Linux Lab Session: eDAC & eKDAC OS Concepts

- When we install Linux OS, we need to create two partitions:

1. swap partition – is used by linux system as a swap arear in which inactive running programs temporarily.

- conventionally the size of swap partition/swap area should be doubles the size of main memory.
- if the size RAM = 4 GB => size of swap partition should be 8 GB.
- if the size RAM = 2 GB => size of swap partition should be 4 GB.
- if the size RAM = 8 GB => size of swap partition should be 16 GB.
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- linux system use swap partition which is a portion of HDD as an extension of the main memory in which inactive running programs can be kept temporarily.

2. data partition "/" root (/) partition – in which linux system keeps/stores all data in an organized manner => filesystem i.e. linux filesystem follows heirarchical structure (inverted tree like structure).

(/) root dir : starting point/dir of linux filesystem structure.
- linux filesystem structure starts from root (/) dir.

- root dir i.e. "/" dir contains sub-dir's like: "/boot", "/bin", "/sbin", "/etc", "/lib", "/usr", "/home", "/root" "/mnt", "/dev" etc....

1. "/boot": contains static files of the boot loader, kernel, initrd (initial ramdisk).
- it contains information about booting the system
- it contains linux kernel by the name vmlinuz.

2. "/bin": contains user commands in a binary format, e.g. commands like ls, cat, cp, mv etc...

3. "/sbin": contains admin/system commands in a binary format, e.g. lscpu, adduser, deluser, mkfs etc...

4. "/home": contains home dir's of all users for multi-user system.
- for any user on its creation of an account by default subdir by the name of the user got created by the operating system, in which that user can store data, user can have read, write as well execute perms in that dir.

5. "/root": root is a home dir for root user

6. "/etc": contains host specific system configuration files - it is like a **"control panel"** in windows.
- in computing configuration files (or config files) are files used to configure the parameters and initial settings for some computer programs. They are used for user applications, server processes and operating system settings.
- e.g. **YaST: Yet another Setup Tool** (Linux operating system setup and configuration tool) or **debconf** (for performing system-wide configuration taskson UNIX-like operating systems).
"/etc/opt": contains configuration files for **add-on-packages** that are stored in /opt.
7. "/dev": contains device files

8. "/lib": contains shared libraries required for /bin and /sbin.

9. "/mnt": contains temporarily mounted filesystems

10. "/media": mount point for removable media such as CDROMs.

11. "/opt": contains optional application software packages.

12. "/proc": virtual filesystem provides process and kernel information as a files. In Linux , corresponds to a **procfs** mount. Generally automatically generated and populated by the system, on the fly.

- In Linux filesystem hierarchy, each file is uniquely identified by its path
path : it is a unique location of any file in a filesystem structure represented/denoted in a **string format** and file names/sub dir name are seperated by **delimiter char (delimiter).**

- there are 3 delimiter chars:
1. slash (/) - used in UNIX based OS's/Linux
2. backslash (\ ) - used in Windows
3. colon (:)

example:
"/" => root (/) dir
"/bin" =>
"/home/sunbeam/feb2021/eDAC"

"C:\sachin\edac"

"https://us06web.zoom.us/support/down4j"

- any file in a linux filesystem can be accessed by using 2 ways:
and hence there are two types of path:
1. absoulte path: it is a full path of any file which starts from **root (/) dir.**
i.e. path of the file with respect to root (/) dir.

2. relative path: path of the file with respect to current directory.

- whenever we create new dir, bydefault two hidden entries gets created inside a dir file.
. (single dot) => current dir
.. (two dots) => parent dir

- root (/) dir is a parent of itself
inode =>

- In Linux filename which starts with dot (.) [the period] is considered as a hidden file.

 # Basic Linux Commands:

Command Name: "pwd" - print/present working directory
- this command displays an absolute path (i.e. full path) of the present/current working directory
- pwd command internally refers the value of shell variable by the name "PWD".

Command Name: "cd" – to change current working directory
- this command is used to navigate from one location to another location.

$cd <dirpath> -- change dir to the dirpath
$cd / -- goto the root directory -- "/" slash -- is user short hand variable
$cd ~ -- goto the user's home dir -- "~" tild symbol -- is user short hand variable
$cd -- goto the user's home dir
$cd - -- goto the prev accessed directory
$cd . -- remains in current dir

$cd .. -- goto the parent dir of the current working dir

Command Name: "ls" - to display contents of the directory/list directory contents.

- contents of the directory files are nothing but name of files and sub-dir's.

$ls <dirpath> -- it displays contents of the dir by the name "dirpath".
$ls -- bydefault it displays contents of the current directory columnwise
$ls -l -- its displays contents of the dir in a listing format.

total n
n = total no. of data blocks allocated for the files and sub dir's in a given dir
feild-1: first char of feild 1 denotes type the file next 3 chars of field 1 denotes access perms for user/owner
next 3 chars of field 1 denotes access perms for group members last 3 chars of field 1 denotes access perms for group others.

feild-2: denotes no. of links exists for that file,
for **regular file** bydefualt no. of links i.e. **link count = 1.**
for **directory file** bydefualt no. of links i.e. **link count = 2**

feild-3 : denotes name of an user/owner
feild-4 : denotes name of group
feild-5 : denotes size of the file in bytes
feild-6 : denotes **time stamps** - date of creation and last modified date & time in ISO format.
feild-7 : name of the file
- In UNIX/Linux filename starts with **(.)** is considered as a **hidden file**
- the period (".")

options/flags/args description:
-h : displays size of the files in human redable format
-l : displays contents of the dir in a listing format
-a : display all contents of the dir (including hidden files)
-A : display all contents of the dir (including hidden files but excluding entries for "." & "..").
-i : display inode number of the files inode number is an unique idenfier of the file.
etc..... explore more options from man pages

Command Name: "cat" -
- cat command is used for concatenation of contents of file/files and print it onto standard output.
- cat command can be used to display contents of the regular file.

$cat > file1.txt
sunbeam infotech

pune
karad
<cntl+d> => to stop file writing

file by the name “file1.txt” created into the cur dir
and

“~” tild – users short hand operator => user’s home dir

$cat file1.txt => to display contents of file1.txt

$cat >> file1.txt => to append contents into the file – file1.txt

- cat command is not used for file editing.

Command Name: "chmod" - used to change file mode bits
- to change (i.e. to assign/ to remove) access permission for user/owner, group members and others.

+x : to assign execute perm to all
+r : to assign read perm to all
+w : to assign write perm to all
u+r: to assign read perm to user/owner
u+w: to assign write perm to user/owner
u+x: to assign excecute perm to user/owner
g+r: to assign read perm to group members
-x : to remove execute perm from all
-r : to remove read perm from all
-w : to remove write perm from all
u-r: to remove read perm from user/owner
u-w: to remove write perm from user/owner
u-x: to remove excecute perm from user/owner
g-r: to remove read perm from group members
.
.
.

hexadecimal values:
r -- read -- 4
w -- write -- 2
x -- execute -- 1
.
.
.

Command Name: "cp" - to copy file/files

$cp <source> <destination>

Command Name: "mv" - command used to move file/s from one location to another location.

- this command is also used to rename file

Command Name: man – display manual pages and info about commands, system calls, library functions etc....

section-1 : contains info about shell commands
section-2 : contains info about system calls
section-3 : contains info abour library functions

+ Command Name: rmdir – remove empty dir only
- this command is used to remove empty dir/s
- if directory is not empty, rmdir command fails, in this case we can use rm command with -r option.

+ Comamnd Name: rm – remove file/s

- process => unique identifier => pid
- file => unique identfier => inode number

- all shell commands are the programs in a binary format
e.g. ls, cp, mv, mkdir
and options/flags/params are the command line arguments which we pass to the program while execution.

$./program.out one two three

$ls -l -i -s dirpath

ls – program
-l, -i -s, dirpath command line args
- all shell command are applications of command line argument programming.

File & filesystem related commands: ls, cp, mv, mkdir, cat, tac, touch, rmdir, rm, alias, unalias

+ Command Name: touch – to update timestamps

$touch filename.txt

- if filename.txt not exists, empty file gets created

+ redirection operators:
- there are 3 redirection operators
1. input redirection operator (<) - left cheveron
2. output redirection operator (>) - right cheveron
3. error redirection operator (2>) -

stdin – input buffer (which is there into the main memory) associated with standard input device i.e. kbd/conosole input

stdout – output buffer (which is there into the main memory) associated with standard ouput device i.e. monitor/console output

stderr – error buffer (which is there into the main memory) associated with standard output device i.e. monitor/console output

- bydefault any process reads input from **stdin** file
- bydefault any process writes output into **stdout** file
- if there are some errors, then list of errors gets written bydefault into the **stderr** file and those list of errors gets displayed onto the console.