

Main references:

- "KDE Desktop Environment" :
<http://www.kde.org/documentation/userguide/index.html>
- "Quick Startup Guide":
<http://doc.mandrakelinux.com/MandrakeLinux/92/ru/Quick-Startup-Plus.html>
- "Starter Guide":
<http://doc.mandrakelinux.com/MandrakeLinux/90c/ru/Starter.html>
- "Command Line Manual":
<http://doc.mandrakelinux.com/MandrakeLinux/90c/ru/Command-Line.html>
- "Multiple Network Firewall" (English, French and Spanish only):
<http://doc.mandrakelinux.com/MandrakeLinux/90c/en/MNF-User.html>
- "Quick-Configuration Server Guide" (English and French only):
<http://doc.mandrakelinux.com/MandrakeLinux/90c/en/Server Conf Guide.html>

A student passing the basic course must be able to fix obvious network and hardware problems, to build a Mandrake 9.2 system without assistance, to understand the types of files and the directory structure, to be able to execute basic command line commands and utilities should they ever have to boot in single user mode without X, to be able to configure their KDE desktop and locale, and to know what and how to monitor the health of the system.

A student passing the advance course must know how to configure important services such as SSH, Telnet, FTP, sendmail, iptables, and squid for use with the Internet, to be able to write simple scripts, to be able to edit skel and bashrc files, to be able to plan and implement security for users and processes, to modify the environment variables and paths, and set up print services.

HARDWARE AND ARCHITECTURE

1. Configuring fundamental BIOS Settings

Students will be able to configure fundamental system hardware by making the correct settings in the system BIOS. This objective includes a proper understanding of BIOS configuration issues such as the use of LBA on IDE hard disks larger than 1024 cylinders, enabling or disabling integrated peripherals, as well as configuring systems with (or without) external peripherals such as keyboards. It also includes the correct setting for IRQ, DMA and I/O addresses for all BIOS administrated ports and settings for error handling. They will be able to describe all common devices and what their characteristic interfaces and BIOS settings are including RAID, EIDE disk drives, etc.

2. Configuring Modems

Ensuring devices meet compatibility requirements, verifying that the modem is using unique and correct IRQ's, I/O, and DMA addresses.

3. Setting up different PC expansion cards, other devices, and internal components

Students will be able to configure various cards for the various expansion slots. They will know the differences between ISA and PCI cards with respect to configuration issues. This objective includes the correct settings of IRQs, DMAs and I/O Ports of the cards, especially to avoid conflicts between devices. It also includes using isapnp if the card is an ISA PnP device. They will learn how to read a mainboard manual and to configure dip switches and jumpers to disable various on-board devices. They will be able to change BIOS batteries. They will be able to replace and install new CD-ROM drives and hard disk drives. They will know the different types of RAM and be able to install it. They will know when and how to replace CPU fans and power supply fans. They will know the difference between types of ribbon cable and where they are used and how they are connected.

4. Configuring Communication Devices

Students will be able to install and configure different internal and external communication devices like modems and IEEE 802.3 NICs. This objective includes

verification of compatibility requirements, necessary hardware settings for internal devices (IRQs, DMAs, I/O ports), and loading and configuring suitable device drivers. It also includes communication device and interface configuration requirements, such as the right serial port for 115.2 Kbps, and the correct modem settings for outbound PPP connection(s).

LINUX INSTALLATION AND PACKAGE MANAGEMENT

5. Designing Hard Disk Layout for Linux Installation

Students will learn to design a disk partitioning scheme for a Linux system. This objective includes allocating filesystems or swap space to separate partitions or disks, and tailoring the design to the intended use of the system. It also includes placing /boot on a partition that conforms with the BIOS' requirements for booting. It considers trade-offs in choosing partition sizes.

6. File system types, mount points and directories.

Students will learn the differences between ext2, ext3, and vfat file systems. They understand how to make later use of unallocated space. They will be able to explain the reasons for using multiple file systems rather than simply one.

7. Mandrake (System V) directory structure

Students will know the top-levels of the directory tree in Mandrake Linux and the purpose of each directory including: /, /root, /boot, /etc, /etc/sysconfig, /etc/rc.d, /home, /bin, /sbin, /usr, /usr/bin, /usr/sbin, /var, /dev, /lib, /lost+found, /swap, /tmp, /proc, /mnt, . They will be able to explain where these directories are based on their knowledge of mount points, partitions and physical devices. They will be able to describe the directory naming convention, i.e., the ".d". They will be able to explain the file naming conventions, e.g., ".tar", ".tgz", ".gz", "rc", ".Z", ".log", etc.

8. File formats

Students will know the difference between binary executable, tarred, compressed, Linux text, and Windows text files. They will know what the "file" command does.

9. Installing with DrakX (Mandrake version 9.2)

Students learn how to use the DrakX installation utility to build and recover a system. This procedure will include but not be limited to the installation of packages (both by manual selection and by loading auto_inst.cfg from diskette), configuring the video adapter and monitor, configuring the NIC, configuring the services that start automatically on boot.

10. Installing a boot manager

Students will be able to select, install, and configure a boot manager. This objective includes providing alternative boot locations and backup boot options (for example, using a boot CD-ROM).

11. Configuring inittab, rc.sysinit, and rc.local

Students will learn the purpose of these files and how to make simple changes to them, e.g., setting the runlevel, setting the CTRL-ALT-DELETE trap to halt, and setting the system to remove /tmp files on startup.

12. Monitoring system errors and viewing of log files

Students will learn the location and importance of monitoring various log files including boot.log, syslog, auth.log, messages, user.log, httpd logs, cron logs, etc. They should be able to view the significant log files with "vi" and with "cat".

13. Making and installing programs from source (advanced topic)

Students will be able to build and install an executable program from source. This objective includes being able to unpack a file of sources. Students will be able to make simple customizations to the Makefile, for example changing paths or adding extra include directories.

14. Managing shared libraries (advanced topic)

Students will be able to determine the shared libraries that executable programs depend on and install them when necessary.

15. Using the rpm package management system

Students will learn to performing package management using the rpm package manager. This objective includes being able to use the KDE 3.1.3 interactive tools to install, upgrade, or uninstall packages, as well as find packages containing specific files or software (such packages might or might not be installed). This objective also includes being able to obtain package information like version, content, dependencies, package integrity and installation status (whether or not the package is installed). They will be able to install and test, in particular, the "apcupsd" package.

GNU AND UNIX COMMANDS

16. Working on the command line

Students will learn to Interact with shells and commands using the command line. This includes typing valid commands and command sequences, defining, referencing and exporting environment variables, using command history and editing facilities, invoking commands in the path and outside the path, using command substitution, applying commands recursively through a directory tree and using man to find out about commands. The commands that students must know include "cp" (-p, -R and -f switches), "mv", "su", "cat", "ls" (-l, -t, -S, -R switches), "cd", "chown", "chgrp", "chmod", "echo", "mkdir", "date", "df", "du", "grep", "gzip", "gunzip", "ifconfig", "kill", "ln" (-s only), "mount", "passwd", "ps", "rm", "shutdown", "tar" (-c, -z, -p, -P, -f, -x, -t switches), "top", "umount", "ps", "tail", "which", "uname", "whoami", "man", "info" and "find". The students will know what the "standard switches" are like "-R", "-a", "-h", and "-l" and understand that there are usually two switch formats available. The student will know the most frequently used special key combinations, e.g., ALT-CTRL-DELETE, CTRL-Q, CTRL-S, CTRL-D, CTRL-C, and CTRL-Z, and be able to use them.

17. Processing text streams using filters

Students will be able to apply filters to text streams. Tasks include sending text files and output streams through text utility filters to modify the output. The filters the students must know include "more", "sort", "tee", "grep" and "tr".

18. Performing basic file management

Students will learn the basic UNIX commands to copy, move, and remove files and directories. Tasks include advanced file management operations such as copying multiple files recursively, removing directories recursively, and moving files that meet a wildcard pattern. This includes using simple and advanced wildcard specifications to refer to files, as well as using find to locate and act on files based on type, size, or time.

19. Using streams, pipes, and redirects

Students will 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.

20. Creating, monitoring, and killing processes

Students will learn to manage processes. Tasks also include monitoring active processes, selecting and sorting processes for display, sending signals to processes, killing processes and starting and stopping services.

21. Modifying process execution priorities (advanced topic)

Students will be able to manage process execution priorities. Tasks include running a program with higher or lower priority, determining the priority of a process and changing the priority of a running process.

22. Searching text files using regular expressions (advanced topic)

Students will learn 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.

23. Performing basic file editing operations using vi

Students will be able to edit text files using vi. This objective includes vi navigation, basic vi modes, inserting, editing, deleting, copying, and finding text.

DEVICES, LINUX FILESYSTEMS, FILESYSTEMS HIERARCHY STANDARD

24. Creating partitions and filesystems

Students will learn to configure disk partitions and then create filesystems on media such as hard disks. This objective includes using KDE DiskDrake to set up partitions to various filesystems, including ext2, ext3, and vfat.

25. Maintaining the integrity of filesystems

Students will be able to verify the integrity of filesystems, monitor free space and inodes, and repair simple filesystem problems. This objective includes the commands required to maintain a standard filesystem, as well as the extra data associated with a journaling filesystem.

26. Controlling mounting and unmounting filesystems

Students will be able to configure the mounting of a filesystem. This objective includes the ability to manually mount and unmount filesystems, configure filesystem mounting on bootup, and configure user mountable removable filesystems such as tape drives, floppies, and CDs. The students will know the location and purpose of the "fstab" and "mtab" files.

27. Using file permissions to control access to files

Students will learn to control file access through permissions. This objective includes access permissions on regular and special files as well as directories. Also included are access modes such as suid, sgid, and the sticky bit, the use of the group field to grant file access to workgroups, the immutable flag, and the default file creation mode.

28. Managing file ownership

Students will 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.

29. Creating and changing symbolic links

Students will be able to create and manage symbolic links to a file or directory. This objective includes the ability to create and identify links, copy files through links, and use linked files to support system administration tasks. Students should know the difference between hard and symbolic links but should not be encouraged to use hard links.

30. Find system files and place files in the correct location

Students will be thoroughly familiar with the Filesystem Hierarchy Standard, including typical file locations and directory classifications. This objective includes the ability to find files and commands on a Linux system. (See 7b, 7c and 12b, above.)

THE X WINDOW SYSTEM

31. Installing & Configuring XFree86

Students will be able to configure the display manager and font server using the Mandrake Control Center and DrakFont, XFdrake, and xf86cfg. This objective includes verifying that the video card and monitor are supported by an X server, as well as customizing and tuning X for the videocard and monitor. It also includes installing an X font server, installing fonts, and configuring X to use the font server. The students will know where the XF86 configuration files are and know how to interpret them. The students will know how to restart the desktop using CTRL-ALT-BACKSPACE.

32. Customizing the KDE desktop and using Mandrake tools

Students will learn how to customize menus, the desktop look and feel, desktop applications, and the taskbar. They will understand all of the options available using the Mandrake Control Center. They will be able to install Windows and X fonts, configure key maps, and set locales.

33. Using KDE desktop applications

Students will learn how to use "Kate" and the "Advanced editor". They will have a basic working knowledge of the "Koffice" applications. They will have experience with configuring and using Mozilla.

BOOT, INITIALIZATION, SHUTDOWN AND RUNLEVELS

34. Booting the system

Students will learn to guide the system through the booting process. This includes giving commands to the boot loader and giving options to the kernel at boot time, and checking the events in the log files.

35. Changing runlevels and shutting down or rebooting system

Students will be able to manage the runlevel of the system. This objective includes changing to single user mode, shutdown or rebooting the system. Students should learn to alert users before switching runlevel, and properly terminate processes. This objective also includes setting the default runlevel. Rebooting with the -b option. Physical security considerations and logging in without a password.

36. Crash recovery

Recovering the system after a disorderly shutdown. The student should know the significance of coredump files and lost+found directories, where they are and what to do with them.

PRINTING (ADVANCED TOPICS)

37. Managing printers and print queues (advanced topic)

Students will be able to manage print queues and user print jobs. This objective includes monitoring print server and user print queues and troubleshooting general printing problems. This topic includes use of the "lp", "lpr", and "lpq" command line commands.

38. Printing files (advanced topic)

Students will be able to manage print queues and manipulate print jobs. This objective includes adding and removing jobs from configured printer queues and converting text files to postscript for printing.

DOCUMENTATION

39. Using and managing local system documentation

Students will be able to use and administer the man facility and the material in /usr/share/doc/. This objective includes finding relevant man pages, searching man page sections, finding commands and man pages related to them, and configuring access to man sources and the man system. It also includes using system documentation stored in /usr/share/doc/ and determining what documentation to keep in /usr/share/doc/.

40. Finding Linux documentation on the Internet

Students will be able to find and use Linux documentation. This objective includes using Linux documentation at sources such as the Mandrake Linux Documentation site, Linux Documentation Project (LDP), vendor and third-party websites, newsgroups, newsgroup archives, and mailing lists.

41. Notifying users on system-related issues (advanced topic)

Students will be able to notify the users about current issues related to the system. This objective includes automating the communication process, e.g. through logon messages.

SHELLS, SCRIPTING, PROGRAMMING AND COMPILING (ADVANCED TOPICS)

42. Customizing and using the shell environment (advanced topic)

Students will be able to customize shell environments to meet users' needs. This objective includes setting environment variables (e.g. PATH) at login or when spawning a new shell. It also includes writing bash functions for frequently used sequences of commands.

43. Customizing or writing simple scripts (advanced topic)

Students will be able to customize existing scripts, or write simple new (ba)sh scripts. This objective includes using standard sh syntax (loops, tests), using command substitution, testing command return values, testing of file status, and conditional mailing to the superuser. This objective also includes making sure the correct interpreter is called on the first (!) line of scripts. This objective also includes managing location, ownership, execution and suid-rights of scripts.

ADMINISTRATIVE TASKS (ADVANCED TOPICS)

44. Managing users and group accounts and related system files (advanced topic)

Students will be able to add, remove, suspend and change user accounts using the KDE Userdrake utility and command line utilities. Tasks include how to add and remove groups, to change user/group info in passwd/group databases. The objective also includes creating special purpose and limited accounts. The students will know the differences among the standard Mandrake Linux user accounts, why they exist and for what they are used. The students will understand the meaning and use of the uid and gid.

45. Tuning the user environment and system environment variables (advanced topic)

Students will be able to modify global and user profiles. This includes setting environment variables and command aliases, maintaining skel directories for new user accounts and setting command search path with the proper directory

46. Configuring and using system log files to meet administrative and security needs (advanced topic - see 8b)

Students will be able to configure system logs. This objective includes managing the type and level of information logged, manually scanning log files for notable activity, monitoring log files, arranging for automatic rotation and archiving of logs and tracking down problems noted in logs.

47. Automating system administration tasks by scheduling jobs to run in the future (advanced topic)

Students will learn to use cron or anacron to run jobs at regular intervals and to use at to run jobs at a specific time. Task include managing cron and anacron jobs and configuring user access to cron and anacron services.

48. Maintaining an effective data backup strategy (advanced topic)

Students will be able to plan a backup strategy and backup filesystems automatically to various media. Tasks include dumping a raw device to a file or vice versa, performing partial and manual backups, verifying the integrity of backup files and partially or fully restoring backups.

49. Maintaining system time

Students will be able to properly maintain the system time. Tasks include setting the system date and time, setting the BIOS clock to the correct time, configuring the correct timezone for the system. (Use of the NTP clock and UTC are advanced topics.)

NETWORKING

50. Fundamentals of TCP/IP

Students will gain a proper understanding of network fundamentals. This objective includes the understanding of IP-addresses, network masks and what they mean (i.e. determine a network and broadcast address for a host based on its subnet mask in "dotted quad" or abbreviated notation or determine the network address, broadcast address and netmask when given an IP-address and number of bits). It also covers the understanding of the network classes and classless subnets (CIDR) and the reserved addresses for private network use. It includes the understanding of the function and application of a default route. It also includes the understanding of basic internet protocols (IP, ICMP, TCP, UDP) and the more common TCP and UDP ports (20, 21, 23, 25, 53, 80, 110, 119, 139, 143, 161).

51. TCP/IP configuration and troubleshooting

Students will learn to view, change and verify configuration settings and operational status for various network interfaces using the KDE configuration tools. This objective includes manual and automatic configuration of interfaces. This especially means to add, start, stop, restart, delete or reconfigure network interfaces. Students will be able to configure Linux as a DHCP client and a TCP/IP host and to debug problems associated with the network configuration. Students will know how to use the "ping" and "ifconfig" commands in Linux and the "ipconfig" command in Windows DOS.

52. DHCP host configuration (advanced topic)

Students will be able to configure Linux as a DHCP host.

53. Configuring and managing inetd, xinetd, and related services (advanced topic)

Students will be able to configure which services are available through inetd, use tcpwrappers to allow or deny services on a host-by-host basis, manually start, stop, and restart internet services, configure basic network services including telnet and ftp. Set a service to run as another user instead of the default in inetd.conf.

54. Operating and performing basic configuration of sendmail (advanced topic)

Students will learn to modify simple parameters in sendmail configuration files (including the "Smart Host" parameter, if necessary), create mail aliases, manage the mail queue, start and stop sendmail, configure mail forwarding and perform basic troubleshooting of sendmail. The objective includes checking for and closing open relay on the mailserver. It does not include advanced custom configuration of Sendmail.

55. Operating and performing basic configuration of Apache (advanced topic)

Students will be able to modify simple parameters in Apache configuration files, start, stop, and restart httpd, arrange for automatic restarting of httpd upon boot. Does not include advanced custom configuration of Apache.

56. Setting up and configuring basic DNS, routed and squid services (advanced topic)

Students will be able to configure hostname lookups and troubleshoot problems with local caching-only name server. Students will be able to configure simple routing tables and squid proxy services.

57. Setting up secure shell (OpenSSH) (advanced topic)

The students will be able to install and configure OpenSSH. This objective includes installation for remote file transfer, remote command line, and proxy services and troubleshooting, as well as configuring sshd to start at system boot.

SECURITY (ADVANCED TOPICS)

58. Performing security administration tasks (advanced topic)

Students will learn how to review system configuration to ensure host security in accordance with local security policies. This objective includes how to configure TCP wrappers, find files with SUID/SGID bit set, verify packages, set or change user passwords and password aging information, update binaries as recommended by CERT, BUGTRAQ, and/or distribution's security alerts. Includes basic knowledge of iptables.

59. Setting up host security (advanced topic)

Students will know how to set up a basic level of host security. Tasks include syslog configuration, shadowed passwords, set up of a mail alias for root's mail and turning off of all network services not in use.

60. Setting up user level security (advanced topic)

Student will be able to configure user level security. Tasks include limits on user logins, processes, and memory usage.