# OPEN SOURCE OS (LINUX)

# برمجة مفتوحة المصدر

## LECTURE02: BASIC COMMANDS

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# The shell

Command Interpreter:

– Same privileges as other program.

– Multiple interpreters available: sh, csh, ksh, tcsh, bash…

–Responds with the prompt: test@si:~$ (normal account:$, root account:#).

• Session (login + passwd):

– Local Access:

– Remote access: through network (telnet, rlogin, ssh...).

# The shell

• Shell Types:

– Bourne shell “sh”(/bin/sh): old UNIX syntax (SysV).

– C shell “csh” (/bin/csh): Cxlike syntax (BSD).

– Bourne Again shell “bash” (/bin/bash): Similar to its antecessor, but Extended with many features from csh.

– Tcsh “tcsh” (/bin/tcsh): improved version of the original C shell.

– In general, differences are not relevant for day-to-day use.

• Shell Goal: interactive dialog between user and system:

– Through a huge amount of orders/commands and applications:

# The shell

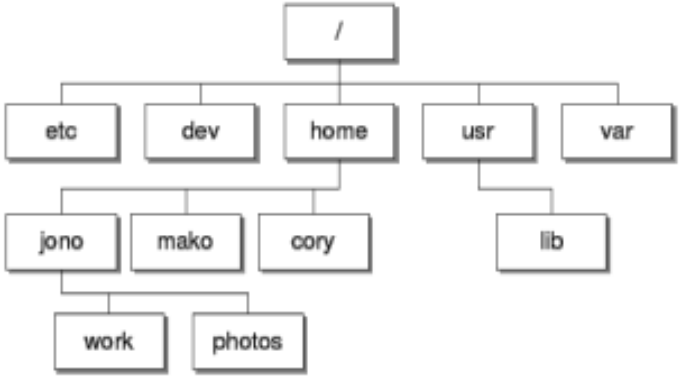
- Command structure:

```
user@machine:~$ command  -<options>  [arguments]
```

  – Options: command pieces that modify the initial behavior.
  – Arguments: file name or any other kind of data needed by the command.

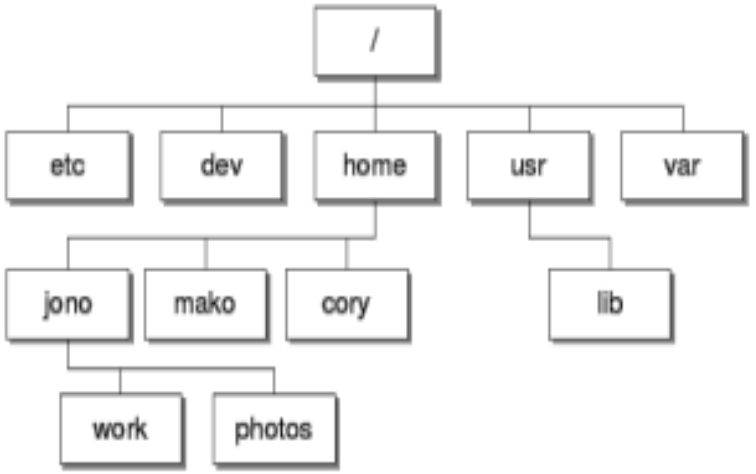
- Man command (formats and displays manual pages):
  – First command to learn. Displays on screen information about a command, programming function, configuration file, etc.
  – Syntax: $ man -<options> [command]:
    - -a: display all the manual pages that match “command”, not just the first one.
    - –K: search for the specified string in all man pages.

# File System



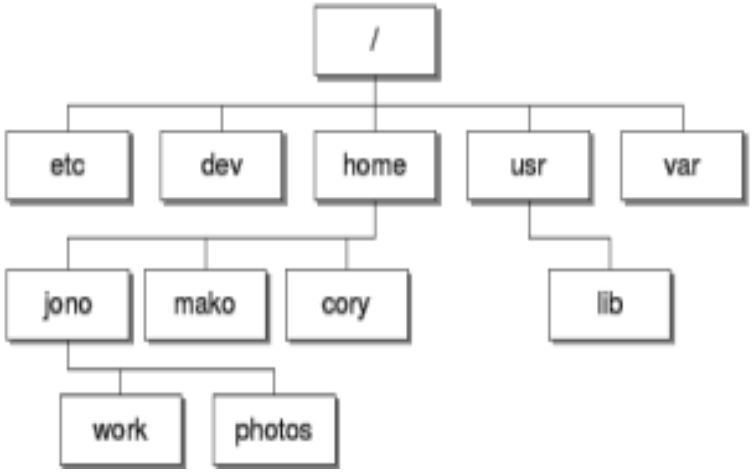

- Definition:
  – Logic structures and their corresponding methods employed by the Operating System to organize the files in the disk.
- Tree-like Hierarchical structure:
  – Efficient management of information (group related info into folders).
  – Folders separated by /
  – File access (path):
- Absolute: cd/home/pepe.
- Relative to current path (with “.” o “..”): cd ../../../usr/local.
- Files starting with “.” are “hidden”.
- Security: protection of files against unauthorized accesses.

# File System




- Unit Mounting:
  - A storage device (usb, cd, etc.) can be associated with a particular position in the directory tree.
- Same treatment to files and I/O devices:
  - Same program can employ files and/or devices indifferently.
- Different locations of the file tree can be linked (ln command).
- Definition of a folder/file path:
  - Directories to be traversed, starting from root directory, in order to reach that folder/file.

# File System




/ Root directory.

/bin Core operating system commands.

/boot Kernel and files needed to load the kernel.

/dev Device entries for disks, printers, pseudo-terminals, etc.

/etc Critical startup and configuration files.

/mnt Temporary mount points, mounts for removable media.

/lib Libraries, shared libraries and parts of the C compiler.

/home Default home directories for users.

/opt Optional software packages (not consistently used).

/root Home directory for the superuser .

/sbin Command needed for minimal system operability.

/proc Information about all running processes.

/tmp Temporary files.

/usr Hierarchy of secondary files and commands.

/usr/local Software installed by users.

/var System specific data and configuration files.

# File System (Commands)

- Large amount of shell command to interact with FS.

- Navigating through the file system:
  - Command pwd: displays current.
  - Command cd: change to a different directory.
  - Command mkdir: create a new folder.
- File Manipulation:
  - Command ls: list folder contents in alphabetical order.
  - – Command cp: copy files.
  - – Command mv: move files (or rename).
  - – Command rm: remove files or folders.

# File System (Commands)

- File Manipulation (cont.):
  - Command ln: create a link between two files.
  - Command whereis: locate the path of a cmd’s binary/src code/manual.
  - Commands locate/find: locate a file in the directory tree.
- File Contents:
  - Commands cat/more/less: show the contents of a file.
  - – Command wc: count the number of bytes/words/lines in a file.
  - – Commands head/tail: display in stdout the first/last lines of a file.
  - – Command grep: display the lines of a file that match a text pauern.
  - – Command tar: add the contents of a file tree to a single file.
  - – Command cut: remove specific sections of each line of a file.
  - – Command sort: arrange file lines in specific order (alphabetical).
  - – Command vi: text editor in the terminal (present in every UNIX system).

# User Management (Commands)

- Detailed description in the APPENDIX.
- Basic user management:
  - Command  whoami: displays username.
  - Command who: shows users connected to the system.
  - Command passwd: change user password.
  - Command useradd:  adds a user in the system.
  - Command userdel:  deletes a user from the system.
- • File Permission management:
- Command chmod: modify file or directory permissions.
- Command chown/chgrp: modify UID/GID of a file.
- Command umask: modifies default permissions assigned to new files.

# Environment Variables

- Group of shell session variables with a pre-defined value. Their value is obtained this way: $ echo $VARIABLE.
- Allow the configuration of certain aspects in the cmd interpreter.  Two kinds:
  - User variables: internal to our shell session:
- Can be listed with command env.
  - System variables: common to every shell and other programs and users:
- Can be listed with command set.

# Environment Variables

- Some important internal variables:
  - $PATH: indicates which are the directories where binaries can be found.
  - Before executing a command, the shell searches in those directories.
  - $HOME: root directory of current user.
  - $TERM: kind of terminal we are employing to connect to the system.
  - $SHELL: user shell. Ex. /bin/bash.
  - $TZ: time zone. Has an influence on the timing format returned by date command. Any change in our files adjusts to the time zone specified by that variable.

The end