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100 Days of DevOps — Day 66-Linux Boot Process

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Welcome to Day 66 of 100 Days of DevOps. Focus for today is Linux Boot Process

Linux Boot Process

UEFI/BIOS → Bootable Disk → BootLoader(GRUB2) → Kernel → Initramfs → init/systemd → Services

- *When the System Boot from Firmware Interface(UEFI/BIOS) it work is to find the bootable disk*
- *Bootable Disk can be anything(hardrive,cd-rom,usb-stick)*
- *Then on the bootable disk we need bootloader(**default:grub2**)*
- *The function of Grub2 is to boot Kernel*
- *Now kernel from the initial stage need drivers and that is provided by initramfs*
- *Init is the first process which kernel looks for(On modern Linux system it's systemd)*
- *Systemd/Init is going to start all services*

Now let's go deeper into each point I mentioned earlier

UEFI(Unified Extensible Firmware Interface): Introduced to replace BIOS and it's specially useful when we want to access larger disk(>2TB) in case of GPT(GUID Partition Table)

In BIOS based system, MBR(Master Boot Record) is read from disk and the stage1 boot loader is activated(446bytes) and it's task is to load stage2 boot loader that resides in the first MB of the disk

*In case of UEFI system, **GPT** partition table is used/df(/grub)/MBR is for backward compatibility)*

```
# gdisk /dev/sda
GPT fdisk (gdisk) version 0.8.6
Partition table scan:
MBR: protective
BSD: not present
APM: not present
GPT: present
Found valid GPT with protective MBR; using GPT.
Command (? for help): p
Disk /dev/sda: 20971520 sectors, 10.0 GiB
Logical sector size: 512 bytes
Disk identifier (GUID): 7D66BEBF-FE14-4BC0-AB70-F42E07B5011F
Partition table holds up to 128 entries
First usable sector is 34, last usable sector is 20971486
Partitions will be aligned on 2048-sector boundaries
Total free space is 2014 sectors (1007.0 KiB)
Number Start (sector) End (sector) Size Code Name
   1 2048 4095 1024.0 KiB EF00  EFI System Partition
   2 4096 20971486 10.0 GiB 8700
```

Now to get more information about first 512bytes

```
# xxd -l 512 /dev/sda
00000000: e0c3 9000 0000 0000 0000 0000 0000 0000  .e..............
00000010: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000020: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000030: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000040: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000050: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000060: 0000 0000 fffa 9090 f6c2 8074 0501 6278  ...........t..p
00000070: 7482 b200 ea79 7c00 0031 c08e d8be 0080  t....y|..1......
00000080: 00c8 75a0 0e7c 7cf7 7482 08c2 52be 857c  ..u..|.t.t..R..|
00000090: 0441 0baa 55cd 135a 5272 3d81 7055 aa75  .A..U..ZRr=.pU.u
000000a0: 3783 e301 7432 31c8 0044 0a40 8844 f189  7...t21..D.@.D..
000000b0: 4402 c704 1000 66b 1e5c 7c66 009c 0066  D.......f.\|f...f
000000c0: 81e 687c 6689 5c0c c744 0600 7b04 42cd  ..`|f\..D..{.B.
000000d0: 1372 050c 0070 e57b 4b81 cd13 730d 5a84  .r...p.v....s.Z.
000000e0: c26f 83de 00bc 057d e982 0066 0f86 c680  .....}...f.....
000000f0: 64ff 0066 8944 04bf 0601 c1e2 8208 e688  d..f.D..........
00000100: 1640 8944 88bf b6c2 c0e8 2600 8944 66a1  .@.D.......f.f.
00000110: 607c 6609 c075 4e66 a15c 7c66 31d2 66f7  `|f.uNf.\|f1.f.
00000120: 3408 d131 d066 7774 8435 4480 7437 fec1  4..1.fwt.5D.t7..
00000130: 8bc5 38c8 c1e8 0208 c188 d05a 88c6 bom8  ..8........Z...
00000140: 70bc c331 d0e8 0182 cd13 721e 8cc3 601e  p..1......r...`.
00000150: 190b 018e d8b31 f6bf 0008 8ec6 fcf3 a51f  .....1..........
00000160: 61ff 265a 7c66 8044 ebf1 7400 b402 bb00  a.&Z\.p.....t..
00000170: 8e94 7b00 2e00 cd18 ebfe 4752 5542 2000  ..}.......GRUB .
00000180: 4765 6f6d 6148 6172 6420 4469 7363 0052  Geom.Hard Disk.R
00000190: 6561 6164 2045 7272 6f72 0bf6 0f00 0180  ead. Error.....
000001a0: 0a6c cd18 ac3c 0075 74c3 8000 0000 0000  .l...<.ut.......
000001b0: 0000 0000 0000 0000 0000 0000 0000 0000  ................
000001c0: 8100 0efe ffff 0100 0000 ffff 3f81 0000  ..............?.
000001d0: 0000 0000 0000 0000 0000 0000 0000 0000  ................
000001e0: 0000 0000 0000 0000 0000 0000 0000 0000  ................
000001f0: 0000 0000 0000 0000 0000 0000 0000 55aa  ..............U.
```

In case of grub2 if we want to make any change,go to

```
# ls -l /etc/sysconfig/grub
lrwxrwxrwx. 1 root root 17 Oct 20 12:52 /etc/sysconfig/grub -> /etc/default/grub
GRUB_CMDLINE_LINUX="console=ttyS0,115200n8 console=tty0 net.ifnames=0 crashkernel=auto
```

At the end of this line I want to change default scheduler from deadline to noop

```
# cat /sys/block/xvda/queue/scheduler
noop [deadline] cfq
```

To do that

```
GRUB_CMDLINE_LINUX="console=ttyS0,115200n8 console=tty0 net.ifnames=0 crashkernel=auto elevator=noop"
```

To make these changes persistent

```
-o, --output=FILE output generated config to FILE [default:stdout]

# grub2-mkconfig -o /boot/grub2/grub.cfg
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-3.10.0-514.el7.x86_64
Found initrd image: /boot/initramfs-3.10.0-514.el7.x86_64.img
Found linux image: /boot/vmlinuz-0-rescue-bc7a4d8d98b4b4dcc0b2c4733c18
Found initrd image: /boot/initramfs-0-rescue-bc7a4d8d98b4b4dcc0b2c4733c18.img
done
```

Looking forward from you guys to join this journey and spend a minimum an hour every day for the next 100 days on DevOps work and post your progress using any of the below medium.

- *Twitter: @100daysofdevops OR @lakhera2015*
- *Facebook: https://www.facebook.com/groups/179382630808645/*
- *Medium: https://medium.com/@devopslearning*
- *Slack: https://devops-myworld.slack.com/messages/CPA1EFG49/*
- *GitHub Link:https://github.com/100daysofdevops*

Reference

100 Days of DevOps — Day 0
D-day is just one day away and finally, this is a continuation of the post(I posted a month earlier)
medium.com

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