

A Basic How To On: Virtual Machines [And How To Nest Them]

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Ubuntu22 and VMWare Workstation17

Ubuntu is a distribution of Linux that has a similar visual GUI to Windows11 or MacOS. We will use this as our base operating system to run other Linux based applications such as QEMU and a KVM.

QEMU: A free and open-source emulator. Similar to how the Dolphin Emulator emulates the Nintendo Wii console, QEMU will emulate other Linux operating systems.

KVM: Kernel-based virtual machines (KVM) are an open-source virtualization technology that turns Linux into a hypervisor.

Hypervisor: A program used to run and manage one or more virtual machines on a computer.

The starting point is to download the two halves that will make a whole virtual machine.

VMWare Workstation 17 Player

This is the emulator that will emulate Operating Systems (OS):

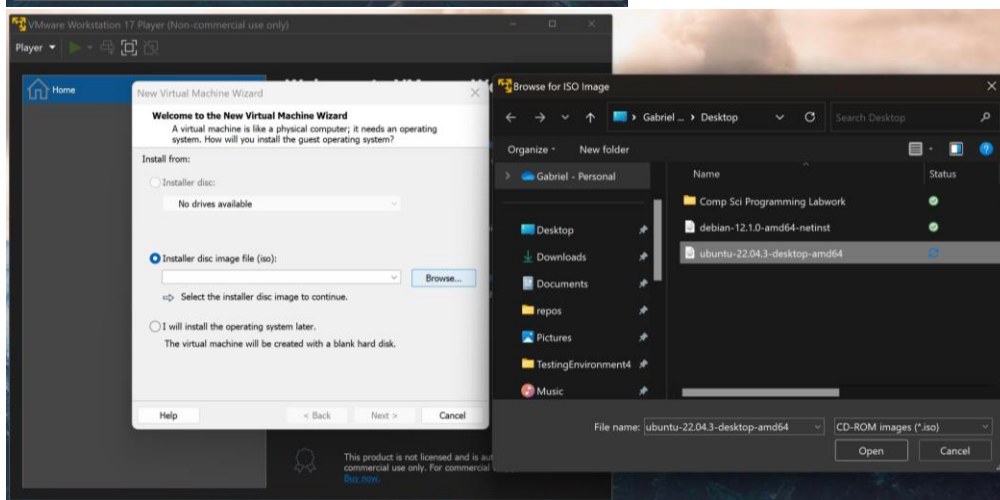
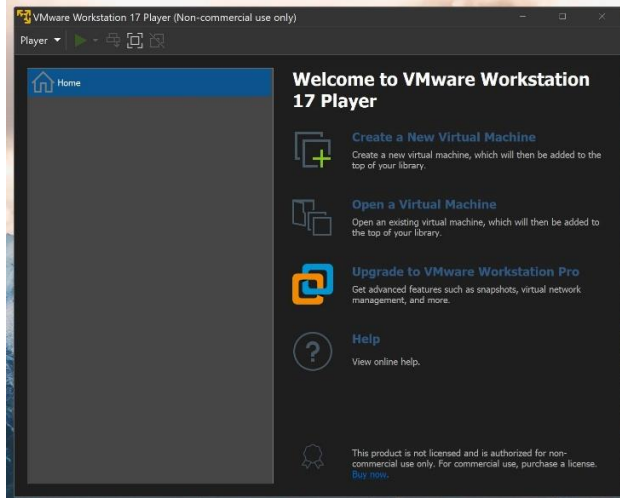
<https://www.vmware.com/products/workstation-player.html/>

Ubuntu 22

This is Linux OS/Linux Distro that will be ran inside of your Windows OS:

<https://releases.ubuntu.com/>

Below listed will be photos of what VMware player will look like and what the ISO will look like when searching for what operating system to install. Follow the instructions of the operating system wizard to finish installing Ubuntu 22.



Installing and Fixing SUDO

The SUDO command should automatically be installed but it did not function on my Windows machine that emulated Ubuntu so this is how I fixed that issue.

Log in as the root user.

```
su -
```

Update the repository.

```
apt update
```

Install the sudo package.

```
apt install sudo -y
```

Update the repository of Debian.

```
apt-get update
```

Restart the machine (this allowed the repository to be properly seen on my nested set up)

```
sudo reboot
```

Now add the user to the sudoers file, a group of users that can use the sudo command. In my case my username is “gabriel” but change yours to what your username is.

```
usermod -aG sudo gabriel
```

Now check if the user is part of the list “27(sudo)”

```
id gabriel
```

The user should now have sudo access.

Now check by exiting the root user and login as the intended user

```
exit
```

```
sudo fdisk -l
```

This command should now function properly.

KVM and QEMU

We will need to install and activate all the necessary components for KVM and QEMU to function to emulate Debian12.

Open the terminal.

Log in as the root.

```
gabriel@gabriel-virtual-machine:~$ su -
```

Update the kernel.

```
root@gabriel-virtual-machine:~$ sudo apt upgrade
```

Install a KVM checker, then run it.

```
sudo apt install cpu-checker  
kvm-ok
```

Looking for something that says “KVM acceleration can be used”.

```
sudo apt install qemu-kvm virt-manager libvirt-daemon-system  
virtinst libvirt-clients bridge-utils
```

It will ask for a confirmation here type y to continue.

```
y
```

The system should reboot.

Install the virtualization daemon.

```
sudo systemctl enable --now libvirt  
sudo systemctl start libvirt  
sudo systemctl status libvirt
```

Looking for a confirmation that the daemon is active.

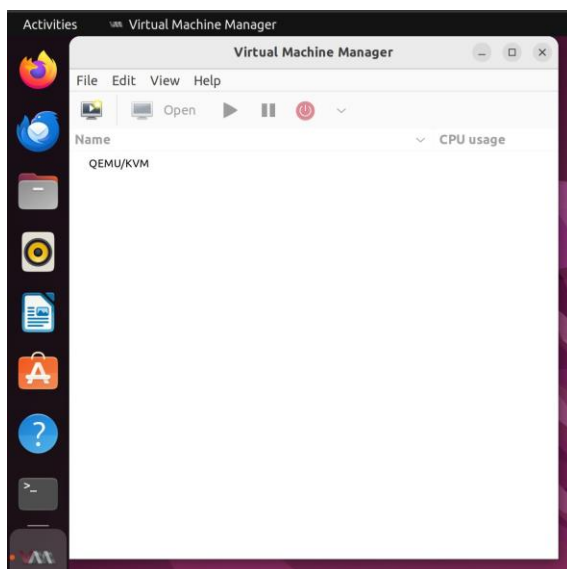
I found that performing a manual reboot helps here for the next step to work.

Add the user to the kvm group.

```
sudo usermod -aG kvm $USER  
sudo usermod -aG libvirt $USER
```

Perform another reboot.

Open the Virtual Machine Manager application.



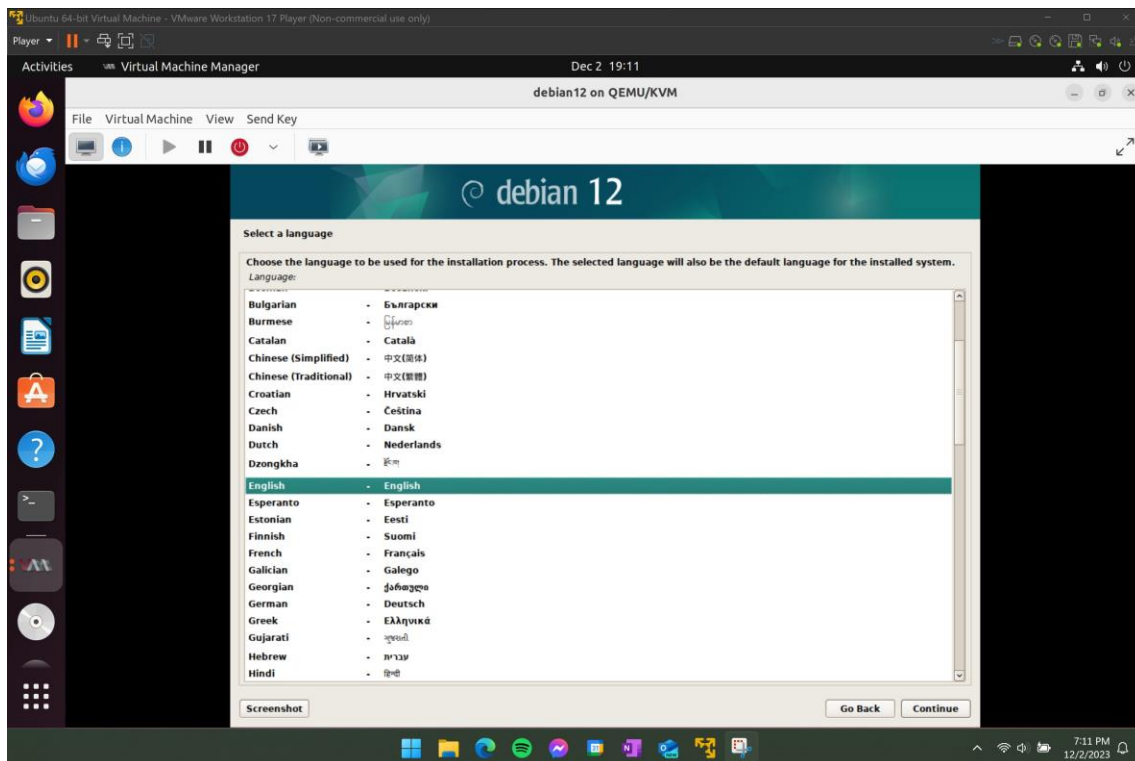
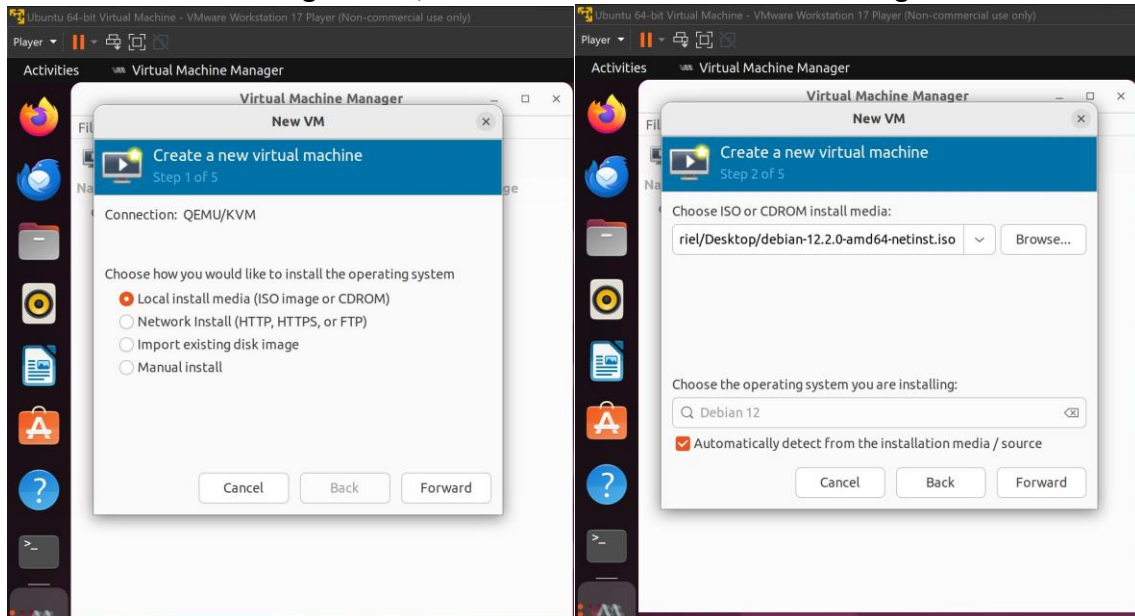
Installing Debian12

The process of installing Debian12 functions fairly similar to installing Ubuntu. Follow the steps listed with installer wizard and be sure to download the Debian12 ISO.

Debian 12

<https://www.debian.org/download>

Then after downloading the ISO, use the now activated Virtual Manager Machine.



After installing Debian 12 onto the new nested virtual machine, there will still be some processes necessary to set it up fully.

Setting up Debian 12

Now set up Debian 12 with features such as:

Sudo: This gives root access to users on the machine.

SSH: This allows you to remote into the Debian virtual machine from an outside terminal.

Serial Port: A port from ye old times where dinosaurs roamed the land and we connected computers via a cable using the standard called serial, similar to the ethernet jack before that was a thing.

LVM: Logical Volume Manager is software that manages hard drives that you add to your system. This will merge multiple hard drives (physical or in our case virtual/not physical but still real) to be accessible by the VM.

Starting with sudo which should follow suit from the previous instructions but should be simpler.

Install sudo then add the user to the sudo user group

```
apt install sudo lvm
usermod -aG sudo tux
```

Now install the ssh server to be able to remote in

Input the following command to install the ssh server.

```
apt install openssh-server
```

Find the virtual machine's IP address in order to remote in from a different terminal

```
ip a
```

Should be listed in a strange spot under the "BROADCAST, MULTICAST, UP, LOWER_UP" section, and inside of there should be the first inet (ipv4) that will say a standard address of "192.168.122.233/24". Take off the last bit that says "24" of the address and use that in your terminal on the outside to remote in. An example would be as follows.

```
ssh tux@192.168.122.233
```

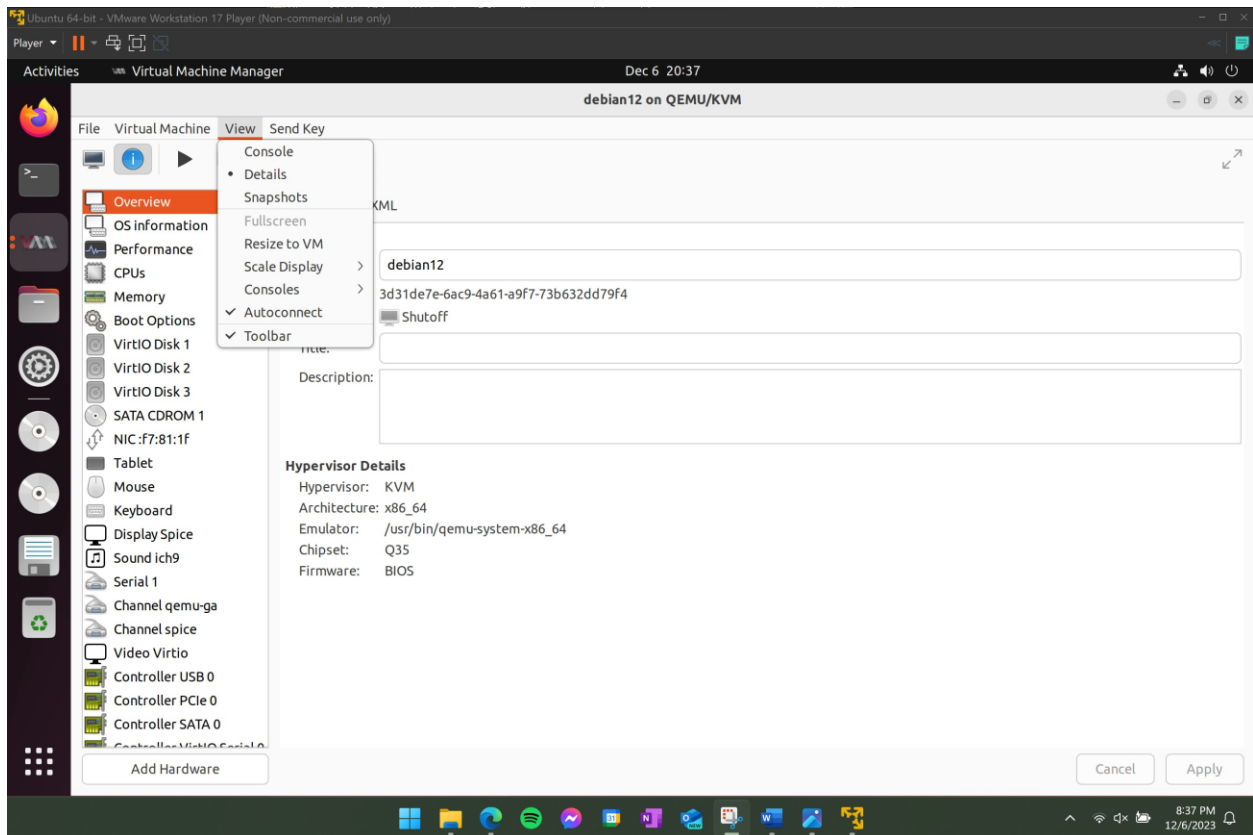
Next is to set up the serial port which will be labeled as serial console when trying to find it on the settings for the virtual machine.

Start by inputting the activation command, then the start command, and finally the status command to make sure it is running properly.

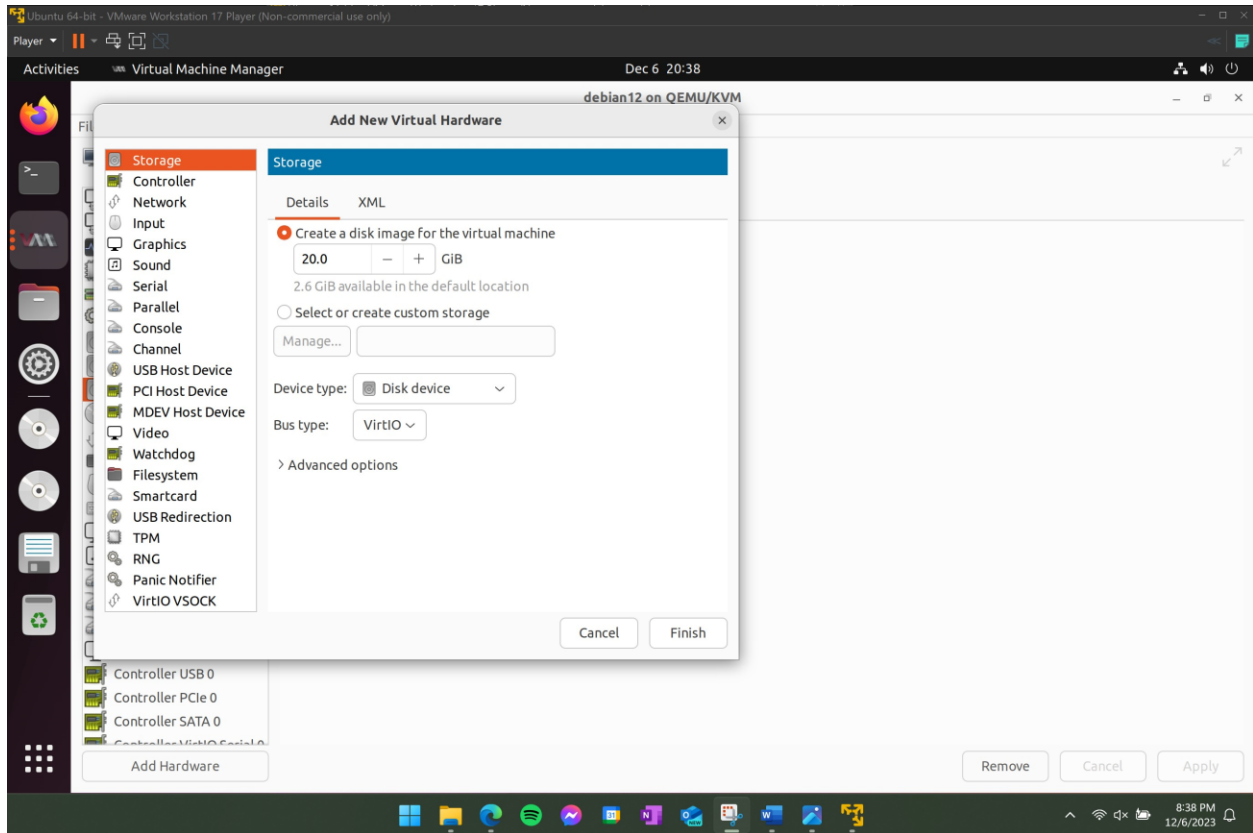
```
systemctl enable serial-getty@S0.service
systemctl start serial-getty@S0.service
systemctl status serial-getty@S0.service
```

Now to set up an LVM which requires to create hard drives first. After creating them in the settings we'll need to format them for linux and put them in a Physical Group. After that, we'll put those PG's into a Volume Group which groups all the previous individual Physical Groups. Next, we'll put those VG's in a Logical Volume Group. This LVM then needs to be mounted to the directory as a single whole to be able to be used as a device.

First create the drives outside the machine so we have something to work with on the software level (the terminal).



Add the add hard drive by clicking “Add Hardware” on the bottom left and select the size you wish to add.



!!!Reboot!!! the machine for the new added drives to be seen!

Now go inside of the virtual machine to add the drives as follows. Note that the naming convention for the drives go up a letter starting from “b” then the second drive will be “c” and so on. So when adding a Virtual Group the first one should be vdb1 and the second one will be vdc1 when trying to locate the drives and their corresponding names.

```
su -  
fdisk -l  
fdisk -l | grep vd  
fdisk /dev/vdb  
#currently at the fdisk commands  
n  
p  
#“ENTER” three times  
#back at the fdisk commands  
p  
#lists out partition name
```



```
t
l
8e
#back at the fdisk commands
w
```

Now do that a second time but for the second drive "c".

```
fdisk /dev/vdc
#currently at the fdisk commands
n
p
#"ENTER" three times
#back at the fdisk commands
t
l
8e
#back at the fdisk commands
w
```

Create a Physical Volume

```
pvcreeate /dev/vdb1 /dev/vdc1
pvs
```

Create and check your VG

```
vgcreate deb1vm /dev/vdb1 /dev/vdc1
vgs
vgscan
```

Create the Logical Volume Group

```
lvcreate -name data -size 3G deb1vm
lvs
mkfs.ext4 /dev/deb1vm/data
cd /mnt
mkdir data
mount /dev/deb1vm/data /mnt/data
df
```

```
vi /etc/fstab
```

Inside of the VI editor some important shortcuts are:

“ESCAPE” = “SHIFT +]”

To insert text press “i”

To open the next line of text at the bottom of the line (which would normally be the Enter key) press “o”

To get back to command mode press “ESCAPE” or the previous equivalent command because linux hates us for some reason and sometimes keys do not work “SHIFT +]”

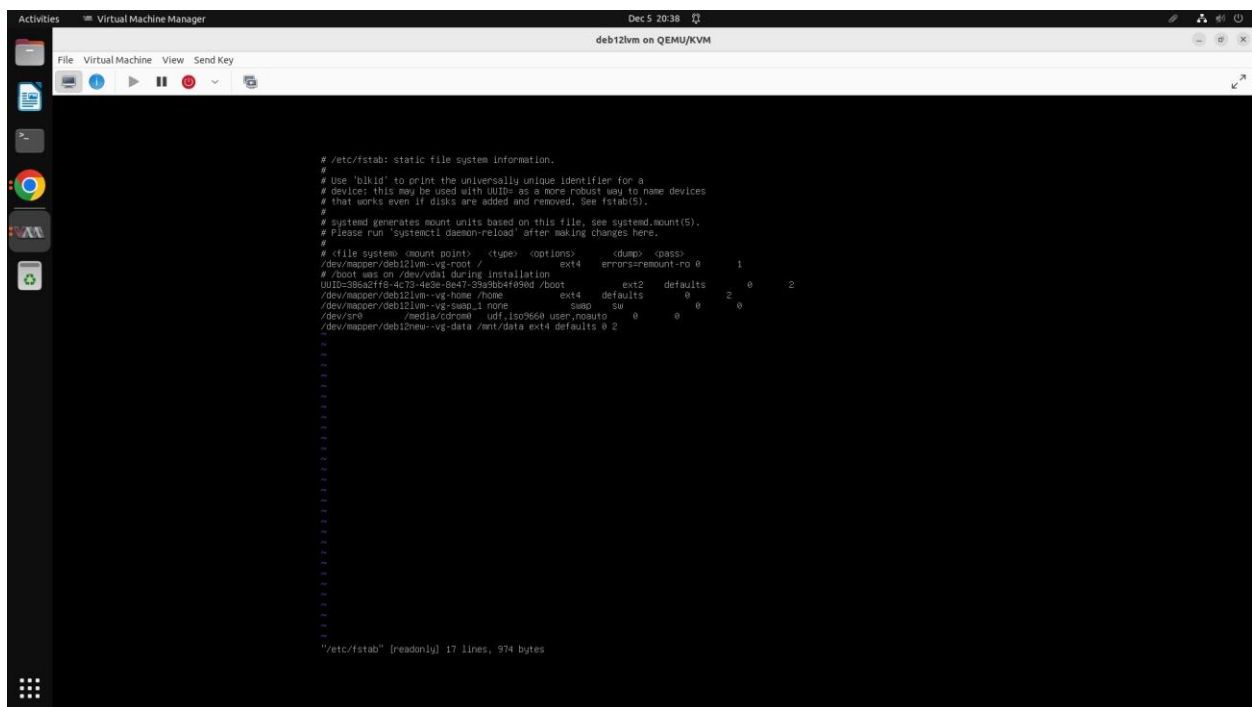
To save your changes get to the command mode and then type “:wq”

To leave but not save your changes when you have made changes type “:q”

To leave but not save your changes when you have NOT made changes, because that needed to be distinguished for some god forsaken reason, type “:q!”

Now type in the following using VI editor.

```
/dev/mapper/deblvm-data /mnt/data ext4 defaults 0 2
```



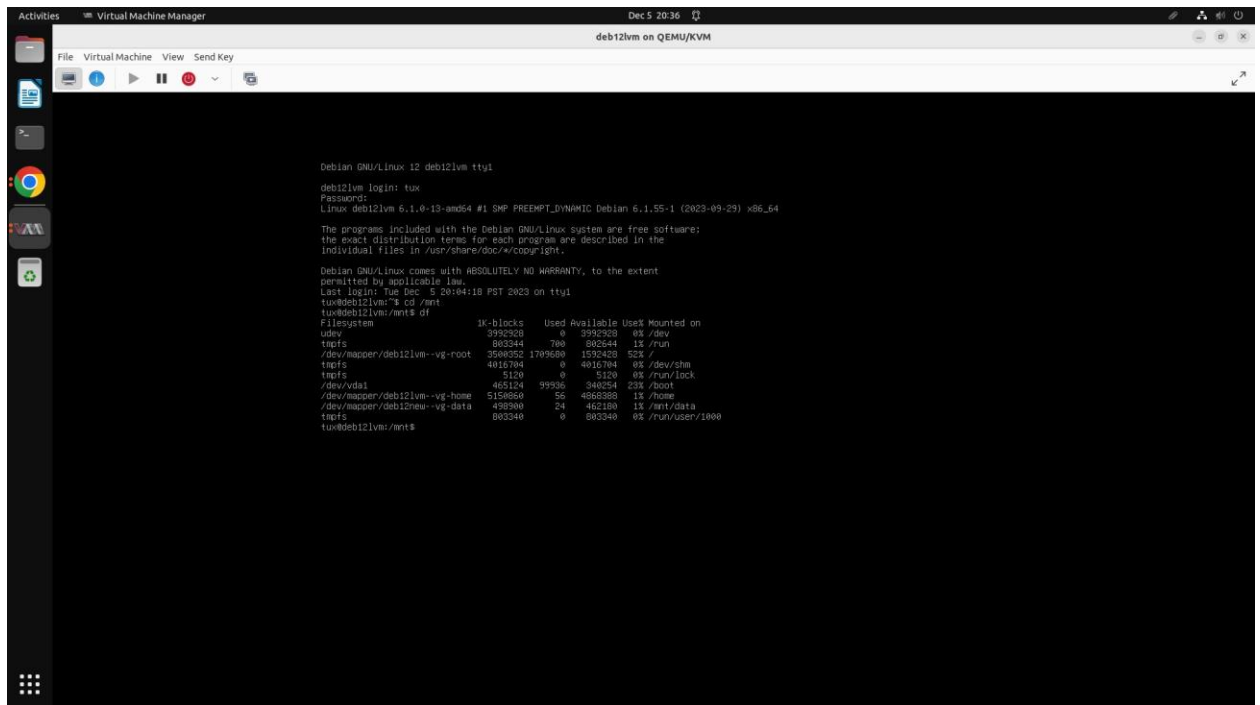
```
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# system generates mount units based on this file, see systemd.mount(5).
# Please run 'systemctl daemon-reload' after making changes here.
#
# (file system) (mount point) (type) (options) (dump) (pass)
/dev/mapper/deblvm--vg-root / ext4 errors=remount-ro 0 1
# /boot was on /dev/vda1 during installation
UUID=386a2ff8-4c73-de3e-6e47-35a7b04f99d /boot ext2 defaults 0 2
/dev/mapper/deblvm--vg-home /home ext4 defaults 0 2
/dev/mapper/deblvm--vg-swap1 none swap sw 0 0
/dev/sr0 /media/cdrom0 udf,iso9660 user,noauto 0 0
/dev/mapper/deblvm--vg-data /mnt/data ext4 defaults 0 2

"/etc/fstab" [readonly] 17 lines, 934 bytes
```

Exit using the very intuitive and understandable VI commands listed above and reboot the system

Check using the df command and see if it was mounted

```
df
```



Extra Resources

YouTube and Google are your best friends when running into any issues plus I have found that when I hit an unexpected, try rebooting the system and that may help. Listed below are some YouTube videos and articles that I found helpful in explaining what needed to be done and how to do it in a step-by-step process outside of the listed process above. This concludes this guide to the wonderful world of installing virtual machines and the various Linux operating systems. Good luck and Hello World!

A video guide to installing KVM on Ubuntu 22:

https://youtu.be/_CkffsxpI5E?si=6sHlInScTeheRMgW

Sudo broken:

<https://linuxhint.com/how-to-fix-debian-sudo-command-not-found/>

Debian Install Guidebook:

<https://debian-handbook.info/browse/stable/sect.installation-steps.html>