LINUX FUNDAMENTALS

The course is a challenging course that focuses on the fundamental tools and concepts of Linux and Unix. Students gain proficiency using the command line. Beginners develop a solid foundation in Unix, while advanced users discover patterns and fill in gaps in their knowledge. Like all Guru Labs courses, the course material is designed to provide extensive hands-on experience. Topics include: basic file manipulation; basic and advanced filesystem features; I/O redirection and pipes; text manipulation and regular expressions; managing jobs and processes; vi, the standard Unix editor; automating tasks with shell scripts; managing software; secure remote administration; and more.

Prerequisites:

Students should be comfortable with computers. No familiarity with Linux or other Unix operating systems is required.

Supported Distributions:

Red Hat Enterprise Linux 6

SUSE Linux Enterprise 11

Ubuntu 12.04 LTS

Recommended Class Length:

5 days

Detailed Course Outline:

1. **WHAT IS LINUX?**
    1. Unix and its Design Principles
    2. FSF and GNU
    3. GPL â€“ General Public License
    4. The Linux Kernel
    5. Linux Kernel and Versioning
    6. Components of a Distribution
    7. Slackware
    8. SUSE Linux Products
    9. Debian
    10. Ubuntu
    11. Red Hat Linux Products
    12. Oracle Linux
    13. Mandriva
2. **LOGIN AND EXPLORATION**
    1. Logging In
    2. Running Programs
    3. Interacting with Command Line
    4. The X Window System
    5. Starting X
    6. Gathering Login Session Info
    7. Gathering System Info
    8. got root?

9. Switching User Contexts
10. sudo
11. Help from Commands and Documentation
12. Getting Help with man & info

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13. Login and Discovery
14. Help with Commands
15. Switching Users With su

3. THE LINUX FILESYSTEM

1. Filesystem Support
2. Unix/Linux Filesystem Features
3. Filesystem Hierarchy Standard
4. Navigating the Filesystem
5. Displaying Directory Contents
6. Filesystem Structures
7. Determining Disk Usage With df and du
8. Determining Disk Usage With baobab
9. Disk Usage with Quotas
10. File Ownership
11. Default Group Ownership
12. File and Directory Permissions
13. File Creation Permissions with umask
14. Changing File Permissions
15. SUID and SGID on files
16. SGID and Sticky Bit on Directories
17. User Private Group Scheme

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18. Navigating Directories and Listing Files
19. Disk and Filesystem Usage
20. File and Directory Ownership and Permissions

4. MANIPULATING FILES

1. Directory Manipulation
2. File Manipulation
3. Deleting and Creating Files
4. Physical Unix File Structure
5. Filesystem Links
6. File Extensions and Content
7. Displaying Files
8. Previewing Files
9. Displaying Binary Files
10. Searching the Filesystem
11. Alternate Search Method
12. Producing File Statistics

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13. Manipulating Files and Directories
14. File Examination & Search Commands

5. SHELL BASICS

1. Role of Command Shell
2. Communication Channels
3. File Redirection
4. Piping Commands Together
5. Filename Matching
6. File Globbing and Wildcard Patterns
7. Brace Expansion
8. Shell and Environment Variables
9. Key Environment Variables
10. General Quoting Rules
11. Nesting Commands
12. Multiple and Multi-line Commands

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13. Connecting Commands
14. Wildcard File Matching
15. Shell Variables
16. Shell Meta-Characters
17. Command Substitution

6. ARCHIVING AND COMPRESSION

1. Archives with tar
2. Archives with cpio
3. The gzip Compression Utility
4. The bzip2 Compression Utility
5. The XZ Compression Utility
6. The PKZIP Archiving/Compression format

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7. Archiving and Compression

7. TEXT PROCESSING

1. Searching Inside Files
2. The Streaming Editor
3. Text Processing with awk
4. Replacing Text Characters
5. Text Sorting
6. Duplicate Removal Utility
7. Extracting Columns of Text
8. Combining Files and Merging Text
9. Comparing File Changes

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10. Text Processing

8. REGULAR EXPRESSIONS

1. Regular Expression Overview
2. Regular Expressions
3. RE Character Classes
4. RE Quantifiers
5. RE Parenthesis

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6. Pattern Matching with Regular Expressions
7. Extended Regular Expressions
8. Using Regular Expressions With sed

9. TEXT EDITING

1. Text Editing
2. Pico/GNU Nano
3. Pico/Nano Interface
4. Pico/Nano Shortcuts
5. vi and Vim
6. Learning vi
7. Basic vi
8. Intermediate vi

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9. Text Editing with Nano
10. Text Editing with Vim

10. COMMAND SHELLS

1. Shells
2. Identifying the Shell
3. Changing the Shell
4. Bourne sh: Configuration Files
5. Script Execution
6. Bourne sh: Prompts
7. bash: Bourne-Again Shell
8. bash: Configuration Files
9. bash: Command Line History
10. bash: Command Editing
11. bash: Command Completion
12. bash: "shortcuts"
13. bash: prompt
14. Setting Resource Limits via ulimit

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15. Linux Shells
16. Bash History
17. Aliases
18. Bash Login Scripts
19. The Z Shell

11. INTRODUCTION TO SHELL SCRIPTING

1. Shell Script Strengths and Weaknesses
2. Example Shell Script
3. Positional Parameters
4. Input & Output
5. Doing Math
6. Comparisons with test
7. Exit Status
8. Conditional Statements
9. Flow Control: case
10. The for Loop
11. The while and until Loops

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12. Writing a Shell Script

12. PROCESS MANAGEMENT AND JOB CONTROL

1. What is a Process?
2. Process Lifecycle
3. Process States
4. Viewing Processes
5. Signals
6. Tools to Send Signals
7. Job Control Overview
8. Job Control Commands
9. Persistent Shell Sessions with Screen
10. Using screen
11. Advanced Screen

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12. Job Control Basics
13. Process Management and Job Control Basics
14. Screen Basics
15. Using Screen Regions

13. PROCESS ADMINISTRATION

1. Automating Tasks
2. at/batch
3. cron
4. The crontab Command
5. crontab Format
6. /etc/cron.*/ Directories
7. Anacron
8. Managing Processes
9. Tuning Process Scheduling

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10. Creating and Managing User Cron Jobs
11. Adding System cron Jobs

14. MANAGING SOFTWARE

1. Downloading with FTP
2. FTP
3. lftp
4. Command Line Internet â€“ Non-interactive
5. Command Line Internet â€“ Interactive
6. Managing Software Dependencies
7. Using the YUM command
8. YUM package groups
9. Configuring YUM
10. Popular Yum Repositories
11. Using the Zypper command
12. Zypper Services and Catalogs
13. The dselect & APT Frontends to dpkg
14. Aptitude
15. Configuring APT

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16. Command Line File Transfers
17. Using YUM
18. Using Zypper
19. Managing YUM Repositories
20. Managing Zypper Repositories

15. MESSAGING

1. System Messaging Commands
2. Controlling System Messaging
3. Internet Relay Chat
4. Instant Messenger Clients
5. Electronic Mail
6. Sending Email with sendmail
7. Sending and Receiving Email with mailx
8. Sending and Receiving Email with mutt
9. Sending Email with Pine
10. Evolution

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11. Command Line Messaging
12. Command Line Email

16. PRINTING

1. Linux Printer Sub-systems
2. Legacy Print Systems
3. Common UNIX Printing System
4. Defining a Printer
5. Standard Print Commands
6. Format Conversion Utilities
7. Ghostscript
8. enscript and mpage

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9. Printing

17. THE SECURE SHELL (SSH)

1. Secure Shell
2. ssh and sshd Configuration
3. Accessing Remote Shells
4. Transferring Files
5. Alternative sftp Clients
6. SSH Key Management
7. ssh-agent

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8. Introduction to ssh and scp
9. SSH Key-based User Authentication
10. Using ssh-agent

18. MOUNTING FILESYSTEMS & MANAGING REMOVABLE MEDIA

1. Filesystems Concept Review

2. Mounting Filesystems
3. NFS
4. SMB
5. Filesystem Table (/etc/fstab)
6. AutoFS
7. Removable Media

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8. Accessing NFS Shares
9. On-demand filesystem mounting with AutoFS

A. THE X WINDOW SYSTEM

1. The X Window System
2. X Modularity
3. X.Org Drivers
4. Configuring X Manually
5. Automatic X Configuration
6. Automatic X Configuration â€“ SLES
7. Xorg and Fonts
8. Installing Fonts for Modern Applications
9. Installing Fonts for Legacy Applications
10. The X11 Protocol and Display Names
11. Display Managers and Graphical Login
12. Starting X Apps Automatically
13. X Access Control
14. Remote X Access (historical/insecure approach)
15. Remote X Access (modern/secure approach)
16. XDMCP
17. Remote Graphical Access With VNC and RDP
18. Specialized X Servers

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19. Remote X with XDMCP
20. Configure X Security
21. Configure a VNC Server
22. Configure a VNC Server
23. Launching X Apps Automatically
24. Secure X

B. EMACS

1. Emacs
2. The Emacs Interface
3. Basic Emacs
4. More Emacs Commands

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5. Text Editing with Emacs