Linux System Administration - Syllabus

Fall 2018

Course Description:

This course will cover the basics of administering a Linux-based server environment in the manner of the EECS Instructional Servers (hivexx.cs.b.e) and the Open Computing Facility (tsunami.ocf.b.e, etc.). By the end of this course, we expect you to be completely comfortable using GNU/Linux, understand in a broad sense how the system's various parts work together, e.g. init, filesystems, services, daemons, etc., understand basic networking, have a good sense about maintaining system security, understand system administration essentials in general and have a practical taste of what sysadmins do in industry.

An important skill for system administrators is the willingness to quickly learn about new and unfamiliar technologies, so while we expect many students will be in CS, the only real prerequisite for this course is a desire to learn. We know potential students will have differing backgrounds in terms of CS and sysadmin experience, therefore, we will be teaching this course in two tracks: a beginner's track which will focus more on introducing new users to Linux, and an advanced track that will cater to students with more experience using Linux. Both tracks will get started fast and move quickly - there's a lot of material to cover.

Course Goals:

By the end of this course, you should be able to take a blank computer and turn it into a reliable general-purpose Linux server. You will also learn how to configure servers for special purposes, have a sysadmin's knowledge and understanding of services/daemons, authentication, networking, databases and other utilities as well as how to configure them to fit your needs. The most important skill you will learn is how to effectively diagnose, troubleshoot, and resolve problems that will inevitably arise in the process of using your computer.

Grading, Attendance, and Collaboration:

As with all Decals, this course will be offered only on a P/NP basis. There will be 10 labs over the semester for both sections. Labs will be graded on completion, each being worth 1 point each. A minimum of 8 labs must be completed in order to pass the course.

In addition, lecture attendance is mandatory and will be tracked. Students are allowed two unexcused absences. Students with more than two unexcused absences will NP the course. Students should notify instructors at least 24 hours in advance if they cannot make a lecture. Instructors may excuse students for these absences at their discretion (e.g. due to exam conflicts, illness, etc.)

Students are free to work together on labs (debugging, advice, hints, clarifications, etc.), but lab submissions must be written up individually. Copying solutions is strictly prohibited.

Tentative Schedule (week-by-week):

This is a lecture and lab-based course. There are no required readings, but you will probably end up doing a lot of reading anyways as you figure out how to get things to work. Generally, each week will have one lecture and one lab related to the lecture.

Intro Track:
1. Introduction to UNIX, the shell, OSS
2. Core shell utilities, man pages, navigating UNIX
3. More CLI (less, grep, awk, sed, find, xargs, tar, gzip, etc.), scripting (bash, py)
4. Getting started with Debian, package management, compiling software

Advanced Track:
1. UNIX background, shells, man pages, hierarchy, review of coreutils and advanced uses thereof
2. Introduction to different distributions, package management, compiling software, dependency management, advanced apt and dpkg use
3. Setting up a new system, pt. 1: partitioning, filesystems, installing the base system
4. Setting up a new system, pt. 2: post-install tasks, adding users and groups, etc.

Common Topics:

Both tracks will cover these topics, but with different levels of depth.

1. Networking 101 - TCP/IP, network stack, network utils
2. Processes and Services: systemd, cron
3. Networked services: NFS, SSH, LDAP/Kerberos, IRC, DNS, more services
4. Security: auth, encryption, keys, certs, sigs, file/network security, best practices
5. Special Topics 1: configuration management, containers, cloud infrastructure
6. Special Topics 2: version control, backups, HPC