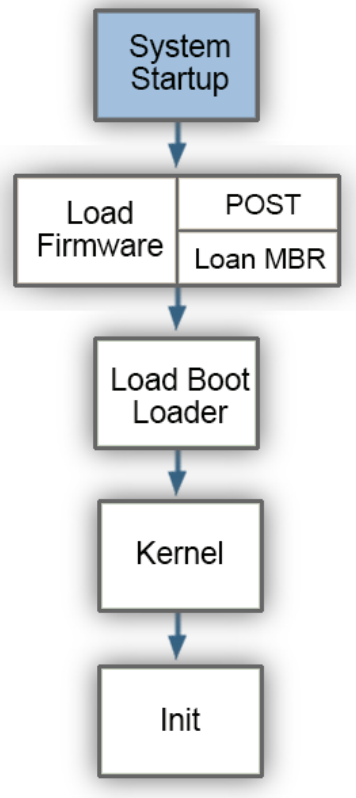
Chapter 16: The Boot Process

Boot Process Overview

- Four main stages
- Some stages can be modified by administrators



Firmware Stage

- Firmware is referred to as the BIOS (Basic Input Output System)
- UEFI (Unified Extensible Firmware Interface) has replaced the BIOS on some systems but typically still referred to as “BIOS”

Firmware Stage (1)

- Two primary jobs in this stage:
  1) Power-On Self Test (POST) – ensures system hardware (CPU, RAM, peripherals, etc.) is functioning properly
  2) Load Master Boot Record (MBR) – contains drive partition table and loads *first stage bootloader* whose purpose is to load the *second stage booloader* (next stage)

Bootloader Stage (2)

- Loads the Linux kernel program into memory
- Most common bootloaders
  - **GRUB and GRUB2 - Grand Unified Bootloader**
    ***Supports systems with UEFI**
    - LILO (old and not used much)
    - Syslinux (used in live cd and resque)
    - System—boot (minimalist and fast)

Kernel Stage (3)

- Initializes hardware drivers
- Mounts the root filesystem
  Contains key system commands and scripts
- Starts the first process (PID of 1) called *systemd* (final stage)

Init Stage (4)

- Final booting stage
- Parent process (PID 0) responsible for starting all other system processes
- Systemd is responsible for starting services

dmesg Command

- Executed after boot to view messages generated by the kernel during the boot process
  - Useful for troubleshooting boot issues
- Also executed upon connecting a new device to see device pathname

/var/log/messages File

- Kernel boot messages are stored in /var/log/dmesg which is overwritten each time the system boots
  - /var/log/sylog on some distributions
- File updated traditionally by `syslogd` and `klogd` daemons
- Syslogd and klogd have been replaced by `rsyslogd` and `syslog-ng` daemons

/var/log/messages File

- Other log files located in /var/log that are good for troubleshooting
- Example – apache web server daemon manages its own log files in /var/log/httpd/error_log

/proc/cmdline

- This file will hold the way the kernel was booted.
- For example: if you add “init=/bin/bash” to the kernel line at boottime. This will be stored in /proc/cmdline.