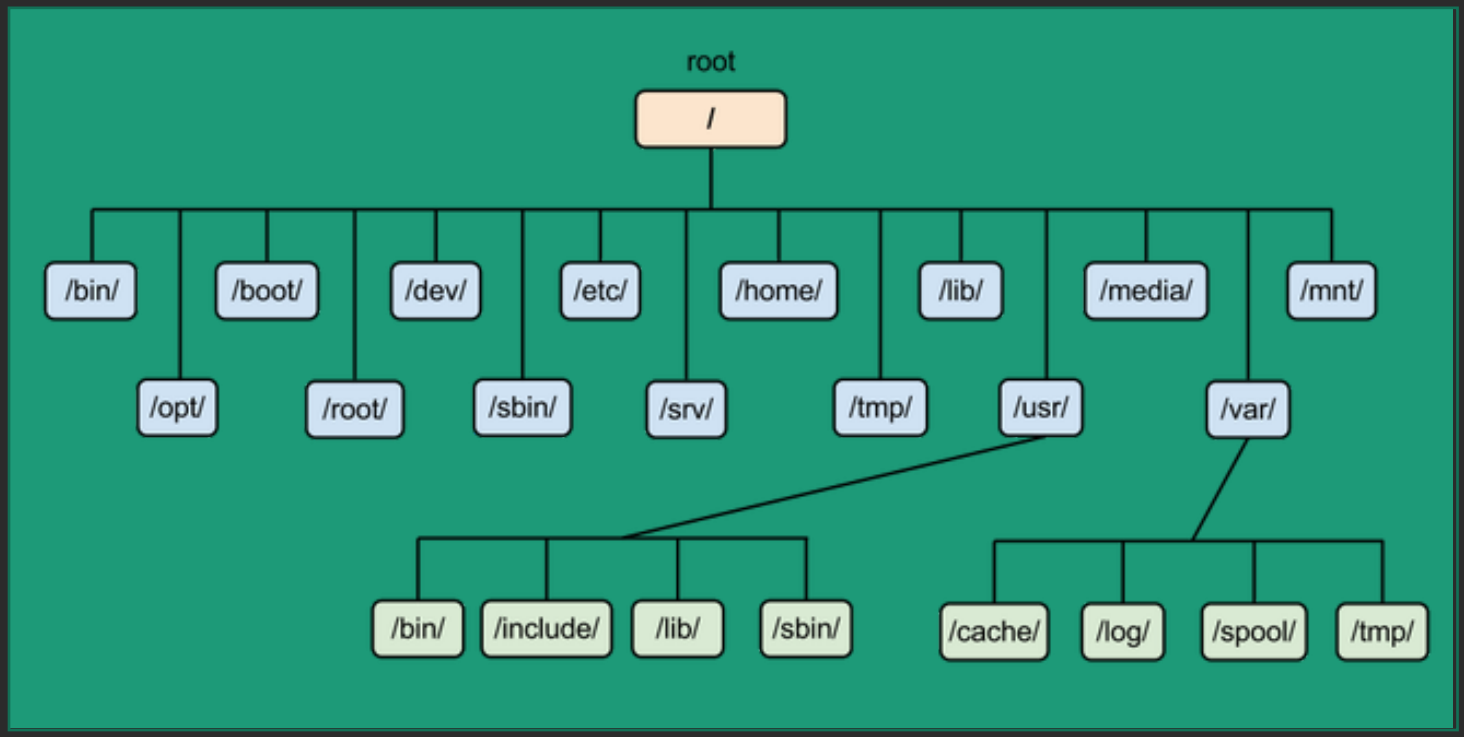
Lesson 4: Configuring Hardware

Objectives covered

- 101.1 Determine and configure hardware settings (weight: 2)
- 102.1 Design hard disk layout(weight: 2)
- **104.1 Create partitions and filesystems (weight: 2)**
- **104.2 Maintain the integrity of filesystems (weight: 2)**
- **104.3 Control mounting and unmounting of filesystems (w: 3)**

Working with filesystems

Linux Filesystem Hierachical Standard (FHS)



Linux Filesystem Hierachical Standard (FHS)

Directory	Description
/boot	Contains boot loader files used to boot the system
/etc	Contains system and application configuration files
/home	Contains user data files
/media	Used as a mount point for removable devices
/mnt	Also used as a mount point for removable devices
/opt	Contains data for optional third-party programs
/tmp	Contains temporary files created by system users
/usr	Contains data for standard Linux programs
/usr/bin	Contains local user programs and data
/usr/local	Contains data for programs unique to the local installation
/usr/sbin	Contains data for system programs and data
/var	Contains variable data files, including system and application logs

Linux filesystem types

Filesystem types	Descriptions
btrfs	high-performance filesystem that supports files up to 16 exbibytes (EiB) in size, and a total filesystem size of 16 EiB. It also can perform its own form of Redundant Array of Inexpensive Disks (RAID) as well as logical volume management (LVM) and subvolumes
ecryptfs	The Enterprise Cryptographic Filesystem (eCryptfs) applies encryption protocol to data before storing it on the device
ext3	supports files up to 2 tebibytes (TiB), with a total filesystem size of 16 TiB. It supports journaling, as well as faster startup and recovery
ext4	sup- ports files up to 16 TiB, with a total filesystem size of 1 EiB. It also supports journaling and utilizes improved performance features
reiserFS	Created before the Linux ext3fs filesystem and commonly used on older Linux systems. Linux has dropped support for the most recent version, reiser4fs.
swap	The swap filesystem allows you to create virtual memory for your system using space on a physical drive. The system can then swap data out of normal memory into the swap space

Non-Linux filesystem types

Filesystem types	Descriptions
CIFS	Common Internet Filesystem (CIFS)
SMB	Server Message Block (SMB)
XFS	The X Filesystem (XFS). The filesystem provided advanced high-performance features that makes it still popular in Linux.
ISO-9660	The ISO-9660 standard is used for creating filesystems on CD-ROM devices.
NFS	Network Filesystem (NFS)
NTFS	New Technology Filesystem (NTFS)
ZFS	Zettabyte Filesystem (ZFS)

Creating filesystems

mkfs

```
$ sudo mkfs -t ext4 /dev/sdb1
mke2fs 1.44.1 (24-Mar-2018)
Creating filesystem with 2621440 4k blocks and 655360 inodes
Filesystem UUID: f9137b26-0caf-4a8a-afd0-392002424ee8
Superblock backups stored on blocks:
      32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632
Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done
```

Mounting filesystems

mount -f fstype device mountpoint

```
$ sudo mount -t ext4 /dev/sdb1 /media/usb1
```

```
$ mount
...
/dev/sda2 on / type ext4 (rw,relatime,errors=remount-ro,data=ordered)
/dev/sda1 on /boot/efi type vfat
 (rw,relatime,fmask=0077,dmask=0077,codepage=437,iocharset=iso8859
-1,shortname=mixed,errors=remount-ro)
...
/dev/sdb1 on /media/usb1 type ext4 (rw,relatime,data=ordered)
/dev/sdb2 on /media/usb2 type ext4 (rw,relatime,data=ordered)
```

Auto-Mounting at boot

/etc/fstab

```
$ cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda2 during installation
UUID=46a8473c-8437-4d5f-a6a1-6596c492c3ce /               ext4
 errors=remount-ro 0       1
# /boot/efi was on /dev/sda1 during installation
UUID=864B-62F5  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda3 during installation
UUID=8673447a-0227-47d7-a67a-e6b837bd7188 none            swap    sw
0       0
```

Getting Filesystem status

Command	Descriptions
df	Displays disk usage by partition
du	Displays disk usage by directory; good for finding users or applications that are taking up the most disk space
iostat	Displays a real-time chart of disk statistics by partition
lsblk	Displays current partition sizes and mount points

Filesystem tools

Command	Descriptions
blkid	Display information about block devices, such as storage drives
chattr	Change file attributes on the filesystem
debugfs	Manually view and modify the filesystem structure, such as undeleting a file or extracting a corrupted file
dumpe2fs	Display block and superblock group information
e2label	Change the label on the filesystem
resize2fs	Expand or shrink a filesystem
tune2fs	Modify filesystem parameters

Check for filesystem errors and fix

fsck, e2fsck

```
$ sudo fsck -f /dev/sdb1
fsck from util-linux 2.31.1
e2fsck 1.44.1 (24-Mar-2018)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
/dev/sdb1: 11/655360 files (0.0% non-contiguous), 66753/2621440 blocks
```

Question...