```
calender:
---------
sudo apt update
sudo apt install ncal
cal or ncal - calender with highlighted date
ncal <month> <year> - ncal 01 2025 -> provides jan 2025 calender

man command :
-------------

manul page (man)

$ man ls

this provides the manual for how to use `ls`

Basic Command syntax:
---------------------

<command> <args>
echo        hello

for shell we provide command followed by arguments

echo hello [echo is command and hello is argument]

There are two types of Arguments
    * Positional arguments
    * Named arguments

Positional Arguments :
-----------------------
<command> <arg1> <arg2>
cp 1.txt 2.txt

here position becomes very critical

Named arguments:
----------------
<command> --<arg> <argvalue>

ping -c 4 google.com


* to see hidden files
ls -a
```

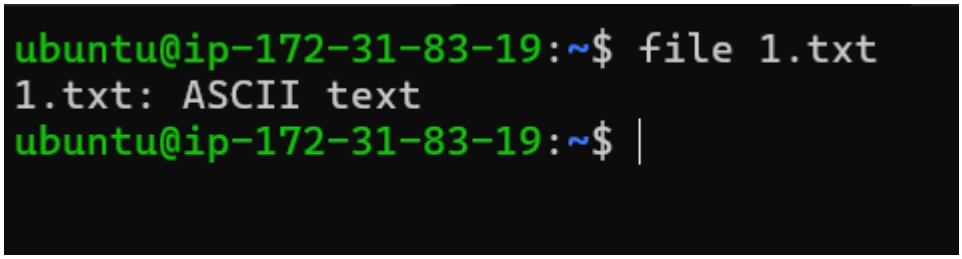
Linux Directory Hierarchy

- / => root directory

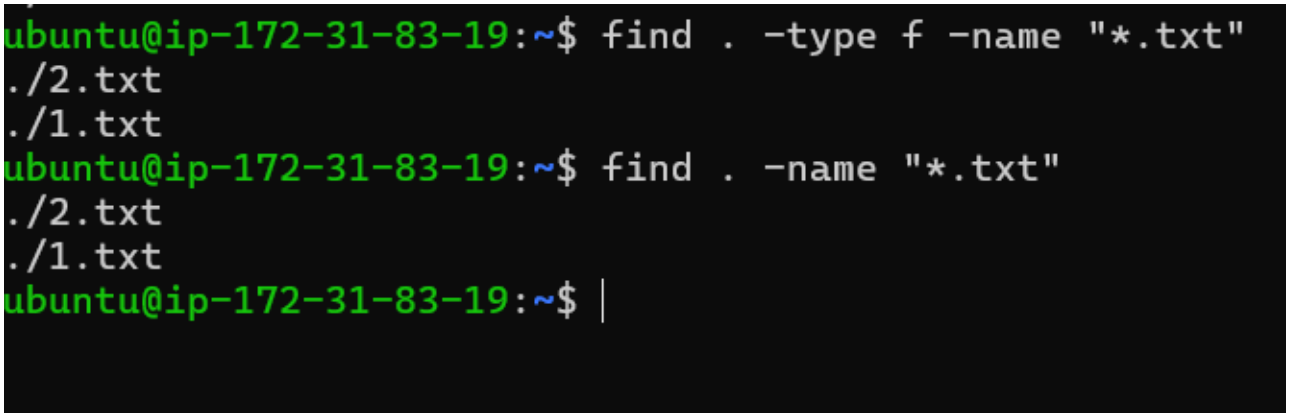
- /bin => Binaries and other executables
- /etc => system configuration files
- /home => home directory
- /opt => optional or third party softwares
- /tmp => Temporary spaces
- /usr => User related programs
- /var => variable data, log
- experiment with mkdir and rmdir.
- ls . [dot represents current directory]
- ls .. [one step back from current]
- ls ../lib [shows inside files of lib]

```
ubuntu@ip-172-31-83-19:~$ less 1.txt
ubuntu@ip-172-31-83-19:~$
ubuntu@ip-172-31-83-19:~$ touch 2.txt
ubuntu@ip-172-31-83-19:~$ diff -u 1.txt 2.txt
--- 1.txt       2024-08-01 02:03:21.100972929 +0000
+++ 2.txt       2024-08-01 02:06:05.571480447 +0000
@@ -1,33 +0,0 @@
-sadfasfasdfs
-asf
-as
-fas
-fs
-vas
-v
-a
-dvadsvdagwd
-g
-ad
-v
-sd
-v
-ad
-va
-dv
-a
-dv
-ad
-vbad
-gqdgadgadgagdas
-sf
-as
-
-as
-dg
-sag
-as
-f
-s
-g
-as
ubuntu@ip-172-31-83-19:~$ cp 1.txt 2.txt
ubuntu@ip-172-31-83-19:~$ diff -u 1.txt  2.txt
ubuntu@ip-172-31-83-19:~$
```

- file command is used to know more about that file

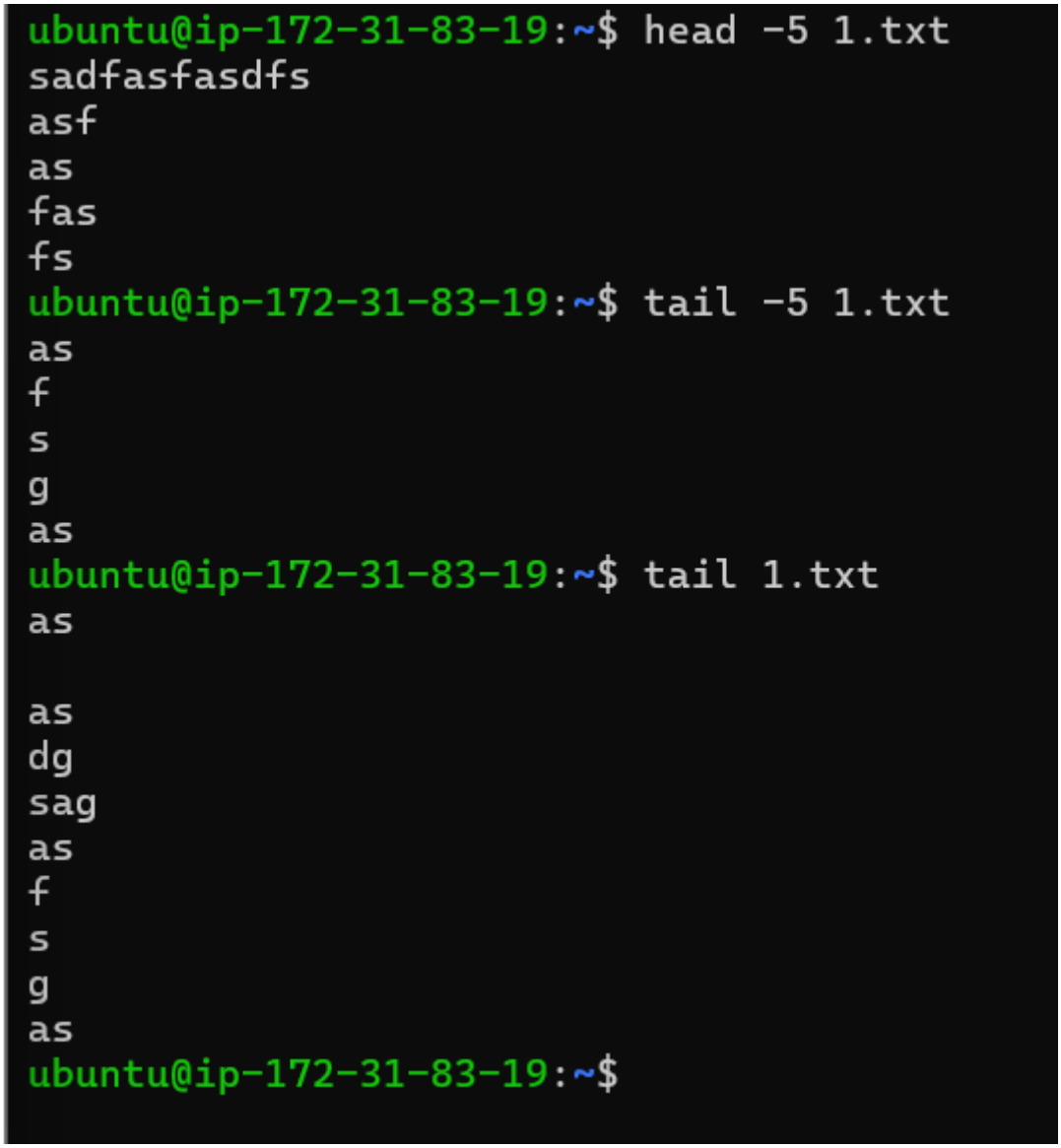


- find command



- head and tail commands
    - head command show fist n lines where n is an integer

- default tail command shows last 10 lines of file



Environmental and shell variables

- Shell variables : Shell can temporarily store variables called as shell variables
- once you logout and login back it cant remember previous values

```
<var-name>=<value>
Topic= linux
to access variable use $
echo $Topic
```

```
ubuntu@ip-172-31-83-19:~$ echo $Topic
linux
ubuntu@ip-172-31-83-19:~$ Topic=ubuntu
ubuntu@ip-172-31-83-19:~$ echo $topic

ubuntu@ip-172-31-83-19:~$ echo $Topic
ubuntu
ubuntu@ip-172-31-83-19:~$ exit
logout
Connection to 3.92.2.115 closed.
PS C:\Users\aravi> ssh ubuntu@3.92.2.115
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1009-aws x86_64
)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Thu Aug  1 02:24:59 UTC 2024

  System load:  0.0               Processes:             115
  Usage of /:   26.0% of 6.71GB   Users logged in:       1
  Memory usage: 23%               IPv4 address for enX0: 172
.31.83.19
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enable
d.

34 updates can be applied immediately.
18 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security update
s.
See https://ubuntu.com/esm or run: sudo pro status


Last login: Thu Aug  1 02:00:32 2024 from 103.197.112.85
ubuntu@ip-172-31-83-19:~$ echo $Topic

ubuntu@ip-172-31-83-19:~$
```

- to make it remember we write values in some files like /etc/environment, later even if you login back and use them

```
ubuntu@ip-172-31-83-19:~$ Topic=linux
ubuntu@ip-172-31-83-19:~$ echo $Topic
linux
ubuntu@ip-172-31-83-19:~$ sudo vi /etc/environment
ubuntu@ip-172-31-83-19:~$ source /etc/environment
ubuntu@ip-172-31-83-19:~$ exit
logout
Connection to 3.92.2.115 closed.
PS C:\Users\aravi> ssh ubuntu@3.92.2.115
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1009-aws x86_64
)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Thu Aug  1 02:35:55 UTC 2024

  System load:  0.0               Processes:             113
  Usage of /:   26.0% of 6.71GB   Users logged in:       1
  Memory usage: 23%               IPv4 address for enX0: 172
.31.83.19
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enable
d.

34 updates can be applied immediately.
18 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security update
s.
See https://ubuntu.com/esm or run: sudo pro status


Last login: Thu Aug  1 02:33:42 2024 from 103.197.112.85
ubuntu@ip-172-31-83-19:~$ echo $Topic
linux
ubuntu@ip-172-31-83-19:~$
```

CLASSESS

Class 1:

Directoroy Navigation

- . represents a present folder
- .. represents parent folder

- ~ Home folder
- linux contains folder and files
- when you get linux fully then it feels Everything in linux is a file.

Class 2:

Linux Directories

- Purpose of following directories
    - /etc
    - /bin
    - /home
    - /var
    - /tmp
- /etc :

Contains configuration files[password configuration,service files, user management, network configuration,package management(apt, dnf)]

- what is configuration ?
- configuration is change in settings of any program, for example : you can change chrome lightning mode from dark to colour or colour to dark this makes a chages in configuration files.
- In linux configuration files are present in /etc folder.
- simply it is settings for linux
- /bin :

Contains binary files

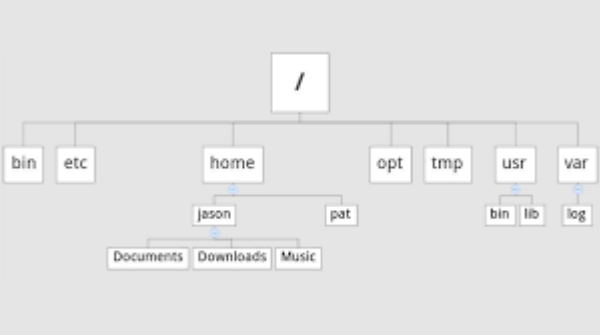
- binary files are files which are not human readable, they are machine readable that is OS. a file consists of instructions which an operating system can understand and whenever you executues it cpu and memory is allocating and program starts running
- executables
    - Binaris
        - all linux commands will exist here
        - when you do cat for binary files it displays in non-understandable languages
    - Scripts
        - when you cat for these files you can see the scripts
        - !#/bin/bash
- /home :

Home directory is used to store multiple users data, when multiple users use the machine they should have data under their names since all thse are under home directory , in windows it is c:/users folder.

- /var : Contains Variable data like logs which get changes all the time.

- tmp/ : Temporary files are stored here. Temporary files are files which are created for a short period of time and then deleted. For example,...when you download a file from the internet, it is first saved as a temporary file in the /tmp directory, and then moved to its final destination once the download is complete.

- tree structure of linux folders



Navigation and file system

- Absolute paths
- Relative paths
- Commands :
  - pwd - present directory
  - ls - list out files
  - cd - get into
- go to cd /var/log and do ls, now how to find whether the listed names are files or folders

```
-rw-rw-r--  1 root      utmp                4224 Aug 11 09:18 wtmp
ubuntu@ip-172-31-9-1:/var/log$ ls -al
total 588
drwxrwxr-x  11 root      syslog              4096 Aug 11 07:43 .
drwxr-xr-x  13 root      root                4096 Aug 11 07:43 ..
lrwxrwxrwx   1 root      root                  39 Jul  1 16:00 README -> ../..
/usr/share/doc/systemd/README.logs
-rw-r--r--   1 root      root                 444 Jul  1 16:03 alternatives.lo
g
drwx------   3 root      root                4096 Aug 11 07:43 amazon
-rw-r-----   1 root      adm                    0 Aug 11 07:43 apport.log
drwxr-xr-x   2 root      root                4096 Jul  1 16:06 apt
-rw-r-----   1 syslog    adm                41556 Aug 11 09:18 auth.log
-rw-rw----   1 root      utmp               31488 Aug 11 08:38 btmp
drwxr-x---   2 _chrony   _chrony             4096 Aug 11 07:43 chrony
-rw-r-----   1 root      adm                 4286 Aug 11 07:43 cloud-init-outp
```

- ls -al : list out files and folders with their permissions, ownership and size
- anything which is starting with d is directory.
- get into home directoy and find out hidden files
- anything which is starting with .txt is a hidden file.
- ls -a : list out all files and folders including hidden files

File Manupulation

- File Management
  - create :
    - touch => creates an empty file

    - edit
        - text editor
            - vim (learnig site openvim.com)
            - nano
    - delete
        - rm -r directoryname
        - rm -rf force deletion
        - rm -i file name -intractive deletion
        - rm *.txt -deletes all the files with extension .txt
- Folder Management
    - create
        - mkdir directoryname
        - mkdir f1 f2 d1 d2 -create multiple foders
    - edit
        - move
            - mv d1 d2 -folder d1 will move to folder d2.
    - delete
        - rmdir dirname -to delete an empty directory
        - rm -r directoryname
        - rm -rf force deletion
        - rm -i file name -intractive deletion
        - rm *.txt -deletes all the files with extension .txt

Users and Groups

Users

- Check Users in linux :
    - cat /etc/passwd
    - getent passwd
    - Check Single user:
        - sudo chage -l sai
    - Check whether account locked:(L defines locked)
        - sudo passwd -S sai
    - Check User exist or not
        - getent passwd | grep sai
    - list users above number 1000
        - getent passwd {1000..1010}
    - Check current user
        - `who` or `users`
- Create User :
    - sudo adduser aravindh
- Delete User :

    - sudo deluser aravindh
- Change password :
    - sudo passwd sai
- Set account expiery date
    - sudo chage -E 2025-05-30 sai
- Set account expiery to never
    - sudo chage -E -1 sai
- Lock User
    - sudo passwd -l sai
- Unlock User
    - sudo passwd -u sai
- change Username :
    - sudo usermod -l "saib" sai
- Add User to a group :
    - sudo usermod -aG group1 saib
- Remove User form a Group
    - sudo gpasswd -d saib group1
- This command sets:
    - Minimum days between password changes to 7 days.
    - Maximum days before the password expires to 90 days.
    - Warning days before expiration to 14 days.
    - Account expiration date to December 31, 2024.
    - `sudo chage -m 7 -M 90 -W 14 -E 2024-12-31 sai`

Groups

- Check groups in linux :
    - cat /etc/group
    - getent group
    - getent group | grep group1
    - getent group {1000..1010}
- To check groups assigned to him
    - `groups`
- To check groups assigned for specific user
    - groups saib
- To checks users identity

    - id sai
- To check id
    - id
- Create Newgroup :
    - sudo groupadd group1
- Delete Group :
    - sudo delgroup group1
- Display all users in specific group
    - getent group group1

VIM Editor :

- Basically VIM has two modes
    - insert mode
    - Normal mode
- insert mode allows you to write text same as text editor.
- Normal mode provides an efficient way to manipulate and navigate to text.
- At any time, you can see which mode you are in on the status bar which is located at the top of the editor.
- To change between modes, use `Esc` for normal mode and `i` for insert mode

Cursor movement :

- h - moves left similar to left navigation key <.
- l - moves right similar to right navigation key >.
- k - move top
- j - move down

Shell and Terminal

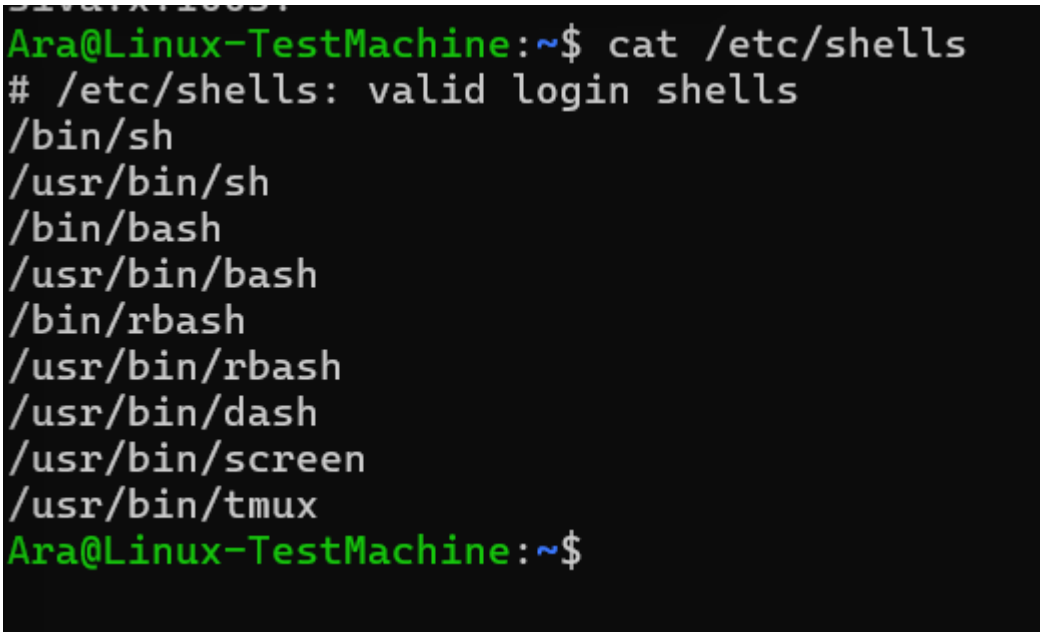
Termial :

- Terminal is a software that allows you to type commands ex: git,bash which are installed on your system

Shell :

- the commands which you wrote in the terminal understands by Shell.
- the software which understands the commands is called shell. windows : * DOS * PowerShell Linux : * bash * flash ..etc
- how to list all the shells

```
cat /etc/shells
```



- in Linux there are two types of users
    - Sytem Users
        - this is crerated to run some applications/services in linux
    - Users
- How to tell whether a user is System user / User.
    - when you see all the users list, where the users doesn't have 'nologin' at last is a system user
    - generally users will be associated with shell and system user will not be associated with shells
- On all linux machines we have `root` User, root user will have full control over machine
- how to change to root user

```
sudo -i
```

- to know who is current user

```
whoami
```

- users can be associated with the groups
- Lets create a Group
    - developer
    - tester
    - devops
- every user has a unique UID and every group will have unique GID

```
Username:password:UID:GID:GECOS:home_directory:login_shell
```

- the users will be listed in above format
- here when you create a user UID will be automatically created, and GID(group id) if you have not assigned to any group it will assign it will create a new group with username ang brings its id.
- if you assign any group, it shows respective group id.
- lets create a 3 Users
    - dev1
        - group : developer
        - shell : /bin/bash
        - home_directory : /home/dev1
    - test1
        - group : developer
        - shell : /bin/bash
        - home_directory : /home/dev1
    - devops1
        - group : developer
        - shell : /bin/bash
        - home_directory : /home/dev1

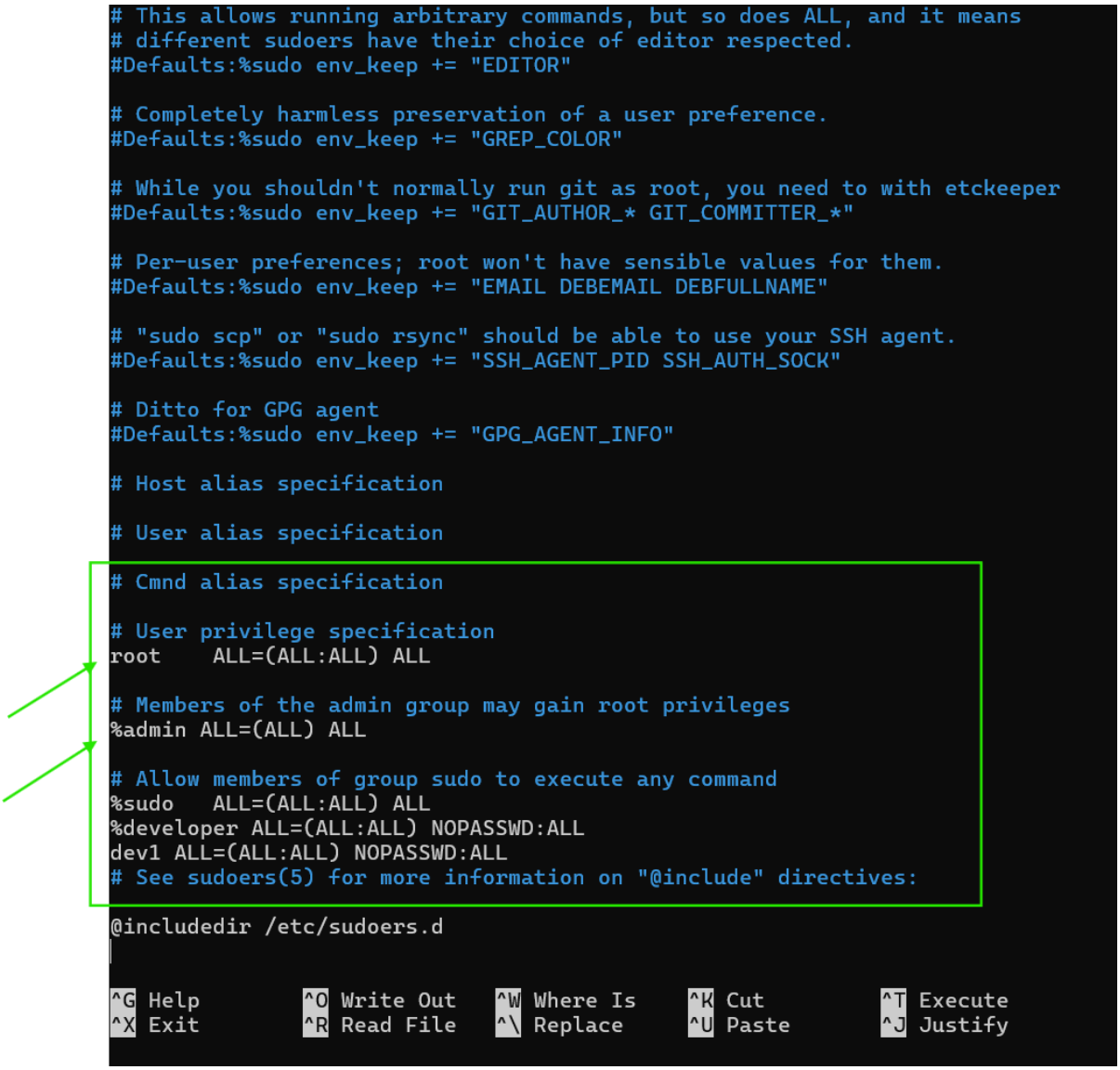
```
sudo adduser dev2 --shell /bin/bash --gid 1005
```

```
Ara@Linux-TestMachine:~$ sudo adduser dev2 --shell /bin/bash --gid 1005
info: Adding user `dev2' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new user `dev2' (1010) with group `developer (1005)' ...
info: Creating home directory `/home/dev2' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for dev2
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n]
info: Adding new user `dev2' to supplemental / extra groups `users' ...
info: Adding user `dev2' to group `users' ...
```

```
sudo useradd -s /bin/bash -g 1006 -m test1
```

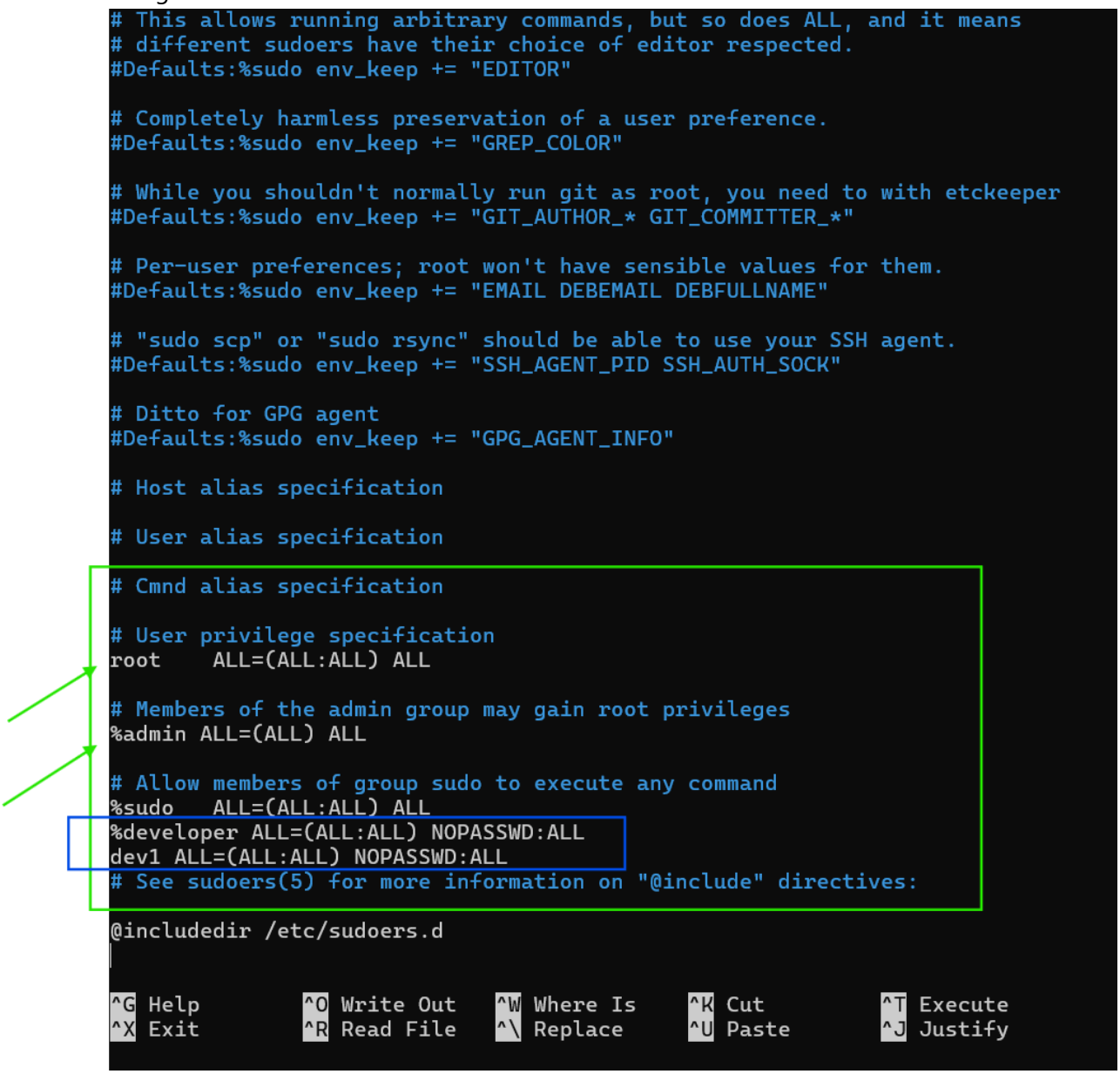
```
Ara@Linux-TestMachine:~$ sudo useradd -s /bin/bash -g 1006 -m test2
Ara@Linux-TestMachine:~$ getent passwd
```

- adding users to `sudoers` group
    - visudo
    - add to sudo group `usermod -aG sudo dev1`
- visudo :
    - open `sudo visuo`



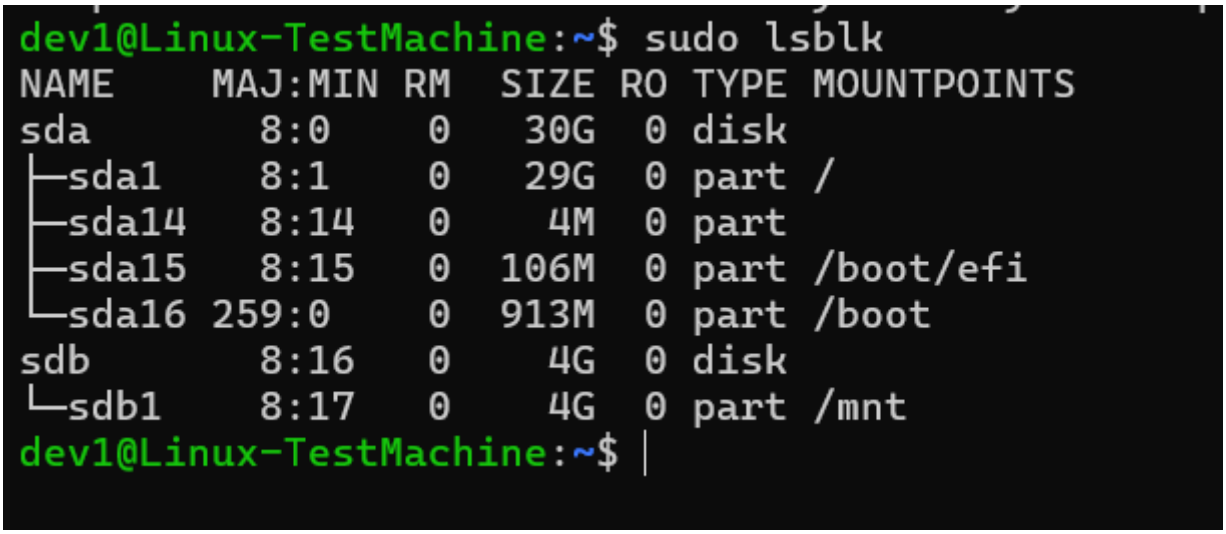
- if a line starts with `%` it is a group and if it starts normally it is a user.

- see above image



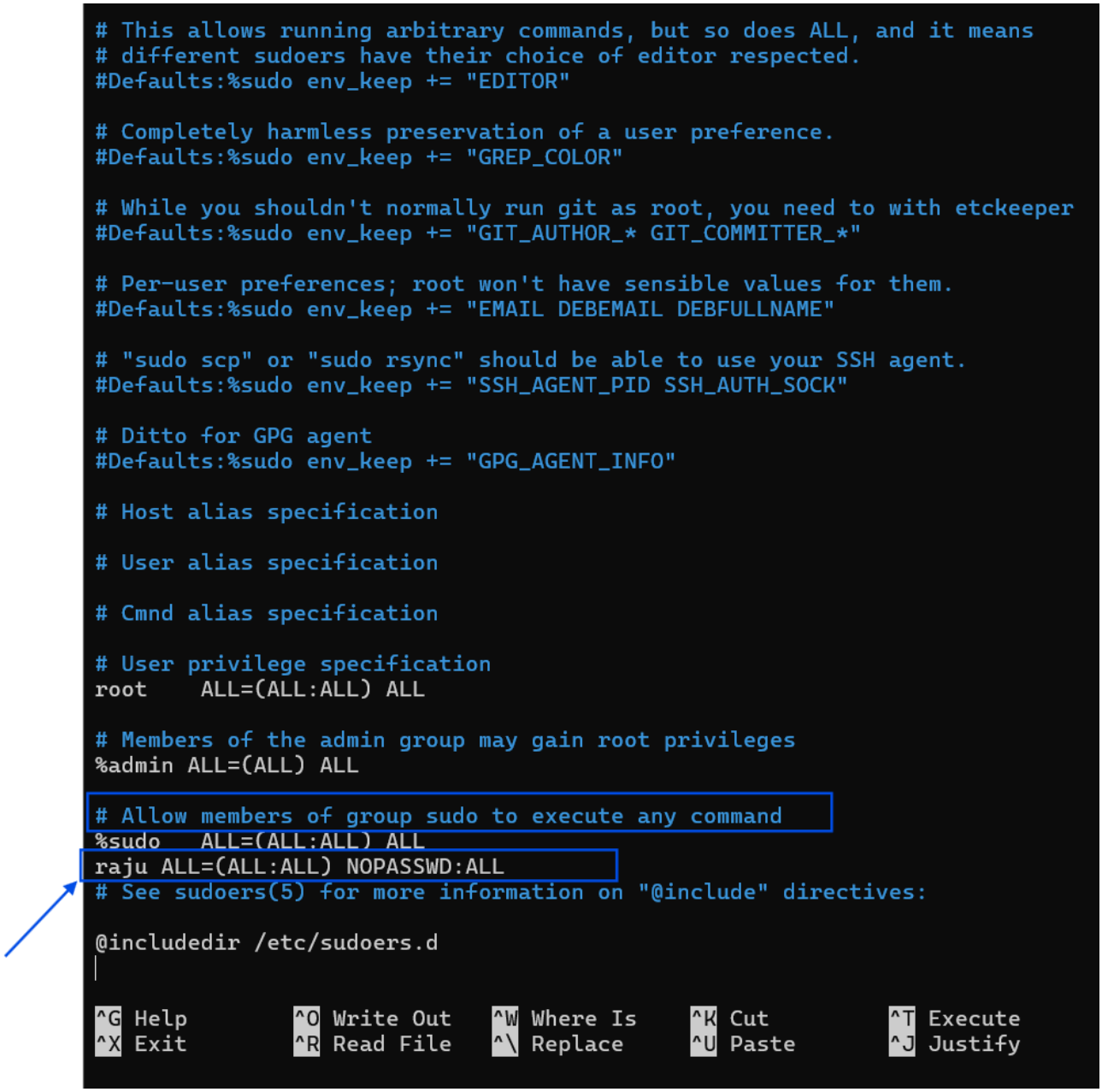
- see above image the blue colurd box content is written for not to ask password for group %developer and user dev1

to check all disks in linux machine



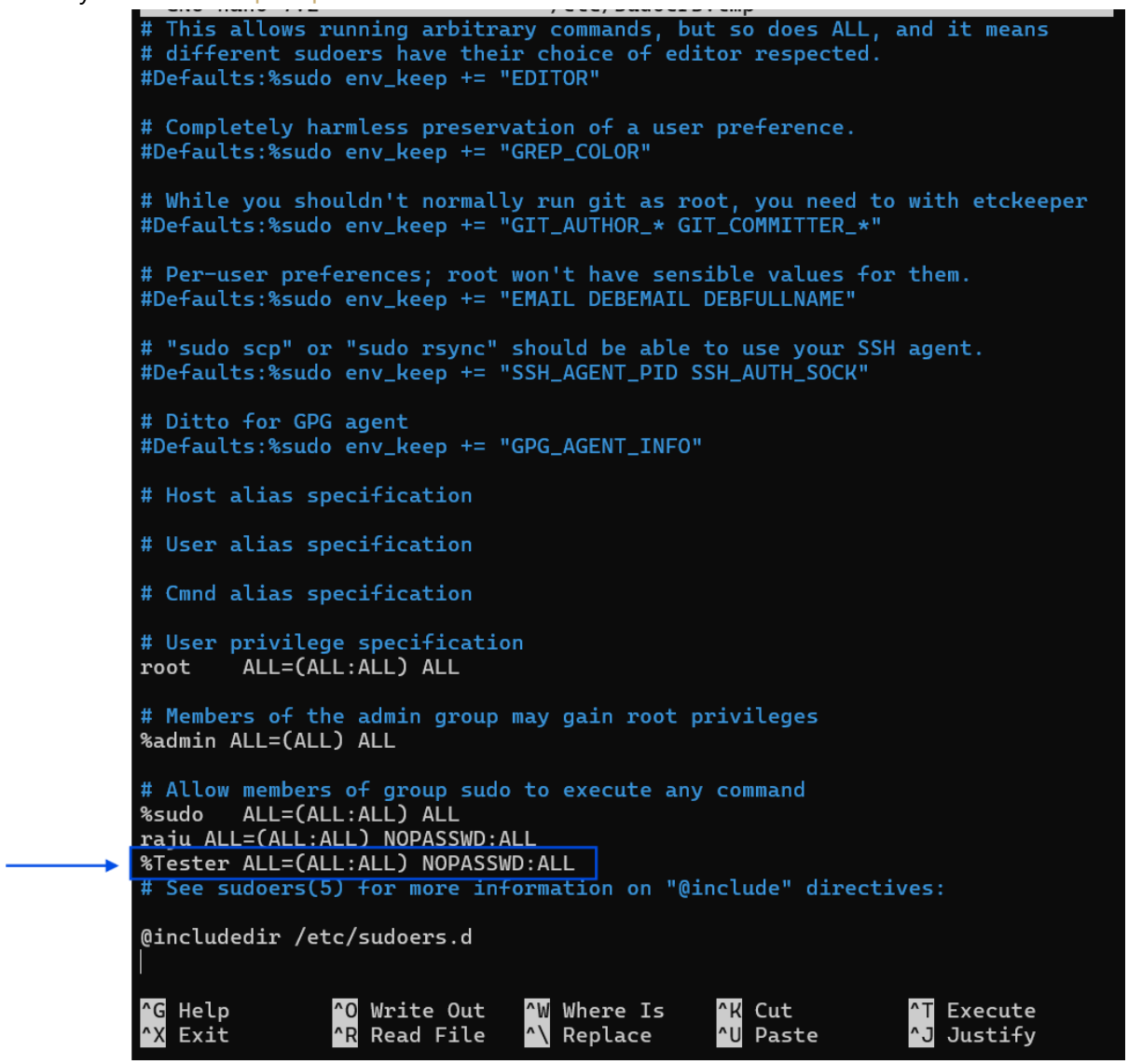
sudo visudo[second way of providing sudo permissions to user]

- if you create new user and add it in this file, he will get full permissions as `sudoers`

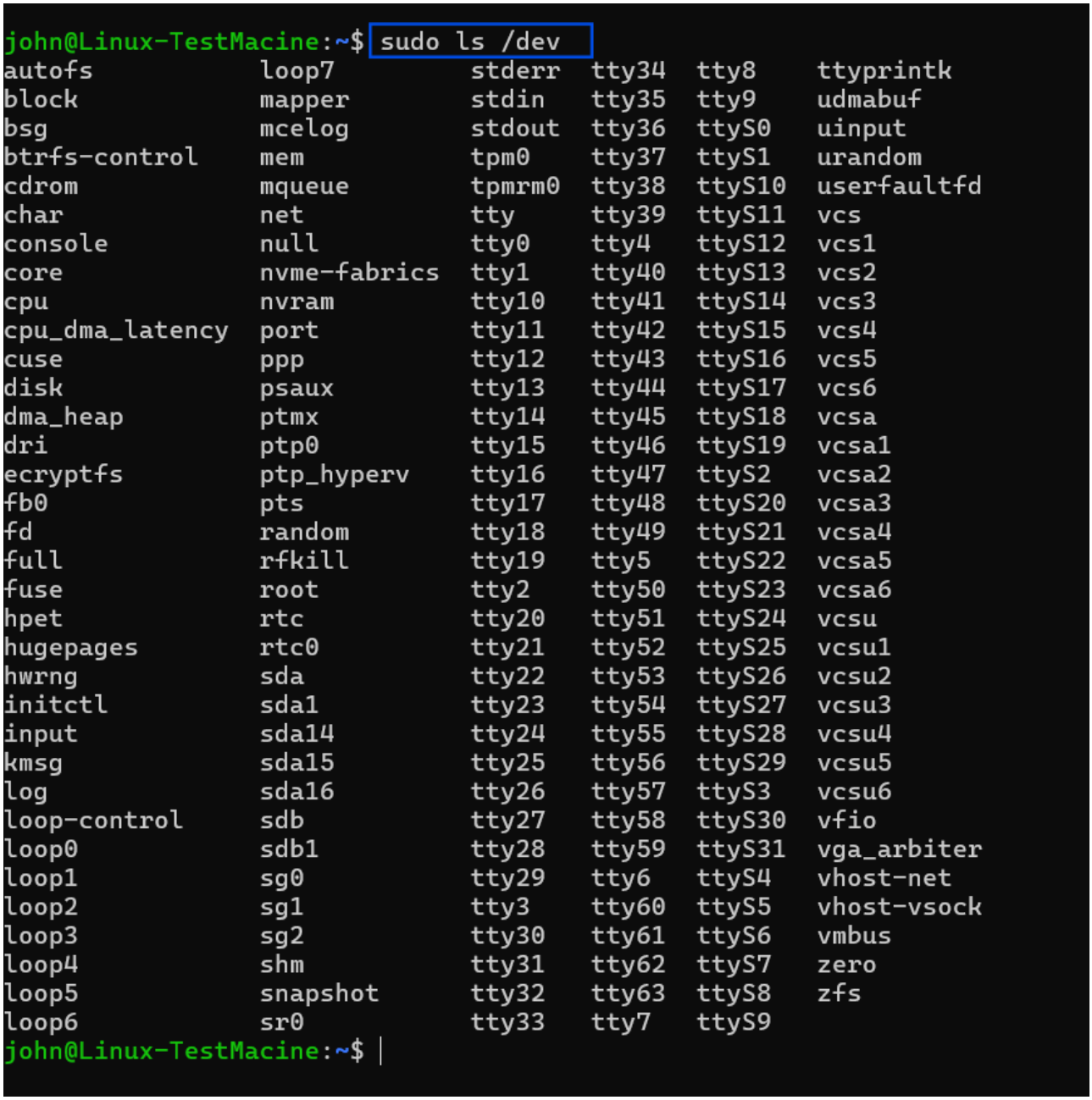


- if you create a new user, new group and add user to new group. then if you add this new group to this file the group will get `sudoers` permissions. ex: * create a new user john
    - create a new group Tester
    - add john to Tester group
    - open `sudo visudo` and add group with all permissions
        - `%Tester ALL(ALL:ALL) NOPASSWD:ALL`
    - save and exit.
    - now switch user `su john` using john

- now try to do `sudo apt update` it will work.



- this commad shows all the devices connected to the linux machine `sudo ls /dev`



FILE PERMISSIONS

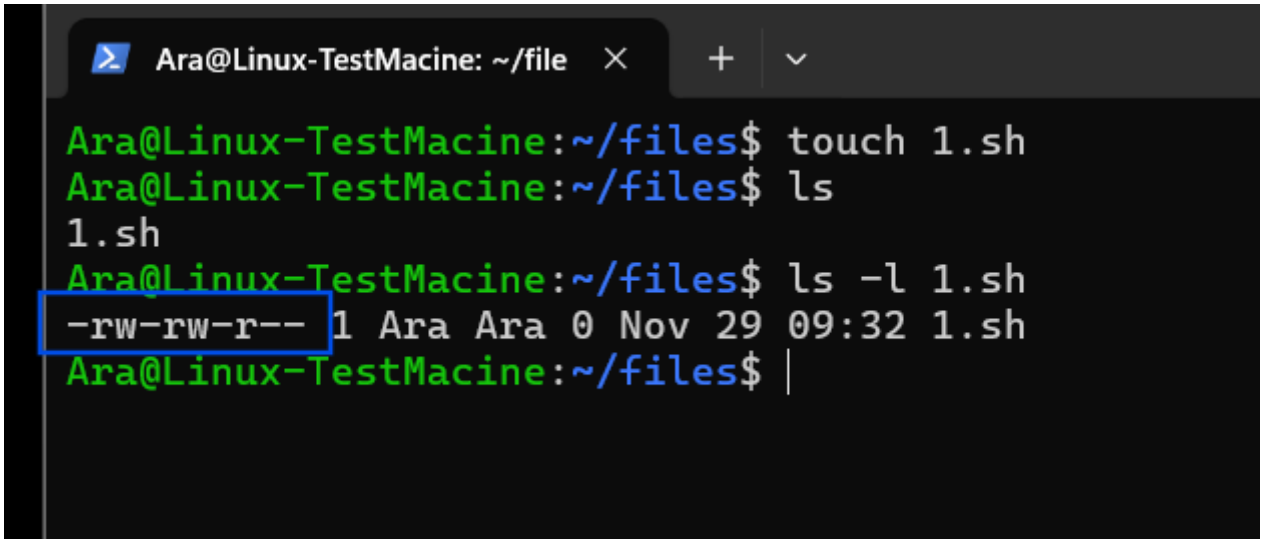
- `chmod` command is used to change file permissions
- `chown` command is used to change file ownership
- `chgrp` command is used to change file group ownership

chmod

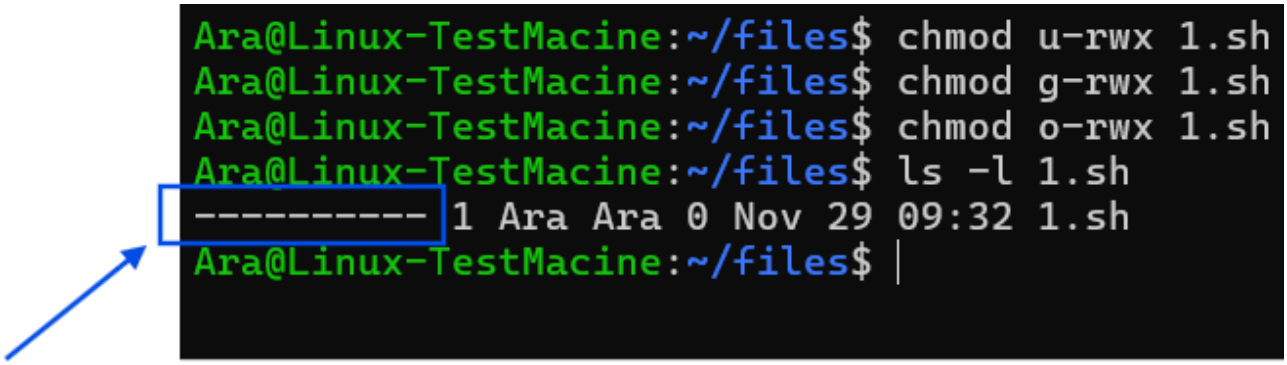
Practical :

- Create a new file `touch 1.sh`

- do `ls -l 1.sh`

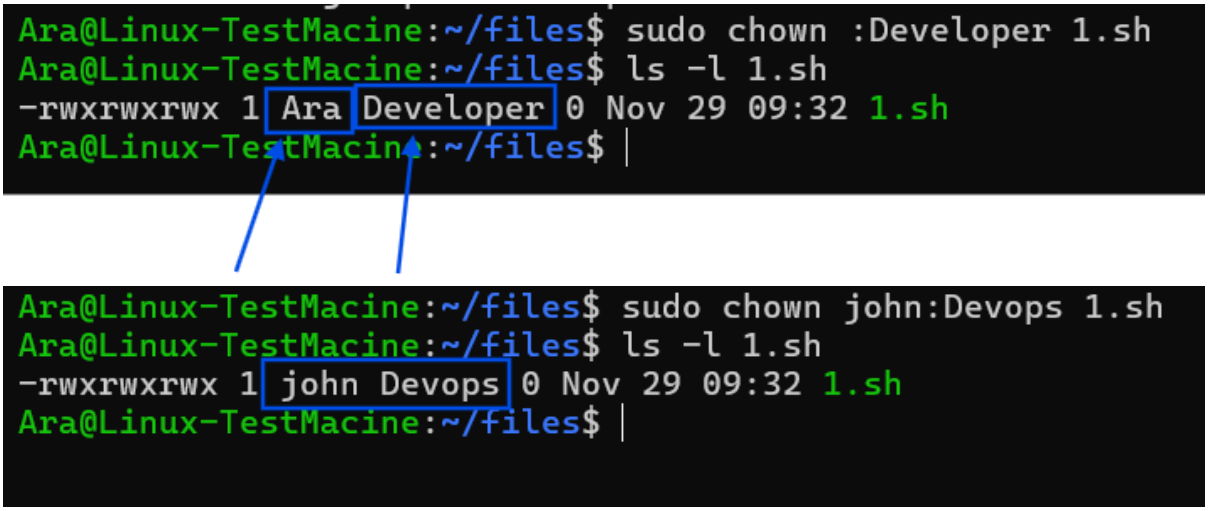


- removing all permissions



- here we have three diffrent access `owner group other`.
- Owner = u
- Group = g
- Other = o
- the command comes as below
    - `chmod u+r 1.sh` - single permission at a time
    - `chmod u+rw 1.sh` - double pemission at a time
    - `chmod u+rwx 1.sh` - triple permission at a time
    - `chmod g+r 1.sh`
    - `chmod g+rw 1.sh`
    - `chmod g+rwx 1.sh`
    - `chmod o+r 1.sh`
    - `chmod o+rw 1.sh`

- `chmod o+rwx 1.sh`



**