Hewlett Packard Enterprise

Linux for Unix Administrators – Part 1
HL967S

This course consists of three-day delivery of modules 1-13 of the five-day Linux for UNIX Administrators course (U2794S). This is an accelerated course combining the topics in the H7091S "Enterprise Linux Systems Administration", and the H7092S "Enterprise Linux Networking Services".

HPE course number	HL967S
Course length	3 days
Delivery mode	ILT, vILT
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Prerequisites

Students should already be experienced Unix administrators. Fundamentals such as the Unix command line and how to edit files will not be covered in class. A good understanding of network concepts, the TCP/IP protocol suite, and basic Unix security is also assumed. The accelerated pace of this class makes it more difficult for unprepared students to keep up.

Less experienced students are encouraged to instead take the U8583S "Linux Fundamentals", H7091S "Enterprise Linux Systems Administration" or H7092S "Enterprise Linux Networking Services".

Supported Distributions

- Red Hat Enterprise Linux 7
- SUSE Linux Enterprise 12

*Realize Technology Value with Training, IDC Infographic 2037, Sponsored by HPE, January 2016

Detailed Course Outline

Module 1: Linux Orientation

- FSF and GNU
- GPL – General Public License
- Linux Kernel and Versioning
- Components of a Distribution
- Red Hat Linux Products
- SUSE Linux Products

Module 2: Linux Kernel & Hardware

- Hardware Discovery Tools
- Configuring New Hardware with hwinfo
- Hardware and System Clock
- Console
- Virtual Terminals
- Keyboard & locale configuration
- Serial Ports
- SCSI Devices
- USB Architecture
- Defining a Printer
- Tape Libraries
- Managing Linux Device Files
- Kernel Hardware Info – /sys/
- /sys/ Structure
- udev
- Kernel Modules
- Configuring Kernel Components and Modules
- Handling Module Dependencies
- Configuring the Kernel via /proc/
- Random Numbers and /dev/random
- System Tools
- Lab Tasks
  - Adjusting Kernel Options
  - Linux Kernel Driver Compilation
  - Configuring Print Queues
  - Introduction to Troubleshooting Labs
  - Troubleshooting Practice: Kernel Modules

Module 3: Systemd Overview

- System Boot Method Overview
- systemd System and Service Manager
- systemd Targets
- Using systemd
- Linux Runlevels Aliases
- Legacy Support for SysV init
- Lab Tasks
  - Managing Services With Systemd's systemctl
  - Creating a systemd unit file

Module 4: GRUB2/Systemd Boot Process

- Booting Linux on PCs
- GRUB 2
- GRUB 2 Configuration
- GRUB 2 Security
- Boot Parameters
- Initial RAM Filesystem
- init
- Systemd local-fs.target and sysinit.target
- Systemd basic.target and multi-user.target
- Legacy local bootup script support
- System Configuration Files
- RHEL7 Configuration Utilities
- SLES12 Configuration Utilities
- Shutdown and Reboot
- Lab Tasks
  - Boot Process
  - Booting directly to a bash shell
  - GRUB Command Line
  - Basic GRUB Security
  - Troubleshooting Practice: Boot Process

Module 5: Software Maintenance

- RPM Architecture
- Working With RPMs
- Querying and Verifying with RPM
- Updating the Kernel RPM
- Using the Yum command
- Using the Zypper command
- YUM package groups
- Zypper Services and Catalogs
- Configuring Yum
- YUM Repositories
- Rebuilding Source RPM Packages
- Software Tools Comparison Matrix
- Lab Tasks
  - Managing Software with RPM
  - Creating a Custom RPM Repository
  - Querying the RPM Database
  - Installing Software via RPM & Source and Rebuilding SRPMs
  - Using Yum
  - Using Zypper

Module 6: Local Storage Administration

- Partitioning Disks with fdisk & gdisk
- Resizing a GPT Partition with gdisk
- Partitioning Disks with parted
- Filesystem Creation
- Mounting Filesystems
- Filesystem Maintenance
- Resizing Filesystems
- Managing an XFS Filesystem
- Swap
- Filesystem Attributes
- Filesystem Creation and Management
- Lab Tasks
  - Creating and Managing Filesystems
  - Hot Adding Swap

Module 7: LVM & RAID

- Logical Volume Management
- Implementing LVM
- Creating Logical Volumes
- Activating LVM VGs
- Exporting and Importing a VG
- Examining LVM Components
- Changing LVM Components
- Advanced LVM Overview
- Advanced LVM: Components & Object Tags
- Advanced LVM: Automated Storage Tiering
- Advanced LVM: Thin Provisioning
- Advanced LVM: Striping & Mirroring
- Advanced LVM: RAID Volumes
- gnome-disk-utility
- SLES Graphical Disk Tool
- RAID Concepts
- Array Creation with mdadm
- Software RAID Monitoring
- Software RAID Control and Display
- LVM and RAID: Unix Tool Comparison
- Lab Tasks
  - Creating and Managing LVM Volumes
  - Creating and Managing a RAID-5 Array

Module 8: Remote Storage Administration

- Remote Storage Overview
- Remote Filesystem Protocols
- Remote Block Device Protocols
- NFS Clients
- NFS Server Configuration
- Implementing NFSv4
- AutoFS
- AutoFS Configuration
- SAN Multipathing
- Multipath Configuration
- Multipathing Best Practices
- iSCSI Architecture
- Open-iSCSI Initiator Implementation
- iSCSI Initiator Discovery
- iSCSI Initiator Node Administration
- Mounting iSCSI Targets at Boot
- iSCSI Multipathing Considerations
- Lab Tasks
  - Using autofs
  - NFS Server Configuration
  - iSCSI Initiator Configuration

Module 9: User/Group Administration

- Approaches to Storing User Accounts
- User and Group Concepts
- User Administration
- Modifying Accounts
- Group Administration
- Password Aging
- Default User Files
- Controlling Login Sessions
- RHEL DS Client Configuration
- SLES DS Client Configuration
- PAM Overview
- PAM Module Types
- PAM Order of Processing
- PAM Control Statements
- pam_wheel.so
- pam_limits.so
- User/Group Administration Comparison Matrix
- Lab Tasks
  - User and Group Administration
  - Using LDAP for Centralized User Accounts
  - Troubleshooting Practice: Account Management
  - Restricting superuser access to wheel group membership
  - Setting Limits with the pam_limits Modules
  - Using pam_limits to Restrict Simultaneous Logins

Module 10: Security Administration

- Security Concepts
- Tightening Default Security
- Security Advisories
- Fine Grained Authorizations with Polkit
- File Access Control Lists
- Manipulating FACLs
- Viewing FACLs
- Backing Up FACLs
- File Creation Permissions with umask
- User Private Group Scheme
- Alternatives to UPG
- TCP Wrappers Concepts
- TCP Wrappers Concepts
- Xinetd
- SUSE Basic Firewall Configuration
- Netfilter Concepts
- Using the iptables Command
- Common match_specs
- Connection Tracking
- AppArmor
- SELinux Security Framework
- SELinux Modes
- SELinux Commands
- Choosing an SELinux Policy
- SELinux Booleans
- SELinux Policy Tools
- (X)INETD and Firewalls
- Lab Tasks
  - User Private Groups
  - Using Filesystem ACLs
  - Securing xinetd Services
  - Enforcing Security Policy with xinetd
  - Securing Services with TCP Wrappers
  - Securing Services with SuSEfirewall2
  - Securing Services with Netfilter
  - Exploring SELinux Modes
  - SELinux File Contexts

Module 11: Process Administration

- at & cron Usage
- Anacron
- Viewing Processes
- Managing Processes
- Tuning Process Scheduling
- Process Accounting
- Setting Resource Limits via ulimit
- Lab Tasks
  - Creating and Managing User Cron Jobs
  - Adding System cron Jobs

Module 12: Networking

- Linux Network Interfaces
- Ethernet Hardware Tools
- Network Configuration with ip Command
- Configuring Routing Tables
- IP to MAC Address Mapping with ARP
- Starting and Stopping Interfaces
- NetworkManager
- DNS Clients
- DHCP Clients
- Network Diagnostics
- Information from ss and netstat
- Managing Network-Wide Time
- Continual Time Sync with NTP
- Configuring NTP Clients
- Multiple IP Addresses
- IPv6
- Interface Aggregation
- Interface Bonding
- Network Teaming
- Interface Bridging
- 802.1q VLANS
- Network Configuration Tools
- Lab Tasks
  - Network Discovery
  - Basic Client Networking
  - NTP Client Configuration
  - Multiple IP Addresses Per Network Interface
  - Configuring IPv6
  - Troubleshooting Practice: Networking

Module 13: Monitoring & Troubleshooting

- System Status – Memory
- System Status – I/O
- System Status – CPU
- Performance Trending with sar
- Troubleshooting Basics: The Process
- Troubleshooting Basics: The Tools
- System Logging
- Syslog-ng
- systemd Journal
- systemd Journal's journactl
- Secure Logging with Journal's Log Sealing
- Rsyslog
- /etc/rsyslog.conf
- Log Management
- Log Anomaly Detector
- strace and ltrace
- Troubleshooting Incorrect File Permissions
- Inability to Boot
- Typos in Configuration Files
- Corrupt Filesystems
- RHEL7 Rescue Environment
- SUSE Rescue Environment
- Process Tools
- Lab Tasks
  - Using the systemd Journal
  - Setting up a Full Debug Logfile
  - Remote Syslog Configuration
  - Remote Rsyslog TLS Configuration
  - Recovering Damaged MBR

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