System Recovery with GRUB

LPIC-2: Linux Engineer (201-450)

Objectives:

At the end of this episode, I will be able to:

1. Describe the purpose and function of the GRUB bootloader.
2. Modify and update GRUB configuration files.
3. Reinstall GRUB to correct a damaged installation.

> Additional resources used during the episode can be obtained using the download link on the overview episode.

- **GR**and **U**nified **B**ootloader (GRUB)

    - GRUB 2
    - Open source boot loader

- Features

    - Multiple architectures
    - Graphical menus
    - Rescue mode
    - Modules

- Menu entries

    - Point to operating systems on disk
    - Point to kernels

- GRUB-related Issues

    - Dual booting operating systems

        - May overwrite GRUB
        - May not be detected
        - GRUB does not update its list automatically

    - Manual configuration

        - Human error (typos)
        - Hard coded kernel versions aren't updated

    - Disk encryption

        - May overwrite GRUB

- Modifying GRUB Parameters (e.g. timeout)

    1. `sudoedit /etc/default/grub`
    2. `update-grub2`

- GRUB Configuration

    - Ubuntu: `/boot/grub/grub.cfg`
    - RHEL: `/boot/grub2/grub.cfg`
    - Should not be edited directly

- Correcting GRUB Menu Entries

    - Different configurations for different distros
      `/boot/grub/menu.lst`

```
/boot/grub/grub.conf
/etc/default/grub
```

- Example: Ubuntu

  - Menu is automatically generated at boot
  - Uses scripts in `/etc/grub.d` to build
  - Copy an existing entry

    - `less /boot/grub/grub.cfg`
    - Search for `menuentry`

  - `sudoedit /etc/grub.d/40_custom`
  - Push the Update

    - `sudo update-grub`
    - `sudo grub-mkconfig`

      - Displays potential config

    - `sudo grub-mkconfig -o /boot/grub/grub.cfg`

      - Installs the config

- Updating GRUB when you can't boot

  1. Boot from a LiveCD or attach to another system
  2. Find the appropriate disk

     - `lsblk -f`
     - `blkid`

  3. Mount the Disk

     - `sudo mount /dev/sda1 /mnt/sda1`

  4. Reinstall GRUB

     - `sudo grub-install --root-directory=/mnt/sda1 /dev/sda`

  5. Unmount the disk

     - `sudo umount /dev/sda1`

  6. Reboot

```
menuentry 'Ubuntu (Init Test)' --class ubuntu --class gnu-linux --class gnu --class os
$menuentry_id_option 'gnulinux-simple-a8af722f-c40a-4f72-844b-8afbbaa6b742' {
        recordfail
        load_video
        gfxmode $linux_gfx_mode
        insmod gzio
        if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
        insmod part_msdos
        insmod ext2
        insmod raid10
        set root='hd0,msdos5'
        if [ x$feature_platform_search_hint = xy ]; then
          search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos5 --hint-
efi=hd0,msdos5    --hint-baremetal=ahci0,msdos5  a8af722f-c40a-4f72-844b-8afbbaa6b742
        else
          search --no-floppy --fs-uuid --set=root a8af722f-c40a-4f72-844b-8afbbaa6b742
        fi
        linux   /boot/vmlinuz-5.8.0-55-generic root=UUID=a8af722f-c40a-4f72-844b-8afbbaa6b742
r    o find_preseed=/preseed.cfg auto noprompt priority=critical locale=en_US quiet
        initrd  /boot/initrd.img-5.8.0-55-don
}
```