

- using `dd` command create empty file with size of 20MB (hint: count 40000, bs=512)

```
samir@samir-VirtualBox:~$ dd if=/dev/zero of=/tmp/disk.img bs=512 count=40000
40000+0 records in
40000+0 records out
20480000 bytes (20 MB, 20 MiB) copied, 0.147168 s, 139 MB/s
samir@samir-VirtualBox:~$
```

- attach the file as loop device using `losetup` command (hint: use `losetup -f` to allocate free device)

```
samir@samir-VirtualBox:~$ losetup -f
/dev/loop2
samir@samir-VirtualBox:~$ losetup -P /dev/loop2 /tmp/disk.img
losetup: /dev/loop2: failed to set up loop device: Permission denied
samir@samir-VirtualBox:~$ sudo losetup -P /dev/loop2 /tmp/disk.img
samir@samir-VirtualBox:~$
```

- using `fdisk` command, create new partition into the loop device (`fdisk /dev/loop<??>` where `<??>` is the device number)

```
samir@samir-VirtualBox:~$ sudo fdisk /dev/loop2

Welcome to fdisk (util-linux 2.37.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0x94cc7dff.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1):
First sector (2048-39999, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-39999, default 39999):

Created a new partition 1 of type 'Linux' and of size 18.5 MiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
```

- format the new partition using `mkfs.ext4` command

```
samir@samir-VirtualBox:~$ sudo mkfs.ext4 /dev/loop2p1
mke2fs 1.46.5 (30-Dec-2021)
Discarding device blocks: done
Creating filesystem with 4744 4k blocks and 4752 inodes

Allocating group tables: done
Writing inode tables: done
Creating journal (1024 blocks): done
Writing superblocks and filesystem accounting information: done
```

- mount the formatted partition into `/mnt` directory

```
samir@samir-VirtualBox:~$ sudo mount /dev/loop2p1 /mn
mount: /mn: mount point does not exist.
samir@samir-VirtualBox:~$ sudo mount /dev/loop2p1 /mnt
samir@samir-VirtualBox:~$
```

- create some files inside the mounted `/mnt` directory

```
samir@samir-VirtualBox:~$ cd /mnt
samir@samir-VirtualBox:/mnt$ sudo touch file1 file2
samir@samir-VirtualBox:/mnt$ ls
file1 file2 lost+found
samir@samir-VirtualBox:/mnt$
```

- unmount `/mnt` directory using `umount` command

```
samir@samir-VirtualBox:/mnt$ cd ..
samir@samir-VirtualBox:/$ sudo umount /mnt
samir@samir-VirtualBox:/$
```

- using `'apt'` command, search and install `'gparted'` program

```
samir@samir-VirtualBox:/$ sudo apt install gparted
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libreoffice-ogltrans linux-headers-5.15.0-43 linux-headers-5.15.0-43-generic linux-image-5.15.0-43-generic linux-modules-5.15.0-43-generic linux-modules-extra-5.15.0-43-generic systemd-hwe-hwdb
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  gparted-common
Suggested packages:
  dmraid gpart jfsutils kpartx mtools reiser4progs reiserfsprogs udftools xfsprogs exfatprogs
The following NEW packages will be installed:
  gparted gparted-common
0 upgraded, 2 newly installed, 0 to remove and 240 not upgraded.
Need to get 490 kB of archives.
After this operation, 2,128 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 gparted-common all 1.3.1-1ubuntu1 [71.9 kB]
Get:2 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 gparted amd64 1.3.1-1ubuntu1 [418 kB]
Fetched 490 kB in 1s (340 kB/s)
Selecting previously unselected package gparted-common.
(Reading database ... 234106 files and directories currently installed.)
Preparing to unpack .../gparted-common_1.3.1-1ubuntu1_all.deb ...
Unpacking gparted-common (1.3.1-1ubuntu1) ...
Selecting previously unselected package gparted.
Preparing to unpack .../gparted_1.3.1-1ubuntu1_amd64.deb ...
Unpacking gparted (1.3.1-1ubuntu1) ...
Setting up gparted-common (1.3.1-1ubuntu1) ...
Setting up gparted (1.3.1-1ubuntu1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
```

- navigate and use gparted to detect the the new partition.

