

3) LINUX BOOT PROCESS:

An operating system (OS) is the low-level software that manages resources, controls peripherals, and provides basic services to other software. In Linux, there are 6 distinct stages in the typical booting process.

They are:

- 1) BIOS - Basic Input/Output System executes MBR
- 2) MBR - Master Boot Record executes GRUB
- 3) GRUB - Grand Unified Bootloader executes Kernel
- 4) Kernel - Kernel executes /sbin/init
- 5) Init - Init executes runlevel programs
- 6) Runlevel - Runlevel programs are executed from /etc/rc.d/rc*.d/

KERNEL:

- ✓ Mounts the root file system as specified in the “root=” in grub.conf
- ✓ Kernel executes the /sbin/init program
- ✓ Since init was the 1st program to be executed by Linux Kernel, it has the process id (PID) of 1. Do a ‘ps -ef | grep init’ and check the pid.
- ✓ initrd stands for Initial RAM Disk.
- ✓ initrd is used by kernel as temporary root file system until kernel is booted and the real root file system is mounted. It also contains necessary drivers compiled inside, which helps it to access the hard drive partitions, and other hardware.

4) ZEPHYR RTOS:

Zephyr is a small real-time operating system (RTOS) for connected, resource-constrained and embedded devices (with an emphasis on microcontrollers) supporting multiple architectures and released under the Apache License 2.0. Zephyr includes a kernel, and all components and libraries, device drivers, protocol stacks, file systems, and firmware updates, needed to develop full application software.

Features:

Zephyr intends to provide all components needed to develop resource-constrained and embedded or microcontroller-based applications. This includes, but is not limited to:

- A small kernel
- A flexible configuration and build system for compile-time definition of required resources and modules
- A set of protocol stacks (IPv4 and IPv6, Constrained Application Protocol (CoAP), LwM2M, MQTT, 802.15.4, Thread, Bluetooth Low Energy, CAN)
- A virtual file system interface with several flash file systems for non-volatile storage (FATFS, LittleFS, NVS)
- Management and device firmware update mechanisms.