

# LINUX

## BASIC COMMANDS

ARIHARASUDHAN



# LINUX

Linux is an **open-source**, Unix-like operating system kernel that serves as the foundation for various Linux distributions (distros). Developed by Linus Torvalds in 1991, Linux has become a prominent player in the world of operating systems, powering a wide range of devices from servers and desktops to embedded systems and mobile devices. Linux is distributed under the GNU General Public License (GPL), making it open source and free to use. This means users have access to the source code, can

modify it, and distribute their own versions. The Linux kernel is the core component of the operating system. It manages hardware resources, facilitates communication between software and hardware, and provides essential services. Linux is not just a single operating system; it comes in various distributions or **distros**. Each distro packages the Linux kernel with a collection of software and tools, creating a complete operating system. Popular distros include Ubuntu, Fedora, Debian, CentOS, and Arch Linux. Linux uses a

command-line interface (CLI) known as the shell. The default shell for many Linux distributions is **Bash** (Bourne Again SHell). The shell allows users to interact with the system by typing commands. Linux organizes its file system in a hierarchical structure. Key directories include `/bin` (binary executables), `/etc` (configuration files), `/home` (user home directories), and `/var` (variable data such as logs). Linux is a multi-user system with a robust permission system. Each user has their own account, and permissions control who can

access, modify, or execute files and directories. Most Linux distros use package management systems to install, update, and remove software. Common package management tools include APT (Advanced Package Tool), Yum, and Pacman, depending on the distro. Linux is known for its strong security features. The principle of least privilege is applied, and regular security updates are provided. Firewalls, access controls, and encryption are commonly used to enhance security. Linux has robust networking capabilities, making

it a popular choice for servers. It supports a wide range of network protocols and services, including **TCP/IP**, **DNS**, **DHCP**, and more. Linux provides both command-line and graphical user interfaces (GUIs). The command line is powerful and efficient for many tasks, while GUIs are available for users who prefer a more visually intuitive experience. Let's learn about some of the most basic linux commands in this little book with examples.

# VERY BASIC COMMANDS

☆ pwd: Present Working Directory

```
ari-18308@ari-18308:~$ pwd  
/home/ari-18308
```

☆ ls: List files and directories in pwd

```
ari-18308@ari-18308:~$ ls  
65ff7287.0  
8d28ae65.0  
anaconda3  
anaconda.sh  
beta.html
```

☆ cd: Change The Directory

```
ari-18308@ari-18308:~$ cd Desktop  
ari-18308@ari-18308:~/Desktop$
```

☆ mkdir: Create A Directory

```
ari-18308@ari-18308:~/Desktop$ mkdir ARI  
ari-18308@ari-18308:~/Desktop$ ls  
ARI  DOCZ-II  git.pdf  ICCV_PHOTOOS  INVOICES  
BOOKS  file.txt  hclust.pdf  IMP  Sabarimala  
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ **rmdir:** Remove A Directory

```
ari-18308@ari-18308:~/Desktop$ rmdir ARI
ari-18308@ari-18308:~/Desktop$ ls
BOOKS      file.txt  hclust.pdf    IMP          Sabarimala
DOCZ-II    git.pdf   ICCV_PHOTOS INVOICES
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ **cp:** Copy a file or directory to destination folder

```
ari-18308@ari-18308:~/Desktop$ ls
a_file.txt  DOCZ-II    git.pdf   ICCV_PHOTOS INVOICES
BOOKS       file.txt  hclust.pdf IMP          Sabarimala
ari-18308@ari-18308:~/Desktop$ cp a_file.txt BOOKS
ari-18308@ari-18308:~/Desktop$ cd BOOKS
ari-18308@ari-18308:~/Desktop/BOOKS$ ls
436182053-ടനி-മനික්ජ්‍යෙනුමේනපdf
a_file.txt
```

## ☆ **mv:** Move a file or directory to destination folder

```
ari-18308@ari-18308:~/Desktop$ ls
a_file.txt  DOCZ-II    git.pdf   ICCV_PHOTOS INVOICES
BOOKS       file.txt  hclust.pdf IMP          Sabarimala
ari-18308@ari-18308:~/Desktop$ mv a_file.txt DOCZ-II
ari-18308@ari-18308:~/Desktop$ ls
BOOKS       file.txt  hclust.pdf IMP          Sabarimala
DOCZ-II    git.pdf   ICCV_PHOTOS INVOICES
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ **touch:** Create an empty file

```
ari-18308@ari-18308:~/Desktop$ touch ari.txt
ari-18308@ari-18308:~/Desktop$ ls
ari.txt  DOCZ-II    git.pdf   ICCV_PHOTOS INVOICES
BOOKS   file.txt  hclust.pdf IMP          Sabarimala
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ cat: Concatenate and display a file

```
ari-18308@ari-18308:~/Desktop$ cat file.txt
Muthai Tharu Patthi Thirunagai
Atthikkirai Satthi Saravana
Mutthikkoru Vitthu Guru Para Ena Odhum...Muruga

Muthai Tharu Patthi Thirunagai
Atthikkirai Satthi Saravana
Mutthikkoru Vitthu Guru Para Ena Odhum
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ echo: Display a message or value

```
ari-18308@ari-18308:~/Desktop$ echo "Meow Meow Poona"
Meow Meow Poona
```

## ☆ man: Display manual for a command

```
ari-18308@ari-18308:~/Desktop$ man cp
CP(1)                               User Commands                               CP(1)

NAME
    cp - copy files and directories

SYNOPSIS
    cp [OPTION]... [-T] SOURCE DEST
    cp [OPTION]... SOURCE... DIRECTORY
    cp [OPTION]... -t DIRECTORY SOURCE...

DESCRIPTION
    Copy SOURCE to DEST, or multiple SOURCE(s) to DIRECTORY.

    Mandatory arguments to long options are mandatory for short options too.

    -a, --archive
        same as -dR --preserve=all

    --attributes-only
        don't copy the file data, just the attributes

Manual page cp(1) line 1 (press h for help or q to quit)
```

Show Application

## ☆ chmod: Permissions to a file/folder

```
ari-18308@ari-18308:~/Desktop$ echo "ARI is HERE">>>ari.txt
ari-18308@ari-18308:~/Desktop$ ls -l ari.txt
-rw-rw---- 1 ari-18308 ari-18308 15 Dec 20 10:17 ari.txt
ari-18308@ari-18308:~/Desktop$ chmod a-w ari.txt
ari-18308@ari-18308:~/Desktop$ echo "HI">>>ari.txt
bash: ari.txt: Permission denied
```

The above given example first lists out the permissions and owners by using **ls -l filename.txt**. Then it sets all unable to write using **chmod a-w filename.txt**. Other options are as displayed below.

```
chmod <operation> <file/dir>      # To change permissions of a file or
                                         directory.
chmod +r sample.sh                  # Granting read permission to a file.
chmod +w sample.sh                  # Granting write permission to a file.
chmod +x sample.sh                  # Granting execute permission to a file.

chmod -r sample.sh                  # Revoking read permission from a file
chmod -w sample.txt                 # Revoking write permission from a file
chmod -x sample.txt                 # Revoking execute permission from a
                                         file.
```

## ☆ chown: Change Ownership to a file/folder

```
ari-18308@ari-18308:~/Desktop$ chown ari-18308 file.txt
ari-18308@ari-18308:~/Desktop$ ls -l file.txt
-rw-rw---- 1 ari-18308 ari-18308 214 Dec 20 10:21 file.txt
```

## ☆ df: Display disk usage

```
ari-18308@ari-18308:~/Desktop$ df
Filesystem      1K-blocks   Used   Available  Use% Mounted on
tmpfs            1598728    2488   1596240   1% /run
/dev/mapper/vgubuntu-root 486903968 91647744 370449416  20% /
tmpfs            7993632     0   7993632   0% /dev/shm
tmpfs             5120      4   5116   1% /run/lock
/dev/nvme0n1p2      1684592  297528  1283180  19% /boot
/dev/nvme0n1p1      523248  48408   474840  10% /boot/efi
tmpfs            1598724   1700   1597024   1% /run/user/1001
ari-18308@ari-18308:~/Desktop$
```

## ☆ du: Display space usage by files/dirs

```
ari-18308@ari-18308:~/Desktop$ cd DOCZ-II
ari-18308@ari-18308:~/Desktop/DOCZ-II$ du
3512  ./DOCS-NEW/.ipynb_checkpoints
19212 ./DOCS-NEW/TEST/WORK_AND_EMPLOYMENT/PAYSLIP
20924 ./DOCS-NEW/TEST/WORK_AND_EMPLOYMENT/PRESENTATION
13500 ./DOCS-NEW/TEST/WORK_AND_EMPLOYMENT/RESUME
53640 ./DOCS-NEW/TEST/WORK_AND_EMPLOYMENT
9036  ./DOCS-NEW/TEST/FINANCIAL_RECORD/BANK_STATEMENT
17560 ./DOCS-NEW/TEST/FINANCIAL_RECORD/CHEQUE
18048 ./DOCS-NEW/TEST/FINANCIAL_RECORD/BUDGET
44648 ./DOCS-NEW/TEST/FINANCIAL_RECORD
164   ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_SCAN/CHEST
7404  ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_SCAN/CHEST-SIDEVIEW
276   ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_SCAN/SPINAL
536   ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_SCAN/KNEE
8384  ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_SCAN
20    ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_PRESCRIPTION/TEMP4
2236  ./DOCS-NEW/TEST/MEDICAL_DOC/MEDICAL_PRESCRIPTION/TEMP6
```

## ☆ ps: Display info of running processes

```
ari-18308@ari-18308:~/Desktop/DOCZ-II$ ps
  PID TTY          TIME CMD
 60190 pts/0        00:00:00 bash
 61661 pts/0        00:00:00 man
 61669 pts/0        00:00:00 pager
 75815 pts/0        00:00:00 ps
ari-18308@ari-18308:~/Desktop/DOCZ-II$
```

## ★ kill: To kill a running process

```
ari-18308@ari-18308:~/Desktop/DOCZ-II$ ps
  PID TTY          TIME CMD
 60190 pts/0    00:00:00 bash
 61661 pts/0    00:00:00 man
 61669 pts/0    00:00:00 pager
 75878 pts/0    00:00:00 ps
ari-18308@ari-18308:~/Desktop/DOCZ-II$ kill 61669
```

## ★ top: A dynamic view of sys processes

```
ari-18308@ari-18308:~/Desktop/DOCZ-II$ top
top - 10:30:40 up 1 day, 1:04, 1 user, load average: 1.26, 1.37, 1.47
Tasks: 293 total, 2 running, 288 sleeping, 2 stopped, 1 zombie
%Cpu(s): 5.4 us, 0.6 sy, 16.8 ni, 77.2 id, 0.1 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 15612.6 total, 4135.4 free, 4376.7 used, 7100.5 buff/cache
MiB Swap: 1956.0 total, 1956.0 free, 0.0 used. 9569.7 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM   TIME+ COMMAND
  2278 ari-183+  39  19 1430868 601036 23056 R 99.3  3.8 519:23.70 tracker-mi+
  58814 ari-183+  20   0 1496820 478088 151460 D 26.2  3.0  2:16.62 soffice.bin
   2367 ari-183+  20   0 5973064 371176 154484 S  5.6  2.3 13:37.40 gnome-shell
   2213 ari-183+  20   0 2209556 27648 22144 S  0.7  0.2  6:35.67 pulseaudio
     905 root     -51   0      0      0      0 S  0.3  0.0  0:03.66 irq/163-iw+
   1195 root     20   0 276216 10496  9600 S  0.3  0.1  1:41.97 thermald
   2566 ari-183+  20   0 319640 15488  7168 S  0.3  0.1  0:03.11 gsd-housek+
   2567 ari-183+  20   0 315088 11852  7040 S  0.3  0.1  0:24.05 ibus-daemon
   2873 ari-183+  20   0 163604  7424  6784 S  0.3  0.0  0:08.90 ibus-engin+
   5340 ari-183+  20   0 7892084 882868 118432 S  0.3  5.5 18:21.79 Isolated W+
   57500 root     20   0      0      0      0 I  0.3  0.0  0:00.77 kworker/u1+
   59549 ari-183+  20   0 2663420 215508 89936 S  0.3  1.3  0:44.03 Isolated W+
   60133 ari-183+  20   0 601572 69404 49588 S  0.3  0.4  0:16.19 gnome-term+
   62025 root     0 -20   0      0      0 D  0.3  0.0  0:00.61 kworker/u1+
     1 root     20   0 183524 12144  8176 S  0.0  0.1  0:03.33 systemd
```

## ★ grep: Search for a pattern in a file/output

```
ari-18308@ari-18308:~/Desktop$ grep "Muth" file.txt
Muthai Tharu Patthi Thirunagai
Muthai Tharu Patthi Thirunagai
ari-18308@ari-18308:~/Desktop$ |
```

## ★ find: Find a file based on patterns

```
ari-18308@ari-18308:~/Desktop$ find ./ -name file.txt
./file.txt
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ tar: Create or Extract tars

```
ari-18308@ari-18308:~/Desktop$ tar -cvf archive.tar file.txt  
file.txt  
ari-18308@ari-18308:~/Desktop$ ls  
archive.tar BOOKS files.tar.gz git.pdf ICCV_PHOTOS INVOICES  
ari.txt DOCZ-II file.txt hclust.pdf IMP Sabarimala  
ari-18308@ari-18308:~/Desktop$ tar -xvf archive.tar  
file.txt  
ari-18308@ari-18308:~/Desktop$ ls  
archive.tar BOOKS files.tar.gz git.pdf ICCV_PHOTOS INVOICES  
ari.txt DOCZ-II file.txt hclust.pdf IMP Sabarimala  
ari-18308@ari-18308:~/Desktop$
```

## ☆ gzip: Compress files

```
ari-18308@ari-18308:~/Desktop$ ls  
archive.tar BOOKS files.tar.gz git.pdf ICCV_PHOTOS INVOICES  
ari.txt DOCZ-II file.txt.gz hclust.pdf IMP Sabarimala  
ari-18308@ari-18308:~/Desktop$ gzip git.pdf  
ari-18308@ari-18308:~/Desktop$ l  
archive.tar BOOKS/ files.tar.gz git.pdf.gz ICCV_PHOTOS/ INVOICES/  
ari.txt DOCZ-II/ file.txt.gz hclust.pdf IMP/ Sabarimala/  
ari-18308@ari-18308:~/Desktop$
```

## ☆ gunzip: Uncompress gzipped files

```
ari-18308@ari-18308:~/Desktop$ gunzip git.pdf.gz  
ari-18308@ari-18308:~/Desktop$ ls  
archive.tar BOOKS files.tar.gz git.pdf ICCV_PHOTOS INVOICES  
ari.txt DOCZ-II file.txt.gz hclust.pdf IMP Sabarimala  
ari-18308@ari-18308:~/Desktop$
```

## ☆ passwd: Change user password

```
ari-18308@ari-18308:~/Desktop$ passwd  
Changing password for ari-18308.  
Current password: |
```

## ☆ whoami: Display current user name

```
ari-18308@ari-18308:~/Desktop$ whoami  
ari-18308  
ari-18308@ari-18308:~/Desktop$
```

☆ **date**: Display current date

```
ari-18308@ari-18308:~/Desktop$ date
Wednesday 20 December 2023 10:46:44 AM IST
```

☆ **ncal**: Display calendar

```
ari-18308@ari-18308:~/Desktop$ ncal
December 2023
Su   3 10 17 24 31
Mo   4 11 18 25
Tu   5 12 19 26
We   6 13 20 27
Th   7 14 21 28
Fr   1  8 15 22 29
Sa   2  9 16 23 30
ari-18308@ari-18308:~/Desktop$
```

☆ **uptime**: Display how long the system is running

```
ari-18308@ari-18308:~/Desktop$ uptime
10:50:07 up 1 day, 1:24, 1 user, load average: 1.77, 1.58, 1.54
ari-18308@ari-18308:~/Desktop$ |
```

☆ **hostname**: Display hostname of sys

```
ari-18308@ari-18308:~/Desktop$ hostname
ari-18308
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ ifconfig: Display network interface configuration

```
ari-18308@ari-18308:~/Desktop$ ifconfig
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 98098 bytes 10898349 (10.8 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 98098 bytes 10898349 (10.8 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp59s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.92.52.225 netmask 255.255.252.0 broadcast 10.92.55.255
        inet6 fe80::3f50:3a64:e9a9:2bda prefixlen 64 scopeid 0x20<link>
            ether 40:74:e0:8f:b8:da txqueuelen 1000 (Ethernet)
            RX packets 1123455 bytes 933572254 (933.5 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 442951 bytes 84610823 (84.6 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ari-18308@ari-18308:~/Desktop$ |
```

## ☆ ping: Check network connection

```
ari-18308@ari-18308:~/Desktop$ ping 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.038 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.035 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.048 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.035 ms
64 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.051 ms
64 bytes from 127.0.0.1: icmp_seq=6 ttl=64 time=0.049 ms
64 bytes from 127.0.0.1: icmp_seq=7 ttl=64 time=0.035 ms
```

## ☆ traceroute: Display the route that packets take to reach a network host.

```
ari-18308@ari-18308:~/Desktop$ traceroute 127.0.0.1
traceroute to 127.0.0.1 (127.0.0.1), 30 hops max, 60 byte packets
  1 localhost (127.0.0.1)  0.046 ms  0.005 ms  0.004 ms
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ wget: Download files from internet.

```
ari-18308@ari-18308:~/Desktop/Downloads$ wget https://cdn.pixabay.com/photo/2015/04/19/08/32/marguerite-729510_640.jpg
--2023-12-20 10:59:06-- https://cdn.pixabay.com/photo/2015/04/19/08/32/marguerite-729510_640.jpg
Resolving cdn.pixabay.com (cdn.pixabay.com)... 104.18.40.96, 172.64.147.160, 2606:4700:91b1:a656:d5c5:0:1719:a39
Connecting to cdn.pixabay.com (cdn.pixabay.com)|104.18.40.96|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 36124 (35K) [binary/octet-stream]
Saving to: 'marguerite-729510_640.jpg'

marguerite-729510_64 100%[=====] 35.28K ---KB/s   in 0s

2023-12-20 10:59:06 (143 MB/s) - 'marguerite-729510_640.jpg' saved [36124/36124]

ari-18308@ari-18308:~/Desktop/Downloads$ ls
marguerite-729510_640.jpg
ari-18308@ari-18308:~/Desktop/Downloads$ |
```

## ☆ curl: Transfer Data with URLs

```
ari-18308@ari-18308:~/Desktop/Downloads$ ls
marguerite-729510_640.jpg
ari-18308@ari-18308:~/Desktop/Downloads$ curl -o output.txt https://www.google.com
  % Total    % Received % Xferd  Average Speed   Time     Time   Current
               Dload  Upload   Total   Spent    Left  Speed
100 20638     0 20638     0    0  39235      0  --::--- --::--- --::--- 39161
ari-18308@ari-18308:~/Desktop/Downloads$ ls
marguerite-729510_640.jpg  output.txt
ari-18308@ari-18308:~/Desktop/Downloads$ cat output.txt
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lang="en-IN"><head><meta content="text/html; charset=UTF-8" http-equiv="Content-Type"><meta content="/images/branding/googleg/1x/googleg_standard_color_128dp.png" itemprop="image"><title>Google</title><script nonce="QrF7wExN_8C2MkcHg5q7VA">(function(){var _g={kEI:'j3yCZfqqDpOA0PEPsvUz',kEXPI:'0,1365468,206,4804,1132070,870536,327209,656,380089,16115,28684,22431,1361,283,12036,17580,4998,17075,38444,2872,2891,4140,4208,3406,606,29842,28444,5018,13721,1014,1,16916,2652,4,59617,27053,6624,7593,1,42154,2,16737,23024,5679,1021,31121,4569,6255,23421,1252,33064,2,2,1,26632,8155,8861,14489,20507,7,1922,4078,5701,42459,20198,20137,14,82,13333,10942,12090,16581,2266,764,15816,1|
```

## ☆ scp: Securely copy files over ssh

```
ari-18308@ari-18308:~/Desktop$ scp -r ./DOCS-NEW test@gpu53:/media/hdd/ARIHARASUDHA/N/Datasets/|
```

## ☆ ssh: Connect to Remote over ssh

```
ari-18308@ari-18308:~/Desktop$ ssh test@gpu53
test@gpu53's password: |
```

## ☆ nano: A Simple Text Editor

```
ari-18308@ari-18308:~/Desktop$ nano file.txt
```

```
GNU nano 6.2                               file.txt

^G Help          ^O Write Out   ^W Where Is   ^K Cut           ^T Execute    ^C Location
^X Exit         ^R Read File   ^V Replace    ^U Paste        ^J Justify    ^/ Go To Line
```

## ☆ vim: An Advanced Text Editor

```
VIM - Vi IMproved

version 8.2.2121
by Bram Moolenaar et al.
Modified by team+vim@tracker.debian.org
Vim is open source and freely distributable

      Help poor children in Uganda!
type :help iccf<Enter>      for information

type :q<Enter>              to exit
type :help<Enter> or <F1>  for on-line help
type :help version8<Enter>  for version info
```

## ☆ history: History of commands

```
ari-18308@ari-18308:~/Desktop$ history
```

```
653 clear
654 ssh test@gpu53
655 jupyter notebook
656 jupyter notebook
657 clear
```

## BASHRC

The `.bashrc` file is a shell script that is executed whenever a new interactive Bash shell is started. It is commonly used to set environment variables, define aliases, customize the prompt, and execute other initialization tasks. Let's open or change a `bashrc` file using nano text editor. It would look like the following.

```
GNU nano 6.2                               /home/ari-18308/.bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples

# If not running interactively, don't do anything
case $- in
  *i*) ;;
  *) return;;
esac

# don't put duplicate lines or lines starting with space in the history.
# See bash(1) for more options
HISTCONTROL=ignoreboth

# append to the history file, don't overwrite it
shopt -s histappend
```

Now, let's create one on our own. Let it be named `ari.sh`. It has to print a greetings message when the greeting variable is SET.

## ★ **export**: Set environment variables

```
ari-18308@ari-18308:~/Desktop$ export GREETING="YES"
```

## ★ **./ (or) source** : To run a script

```
ari-18308@ari-18308:~/Desktop$ ./ari.sh
```

Now, our bash execution goes...

```
ari-18308@ari-18308:~/Desktop$ nano ari.sh
ari-18308@ari-18308:~/Desktop$ cat ari.sh
#!/bin/bash

# Check if the GREETING environment variable is set
if [ -z "$GREETING" ]; then
    echo "GREETING environment variable is not set."
else
    echo "GREETINGS MR.ARIHARASUDHAN!"
fi
ari-18308@ari-18308:~/Desktop$ chmod +x ari.sh
ari-18308@ari-18308:~/Desktop$ export GREETING="YES"
ari-18308@ari-18308:~/Desktop$ ./ari.sh
GREETINGS MR.ARIHARASUDHAN!
```

We can also set environment variables and check them. Make sure to execute or restart the terminal to apply changes.

```
GNU nano 6.2                               /home/ari-18308/.bashrc *
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples
export NAME="ARIHARASUDHAN"

# If not running interactively, don't do anything
case $- in
  *i*) ;;
  *) return;;
esac
ari-18308@ari-18308:~/Desktop$ source ~/.bashrc
ari-18308@ari-18308:~/Desktop$ echo $NAME
ARIHARASUDHAN
```

# ENVIRONMENT VARIABLES

Environment variables are used to **configure and customize** the behavior of software applications and the operating system. They provide a way for processes and programs to access configuration information, user preferences, and other system-related settings. Many applications use environment variables to store configuration settings. These settings can include parameters such as database connection strings, file paths, and server addresses. By using environment variables, applications can be **configured without modifying the source code**. Environment variables allow users to customize the behavior of applications and the shell environment. For example, setting the **PATH** variable allows users to specify directories where executable files are located, influencing which programs are

accessible from the command line. Environment variables can be used to store **sensitive information** such as API keys, passwords, and authentication tokens. Storing this information in environment variables is often more secure than hardcoding it directly into scripts or configuration files, as environment variables are not easily visible to other users. Environment variables can be used for **communication between different processes**. A parent process can set environment variables that are inherited by its child processes. This provides a way for processes to share information during their execution. Environment variables are widely used in scripts and automation workflows. Scripts can read and use environment variables to adapt their behavior based on the environment in which they are executed. This makes scripts more

flexible and portable. Some applications use environment variables to determine the user's preferred language or locale. This information is then used to provide a localized user interface or to format dates, numbers, and currency according to the user's regional preferences. Operating systems use environment variables to manage system-wide settings. For example, the PATH variable defines the directories where the operating system looks for executable files. Developers often use environment variables during the development and debugging process. They can set variables to control the behavior of their code, enable or disable features, and switch between different configurations **without modifying the source code**. Following is the list of ways of setting environment variables.

★ **Using the export Command:** The export command is used to set environment variables in the current shell session.

```
ari-18308@ari-18308:~/Desktop$ export NAME="ARI"
ari-18308@ari-18308:~/Desktop$ echo $NAME
ARI
ari-18308@ari-18308:~/Desktop$
```

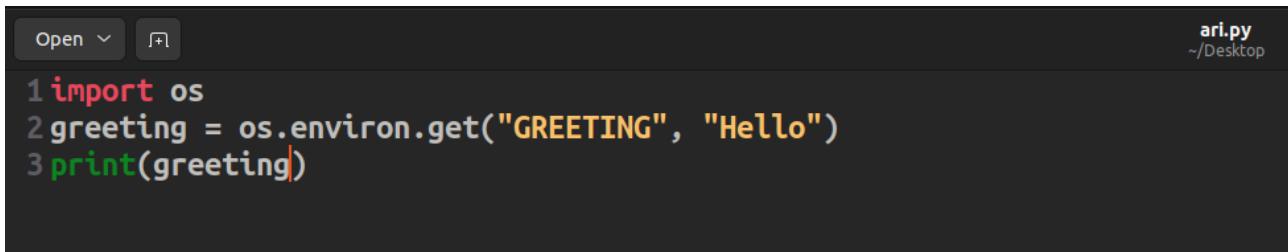
This sets the NAME environment variable to "ARI" for the current session.

★ **Setting Environment Variables in Shell Configuration Files:** We can set environment variables in the configuration files for our shell. This makes the variables persistent across sessions. It can be done as we have already done in the above examples.

```
GNU nano 6.2                               /home/ari-18308/.bashrc *
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples
export NAME="ARIHARASUDHAN"

# If not running interactively, don't do anything
case $- in
    *i*) ;;
    *) return;;
esac
```

★ **Using the env Command:** The env command can be used to set environment variables when running a command. To demonstrate this, let's create a python file which prints an environment variable.



A screenshot of a terminal window titled "ari.py" located in the "/Desktop" directory. The window shows the following Python code:

```
1 import os
2 greeting = os.environ.get("GREETING", "Hello")
3 print(greeting)
```

Now, let's set this when running the python script.

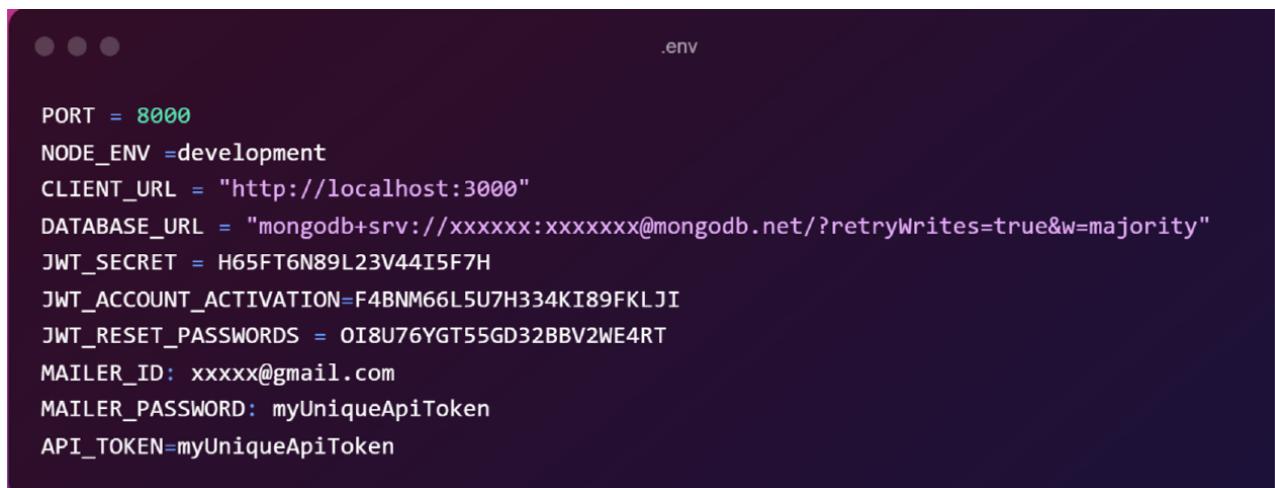
```
ari-18308@ari-18308:~/Desktop$ env GREETING="VANAKKAM" python ari.py
VANAKKAM
ari-18308@ari-18308:~/Desktop$ |
```

★ **Command Prefixing:** We can set an environment variable for a specific command without affecting the rest of the session.

```
ari-18308@ari-18308:~/Desktop$ NAME="ARI" echo $NAME
ARI
ari-18308@ari-18308:~/Desktop$
```

This sets the variable only for the duration of the `my\_command` execution.

☆ **.env File:** A .env file is a text file commonly used to store configuration settings, including environment variables. It's a convenient way to organize and manage variables, especially in development environments. Each line in the file typically follows the **KEY=VALUE** format.



```
PORT = 8000
NODE_ENV =development
CLIENT_URL = "http://localhost:3000"
DATABASE_URL = "mongodb+srv://xxxxxxxx:xxxxxxxx@mongodb.net/?retryWrites=true&w=majority"
JWT_SECRET = H65FT6N89L23V44I5F7H
JWT_ACCOUNT_ACTIVATION=F4BNM66L5U7H334KI89FKLJI
JWT_RESET_PASSWORDS = OI8U76YGT55GD32BBV2WE4RT
MAILER_ID: xxxx@gmail.com
MAILER_PASSWORD: myUniqueApiToken
API_TOKEN=myUniqueApiToken
```

To use the variables from a .env file, we can source the file in our shell or in a script.

```
ari-18308@ari-18308:~/Desktop$ ls -a
.          ari.sh  Downloads      .file.txt.swp  ICCV_PHOTOS      Sabarimala
..         ari.txt  .env        .git           IMP
archive.tar BOOKS   files.tar.gz  git.pdf       INVOICES
ari.py     DOCZ-II  file.txt.gz  hclust.pdf   .ipynb_checkpoints
ari-18308@ari-18308:~/Desktop$ source .env
ari-18308@ari-18308:~/Desktop$ echo "$NAME hails from $NATIVE is $AGE years old!"
ARI hails from TENKASI is 21 years old!
ari-18308@ari-18308:~/Desktop$ cat .env
NAME=ARI
AGE=21
NATIVE=TENKASI
ari-18308@ari-18308:~/Desktop$ |
```

# SOME MORE COMMANDS

Let's go through some more commands

## ☆ SSH - Using Password

```
ari-18308@ari-18308:~/Desktop$ ssh test@gpu53  
test@gpu53's password: |
```

## ☆ SSH - Using Key

```
ari-18308@ari-18308:~/Desktop$ ssh -i /path/to/private_key test@gpu53
```

Replace `/path/to/private_key` with the appropriate value. This method assumes that the corresponding public key is added to the `~/.ssh/authorized_keys` file on the remote host.

## Similary

- ☆ SCP - Using Password and
- ☆ SCP - Using Key can be done.

## ☆ rsync - Efficient File Copy

```
ari-18308@ari-18308:~/Desktop$ rsync -avz /path/to/local/directory username@remote_  
server:/path/on/remote/server
```

`rsync` (Remote Sync) is a powerful and versatile utility for efficiently copying and synchronizing files between

directories, either locally or across a network. It employs several strategies to optimize file transfers and reduce the amount of data transferred, making it an efficient tool for synchronization.

## ☆ wc - Word Count

```
ari-18308@ari-18308:~/Desktop$ wc ari.txt
 2  4 15 ari.txt
ari-18308@ari-18308:~/Desktop$ cat ari.txt
hi
ARI is HERE
```

## ☆ Head / Tail:

```
ari-18308@ari-18308:~/Desktop$ cat file.txt
Muthai Tharu Patthi Thirunagai
Atthikkirai Satthi Saravana
Mutthikkoru Vitthu Guru Para Ena Odhum...Muruga

Muthai Tharu Patthi Thirunagai
Atthikkirai Satthi Saravana
Mutthikkoru Vitthu Guru Para Ena Odhum
NOTHING
ari-18308@ari-18308:~/Desktop$ head -2 file.txt
Muthai Tharu Patthi Thirunagai
Atthikkirai Satthi Saravana
ari-18308@ari-18308:~/Desktop$ tail -2 file.txt
Mutthikkoru Vitthu Guru Para Ena Odhum
NOTHING
```

These commands allow us to view the beginning or end of a file (head and tail).

### ☆ More / Less / Most:

These all commands are used as pagers.

More: Forward Navigation and Limited Backward Navigation.

Less: Both Forward and Backward Navigation and also has search options.

We can go to the beginning and the end of a file instantly. Plus we can switch to an editor (like open the file in vi or vim). It is noticeably quicker than editor for when the file is large.

Most: has all the features of more and less but we can also open multiple files, close 1 file at a time when we have multiple files open, allows locking and scrolling of the open windows and allows for splitting of open windows.

```
ari-18308@ari-18308:~/Desktop$ more file.txt
```

ed ut perspiciatis, unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam eaque ipsa, quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt, explicabo. Nemo enim ipsam voluptatem, quia voluptas sit, aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos, qui ratione voluptatem sequi nesciunt, neque porro quisquam est, qui dolore m ipsum, quia dolor sit amet consectetur adipisci[ng] velit, sed quia non numquam [do] eius modi tempora inci[di]dunt, ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima veniam, quis nostrum[d] exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? [D]Quis autem vel eum i[r]ure reprehenderit, qui in ea voluptate velit esse, quam nihil molestiae consequatur, vel illum, qui dolorem eum fugiat, quo voluptas nulla pariatur?

[33] At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti, quos dolores et quas molestias excepturi sint, obcaecati cupiditate non provident, similique sunt in culpa, qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem reru[d]um facilis est e[r]t expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio, cumque nihil impedit, quo minus id, quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellend[a]us. Temporibus autem qu

```
ari-18308@ari-18308:~/Desktop$ less file.txt
```

ed ut perspiciatis, unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam eaque ipsa, quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt, explicabo. Nemo enim ipsam voluptatem, quia voluptas sit, aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos, qui ratione voluptatem sequi nesciunt, neque porro quisquam est, qui dolore m ipsum, quia dolor sit amet consectetur adipisci[ng] velit, sed quia non numquam [do] eius modi tempora inci[di]dunt, ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima veniam, quis nostrum[d] exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? [D]Quis autem vel eum i[r]ure reprehenderit, qui in ea voluptate velit esse, quam nihil molestiae consequatur, vel illum, qui dolorem eum fugiat, quo voluptas nulla pariatur?

[33] At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti, quos dolores et quas molestias excepturi sint, obcaecati cupiditate non provident, similique sunt in culpa, qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem reru[d]um facilis est e[r]t expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio, cumque nihil impedit, quo minus id, quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellend[a]us. Temporibus autem qu

```
ari-18308@ari-18308:~/Desktop$ most file.txt
```

[33] At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditii\$  
What follows is H. Rackham's translation, as printed in the 1914 Loeb edition, wit\$

[32] But I must explain to you how all this mistaken idea of reprobating pleas\$

[33] On the other hand, we denounce with righteous indignation and dislike men\$

[33] At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditii\$  
-- MOST: file.txt (1,1) 0%  
Search: b

## ☆ which - Full path of an executable

```
ari-18308@ari-18308:~/Desktop$ which python  
/home/ari-18308/anaconda3/bin/python  
ari-18308@ari-18308:~/Desktop$ |
```

## ☆ lsb\_release - Your Linux Distribution

```
ari-18308@ari-18308:~/Desktop$ lsb_release -a  
No LSB modules are available.  
Distributor ID: Ubuntu  
Description:     Ubuntu 22.04.3 LTS  
Release:        22.04  
Codename:       jammy  
ari-18308@ari-18308:~/Desktop$
```

## ☆ uname - Linux Kernel Version

```
ari-18308@ari-18308:~/Desktop$ uname -r  
6.2.0-37-generic  
ari-18308@ari-18308:~/Desktop$
```

## ☆ lscpu – CPU architecture info

```
ari-18308@ari-18308:~/Desktop$ lscpu  
Architecture:          x86_64  
CPU op-mode(s):       32-bit, 64-bit  
Address sizes:        39 bits physical, 48 bits virtual  
Byte Order:           Little Endian  
CPU(s):               6  
On-line CPU(s) list:  0-5  
Vendor ID:            GenuineIntel  
Model name:           Intel(R) Core(TM) i7-9850H CPU @ 2.60GHz  
CPU family:           6  
Model:                158  
Thread(s) per core:   1  
Core(s) per socket:   6  
Socket(s):            1  
Stepping:             13  
CPU max MHz:          4600.0000  
CPU min MHz:          800.0000  
BogoMIPS:              5199.98  
Flags:                fpu vme de pse tsc msr pae mce cx8 apic sep mtrr  
mov pat pse36 clflush dts acpi mmx fxsr sse sse2  
sse3 syscall nx pdpe1gb rdtscp lm constant_tsc ar
```

## ☆ /proc/meminfo – Memory Information

```
ari-18308@ari-18308:~/Desktop$ cat /proc/meminfo
MemTotal:       15987264 kB
MemFree:        3653880 kB
MemAvailable:   9574984 kB
Buffers:         549716 kB
Cached:          6461028 kB
SwapCached:      0 kB
Active:          3489816 kB
Inactive:        7200576 kB
Active(anon):    6100 kB
Inactive(anon):  4990504 kB
Active(file):    3483716 kB
Inactive(file):  2210072 kB
Unevictable:     630040 kB
Mlocked:         16 kB
SwapTotal:       2002940 kB
SwapFree:        2002940 kB
Zswap:           0 kB
Zswapped:        0 kB
Dirty:            1564 kB
Writeback:        0 kB
```

## ☆ top – Currently Running Processes and Their RAM/Core Usage.

```
top - 13:54:51 up 1 day, 4:28, 1 user, load average: 1.45, 1.41, 1.43
Tasks: 301 total, 2 running, 289 sleeping, 9 stopped, 1 zombie
%Cpu(s): 0.0 us, 1.1 sy, 17.2 ni, 80.6 id, 0.0 wa, 0.0 hi, 1.1 si, 0.0 st
MiB Mem : 15612.6 total, 3627.9 free, 4561.4 used, 7423.2 buff/cache
MiB Swap: 1956.0 total, 1956.0 free, 0.0 used. 9411.4 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2278	ari-183+	39	19	1430868	601164	23056	R	100.0	3.8	722:42.32	tracker-mi+
2367	ari-183+	20	0	5990060	397380	155108	S	6.2	2.5	20:22.85	gnome-shell
1	root	20	0	183524	12144	8176	S	0.0	0.1	0:03.62	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.03	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_flush+
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:+
10	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_+
11	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_+
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_+
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_+
14	root	20	0	0	0	0	S	0.0	0.0	0:00.53	ksoftirqd/0
15	root	20	0	0	0	0	I	0.0	0.0	0:17.52	rcu_preempt

## ★ Sorting based on RAM/Core Usage > top -o %MEM

```
top - 13:56:11 up 1 day, 4:30, 1 user, load average: 1.48, 1.44, 1.44
Tasks: 302 total, 2 running, 289 sleeping, 10 stopped, 1 zombie
%Cpu(s): 0.2 us, 0.2 sy, 16.7 ni, 82.9 id, 0.0 wa, 0.0 hi, 0.1 si, 0.0 st
MiB Mem : 15612.6 total, 3613.1 free, 4584.6 used, 7414.8 buff/cache
MiB Swap: 1956.0 total, 1956.0 free, 0.0 used. 9398.3 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
4215	ari-183+	20	0	13.0g	847356	234452	S	0.3	5.3	49:52.79	firefox
58814	ari-183+	20	0	1779300	773736	158436	S	0.0	4.8	10:37.46	soffice.bin
2278	ari-183+	39	19	1430868	601164	23056	R	100.3	3.8	724:02.74	tracker-mi+
5340	ari-183+	20	0	7808744	575388	118816	S	0.0	3.6	19:03.24	Isolated W+
2367	ari-183+	20	0	5980312	398036	155108	S	0.3	2.5	20:25.40	gnome-shell
57344	ari-183+	20	0	7206844	360796	108672	S	0.0	2.3	0:58.29	Isolated W+
83565	ari-183+	20	0	2698692	214032	93672	S	0.0	1.3	0:14.85	Isolated W+
86980	ari-183+	20	0	2635404	204892	91412	S	0.0	1.3	0:23.79	Isolated W+
90549	ari-183+	20	0	2578872	184476	88424	S	0.0	1.2	0:04.40	Isolated W+
87344	ari-183+	20	0	2520572	172612	88064	S	0.0	1.1	0:01.54	Isolated W+
89345	ari-183+	20	0	2515724	166244	87828	S	0.0	1.0	0:01.76	Isolated W+
90386	ari-183+	20	0	2480220	146424	86364	S	0.0	0.9	0:01.32	Isolated W+
4774	ari-183+	20	0	2500728	140656	89932	S	0.0	0.9	1:44.72	Privileged+
2861	ari-183+	20	0	1838276	131432	81192	S	0.0	0.8	0:48.11	xdg-desktop
5243	ari-183+	20	0	630148	122940	99796	S	0.0	0.8	0:31.81	RDD Proc

## ★ GPU Availability:

```
ari-18308@ari-18308:~/Desktop$ lspci | grep -i vga
00:02.0 VGA compatible controller: Intel Corporation CoffeeLake-H GT2 [UHD Graphics 630] (rev 02)
ari-18308@ari-18308:~/Desktop$
```

This command lists the VGA-compatible controllers, which may include GPUs.

## ★ Number of Disks and Space Usage :

```
ari-18308@ari-18308:~/Desktop$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           1.6G  2.5M  1.6G  1% /run
/dev/mapper/vgubuntu-root 465G  88G  354G  20% /
tmpfs           7.7G    0  7.7G  0% /dev/shm
tmpfs           5.0M  4.0K  5.0M  1% /run/lock
/dev/nvme0n1p2   1.7G 291M  1.3G  19% /boot
/dev/nvme0n1p1   511M  48M  464M  10% /boot/efi
tmpfs           1.6G  1.7M  1.6G  1% /run/user/1001
ari-18308@ari-18308:~/Desktop$
```

## ☆ All The USB Devices connected

```
ari-18308@ari-18308:~/Desktop$ lsusb
Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 002: ID 8087:0025 Intel Corp. Wireless-AC 9260 Bluetooth Adapter
Bus 001 Device 003: ID 0c45:6723 Microdia Integrated_Webcam_HD
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
ari-18308@ari-18308:~/Desktop$
```

## SUDO AND SUPER USER

☆ sudo allows a permitted user to execute a command as the superuser or another user, as specified by the security policy. This is typically configured in the */etc/sudoers* file.

```
ari-18308@ari-18308:~/Desktop$ sudo apt-get ncal
[sudo] password for ari-18308: |
```

☆ Super User (su) command allows switching to another user or becoming the superuser. When we run su without specifying a username, it defaults to becoming the superuser.

```
ari-18308@ari-18308:~/Desktop$ su
Password:
```

# MOUNTING

Mounting is the process of **making a filesystem accessible and usable to the operating system**. When we mount a filesystem, it becomes integrated into the directory structure, and we can access its files and directories as if they were part of the local system. Here are the simple steps to go on.

## 1. Identify the Disk

Use a command like `lsblk` or `fdisk -l` to list the available disks and their partitions. Identify the disk we want to mount.

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
loop0	7:0	0	4K	1	loop	/snap/bare/5
loop1	7:1	0	322.4M	1	loop	/snap/blender/4228
loop2	7:2	0	322.6M	1	loop	/snap/blender/4300
loop3	7:3	0	69.3M	1	loop	/snap/climate-trail/12
loop4	7:4	0	105.8M	1	loop	/snap/core/16202
loop5	7:5	0	55.7M	1	loop	/snap/core18/2796
loop6	7:6	0	55.7M	1	loop	/snap/core18/2812

## 2. Create a Mount Point

Choose or create a directory (folder) where we want to access the contents of the disk. This is called the mount point.

```
ari-18308@ari-18308:~/Desktop$ sudo mkdir mydisk  
[sudo] password for ari-18308:  
ari-18308@ari-18308:~/Desktop$ |
```

### 3. Mount the Disk

Use the mount command to mount the disk to the chosen mount point.

```
> sudo mount /dev/sdXn ./mydisk
```

The mount command attaches the file system of an external device to the file system of a system. It instructs the operating system that file system is ready to use and associate it with a particular point in the system's hierarchy. Mounting will make files, directories and devices available to the users. Mount Point is a directory in the Linux filesystem where the contents of a disk or partition are made available. When we mount a disk, its files and directories become accessible through the chosen mount point. In our case, it is mydisk.

## 4. The fstab File

The /etc/fstab file is a configuration file that contains information about disk drives and partitions. It defines how and where each disk or partition should be mounted automatically when the system starts.

## 5. Unmounting

Before physically removing a disk or making changes to its partitions, we should unmount it. We can use the umount command:

```
> sudo umount ./mydisk
```

Unmounting ensures that all data is written to the disk, preventing potential data loss or corruption.

❖ **duf** provides a more modern and user-friendly interface of disk usage.

```
ari-18308@ari-18308:~/Desktop$ duf
```

4 local devices						
MOUNTED ON	SIZE	USED	AVAIL	USE%	TYPE	FILESYSTEM
/	464.3G	87.5G	353.2G	18.8%	ext4	/dev/vgubuntu/root
/boot	1.6G	290.6M	1.2G	17.7%	ext4	/dev/nvme0n1p2
/boot/efi	511.0M	47.3M	463.7M	9.3%	vfat	/dev/nvme0n1p1
/var/snap/firefox/common/host-hunspell	464.3G	87.5G	353.2G	18.8%	ext4	/dev/vgubuntu/root

# PACKAGE MANAGEMENT

In Debian-based Linux distributions such as Ubuntu, **apt (Advanced Package Tool)** is a package management tool. It is designed to simplify the process of installing, upgrading, configuring, and removing software packages on Linux system. When we install a package, apt automatically resolves and installs any dependencies required by that package. This helps ensure that the software runs correctly. apt interacts with a centralized repository of software packages. This repository contains a vast collection of precompiled software, making it convenient to find and install applications. Let's start using it.

**> sudo apt update**

This command refreshes the local package list, ensuring we have the latest information about available packages.

> **sudo apt update**

This command upgrades installed packages to their latest versions.

> **sudo apt install package\_name**

We can replace package\_name with the name of the package we want to install.

> **sudo apt remove package\_name**

This command removes a previously installed package while keeping its configuration files.

> **sudo apt purge package\_name**

This command removes a package and its configuration files.

> **apt search search\_term**

We can replace search\_term with the name or keywords related to the package we are looking for.

Task	apt (deb) Debian, Ubuntu	zypp (rpm) openSUSE	yum/dnf (rpm) Fedora, CentOS	urpmi (rpm) Mandriva, Mageia
<b>Managing software</b>				
Install new software from package repository	apt-get install <i>pkg</i>	zypper install <i>pkg</i>	dnf install <i>pkg</i>	urpmi <i>pkg</i>
Install new software from package file	dpkg -i <i>pkg</i>	zypper install <i>pkg</i>	dnf localinstall <i>pkg</i>	urpmi <i>pkg</i>
Update existing software	apt-get install <i>pkg</i>	zypper update -t package <i>pkg</i>	dnf update <i>pkg</i>	urpmi <i>pkg</i>
Remove unwanted software	apt-get remove <i>pkg</i>	zypper remove <i>pkg</i>	dnf erase <i>pkg</i>	urpme <i>pkg</i>
<b>Updating the system</b>				
Update package list	apt-get update aptitude update	zypper refresh	dnf check-update	urpmi.update -a
Update system	apt-get upgrade aptitude safe-upgrade	zypper update	dnf update	urpmi --auto-select
<b>Searching for packages</b>				
Search by package name	apt-cache search <i>pkg</i>	zypper search <i>pkg</i>	dnf list <i>pkg</i>	urpmq <i>pkg</i>
Search by pattern	apt-cache search <i>pattern</i>	zypper search -t pattern <i>pattern</i>	dnf search <i>pattern</i>	urpmq --fuzzy <i>pkg</i>
Search by file name	apt-file search <i>path</i>	zypper wp <i>file</i>	dnf provides <i>file</i>	urpmf <i>file</i>
List installed packages	dpkg -l	zypper search -is	rpm -qa	rpm -qa
<b>Configuring access to software repositories</b>				
List repositories	cat /etc/apt/sources.list	zypper repos	dnf repolist	urpmq --list-media
Add repository	(edit /etc/apt/sources.list)	zypper addrepo <i>path name</i>	(add repo to /etc/yum.repos.d/)	urpmi.addmedia <i>name path</i>
Remove repository	(edit /etc/apt/sources.list)	zypper removerepo <i>name</i>	(remove repo from /etc/yum.repos.d/)	urpmi.removimedia <i>media</i>

# TERMINAL MULTIPLEXER

A terminal is a program that provides a text-based interface to interact with the operating system. It's the window where we type commands. TMUX, on the other hand, is a terminal multiplexer. TMUX stands for terminal multiplexer. It allows to create several pseudo terminals from a single terminal. This is very useful for running multiple programs with a single connection, such as when we're remotely connecting to a machine using Secure Shell (SSH). It enables us to run and manage multiple terminal sessions within a single terminal window. This can be particularly useful for multitasking and organizing work efficiently. TMUX allows our processes to run in the background, even if we disconnect from our terminal. This makes it useful for remote server management.

# 1. To install TMUX, > sudo apt-get update

```
ari-18308@ari-18308:~/Desktop$ sudo apt-get install tmux
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer
  libflashrom1 libftdi1-2 libllvm13
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libevent-core-2.1-7 libutempter0
The following NEW packages will be installed:
```

# 2. To create a session

```
(base) test@gpu53:~$ tmux new-session -s aridl
(arisenv) test@gpu53:/media/hdd/ARIHARASUDHAN$ python resnet.py
LOADED TEST_SAMPLES
-----
[aridl] 0:python*                                     "gpu53" 15:30 20-Dec-23
```

# 3. To detach, press Ctrl+F+D (May vary)

```
(base) test@gpu53:~$ tmux new-session -s aridl
[detached (from session aridl)]
(base) test@gpu53:~$ |
```

#### 4. To attach,

```
(base) test@gpu53:~$ tmux attach -t aridl
```

```
(arisenv) test@gpu53:/media/hdd/ARIHARASUDHAN$ python resnet.py  
LOADED TEST_SAMPLES
```

```
-----  
LOADED INDEX.... 1  
CHECKING WITH 1TH TEST_EMB  
2521it [01:38, 40.97it/s]
```

#### 5. To list the sessions alive,

```
(base) test@gpu53:~$ tmux list-sessions  
aridl: 1 windows (created Wed Dec 20 15:29:08 2023)
```

#### 6. To kill a session,

```
(base) test@gpu53:~$ tmux kill-session -t aridl  
(base) test@gpu53:~$
```

## TMUX CONFIGURATIONS

We can configure the TMUX environment with the help of a system configuration file. To use it, create the tmux.conf file. Then, add the preferred configuration commands to it.

```
GNU nano 6.2                                /home/ari-18308/.tmux.conf  
# Change prefix from 'Ctrl+B' to 'Ctrl+A'  
unbind C-b  
set-option -g prefix C-a  
bind-key C-a send-prefix
```

We can configure even color of the background.

```
GNU nano 6.2                               /home/ari-18308/.tmux.conf

# Change prefix from 'Ctrl+B' to 'Ctrl+A'
unbind C-b
set-option -g prefix C-a
bind-key C-a send-prefix
set -g window-active-style bg=white
```

```
root@myvps:~# [0] 0:bash* "myvps.tld" 09:35 10-Jan-23
```

## We can also change the border color.

```
GNU nano 6.2                               /home/ari-18308/.tmux.conf

set -g pane-active-border fg=red
set -ag pane-active-border bg=magenta
```

```
root@myvps:~# [0] 0:bash* "myvps.tld" 09:36 10-Jan-23
```

# SOME BASICS LEFT

☆ **find:** The find command is commonly used to locate or search for files in the system.

```
ari-18308@ari-18308:~/Desktop/TextFiles$ ls  
aridl.txt ariharan.tx ari.txt gameover.txt gamestart.txt  
ari-18308@ari-18308:~/Desktop/TextFiles$ find ./ -name aridl.txt  
./aridl.txt
```

We can also search based on a pattern.

```
ari-18308@ari-18308:~/Desktop/TextFiles$ find ./ -name "ari*"  
./aridl.txt  
./ariharan.tx  
./ari.txt  
ari-18308@ari-18308:~/Desktop/TextFiles$
```

We can also delete based on a pattern.

```
ari-18308@ari-18308:~/Desktop/TextFiles$ ls  
aridl.txt ariharan.tx ari.txt gameover.txt gamestart.txt  
ari-18308@ari-18308:~/Desktop/TextFiles$ find ./ -name "game*" -type f -delete  
ari-18308@ari-18308:~/Desktop/TextFiles$ ls  
aridl.txt ariharan.tx ari.txt  
ari-18308@ari-18308:~/Desktop/TextFiles$
```

☆ **Standard Output to File:** To redirect the standard output of a program to a file, you can use the > operator.

```
ari-18308@ari-18308:~/Desktop/TextFiles$ touch ari.py  
ari-18308@ari-18308:~/Desktop/TextFiles$ echo "print('Hello ARI')" >> ari.py  
ari-18308@ari-18308:~/Desktop/TextFiles$ python ari.py > output.ttx  
ari-18308@ari-18308:~/Desktop/TextFiles$ ls  
aridl.txt ariharan.tx ari.py ari.txt output.ttx  
ari-18308@ari-18308:~/Desktop/TextFiles$ cat output.ttx  
Hello ARI  
ari-18308@ari-18308:~/Desktop/TextFiles$
```

☆ **Standard Output to Err:** The /dev/stderr represents the standard error stream.

```
ari-18308@ari-18308:~/Desktop/TextFiles$ python ari.py > /dev/stderr  
Hello ARI
```

NANDRI