

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.

```
venis@venis-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.

```
venis@venis-VirtualBox:/$ ls /bin
['aa-enabled', 'aa-exec', 'aa-features-abi', 'aconnet', 'acpi_listen', 'add-apt-repository', 'addpart', 'airscan-discover', 'alsabat', 'alsaaloop', 'alsamixer', 'alsatplg', 'alsaucm', 'amidi', 'amixer', 'apg', 'apgbfm', 'aplay', 'aplaymidi', 'apport-bug', 'apport-cli', 'apport-collect', 'apport-unpack', 'appres', 'appstreamcli', 'apropos', 'apt', 'apt-add-repository', 'gtk4-encode-symbolic-svg', 'gtk4-launch', 'gtk4-query-settings', 'gtk4-update-icon-cache', 'gtk-builder-tool', 'gtk-encode-symbolic-svg', 'gtk-launch', 'gtk-query-settings', 'gtk-update-icon-cache', 'gunzip', 'gzexe', 'gzip', 'h2ph', 'h2xs', 'hardlink', 'hbpldecode', 'hciattach', 'hcidconfig', 'hcitool', 'hd', 'head', 'HEAD', 'helpztags', 'hex2hcd', 'hexdump', 'hipercdecode', 'host', 'hostid', 'hostname', 'pw-midirecord', 'pw-mon', 'pw-play', 'pw-profiler', 'pw-record', 'pw-reserve', 'pw-top', 'pw-v4l2', 'py3clean', 'py3compile', 'py3versions', 'pydoc3', 'pydoc3.10', 'pygettext3', 'pygettext3.10', 'python3', 'python3.10', 'python3-futurize', 'python3-pasteurize', 'pzstd', 'qpdfdecode', 'quirks-handler', 'rbash', 'rcp', 'rctest', 'rdiffdir', 'rdma', 'readlink', 'realpath']
```

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

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

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

```

venis@venis-VirtualBox:/$ ls /dev
autofs          hidraw0        loop4          rfskill        tty11          tty3           tty48          tty9            ttyS25          vboxguest      vcsu4
block           hpet           loop5          rtc             tty12          tty30          tty49          ttyprintk       ttyS26          vboxuser       vcsu5
bsg             hugepages      loop6          rtc0            tty13          tty31          tty5           ttyS0           ttyS27          vcs            vcsu6
btrfs-control   hwrng          loop7          sda             tty14          tty32          tty50          ttyS1           ttyS28          vcs1           vfio
bus             i2c-0          loop8          sda1            tty15          tty33          tty51          ttyS10          ttyS29          vcs2           vga_arbite
cdrom           initctl        loop9          sda2            tty16          tty34          tty52          ttyS11          ttyS3           vcs3           vhci
char            input          loop-control   sda3            tty17          tty35          tty53          ttyS12          ttyS30          vcs4           vhost-net
console         kmsg           mapper         sg0             tty18          tty36          tty54          ttyS13          ttyS31          vcs5           vhost-vsoc
core            log            mcelog         sg1             tty19          tty37          tty55          ttyS14          ttyS4           vcs6           zero
cpu             loop0          mem            shm             tty2           tty38          tty56          ttyS15          ttyS5           vcsa           zfs
cpu_dma_latency loop1           mqueue         snapshot        tty20          tty39          tty57          ttyS16          ttyS6           vcsa1
cuse            loop10         net            snd             tty21          tty4           tty58          ttyS17          ttyS7           vcsa2
disk            loop11         null           sr0             tty22          tty40          tty59          ttyS18          ttyS8           vcsa3
dma_heap        loop12         nvram          stderr          tty23          tty41          tty6           ttyS19          ttyS9           vcsa4
dri             loop13         port           stdin           tty24          tty42          tty60          ttyS2           udmabuf         vcsa5
ecryptfs        loop14         ppp            stdout          tty25          tty43          tty61          ttyS20          uhid            vcsa6
fb0             loop15         psaux          tty             tty26          tty44          tty62          ttyS21          uinput          vcsu
fd              loop16         ptmx           tty0            tty27          tty45          tty63          ttyS22          urandom         vcsu1
full            loop2          pts            tty1            tty28          tty46          tty7           ttyS23          userfaultfd     vcsu2
fuse            loop3          random         tty10           tty29          tty47          tty8           ttyS24          userio          vcsu3

```

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

```

venis@venis-VirtualBox:/$ ls /etc
acpi                dpkg                issue.net           nsswitch.conf       shadow
adduser.conf        e2scrub.conf        kernel              openvpn              shadow-
alsa                emacs               kernel-img.conf     opt                  shells
alternatives        environment          kerneloops.conf     os-release           skel
anacrontab          envronment.d        ldap                PackageKit           snmp
apg.conf             ethertypes          ld.so.cache         pam.conf             speech-dispatcher
apm                 firefox             ld.so.conf          pam.d                ssh
apparmor             fonts               ld.so.conf.d        papersize             ssl
apparmor.d           fstab               legal               passwd               subgid
appopt              fuse.conf            libao.conf           passwd-              subgid-
appstream.conf       fwupd               libaudit.conf        pcmcia               subuid
apt                  gai.conf            libblockdev          perl                  subuid-
avahi                 gdm3                libnl-3              pki                   sudo.conf
bash.bashrc          gdb                  libpaper.d           pm                     sudoers
bash_completion      gdm3                libreoffice          pnm2ppa.conf         sudoers.d
bash_completion.d    geoclue              locale.alias         polkit-1              sudo_logsrvd.conf
bindresvport.blacklist ghostscript           locale.gen           ppp                    sysctl.conf
binfmt.d             glvnd                localtime            printcap              sysctl.d
bluetooth            gnome                logcheck             profile                systemd
brlapi.key            groff                login.defs            profile.d              terminfo
brlty                 group                logrotate.conf       protocols              thermald
brlty.conf            group-               logrotate.d           pulse                  thunderbird
ca-certificates       grub.d               lsb-release           python3                timezone
ca-certificates.conf gshadow              machine-id            python3.10             tmpfiles.d
ca-certificates.conf.dpkg-old gshadow-gss          magic                 rc0.d                  ubuntu-advantage
chatscripts           gss                  magic.mime            rc1.d                   ucf.conf
console-setup         gtk-2.0              mailcap               rc2.d                   udev
cracklib              gtk-3.0              mailcap.order         rc3.d                   udisks2
cron.d                hdparm.conf          manpath.config        rc4.d                   ufw
cron.daily             host.conf             mime.types            rc5.d                   update-manager
cron.hourly            hostid               mke2fs.conf          rc6.d                   update-motd.d

```

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.

```

venis@venis-VirtualBox:/$ ls /home
venis
venis@venis-VirtualBox:/$

```

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

```

venis@venis-VirtualBox:/$ ls /lib
apg                               gnome-shell                       netplan                           software-properties
apparmor                          gnupg                             networkd-dispatcher              speech-dispatcher-modules
apt                               gnupg2                            NetworkManager                   ssl
aspell                           groff                              nvidia                           sysctl.d
binfmt.d                         grub                               openssh                          systemd
bluetooth                       grub-legacy                      openvpn                          sysusers.d
britty                           gvfs                              os-prober                       tc
cnf-update-db                   hdparm                           os-probes                       terminfo
command-not-found               init                              os-release                      thunderbird
console-setup                   initramfs-tools                  pam.d                            thunderbird-addons
cpp                              ispell                           pcmciautils                     tmpfiles.d
crda                             kernel                           pkgconfig                       ubiquity
cups                             klibc                            pm-utils                        ubuntu-advantage
dbus-1.0                        klibc-K8e6D0mVI9JpyGMLR7qNe5iZeBk.so policykit-1                     ubuntu-release-upgrader
debug                           libreoffice                      polkit-1                        udev
dpkg                             linux                             pppd                            udisks2
emacs-common                    linux-boot-probes                pulse-15.99.1+dfsg1            ufw
environment.d                   linux-sound-base                 python2.7                       unity-settings-daemon-1.0
evolution-data-server           locale                           python3                          update-notifier
file                             lp_solve                         python3.10                      usrmerge
firewalld                       lsb                              python3.11                      valgrind
firmware                       man-db                           recovery-mode                   X11
gcc                             mentestB6+                      rhythmbox                       x86_64-linux-gnu
girepository-1.0                mime                             rsyslog                         xorg
gnome-session                   modprobe.d                      sasl2                           xserver-xorg-video-intel
gnome-settings-daemon-3.0       modules                         shim
gnome-settings-daemon-42        modules-load.d                  snapd
venis@venis-VirtualBox:/$

```

8. **/proc (Process)**: This is a virtual file system that provides information about currently running processes and system status.

```

venis@venis-VirtualBox:/$ ls /proc
1      1219 1364 1501 1556 1938 2608 35   514 6   978      fb      mdstat      sys
10     1223 1365 1509 1562 1980 2612 36   519 61  acpi     filesystems meminfo     sysrq-trigger
107    1231 1375 1511 1595 1997 2613 37   522 613 asound   fs         misc        sysvipc
108    1244 1384 1516 1596 2      262 38   523 63  bootconfig interrupts modules      thread-self
11     1250 1391 1517 16      20  2621 385  527 635 buddyinfo iomem      mounts      timer_list
111    1253 1395 1518 1605 2033 2664 39   53 64  bus      ioports    mtrr        tty
1127   1264 14      1519 1623 2051 27      4 539 669 cgroups   irq        net         uptime
1187   1266 1406 1520 1627 21  2707 41 54 676 cmdline  kallsyms   pagetypeinfo version
1195   1278 1446 1521 1640 22  28 42 543 677 consoles kcore      partitions  version_signature
1196   13      1451 1527 1683 224 281 43 545 678 cpuinfo  keys       pressure    vmallocinfo
12     1318 1452 1528 17 23 29 44 547 68 crypto   key-users  schedstat   vmstat
1202   132 1456 1529 1701 24 3 45 556 715 devices kmsg       scsi        zoneinfo
1203   133 1462 1530 1728 2519 30 46 559 721 diskstats kpagecgroup self
1205   1330 1473 1532 1775 2533 31 47 567 728 dma      kpagecount slabinfo
1206   1347 1480 1547 1811 2570 32 48 574 748 driver   kpageflags softirqs
1210   1349 1486 1553 1833 2575 33 5 582 8  dynamic_debug loadavg    stat
1212   1351 15 1555 19 2585 34 513 592 940 execdomains locks      swaps

```

9. **/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.

```

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

```

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

```

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

```