

Expanding VirtualBox Linux Partition Size

Practical Class 4-b

Systems and Storage Laboratory

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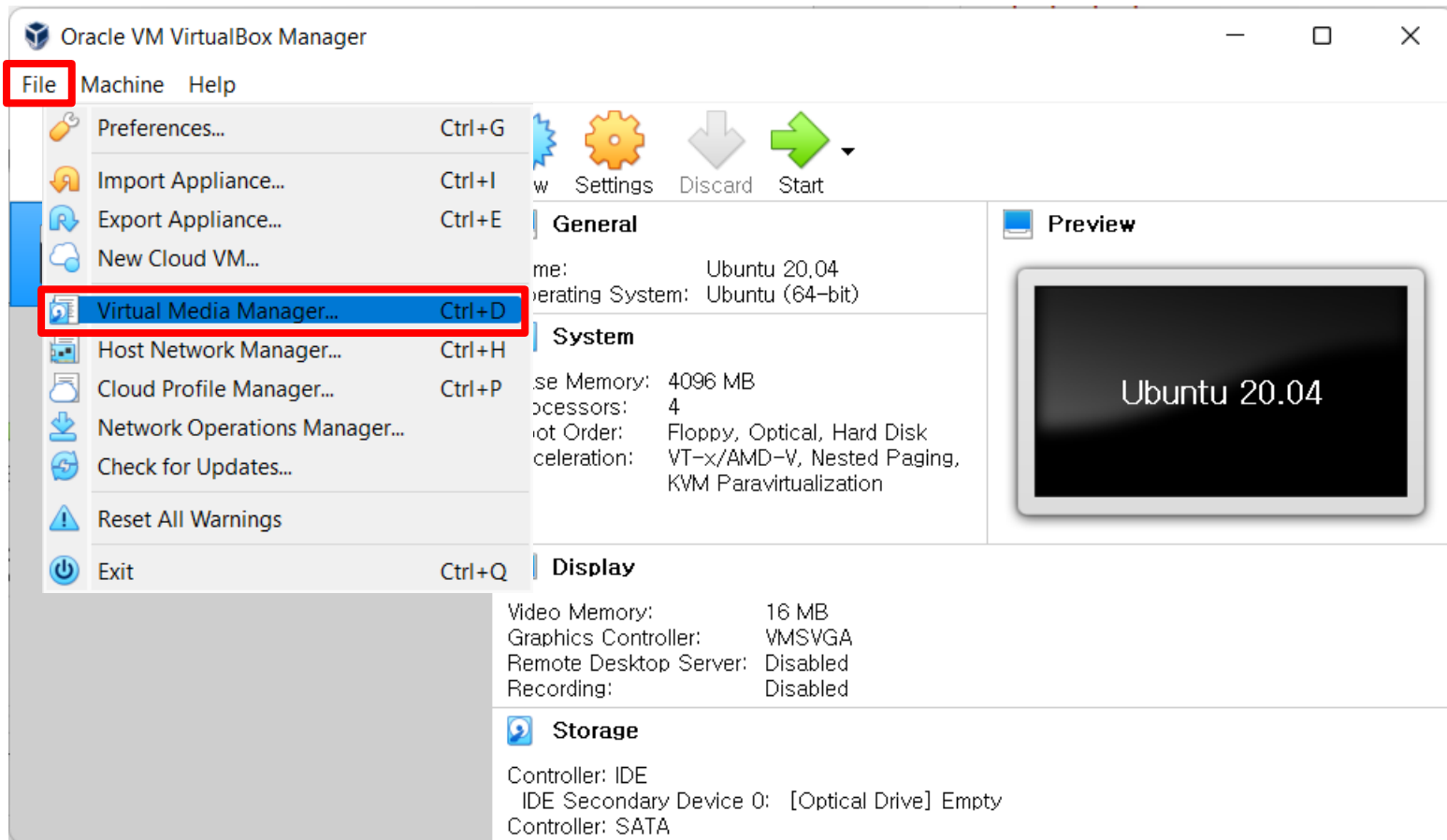
- ❖ **Increasing disk size**
- ❖ **Two options to increase partition size:**
 - **GUI: GParted**
 - **CLI: Parted**

Why do we need to expand partition size?

- ❖ Building Linux Kernel in Ubuntu 20.04 desktop needs **at least 40GB** of free space
 - We recommend expanding partition size to **more than 40GB**, because you may want to install various applications on this machine
 - For enough free space, we recommend virtual disk size to be **50GB or more**
- ❖ Those who already have enough space more than 50GB can skip these steps

Increasing disk size

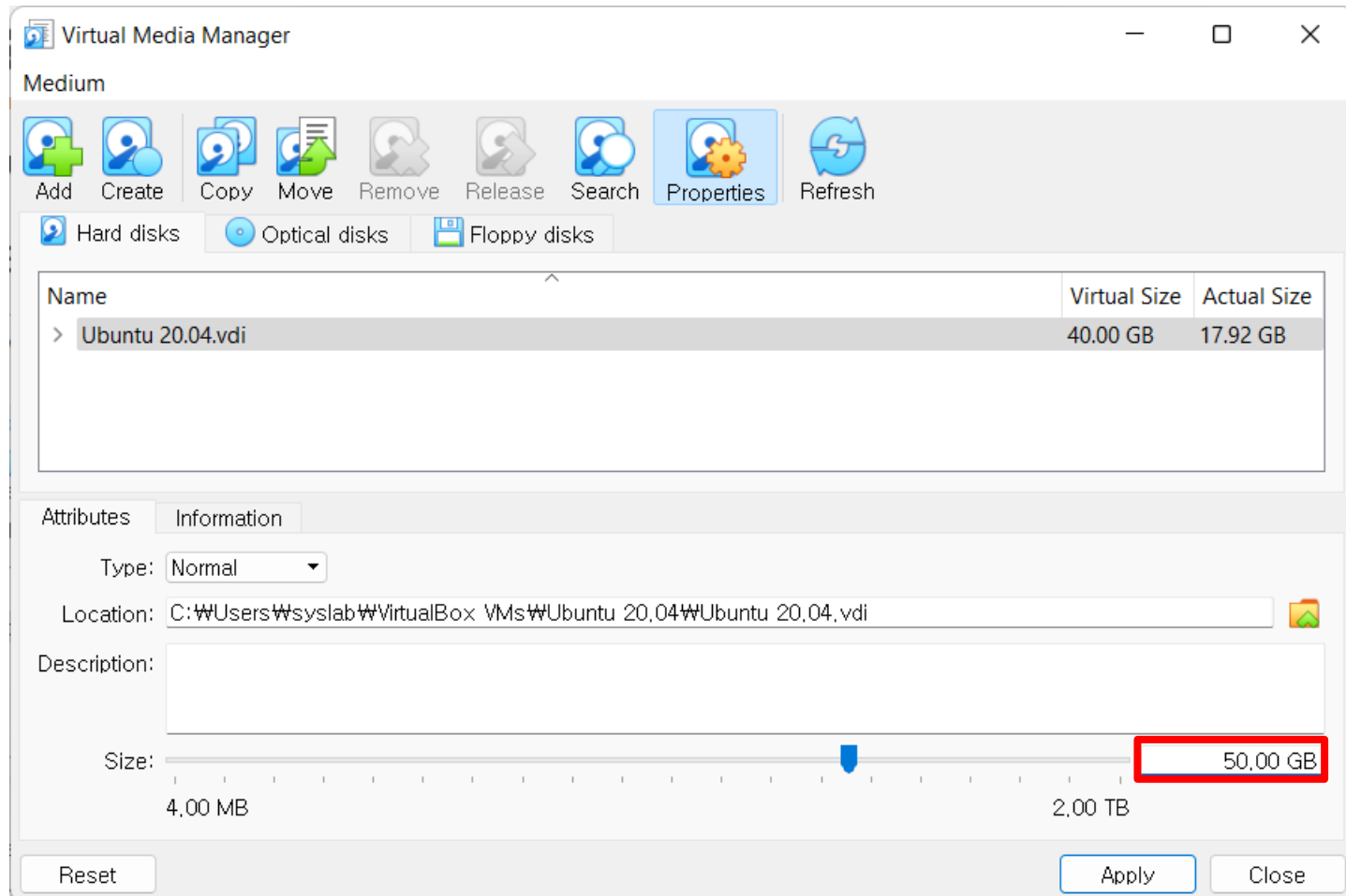
- ❖ Before we proceed, make sure your machine is turned off
- ❖ File → Virtual Media Manager



Increasing disk size

❖ In the Virtual Media Manager

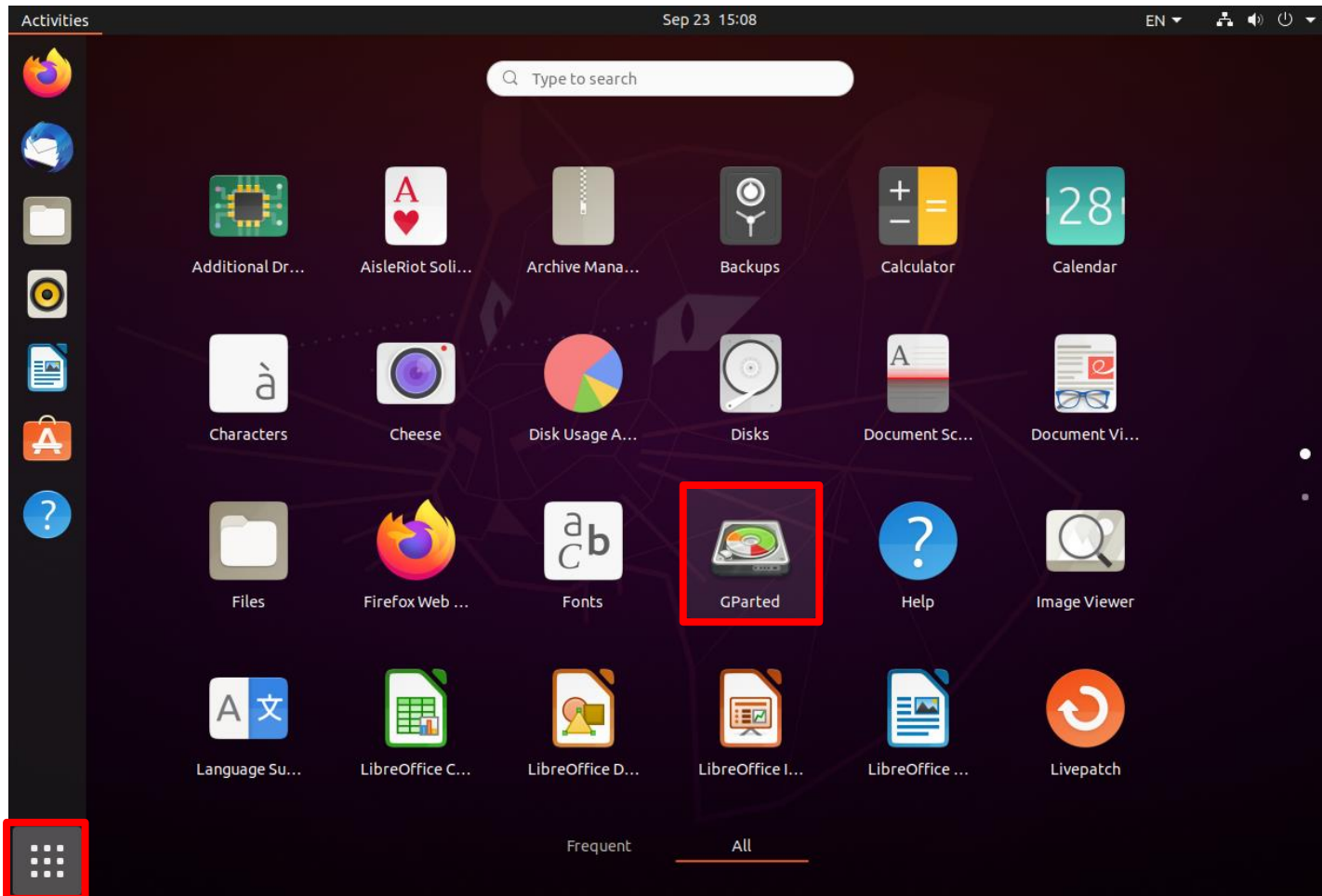
- Increase virtual disk size more than **50GB** (at least 40GB)



Increasing partition size (GUI)

❖ Boot into Linux, install and launch GParted

```
$ sudo apt install gparted
```

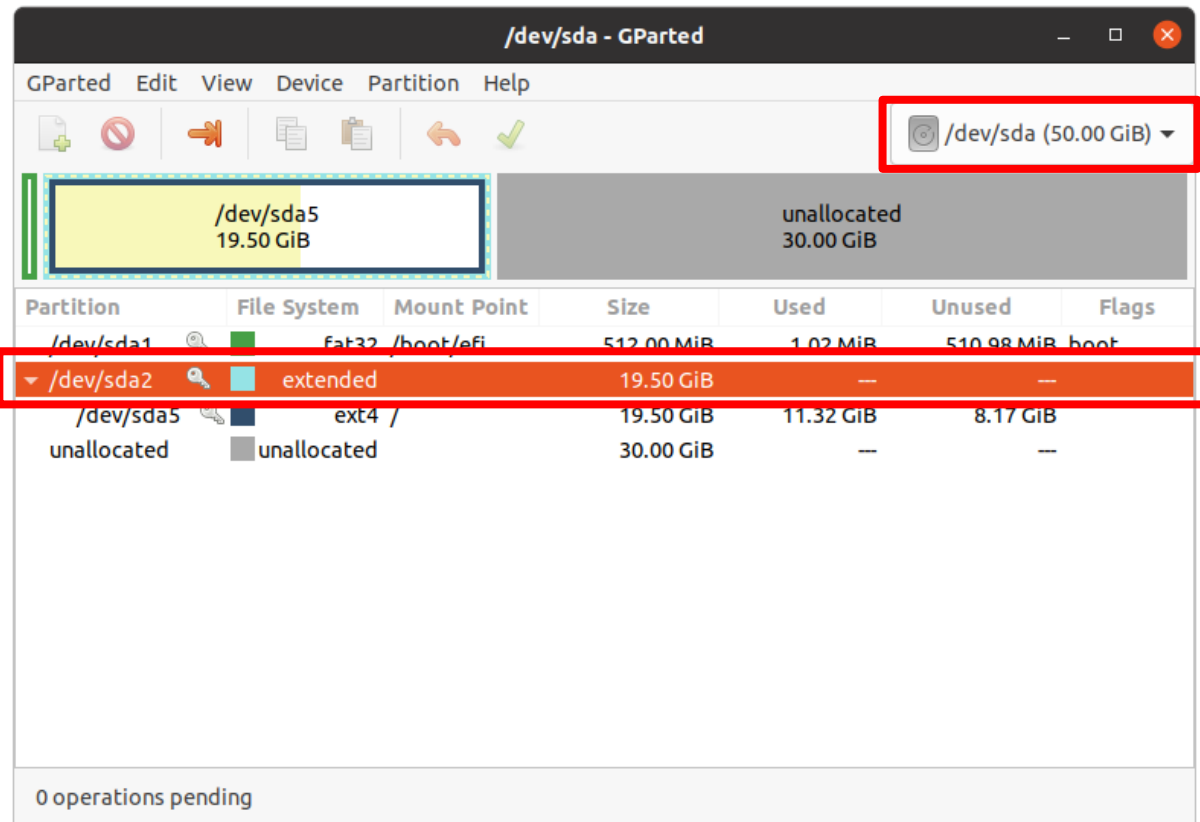


Increasing partition size (GUI)

- ❖ **Select your Linux drive** (In this case, /dev/sda)
- ❖ **If you have an extended partition, you have to increase this container partition first.** (In this case, /dev/sda2)

1. Right click
2. Resize/Move

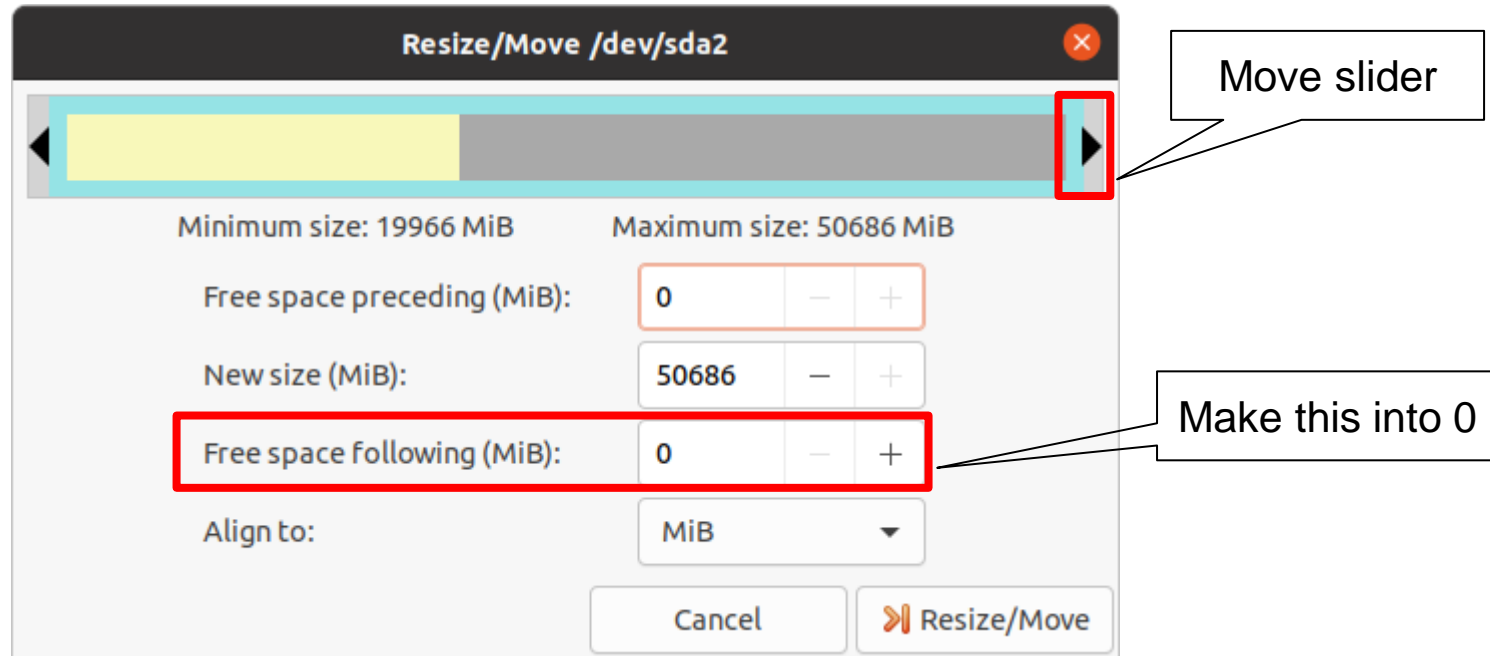
Right-click to
resize



Increasing partition size (GUI)

❖ Move the slider to fit the free space

- You can also make **Free space following (MiB)** as 0



Increasing partition size (GUI)

❖ Do the same with your root partition

The screenshot shows the GParted application window titled "/dev/sda - GParted". The main display area shows a disk layout with a yellow partition labeled "/dev/sda5 19.50 GiB" and a grey unallocated area labeled "unallocated 30.00 GiB". Below this, a table lists the partitions:

Partition	File System	Mount Point	Size	Used	Unused	Flags
/dev/sda1	fat32	/boot/efi	512.00 MiB	1.02 MiB	510.98 MiB	boot
/dev/sda2	extended		49.50 GiB	---	---	
/dev/sda5	ext4	/	19.50 GiB	11.32 GiB	8.17 GiB	
unallocated	unallocated		30.00 GiB	---	---	

A red rectangle highlights the row for /dev/sda5. A callout box points to this row with the text "Right-click to resize".

Below the table, a message says "Grow /dev/sda2 from 19.50 GiB to 49.50 GiB". At the bottom, it says "1 operation pending".

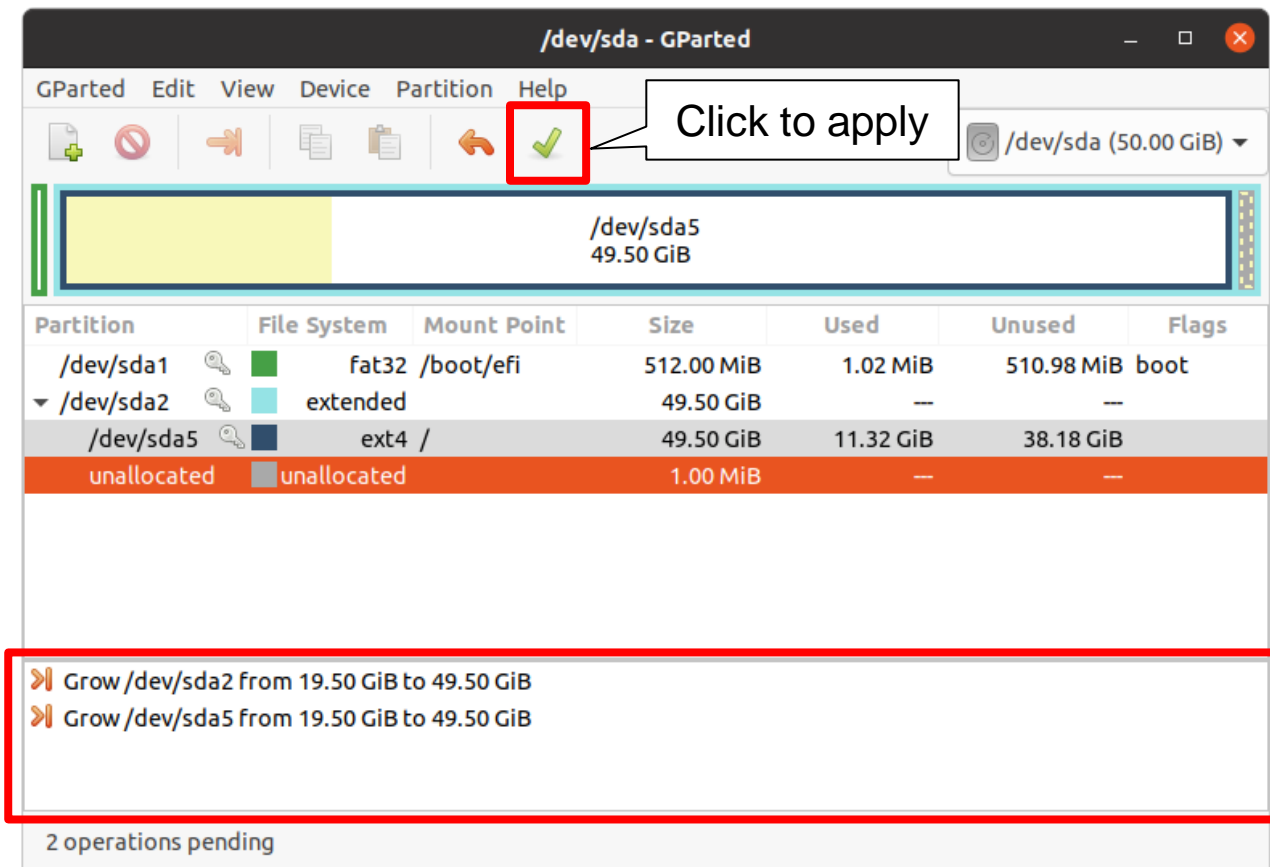
A "Resize /dev/sda5" dialog box is open in the foreground. It shows a slider at the top. Below the slider, it displays "Minimum size: 19965 MiB" and "Maximum size: 50686 MiB". There are three input fields with spinners:

- "Free space preceding (MiB):" with value 0
- "New size (MiB):" with value 50686
- "Free space following (MiB):" with value 0, which is highlighted by a red rectangle. A callout box points to this field with the text "Make this into 0".

The "Align to:" dropdown is set to "MiB". At the bottom are "Cancel" and "Resize" buttons.

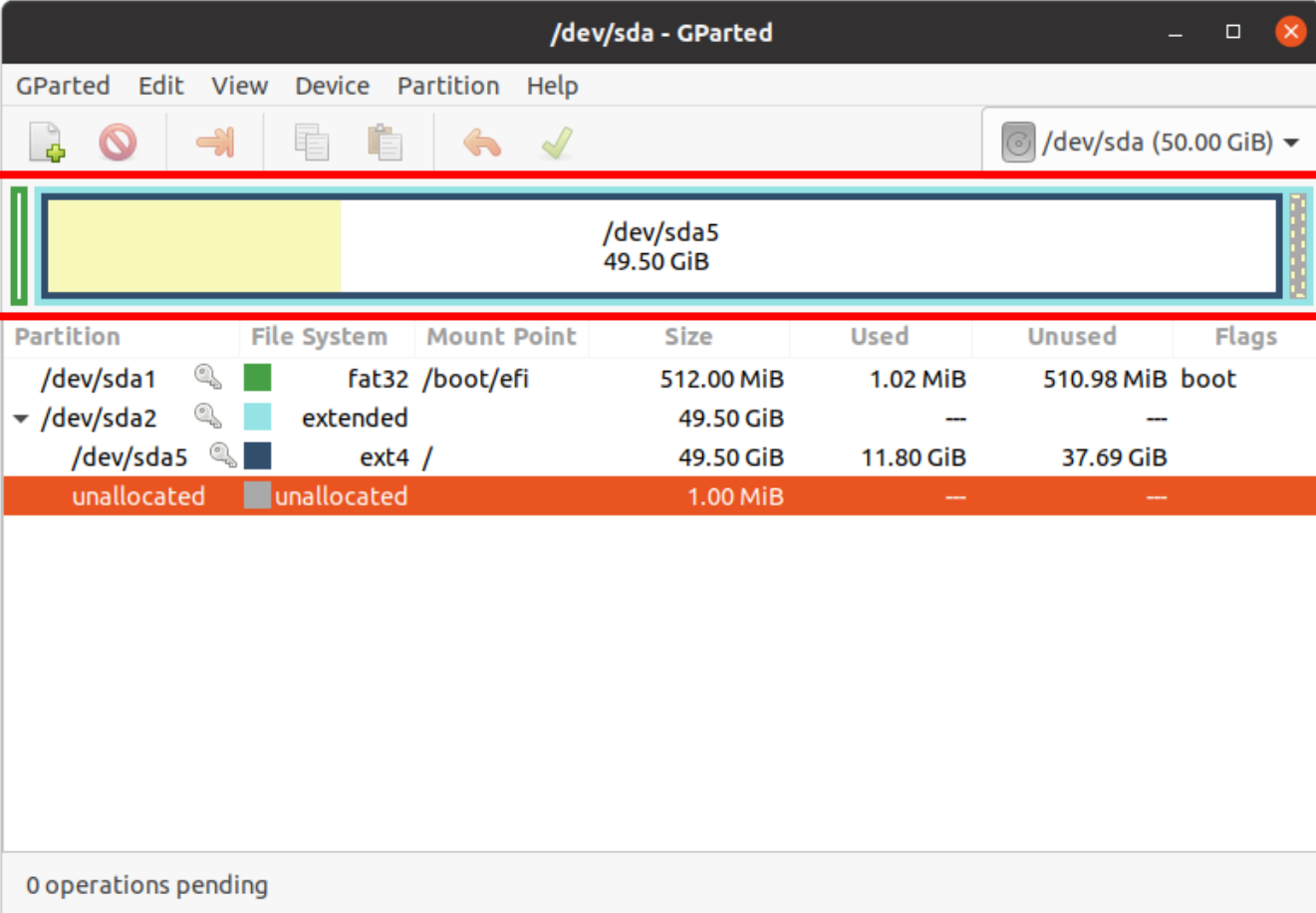
Increasing partition size (GUI)

- ❖ Check pending operations to apply
- ❖ Click **Apply All Operations**
 - **This cannot be undone**



Increasing partition size (GUI)

- ❖ Finally you can now use all the free space in your disk



The screenshot shows the GParted application window titled "/dev/sda - GParted". The window has a menu bar (GParted, Edit, View, Device, Partition, Help) and a toolbar with icons for creating, deleting, moving, copying, pasting, and committing changes. A dropdown menu shows the selected device as "/dev/sda (50.00 GiB)".

A red rectangle highlights the partition bar at the top, where the partition **/dev/sda5** is selected. It is represented by a yellow bar and labeled with its size, **49.50 GiB**.

Below the partition bar is a table showing the disk layout:

Partition	File System	Mount Point	Size	Used	Unused	Flags
/dev/sda1	fat32	/boot/efi	512.00 MiB	1.02 MiB	510.98 MiB	boot
▼ /dev/sda2	extended		49.50 GiB	---	---	
/dev/sda5	ext4	/	49.50 GiB	11.80 GiB	37.69 GiB	
unallocated	unallocated		1.00 MiB	---	---	

At the bottom of the window, it states "0 operations pending".

Increasing partition size (CLI)

❖ Boot into Linux, install and launch Parted

```
$ sudo apt install parted  
$ sudo parted
```

```
syslab@syslab-VirtualBox:~$ sudo parted  
GNU Parted 3.3  
Using /dev/sda  
Welcome to GNU Parted! Type 'help' to view a list of commands.  
(parted)
```

Increasing partition size (CLI)

- ❖ Use **print list** to view all the partitions in your machine

```
syslab@syslab-VirtualBox:~$ sudo parted
GNU Parted 3.3
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) print list
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 53.7GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number   Start   End     Size    Type     File system  Flags
  1       1049kB  538MB   537MB   primary  fat32        boot
  2       539MB   21.5GB  20.9GB   extended
  5       539MB   21.5GB  20.9GB   logical  ext4

(parted)
```

Increasing partition size (CLI)

- ❖ **select** your Linux drive (In this case, /dev/sda)
- ❖ Use **print free** to list all the free space

```
(parted) select /dev/sda
Using /dev/sda
(parted) print free
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 53.7GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type    File system  Flags
  1      1024B   1049kB  1048kB  primary fat32         boot
        538MB   539MB   1048kB             Free Space
  2      539MB   21.5GB  20.9GB  extended
  5      539MB   21.5GB  20.9GB  logical  ext4
        21.5GB  21.5GB  1049kB             Free Space
        21.5GB  53.7GB  32.2GB             Free Space

(parted)
```

Increasing partition size (CLI)

- ❖ If you have an extended partition, you have to increase this container partition first. (In this case, /dev/sda2)
- ❖ Use **resizepart** to expand partition size

```
(parted) resizepart [<partition num>] [<end of new partition>]
```

```
(parted) resizepart
Partition number? 2
Warning: Partition /dev/sda2 is being used. Are you sure you want to continue?
Yes/No? Yes
End? [21.5GB]? 100%
```

```
(parted) print tree
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 53.7GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type    File system  Flags
  1      1049kB  538MB   537MB   primary fat32         boot
        538MB  539MB   1048kB
  2      539MB   53.7GB  53.1GB   extended
  5      539MB   21.5GB  20.9GB   logical  ext4
        21.5GB  53.7GB  32.2GB   Free Space
```

```
(parted) _
```

Increasing partition size (CLI)

❖ Do the same with your root partition

- Check if partition is utilizing all the free space in your disk
- Use **quit** to exit

```
(parted) resizepart
Partition number? 5
Warning: Partition /dev/sda5 is being used. Are you sure you want to continue?
Yes/No? Yes
End? [21.5GB]? 100%
(parted) print free
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 53.7GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type    File system  Flags
  1      1049kB  538MB   537MB   primary fat32         boot
  2      538MB  539MB   1048kB          Free Space
  5      539MB  53.7GB  53.1GB   logical ext4
```

```
(parted) _
```


Increasing partition size (CLI)

- ❖ Perform resizing file system to fit into the partition

```
$ sudo resize2fs /dev/<your root partition>
```

```
syslab@syslab-VirtualBox:~$ sudo resize2fs /dev/sda5  
resize2fs 1.45.5 (07-Jan-2020)  
Filesystem at /dev/sda5 is mounted on /; on-line resizing required  
old_desc_blocks = 3, new_desc_blocks = 7  
The filesystem on /dev/sda5 is now 12975616 (4k) blocks long.
```

Increasing partition size (CLI)

- ❖ Finally you can now use all the free space in your disk

```
syslab@syslab-VirtualBox:~$ sudo df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            1.9G   0    1.9G   0% /dev
tmpfs           393M  1.3M  392M   1% /run
/dev/sda5       49G   12G   36G   24% /
tmpfs           2.0G   0    2.0G   0% /dev/shm
tmpfs           5.0M  4.0K   5.0M   1% /run/lock
tmpfs           2.0G   0    2.0G   0% /sys/fs/cgroup
/dev/loop0      128K  128K   0  100% /snap/bare/5
/dev/loop1       62M   62M   0  100% /snap/core20/1611
/dev/loop2      347M  347M   0  100% /snap/gnome-3-38-2004/115
/dev/loop3      249M  249M   0  100% /snap/gnome-3-38-2004/99
/dev/loop5       92M   92M   0  100% /snap/gtk-common-themes/1535
/dev/loop4       64M   64M   0  100% /snap/core20/1623
/dev/loop9       46M   46M   0  100% /snap/snap-store/592
/dev/loop7       46M   46M   0  100% /snap/snap-store/599
/dev/loop6       47M   47M   0  100% /snap/snapd/16292
/dev/loop8       66M   66M   0  100% /snap/gtk-common-themes/1519
/dev/loop10      48M   48M   0  100% /snap/snapd/16778
/dev/sda1       511M  4.0K  511M   1% /boot/efi
ubuntu         233G  154G   80G   66% /home/syslab/ubuntu
tmpfs           393M   12K  393M   1% /run/user/1000
tmpfs           393M   36K  393M   1% /run/user/125
syslab@syslab-VirtualBox:~$ _
```