Operating System

We have two types of Operating Systems:

1. Textual User Interface Operating System
   1. DOS (Disk Operating System)
   2. UNICS (Uniplexed Information and Computing Services) – Open Source Software
2. Graphical User Interface Operating System

MIMX-OS – before Unics

**Operating Systems developed based on UNICS**:

* IBM Z/OS
* IBM AIX
* Sun Solaris
* Mac OS
* HP UX

**Linus Torvald**: Invented Linux Operating System

* Linux is Kernel, not OS.
* Linux is not a Unix derivative, it is written from the scratch.
* A Linux distribution is the Linux Kernel and a collection of software that together can create a OS.

**Types of Linux Operating Systems**:

* RHEL (Red Hat Enterprise Linux)
* Fedora
* Debian
* Ubuntu
* CentOS
* Amazon Linux
* Oracle Linux
* Kali Linux (Hacking Operating System)
* Mandriva

**File Level Permissions**:

* File Level permissions are managed under 10 chars.
* The First char resembles whether it is a file or a directory (Directory(d), File(-))
* Next 3 chars resembles, owner permissions for read(r), write(w), execute(x) (4,2,1)
* Next 3 chars resembles, owner group permissions.
* Last 3 chars resembles other Group permissions.
  + Example: drwxr-xr-- 2 <Owner> <group-name> <size in bytes> <date & time> <file/directory name>

**Links**:

We have two types of links:

1. Soft link/Symbolic link: This is equivalent to the shortcut in windows.
   1. Ex: ln -s <original-file> <link-file-name>

Note: once original file is deleted soft link doesn’t work anymore

1. Hard Link: This is equivalent to back of a folder/file which is in sync with the original file.
   1. Ex: ln <original-file> <link-file-name>

Note: Even after original file is deleted, link file exists with the full backup

**File Creation Methodologies**:

1. cat
2. touch
3. vi editor
4. nano editor

**Cat command**:

* The cat command is one of the universal tools, yet all it does is copy standard input to standard output.
* **To create a file**:
  + cat > <file-name>
  + write the file content & CNTRL+D
* **To View a File**: Display’s the content of the file
  + cat <file-name>
* To **append** content to an existing file:
  + cat >> <file-name>
  + Write the content of the file & CNTRL+D
* To **concatenate** two files:
  + cat <file1> <file2> **>**  file3
* To **copy file** into new file:
  + cat <file1> > <file2>
* To **print/view** the content of the file in **reverse order**:
  + tac <file-name>

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**touch command**:

* Touch can be used to create an empty file
* Touch can create multiple empty files at a time.
  + - touch <file-name1> <file-name2> <file-name3>…
* Touch can also be used to change timestamp of a file.
* Touch can also be used to update access time of the file, modify timestamp of the file.
* **Timestamp**:
  + Access time: Last time when a file was accessed
    - touch -a <file-name>
  + Modified time: Last time when a file was modified
    - touch -m <file-name>
  + Change time (meta data change): Last time when a file metadata was changed

**vi editor(command)**:

* A programmer/Administrator text editor.
* It can be used to edit all kinds of plain text or program files or configuration files. It is specially useful for editing UNIX programs.

Note: Commands inside the vi editor

* + i - for insert mode
  + :w – to save the file
  + :wq – to save and quit from the editor
  + :q – to quit from the editor
  + :q! – force quit without saving file from the editor

**nano editor**:

* “vi” is a standard whereas nano has to be available depending on Linux that we use.
* If not available bydefault, we can install using “yum” command.

**stat command**:

* stat command is used to view the status of all the timestamps of the file.
* It shows timestamps like access time stamp, modified timestamp and change timestamp

Ex: stat <file-name>

**mkdir command**:

* This is used to make a directory or create a directory (folder).
* By default every directory created using this command will contain two hidden folders inside the directory.
  + . – resembles root
  + .. – resembles home
* Ex: mkdir <directory-name>

**cd command**:

* This command is used to change the directory path from current path to another directory path.
* Ex: cd /home/<user>
* cd .. : to come out of directory at one level.

**pwd (present working directory)**:

* This command shows you the path where you are currently located.
* Ex: pwd

**cp command (copy)**:

* Used to copy only files.
* We can use this command to copy a file from current path(absolute path) to another absolute directory path.
* Ex: cp <file1> <file-name/dir-path>
* Note: There is no change the stats of access timestamp & modified time stamp.

**mv command (move)**:

* Used to move file content from one file to another (similar to rename file).
* Used to move a file from one path to another path.
* Ex: mv <file1> <file-name/dir-path>
* Note: There is no change the stats of access timestamp & modified time stamp.

**rmdir command (remove directory)**:

* Remove directory command works only on empty directories.
* Remove directory can delete a single directory or it can also delete a recursive way of deletion only if all the directories are empty.
* Ex: rmdir <dir-name>
* Ex: rmdir -p <dir-name> (will delete parent and child directories)
* Ex: rmdir -pv <dir-name> (will delete parent and child directories in verbose mode (information about the process))

**rm command (remove)**:

* Remove command works for files as well as directories.
* Remove command also works for non-empty directories.
* Ex: rm <file/dir>
* Ex: rm -rf <file/dir> (removes all the files/directories in the parent directory forcefully, even the non-empty)
* Ex: rm -r <file/dir> (removes all the files/directories only if they are empty in a recursive manner)

**hostname command**:

* Hostname command gives the host name of the computer (similar to computer name in windows).
* Ex: hostname

**ifconfig command**:

* It shows both IPV4 & IPV6 addresses.
* It also shows subnet masks of our network.
* It shows information about our public and private network details.

**cat /etc/os-release command**:

* This shows the OS version and patches details.

**yum command**:

* It is a powerful command in Linux which can install/remove/update any package(software).
* yum should be executed only in the root/sudo users.
  + Ex: yum install <package-name>
  + Ex: yum update /<package-name>
  + Ex: yum remove <package-name>
  + Ex: yum list installed – shows all the installed packages

**which command**:

* This is one of the command used in day-to-day life to know if the package is installed (where) or not.
* Ex: which <package-name>

**whoami command**:

* To find the user which you are working on.
* Ex: whoami

**hostname -i command**:

* This command displays only the ip address.

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**Creation of New USER**:

* useradd command: To create a new user in linux environment
  + syntax: ]# useradd <user-name>
* To attach password to the newly user created:
  + syntax: ]# gpasswd <user-name>
  + enter password & re-type new password again

**Creation of a New Group**:

* groupadd command: TO create a new group in linux environment
  + syntax: ]# groupadd <group-name>
* to attach a user to the group:
  + syntax: ]# gpasswd -a <user-name> <group-name>
* to attach multiple users at a time to a group:
  + syntax: ]# gpasswd -m <user1,user2…userX> <group-name>

**Viewing the Users & Group details**:

* cat /etc/passwd 🡪 to view the list of users created
* cat /etc/groups 🡪 to view the list of groups created with users assignments

**File permissions change commands:**

* chmod command
* chown command

1. **chmod command**: Change Moderator command

* This command can change the read, write and execute permissions for owner, owner group & other groups.
* Read resembles 4, write resembles 2 & execute resembles 1. So total 7
* If read and write are provided as a permission, you must enable mandatorily execute permission.
* chmod 700 resembles, full permission to the owner i.e. r,w,x
* chmod 500 resembles, read and execute permissions for the owner i.e. r,-,x
* chmod 400 resembles, read only permission for the owner i.e. r,-,-
* chmod 750 resembles, full permission to the owner. Read and execute permission to the owner group
* chmod 740 resembles, full permission to the owner. Read only permission to the owner group.
* chmod 774 resembles -> full permission to the owner, Full permission to the owner group & Read only permission to other groups.
* chmod 775 resembles -> full permission to the owner, Full permission to the owner group and Read & Execute permission to other groups.

1. **chown command**: This command helps to change the ownership of the file/directory. Only either root or the file owner can execute this command.

* Syntax: chown <new-owner-name> <file-name>

**chgrp command**: This command can change the user from existing group to new group.

Syntax: ]# chgrp <new-group-name> <user-name>

**Downloading a file from internet using command prompt**:

* wget command: This command is used to download any packages or files or software using url
  + syntax: ]# wget <url>

**Compression/Zipping in Linux**:

1. tar command
2. gzip command
3. tar command: (No compression)
   * tar is an archival command used to combine multiple files into one single file.
     + Syntax: ]# tar -cvf <directory-name> <tar-file-name>.tar.gz
4. gzip command: (compression)
   * gzip is a compression tool used to reduce the file size.
     + Syntax: ]# gzip -cvf <directory-name> <tar-file-name>.tar.gz

-**cvf options**:

* c resembles create
* v resembles verbose mode
* f resembles forcefully

**Installing a web server on a Linux Environment**:

* First we need to install WebServer package.
  + Syntax: ]# yum install httpd
* We need to verify whether the webserver started or not!
  + Syntax: ]# service httpd status
* If the server is not started, we need to start the server.
  + Syntax: ]# service httpd start
* To verify the server from the browser, type the url in the browser as
  + <host-name>:80
  + It should display the Apache webserver home page.
* To host a website, place the website content into **/var/www/html/**

**Sort command**:

* This is used to sort the content of the file by alphabetical order in a line-by-line manner.
  + Syntax: sort <file-name>

**Tree command**:

* This shows the current directory structure in the form of a tree.
  + Syntax: tree <directory-name>
* Note: tree is not available by default in Linux environment, to install “tree” tool/package use yum command.