GLS250 "Enterprise Linux Systems Administration"

Intended for students already comfortable with working in the Unix environment, this in-depth course helps students acquire the variety of skills needed to set up and maintain Unix computers. The class concentrates on the popular SUSE LINUX Enterprise Server distribution, and covers subjects ranging from initial installation of Linux to day-to-day administrative tasks such as management of user accounts and disk space, and even imparting the trouble-shooting skills future system administrators will need to cope with unexpected behavior.

Prerequisites: Individuals wishing to take this class should already have a solid grounding in UNIX concepts. Fundamentals such as an understanding of the Linux filesystem, process management, and the ability to manipulate and edit files is considered a must and will not be covered in class. An understanding of network concepts, and the TCP/IP protocol suite is helpful.

Courseware supports latest versions of SUSE LINUX Professional and SUSE LINUX Enterprise Server.

Suggested course duration: 5 days.

Detailed Course Outline

Section 1 SUSE LINUX Introduction & Installation

- Linux Distribution Process
- SUSE Company Overview
- SUSE Linux Comparison
- SUSE Linux vs. RHEL/FC
- Pre-Installation Considerations
- Hardware Compatibility
- Multi-OS Booting
- Partition Considerations
- Partition Planning
- Filesystem Considerations
- Journaled Filesystems
- Installation Choices
- CD-ROM/DVD Installation
- Network Installation
- SLP for Installation
- Local Hard Drive Installation
- Install Program Interface
- The rclinux program
- Installation Diagnostics
- Language Selection
- The YaST Installer Design
- Installation Mode
- Keyboard Configuration
- Mouse Configuration
- Disk Partitioning
- Software Package Selection

Boot Loader Configuration
Clock and Time Zone
Confirmation and File install
The Root Password
Adding A User Account
X Window Configuration
Network Configuration
Final Installation Hub

Lab 1 - Installation

Perform a GUI network NFS based workstation install

Section 2 PC Hardware and Linux

hwinfo
PC System Hardware
USB Devices and Configuration
Linux Device Files
Configuring New Hardware
Kernel Modules
Handling Module Dependencies
Configuring Kernel via /proc
Kernel Hardware Info - sysfs
/sys/ structure

Lab 2 - PC Hardware and Linux

Enable the Magic-SysReq key
Use /etc/sysct1.conf to disable ICMP broadcast

Section 3 Post-Install System Configuration

Configuration Utilities
SUSE Configuration Fles
Network Services
Managing System Time and Network-Wide Time
Continual Time Sync - NTP
Configuring NTP Clients
Managing Software
RPM Features, Architecture, and Package Files
Working With RPMs
Package Dependencies
Querying and Verifying with rpm
Configuring Printers
Common UNIX Printing System
YaST Printer Configuration
AutoYaST2
Creating AutoYaST2 Files
Using AutoYaST2 files
linuxrc Automation

Lab 3 - Post-Install Config

Answer some questions about the system using RPM queries
Install zsh using RPM
Troubleshoot and repair a package using RPM verification

Upgrade the kernel using RPM
Setup print queues using CUPS using: YaST, lpadmin, and the CUPS web interface
Modify an AutoYaST2 file using a text editor
Create an AutoYaST2 file using YaST's autoyast module
Start an install using a pre made AutoYaST2 file

Section 4 Boot Process and SysV Init

Booting Linux on PCs
LILO Options
GRUB Configuration
Kernel Boot Parameters
/sbin/init
System init Styles
/etc/inittab
/etc/init.d/boot
init.d and rcX.d
rc
Typical SysV Init Script
The *.local files
Managing Daemons
Controlling Startup Services
Shutdown and Reboot

Lab 4 - Boot Process

Use GRUB to boot into a single user mode
Modify kernel / init parametere
Explore the GRUB interface
Attach to the /boot filesystem and display the contents of the grub/menu.lst file
Set a GRUB password
Configure the system to use LILO as the boot loader

Section 5 User/Group Administration and NFS

User/Group Concepts
User Private Group Scheme
User Administration
Modifying Accounts
Group Administration
Password Aging
Default User Files
Controlling Logins
PAM, PAM Services, and PAM Control Statements
su, Wheel, and sudo
DS Client Configuration
File Sharing via NFS
NFS Server Configuration
NFS Clients
Automounting Filesystems

Lab 5 - User and Group Administration

Customize /etc/skel
Add new users and manage password aging

Set up wheel group behavior for su
Configure a project directory to take advantage of the user private group scheme.
Configure autofs to access an NFS export
Configure NIS client as part of the domain
Configure autofs to mount home directories
Setup an NFS server and export directories

Section 6 Filesystem Administration

Partition Tables
File System Creation
Mounting File Systems
Filesystem Maintenance
Persistent Block Devices
udev
Resizing Filesystems
File Deletion and Undeletion
Swap
Disk Usage
Configuring and Checking Disk Quotas
Filesystem Attributes
File Access Control Lists
Manipulating FACLs
Viewing FACLs
Backing Up FACLs
Backup Hardware and Software
Tape Libraries
Backup Examples

Lab 6- Filesystem Admin

Create and activate additional swap space
Configure and test disk quotas on the /tmp filesystem
Backup files using tar and cpio over ssh
Backup files using rsync over ssh
Backup and restore files with dump and restore
Create and test an ISO9660 image

Section 7 - RAID and LVM

Logical Volume Management
Implementing LVMs
Manipulating LVMs
Advanced LVM Concepts
RAID Concepts
RAID Tools

Lab 7 - RAID and LVM

Use command line tools to partition free space
Configure software RAID-5 with a hot spare
Fail a member device of the array, examine the automatic recovery using the hot-spare
Fail another member device testing RAID-5
Remove failed member devices, add new devices to array, examine the recovery of array
Partition the drive and create LVM Physical Volumes

Create a LVM Volume Group and Logical Volume to hold website content
Verify the operation of LVM snapshots
Extend and grow the logical volume and the reiserfs filesytem

Section 8 Task Automation & Process Accounting

Automating Tasks
at / batch
at Access Control
cron
crontab Format
crontab
/etc/cron.* Directories
Viewing Processes
Managing Processes
System Logging
/etc/syslog.conf
Log Management
Log Anomaly Detector
Process Accounting
Using Process Accounting
Limiting System Resources
System Status - Memory, I/O, and CPU
sar

Lab 8 - Cron & Process Admin

Create and edit user cron jobs
Add a system-wide cron task to /etc/cron.hourly
Install and configure process accounting
Enable and set process limits
Remove cron jobs previously created

Section 9 Client Networking

Linux Network Interfaces
Ethernet Hardware Tools
Runtime Configuration Change
Configuring Routing Tables
ARP
Advanced Configuration
Starting and Stopping Interfaces
Virtual IP Interfaces
Enabling IPv6
Interface Bonding
802.1q VLANS
IP Stack Configuration
DNS Clients
Network Services via DHCP
DHCP Clients
dhcpd.conf Syntax
YaST Configuration Tools

Network Diagnostics
Point-to-Point Protocol
PPP Configuration Files, Chat, and Secrets Files

Lab 9 - Client Networking

Enable static configuration
Configure and test a virtual interface (eth0:0)
Verify Link-Local IPv6 Connectivity
Configure and Test Site-Local Connectivity

Section 10 The X Window System

XFree86 / X.org
Configuring X
X Fonts
Using Fonts
Display Manager Selection
XDMCP
Using Unix Remotely
X Security
Specialized X Servers
Starting X Apps Automatically

Lab 10 - X

Change the display manager to gdm
Enable XDMCP to support remote desktop login
Configure VNC to accept incoming connections
Launch a program by creating a script in the /etc/X11/xinit/xinitrc.d/ directory
Start a custom X session by modifying the ~/.xinitrc file
Secure X for use in a public kiosk
Test and verify that the special key sequences are disabled

Section 11 Security Concepts

Security Concepts
Tightening Default Security
SUSE Security Checker
Staying Current
Using YOU
Security Advisories
inetd / xinetd
Xinetd Features
TCP Wrappers
hosts.allow & hosts.deny
hosts.* Syntax Shortcuts
Advanced TCP Wrappers
Basic Firewall Activation
Stateful Packet Filter: iptables
Netfilter Concepts
Using iptables Command
Netfilter Rule Syntax
Targets
Common match_specs

Stateless Firewall Example
Connection Tracking
Stateful Firewall Example

Lab 11 - Security Lab

Examine current system
Configure Xinetd to provide a variety of limits for connecting to services
Configure a sensor to log connection attempts
Use TCP Wrappers to secure various services
Use the SUSEfirewall2 script
Use Netfilter stateful packet filtering to better protect the system

Section 12 Linux Kernel Compilation

Why Compile?
Getting Kernel Source
Preparing to Compile
Configuring the Kernel
General Options
Disk Configuration
Network Configuration
Expansion Port Configuration
Multimedia Configuration
Kernel Documentation
SUSE Kernel Extensions
Compiling the Kernel
Compile and Install Modules
Installing the Kernel
Tips and Tricks

Lab 12 - Kernel Compilation

Build, test, and install a new driver for the currently running kernel
Patch the Linux kernel source to add support for a new device
Compile and install a custom Linux kernel

Section 13 Troubleshooting

Basic Troubleshooting
Gathering Information
Information from df and mount
Information from Log Files
Information Regarding Network Settings
Information from ps, chkconfig, dmesg, w, and netstat
Useful Debugging Aids
Common Problems
Incorrect File Permissions
Inability To Boot
Corrupt File Systems
Typos in Configuration Files
Disks Full?
Runaway Processes
Shared Libraries
The Rescue Environment

Lab 13 - Troubleshooting

Explore troubleshooting and disaster recovery on non-mission-critical machines
Troubleshoot common system and daemon errors