Disk Management

Partitions

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fdisk

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File Systems

What You Will Learn

- Partitions
- MBR
- GPT
- Mount points
- fdisk

What You Will Learn

- fdisk
- MBR
- GPT

What You Will Learn

- Creating file systems
- Mounting file systems
- Unmount file systems
- How to prepare swap space for use
- File System Table
- Disk UUIDs and Labels

Partitions

- Disks can be divided into parts, called partitions.
- Partitions allow you to separate data.
- Partitioning schemes
  - 1) OS, 2) Application, 3) User, 4) Swap
  - 1) OS, 2) User home directories
  - As a system administrator, you decide.

Partitioning

- Can protect the overall system.
- Keep users from creating outages by using a home directory partition.

```
$ df -h
Filesystem    Size   Used   Avail  Use%   Mounted on
/dev/sda2     100G    75G    25G    75%    /
/dev/sda1     488M   111M   342M    25%    /boot
/dev/sda3      10G    10G      0   100%    /home
```

MBR

- Master Boot Record
- Can only address 2 TB of disk space
- Being phased out by GPT
  - GPT= GUID Partition Table
- 4 Primary Partitions
- Extended partitions allow you to create logical partitions

GPT

- GPT = GUID Partition Table
- GUID = Global Unique Identifier
- Replacing the MBR partitioning scheme
- Part of UEFI
- UEFI = Unified Extensible Firmware Interface
- UEFI is replacing BIOS

GPT

- Supports up to 128 partitions
- Supports up to 9.4 ZB disk sizes
- Not supported by older operating systems
- May require newer or special tools

Mount Points

- A directory used to access the data on a partition
- / (slash) is always a mount point
- /home
  - /home/jason is on the partition mounted on /home
- /export/home
  - /export/home/jason

Mounting over existing data

```
mkdir /home/sarah
```

```
mount /dev/sdb2 /home
```

* You will not be able to see /home/sarah now.

```
umount /home
```

* You can now see /home/sarah again.

Mount Points on Mount Points

/home

/home/jason

fdisk

- Alternatives: gdisk, parted
- Earlier versions of fdisk did not support GPT

```
fdisk /path/to/device
```

File Systems

- ext = Extended file system
  - ext2, ext3, and ext4 are later releases
  - Often the default file system type
- Other file systems:
  - ReiserFS
  - JFS
  - XFS
  - ZFS
  - Btrfs

mkfs

```
mkfs -t TYPE DEVICE

mkfs -t ext3 /dev/sdb2

mkfs -t ext4 /dev/sdb3
mkfs.ext4 /dev/sdb3
```

mkfs

```
# ls -1 /sbin/mkfs*
/sbin/mkfs
/sbin/mkfs.btrfs
/sbin/mkfs.cramfs
/sbin/mkfs.ext2
/sbin/mkfs.ext3
/sbin/mkfs.ext4
/sbin/mkfs.minix
/sbin/mkfs.xfs
```

Mounting with mount

mount DEVICE MOUNT_POINT

```
mount /dev/sdb3 /opt
```

The mount command

```
# mount
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev)
tmpfs on /run type tmpfs (rw,nosuid,nodev,mode=755)
...
/dev/sda2 on / type xfs (rw,relatime,attr2,inode64,
noquota)
/dev/sdb3 on /opt type ext4 (rw,relatime,data=ordered)
```

The df command

```
# df -h
Filesystem          Size   Used  Avail Use% Mounted on
/dev/sda2           198G   1.7G   196G    1% /
devtmpfs            489M      0   489M    0% /dev
tmpfs               497M      0   497M    0% /dev/shm
tmpfs               497M   6.5M   491M    2% /run
tmpfs               497M      0   497M    0% /sys/fs/cgroup
/dev/sdb3           484G    73M   459G    1% /opt
#
```

Manual mounts do not persist

In order to make mounts persist between reboots, add an entry in the /etc/fstab file.

Unmount with the umount command

umount DEVICE_OR_MOUNT_POINT

```
umount /opt
umount /dev/sdb3
```

Preparing swap space

```
# mkswap /dev/sdb1
Setting up swapspace version 1, size = 1048572 KiB
no label, UUID=619dc6d9-1b0b-4a9a-9df5-bfc343fb8d6e
# swapon /dev/sdb1
# swapon -s
Filename       Type       Size       Used       Priority
/dev/sda1      partition  2047996    0          -1
/dev/sdb1      partition  1048572    0          -2
```

/etc/fstab - The File System Table

- Controls what devices get mounted and where on boot.
- Each entry is made up of 6 fields
  - device
  - mount point
  - file system type
  - mount options
  - dump
  - fsck order

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Sample /etc/fstab file

```
# device   mount point  FS     options   dump   fsck
/dev/sda2 /                     xfs    defaults    0     1
/dev/sda1 swap                  swap   defaults    0     0
```

Sample /etc/fstab file

```
UUID=dbae4fe7-b06f-4319-85dc-b93ba4a16b17 / xfs defaults 0 1
LABEL=opt /opt          ext4        defaults 1 1
/dev/sda1 swap          swap        defaults   0     0
```

Viewing Labels and UUIDs

```
# lsblk -f
 NAME    FSTYPE LABEL UUID                                  MOUNTPOINT
sda
├─sda1 swap         1cb76bec-a1fa-4ac6-8296-c508e936b744 [SWAP]
└─sda2 xfs    root   dbae4fe7-b06f-4319-85dc-b93ba4a16b17 /

# blkid
/dev/sda1: UUID="1cb76bec-a1fa-4ac6-8296-c508e936b744" TYPE="swap"
/dev/sda2: LABEL="root" UUID="dbae4fe7-b06f-4319-85dc-b93ba4a16b17" TYPE="xfs"
```

Labeling a file system.

```
# e2label /dev/sdb3 opt
```

Summary

- mkfs
- mount
- df
- umount
- mkswap
- swapon

Summary

- /etc/fstab
- viewing UUIDs and labels
- creating labels

Summary

- Partitions
- Partition tables
  - MBR
  - GPT
- Mount points
- fdisk