CS 30C: LINUX SYSTEM ADMINISTRATION

Foothill College Course Outline of Record

<table>
<thead>
<tr>
<th>Heading</th>
<th>Value</th>
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<tbody>
<tr>
<td>Effective Term:</td>
<td>Summer 2023</td>
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<tr>
<td>Units:</td>
<td>4.5</td>
</tr>
<tr>
<td>Hours:</td>
<td>4 lecture, 2 laboratory per week (72 total per quarter)</td>
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<td>Advisory:</td>
<td>C S 30A.</td>
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<tr>
<td>Degree &amp; Credit Status:</td>
<td>Degree-Applicable Credit Course</td>
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<td>Foothill GE:</td>
<td>Non-GE</td>
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<tr>
<td>Transferable:</td>
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<tr>
<td>Grade Type:</td>
<td>Letter Grade (Request for Pass/No Pass)</td>
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<tr>
<td>Repeatability:</td>
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Student Learning Outcomes

- A successful student will be able to manage and repair the many aspects of the operating system including networking, file sharing, accounting, logging, printing and disk file system.
- A successful student will be able to configure an OS and be capable of planning for the routine maintenance of the system’s many components.

Description

Basic Linux systems administration. Command line fundamentals, file management from command line, help commands, create/view/edit text files, manage local Linux users and groups, control access to files with Linux file system permissions, monitor and manage Linux processes, control services and daemons, configure and secure OpenSSH service, analyze and store logs, manage Linux networking, archive and copy files between systems, install and update software packages, access Linux file systems, use virtualized systems.

Course Objectives

The student will be able to:

a. Use basic command lines
b. Manage files from the command line
c. Utilize help commands
d. Use the VIM editor to create, view, and edit text files
e. Demonstrate how to manage local users and groups
f. Control access to files using Linux file system permissions
g. Monitor and manage Linux processes
h. Control services and daemons
i. Understand how to configure and secure the OpenSSH service
j. Understand content of system logs and how to manage the logs
k. Manage basic Linux networking
l. Understand how to install and update software packages
m. Understand how to manage the Linux file system
n. Understand basic virtual systems

Course Content

a. Access the command line
   i. Access the command line using the desktop
   ii. Execute commands using the Bash shell
b. Manage files from the command line
   i. Linux file system hierarchy
   ii. Manage files using command line tools
   iii. Match file names using path name expansion
c. Getting help in Linux
   i. Reading documentation using man command
   ii. Getting help from Red Hat
d. Creating, viewing, and editing text files
   i. Redirection of output to a file or program
   ii. Basic VIM text editor commands
   iii. Examples of graphical text editors
e. Managing local Linux users and groups
   i. Definition of users and groups
   ii. Superuser access
   iii. Managing local accounts
   iv. Managing local group accounts
   v. Managing user passwords
f. Controlling access to files
   i. Linux file system permissions
   ii. Managing file system permissions from the command line
   iii. Managing default permissions and file access
g. Monitoring and managing processes
   i. What are processes?
   ii. Controlling jobs
   iii. Monitoring process activity
h. Controlling services and daemons
   i. Identifying automatically started processes
   ii. Controlling system services
   i. Configuring and securing OpenSSH service
   i. Access the remote command line with SSH
   ii. Customizing SSH service configuration
j. Analyzing and storing logs
   i. System log architecture
   ii. Systemd journal entries
   iii. Maintaining accurate time
k. Managing Linux networking
   i. Networking concepts
   ii. Editing network configuration files
   iii. Configuring host names and name resolution
l. Archiving and copying files between systems
   i. Managing compressed tar archives
   ii. Copying files between systems securely
   iii. Synchronizing files between systems securely
m. Installing and updating software packages
   i. Attaching systems to subscriptions for software updates
   ii. RPM software packages and Yum
   iii. Managing software updates with Yum
n. Accessing file systems
   i. Identifying file systems and devices
   ii. Mounting/unmounting file systems
iii. Making links between files
iv. Locating files on the system
o. Using virtualized systems
i. Managing a local virtualization host
ii. Installing a new virtual machine

Lab Content

a. Access the command line
i. Local console access terms
ii. The GNOME 3 desktop environment
iii. Bash commands and keyboard shortcuts
iv. Accessing the command line
b. Manage files from the command line
i. File system hierarchy
ii. Locating files and directories
iii. Command line file management
iv. Lab - managing files with shell expansion
v. Manage files using command line tools
vi. Match file names using path name expansion
c. Getting help in Linux
i. Using the man command
ii. Using the pinfo command
iii. Viewing package documentation
iv. Creating and viewing an SoS report
v. Viewing and printing help documentation
vi. Getting help from Red Hat
d. Creating, viewing, and editing text files
i. I/O redirection and pipelines
ii. Editing files with Vim
iii. Copying text between windows
iv. Creating, viewing, and editing text files
e. Managing local Linux users and groups
i. User and group concepts
ii. Running commands as root
iii. Creating users using command line tools
iv. Managing groups using command line tools
v. Managing user password aging
vi. Managing local users and groups
f. Controlling access to files
i. Interpreting file and directory permissions
ii. Managing file security from the command line
iii. Controlling new file permissions and ownership
iv. Controlling access to files with file system permissions
g. Monitoring and managing processes
i. Processes
ii. Background and foreground processes
iii. Killing processes
iv. Monitoring process activity
v. Monitoring and managing processes
h. Controlling services and daemons
i. Identify the status of system units
ii. Using systemctl to manage services
iii. Controlling services and daemons
i. Configuring and securing OpenSSH service
j. Analyzing and storing log
i. System logging components
ii. Finding log entries
iii. Finding events with journalctl
iv. Configure a persistent systemd journal
v. Adjusting system time
vi. Analyzing and storing logs
k. Managing Linux networking
i. Networking concepts
ii. Examining network configuration
iii. Configuring networking with nmcli
iv. Editing network configuration files
v. Configuring host names and name resolution
vi. Managing RHEL networking
l. Archiving and copying files between systems
i. Backing up and restoring files from a tar archive
ii. Copying files over the network with scp
iii. Synchronizing two directories securely with rsync
iv. Archiving and copying files between systems
m. Installing and updating software packages
i. Red Hat subscipting management
ii. RPM software packages
iii. Installing and updating software with Yum
iv. Enabling software repositories
v. Working with PRM package files
vi. Installing and updating software packages
n. Accessing file systems
i. Identifying file systems and devices
ii. Mounting and unmounting file systems
iii. Making links between files
iv. Locating files on the system
v. Accessing Linux file systems
o. Using virtualized systems
i. Managing a local virtualization host
ii. Installing a new virtual machine

Special Facilities and/or Equipment

1. Access to a computer laboratory with current Linux based computers required to support the class.
2. A website or course management system with an assignment posting component (through which all lab assignments are to be submitted) and a forum component (where students can discuss course material and receive help from the instructor). This applies to all sections, including on-campus (i.e., face-to-face) offerings.
3. When taught via Foothill Global Access on the internet, the college will provide a fully functional and maintained course management system through which the instructor and students can interact.
4. When taught via Foothill Global Access on the internet, students must have currently existing email accounts and ongoing access to computers with internet capabilities.
Method(s) of Evaluation
Methods of Evaluation may include but are not limited to the following:

- Tests and quizzes
- Written laboratory assignments
- Final examination

Method(s) of Instruction
Methods of Instruction may include but are not limited to the following:

- Lectures which include motivation for the architecture of the specific topics being discussed
- In-person or online labs (for all sections, including those meeting face-to-face/on-campus), consisting of:
  1. An assignment webpage located on a college-hosted course management system or other department-approved internet environment. Here, the students will review the specification of each assignment and submit their completed lab work
  2. A discussion webpage located on a college-hosted course management system or other department-approved internet environment. Here, students can request assistance from the instructor and interact publicly with other class members
- Detailed review of laboratory assignments, which includes model solutions and specific comments on the student submissions
- In-person or online discussion which engages students and instructor in an ongoing dialog pertaining to all aspects of designing, implementing, and analyzing programs
- When course is taught fully online:
  1. Instructor-authored lecture materials, handouts, syllabus, assignments, tests, and other relevant course material will be delivered through a college-hosted course management system or other department-approved internet environment
  2. Additional instructional guidelines for this course are listed in the addendum of CS department online practices

Representative Text(s) and Other Materials

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- a. Reading
  i. Textbook assigned reading averaging 30 pages per week
  ii. Online curriculum averaging 20 pages per week
  iii. Online resources as directed by instructor though links pertinent to networking
  iv. Library and reference material directed by instructor through course handouts
- b. Writing
  i. Technical prose documentation that supports and describes the laboratory exercises that are submitted for a grade