# Further on Linux

Day4_MoreLinux.md

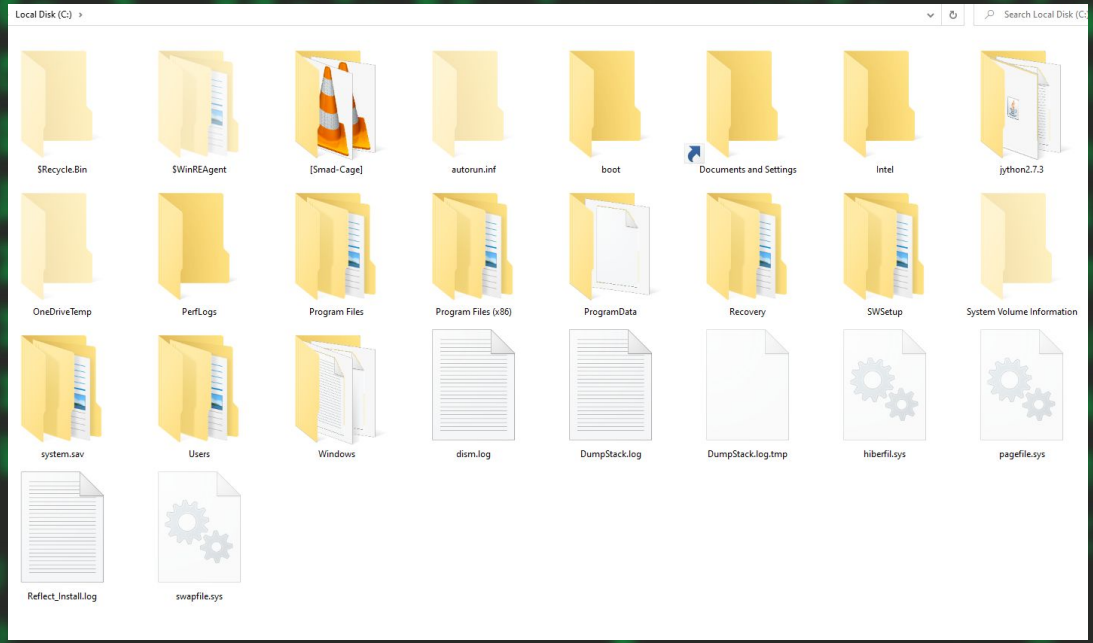
# Last time topics

# Topics

- Linux File Hierarchy
- VIM
- NANO
- Linux user management

# Linux File Hierarchy

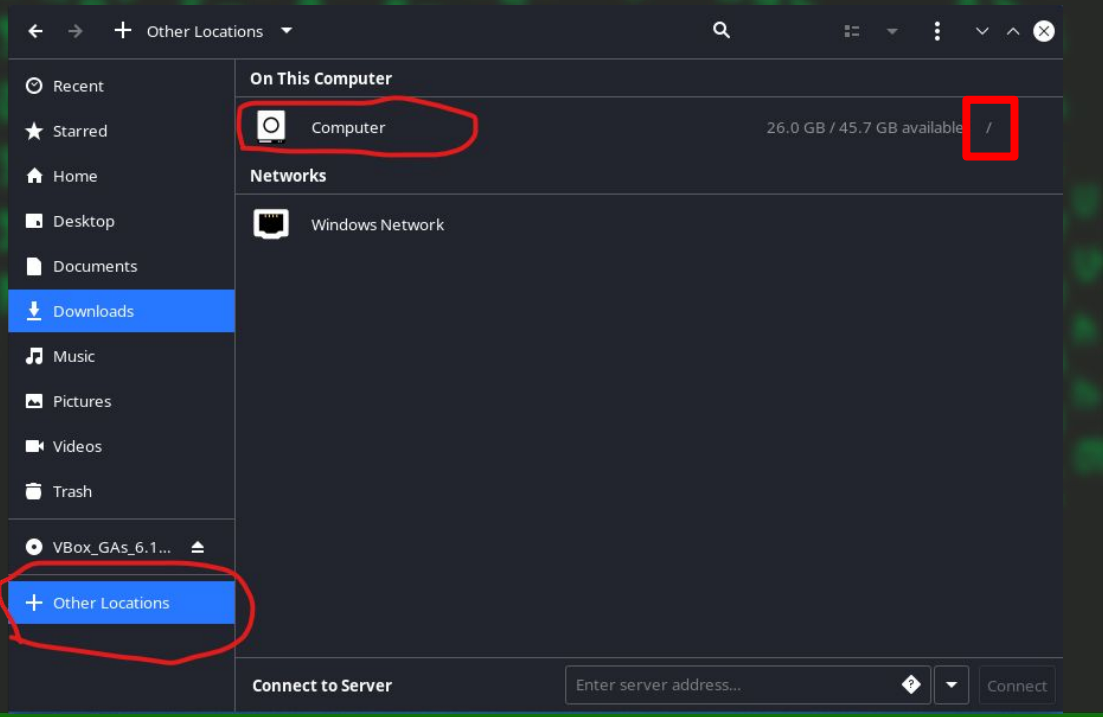
- Linux/UNIX have  a special file system than windows.
- File system is a directory structure that the OS uses.

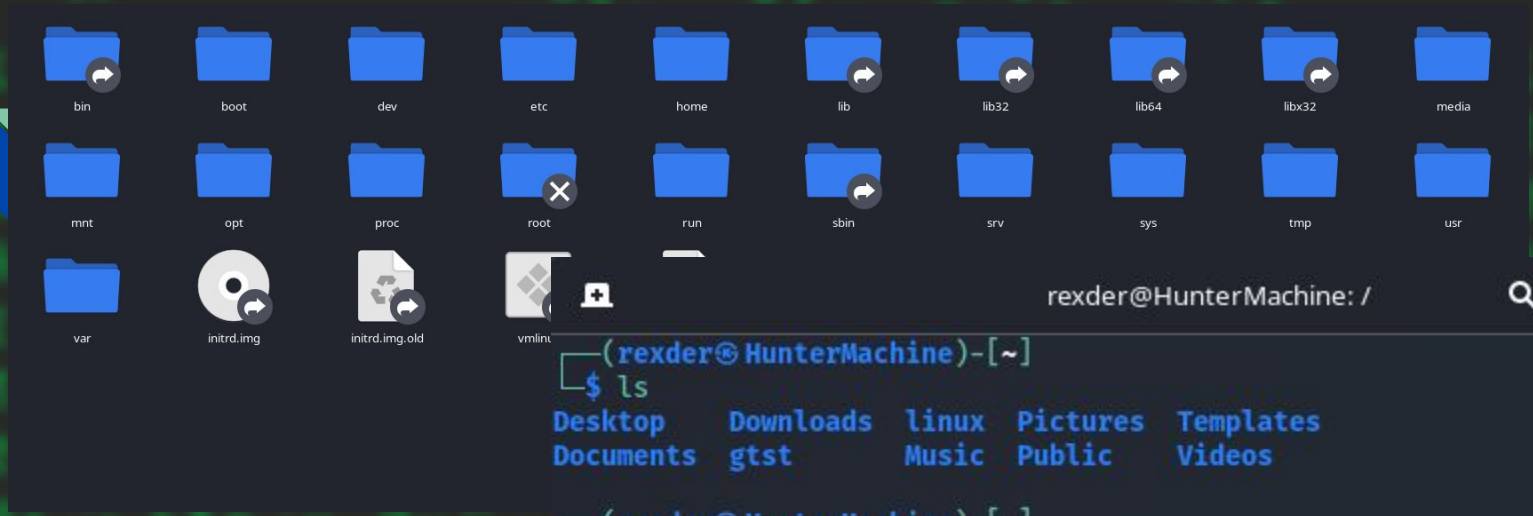



File system: WINDOWS 10

# System Files

- System Files are files used by the system software( OS ).
- **Windows**: System files appear under the **local disk C:**
- **Linux**: System files appear under the **root directory ( / )**



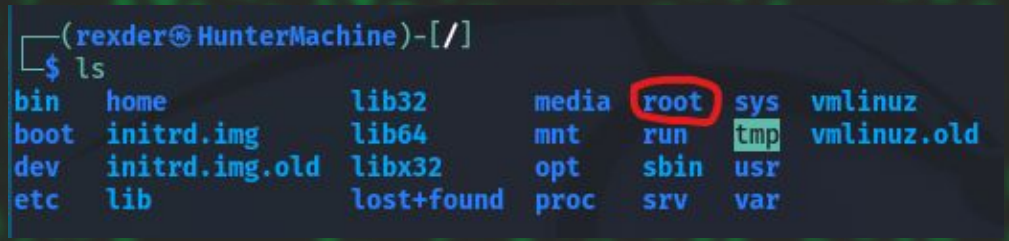



You can Check it in terminal also in file manager

```
rexder@HunterMachine: /

┌──(rexder㉿HunterMachine)-[~]
└─$ ls
Desktop    Downloads  linux  Pictures  Templates
Documents  gtst       Music  Public    Videos

┌──(rexder㉿HunterMachine)-[~]
└─$ pwd
/home/rexder

┌──(rexder㉿HunterMachine)-[~]
└─$ cd /

┌──(rexder㉿HunterMachine)-[/]
└─$ ls
bin   home          lib32       media  root  sys  vmlinuz
boot  initrd.img    lib64       mnt    run   tmp  vmlinuz.old
dev   initrd.img.old libx32     opt    sbin  usr
etc   lib           lost+found  proc   srv   var
```

# File structure in detail

1) / ( root )
   - Every single file and directory starts from the root directory
   - The only root user has the right to write under this directory
   - /root is the root user's home directory, which is not the same as /




# File structure in detail

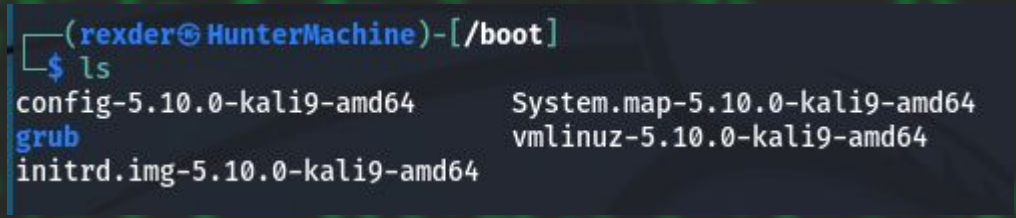
2) bin - Binary executables
   - Essential command binaries that need to be available in single-user mode; for all users
     i) e.g) cat, ls, cp,pwd

```
┌──(rexder㉿HunterMachine)-[/]
└─$ cd bin

┌──(rexder㉿HunterMachine)-[/bin]
└─$ ls -la
total 528200
drwxr-xr-x  2 root root       114688 Dec  6 02:48  .
drwxr-xr-x 15 root root         4096 Dec  6 02:32  ..
-rwxr-xr-x  1 root root        60224 Sep 24  2020 '['
-rwxr-xr-x  1 root root         2376 Sep 25  2020  0trace.sh
-rwxr-xr-x  1 root root           96 Jul 14  2021  2to3-2.7
-rwxr-xr-x  1 root root        18504 Feb  7  2021  411toppm
-rwxr-xr-x  1 root root           39 Aug 15  2020  7z
-rwxr-xr-x  1 root root           40 Aug 15  2020  7za
-rwxr-xr-x  1 root root           40 Aug 15  2020  7zr
-rwxr-xr-x  1 root root        31096 Apr  3  2021  aa-enabled
-rwxr-xr-x  1 root root        31096 Apr  3  2021  aa-exec
lrwxrwxrwx  1 root root           42 Jan  5  2021  aapt -> ../lib/android-sdk/b
uild-tools/debian/aapt
lrwxrwxrwx  1 root root           43 Jan  5  2021  aapt2 -> ../lib/android-sdk/
build-tools/debian/aapt2
-rwxr-xr-x  1 root root        59744 Aug 12  2021  ab
-rwxr-xr-x  1 root root        14600 May  8  2021  acyclic
lrwxrwxrwx  1 root root           23 Jul 10  2021  count-9 -> ../lib/llvm-9/bin
/count
-rwxr-xr-x  1 root root        30872 Sep 12  2020  cowpatty
-rwxr-xr-x  1 root root       151168 Sep 24  2020  cp
-rwxr-xr-x  1 root root         8357 Aug  5  2021  cpan
-rwxr-xr-x  1 root root         8378 Aug  5  2021  cpan5.32-x86_64-linux-gnu
-rwxr-xr-x  1 root root       162352 Aug 22  2021  cpio
```

# File structure in detail

3) /boot - Boot loader files

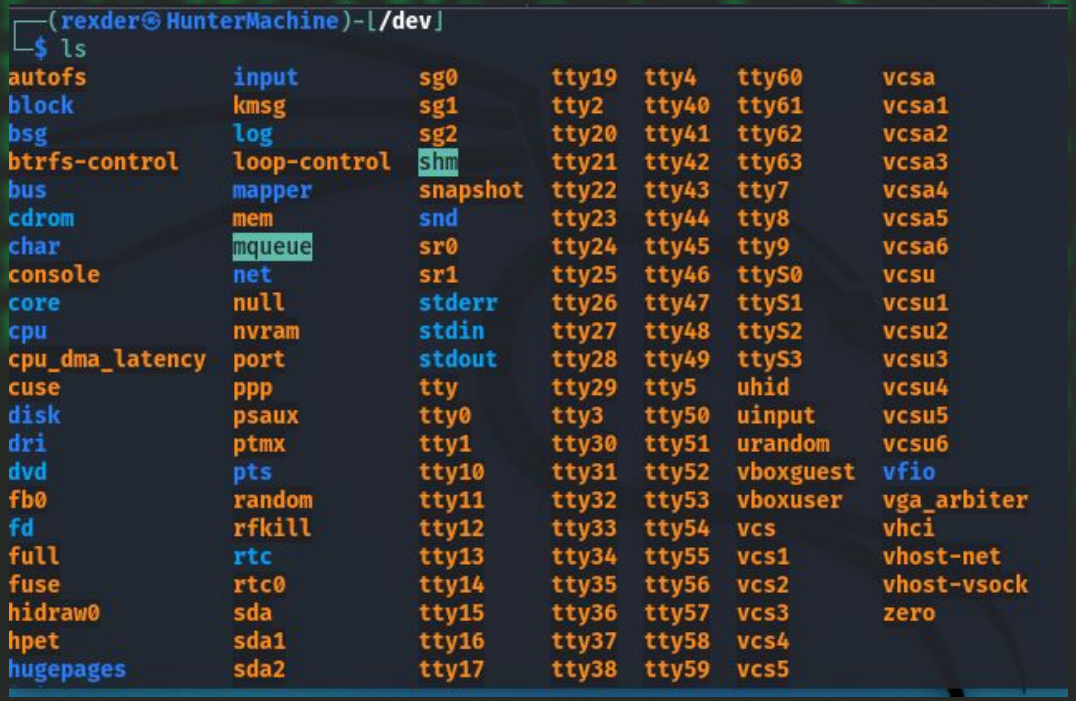
- Kernel initrd, vmlinux, grub files are located under /boot
- Example: initrd.img-2.6.32-24-generic, vmlinuz-2.6.32-24-generic



# File structure in detail

4) /dev - Essential Device files

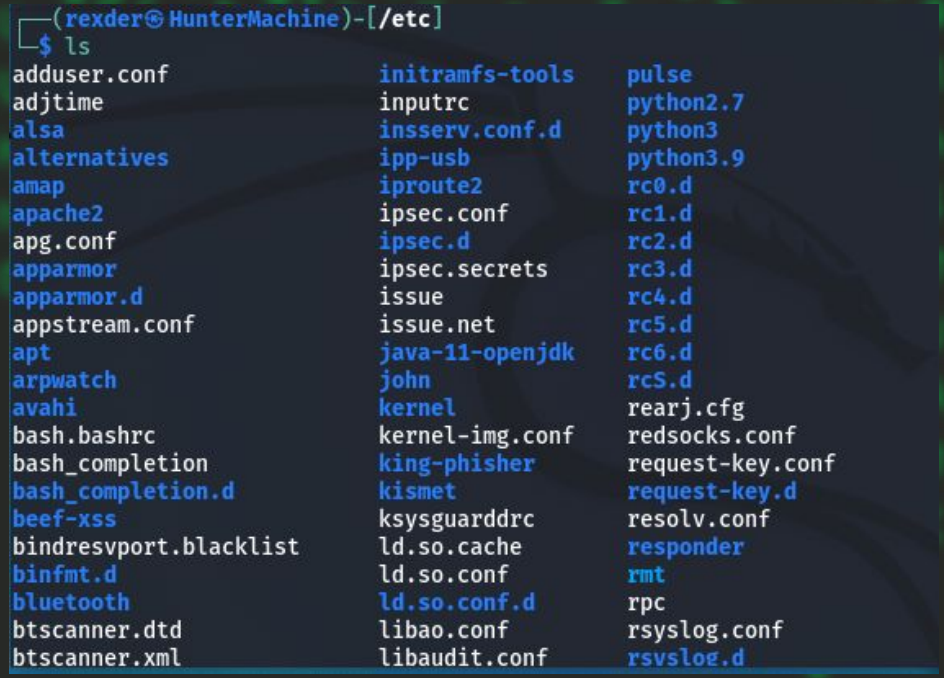
- These include terminal devices, usb, or any device attached to the system.
- Example: /dev/tty1, /dev/usbmon0



# File structure in detail

5) /etc - et cetera

- Contains configuration files required by all programs.
- This also contains startup and shutdown shell scripts used to start/stop individual programs.
- Example: /etc/resolv.conf, /etc/hosts, /etc/passwd



# File structure in detail

```
┌──(rexder㉿HunterMachine)-[/home]
└─$ ls
rexder
```

6) /home - Home directory

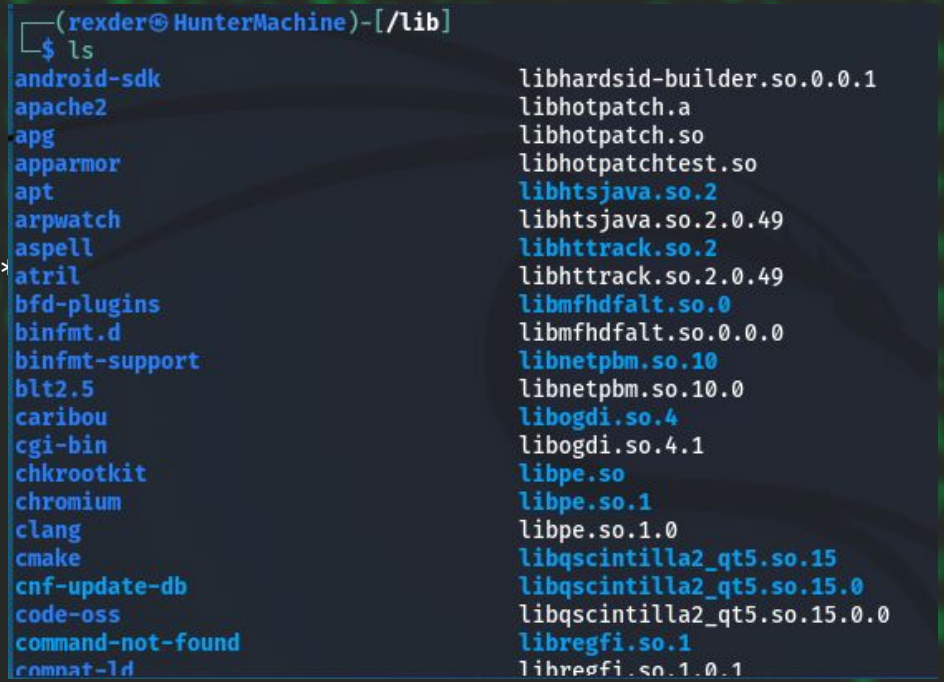
- Home directories for all users to store their personal files.
- example: /home/nathan, /home/rexder
- Here, You cant access files of other users.
  i) Example: if your home is /home/nathan You cant access /home/rexder
- Your home directory /home/nathan will be denoted by ~

```
┌──(rexder㉿HunterMachine)-[/home]
└─$ ls
rexder

┌──(rexder㉿HunterMachine)-[/home]
└─$ cd rexder

┌──(rexder㉿HunterMachine)-[~]
└─$ ls
Desktop    Downloads  linux  Pictures  Templates
Documents  gtst       Music  Public    Videos
```

# File structure in detail

7) /lib - Libraries essential for the binaries in /bin & /sbin

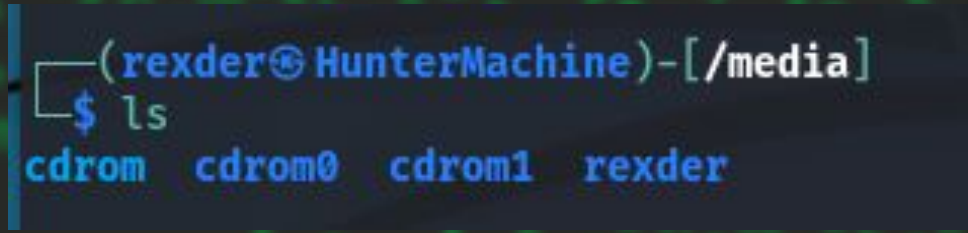
- Library filenames are either ld* or lib*.so.*
- Example: ld-2.11.1.so, libncurses.so.5.7



# File structure in detail

8) /media - Mount points for removable media such as CD-ROMs

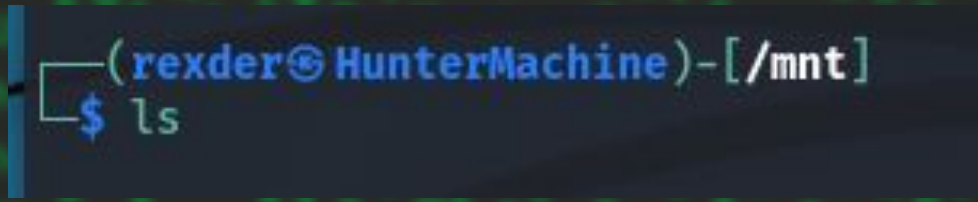
- Temporary mount directory for removable devices.
- Examples, /media/cdrom for CD-ROM; /media/floppy for floppy drives; /media/cd recorder for CD writer



# File structure in detail

9) /mnt - Temporarily mounted file

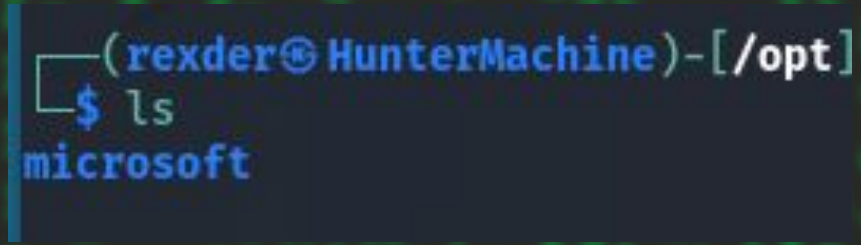
- Temporary mount directory where sysadmins can mount filesystems.



# File structure in detail

10) /opt - Optional application software packages

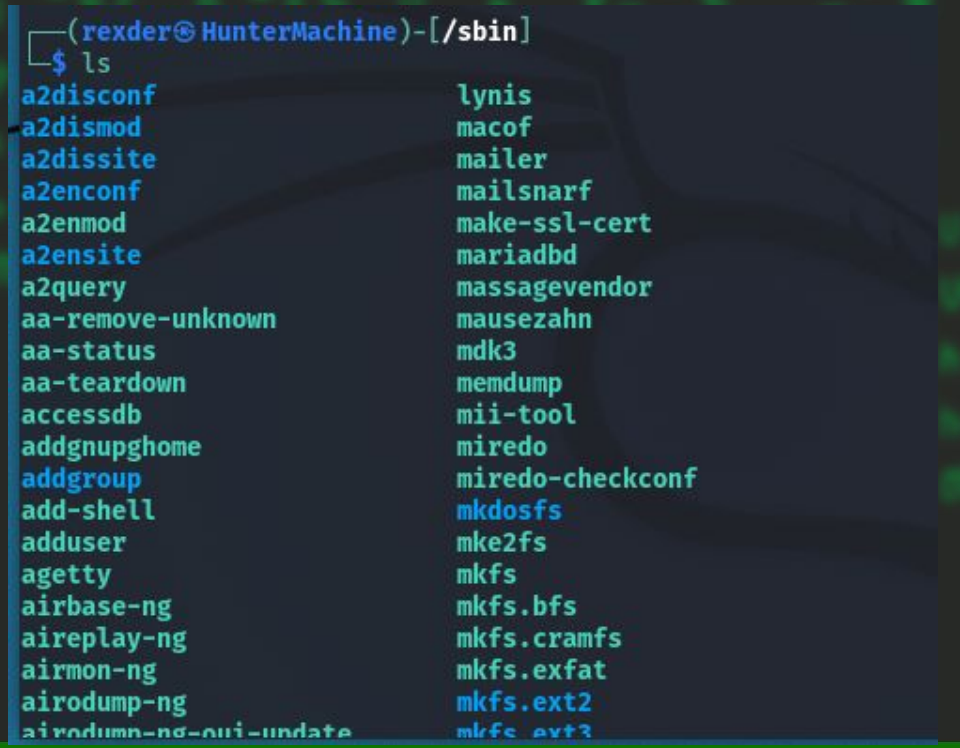
- Contains add-on applications from individual vendors.
- Add-on applications should be installed under either /opt/ or /opt/ sub-directory.



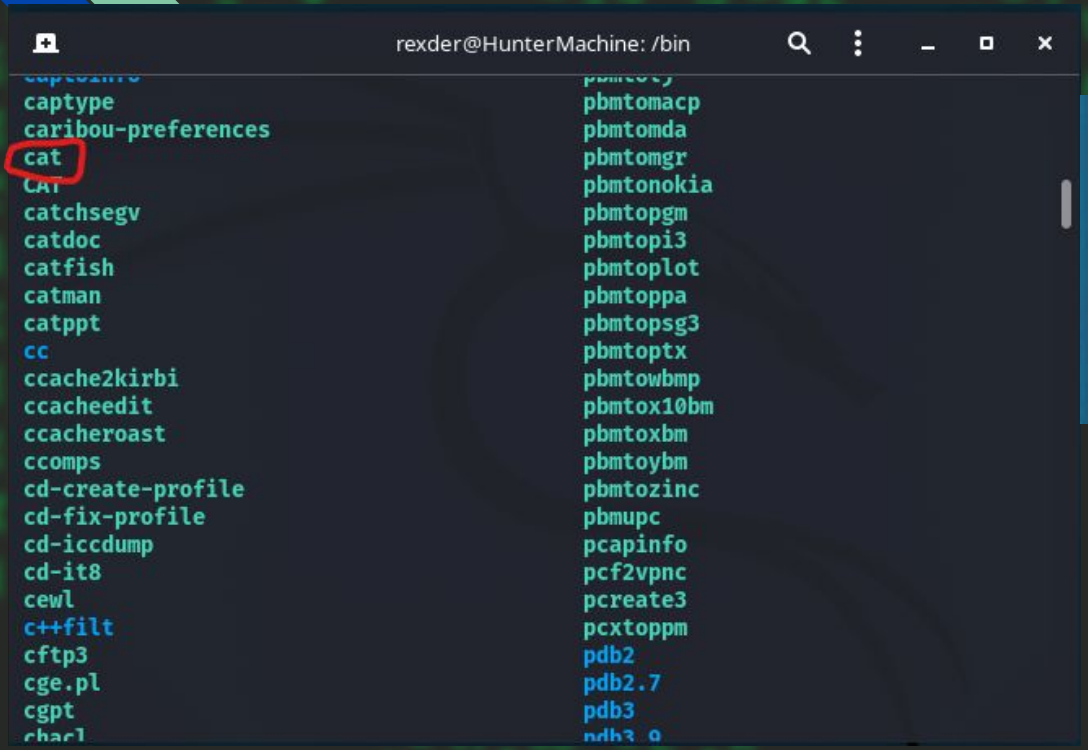
# File structure in detail

11) /sbin - Essential **system binaries**

- Just like /bin, /sbin also contains binary executables.
- The linux commands located under this directory are used typically by system administrator, for system maintenance purpose.



# CONT... /bin




```
┌──(rexder㉿HunterMachine)-[~/gtst]
└─$ cat linux.txt
Hello This is my first text

┌──(rexder㉿HunterMachine)-[~/gtst]
└─$ sudo cat linux.txt
Hello This is my first text
```

# CONT... /sbin

```
┌──(rexder㉿HunterMachine)-[/sbin]
└─$ ls
a2disconf                   lynis
a2dismod                    macof
a2dissite                   mailer
a2enconf                    mailsnarf
a2enmod                     make-ssl-cert
a2ensite                    mariadbd
a2query                     massagevendor
aa-remove-unknown           mausezahn
aa-status                   mdk3
aa-teardown                 memdump
accessdb                    mii-tool
addgnupghome                miredo
addgroup                    miredo-checkconf
add-shell                   mkdosfs
adduser                     mke2fs
agetty                      mkfs
```

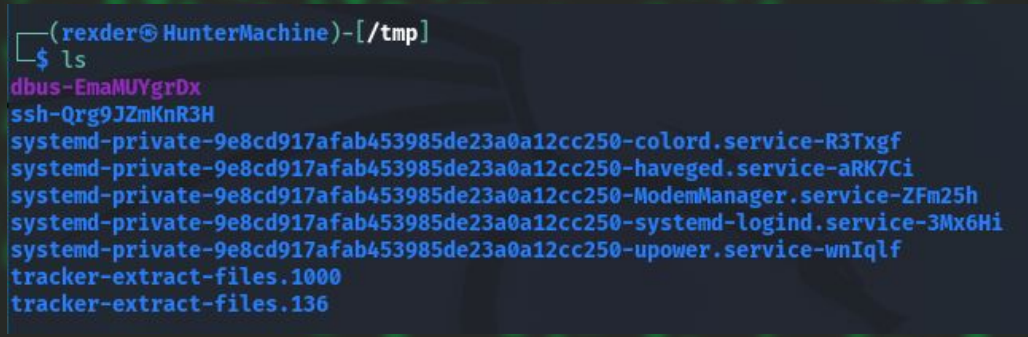
```
┌──(rexder㉿HunterMachine)-[/sbin]
└─$ adduser nathan
adduser: Only root may add a user or group to the system.
```

```
┌──(rexder㉿HunterMachine)-[/sbin]
└─$ sudo adduser nathan
Adding user `nathan' ...
Adding new group `nathan' (1001) ...
Adding new user `nathan' (1001) with group `nathan' ...
Creating home directory `/home/nathan' ...
Copying files from `/etc/skel' ...
New password:
```

# File structure in detail

12) /tmp - Temporary Files

- Directory that contains temporary files created by system and users.
- Files under this directory are deleted when system is rebooted.



# File structure in detail

## 13) /usr - User Utilities

- Contains binaries, libraries, documentation, and source-code for second level programs.
- /usr/bin contains binary files for user programs. If you can't find a user binary under /bin, look under /usr/bin. For example: at, awk, cc, less, scp
- /usr/sbin contains binary files for system administrators. If you can't find a system binary under /sbin, look under /usr/sbin. For example: atd, cron, sshd, useradd, userdel
- /usr/lib contains libraries for /usr/bin and /usr/sbin

/usr/src holds the Linux kernel sources, header-files and documentation.

# Text Editors

- Programs That used for text processing.
- Linux command line text editors
  - VIM
  - Nano
  - Emacs
  - Neovim
  - ....
- Linux Graphical Text editors
  - Sublime
  - Vscode
  - Gedit
  - Pluma
  - ...

# VIM

- Before vi the primary editor used on Unix was the **line editor**
  - User was able to see/edit only one line of the text at a time
- Then then vi editor improved and developed VIM. ( VI iMproved)
- The vim editor is:
  - a very powerful
  - but at the same time it is cryptic
  - It is hard to learn, specially for windows users
- It have mainly to modes
  - Command Mode
  - Input Mode
  - Visual Mode
  - Normal Mode

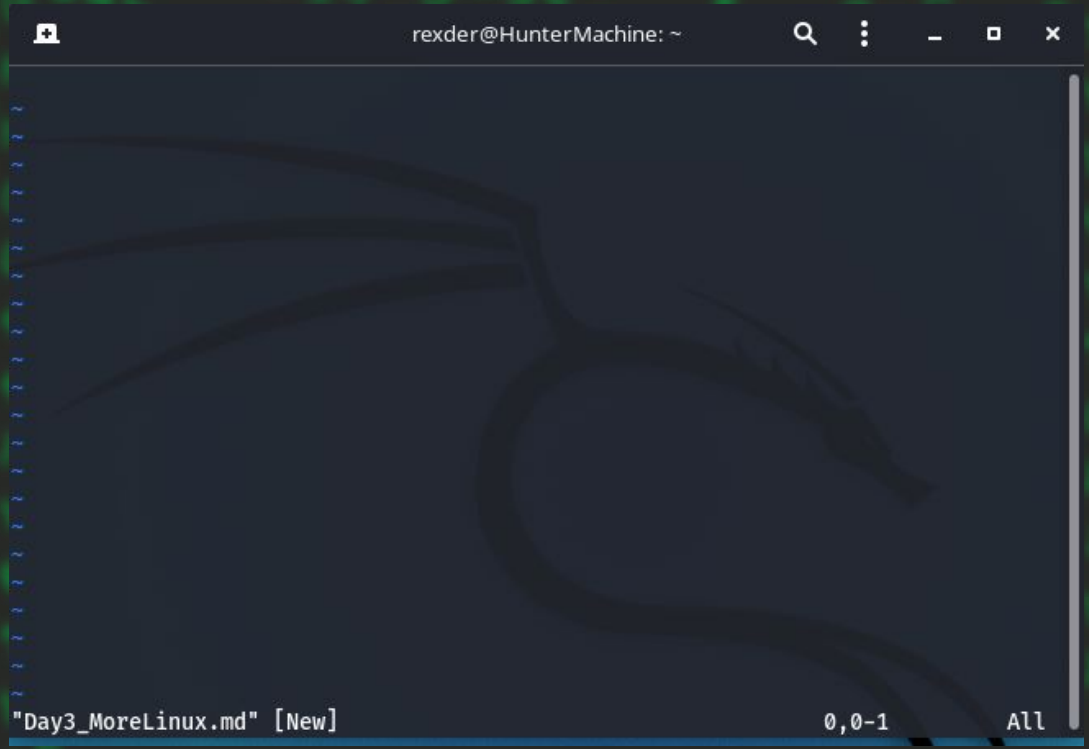
# Opening vim

Syntax

vim yourfilename

```
┌──(rexder㉿HunterMachine)-[~]
└─$ vim Day3_MoreLinux.md
```

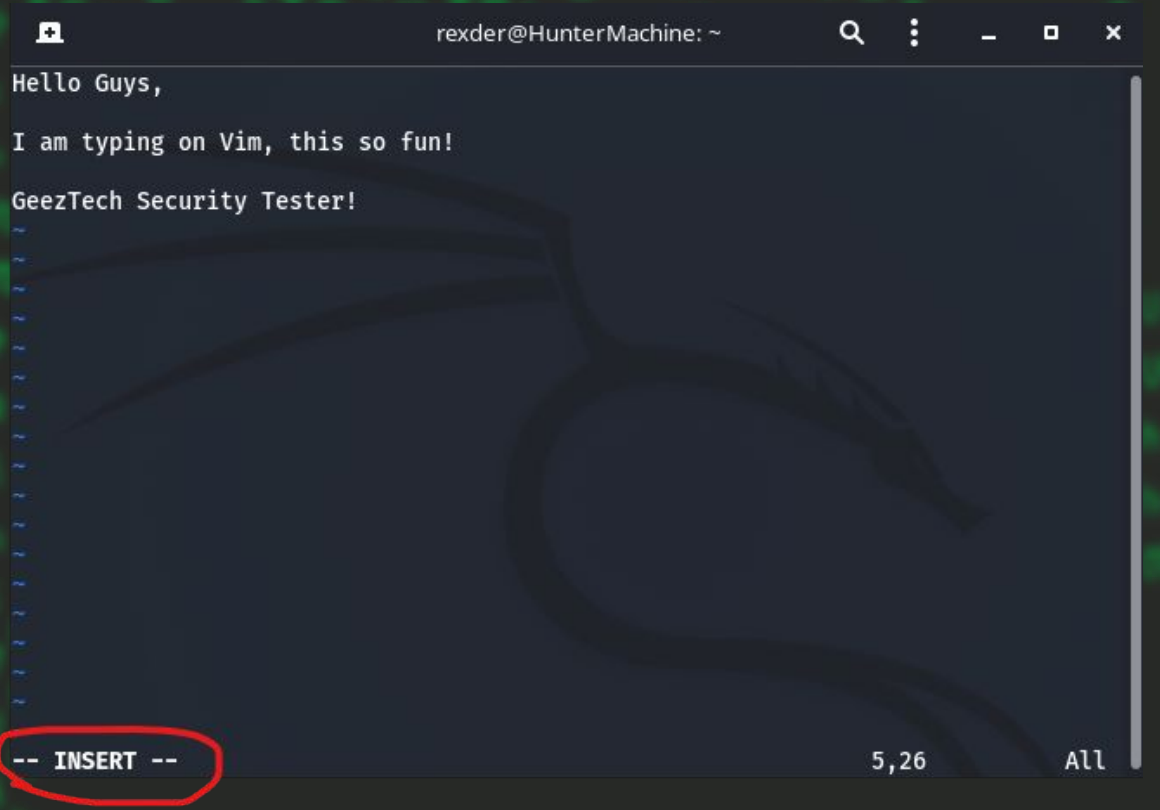
Vim is by default on Normal mode when you open it.
To get on insert mode you have to type ‘i’



# Insert mode

Press ‘i’

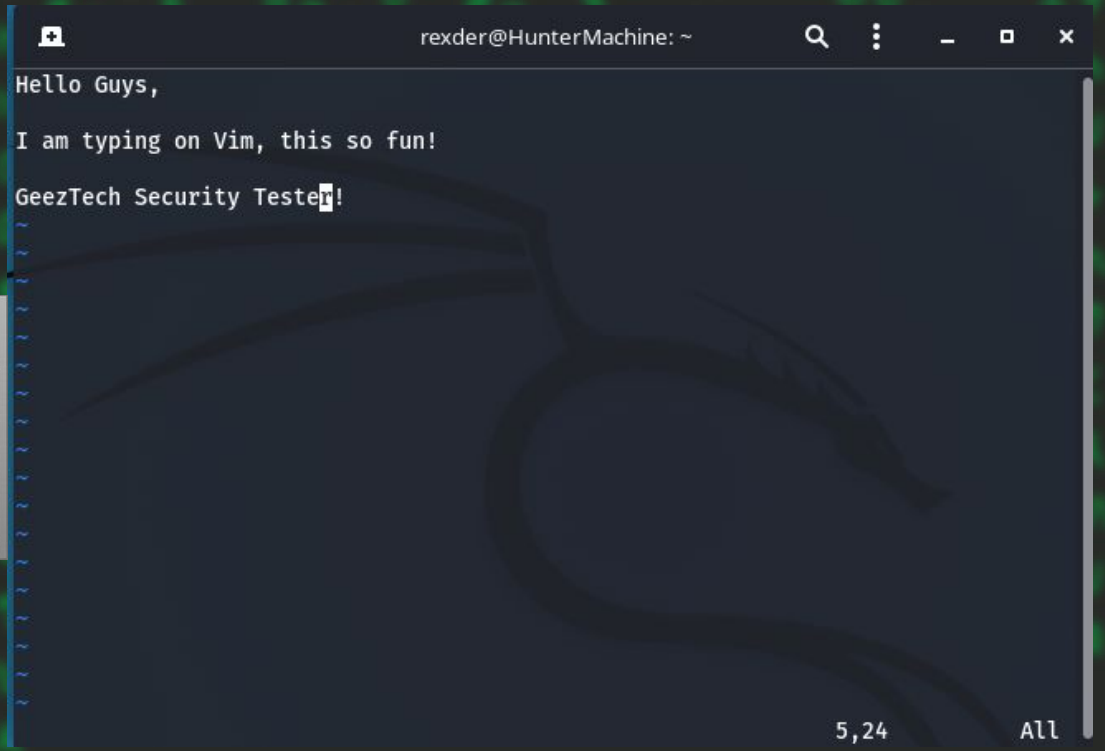
- Here You can Type anything you want, and Edit your text



# Command mode

To get back to command mode

you press ‘esc’

# Cont...

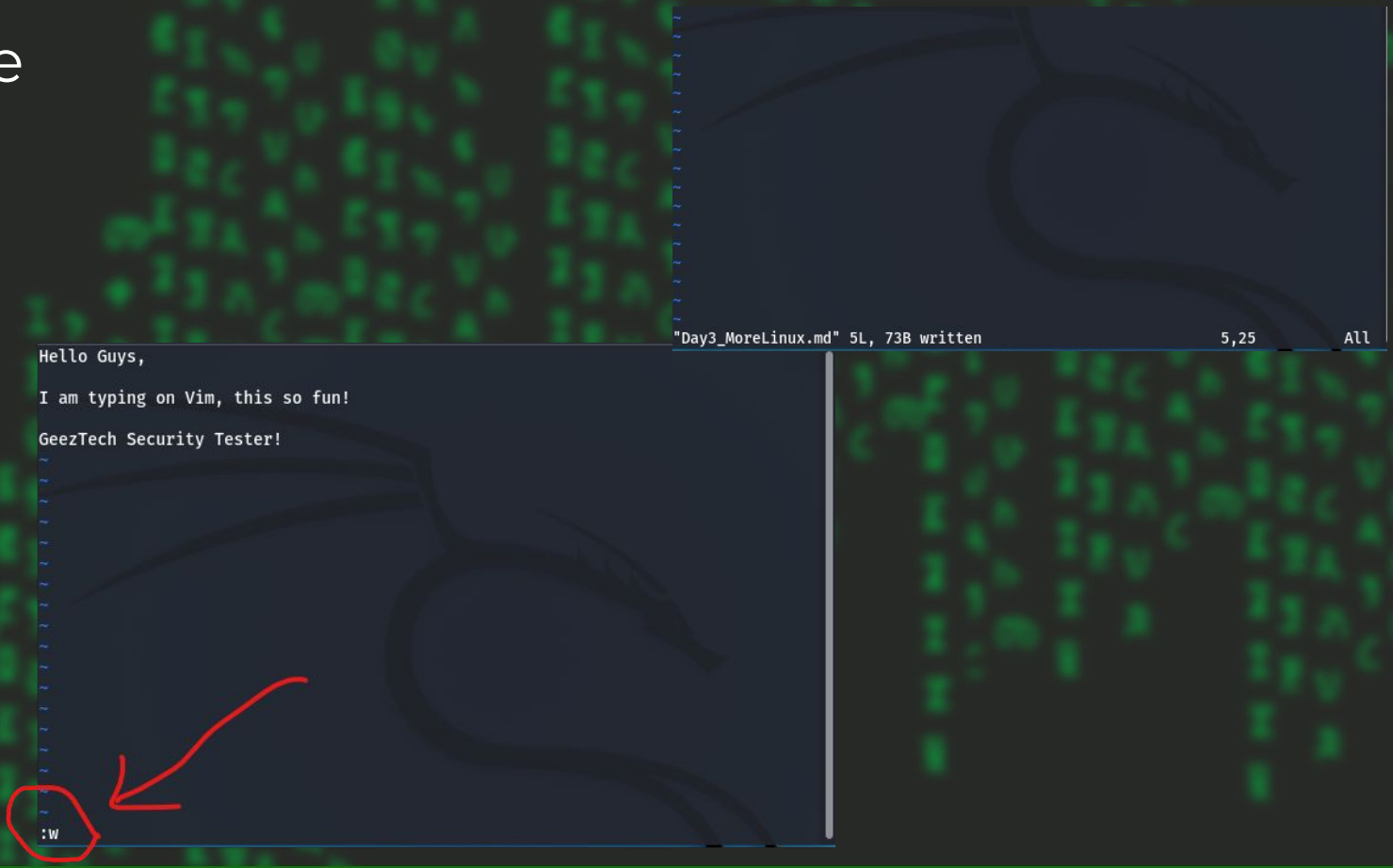
- Inside Command mode you can
  - Save
  - Save & quit
  - Force Quit & Save
  - Undo
  - Execute bash commands

# Save

Type

:w +

enter

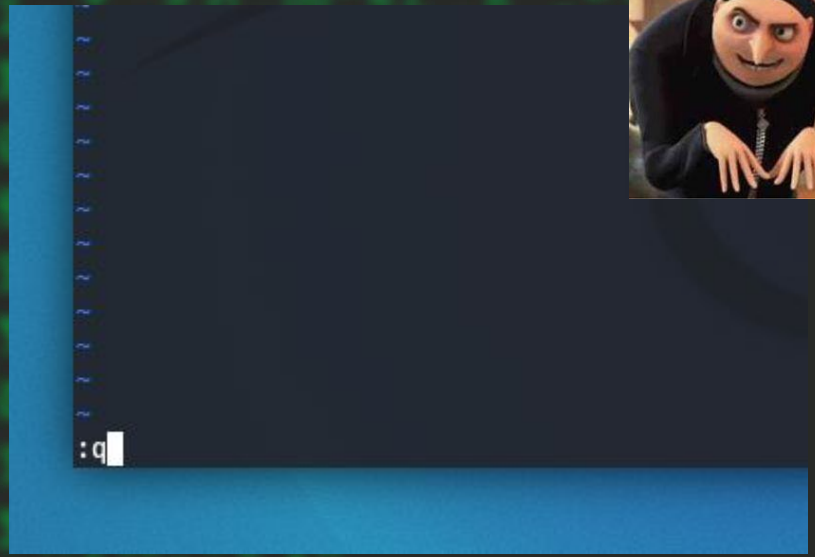


# Quit

Type

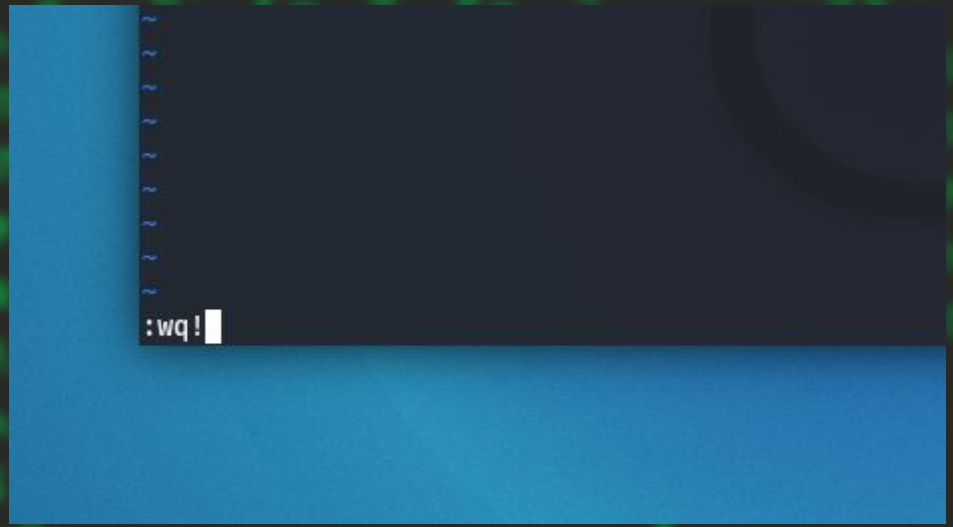
:q +

enter




# Quit

Type
:wq! +
enter
Force = !

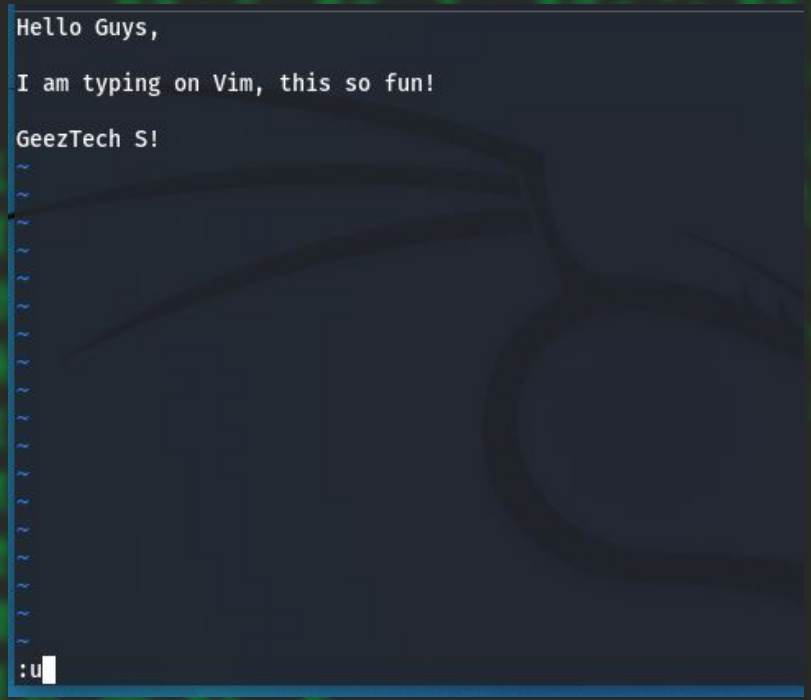


# Undo

Type

:undo + enter

Or :u

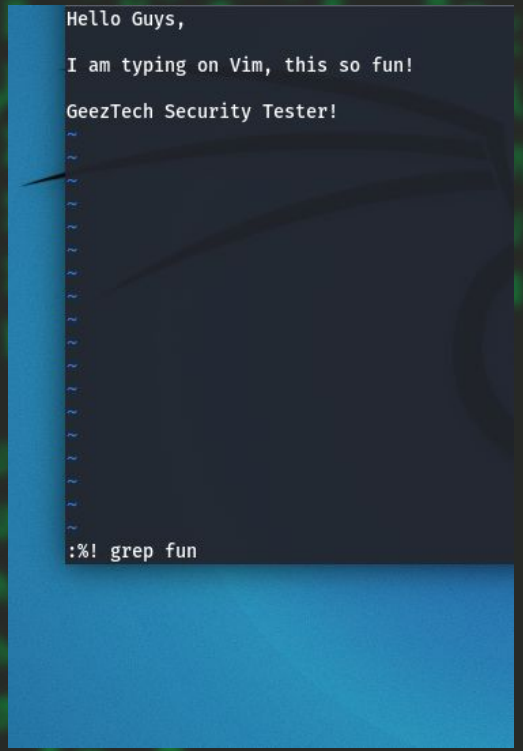


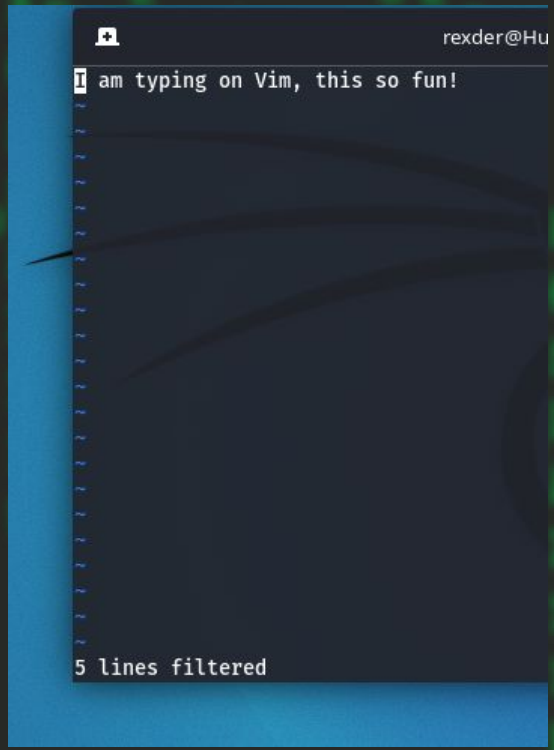

# Execute commands

## Type

:%!yourcommand

*the is no space between them



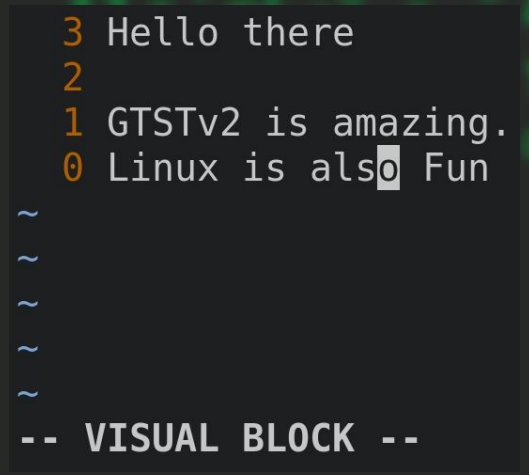



# Visual Mode

Visual Mode in `vim` allows users to select and manipulate blocks of text.

**Types of Visual Mode**:

- **Character-wise Visual Mode**: Selects text character by character.
  a. Press ‘v’
- **Line-wise Visual Mode**: Selects entire lines of text.
  a. Press ‘shift+v’
- **Block-wise Visual Mode**: Selects rectangular blocks of text.
  a. Press ‘ctrl+v’ or ‘ctrl+q’

# Commands in Visual Mode

**Once You select the texts on visual mode**

**Common Commands**:

- d: Delete the selected text.
- y: Yank (copy) the selected text.
- p: Paste the yanked text after the cursor.

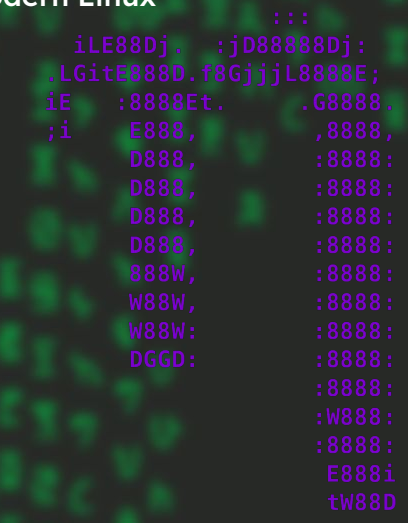
For more check this video on youtube


```
3 Hello there
2
1 GTSTv2 is amazing.
0 Linux is also Fun



-- VISUAL LINE --
```

```
7 Hello there
6
5 GTSTv2 is amazing.
4 Linux is also Fun
3 Linux is also Fun
2 Linux is also Fun
1 Linux is also Fun
0 Linux is also Fun
```

# NANO

The GNU nano text editor is a user-friendly, free and open-source text editor that usually comes pre-installed in modern Linux systems.

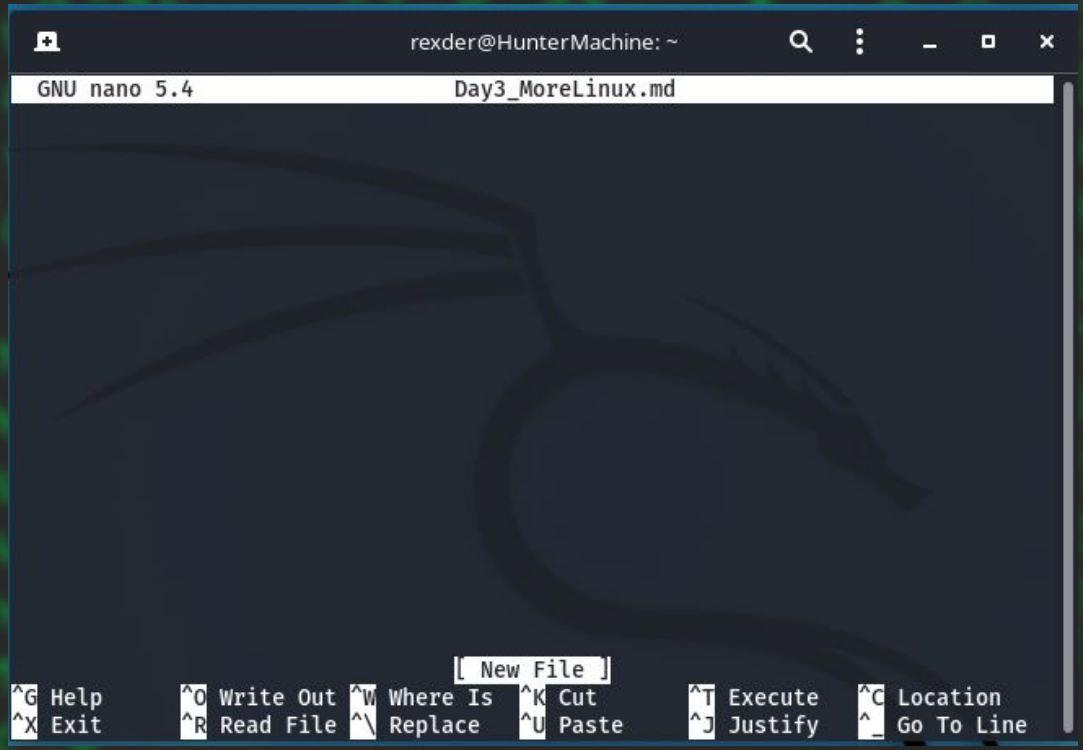


# Starting nano

Syntax

nano filename

Then start typing.



# Nano hotkeys

Ctrl + S - save

Alt + U - Undo  the ^ is equal to 'Ctrl'

Alt + E - Redo

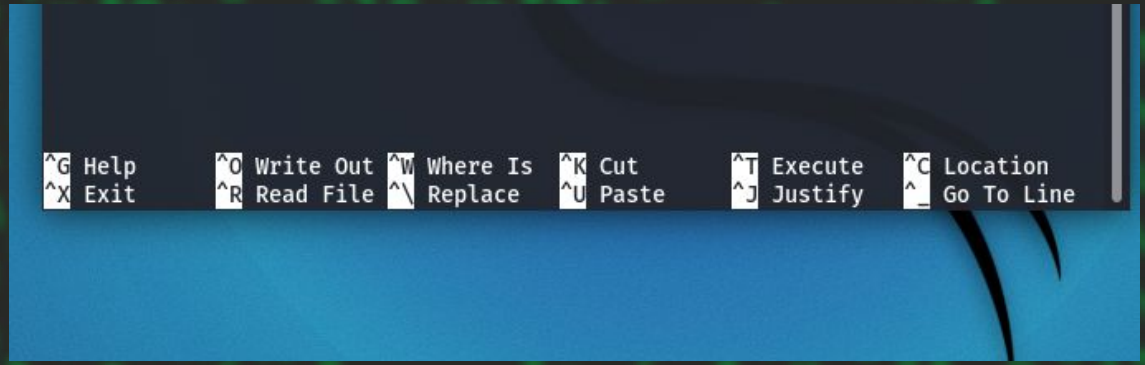
Ctrl + X - Exit

Paste,Copy & paste all over the linux is

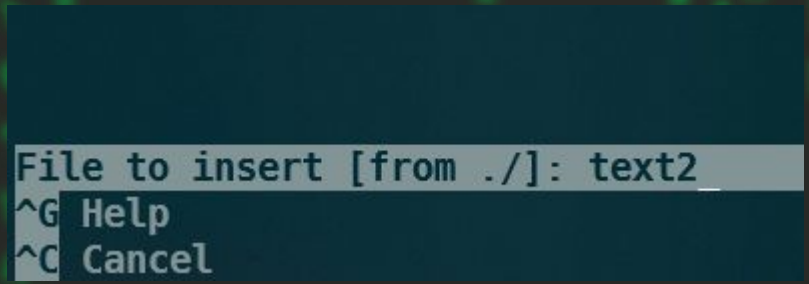
Ctrl+shift+C - copy

Ctrl+shift+X - Cut

Ctrl+shift+V - Paste

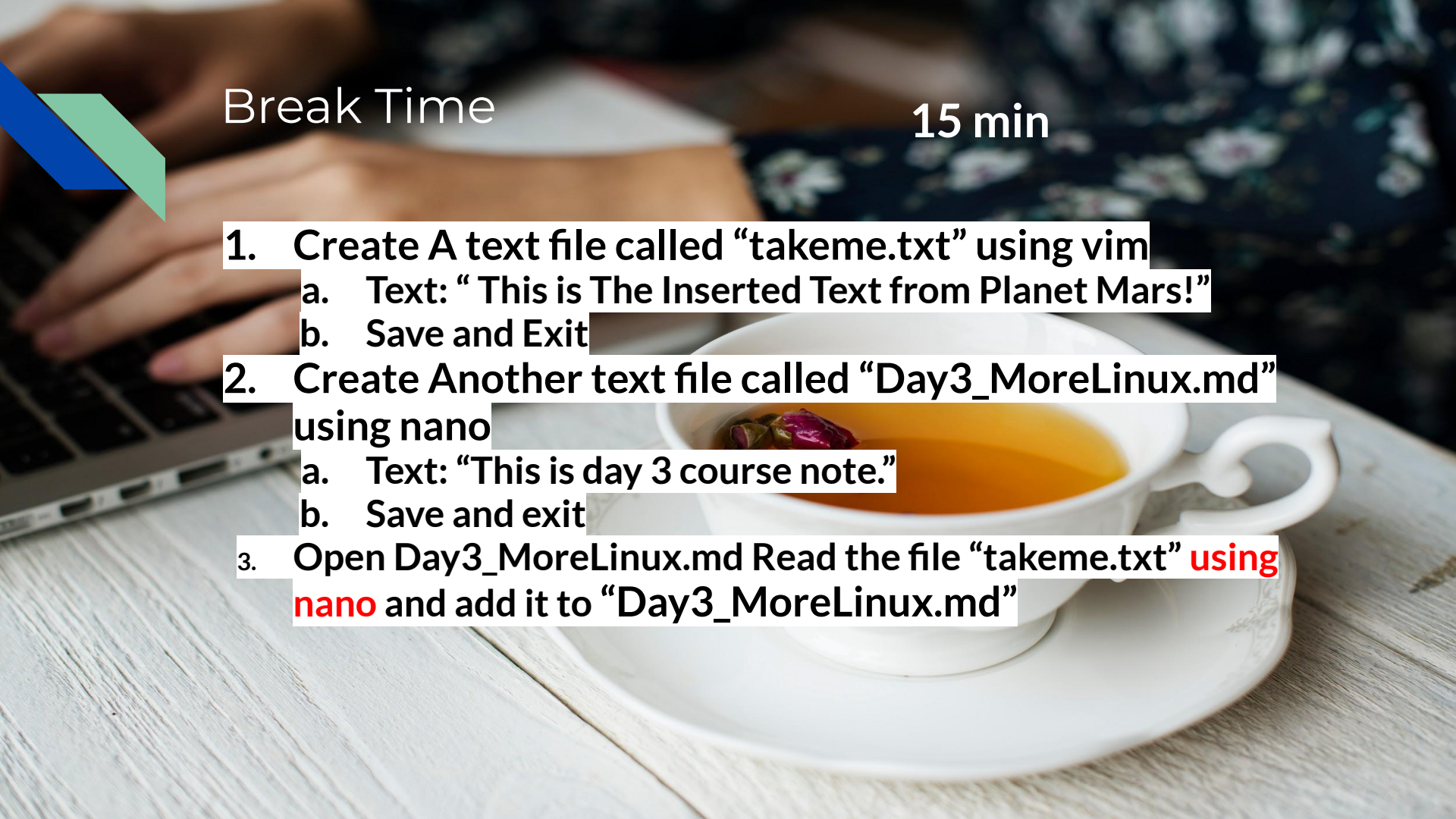



**You can append texts from other files with Crtl + R and Specify the Path**



Lets make our hand Dirty!

# Open Your Linux



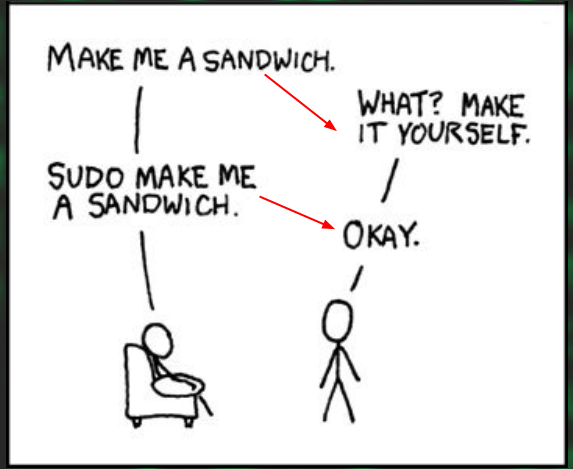
# Break Time

**15 min**

1. Create A text file called “takeme.txt” using vim
   a. Text: “ This is The Inserted Text from Planet Mars!”
   b. Save and Exit
2. Create Another text file called “Day3_MoreLinux.md” using nano
   a. Text: “This is day 3 course note.”
   b. Save and exit
3. Open Day3_MoreLinux.md Read the file “takeme.txt” using nano and add it to “Day3_MoreLinux.md”

# Linux User Management

- On Computer system, person who uses the computer is called “**user**”
- Every Users have Group.
- Users have their own file & applications.
- To know our name on linux -> “ whoami “
- Those users have power/privilege.
- On linux  there's 2 kinds users.
  - Root  id = 0
  - Normal User id start with 1-999




The root user have the power to do everything on linux ,

but if users want to have a root access they add **sudo** in front of the command .

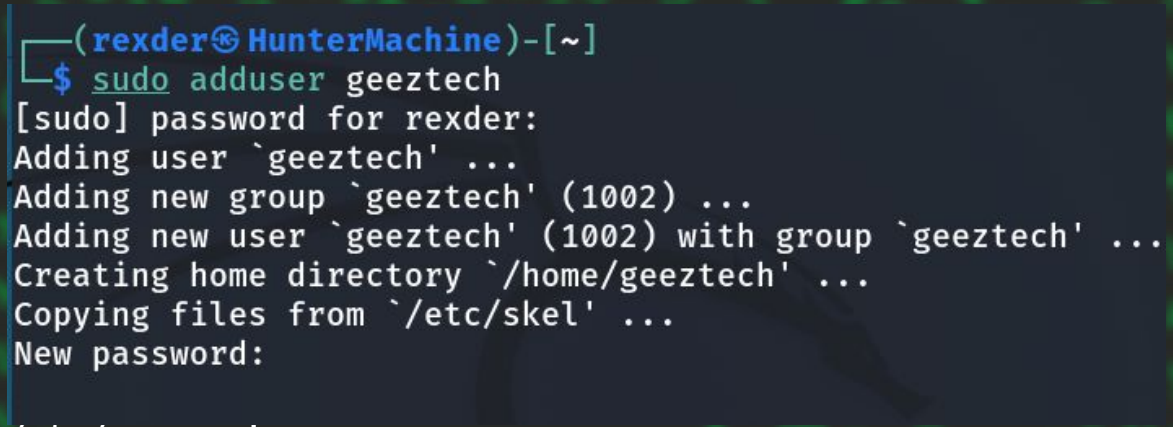
sudo YourCommand

```
┌──(rexder㉿HunterMachine)-[~]
└─$ sudo adduser geeztech
[sudo] password for rexder:
```

- SUDO = Superuser do ， used to pass permission denied

# Creating Users

- On linux, to create users you can use the following commands
  - Useradd -> simple
  - Adduser -> Detailed
- Useradd command
  - sudo useradd username
- Adduser command
  - sudo adduser username




The User files are stored inside /etc/passwd

The User password are stored inside /etc/shadow

When you create a user it creates a group with that name.

# Checking /etc/passwd

This happened what shall i do?

```
┌──(rexder㉿HunterMachine)-[~]
└─$ cat /etc/shadow
cat: /etc/shadow: Permission denied
```

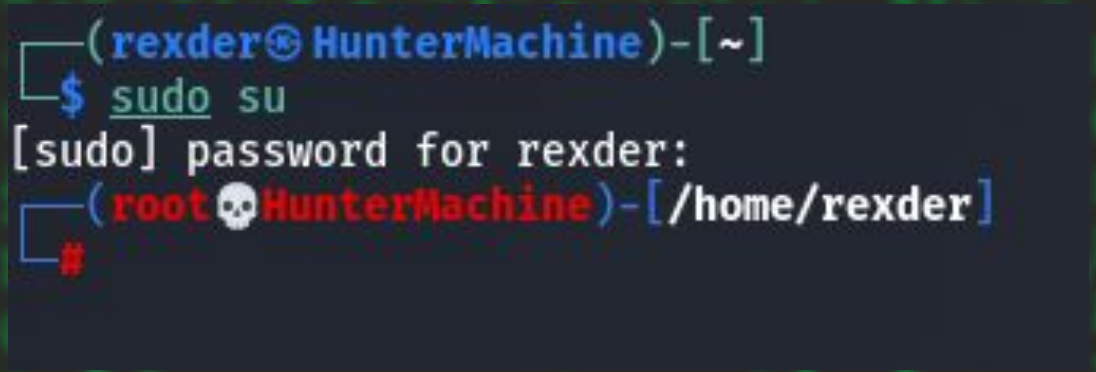
```
┌──(rexder㉿HunterMachine)-[~]
└─$ id
uid=1000(rexder) gid=1000(rexder) groups=1000(rexder)
```

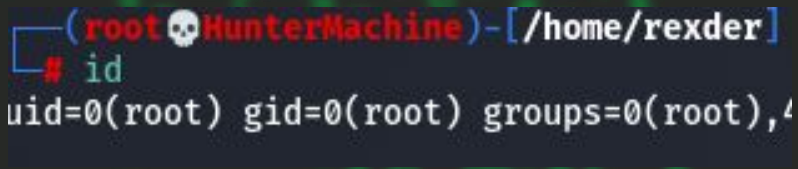
```
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
_apt:x:100:65534::/nonexistent:/usr/sbin/nologin
systemd-timesync:x:101:101:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
systemd-network:x:102:103:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:103:104:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
mysql:x:104:110:MySQL Server,,,:/nonexistent:/bin/false
tss:x:105:111:TPM software stack,,,:/var/lib/tpm:/bin/false
strongswan:x:106:65534::/var/lib/strongswan:/usr/sbin/nologin
ntp:x:107:112::/nonexistent:/usr/sbin/nologin
messagebus:x:108:113::/nonexistent:/usr/sbin/nologin
redsocks:x:109:114::/var/run/redsocks:/usr/sbin/nologin
rwhod:x:110:65534::/var/spool/rwho:/usr/sbin/nologin
iodine:x:111:65534::/run/iodine:/usr/sbin/nologin
miredo:x:112:65534::/var/run/miredo:/usr/sbin/nologin
_rpc:x:113:65534::/run/rpcbind:/usr/sbin/nologin
arpwatch:x:114:120:ARP Watcher,,,:/var/lib/arpwatch:/bin/sh
usbmux:x:115:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
tcpdump:x:116:122::/nonexistent:/usr/sbin/nologin
rtkit:x:117:123:RealtimeKit,,,:/proc:/usr/sbin/nologin
sshd:x:118:65534::/run/sshd:/usr/sbin/nologin
statd:x:119:65534::/var/lib/nfs:/usr/sbin/nologin
postgres:x:120:125:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash
avahi:x:121:127:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
stunnel4:x:122:128::/var/run/stunnel4:/usr/sbin/nologin
Debian-snmp:x:123:129::/var/lib/snmp:/bin/false
speech-dispatcher:x:124:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
sslh:x:125:131::/nonexistent:/usr/sbin/nologin
nm-openvpn:x:126:132:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
nm-openconnect:x:127:133:NetworkManager OpenConnect plugin,,,:/var/lib/NetworkManager:/usr/sbin/
pulse:x:128:134:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
saned:x:129:137::/var/lib/saned:/usr/sbin/nologin
inetsim:x:130:139::/var/lib/inetsim:/usr/sbin/nologin
lightdm:x:131:140:Light Display Manager:/var/lib/lightdm:/bin/false
colord:x:132:141:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:133:142::/var/lib/geoclue:/usr/sbin/nologin
sddm:x:134:143:Simple Desktop Display Manager:/var/lib/sddm:/bin/false
king-phisher:x:135:144::/var/lib/king-phisher:/usr/sbin/nologin
Debian-gdm:x:136:145:Gnome Display Manager:/var/lib/gdm3:/bin/false
dradis:x:137:146::/var/lib/dradis:/usr/sbin/nologin
beef-xss:x:138:147::/var/lib/beef-xss:/usr/sbin/nologin
_caldera:x:139:148::/var/lib/caldera:/usr/sbin/nologin
rexder:x:1000:1000:Rexder,,,:/home/rexder:/usr/bin/zsh
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
nathan:x:1001:1001:Nathan Hailu,001,09200000000,07098765432:/home/nathan:/bin/bash
geeztech:x:1002:1002::/home/geeztech:/bin/bash
```

# To access root user

Command

sudo su



# Class is Over

1) Push your note to Github
2) Repeat the commands
3) Stay Strong and curious