Further on Linux

Day4_MoreLinux.md

Last time topics

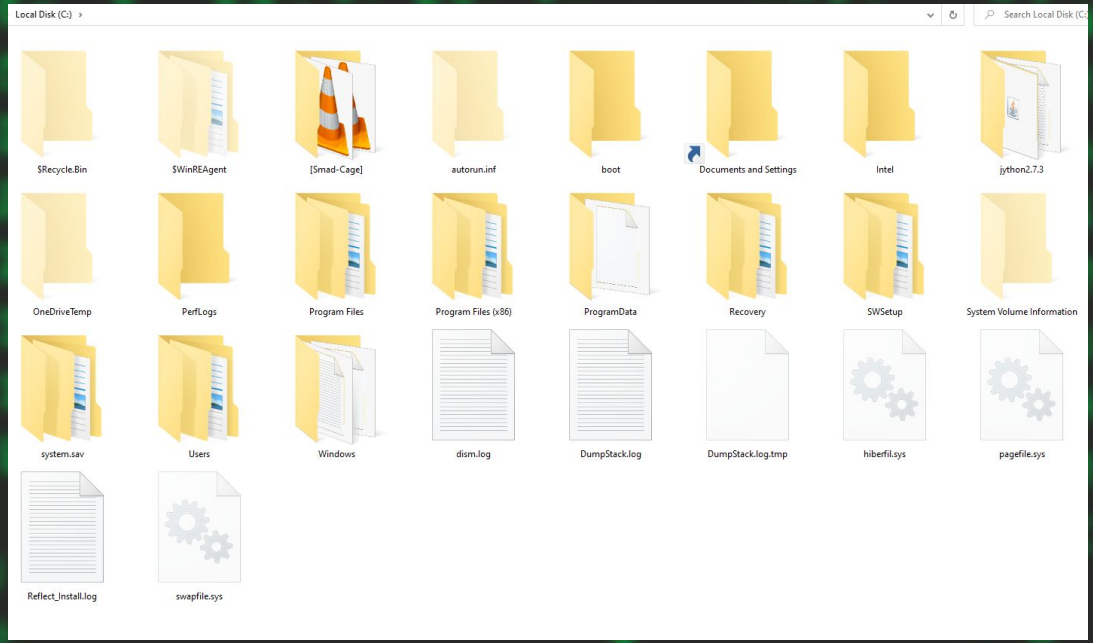
Have you seen about awk and sed?

Topics

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

Linux File Hierarchy

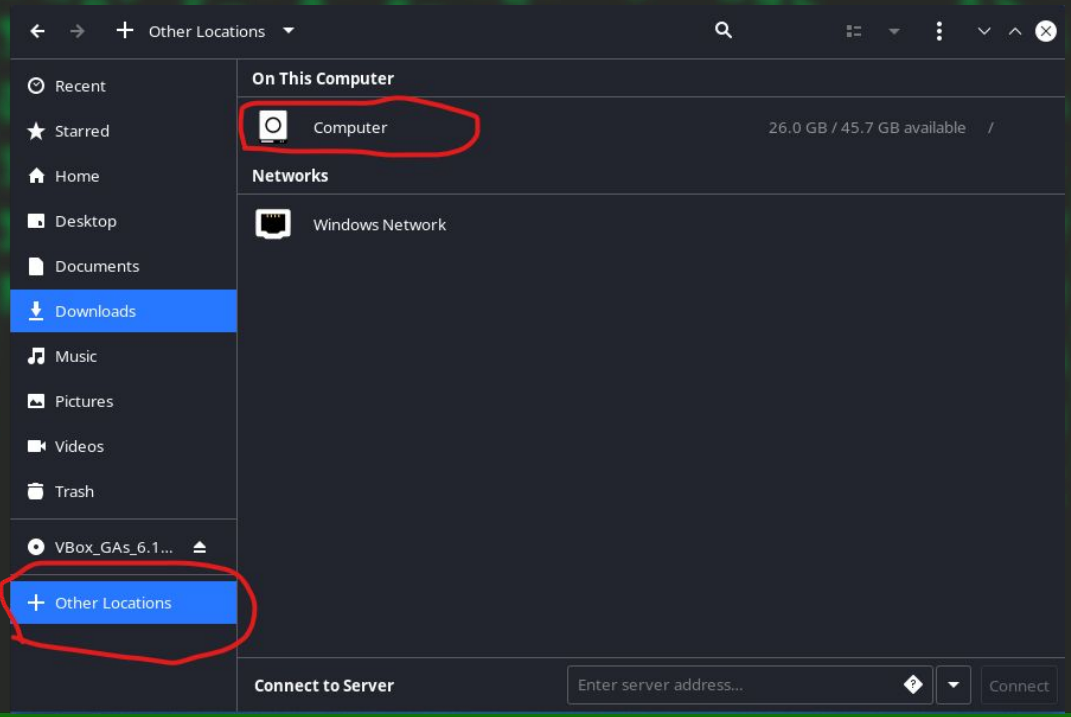
- Linux/UNIX have a special file system than windows.
- File system is a directory structure that the OS uses.

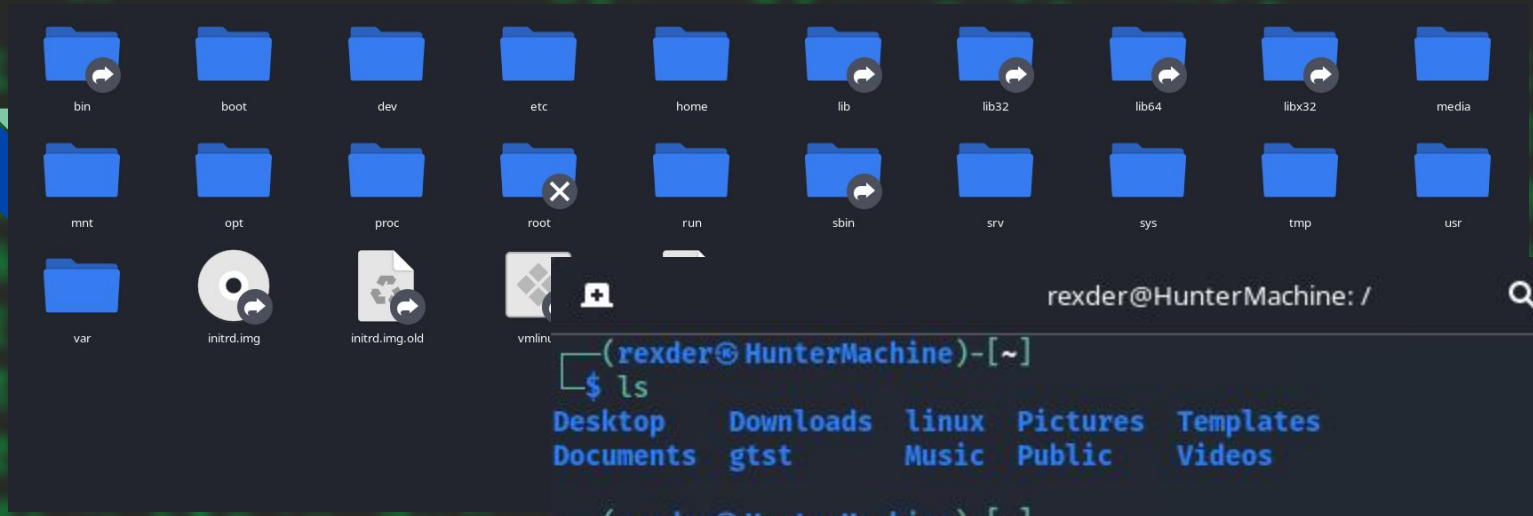


File system: WINDOWS 10

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 (/)**



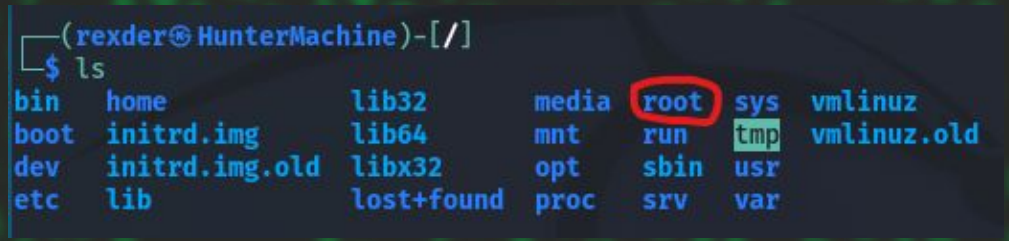


You can Check it in terminal also in file manager

```
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

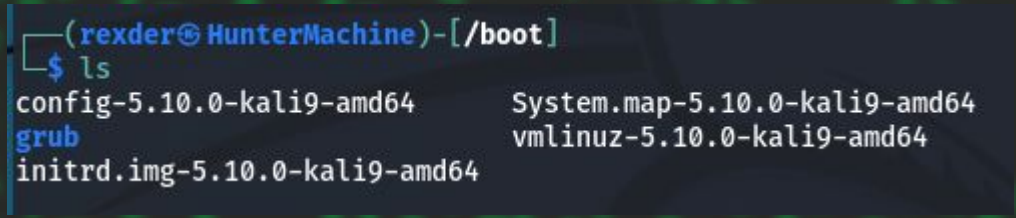
2) bin - Binary executables
   - Essential command binaries that need to be available in single-user mode; for all users
     i) e.g) cat, ls, cp,pwd

```
┌──(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/build-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
lrwxrwxrwx  1 root root            6 Jan 11  2021 cpp -> cpp-10
```

File structure in detail

3) /boot - Boot loader files

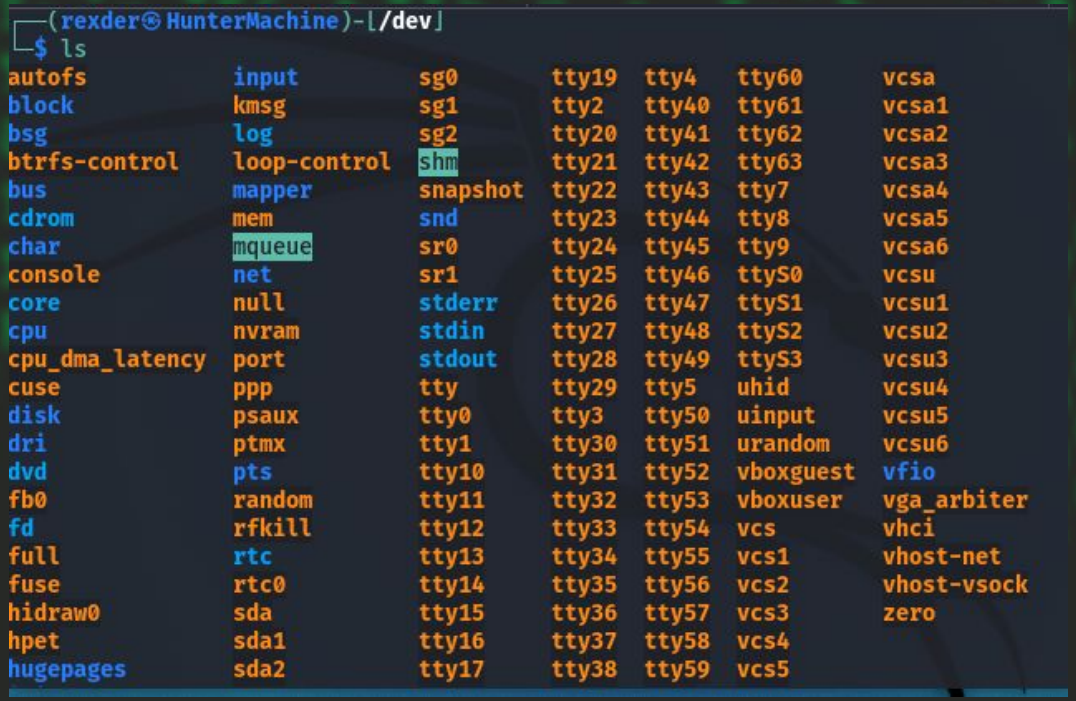
- Kernel initrd, vmlinux, grub files are located under /boot
- Example: initrd.img-2.6.32-24-generic, vmlinuz-2.6.32-24-generic



File structure in detail

4) /dev - Essential Device files

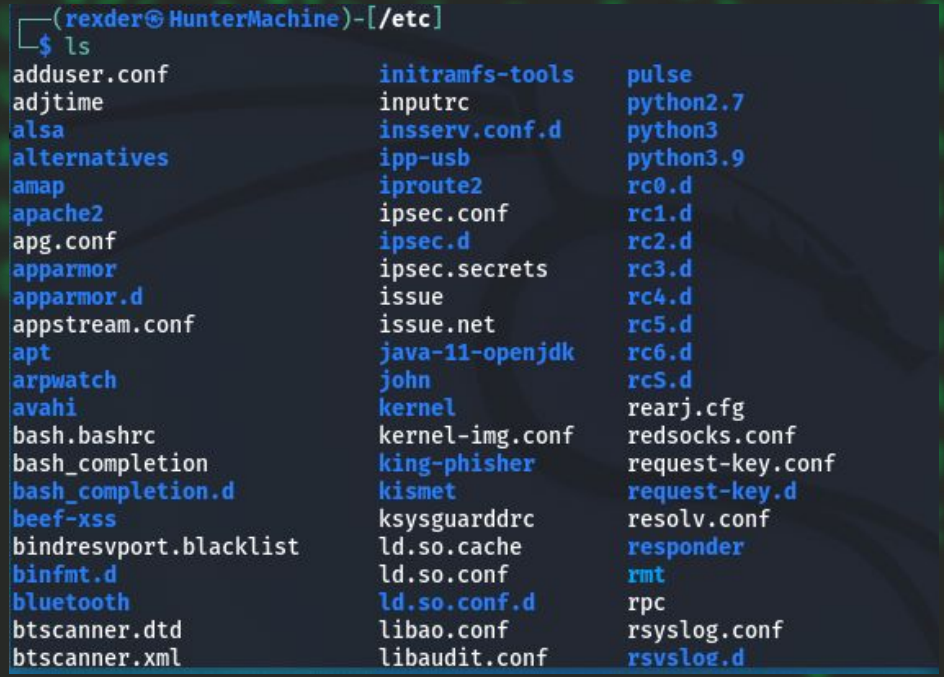
- These include terminal devices, usb, or any device attached to the system.
- Example: /dev/tty1, /dev/usbmon0



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/logrotate.conf.



File structure in detail

6) /home - Home directory

- Home directories for all users to store their personal files.
- example: /home/nathan, /home/rexder

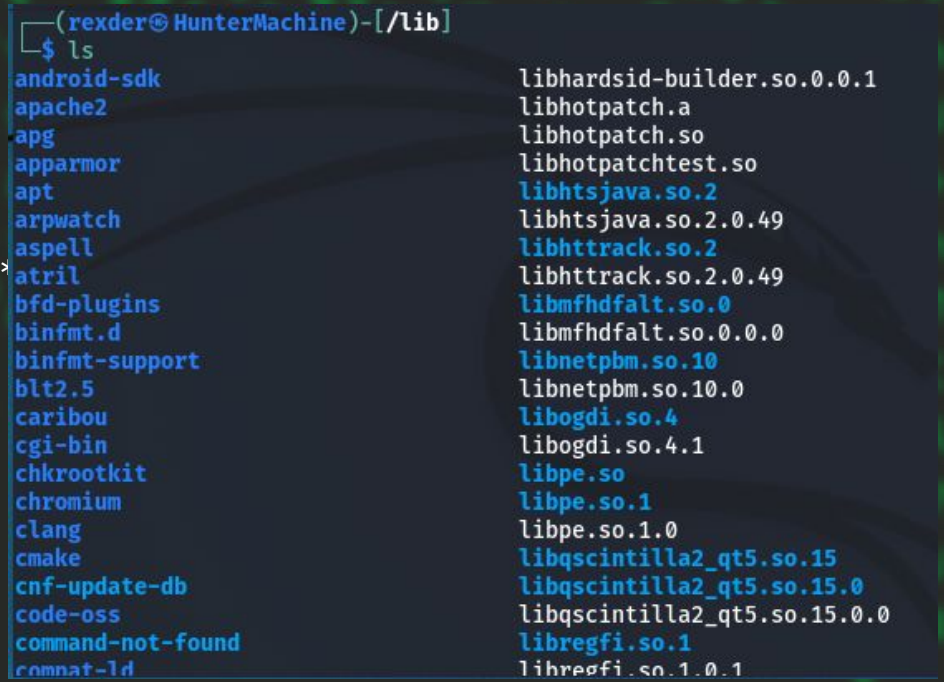
```
┌──(rexder㉿HunterMachine)-[/home]
└─$ ls
rexder
```

```
┌──(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

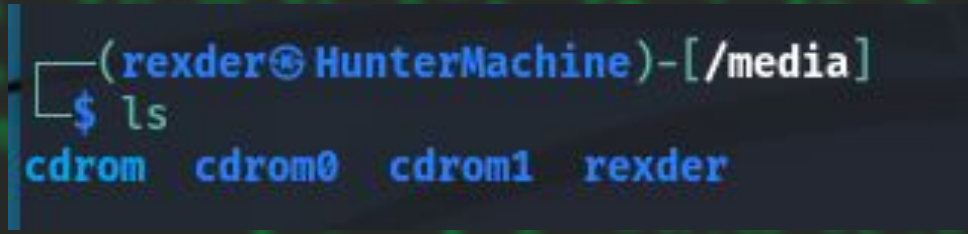
- Library filenames are either ld* or lib*.so.*
- Example: ld-2.11.1.so, libncurses.so.5.7



File structure in detail

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

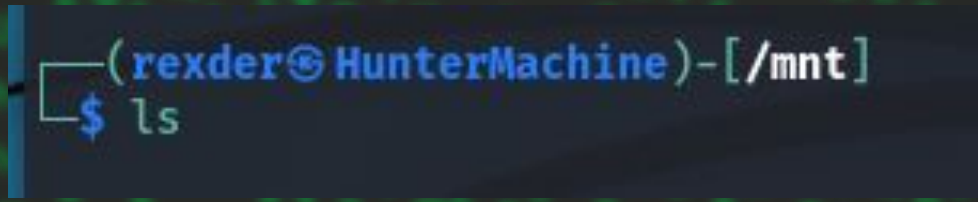
- Temporary mount directory for removable devices.
- Examples, /media/cdrom for CD-ROM; /media/floppy for floppy drives; /media/cd recorder for CD writer



File structure in detail

9) /mnt - Temporarily mounted file

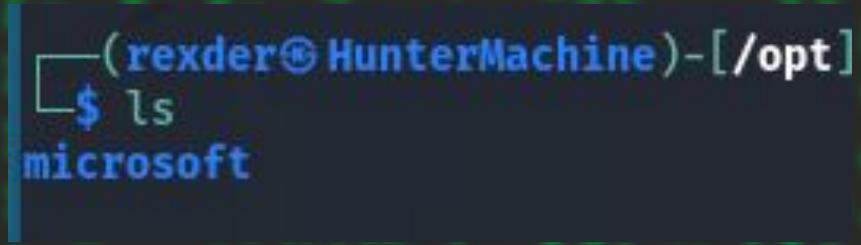
- Temporary mount directory where sysadmins can mount filesystems.



File structure in detail

10) /opt - Optional application software packages

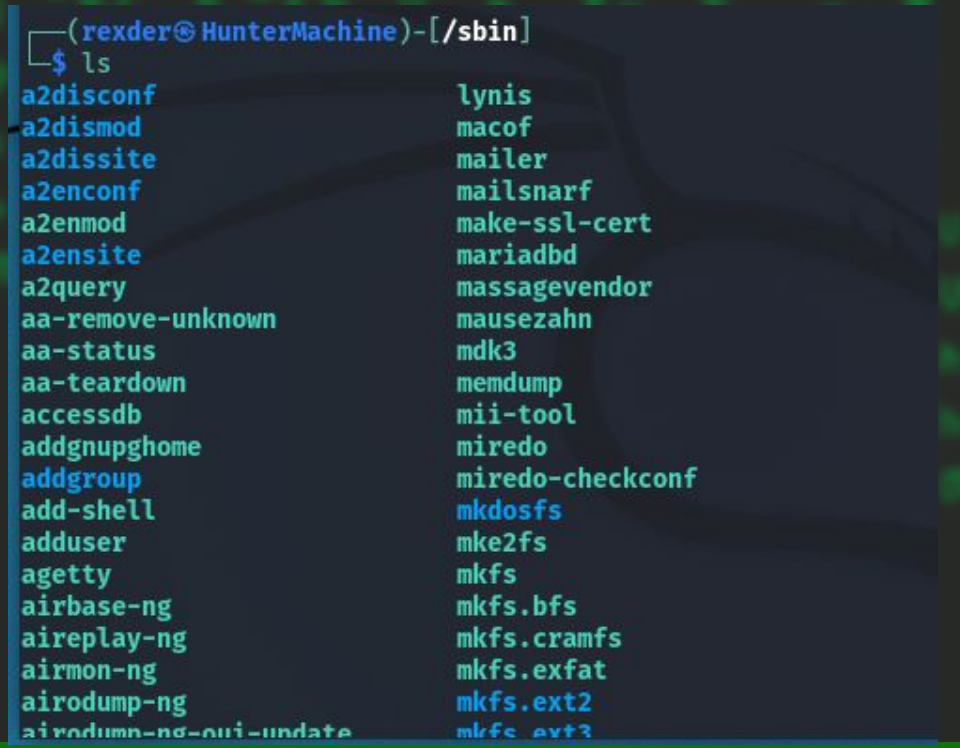
- Contains add-on applications from individual vendors.
- Add-on applications should be installed under either /opt/ or /opt/ sub-directory.



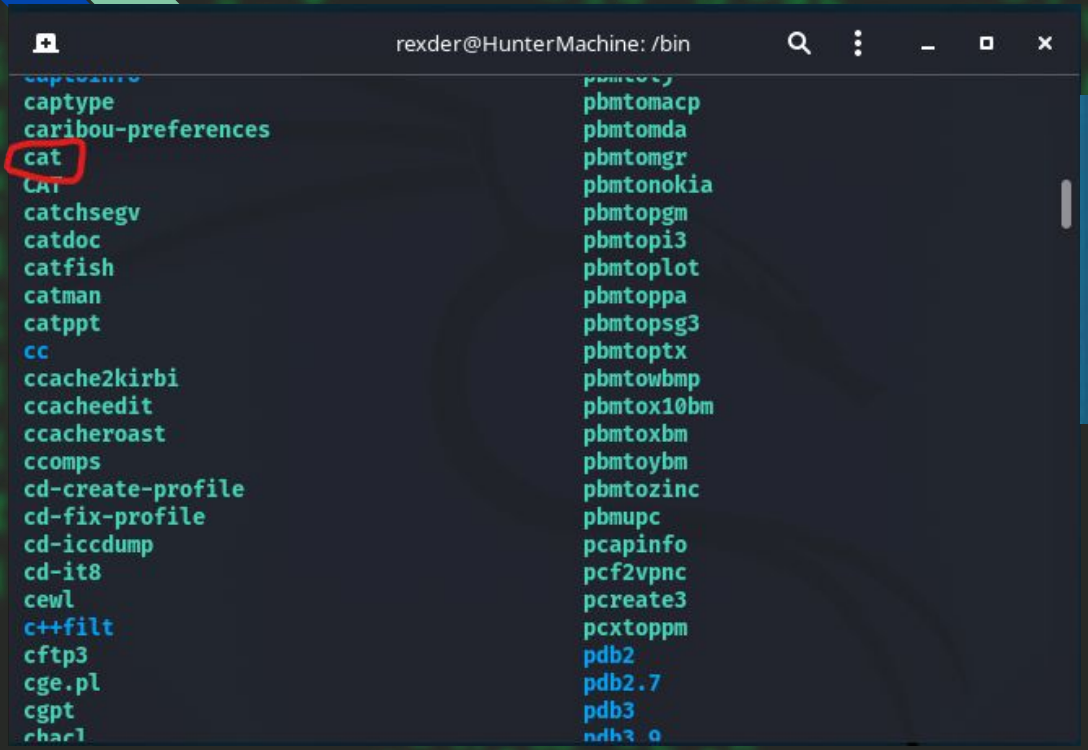
File structure in detail

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.

```
┌──(rexder㉿HunterMachine)-[/tmp]
└─$ ls
dbus-EmaMUYgrDx
ssh-Qrg9JZmKnR3H
systemd-private-9e8cd917afab453985de23a0a12cc250-colord.service-R3Txgf
systemd-private-9e8cd917afab453985de23a0a12cc250-haveged.service-aRK7Ci
systemd-private-9e8cd917afab453985de23a0a12cc250-ModemManager.service-ZFm25h
systemd-private-9e8cd917afab453985de23a0a12cc250-systemd-logind.service-3Mx6Hi
systemd-private-9e8cd917afab453985de23a0a12cc250-upower.service-wnIqlf
tracker-extract-files.1000
tracker-extract-files.136
```

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 -> where you can do commands
  - Input mode -> where you can write

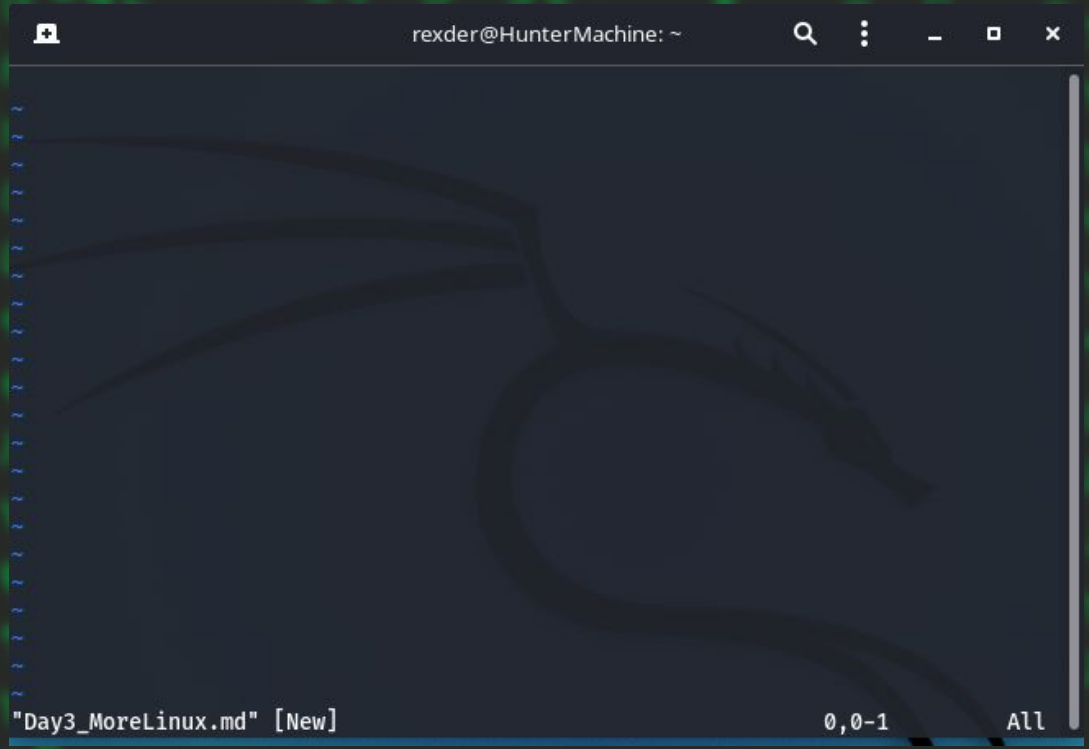
Opening vim

Syntax

vim yourfilename

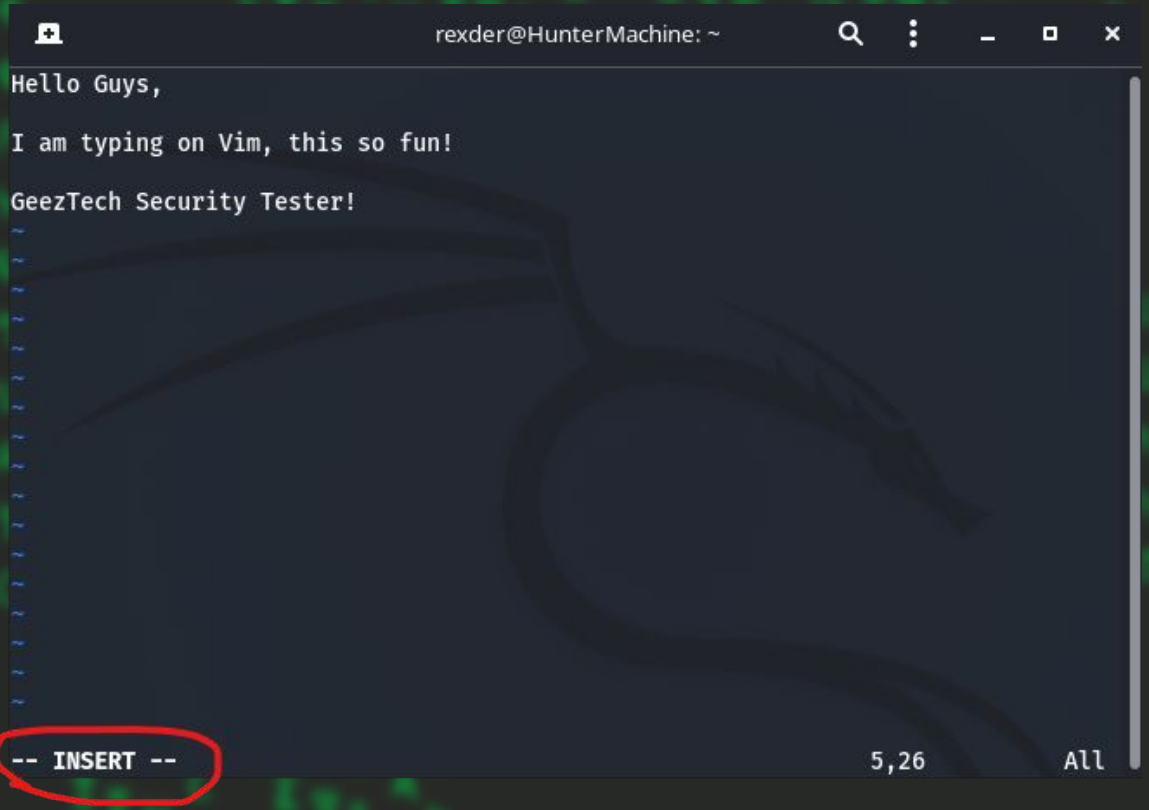
```
┌──(rexder㉿HunterMachine)-[~]
└─$ vim Day3_MoreLinux.md
```

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



Insert mode

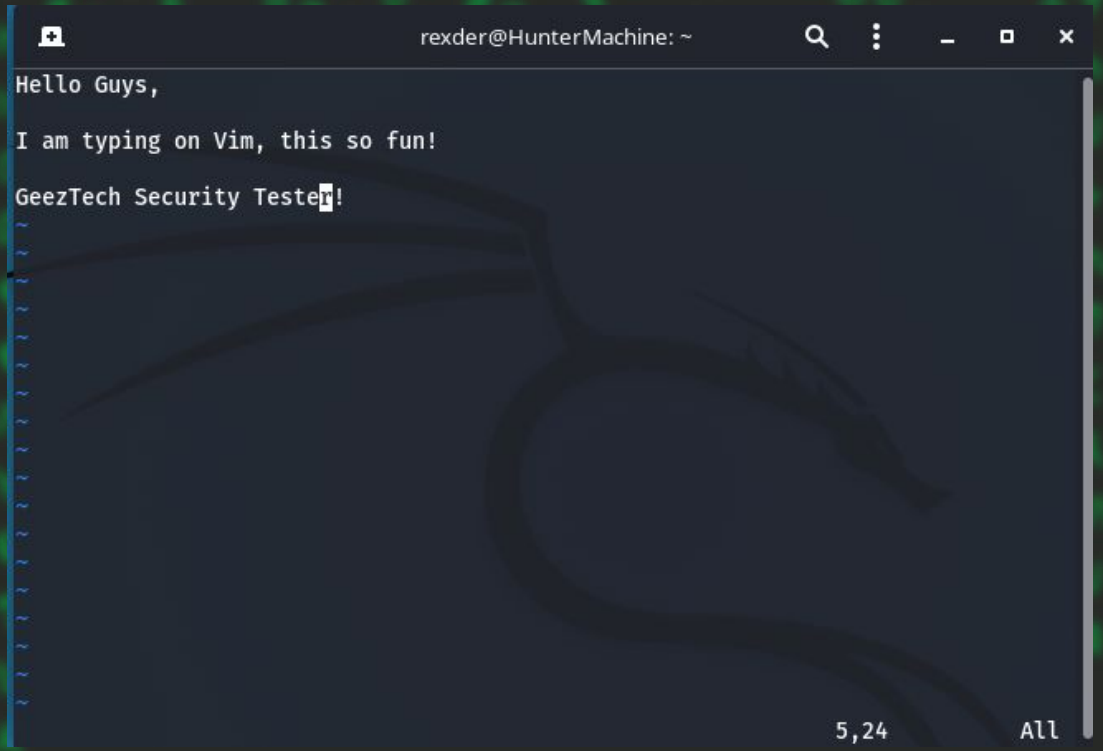
Press ‘i’



Command mode

To get back to command mode

you press ‘esc’



Cont...

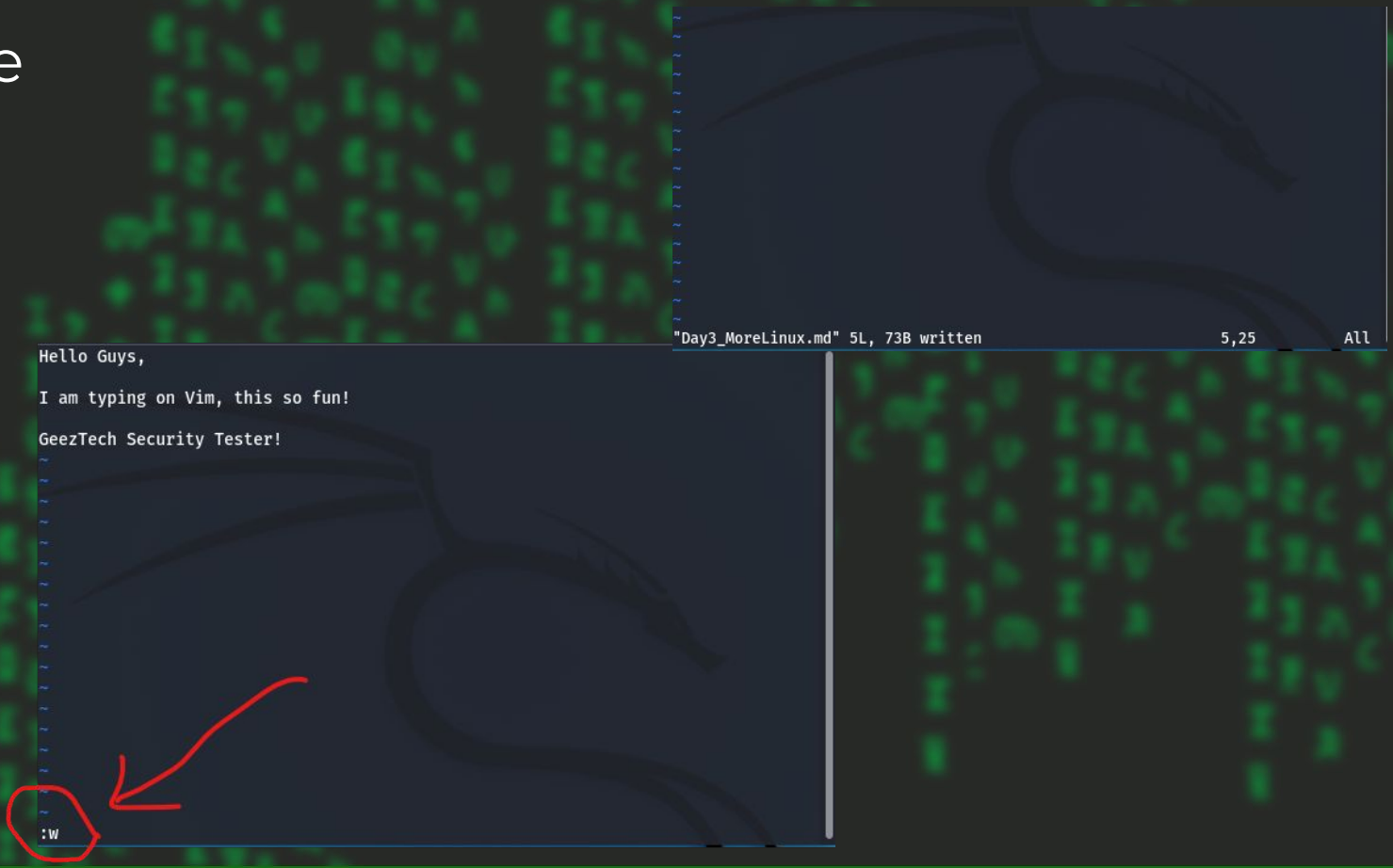
- Inside Command mode you can
  - Save
  - Save & quit
  - Force Quit & Save
  - Undo
  - Execute bash commands

Save

Type

:w +

enter

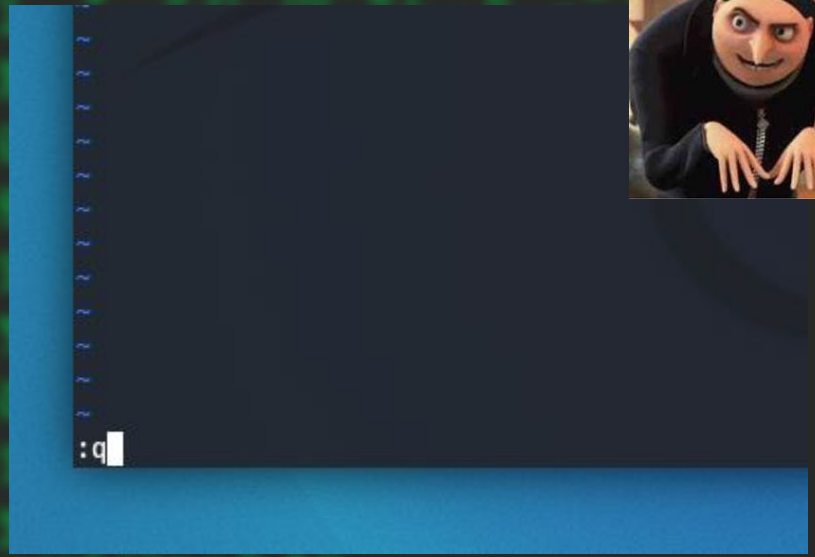


Quit

Type

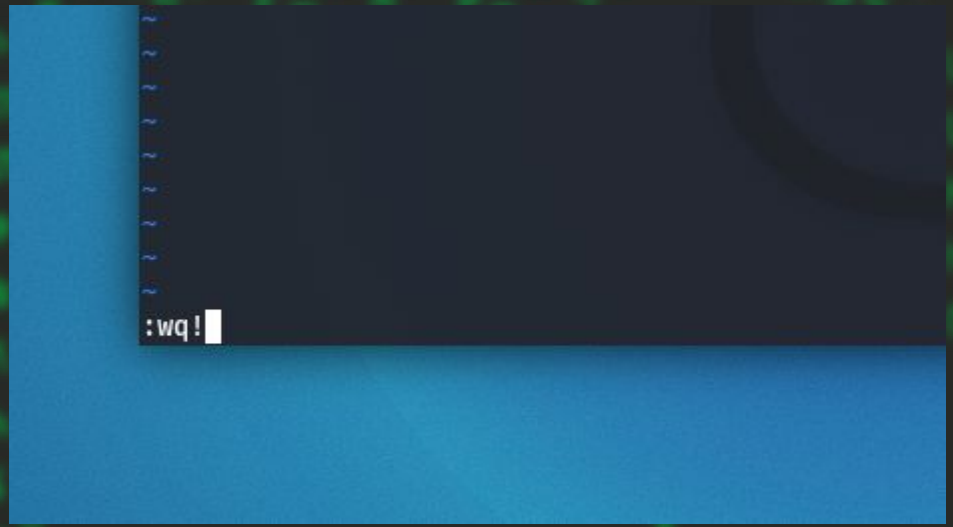
:q +

enter



Quit

Type
:wq! +
enter
Force = !

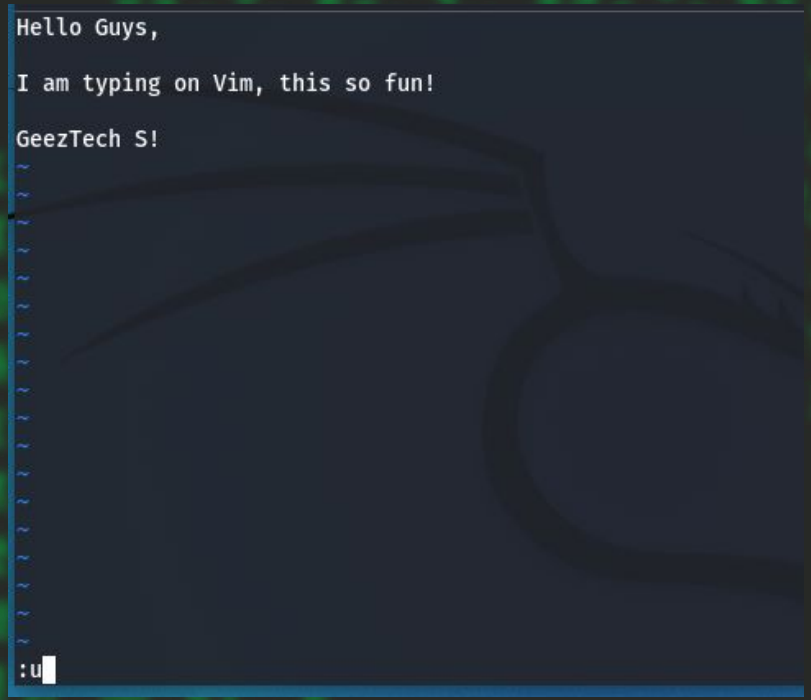


Undo

Type

:undo + enter

Or :u

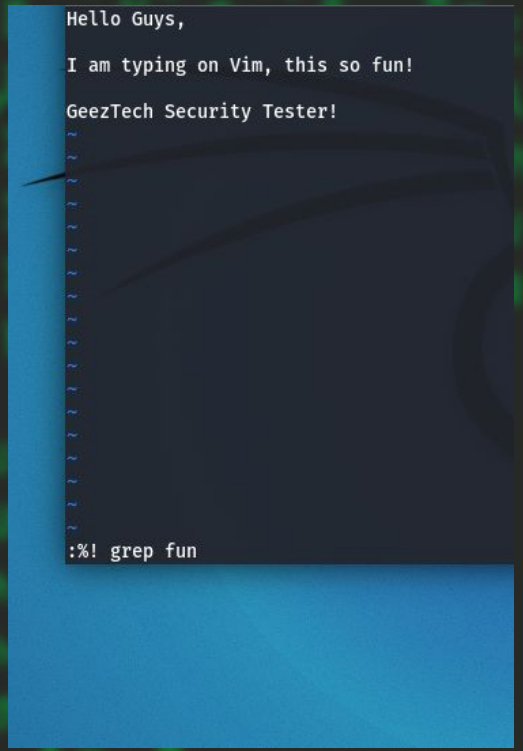


Execute commands

Type

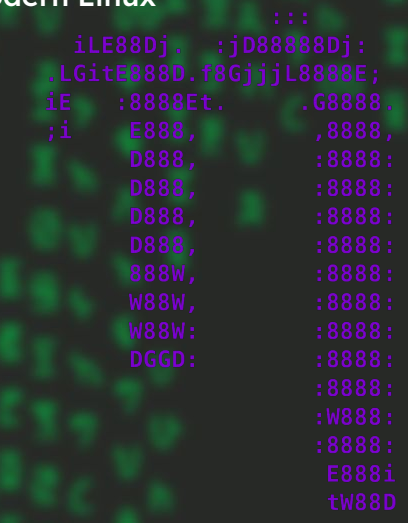
:%!yourcommand

*the is no space between them



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.

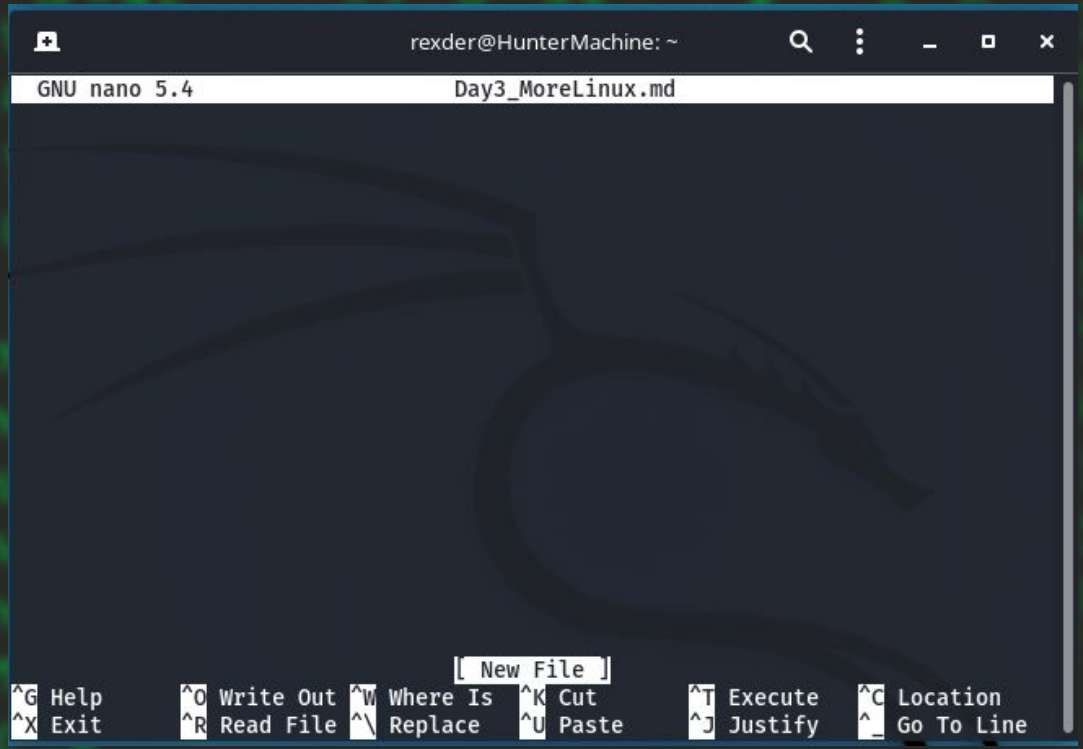


Starting nano

Syntax

nano filename

Then start typing.



SAving Exiting & Undo_redo

Ctrl + S - save

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

Alt + E - Redo

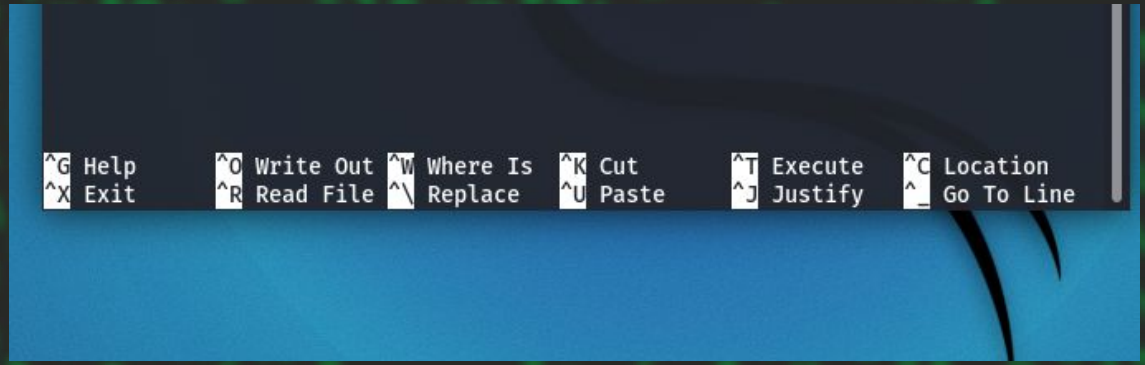
Ctrl + X - Exit

Paste,Copy & paste all over the linux is

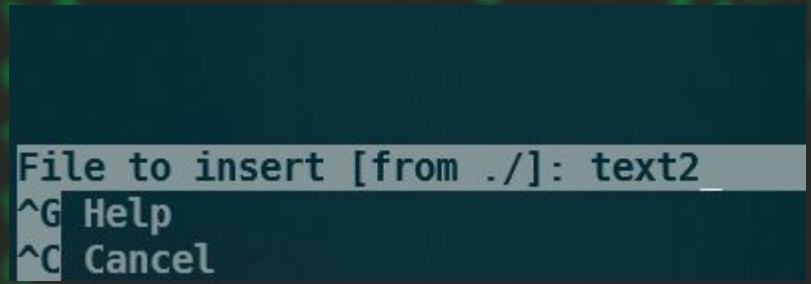
Ctrl+shift+C - copy

Ctrl+shift+X - Cut

Ctrl+shift+V - Paste

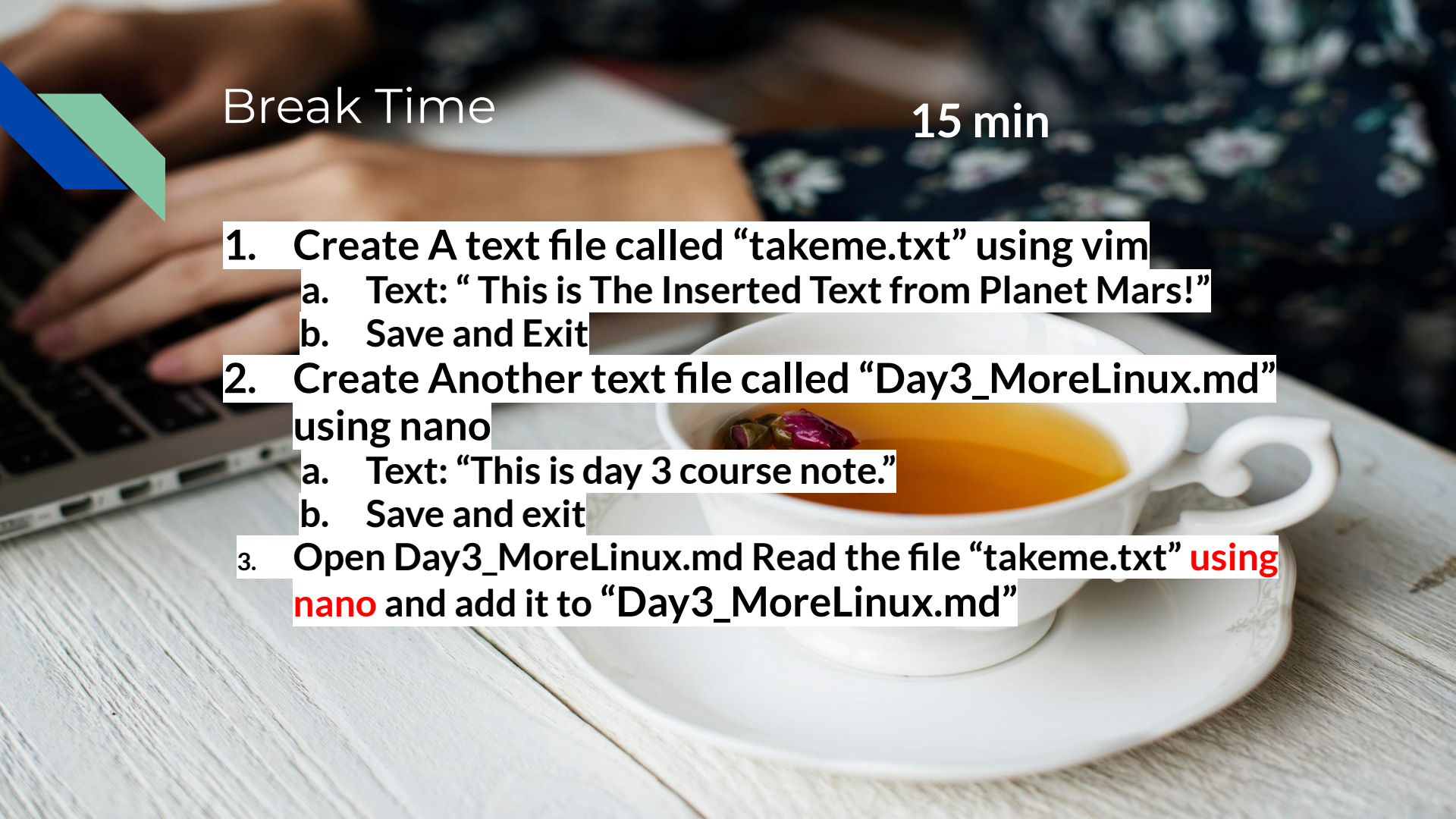


You can append texts from other files with Crtl + R and Specify the Path



Lets make our hand Dirty!

Open Your Linux



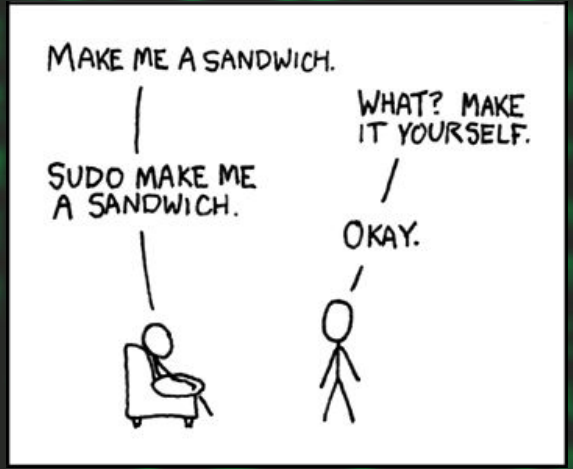
Break Time

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 .

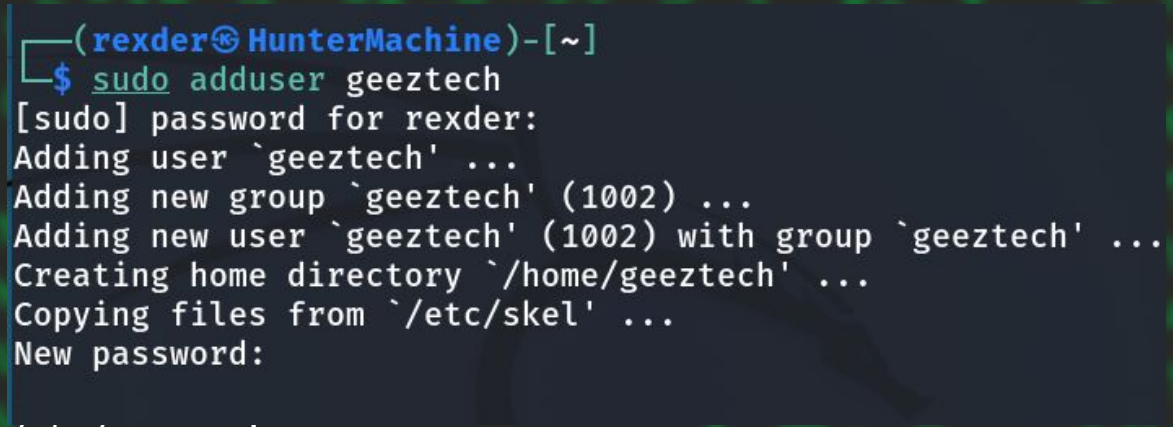
sudo YourCommand

```
┌──(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
```

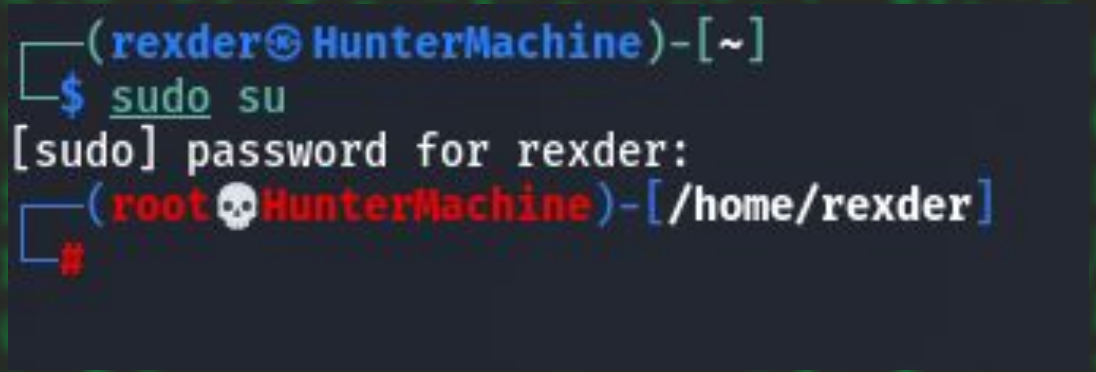
```
┌──(rexder㉿HunterMachine)-[~]
└─$ id
uid=1000(rexder) gid=1000(rexder) groups=1000(rexder)
```

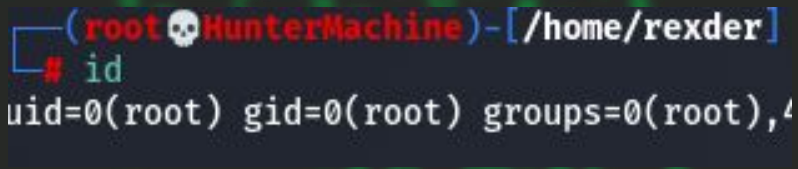
```
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
_apt:x:100:65534::/nonexistent:/usr/sbin/nologin
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