**UNIX** is a very popular, multiuser, multitasking, time sharing OS. Flavors of UNIX are AIX (Advanced IBM Unix), HP-UX, Linux, Solaris etc. Unix was written by Ken Thompson in ‘C’ language.

**Features of Unix: -**

1. **Portability**
2. **Security**
3. **Background Processing**
4. **Pipes**
5. **Stable and Reliable**
6. **Shells**

**Compilers**

**DB**

**Other** **Applications**

**Unix Commands**

U

**KERNEL**

**SHELL**

**SHELL SHELL**

**SHELL**

**UNIX** follows layered approach. Kernel is the important part of Unix system. It is a collection of programs which directly communicates with hardware. It is that part of system which loaded into memory when system is booted. It manages System resources, time between users and processes etc.

A program is just an executable file where as a process is an instance of a program in execution.

**SHELL: -** It is a command interpreter. User communicates directly with shell. Then shell translates user communication to functions understandable by kernel. It is programmable.

**Directories in Unix: -**

**Home: -** Home directories for users.

**Bin:** - Executable system functions like sh, rm etc.

**Dev:** - Primary location for special files or device files.

**Etc:** - System configurable files such as passwd, shadow etc.

**Tmp:** - Temporary files.

**Lib:** - Kernel related files.

**Usr:** - User related files.

**Features of UNIX file system: -** Hierarchical structure, Create and delete files, Dynamic growth of files, Protection of file data, i-node no, File permissions like Read (R), Write (W), Execute (X) etc.

**Commands:** -

**Cal** -> Calendar

**Who** -> Displays current user connected

**Date** -> System date and time

**Clear** -> Clear the screen

**More** -> Allows page wise display

**Whoami** -> Displays username/ who am I -> details about user

**Tty** -> Name of terminal

**Uname** –a -> Displays system information like Kernel name, Version, OS, Hardware name etc.

**Man** -> Displays manual

**Bc** -> Opens arbitrary calculator, to quit press EOF character (ctrl + d)

**Echo** -> Echo’s to screen what we type after echo

**Printf** -> Write formatted output.

**Type** -> Displays location of commands.

**Which** -> Looks for a file of a particular command.

Get a count of all files and directories in current directory -> **echo \* | wc**

Get a count of all files in current directory -> **echo \*.\* | wc**

Get a count of all directory in current directory -> **echo \*/ | wc**

**Ls** -> List contents of a directory -> **-r (reverse list), -a (hidden files), -I (inode numbers) –l (long format)**

**Cat** -> Concatenate and display files -> **cat a.txt (Displays content of a file), cat >> a.txt (Append to a file)**

**Cat > a.txt (Create a new file)**

**Cp** -> Copy Files -> **cp a.txt b.txt**

**Mv** -> Move/rename to a file -> **mv a.txt b.txt**

**Pwd** -> Present Working Directory

**Cd** -> Change Directory -> **cd .. (Parent Directory / back by 1 directory) “~” symbol of Home Directory.**

**Mkdir** -> Create new directory

**Rmdir** -> Remove directories (if it is empty)

**Rm** -> Remove files/directories -> **-f (forcefully), -r (recursively), -I (ask before deleting)**

**Ln** -> Link to a files. A link is nothing but a directory entry to a file.

1. Hard Link -> **ln a.txt b.txt** (should not exist already)
2. Soft Link -> **ln –s a.txt /tmp/b.txt** (should not exist already)

|  |  |
| --- | --- |
| **HARD LINK** | **SOFT LINK** |
| Same i-node numbers | Different i-node numbers |
| Original file deleted then link not delete | Original file deleted then link remains as invalid link |
| More Efficient | Less Efficient |
| Cannot used to link a file to another system | Can be used to link a file to another system |
| Cannot used to link directories | Can be used to link directories |

**Touch** -> Update access and modification time of a file/directory.

**Touch [-amc] [mmddhhmm[yy]] filename**

**Touch a.txt (Create new file)**

**“\*”** -> Matches 0 or more characters **“?”** -> Matches single character

**“[]”** -> Matches 1 single character defined inside []

When a pipe is established between two commands the output of 1st command will be redirected as standard input of 2nd command. Pipe is a mechanism through which process communicates with each other.

**Tr** -> Translate characters -> It is a filter program.

**Tr “a” “b” -> Converts any occurrence of letter “a” to letter “b”**

**Tr –s “ “ “:” -> Multiple occurrences of white spaces between the words replaces with “:”**

**Cmp** -> Compare 2 files -> **-s returns an exit code**

**Cut** -> Cut selected field of each line of a file -> **-f is a list of filed and –d is a delimiter**

**Cut –f 1,3 –d “:” a.txt - > Extract 1st and 3rd field from file.**

**Cut –c 2-5, 8-10 a.txt -> Extract 2nd to 5th and 8th to 10th characters from all lines of a file.**

**Paste** -> Merging corresponding lines of given files. It does horizontal pasting.

**Sort** -> To sort contents of a file. -> **-d (directory) / -n (numeric) / -r (reverse) / -k n (sort on field n)**

**Sort –t “:” –k 3 a.txt -> -t is a delimiter and 3 is a field**

**Head** -> Displays first count lines of a file (10 by default). If no file specifies it reads from standard command line.

**Tail** -> Displays last count lines of a file

**WC -> Displays no. of. Words (-w) / no. of. Lines (-l)/ no. of. Charcters (-c) in a file.**

**Uniq** -> To remove adjacent repeated lines.

**-u (displays only lines not repeated in file)**

**-d (displays repeated lines in file)**

**-c (precede count of line number of times it occurs)**

Regular Expression is a string of meta characters which can be used to match more than 1 type of pattern. Used in grep, egrep etc.

**Grep** -> Pattern matching in a file. Displays line containing the pattern to standard output.

**-c (Report only the no. of. Matching lines)**

**-l (list only names of files containing pattern)**

**-v (displays all lines expect those containing pattern)**

**Anchor -> “^” (beginning of line), “$” (end of line), “\<” (beginning of word), “/>” (end of word)**

**Egrep ‘you|You’ a.txt (matches lines containing you or You)**

**Hel (l|llo) matches either Hell or Hello**

**Ab \ {2,4\} matches abb, abbb, abbbb -> 2 represent atleast position and 4 represent atmost position**

**Ab \ {2\} matches abb exactly 2 b’s.**

**A process is a program in execution. Each process is allocated a process Id called as PID.**

**Ps -> Give details of a process**

**-f gives full listing**

**-e / -a displays all process**

**Nice -> Execute a command with lower priority. Default is 10. Nice to other processes.**

**Kill -> Send signal to process.**

**-9 Terminate Process**

**-15 Software Termination Signal (Default)**

**Time -> Sum of User time and System time represents CPU time.**

**Jobs -> List the status of all jobs -> -1 displays process id.**

**FTP** protocol establishes 2 connections with host. One of the connection is used for data transfer and second one is used for control purpose. It remains active throughout session while data transfer connection is open and closed for every file transfer. ASCII and Binary are modes of file transfer in FTP.

**SSH** (Secure Shell Conn) it is secure and encrypted form of remote connection.

**SCP** uses **ssh** connection for file transfer.

The 2 imp files are used frequently for password authentication **are /etc/passwd (normal user view) & /etc/shadow (admin view)**

**Passwd** -> Command used to change user password.

**Class of users for a file -> Owner/ Group/ Others**

**2 modes to set permission to a file -> Absolute (Octal) / Symbolic (String)**

**Owner -> Read (4), Write (2), Execute (1)**

**Group -> Read (4), Write (2), Execute (1)**

**Others -> Read (4), Write (2), Execute (1)**

**“-“ indicates no permission set**

**(rwxrw-r--) -> 1st set of rwx stand for owner -> 2nd set of rw- for Group -> 3rd set of r—for Others)**

**Default permission for a file rw-rw-rw- (666) and for directory rwxrwxrwx (777)**

**U + rx -> indicates that user has read and execute access.**

**Chmod -> Used for setting file and directory permission.**

**Chown -> Change ownership of a file.**

**Chmod 777 a.txt #absoulte mode**

**Chmod ugo + rwx a.txt #string mode (Symbolic Mode)**

**“r” -> Only list contents of directory nothing else is possible.**

**“w” -> Nothing can be done.**

**“x” -> Can enter in directory only but nothing else is possible.**

**“w” and “x” -> Everything is possible except listening of file.**

**“r” and “x” -> Can’t create a new file but edit/append/delete existing ones.**

**“r” and “w” -> Nothing is possible because can’t enter into directory**.