# LPIC-1 101-500 – Lesson 20

104.3 Control mounting and unmounting of filesystems

Mounting filesystems

- For filesystems to be used, they need to be mounted on a directory.

- The directory is a subdirectory of the root – "/" filesystem and best practice dictates that it should not have any content. If there is some content in the directory to be mounted, this will be inaccessible until unmounted.

- Automatic mounting of systems is set in the **/etc/fstab** configuration file. In **systemd** systems we can also be used to mount filesystems, using mount units. This usually happens for virtual filesystems.

- On systemd systems it is also possible to use systemd mount units.
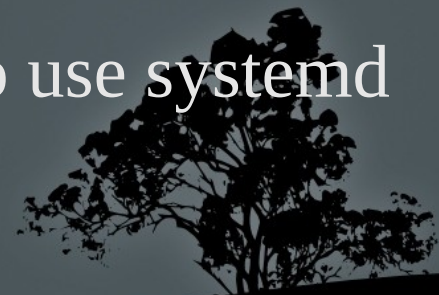
The */etc/fstab* file

- The **/etc/fstab** is used for the automatic and permanent mounting of filesystems during startup.

- /dev/sda2   /   ext3   errors=remount-ro   0   1

    device hosting the filesystem
    mount point
    filesystem type
    mount options
    frequency of filesystem backup
    filesystem check priority

- Use of Label or UUID:

    UUID=0b2030ea-9366-4455-8c4a-a7d4452aeb46   /boot   ext2
        defaults   0   2

The */etc/fstab* file

```
$ cat /etc/fstab # show fstab

# <file system> <mount point>    <type>   <options>            <dump>   <pass>
proc                 /proc             proc    defaults          0         0
# / was on /dev/sda2 during installation
UUID=cce3bbf5-5b7e-446a-8de3-e8f859ac0d3d /            ext3      errors=remount-ro   0
      1
# /boot was on /dev/sda1 during installation
UUID=d2186c7c-3ba5-4171-ac67-976953db45b3 /boot         ext3    defaults        0   2
# /home was on /dev/sda6 during installation
UUID=59b334eb-8761-438e-ba7d-24125e82132f /home         ext3    defaults        0   2
# /tmp was on /dev/sda8 during installation
UUID=2d7903c5-4c5c-46aa-a5c6-7012af4e5055 /tmp          ext3    defaults        0   2
# /usr was on /dev/sda5 during installation
UUID=68a3dafb-5cac-4a11-aff5-a088ff057b45 /usr          ext3    defaults        0   2
# /var was on /dev/sda7 during installation
UUID=ae7aa654-dd03-407e-b579-137824495665 /var          ext3    defaults        0   2
# swap was on /dev/sda3 during installation
UUID=ab3caf8e-0e2a-48bf-bb2a-45e6714b7cb0 none          swap    sw              0   0
/dev/scd0         /media/cdrom0    udf,iso9660 user,noauto      0         0
```
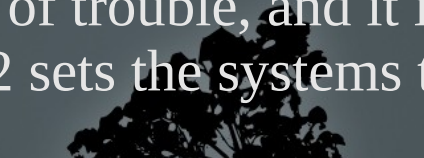
Fields in /etc/fstab

- **Filesystem**: the first field in /etc/fstab defines the device which hosts the filesystem. We can use the device name, label or UUID (recommended).

- **Mount point**: the second field defines the mount point (directory) where the filesystem will be mounted.

- **Type**: define the filesystem type. If the value is **auto** it will be scanned and picked automatically.

- **Mount options**: defines various mount parameters like **ro**, **rw**, **users**, etc.

- **Dump field**: enable filesystem backup using the **dump** utility. It can be either **0** or **1** where 0 disables this use. Not used typically.

- **Pass field**: defines if filesystem is to be checked. **1** is set to the system with the higher priority to be checked by **fsck**, in case of trouble, and it is usually set on the root filesystem (/). A value of 2 sets the systems to be checked after 1 and 0 disables all checks.

Mount options

- Mount options can be set in the 4th field of **fstab** or can be defined as comma separated values to the **-o** option of **mount**.

- **async**: aynchronous I/O. It is consider a faster access method but unsafe. It is the opposite of **sync**.

- **auto**: defined in **fstab** and declares that the system will be auto-mounted when the **-a** option is used during **mount** invocation. Opposite of **noauto**.

- **defaults**: implies the options **rw**, **suid**, **dev**, **exec**, **auto**, **nouser** and **async**. It is the most typical option in **fstab**.

- **dev**: allows the presence of devices (either character or block) in the filesystem. Opposite of **nodev**.

Mount options

- **exec**: allows the invocation of executables from the filesystem. Opposite of **noexec**.

- **ro**: mount the filesystem read-only.

- **rw**: mount the filesystem read-write.

- **suid**: allows **suid** and **sgid** bits in the files/directories of the filesystem. Opposite of **nosuid**.

- **user**: allows an unprivileged user to mount the filesystem and forbids unmounting others. Opposite of **nouser**.

- **users**: allows mounting and unmounting of the filesystem by all users. Opposite to **nousers**.

List of possible filesystems

- **ext2**: basic Linux filesystem.

- **ext3**: compatible with ext2. Supports journaling.

- **ext4**: evolution of ext3.

- **reiserfs**: alternative Linux filesystem with journaling.

- **msdos**: traditional "8.3" filesystem for dos.

- **vfat**: A FAT32 implementation on Linux.

- **exfat**: a modern filesystem by Microsoft.

- **ntfs**: a Windows filesystem.

- **iso9660**, **udf**: filesystems for CD/DVD.

- **nfs**: UNIX network filesystem.

- **smbfs**, **cifs**: Windows network filesystem.

- **swap**: for swap partitions.

- **proc, sysfs, tmpfs**: virtual filesystems.

The `mount` command

- The **mount** command is used for mounting. filesystem on directories which are called "mount point". If used without arguments it will simply return a list of mounted filesystems.

- # **mount** # show the actively mounted system.

- # **cat /etc/mtab** # similar information with the command above. There is also **/proc/mounts**.

The `mount` command

- # **mount /dev/sdb2 /mnt/temp** # mount the **sdb2** filesystem on the **/mnt/temp** directory. The filesystem type is automatically detected by **mount**.

- # **mount -t ntfs /dev/sdb3 /mnt/temp2** # use the **ntfs** filesystem type for mounting.

- # **mount -t vfat -o ro /dev/sdb3 /mnt/temp3** # mount a **vfat** filesystem as read-only.

- # **mount -r -t iso9660 /dev/cdrom /media/cdrom** # = **mount -o ro -t iso9660**. Mount the **iso9660** filesystem as read only.

The `mount` command

- # **mount /dev/sda5** # mount **/dev/sda5** to the mount point defined in **/etc/fstab**. This will fail if the **sda5** filesystem is not defined in **fstab**.

- # **mount /usr** # mount the filesystem that matches the **/usr** mount point in **fstab**. This will fail if the **/usr** is not defined in **fstab**.

The `mount` command

<u>**Options:**</u>

- **-t <fstype>** # set filesystem type.

- **-a** # mount all filesystems in **fstab**. Entries with **noauto** are exempted.

- **-o <mount_options>** # choose mount options.

- **-r** # = **-o ro**. Mount filesystem read-only.

- **-w** # = **-o rw**. Mount filesystem read-write.
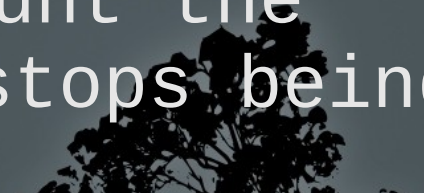
- **-v** # verbose output.

The `umount` command

- The **umount** command is used for the unmounting of filesystems, provided they are not is use. We can use either the filesystem or the mount point as an argument.

- # **umount /dev/sdb2** # unmount **sdb2**.

- # **umount /mnt/temp** # unmount the filesystem mounted on the **/mnt/temp** mount point.

The `umount` command

- # **umount -at ntfs** # unmount all **ntfs** filesystems.

  Options:

- **-a** # unmount all filesystem. Usually used during shutdown or restart.

- **-t <fstype>** # unmount the filesystem only if the defined filesystem type matches the one of the filesystem.

- **-l** # lazy unmount i.e. unmount the filesystem as soon as it stops being used.

The */media* and */mnt* directories

- The **/media** directory hosts the mount points of automatically attached removable devices like CD/DVD, floppy, USB Storage, etc.

- The **/mnt** directory is used for the temporary and manual mounting of filesystem e.g. **/mnt/temp**, **/mnt/test**, etc.

The `blkid` command

- The **blkid** command shows the UUID of all the partitions in the system.

```
# blkid
/dev/nvme0n1p1: UUID="D144-180D" TYPE="vfat"
PARTUUID="ec25fee9-5259-46a2-8e61-40c6077a84d9"
/dev/nvme0n1p2: UUID="837fd287-1dc9-42e3-87c4-
44c5dff5b957" TYPE="ext2" PARTUUID="38af624e-1319-
4cc5-a3a4-d4d31e200bfb"
/dev/nvme0n1p3: UUID="857acfc8-70de-4ad2-82c6-
e3fa024b6b72" TYPE="crypto_LUKS" PARTUUID="c51adabc-
9c0b-4133-ab63-46570d0365b5"
/dev/mapper/nvme0n1p3_crypt: UUID="DolrUR-zp04-FpNM-
2zKr-zHif-3Guk-C5tyS6" TYPE="LVM2_member"
/dev/mapper/alita--vg-root: UUID="bf2f3c6a-b221-420c-
9baf-99b9fd5e9a55" TYPE="ext4"
/dev/mapper/alita--vg-swap_1: UUID="c4c919f1-c4d2-
45bf-a902-4c2c94d26bbb" TYPE="swap"
/dev/nvme0n1: PTUUID="4d0ebcd1-67c4-42c9-8207-
4a23dccb4dc2" PTTYPE="gpt"
```
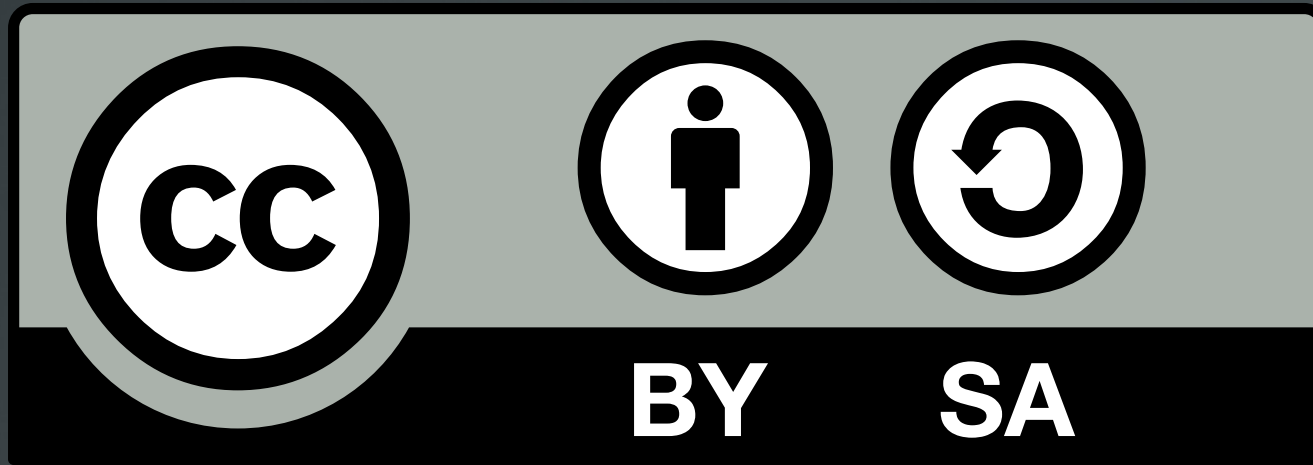
The `lsblk` command

- The **lsblk** command shows the UUID of all the disk, partitions and volumes in the system:

```
$ lsblk
NAME                     MAJ:MIN RM     SIZE RO TYPE  MOUNTPOINT
nvme0n1                  259:0    0     477G  0 disk
├─nvme0n1p1              259:1    0     512M  0 part  /boot/efi
├─nvme0n1p2              259:2    0     244M  0 part  /boot
└─nvme0n1p3              259:3    0   476,2G  0 part
  └─nvme0n1p3_crypt      254:0    0   476,2G  0 crypt
    ├─alita--vg-root     254:1    0   460,5G  0 lvm   /
    └─alita--vg-swap_1   254:2    0    15,7G  0 lvm   [SWAP]
```

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