



LINUX System Administration

The GL250 is an in-depth course that explores installation, configuration and maintenance of Linux systems. The course focuses on issues universal to every workstation and server. The course material is designed to provide extensive hands-on experience. Topics include: installation and configuration; the boot process; user and group administration; filesystem administration, including quotas, ACLs, RAID and LVM; task automation; client networking; SELinux; configuring Netfilter firewalls with iptables; troubleshooting; and more.

Duration: 5 days

Prerequisites: Students should be comfortable working in a Linux or Unix environment. Fundamentals such as the Linux filesystem, process management, and how to edit files will not be covered in class. An understanding of network concepts and the TCP/IP protocol suite is helpful.

Outline:

1. Pre-Installation Considerations

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2. Hardware Compatibility
3. Multi-OS Booting
4. Partition Considerations
5. Partition Planning
6. Filesystem Considerations
7. Journaled Filesystems

2. Installing RHEL5/FC6

1. Installation Choices
2. Starting Installations from CD/DVD or USB
3. Installing From a Network Server
4. Installing From a Local Hard Drive
5. Install Program Interface
6. Installation Diagnostics
7. Language Selection
8. Keyboard Configuration
9. Automatic Partitioning
10. Partitioning with Disk Druid
11. Installing a Boot Loader
12. Network Configuration
13. Time Zone Configuration

14. root Password Configuration
15. Package Group Selection
16. Installing Packages
17. Install Finished
18. Firstboot
19. Firstboot Firewall Configuration
20. Firstboot SELinux Configuration
21. Firstboot Kernel Crash Dump Configuration
22. Firstboot Date and Time Configuration
23. Firstboot Authentication Configuration

Lab Tasks

24. Linux Installation [RHEL5 FC6]

3. Installing SLES10/SL10.1

1. Installation Choices
2. CD-ROM/DVD Installation
3. Network Installation
4. SLP for SUSE Installation
5. Local Hard Drive Installation
6. The linuxrc Program
7. Install Program Interface
8. Installation Diagnostics
9. Language Selection



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10. Installation Mode
11. Clock and Time Zone
12. Desktop Selection
13. The YaST Installer Design
14. Keyboard Configuration
15. Disk Partitioning
16. Software Package Selection
17. Boot Loader Configuration
18. Confirmation and File Installation
19. Hostname and Domain Name
20. Setting the Root Password
21. Network Configuration
22. SLES Services Configuration
23. Adding a User Account
24. Release Notes
25. Final Installation Hub
26. Installation Complete and AutoYaST "Cloning"

Lab Tasks

27. SUSE Installation [SLES SL10.1]

4. PC Hardware & Linux

1. Detecting New Hardware Manually
2. Configuring New Hardware with Kudzu
3. Configuring New Hardware with hwinfo
4. PC System Hardware
5. SCSI Devices
6. Serial Ports
7. USB Devices and Configuration
8. Linux Device Files
9. Configuring New Hardware
10. Kernel Modules
11. Handling Module Dependencies
12. Configuring the Kernel via /proc/

13. Kernel Hardware Info - /sys/
14. /sys/ Structure

Lab Tasks

15. PC Hardware and Linux

5. Post-Install System Configuration

1. System Configuration Files
2. Configuration Utilities
3. SUSE Configuration Utilities
4. Managing System Time
5. Managing Network-Wide Time
6. Continual Time Sync with NTP
7. Configuring NTP Clients
8. Managing Software
9. RPM Features, Architecture, and Package Files
10. Working With RPMs
11. Querying and Verifying with RPM
12. Updating the Kernel RPM
13. Intro to Package Management
14. Using the YUM command
15. Using the RUG command
16. Configuring YUM
17. RUG Services and Catalogs
18. YUM Repositories
19. Popular Yum Repositories
20. Common UNIX Printing System
21. Printing Subsystems
22. Defining a Printer
23. Kickstart
24. AutoYaST
25. Creating and Using Kickstart Files
26. Creating and Using Auto YaST2 Files
27. Using Kickstart files
28. Using AutoYaST2 files
29. linuxrc Automation



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Lab Tasks

30. NTP Client Configuration
31. Post-Install Configuration
32. YUM
33. RUG
34. Creating a Custom RPM Repository
35. Configuring Print Queues
36. Printer Configuration with system-config-printer
37. Printer Configuration with YaST
38. Automating Installation with Kickstart
39. Automating Installation with Auto YaST

6. Boot Process and SYSV Init

1. Booting Linux on PCs
2. LILO Options
3. GRUB Configuration
4. Kernel Boot Parameters
5. /sbin/init
6. System Init Styles
7. Linux Runlevels
8. /etc/inittab
9. /etc/rc.sysinit
10. SUSE /etc/init.d/boot
11. /etc/init.d/ and rc#.d/
12. rc
13. Typical SysV Init Script
14. The /etc/rc.local File
15. The /etc/init.d/*.local Files
16. Managing Daemons
17. Controlling Service Startup
18. Shutdown and Reboot

Lab Tasks

19. Boot Process
20. GRUB Command Line
21. Basic GRUB Security

7. User/Group Administration & NFS

1. User / Group Concepts
2. User Private Group Scheme
3. User Administration
4. Modifying Accounts
5. Group Administration
6. Password Aging
7. Default User Files
8. Controlling Logins
9. PAM, PAM Services, and PAM Control Statements
10. su and Wheel
11. sudo
12. Manual DS Client Configuration
13. RHEL/FC Graphical DS Client Configuration
14. SLES/SL Graphical DS Client Configuration
15. File Sharing via NFS
16. NFSv4
17. NFS Server Configuration and Clients
18. Implementing NFSv4
19. Automounting Filesystems

Lab Tasks

20. User and Group Administration
21. User Private Groups
22. Using autofs
23. Configure NIS Authentication
24. Using autofs for Home Directories
25. Using LDAP for Centralized User Accounts
26. NFS Server Configuration

8. Filesystem Administration

1. Partition Tables
2. File System Creation
3. Mounting File Systems



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4. Filesystem Maintenance
5. Persistent Block Devices
6. udev
7. Resizing Filesystems
8. File Deletion and Undeletion
9. Swap
10. Disk Usage
11. Configuring Disk Quotas
12. Setting Quotas
13. Viewing and Monitoring Quotas
14. Filesystem Attributes
15. File Access Control Lists
16. Manipulating, Viewing, and Backing Up ACLs
17. Backup Hardware
18. Tape Libraries
19. Backup Software and Examples

Lab Tasks

20. Hot Adding Swap
21. Setting User Quotas
22. Using tar and cpio for Backups
23. Using rsync and ssh for Backups
24. Using dump and restore for Backups
25. Creating CD Images for Backups
26. Using Filesystem ACLs

9. LVM & RAID

1. Logical Volume Management
2. Implementing LVM
3. Creating Logical Volumes
4. Manipulating VGs & LVs
5. Advanced LVM Concepts
6. RHEL/FC Graphical LVM Admin Tool
7. RAID Concepts
8. The mdadm Command
9. mdadm RAID Implementation
10. RAID Monitoring/Control

Lab Tasks

11. Creating and Managing a RAID-5 Array
12. Creating and Managing LVM Volumes

10. Task Automation & Process Accounting

1. Automating Tasks
2. at/batch
3. at Access Control
4. cron
5. crontab Format
6. The crontab Command
7. /etc/cron.* / Directories
8. anacron
9. Viewing and Managing Processes
10. Tuning Process Scheduling
11. System Logging
12. /etc/syslog.conf
13. syslog-ng
14. Log Management
15. Log Anomaly Detector
16. Process Accounting
17. Enabling Process Accounting
18. Setting Resource Limits via ulimit
19. Resource Limits with pam_limits.so Module
20. System Status - Memory, I/O, and CPU
21. sar

Lab Tasks

22. Creating and Managing User Cron Jobs
23. Adding System cron Jobs
24. Using BSD Process Accounting
25. Setting Limits with the pam_limits Modules



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11. Client Networking

1. IPv4 Fundamentals
2. TCP/IP Fundamentals
3. Linux Network Interfaces
4. Ethernet Hardware Tools
5. Runtime configuration change
6. Configuring Routing Tables
7. ARP
8. Advanced Configuration
9. Starting and Stopping Interfaces
10. Virtual Interfaces
11. Enabling IPv6
12. Interface Bonding
13. 802.1q VLANS
14. Network Profiles and ifup with
15. IP Stack Configuration
16. DNS Clients
17. Network Services via DHCP
18. DHCP Clients
19. Configuring a DHCP server
20. Configuration Tools
21. YaST Configuration Tool
22. Network Diagnostics

Lab Tasks

23. Basic Client Networking
24. Virtual Interfaces
25. Alias Addresses
26. Configuring Ipv6

12. The X Window System

1. The X Window System
2. X Modularity
3. X.Org Drivers
4. Configuring X Manually
5. system-config-display
6. sax2 and yast x11
7. Xorg and Fonts
8. The X Font Server

9. Installing Fonts for Modern Applications and 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 and modern/secure approach)
15. XDMCP
16. Alternative Remote Graphical Protocols
17. Specialized X Servers

Lab Tasks

18. Remote X with XDMCP
19. Configure a VNC Server
20. Launching X Apps Automatically
21. Secure X

13. Security Concepts

1. Security Concepts
2. Tightening Default Security
3. SuSE Security Checker
4. Staying Current
5. Using YOU
6. Security Advisories
7. SELinux Security Framework
8. Choosing an SELinux Policy
9. SELinux Commands and Booleans
10. Graphical SELinux Policy Tools
11. Xinetd and Xinetd Features
12. TCP Wrappers
13. The /etc/hosts.allow & /etc/hosts.deny Files

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14. /etc/hosts.{allow,deny}
Shortcuts
15. Advanced TCP Wrappers
16. Basic Firewall Activation
17. Netfilter: Stateful Packet Filter
Firewall
18. Netfilter Concepts
19. Using the iptables Command
20. Netfilter Rule Syntax
21. Targets
22. Common match_specs
23. Stateless Firewall Example
24. Connection Tracking
25. Stateful Firewall Example

Lab Tasks

26. Securing xinetd Services
27. Enforcing Security Policy with
xinetd
28. Securing Services with TCP
Wrappers
29. Securing Services with
SuSEfirewall 2
30. Securing Services with Netfilter

14. Linux Kernel Compilation

1. Why Compile?
2. Getting Kernel Source
3. Preparing to Compile
4. Configuring the Kernel
5. Kernel Compile Options and
Documentation
6. Distribution Specific Kernel
Extensions
7. Compiling the Kernel
8. Compile and Install Modules
9. Installing the Kernel
10. Tips and Tricks

Lab Tasks

11. Linux Kernel 2.6 Driver
Compilation
12. Linux Kernel 2.6 Compilation

15. Xen Virtualization

1. Virtualization?
2. Virtualization Technologies
3. What is Xen?
4. Xen Architecture, Deployment
Options and Considerations
5. Workstation/Server Xen
Deployment
6. Xen Server Farms
7. Storage Options for Xen Farms
8. Xen Networking
9. Live Migration of Xen Virtual
Servers
10. xend Configuration
11. Guest Config Files
12. The xm Command
13. Common xm Usage
14. SUSE Xen Tools
15. Red Hat Xen Tools

Lab Tasks

16. Installing Xen
17. Creating a Bootstrapped Xen
Guest

16. Troubleshooting

1. Basic Troubleshooting
2. Gathering Information
3. Information from df, mount,
and Log Files
4. Information Regarding Network
Settings
5. Information from ps, chkconfig,
dmesg, w, and netstat
6. Useful Debugging Aids
7. Common Problems
8. Incorrect File Permissions



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9. Inability to Boot
 10. Corrupt Filesystems
 11. Typos in Configuration Files
 12. Disks Full?
 13. Runaway Processes
 14. Shared Libraries
 15. Rescue Environment
 16. SUSE Rescue Environment
- Lab Tasks**
17. Recovering Damaged MBR
 18. Troubleshooting Practice