo etc. are using it to run their businesses on



## Businesses and organizations that run on Linux

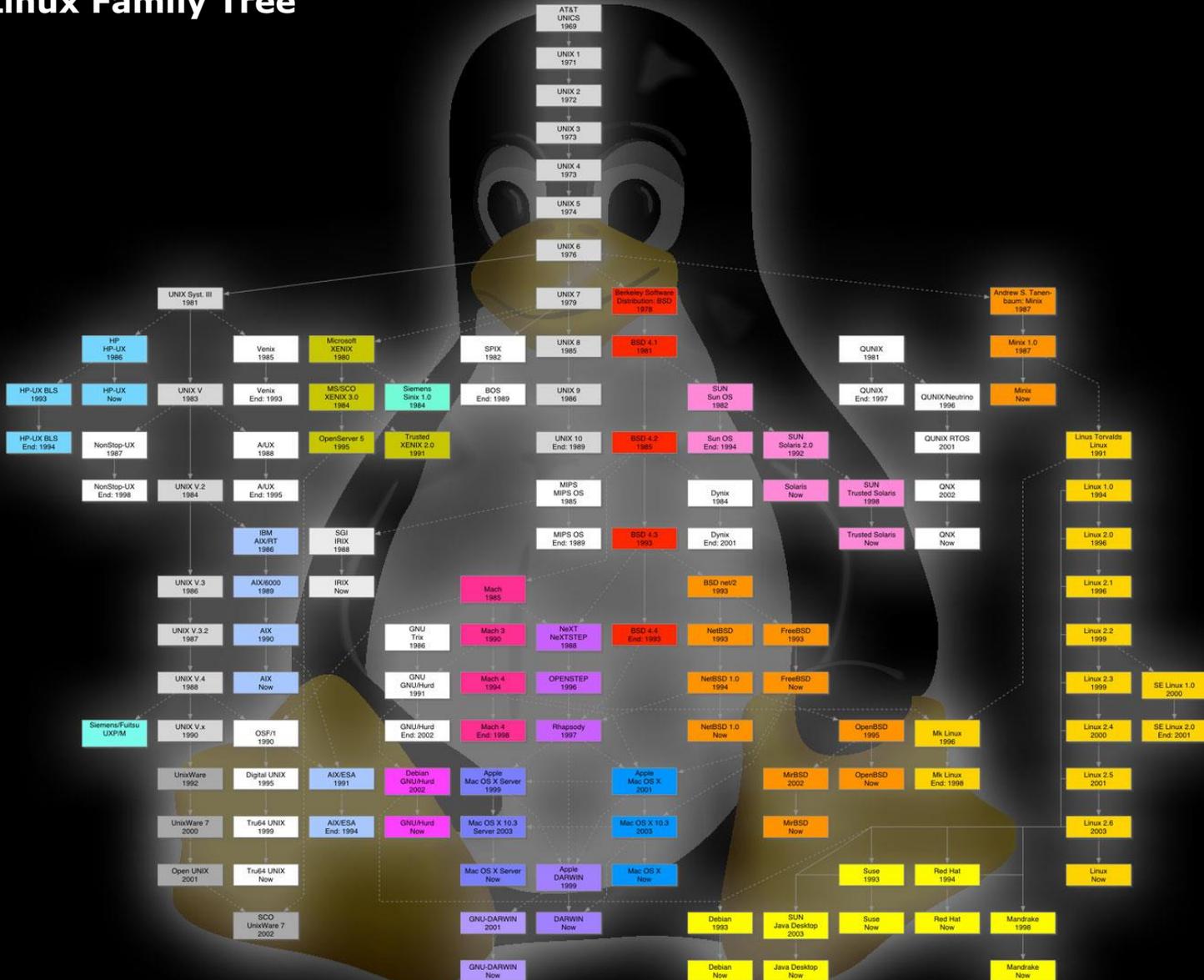


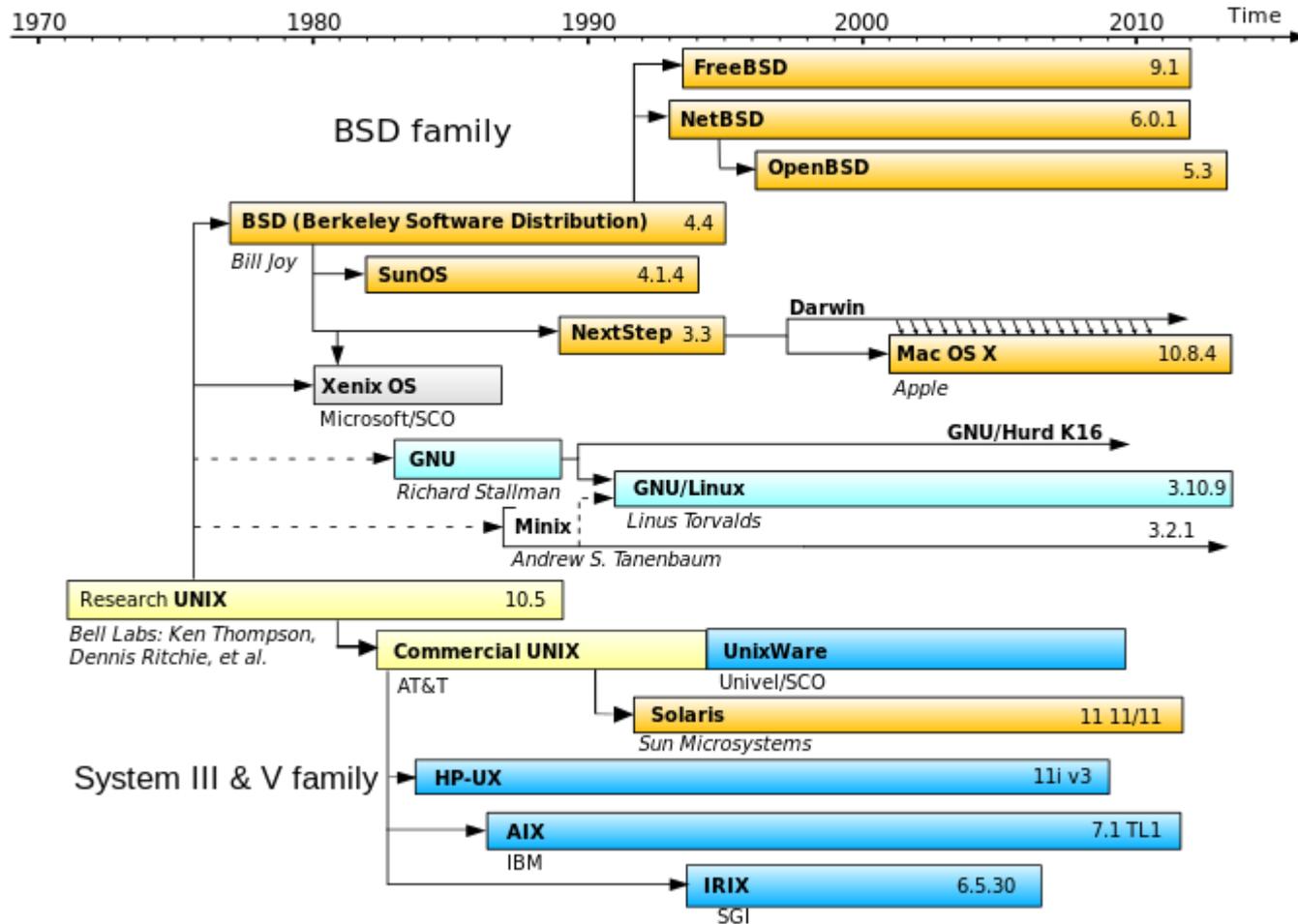
WIKIPEDIA  
*The Free Encyclopedia*

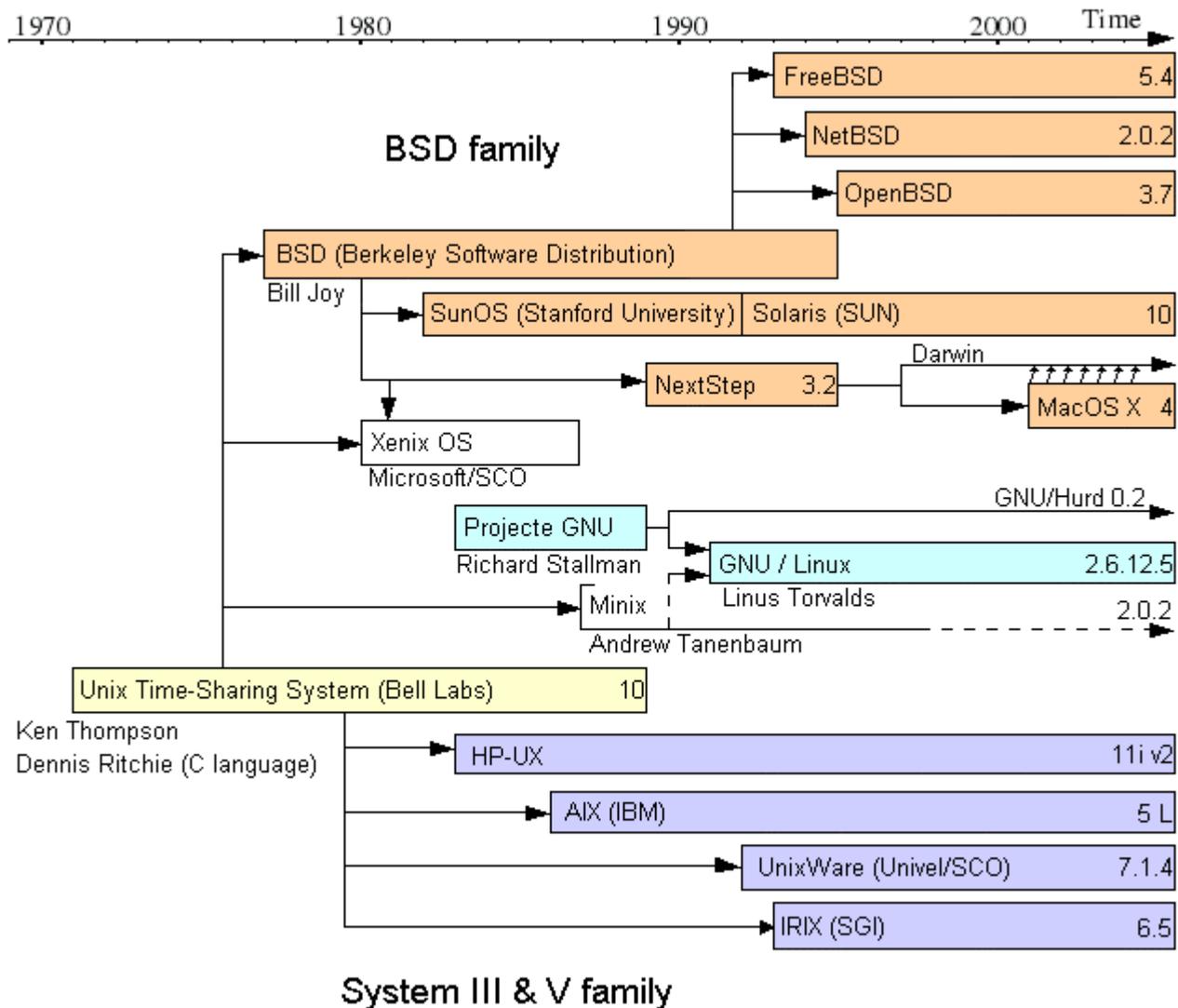


# UNIX family trees

## UNIX/Linux Family Tree





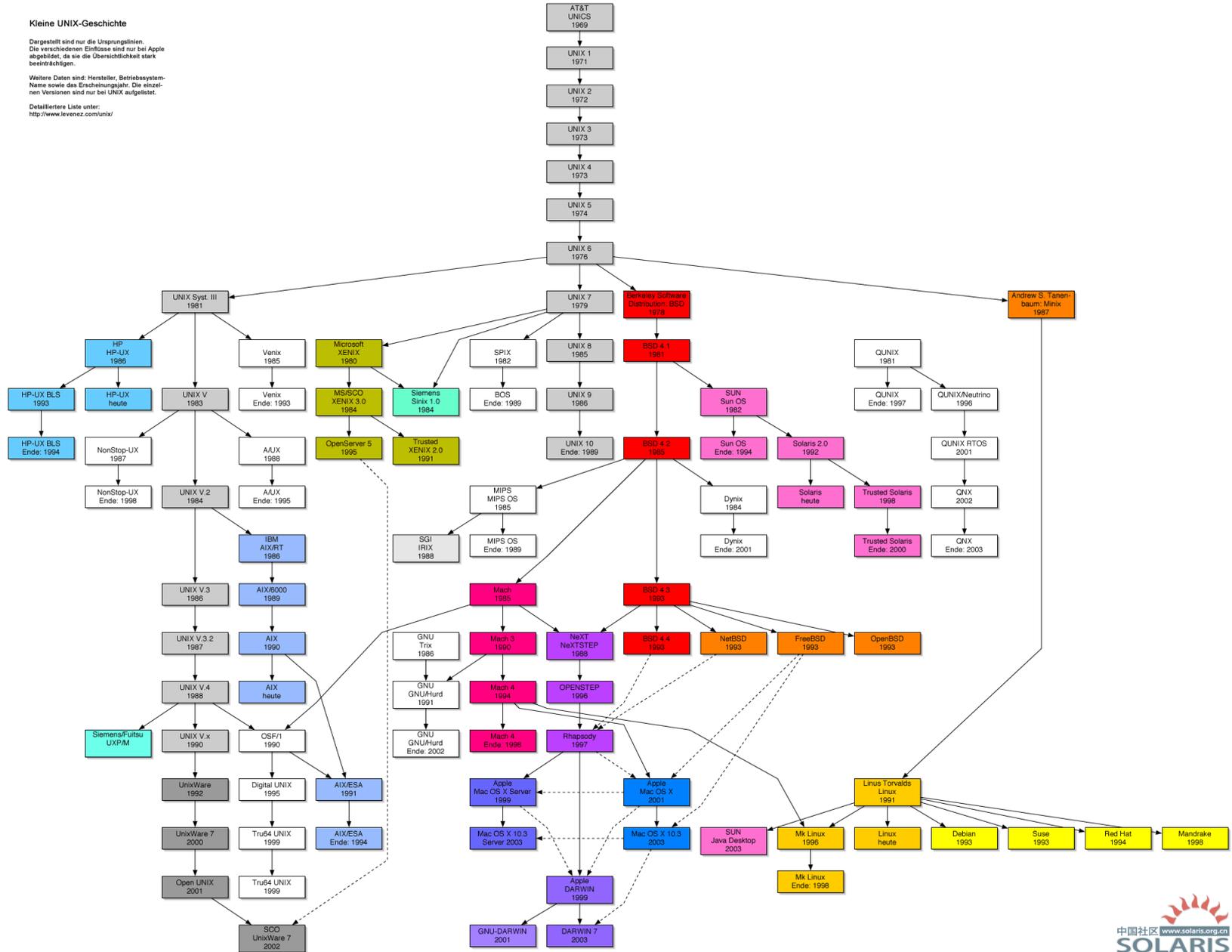


## Kleine UNIX-Geschichte

Dargestellt sind nur die Ursprungslinien. Die verschiedenen Endäste sind nur bei Apple abgebildet, da sie die Übersichtlichkeit stark beeinträchtigen.

Weitere Daten sind: Hersteller, Betriebssystem-Name sowie das Erscheinungsjahr. Die einzelnen Versionen sind nur bei UNIX aufgelistet.

Detailliertere Liste unter:  
<http://www.levenez.com/unix/>



**Unix History**

### Unix Timeline

Below, you can see the preview of the **Unix History** (move on the white zone to get a bigger image):

This is a simplified diagram of unix history. There are numerous derivative systems not listed in this chart, maybe 10 times more! In the recent past, many electronic companies had their own unix releases. This diagram is only the tip of an iceberg, with a penguin on it ;-).

System	Version	Release Date
Oracle Solaris	11.1	October 4, 2012
Android	4.1.1 Jelly Bean	July 9, 2012
Android	4.1.2	October 9, 2012
Android	4.2	October 29, 2012
Android	4.2.1	November 27, 2012
Linux	3.5	July 21, 2012
Linux	3.6	September 30, 2012
Linux	3.7	December 10, 2012

www.levenez.com/unix/redirect\_unix\_a4\_pdf.html

# UNIX and Unix-like Operating systems

## Descendants from the Unix OS developed in Bell Labs



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



IBM AIX  
servers, mainframes and workstations



Sun Solaris  
servers and workstations



HP HP-UX  
servers and workstations



Apple OS X  
Mac computers



Berkeley Software Distribution  
Mini-computers and servers



GNU Linux  
Servers, PC, smartphones,  
tablets, embedded



Apple iOS  
Smartphones and tablets

*UNIX and Unix-like operating systems are found on all types of computers from high end commercial mainframes, servers, and workstations to consumer focused Apple desktop and mobile devices*

## Embedded Unix in Apple Products

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/Darwin_(operating_system))  
[http://en.wikipedia.org/wiki/IOS\\_\(Apple\)](http://en.wikipedia.org/wiki/IOS_(Apple))  
<http://code.google.com/p/mobileterminal/>

# GNU/Linux

# GNU is not UNIX

## Various Linux Distributions for PCs and Servers

OpenSUSE



Red Hat Enterprise Linux



Fedora



Debian



CentOS



Ubuntu



Mandriva



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



*Tux, the penguin, is the Linux kernel mascot*

# iso.linuxquestions.org

## 15 Most Popular Linux Distro Downloads

15 Most Downloaded Distribution Versions (last 30 Days)	 15 Most Downloaded Distributions (Ever)
1. <a href="#">BackTrack 5 R3</a> (194567)	1. <a href="#">Fedora</a>
2. <a href="#">CentOS 6.3</a> (61005)	2. <a href="#">Red Hat Enterprise Linux</a>
3. <a href="#">BackTrack 5 R2</a> (9363)	3. <a href="#">Mandriva</a>
4. <a href="#">Puppy Linux 5.4</a> (8294)	4. <a href="#">SUSE</a>
5. <a href="#">Zorin OS 6.2 "Lite"</a> (4588)	5. <a href="#">Ubuntu</a>
6. <a href="#">FreeBSD 8.3</a> (2119)	6. <a href="#">CentOS</a>
7. <a href="#">Slax 7.0.4</a> (1744)	7. <a href="#">Damn Small Linux</a>
8. <a href="#">Damn Small Linux 4.4.10</a> (1454)	8. <a href="#">Knoppix</a>
9. <a href="#">Ubuntu 12.10</a> (1397)	9. <a href="#">Debian</a>
10. <a href="#">Ubuntu 12.04.2</a> (734)	10. <a href="#">Slackware</a>
11. <a href="#">Oracle Linux 6 Update 1</a> (498)	11. <a href="#">PCLinuxOS</a>
12. <a href="#">KNOPPIX 7.0.4</a> (419)	12. <a href="#">MEPIS</a>
13. <a href="#">KNOPPIX 5.1.1</a> (398)	13. <a href="#">Linux Mint</a>
14. <a href="#">Oracle Linux 6.3</a> (381)	14. <a href="#">Gentoo</a>
15. <a href="#">Wifislax 4.3</a> (354)	15. <a href="#">Puppy Linux</a>

Jan 21, 2014

*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



Asus RT-AC66U  
wireless router



Tivo



Yamaha Disklavier  
Mark IV

```
02:10:10@ubuntu:~$ cat /proc/cpuinfo  
Linux version 3.0.31-284565 (cc.Linux@SEP-120) (gcc version  
4.7 (GCC) ) #1 SMP PREEMPT Mon Nov 11 21:11:31 KST 2013  
02:10:10@ubuntu:~$
```



Android



Some TomTom  
GPS models



Garmin  
Nuvi 5000



Buffalo  
NAS storage



Virgin America  
Personal  
Entertainment



MikroTik Routers



Sony TVs



Android Tablets



Raspberry Pi

## Televisions

### 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>

The top screenshot shows the Sony Linux TV source code distribution service search page. It features a search bar and two main sections: 'Search by Model/Module' and 'Search by Category'. Under 'Search by Category', there are two expandable sections: 'Japan' and 'Americas'. The 'Japan' section lists 'Digital TV', 'Network TV Box', and 'Media Player'. The 'Americas' section lists 'Digital TV', 'Internet TV', 'Internet TV Box', and 'Media Player'.

The bottom screenshot shows the search results for the 'Japan' category. It lists a long string of model numbers: 'Model/Module: KDL-60NX800/KDL-52NX800/KDL-46NX700/KDL-40NX700/KDL-55HX701/KDL-46HX701/KDL-48HX701/KDL-59EX703/KDL-52EX703/KDL-48EX703/KDL-48EX703/KDL-48EX701/KDL-52EX701/KDL-48EX701/KDL-69EX700/KDL-52EX700/KDL-46EX700/KDL-40EX700/KDL-32EX700/KDL-32EX308/KDL-22EX308/KDL-46NX800/KDL-40EX408/KDL-32EX408/KDL-60NX801/KDL-52NX807/KDL-52EX707/KDL-46EX707/KDL-40EX707/KDL-32EX707/KDL-46EX607/KDL-40EX607/KDL-32EX607/KDL-40EX507/KDL-40EX407/KDL-32EX407/XBR-60EX900/XBR-52EX900/XBR-52HX909/XBR-46HX909/KDL-55HX800/KDL-48HX800/KDL-40HX800/KDL-48NX807/KDL-46EX707/XBR-46LX900/XBR-40LX900/KDL-60NX810/KDL-55NX810/KDL-49NX710/KDL-40NX710/KDL-55EX710/KDL-46EX710/KDL-40EX710/KDL-32EX710/KDL-46NX810/KDL-55EX713/KDL-46EX713/KDL-40EX713/KDL-46NX711/KDL-40NX711/KDL-55NX811/KDL-60NX817/KDL-55NX817/KDL-46NX717/KDL-40NX717/KDL-55EX717/KDL-46EX717/KDL-40EX717/KDL-32EX717/KDL-55EX711/KDL-46EX711'. Below the list, there is a section for 'Package:' containing a list of source code packages for download, such as 'cairo-1.8.6.tgz', 'directfb\_modules.zip', 'exceptionmonitor.tgz', 'glib-2.16.6.tgz', 'kernel26.tgz', 'libjs-1.5.tgz', 'pango-1.24.2.tgz', 'pump-autotp-0.8.15-5\_0\_DTV10\_20090911.tar.gz', 'sony-target-srel-busybox-1.4.2.05000302.src.rpm', 'sony-target-srel-directfb-1.3.0-05000306.src.rpm', 'sony-target-srel-dosfstools-2.11-05000301.src.rpm', and 'sony-target-srel-iptables-1.4.0-05000301.src.rpm'. At the bottom, there are 'BACK' and 'Back to Search' buttons, and a footer with 'Terms of Use', 'About This Site', and 'Copyright 2014 Sony Corporation'.

# Unix/Linux Architecture simplified

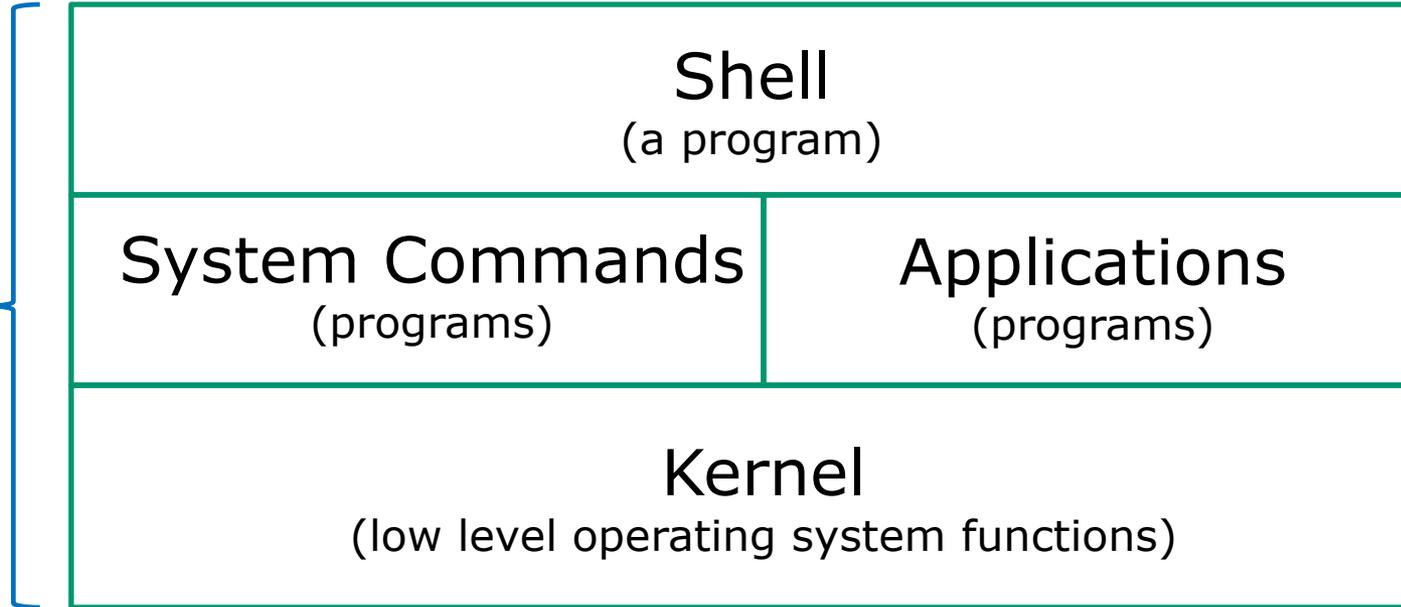
# UNIX/Linux Architecture

## Simplified View - Four Major Components

Users



Software

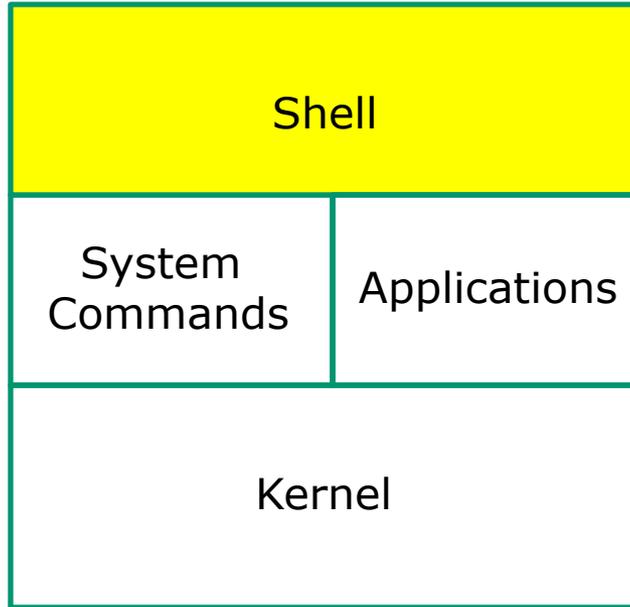


Hardware



# UNIX/Linux Architecture

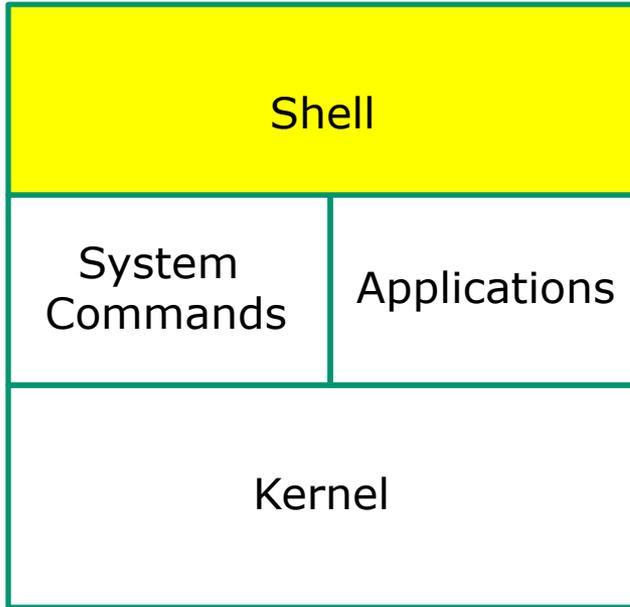
## The Shell



- 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 ("Born/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.

# UNIX/Linux Architecture

## The Shell



```
rsimms@opus:~  
[rsimms@opus ~]$ hostname  
opus.cabrillo.edu  
[rsimms@opus ~]$ █
```

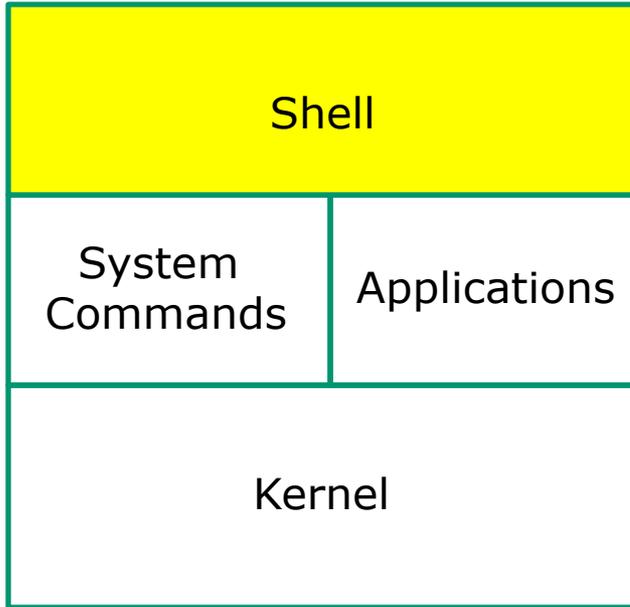
```
rsimms@opus:~  
[rsimms@opus ~]$ for i in Larry Moe Curly  
> do  
>   echo "Hello $i"  
>   sleep 1  
> done  
Hello Larry  
Hello Moe  
Hello Curly  
[rsimms@opus ~]$ █
```



*The shell is a user interface and a programming language*

# UNIX/Linux Architecture

## Various types of user interfaces



### Shell Command Line Interface (CLI)

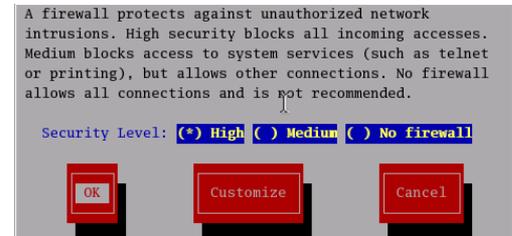
```
[root@frida root]# iptables -L -t nat
Chain PREROUTING (policy ACCEPT)
target     prot opt source                destination

Chain POSTROUTING (policy ACCEPT)
target     prot opt source                destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source                destination
[root@frida root]#
```

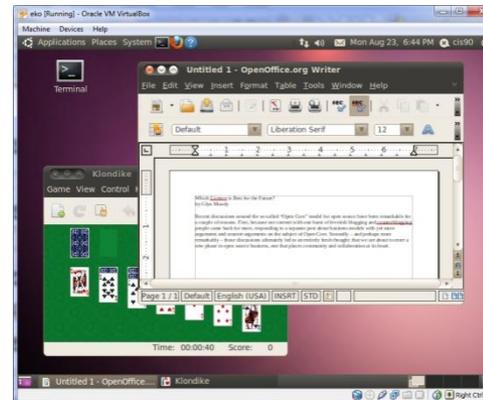
bash

### Text User Interface (TUI)



Lokkit Utility (uses curses library)

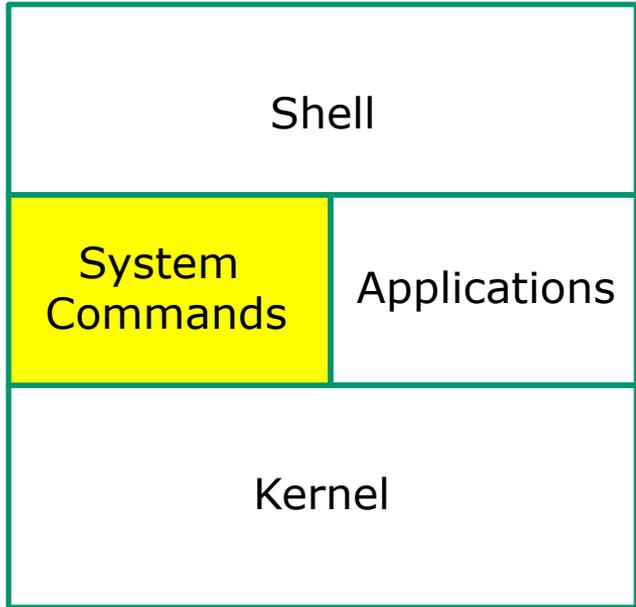
### Graphic shells or desktops (GUI)



gnome

# UNIX/Linux Architecture

## System Commands

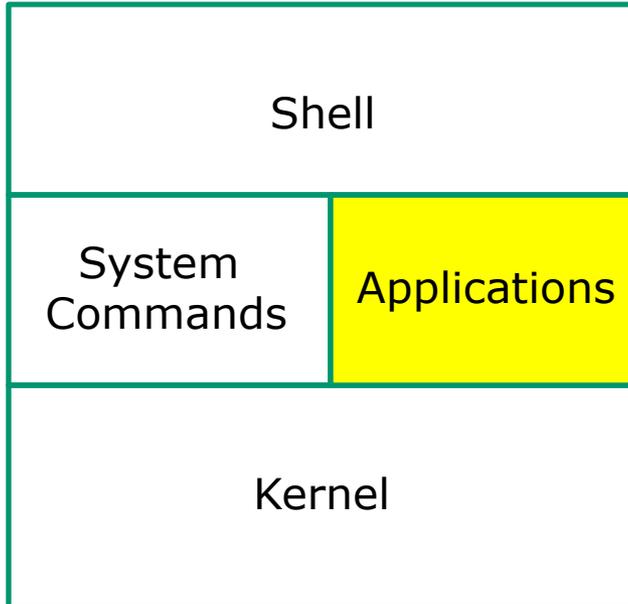


- 100's of system commands and utilities.
- We will learn how to use the following commands later in this lesson:

- cal
- clear
- date
- exit
- hostname
- id
- ps
- ssh
- tty
- uname

# UNIX/Linux Architecture

## Applications

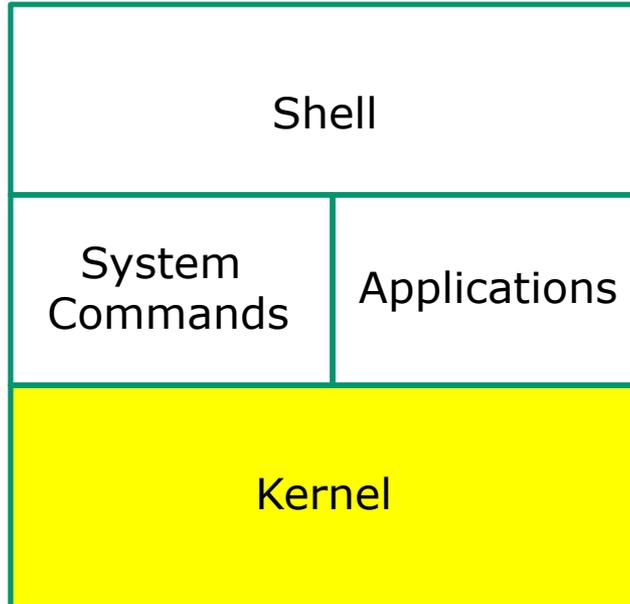


- Could be included in the distribution or optionally installed.
- Could be an add-on program developed by an ISV (Independent Software Vendor) or Open Source organization.
- Could be an in-house developed custom application.
- Examples are **Apache** (web server), **GIMP** (GNU image manipulation program),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



# UNIX/Linux Architecture

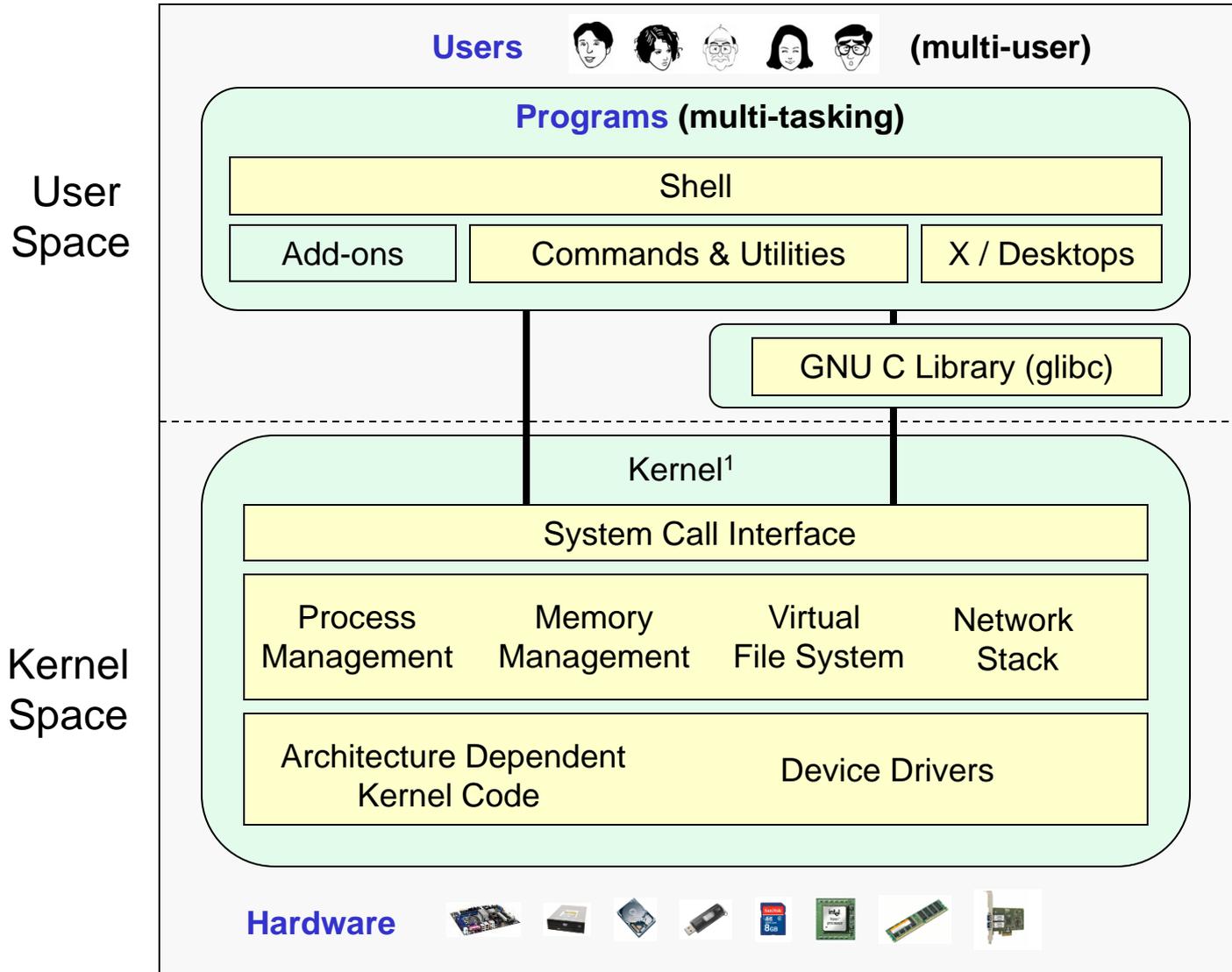
## Kernel



- 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



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.

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



# UNIX/Linux Design “Observations”

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

# Market Share



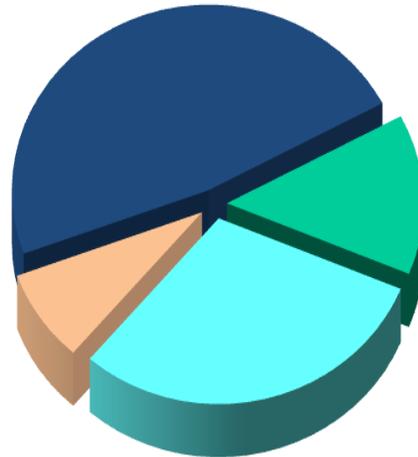
## Worldwide Server Market



\$14.2 Billion Server Revenue Q4 2013

Year over Year Change

Windows  
\$6.5B  
(45.7%)



Other  
\$1.1B  
(8.0%)

Linux  
\$4.1B  
(28.5%)

Unix  
\$1.9B  
(13.6%)

Linux

+14.4%

Unix

-20.2

Windows

+0.1%

Source: IDC, 26 Feb 2014

## Website hits by browser OS

Jan 2013<sup>1</sup>

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 2013<sup>2</sup>

Operating Systems		
1	Windows 7	40.93%
2	Windows XP	14.32%
3	Mac OS X	8.45%
4	iOS 7	7.33%
5	Windows 8	7.20%
6	Android 4	5.31%
7	Windows Vista	3.26%
8	Linux	2.12%
9	iOS 6	2.08%
10	Android 2	1.15%

26.3%

July 2014<sup>3</sup>

Operating Systems		
1	Windows 7	39.48%
2	iOS 7	10.10%
3	Windows XP	9.64%
4	Windows 8	8.90%
5	Android 4	8.57%
6	Mac OS X	6.42%
7	Windows Vista	4.21%
8	Linux	2.14%
9	Android	1.35%
10	iOS 6	0.97%

29.6%

1-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.

2-This report was generated 12/31/2013 based on the last 15,000 page views to each website tracked by W3Counter. W3Counter's sample currently includes 71,069 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 07/31/2014 based on the last 15,000 page views to each website tracked by W3Counter. W3Counter's sample currently includes 76,910 websites. The browser market share graph includes data from all versions of the named browser families, not only the top 10 as listed below.



## Smartphones



### Worldwide Smartphone Sales to End Users by Operating System in 2013 (Thousands of Units)

Operating System	2013 Units	2013 Market Share (%)	2012 Units	2012 Market Share (%)
Google Android ↑	758,719.9	78.4	451,621.0	66.4
Apple iOS ↓	150,785.9	15.6	130,133.2	19.1
Microsoft ↑	30,842.9	3.2	16,940.7	2.5
BlackBerry	18,605.9	1.9	34,210.3	5.0
Other OS	8,821.2	0.9	47,203.0	6.9
<b>Total</b>	<b>967,775.8</b>	<b>100.0</b>	<b>680,108.2</b>	<b>100.0</b>

Source: Gartner (February 2014)



## Tablets

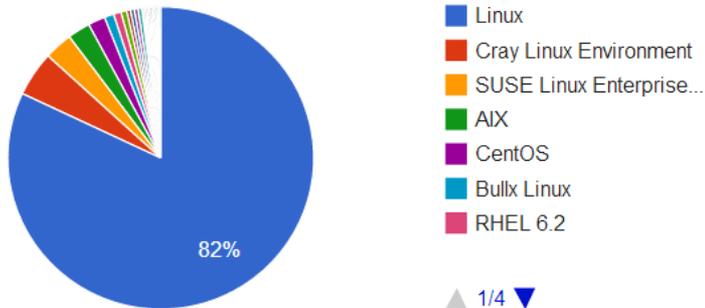


### Worldwide Tablet Sales to End Users by Operating System, 2013 (Units)

Operating System	2013 Sales	2013 Market Share (%)	2012 Sales	2012 Market Share (%)
Google <span style="border: 1px solid blue; padding: 2px;">Android</span> ↑	120,961,445	61.9	53,341,250	45.8
Apple <span style="border: 1px solid blue; padding: 2px;">iOS</span> ↓	70,400,159	36.0	61,465,632	52.8
Microsoft ↑	4,031,802	2.1	1,162,435	1.0
Others	41,598	<0.1	379,000	0.3
<b>Total</b>	<b>195,435,004</b>	<b>100.0</b>	<b>116,348,317</b>	<b>100.0</b>

Source: Gartner (February 2014)

## Operating System Share (by system) June 2014



Operating System	Count	System Share (%)	Rmax (GFlops)	Rpeak (GFlops)	Cores
Linux	410	82	170,858,490	254,569,525	14,829,593
Cray Linux Environment	24	4.8	39,060,748	55,313,420	1,855,432
SUSE Linux Enterprise Server 11	15	3	10,856,287	15,078,367	520,704
AIX	12	2.4	4,443,567	5,288,805	176,288
CentOS	9	1.8	2,438,215	3,276,319	172,296
Bullx Linux	5	1	1,565,126	1,878,599	69,668
RHEL 6.2	4	0.8	1,738,900	2,132,582	102,528
bullx SUpErCOmputer Suite A.E.2.1	3	0.6	2,942,070	3,583,180	165,888
SLES10 + SGI ProPack 5	2	0.4	398,000	439,910	38,400
Redhat Enterprise Linux 6.5	2	0.4	611,669	628,800	28,000
Redhat Enterprise Linux 6.4	2	0.4	720,702	1,223,280	56,026
Redhat Enterprise Linux 6	2	0.4	2,433,470	3,032,783	295,656
Redhat Linux	1	0.2	196,234	262,560	8,412
RHEL 6.1	1	0.2	230,800	340,915	37,056
bullx SCS	1	0.2	255,078	274,176	12,240
SUSE Linux	1	0.2	274,800	308,283	26,304
Kylin Linux	1	0.2	33,862,700	54,902,400	3,120,000
Windows Azure	1	0.2	151,300	167,731	8,064
CNL	1	0.2	165,600	201,216	20,960
Windows HPC 2008	1	0.2	180,600	233,472	30,720
Scientific Linux	1	0.2	188,725	199,680	9,600
CNK/SLES 9	1	0.2	190,900	222,822	65,536

## Linux dominates the Supercomputer market



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/>



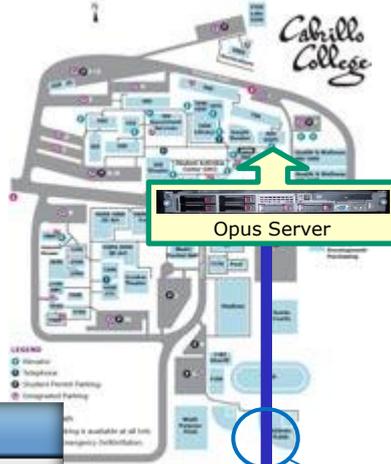
# SSH (secure shell)

Getting the car keys

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



*SSH is a network protocol that enables secure connections between computers*



## Remote Server

Old way: **telnet**

Sniffer view of a Telnet session

```

root@ server2-01:~
telnet-session - Ethereal
Contents of TCP stream
login: rssiimmmssr
Password: nimbus2000r
Last login: Sun Jul 6 18:47:03 from 192.168.1.254r
[rsimms@server2-01 rsimms]$ ccaatt sseeccrreett r
The D-Day invasion is set for June 6th at Normandyr
[rsimms@server2-01 rsimms]$ eexxiitt r
logout r
≥[H≥[J
    
```

Telnet uses clear text

New way: **ssh**

Sniffer view of a SSH session

```

root@ server2-01:~
ssh-session - Ethereal
Contents of TCP stream
000005AE 80 72 2b 72 d4 3b 46 a6 7b 67 6b d4 df a2 b2 8c ,r+r,;F,
000005BE 01 7c 39 78 bd c4 95 f2 61 93 73 a1 76 49 cf 00 ,19x,...
000005CE 68 c2 85 71 b0 75 c6 72 b5 18 27 10 4b 57 ed 88 h.,q,u,r
000005DE 17 df 2b a1 dd 81 4f 0a 58 51 f5 f7 54 3e cc 89 ..+.0.
000005EE 55 70 e9 73 b4 0a 6f 3f af 5b f7 3c 4e 30 92 39 Up,s..o?
000005FE 62 fc fd a6 fd b9 45 e2 56 12 d1 90 0c d9 ce 34 b.....E.
0000060E 6d 1f 8b 44 a7 50 3c 59 aa 0b 2a c2 04 c1 da 43 m..D,P<Y
0000061E 21 87 2d 32 67 48 d3 47 2f 43 25 5b ee 65 89 76 l.-2gH,G
0000062E 83 1c 74 91 b1 f5 3e 8b 57 ee d9 fc f5 45 e3 b6 ..t...>.
0000063E ef 9c f0 89 eb f7 1d c9 fd 29 69 44 a9 75 98 5a .....
0000064E b2 ba d5 62 9f 35 e1 1a ee 06 8b 79 fe e9 f0 0a ...b,5..
0000065E df ..b
0000066E ea ..P
0000067E 06 ..<
0000068E 8c 8f a3 07 6e 69 62 02 a7 3f e0 e1 9b ec af d0 ....nib.
    
```

SSH is encrypted

```

username
password
cat secret
exit
    
```

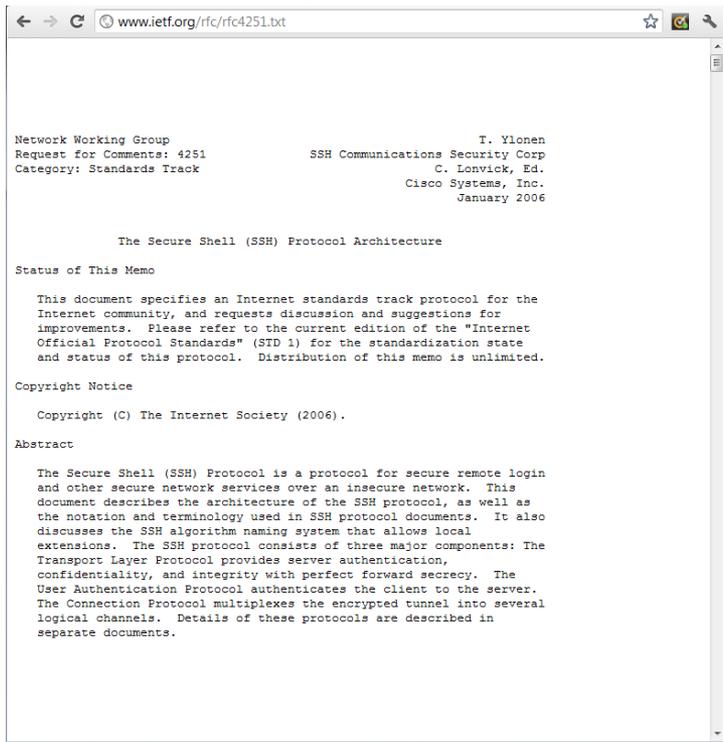
*With telnet, everything is transferred in clear text over the network*

*With ssh, everything is encrypted. This is how we will access all remote systems in CIS 90.*



**Local computer at home or on campus**

# SSH (secure shell) is a standards based protocol for remotely logging into and running commands on a UNIX/Linux system



- See RFCs 4250 to 4254 at [www.ietf.org](http://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

<p><b>Operating System</b></p>	 <p><b>Students in the classroom</b></p>	 <p><b>Students at home</b></p>
 <p>Windows</p>	 <ul style="list-style-type: none"> <li>Find and run the Putty program</li> </ul>	 <ul style="list-style-type: none"> <li>Google “putty download”</li> <li>Download the <u>putty.exe</u> binary to your desktop</li> <li>Run the Putty program</li> </ul> <p><a href="http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html">http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html</a></p>
 <p>Linux or Mac</p>		<ul style="list-style-type: none"> <li>Search for and run the terminal app</li> </ul>

# Logging Into Opus via SSH

Get into the car

## 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)
- Your login credentials (**username** and **password**) on the remote server
- The **port** number the SSH service is listening on (the default is port 22)

# SSH connection to a UNIX/Linux Server - from Windows

(specify hostname, username, password and port)



```

simben90@opus:~$ ssh simben90
Warning: Permanently added the RSA host key to the list of known hosts.
login as: simben90
simben90@opus.cabrillo.edu's password: 
Last login: Sun Feb  5 21:18:07 2012 from dsl-74-220-66-39.dhcp.cruzio.com

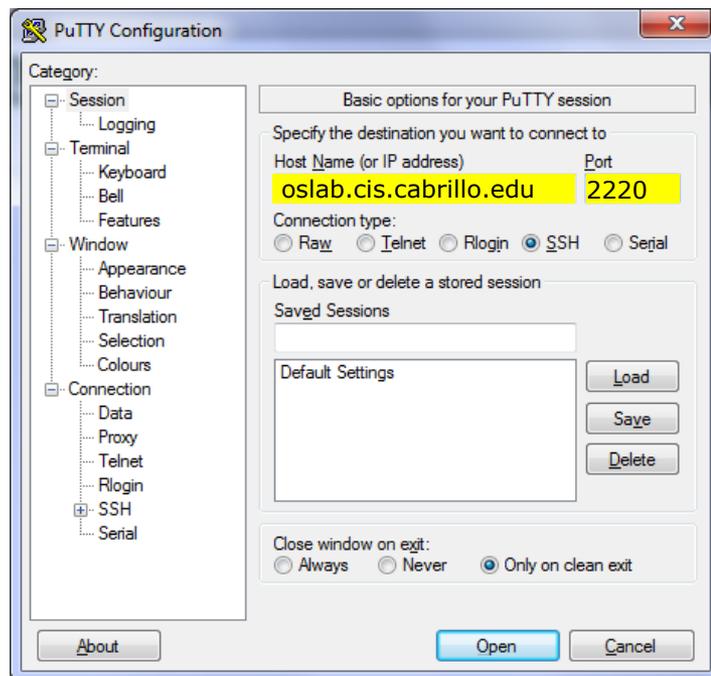
      ({}~)
    //--=\\
    (\\_=/)
      ~~~~

Welcome to Opus
Serving Cabrillo College

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

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

On Windows run Putty



*Click Open*



*Click Yes*

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

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

(specify hostname, username, password and port)



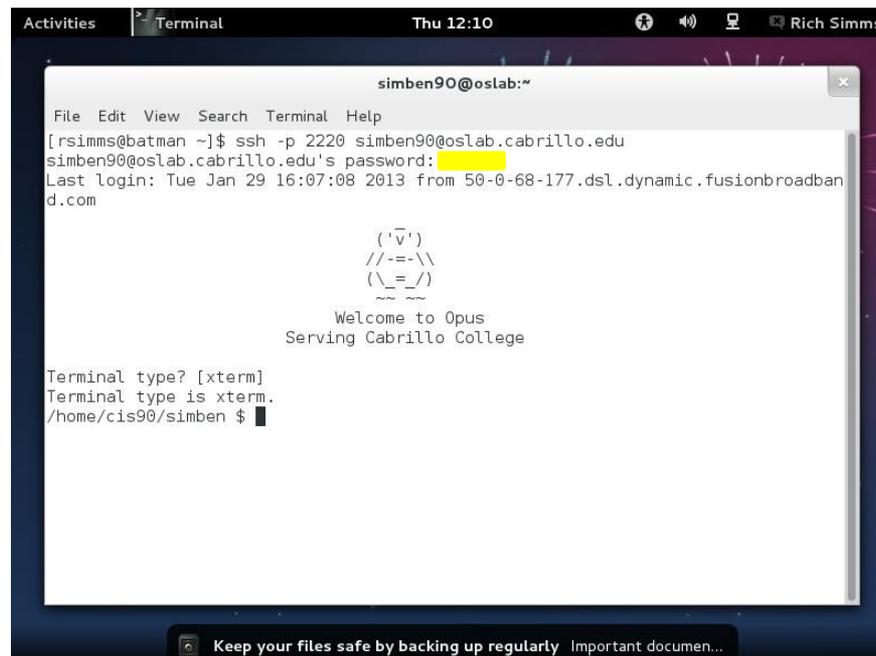
Opus



On a Mac or Linux terminal type:

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

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



*Enter yes if you get  
this authenticity  
warning*

## SSH login to a UNIX/Linux Server

**username**

**password**  
(not echoed)

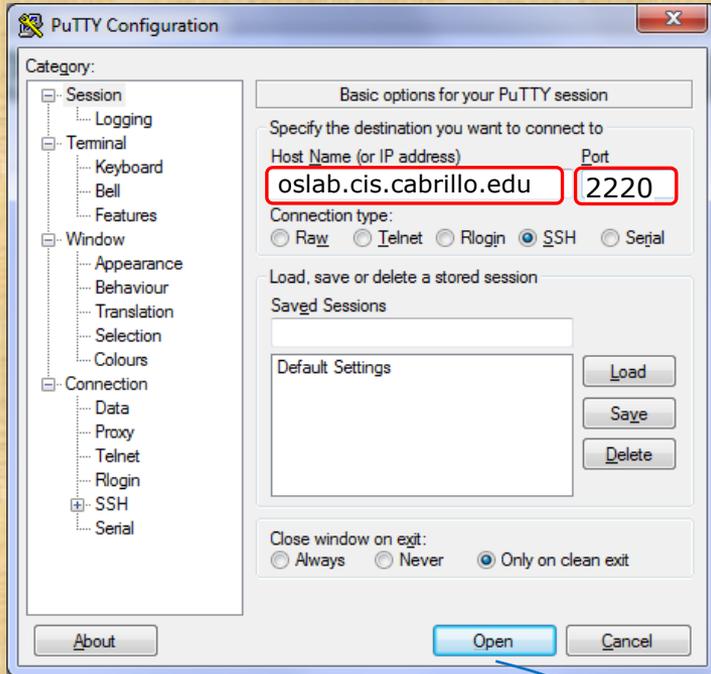
```
simben90@opus:~  
login as: simben90  
simben90@opus.cabrillo.edu's password:   
Last login: Sun Feb 5 21:18:07 2012 from dsl-74-220-66-39.dhcp.cruzio.com  
  
      (|v|)  
    //--\\  
  (\\=_/)  
    ~ ~  
  
Welcome to Opus  
Serving Cabrillo College  
  
Terminal type? [xterm]   
Terminal type is xterm.  
/home/cis90/simben $ hostname  
opus.cabrillo.edu  
/home/cis90/simben $
```

*Hit Enter key here to  
accept default terminal  
type*

*Use exit command to  
end session*

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

1) On Windows run Putty:



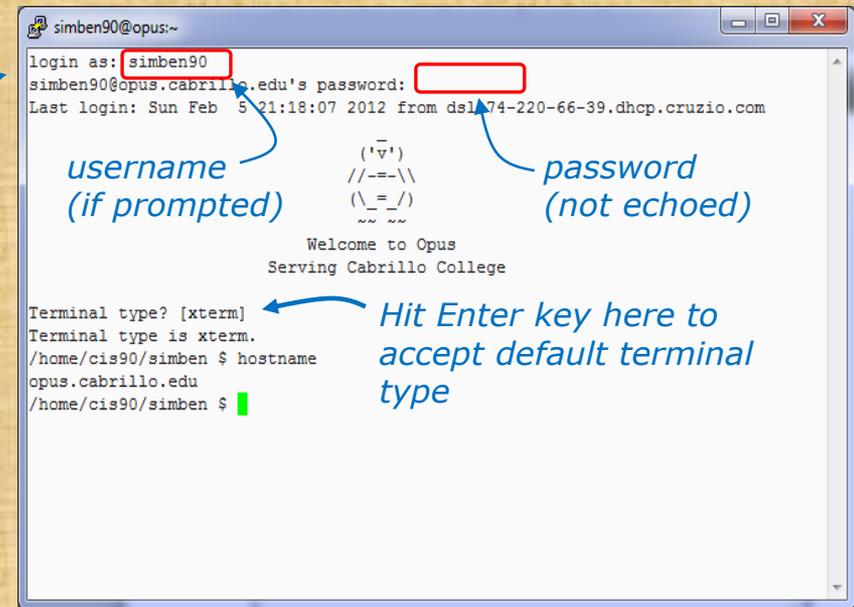
*Respond "yes" to authenticity warning if it appears*

Class Activity

Log into Opus using SSH

(specify hostname, username, password, and port)

2) Enter your credentials (not Benji's)



*username (if prompted)*

*password (not echoed)*

*Hit Enter key here to accept default terminal type*

1) On a Mac or Linux terminal type:

`ssh -p 2220 username@oslab.cis.cabrillo.edu`

## Additional Resources

- How to open the terminal window on a mac  
[https://www.youtube.com/watch?v=zw7Nd67\\_aFw](https://www.youtube.com/watch?v=zw7Nd67_aFw)
- Howto #143: Logging into Opus  
<http://simms-teach.com/howtos/143-opus-access.pdf>



# Lesson 1

# Commmands

First driving lesson

## First commands for your toolbox



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

## Terminal type

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

```
  _  
 ( 'v' )  
 //--=\ \  
 (\ _ _ / )  
  ~ ~  ~ ~
```

```
Welcome to Opus  
Serving Cabrillo College
```

```
Terminal type? [xterm] ← Hit Enter key here to accept  
Terminal type is xterm. default terminal type  
/home/cis90/simben $
```

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

## Shell Prompt

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

```
  _
 ('v')
//--=\
(\_=_/)
~~  ~~
```

```
Welcome to Opus
Serving Cabrillo College
```

```
Terminal type? [xterm]
Terminal type is xterm.
```

*Hit Enter key here to accept  
default terminal type*

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

*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 \$

## cal command

*prompt*                      *command*

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

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

## cal command continued

prompt  
command  
arguments

```

/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

*prompt*  
/home/cis90/simben \$ *command* **date**  
Tue Aug 26 08:11:31 PDT 2014

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
```

```
/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 **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
```

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

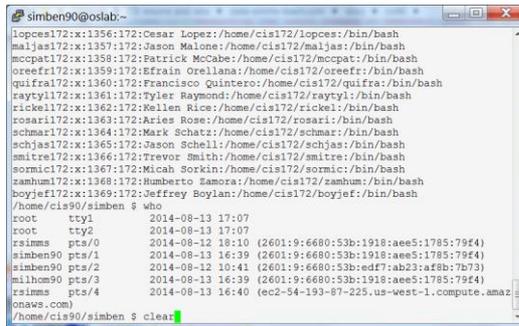
*These are **arguments** for the command to process*

## clear command

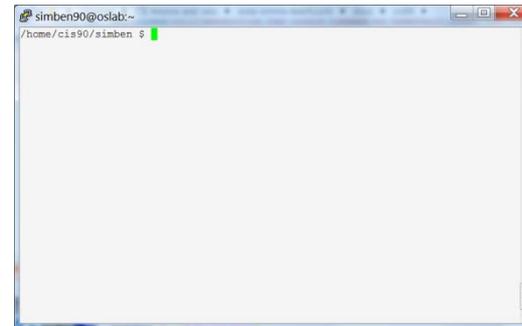


The clear command will clear the screen.

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



before



after

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

## hostname command

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

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

**Question:** What is the hostname of this system?

**Answer:** oslab.cishawks.net

## ps command

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

```

/home/cis90/simben $ ps
  PID TTY          TIME CMD
 21629 pts/0    00:00:00 bash
 21674 pts/0    00:00:00 ps
  
```

*prompt* (bracketed over the path and prompt)

*command* (bracketed over the **ps** command)

*name of the shell being run* (arrow pointing to **bash**)

*name of the ps command running that produces this output* (arrow pointing to **ps**)

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

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

## **uname** command

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

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

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

**Answer:** Linux

## cat command (to show the name of the distribution)

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

*Name of distro*

*Version of distro*

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

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

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

**Answer:** CentOS

## cat command (to show the name of the distribution)

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

*Name of distro*

*Version of distro*

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

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

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

**Answer: Ubuntu**

## who command

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

*username*

*terminal  
device  
used for  
login  
session*

*date and time  
of login*

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

*Show information about current login sessions*

## who command

```

/home/cis90/simben $ who
local {
root      tty1      2014-08-13 17:07
root      tty2      2014-08-13 17:07
remote {
rsimms    pts/0      2014-08-12 18:10 (2601:9:6680:53b:1918:ae5:1785:79f4)
simben90  pts/1      2014-08-13 16:39 (2601:9:6680:53b:1918:ae5:1785:79f4)
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:ae5:1785:79f4)
rsimms    pts/4      2014-08-13 16:40 (ec2-54-193-87-225.us-west-1.compute.amazonaws.com)

```

*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:ae5:1785:79f4)
```

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

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

## **tty** command

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

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

Every login session uses a unique terminal device.

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

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

## tty command

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

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

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

**Answer:** pts/1

## id command

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

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

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

**Answer:** 1201

**Question:** What is your username on oslab?

**Answer:** simben90

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

**Answer:** 190

## history command

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

```
<snipped>
```

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

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

*The list can span multiple login sessions.*

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

## ssh command

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

### Basic command syntax:

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

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

**ssh -p nnnn username@hostname**

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

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

## Example **ssh** command Logging into a Pxx-Arwen system from Opus

```

username → /home/cis90/simben $ ssh cis90@arya-03
short hostname →
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.
password is typed but not echoed →
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 $

```

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

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

```

/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

```

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

*password is typed*

```

      _
     ('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 $

```

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

## **exit** command

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

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



# Housekeeping

## **Add Codes**

- Available after class
- You can stop by before you leave or email me
- Please use them online the same day you get them!



## **CIS 81                      Networking Fundamentals and Theory (Cisco CCNA 1)**

Presents networking protocols, standards, concepts, and terminology including Ethernet, ARP, ICMP, IP addressing, subnetting, switches, hubs, routers, TCP, UDP, OSI Model and other standards and protocols. Hybrid Requisite: Completion of or concurrent enrollment in CIS 72. Recommended Preparation: Eligibility for MATH 154.

Transfer Credit: CSU.

<b>Section</b>	<b>Days</b>	<b>Times</b>	<b>Units</b>	<b>Instructor</b>	<b>Room</b>
86319	M	09:30AM-01:35PM	4.00	R.Graziani	828
&	Arr.	Arr.		R.Graziani	OL

Section 86319 is a Hybrid ONLINE course. Meets weekly throughout the semester at the scheduled times with an additional 50 min online lab per week. Students will be required to show that they meet the course prerequisites. For details, see instructor's web page at [go.cabrillo.edu/online](http://go.cabrillo.edu/online).

86320	T	05:30PM-09:35PM	4.00	M.Matera	828
&	Arr.	Arr.		M.Matera	OL

Section 86320 is a Hybrid ONLINE course. Meets weekly throughout the semester at the scheduled times with an additional 50 min online lab per week.

Students will be required to show that they meet the course prerequisites. For details, see instructor's web page at [go.cabrillo.edu/online](http://go.cabrillo.edu/online).

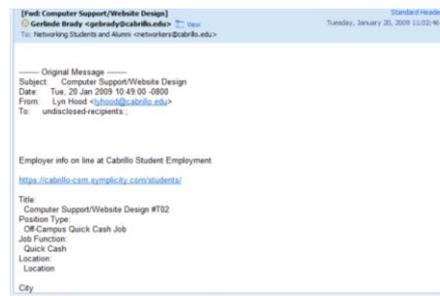
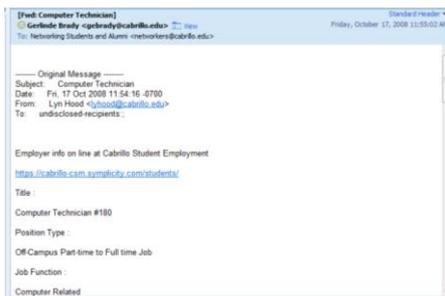
*We have open seats in this section of CIS 81. Please sign up ASAP if you are interested in learning about networking!*

# Cabrillo Networking Program Mailing list

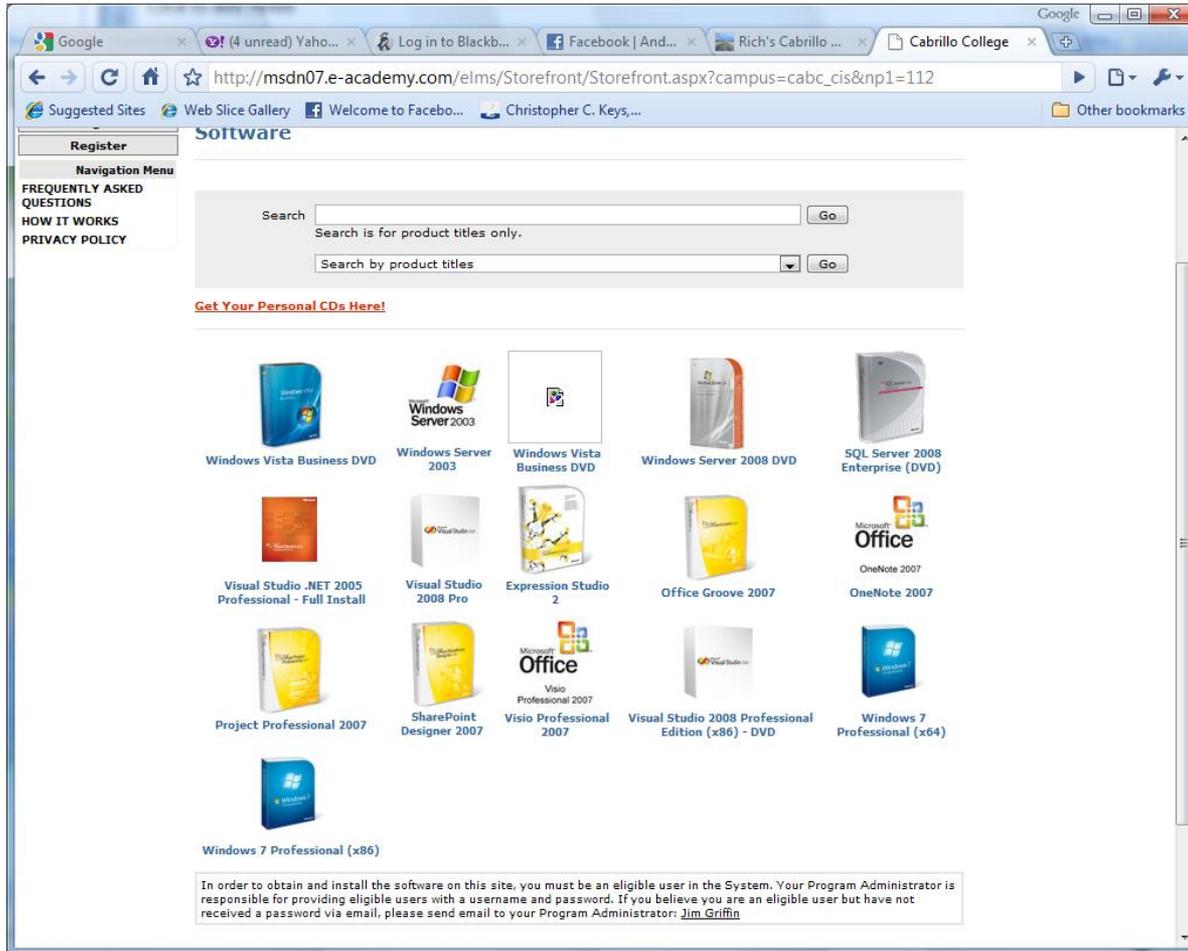
Subscribe by sending an email (no subject or body) to:

**networkers-subscribe@cabrillo.edu**

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



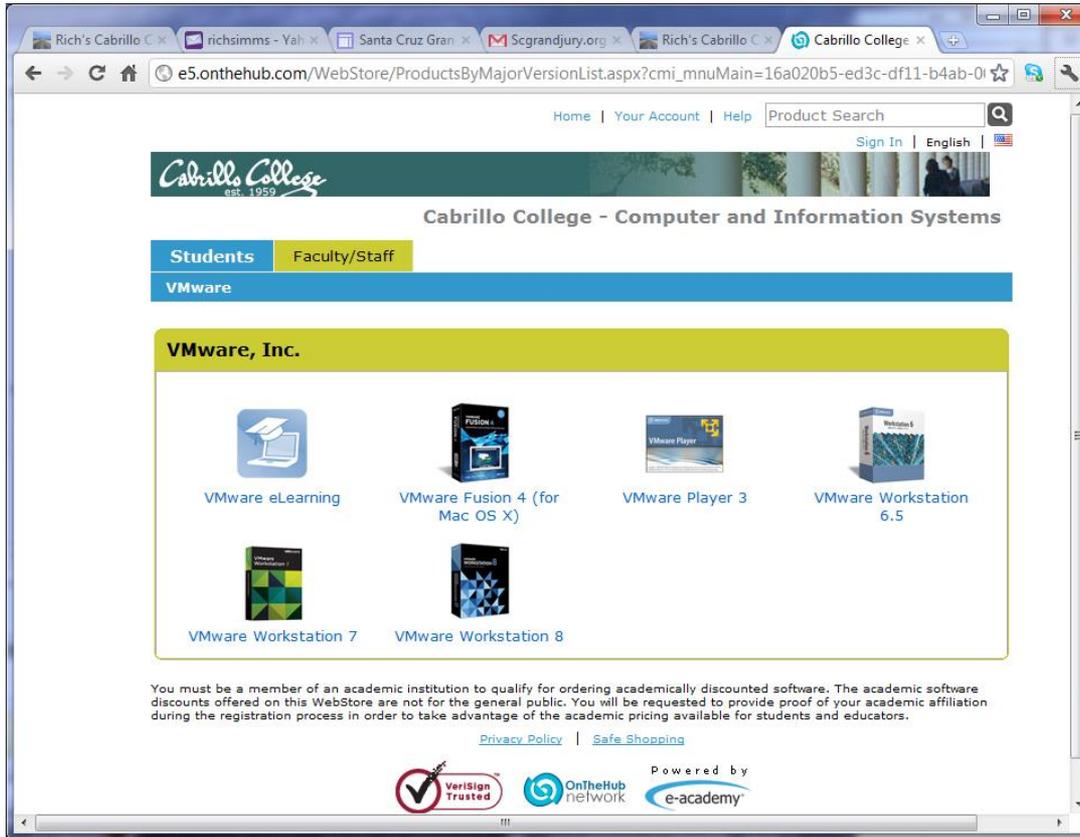
# MSDN Academic Alliance



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

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

# VMware e-academy

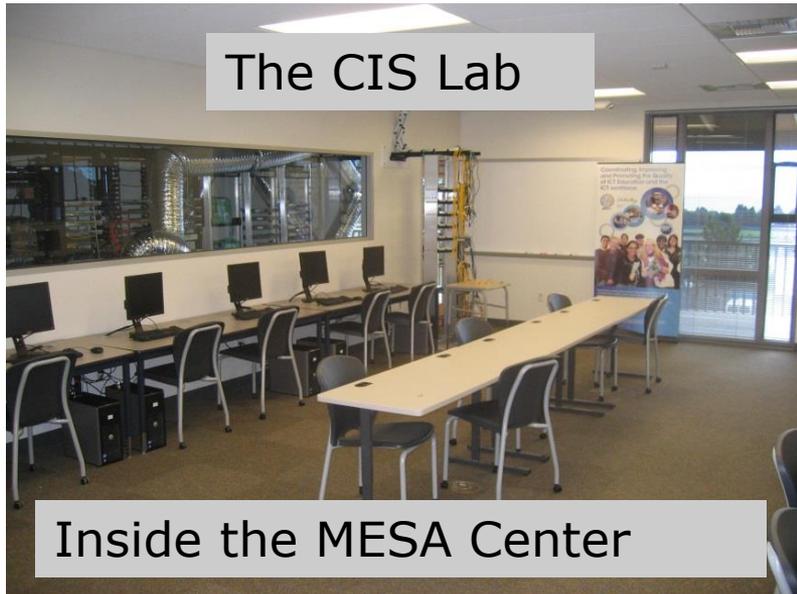


- VMware software for students registered in a CIS or CS class at Cabrillo
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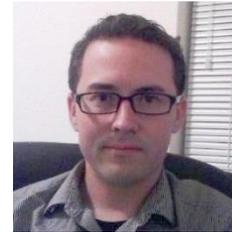
To get to this page, go to **<http://simms-teach.com/resources>** and click on the appropriate link in the Tools and Software section

## Help Available in the CIS Lab

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



CIS 90 Lab Assistants:

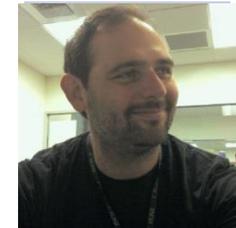


Geoff



Leandro

Linux Instructors



Michael Matera



*Look for Geoff, Leandro or Michael on the schedule found here*

# CIS 90 Tutoring Available

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

The screenshot shows the Cabrillo College website's Tutorials Center page. The page is titled "TUTORIALS" and includes a navigation menu with options like "ABOUT", "ACADEMICS/CAREERS", "ADMISSIONS", "CLASS SCHEDULES", "REGISTRATION", and "WEBADVISOR". The main content area is divided into several sections:

- TUTORIALS:** Includes an image of students working together.
- ANNOUNCEMENTS & DEADLINES:** Lists "New subjects for Spring 2014:" including American Sign Language, Computer Applications/Business Technology (CABT), Computer and Information Systems (CIS), and History 17A.
- Welcome to the Tutorials Center!:** States that free peer tutoring is offered to students. It lists services such as:
  - Tutoring is by appointment.
  - Sessions are weekly and for the duration of the semester.
  - Tutoring sessions are scheduled in small groups.
  - Students should come directly to the TC office to schedule.
- The following classes are being tutored for Spring 2014:**
  - Accounting 1A, 1B, 6, 54A, 151A, 159, 163
  - American Sign Language (ASL) 1, 2
  - Biology 4, 5, 6
  - Computer Applications/Business Technology (CABT) 31, 38, 41, 101, 157, 160
  - Computer and Information Systems (CIS) 81, 90, 172** (highlighted with a red box)
  - Chemistry 1A, 1B, 2, 30A, 30B, 32
- CONTACT INFORMATION:** Provides details for the Tutorials Center, including location (Room 1080A), phone (831.479.6470), email (tutorialscenter@cabrillo.edu), and coordinator (Lori Chavez).



Matt Smithey

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

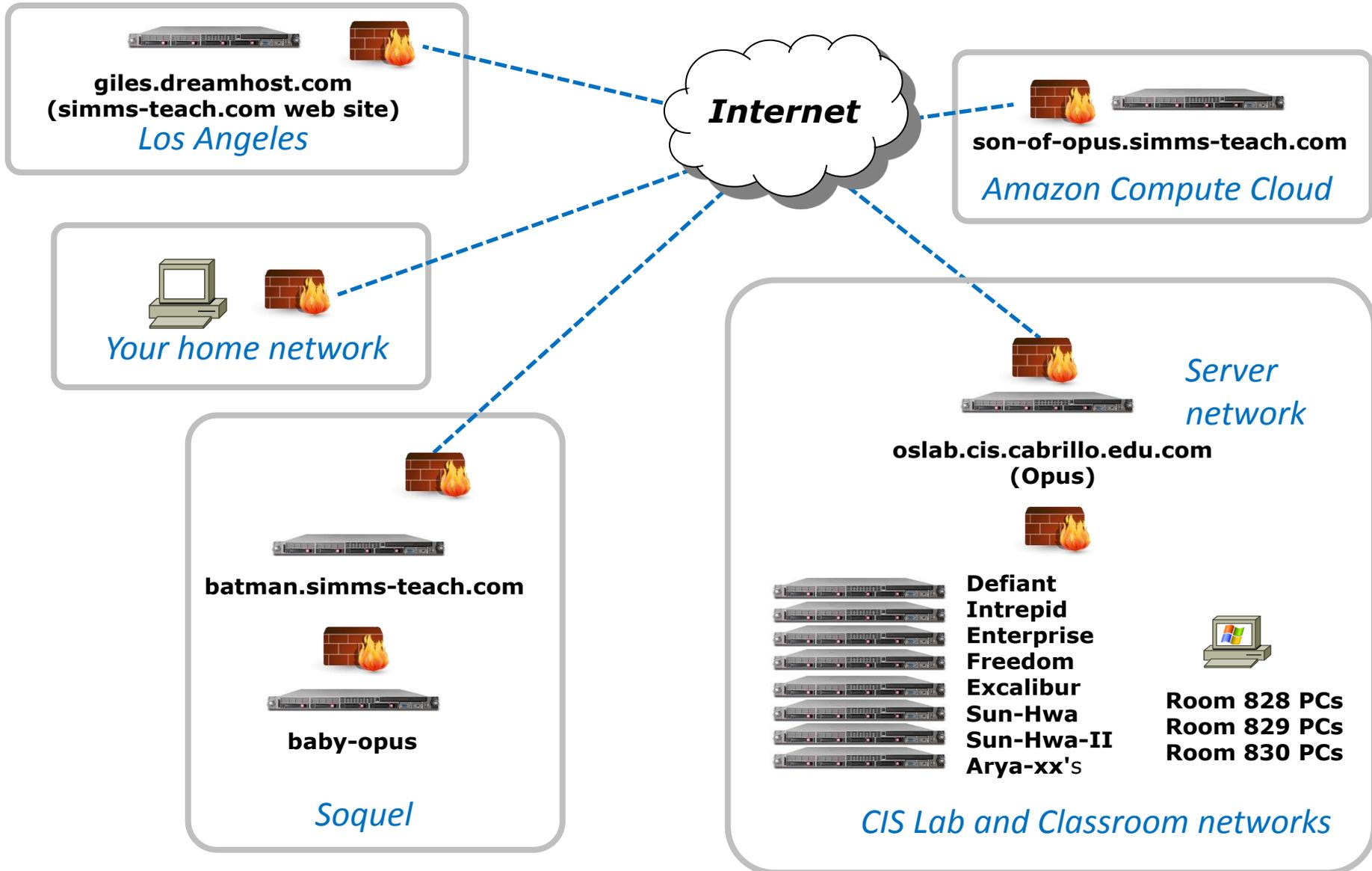
The tutoring will take place at the STEM center and they will log in and log out on a computer you have designated (I will figure out exactly what that means).

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

## Additional Resources

- My office hours for additional hands-on help, feedback and development planning.
- Cabrillo CS/CIS LinkedIn group for students and alumni  
<http://www.linkedin.com/groups/Computer-Science-Computer-Information-Systems-6689142>
- Society of Women Engineers (SWE) Facebook page  
<https://www.facebook.com/SWEorg>
- Systems Listserv  
<http://anitaborg.org/get-involved/systems/>

# CIS 90 systems Roadmap

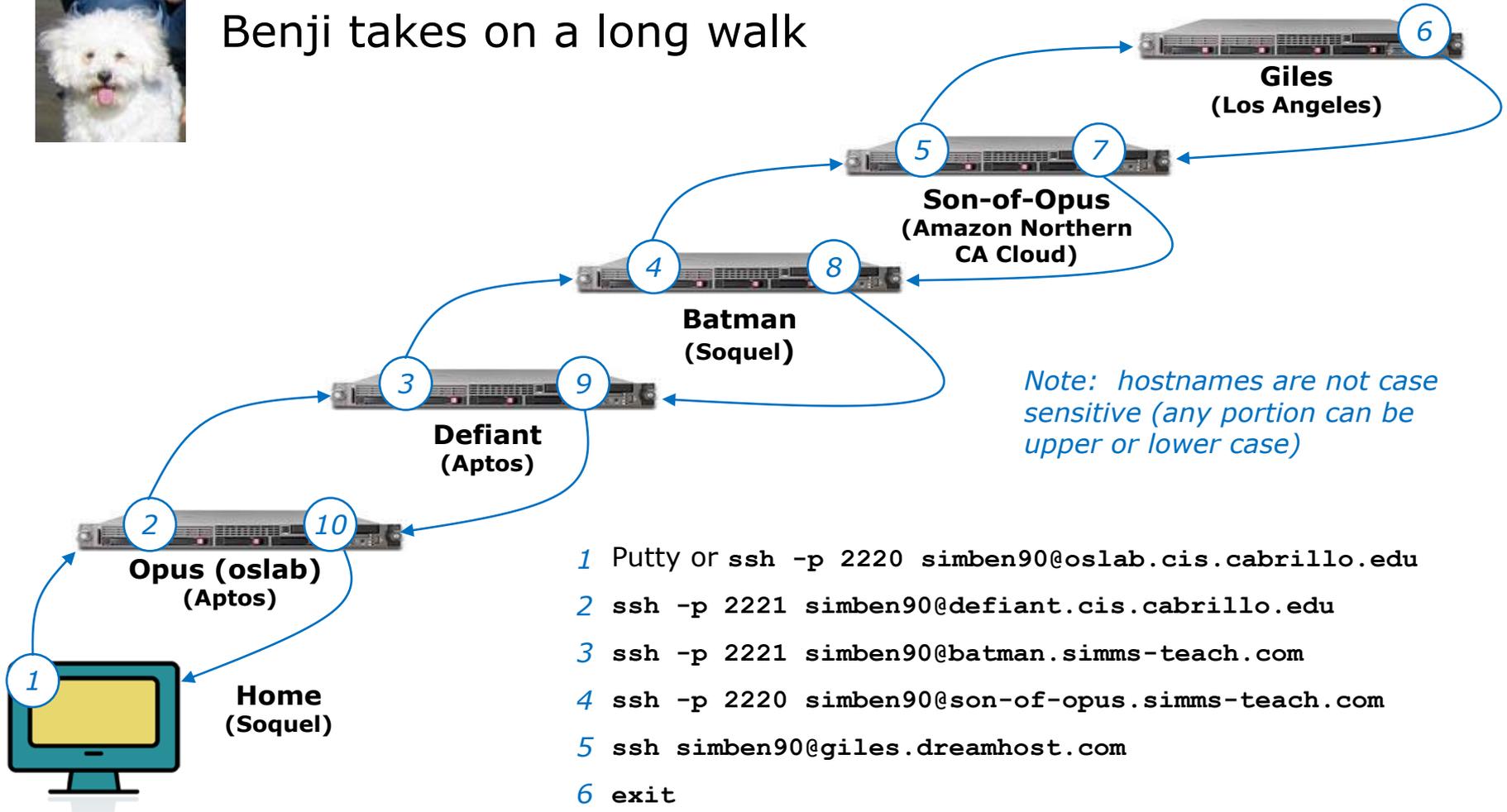


# Navigating the Internet using SSH

Second driving lesson



## Benji takes on a long walk



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

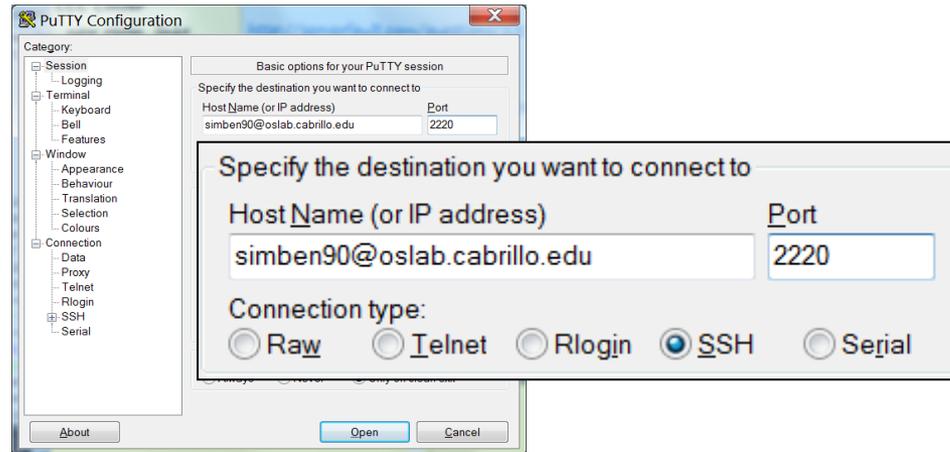
- 1 Putty or `ssh -p 2220 simben90@oslab.cis.cabrillo.edu`
- 2 `ssh -p 2221 simben90@defiant.cis.cabrillo.edu`
- 3 `ssh -p 2221 simben90@batman.simms-teach.com`
- 4 `ssh -p 2220 simben90@son-of-opus.simms-teach.com`
- 5 `ssh simben90@giles.dreamhost.com`
- 6 `exit`
- 7 `exit`
- 8 `exit`
- 9 `exit`
-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



# Benji takes on a long walk



**Opus (oslab)  
(Aptos)**



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

```
('_v')
\/-=-\ /
(\ _ _ /)
~~ ~~
```

Welcome to Opus  
Serving Cabrillo College

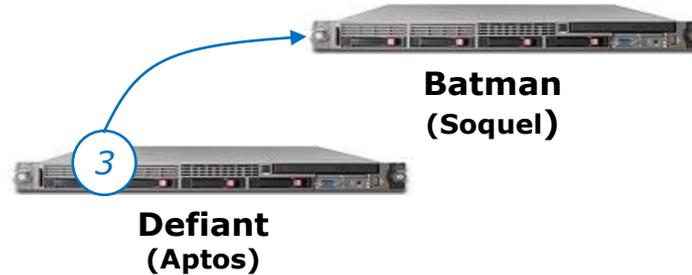
```
Terminal type? [xterm]
Terminal type is xterm.
/home/cis90/simben $ hostname
oslab.cis.cabrillo.edu
/home/cis90/simben $
```

*Note: usernames and passwords are case sensitive*





# Benji takes on a long walk



```
[defiant] $ ssh -p 2221 simben90@batman.simms-teach.com
The authenticity of host '[batman.simms-teach.com]:2221 ([2601:9:6680:53b:20c:29ff:fe0d:9285]:2221)'
can't be established.
RSA key fingerprint is b4:20:f4:dc:d1:ab:5b:8a:bb:44:61:bf:1c:c8:97:6e.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[batman.simms-teach.com]:2221,[2601:9:6680:53b:20c:29ff:fe0d:9285]:2221'
(RSA) to the list of known hosts.
simben90@batman.simms-teach.com's password:
```

```

      _==/          i      i          \==_
     /xx/          | \__ /|          \xx\
    /xxxx\        |xxxxx|          /xxxx\
 |xxxxxx\_      _xxxxxxx_      _/xxxxxx|
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
|XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX|
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
|XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX|
XXXXXXXX/^^^^"\XXXXXXXXXXXXXXXXXXXXXXXX/^^^^\XXXXXXXX
|xxx|          \xxx/^\\xxxxx/^\\xxx/          |xxx|
 \xx\          \x/  \xxx/  \x/          /xx/
  "\           "    \x/   "    /"

```

```

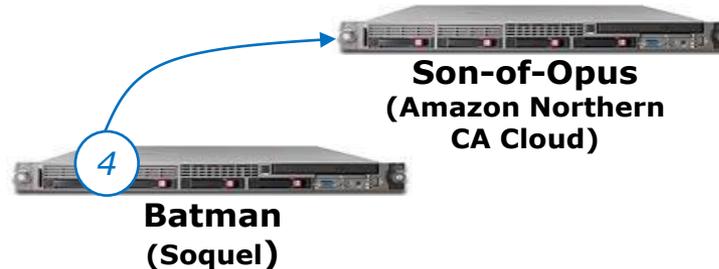
Welcome to Batman
Serving Cabrillo College and Ceiba College Prep

```

```
[simben90@batman ~]$ hostname
batman.simms-teach.com
[simben90@batman ~]$
```



## Benji takes on a long walk



```
[simben90@batman ~]$ 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
```

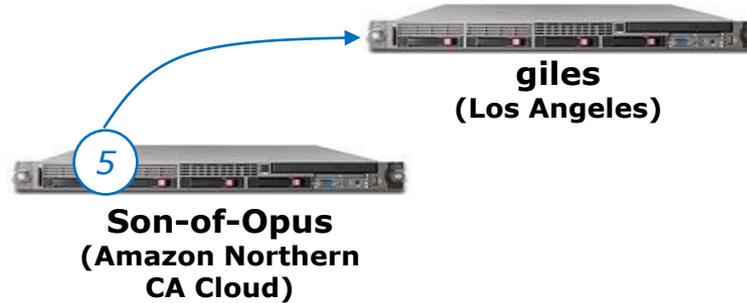
```
  _
 ('v')
 //---\
 (\_=_/)
  ~ ~
```

```
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:
```

```

  _ _
 / _ \ | | | | / _ \ | | |
 | ( | | | | _ \| | | \
 \ _ / | | | \ | | | /
  |___/

```

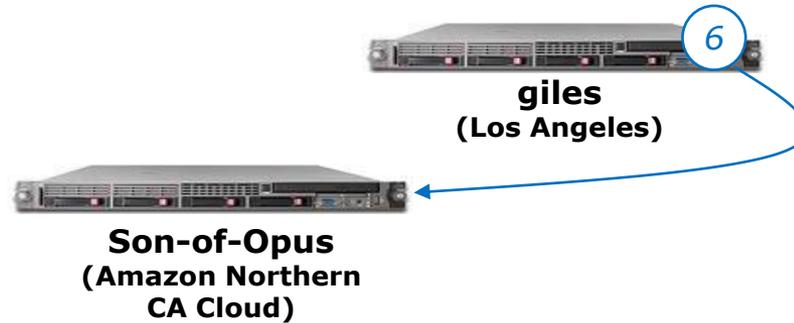
Welcome to giles.dreamhost.com

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



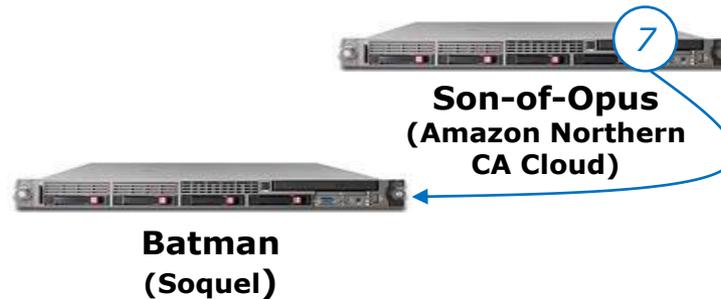
```
[giles]$ exit  
logout  
Connection to giles.dreamhost.com closed.  
[simben90@son-of-opus ~]$ hostname  
son-of-opus.simms-teach.com  
[simben90@son-of-opus ~]$
```



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



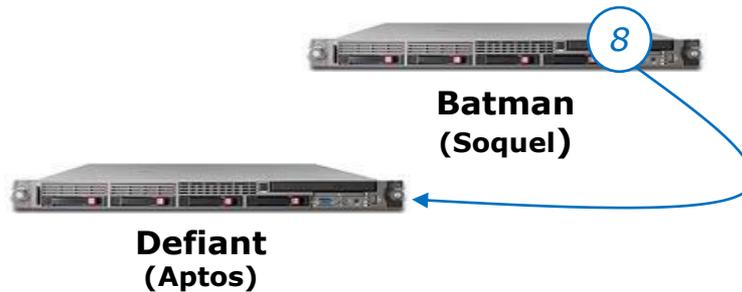
```
[simben90@son-of-opus ~]$ exit
logout
Connection to son-of-opus.simms-teach.com closed.
[simben90@batman ~]$ hostname
batman.simms-teach.com
[simben90@batman ~]$
```



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



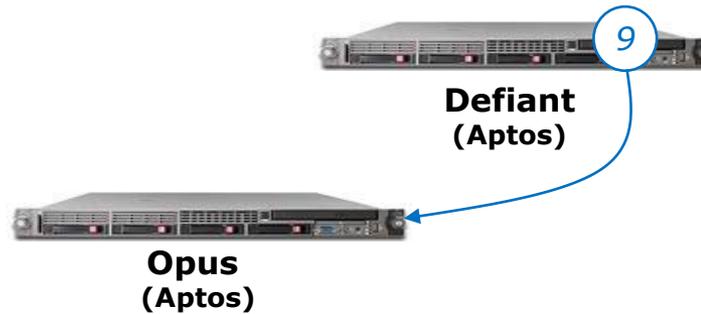
```
[simben90@batman ~]$ exit
logout
Connection to batman.simms-teach.com closed.
[defiant] $ hostname
defiant.cis.cabrillo.edu
[defiant] $
```



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



Benji takes on a long walk



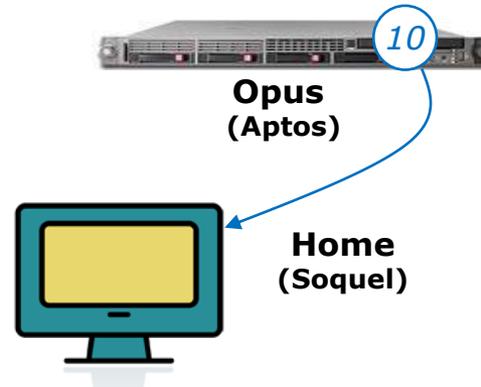
```
[defiant] $ exit
Connection to defiant.cis.cabrillo.edu closed.
/home/cis90/simben $ hostname
oslab.cis.cabrillo.edu
/home/cis90/simben $
```



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



Benji takes on a long walk



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

*And the Putty terminal program closes*



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

# Assignment

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

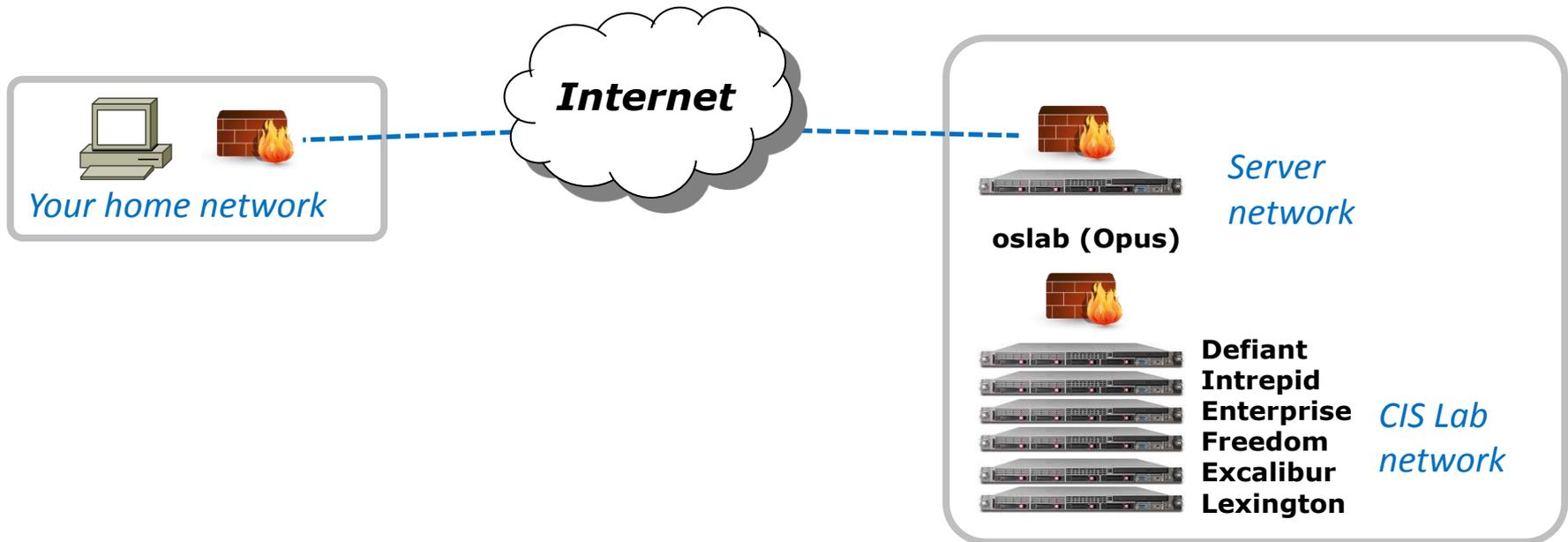
Lesson	Date	Topics	Chapter	Due*
1	9/2	<p><b>Class and Linux Overview</b></p> <ul style="list-style-type: none"> <li>Understand how this course will work</li> <li>High level overview of computers, operating systems</li> <li>Using SSH for remote network logins</li> <li>Using terminals and the command line</li> </ul> <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>Presentation slides (<a href="#">download</a>)</li> <li>Login Credentials Sheet (<a href="#">download</a>)</li> </ul> <p><b>Supplemental</b></p> <ul style="list-style-type: none"> <li>Howto #143: Logging into Opus (<a href="#">download</a>)</li> </ul> <p><b>Assignment</b></p> <ul style="list-style-type: none"> <li>Student Survey</li> <li>Lab 1</li> </ul> <p><b>CCC Confer</b></p> <ul style="list-style-type: none"> <li>Enter virtual classroom</li> <li>Class archives</li> </ul>	<p>1.1-1.15 (Gillay)</p> <p>2,4,5, p113-115, p164-172 (Hahn)</p>	Assigned on 9/2
2	9/9	<p><b>Quiz 1</b></p> <p><b>Commands</b></p> <ul style="list-style-type: none"> <li>Understand how the UNIX login operation works</li> <li>Meet John the Ripper and learn how vulnerable a poor password is</li> <li>Understand basic command syntax and operation</li> <li>Understand program files and what happens when they are run</li> <li>Understand how the shell works and environment variables</li> <li>Understand how to get online documentation</li> </ul> <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>Presentation slides (<a href="#">download</a>)</li> <li>Howto #106: Configuring Putty (<a href="#">download</a>)</li> </ul> <p><b>Assignment</b></p> <ul style="list-style-type: none"> <li>Lab 2</li> </ul> <p><b>CCC Confer</b></p> <ul style="list-style-type: none"> <li>Enter virtual classroom</li> <li>Class archives</li> </ul>	<p>2.3-2.7</p> <p>2.11</p> <p>3.7-3.20</p> <p>4.19-4.22</p> <p>9.1-9.2 (Gillay)</p>	Lab 1 Student Survey

Survey

Lab 1  
Scavenger  
Hunt

Both due by 11:59PM on 9/9

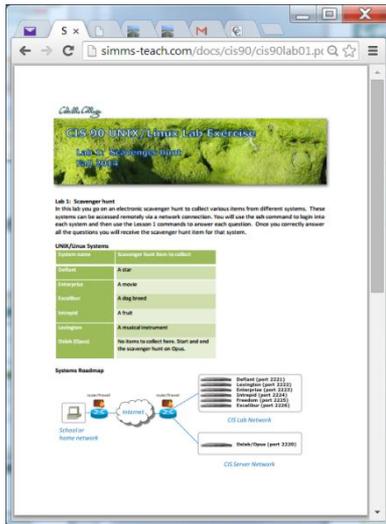
*In Lab 1 is an electronic scavenger hunt. You will visit several systems, answer questions and collect scavenger hunt items. Back on Opus you will submit your collection to finish the lab.*



# 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. Use Google or refer back to lesson slides to understand the commands you are using.
- Use Google when trouble-shooting
- Keep a growing cheat sheet of commands and examples.
- Study groups are very productive and beneficial.
- Use the forum to collaborate, ask questions, get clarifications and share tips you learned while doing a lab.
- Plan for things to go wrong and give yourself time to ask questions and get answers.
- **Late work is not accepted** so submit what you have for partial credit.



# Wrap up

### New shell commands:

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

### New Files and Directories:

### VMware:

## Next Class

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

**Lab 1  
& Survey**

Quiz questions for next class:

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



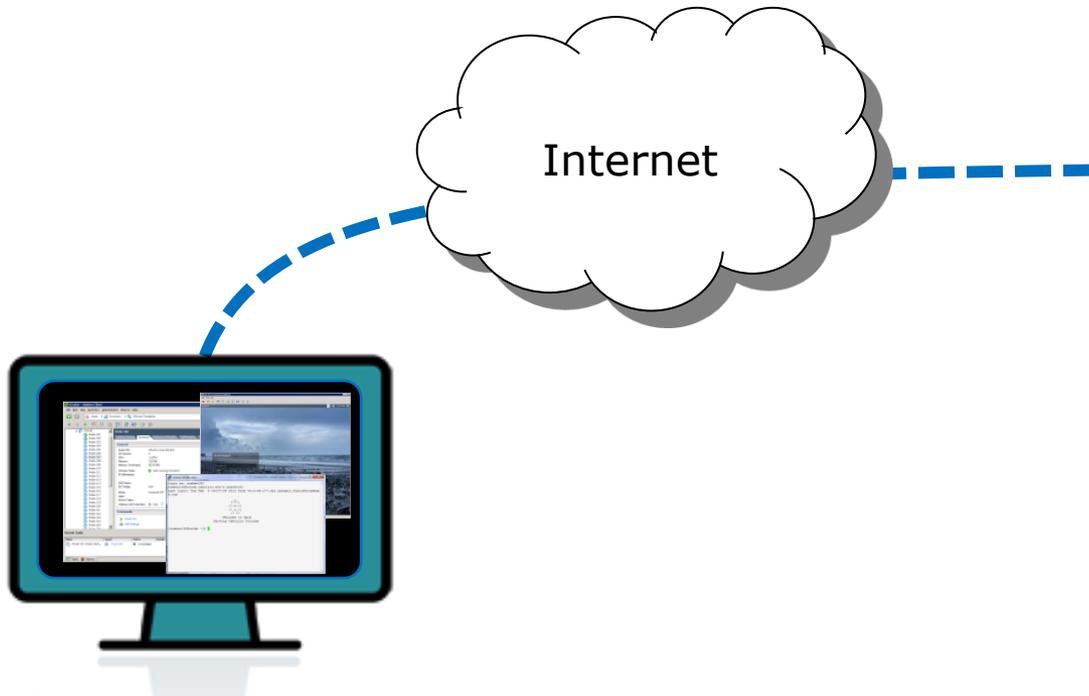
# Backup

*If we have time*

# Using CIS VLab (Virtual Lab)

Third driving lesson

## Accessing CIS VLab VMs



CIS Lab servers on the Aptos campus



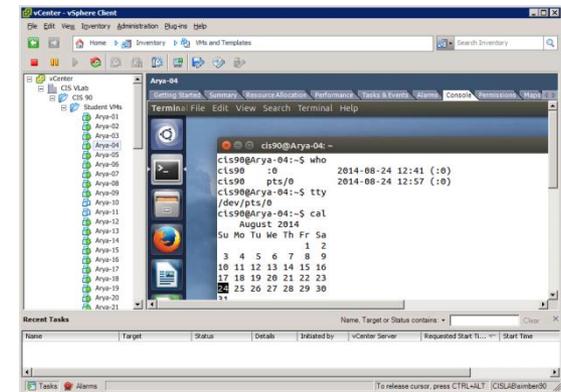
Home



School



Travel





**Rich's Cabrillo College CIS Classes Home Page**

Home Resources Forums CIS Lab Blackboard

Login  
Flashcards  
Admin

CIS 90  
Previous Classes

0 days till term starts!

Cabrillo College  
Web Advisor  
Commands and Files

VLab RDP file

**CIS 90 VLab VM Assignments**

RIP Dennis Ritchie

**Rich Simms**



**Contact**

- Email: [risimms@cabrillo.edu](mailto:risimms@cabrillo.edu)
- Office hours: [directory page](#)

**Fall 2013 Cabrillo Linux Classes**

- Introduction to UNIX/Linux (CIS 90) - Rich teaching
- UNIX/Linux System Administration (CIS 191AB) - [Michael Matzra](#) teaching

Metal Sitemap W3C XHTML 1.0 CSS Credits Earth



CIS 90 VLab Assignments

Student	VM
TBD	Arya-01
TBD	Arya-02
TBD	Arya-03
TBD	Arya-04
TBD	Arya-05
TBD	Arya-06
TBD	Arya-07
TBD	Arya-08
TBD	Arya-09
TBD	Arya-10
TBD	Arya-11
TBD	Arya-12
TBD	Arya-13
TBD	Arya-14
TBD	Arya-15
TBD	Arya-16
TBD	Arya-17
TBD	Arya-18
TBD	Arya-19
TBD	Arya-20
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TBD	Arya-28
TBD	Arya-29
TBD	Arya-30
TBD	Arya-31
TBD	Arya-32
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TBD	Arya-40
TBD	Arya-41
TBD	Arya-42
TBD	Arya-43
TBD	Arya-44
TBD	Arya-45
TBD	Arya-46
TBD	Arya-47
TBD	Arya-48
TBD	Arya-49
TBD	Arya-50
TBD	Arya-51

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

## Accessing CIS VLab

**Rich's Cabrillo College CIS Classes Home Page**

Home Resources

Login  
Flashcards  
Admin

CIS 90  
CIS 192  
Previous Classes

10 days till term starts!

Cabrillo College  
Web Advisor  
Commands and Files

**VLab RDP file**

CIS 90 VLab VM Assignments  
CIS 192 VLab Pod Assignments

RJP Dennis Ritchie

---

**Welcome to Opus**  
opus.cis.cabrillo.edu

**Remote access to the CIS Virtual Lab (VLab)**

Download this RDP file: [vcenter.rdp](#)  
(Use right-click Save As...)

**Contact**

- Email: [risimms@cabrillo.edu](mailto:risimms@cabrillo.edu)
- Office hours: [directory page](#)

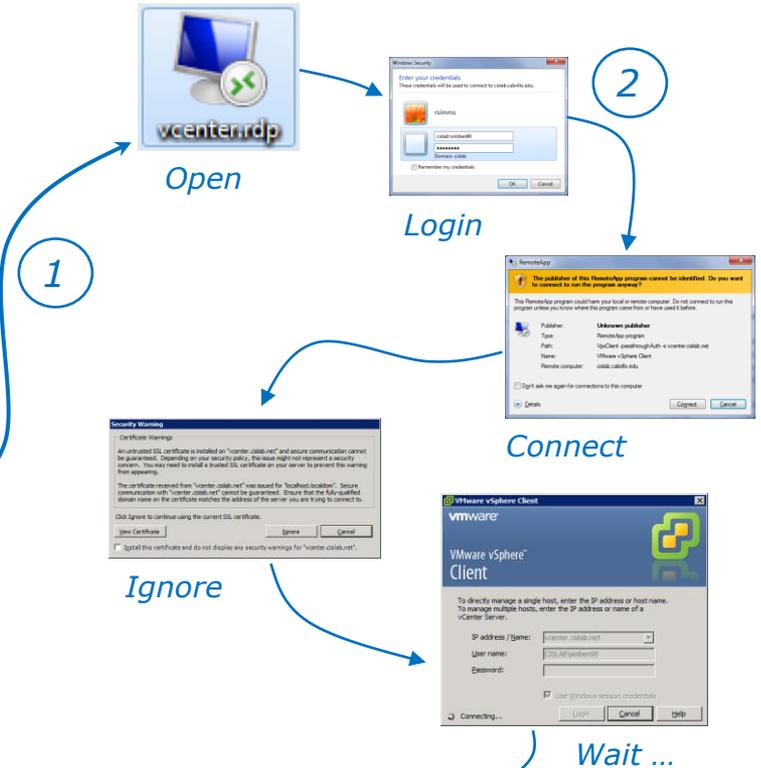
**Spring 2013 Cabrillo Linux Classes**

- Introduction to UNIX/Linux (CIS 90) - Rich Simms teaching
- UNIX/Linux Network Administration (CIS 192AB) - Rich Simms teaching

1) Download the vcenter.rdp file to your desktop and then open it to access VLab.

2) Mac users will **need to install CoRD**.

3) When entering your username and password you must preface your username with the "cislab\", for example Benji VM would use: `cislab\simben90`



VMware vSphere Client

frsdo-108

Getting Started

What is a Virtual Machine?

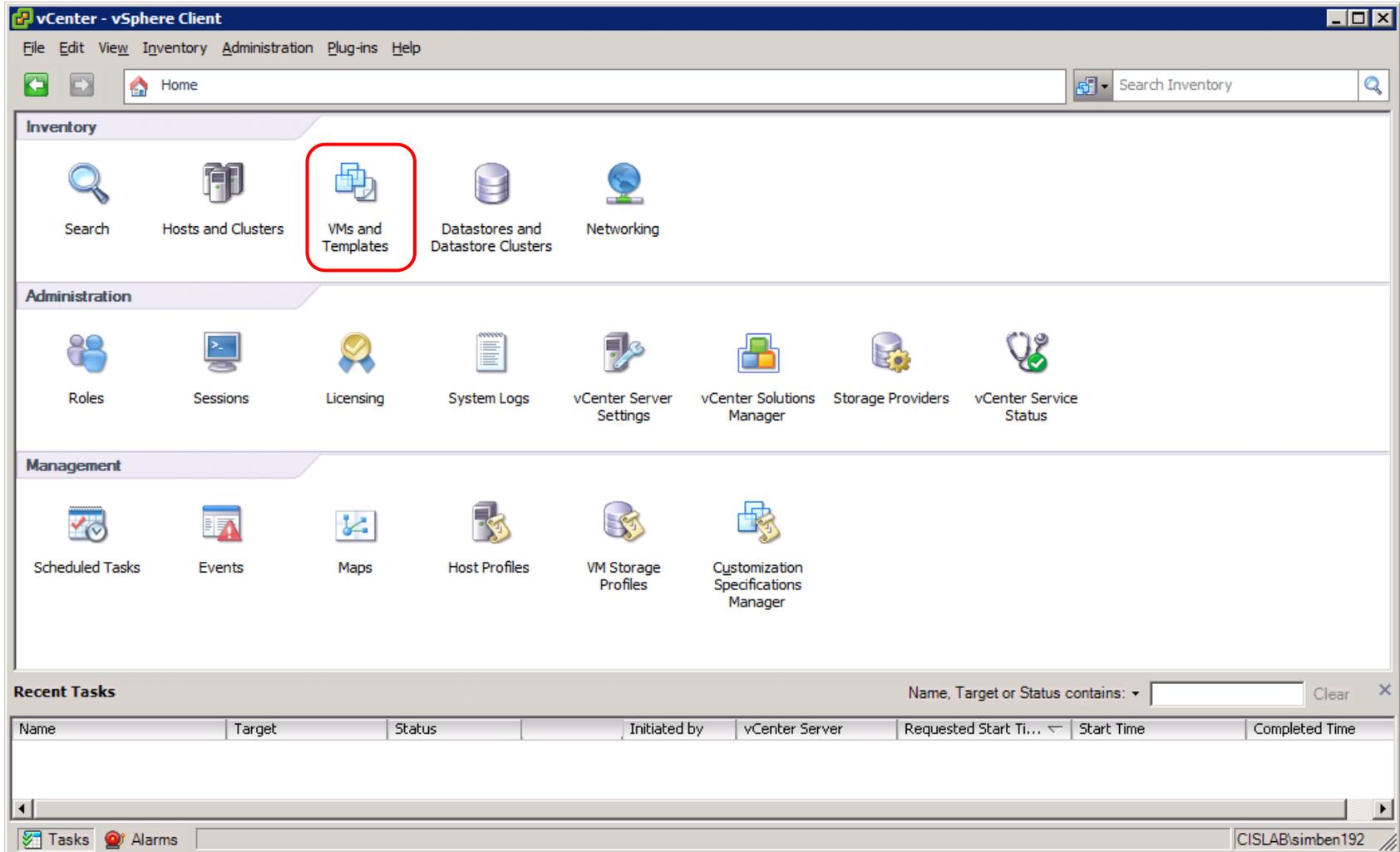
A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.

Because every virtual machine is an isolated computing environment, you can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server applications.

In vCenter Server, virtual machines run on hosts or clusters. The same host can run many virtual machines.

Locate and select your assigned VM

## CIS VLab Home View



*Click VMs and Templates to get to your course VMs*

## Selecting and powering on your VM

The screenshot shows the vCenter - vSphere Client interface. The left pane displays a tree view with 'vCenter' expanded to 'CIS VLab' > 'CIS 90' > 'Student VMs'. A list of VMs from Arya-01 to Arya-21 is shown. 'Arya-04' is selected. The main pane shows the 'Arya-04' VM details, including a 'Getting Started' tab and a 'Basic Tasks' section with a 'Shut down the virtual machine' button. The toolbar at the top contains various icons, including a power icon. A blue callout box points to the power icon with the text: '2) If it is not powered on them then click the Power On icon on the toolbar. This icon will be grayed out if your VM is already running.' Another blue callout box points to 'Arya-04' in the list with the text: '1) Find and select your Arya VM'. At the bottom, the 'Recent Tasks' table is visible.

Name	Target	Status	Details	Initiated by	vCenter Server	Requested Start Ti...	Start Time
Initiate guest OS shutd...	Arya-11	Completed		CISLAB\simb...	vCenter	8/24/2014 12:35:17 ...	8/24/2014 12:35:1...
Initiate guest OS shutd...	Arya-10	Completed		CISLAB\simb...	vCenter	8/24/2014 12:35:13 ...	8/24/2014 12:35:1...

*Note that the Arya-10 and Arya-11 VMs above are not powered on*

## Launching a graphical console

**2) Use the Launch Virtual Machine Console icon on the toolbar for the selected VM**

**What is a Virtual Machine?**

A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.

Because every virtual machine is an isolated computing environment, you can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server applications.

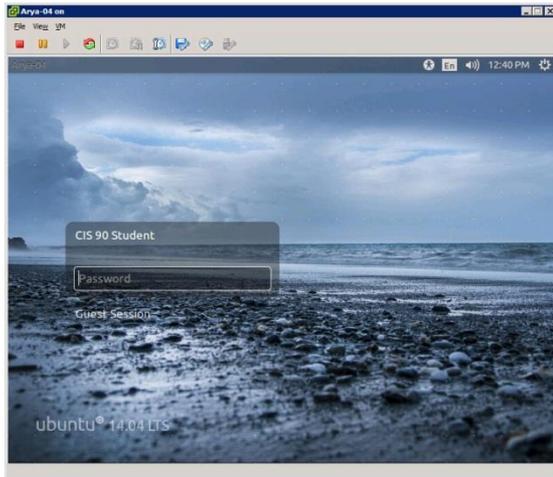
In vCenter Server, virtual machines run on hosts or clusters. The same host can run many virtual machines.

**Basic Tasks**

- Shut down the virtual machine

Name	Target	Status	Details	Initiated by	vCenter Server	Requested Start Ti...	Start Time

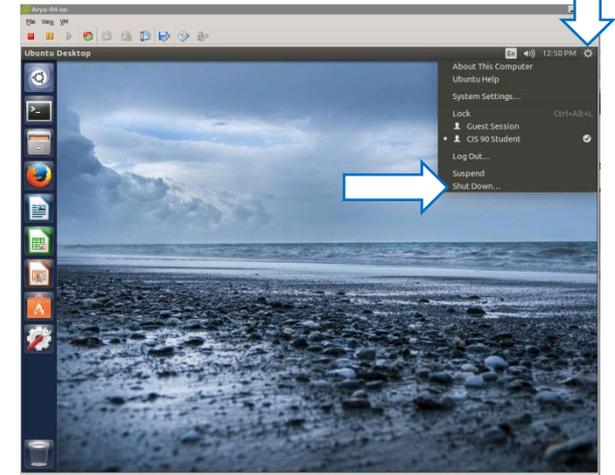
Log in as  
**CIS 90 Student**



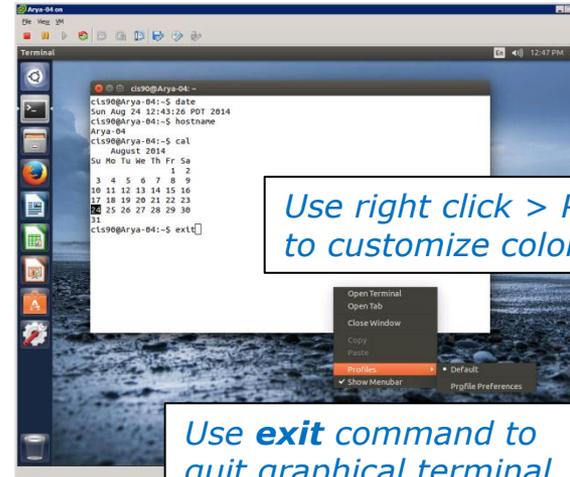
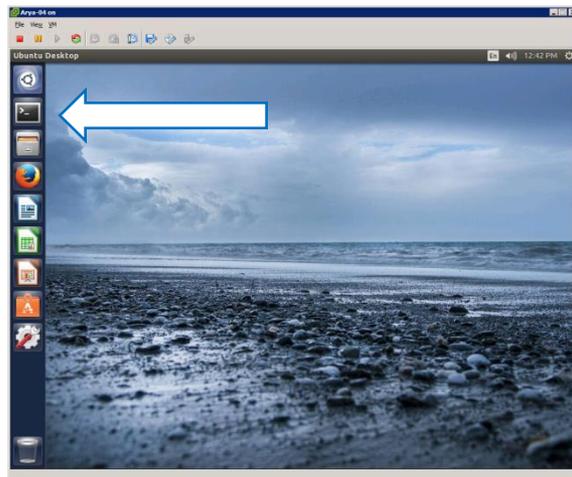
## The Arya VM



Shutdown using  
 **> Shut Down...**



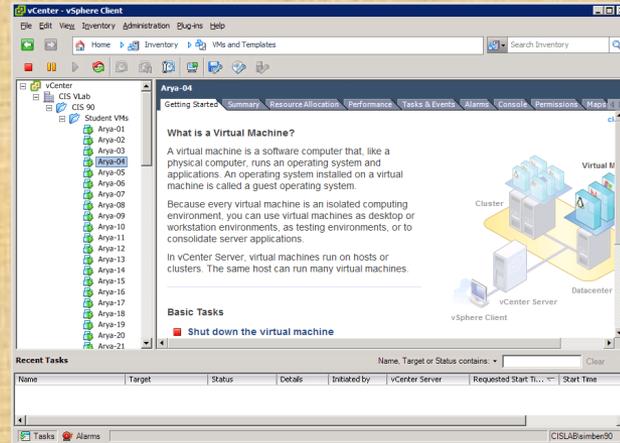
To get a graphical terminal  
**Terminal icon (under System Settings)**



*Use right click > Profiles  
to customize colors*

*Use **exit** command to  
quit graphical terminal*

## Class Activity



Try logging into CIS VLab with your **own credentials**

- Find your VM
- Power it on (if it's not already)
- Open a separate console for your VM
- Login as CIS 90 Student into the graphical desktop
- Run a terminal on the graphical desktop
- Shut down the VM

# Virtual/Console tty Terminals

## Virtual Terminals

- 1) While holding down Ctrl--Alt keys, tap Space, then tap Fn key
- 2) or try: **chvt n**
- 3) or try: **sudo chvt n**
- 4) or try: **<alt-key> n**  
(in an Ubuntu virtual terminal)

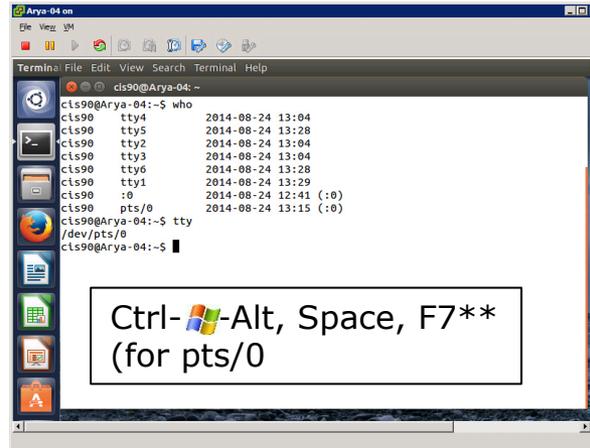
-Alt-Space-F2 (for tty2)'."/>

-Alt-Space-F3 (for tty3)'."/>

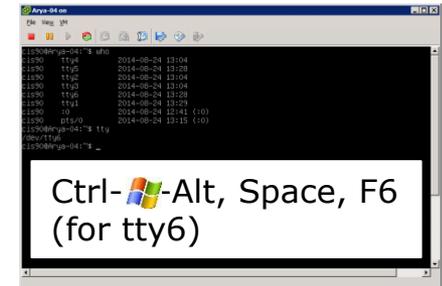
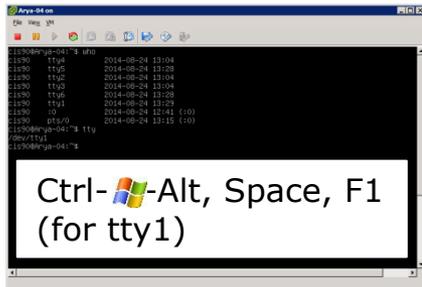
-Alt-Space-F4 (for tty4)'."/>

-Alt-Space-F7 (for pts/0)'."/>

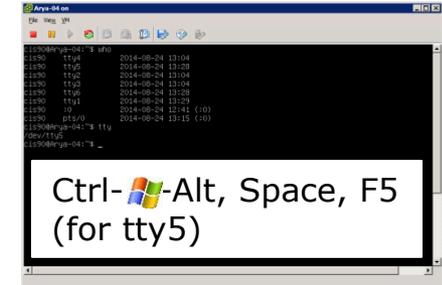
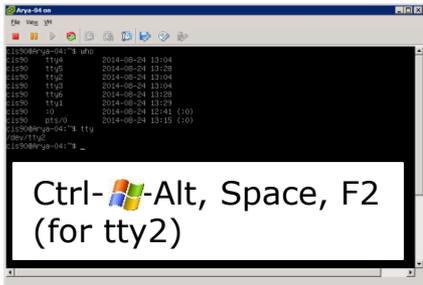
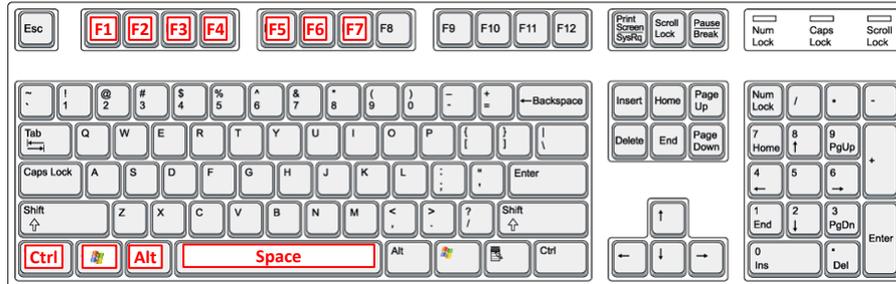
## Changing Virtual TTY Terminals using VMware vSphere



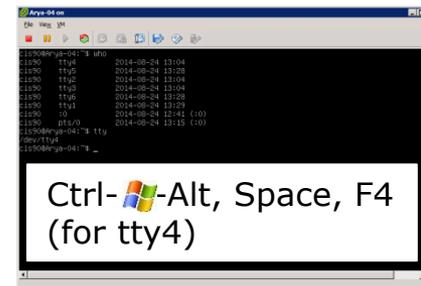
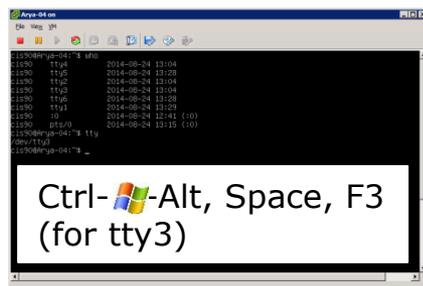
## Windows PC Keyboard



While holding down Ctrl-Alt keys, tap Space, then tap Fn key\*



\*On some PC keyboards it is not necessary to use the Windows key



Note: This is for vSphere only. The Windows key and Space bar are not pressed for physical (non-VM) servers

## Changing Virtual Terminals on VMware Linux VMs

VMware operations	
On PC Keyboard:	While holding down the Ctrl-  -Alt keys, tap spacebar then tap f1, f2, ... or f7.
On Mac keyboard:	Hold down Control and Option keys, tap the spacebar, hold down fn key (in addition to Control and Option keys) and tap f1, f2, ... or f7.

Pressing the  on some Windows keyboards may not be necessary

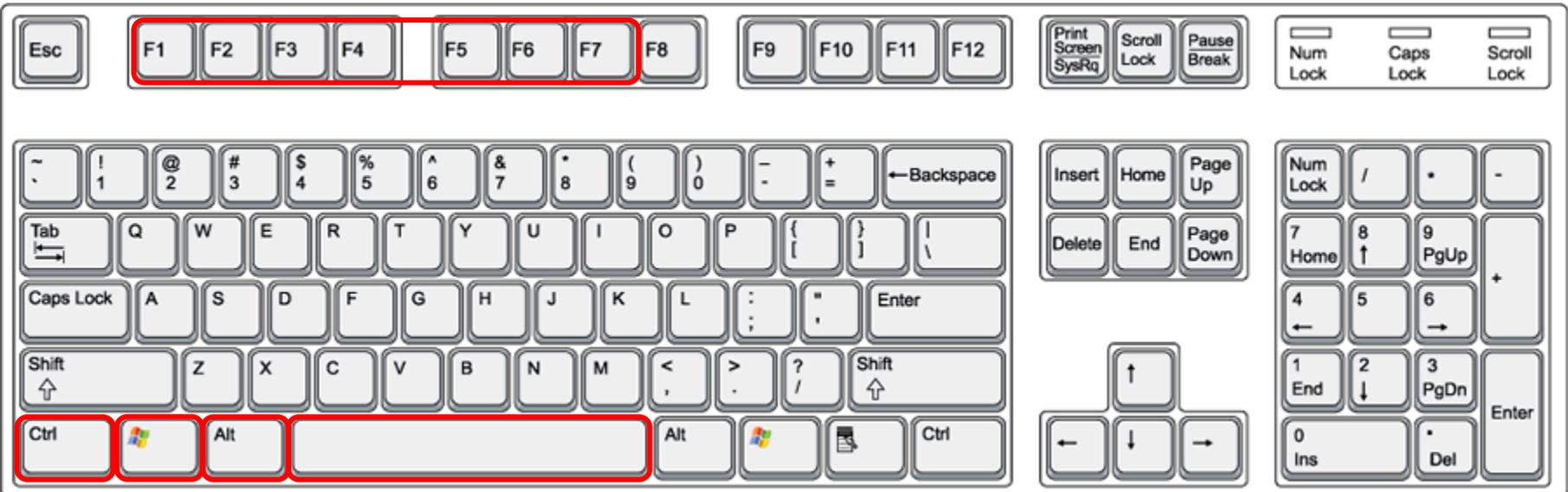
F7 is graphics mode for the Ubuntu VMs.

The Centos VMs do not have a graphics mode components installed (run level 3 only)

*Note: the spacebar does not need to be tapped on a physical (non-VM) system. This is only required when changing virtual terminals on VMware VMs.*

# VMware VM Operations

## Changing Virtual Terminals with a PC keyboard



On PC keyboard:

While holding down the **Ctrl--Alt** keys,  
tap **Spacebar** then tap **F $n$**  key  
(where  $n=1-7$  to specify a function key)

# VMware VM Operations

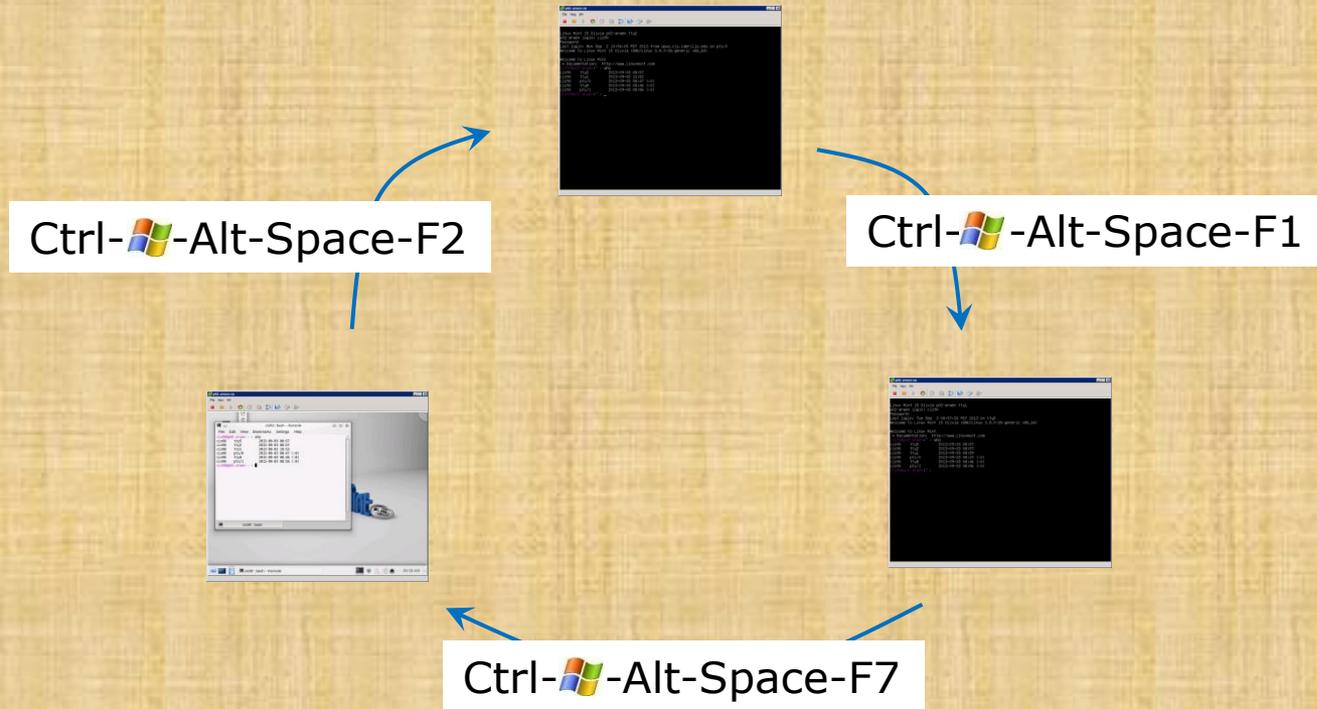
## Changing Virtual Terminals with a Mac keyboard



On Mac keyboard:

While holding down the **control-option** keys  
tap **Spacebar** then tap **fn-F $n$**  keys  
(where  $n=1-7$  to specify a function key)

Class Activity



On your VM:

- Try changing between the graphical desktop and the TTYS
- Login as cis90 on tty1 and tty2
- Run a terminal on the graphical desktop
- Use the who command to see how many logins there are

# More on who command

## Deciphering **who** command output (Ubuntu 12.04)

```

frodo-108 on vmserver3.cislab.net
File View VM
cis90@frodo-108:~$ tty
/dev/tty5
cis90@frodo-108:~$
    
```

*tty2 (virtual terminal)*

```

frodo-108 on vmserver3.cislab.net
File View VM
Ubuntu 12.04.1 LTS frodo-108 tty2
frodo-108 login: cis90
Password:
Last login: Mon Feb 11 13:21:30 PST 2013 on tty1
Welcome to Ubuntu 12.04.1 LTS (GNU/Linux 3.2.0-29-generic x86_64)

 * Documentation:  http://help.ubuntu.com
                   http://wiki.ubuntu.com
                   http://answers.ubuntu.com
                   http://faq.ubuntu.com
                   http://support.ubuntu.com
                   http://ubuntu.com/bugs

335 packages can be updated.
112 updates are security updates.

cis90@frodo-108:~$ tty
/dev/tty2
cis90@frodo-108:~$ _
    
```

*tty5 (virtual terminal)*

```

cis90@frodo-108:~$ who
cis90    tty5        2013-02-11 13:23
cis90    tty2        2013-02-11 13:23
cis90    tty7        2013-02-11 13:16
cis90    pts/0      2013-02-11 13:26 (:0)
cis90    pts/2      2013-02-13 17:17 (:0)
cis90    pts/3      2013-02-13 17:18 (oslab.cabrillo.edu)
cis90@frodo-108:~$
    
```

*pts/3 (login session from Opus)*

*tty7 (graphical desktop)*

```

Terminal
cis90@frodo-108:~$ tty
/dev/pts/0
cis90@frodo-108:~$
    
```

*pts/0 (graphical terminal)*

```

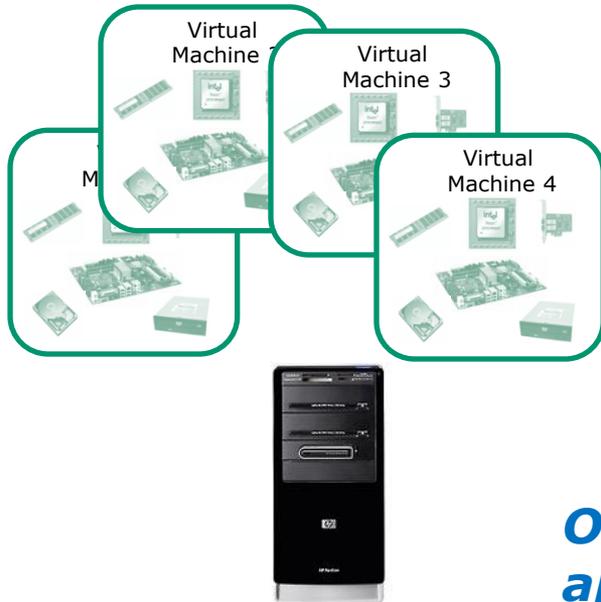
cis90@frodo-108:~$ tty
/dev/pts/2
cis90@frodo-108:~$
    
```

*pts/2 (graphical terminal)*

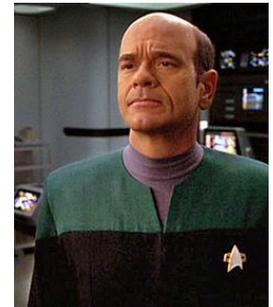
# Virtual Machines

# What is a virtual machine?

- There are software programs (e.g. VMWare, VirtualBox, MS Virtual Server) that simulate perfectly all the hardware of a real computer.
- These simulated computers are called virtual machines or VMs.



- You load an operating system and applications on virtual machines just like you would any other computer.
- The guest OS and apps don't even know they are not running on a "real" computer.
- Opus used to be a 1U rack mounted server. Now it's a VM on a server in building 1300.

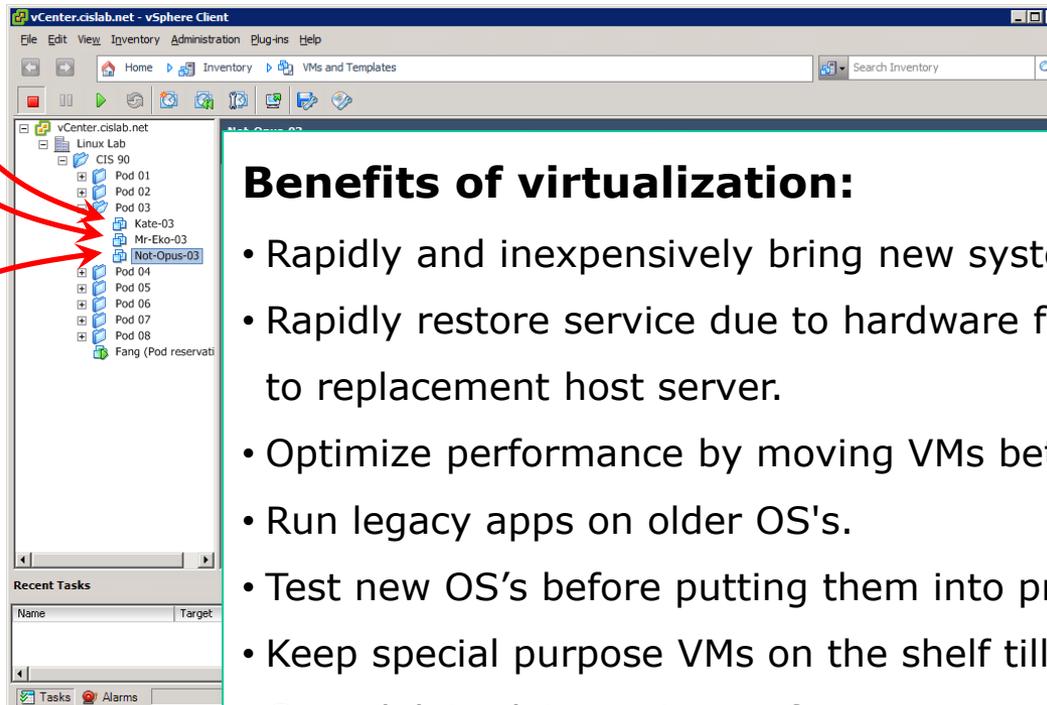


*The EMH doctor on Star Trek Voyager was a simulation*

***Over the network, virtual machines appear just like any other computer.***

# Virtual Machines

*Multiple computers on one computer  
... running at the same time  
... sharing the same physical hardware*

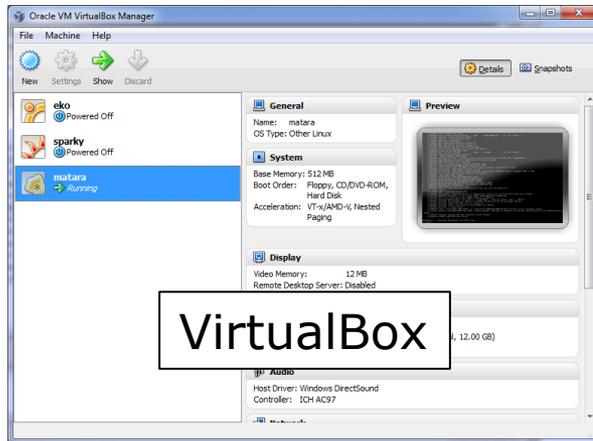


## Benefits of virtualization:

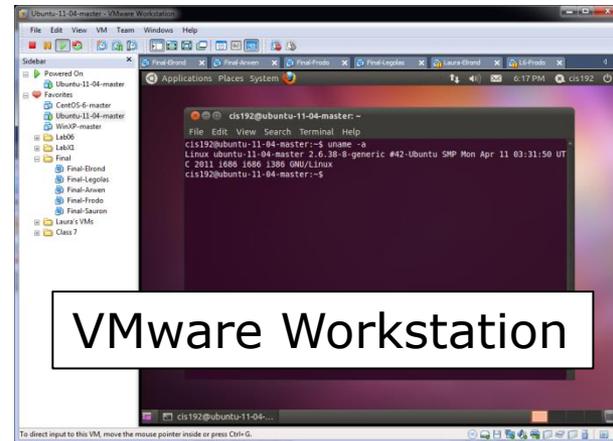
- Rapidly and inexpensively bring new systems online.
- Rapidly restore service due to hardware failures by moving VMs to replacement host server.
- Optimize performance by moving VMs between physical hosts.
- Run legacy apps on older OS's.
- Test new OS's before putting them into production.
- Keep special purpose VMs on the shelf till needed.
- Consolidate data center on fewer servers.
- Students can have their own personal computer lab!



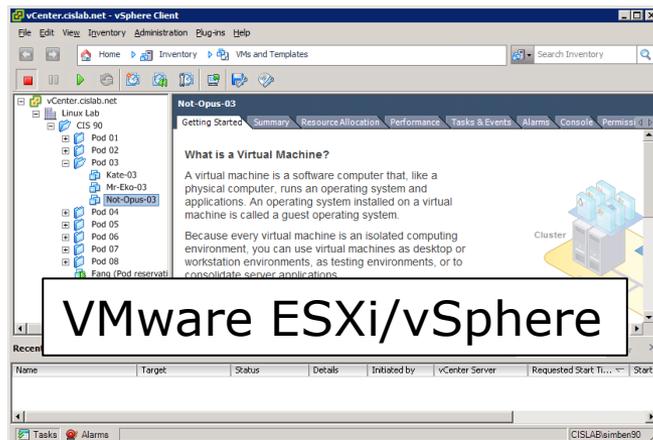
# Various Virtualization Products



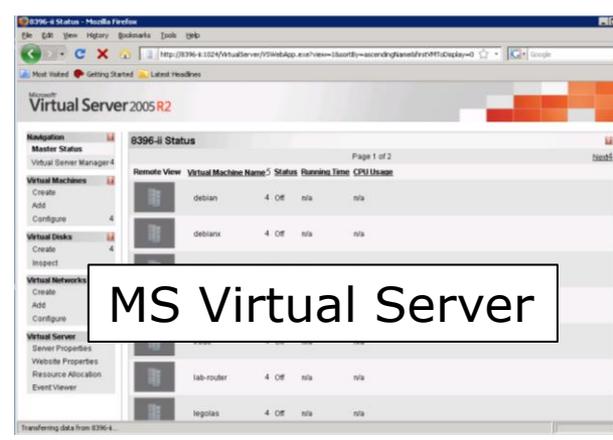
VirtualBox



VMware Workstation



VMware ESXi/vSphere

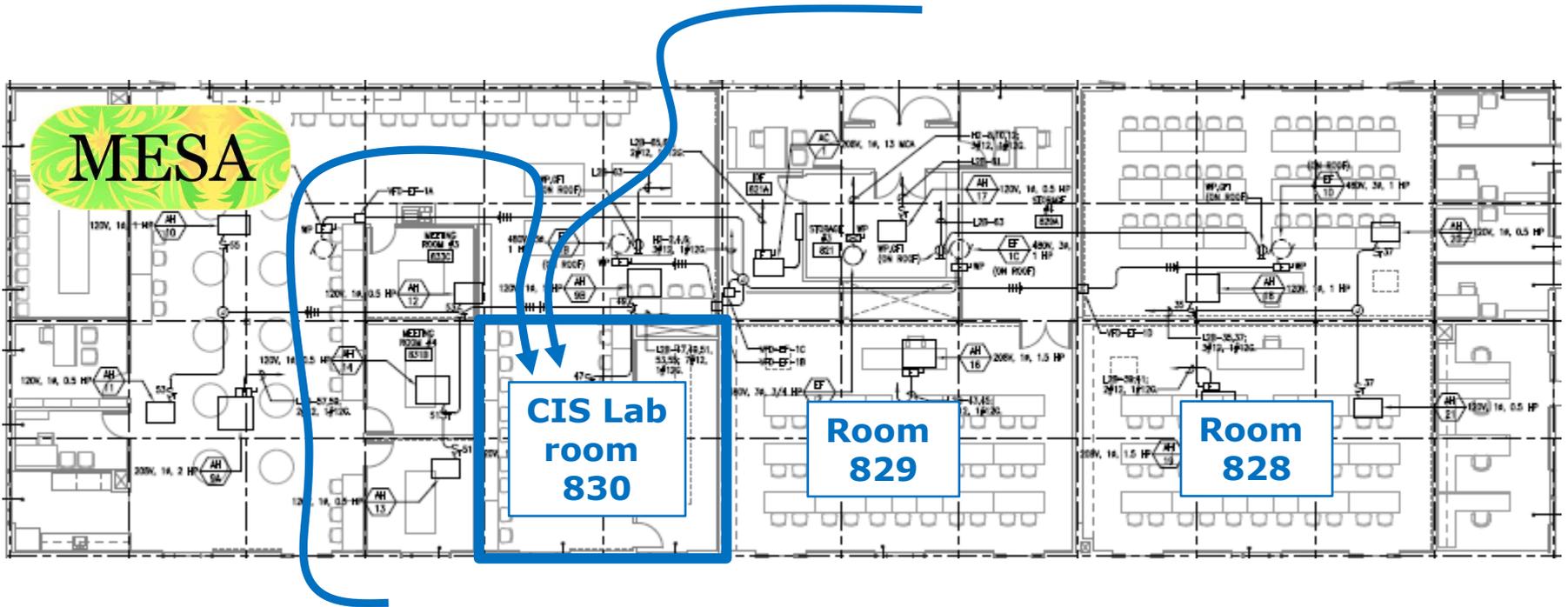


MS Virtual Server

# CIS Lab

# The CIS Lab

Building 800 - room 830



*The CIS Lab is inside the MESA Center*

# UNIX/Linux Devices

## Apple iPad



```
ipa$ 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
```

```
ipa$ date
Monday, August 25, 2014 at 5:25:49 PM Pacific Daylight Time
ipa$ hostname
Mary's iPad
ipa$ uname
Darwin
ipa$ 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   aosnotifd            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
ipa$
```

## 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     usbld
  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     wpaide
  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

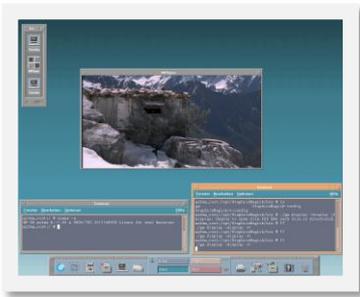


```

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



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

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

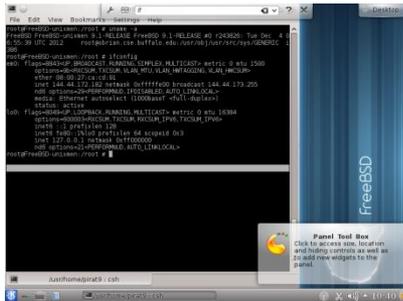
Rights for non-DOD U.S. Government Departments and Agencies are as set
forth in FAR 52.227-19(c)(1,2).
You have mail.

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

# ls /
.mozilla          .sw             home            sbin
.mozilla-license  bin             lib             stand
.profile          core            lost+found      tmp
.rnd              dev             net             usr
.ssh              etc             opt             var

# uname -a
HP-UX cupsim98 B.11.23 U ia64 0564465391 unlimited-user license
#
```

## BSD Unix



```

root@FreeBSD-unixmen:/root # uname -a
FreeBSD FreeBSD-unixmen 9.1-RELEASE FreeBSD 9.1-RELEASE #0 r243826: Tue Dec  4 06:55:39 UTC 2012   root@obrian.cse.buffalo.edu:/usr/obj/usr/src/sys/GENERIC i386
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

