

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

```
radwa@Ubuntu:~/Desktop$ 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, 0.183468 s, 112 MB/s
```

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

```
radwa@Ubuntu:~/Desktop$ losetup -f
/dev/loop4
```

```
radwa@Ubuntu:~/Desktop$ sudo losetup /dev/loop4 /tmp/disk.img
```

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

```
radwa@Ubuntu:~/Desktop$ sudo fdisk /dev/loop4

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 0x32f24c47.

Command (m for help):
```

4) format the new partition using `mkfs.ext4` command

```
radwa@Ubuntu:~/Desktop$ sudo mkfs.ext4 /tmp/disk.img
[sudo] password for radwa:
mke2fs 1.46.5 (30-Dec-2021)
Discarding device blocks: done
Creating filesystem with 5000 4k blocks and 5008 inodes

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

5) mount the formatted partition into `/mnt` directory

```
radwa@Ubuntu:~/Desktop$ sudo mount /dev/loop4 /mnt
radwa@Ubuntu:~/Desktop$ ls /mnt
lost+found
```

6) create some files inside the mounted /mnt directory

```
radwa@Ubuntu:~/Desktop$ sudo touch /mnt/text1.txt
radwa@Ubuntu:~/Desktop$ sudo touch /mnt/text2.txt
radwa@Ubuntu:~/Desktop$ ls /mnt
lost+found  text1.txt  text2.txt
```

7) unmount /mnt directory using umount command

```
radwa@Ubuntu:~/Desktop$ sudo umount /mnt
```

8) using `apt` command, search and install `gparted` program

```
radwa@Ubuntu:~/Desktop$ sudo apt search gparted
Sorting... Done
Full Text Search... Done
gparted/jammy 1.3.1-1ubuntu1 amd64
  GNOME partition editor
```

```
gparted-common/jammy,jammy 1.3.1-1ubuntu1 all
  GNOME partition editor -- common data
```

```
partitionmanager/jammy 21.12.3-0ubuntu1 amd64
  file, disk and partition management for KDE
```

```
radwa@Ubuntu:~/Desktop$ sudo apt install gparted
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  systemd-hwe-hwdb
Use 'sudo apt autoremove' to remove it.
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 193 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 3s (183 kB/s)
Selecting previously unselected package gparted-common.
(Reading database ... 230531 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) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for man-db (2.10.2-1) ...
```

9) navigate and use gparted to detect the the new partition.

The screenshot shows a terminal window and the GParted graphical interface. The terminal window, titled 'radwa@Ubuntu: ~/Desktop', displays the following commands and output:

```
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for man-db (2.10.2-1) ...
radwa@Ubuntu:~/Desktop$ sudo gparted /dev/loop4
GParted 1.3.1
configuration --enable-libparted-dmraid --enable-online-resize
libparted 3.4
```

The GParted window, titled '/dev/loop4 - GParted', shows a single partition on the disk. The partition is represented by a yellow bar. The details of the partition are as follows:

Partition	File System	Size	Used	Unused	Flags
/dev/loop4	ext4	19.53 MiB	5.30 MiB	14.23 MiB	

At the bottom of the GParted window, it states '0 operations pending'.