



Linux Administration and Networking Course

12-16 April 2010, eDevelopment House, Nairobi

Course Outline

Topic 101: Hardware & Architecture

1.101.1 Configure Fundamental BIOS Settings

Weight: 1

Description: Candidates should be able to configure fundamental system hardware by making the correct settings in the system BIOS in x86 based hardware.

Key knowledge area(s):

Enable and disable integrated peripherals.

Configure systems with or without external peripherals such as keyboards.

Correctly set IRQ, DMA and I/O addresses for all BIOS administrated ports and settings for error handling.

The following is a partial list of the used files, terms and utilities:

/proc/ioports
/proc/interrupts
/proc/dma
/proc/pci

1.101.3 Configure Modem and Sound cards

Weight: 1

Description: Candidates should be able to configure modem and soundcard settings.

Key knowledge area(s):

Ensure devices meet compatibility requirements (particularly that

the modem is not an unsupported win-modem).
Verify that correct resources are used by the cards.
Configure modem for outbound dial-up.
Set serial port speeds.

The following is a partial list of the used files, terms and utilities:

/proc/dma
/proc/interrupts
/proc/ioports
/proc/pci
lspci
lsusb

1.101.4 Setup non-IDE Devices **Weight: 1**

Description: Candidates should be able to configure non-IDE devices as SCSI, SATA, USB drives using the special BIOS as well as the necessary Linux tools.

Key knowledge area(s):

Differentiate between the various types of non-IDE devices.
Manipulate BIOS to detect used and available SCSI IDs.
Set the correct hardware ID for different devices, especially the boot device.
Configure BIOS settings to control the boot sequence when both non-IDE and IDE devices are present .

The following is a partial list of the used files, terms and utilities:

SCSI ID
/proc/scsi/
scsi_info

1.101.5 Setup different PC expansion cards **Weight: 3**

Description: Candidates should be able to configure various cards for the various expansion slots.

Key knowledge area(s):

Know the differences between coldplug and hotplug devices.
Determine hardware resources for devices.

The following is a partial list of the used files, terms and utilities:

The appropriate subdirectories of */proc*
hotplug configuration files, terms and utilities
lspci
lsusb

1.101.6 Configure Communication Devices **Weight: 1**

Description: Candidates should be able to install and configure different internal and external communication devices like modems, ISDN adapters and DSL modems.

Key knowledge area(s):

Verification of compatibility requirements (such as the modem is not a winmodem).

Correctly set IRQs, DMAs and I/O Ports of the cards to avoid conflicts between devices.

Load and configure suitable device drivers.

Set serial port speed.

Setup modem for outbound PPP connections.

lspci

xHCI modules

lsusb

/etc/usbmgr/

usbmodules

/etc/hotplug

udev configuration files, utilities and documentation

The following is a partial list of the used files, terms and utilities:

/proc/dma

/proc/interrupts

/proc/ioports

setserial

1.101.7 Configure USB devices

Weight: 1

Description: Candidates should be able to activate USB support, use and configure different USB devices.

Key knowledge area(s):

Identify and load the correct USB driver module.

Demonstrate knowledge of the USB layer architecture and the modules used in the different layers.

The following is a partial list of the used files, terms and utilities:

Topic 102: Linux Installation & Package Management**1.102.1 Design hard disk layout**

Weight: 5

Description: Candidates should be able to design a disk partitioning scheme for a Linux system.

Key knowledge area(s):

Allocate filesystems and swap space to separate partitions or disks.

Tailor the design to the intended use of the system.

Ensure the */boot* partition conforms to the BIOS requirements for booting.

The following is a partial list of the used files, terms and utilities:

/ (root) filesystem

/var filesystem

/home filesystem

swap space

mount points
partitions

1.102.2 Install a boot manager

Weight: 1

Description: Candidates should be able to select, install and configure a boot manager.

Key knowledge area(s):

Providing alternative boot locations and backup boot options (for example, using a boot floppy or a bootable CDROM).
Install and configure a boot loader such as GRUB or LILO.
Interact with the boot loader.

The following is a partial list of the used files, terms and utilities:

/boot/grub/grub.conf
/boot/grub/menu.lst
grub-install
MBR
superblock
first stage boot loader
/etc/lilo.conf
lilo

1.102.3 Make and install programs from source

Weight: 5

Description: Candidates should be able to build and install an executable program from source. This objective includes being able to unpack a file of sources. Candidates should be able to make simple customizations to the *Makefile*, for example changing paths or adding extra *include* directories, either in the raw *Makefile* or using the *configure* tools.

Key knowledge area(s):

Unpack a file of sources using typical compression utilities.
Make simple customizations to *Makefile* such as changing paths or adding extra include directories.
Apply parameters to a *configure* script.
Know where sources are stored by default.
Compile a RPM or DPKG software package using sources.

The following is a partial list of the used files, terms and utilities:

RPM and DPKG commands
/usr/src/
gunzip
gzip
bzip2
tar
configure
make

1.102.4 Manage shared libraries

Weight: 3

Description: Candidates should be able to determine the shared libraries that executable programs depend on and install them when necessary.

Key knowledge area(s):

Identify shared libraries.

Identify the typical locations of system libraries.

Load shared libraries.

The following is a partial list of the used files, terms and utilities:

ldd

ldconfig

/etc/ld.so.conf

LD_LIBRARY_PATH

may not be installed.

Obtain package information like version, content, dependencies, package integrity and installation status (whether or not the package is installed).

The following is a partial list of the used files, terms and utilities:

unpack

configure

/etc/dpkg/dpkg.cfg

*/var/lib/dpkg/**

/etc/apt/apt.conf

/etc/apt/sources.list

dpkg

dselect

dpkg-reconfigure

apt-get

alien

1.102.5 Use Debian package management

Weight: 8

Description: Candidates should be able to perform package management using the Debian package tools.

Key knowledge area(s):

Install, upgrade and uninstall Debian binary packages.

Find packages containing specific files or libraries which may or

1.102.6 Use Red Hat Package Manager (RPM)

Weight: 8

Description: Candidates should be able to perform package management using RPM based tools.

Key knowledge area(s):

Install, re-install, upgrade and remove RPM packages.

Obtain information on RPM packages such as version, status, dependencies, integrity and signatures.

Determine what files a package provides, as well as find which package a specific file comes from.

The following is a partial list of the used files, terms and utilities:

/etc/rpmrc
*/usr/lib/rpm/**
rpm
grep

Topic: 103 GNU & Unix Commands

1.103.1 Work on the command line

Weight: 5

Description: Candidates should be able to interact with shells and commands using the command line. The objective assumes the *bash* shell.

Key knowledge area(s):

Use single shell commands and one line command sequences to perform basic tasks on the command line.
Use and modify the shell environment including defining, referencing and exporting environment variables.
Use and edit command history.
Invoke commands inside and outside the defined path.
Use commands recursively through a directory tree.

The following is a partial list of the used files, terms and utilities:

bash
echo
env
exec
export
pwd
set
unset
~/.bash_history
~/.profile

1.103.2 Process text streams using filters

Weight: 6

Description: Candidates should be able to apply filters to text streams.

Key knowledge area(s):

Send text files and output streams through text utility filters to modify the output using standard UNIX commands found in the GNU textutils package.

The following is a partial list of the used files, terms and utilities:

cat
cut
expand

fmt
head
hexdump
join
nl
paste
pr
sed
sort
split
tac
tail
tr
unexpand
uniq
wc

1.103.3 Perform basic file management

Weight: 3

Description: Candidates should be able to use the basic Linux commands to manage files and directories.

Key knowledge area(s):

Copy, move and remove files and directories individually.
Copy multiple files and directories recursively.
Remove files and directories recursively.
Use simple and advanced wildcard specifications in commands.
Using find to locate and act on files based on type, size, or time.

The following is a partial list of the used files, terms and utilities:

cp
find
mkdir
mv
ls
rm
rmdir
touch
file globbing

1.103.4 Use streams, pipes and redirects

Weight: 5

Description: Candidates should be able to redirect streams and connect them in order to efficiently process textual data. Tasks include redirecting standard input, standard output and standard error, piping the output of one command to the input of another command, using the output of one command as arguments to another command and sending output to both *stdout* and a file.

Key knowledge area(s):

Redirecting standard input, standard output and standard error.
Pipe the output of one command to the input of another command.
Use the output of one command as arguments to another command.
Send output to both *stdout* and a file.

The following is a partial list of the used files, terms and utilities:

tee
xarg
<
<<
>>

/

` (*back ticks*)

1.103.5 Create, monitor and kill processes **Weight: 5**

Description: Candidates should be able to perform basic process management.

Key knowledge area(s):

Run jobs in the foreground and background.
Start a process that will run without being associated to a terminal.
Signal a program to continue running after logout.
Monitor active processes.
Select and sort processes for display.
Send signals to processes.
Kill processes including processes that did not terminate correctly after an X session has closed

The following is a partial list of the used files, terms and utilities:

&
bg
fg
jobs
kill
nohup
ps
top
killall

1.103.6 Modify process execution priorities **Weight: 3**

Description: Candidates should be able to manage process execution priorities.

Key knowledge area(s):

Know the default priority of a job that is created.
Run a program with higher or lower priority than the default..
Change the priority of a running process.

The following is a partial list of the used files, terms and utilities:

nice
ps
renice
top

1.103.7 Search text files using regular expressions

Weight: 3

Description: Candidates should be able to manipulate files and text data using regular expressions. This objective includes creating simple regular expressions containing several notational elements. It also includes using regular expression tools to perform searches through a filesystem or file content.

Key knowledge area(s):

Create simple regular expressions containing several notational elements.

Use regular expression tools to perform searches through a filesystem or file content.

The following is a partial list of the used files, terms and utilities:

grep
sed

1.103.8 Perform basic file editing operations using vi

Weight: 1

Description: Candidates should be able to edit text files using *vi*. This objective includes *vi* navigation, basic *vi* modes, inserting, editing, deleting, copying and finding text.

Key knowledge area(s):

Navigate a document using *vi*.

Use basic *vi* modes (Command, Insert, Replace).
Insert, edit, delete, copy and find text.

The following is a partial list of the used files, terms and utilities:

vi
/, ?
h, j, k, l
G, H, L
i, c, d, dd, p, o, a
ZZ, :w!, :q!, :e!
:!

Topic 104: Devices, Linux File systems, File system Hierarchy Standard

1.104.1 Create partitions and file systems

Weight: 3

Description: Candidates should be able to configure disk partitions and then create filesystems on media such as hard disks. This includes the handling of swap partitions.

Key knowledge area(s):

Use various *mkfs* commands to set up partitions and create various file systems, including *ext2*, *ext3*, *reiserfs*, *vfat* and *xfs*.

The following is a partial list of the used files, terms and utilities:

fdisk
mkfs
mkswap

1.104.2 Maintain the integrity of file systems Weight: 3

Description: Candidates should be able to maintain a standard file system, as well as the extra data associated with a *journaling* file system.

Key knowledge area(s):

Verify the integrity of file systems.
Monitor free space and inodes.
Repair simple file system problems.

The following is a partial list of the used files, terms and utilities:

du
df
fsck
e2fsck
mke2fs
debugfs

dumpe2fs
tune2fs

1.104.3 Control mounting and unmounting file systems Weight: 3

Description: Candidates should be able to configure the mounting of a filesystem.

Key knowledge area(s):

Manually mount and unmount filesystems.
Configure filesystem mounting on bootup.
Configure user mountable removeable filesystems such as tape drives, floppies and CDROMs.

The following is a partial list of the used files, terms and utilities:

/etc/fstab
mount
umount

1.104.4 Managing disk quota Weight: 3

Description: Candidates should be able to manage disk quotas for users.

Key knowledge area(s):

Set up a disk quota for a filesystem.
Edit, check and generate user quota reports.

The following is a partial list of the used files, terms and utilities:

quota
edquota
repquota
quotaon

1.104.5 Use file permissions to control access to files
Weight: 5

Description: Candidates should be able to control file access through the proper use of permissions.

Key knowledge area(s):

Manage access permissions on regular and special files as well as directories.
Use access modes such as *suid*, *sgid* and the *sticky bit* to maintain security.
Use the group field to grant file access to workgroups.
Basic knowledge of ACL.
Know how to change the default file creation mode of the shell.

The following is a partial list of the used files, terms and utilities:

chmod

umask

chattr (where applicable)

1.104.6 Manage file ownership
Weight: 1

Description: Candidates should be able to control user and group ownership of files. This objective includes the ability to change the user and group owner of a file as well as the default group owner for new files.

Key knowledge area(s):

Manage access permissions on regular and special files as well as directories.
Use the group field to grant file access to workgroups.

The following is a partial list of the used files, terms and utilities:

chmod
chown
chgrp

1.104.7 Create and change hard and symbolic links
Weight: 1

Description: Candidates should be able to create and manage hard and symbolic *links* to a file.

Key knowledge area(s):

Create links.
Identify hard and/or softlinks.
Copying versus linking files.
Use links to support system administration tasks.

The following is a partial list of the used files, terms and utilities:

ln

1.104.8 Find system files and place files in the correct location
Weight: 5

Description: Candidates should be thoroughly familiar with the *Filesystem Hierarchy Standard* (FHS), including typical file locations and directory classifications.

Key knowledge area(s):

Understand the correct locations of files under the FHS.
Find files and commands on a Linux system.
Know the location and purpose of important file and directories as defined in the FHS.

The following is a partial list of the used files, terms and utilities:

find
locate
slocate
updatedb

whereis

/etc/updatedb.conf

Topic 110: The X Window System

1.110.1 Install & Configure X11

Weight: 5

Description: Candidates should be able to install and configure X and an X font server.

Key knowledge area(s):

Verify that the video card and monitor are supported by an X server.
Customize and tune X for the videocard and monitor.
Install and configure an X font server.
Install fonts.
Manually edit the X Window configuration file.

The following is a partial list of the used files, terms and utilities:

xorgcfg
xorgconfig
/etc/X11/xorg.conf *XF86Setup*
xf86config
xvidtune
/etc/X11/XF86Config
.Xresources

1.110.2 Setup a display manager

Weight: 3

Description: Candidates should be able setup and customize a display manager. This objective covers the display managers XDM (X Display Manger), GDM (Gnome Display Manager) and KDM (KDE Display Manager).

Key knowledge area(s):

Turn the display manager on or off.
Change the display manager greeting.
Change default color depth for the display manager.
Configure display managers for use by X-stations.

The following is a partial list of the used files, terms and utilities:

/etc/inittab
*/etc/X11/xdm/**
*/etc/X11/kdm/**
*/etc/X11/gdm/**

1.110.4 Install & Customize a Window Manager Environment

Weight: 5

Description: Candidates should be able to customize a system-wide desktop environment and/or window manager.

Key knowledge area(s):

Demonstrate an understanding of customization procedures for

window manager menus and/or desktop panel menus.

Select and configuring the desired x-terminal (*xterm*, *rxvt*, *aterm* etc.).

Verify and resolve library dependency issues for X applications.

Export the X-display to a client workstation.

The following is a partial list of the used files, terms and utilities:

.xinitrc
.Xdefaults
xhost
DISPLAY environment variable