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SYSTEM ADMINISTRATOR

- The system administrator is the super user who maintains the entire system. The system administrator has special user login name, named root and special prompt #.
- The system administrator can create files in or delete any file from any directory. He can also read from, write to or execute any file.

SYSTEM ADMINISTRATOR

- The super user mode can be acquired by
 - 1. running in single user mode.
 - 2. logging as root with giving correct super user password
 - 3. by giving su(substitute user) command from a user shell
- When su command is used, the user can return to the normal mode by terminating the shell by pressing (ctrl+d) or by giving exit command.
- The command are stored in /sbin and /usr/sbin directories. The commands can be execute by giving their full path names or by including these /sbin and /usr/sbin directories in PATH when logged as system administrator.

Booting the system

- When system is on, the system execute the boot loader from start up disk. This boot loads the OS kernal and run the kernel.
- General purpose utility named called “lilo” [linux loader]. Write the boot loader to start of the active partition.
- When system is switched on next time, the kernel will start by this lilo utility.

Booting the system

- The first process get PID 0. the kernel execute the /etc/init file to invoke “init” process.
- This process had PID 1 and responsible for intiation of all other process.
- The init process invoke /etc/inittab file.
- This file inform init about the status of terminal to be used.
- The init will invoke /etc/getty file. This file has various parameter for communication between terminal and computer systems.

Run level	Action
S	Single user mode
5	Multi-user mode
0	Halts the system
4	start X windows immediately after booting

Single user mode: when system is operating in single mode, the system console will be enabled.

Multi user mode: it is default mode and all individual file system are mounted and Also system domains are started.

Shutting down the system

The shutdown utility perform all necessary task to bring down the system safely.

Gf: shutdown [-options] time

Where options are

H – halts the system after shutdown

R – reboot the system after shutdown

K – don't really shutdown but only warn

Eg: shutdown -h 16:30

Shutting down the system

- The halt command can be used to halt the system.
- The reboot command reboot the system.
- Halt function -h option of shutdown command
- Reboot function -r option of shutdown command
- The sync command can be used to flush the file system buffers..
- It writes the information stored in buffer(main memory) into appropriate files on disk.
- The kernel does not write information to the disk immediately. But it keep the data in main memory and write them into the disk when it desires. The sync command forces the kernel to write any data buffered in memory out to disk. And this command can be used to save the data from system crashes.

Adding the user

- The system admin can add/remove user to the system manually, or he can use tool such as useradd .
- Gf: useradd <username>
- useradd -u <user-id> -g <group -id>
- useradd -c <comment> -
d<user's_home_directory>
- useradd -s <default_login_shell> <username>
- The system administrator can set an initial password for a user by using the following format of this password command.
- Passwd <username>

Adding the user

- The system admin can set an initial password for a user by using the following format of this passwd command
- `Passwd<username>`
- If SA uses `adduser` command for creating a user, then he must set an initial password for the user in above format of `passwd` command, or he must delete the password entry of user in `/etc/passwd` file. The logged user can change this password using the `passwd` command without any arguments.
- The `useradd` command insert necessary entries in files
- `/etc/passwd`, `/etc/shadow` and `/etc/group`.

Adding a user

- Format:

Username:

Username: maximum 8 characters length name of user

Password: the system places x in this field if shadow password system is used, otherwise the user's encrypted password is stored in this field.

User_ID: a number that identifies the user

Group_ID: A number that identifies the group that user belongs.

Comment: Comment about user original name , designation, address etc

Home directory: it is directory that system will place the corresponding user after the login successful.

Users'shell: it specify the shell type for user.

Deleting a user

- The “userdel “command is used to delete a user from the system, which removes all the entries pertaining to the specified user from the three files - /etc/passwd, /etc/shadow & /etc/group
- Gf: `userdel <username>`
- This cmd only removes the user account, but the user’s file remains there and not deleted.
- The system administrator can delete these files separately if required.
- The system admin can also create the necessary groups and add the users to these group. Instead of leaving to adduser command.

Deleting a user

- The groupadd command is used to add a group to the system, which has the following syntax.

```
groupadd [-g <group_id> ] <group_name>
```

```
Eg: groupadd [-g <01-65>] AVR CLASS
```

The <group_id> is a non negative numeric value, which refer the group by number. The default for <group_id> is to use the smallest numeric value greater than 500 and greater than every group. The values between 0 and 499 are reserved for system accounts.

The groupdel command is used to delete an existing group. But all users who belong to that group must be removed before using this command.

```
g.f: groupdel<group_name>
```

```
Eg: groupdel AVR CLASS
```

MANAGINE DEVICE

- Linux treat all hardware devices as files. These files are stored in directory “/dev.”
- These device can be grouped into two types:
- character devices & Block devices.
- A character device is a device, which uses serial line for data transfer. We can read/write a sequence of character from / to these device.
- Eg: tape drives & printers
- A character device can be removed by Block devices that provide random access. We can read/write block of data and it allows access to all parts of devices equally. This is called “random access devices”

HARD DISK

- Hard disk are huge storage device used for permanent storage. We can divide a disk into different parts called partitioning.
- Linux does not use C:, D: to denote the hard disk and its partition like DOS.
- Linux use special name to represent hard disk and their individual partitions. The first two letters of names are hd for IDE disk, the next letter [a-d] indicate the device on which the partition is located.
- The first IDE hard disk is represented as /dev/hda & its individual partitions are /dev/hda1, /dev/hda2...
- The second IDE hard disk is represented as /dev/hdb and its individual partitions are /dev/hdb1, /dev/hdb2...

HARD DISK

- For IDE(Integrated Drive Electronics) disk, /dev/hd[a-h]
- For SCSI(Small Computer SystemInterface)disk, /dev/sd[a-p]
- The fdisk command is used to manage partition such as creating, deleting partitions on a hard disk.

Eg: [root@avr/root]# fdisk /dev/had <-taking 1st
IDE hdd

FLOPPY DISK

- The floppy disk are removable media, used to store less data. These floppy disk are represent with the prefix fd.
- The first floppy disk is /dev/fd0 and the second floppy disk is /dev/fd1 ...
- Linux calculate the correct format of floppy disk such as 1.2MB floppy, 1.44MB floppy. We can also specify the exact format for better access.

Floppy disk

- Formatting a floppy disk:

The `fdformat` command does a low level format on floppy disk

Gf: `fdformat <device_name_with_format>`

Ex: `fdformat /dev/fd0H1440`

This `fdformat` command completely delete the entire disk contents and it must be used in root login.

Gf: `mkfs[-t <file_system_type>]<device_name>` where `<file_system_type>` specify the type of file system is to be built. The default file system type(`ext2`)is used.

CD ROMS

- The CD –ROMs are compact and used to store huge amount of data than floppy disk. But, the data are set as read only. The CD-ROM is represented as /dev/cdrom or /dev/hdc
- Other Devices
- /dev/cua0 Serial port 1
- /dev/cua1 (or) /dev/mouse Serial port 2
- /dev/ttyS0 (or) /dev/modem Serial port 1
- /dev/ttyS1 Serial port 2 , /dev/ttyS2 Serial port 3 , /dev/ttyS3 Serial port 4, /dev/mouse Mouse,
- /dev/lp0 First parallel printer , /dev/lp1 Second parallel printer, /dev/lp2 Third parallel printer

Mounting the File System

- The mount command is used to mount a block device on the file system. i.e.. Attaching a specified file system to the root file system.
- General format is,
 - `mount [-t file_system_type] <device_name> <mount point>`
- The `-t` option specifies the name of the file system and mount point specifies the directory under which the device is to be mounted.
- Some of the file system types are,
 - Ext 2 (Linux default file system)
 - Iso9660 (for CD-ROM)
 - Vfat
 - Msdos
- The `-t` option is required when the CD-ROM are mounted.

Mounting the File System

- Unmount:
- G.f: `umount <device_name>/<mount_point>`
- Create a directory for mount-point.
- `#mkdir /home/copying`
- Mount the hard disk's first partition on the mount point `/home/copying`.

```
#mount /dev/hda1 /home/copying
```

Then all files of first hard disk are mapped on this `/home/copying` directory.

Copy the necessary file.

```
# cp /home/bmi/test.txt/home/copying.
```

Mounting the File System

- Unmount the file system

```
# umount /dev/hda1
```

Remove the mount-point directory

```
#rm /home/copying
```

Fsck – this fsck(file system check) is used to check and repair the specified file system.

```
g.f: fsck [-t <file_system_type>] <device_name>
```

The `-t` option specifies the file-system to be checked.

Mounting the File System

- The error codes are
 - 0 - No errors
 - 1 - File System error corrected
 - 2 - System should be rebooted
 - 4 - File system error left uncorrected.

COMPRESSION AND DECOMPRESSION

- The gzip command is used to compress the specified files.

g.f: `gzip <files_to_be_compressed>`

The `-r` option can be used to recursively compress files in all sub-directories.

The compressed files have an extension `.gz` and these files can be uncompressed using `gunzip` command, which has the following syntax,

`Gunzip <files_to_be_decompressed>`

BACK UP

- The backup is essential to prevent loss of data. The backup device may be a magnetic tape, floppy disk or other storage media.

tar: this tar(tap archive) command is used to create an archive and extract files from an existing archive.

g.f: tar [-options] <filenames>

Where options are

C – creates a new archive / x –extracts files from an archive / u – Appends files from an archive /t – list the contents of an archive / list files in long format while copying.

Back UP

- F <archive_device>/<archive_filename> - uses the specified archive_device or archive_filename for storing the archive file
- Z – compress while copying and decompresses while extracting. This option instructs 'tar' to read or write archives through 'gzip'
- Eg: creating an archive:

```
# tar -cvf /dev /f0 /home/jmc/*.c
```

Back up

- Extracting from an archive:

```
# tar -xvf /dev/f0
```

List files in an archive:

```
# tar -tvf /dev/f0
```

Appending an file to an existing archive:

```
# tar -uvf /dev/f0 /home/jmc/sort.c
```

Compressing and decompressing while backing up:

```
# tar -czvf /dev/f0 /home /jmc/*.c
```