50 Most Useful Linux Commands for VLSI Engineers

Linux is an open-source operating system which is the first choice of every technocrat. For VLSI Design Engineers also most of the EDA tools are only compatible with Linux. In Linux, we interact with OS majorly with Command-Line Interface (CLI). In beginning, it might look a bit tedious as you have to remember lots of commands and we are addicted to GUI interface but later you will definitely love it.

we will learn some of basic Linux commands with examples. I would request to my reader don’t just read this article but, practice these commands parallelly for best understanding and clarity. If you wish you can also make a small cheat sheet for your use. In this article, we will learn 4 categories of 50 most useful basic commands.

Category-1:  File System Management

**1.  ls**

**:**list files and directories

**Use:**

    ls -l   ; indicates file/directory type, permissions, owner, size, last modified

        – normal, d- directory, s-socket file, l-link file

    ls  -a  ; shows hidden files/directories

    ls -t   ; lists the files/directory on basis of modification time

    ls -lart   ; lists all the files and directories in order of last modified.

**2.  clear**

: clear the terminal (but keep the history of commands intact)

**3.  man / –help**

: Show a manual of command and switches written in details.

**4.  pwd**

: Print Working Directory, The directory where you are currently.

**5.  cd**

: Change Directory, to move to another directory.

**Use:**

    cd  .. ; back to parent directory

    cd  –  ; back to previous directory

    cd ~  ; go to home directory

    cd ../../../ ; back to n steps

    cd ‘abc xyz’   ; go to a directory whose name contain white space

**6.  mkdir**

: create a directory

**Use:**

    mkdir directory\_name ; To create a new directory with the given name.

    mkdir dir1 dir2 dir3 ; To create multiple directories in a single step.

**7.  touch**

: create a file

**Use:**

    touch file\_name ; create a new file

    touch file1 file2 file3 ; To create multiple files

    touch –a file\_name  ; to change file access time

    touch –m file\_name ; to change the file modification time

**8.  gedit file\_name &**

: create and edit a file in GUI mode

**Use:**

    gedit /path/to/file\_name ; create and edit a file in specified location

                                                  ; word count, line no. , language

**9.  vi file\_name**

: create and edit a file using command-line interface

**Use:**

    i    ; Switch to edit mode

    ESc    ; Exit from edit mode and Switch to command mode

    /string ; find the string

    Esc + :q  ;exit without saving

    Esc + :s   ; Save only not exit

    Esc + :wq  ; save and exit

10.  cp source destination

: copy command

**Use:**

    cp source\_file destination\_dir     ; To copy a file

    cp source\_file .     ; To copy a file to current directory (“.” means current dir)

    cp -f source\_file destination\_dir     ; To copy forcefully a regular file

    cp -R source\_file destination\_dir ; To coppy recursive a directory

**11.  mv source destination**

: move command, like cut+paste

**Use:**

    mv f1 f2     ; rename f1 by f2

    mv -rf   ; recursive and force moving of a directory

12.  rm

: remove file/directory, like delete

**Use:**

    rm -rf   ; remove recursive and force

                    ! One of the dangerous commands for root, use carefully!!!

    rm \*.txt ; Will remove all the file having extension .txt in PWD

**13.  cat**

: stands for concatenate

**Use:**

    cat file\_name   ; Display a contain of a file in CLI

    cat text1 > text2 ; redirection of text, overwrite

    cat text1 >> text2 ; appending the text

**14.  which**

: Path of the command

**Use:**

    which virtuoso ; Display the path of the executable file for virtuoso

    which vi ; Will show the vi command path

    which python ; Will show the installation path of the python program

**15.  find**

: searching a file/directory

**Use:**

    find / -name “dir\_name” ; to find a file/dir

    find /home/user\_name -name “file\_name” ; to find a file/dir only in user’s home area

    man find ; to get more details on find command

**16.  history**

: Get the list of executed commands

**Use:**

    history ; the history of all command

    history n   ;list of last n command executed

                !n             ; repeat any command in the history list

    export HISTTIMEFORMAT=‘%F %T ’   ; setting history command with timestamp format

    unset export HISTTIMEFORMAT  ; unsetting the time format

    history -c ; clear all the history

    ~/.bash\_history ; location of stored command history

**17.  chmod**

: Change mode, change the permission of file/directory

**Use:**

    ls -l  file\_name           ; To see the current permissions of the file/dir

Let’s understand the permissions through this ecample.

A black and white screen with white text

Description automatically generated

r   w   x 7     7     7 7      5      4

4   2  1 rwx  rwx rwx rwx   r-x    r- –

Numeric and Symbolic permissions

    chmod  777 file\_name         ; set all the permission for all users

    chmod  754 file\_name        ; set rwx for owner, r-x for the group and r– for others

    chmod –R 777 dir\_name    ; Set all permission recursively inside the dir

Category-2:  Text processing commands

**18. touch**

: create a new file

**Use:**

    touch file1  ; create an empty file

    touch file1 file2 file3 ; create multiple files in one command

    touch –am file2   ; change access and modification time

**19. gedit**

: A GUI based Linux text editor

**Use:**

    gedit &  ; open gedit text editor and release the CLI

    gedit file1  ; create/open a file in geditor

**20. head**

: To read the first 10 lines of a file in CLI

**Use:**

    head file\_name   ; To read the first 10 lines of a file

    head –n 8 file\_name   ; To read first 8 lines of a file OR head -8 file

    head -4 \*.log            ; Read first 4 lines of all log files in PWD

**21. tail**

: To read the last 10 lines in the command line

**Use:**

    tail file\_name   ; To read last 10 lines of a file

    tail –n 12 file\_name   ; To read last 12 lines of a file OR tail -2 file

**22. sort**

: To sort the list

**Use:**

    sort file\_name   ; sort the content of file

    sort –n file\_name   ; sorting a file which has numbers

    sort –r file\_name   ; sorting  the file in reverse order

    sort –o outputfile inputfile  ; redirection of sorted output

    sort –n -k2 file\_name   ; sorting  the file on basis of the nth column

**23. unique**

: An utility for filtering the repeated lines in a file

**Use:**

    unique file\_name   ; will display only unique lines

    unique –c file\_name   ; will tell no. of times a line has repeated

**24. more**

: Display text one screen at a time

**Use:**

    more  file\_name   ; display the text in command line

                               <space> next screen,

                                    <b> back to previous screen,

                                    <enter>  next line

    more -10 file\_name  ; will display 10 lines at a time

    dmesg | more  ; more with pipe.

**25. less**

: to read the text file in the command line

**Use:**

    less  file\_name ; To view the content of a file

                                    similar to more command with some advance features

     less -N file\_name ; Will show the content with line number

                                        <Enter> or Down Arrow: To move next line

                                        Up Arrow: to move up a line

                                        <space>: To move down one page

                                        <b>: To move up one page

**26. grep**

: global regular expression print

**Use:**

    grep –i  words file\_name ; display the line contains searched word

    dmesg | grep sda   ; filtered the output and show only line having sda

    dmesg | grep sda –A 5 ; Display 5 lines after the matching word sda

**27. diff or vimdiff**

: find the difference between two files/dir

**Use:**

    diff file1 file2 ; To check the difference between two files

    diff dir1 dir2  ; To check the difference between contains of two dir

     A similar GUI tool is “meld”

    vimdiff f1 f2 , gvimdiff f1 f2

**28. wc**

: word count of a file

**Use:**

    wc file\_name ; Newline, word and byte count in the file

    wc –l file\_name  ; To count total new lines in the file

    wc –w file\_name ; T count total words only

    wc –c file\_name ; T count total characters only

Category-3:  Process management commands

**29. top or htop**

: It will show the status of various resources and tasks

**Use:**

    top    ; you can see the utilization statics for resources and get PID of all running process

    htop    ; Similar to the top command but an improved version.

**30. ps**

: Known as Process Status

**Use:**

    ps             ; process for the current shell

    ps -e        ; Display all active process

    ps -ef        ; Display all active process in full format

    ps –ef | grep virtuoso   ; If the list is too big we can grep it to a specific command

**31. kill**

: To terminate a process

**Use:**

    kill PID    ; Killing a process by PID, PID is a numeric value.

    kill PID1 PID2 PID3     ; Kill multiple processes together. You can specify the signal name in between Kill and PID. If no signal has been specified, by default TERM signal will be sent.

**32. who**

: Display the users who are currently logged in your Linux machine

**Use:**

    who    ; Without any argument who command will display user’s login name, terminal, login time and host

    who –q    ;Display the name of all users and total no. of users logged in

**33. w**

: information about current logged user and what they are doing

**34. users**

: Display the all current users name in a single line

**35. last**

: it display the list of user who logged the system

**Use:**

    last    ; If no options provided the last command displays a list of all users   logged in (and out) since /var/log/wtmp file was created

    last user\_name      ;Will display the activities of a particular user only

**36. free**

: Used to check available physical memory and swap memory

**Use:**

    free    ; Command used to check used and free memory space in KB

    free –m/g ;Space will be shown in MB or GB

    free  -s 5   ; Will update the status in every 5 seconds.

**37. lshw**

: Used to check hardware information

**Use:**

    lshw    ; Generates detail reports about various hardware of system

    lshw –class memory   ;Details memory in the system

    lshw –class processor ; Details of processor in the system

    lshw –short –class disk   ; Details about the hard drives (network)

**38. lscpu**

: Display information about CPU architecture

**Use:**

lscpu    ; Give the detailed information about the CPU

**39. cat /proc/cpuinfo**

: Similar information like lscpu

**40. dmidecode**

: Is a tool for dumping System Management BIOS (SMBIOS) table content in a human-readable format

**Use:**

    dmidecode    ; Gives all the hardware details

    dmidecode –t system   ; Gives the manufacturer, model no. etc details

    dmidecode –t bios  ; Gives the bios information of system (/memory)

**41. uptime**

: Gives the time how long system is running

**Use:**

    uptime -p    ; Gives the duration of the system running

**42. reboot**

: Will shutdown and restart the machine instantly

**43. shutdown**

: Can be used to shut down or restart the machine

**Use:**

    shutdown –h now     ; System will be shut down instantly

    shutdown –h +5 “message”  ; System will be shut down after 5 minute

    shutdown –r +5     ; System will be restart after 5 minutes

Category-4:  Bash Environment Related Commands

**44. date**

: Will show the current date, time and of time zone

**Use:**

    date           ; Will show day, date, current time and timezone

    date –d “1990-12-31”  ; Details of any specific date

    timedatectl      ; Will show details of local and universal time and timezone

    timedatectl set-time ‘2018-12-27 07:30:10’ ; to set specific date and time

    timedatectl set-time ‘Asia/Kolkata’     ; Setting time by time zone

**45. cal**

: Will display the calendar of current month in terminal

**Use:**

    cal                       ; Will show calendar of current month in terminal

    cal  08 1947       ; To display a calendar of particular month and year

    cal –y 2019            ; Will show calendar of all month of a particular year

**46. env**

: Used to print all the current environment variables and it’s value

**47. whoami**

: prints the username of the current user

**48. uname**

: It provides kernel versions and other details

**Use:**

    uname           ; Without any option, will print kernel name only

    uname -a        ; Get all the information like, kernel name, version,   architecture, host name, current date and time.

**49. hostname**

: To know the hostname

    hostname          ;It will display the hostname

    cat /etc/hostname   ;Inside the hostname file hostname is stored and  we can read and edit.

    vi /etc/hostname ;to change a new hostname edit the name here   and reboot the machine

**50. echo $BASH\_VERSION**

: To know the BASH version. For more variables value run env command