

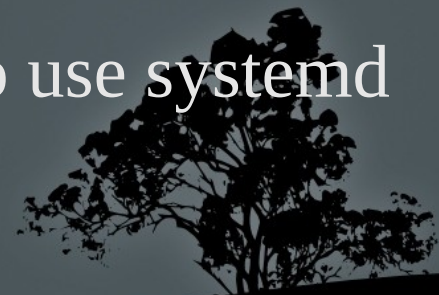
# LPIC-1 101-500 – Lesson 20

## 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
```

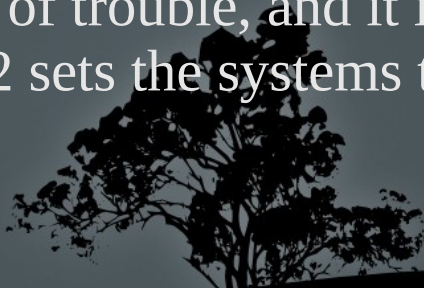
# The */etc/fstab* file

```
$ 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 /
    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 4<sup>th</sup> field of **fstab** or can be defined as comma separated values to the **-o** option of **mount**
- **async**: asynchronous 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
- 



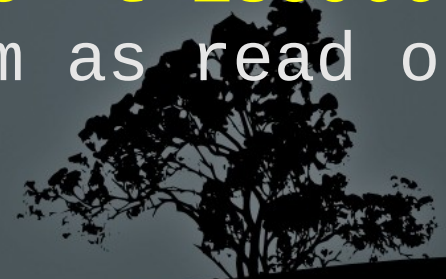
# The `mount` command

- 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

## Options:

- `-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

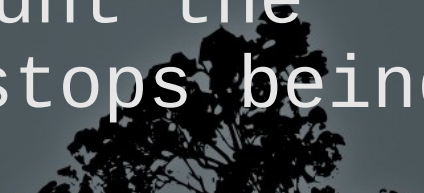
- The **umount** command is used for the unmounting of filesystems, provided they are not in use. We can use either the filesystem or the mount point as an argument
- `# umount /dev/sdb2 # unmount sdb2`
- `# umount /mnt/temp # unmount the filesystem mounted on the /mnt/temp mount point`



# 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="Do1rUR-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

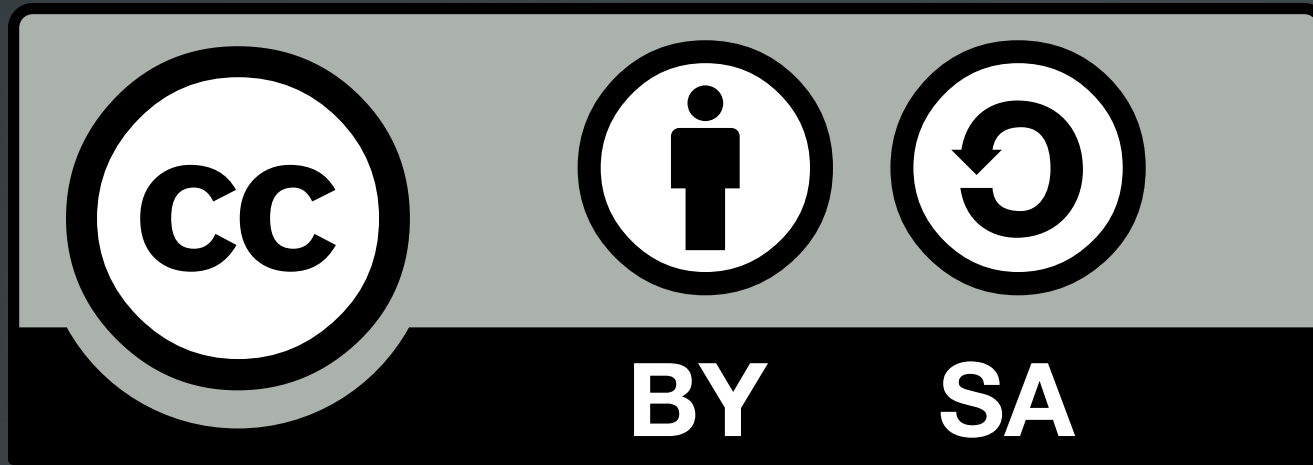
- The **lsblk** command shows the UUID of all the disk, partitions and volumes in the system:

```
$ 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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