Exploring Linux Based Operating Systems

```
Module Code: COMP1712

Module Name: Computer Architectures and Operating Systems

Credits: 15

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```

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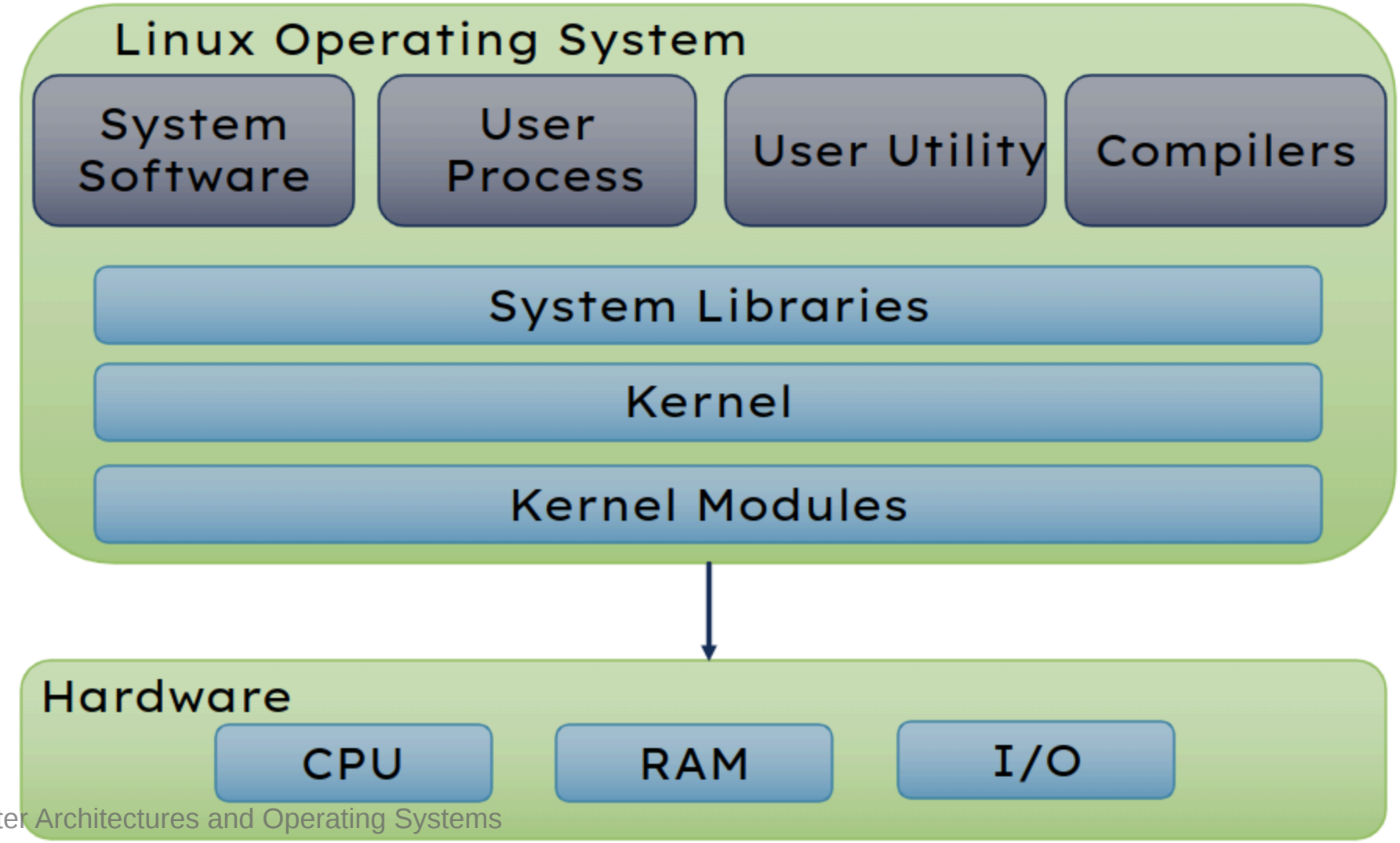
Linux System: Diagrammatic View



Linux A version of UNIX

Linux OSs have these primary components

- Kernel
- System Library
- System Utility
- User Application
- Hardware Platform

System Library 1

System libraries are special functions or programs using which application programs or system utilities accesses Kernel's features.

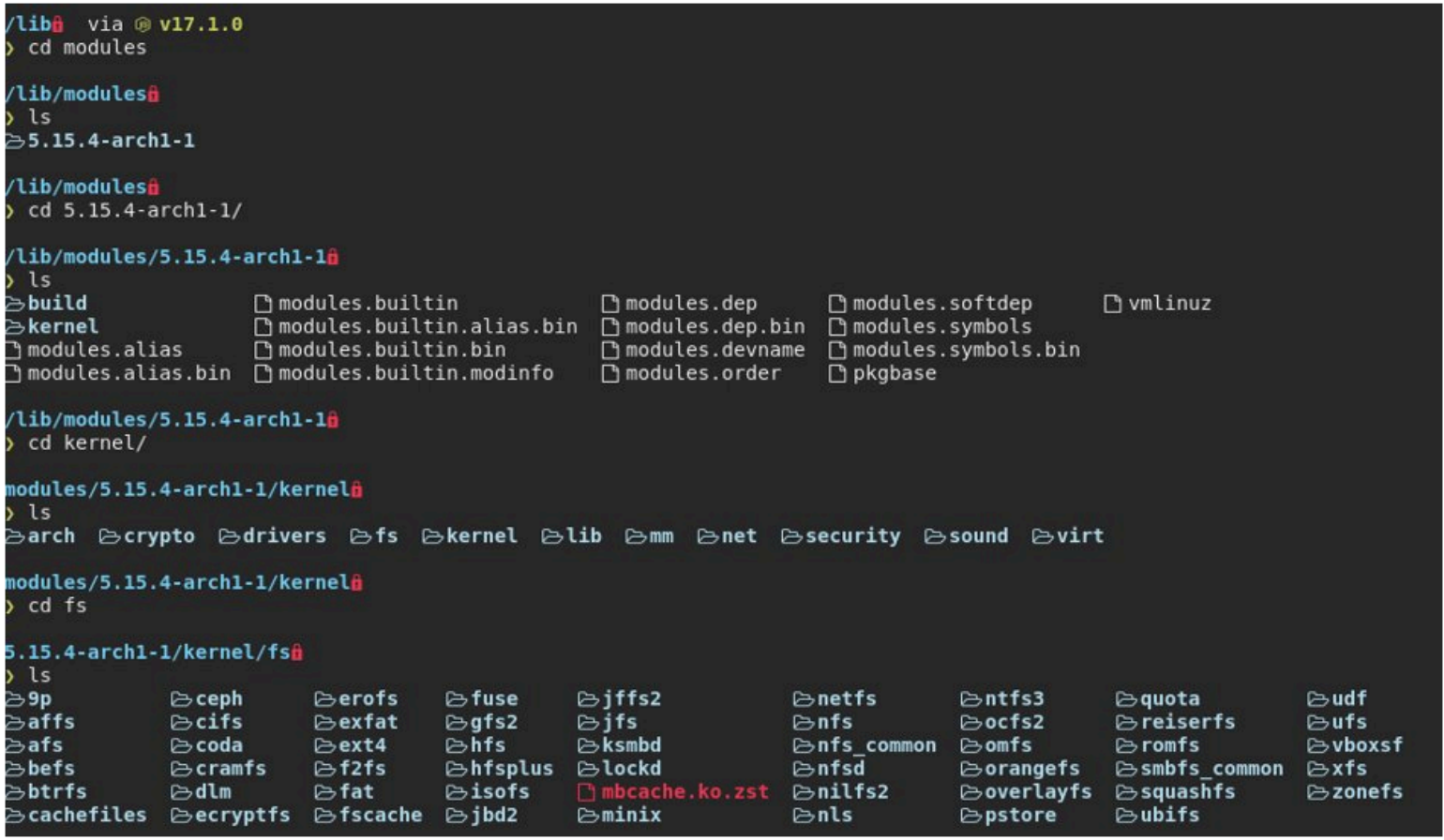
Examples of file extensions for libraries files:

- *.a - These are statically linked libraries. Static libraries are linked into programs.
- *.bin - These libraries are binary files.
- *.fw - Firmware files are special libraries/drivers for hardware.
- *.o - Many loadable kernel modules/objects are object files.
- *.so - These files are dynamically-linked shared libraries that are not linked put into programs. Rather, programs reference this library and obtain functions/code from it.

System Library 2

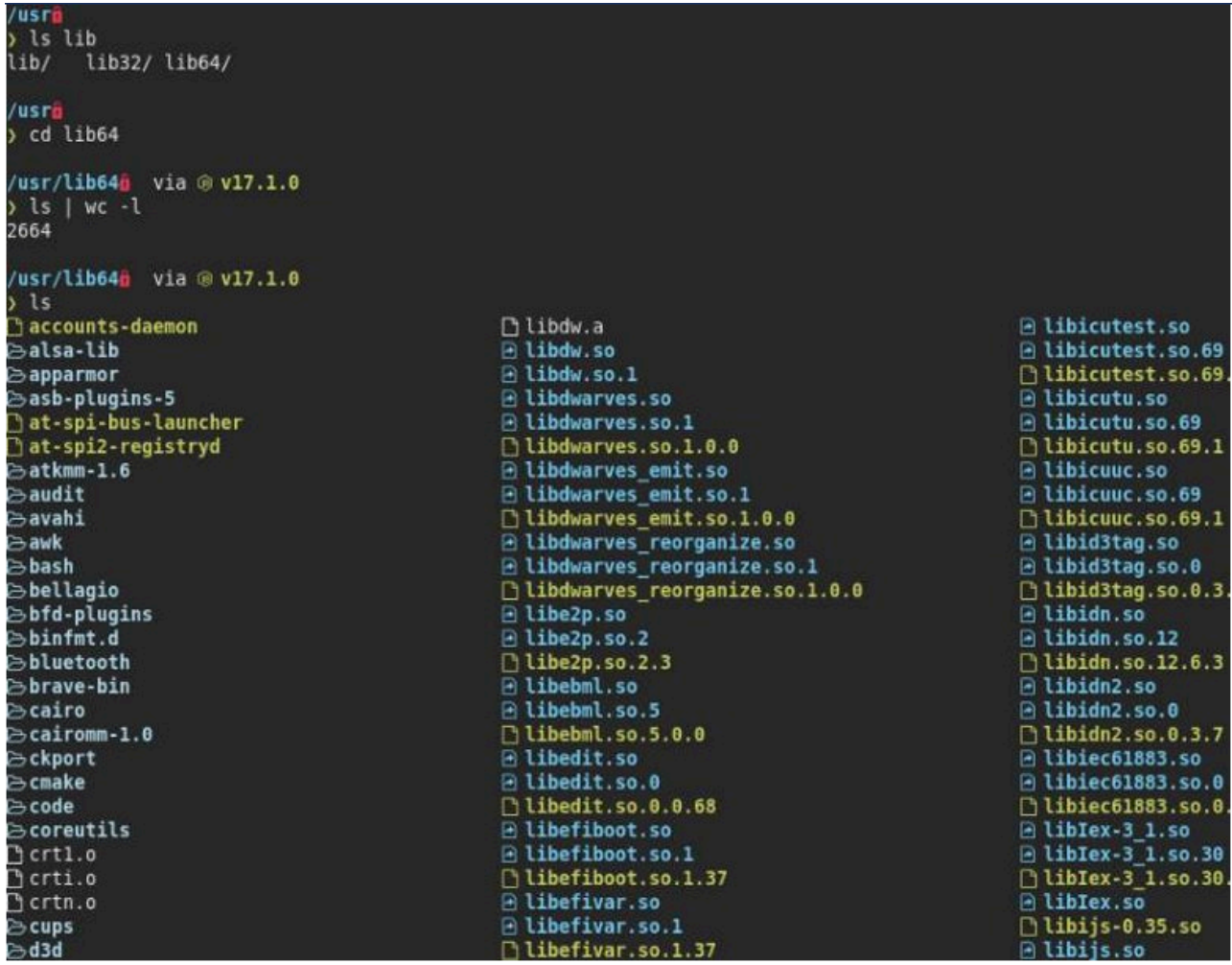
`/lib/` - The important shared library files are kept in here. Mainly these are system libraries or low-level libraries.

The Linux kernel modules are kept under `/lib/modules/` and firmware drivers are under `/lib/firmware/`.



System Library 3

- `/usr/lib/` - Program libraries are stored here. These libraries are either multiarch or specific to the current system
- `/usr/libexec/` - These are application-specific executable libraries.
- `/usr/lib32/` - 32-bit specific application libraries are found here.
- `/usr/lib64/` - 64-bit specific application libraries are found here.



System Library 4

Users can see a list of libraries needed by an executable by running the `"ldd"` command

`cp` – uses dynamic libraries

`brave` – uses static libraries that are built in to the executable

```
❯ ldd --help
Usage: ldd [OPTION]... FILE...
      --help              print this help and exit
      --version           print version information and exit
  -d, --data-relocs       process data relocations
  -r, --function-relocs   process data and function relocations
  -u, --unused            print unused direct dependencies
  -v, --verbose           print all information

For bug reporting instructions, please see:
<https://bugs.archlinux.org/>.

~
❯ ldd `which cp`
        linux-vdso.so.1 (0x00007ffdbe4d3000)
        libacl.so.1 => /usr/lib/libacl.so.1 (0x00007fde890e9000)
        libattr.so.1 => /usr/lib/libattr.so.1 (0x00007fde890e1000)
        libc.so.6 => /usr/lib/libc.so.6 (0x00007fde88f15000)
        /lib64/ld-linux-x86-64.so.2 => /usr/lib64/ld-linux-x86-64.so.2 (0x00007fde8912a000)

~
❯ ldd `which brave`
        not a dynamic executable

~
❯
```

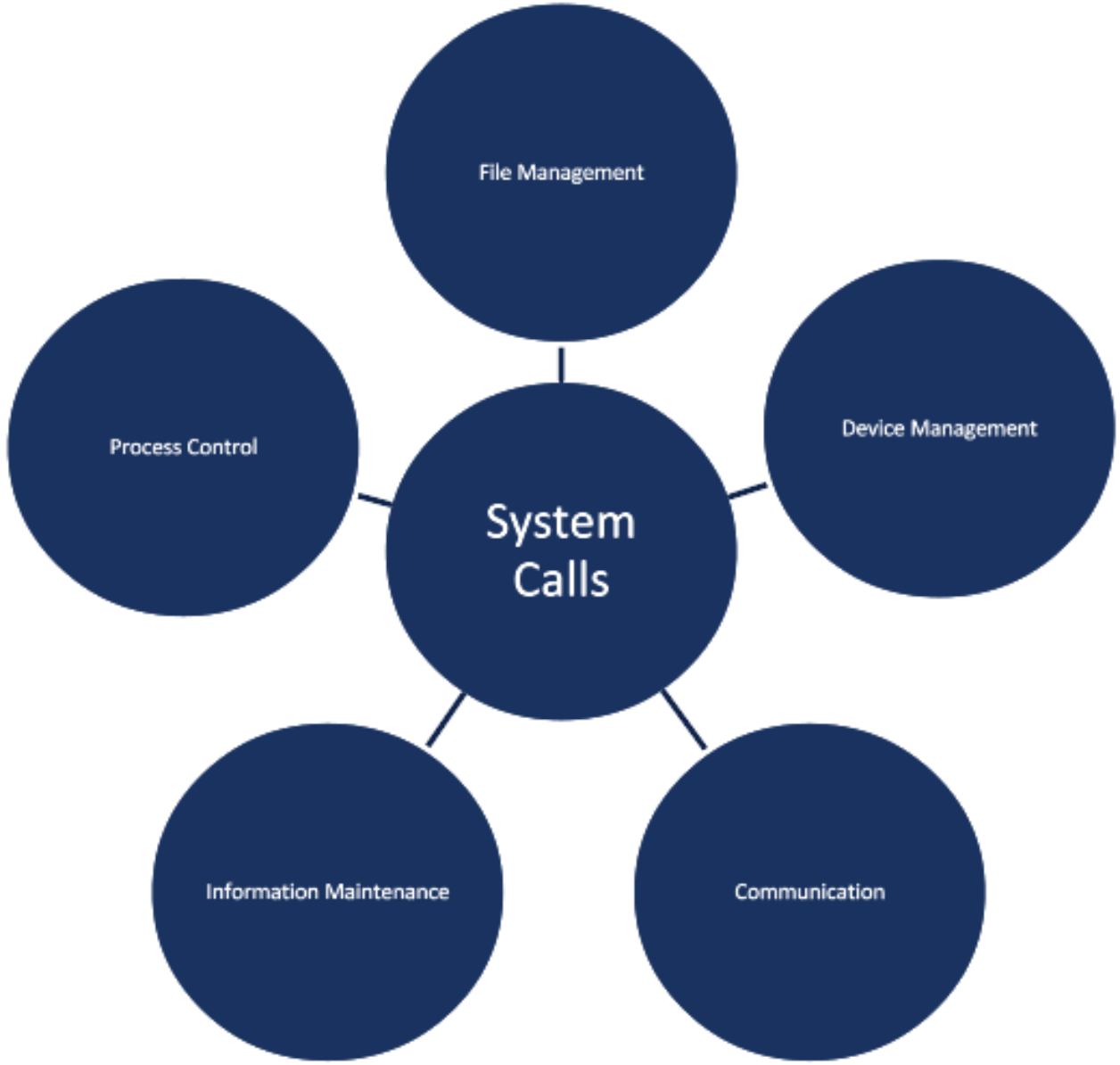
System Utility 1

System Utility programs are responsible to do specialized, individual level tasks.

The system utilities consist of various system interrupts and system calls which are to transfer the control for the user mode to the kernel mode containing the kernel and shell for further execution of the commands.

The control can be transferred using system calls.

System call is an interface between a



System Utility 2

File management system calls handle file manipulation jobs like creating a file, reading, and writing, etc.

The Linux System calls under this are:

`open()`: It is the system call to open a file.

`read()`: This system call opens the file in reading mode. Multiple processes can execute the `read()` system call on the same file simultaneously.

`write()`: This system call opens the file in writing mode. Multiple processes can not execute the `write()` system call on the same file simultaneously.

`close()`: This system call closes the opened file.

System Utility 3

Device management does the job of device manipulation like reading from device buffers, writing into device buffers, etc.

The Linux System calls under this is `ioctl()`.

`ioctl()`: is referred to as Input and Output Control.

It is a system call for device-specific input/output operations and other operations which cannot be expressed by regular system calls.

System Utility 4

Information Maintenance handles information and its transfer between the OS and the user program. In addition, OS keeps the information about all its processes and system calls are used to access this information.

`getpid()` : `getpid()` stands for Get the Process ID.

The function shall return the process ID of the calling process..

`alarm()`: This system call sets an alarm clock for the delivery of a signal that when it has to be reached.

`sleep()`: This System call suspends the execution of the currently running process for some interval of time.
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System Utility 5

These types of system calls are specially used for inter-process communications.

- **Message Passing**(processes exchange messages with one another)
- **Shared memory** (processes share memory region to communicate)
- `pipe()` : System call is used to communicate between different Linux processes.
- `shmget()` : Stands for shared memory segment. It is mainly used for Shared memory communication.
- `mmap()` : This function call is used to map or unmap files or devices into memory.

System Utility 6

Process Control system calls perform the task of process creation, process termination, etc.

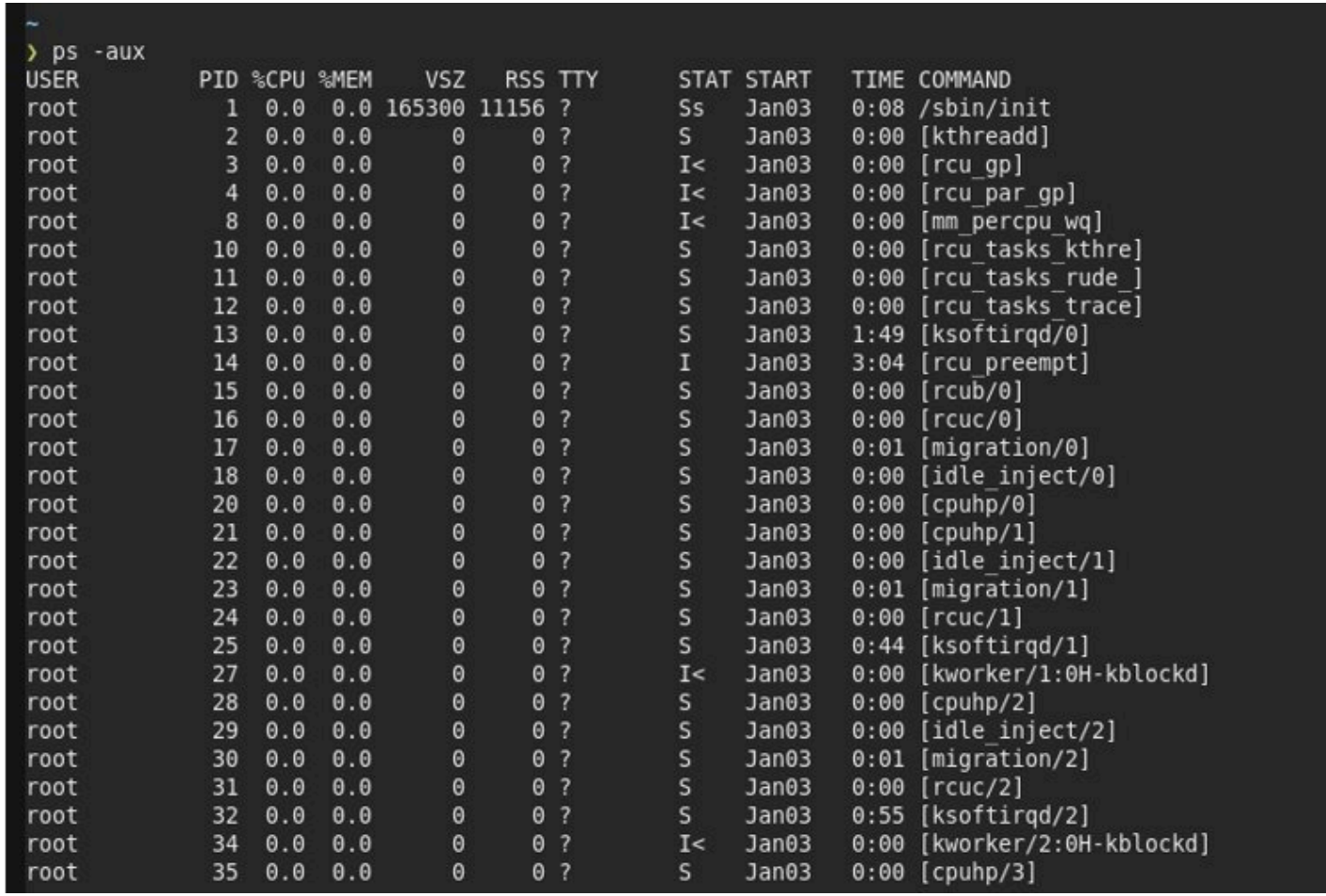
`fork()`: A new process is created by this system call. A new process may be created with `fork()` without a new program being run-the new sub-process simply continues to execute exactly the same program that the first (parent) process was running.

`exit()`: system call is used by a program to terminate its execution.

`exec()`: A new program will start executing after a call to `exec()`. Running a new program does not require that a new process be created first.

System Utility 7

`ps` is a system utility program for snapshotting of the current processes.



```
~
❯ ps -aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.0 165300 11156 ?        Ss   Jan03   0:08 /sbin/init
root           2  0.0  0.0      0     0 ?        S    Jan03   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        I<   Jan03   0:00 [rcu_gp]
root           4  0.0  0.0      0     0 ?        I<   Jan03   0:00 [rcu_par_gp]
root           8  0.0  0.0      0     0 ?        I<   Jan03   0:00 [mm_percpu_wq]
root          10  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcu_tasks_kthre]
root          11  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcu_tasks_rude_]
root          12  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcu_tasks_trace]
root          13  0.0  0.0      0     0 ?        S    Jan03   1:49 [ksoftirqd/0]
root          14  0.0  0.0      0     0 ?        I    Jan03   3:04 [rcu_preempt]
root          15  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcub/0]
root          16  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcuc/0]
root          17  0.0  0.0      0     0 ?        S    Jan03   0:01 [migration/0]
root          18  0.0  0.0      0     0 ?        S    Jan03   0:00 [idle_inject/0]
root          20  0.0  0.0      0     0 ?        S    Jan03   0:00 [cpuhp/0]
root          21  0.0  0.0      0     0 ?        S    Jan03   0:00 [cpuhp/1]
root          22  0.0  0.0      0     0 ?        S    Jan03   0:00 [idle_inject/1]
root          23  0.0  0.0      0     0 ?        S    Jan03   0:01 [migration/1]
root          24  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcuc/1]
root          25  0.0  0.0      0     0 ?        S    Jan03   0:44 [ksoftirqd/1]
root          27  0.0  0.0      0     0 ?        I<   Jan03   0:00 [kworker/1:0H-kblockd]
root          28  0.0  0.0      0     0 ?        S    Jan03   0:00 [cpuhp/2]
root          29  0.0  0.0      0     0 ?        S    Jan03   0:00 [idle_inject/2]
root          30  0.0  0.0      0     0 ?        S    Jan03   0:01 [migration/2]
root          31  0.0  0.0      0     0 ?        S    Jan03   0:00 [rcuc/2]
root          32  0.0  0.0      0     0 ?        S    Jan03   0:55 [ksoftirqd/2]
root          34  0.0  0.0      0     0 ?        I<   Jan03   0:00 [kworker/2:0H-kblockd]
root          35  0.0  0.0      0     0 ?        S    Jan03   0:00 [cpuhp/3]
```

ISO/IEC 9945-1:2000

> “Defines a standard operating system interface and environment, including a command interpreter (or "shell"), and common utility programs to support applications portability at the source code level.”

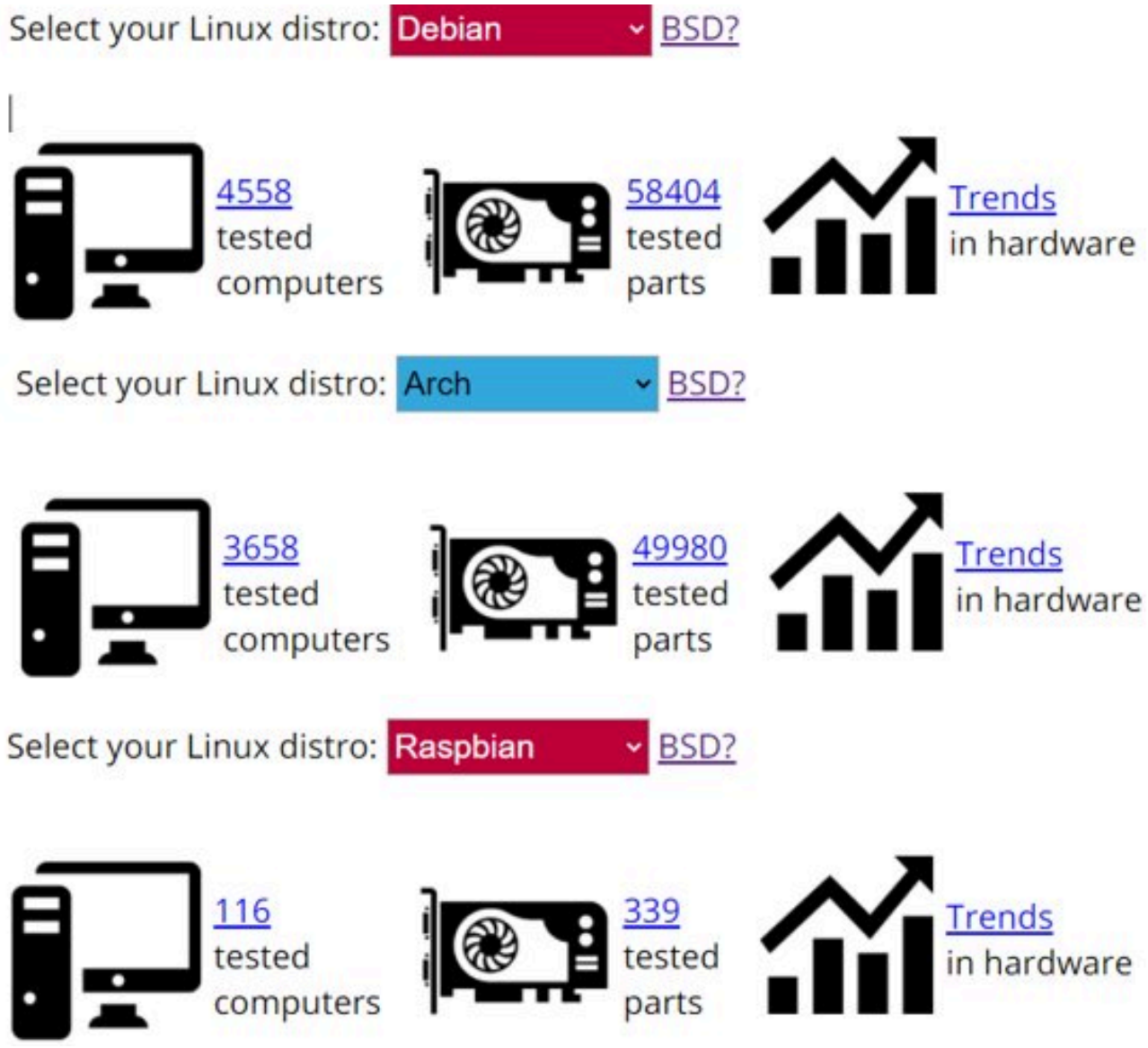
User Application

The application which user required to perform its task. example – office suites, VSCode, gcc, brave, etc

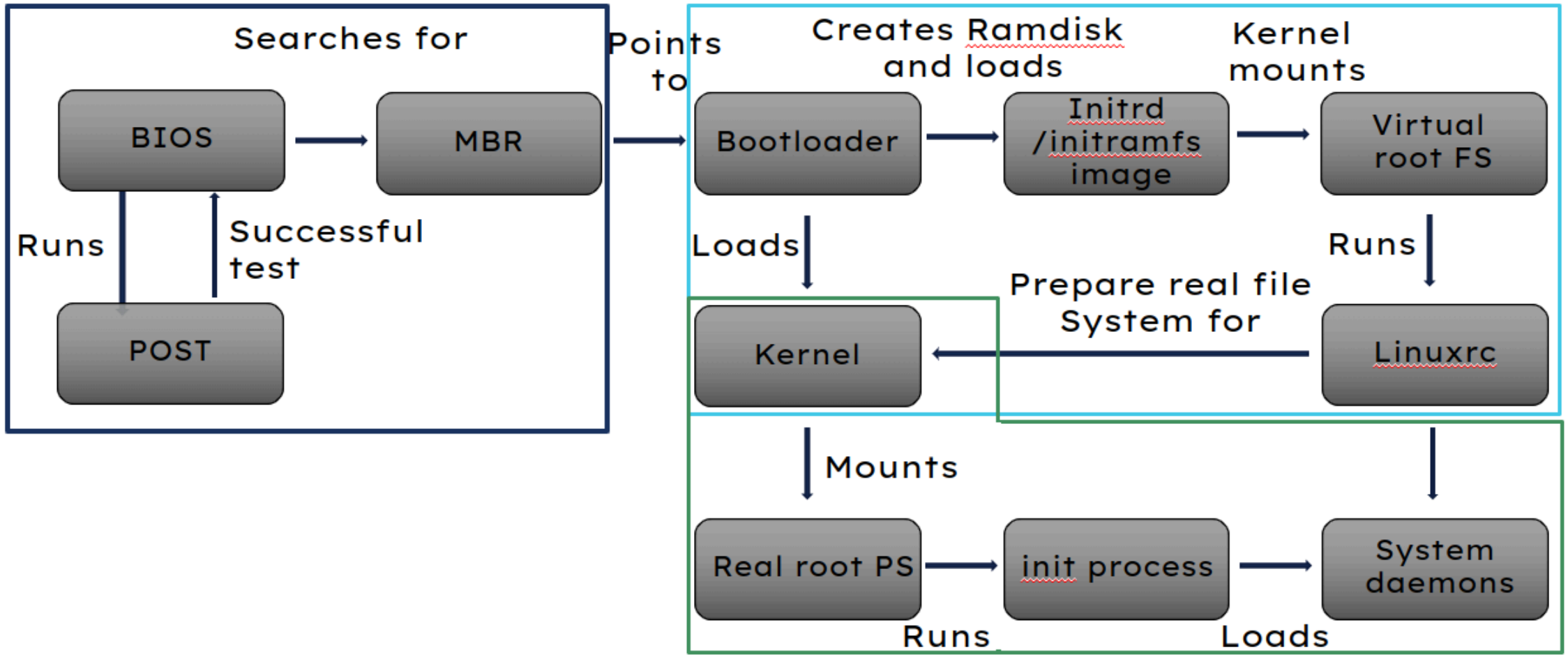
Hardware Platform

The resources of the system such as keyword, Monitor, Printer etc with which a user can input/output the request are supported by the Linux.

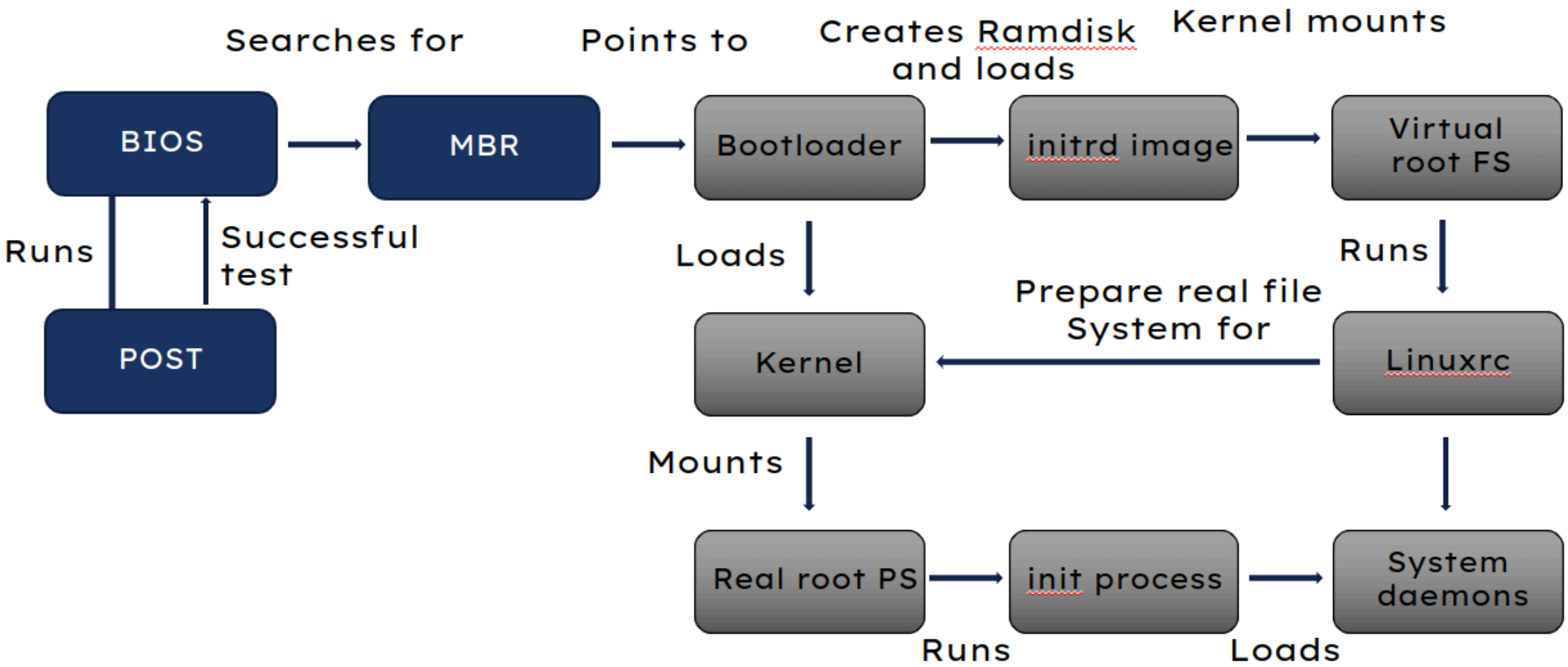
https://linux-hardware.org/



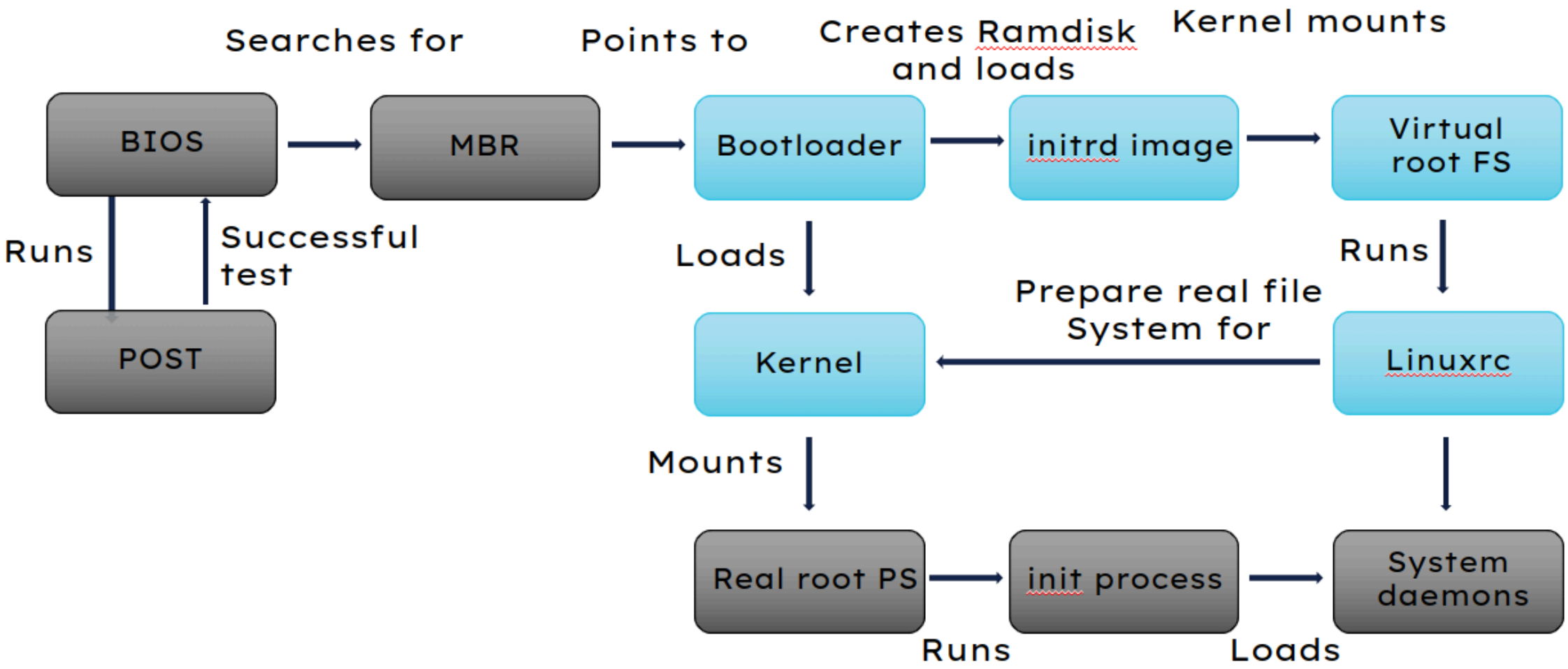
Boot Process



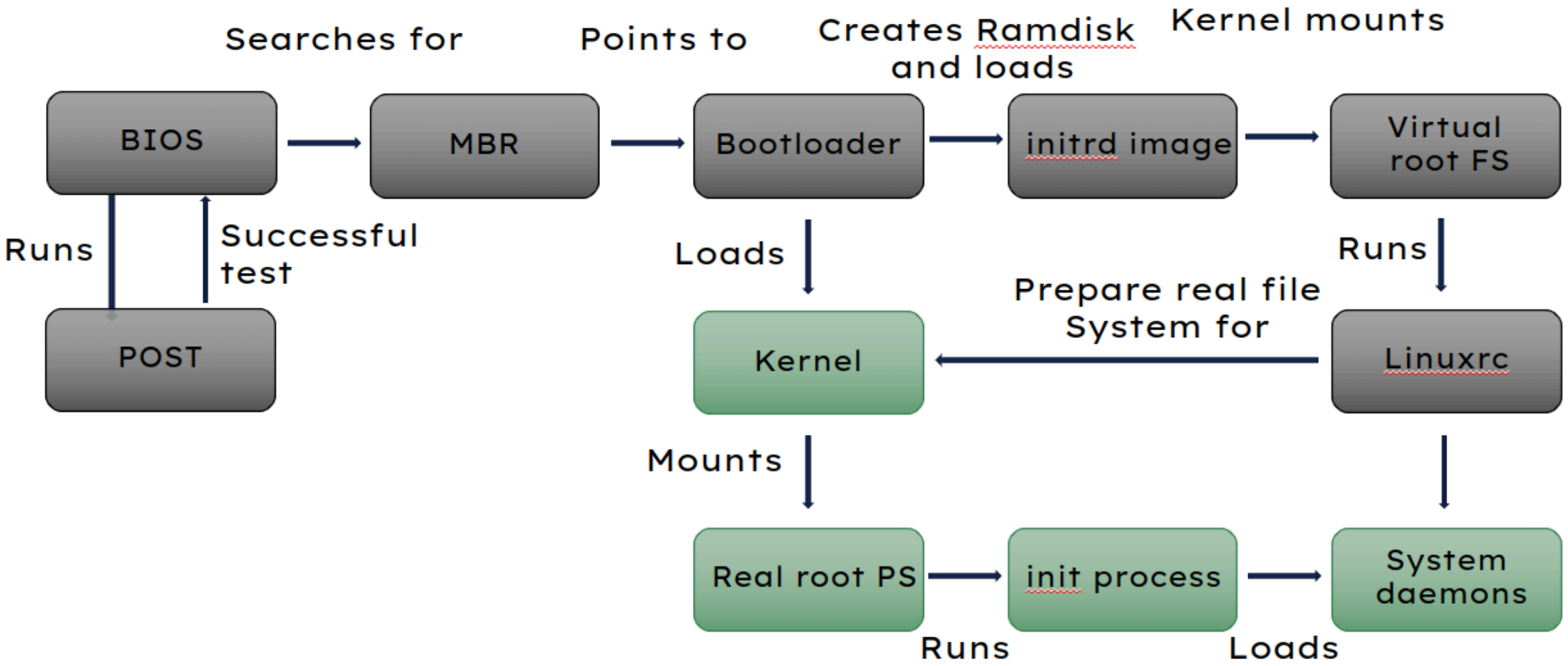
BIOS Stage


Searches for
Points to
Creates Ramdisk and loads
Kernel mounts
BIOS
MBR
Bootloader
initrd image
Virtual root FS
Runs
Successful test
Loads
Runs
Prepare real file System for
POST
Kernel
Linuxrc
Mounts
Real root PS
init process
System daemons
Runs
Loads

Bootloader Stage



Kernel Stage



Boot Process Log

```
Jan 12 10:13:06 nyx kernel: sd 0:0:0:0: [sda] Write Protect is off
Jan 12 10:13:06 nyx kernel: sd 0:0:0:0: [sda] Mode Sense: 00 3a 00 00
Jan 12 10:13:06 nyx kernel: sd 0:0:0:0: [sda] Write cache: enabled, read cache: enabled, doesn't support DPO or FUA
Jan 12 10:13:06 nyx kernel: sd 0:0:0:0: [sda] Attached SCSI disk
Jan 12 10:13:06 nyx kernel: Freeing unused decrypted memory: 2036K
Jan 12 10:13:06 nyx kernel: Freeing unused kernel image (initmem) memory: 1864K
Jan 12 10:13:06 nyx kernel: Write protecting the kernel read-only data: 28672k
Jan 12 10:13:06 nyx kernel: Freeing unused kernel image (text/rodata gap) memory: 2036K
Jan 12 10:13:06 nyx kernel: Freeing unused kernel image (rodata/data gap) memory: 1496K
Jan 12 10:13:06 nyx kernel: x86/mm: Checked W+X mappings: passed, no W+X pages found.
Jan 12 10:13:06 nyx kernel: rodata_test: all tests were successful
Jan 12 10:13:06 nyx kernel: Run /init as init process
Jan 12 10:13:06 nyx kernel:   with arguments:
Jan 12 10:13:06 nyx kernel:     /init
Jan 12 10:13:06 nyx kernel:   with environment:
Jan 12 10:13:06 nyx kernel:     HOME=/
Jan 12 10:13:06 nyx kernel:     TERM=linux
Jan 12 10:13:06 nyx kernel:     BOOT_IMAGE=/vmlinuz-linux
Jan 12 10:13:06 nyx kernel: fbcon: Taking over console
Jan 12 10:13:06 nyx kernel: Console: switching to colour frame buffer device 240x67
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: xHCI Host Controller
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: new USB bus registered, assigned bus number 1
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: hcc params 0x200077c1 hci version 0x110 quirks 0x0000000000009810
Jan 12 10:13:06 nyx kernel: sdhci: Secure Digital Host Controller Interface driver
Jan 12 10:13:06 nyx kernel: sdhci: Copyright(c) Pierre Ossman
Jan 12 10:13:06 nyx kernel: i8042: PNP: PS/2 Controller [PNP0303:PS2K] at 0x60,0x64 irq 1
Jan 12 10:13:06 nyx kernel: i8042: PNP: PS/2 appears to have AUX port disabled, if this is incorrect please boot with i8042.nopnp
Jan 12 10:13:06 nyx kernel: usb usb1: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 5.15
Jan 12 10:13:06 nyx kernel: usb usb1: New USB device strings: Mfr=3, Product=2, SerialNumber=1
Jan 12 10:13:06 nyx kernel: usb usb1: Product: xHCI Host Controller
Jan 12 10:13:06 nyx kernel: usb usb1: Manufacturer: Linux 5.15.13-arch1-1 xhci-hcd
Jan 12 10:13:06 nyx kernel: usb usb1: SerialNumber: 0000:00:14.0
Jan 12 10:13:06 nyx kernel: hub 1-0:1.0: USB hub found
Jan 12 10:13:06 nyx kernel: hub 1-0:1.0: 12 ports detected
Jan 12 10:13:06 nyx kernel: serio: i8042 KBD port at 0x60,0x64 irq 1
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: xHCI Host Controller
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: new USB bus registered, assigned bus number 2
Jan 12 10:13:06 nyx kernel: xhci_hcd 0000:00:14.0: Host supports USB 3.1 Enhanced SuperSpeed
Jan 12 10:13:06 nyx kernel: usb usb2: New USB device found, idVendor=1d6b, idProduct=0003, bcdDevice= 5.15
Jan 12 10:13:06 nyx kernel: usb usb2: New USB device strings: Mfr=3, Product=2, SerialNumber=1
Jan 12 10:13:06 nyx kernel: usb usb2: Product: xHCI Host Controller
Jan 12 10:13:06 nyx kernel: usb usb2: Manufacturer: Linux 5.15.13-arch1-1 xhci-hcd
Jan 12 10:13:06 nyx kernel: usb usb2: SerialNumber: 0000:00:14.0
Jan 12 10:13:06 nyx kernel: hub 2-0:1.0: USB hub found
Jan 12 10:13:06 nyx kernel: hub 2-0:1.0: 6 ports detected
Jan 12 10:13:06 nyx kernel: usb: port power management may be unreliable
```

Kernel Log

```
:13:06 nyx kernel: Linux version 5.15.13-arch1-1 (linux@archlinux) (gcc (GCC) 11.1.0, GNU ld (GNU Binutils) 2.36.1) #1 SMP PREEMPT Wed, 05 Jan 2022 16:20
:13:06 nyx kernel: Command line: BOOT_IMAGE=/vmlinuz-linux root=UUID=6b5b2843-50de-4cef-b562-658fad8e1aed rw loglevel=3 quiet snd-intel-dspcfg.dsp_driver
:13:06 nyx kernel: x86/fpu: Supporting XSAVE feature 0x001: 'x87 floating point registers'
:13:06 nyx kernel: x86/fpu: Supporting XSAVE feature 0x002: 'SSE registers'
:13:06 nyx kernel: x86/fpu: Supporting XSAVE feature 0x004: 'AVX registers'
:13:06 nyx kernel: x86/fpu: Supporting XSAVE feature 0x008: 'MPX bounds registers'
:13:06 nyx kernel: x86/fpu: Supporting XSAVE feature 0x010: 'MPX CSR'
:13:06 nyx kernel: x86/fpu: xstate_offset[2]:  576, xstate_sizes[2]:  256
:13:06 nyx kernel: x86/fpu: xstate_offset[3]:  832, xstate_sizes[3]:   64
:13:06 nyx kernel: x86/fpu: xstate_offset[4]:  896, xstate_sizes[4]:   64
:13:06 nyx kernel: x86/fpu: Enabled xstate features 0x1f, context size is 960 bytes, using 'compacted' format.
:13:06 nyx kernel: signal: max sigframe size: 2032
:13:06 nyx kernel: BIOS-provided physical RAM map:
:13:06 nyx kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000009efff] usable
:13:06 nyx kernel: BIOS-e820: [mem 0x000000000009f000-0x000000000000ffff] reserved
:13:06 nyx kernel: BIOS-e820: [mem 0x0000000000100000-0x00000000c25eafff] usable
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c25eb000-0x00000000c2aeafff] type 20
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c2aeb000-0x00000000c38cefff] reserved
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c38cf000-0x00000000c3acefff] ACPI NVS
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c3acf000-0x00000000c3b4efff] ACPI data
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c3b4f000-0x00000000c3b4ffff] usable
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000c3b50000-0x00000000d67fffff] reserved
:13:06 nyx kernel: BIOS-e820: [mem 0x00000000ff380000-0x00000000ffffffff] reserved
:13:06 nyx kernel: BIOS-e820: [mem 0x0000000100000000-0x00000004277fffff] usable
:13:06 nyx kernel: NX (Execute Disable) protection: active
:13:06 nyx kernel: efi: EFI v2.70 by HP
:13:06 nyx kernel: efi: ACPI=0xc3b4e000 ACPI 2.0=0xc3b4e014 ESRT=0xc2dca298 TPMFinalLog=0xc3a7d000 SMBIOS=0xc2db6000 MEMATTR=0xbe2e4018
:13:06 nyx kernel: SMBIOS 3.2 present.
:13:06 nyx kernel: DMI: HP HP ProBook 440 G7/869D, BIOS S71 Ver. 01.09.00 04/26/2021
:13:06 nyx kernel: tsc: Detected 2100.000 MHz processor
:13:06 nyx kernel: tsc: Detected 2099.944 MHz TSC
:13:06 nyx kernel: e820: update [mem 0x00000000-0x00000fff] usable ==> reserved
:13:06 nyx kernel: e820: remove [mem 0x000a0000-0x000fffff] usable
:13:06 nyx kernel: last_pfn = 0x427800 max_arch_pfn = 0x400000000
:13:06 nyx kernel: x86/PAT: Configuration [0-7]: WB  WC  UC- UC  WB  WP  UC- WT
:13:06 nyx kernel: last_pfn = 0xc3b50 max_arch_pfn = 0x400000000
:13:06 nyx kernel: esrt: Reserving ESRT space from 0x00000000c2dca298 to 0x00000000c2dca348.
:13:06 nyx kernel: Using GB pages for direct mapping
:13:06 nyx kernel: Secure boot disabled
:13:06 nyx kernel: RAMDISK: [mem 0x3658b000-0x372bcfff]
:13:06 nyx kernel: ACPI: Early table checksum verification disabled
:13:06 nyx kernel: ACPI: RSDP 0x00000000C3B4E014 000024 (v02 HPQOEM)
:13:06 nyx kernel: ACPI: XSDT 0x00000000C3AFC188 00013C (v01 HPQOEM SLIC-BPC 00000000 INTL 20160422)
:13:06 nyx kernel: ACPI: FACP 0x00000000C3B31000 000114 (v06 HPQOEM SLIC-BPC 00000000 HP   00000001)
:13:06 nyx kernel: ACPI: DSDT 0x00000000C3B06000 027F1A (v02 HPQOEM 869D     00000000 INTL 20160527)
:13:06 nyx kernel: ACPI: FACS 0x00000000C3A78000 000040
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B4C000 0002D7 (v01 HP     NVTEC    00000001 INTL 20160527)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B4B000 00012A (v02 HP     ShmTable 00000001 INTL 20160527)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B48000 0020AD (v02 CpuRef CpuSsdt  00003000 INTL 20160527)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B47000 000DF9 (v02 CtdpB  CtdpB    00001000 INTL 20160527)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B3A000 00CE82 (v02 AcpiRe PLT_RTD3 00001000 INTL 20160527)
:13:06 nyx kernel: ACPI: RTMA 0x00000000C3B39000 00009E (v01 HP      HBMART  00001000 HP   00000001)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B37000 001575 (v02 HP     UcsiAcpi 00000001 INTL 20160527)
:13:06 nyx kernel: ACPI: SSDT 0x00000000C3B36000 0000FB (v02 HP     UcsiCntr 00000001 INTL 20160527)
```

Systemmd Log

```
systemd[655]: Listening on p11-kit server.
systemd[655]: Listening on PipeWire Multimedia System Socket.
systemd[655]: Listening on Sound System.
systemd[655]: Listening on D-Bus User Message Bus Socket.
systemd[655]: Reached target Sockets.
systemd[655]: Reached target Basic System.
systemd[1]: Started User Manager for UID 1000.
systemd[655]: Starting Update XDG user dir configuration...
systemd[655]: Finished Update XDG user dir configuration.
systemd[655]: Reached target Main User Target.
systemd[655]: Startup finished in 112ms.
systemd[655]: Started D-Bus User Message Bus.
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='org.freedesktop.portal.Desktop' unit='xdg-desktop-portal.servi
systemd[655]: Created slice User Core Session Slice.
systemd[655]: Starting Portal service...
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='org.freedesktop.portal.Documents' unit='xdg-document-portal.se
systemd[655]: Starting flatpak document portal service...
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='org.freedesktop.impl.portal.PermissionStore' unit='xdg-permiss
systemd[655]: Starting sandboxed app permission store...
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.freedesktop.impl.portal.PermissionStore'
systemd[655]: Started sandboxed app permission store.
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.freedesktop.portal.Documents'
systemd[655]: Started flatpak document portal service.
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='org.freedesktop.impl.portal.desktop.gtk' unit='xdg-desktop-por
systemd[655]: Starting Portal service (GTK/GNOME implementation)...
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='org.a11y.Bus' unit='at-spi-dbus-bus.service' requested by ':1.
systemd[655]: Starting Accessibility services bus...
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.a11y.Bus'
systemd[655]: Started Accessibility services bus.
at-spi-bus-launcher[924]: dbus-daemon[924]: Activating service name='org.a11y.atspi.Registry' requested by ':1.0' (uid=1000 pid=894 comm="/usr/li
at-spi-bus-launcher[929]: dbus-daemon[929]: writing oom_score_adj error: Permission denied
at-spi-bus-launcher[924]: dbus-daemon[924]: Successfully activated service 'org.a11y.atspi.Registry'
at-spi-bus-launcher[929]: SpiRegistry daemon is running with well-known name - org.a11y.atspi.Registry
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.freedesktop.impl.portal.desktop.gtk'
systemd[655]: Started Portal service (GTK/GNOME implementation).
systemd[655]: Started PipeWire Multimedia Service.
dbus-daemon[686]: [session uid=1000 pid=686] Activating service name='org.freedesktop.secrets' requested by ':1.3' (uid=1000 pid=871 comm="/usr/l
dbus-daemon[1001]: writing oom_score_adj error: Permission denied
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.freedesktop.secrets'
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'org.freedesktop.portal.Desktop'
systemd[655]: Started Portal service.
systemd[655]: Starting Sound Service...
pulseaudio[1613]: stat('/etc/pulse/default.pa.d'): No such file or directory
systemd[655]: Started Sound Service.
dbus-daemon[686]: [session uid=1000 pid=686] Activating via systemd: service name='ca.desrt.dconf' unit='dconf.service' requested by ':1.8' (uid=
systemd[655]: Starting User preferences database...
dbus-daemon[686]: [session uid=1000 pid=686] Successfully activated service 'ca.desrt.dconf'
systemd[655]: Started User preferences database.
dbus-daemon[686]: [session uid=1000 pid=686] Reloaded configuration
dbus-daemon[686]: [session uid=1000 pid=686] Reloaded configuration
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dbus-daemon[686]: [session uid=1000 pid=686] Reloaded configuration
dbus-daemon[686]: [session uid=1000 pid=686] Reloaded configuration
(END)
```
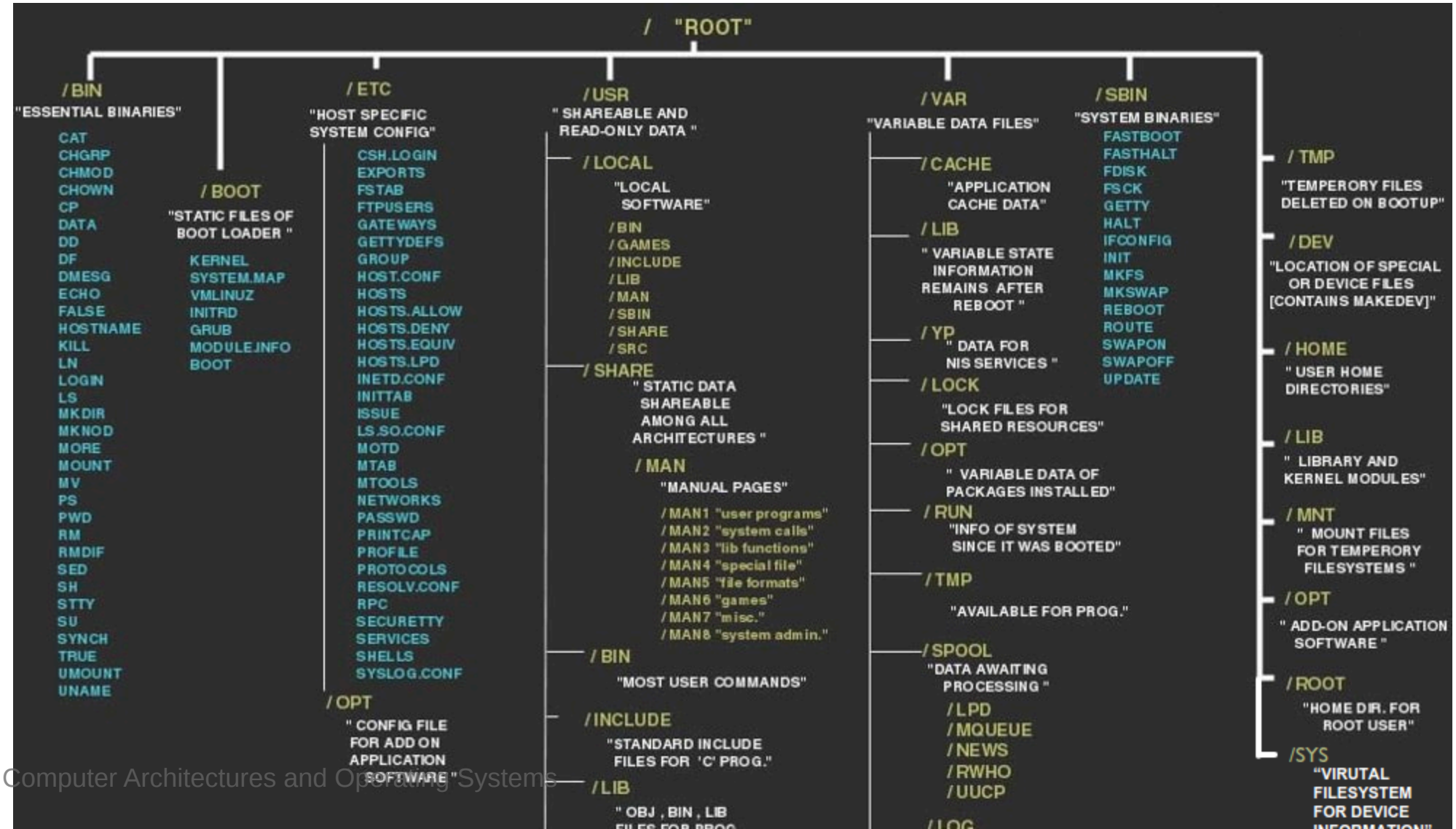

File System


/ "ROOT"
/BIN
"ESSENTIAL BINARIES"
CAT
CHGRP
CHMOD
CHOWN
CP
DATA
DD
DF
DMESG
ECHO
FALSE
HOSTNAME
KILL
LN
LOGIN
LS
MKDIR
MKNOD
MORE
MOUNT
MV
PS
PWD
RM
RMDIF
SED
SH
STTY
SU
SYNCH
TRUE
UMOUNT
UNAME
/BOOT
"STATIC FILES OF BOOT LOADER "
KERNEL
SYSTEM.MAP
VMLINUZ
INITRD
GRUB
MODULEJNFO
BOOT
/ETC
"HOST SPECIFIC SYSTEM CONFIG"
CSH.LOGIN
EXPORTS
FSTAB
FTPUSERS
GATEWAYS
GETTYDEFS
GROUP
HOST.CONF
HOSTS
HOSTS.ALLOW
HOSTS.DENY
HOSTS.EQUIV
HOSTS.LPD
INETD.CONF
INITTAB
ISSUE
LS.SO.CONF
MOTD
MTAB
MTOOLS
NETWORKS
PASSWD
PRINTCAP
PROFILE
PROTOCOLS
RESOLV.CONF
RPC
SECURETTY
SERVICES
SHELLS
SYSLOG.CONF
/OPT
" CONFIG FILE FOR ADD ON APPLICATION SOFTWARE "
/USR
" SHAREABLE AND READ-ONLY DATA "
/LOCAL
"LOCAL SOFTWARE"
/BIN
/GAMES
/INCLUDE
/LIB
/MAN
/SBIN
/SHARE
/SRC
/SHARE
" STATIC DATA SHAREABLE AMONG ALL ARCHITECTURES "
/MAN
"MANUAL PAGES"
/MAN1 "user programs"
/MAN2 "system calls"
/MAN3 "lib functions"
/MAN4 "special file"
/MAN5 "file formats"
/MAN6 "games"
/MAN7 "misc."
/MAN8 "system admin."
/BIN
"MOST USER COMMANDS"
/INCLUDE
"STANDARD INCLUDE FILES FOR 'C' PROG."
/LIB
" OBJ , BIN , LIB
/VAR
"VARIABLE DATA FILES"
/CACHE
"APPLICATION CACHE DATA"
/LIB
" VARIABLE STATE INFORMATION REMAINS AFTER REBOOT "
/YP
" DATA FOR NIS SERVICES "
/LOCK
"LOCK FILES FOR SHARED RESOURCES"
/OPT
" VARIABLE DATA OF PACKAGES INSTALLED"
/RUN
"INFO OF SYSTEM SINCE IT WAS BOOTED"
/TMP
"AVAILABLE FOR PROG."
/SPOOL
"DATA AWAITING PROCESSING "
/LPD
/MQUEUE
/NEWS
/RWHO
/UUCP
/SBIN
"SYSTEM BINARIES"
FASTBOOT
FASTHALT
FDISK
FSCK
GETTY
HALT
IFCONFIG
INIT
MKFS
MKSWAP
REBOOT
ROUTE
SWAPON
SWAPOFF
UPDATE
/TMP
"TEMPERORY FILES DELETED ON BOOTUP"
/DEV
"LOCATION OF SPECIAL OR DEVICE FILES [CONTAINS MAKEDEV]"
/HOME
" USER HOME DIRECTORIES"
/LIB
" LIBRARY AND KERNEL MODULES"
/MNT
" MOUNT FILES FOR TEMPERORY FILESYSTEMS "
/OPT
" ADD-ON APPLICATION SOFTWARE "
/ROOT
"HOME DIR. FOR ROOT USER"
/SYS
"VIRUTAL FILESYSTEM FOR DEVICE

Explore some of the files in the linux system to obtained useful for information about the system in the command line and then via a bash script.