



Solutions

Security

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Strategies

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LPIC-1: Linux Administrator

OVERVIEW:

LPIC-1 is the first certification in the multi-level Linux professional certification program of the Linux Professional Institute (LPI). The LPIC-1 will validate the candidate's ability to perform maintenance tasks on the command line, install and configure a computer running Linux and configure basic networking.

The LPIC-1 is designed to reflect current research and validate a candidate's proficiency in real world system administration. The objectives are tied to real-world job skills, which we determine through job task analysis surveying during exam development.

Prerequisites: There are no prerequisites for this certification.

Requirements: Passing the 101 and 102 exams. Each 90-minute exam is 60 multiple-choice and fill-in-the-blank questions.

Validity period: 5 years unless retaken or higher level is achieved

COURSE 101

Work On The Command Line

- ✓ LPI Objectives Covered
- ✓ Role of Command Shell
- ✓ Shells
- ✓ Gathering System Info
- ✓ Identifying the Shell
- ✓ Changing the Shell
- ✓ Shell Prompts
- ✓ Bash: Bourne-Again Shell
- ✓ Navigating the Filesystem
- ✓ Help from Commands and Documentation
- ✓ Getting Help Within the Graphical Desktop
- ✓ Getting Help with man & info
- ✓ Bash: Command Line History
- ✓ Bash: Command Editing
- ✓ Bash: Command Completion
- ✓ Shell and Environment Variables
- ✓ Key Environment Variables
- ✓ Lab Tasks
 - Help with Commands
 - Linux Shells
 - Shell Variables
 - Bash History
 - Aliases

Use Streams, Pipes, And Redirects

- ✓ LPI Objectives Covered
- ✓ File Redirection
- ✓ Piping Commands Together
- ✓ Filename Matching
- ✓ File Globbing and Wildcard Patterns
- ✓ Brace Expansion
- ✓ General Quoting Rules
- ✓ Nesting Commands
- ✓ Gotchas: Maximum Command Length

- ✓ Lab Tasks
 - Redirection and Pipes
 - Wildcard File Matching
 - Shell Meta-Characters
 - Command Substitution

Manage File Permissions And Ownership

- ✓ LPI Objectives Covered
- ✓ Filesystem Hierarchy Standard
- ✓ Displaying Directory Contents
- ✓ Filesystem Structures
- ✓ Determining Disk Usage With df and du
- ✓ File Ownership
- ✓ Default Group Ownership
- ✓ File and Directory Permissions
- ✓ File Creation Permissions with umask
- ✓ Changing File Permissions
- ✓ SUID and SGID on files
- ✓ SGID and Sticky Bit on Directories
- ✓ User Private Group Scheme
- ✓ Lab Tasks
 - Navigating Directories and Listing Files
 - Disk and Filesystem Usage
 - File and Directory Ownership and Permissions

Create, Delete, Find, And Display Files

- ✓ LPI Objectives Covered
- ✓ Directory Manipulation
- ✓ File Manipulation
- ✓ Deleting and Creating Files
- ✓ Physical Unix File Structure
- ✓ Filesystem Links
- ✓ File Extensions and Content
- ✓ Which and Type whereis
- ✓ Searching the Filesystem
- ✓ Alternate Search Method

- ✓ Manually Installed Shared Libraries
- ✓ LAB TASKS
 - Manipulating Files and Directories

Work With Archives And Compression

- ✓ LPI Objectives Covered
- ✓ Archives with tar
- ✓ Archives with cpio
- ✓ The gzip Compression Utility
- ✓ The bzip2 Compression Utility
- ✓ The XZ Compression Utility
- ✓ The PKZIP Archiving/Compression format
- ✓ Lab Tasks
 - Archiving and Compression
 - Using tar for Backups
 - Using cpio for Backups

Process Text Streams Using Filters

- ✓ LPI Objectives Covered
- ✓ Producing File Statistics
- ✓ The Streaming Editor
- ✓ Replacing Text Characters
- ✓ Text Sorting
- ✓ Duplicate Removal Utility
- ✓ Extracting Columns of Text
- ✓ Displaying Files
- ✓ Prepare Text for Display
- ✓ Previewing Files
- ✓ Displaying Binary Files
- ✓ Combining Files and Merging Text
- ✓ Lab Tasks
 - Text Processing
 - Processing Text Streams

Search Text Files Using Regular Expressions

- ✓ LPI Objectives Covered
- ✓ Searching Inside Files

- ✓ 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

Perform Basic File Editing Operations Using Vi

- ✓ LPI Objectives Covered
- ✓ Text Editing
- ✓ vi and Vim
- ✓ Learning Vim
- ✓ Basic vi
- ✓ Intermediate vi
- ✓ Lab Tasks
 - Text Editing with Vim

Create, Monitor, And Kill Processes

- ✓ LPI Objectives Covered
- ✓ What is a Process?
- ✓ Process Lifecycle
- ✓ Process States
- ✓ Viewing Processes
- ✓ Signals
- ✓ Tools to Send Signals
- ✓ Managing Processes
- ✓ Tuning Process Scheduling
- ✓ Job Control Overview
- ✓ Job Control Commands
- ✓ nohup and disown
- ✓ uptime
- ✓ Persistent Shell Sessions with Screen
- ✓ Using screen
- ✓ Advanced Screen

- ✓ Lab Tasks
 - Job Control Basics
 - Process Management Basics
 - Screen Basics
 - Using Screen Regions

Use RPM, Yum, And Debian Package Management

- ✓ LPI Objectives Covered
- ✓ Managing Software
- ✓ RPM Architecture
- ✓ Working With RPMs
- ✓ Querying and Verifying with RPM
- ✓ Installing Debian Packages
- ✓ Querying and Verifying with dpkg
- ✓ The alien Package Conversion Tool
- ✓ Managing Software Dependencies
- ✓ Using the Yum command yumdownloader
- ✓ Configuring Yum
- ✓ The dselect & APT Frontends to dpkg
- ✓ Aptitude
- ✓ Configuring APT
- ✓ Lab Tasks
 - Working with RPMs on Ubuntu
 - Querying the RPM Database

Work With Partitions, Filesystems, And Disk Quotas

- ✓ LPI Objectives Covered
- ✓ Partition Considerations
- ✓ Logical Volume Management
- ✓ Filesystem Planning
- ✓ Partitioning Disks with fdisk & gdisk

- ✓ Resizing a GPT Partition with gdisk
- ✓ Partitioning Disks with parted
- ✓ Filesystem Creation
- ✓ Filesystem Support
- ✓ Unix/Linux Filesystem Features
- ✓ Swap
- ✓ Selecting a Filesystem
- ✓ Filesystem Maintenance
- ✓ Mounting Filesystems
- ✓ Mounting Filesystems
- ✓ Managing an XFS Filesystem
- ✓ NFS
- ✓ SMB
- ✓ Filesystem Table (/etc/fstab)
- ✓ Configuring Disk Quotas
- ✓ Setting Quotas
- ✓ Viewing and Monitoring Quotas
- ✓ Lab Tasks
 - Hot Adding Swap
 - Accessing NFS Shares
 - Setting User Quotas

Linux Boot Process

- ✓ LPI Objectives Covered
- ✓ Booting Linux on PCs
- ✓ GRUB 2
- ✓ GRUB 2 Configuration
- ✓ GRUB Legacy Configuration
- ✓ Boot Parameters
- ✓ init
- ✓ Linux Runlevels Aliases
- ✓ Systemd local-fs.target and sysinit.target
- ✓ Runlevel Implementation
- ✓ System Boot Method Overview
- ✓ systemd System and Service Manager
- ✓ systemd Targets
- ✓ Using systemd
- ✓ Shutdown and Reboot

- ✓ System Messaging Commands
- ✓ Controlling System Messaging
- ✓ Lab Tasks
 - Command Line Messaging
 - Messaging with talkd
 - Boot Process
 - GRUB Command Line
 - Basic GRUB Security

Determine And Configure Hardware Settings

- ✓ LPI Objectives Covered
- ✓ Managing Linux Device Files
- ✓ Hardware Discovery Tools
- ✓ Configuring New Hardware with hwinfo
- ✓ PC Architecture and Bus
- ✓ DMA & IRQ
- ✓ USB Devices
- ✓ USB Configuration
- ✓ Configuring Kernel Components and Modules
- ✓ Kernel Modules
- ✓ Handling Module Dependencies
- ✓ Configuring the Kernel via /proc/
- ✓ Kernel Hardware Info – /sys/
- ✓ /sys/ Structure
- ✓ Random Numbers and /dev/random
- ✓ Lab Tasks
 - Adjusting Kernel Options

Linux Fundamentals

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

- ✓ Logging In
- ✓ got root?
- ✓ Switching User Contexts
- ✓ Gathering Login Session Info
- ✓ Lab Tasks
 - Login and Discovery
 - Switching Users With su

COURSE 102

Account And Security Administration

- ✓ LPI Objectives Covered
- ✓ Gathering System Info
- ✓ Approaches to Storing User Accounts
- ✓ User and Group Concepts
- ✓ User Private Group Scheme
- ✓ User Administration
- ✓ Modifying Accounts
- ✓ Group Administration
- ✓ Password Aging
- ✓ Limiting Logins
- ✓ Default User Files
- ✓ su and Wheel
- ✓ sudo
- ✓ Setting Resource Limits via ulimit
- ✓ pam_limits.so
- ✓ lsof and fuser
- ✓ Lab Tasks

- User and Group Administration
- Restricting superuser access to wheel group membership
- User Private Groups
- Setting Limits with the pam_limits Modules

Customizing The Shell And Writing Simple Scripts

- ✓ LPI Objectives Covered

- ✓ Configuration Files
- ✓ Script Execution
- ✓ Bash: Configuration Files
- ✓ Shell and Environment Variables
- ✓ Bash Shell Options
- ✓ Bash: 'shortcuts'
- ✓ Bash: prompt
- ✓ Nesting Commands
- ✓ 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
- ✓ Functions
- ✓ Sending and Receiving Email with mailx
- ✓ Lab Tasks
 - Bash Login Scripts
 - Writing a Shell Script
 - Command Line Email
 - Alpine

Automating Tasks

- ✓ LPI Objectives Covered
- ✓ Automating Tasks
- ✓ at/batch
- ✓ cron
- ✓ The crontab Command
- ✓ crontab Format
- ✓ /etc/cron.*/ Directories
- ✓ Anacron
- ✓ Lab Tasks
 - Adding System cron Jobs

- Creating and Managing User Cron Jobs

Networking

- ✓ LPI Objectives Covered
- ✓ IPv4 Fundamentals
- ✓ TCP/UDP Fundamentals
- ✓ IPv6
- ✓ Linux Network Interfaces
- ✓ Ethernet Hardware Tools
- ✓ Configuring Routing Tables
- ✓ Network Configuration with ip Command
- ✓ Starting and Stopping Interfaces
- ✓ SUSE YaST Network Configuration Tool
- ✓ Hostname and Domain Name
- ✓ Name Resolution
- ✓ DNS Clients
- ✓ Network Diagnostics
- ✓ Information from ss and netstat
- ✓ nmap
- ✓ Netcat
- ✓ Lab Tasks
 - Basic Client Networking
 - Configuring IPv6

X Window System

- ✓ LPI Objectives Covered
- ✓ The X Window System
- ✓ X Modularity
- ✓ X.Org Drivers
- ✓ Starting X
- ✓ 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
- ✓ X Access Control
- ✓ Remote X Access (historical/insecure)
- ✓ Remote X Access (modern/secure)
- ✓ Customizing X Sessions
- ✓ Starting X Apps Automatically
- ✓ Lab Tasks
 - Configure X Security
 - Launching X Apps Automatically
 - Secure X

Accessibility And Localization

- ✓ LPI Objectives Covered
- ✓ GNOME Accessibility Support
- ✓ Internationalization & Localization
- ✓ Character Encodings
- ✓ Locales
- ✓ Setting the Time Zone
- ✓ Lab Tasks
 - GNOME Accessibility
 - Character Encoding Conversion
 - Locale Configuration
 - Time Zone Configuration - Traditional Method
 - System Clock Configuration - Distribution tools
 - System Clock Configuration - Distribution tools

Time And Printing

- ✓ LPI Objectives Covered
- ✓ Hardware and System Clock
- ✓ Managing Network-Wide Time
- ✓ Continual Time Sync with NTP

- ✓ Configuring NTP Clients
- ✓ Useful NTP Commands
- ✓ Common UNIX Printing System
- ✓ Defining a Printer
- ✓ Standard Print Commands
- ✓ CUPS Troubleshooting
- ✓ CUPS Troubleshooting
- ✓ Lab Tasks
 - NTP Client Configuration
 - Printing
 - Configuring Print Queues

Log File Administration

- ✓ LPI Objectives Covered
- ✓ System Logging
- ✓ Syslog-ng
- ✓ systemd Journal
- ✓ systemd Journal's journactl
- ✓ Secure Logging with Journal's Log Sealing
- ✓ Rsyslog
- ✓ /etc/rsyslog.conf
- ✓ Log Management
- ✓ Sending logs from the shell
- ✓ Lab Tasks
 - Using the systemd Journal
 - Setting up a Full Debug Logfile
 - Remote Syslog Configuration

SQL And MTA Fundamentals

- ✓ LPI Objectives Covered
- ✓ Popular SQL Databases
- ✓ SELECT Statements
- ✓ INSERT Statements
- ✓ UPDATE Statements
- ✓ DELETE Statements
- ✓ JOIN Clauses
- ✓ SMTP
- ✓ SMTP Terminology
- ✓ SMTP Architecture

- ✓ Sendmail Architecture
- ✓ Sending Email with sendmail
- ✓ Sendmail Components
- ✓ Exim
- ✓ Postfix Features
- ✓ Postfix Architecture
- ✓ Postfix Components
- ✓ Postfix Map Types
- ✓ Configuration Commands
- ✓ Lab Tasks
 - SQL with Sqlite3
 - Configuring Postfix
 - Configuring Sendmail

- Using ssh-agent
- File Encryption with GPG

Host Security And Encryption

- ✓ LPI Objectives Covered
- ✓ Controlling Login Sessions
- ✓ Xinetd
- ✓ TCP Wrappers
- ✓ /etc/hosts.{allow,deny} Shortcuts
- ✓ Advanced TCP Wrappers
- ✓ Discovering Hosts
- ✓ Secure Shell
- ✓ ssh and sshd Configuration
- ✓ Accessing Remote Shells
- ✓ SSH Port Forwarding
- ✓ Transferring Files
- ✓ Alternative sftp Clients
- ✓ SSH Key Management
- ✓ ssh-agent
- ✓ GPG – GNU Privacy Guard
- ✓ Lab Tasks
 - Securing xinetd Services
 - Enforcing Security Policy with xinetd
 - Securing Services with TCP Wrappers
 - Introduction to ssh and scp
 - SSH Key-based User Authentication