When `mount` knows that it is operating on a loopback file, it automatically sets up a device in `/dev` corresponding to the loopback file and then mounts it. If we wish to do it manually, we use the `losetup` command to set up the device and then the `mount` command to mount it.

There's more...

Let's explore some more possibilities with loopback files and mounting.

Creating partitions inside loopback images

Suppose we want to create a loopback file, want to partition it, and finally mount a subpartition. In this case, we cannot use `mount -o loop`. We have to manually set up the device and mount the partitions in it. Partition a file with zeros dumped in it as follows:

```
# losetup /dev/loop1 loopback.img
# fdisk /dev/loop1
```

`fdisk` is a standard partitioning tool on Linux systems, a very concise tutorial on creating partitions using `fdisk` is available at `http://www.tldp.org/HOWTO/Partition/fdisk_partitioning.html` (make sure to use `/dev/loop1` instead of `/dev/hdb` in the aforementioned tutorial).

Create partitions in `loopback.img` and mount the first partition as follows:

```
# losetup -o 32256 /dev/loop2 loopback.img
```

Here, `/dev/loop2` will represent the first partition, `-o` is the offset flag, `32256` bytes are for a DOS partition scheme. The first partition starts after an offset of 32256 bytes from the start of the hard disk.

We can set up the second partition by specifying the required offset. After mounting, we can perform all regular operations as we can on physical devices.

Quicker way to mount loopback disk images with partitions

As we saw, we can manually pass partition offsets to `losetup` when we want to mount partitions inside a loopback disk image. However, there is a quicker way to mount all the partitions inside such an image using `kpartx`. This utility is usually not installed by default, so you will have to install it using your package manager:

```
# kpartx -v -a diskimage.img
add map loop0p1 (252:0): 0 114688 linear /dev/loop0 8192
add map loop0p2 (252:1): 0 15628288 linear /dev/loop0 122880
```

This creates mappings from the partitions in the disk image to devices in `/dev/mapper` which you can then mount. For example, to mount the first partition, use the following command:

```
# mount /dev/mapper/loop0p1 /mnt/disk1
```

When you're done with the devices (and unmounting any mounted partitions using `umount`), remove the mappings by:

```
# kpartx -d diskimage.img
loop deleted : /dev/loop0
```

Mounting ISO files as loopback

An ISO file is an archive of an optical media. We can mount ISO files in the same way that we mount physical disks by using loopback mounting.

We can even use a nonempty directory as the mount path. Then, the mount path will contain data from the devices rather than the original contents until the device is unmounted. For example:

```
# mkdir /mnt/iso
# mount -o loop linux.iso /mnt/iso
```

Now perform operations using files from `/mnt/iso`. ISO is a read-only filesystem.

Flush changing immediately with sync

While making changes on a mounted device, they are not immediately written to the physical devices. They are only written when the buffer is full. But, we can force writing of changes immediately by using the `sync` command as follows:

```
$ sync
```

Creating ISO files and hybrid ISO

An ISO image is an archive format that stores the exact storage images of optical disks such as CD-ROM, DVD-ROM, and so on. ISO files are commonly used to store content to be burned to optical media. We will now see how to create an ISO image from an optical disk. Many people rely on third-party utilities to do this, but using the command line, it's even simpler.

We also need to distinguish between bootable and non-bootable optical disks. Bootable disks are capable of booting from themselves and also running an operating system or another product. Non-bootable ISOs cannot do that. The important thing to note here is that just copying files from a bootable CD-ROM to another one is not sufficient to make the new one bootable. To preserve the bootable nature of a CD-ROM, it should be copied as a disk image using an ISO file.