



# LINUX FUNDAMENTALS

## Course Outline



## Program Overview

The course is designed to run for 32 hours (4 days with 8 hours each), in a classroom type environment. Participants will be required to login to a Linux computer throughout the course to complete seat works. Thus, they are expected to be tech-savvy, and has basic knowledge of computers and computer peripherals. An initial exposure to the Linux or UNIX Operating System (of any distribution type) is desired but not required

## Duration

4- Day Program

## Learning Objectives

Primary: Participants will be able to install, configure, maintain and administer Linux Operating System of any distribution type. The course is designed to train participants proficient in the administration of Linux using the command line; and by automatic common administration tasks by using shell scripts placed in the cron tab, or adding "at job" services.

Secondary: Since the training syllabus covers all the learning objectives of the Linux Professional Institute Certified Administrator (LPIC-1), interested participants may apply to take the LPI exams 101 and 102 after successful completion of the course.

## Target Audience

People who use Linux Operating System of any distribution (RHEL, CentOS, Fedora, Ubuntu, etc.) in their work such as System Administrators/Engineers, or Technical Support personnel are perfect candidates for this course. Programmers who are, or will be, developing programs for the Linux environment should also attend.

This course covers the learning objectives to pass the Linux Professional Institute (LPI) exams 101 and 102 (101-400 and 102-400 as of December 15, 2016). The exams are prerequisites to be awarded the Linux Professional Institute Certified Administrator (LPIC-1) credential.

## Program Structure and Outline

This course is a combination of instructor-led lectures and group activities.

### PART 1: BASICS

- History of Linux Operating System and the Open Systems Standard
  - History of Linux Operating System
  - The Open Source Project and OSI
  - Open Source Licenses and Standards (GPL, LPGL, Common Development and Distribution License, etc.).



**SPARTAN**

Allied Services

*Deliver Results - Create Value*

- Overview of the major Linux Distributions
- Overview of the different Linux OS Architectures
- Installation
  - Designing the disk partitioning scheme for a Linux System
  - Ensuring the /boot partition conforms to the hardware architecture requirements
  - Concept of swap space
  - Understanding LVM
- Booting the System
  - The BIOS boot sequence
  - Introduction to Linux Boot events (use of utilities such as dmesg, intramfs, etc.)
  - Common commands to the boot loader
  - Kernel options at boot time
  - Use of SysVinit, SystemD, UpStart
  - Changing runlevels, boot targets, and reverting to single user mode.
  - Reboot and shutdown commands (including alerting logged users before the switch)
- The Linux Terminal / Command Line
  - Opening the terminal
  - Terminal settings
  - Common terminal commands (bash, echo, env, export, pwd, set, unset, man, uname, history, .bash\_history).
  - Customizing the look of the prompt and shell environments
  - Creating aliases
- Determining attached hardware and Computer peripherals
  - How Linux detects hardware, and understanding of sysfs, udev, and dbus.
  - Use of Linux tools and utilities to list hardware information
  - Tools and utilities to manipulate USB devices (i.e. modprobe)
  - Manually mount and unmount filesystems
  - Configuring filesystems to automatically mount on boot
- Package Management
  - The Linux File System Structure
  - Managing Shared Libraries (ldd, ldconfig, /etc/ld.so.conf, LD\_LIBRARY\_PATH)
  - Debian Package Management
    - a. sources.list
    - b. apt-get
    - c. dpkg
    - d. apt-cache
    - e. aptitude



- RPM and YUM package management
  - f. /etc/yum.conf and /etc/yum.repos.d/
  - g. Yumdownloader
  - h. Rpm and rpm2cpio
- Creating and changing symbolic and hard links (ln vs ls)
- Basic Linux File Management
  - Common Archiving tools
  - Making directories
  - Copy, move, delete individual and multiple files; as well as directories
  - Finding and locating files (find, locate, updated, whereis, which, type, /etc/updated.conf, etc.)
- Text editors, and processing text streams through filters
  - Vi versus vim and how to use both.
  - Output redirection and modification of text streams using GNU textutils (i.e. cat, cut, sort, expand, join, sort, split, wc, sed, tail, etc.)
  - Use of streams, pipes, and redirects (including use of tee and xargs)
  - Search text files using regular expressions (grep, egrep, fgrep, sed, regex)
- File Permissions and Ownership
  - The default file permissions in Linux and the file creation mask
  - Reading the output of ls (i.e. permission symbols, etc.)
  - Managing access permissions for regular and special files (including directories)
    - a. Numeric permissions
    - b. Symbolic text permissions
    - c. Group permissions
  - Customizing file creation mask
- Basic network configuration and troubleshooting
  - IP Addressing essentials: IP addresses and subnet masking
  - Essentials of routing (different routing protocols, and route metrics)
  - Basic TCP/IP host configuration
  - Manual versus automatic network interface configurations
  - Configuring resolution for remote DNS servers, and querying remote DNS servers
  - Local name resolution and modifying the order of name resolution
  - Setting up routes
  - Basic Troubleshooting (traceroute, ping, ping6, ifconfig, ip, ifup, ifdown, host, hostname)
  - Advanced Troubleshooting (ping6, traceroute6, tracepath, tracepath6, netcat, dig, route).



## PART 2 LINUX ADMINISTRATION

- Creating Custom Partitions and Filesystem Administration
  - Introduction, MBR, GUID and GPT
  - Formatting disk drives
  - Introduction to gdisk, parted, and gparted
  - Monitoring disk space and inodes
  - Checking disk integrity and repairing simple filesystem problems (fsck, efsck, mke2fs, dumpe2fs, tune2fs, and XFS tools)
  - Setting up and managing disk quotas
  
- Linux Security Administration
  - Introduction to Linux password management of user accounts
  - Setting password aging and complexity
  - Limiting number of user login attempts
  - Host Security and TCP Wrappers
  - Determining currently logged in users, and historical access logs
  - Discovering open ports on a system using nmap and netstat
  - Configuring memory usage and process limits
  - Setting up process execution priorities (nice, renice, top, ps)
  - Add, modify, and remove users and groups
  - Introduction to sudo
  
- Configuring SSH access and encryption
  - Introduction to SSH, SSH version 1 vs version 2
  - Enabling or disabling SSH server
  - Restricting SSH access using allowed hosts, and authorized keys/certificates
  - Passkey-less SSH access
  - Configuring X11 tunnels and SSH port tunnels
  - Basic GnuPG configuration, usage and revocation
  
- Customizing the Shell Environment
  - Setting environment variables
  - Setting command search path to the proper directories
  - Setting directory environment for new user accounts
  - Introduction to Bash functions



- Shell Scripting
  - Introduction to shell scripting (syntax, organization, shebang, etc.)
  - Loops and command substitution
  - Managing ownership and suid rights of scripts
  - Towards a smarter organization: avoiding organizational traps and how to build smarter decision-making in organizations.
  
- Automating System Administration Jobs
  - Configuring and Managing Cron and at jobs
  - Configuring Anacron
  
- Managing Other Essential System Services
  - Local settings (language, time zone, keyboard accessibility, etc.)
  - Setting time and NTP
  - Configuring and auditing system logs
  - Mail Transfer Agent Basics
  - Managing Printers (emphasis on CUPS)
  - Setting up a Display Manager
  - Installing and Configuring X11



## Why Choose SAS Management Inc.

### We Deliver Results

SAS Management Inc. has consistently proven its capability to deliver and exceed our clients' expectations. We are the only PEOPLECERT® Accredited Training Organization (ATO) in the Philippines. Our pool of consultants and trainers are seasoned industry veterans who have above average qualifications and certifications such as Business Management, Process Improvement, and Organizational Development Programs.

### We Create Value

SAS Management Inc. believes in ensuring that our services meet the intended needs of our clients. To us, it is more than just providing training and consulting but rather ensuring that these are the things that our clients really need. This is why SAS Management Inc. is probably the only training provider that does a thorough needs assessment prior to providing a proposal. Our goal for every proposal is to CREATE VALUE for your organization.

SAS Management, Inc. is affiliated and endorsed by the following organizations:

Key Affiliations/Accreditation	Key Partner Programs	Key Partners
 	 	    
		   