Description

This course covers the Linux operating system, its related applications, and the Open Source Software (OSS) model. Emphasis is on how Linux is different from other systems.

Objectives

The focus of the course is two-fold. One component is developing hands-on technical experience with installing, configuring, and administering Linux systems and Open Source applications. This will be done partly through in-class lectures, but the hands-on lab work will generally be done by the students outside of class time.

The other component of the course is to developing an understanding of how Linux & Open Source fit into enterprise IT environments, their strengths and weaknesses, and the economic, social, political, and legal forces acting on them. This will be covered primarily through classroom lectures & BlackBoard discussion.

Skills and knowledge students will gain in this course:

- Install Red Hat and Debian based Linux distributions;
- Maintain operating system updates;
- Install and configure useful application software (LAMP stack apps, SAMBA, and others);
- Interoperate between Linux and Windows;
- Understanding of each of the following:
  - Basics of Linux security;
  - Major issues involved in Open Source licensing;
  - Basics of Linux scripting and be able to write a simple script;
  - Pros & cons of Linux & be able to decide where it makes sense to use it or not;
- A sufficient knowledge framework of Linux upon which they can build if desired.

Prerequisites

A computer with a 64-bit CPU and hardware virtualization, on which to run the Lab exercises. Having a laptop in class is best but not required. A minimum of 2GB RAM is required, 4GB is preferred. You will need at least 10-12GB of free disk space. If you have a non-Windows computer, that is OK, but you will need to get access to a Windows machine (physical or virtual) in order to complete the last Lab.

A basic understanding of PC hardware/software architecture/networking (such as BIOS boot order, disk partitions, IP addresses).

Understanding of computer programming concepts in any language.

Use of LibreOffice/OpenOffice Writer and Impress for class documents and presentations, in both your host and guest OS's.

Use of VirtualBox to run Linux virtual machines.

Some familiarity with any version of Unix (Linux, Solaris, AIX, HPUX, etc) is helpful but not required.
**Textbook**


**Schedule**

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<tr>
<td>Week 2: Sep 6</td>
<td><em>Pieces &amp; Parts</em>: Structure of the operating system. Unix survival guide.</td>
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<td>Lab 0 Due. (installs) Bio post Due.</td>
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<td>Week 7: Sep 13</td>
<td><em>Will The One True Linux Please Stand Up</em>: Understanding the major Linux distributions. Repositories and package management systems for adding software.</td>
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<td>Lab 1 Due. (commands)</td>
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<td>Lab 2 Due. (packages) Quiz 1.</td>
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<td>Week 5: Sep 27</td>
<td><em>So What Is It Good For?</em>: Common applications for Linux. Installing and configuring services (web, ftp, file/print, etc).</td>
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<td>License Analysis Due</td>
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<td>Week 6: Oct 4</td>
<td><em>Barbarians at the Gate</em>: using Linux for network security. Unix scripting languages.</td>
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<td>Lab 3 Due. (apps) Quiz 2.</td>
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<td>Week 7: Oct 11</td>
<td><em>Plays Nice With Others</em>: Integrating Linux into other environments. Linux in the cloud / Linux IS the cloud.</td>
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<td>Lab 4 Due. (security)</td>
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<td>Week 8: Oct 18</td>
<td><em>Feel the Power</em>: Understanding the role of Linux on non-PC platforms. Advanced Linux system administration, recompiling the kernel. Student interest topics.</td>
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<td>Lab 5 Due. (integration) Lab 6 Due. (scripting) Quiz 3.</td>
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**Software**

*VirtualBox*

Each student will use a copy of VirtualBox in order to run multiple versions of Linux non-destructively on their computer. VirtualBox is a cross-platform “virtual PC” program that emulates a complete separate additional system within your host computer. The program and documentation can be downloaded from [virtualbox.org](http://virtualbox.org) or locally at [linuxclass.heinz.cmu.edu/virtualbox](http://linuxclass.heinz.cmu.edu/virtualbox).

You are required to use VirtualBox for this class, both for consistency with the instructor's and other students' environments, and to experience an Open Source-based virtualization system. The labs are verified and known to work on VirtualBox 5.1.18 on Windows 7, and are compatible with Macs as well. Virtualbox will coexist with other virtualization software you may have installed though you should not run them both at the same time.

The versions of Linux used in the class are distributed as .ISO files for burning onto DVD or using as a VirtualBox virtual optical disk file, and can be downloaded from [linuxclass.heinz.cmu.edu/iso-images/](http://linuxclass.heinz.cmu.edu/iso-images/). You should use those exact versions, so you are in sync with the lectures, labs, and the other students.

*LibreOffice*

We use the free & open source LibreOffice office suite for all class documents – syllabus, lab assignments, lecture slides, and so forth. Windows and Mac installers for LibreOffice are available at [linuxclass.heinz.cmu.edu/libreoffice](http://linuxclass.heinz.cmu.edu/libreoffice) or [libreoffice.org](http://libreoffice.org). There is another variant called OpenOffice – if you have that installed you can use it instead.
Assignments:

**Biographical Post:** The first assignment is to make a biographic Blackboard discussion group post with the following information:

- Your name, how to pronounce it, and any shortened or alternate name that you prefer.
- A brief description of your school/work history.
- A quick summary of your level of technical knowledge/experience with PC hardware & software, networks, the Internet, Unix in general, and Linux.
- The URL of your personal website/blog/etc, if you have one (optional).
- Any topics of particular interest that you would like to see covered in this class.

You do not need to reveal any information that you are uncomfortable sharing with the other students. This assignment should be two or three paragraphs in length. Value: 1 point. (est time 20 minutes)

**Open Source License Analysis:** There are dozens of different Open Source software licenses, each with their own legal terms and conditions. You will analyze and review an OSS license of your choice (other than GPL, LGPL, BSD, & MIT) and submit it via the class Blackboard site. A standardized template will be provided. See the initial Blackboard forum post for details. 10 points (9+1). (est time 3 hours)

**Labs:** The bulk of the assignments are the hands-on labs. The instructor will discuss the main steps of the lab during class, but students are not expected to begin or complete the labs in class. Students will work on the labs in their own time until they achieve the intended result. Each lab will have some final step (screen snapshot, writeup, etc) demonstrating successful completion, submitted to Blackboard via each lab’s page. 95 points (6 @ 15pts each (three labs are 14+1), 1 at 5 pts; est time 1-5 hours each).

**Quizzes:** There are three brief quizzes conducted via Blackboard just before mid-class break. These will address technical architecture topics, the non-technical economic/social/political/legal topics, and lab experiences. They will not cover details of individual installation or configuration steps. Quizzes are closed book – no notes, books, online resources, etc are permitted. 39 points (3 @ 13 pts each, est 10 minutes each).

**Participation:** There is a participation grade split between activity in the class discussions and postings in the class forums on Blackboard. You are expected to post your own problems and also assist other students with their technical problems. Non-technical (social/political/economic/legal) posts are encouraged also. Minimum expected activity for the discussion groups, to receive an average grade, is one meaningful post per week per student. See Blackboard Permanent Forum Posts section for required reading on what constitutes a meaningful post. 10 points. Class attendance is not counted toward participation.

**Grading**

Total points: 155, made up of all the assignments listed above including participation. According to Heinz School grading guidelines, the course grade average will be targeted at 3.5. The grading scale will be curved as needed to reach this average, so it may vary from the typical 90+:%:A 80+:%:B scale.

What “14+1” means: Assignment submissions that adequately meet the assignment requirements receive 14 out of 15 points for that assignment (or 9 out of 10 on the license analysis). Sometimes there is a wide disparity between those that simply satisfy the requirements and a few submissions that are of much higher quality - much more thorough and thoughtful analysis, much greater care and polish. These submissions are noticeably better than the "adequate" ones, and it seems appropriate to have some small way to recognize that extra effort. That's what the 1 extra possible point is for. Typically between zero and three submissions fall into this category for a given assignment, and are awarded an extra 1/2 or 1 point. This aspect of the grading is necessarily somewhat subjective.
Course Material Hosting

The course Blackboard site is the main site for course-related materials. The slides used for the lectures are posted here before the start of class. Assignment documents are on Blackboard as well, and submissions are done through Blackboard’s Assignment feature.

Supplemental videos, large files and other miscellany are hosted on a separate site maintained by the instructor – linuxclass.heinz.cmu.edu. The Linux OS CD/DVD ISO images are here, along with the VirtualBox software. The first week’s lecture/lab files are also available here for students who may not have access to Blackboard yet due to waitlisting.

Teaching Assistant(s)

TA(s) for the course have three roles – help students with technical or conceptual problems with their Linux virtual machines & related software; monitor the Blackboard forums (along with the instructor) to respond where useful; and assist the instructor with some grading.

Also see Blackboard Course Documents → Permanent Forum Posts → Technical Support Process for more information about the role of the TAs in helping you with technical issues.

TL;DR; - don’t just email the instructor when you have a problem.

Course Policies

Collaboration and Original Work

Students are welcome to collaborate and share information on lab assignments. Each student must complete and submit each lab themselves, but you may discuss any aspects of the labs (problems, steps, useful tricks, etc.) with others.

The license analysis, lab assignment text, and Blackboard forum post text must be in your own words. Any direct quotation from another source must be clearly attributed to the source, and the use of direct quotations should be kept to a minimum. Mark any copied text with quotation marks ( “ ” ). Plagiarism will not be tolerated.

The quizzes, while conducted online via Blackboard, are closed book – no notes, books, online resources, etc are permitted. If you notice fellow students cheating, inform the instructor (anonymously if necessary) – they are cheating *you* out of a fair grade due to the grading curve.

Original Work policies will be strictly enforced, and any students found cheating or plagiarizing will fail at least the assignment and possibly the whole course, and additional disciplinary actions may apply up to and including expulsion from the university. Think about explaining that to your family and to your funding agency. It's not worth it - just don't do it.

Recording

Lectures may be recorded by students for their academic use. Recordings may be shared with other current students of this class only. Recordings are not allowed to be further copied, distributed, published, posted, or otherwise used for any other purpose without the express written consent of the instructor.
Missed assignments

Many students at Carnegie Mellon are extremely busy and overcommitted, so requests for due date extension due to other workloads and activities will not be granted. You will need to plan your efforts accordingly and start early enough that you have time to handle any problems that occur while working on the Labs, which are by nature somewhat unpredictable. TA(s) are available to assist you with Lab problems – make use of them, but don't wait until the last minute. Late assignments will have a 10% penalty per week assessed.

If you will miss a quiz day for a good reason (due to an interview, for example), notify the instructor in advance so that arrangements can be made for you to take the quiz at another time.

Attendance & Classroom Activity

Classroom attendance is not mandatory and is not counted towards participation. You may eat, sleep, etc in class as long as you are not bothering other students. Do not talk amongst yourselves during class as this is disruptive to neighboring students. If you need to leave part way through class, please sit near the edge so you won't disturb others as you leave.