CSGE602055 Operating Systems
CSF2600505 Sistem Operasi
Minggu 03

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Agenda

Week 03: BIOS, Boot and UpStart

- Reference: (Any Related Tutorial) (ETC 300-324)
- Firmware
    - BIOS: Basic Input Output System.
    - UEFI: Unified Extensible Firmware Interface.
    - ACPI: Advanced Configuration and Power Interface.
- Operating System (Boot) Loader
    - BOOTMGT: Windows Bootmanager / Bootloader.
    - LILO: Linux Loader.
    - GRUB: GRand Unified Bootloader.
- Operating System Initialization
    - Init (legacy)
    - UpStart
    - Systemd
- Lab
    - Scripting
    - Simple Programs

Legacy BIOS

- Check Settings.
- Initialize CPU & RAM.
- POST: Power-On Self-Test.
- Initialize ports, LANS, etc.
- Load a Boot Loader.
- Handover to the Boot Loader.
- Provides "Native" (obsolete) Drivers only (not loadable).
- Provides "INT" services .
- Limitation.
  - Technology of 1970s.
  - 16 bits software.
  - 20 bits address space (1 MB).
  - 31 bits disk space (2 TB).

UEFI

- A Firmware Specification, not an Implementation!
- No (INT) service after boot.
- HII: Human Interface Infrastructure.
- Protected Mode.
- Flexible.
  - Technology of 2000s.
  - writen in C.
  - (third party) loadable drivers and tools.
  - Emulate Legacy BIOS transition (MBR block, INT service).
  - UEFI Shell: environment shell for diagnostic (no need for DOS).
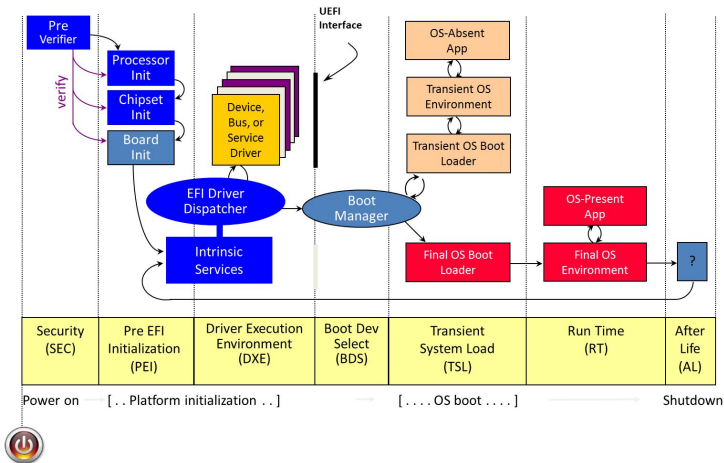
Platform Initialization (PI) Boot Phases

Figure: UEFI Boot Process[1].

Operating System (Boot) Loader

- General
  - How/Where to start the operating system?
  - What to do?
  - How many ways to boot?
  - How many types of OS?
- GRUB/GRUB2: GRand Unified Boot system
  - Stage 1 (boot.img): MBR (Master Boot Record) – Where is everything
  - Stage 1.5 (image.img): generated from diskboot.img
  - Stage 2: Kernel Selection: Windows, Linux, BSD, etc.
- GRUB2
  - More flexible than GRUB legacy
  - More automated than GRUB legacy
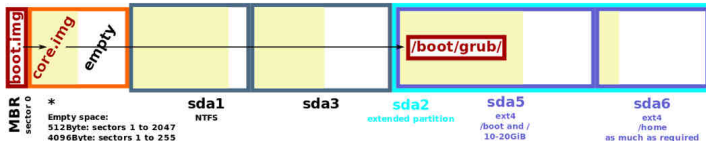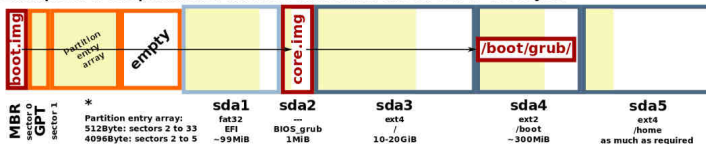
Figure: GRUB[1].

init (SYSV legacy)

- File: /etc/inittab.
- Folders: /etc/rcX.d — X = runlevel.
  - Seven (7) different runlevels:
    - 0 (shutdown).
    - 1 (single-user/admin).
    - 2 (multi-user non net).
    - 3 (standard).
    - 4 (N/A).
    - 5 (3+GUI).
    - 6 (reboot).
  - SXX-YYY: Start
  - KXX-YYY: Kill.
- One script at a time in order.
- dependency is set manually.

UpStart - Ubuntu

- Developer: Ubuntu.
- Folder: /etc/init/.
- Control: initctl.
    - initctl list – listing all processes managed by upstart.
- better support for hotplug devices.
- cleaner service management.
- faster service management.
- asynchronous.

The All New "systemd"

- Replaces (SYSV) init and UpStart.
    - better concurency handling: Faster!
    - better dependencies handling: No more "S(tarts)" and "K(ills)".
    - better crash handling: automatic restart option.
    - better security: group protection from anyone including superusers.
    - simpler config files: reliable and clean scripts.
    - hotplug: dynamic start/stop.
    - supports legacy systems (init).
    - overhead reducing.
    - unified management way for all distros.
    - bloated: doing more with more resources.
    - linux specific: NOT portable.

X

- Control: `systemctl`.
- `systemctl`
- `systemctl list-units`
- `systemctl start XXXX`
- `systemctl status ssh.service`
  - status, start, restart, stop, disable.

- This is the end of the presentation.