

CSGE602055 Operating Systems

CSF2600505 Sistem Operasi

Week 03

Rahmat M. Samik-Ibrahim

University of Indonesia at Lenteng Agung

<http://rahmatm.samik-ibrahim.vlsm.org/>

REV04 04-Oct-2016

Agenda

- 1 Start
- 2 Agenda
- 3 Week 03
- 4 Legacy BIOS
- 5 UEFI
- 6 UEFI Boot
- 7 Bootloader
- 8 GRUB Map
- 9 init (legacy)
- 10 UpStart
- 11 systemd
- 12 The End

Week 03: BIOS, Boot and UpStart

- Reference: (Any Related Tutorial) (ETC 300-323)
 - Upstart Intro, Cookbook and Best Practices
`upstart.ubuntu.com/cookbook/upstart_cookbook.pdf`
- BIOS & UEFI
- Loader: grub, lilo
- Init, UpStart & Systemd
- Lab
 - Scripting
 - Simple Programs

- 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
- Provides "INT" services
- Limitation: Technology of 1970-80s (size).

- A Firmware Specification, not an Implementation!
- No service after boot.
- HII: Human Interface Infrastructure
- Protected Mode
- Flexible
 - Technology of 2000s
 - written in C
 - loadable drivers
 - Emulate Legacy BIOS (MBR block, INT service)
 - UEFI Shell: environment shell for diagnostic (no need for an OS)

Platform Initialization (PI) Boot Phases

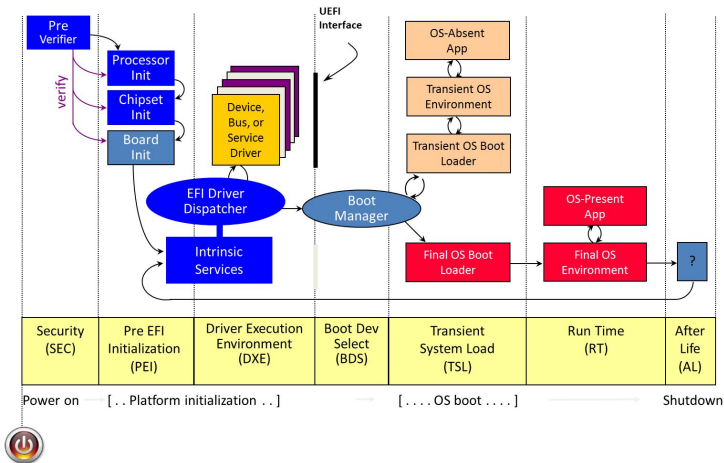


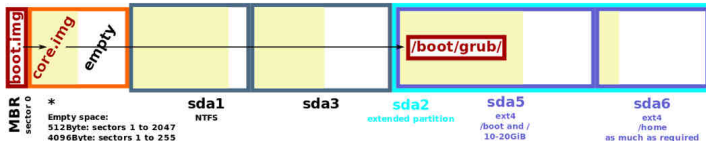
Figure: UEFI Boot Process¹.

- 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

GNU GRUB 2

Locations of *boot.img*, *core.img* and the */boot/grub* directory

Example 1: an MBR-partitioned harddisc with sector size of 512 or 4096Bytes



Example 2: a GPT-partitioned harddisc with sector size of 512 or 4096Bytes

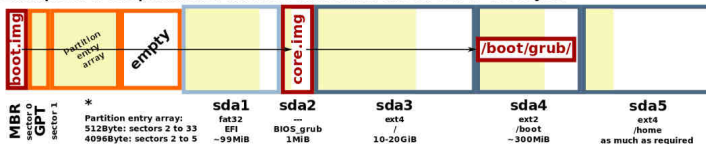


Figure: GRUB¹.

¹Source Shmuel Csaba Otto Traian 2013

init (legacy)

- File: `/etc/inittab`
- Folders: `/etc/rcX.d` — `X` = runlevel
- runlevels: 0 (shutdown), 1 (single-user/admin), 2 (multi-user non net) 3 (standard), 4 (N/A), 5 (3+GUI), 6 (reboot)
- dependency is set manually

- Developer: Ubuntu
- Folder: `/etc/init/`
- Control: `initctl`
- better support for hotplug devices
- cleaner service management
- faster service management
- asynchronous

- dependencies handling
- concurency handling
- overhead reducing

The End

- This is the end of the presentation.