Linux Booting

- References
  - https://opensource.com/article/17/2/linux-boot-and-startup
  - terminal> man 7 boot
  - terminal> man 7 bootup
- Booting Process
  - Firmware is loaded in RAM.
  - POST is done.
  - Bootstrap Loader program finds bootable device.
  - Start Bootloader (GrUB):
    - Can start any Linux/OpenSource kernels & chainload to proprietry OS bootloaders.
    - Grub Stage1:
      - Boot Block -- 1st 440 Bytes : Bootstrap (Stage1)
      - It loads stage 1.5.
    - Grub Stage1.5:
      - In first 32 KB of disk.
      - Size approx: 25 KB.
      - It contains basic FS drivers.
      - It loads stage 2.
    - Grub Stage2:
      - In linux boot (/boot) partition
      - Reads config file (grub.cfg)
      - Presents UI for selecting OS to boot (if needed)
      - Loads Linux kernel (vmlinuz) -- self extracting.
- Startup Process
  - systemd/init process is executed (pid=1).
  - systemd is designed to start (independent) services parallely. In init services were started sequentially.
  - It starts multiple child processes as per configred run-level.
  - Runlevels are like "checkpoints"/"states".
- Runlevels

    - 1 - Single user mode (Used for failsafe/rescue)
    - 2 - Multi user mode (User login enabled, User files accessible)
    - 3 - Networking (Multiuser with Networking on CLI) -- multi-user.target
    - 4 - Reserved (unused)
    - 5 - Graphical user interface -- graphical.target
    - https://likegeeks.com/linux-runlevels/
- Linux commands
    - terminal> runlevel
    - terminal> init 0 --> shutdown
    - terminal> init 6 --> reboot
    - terminal> init 3 --> go to runlevel 3 (GUI will be stopped if already started)
    - terminal> init 5 --> go to runlevel 5 (GUI will be started)
    - terminal> startx --> start GUI (give this command from runlevel 3)
- During booting runlevel can be given as bootparam (in GrUB -- edit entry before booting).
    - Press "e" to edit the entry.
    - linux /boot/vmlinuz-x.y.z root=UUID=xxxxxxxxxxxxxx ro splash=no init 3