

Expand a Hard Disk with Ubuntu LVM

So you're running an Ubuntu server in a virtual machine, and now you need to add 20 GB of disk space to root (/). There are quite a few ways to do this, and fortunately you're running the [Logical Volume Manager\(link is external\)](#) (LVM) in Ubuntu, so the process isn't too bad.

(This example uses Ubuntu Server 12.04, but it works for 14.04, 16.04 and 18.04 as well.)

After you make the additional space available in VMWare/Xen/Hyper-V, first reboot your Ubuntu server so it can see the new free space. Then we'll run the GNU partition editor to examine our disk:

```
root@myserver:/# parted
GNU Parted 2.2
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) print free
Model: VMware Virtual disk (scsi)
Disk /dev/sda: 42.5GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
```

Number	Start	End	Size	Type	File system	Flags
	32.3kB	32.8kB	512B		Free Space	
1	32.8kB	255MB	255MB	primary	ext2	boot
	255MB	255MB	8192B		Free Space	
2	255MB	16.1GB	15.8GB	extended		
5	255MB	16.1GB	15.8GB	logical		lvm
3	16.1GB	21.5GB	5365MB	primary		
	21.5GB	21.5GB	6856kB		Free Space	
	21.5GB	42.5GB	21.0GB		Free Space	<-----

You can see your free space, so let's partition it:

```
$ cfdisk
```

Pick your free space, select New, then choose a Primary or Logical partition. For a small server, it probably doesn't matter too much.

Remember in x86 Linux that you can have a maximum of 4 primary + extended partitions per disk.

Beyond that, you'll need to begin adding logical partitions in your extended partitions.

Use partition type Linux LVM (8e).

Select the Write command to create the partition, then (if necessary) reboot your system.

When your system comes back up, check on your new partition:

```
$ fdisk -l /dev/sda
```

Disk /dev/sda: 42.5 GB, 21474836480 bytes

255 heads, 63 sectors/track, 2610 cylinders

Units = cylinders of 16065 * 512 = 8225280 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk identifier: 0x000d90ee

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	1	31	248832	83	Linux
Partition 1 does not end on cylinder boundary.						
/dev/sda2		31	1958	15476768	5	Extended
/dev/sda3		1958	2610	5239185	83	Linux
/dev/sda4		2610	3608	16815191	83	Linux <-----
/dev/sda5		31	1958	15476736	8e	Linux LVM

So now let's pull it into our LVM configuration. First we'll create the physical volume:

```
$ pvcreate /dev/sda4
```

Physical volume "/dev/sda4" successfully created

Let's take a look at our physical volumes:

```
$ pvdisplay
```

--- Physical volume ---

PV Name /dev/sda5

VG Name ubuntu-1004

PV Size	14.76 GiB / not usable 2.00 MiB
Allocatable	yes (but full)
PE Size	4.00 MiB
Total PE	3778
Free PE	0
Allocated PE	3778
PV UUID	f3tYaB-YCoK-ZeRq-LfDX-spqd-ggeV-gdsemo

--- Physical volume ---

PV Name	/dev/sda3
VG Name	ubuntu-1004
PV Size	5.00 GiB / not usable 401.00 KiB
Allocatable	yes
PE Size	4.00 MiB
Total PE	1279
Free PE	11
Allocated PE	1268
PV UUID	rL0QG1-OmuS-d4qL-d9u3-K7Hk-4a1l-NP3DtQ

"/dev/sda4" is a new physical volume of "20.00 GiB"

--- NEW Physical volume ---

PV Name	/dev/sda4
VG Name	
PV Size	20.00 GiB
Allocatable	NO
PE Size	0
Total PE	0
Free PE	0
Allocated PE	0
PV UUID	uaJn0v-HbRz-YKv4-Ez83-jVUo-dfyH-Ky2oHV

Now, extend our volume group (ubuntu-1004) into our new physical volume (/dev/sda4):

```
$ vgextend ubuntu-1004 /dev/sda4
Volume group "ubuntu-1004" successfully extended
```

The whole purpose of this exercise is to expand the root filesystem, so let's find our main logical volume:

```
$ lvdisplay
```

--- Logical volume ---

```
LV Name          /dev/ubuntu-1004/root
VG Name          ubuntu-1004
LV UUID          UJQUwV-f3rl-Tsd3-dQYO-exIk-LSpq-2qIs13
LV Write Access   read/write
LV Status         available
# open           1
LV Size          19.39 GiB
Current LE        1892
Segments          1
Allocation        inherit
Read ahead sectors    auto
- currently set to  256
Block device      254:0
```

Now, let's extend the logical volume to all free space available:

```
$ lvextend -l+100%FREE /dev/ubuntu-1004/root
```

Next, extend the filesystem:

```
$ resize2fs /dev/mapper/ubuntu--1004-root
```

Finally, let's check our free space:

```
$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mapper/ubuntu--1004-root
                39G  14G  24G  37% / <----
none            495M  176K  495M   1% /dev
none            500M    0  500M   0% /dev/shm
none            500M   36K  500M   1% /var/run
none            500M    0  500M   0% /var/lock
none            500M    0  500M   0% /lib/init/rw
/dev/sda1        228M  144M   72M  67% /boot
```

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