How to partition a drive on Linux

14 December 2022 by Korbin Brown

Every hard disk, in order to be accessible under Linux, must have at least one partition on it. A partition is a way to logically separate different sections of a disk. For example, a 4 TB hard drive could have four different 1 TB partitions, and all would appear as separate storage systems under the operating system. Alternatively, a hard disk could simply contain a single partition that spans the entire volume. The configuration is entirely up to the user.

Whatever configuration you decide for your hard disk, setting up partitions is one of the most essential and dangerous task to perform when working with operating systems. It is possible to create new partitions, delete partitions, and to shrink or expand existing partitions. In the sections below, we will assume that you need to add a new partition to a hard disk that is either currently unpartitioned or already contains some partitions.

In this tutorial, we will cover the step by step instructions to partition a hard drive or solid state drive on an existing Linux system. We will show the necessary steps for both a brand new disk and one that already has one or more partitions on the disk. You will see the steps for both command line and GUI methods, so you can follow along with set of instructions you are most comfortable with. Let's get started.

In this tutorial you will learn:

- How to add partition to new, blank disk
- How to add to, delete, and resize an existing partition table

- How to partition a drive via command line
- How to partition a drive via GUI

PARTITIONING HARD DRIVE
HOW TO PARTITION A HARD DRIVE IN LINUX
LINUXCONFIG.ORG
YOUR SYSADMIN GUIDE TO GNU/LINUX

How to partition a drive on Linux

Software Requirements and Linux Command Line Conventions

Category	Requirements, Conventions or Software Version Used
System	Any Linux distro
Software	parted, gparted
Other	Privileged access to your Linux system as root or via the `sudo` command.
Conventions	**#** – requires given linux commands to be executed with root privileges either directly as a root user or by use of `sudo` command **$** – requires given linux commands to be executed as a regular non-privileged user

How to partition a drive on Linux via command line

Follow LinuxConfig.org on Twitter for the latest tips and tricks about Linux!

Your steps for partitioning a hard drive on Linux will vary depending on whether your disk already contains existing partitions or not. For example, if your hard disk already contains a partition that spans the entire volume, then you will first need to shrink the existing partition in order to be able to add a new one to the disk.

In the step by step instructions below, we will initialize a disk with a partition table, create a new partition, check the partition alignment, resize a partition, and remove an existing partition. This should cover a variety of scenarios depending on whether you are trying to partition a new disk or one with existing partitions.

Step 1

Initializing a device with a partition table

The device we will be working with in these steps is `/dev/sdX` . To run in `interactive mode` we must launch parted with root permissions, passing as an argument to the command, the path of device we want to operate on, in this case:

```
$ sudo parted /dev/sdX
```

The parted prompt will be opened:

```
GNU Parted 3.4
Using /dev/sdX
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted)
```

Step 2 First, need to visualize the current state of the drive. This will tell us what the current partition table looks like, or if one even exists at all. Therefore we will use the `print` command:

```
(parted) print
Error: /dev/sdX: unrecognised disk label
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sdX: 42.9GB
Sector size (logical/physical): 512B/512B
Partition Table: unknown
Disk Flags:
```

As you can see, since `/dev/sdX` does not contain a partition table, parted only shows us information about the disk model, total size and sector size. To be able to use the disk we need to initialize it, therefore we must create a partition table on it.

Step 3 The command that allows us to create a partition table is `mklabel`. If we do not specify what kind of partition table we want to create, parted will ask us in the prompt:

```
(parted) mklabel
New disk label type? msdos
```

In this case we create a traditional `msdos` partition table. Other valid values are “aix”, “amiga”, “bsd”, “dvh”, “gpt”, “loop”, “mac”, “pc98” and “sun”. As said before, we could have also specified the type of partition table as an argument to the `mklabel` command.

Step 4

Creating a partition

Next, we will create our first partition on the device. We will need to provide the partition type, choosing between primary or extended, the filesystem type (optional), the partition starting point and the partition ending point. Again if not provided directly, those values will be requested interactively. The command to create a partition is `mkpart`:

```
(parted) mkpart
Partition type?  primary/extended? primary
File system type?  [ext2]? ext4
```

```
Start? 0%
End? 100%
```

In this example, we have chosen to create a primary partition, formatted with the ext4 file system, and we are letting the partition span the entire disk, hence it starts at 0% and ends at 100%. Alternatively, you can specify a start and end in MiB or GiB values instead of percentages as we did above.

Step 5 We can now run the `print` command again in order to see the partition we have just created:

```
 (parted) print
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sdX: 42.9GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type     File system  Flags
 1      1049kB  42.9GB  42.9GB  primary  ext4         lba
```

Step 6

Checking the partition alignment

The alignment of a partition is a very important factor to optimize performance. With `parted`, we can check two type of alignments, `minimal` and `optimal`. In minimal mode, the program checks that the partition respects the minimum alignment value to physical blocks, while in optimal mode, it checks if the partition is aligned to a multiple of the physical block size, to provide optimal performances. The command to use to perform those checks is `align-check`:

```
 (parted) align-check
alignment type(min/opt)  [optimal]/minimal? minimal
```

```
Partition number? 1
1 aligned
```

Once the command is run in interactive mode, we are prompted to provide the type of alignment we want to check (optimal is used by default) and the partition number (1). In this case parted confirmed that the partition is aligned correctly.

Step 7

Resizing a partition

Resizing a partition is also a very dangerous operation, especially if the partition already contains a filesystem. Be aware that when changing the size of a partition, `parted` will never adapt the filesystem to it, therefore, especially when shrinking, you must use the dedicated tools to resize the filesystem in use first. The command used to perform a partition resize is `resizepart`. Our partition size currently consumes 100% of the disk; if for example, we would like to extend it to cover only 50% of the device instead, we would type:

```
(parted) resizepart
Partition number? 1
End?  [42.9GB]? 50%
Warning: Shrinking a partition can cause data loss, are you sure you wan
Yes/No? yes
```

The partition now covers only half the space on the device.

Step 8

Removing a partition

Removing a partition is just as easy. Obviously we should perform such an operation with the greatest amount of caution. The command to use in this case is `rm`:

```
(parted) rm
Partition number? 1
```

WARNING

There is no prompt for confirmation, so think twice before running this command to destroy an existing partition.

Step 9 To confirm your changes before exiting `parted`, use the `print` command, and then exit out of parted with `quit`:

```
(parted) print
```

And:

```
(parted) quit
```

How to partition a drive on Linux via GUI

There are many GUI programs which can also be used to create or edit partitions for a hard disk on Linux. In this tutorial, we will focus on using `gparted`, which, as the name implies, is the GUI counterpart of the command line `parted` tool that we used above.

You can use the appropriate command below to install gparted with your system's package manager.

To install gparted on Ubuntu, Debian, and Linux Mint:

```
$ sudo apt install gparted
```

To install gparted on Fedora, CentOS, AlmaLinux, and Red Hat:

```
$ sudo dnf install gparted
```

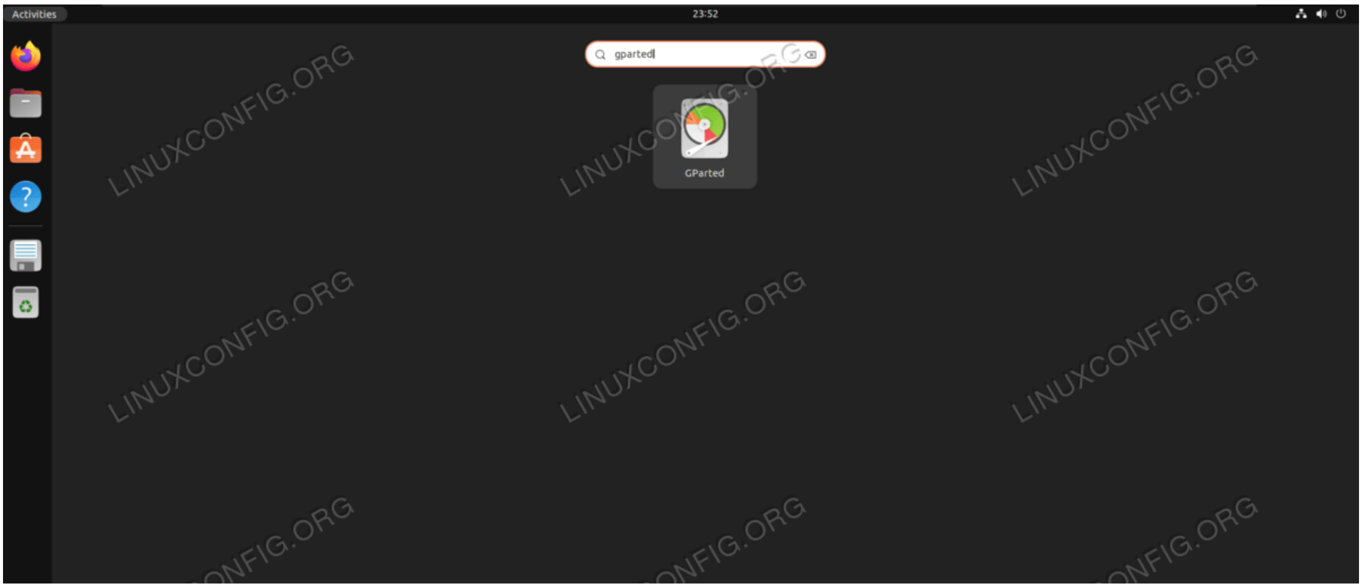
To install gparted on Arch Linux and Manjaro:

```
$ sudo pacman -S gparted
```

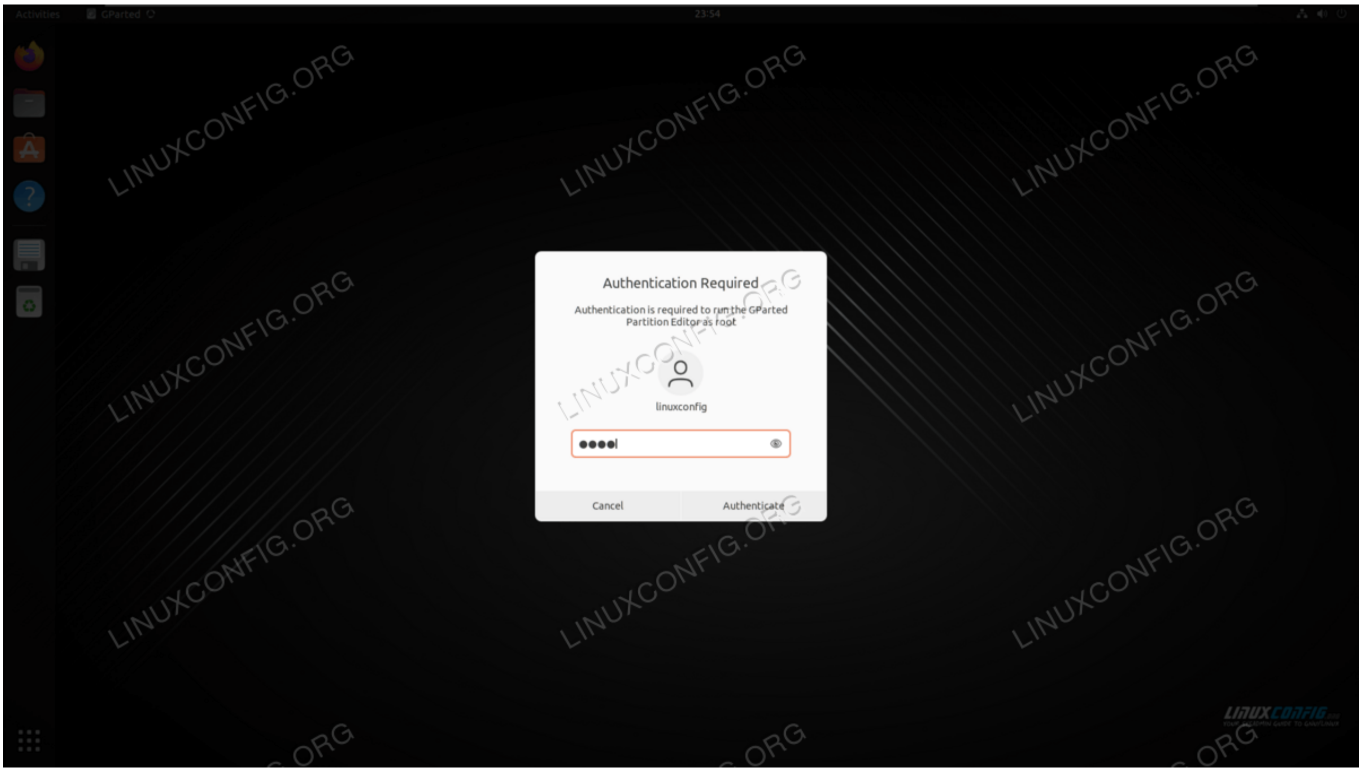
After it is installed, follow the steps below to use gparted to create, resize, and delete partitions:

Step 1 Get started by searching for the gparted application in your desktop envrionment's app launcher. You will be prompted for the root password upon opening the program.

Follow LinuxConfig.org on Twitter for the latest tips and tricks about Linux!



Search for and open the gparted app



Authentication Required

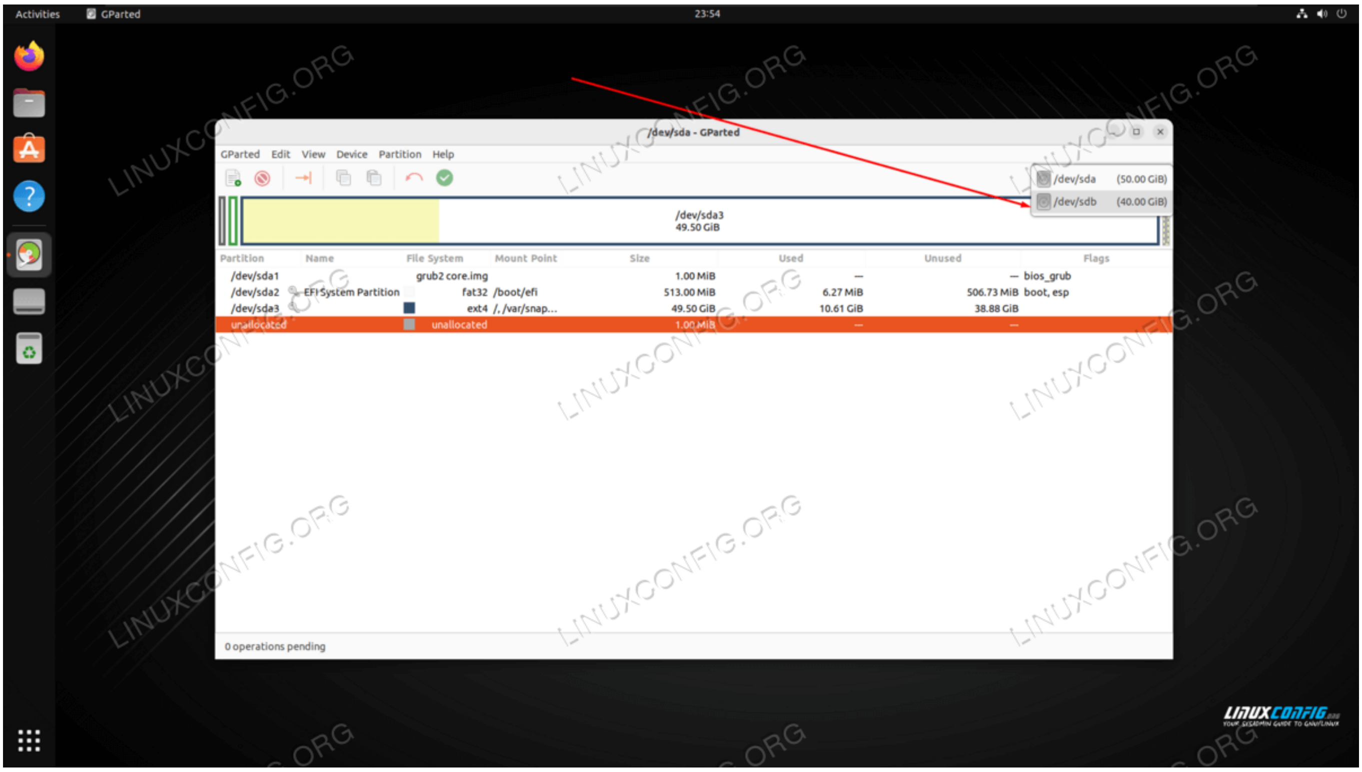
Authentication is required to run the GParted Partition Editor as root

linuxconfig

●●●●

You must supply your root password in order to use gparted

Step 2 The first thing we need to do is select the correct device that we will be working with from the upper right corner. On our test system, this would be `/dev/sdb` as indicated in the screenshot below.



Partition	Name	File System	Mount Point	Size	Used	Unused	Flags
/dev/sda1		grub2 core.img		1.00 MiB	—	—	bios_grub
/dev/sda2	EFI System Partition	fat32	/boot/efi	513.00 MiB	6.27 MiB	506.73 MiB	boot, esp
/dev/sda3		ext4	/, /var/snap...	49.50 GiB	10.61 GiB	38.88 GiB	
unallocated		unallocated		1.00 MiB	—	—	

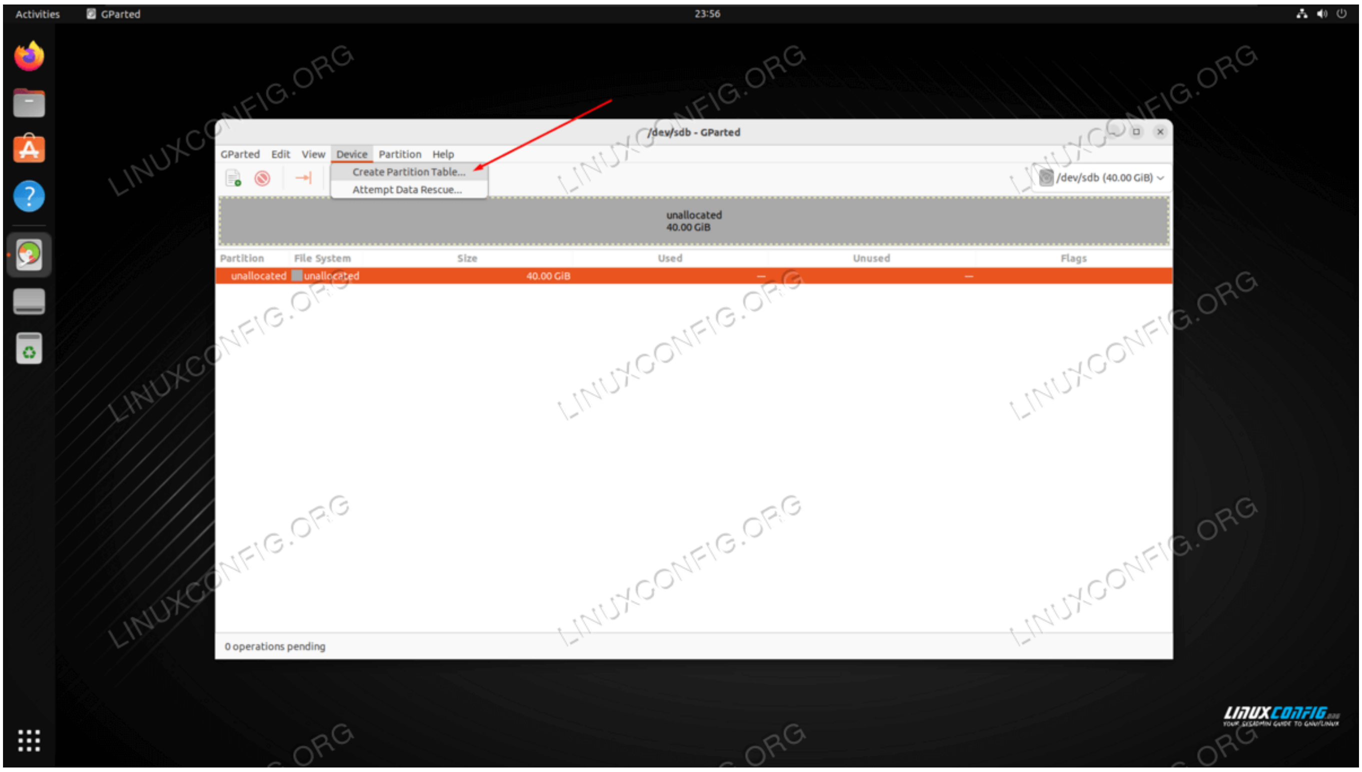
0 operations pending

First select the correct hard disk to work with in gparted

Step 3

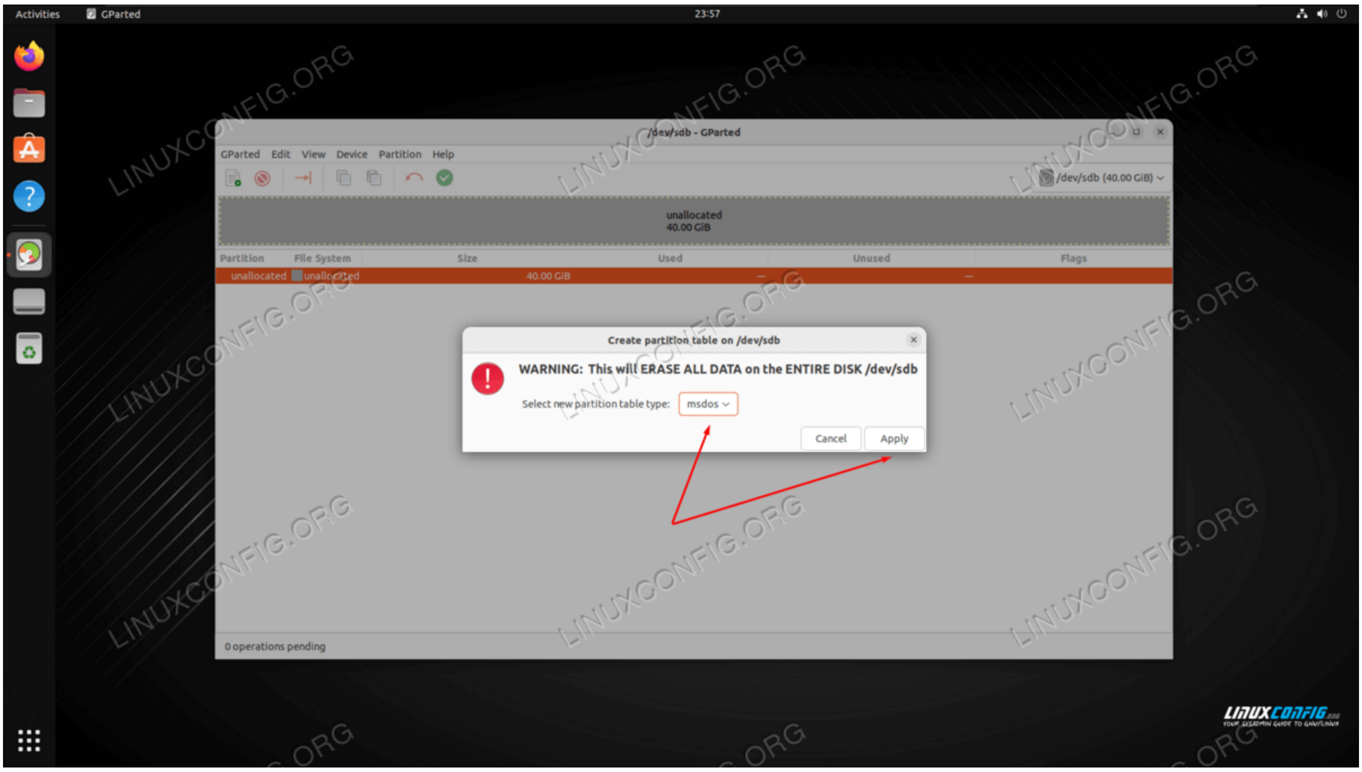
Create new partition

As you can see, your disk currently has no partitions. Let’s add one by going to Device > Create Partition Table.


Activities
GParted
23:56
/dev/sdb - GParted
GParted Edit View Device Partition Help
Create Partition Table...
Attempt Data Rescue...
/dev/sdb (40.00 GiB)
unallocated
40.00 GiB
Partition File System Size Used Unused Flags
unallocated unallocated 40.00 GiB — —
0 operations pending
LINUXCONFIG.ORG

Select to create a new partition table from the Device menu

Step 4 Next, select the type of partition you would like to create. We will by sticking with `msdos` in our tutorial but feel free to pick something else. GPT is recommended for hard disks greater than 2 TB in size.



Partition	File System	Size	Used	Unused	Flags
unallocated	unallocated	40.00 GiB	—	—	

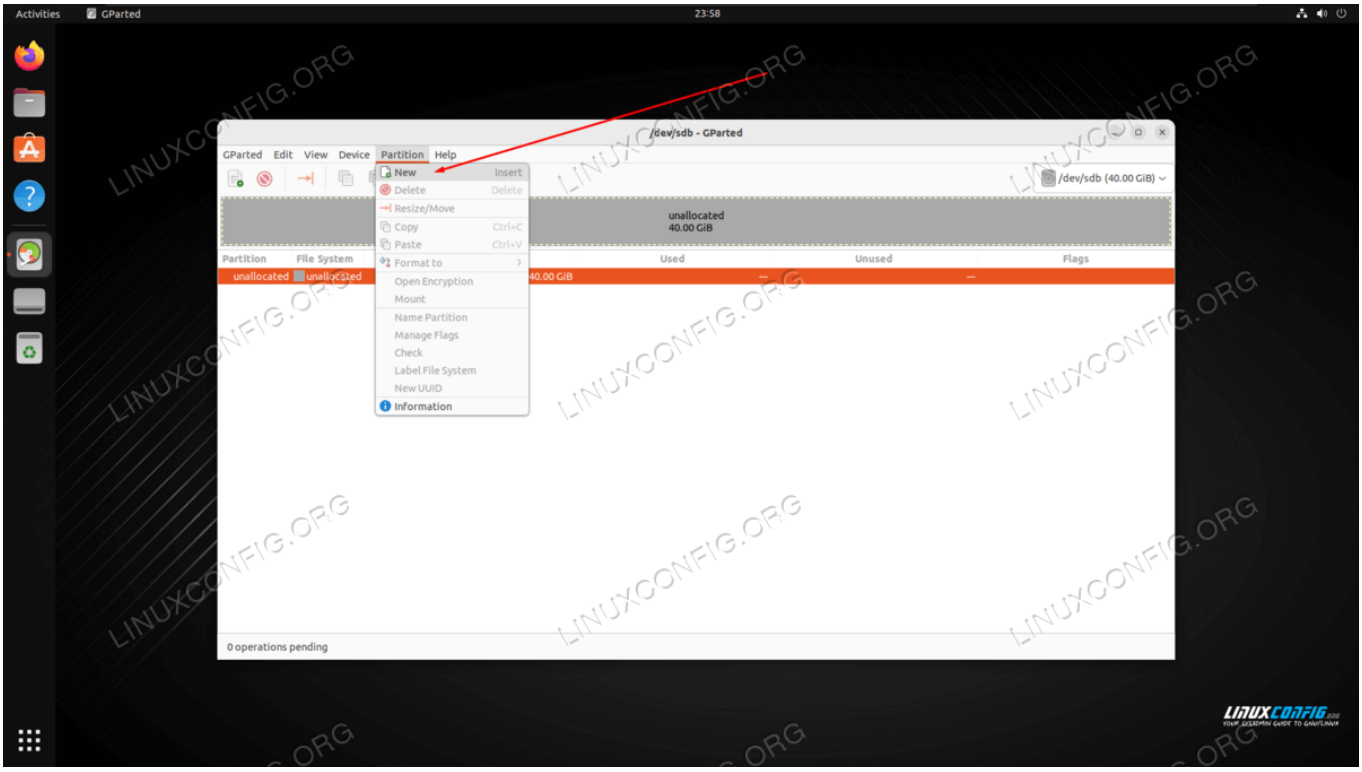
WARNING: This will ERASE ALL DATA on the ENTIRE DISK /dev/sdb

Select new partition table type: msdos

0 operations pending

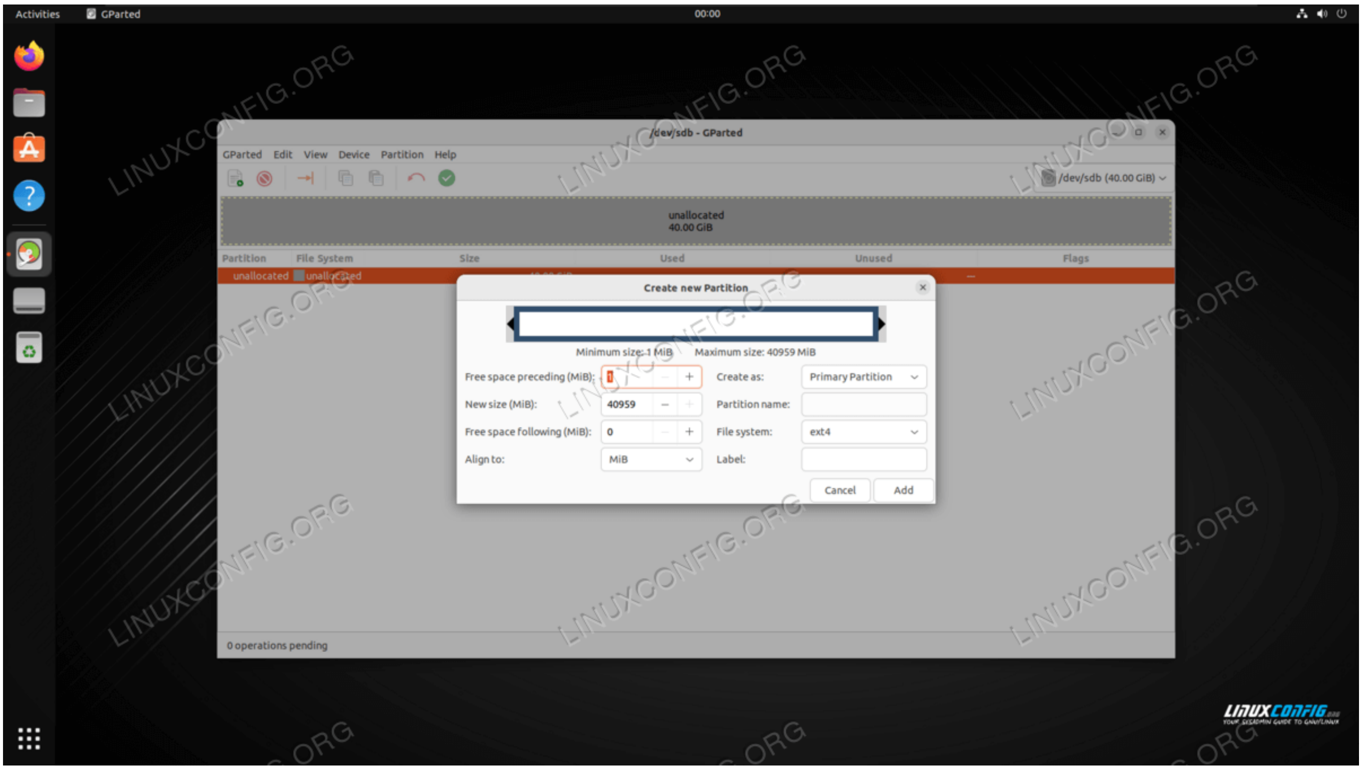
Select partition type and confirm that these changes will erase current disk data

Step 5 Now that the partition table has been created, we can move forward with adding a new partition to the hard disk. This option can be found by heading to Partition > New.



Select to create a new partition

Step 6 On this menu, we get to select the size of our new partition. Rather than working with exact values, feel free to use the sliders with your mouse in order to configure the size that you want. For our example, we will simply make one partition that spans the entire size of the hard disk. Click 'Add' when ready to proceed.



Minimum size: 1 MiB Maximum size: 40959 MiB

Free space preceding (MiB): 1

New size (MiB): 40959

Free space following (MiB): 0

Align to: MiB

Create as: Primary Partition

Partition name:

File system: ext4

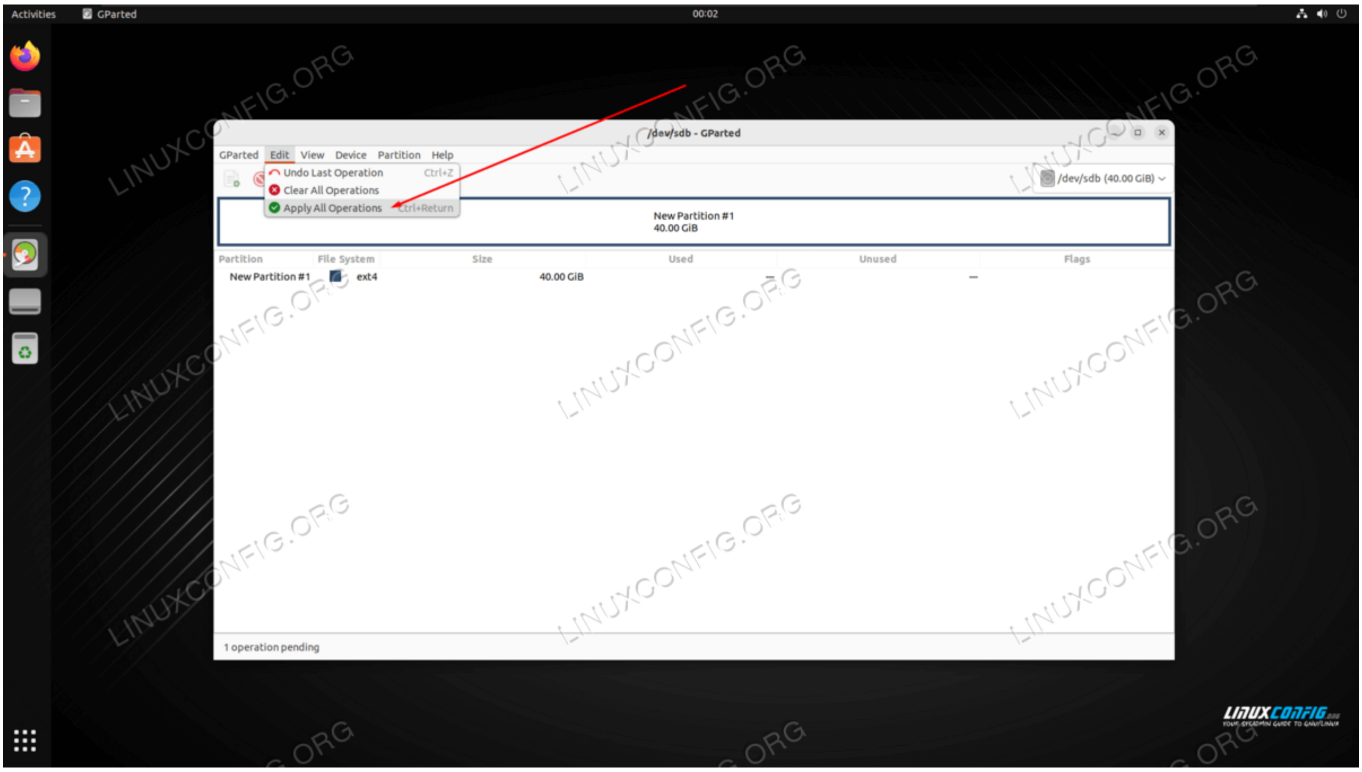
Label:

Select size of partition and optionally a name

NOTE

`ext4` is the recommended file system to use on Linux systems, unless you have a special reason to format the disk with some other kind.

Step 7 The changes are not yet written to the disk, but we can see in the preview pane the configurations that we are about to apply. Once you are ready, click on Edit > Apply All Operations.



Partition	File System	Size	Used	Unused	Flags
New Partition #1	ext4	40.00 GiB	—	—	

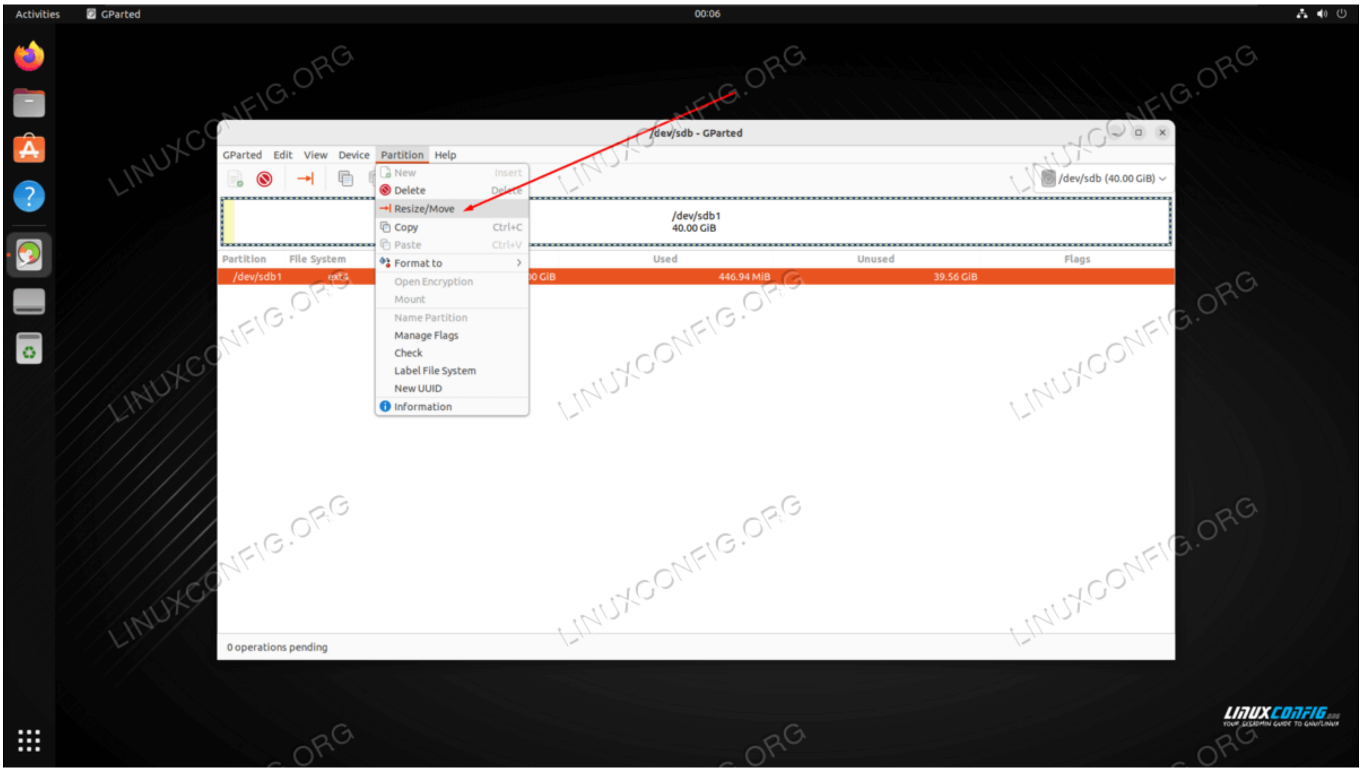
1 operation pending

Applying the changes to disk

Step 8

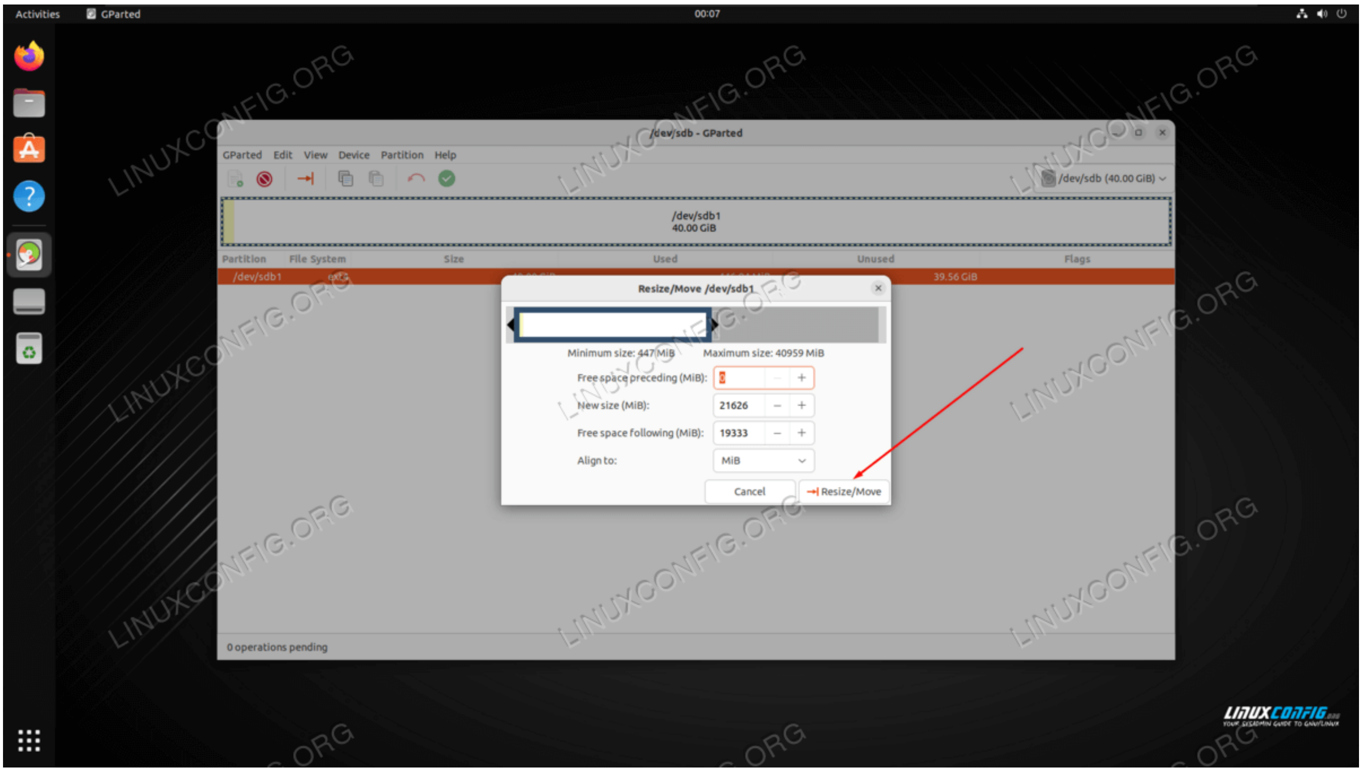
Resize a partition

Click on Partition > Resize in order to resize the currently selected partition.



Select the Resize partition option from the menus

Step 9 Enter the new start and end points for your partition. Alternatively, simply use the slider to adjust the size of the partition. In this case, we will shrink our partition to about half the size.



Minimum size: 447 MiB Maximum size: 40959 MiB

Free space preceding (MiB): 0

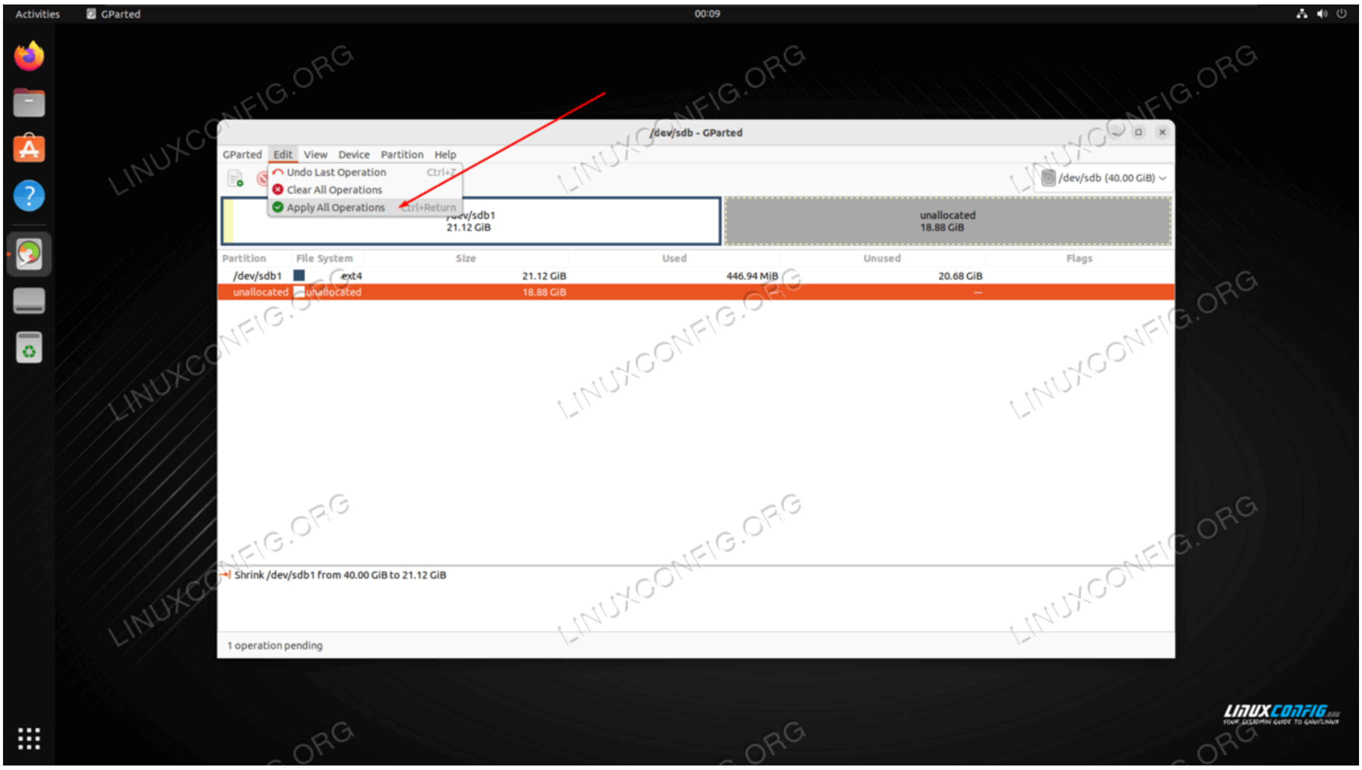
New size (MiB): 21626

Free space following (MiB): 19333

Align to: MiB

Enter values and then click Resize when done

Step 10 You can see the new changes that we have made. To finish writing them, click on Edit > Apply All Operations.



Partition	File System	Size	Used	Unused	Flags
/dev/sdb1	ext4	21.12 GiB	446.94 MiB	20.68 GiB	
unallocated	unallocated	18.88 GiB	—	—	

Shrink /dev/sdb1 from 40.00 GiB to 21.12 GiB

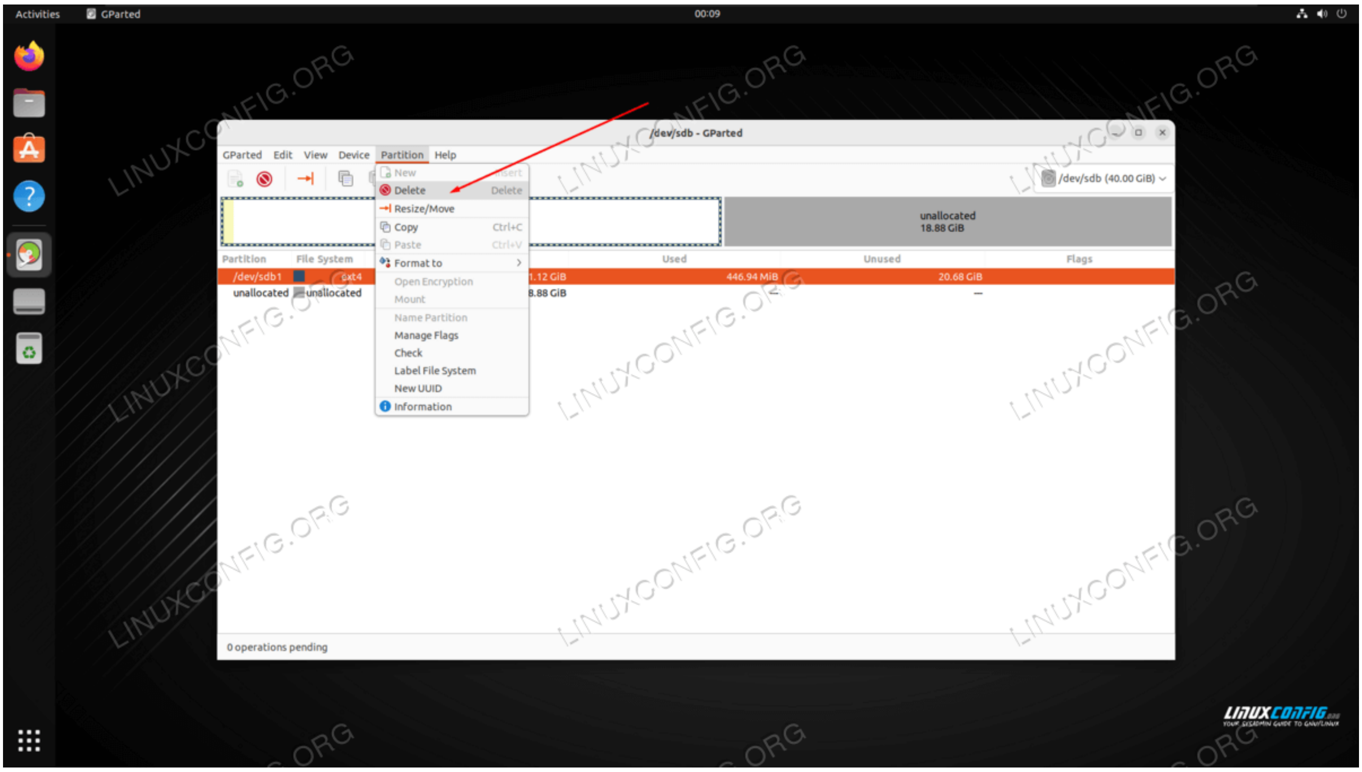
1 operation pending

Applying the changes to disk and shrinking the partition

Step 11

Delete a partition

To delete the partition, just select it in gparted and navigate to Partition > Delete. When done, click Edit > Apply All Operations to confirm the changes.



Partition	File System		Used	Unused	Flags
/dev/sdb1	ext4	1.12 GiB	446.94 MiB	20.68 GiB	
unallocated	unallocated	8.88 GiB	—	—	

How to delete a partition in gparted

Closing Thoughts

In this tutorial, we saw how to partition a hard drive from command line and GUI on a Linux system. Managing partitions is a dangerous task that should be performed with the utmost caution. The command line and GUI both prove as viable methods for managing partitions, especially in the case of `parted` and `gparted`, which are closely related tools.

Related Linux Tutorials:

- How to partition USB drive in Linux
- Things to install on Ubuntu 20.04
- Things to do after installing Ubuntu 20.04 Focal Fossa Linux
- Introduction to MySQL storage engines
- How to use Google Drive on Linux
- How to benchmark Disk performance on Linux
- Mint 20: Better Than Ubuntu and Microsoft Windows?
- How to format disk in Linux