

# Ubuntu Linux : System Administration

## Presentation

**Objectives** : Learn Ubuntu Linux system administration.

**Who can benefit**: Linux users and technicians / Windows™, Mac and Unix users/administrators.

**Prerequisites**: Computer literacy.

**Learning technique** : Clear, theoretical course content divided into lessons and extensive LABS available on-line 24/24 7/7.

**Duration** : 35 hours.

**Instructor** : Certified **LPI**.

**Student Progression** : Student progression is monitored both in terms of effective course duration and in terms of student comprehension using self-assessment tests.

**Resources** : Ubuntu 16.04 Virtual Appliance.

## Cursus

- **Managing Users and Groups**

- Groups
- Users
- Commands
  - Groups
    - groupadd
    - groupdel
    - groupmod
    - newgrp
    - gpasswd
  - Users
    - useradd
    - userdel

- usermod
- passwd
- Configuration
- LAB #1 - Managing Groups and Users
- su et su -
- sudo
- **Commands** : getent, grpck, grpconv, grpunconv, pwck, pwconv, pwunconv, groupadd, groupdel, groupmod, newgrp, gpasswd, useradd, userdel, usermod, passwd, id, groups, su, sudo.

### • Package Management

- Compiling Software the Old Way
  - ./configure
  - make
  - make check
  - make install
- The dpkg Command
- Advanced Package Tool
  - Configuration
  - Repositories
  - Usage
  - LAB #1 - Working with Apt
- Shared Libraries
  - Presentation
    - Introduction
    - Shared Object Locations
    - ld-linux.so.2
    - The ldd Command
    - The /etc/ld.so.conf File
    - The ldconfig Command
- **Commands** : dpkg, apt-get, apt-cache, mc, wget, configure, make, ldd, ldconfig.

### • Managing File Permissions

- Preparation
  - Basic Unix File Permissions
    - Changing Permissions with chmod
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- Symbolic Mode
- Octal Mode
- The umask command
- Changing the Owner or the Group with chown and chgrp
- Advanced Unix Permissions
  - SUID/SGID bit
  - Inheritance Flag
  - Sticky bit
- ACLs
  - Commande Line Switches
- Ext2/Ext3/Ext4 Attributes
- **Commands** : chmod, umask, chown, chgrp, setfacl, getfacl, chattr, lsattr.

## • Managing Disks and Swap Space

- Block Devices
  - Partitions
    - Master Boot Record
    - Apple Partition Map
    - GUID Partition Table
  - Partitioning
    - LAB #1 - Using fdisk and parted
  - Journaled Filesystems
    - Presentation
    - Ext3
    - Ext4
    - ReiserFS
    - XFS
    - JFS
    - Btrfs
  - Swap Space
    - Swap Size
    - Swap Partitions
    - The swapon Command
    - The swapoff Command
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- The /etc/fstab file
- Swap Files
- Logical Volume Manager (LVM)
  - Physical Volumes (PV)
  - Volume Groups (VG) and Physical Extents (PE)
  - Logical Volumes (LV)
  - Administration
  - Snapshots
  - Deleting Volumes
  - Mirrored Logical Volumes
  - Attributes
  - Striped Logical Volumes
  - Metadata
- **Commands** : fdisk, gdisk, parted, swapon, swapoff, mkswap, dumpe2fs, tune2fs, mke2fs, mkfs.ext3, e2fsck, resize2fs, debugfs, e2label, mkfs.ext4, mkfs.xfs, xfs\_check, xfs\_repair, xfs\_admin, xfs\_growfs, xfs\_info, xfs\_metadump, xfs\_db, xfs\_admin, mkfs.reiserfs, mkreiserfs, reiserfsck, reiserfstune, resize\_reiserfs, debugreiserfs, mkfs.jfs, jfs\_tune, jfs\_fsck, jfs\_febugfs, btrfs-balance, btrfs-check, btrfs-device, btrfs-filesystem, btrfs-inspect-internal, btrfs-property, btrfs-qgroup, btrfs-quota, btrfs-qgroup, btrfs-receive, btrfs-replace, btrfs-rescue, btrfs-restore, btrfs-scrub, btrfs-send, btrfs-subvolume, pvcreate, vgcreate, lvcreate, pvdisplay, vgdisplay, lvdisplay, lvextend, lvreduce, resize2fs, lvs, lvremove, vgremove, pvremove, lvconvert, vgs, pvs, lvchange, vgcfgbackup, vgcfgrestore.

### • Process Scheduling

- cron
- anacron
- at
- **Commands** : cron, anacron, at.

### • Archiving and Compression

- Archiving
  - tar
    - Presentation
    - LAB #1 - Using tar
  - cpio
    - Presentation
    - Command Line Switches
    - LAB #2 - Using cpio

- dd
  - Presentation
  - Command Line Switches
  - LAB #3 - Using dd
- dump and restore
  - Presentation
- Compression
  - gzip
    - Presentation
    - LAB #4 - Using gzip
  - bzip2
    - Presentation
    - LAB #5 - Using bzip2
  - xz
    - Presentation
    - LAB #5 - Using xz
  - Other Tools
- **Commands** : tar, cpio, dd, dump, restore, gzip, gunzip, bzip2, bunzip2, xz, compress, uncompress, rar, unrar, zip, unzip.

- **Process Management**

- Process Types
  - Process priorities
  - Synchronous and Asynchronous
  - Process Commands
    - The ps Command
    - The pstree Command
    - The top Command
    - The fg and bg Commands
    - The wait Command
    - The nice Command
    - The renice Command
    - The nohup Command
    - The kill Command
  - **Commands** : ps, pstree, top, fg, bg, wait, nice, renice, nohup, kill.
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## • Managing Logs

- The /var/log/messages file
  - The /bin/dmesg Command
  - The /var/log/audit/audit.log file
    - Managing Audit Events
      - auditd
      - auditctl
      - audispd
    - Viewing Audit Events
      - The aureport Command
      - The ausearch Command
  - Applications
  - rsyslog
    - Priorities
    - Facilities
    - /etc/rsyslog.conf
      - Modules
      - Global Directives
      - Rules
        - Facility.Priority
        - Facility!Priority
        - Facility=Priority
        - Using the \* Wildcard
        - n Facilities with Identical Priorities
        - n Selectors with Identical Actions
  - /usr/bin/logger
  - /usr/bin/logrotate
  - Journald
    - Viewing logs
    - Viewing logs of a specific application
    - Viewing the logs of the last boot process
    - Viewing logs of a specific priority
    - Viewing logs over a date period
    - Viewing logs in real time
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- Viewing logs using keywords
- **Commands** : dmesg, auditd, auditctl, audoispd, aureport, ausearch, rsyslog, logger, logrotate, journalctl.

## • Printer Management

- Introduction
  - Protocols
  - Daemon
- Configuration
  - /etc/cups/cupsd.conf
  - Filters
  - Backends
  - Logs
  - Printers
- Administration
  - The lpstat Command
  - The lpadmin Command
  - The accept and cupsenable Commands
  - Setting Up the Default Printer
  - Using a .ppd File to Add a Printer
  - Classes
  - The /etc/cups/printers.conf File
  - The /etc/cups/classes.conf File
  - The cancel Command
  - The lpmove Command
  - Destroying a Class
- Web Interface
- Graphical Interface
- **Commands** : lpadmin, accept, reject, cupsenable, cupsdisable, lpstat, cancel, lpmove, lpinfo, lppasswd, lp.

## • System Startup and Shutdown

- System Startup
    - Boot Loader
      - BIOS Systems
      - EFI Systems
  - GRUB 2
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- The /boot/grub/device.map file
  - The /etc/default/grub file
  - Files in the /etc/grub.d directory
    - /etc/grub.d/10\_Linux
    - /etc/grub.d/30\_os-prober
    - /etc/grub.d/40\_custom
    - /etc/grub.d/41\_custom
    - Password protection
  - Initramfs
    - The mkinitramfs Command
  - Kernel Booting Process
  - SysVinit startup process
    - The Init Process
    - RUNLEVELS
    - Unix System V Startup Scripts
    - Inittab
    - The /etc/init.d directory
    - The rcX.d Directories
    - The update-rc.d Command
    - The chkconfig Command
    - openSUSE
  - Upstart startup process
    - System Initialisation
    - Runlevels
    - [CTL]-[ALT]-[DEL]
    - mingetty
    - rc.sysinit
    - The /etc/rc.d/init.d Directory
    - The /etc/rc.d/rcX.d Directories
    - Managing Upstart services
  - The Systemd startup process
    - The systemctl command
    - Configuration files
    - The systemd-analyze command
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- Managing systemd services
- System Shutdown
  - The shutdown Command
  - The reboot command
  - The halt Command
  - The poweroff Command
- **Commands** : grub\_install, runlevel, init, telinit, chkconfig, update-rc.d, mkinitramfs, systemctl, systemd-analyze, shutdown, halt, reboot, poweroff.

### • Managing Integrated Peripherals

- Special Files
- Commands
  - The lspci Command
  - The lsusb Command
  - The dmidecode Command
- The /proc Directory
  - Sub-directories
    - ide/scsi
    - acpi
    - bus
    - net
    - sys
    - The sysctl Command
  - Files
    - /proc/cpuinfo
    - /proc/interrupts
    - /proc/dma
    - /proc/ioports
    - /proc/devices
    - /proc/modules
    - /proc/diskstats
    - /proc/partitions
    - /proc/swaps
    - /proc/loadavg

- /proc/meminfo
  - /proc/version
  - Interpreting Information in /proc
    - Commands
      - free
      - uptime or w
      - iostat
      - vmstat
      - mpstat
      - sar
    - Production Environments
      - Identifying a System with a CPU Bottleneck
      - Identifying a Memory Problem
      - Identifying I/O Bottlenecks
  - USB Modules
  - udev
    - The udevadm Command
  - The /sys Filesystem
  - Planning resources - the collectd command
  - Limiting Resources
    - ulimit
    - Control groups
  - **Commands:** lspci, lsusb, dmidecode, free, uptime, w, iostat, vmstat, mpstat, sar, udevadm, collectd, sysctl.
  - **Managing a the Network**
    - Communication models
      - OSI
        - NDIS and ODI
      - TCP/IP
        - Messages, Datagrams and Segments
        - Establishing a TCP connection
        - The TCP header
        - The UDP header
        - Fragmentation and Re-encapsulation
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- TCPv4 Classes
  - Subnet Masks
    - Variable Length Subnet Masks - VLSM
  - Ports and sockets
  - Configuring a Network Client under Linux
    - /etc/services
    - Ethernet address resolution with arp
  - Configuring TCP/IP on Ubuntu 16.04
    - The nmcli command
    - Connections and Profiles
    - Adding a second IP address to an existing profile
    - The hostname command
    - The ip command
    - Manually bringing up and down a network interface
  - Network Services
    - xinetd
    - TCP Wrapper
  - Network Diagnostic Commands
    - ping
    - ping6
    - netstat-i
    - traceroute
    - traceroute 6
    - tracepath6
  - Static Routing Tables on Ubuntu 16.04
    - The ip Command
    - Turning routing ON/OFF
  - Remote Administration
    - Telnet
    - ssh
    - wget
    - ftp
    - scp
  - Administrating an NFS server
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- Presentation
  - NFSv3 services and processes
  - Basic commands
  - Server installation on Ubuntu 16.04
  - Server installation on Ubuntu 16.04
  - The rpcinfo command
  - The nfsstat command
  - Packet Sniffers
    - TCPdump
    - Wireshark
  - Port Scanners
    - nmap
    - netcat
  - The Netfilter Firewall
    - Introduction
    - Configuration using firewalld
  - Cryptologie
    - GnuPG
    - Public Key Infrastructures
      - X509 Certificates
    - SSH and SCP
    - SSH Tunneling
  - **Commands** : netstat, arp, nslookup, dig, ifconfig, ifup, ifdown, ifstatus, NetworkManager, hostname, uname, nmcli, ip, network-manager, ping, ping6, Traceroute, Traceroute6, Tracepath6, tcpd, xinetd, route, ntpd, telnet, wget, ftp, tcpdump, wireshark, nmap, netcat, iptables, gpg, firewall-cmd, ssh, scp.
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