

1. using `dd` command create empty file with size of 20MB (hint: count 40000, bs=512)
2. attach the file as loop device using `losetup` command (hint: use `losetup -f` to allocate free device)

```
mariam@ubuntu22: ~  
mariam@ubuntu22:~$ 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, 0.117147 s, 175 MB/s  
mariam@ubuntu22:~$ sudo losetup -f  
[sudo] password for mariam:  
/dev/loop14  
  
mariam@ubuntu22:~$ sudo losetup -P /dev/loop14 /tmp/disk.img
```

3. using `fdisk` command, create new partition into the loop device (`fdisk /dev/loop<??>` where `<??>` is the device number)
4. format the new partition using `mks.ext4` command

```
mariam@ubuntu22:~$ sudo fdisk /dev/loop14  
  
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 0xbfeee842.  
  
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): ^C  
The partition table has been altered.  
Calling ioctl() to re-read partition table.  
Syncing disks.  
  
fdisk: write error  
mariam@ubuntu22:~$ sudo mkfs.ext4 /dev/loop14p1  
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  
  
mariam@ubuntu22:~$
```

5. mount the formatted partition into /mnt directory
6. create some files inside the mounted /mnt directory
7. unmount /mnt directory using umount command
8. using `apt` command, search and install `gparted` program

```
maria@ubuntu22:~$ ls /mnt
lost+found
maria@ubuntu22:~$ sudo touch /mnt/fileOne.txt
maria@ubuntu22:~$ sudo touch /mnt/fileTwo.txt
maria@ubuntu22:~$ ls /mnt
fileOne.txt fileTwo.txt lost+found
maria@ubuntu22:~$ sudo umount /mnt
maria@ubuntu22:~$ 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 183 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 (146 kB/s)
Selecting previously unselected package gparted-common.
(Reading database ... 233345 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) ...
maria@ubuntu22:~$
```

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

