Let’s say you want to extend existing disk on your already installed VM. Usually to extend the existing ext4 partition where system is running you would use some Live CD, to edit partition while it’s unmounted. However it’s possible to extend the partition without booting from Live CD. Here are some simple steps to do so:

Here we see that we have disk bigger than already existing partition:

```
root@test:~# df -h /
Filesystem Size Used Avail Use% Mounted on
/dev/vda1 24G 1008M 22G 5% /

root@test:~# fdisk -l /dev/vda

Disk /dev/vda: 53.7 GB, 53687091200 bytes
255 heads, 63 sectors/track, 6527 cylinders, total 104857600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009256d

 Device Boot Start End Blocks Id System
/dev/vda1 * 2048 50329215 25163584 83 Linux
/dev/vda2 50329216 52426367 1048576 82 Linux swap / Solaris
```

First of all you have to make sure to turn off swap:

```
root@test:~# swapoff -a
root@test:~# free -m
 total used free shared buffers cached
Mem: 994 189 804 0 11 140
-/+ buffers/cache: 38 955
Swap: 0 0 0

#Make sure that you see zeroes in "Swap:" row
```

And now let’s remove swap partition and extend root partition. From previous fdisk command we can see that our swap partition is second one (/dev/vda2).

In following steps we’re going to remove swap partition and root partition, create root partition with new size (size should be = [last sector] – [swap partition sector count]) and finally new swap partition with same size.

```
root@test:~# fdisk /dev/vda
```

```
Command (m for help): p

Disk /dev/vda: 53.7 GB, 53687091200 bytes
255 heads, 63 sectors/track, 6527 cylinders, total 104857600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009256d

 Device Boot      Start         End      Blocks   Id  System
/dev/vda1   *        2048    50329215    25163584   83  Linux
/dev/vda2        50329216    52426367     1048576   82  Linux swap / Solaris

Command (m for help): d
Partition number (1-4): 2

Command (m for help): d
Selected partition 1

Command (m for help): n
Partition type:
 p   primary (0 primary, 0 extended, 4 free)
 e   extended
Select (default p):
Using default response p
Partition number (1-4, default 1):
Using default value 1
First sector (2048-104857599, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-104857599, default 104857599): +103809023

Command (m for help): n
Partition type:
 p   primary (1 primary, 0 extended, 3 free)
 e   extended
Select (default p):
Using default response p
Partition number (1-4, default 2):
Using default value 2
First sector (103811072-104857599, default 103811072):
Using default value 103811072
Last sector, +sectors or +size{K,M,G} (103811072-104857599, default 104857599):
Using default value 104857599

Command (m for help): p
```

```
Disk /dev/vda: 53.7 GB, 53687091200 bytes
255 heads, 63 sectors/track, 6527 cylinders, total 104857600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009256d

 Device Boot      Start         End      Blocks   Id  System
/dev/vda1            2048   103811071    51904512   83  Linux
/dev/vda2       103811072   104857599      523264   83  Linux
```

Before writing changes to disk we have to set proper partition types and make root partition bootable:

```
Command (m for help): t
Partition number (1-4): 1
Hex code (type L to list codes): 83

Command (m for help): t
Partition number (1-4): 2
Hex code (type L to list codes): 82
Changed system type of partition 2 to 82 (Linux swap / Solaris)

Command (m for help): a
Partition number (1-4): 1

Command (m for help): p

Disk /dev/vda: 53.7 GB, 53687091200 bytes
255 heads, 63 sectors/track, 6527 cylinders, total 104857600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009256d

 Device Boot      Start         End      Blocks   Id  System
/dev/vda1   *        2048   103811071    51904512   83  Linux
/dev/vda2       103811072   104857599      523264   82  Linux swap / Solaris
```

Now let’s write changes to disk and re-read partition table (to re-read partition table you can also reboot the VM) so the system could see new size:

```
Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
```

```
WARNING: Re-reading the partition table failed with error 16: Device or resource busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.
root@test:~# partprobe
root@test:~# fdisk -l

Disk /dev/vda: 53.7 GB, 53687091200 bytes
16 heads, 63 sectors/track, 104025 cylinders, total 104857600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009256d

 Device Boot      Start         End      Blocks   Id  System
/dev/vda1   *        2048   103811071    51904512   83  Linux
/dev/vda2       103811072   104857599      523264   82  Linux swap / Solaris
```

Now we can see that we have new partition table with resized partitions, however root partition's filesystem has to be resized as well. It's one simple step left:

```
root@test:~# resize2fs /dev/vda1
resize2fs 1.42.9 (4-Feb-2014)
Filesystem at /dev/vda1 is mounted on /; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 4
The filesystem on /dev/vda1 is now 12976128 blocks long.

root@test:~# df -h /
Filesystem      Size  Used Avail Use% Mounted on
/dev/vda1        49G 1009M   46G   3% /
```

Resize2fs did the trick and you can see that we have 49G partition now.