

# Linux® Fundamentals (GL120) U8583S

This 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. 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.

<b>HPE course number</b>	U8583S
<b>Course length</b>	5 days
<b>Delivery mode</b>	ILT, vILT
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## Prerequisites

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

## Supported distributions

- Red Hat® Enterprise Linux 7
- SUSE® Linux Enterprise 12
- Ubuntu 16.04 LTS

\*Realize Technology Value with Training, IDC Infographic 2037, Sponsored by HPE, October 2017

## Detailed Course Outline

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### Module 1: What is Linux?

- Unix and its Design Principles
- FSF and GNU
- GPL – General Public License
- The Linux Kernel
- Linux Kernel and Versioning
- Components of a Distribution
- Slackware
- SUSE Linux Products
- Debian
- Ubuntu
- Red Hat Linux Products
- Oracle Linux

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### Module 2: Login and Exploration

- Logging In
- Running Programs
- Interacting with Command Line
- Desktop Environments
- GNOME
- Starting X
- Gathering Login Session Info
- Gathering System Info
- uptime & w
- got root?
- Switching User Contexts
- sudo
- Help from Commands and Documentation
- whereis
- Getting Help Within the Graphical Desktop
- Getting Help with man & info
- **Lab Tasks**
  - Login and Discovery
  - Help with Commands
  - Switching Users with su

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### Module 3: The Linux Filesystem

- Filesystem Support
- Unix/Linux Filesystem Features
- Filesystem Hierarchy Standard
- Navigating the Filesystem
- Displaying Directory Contents
- Filesystem Structures
- Determining Disk Usage with df and du
- Determining Disk Usage (GUI)
- Disk Usage with Quotas
- File Ownership
- Default Group Ownership
- File and Directory Permissions
- File Creation Permissions with umask
- SUID and SGID on files
- SGID and Sticky Bit on Directories
- Changing File Permissions
- User Private Group Scheme
- **Lab Tasks**
  - Navigating Directories and Listing Files
  - Disk and Filesystem Usage
  - File and Directory Ownership and Permissions
  - Introduction to Troubleshooting Labs
  - Troubleshooting Practice: Filesystem

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### Module 4: Manipulating Files

- Directory Manipulation
- File Manipulation
- Deleting and Creating Files
- Managing Files Graphically
- Drag and drop with Nautilus
- Physical Unix File Structure
- Filesystem Links
- File Extensions and Content
- Displaying Files
- Previewing Files
- Producing File Statistics
- Displaying Binary Files
- Searching the Filesystem
- Alternate Search Method
- **Lab Tasks**
  - Manipulating Files and Directories
  - File Examination & Search Commands

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### Module 5: Shell Basics

- Role of Command Shell
  - Communication Channels
  - File Redirection
  - Piping Commands Together
  - Filename Matching
  - File Globbing and Wildcard Patterns
  - Brace Expansion
  - Shell and Environment Variables
  - Key Environment Variables
  - Which and Type
  - General Quoting Rules
  - Nesting Commands
  - **Lab Tasks**
    - Redirection and Pipes
    - Wildcard File Matching
    - Shell Variables
    - Shell Meta-Characters
    - Command Substitution
-

**Module 6: Archiving and Compression**

- Archives with tar
- Archives with cpio
- The gzip Compression Utility
- The bzip2 Compression Utility
- The XZ Compression Utility
- The PKZIP Archiving/Compression format
- GNOME File Roller
- **Lab Tasks**
  - Archiving and Compression

**Module 7: Text Processing**

- Searching Inside Files
- The Streaming Editor
- Text Processing with Awk
- Replacing Text Characters
- Text Sorting
- Duplicate Removal Utility
- Extracting Columns of Text
- Combining Files and Merging Text
- Comparing File Changes
- **Lab Tasks**
  - Processing Text Streams
  - Text Processing

**Module 8: Regular Expressions**

- Regular Expression Overview
- Regular Expressions
- RE Character Classes
- Regex Quantifiers
- RE Parenthesis
- **Lab Tasks**
  - Pattern Matching with Regular Expressions
  - Extended Regular Expressions
  - Using Regular Expressions with sed

**Module 9: Text Editing**

- Text Editing
- Pico/GNU Nano
- Pico/Nano Interface
- Nano configuration
- Pico/Nano Shortcuts
- vi and Vim
- Learning Vim
- Basic vi
- Intermediate vi
- **Lab Tasks**
  - Text Editing with Nano
  - Text Editing with Vim

**Module 10: Messaging**

- System Messaging Commands
- Controlling System Messaging
- Internet Relay Chat
- Instant Messenger Clients
- Electronic Mail
- Sending Email with sendmail
- Sending and Receiving Email with mailx
- Sending and Receiving Email with mutt
- Sending Email with Pine
- Evolution
- **Lab Tasks**
  - Command Line Messaging
  - Messaging with talkd
  - Command Line Email
  - Alpine

**Module 11: Command Shells**

- Shells
- Identifying the Shell
- Changing the Shell
- Configuration Files
- Script Execution
- Shell Prompts
- Bash: Bourne-Again Shell
- Bash: Configuration Files
- Bash: Command Line History
- Bash: Command Editing
- Bash: Command Completion
- Bash: "shortcuts"
- Bash: prompt
- Setting Resource Limits via ulimit
- **Lab Tasks**
  - Linux Shells
  - Bash History
  - Aliases
  - Bash Login Scripts
  - The Z Shell

**Module 12: Introduction to Shell Scripting**

- Shell Script Strengths and Weaknesses
- Example Shell Script
- Positional Parameters
- Input & Output
- Doing Math
- Comparisons with test
- Exit Status
- Conditional Statements
- Flow Control: case
- The for Loop
- The while and until Loops
- **Lab Tasks**
  - Writing a Shell Script

<b>Module 13: Process Management and Job Control</b>	<ul style="list-style-type: none"> <li>• What is a Process?</li> <li>• Process Lifecycle</li> <li>• Process States</li> <li>• Viewing Processes</li> <li>• Signals</li> <li>• Tools to Send Signals</li> <li>• nohup and disown</li> <li>• Managing Processes</li> <li>• Tuning Process Scheduling</li> <li>• Job Control Overview</li> </ul>	<ul style="list-style-type: none"> <li>• Job Control Commands</li> <li>• Persistent Shell Sessions with Screen</li> <li>• Using screen</li> <li>• Advanced Screen</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Job Control Basics</li> <li>– Process Management Basics</li> <li>– Screen Basics</li> <li>– Using Screen Regions</li> <li>– Troubleshooting Practice: Process Management</li> </ul> </li> </ul>
<b>Module 14: At and Cron</b>	<ul style="list-style-type: none"> <li>• Automating Tasks</li> <li>• at/batch</li> <li>• cron</li> <li>• The crontab Command</li> <li>• crontab Format</li> <li>• /etc/cron.*/ Directories</li> </ul>	<ul style="list-style-type: none"> <li>• Anacron</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Creating and Managing User Cron Jobs</li> <li>– Adding System cron Jobs</li> <li>– Troubleshooting Practice: Automating Tasks</li> </ul> </li> </ul>
<b>Module 15: Managing Software</b>	<ul style="list-style-type: none"> <li>• Downloading with FTP</li> <li>• FTP</li> <li>• lftp</li> <li>• Command Line Internet – Non-interactive</li> <li>• Command Line Internet – Interactive</li> <li>• Managing Software Dependencies</li> <li>• Using the Yum command</li> <li>• Using Yum history</li> <li>• YUM package groups</li> <li>• Configuring Yum</li> <li>• yumdownloader</li> <li>• Popular Yum Repositories</li> <li>• Using the Zypper command</li> </ul>	<ul style="list-style-type: none"> <li>• Zypper Services and Catalogs</li> <li>• The dselect &amp; APT Frontends to dpkg</li> <li>• Aptitude</li> <li>• Configuring APT</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Command Line File Transfers</li> <li>– Using Yum</li> <li>– Using Zypper</li> <li>– Managing Yum Repositories</li> <li>– Managing Zypper Repositories</li> <li>– Using APT</li> <li>– Adding an APT repository</li> </ul> </li> </ul>
<b>Module 16: The Secure Shell (SSH)</b>	<ul style="list-style-type: none"> <li>• Secure Shell</li> <li>• ssh and sshd Configuration</li> <li>• Accessing Remote Shells</li> <li>• Transferring Files</li> <li>• Alternative sftp Clients</li> <li>• SSH Key Management</li> </ul>	<ul style="list-style-type: none"> <li>• ssh-agent</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Introduction to ssh and scp</li> <li>– SSH Key-based User Authentication</li> <li>– Using ssh-agent</li> </ul> </li> </ul>
<b>Module 17: Mounting Filesystems &amp; Managing Removable Media</b>	<ul style="list-style-type: none"> <li>• Filesystems Concept Review</li> <li>• Mounting Filesystems</li> <li>• NFS</li> <li>• SMB</li> <li>• Filesystem Table (/etc/fstab)</li> </ul>	<ul style="list-style-type: none"> <li>• AutoFS</li> <li>• Removable Media</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Accessing NFS Shares</li> <li>– On-demand filesystem mounting with AutoFS</li> </ul> </li> </ul>
<b>Module 18: Printing</b>	<ul style="list-style-type: none"> <li>• Legacy Print Systems</li> <li>• Common UNIX Printing System</li> <li>• Defining a Printer</li> <li>• Standard Print Commands</li> <li>• Format Conversion Utilities</li> </ul>	<ul style="list-style-type: none"> <li>• enscript and mpage</li> <li>• <b>Lab Tasks</b> <ul style="list-style-type: none"> <li>– Printing</li> <li>– Configuring Print Queues</li> </ul> </li> </ul>

## Course data sheet

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### Appendix A: The X Window System

- The X Window System
- X Modularity
- X.Org Drivers
- Configuring X Manually
- Automatic X Configuration
- Xorg and Fonts
- Installing Fonts for Modern Applications
- Installing Fonts for Legacy Applications
- The X11 Protocol and Display Names
- Display Managers and Graphical Login
- Starting X Apps Automatically
- X Access Control
- Remote X Access (historical/insecure)
- Remote X Access (modern/secure)
- XDMCP
- Remote Graphical Access with VNC and RDP
- Specialized X Servers
- **Lab Tasks**
  - Remote X with XDMCP
  - Configure X Security
  - Configure a VNC Server
  - Configure a VNC Server
  - Configure a VNC Server
  - Launching X Apps Automatically
  - Secure X

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### Appendix B: Emacs

- Emacs
  - The Emacs Interface
  - Basic Emacs
  - More Emacs Commands
  - **Lab Tasks**
    - Text Editing with Emacs
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U8583S J.01, November 2018