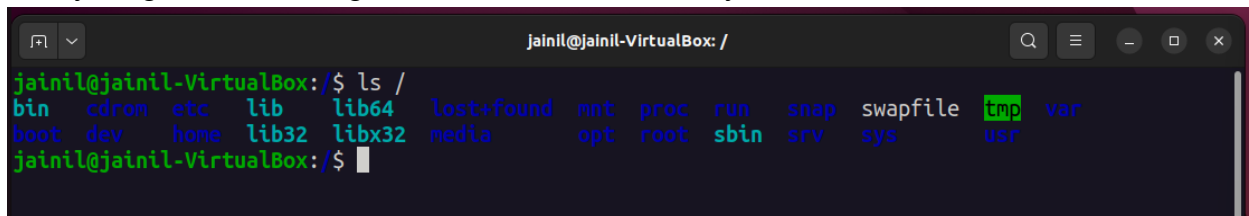


TASK 4

a. Task: Explore and document the Linux file system structure - Use the `ls` command to explore the key directories in the Linux file system. Document the purpose of each directory and its common contents.

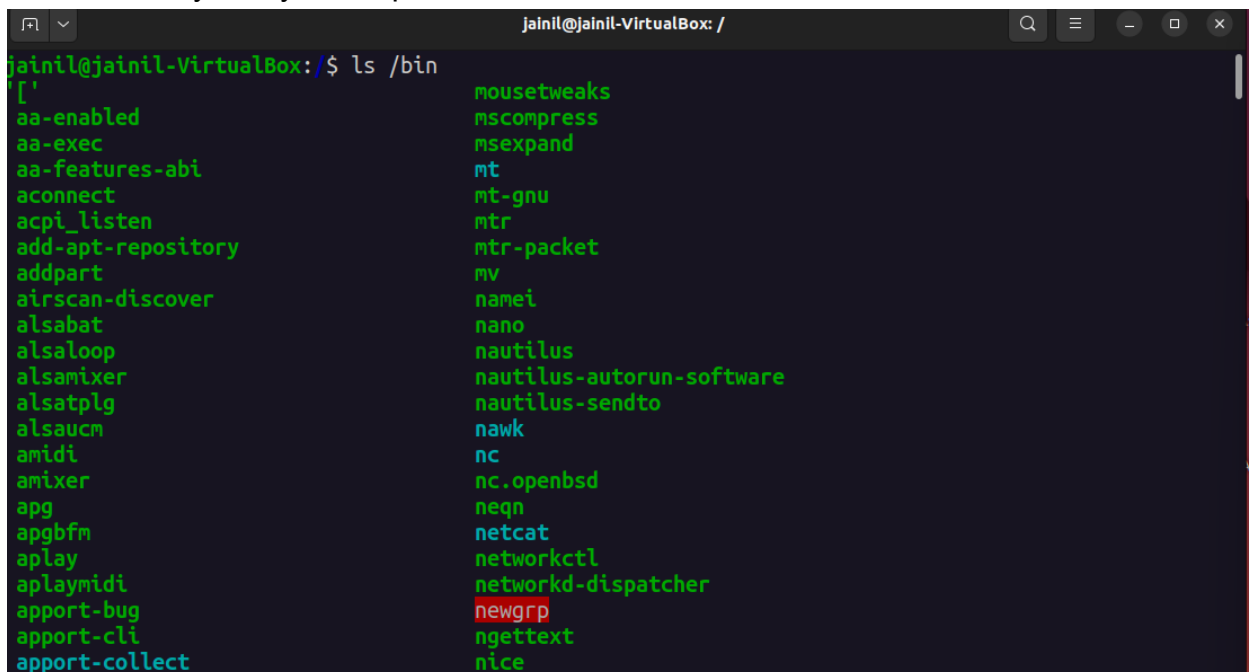
Linux file systems are organized in a hierarchical structure that starts with the root directory denoted by a forward slash `/`. Within this file system, various directories and files are organized to serve different purposes. `ls` command list of directory contents. Here are some common directories and their associated functions:

1. **/ (Root Directory):** The root directory is the top-level directory in the Linux file system. Everything in Linux is organized under this directory.



```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /  
bin      cdrom    etc      lib      lib64    lost+found  mnt  proc  run  snap  swapfile  tmp  var  
boot     dev      home    lib32    libx32   media      opt  root  sbin  srv   sys       usr
```

2. **/bin (Binary):** This directory contains essential binary executables (commands) required for system boot and repair. These executables are available to all users and are necessary for system operation.



```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /bin  
['  
aa-enabled  
aa-exec  
aa-features-abi  
aconnect  
acpi_listen  
add-apt-repository  
addpart  
airscan-discover  
alsabat  
alsaloop  
alsamixer  
alsatplg  
alsaucm  
amidi  
amixer  
apg  
apgbfm  
aplay  
aplaymidi  
apport-bug  
apport-cli  
apport-collect  
mousestweaks  
mscompress  
msexpand  
mt  
mt-gnu  
mtr  
mtr-packet  
mv  
namei  
nano  
nautilus  
nautilus-autorun-software  
nautilus-sendto  
nawk  
nc  
nc.openbsd  
neqn  
netcat  
networkctl  
networkd-dispatcher  
newgrp  
ngettext  
nice
```

3. **/boot:** This directory contains the bootloader configuration and the Linux kernel. It's crucial for the initial stages of the boot process.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /boot
config-6.2.0-26-generic      initrd.img-6.2.0-39-generic  System.map-6.2.0-39-generic
config-6.2.0-39-generic     initrd.img.old              vmlinuz
efi                          memtest86+.bin              vmlinuz-6.2.0-26-generic
grub                         memtest86+.elf              vmlinuz-6.2.0-39-generic
initrd.img                  memtest86+_multiboot.bin    vmlinuz.old
initrd.img-6.2.0-26-generic System.map-6.2.0-26-generic
jainil@jainil-VirtualBox:/$
```

4. **/dev (Device):** This directory contains special device files that represent hardware devices connected to the system, such as disks, terminals, or printers.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /dev
autofs          i2c-0          nvram           tty             tty29           tty5            ttyS11          ttyS4           vcsa2
block           initctl        port            tty0            tty3            tty50           ttyS12          ttyS5           vcsa3
bsg             input          ppp             tty1            tty30           tty51           ttyS13          ttyS6           vcsa4
btrfs-control   kmsg           psaux           tty10           tty31           tty52           ttyS14          ttyS7           vcsa5
bus             log            ptmx            tty11           tty32           tty53           ttyS15          ttyS8           vcsa6
cdrom           loop0          pts             tty12           tty33           tty54           ttyS16          ttyS9           vcsu
char            loop1          random           tty13           tty34           tty55           ttyS17          udmabuf         vcsu1
console         loop10         rfkill           tty14           tty35           tty56           ttyS18          uhid            vcsu2
core            loop2          rtc             tty15           tty36           tty57           ttyS19          uinput          vcsu3
cpu             loop3          rtc0            tty16           tty37           tty58           ttyS2            urandom         vcsu4
cpu_dma_latency loop4          sda             tty17           tty38           tty59           ttyS20          userfaultfd     vcsu5
cuse            loop5          sda1            tty18           tty39           tty6            ttyS21          userio          vcsu6
disk            loop6          sda2            tty19           tty4            tty60           ttyS22          vboxguest       vfio
dma_heap        loop7          sda3            tty2            tty40           tty61           ttyS23          vboxuser        vga_arbiter
dri             loop8          sg0             tty20           tty41           tty62           ttyS24          vcs             vhci
ecryptfs        loop9          sg1             tty21           tty42           tty63           ttyS25          vcs1            vhost-net
fb0             loop-control   shm             tty22           tty43           tty7            ttyS26          vcs2            vhost-vsock
fd              mapper         snapshot        tty23           tty44           tty8            ttyS27          vcs3            zero
full            mcelog         snd             tty24           tty45           tty9            ttyS28          vcs4            zfs
fuse            mem            sr0             tty25           tty46           tty46           ttyS29          vcs5
hpet            mqueue         stderr           tty26           tty47           tty50           ttyS3            vcs6
hugepages       net            stdin            tty27           tty48           tty51           ttyS30          vcsa
hwrng           null           stdout           tty28           tty49           ttyS10          ttyS31          vcsa1
```

5. **/etc (Etcetera):** This directory contains system-wide configuration files and scripts. It's where you'll find files for system settings, network configuration, and more.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /etc
acpi              gai.conf         magic             rygel.conf
adduser.conf      gdb              magic.mime        sane.d
alsa              gdm3             mailcap           security
alternatives      geoclue          mailcap.order     selinux
anacrontab        ghostscript      manpath.config    sensors3.conf
apg.conf          glvnd            mime.types        sensors.d
apm               gnome            mke2fs.conf       services
apparmor          groff            ModemManager      sgml
apparmor.d        group            modprobe.d        shadow
appport           group-           modules            shadow-
appstream.conf    grub.d           modules-load.d    shells
apt               gshadow          ntab              skel
avahi             gshadow-         nanorc            snmp
bash.bashrc       gss              netconfig         speech-dispatcher
bash_completion   gtk-2.0          netplan           ssh
bash_completion.d gtk-3.0          network           ssl
bindresvport.blacklist hdparm.conf      networkd-dispatcher subgid
binfmt.d          host.conf        NetworkManager    subgid-
bluetooth         hostid           newt               subuid
brlapi.key        hostname         nftables.conf     subuid-
brltty            hosts            nsswitch.conf     sudo.conf
brltty.conf       hosts.allow      openvpn            sudoers
ca-certificates   hosts.deny
```

6. **/home:** This is the location of user home directories. Each user has a subdirectory here, and they typically store their personal files and settings.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /home
jainil
jainil@jainil-VirtualBox:/$
```

7. **/lib (Library)**: Essential shared libraries needed by the system and applications are stored here.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /lib
apg                               initramfs-tools                  python3
apparmor                          ispell                          python3.10
apt                               kernel                           python3.11
aspell                            klibc                           recovery-mode
binfmt.d                         klibc-K8e6D0mVI9JpyGMLR7qNe5iZeBk.so rhythmbox
bluetooth                        libreoffice                      rsyslog
brltty                            linux                            sasl2
cnf-update-db                    linux-boot-probes               shim
command-not-found                linux-sound-base                snapd
console-setup                    locale                           software-properties
cpp                               lp_solve                        speech-dispatcher-modules
crda                              lsb                              ssl
cups                              man-db                           sysctl.d
dbus-1.0                          memtest86+                      systemd
debug                             mime                             sysusers.d
dpkg                              modprobe.d                      tc
emacsens-common                  modules                          terminfo
environment.d                    modules-load.d                  thunderbird
evolution-data-server            netplan                         thunderbird-addons
file                              networkd-dispatcher             tmpfiles.d
firewalld                        NetworkManager                  ubiquity
firmware                         nvidia                          ubuntu-advantage
gcc                              openssh                          ubuntu-release-upgrader
```

8. **/media**: Removable media, such as USB drives or optical discs, are typically mounted in subdirectories under /media when they're inserted.
9. **/mnt (Mount)**: Historically used as a temporary mount point for mounting file systems, though /media is commonly used for this purpose today.
10. **/opt (Optional)**: This directory is often used for optional, third-party software packages. Some applications install in subdirectories under /opt.
11. **/proc (Process)**: This is a virtual file system that provides information about currently running processes and system status.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /proc
1      12504  15    1838  2018  2487  47    559   74    execdomains  pagetypeinfo
10     12509  1504  1846  2023  25    479   56    75    fb           partitions
10716  12527  1512  1866  205   2516  48    562   772    filesystems  pressure
11     12548  1519  1873  2068  2538  480   564   8     fs           schedstat
11011  12825  1522  1886  2086  26    481   567   83    interrupts   scsi
112    12831  1563  19    21    27    49    57    85    iomem        self
11387  12832  16    1919  2138  28    5    571   86    ioports      slabinfo
1143   12861  1601  1940  2141  286   50    59    90    irq          softirqs
11481  12889  1616  1942  2146  29    51    6    940    kallsyms     stat
11514  12933  1624  1967  2155  3    52    60   953    kcore        swaps
11528  12934  1626  1968  22    307   527   61    acpi         keys          sys
11567  12935  165   1970  2234  31    528   62    asound       key-users     sysrq-trigger
11674  12954  166   1971  2250  32    53    639    bootconfig   kmsg          sysvipc
11826  13    1684  1977  2255  33    531   64    buddyinfo    kpagecgroup  thread-self
11851  133    17    1988  2256  34    532   642    bus           kpagecount    timer_list
12     134    1728  1990  2281  35    533   647    cgroups      kpageflags    tty
12011  14    1734  1992  2282  38    534   66    cmdline      loadavg       uptime
12285  1433   1746  1994  23    39    54    67    consoles     locks         version
12307  1484   1769  1995  2312  3922  543   672    cpuinfo      mdstat        version_signature
12328  1485   1775  2    2341  4    547   68    crypto       meminfo       vmallocinfo
12369  1491   1780  20    2370  40    549   69    devices      misc          vmstat
124    1492   1790  2001  245   41    55    699    diskstats    modules       zoneinfo
12470  1493   1816  2003  2459  42    551   719    dma           mounts
```

12. **/root**: This is the home directory for the superuser (root). The root user is the administrative user with the highest privileges.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ sudo ls /root
[sudo] password for jainil:
snap
jainil@jainil-VirtualBox:/$ sudo tree /root
/root
├── snap
│   ├── firefox
│   │   ├── 2987
│   │   ├── common
│   │   └── current -> 2987
│   ├── snapd-desktop-integration
│   │   ├── 83
│   │   ├── common
│   │   └── current -> 83
│   └── snap-store
│       ├── 959
│       ├── common
│       └── current -> 959
13 directories, 0 files
jainil@jainil-VirtualBox:/$
```

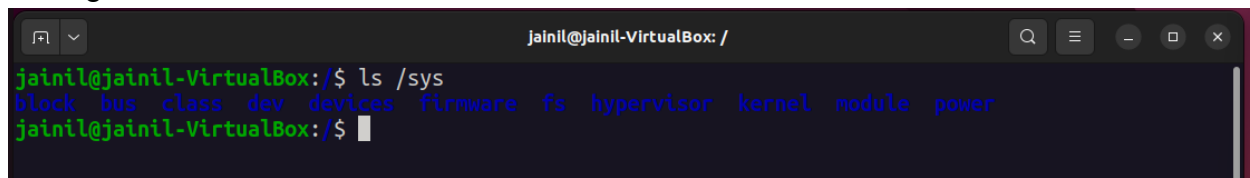
13. **/run**: This directory holds system runtime data, such as process IDs and socket files. It is often a tmpfs file system that is cleared at boot.

```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /run
acpid.pid      crond.pid      initctl        NetworkManager  snapd           tmpfiles.d
acpid.socket   crond.reboot   initramfs      openvpn          snapd-snap.socket  udev
alsa           cups           irabalance     openvpn-client  snapd.socket     udisks2
avahi-daemon   dbus           lock           openvpn-server  speech-dispatcher  user
blkid          fsck           log            plymouth        spice-vdagentd     utmp
console-setup  gdm3           mount          sendsigs.omit.d sudo             uuidd
credentials    gdm3.pid       netns          shm             systemd
jainil@jainil-VirtualBox:/$
```

14. **/bin (System Binary)**: Similar to /bin, but it contains binary executables that are typically used for system maintenance and repair.


```
jainil@jainil-VirtualBox: /
jainil@jainil-VirtualBox:/$ ls /bin
['
aa-enabled      mousetweaks
aa-exec         mscompress
aa-features-abi msexpand
aconnect        mt
acpi_listen     mt-gnu
add-apt-repository mtr
addpart         mtr-packet
airscan-discover mv
alsabat         namei
alsaloop        nano
alsamixer       nautilus
alsatplg        nautilus-autorun-software
alsaucm         nautilus-sendto
amidi           nawk
amixer          nc
apg             nc.openbsd
apgbfm          neqn
aplay           netcat
aplaymidi       networkctl
appport-bug     networkd-dispatcher
appport-cli     newgrp
appport-collect ngettext
nice
```

15. **/srv (Service)**: This directory can be used for data and service-specific files. For example, web server data might be located under /srv.
16. **/sys (System)**: A virtual file system that exposes kernel information and configuration settings.



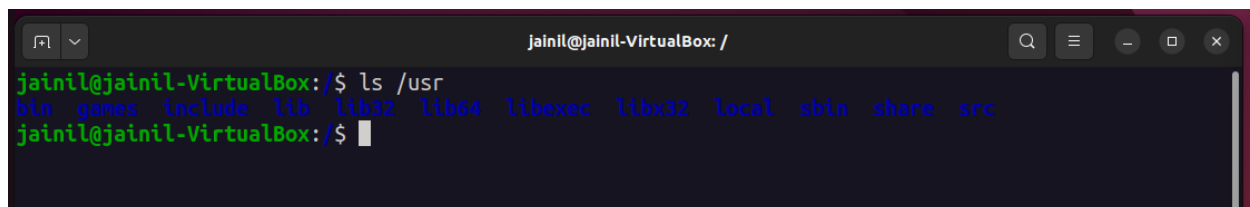
```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /sys  
block bus class dev devices firmware fs hypervisor kernel module power  
jainil@jainil-VirtualBox:/$
```

17. **/tmp (Temporary)**: A directory for temporary files that are not intended to be preserved across reboots. It's often used for storing temporary data by applications.



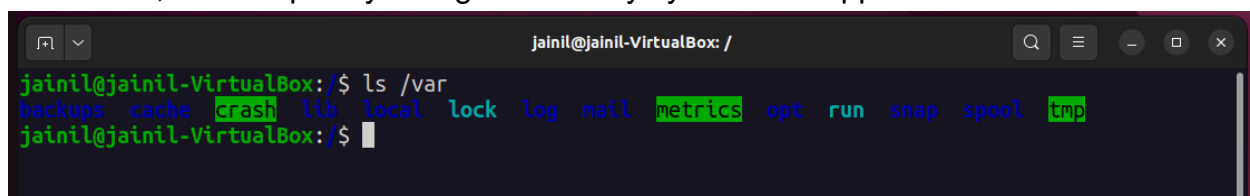
```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /tmp  
snap-private-tmp  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-colord.service-msotkx  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-ModemManager.service-gKR5nz  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-power-profiles-daemon.service-MeMaLY  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-switcheroo-control.service-Ovt01Q  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-systemd-logind.service-bdZbGK  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-systemd-oond.service-OfHkBr  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-systemd-resolved.service-EhUigC  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-systemd-timesyncd.service-LAE1Ba  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-ubuntu-advantage-desktop-daemon.service-ZyFluH  
systemd-private-5ab7ee91af57413da98774aa3c6e30d0-upower.service-oNYaHG  
tracker-extract-3-files.1000  
tracker-extract-3-files.128  
VMwareDnD  
jainil@jainil-VirtualBox:/$
```

18. **/usr (User System Resources)**: This directory contains user data and program files. It's subdivided into /usr/bin, /usr/lib, /usr/share, etc.



```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /usr  
bin games include lib lib32 lib64 libexec libx32 local sbin share src  
jainil@jainil-VirtualBox:/$
```

19. **/var (Variable)**: This directory contains variable data, including log files, spool directories, and temporary files generated by system and applications.



```
jainil@jainil-VirtualBox: /  
jainil@jainil-VirtualBox:/$ ls /var  
backups cache crash lib local lock log mail metrics opt run snap spool tmp  
jainil@jainil-VirtualBox:/$
```