# LINUX_

The Basics

Agenda

1. Platform
2. Applications and Services
3. File System and Directories
4. Environment Variables
5. Runlevels
6. Managing Processes
7. Networking
8. System Configuration

Platform (1)

Distributions – SUSE, Fedora, Ubuntu, Red Hat, Scientific Linux…

Kernel - the central component of the operating systems. It is platform dependent and takes care of: memory allocation, multitasking, device drivers and etc.

Applications	
Kernel	
CPU	Memory	Devices
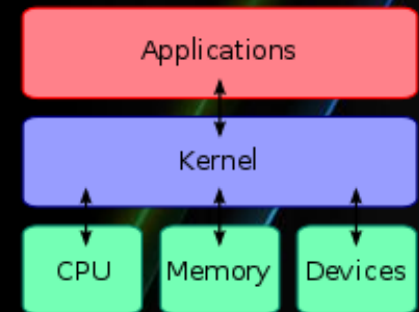
"uname –u" – identify the kernel

2.6.18-<u>26</u> version level

major

minor

subversion

INIT Process – this is the main process in the system and usually has PID 1. It is also called the main daemon. Its job is to start all other daemons.
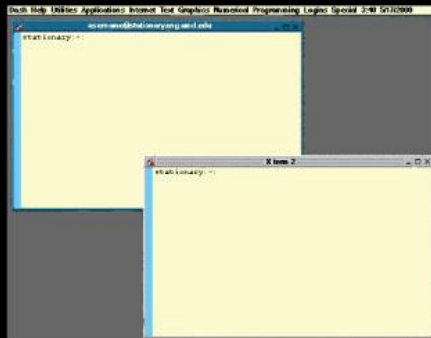
Platform (2)

Daemons – programs that run in the background. In windows they are know as services.

Shell – text based user interface. There are different types of shells: bash, **sh, csh, etc.**

Boot Loaders – GRUB and LILO

GUI – Graphical User Interface

X windows   **Gnome**   **KDE**

Applications and Services

- GIMP – image editor, almost as powerful as Adobe Photoshop
- Apache – web server
- MySQL – database server
- IPtables –very powerful and flexible firewall
- BIND – DNS server
- DHCPD – DHCP Server
- Samba – file and printer sharing with windows systems
- Squid – proxy server
- Evolution – Outlook like email client
- Sendmail - SMTP server
- OpenOffice – Word, Excel, PowerPoint, Access and Paint equivalent
- …

File System and Directories

- / - root directory
    - /bin/ - internal commands
    - /boot/ - kernel and critical files
    - /dev/ - hardware devices
    - /etc/ - system configuration files
    - /home/ - user's home directories
    - /lib/ - essential support files
    - /proc/ - runtime system information
    - /root/ - root's home directory
    - /sbin/ - "dangerous" executables
    - /tmp/ - temporary files
    - /usr/ - applications
    - /var/ - log files, print spools and etc.
    - /mnt/ - all non-boot drives (partitions) are mounted here

File System and Directories – Commands

- **ls -la** - list details of all files
- **cd** - change current working directory
- **pwd** - print current working directory
- **cp** - copy files
- **mv** - move or rename files
- **rm** - remove files
- **mkdir** - create a new directory
- **rmdir** - remove an empty directory
- **ln** (link) - add another name to a file
- **touch** - create or update timestamp of file
- **file** - show file type (text, binary, etc.)
- **mc** - Midnight Commander

File System and Directories – Partitions

- **mount -** shows mounted filesystems (without parameters). To mount a partition:

  mount -t <type> <device> <dir>

  The file system types which are currently supported are: *adfs, affs, autofs, coda, coherent, cramfs, devpts, efs, ext, ext2, ext3, hfs, hpfs, iso9660, jfs, minix, msdos, ncpfs, nfs, ntfs, proc, qnx4, ramfs, reiserfs, romfs, smbfs, sysv, tmpfs, udf, ufs, umsdos, vfat, xenix, xfs, xiafs, …*
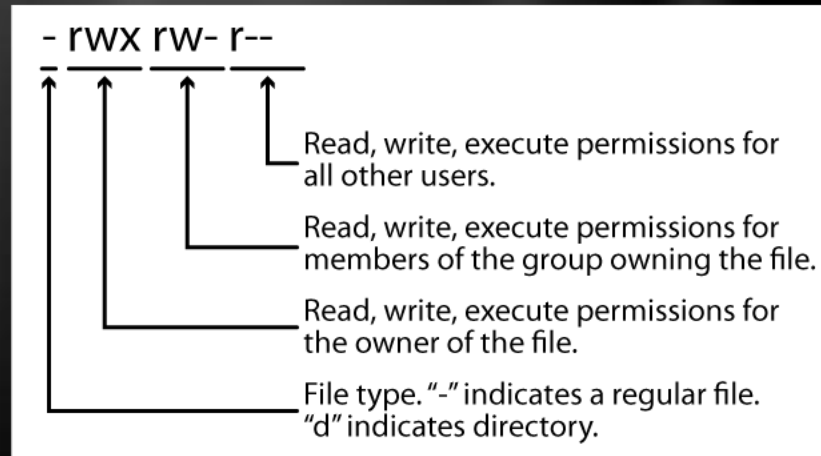
- **umount** – unmount a partition.

  umount <device>|<dir>

- **/etc/fstab -** configuration for filesystem mounts

- **df -** shows disk free space on all filesystems. T*o* show available space on a particular filesystem, specify a path:

  df /mnt/mount_01/

- **du -** shows disk usage. To show a summary in human-readable form:

  du -sh

File System and Directories – Permissions

- **ls –al** – list all files with permissions
- **chmod** – change the file or directory permissions
- **chown** – change the owner of a file
- **chgrp** – change the group of a file

File System and Directories – Searching

- **which** - show first executable in PATH

  which <command> - will show the full path of the executable

- **find** - find files by name/inode attributes

  find /var/develop -name "*.bak" -mtime +7 -exec rm {} \;

- **grep** – like find, but with a simpler syntax

  grep <search_word> <dir>

- **locate** - fast find (of files indexed in file name database)

File System and Directories – Archives

- **tar** - **t**ape **ar**chiver (.tar files). Most widely used command for archiving, with a lot of options:
  - x - extract archive
  - c - create archive
  - v - verbose output
  - f - archive file (mandatory)
  - z - gzip archive
  - j - bzip2 archive
- **gzip, gunzip** - GNU zip/unzip (.gz files)
- **bzip2, bunzip2** - better compression algorithm (.bz2 files)
- **zip, unzip** - winzip and pkzip-compatible archiver (.zip files)
- **compress, uncompress** - old UNIX archiver (.Z files)

Environment Variables

Environment variables are a set of dynamic named values that can affect the way running processes will behave on a computer. They have the same use as on windows systems.

set – set or show a system variable

export – set a system variable

> export PATH=$PATH:/secret

setenv – set a system variable

printenv – print all variables

":" - separator in linux (windows uses ";")

Useful variables - $PATH, $SHELL, $DISPLAY, $HOME, $LD_LIBRARY_PATH, etc.

Runlevels

The term runlevel refers to a mode of operation in one of the computer operating systems that implement Unix System V-style initialization. Conventionally, seven runlevels exist:

- 0 – shutdown
- 1 – single user, only console
- 2 – multi-user, no network
- 3 – multi-user, normal mode
- 4 – user defined
- 5 – GUI
- 6 – reboot

/sbin/init – change the runlevel

/etc/inittab – set the default runlevel

/etc/rc.d/rc0.d … rc6.d – script directories with information what will be started and what won't.

chkconfig – command to change the startup scripts

Managing Processes (1)

- **bg, fg** – move processes between the foreground and background.

- **ps** – list running processes.

  ps –e – show all running processes

- **kill PID** – stop one process.

- **killall** – stop all processes. The behavior is different on different distributions.

- **top** – task manager for linux.

Managing Processes (2)

- **ulimit** – shows the software limitations:
    - core file size
    - data seg size
    - file size
    - pending signals
    - max locked memory
    - max memory size
    - open files
    - pipe size
    - POSIX message queues
    - stack size
    - cpu time
    - max user processes
    - virtual memory
    - file locks

Networking

- **/etc/modules.conf** – NIC configuration
- **/etc/resolv.conf** – DNS configuration
- **/etc/hosts** - mapping IP addresses to machine or domain names.
- **ifconfig** – see the current network configuration ifconfig eth0 down/up – disable or enable a network card
- **netstat** - show open ports
- **hostname** - prints the network host name
- **domainname** - prints the domain name of the host
- **ping** - tests host/network availability
- **traceroute** - print the route packets to host
- **host, nslookup, dig** - lookup hostname in DNS
- **nmap** - extremely useful port scanner

System Configuration – Managing Users

- **su** - change current user or become the superuser (default)

- **sudo** - manages access to resources for specific users and groups

- **passwd** - changes user's password

- **useradd, usermod, userdel** - adds/modifies/deletes user

- **groupadd, groupmod, groupdel** - adds/modifies/deletes group

- **adduser, addgroup** - friendlier frontends to useradd and groupadd

System Configuration – User config files

- **/etc/passwd** - contains user info (id, default group, home directory, login shell)
- **/etc/group** - contains group info (id, users)
- **/etc/shadow** - contains encrypted passwords (only root-readable)
- **vipw** - edit and check passwd file
- **vigr** - edit and check group file

System Configuration – Monitor activity

- **last** - show last logged users
- **lastb** - show last unsuccessful login attempts
- **lastcomm** - show last executed commands of users (package acct/psacct)
- **sa** - summarizes account information about previously executed commands (package acct/psacct)

Thank you for your attention!