Lesson Module Checklist

- Slides
- Flash cards
- First minute quiz
- Web calendar summary
- Web book pages
- Commands
- Howtos

- Lab tested
- Youtube Videos uploaded

- Forum created and registration tested
- Opus accounts made and populated
- CIS 90 VMs created and configured
- Surveys and PW sheet posted

- Rosters printed
- Add codes printed

- Backup slides, Confer links, handouts on flash drive
- Wireless lapel mic + 9v spares
- Key card

Cabrillo College est. 1959
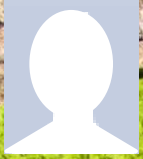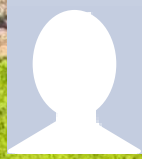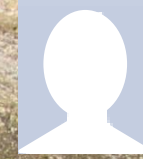
Instructor: **Rich Simms**
Dial-in: **888-450-4821**
Passcode: **761867**

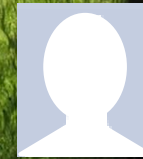|					
Aaron	Alexandr	Andrew B.	Andrew C.	Arthur	Brent
Brian	Cliff	Contessa	Cory	Daniel Be.	Daniel H.	David G.	Dave L.	David P.	Davina
Debbie	Dylan	Edtson	Fidel	Humberto	Hunter	Ismael	Jessica	Jose	Joseph
Juliana	Lucie	Marcus	Marty	Matt	Michael B.	Michael P.	Nathan	Nicholas	Rochelle
Rudy	Shawn	Steve	Tabitha	Taylor	Tyler	William C.	Will M.	Zachary	Zsolt
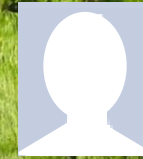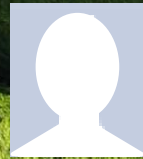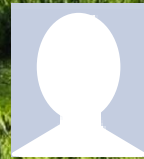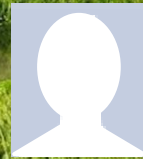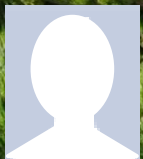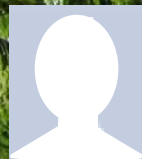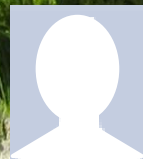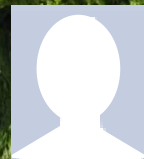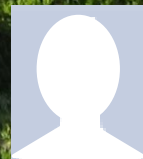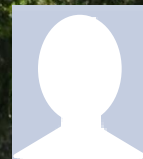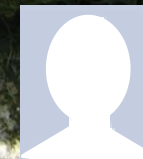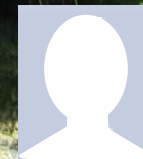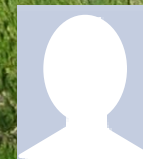
Email me (risimms@cabrillo.edu) a relatively current photo of your face for 3 points extra credit

Classroom PC image needs some fixes

1) Enable Java cache for CCC Confer
   - Control Panel > Programs > Java > General Tab > Temporary Internet File Settings button
   - Check "Keep temporary files on my computer"
   - 512MB

2) Download **vcenter.rdp** file to desktop
   - http://opus.cis.cabrillo.edu

3) Search for **putty.exe** and copy to desktop
   - C:\Program File (x86)\Putty\putty.exe

4
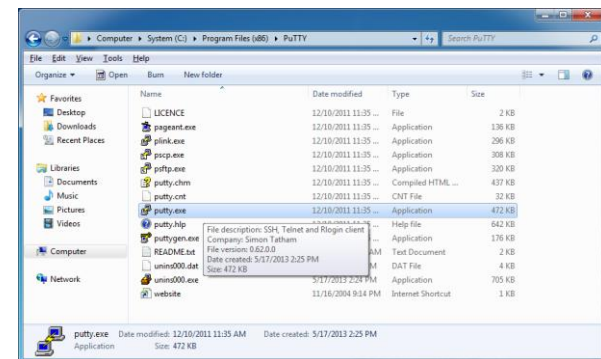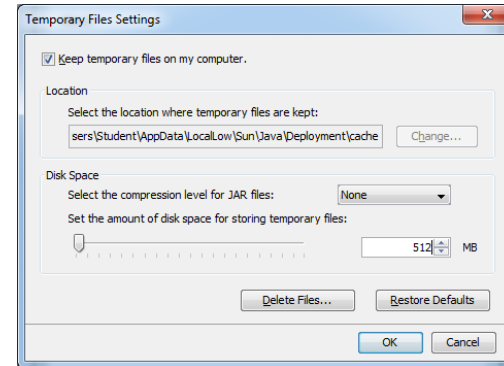
[ ] Preload White Board with *cis*lesson??*-WB*
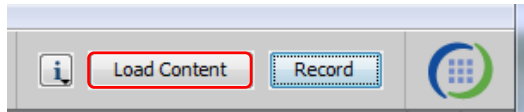
[ ] Connect session to Teleconference

Session now connected to teleconference
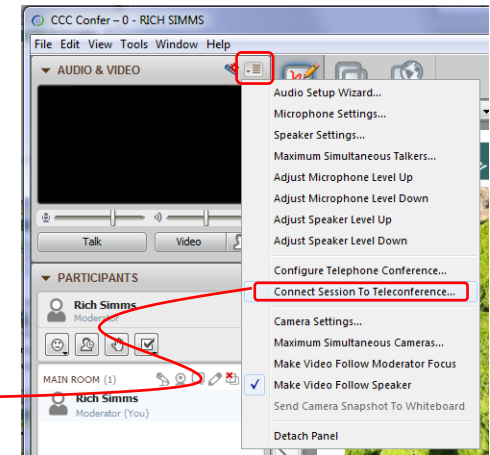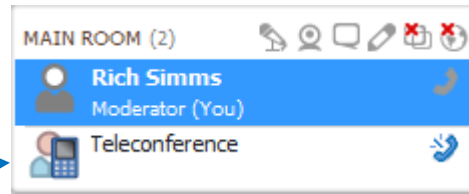
[ ] Is recording on?

Red dot means recording

[ ] Use teleconferencing, not mic

Should be greyed out

5

[ ] **Video (webcam) optional**

[ ] **layout and share apps**

foxit for slides

chrome

putty

vSphere Client

[ ] Video (webcam) optional

[ ] Follow moderator

7
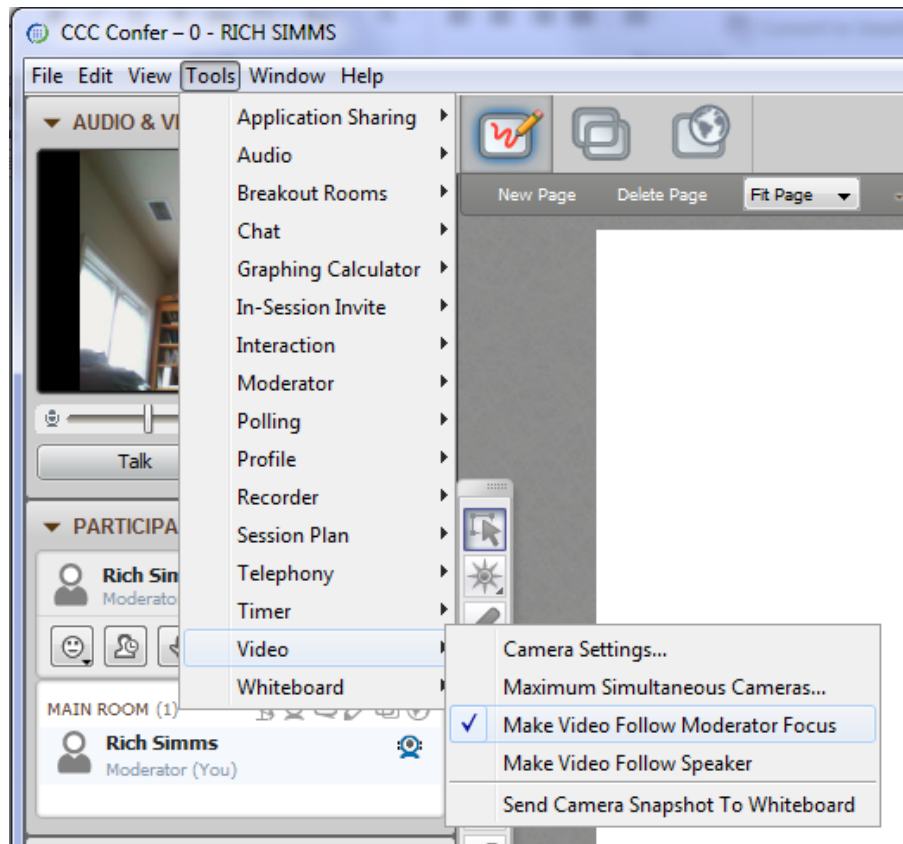
Universal Fix for CCC Confer:

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

Control Panel (small icons)

General Tab > Settings…
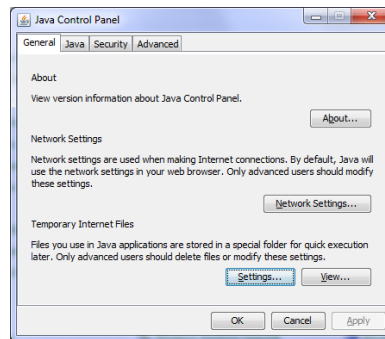
500MB cache size
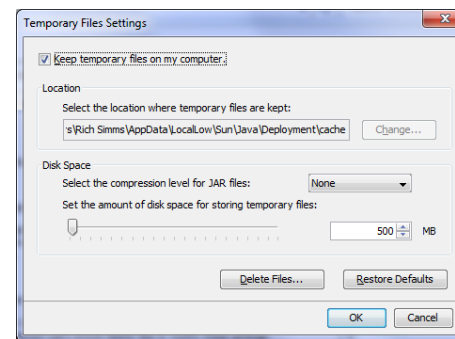
Delete these

Google Java download

Shell commands

Permissions

Secure logins

Processes

Navigate file tree

Scheduling tasks

Welcome to CIS 90 Introduction to UNIX/Linux

Files and directories

Mail

vi editor

Environment variables

Run programs/scripts

Filters

Pipes
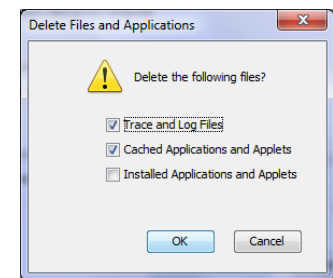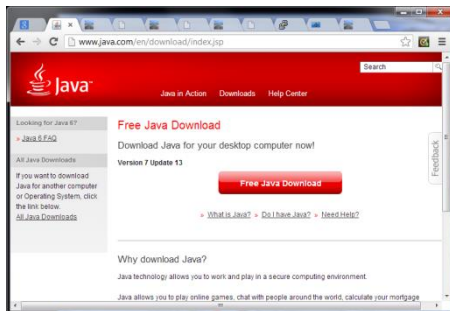
Student Learner Outcomes
Upon successful completion of this course students will be able to:
Navigate and manage the UNIX/Linux file system
Automate and schedule tasks
Customize the shell environment

9

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/)

11

Class and Linux Overview

Objectives	Agenda
• Understand how this course works • Use Opus (SSH) • Use Pod VMs (SSH) • Use Graphical Desktops (VLab) • Use Virtual TTY terminals (VLab) • Learn first UNIX/Linux commands	• Introductions • How this class works • Using Opus and VLab • Housekeeping • UNIX/Linux Market • Computers • Virtual Machines • UNIX/Linux Architecture • First Commands • Navigating Terminals • Lab 1 • Wrap up

Virtual Classroom with CCC Confer

- Listen using your computer's speakers/headset or with your phone using the dial-in number
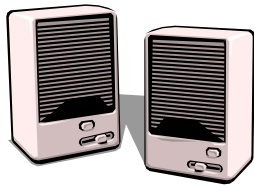
- Ask questions using the chat window or just speak if dialed in with your phone (or Skype)

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

14

Class Activity
Enter the online virtual classroom

Rich's Cabrillo College CIS Classes
CIS 90 Calendar

| Home | Resources | Forums | CIS Lab | CTC |

CIS 90 (Fall 2010) Course Calendar

Course Home   Grades

Login
Flashcards
Admin

CIS 90
Previous Classes

8 days till term starts!

Cabrillo College
Web Advisor
CCC Confer
Static IPs
Quick Ref
VM Repairs
GAH!

1. Browse to simms-teach.com
2. Click the *CIS 90* link
3. Click the *Calendar* link
4. Look for any CCC Confer section
5. Click the *Enter virtual classroom* link

- Use Linux running on a local virtual machine

Materials
- Presentation slides (download)
- Logins Sheet (download)
- Howto #103: Installing PuTTY (download)
- Howto #301: Bringing the Eko VM home (download)

Assignment
- Student Survey
- Lab 1

CCC Confer
- Enter virtual classroom
- Class archives

| 1 | 9/1 | | 1.1-1.15 (Gillay) |

15

CCC Confer - Attending class online

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

16

CCC Confer - Attending class online

Raise your hand, make gestures, use emoticons and indicate responses using these controls

Ask public or private questions using the chat area

17

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.
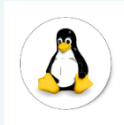
Switch to preloaded whiteboard

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

			Other

Class Activity – Where are you now?
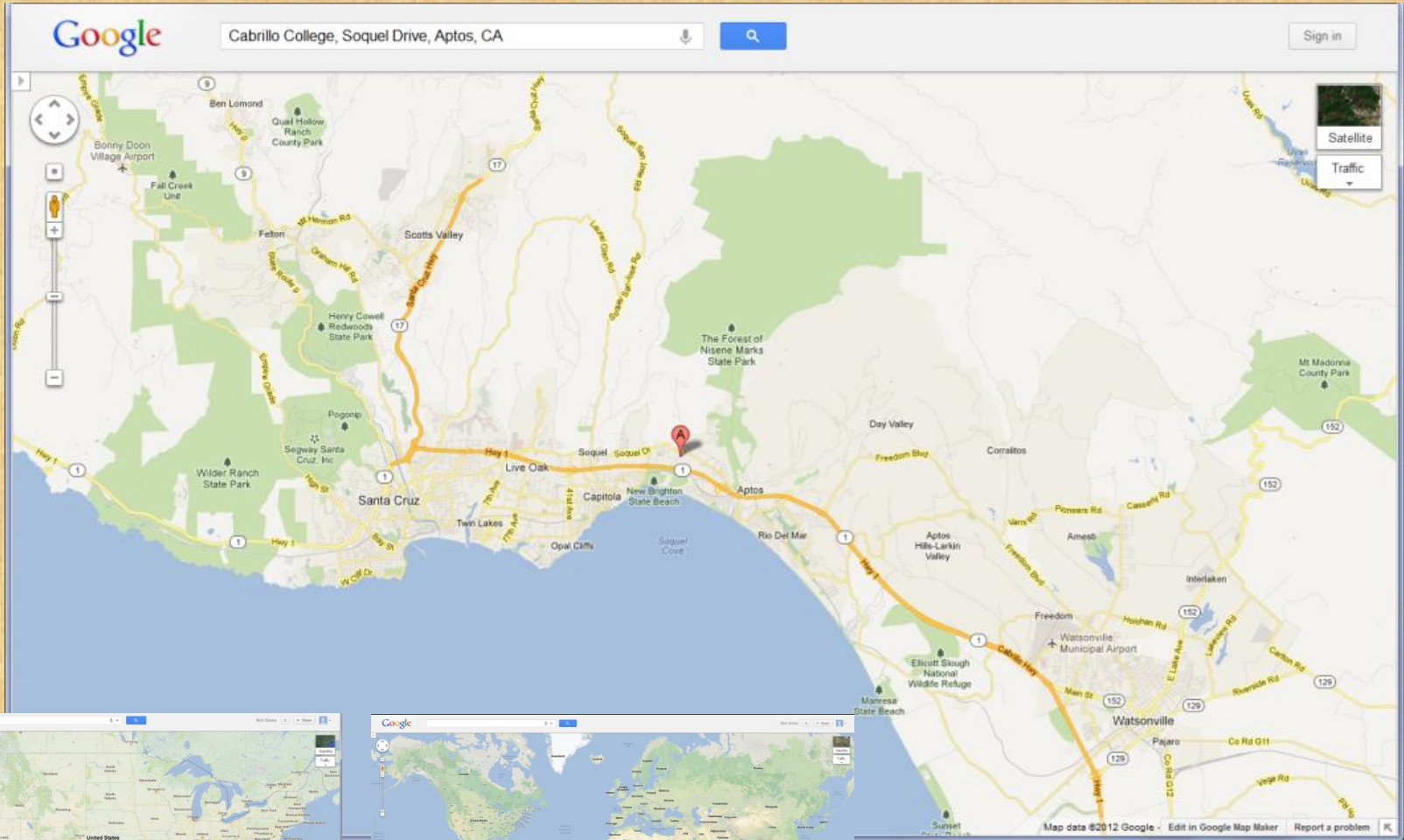
Turn Recording Off
Stay on preloaded whiteboard

Roll Call

Login Credentials

Usernames and passwords

http://simms-teach.com/docs/cis90/logins-cis90.pdf

An email was sent to each student on the roster containing login information.

For any questions on login credentials contact the instructor at: risimms@cabrillo.edu

Turn Recording On
Switch back to shared slides

Why Study UNIX/Linux?

27

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

Bell Laboratories

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

29
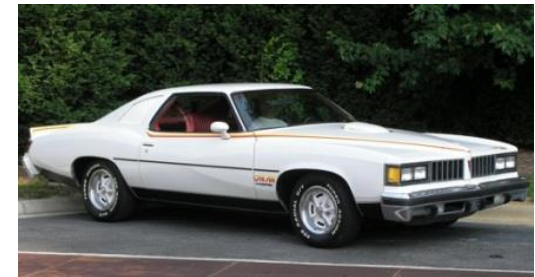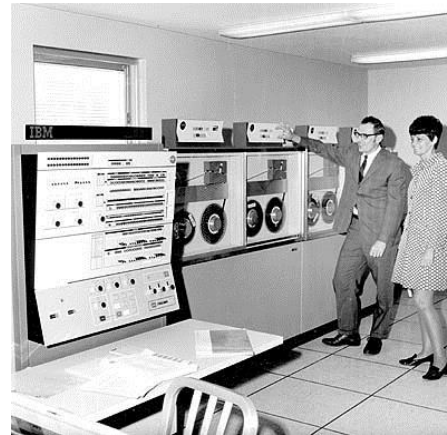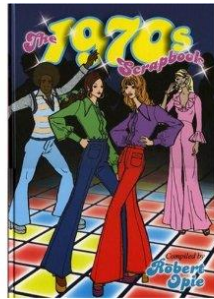
Heck NO !!

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

- Embedded in smartphones and many other appliances

- Internet services - Web, DNS, DHCP, Net News, Mail, etc.

- Enterprise and mission critical applications - Large databases, Enterprise Resource Management (ERM), Customer Relationship Management (CRM), data warehouse, manufacturing, supply chain management, etc.

- Hollywood - feature animation, visual effects, rendering farms.

- Number-crunching super computers

- Companies like Google, Amazon, Facebook, PayPal, Yahoo etc. are using it to run their businesses on

Commercial UNIX Operating Systems

SCO UNIX

Berkeley
Software
Distribution

AIX
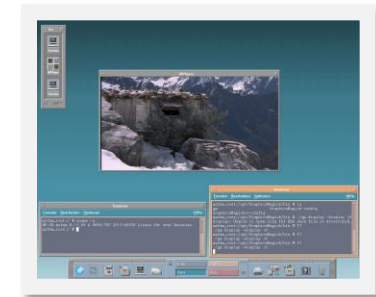
HP-UX
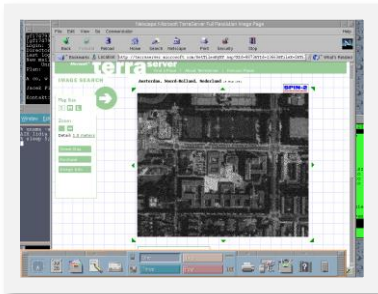
Solaris
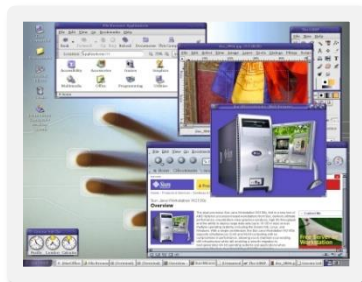
Apple Mac OS X
and iOS

*The kernel is
UNIX based*

31

Various Linux Distributions

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

32

Embedded UNIX in Apple Products

Apple iOS


```
ip4:~ mobile$ uname -a
Darwin ip4 10.3.1 Darwin Kernel Version 10.3.1: Wed Aug  4 22:35:51 PDT 2010; r
oot:xnu-1504.55.33~10/RELEASE_ARM_S5L8930X iPhone3,1 arm N90AP Darwin
ip4:~ mobile$
```

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

Sources: http://en.wikipedia.org/wiki/Darwin_(operating_system)
http://en.wikipedia.org/wiki/IOS_(Apple)
http://code.google.com/p/mobileterminal/

Embedded Linux
(just a few)

Katana Robotic Arm

Linksys WRT-54GL

Tivo

Yamaha Disklavier
Mark IV

Android

Some TomTom
GPS models

Garmin
Nuvi 5000

Buffalo
NAS storage

Virgin America
Personal
Entertainment

MikroTik Routers

Google Chrome OS
for Netbooks and Tablets

Raspberry Pi

http://www.linuxfordevices.com/c/a/Linux-For-Devices-Articles/The-Linux-Devices-Showcase/

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

35

Businesses and organizations that run on Linux

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

Worldwide Server Market

$12.2 Billion Server Revenue Q3 2012

Windows
$6.2B
(51.1%)

Unix
$2.1B
(17.3%)

Other
$1.3B
(10.1%)

Linux
$2.6B
(21.5%)

Year over Year Change

Linux   +2.1%

Unix   0.8%

Windows   +1.6%

Source: IDC, Nov 2012

37

http://www.idc.com/getdoc.jsp?containerId=prUS23808612#.UQx2eKVZW5I
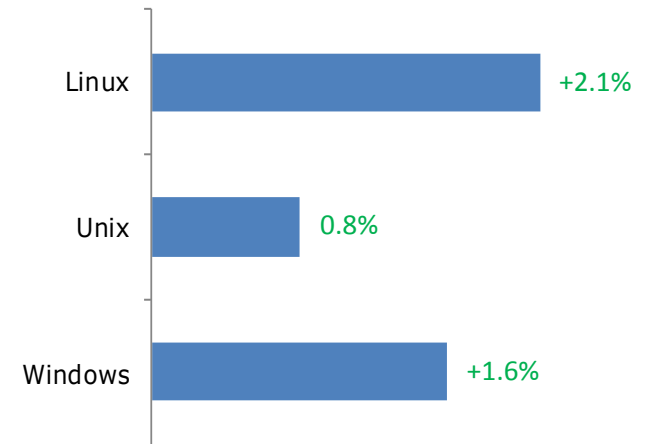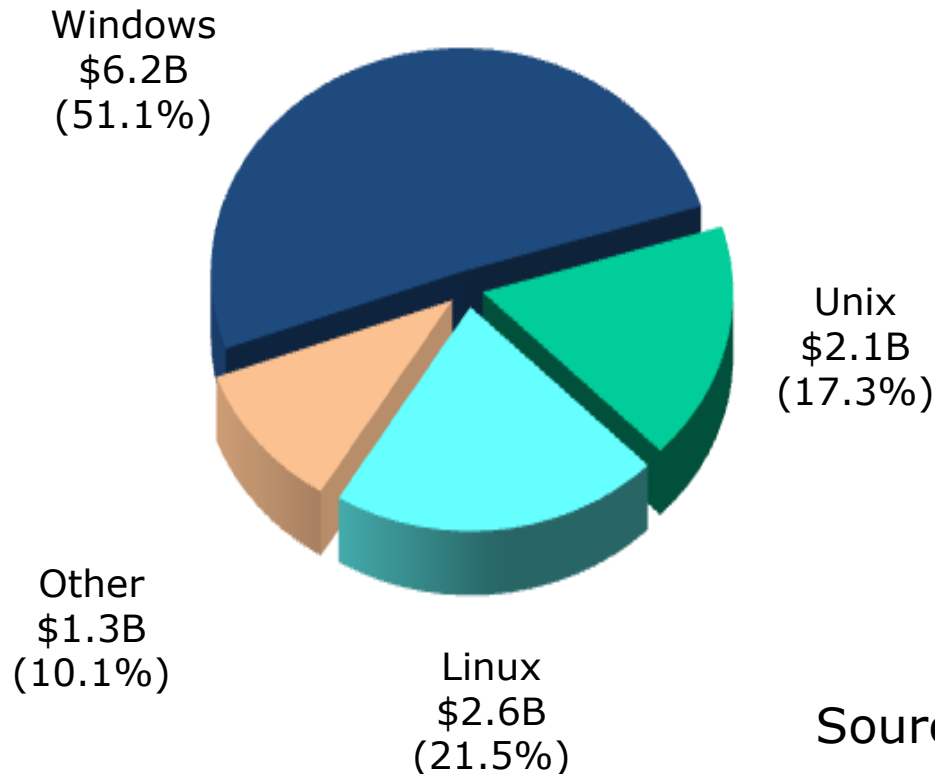
Website hits by browser OS

Jul 2010[1]

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

6.9%

Dec 2011[2]

	Operating Systems	
1	Windows 7	37.60%
2	Windows XP	31.72%
3	Windows Vista	8.87%
4	Apple OS X	8.59%
5	Apple iOS	3.96%
6	Linux	1.64%
7	Android	1.64%
8	BlackBerry	0.68%
9	SymbianOS	0.23%
10	Windows 2000	0.09%

15.8%

Jan 2013[3]

	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%

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

2-This report was generated 12/31/2011 based on the last 15,000 page views to each website tracked by W3Counter. W3Counter's sample currently includes 53,526 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 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.

38

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

Operating System System Share

- Linux
- AIX
- Cray Linux Environment
- CNK/SLES 9
- SLES10 + SGI ProPac...
- bullx SUperCOmputer...
- SUSE Linux Enterpris...
- CNL

△ 1/3 ▼

83.8%
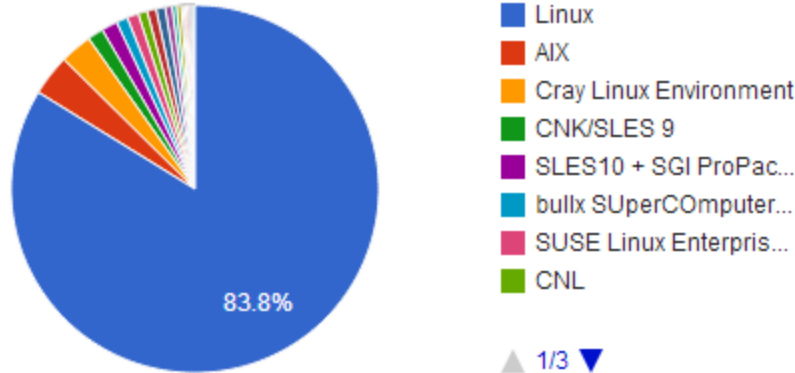
Linux dominates the Supercomputer market

TOP500® NOVEMBER 2012

IBM iDataPlex in Canada

NASA Advanced Supercomputing (NAS) Facility

CERN

Operating System	Count	System Share (%)	Rmax (GFlops)	Rpeak (GFlops)	Cores
Linux	419	83.8	124122700	177021632	12328716
AIX	18	3.6	4072666	5099712	182976
Cray Linux Environment	14	2.8	21742588	32301256	1034656
CNK/SLES 9	7	1.4	1453422	1749811	528384
SLES10 + SGI ProPack 5	7	1.4	960800	1096704	94208
bullx SUperCOmputer Suite A.E.2.1	5	1	3241378	3961958	183424
SUSE Linux Enterprise Server 11	5	1	1624382	1921199	94752
CNL	4	0.8	453460	587565	60144
RHEL 6.2	4	0.8	1738900	2132582	102528
CentOS	4	0.8	955100	1182927	88928
Redhat Linux	3	0.6	311080	384785	42144
Windows HPC 2008	2	0.4	314300	460398	38028
RedHat Enterprise 5	2	0.4	177740	200271	17088
SUSE Linux	1	0.2	274800	308283	26304
RHEL 6.1	1	0.2	230600	340915	37056
Open Solaris	1	0.2	110600	121282	12032
Cell OS	1	0.2	81171	105830	5088
Windows Azure	1	0.2	151300	167731	8064
Super-UX	1	0.2	122400	131072	1280

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

iso.linuxquestions.org
15 Most Popular Linux Distro Downloads

15 Most Downloaded Distribution Versions (last 30 Days)	15 Most Downloaded Distributions (Ever)
1. BackTrack 5 R3 (576742)	1. Fedora
2. CentOS 6.3 (81624)	2. Mandriva
3. FreeBSD 8.3 (12010)	3. Red Hat Enterprise Linux
4. BackTrack 5 R1 (8800)	4. SUSE
5. Oracle Linux 5 Update 7 (6246)	5. Ubuntu
6. BackTrack 5 R2 (3277)	6. CentOS
7. Linux Mint 13 "KDE" (3206)	7. Damn Small Linux
8. Ubuntu 12.10 (2737)	8. Linux XP
9. Damn Small Linux 4.4.10 (1714)	9. Knoppix
10. Zorin OS 5 "Educational" (1398)	10. Debian
11. Zenwalk Linux 7.2 (1295)	11. Slackware
12. Wifislax 4.3 (881)	12. PCLinuxOS
13. Fedora 18 (712)	13. MEPIS
14. KNOPPIX 7.0.4 (671)	14. Gentoo
15. KNOPPIX 5.1.1 (448)	15. Linux Mint

Feb 1, 2013

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

40

Worldwide Smartphone Sales

Worldwide Mobile Device Sales to End Users by Operating System in 3Q12 (Thousands of Units)

Operating System	3Q12 Units	3Q12 Market Share (%)	3Q11 Units	3Q11 Market Share (%)
Google Android ⬆	122,480.0	72.4	60,490.4	52.5
Apple iOS ⬇	23,550.3	13.9	17,295.3	15.0
Blackberry Research In Motion ⬇	8,946.8	5.3	12,701.1	11.0
Bada	5,054.7	3.0	2,478.5	2.2
Nokia Symbian ⬇	4,404.9	2.6	19,500.1	16.9
Microsoft ⬆	4,058.2	2.4	1,701.9	1.5
Others	683.7	0.4	1,018.1	0.9
Total	**169,178.6**	**100.0**	**115,185.4**	**100.0**

Source: Gartner (November 2012)

http://www.gartner.com/newsroom/id/2237315

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How this class works

CIS 90
Fall 2013

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

- **1:00-4:05PM**, from **Sep 3rd** to **Dec 10th**

- 15 lessons (class meetings) total

- Final exam at **1-3:50PM**, on **Dec 17th**

```
        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  6              1  2  3     1  2  3  4  5  6  7
 7  8  9 10 11 12 13     4  5  6  7  8  9 10     8  9 10 11 12 13 14
14 15 16 17 18 19 20    11 12 13 14 15 16 17    15 16 17 18 19 20 21
21 22 23 24 25 26 27    18 19 20 21 22 23 24    22 23 24 25 26 27 28
28 29 30 31             25 26 27 28 29 30 31    29 30

      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  5                    1  2     1  2  3  4  5  6  7
 6  7  8  9 10 11 12     3  4  5  6  7  8  9     8  9 10 11 12 13 14
13 14 15 16 17 18 19    10 11 12 13 14 15 16    15 16 17 18 19 20 21
20 21 22 23 24 25 26    17 18 19 20 21 22 23    22 23 24 25 26 27 28
27 28 29 30 31          24 25 26 27 28 29 30    29 30 31
```

You may attend by either coming to room 828 or remotely using CCC Confer

43
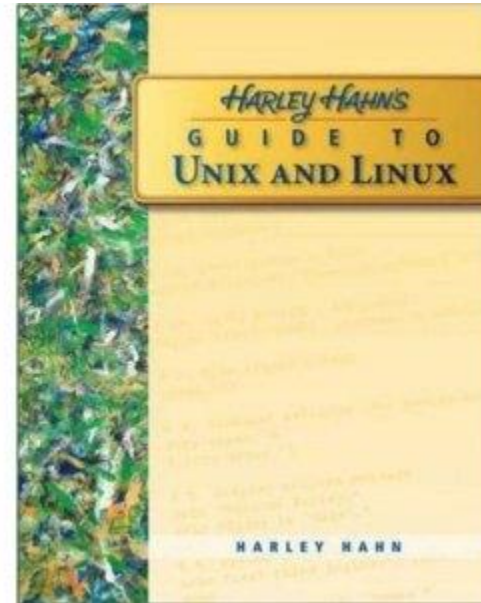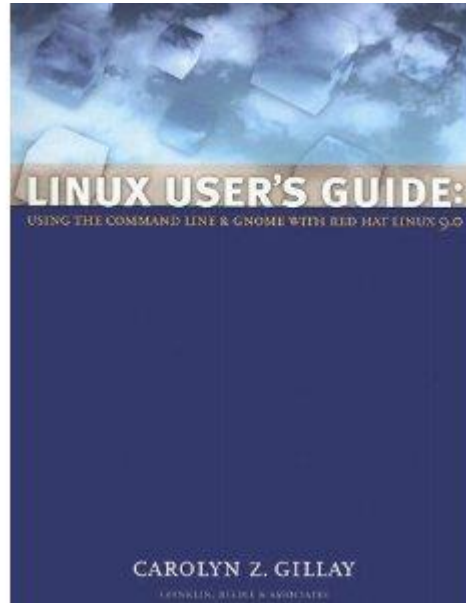
Optional Textbooks:

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)

Use Forum to
ask and answer
questions
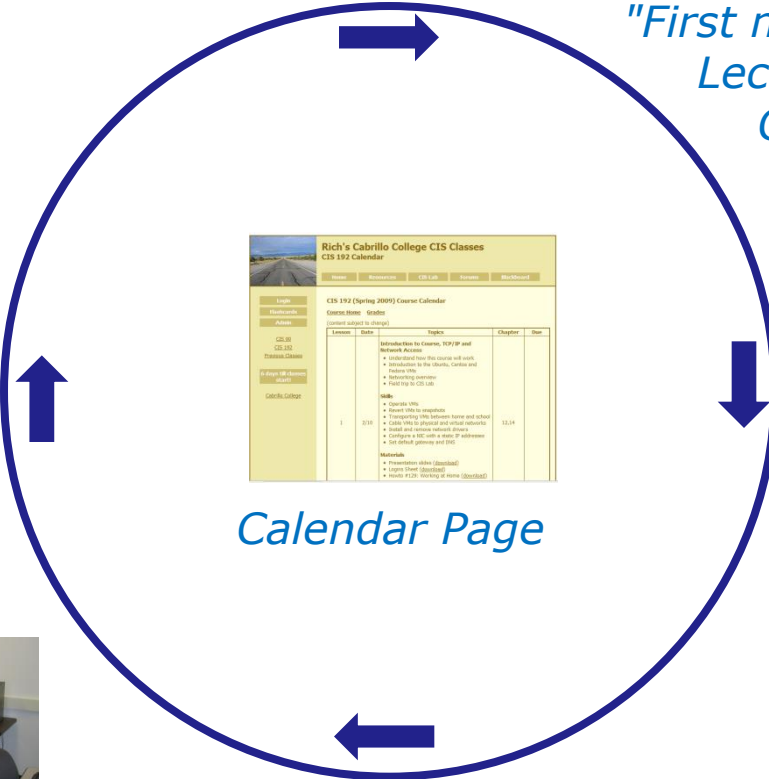
Calendar Page

Wednesday
is grading day

Check progress
on the Grades
Page

Work Lab Assignments
in the CIS Lab or from home
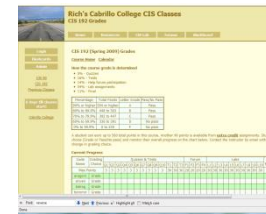
Check Extra Credit Page
if you need some more
points

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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

- Also available in the CIS Lab for help with lab assignments or class material:
  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 (class website)

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

*First click on **CIS 90** on left panel to see syllabus*

Rich's Cabrillo College CIS Classes
CIS 90 Home

| Home | Resources | Forums | CIS Lab | Blackboard |

Login

Flashcards

Admin

CIS 90
CIS 192
Previous Classes

9 days till term starts!

Cabrillo College
Web Advisor
Commands and Files

VLab RDP file
CIS 90 VLab VM Assignments
CIS 192 VLab Pod Assignments

CIS 90 Syllabus (Spring 2013) Section 78467

Calendar Grades

Introduction to UNIX/Linux

- Thursdays - 1:15PM to 4:20PM
  - Meets in room 2501 on the Aptos Main Campus
  - Meets simutaneously online in this virtual classroom for remote students
- Units: 3, prerequisites: none, recommended: CS 1L or CIS
- Optional Textbooks, available at the Cabrillo College Books
  - Linux User's Guide: Using the Command Line and GNOM
    - by Carolyn Z. Gillay
    - Franklin Beedle & Associates ISBN-13: 978-188790
  - Harley Hahn's Guide to Unix and Linux
    - by Harley Hahn
    - McGraw-Hill ISBN-13: 978-0073133614

Then click these links to toggle between Home (Syllabus), Calendar and Grades

Course Description

Provides a technical overview of the UNIX/Linux operating system, including hands-on experience with commands, files, and tools.

This is a starter course for people interested in learning how to use a UNIX/Linux computer. It is also a prerequisite to all the follow-on UNIX/Linux classes taught at Cabrillo College.

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Course Syllabus
(on the CIS 90 home page)

It is a good idea to read through the syllabus carefully to avoid any surprises and get a good idea how this course works.

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Course Calendar

First minute quiz

Lesson # and Date

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

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

Test

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

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Course Grading

Rich's Cabrillo College CIS Classes
CIS 90 Grades

| Home | Resources | Forums | CIS Lab | Blackboard |

CIS 90 (Spring 2013) Grades
Course Home   Calendar

Points can be earned from the following activities:

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

How your grade is determined:

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

Percentage	Total Points	Letter Grade	Pass/No Pass
90% or higher	504 or higher	A	Pass
80% to 89.9%	448 to 503	B	Pass
70% to 79.9%	392 to 447	C	Pass
60% to 69.9%	336 to 391	D	No pass
0% to 59.9%	0 to 335	F	No pass

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

Choice of Grade or Pass/No Pass

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

Recommendations

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

Current Progress

Code Name	Grading Choice	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	Project	Extra Credit	Total	Grade
Max Points		3	3	3	3	3	3	3	3	3	3	30	30	30	20	20	20	20	30	30	30	30	30	30	30	30	30	30	60	90	560	
anborn	grade																															

Monitor this page to track your progress in the course.

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

Use extra credit to earn 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.

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

Each student is assigned a secret LOR code name

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More on Grading

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0% to 59.9%	0 to 335	F	No pass

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

*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)

- Will be 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
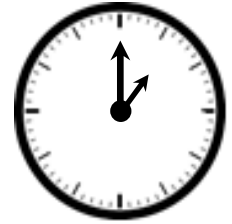
"First Minute" quizzes (10 quizzes, 3 points each)

As an incentive to start class on time, 3 points are awarded for correctly answering 3 questions, in the correct order, at the very beginning of class.

- The quiz questions are shown on CCC Confer at **1:00PM** sharp.

- The quiz questions are given out in advance and students can use the forum to collaborate on answers prior to class.

- 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.

- Quizzes are open book/notes. Students may not give or ask others for assistance while taking a quiz.

- To take the quiz, students email the answers to the instructor.

- There are **no makeup's** for these quizzes and they **must be turned in within the first few minutes of class**.

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More on Grading

Tests (3 tests, 30 points each)

• Tests will be distributed by during the last hour of the class.

• Test 3 is the final exam.

• Tests are usually comprised of fill-in-the-blank type questions. Often you will have to use a Linux server to verify an answer.

• Tests are open notes, open book, and open computer.

• Tests are designed to take about and hour and be turned in at the end of class. To minimize "clock stress" on Test 1 and 2, you may continue to work on the test after class is over and turn it no later than 11:59PM.

• **Students may not give or ask others for assistance while taking a test.**

• Tests 1 and 2 may be taken remotely online. Students must take Test 3 (the final exam) in room 828 on campus.

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

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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* (Forum 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 forum for this class 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!

Course outline and syllabus

Please don't forget:

1) **No makeup's for missed quizzes**

2) **Late work (lab assignments) will not be accepted**

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.

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

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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.

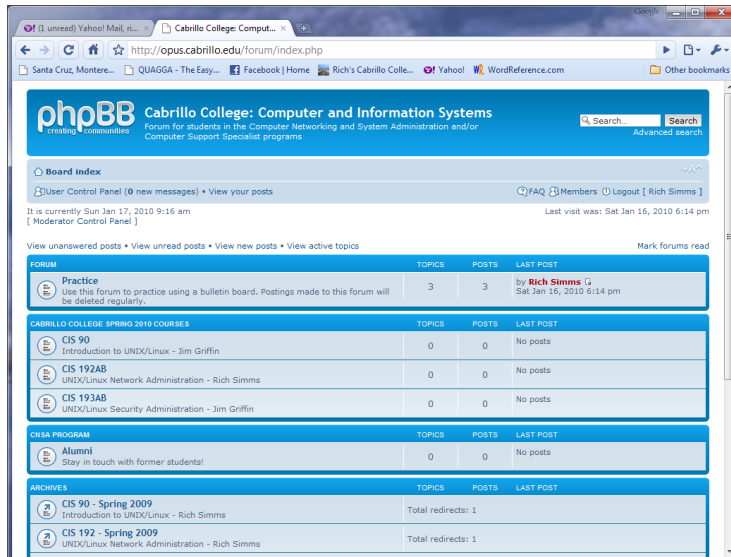- Use the Calendar web page to see due dates for all assignments.
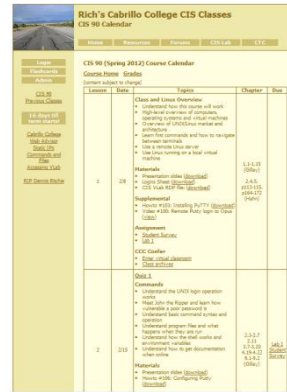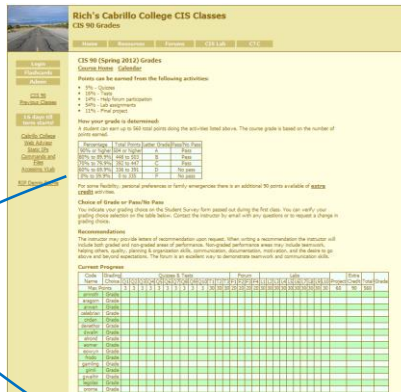
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0% to 59.9%	0 to 335	F	No pass

At the end of the course I use the table on the Grades web page to determine your grade

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Help Forum

Online Help Forum

- Post questions and answers

- Collaborate on lab assignments

- Share UNIX/Linux information

- Post class notes for classmates who miss class

- Get clarifications

- Collaborate on quiz questions

- Never 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
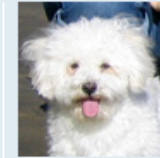
POSTREPLY ↙ | 🔍 Search this topic... | Search | 3 posts • Page 1 of 1

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.

Last edited by Benji Simms on Mon May 26, 2008 11:31 am, edited 1 time in total.
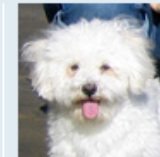
Benji Simms

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

- Usernames cannot be anonymous and must be:
  - Your real **first** and **last** name separated by a **space** e.g. Rich Simms
  - Your username must match a name on the class roster otherwise the account will be deleted

- Uploading an avatar is optional. Identifying photos are preferred so students can get to know each other.

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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.
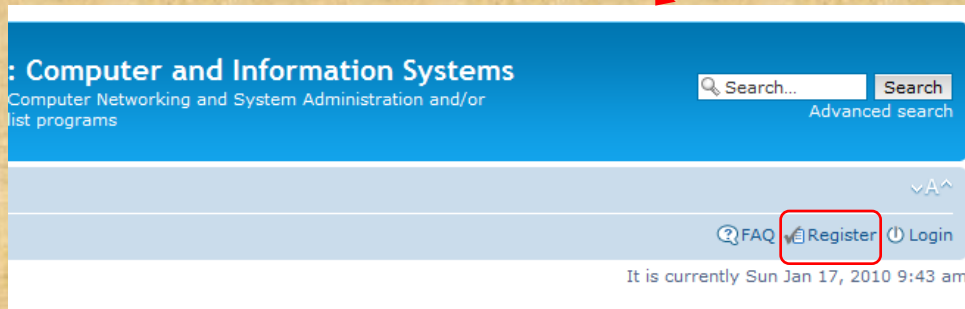
⬆ Board index ☑ Subscribe forum

Unsubscribed looks like this

⬆ Board index ☒ Unsubscribe forum

Subscribed looks like this

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Class Activity
Forum Registration

There is a Forums link on **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

∨A^

②FAQ ✓⊟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
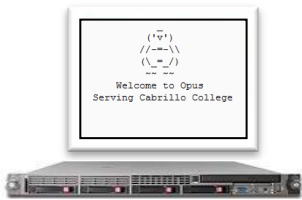   - match a name on the class roster

Note: If you have already registered you don't need to do it again. If your username is incomplete or does not match a name of the class roster it will be modified or deleted by the instructor.

Lab Resources

The CIS 90 Playground
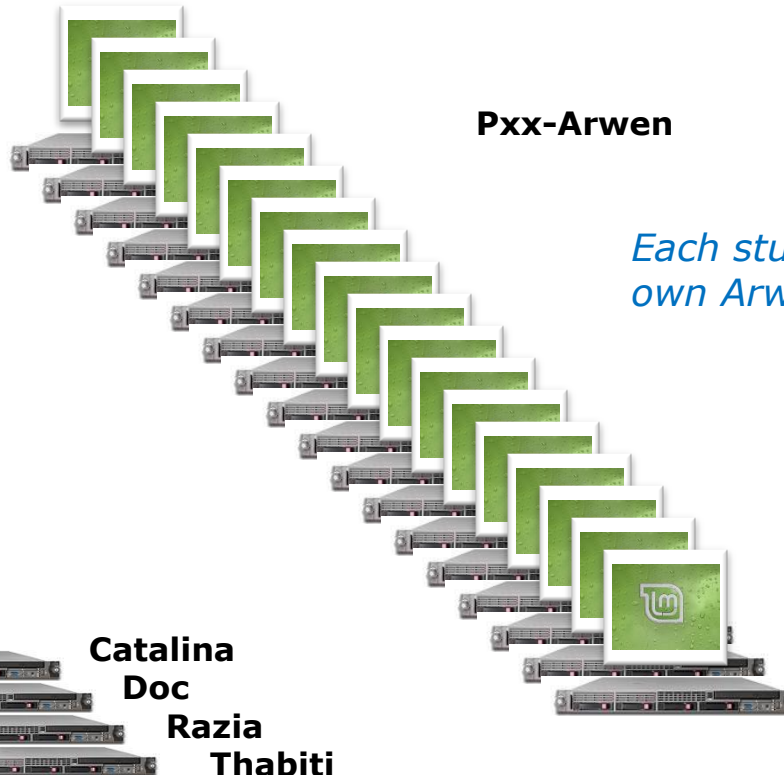
Configured for
Command Line Only

Configured for
Graphics and Command Line

Pxx-Arwen

Opus

Each student gets their own Arwen VM for the term

Sun-Hwa

Catalina
Doc
Razia
Thabiti

All the systems are virtual machines (VMs) available remotely from on or off-campus   65

The CIS Lab
Building 800 Room 830

A lab for CIS students with all the equipment needed to complete lab assignments

Instructors and lab assistants are available (see schedule) to help

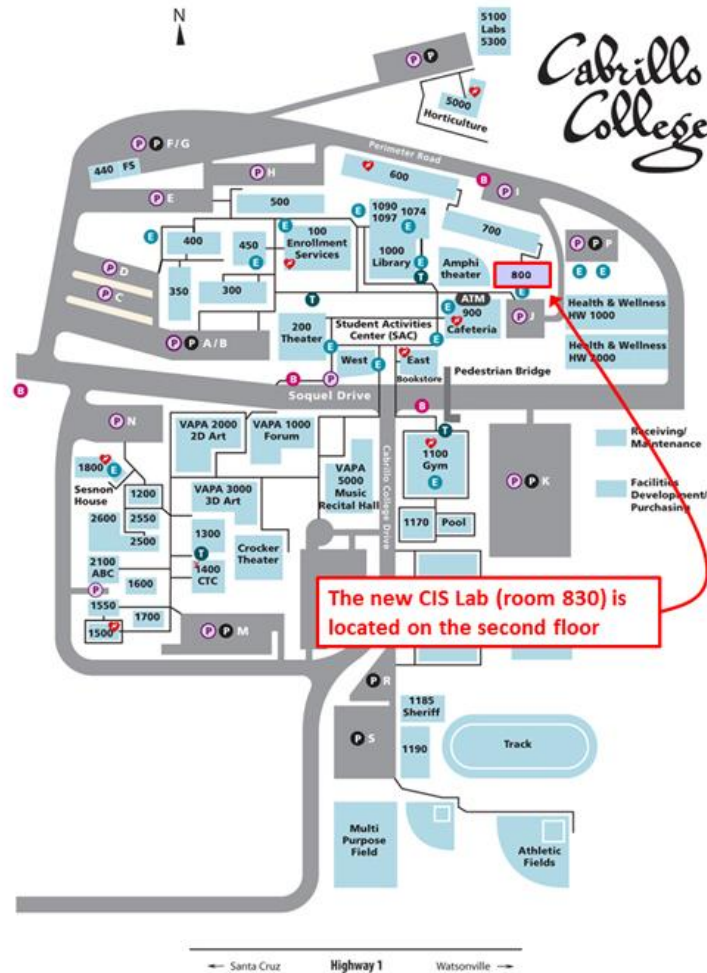**Rich's Cabrillo College CIS Classes**
CIS 90 Grades

| Home | Resources | Forums | CIS Lab | Blackboard |

Use this link to see the schedule and location
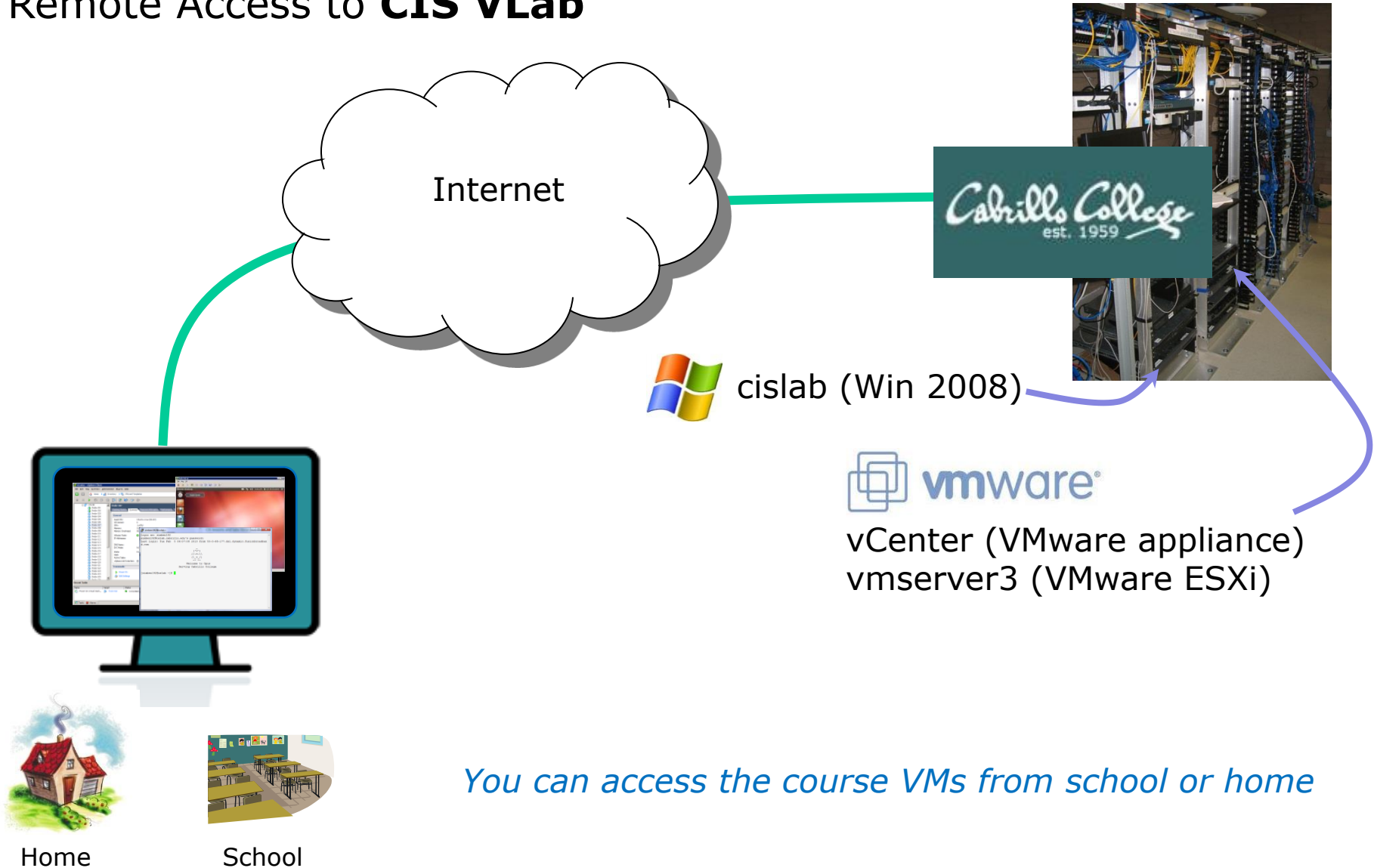
The CIS Lab
Building 800 Room 830

The new CIS Lab (room 830) is located on the second floor

Lab Resources
Remote Access to **CIS VLab**

CIS Lab on Aptos Campus

Internet

cislab (Win 2008)

vmware®

vCenter (VMware appliance)
vmserver3 (VMware ESXi)

You can access the course VMs from school or home

Home   School

CIS VLab

Each student gets their own Arwen VM for the term

Rich's Cabrillo College CIS Classes
Home Page

| Home | Resources | Forums | CIS Lab | Blackboard |

Rich Simms

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 Assignements

RIP Dennis Ritchie

Contact
- Email: risimms *at* cabrillo *dot* 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 Matera teaching

Metal   Sitemap   W3C XHTML 1.0   W3C CSS   Credits   Earth

CIS 90 VLab Assignments	
Student	**VM**
Aaron	P01-Arwen
Alexandr	P02-Arwen
Andrew B.	P03-Arwen
Andrew C.	P04-Arwen
Arthur	P05-Arwen
Benji	P06-Arwen
Brent	P07-Arwen
Brian	P08-Arwen
Cliff	P09-Arwen
Contessa	P10-Arwen
Cory	P11-Arwen
Daniel B.	P12-Arwen
Daniel H.	P13-Arwen
David G.	P14-Arwen
David L.	P15-Arwen
David P.	P16-Arwen
Davina	P17-Arwen
Debbie	P18-Arwen
Duke	P19-Arwen
Dylan	P20-Arwen
Edtson	P21-Arwen
Fidel	P22-Arwen
Homer	P23-Arwen
Humberto	P24-Arwen
Hunter	P25-Arwen
Ismael	P26-Arwen
Jessica	P27-Arwen
Jose	P28-Arwen
Joseph	P29-Arwen
Juliana	P30-Arwen
Leandro	P31-Arwen
Lucie	P32-Arwen
Marcus	P33-Arwen
Marty	P34-Arwen
Matthew	P35-Arwen
Michael B.	P36-Arwen
Michael P.	P37-Arwen
Nathan	P38-Arwen
Nicholas	P39-Arwen
Rochelle	P40-Arwen
Rudy	P41-Arwen
Shawn	P42-Arwen
Steve	P43-Arwen
Tabitha	P44-Arwen
Taylor	P45-Arwen
Tyler	P46-Arwen
William C.	P47-Arwen
William N.	P48-Arwen
Zachary	P49-Arwen
Zsolt	P50-Arwen
Tbd 1	P51-Arwen
Tbd 2	P52-Arwen
Tbd 3	P53-Arwen
Tbd 4	P54-Arwen
Tbd 5	P55-Arwen
Spare	P56-Arwen
Spare	P57-Arwen
Spare	P58-Arwen
Spare	P59-Arwen
Spare	P60-Arwen

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

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SSH

Getting the car

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

SSH is a network protocol that enables secure connections between computers

Remote Server

Opus Server

Sniffer view of a Telnet session


```
login: rrssiimmmmss
Password: nimbus2000
Last login: Sun Jul  6 18:47:03 from 192.168.1.254
[rsimms@server2-01 rsimms]$ ccaatt  sseeccrreett
The D-Day invasion is set for June 6th at Normandy
[rsimms@server2-01 rsimms]$ eexxiitt
logout
```

Telnet uses clear text

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

Sniffer view of a SSH session

SSH is encrypted

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

```
username
password
cat secret
exit
```

Local computer

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SSH is a standards based protocol
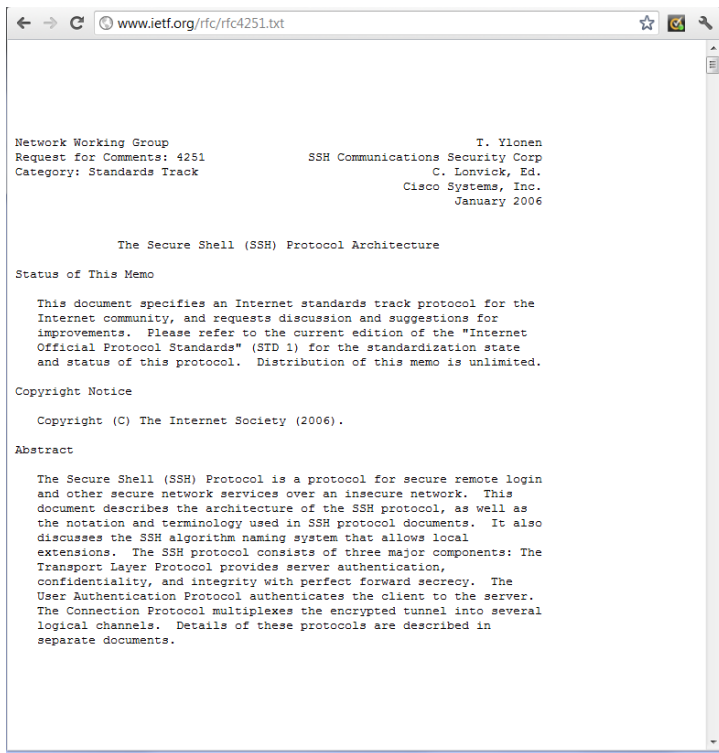
- See RFCs 4250 to 4254 at www.ietf.org

- "RFC" = Request for Comment

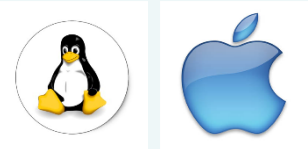- "IETF" = Internet Engineering Task Force

SSH tools

- Linux and Mac already have SSH built in

- Droid smartphones can use the ConnectBot app for SSH

- iPhones can use the iSSH app for SSH

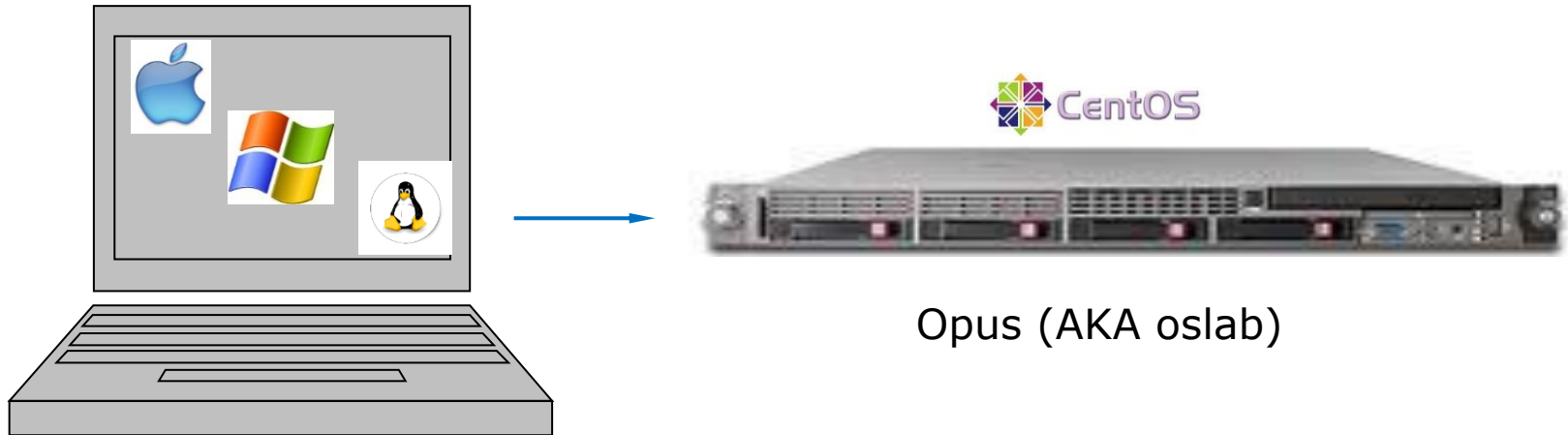- Windows can use the Putty app for SSH

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

Class Activity – SSH Prep

Operating System	Students in the classroom	Students at home
	  • Find putty.exe • Copy it to desktop • Run the Putty program	 • Google "putty download" • Download the putty.exe binary to your desktop • Run the Putty program http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
		• Run a Terminal

Logging Into Opus via SSH

First driving lesson

Opus (AKA oslab)

You can log into Opus from your home or classroom computer

SSH connection to a UNIX/Linux Server

You need to know three things:

- The **hostname** of the remote server (must be a *fully qualified domain name* when going over the Internet)

- Your **login credentials** (username/password) on the remote server

- The **port number** the SSH service is listening on (the default is port 22)
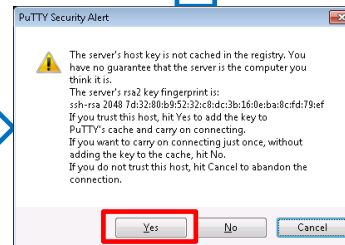
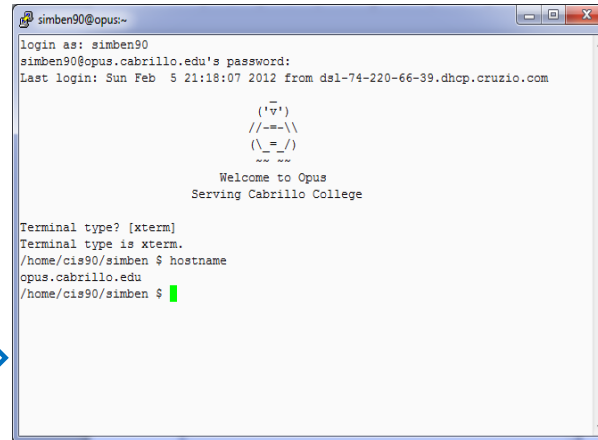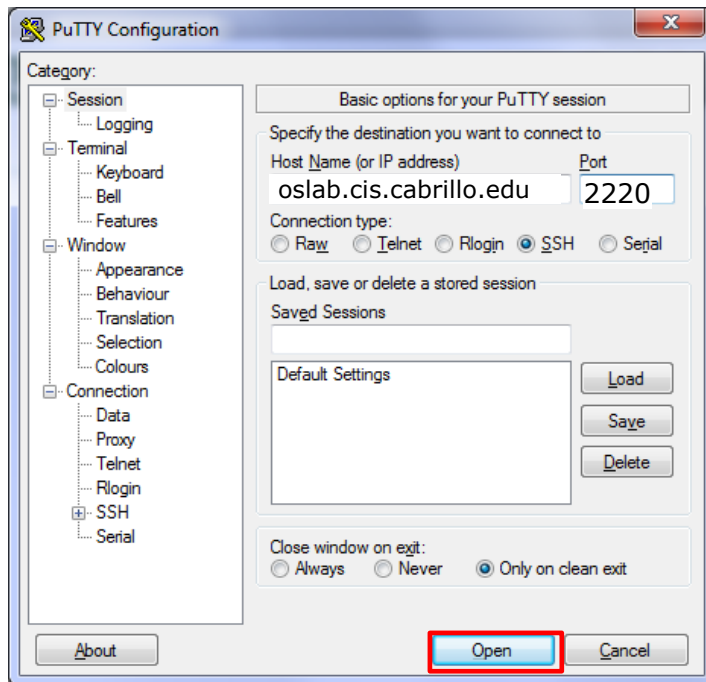## Logging into Opus from **home**

Opus

Temporary glitch:
If you get "**host does not exist**" use:
207.62.187.230 instead of oslab.cis.cabrillo.edu

On Windows run Putty

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

Logging into Opus from **home**

Opus
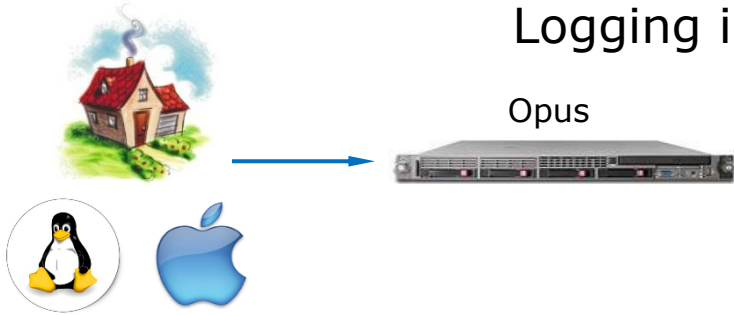
Temporary glitch:
If you get "**Could not resolve hostname"** use:
207.62.187.230 instead of oslab.cis.cabrillo.edu

On a Mac or Linux terminal:
ssh -p 2220 *username***@oslab.cis.cabrillo.edu**

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Logging into Opus from **the classroom or CIS Lab**
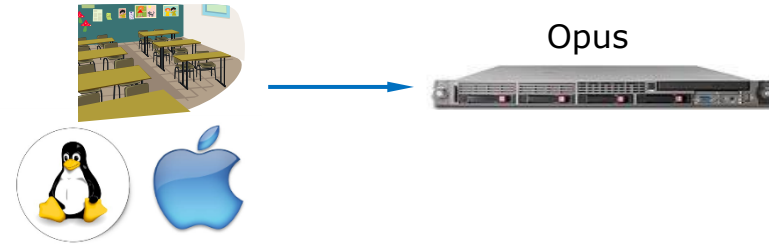
Opus

Opus

On Windows run Putty:
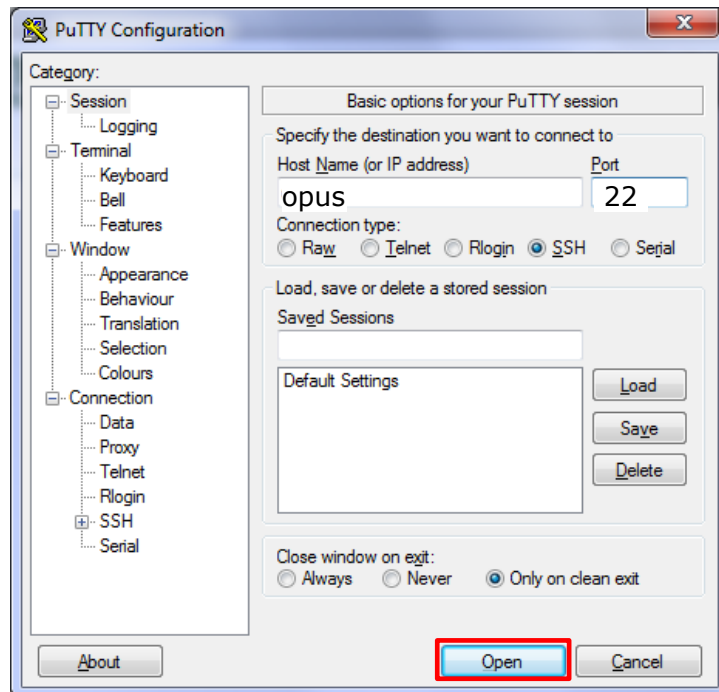
On a Mac or Linux terminal:

ssh *username***@opus**

When connected to the CIS network rather than the Cabrillo campus network you can just use "opus" as the hostname with port 22

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Accessing Opus from a Windows PC using Putty
Log in with username and password

username

password
(not echoed)

Hit Enter key here to accept default terminal type

Use exit command to end session

Class Activity

Temporary glitch:
If you get **hostname error** use:
207.62.187.230 instead of oslab.cis.cabrillo.edu

	Hostname	Port
Home or campus wireless network	oslab.cis. cabrillo.edu	2220
Classroom or CIS Lab PCs	opus	22

1. Use Putty (or a Mac terminal) and connect to Opus

2. Login using your unique username and password

3. Use the **exit** command to end the session

Lesson 1 Commands

First maneuvers

First commands for your toolbox

cal - show calendar
date - show current time and date
clear - clear the terminal screen

hostname - show the name of the computer being accessed
ps - show processes (includes shell) being run
uname - show kernel name
cat /etc/issue - usually shows distro (distribution) name
cat /etc/*-release - usually shows distro (distribution) name

who - show everyone logged in
who am i - identifies which login session you are using
tty - show terminal device
id - show username and group information

history - show previous commands

exit - terminate your shell and log off

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Lesson 1 Commands

```
login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Sun Aug 26 08:54:09 2012 from 41-3-21-
105.dsl.dynamic.fusionbroadban
d.com

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


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

Shell prompt

The initial shell prompt string on Opus, for the user simben90, is "/home/cis90/simben $ "

The prompt is used by the shell to request a command from the user.

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Lesson 1 Commands

```
login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Sun Aug 26 08:54:09 2012 from 41-3-21-
105.dsl.dynamic.fusionbroadban
d.com

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


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

*Entering the **cal** command after the prompt tells the shell to run the cal program. The cal program shows a calendar for the current month.*

Lesson 1 Commands

```
/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 $ date
Mon Aug 27 09:01:29 PDT 2012
```

*Adding month and year arguments to the **cal** command lets you specify any month of any year*

*The **date** command runs the date program which shows the current date and time*

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Lesson 1 Commands

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

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

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

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

*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
```

Lesson 1 Commands

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

Shell prompt

The clear command will clear the screen.

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

Lesson 1 Commands

```
/home/cis90/simben $ hostname
opus.cislab.net
```

*The **hostname** command shows the name of the system being interacted with*

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

*The **ps** command shows the processes (programs loaded into memory and running) belonging to your username. This is an easy way to see the name of the shell program being used which is **bash** in this example.*

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

*The **uname** command shows the name of the kernel being used. In this example the kernel is Linux.*

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

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

*These two **cat** commands can usually be used to show the name of the Linux distribution being used. In this case version 6.2 of the CentOS distribution is being used.*

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Lesson 1 Commands

```
/home/cis90/simben $ who
simben90 pts/0        2012-08-27 09:00 (50-0-68-235.dsl.dynamic.fusionbroadband.com)
milhom90 pts/1        2012-08-27 09:02 (50-0-68-235.dsl.dynamic.fusionbroadband.com)
rsimms   pts/2        2012-08-27 09:03 (50-0-68-235.dsl.dynamic.fusionbroadband.com)
rsimms   pts/3        2012-08-27 09:03 (50-0-68-235.dsl.dynamic.fusionbroadband.com)
cis90    pts/4        2012-08-27 09:55 (p1-hugo.cislab.net)
```

*The **who** commands show all users currently logged in. It also shows the terminal device they are using, when they logged in, and where they logged in from. For example, the cis90 user is using the pts/4 terminal device and logged in from the Hugo server in Pod 1 (p1-hugo) at 9:55AM on August 27th. The other uses are logged in from off campus.*

```
/home/cis90/simben $ who am i
simben90 pts/0        2012-08-27 09:00 (41-3-21-105.dsl.dynamic.fusionbroadband.com)
```

*The **who am i** command indicates the specific login session you are using. This is a good way to distinguish which session you are currently interacting when you have more than one login session underway.*

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

*The **tty** command shows the terminal device being used for the login session. Note: "/dev/pts/0" is the same device as the abbreviated "pts/0" shown in the **who** and **who am i** command output. Every login session uses a unique terminal device*

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Lesson 1 Commands

```
/home/cis90/simben $ id
uid=1001(simben90) gid=190(cis90) groups=190(cis90),100(users)
context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
```

*The **id** command shows the username and UID (User ID) number as well as additional information. In the example above the user is simben90 and the user ID number is 1001*

```
/home/cis90/simben $ id milhom90
uid=1002(milhom90) gid=190(cis90) groups=190(cis90),100(users)

/home/cis90/simben $ id rsimms
uid=201(rsimms) gid=503(staff) groups=503(staff),100(users),190(cis90),191(cis191),192(cis192)
```

*Specifying a username as an argument on the **id** command with show user ID's for other users. For example the UID number for milhome90 is 1002 and for rsimms it is 201.*

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```
/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*

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

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

Class Activity

Use Putty (or a Mac terminal) and log into Opus

Try these commands:

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

Using CIS VLab (Virtual Lab)

Third driving lesson

Lab Resources
Remote Access to **CIS VLab**

Room 1403 on Aptos Campus

Internet

cislab (Win 2008)

vmware®

vCenter (VMware appliance)
vmserver3 (VMware ESXi)

You can access the course VMs from school or home

Home   School

Getting to CIS VLab

1

Open

2

Login

Connect

Ignore

Wait …

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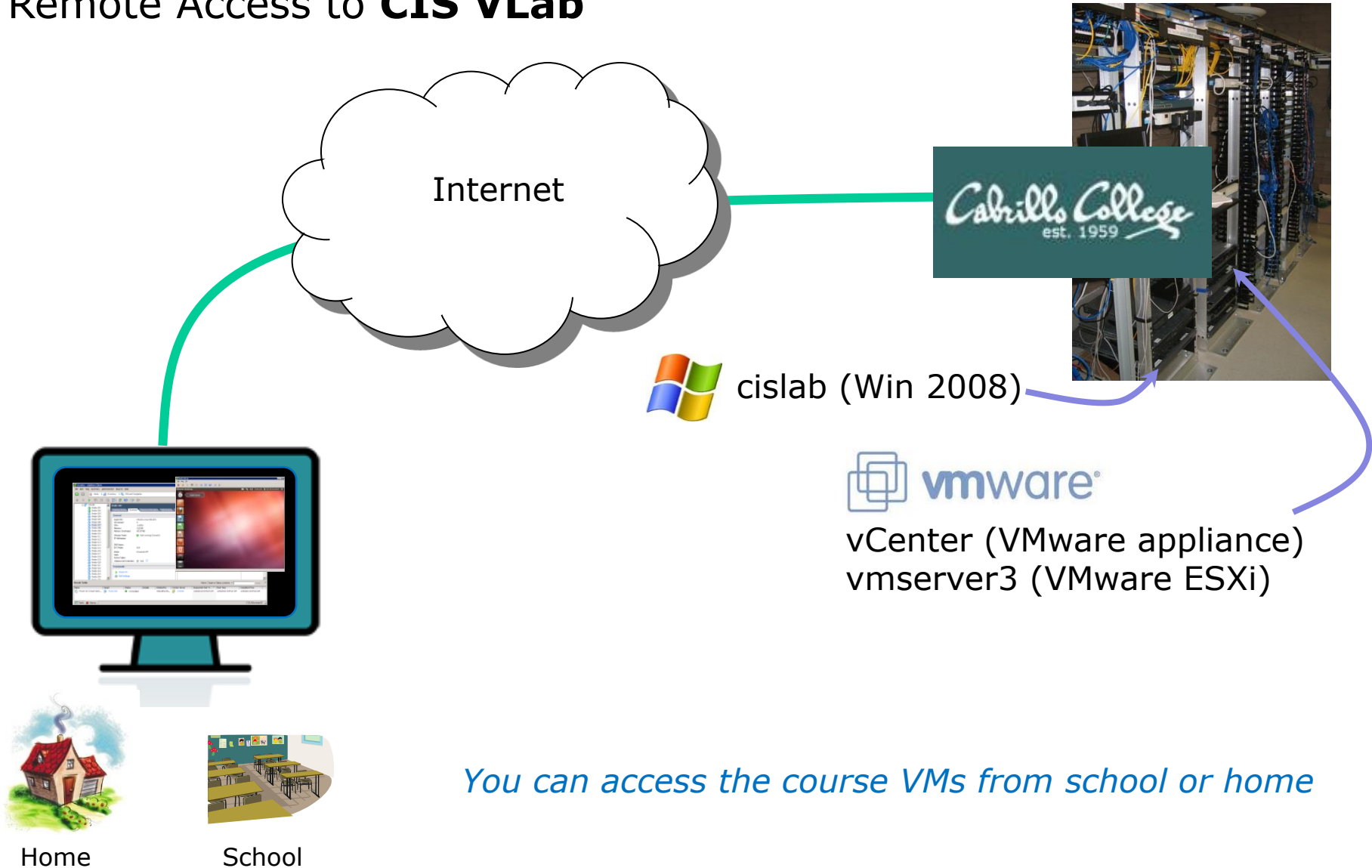
1) Download the vcenter.rdp file to your desktop and then open it to access VLab.

2) Mac users only will need to install CoRD.

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

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CIS VLab Home View

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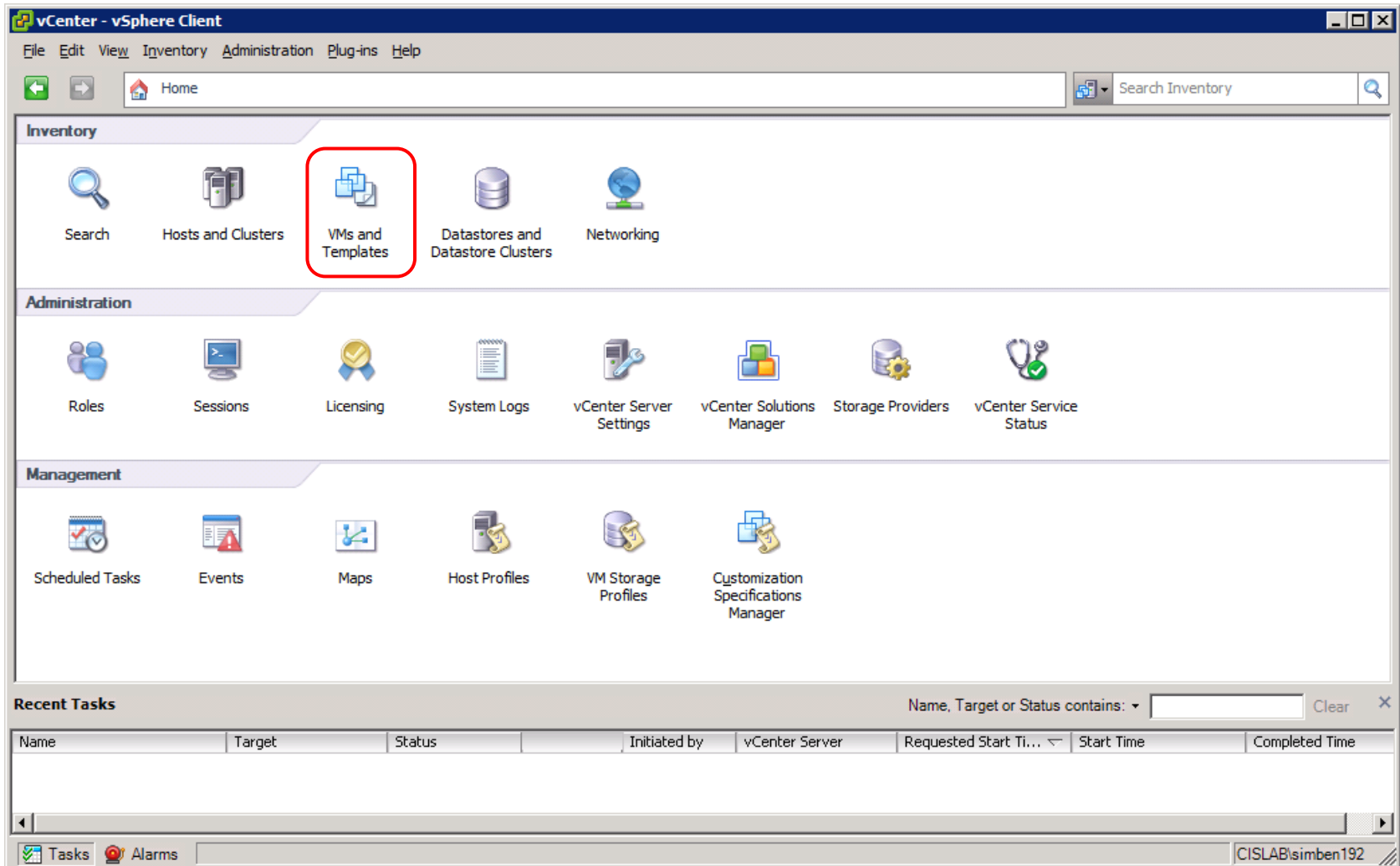
Click VMs and Templates to get to your course VMs

CIS Vlab VMs and Templates View

Peel off a separate window for a VM console

One Arwen VM is assigned to each student for the semester

VMware vSphere Client

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Powering On a VM

Note that p01-arwen through p10-arwen VMs are already powered on

CIS 90 VLab Assignments

| Student	VM
Aaron	P01-Arwen
Alexandr	P02-Arwen
Andrew B.	P03-Arwen
Andrew C.	P04-Arwen
Arthur	P05-Arwen
Benji	P06-Arwen
Brent	P07-Arwen
Brian	P08-Arwen
Cliff	P09-Arwen
Contessa	P10-Arwen
Cory	P11-Arwen
Daniel B.	P12-Arwen
Daniel H.	P13-Arwen
David G.	P14-Arwen
David L.	P15-Arwen
David P.	P16-Arwen
Davina	P17-Arwen
Debbie	P18-Arwen
Duke	P19-Arwen
Dylan	P20-Arwen
Edtson	P21-Arwen
Fidel	P22-Arwen
Homer	P23-Arwen
Humberto	P24-Arwen
Hunter	P25-Arwen
Ismael	P26-Arwen
Jessica	P27-Arwen
Jose	P28-Arwen
Joseph	P29-Arwen
Juliana	P30-Arwen
Leandro	P31-Arwen
Lucie	P32-Arwen
Marcus	P33-Arwen
Marty	P34-Arwen
Matthew	P35-Arwen
Michael B.	P36-Arwen
Michael P.	P37-Arwen
Nathan	P38-Arwen
Nicholas	P39-Arwen
Rochelle	P40-Arwen
Rudy	P41-Arwen
Shawn	P42-Arwen
Steve	P43-Arwen
Tabitha	P44-Arwen
Taylor	P45-Arwen
Tyler	P46-Arwen
William C.	P47-Arwen
William N.	P48-Arwen
Zachary	P49-Arwen
Zsolt	P50-Arwen
Tbd 1	P51-Arwen
Tbd 2	P52-Arwen
Tbd 3	P53-Arwen
Tbd 4	P54-Arwen
Tbd 5	P55-Arwen
Spare	P56-Arwen
Spare	P57-Arwen
Spare	P58-Arwen
Spare	P59-Arwen
Spare	P60-Arwen

To see which Arwen VM is yours use the link on the class website
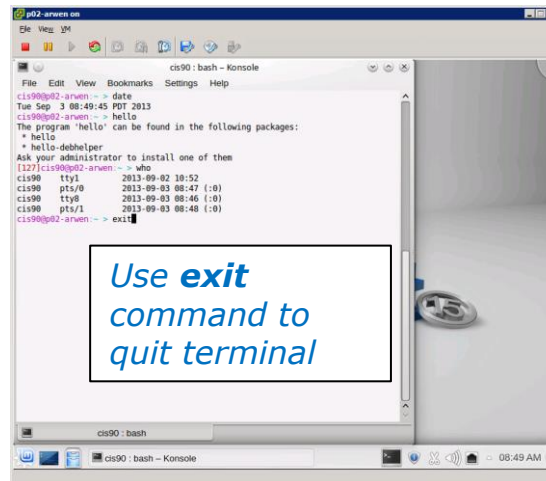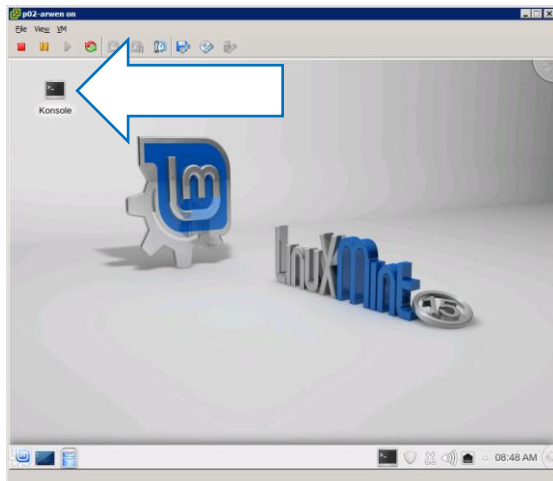
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Log in as
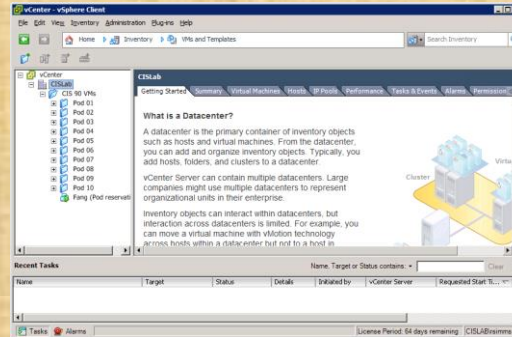**CIS 90 Student**

Shutdown using
> Leave > Shut Down…

The Arwen VM
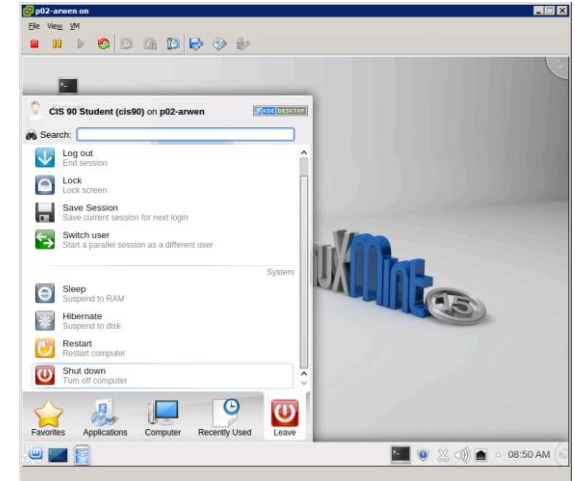
To get a graphical terminal
Terminal icon (under System Settings)

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

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Class Activity

Try logging into CIS VLab with your **own credentials**
- Find your Arwen VM
- Power it on (if it's not already)
- Open a separate console for your Arwen 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

Use virtual terminals (tty's) to have multiple login sessions on one system

While holding down Crtl-⊞-Alt keys, tap Space, then tap Fn key

Ctrl-⊞-Alt-Space-F1 (for tty1)

Ctrl-⊞-Alt-Space-F2 (for tty2)

Ctrl-⊞-Alt-Space-F5 (for tty5)

Ctrl-⊞-Alt-Space-F8 (for tty1)

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Changing Virtual TTY
Terminals using
VMware vSphere

Windows PC
Keyboard

Ctrl-⊞-Alt, Space, F7**
(for graphics)

** F8 on LinuxMint

While holding down Crtl-⊞-Alt
keys, tap Space, then tap Fn key*

Ctrl-⊞-Alt, Space, F6
(for tty6)

Ctrl-⊞-Alt, Space, F1
(for tty1)

Ctrl-⊞-Alt, Space, F5
(for tty5)

Ctrl-⊞-Alt, Space, F2
(for tty2)
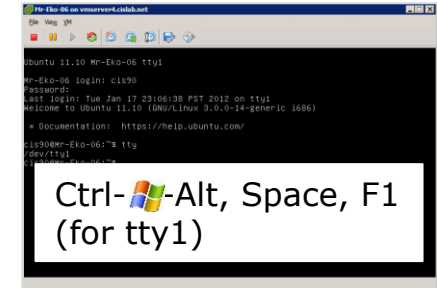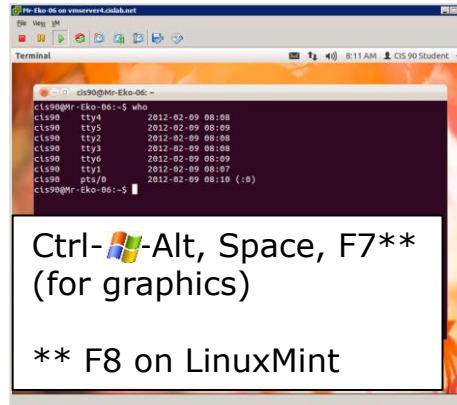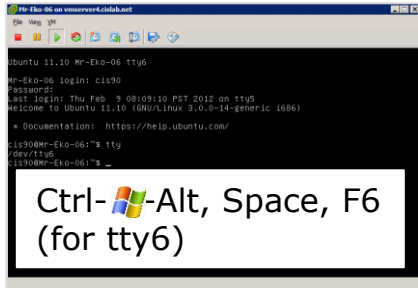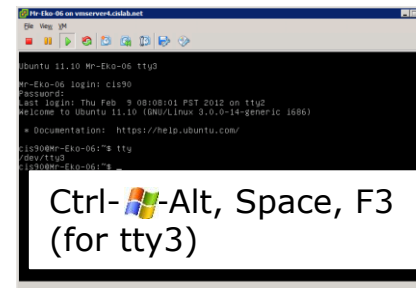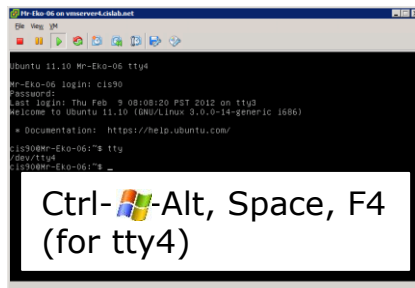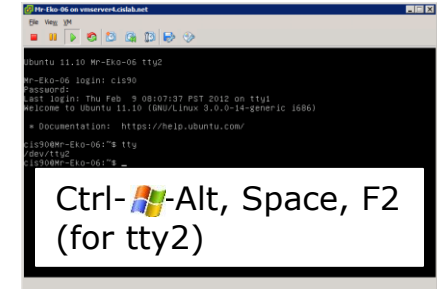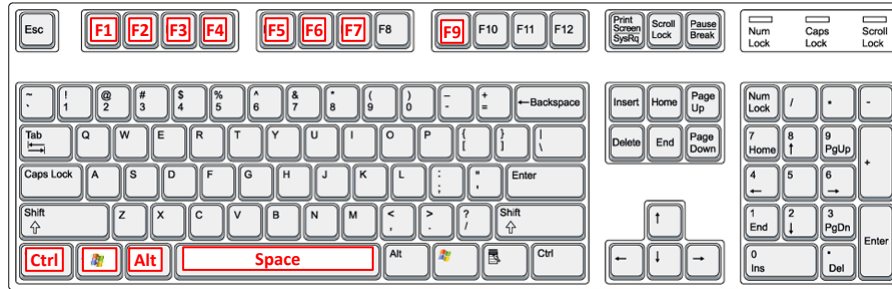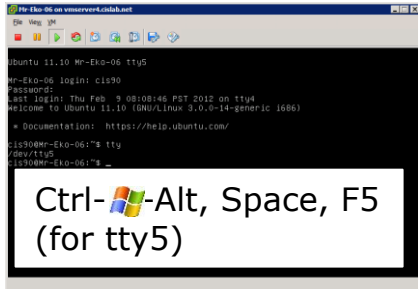
*On some PC
keyboards it is not
necessary to use
the ⊞ key

Ctrl-⊞-Alt, Space, F4
(for tty4)

Ctrl-⊞-Alt, Space, F3
(for tty3)

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

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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.

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VMware VM Operations
Changing Virtual Terminals with a PC keyboard
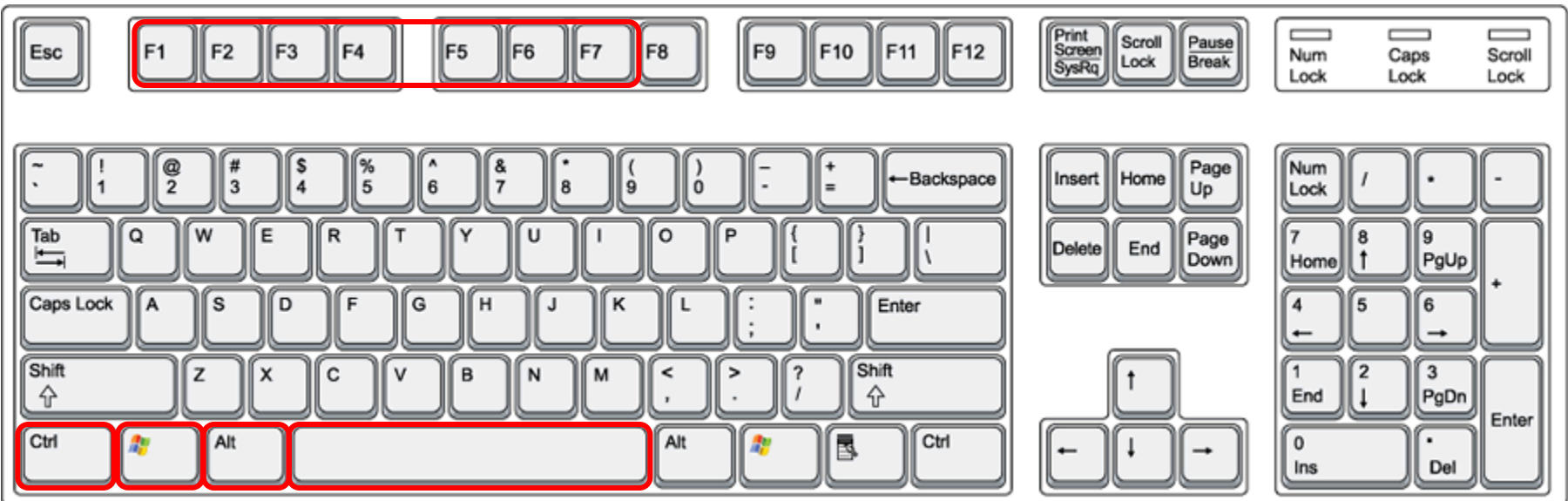
On PC keyboard:
   While holding down the **Ctrl-Alt** keys,
   tap **Spacebar** then tap **F**N key
      (where N=1-7 to specify a function key)

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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-FN** keys
        (where N=1-7 to specify a function key)

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Class Activity

Ctrl-🪟-Alt-Space-F2

Ctrl-🪟-Alt-Space-F1

Ctrl-🪟-Alt-Space-F8
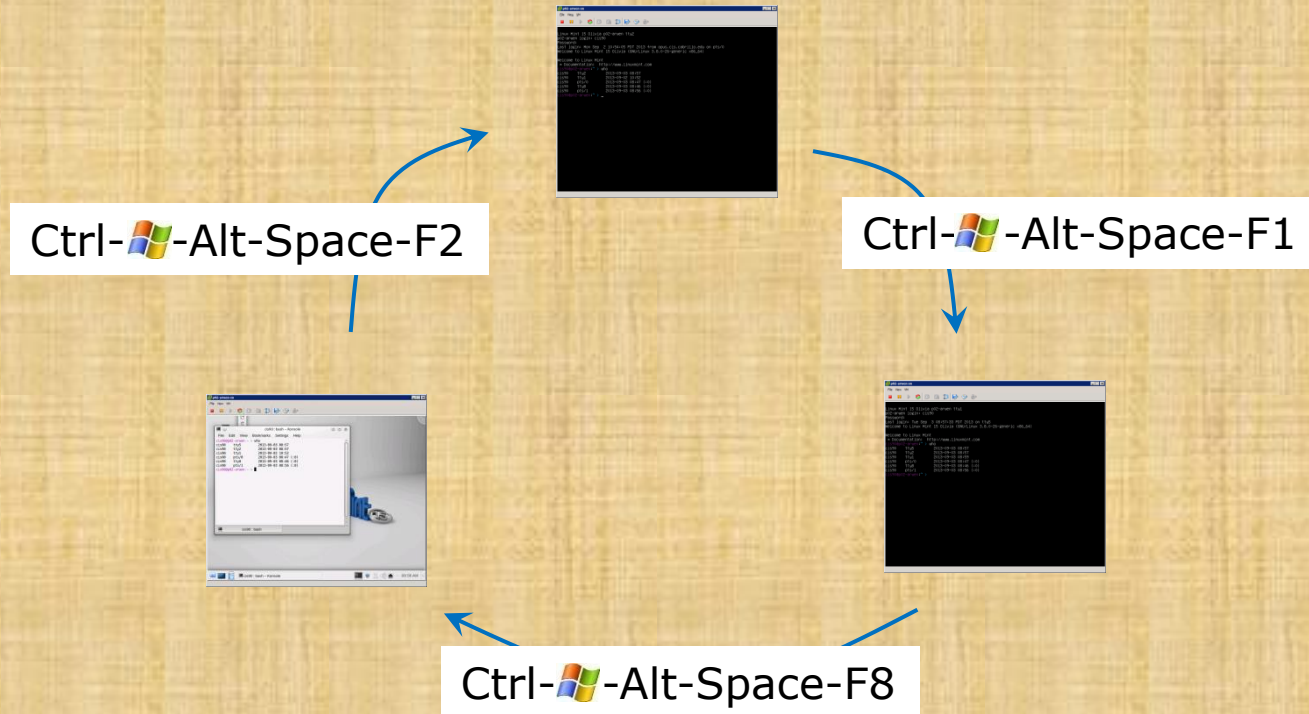
On your Arwen VM:
- Try changing between the graphical desktop and the TTYs
- Login as cis90 on tty1 and tty2
- Run a terminal on the graphical desktop
- Use the who command to see how many logins there are

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Logging Into VLab VMs via Opus Using IP addresses

More commands for your toolbox
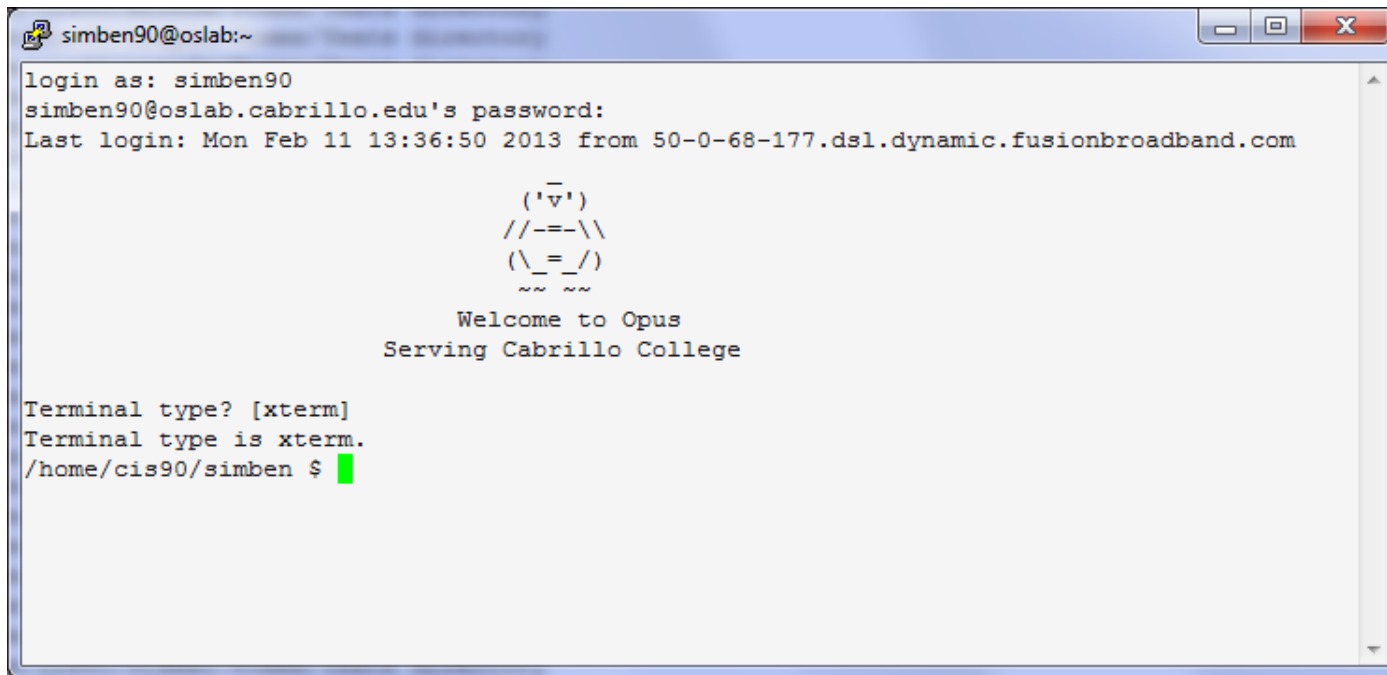
ifconfig   *show IP address*

Logging into your Arwen VM from Opus

Step 1 - Log into Opus

```
simben90@oslab:~                                                    [ - ] [ □ ] [ x ]

login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Mon Feb 11 13:36:50 2013 from 50-0-68-177.dsl.dynamic.fusionbroadband.com

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

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

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Logging into your Arwen VM from Opus

Step 2 - Run a terminal on your Arwen VM and type the **ifconfig** command

Look for your IP address in the output of the ifconfig command

To specify just the eth0 interface use:
ifconfig eth0

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Logging into your Arwen VM from Opus

Step 3 - Use SSH to login to Arwen from Opus

Login in as the cis90 user

Use the IP address for your Arwen VM

Enter the password for the cis90 user

```
simben90@oslab:~
/home/cis90/simben $ ssh cis90@172.20.90.2
The authenticity of host '172.20.90.2 (172.20.90.2)' 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 '172.20.90.2' (RSA) to the list of known hosts.
cis90@172.20.90.2'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: Tue Sep  3 08:59:20 2013
cis90@p02-arwen:~ > hostname
p02-arwen
cis90@p02-arwen:~ > 
```

Notice the prompt changes after logging into Arwen to indicate you are now communicating with a different Linux system

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Logging out of your Arwen VM and back to Opus

Use the exit command on Arwen to pop back to Opus

Notice the prompt changes after exiting Arwen to indicate you are back on Opus again

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Class Activity

1. Use Putty (or a Mac terminal) and login to Opus

2. In VLab, determine your Arwen's IP address with the **ifconfig** command

3. Use **ssh cis90@**<*ip address*> to login to your Arwen from Opus

4. Check your prompt on Arwen -- is it your assigned Arwen VM?

5. Use the **exit** command to end the Arwen session and return to Opus

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Logging Into VLab VMs via Opus using hostnames

Benji's journey through some VLab VMs

doc

6) ssh to doc

catalina

4) ssh to thabiti

2) ssh to p06-arwen

3) ssh to catalina

p06-arwen

Opus

thabiti

From off campus, the firewall only allows entering VLab via Opus

5) ssh back to arwen

1) Putty or ssh to opus

Home or Lab Computer

121
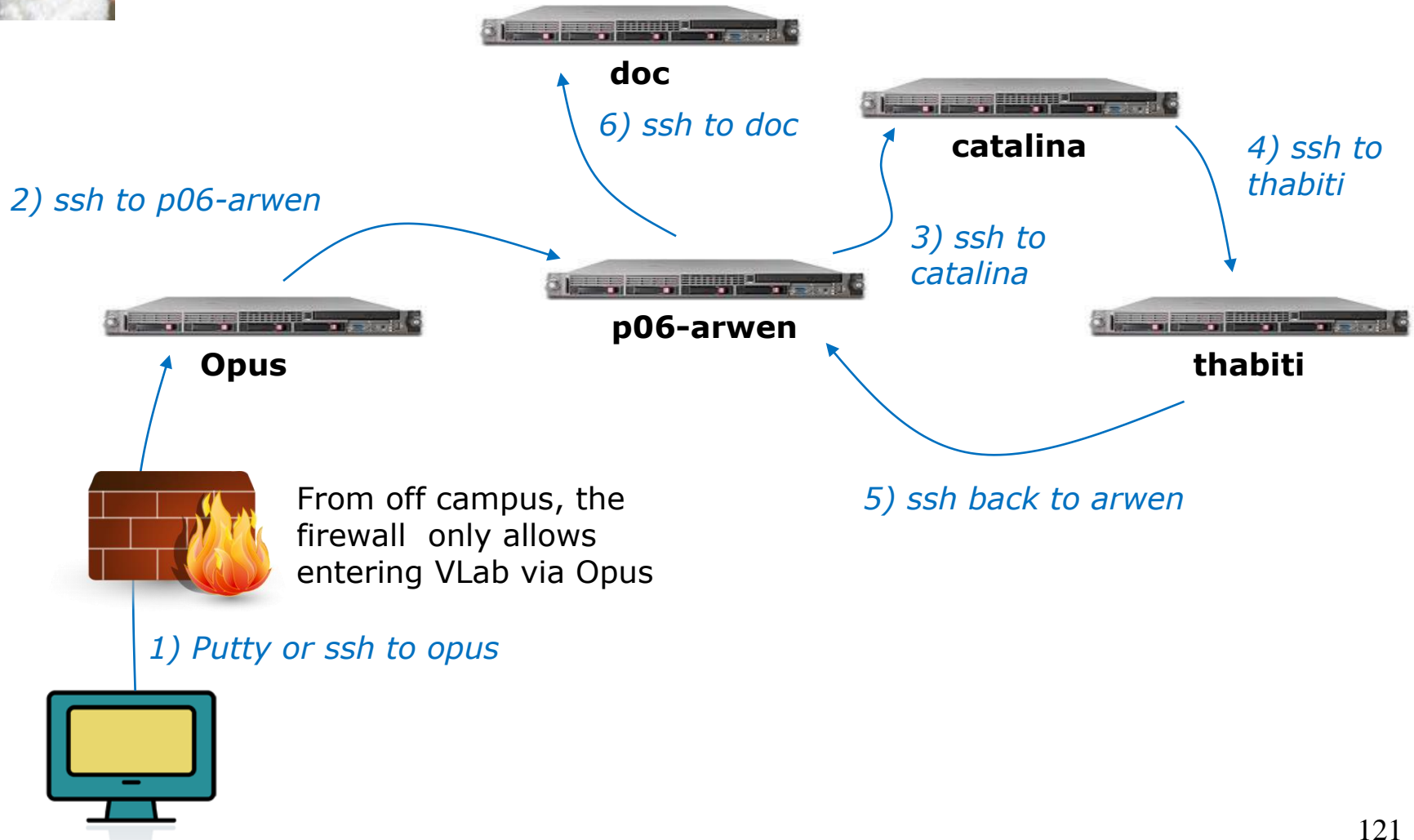
```
cis90@doc: ~                                                    _ □ X

login as: simben90                          1) Putty or ssh to opus
simben90@oslab.cishawks.net's password:
Last login: Sat Sep  7 13:35:01 2013 from 50-0-124-216.dsl.dynamic.fusionbroadba
nd.com


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

Terminal type? [xterm]
Terminal type is xterm.
/home/cis90/simben $ hostname
oslab.cishawks.net
/home/cis90/simben $ ssh cis90@p06-arwen     2) ssh to p06-arwen
cis90@p06-arwen'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: Sat Sep  7 13:38:35 2013 from 172.20.90.201
cis90@p06-arwen:~ >
cis90@p06-arwen:~ > hostname
p06-arwen
cis90@p06-arwen:~ >
cis90@p06-arwen:~ >
```
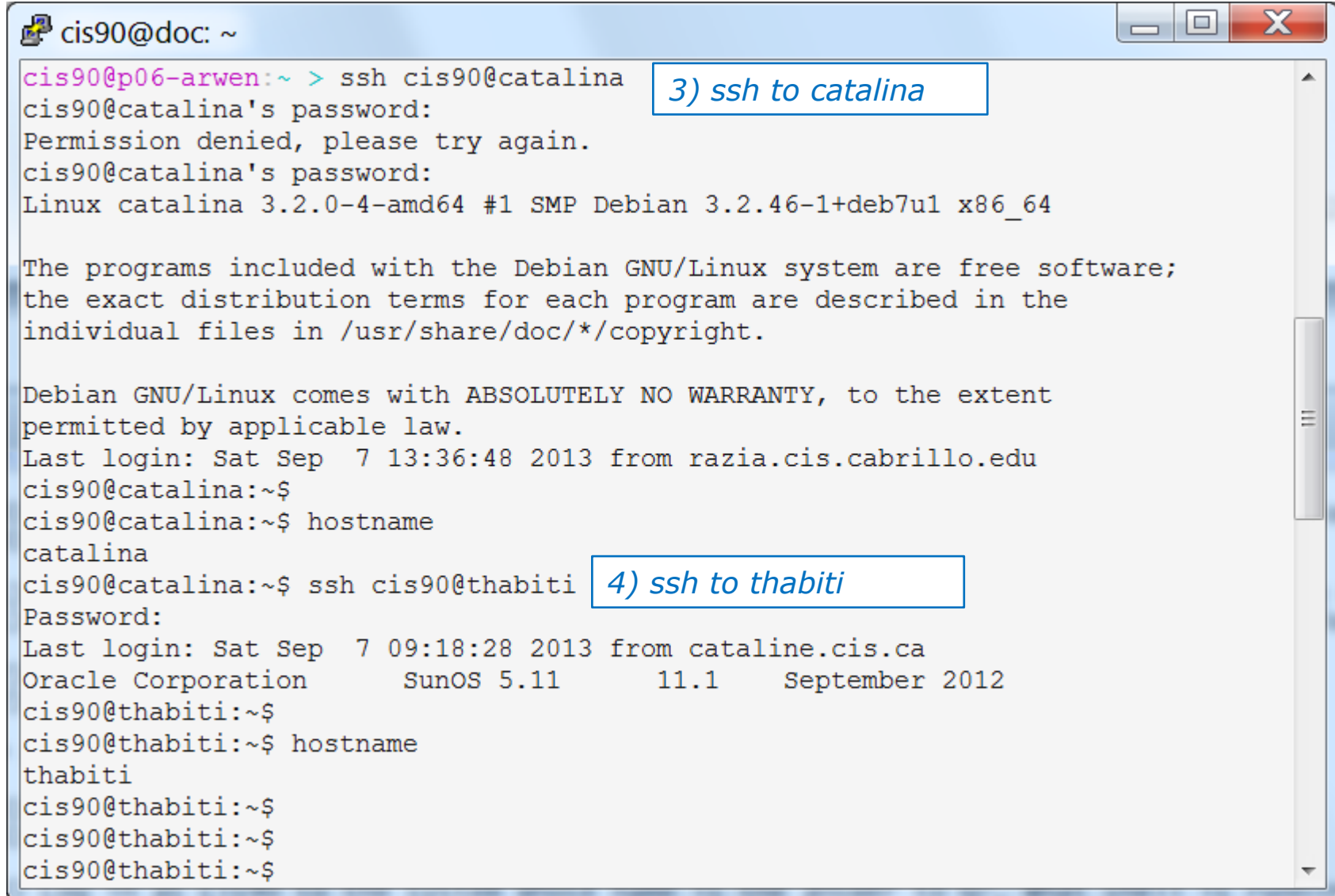
122

```
cis90@doc: ~

cis90@p06-arwen:~ > ssh cis90@catalina        3) ssh to catalina
cis90@catalina's password:
Permission denied, please try again.
cis90@catalina's password:
Linux catalina 3.2.0-4-amd64 #1 SMP Debian 3.2.46-1+deb7u1 x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sat Sep  7 13:36:48 2013 from razia.cis.cabrillo.edu
cis90@catalina:~$
cis90@catalina:~$ hostname
catalina
cis90@catalina:~$ ssh cis90@thabiti        4) ssh to thabiti
Password:
Last login: Sat Sep  7 09:18:28 2013 from cataline.cis.ca
Oracle Corporation      SunOS 5.11      11.1     September 2012
cis90@thabiti:~$
cis90@thabiti:~$ hostname
thabiti
cis90@thabiti:~$
cis90@thabiti:~$
cis90@thabiti:~$
```

123
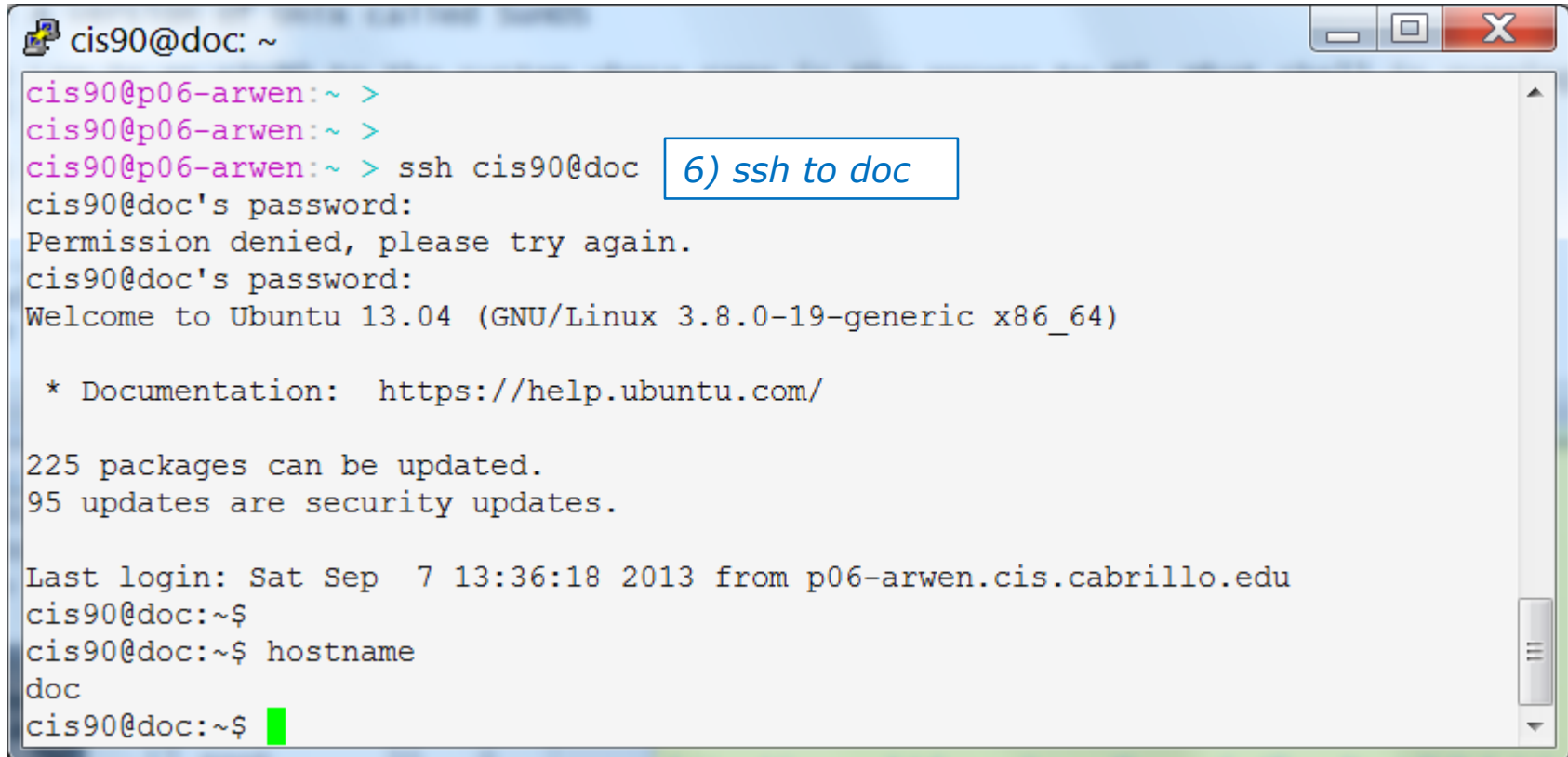
cis90@doc: ~

```
cis90@thabiti:~$
cis90@thabiti:~$ ssh p6-arwen
ssh: p6-arwen: node name or service name not known
cis90@thabiti:~$ ssh cis90@p6-arwen
ssh: p6-arwen: node name or service name not known
cis90@thabiti:~$ ssh cis90@p06-arwen
The authenticity of host 'p06-arwen (172.20.90.6)' 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 'p06-arwen,172.20.90.6' (RSA) to the list of known ho
sts.
cis90@p06-arwen'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: Sat Sep  7 13:41:09 2013 from opus.cis.cabrillo.edu
cis90@p06-arwen:~ >
cis90@p06-arwen:~ > hostname
p06-arwen
cis90@p06-arwen:~ > who
cis90    pts/0        2013-09-07 13:41 (opus.cis.cabrillo.edu)
cis90    pts/1        2013-09-07 13:44 (thabiti.cis.cabrillo.edu)
cis90@p06-arwen:~ > tty
/dev/pts/1
cis90@p06-arwen:~ >
```

5) ssh back to arwen

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```
cis90@doc: ~                                           □ □ X

cis90@p06-arwen:~ >
cis90@p06-arwen:~ >
cis90@p06-arwen:~ > ssh cis90@doc    6) ssh to doc
cis90@doc's password:
Permission denied, please try again.
cis90@doc's password:
Welcome to Ubuntu 13.04 (GNU/Linux 3.8.0-19-generic x86_64)

 * Documentation:  https://help.ubuntu.com/

225 packages can be updated.
95 updates are security updates.

Last login: Sat Sep  7 13:36:18 2013 from p06-arwen.cis.cabrillo.edu
cis90@doc:~$
cis90@doc:~$ hostname
doc
cis90@doc:~$
```
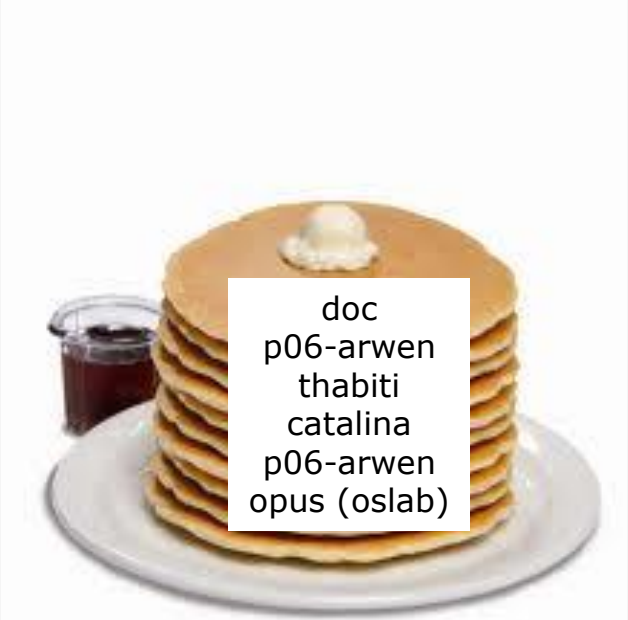
```
cis90@doc:~$ hostname
doc          ◄──────
cis90@doc:~$ exit
logout
Connection to doc closed.
cis90@p06-arwen:~ > hostname
p06-arwen    ◄──────
cis90@p06-arwen:~ > exit
logout
Connection to p06-arwen closed.
cis90@thabiti:~$ hostname
thabiti      ◄──────
cis90@thabiti:~$ exit
logout
Connection to thabiti closed.
cis90@catalina:~$ hostname
catalina     ◄──────
cis90@catalina:~$ exit
logout
Connection to catalina closed.
cis90@p06-arwen:~ > hostname
p06-arwen    ◄──────
cis90@p06-arwen:~ > exit
logout
Connection to p06-arwen closed.
/home/cis90/simben $ hostname
oslab.cishawks.net  ◄──────
/home/cis90/simben $
```

simben90@oslab:~

doc
p06-arwen
thabiti
catalina
p06-arwen
opus (oslab)

As you exit you pop off each system just like eating a stack of pancakes

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More on who command

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

frodo-108 on vmserver3.cislab.net

```
cis90@frodo-108:~$ tty
/dev/tty5
cis90@frodo-108:~$
```

tty2 (virtual terminal)

frodo-108 on vmserver3.cislab.net

```
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

335 packages can
112 updates are security updates.

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

tty5 (virtual terminal)

cis90@frodo-108: ~

```
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)

frodo-108 on vmserver3.cislab.net

tty7 (graphical desktop)

```
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)

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Housekeeping

- Adds

- Last day to add is 9/14/2013

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

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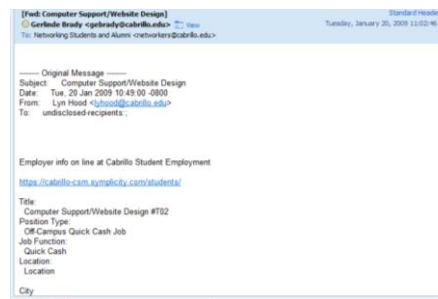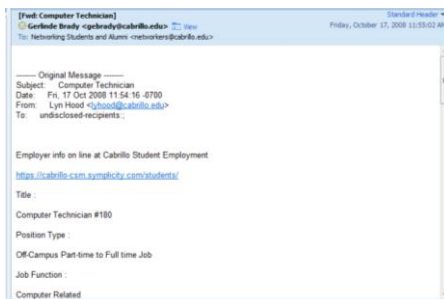
MSDN Academic Alliance
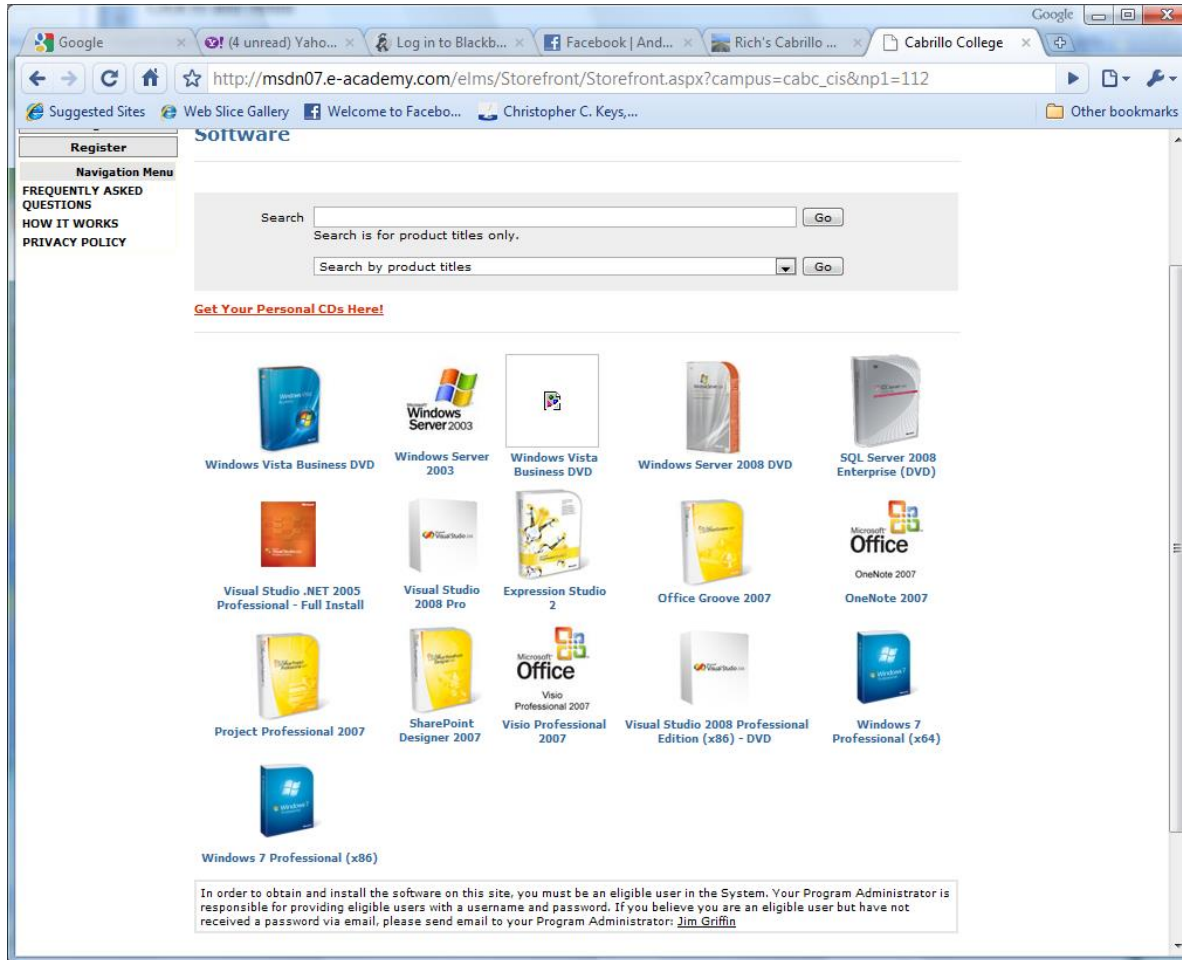
- Microsoft software for students registered in a CIS or CS class at Cabrillo

- Available after registration is final (two weeks after first class)

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

VMware e-academy
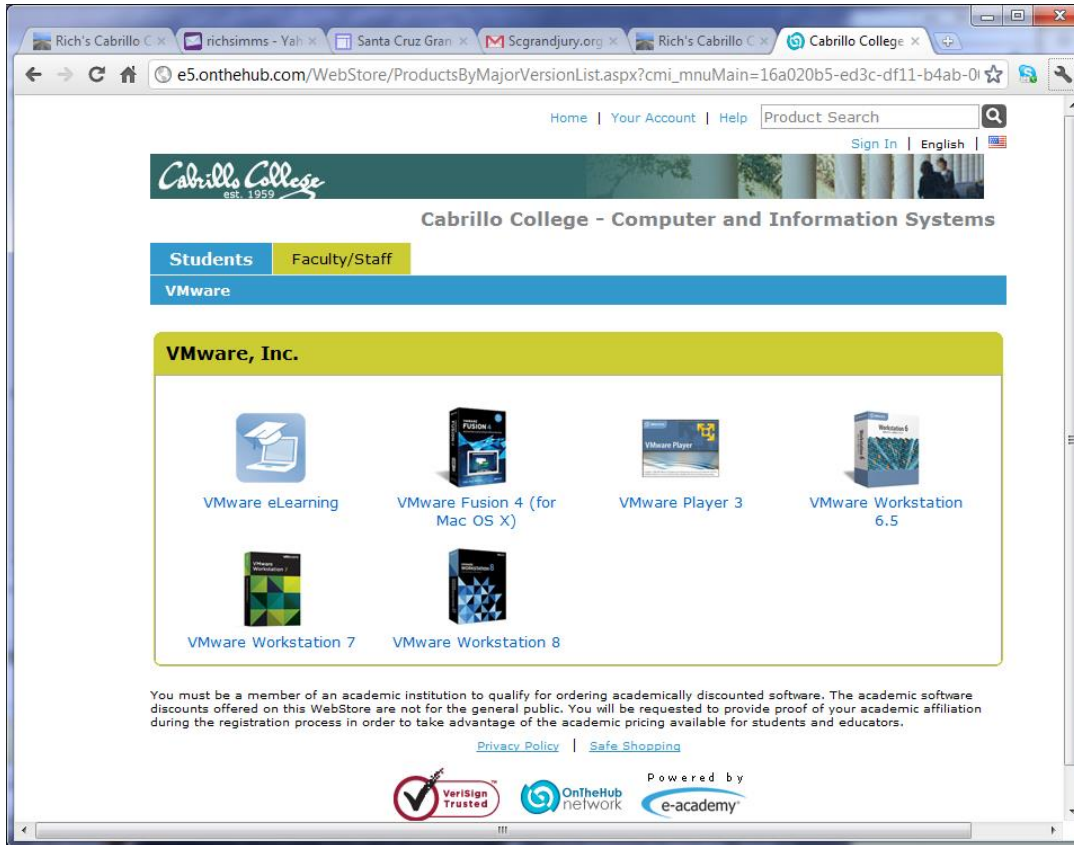
- VMware software for students registered in a CIS or CS class at Cabrillo

- Available after registration is final (two weeks after first class)

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

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What is a computer

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What is a computer?
Desktops

Usually one user at a time

Hardware

RAM

CPU

intel Xeon processor

Network Interface

Motherboard

Hard Drive

CD/DVD Drive

Desktop or Workstation

Software

Programs/Apps

Operating System

135
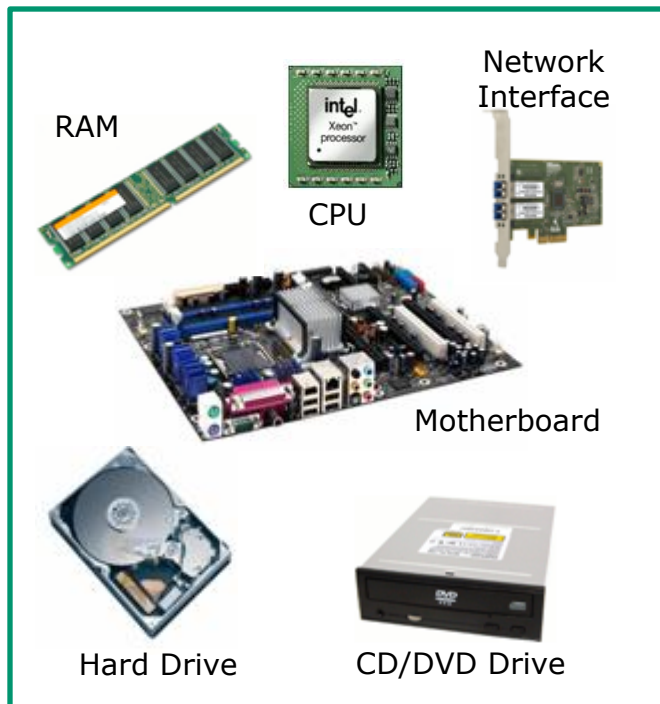
What is a computer?
Mobile Devices

Usually one user at a time

Hardware

RAM

Network Interface

CPU

Motherboard

Hard Drive

CD/DVD Drive

Mobile Devices
(designed for mobility)

Software

Programs/Apps

Operating System

136
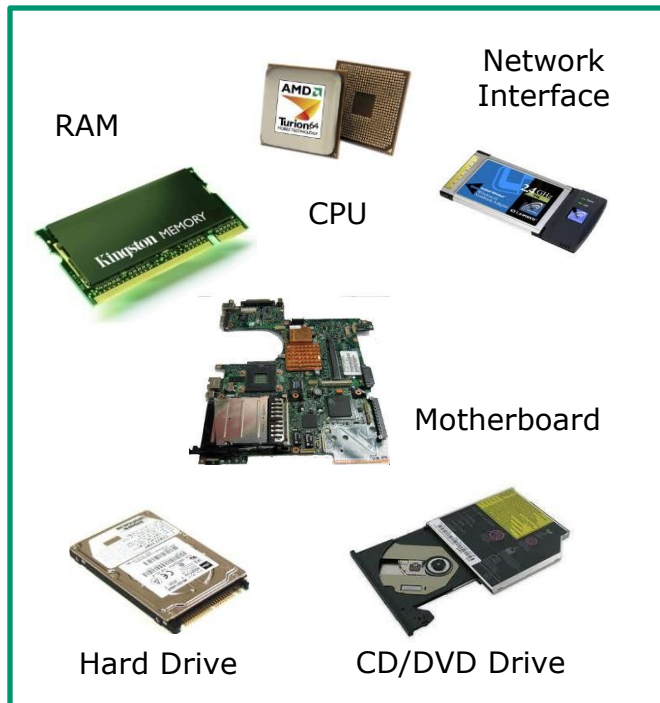
What is a computer?
Servers

Usually many users at the same time

Hardware

RAM

CPU

Network Interface

Motherboard

Hard Drive

CD/DVD Drive

Server Blade
(designed for uptime)

Software

Programs/Apps

Operating System

137
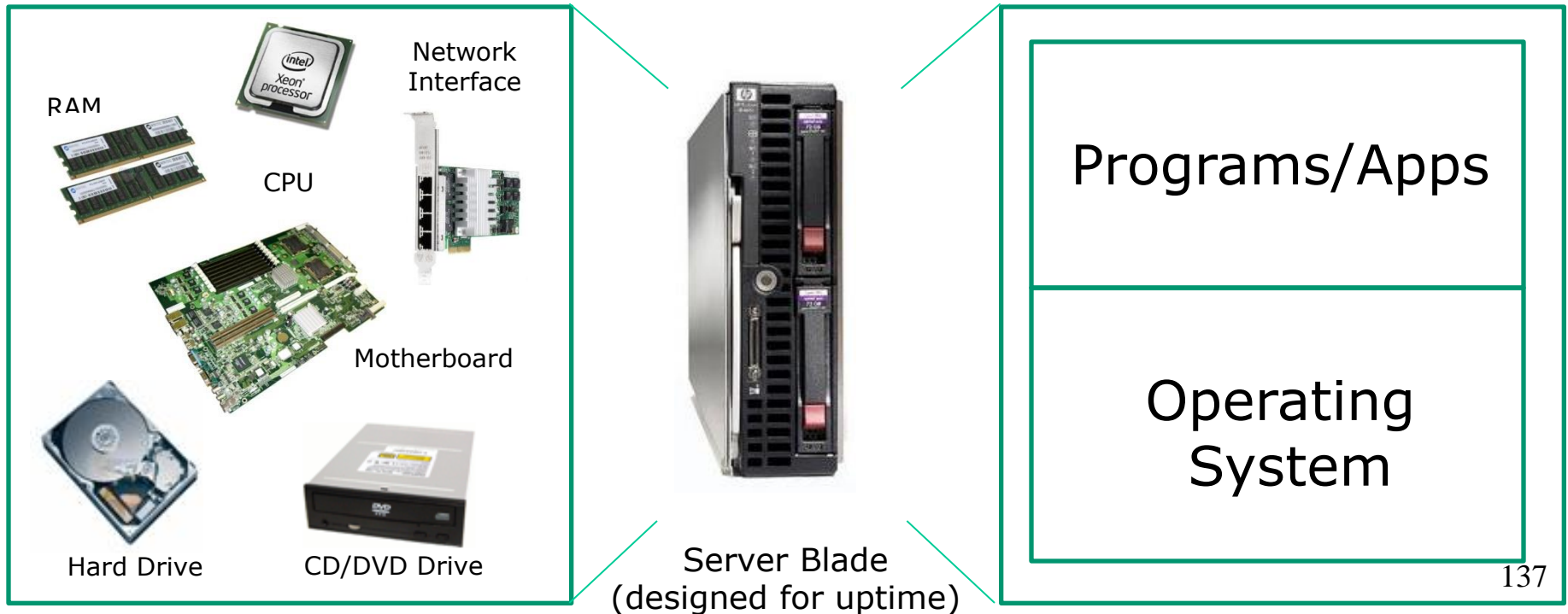
What is a computer?
Virtual Machines

Virtual Hardware

RAM

CPU

Network Interface

Motherboard

Hard Drive

CD/DVD Drive

Virtual Machine

Software

Programs/Apps

Operating System

138
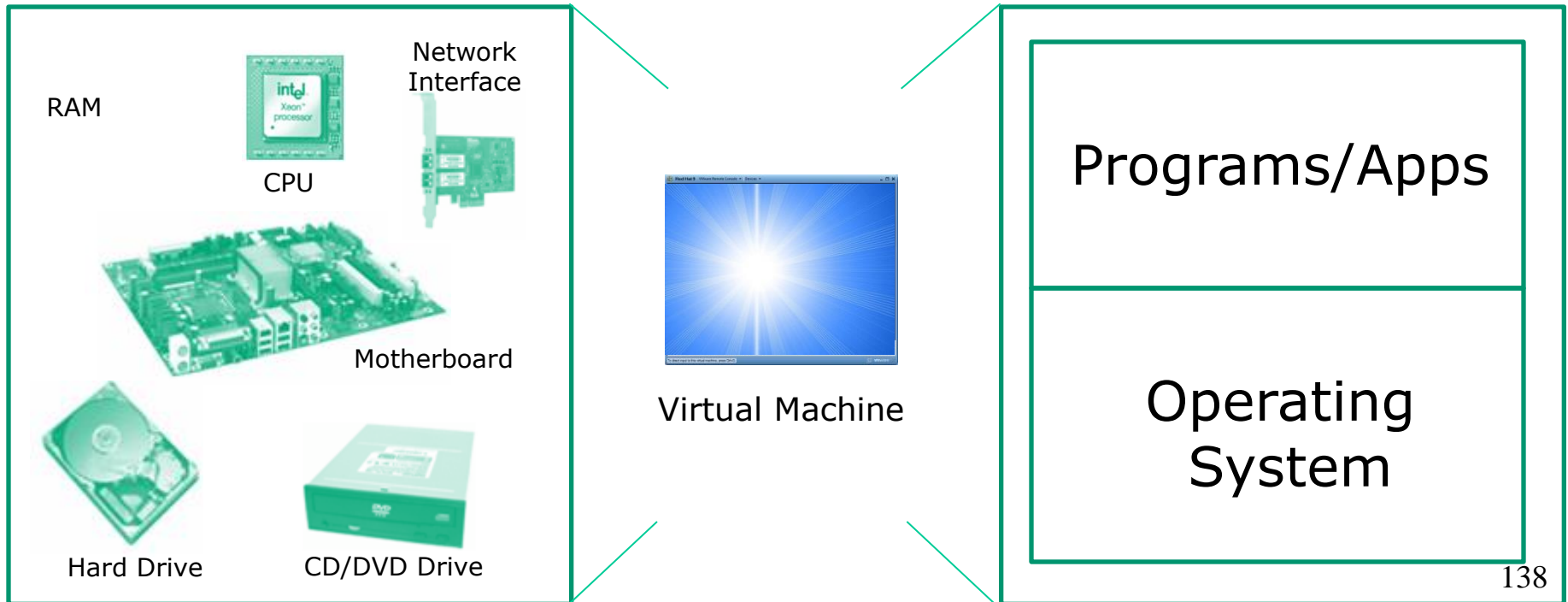
Virtual Machines

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.

Virtual Machine
Virtual Machine 3
Virtual Machine 4
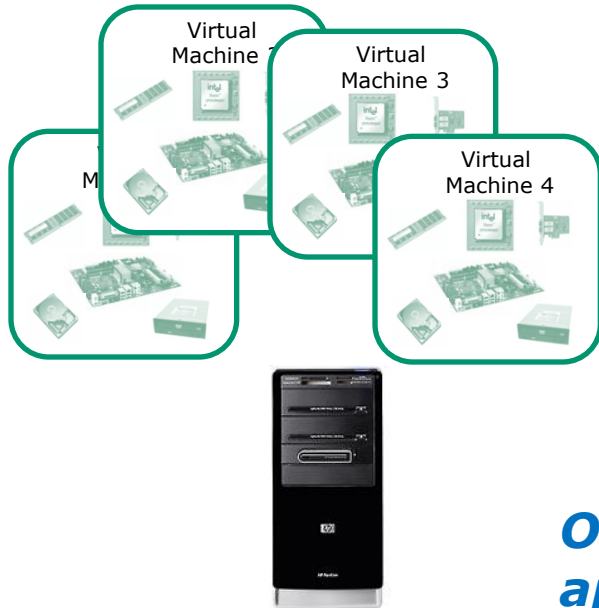
- You load an operating system and applications on virtual machines just like you would any other computer.

- 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.
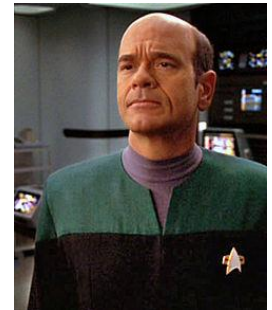
The EMH doctor on Star Trek Voyager was a simulation

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

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Virtual Machines

Multiple computers on one computer
… running at the same time
… sharing the same physical hardware
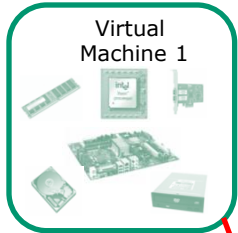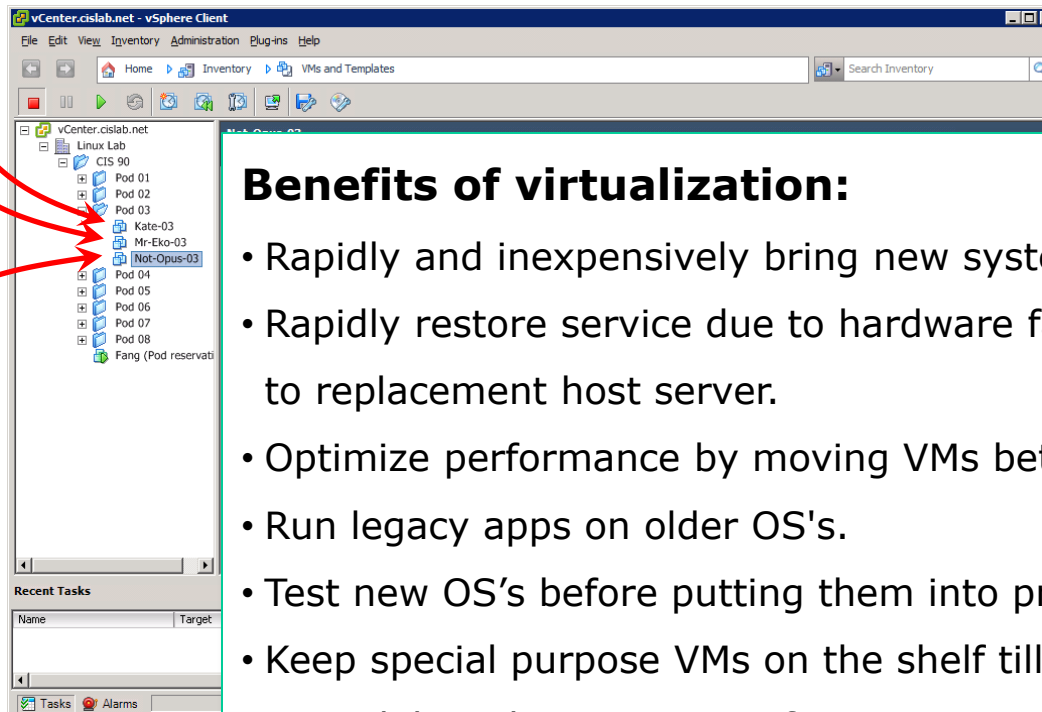
Benefits of virtualization:

- 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!

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Various Virtualization Products
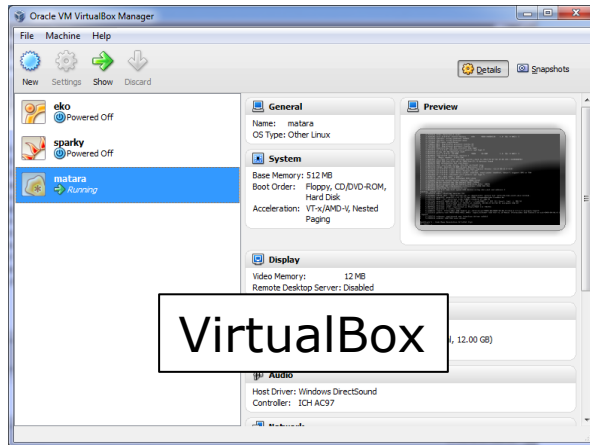
VirtualBox
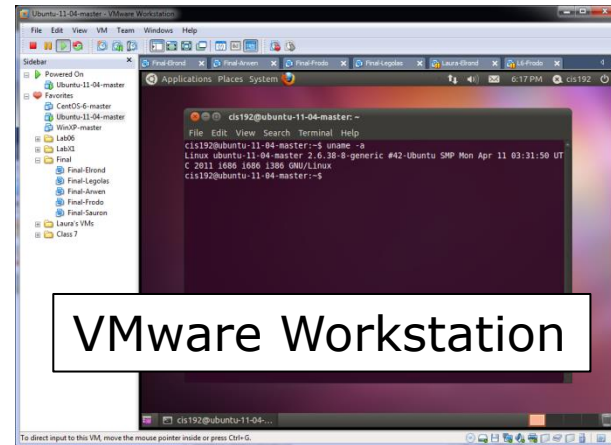
VMware Workstation
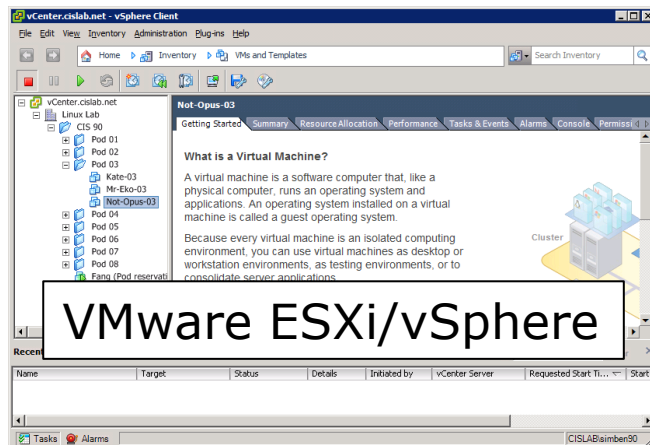
VMware ESXi/vSphere
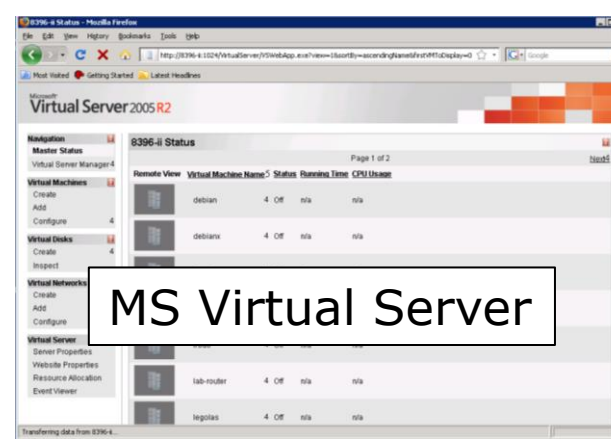
MS Virtual Server

Software

Software – Programs/Apps

Users

Software

Programs/Apps
- Some programs come as part of the OS
- Some programs are add-ons purchases or downloads
- Provide the interface between user and computer
- Depends on the OS for all access to the hardware

Operating System

Hardware

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Software – Programs/Apps

Users

Software

Programs (examples)

Common		Enterprise	UI	Browsers
Word games vi	Photoshop email iTunes	SAP Oracle custom	Explorer bash cmd.exe	Firefox IE Safari

Operating System

Hardware

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Software - The Operating System

Users

Software

Programs

Operating System
- Interface to the hardware
- Shares hardware resources
- Schedules/executes programs
- Process management
- Input/output services
- System monitoring
- Network stack

Hardware

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Software - The Operating System

Users

Software

Programs

Operating System (examples):

⊞	🐧	UNIX
Windows 7 Windows Server	Red Hat Linux Ubuntu Linux	Mac OS X HP-UX

Hardware

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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") license, COPYLEFT
• Examples: GNU/Linux, GIMP

Proprietary
• Intellectual property
• Copyright law
• Examples: Adobe Photoshop, Microsoft Windows, Mac OS X, AT&T UNIX System V

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UNIX/Linux Architecture simplified

UNIX/Linux Architecture
Simplified View - Four Major Components

Users

Shell
(a program)

System Commands	Applications
(programs)	(programs)

Kernel

Hardware

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UNIX/Linux Architecture
The Shell

Shell

System Commands | Applications
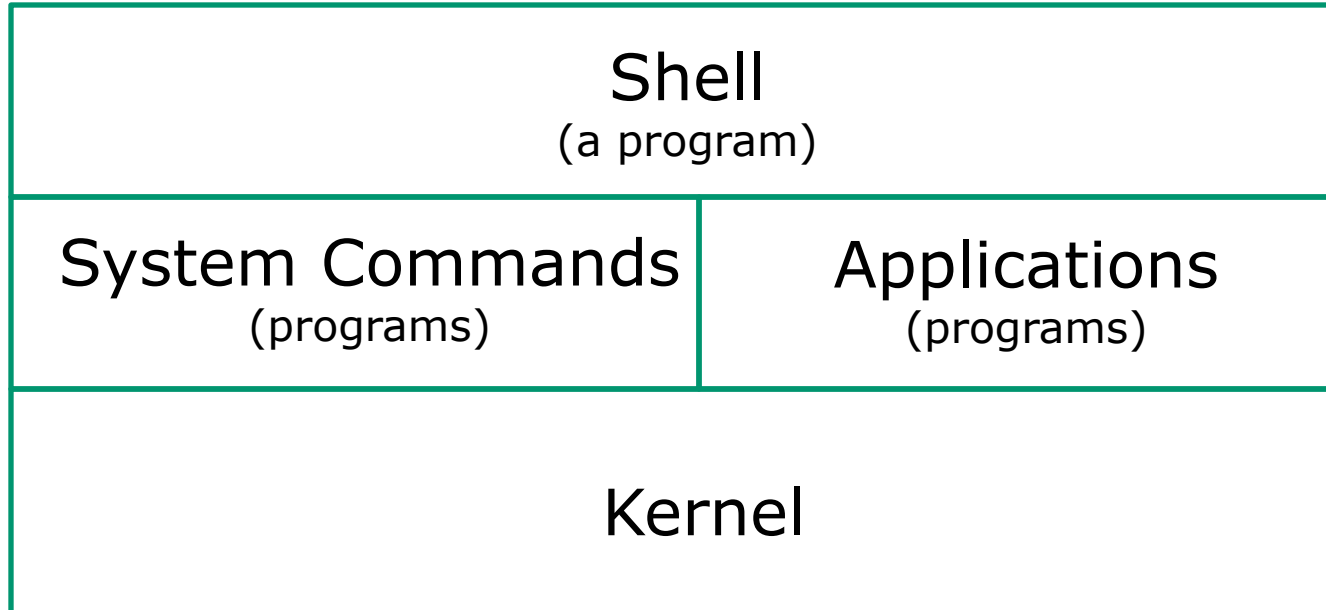
Kernel
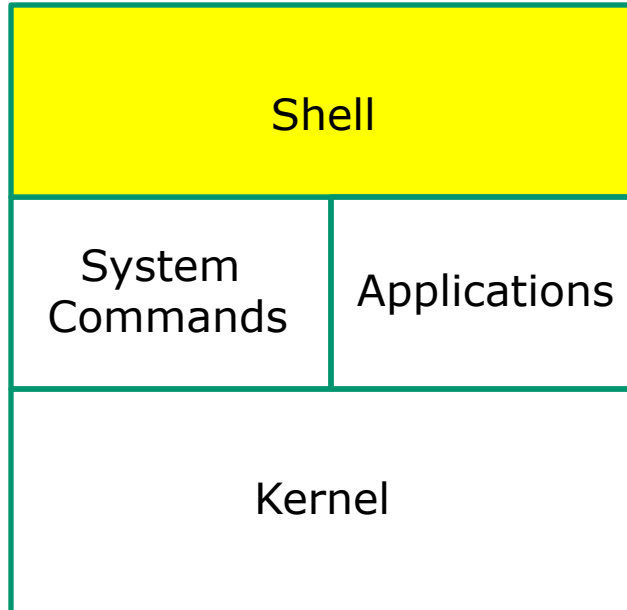
- Allows users to interact with the computer via a "command line".

- Prompts for a command, parses the command, finds the right program and gets that program executed.

- Called a "shell" because it hides the underlying operating system.

- 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

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UNIX/Linux Architecture
The Shell is a user interface and a programming language
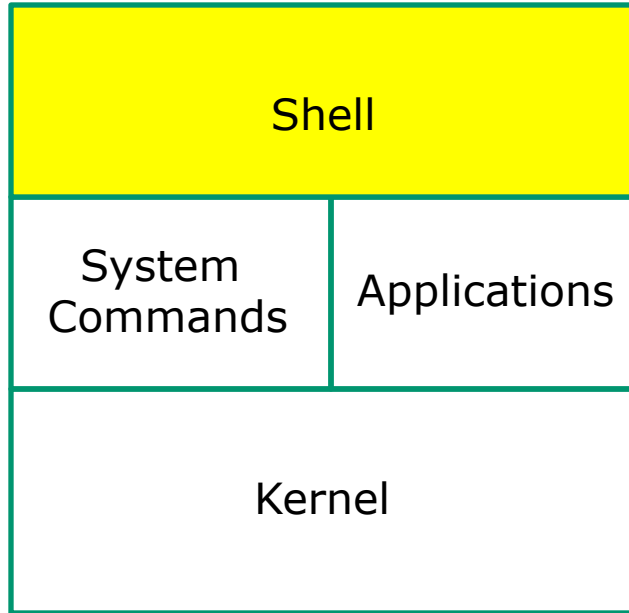

```
[rsimms@opus ~]$ hostname
opus.cabrillo.edu
[rsimms@opus ~]$ █
```

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

Shell

System Commands

Applications

Kernel

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UNIX/Linux Architecture
Shells, graphical shells and in-between
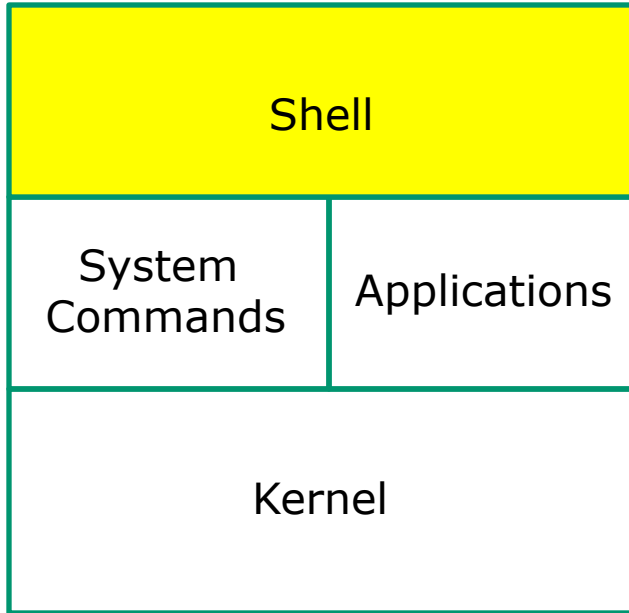
Shell Command Line Interface (CLI)

```
[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

Shell	
System Commands	Applications
Kernel	

Graphic shells or desktops (GUI)

Text User Interface (TUI)

A firewall protects against unauthorized network intrusions. High security blocks all incoming accesses. Medium blocks access to system services (such as telnet or printing), but allows other connections. No firewall allows all connections and is not recommended.

Security Level: (*) High ( ) Medium ( ) No firewall

OK   Customize   Cancel
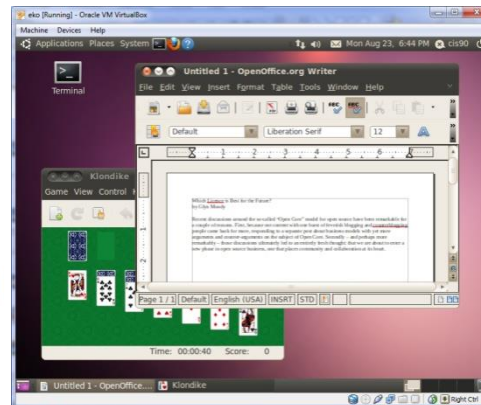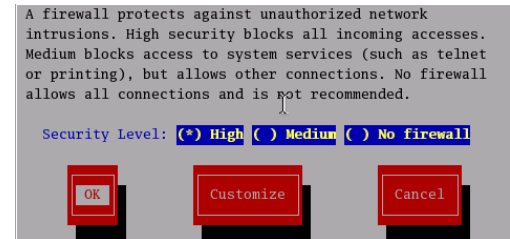
Lokkit Utility (uses curses library)

gnome

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UNIX/Linux Architecture
System Commands

Shell
System Commands / Applications
Kernel
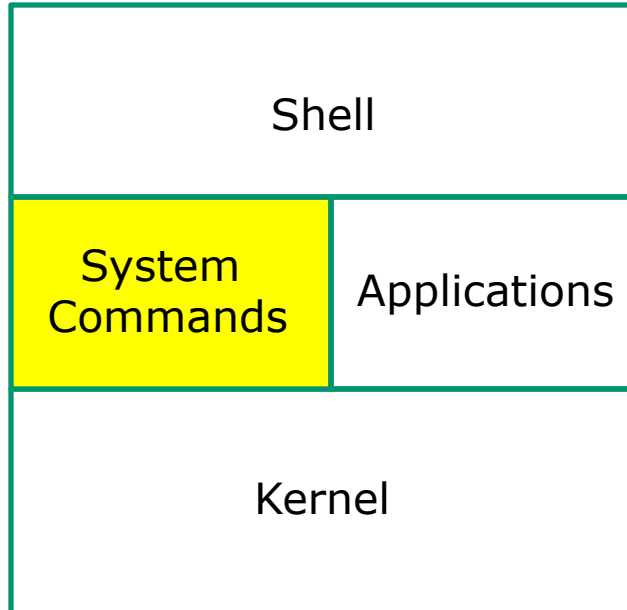
- 100's of system commands and utilities .

- Commands like **ls** (list directories), **cat** (print a file), **rm** (remove a file), … etc.

- Utilities like **vi** (text editor), **sort** (sorts file contents), **find** (searches), … etc.

- Larger utilities like **sendmail** (email), **tar** (backup), **tcpdump** (sniffer), … etc.

- Administrative utilities like **useradd**, **groupadd**, **passwd** (change password), … etc.

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UNIX/Linux Architecture
Applications

Shell

System Commands	Applications

Kernel
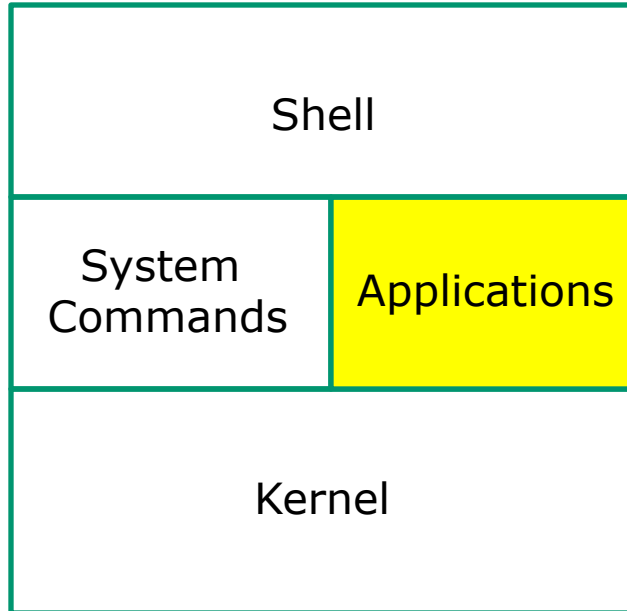
- Could be included in the distribution or optionally installed.

- 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.

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UNIX/Linux Architecture
Kernel

Shell

System Commands	Applications

Kernel
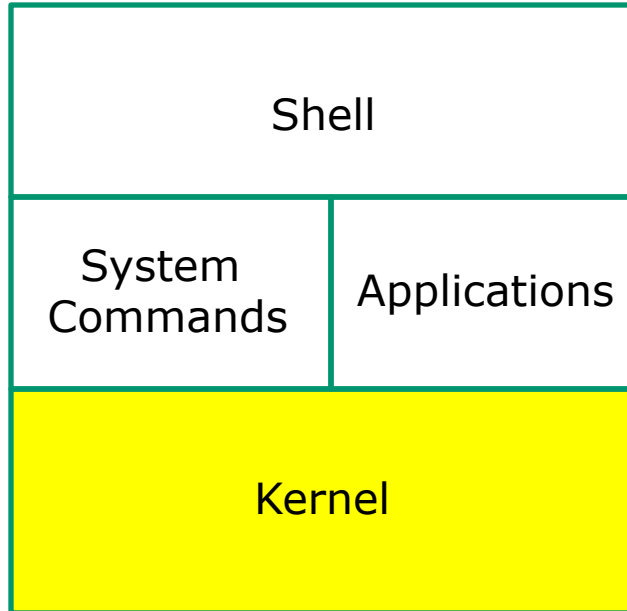
- Lowest level, inner-most core of the operating system.

- 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

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All Linux distros are based on the GNU/Linux Operating System Architecture

Users (multi-user)

User Space

Programs (multi-tasking)

Shell

| Add-ons | Commands & Utilities | X / Desktops |

GNU C Library (glibc)

Kernel[1]

System Call Interface

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

Architecture Dependent Kernel Code | Device Drivers

Kernel Space

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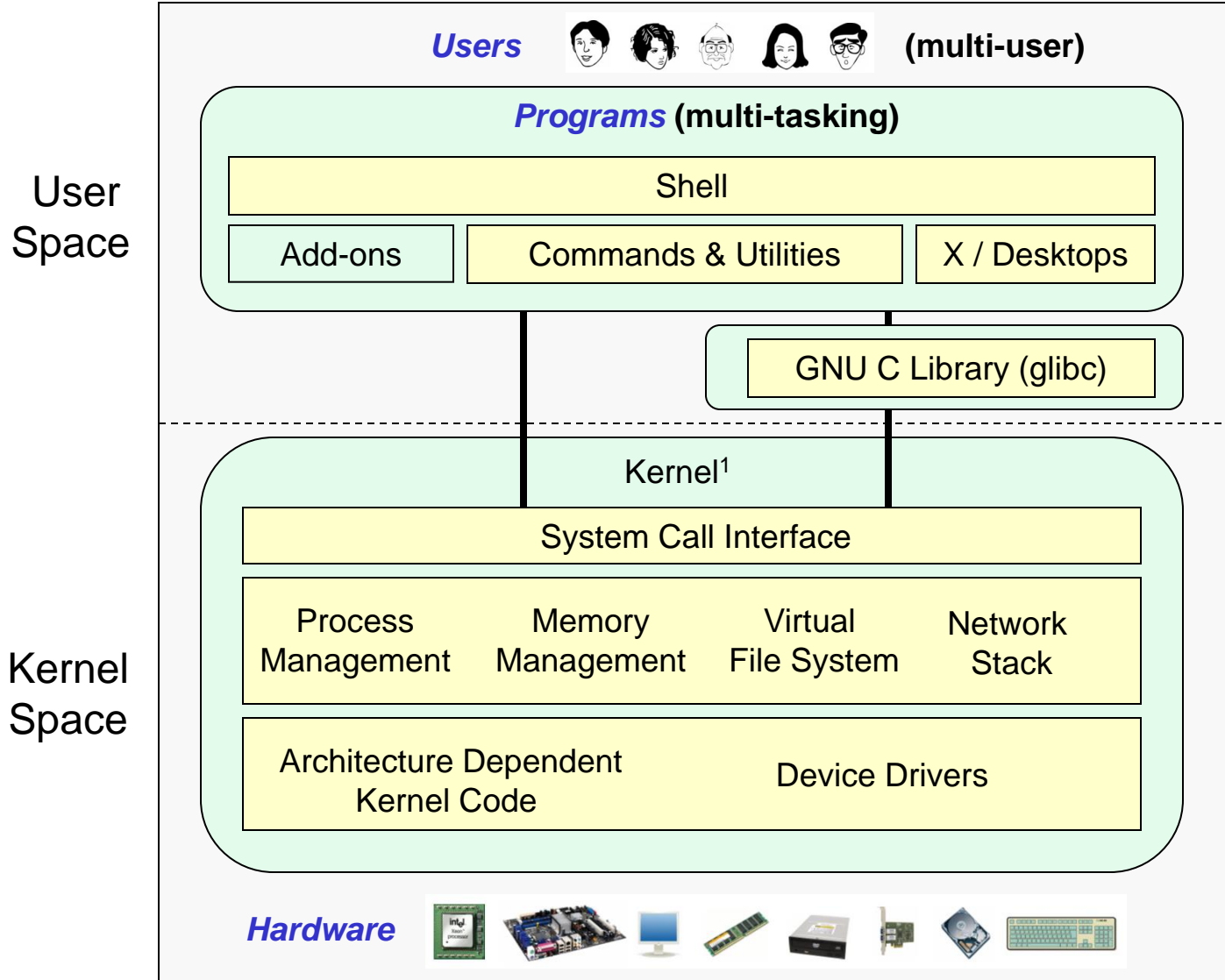
Richard Stallman started the GNU project in 1983 to create a free UNIX-like OS. He Founded the Free Software Foundation in 1985. In 1989 he wrote the first version of the GNU General Public License

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

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

UNIX/Linux Design "Observations"

- Multi-tasking and multi-user capabilities

- Unlike Windows, the GUI does not run in the kernel (adds stability)

- Unlike Windows, multiple graphical desktops available

- Linux kernel is "monolithic", not a "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 !!

Assignment

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

Survey

Lab 1

(content subject to change)

Lesson	Date	Topics	Chapter	Due
1	9/3	**Class and Linux Overview** • Understand how this course will work • High-level overview of computers, operating systems and virtual machines • Overview of UNIX/Linux market and architecture • Learn first commands and how to navigate between terminals • Use a remote Linux server • Use Linux running on a local virtual machine **Materials** • Presentation slides (download) • Logins Sheet (download) • CIS VLab RDP file: (here) **Supplemental** • Howto #140: Accessing Opus (download) • Howto #307: Accessing VLab (download) **Assignment** • Student Survey • Lab 1 **CCC Confer** • Enter virtual classroom • Class archives	1.1-1.15 (Gillay) 2,4,5, p113-115, p164-172 (Hahn)	
2	9/10	Quiz 1 **Commands** • Understand the UNIX login operation works • Meet John the Ripper and learn how vulnerable a poor password is • Understand basic command syntax and operation • Understand program files and what happens when they are run • Understand how the shell works and environment variables • Understand how to get documentation when online **Materials** • Presentation slides (download)	2.3-2.7 2.11 3.7-3.20 4.19-4.22 9.1-9.2 (Gillay)	Lab 1 Student Survey

Both due by 11:59PM on 9/10

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Lab Assignments
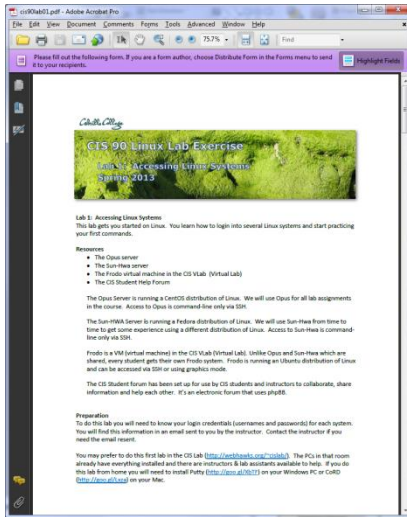
Pearls of Wisdom:

• 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.

• Partner with another student – "two heads are better than one" (at least most of the time!)

• Use the forum to collaborate and share specific tips you learned while doing a lab.

• Late work is not accepted so submit what you have for partial credit.

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Wrap up

New shell commands:
cal	- show calendar
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
ifconfig	- show IP address
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
Ctrl-Win-Alt-F1	- change between terminals and X windows (graphics)
to Ctrl-Win-Alt-F7	

New Files and Directories:

VMware:
Ctrl-Alt	- to release mouse from VM

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

Logging Into Sun-Hwa via Opus

Second driving lesson

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More commands for your toolbox

SSH command is used to login to remote systems

ssh *<username>***@***<hostname>*

ssh *<username>***@***<IP address>*

ssh *<domain>******<username>***@***<IP address>*

*A domain must be specified in conjunction with the username
for system that authenticate using Windows Active Directory*
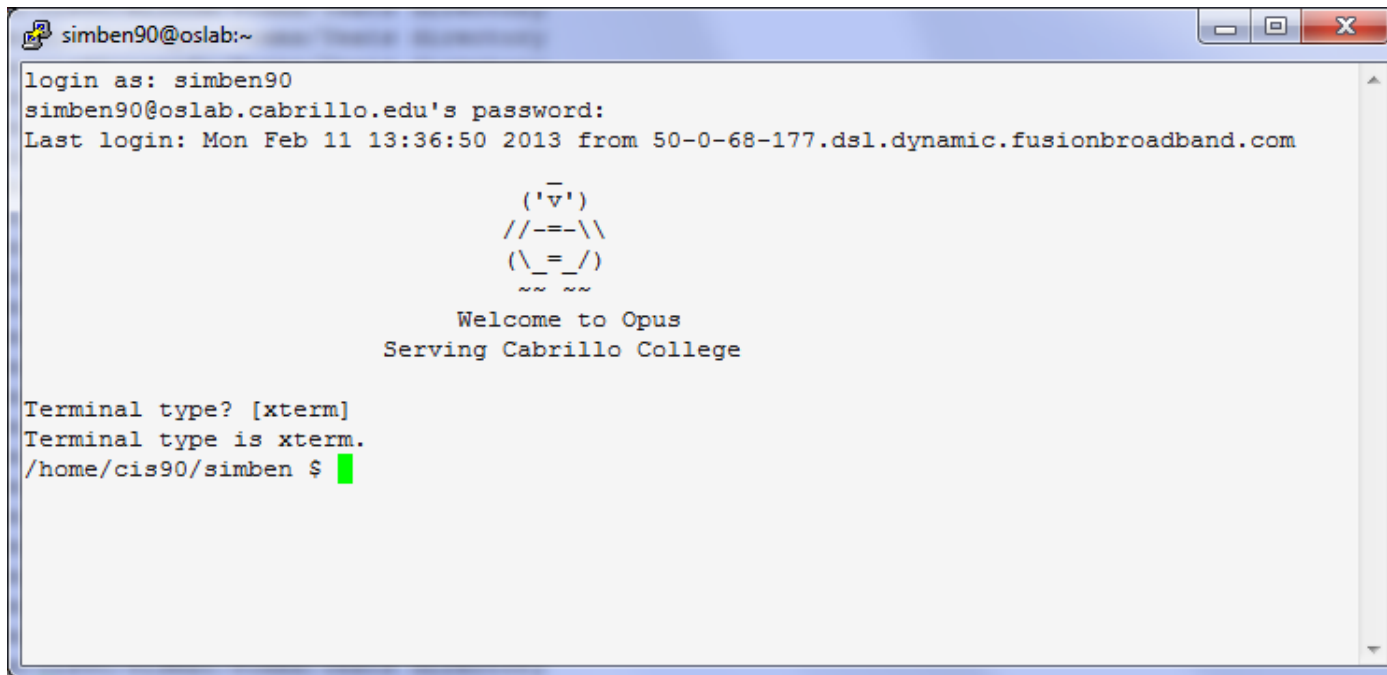
Logging into Sun-Hwa from Opus

Once you login to Opus, you can then login to another Linux system like Sun-Hwa

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Logging into Sun-Hwa from Opus

Step 1 - Log into Opus


```
simben90@oslab:~                                          _ □ x

login as: simben90
simben90@oslab.cabrillo.edu's password:
Last login: Mon Feb 11 13:36:50 2013 from 50-0-68-177.dsl.dynamic.fusionbroadband.com

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

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

Note the Opus prompt is configured to indicate where you are in the file tree

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Logging into Sun-Hwa from Opus

Step 1 - SSH into Sun-Hwa from Opus

```
/home/cis90/simben $ ssh cislab\\simben90@sun-hwa
The authenticity of host 'sun-hwa (172.30.5.21)' can't be established.
RSA key fingerprint is 4d:85:56:fb:47:59:ed:4e:c7:a9:cd:e8:cf:bb:13:cd.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'sun-hwa,172.30.5.21' (RSA) to the list of
known hosts.
cislab\simben90@sun-hwa's password:
Last login: Tue Jan 29 14:33:21 2013 from opus.cislab.net
```

Sun-Hwa is a member of an Active Directory domain which requires the domain name, followed by two backslashes then the username.

You get an authenticity warning the first time only. Type yes if you trust you are connecting to the real Sun-Hwa.

```
                 _
              /_'.
          _    \ / '-.
        <'``-.;),--'`
         '--.</()`--.
         / |/-/`'._\
         |/  |=|
             |_|
       ~`    |-| ~~        ~
    ~~  ~~ __|=|__   ~~
   ~~   .-'` |_| `,`""-._   ~~
    ~~.'      |=|    O    '-.  ~
     |     `"""` <|\      \  ~
   ~   \          |\      | ~~
    jgs '-.__.--._      |/    .-'
          ~~   `--...-'`     ~~
      ~~       ~       ~
          ~~        ~~     ~
```

Note the shell prompt on Sun-Hwa is different than the one on Opus.

```
      No one ever leaves the island!


[CISLAB\simben90@sun-hwa ~]$
```

ASCII art by Joan Stark
http://www.ascii-art.com

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Logging out of Sun-Hwa and back to Opus

Use the exit command on Sun-Hwa to pop back to Opus


```
simben90@oslab:~
/home/cis90/simben $ ssh cislab\\simben90@sun-hwa
The authenticity of host 'sun-hwa (172.30.5.21)' can't be established.
RSA key fingerprint is 4d:85:56:fb:47:59:ed:4e:c7:a9:cd:e8:cf:bb:13:cd.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'sun-hwa,172.30.5.21' (RSA) to the list of known hosts.
cislab\simben90@sun-hwa's password:
Last login: Mon Feb 11 13:09:26 2013 from opus.cislab.net
```

```
No one ever leaves the island!

[CISLAB\simben90@sun-hwa ~]$ hostname
sun-hwa.cislab.net
[CISLAB\simben90@sun-hwa ~]$ exit
logout
Connection to sun-hwa closed.
/home/cis90/simben $
```

Notice the prompt changes after exiting Sun-Hwa to indicate you are back on Opus again

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Class Activity

```
              _
            /_'.  _
             \ /¯'-.
      _  ``-.;),--'`
     < `--.</ () `--.
       / |/-/`'._\
        |/ |=|
           |_|
      ~`   |=| ~~        ~
   ~~  ~~ __|=|__    ~~
  ~~   .-'`  |_|  ``""-._   ~~
   ~~.'      |=|    o    '-.  ~
     |     `"""`  <|\      \  ~
   ~   \            |\      | ~~
   jgs '-.__.--._   |/    .-'
          ~~   `--...-'`     ~~
    ~~        ~        ~
       ~~          ~~     ~
```

No one ever leaves the island!

1. Use Putty (or a Mac terminal) and login to Opus
2. Login to Sun-Hwa with **ssh cislab***username***@sun-hwa**
3. Type a few commands like **who** and **tty**
4. Use the **exit** command to end the Sun-Hwa session and return to Opus