Setting up a virtual home lab

I built a free virtual IT lab from scratch on my home computer, Windows 11 OS and MacOS, using open-source software.

In the early 2000s the only way one could have built an IT lab was to purchase physical servers or re-purpose old computers. While this can be very beneficial as far as IT experience and skills, it can be much faster simply to build a free virtualized IT lab.

Let's dive in!

Index

Virtualization Overview

So, what is virtualization anyway? Basically, the IT term virtualization refers to the practice of emulating (or simulating) a computer. You can use a Virtual Machine to run a computer as an application on your host computer.

On the image below - the top computer would be the host computer. The three computers below the host are referred to as guest virtual machines.

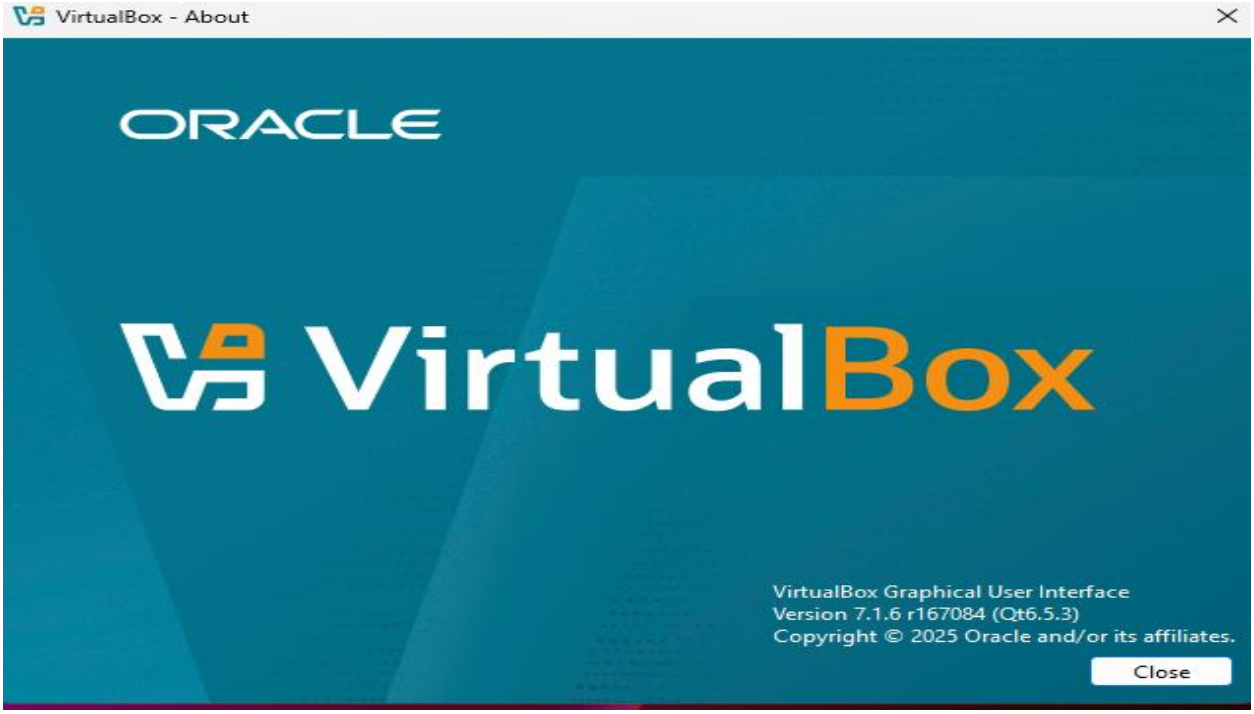
Virtual machines act like real computers but run as a software program. So, you can start, restart, shut down, install software and operate systems just like you would on a normal computer.
This makes virtual machines perfect for IT labs.

Free Virtualization Software

With so many different virtualization software options available, it can be confusing to know which one is the "best" and which one you should use. Let's address this now.

There is no "best" virtualization software. There are simply different options - and the ones you should consider will depend on your host operating system.

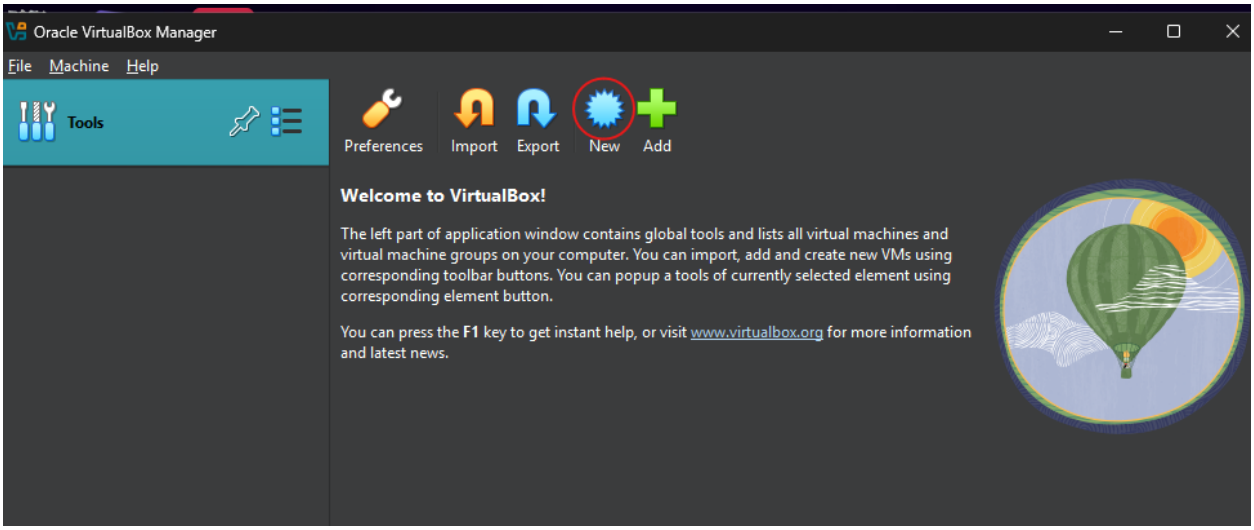
In this setup I will be using Oracle VM VirtualBox version 7.1.6 because it is compatible with both Windows and Linux, but you can use anything you want. The steps will nearly be identical to other virtualization software.



Step 1: Download and Install VirtualBox for Windows 11

1. Go to the official VirtualBox website
   https://www.virtualbox.org/
2. Click on "Downloads" (on the left-hand side).
3. Under "VirtualBox platform packages," click on "Windows hosts."
   - This will download the installer file: something like VirtualBox-x.x.x-x-Win.exe
4. Run the installer after it downloads:
   - Accept all the default settings unless you have special preferences.
   - It will install VirtualBox and its networking drivers.
   - You might briefly lose internet connection during install — it's normal.
5. Download the VirtualBox Extension Pack. Though this is optional,
   - But it adds USB 2.0/3.0 support, RDP, disk encryption, and other functionalities.
   - After downloading, open VirtualBox > File > Preferences > Extensions > Install the extension pack.

Now I have VirtualBox installed! See below.



Step 2: Downloading the ISO files to my host computer

The next task was to start installing various OS on the VirtualBox, starting with Kali Linux. I headed to the following official websites for the download; Kali, ubuntu.com, and parrotsec.org.

Other OS downloaded are **Windows Server Evaluation** www.microsoft.com for the server and **Windows 11 ISO** www.microsoft.com for the Windows OS

Once I downloaded all the ISOs, the next thing was to start the mounting, configured it and ready for use.

It's basically almost the same process for all. Sharing below is the screenshot for each step.

Step 3: Create Virtual Machines in VirtualBox

This step will create new VM for each of the OS. It is basically almost the same steps to mount and install the OS in each the VM to be created. The steps was repeated for each machine.

1 Creating New Machine.

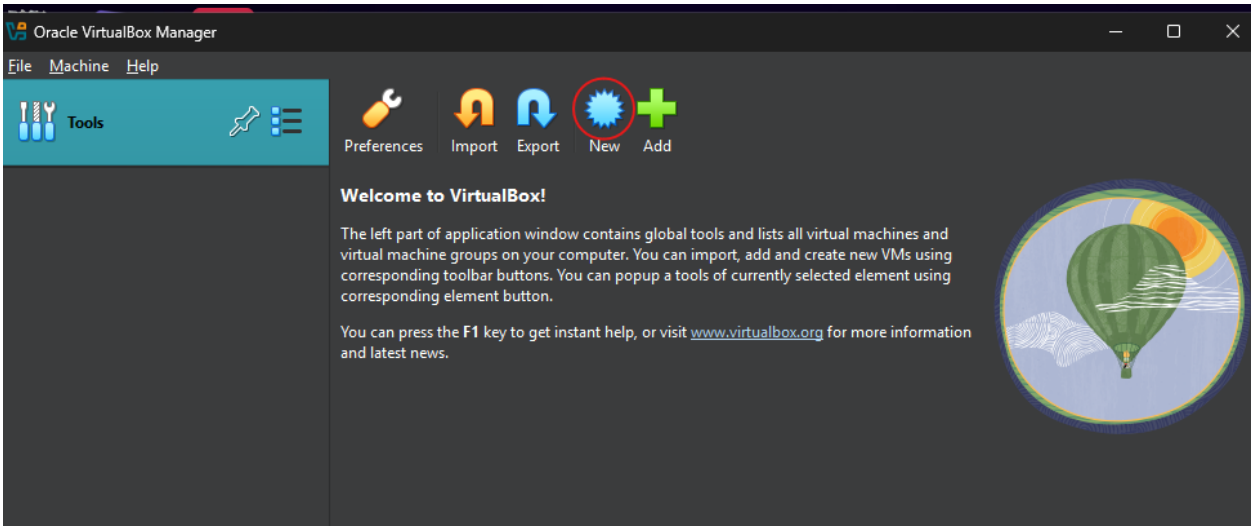
- Open VirtualBox.
- Click **New**.
- Name: I chose name for each machine "Kali Linux," "Ubuntu Desktop," etc.
- Folder: I used the default.
- ISO Image: I selected the ISO I downloaded in step 2.

- Type:

- Linux for Kali, Ubuntu, and Parrot
- Windows for Windows Server and Windows 11

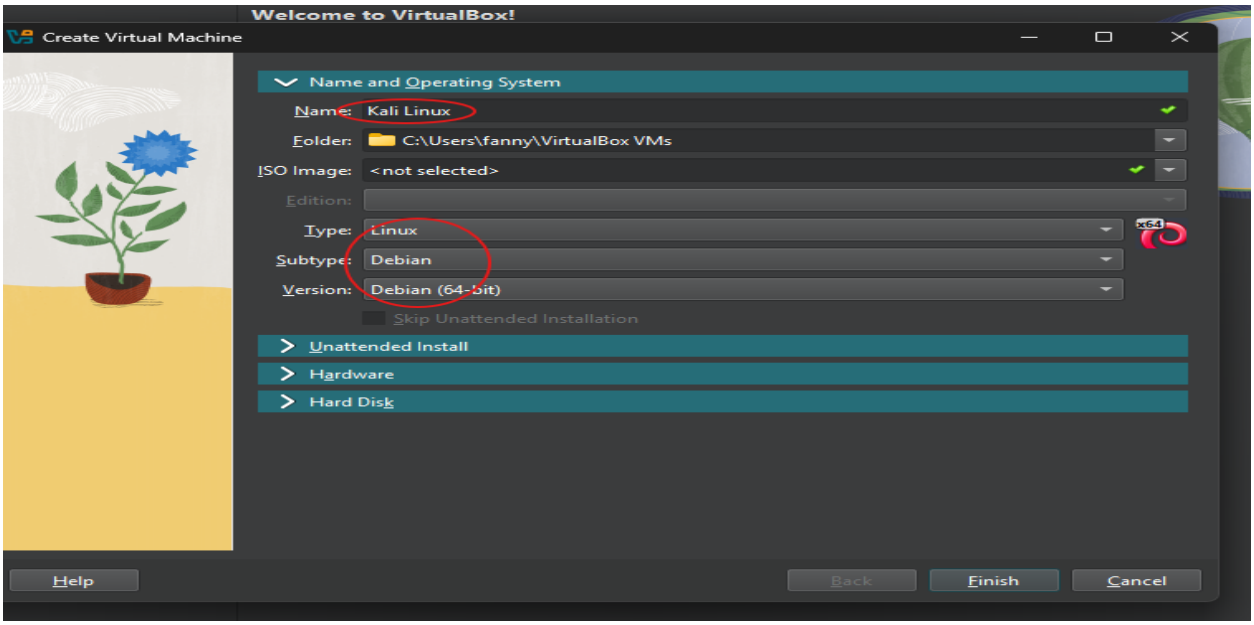
• Version:

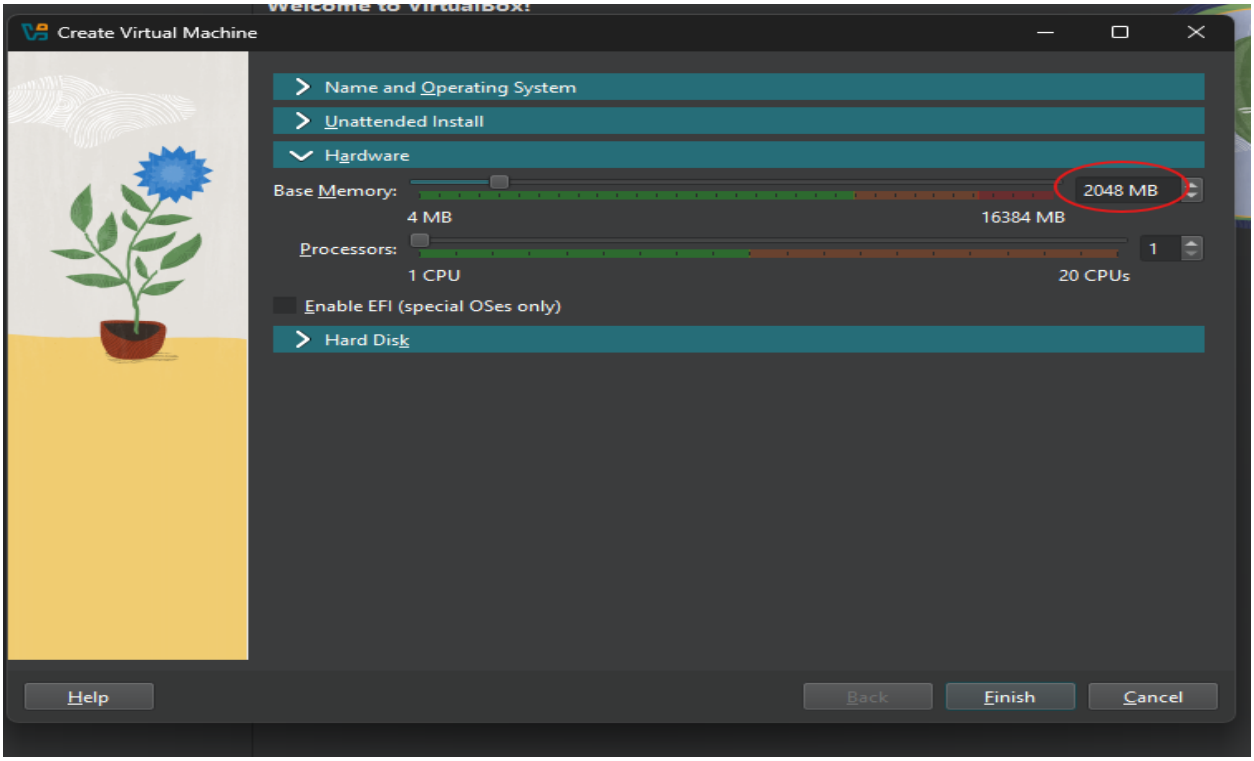
- Ubuntu (64-bit), Debian (64-bit) for Kali/Parrot, Windows 11 (64-bit), etc.)

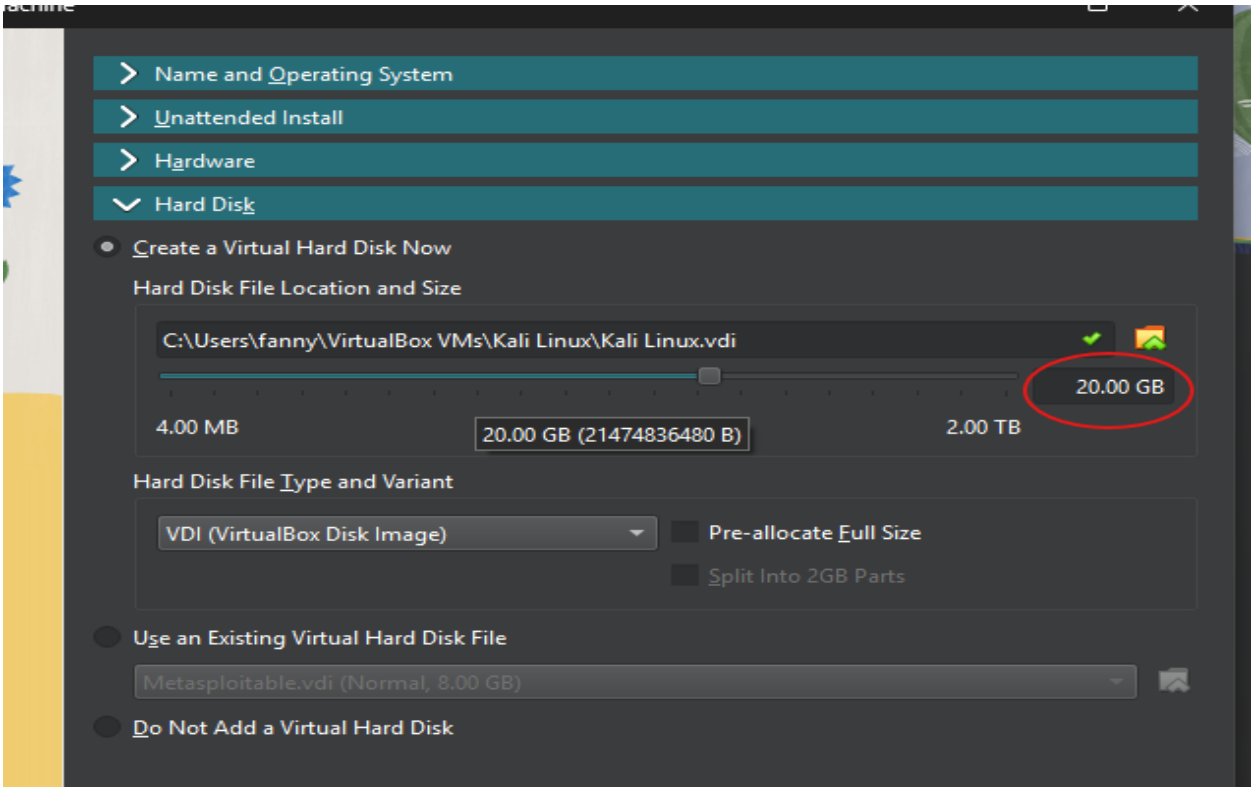


2. Configuring the Basic Settings

- Memory Size (RAM): I allocated 4096MB to each machine
- Processors: I allocated 2 -3 CPUs to each machine
- Create Virtual Hard Disk:
    - Type: VDI (VirtualBox Disk Image)
    - Size:
        - 20 GB for Linux
        - 60+ GB for Windows Server/Desktop


Welcome to VirtualBox!
Create Virtual Machine
Name and Operating System
Name: Kali Linux
Folder: C:\Users\fanny\VirtualBox VMs
ISO Image: <not selected>
Edition:
Type: Linux
Subtype: Debian
Version: Debian (64-bit)
Skip Unattended Installation
Unattended Install
Hardware
Hard Disk
Help
Back
Finish
Cancel


Create Virtual Machine
Name and Operating System
Unattended Install
Hardware
Base Memory:
2048 MB
4 MB
16384 MB
Processors:
1
1 CPU
20 CPUs
Enable EFI (special OSes only)
Hard Disk
Help
Back
Finish
Cancel



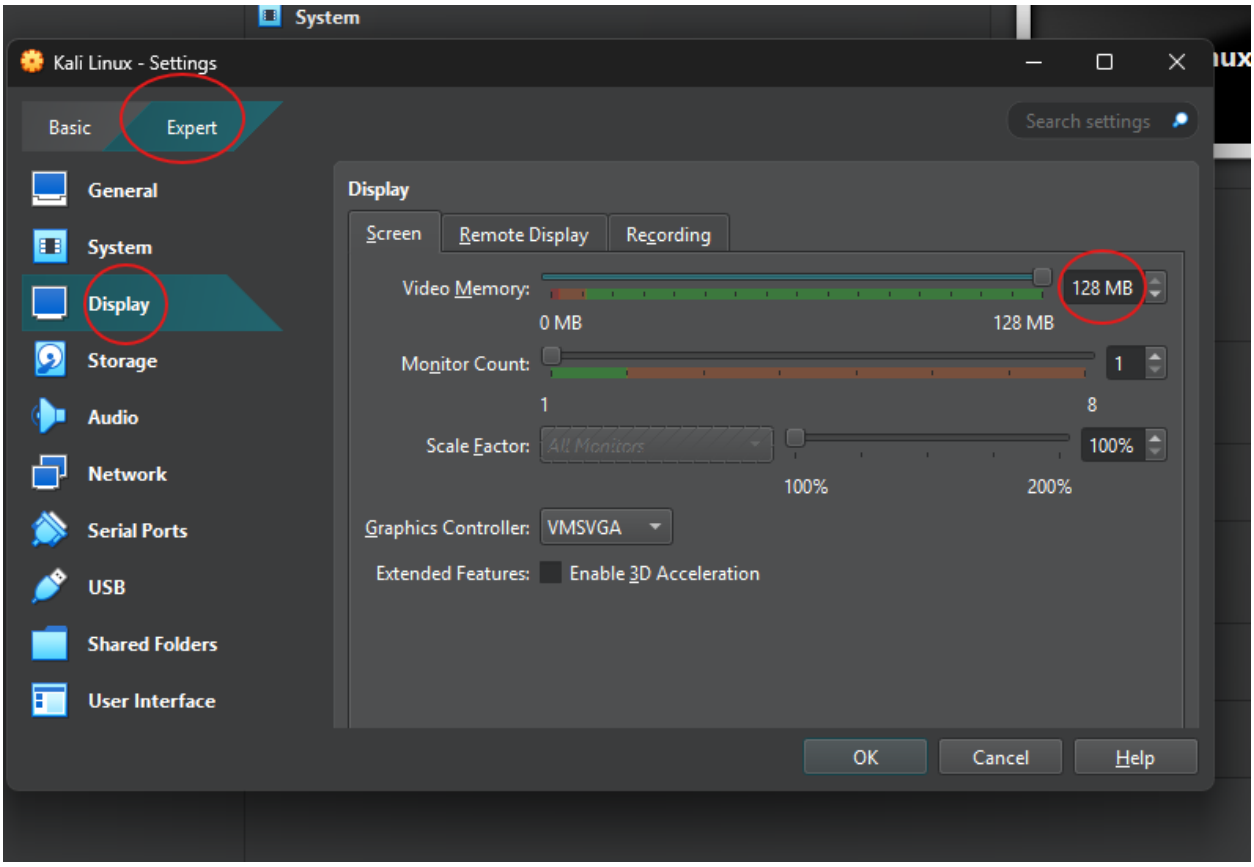
3. Next was to Configure the System Settings.

Before starting the VM:

- I Selected the VM → Clicked **Settings** → then made the following changes:

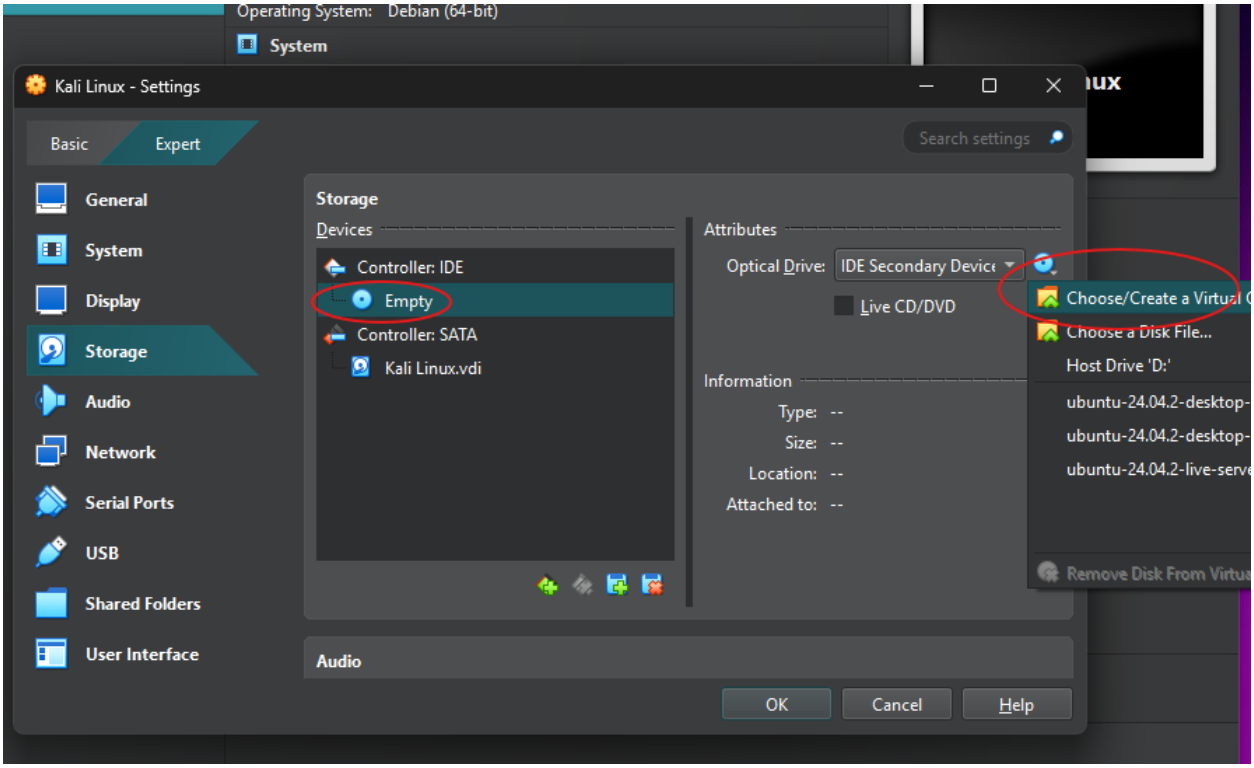
Display → Screen:

- Video Memory: Set it to max (128 MB).



Storage → Controller:

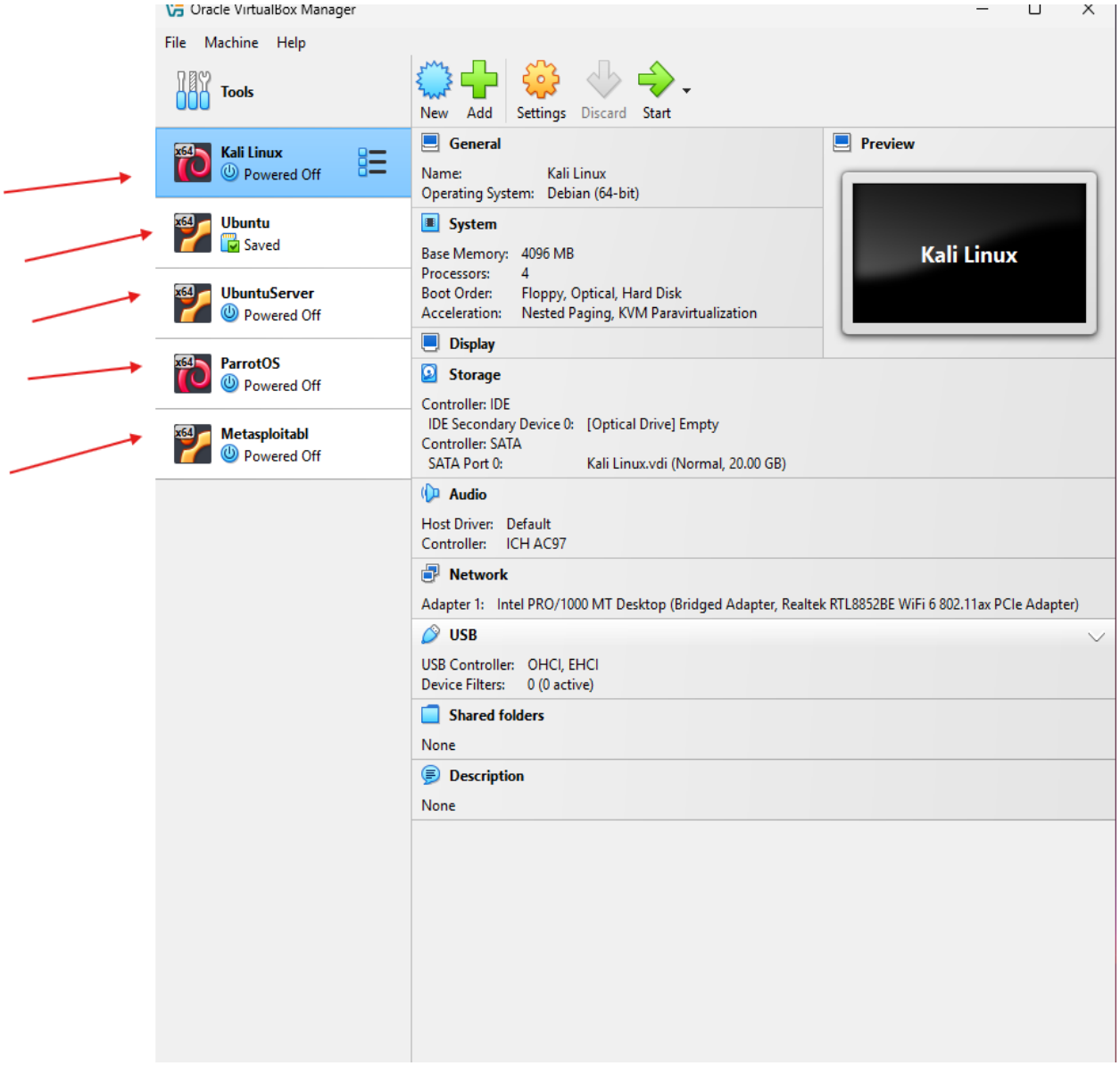
- I clicked on the storage to mount the ISO image to the VM. From there, I clicked the Empty disc icon, then again, the disc icon under Attributes on the right-hand side of the window, then “choose/create a Virtual Optical Disk... and browse to and open the location for the desired ISO.



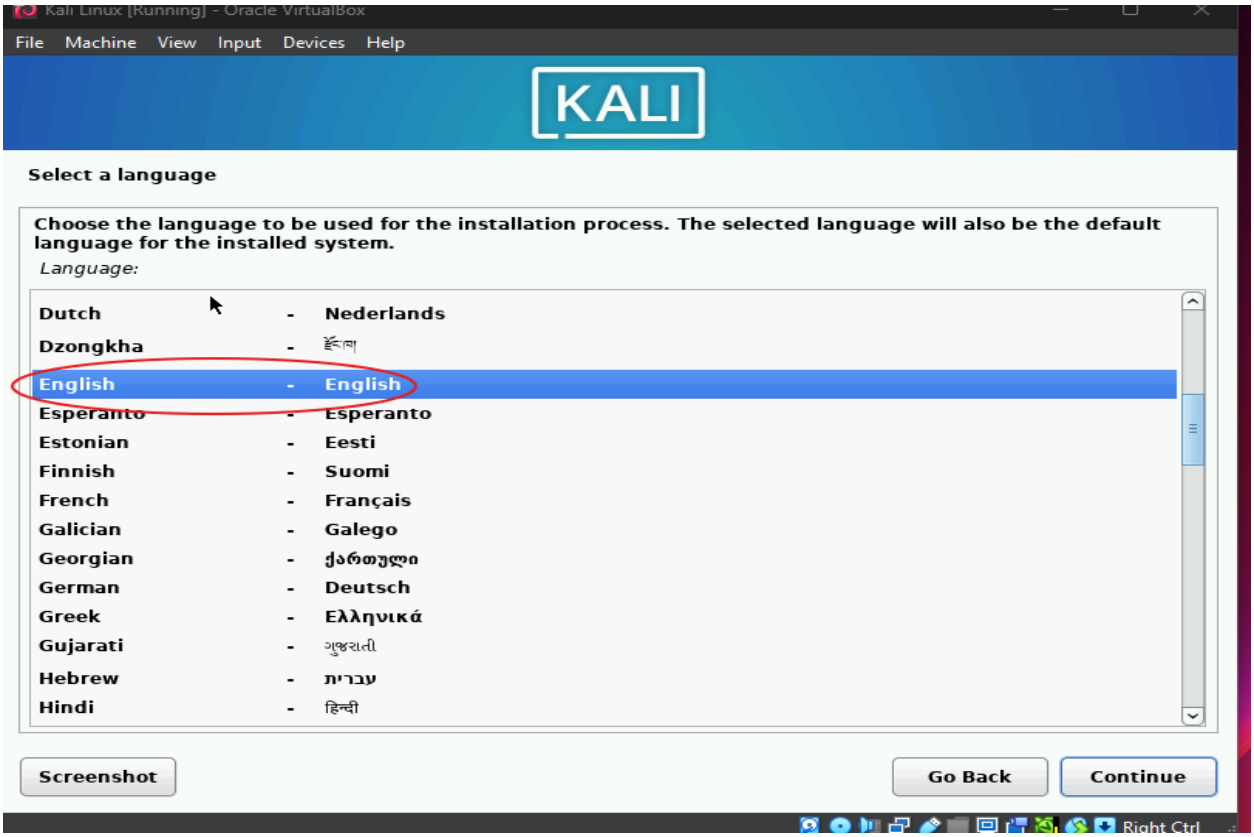
Network → Adapter 1:

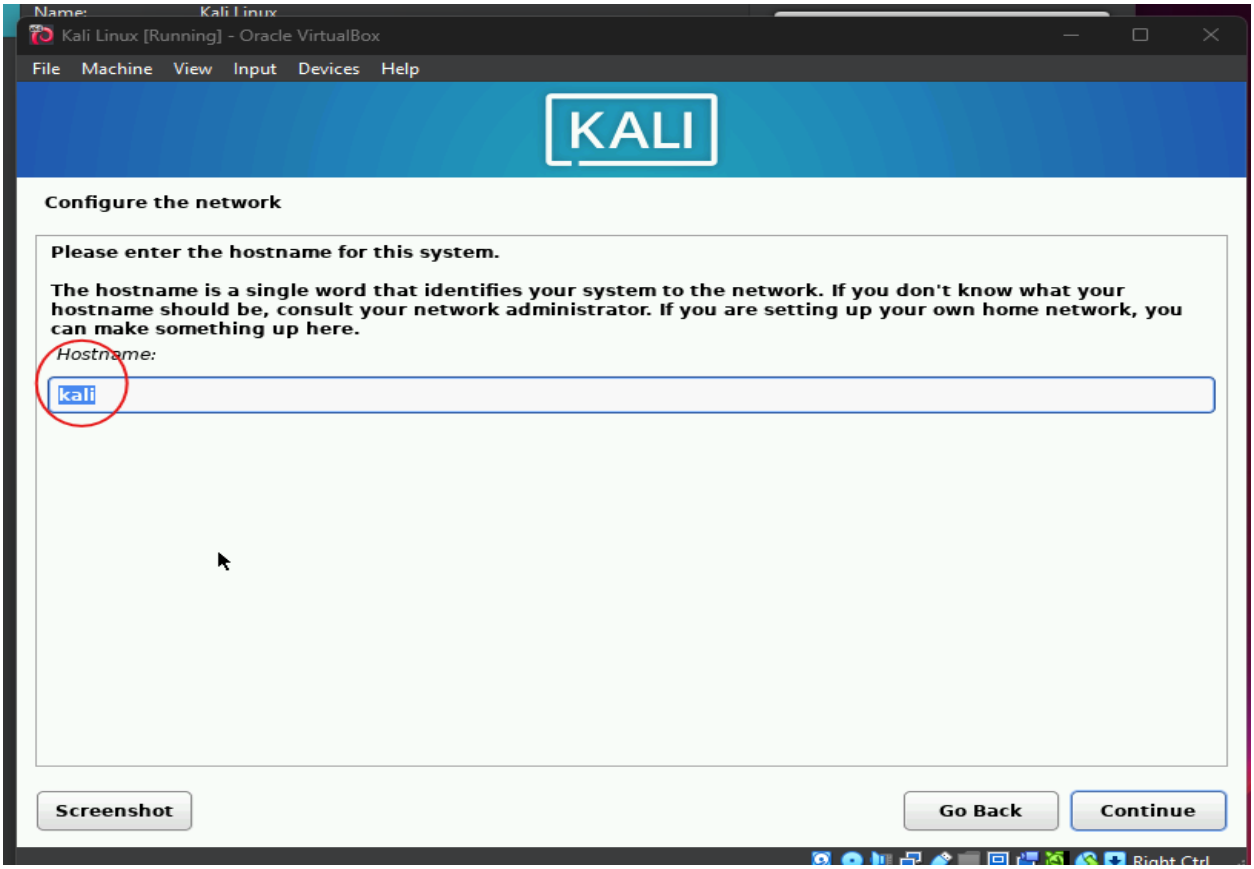
- Attach to: I changed the Network to use Bridge adapter, since I am going to have multiple VM on the VirtualBox. (default, for internet access).

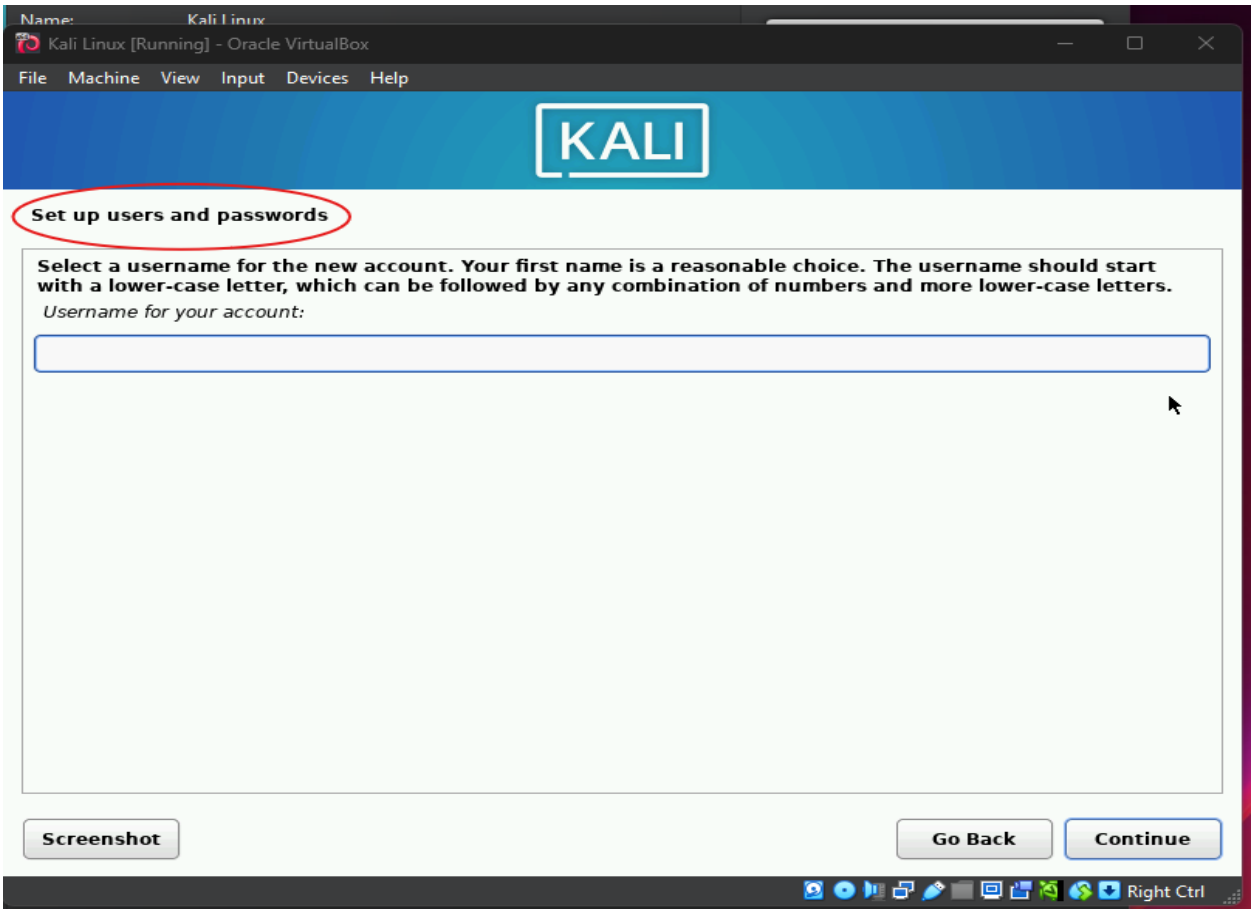
Then

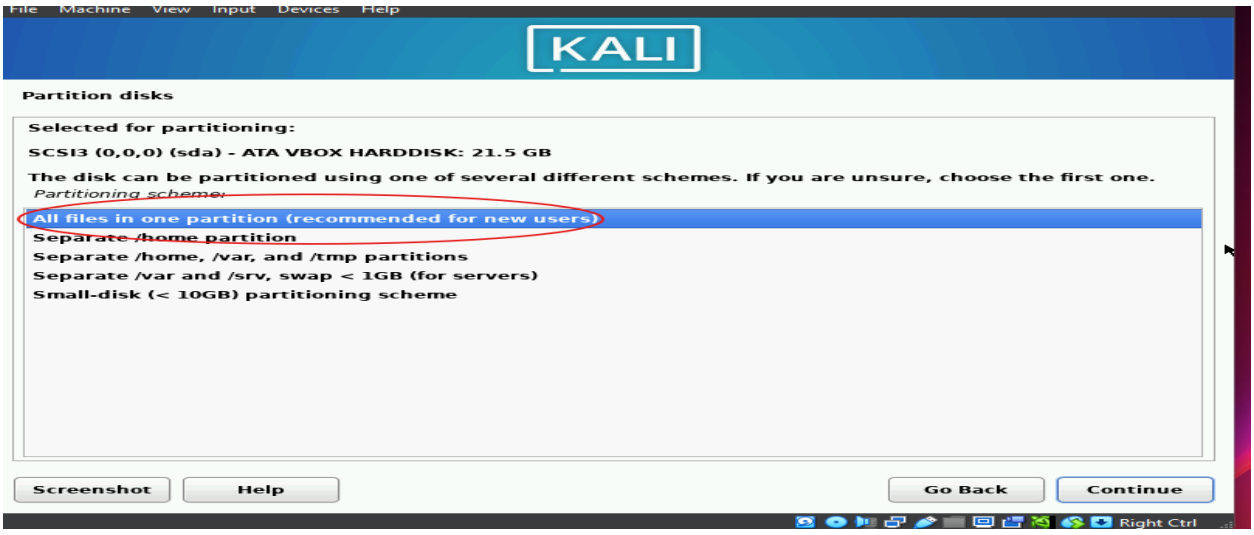


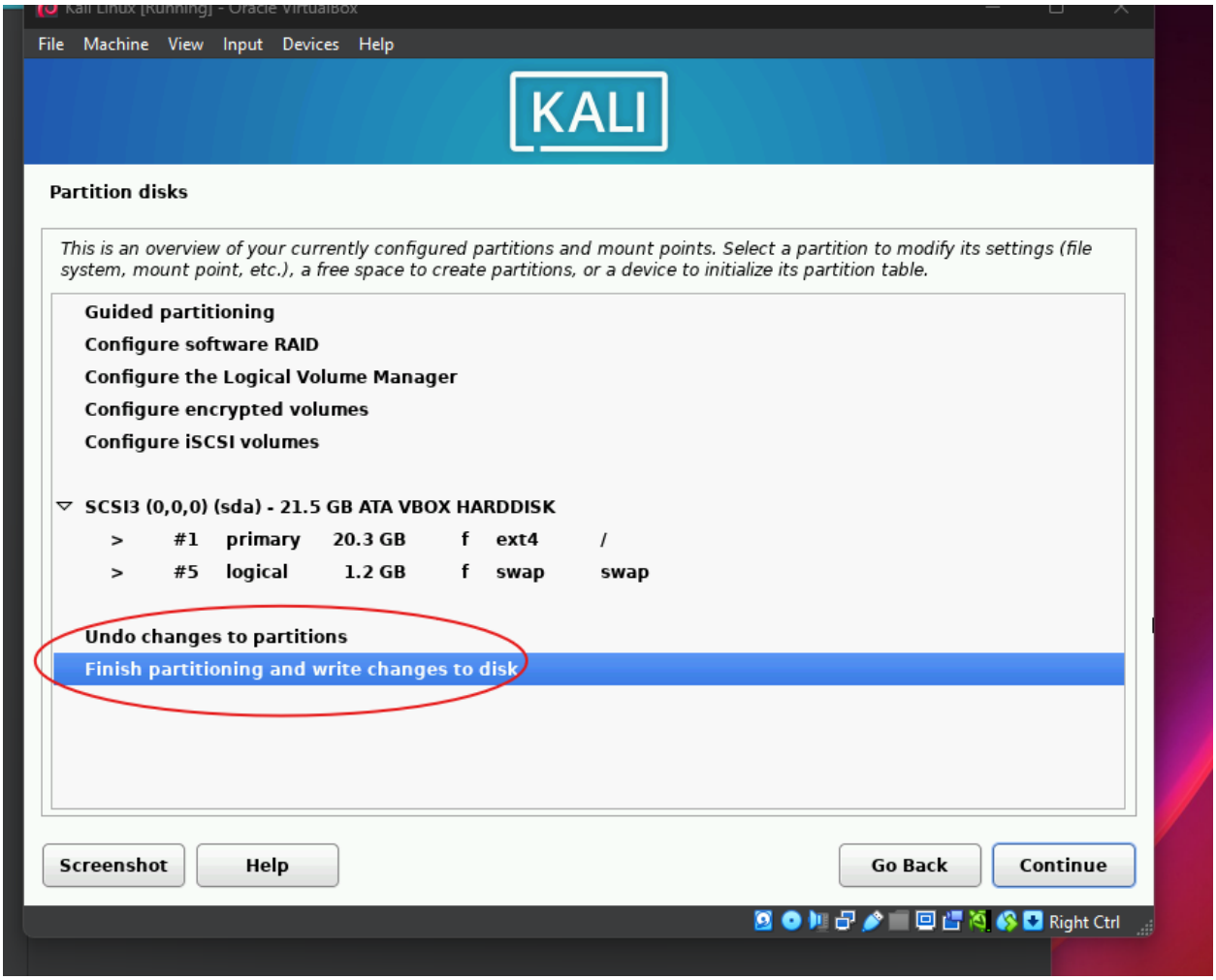
powered the Virtual Machine, completed the initial setup. VM is now ready.

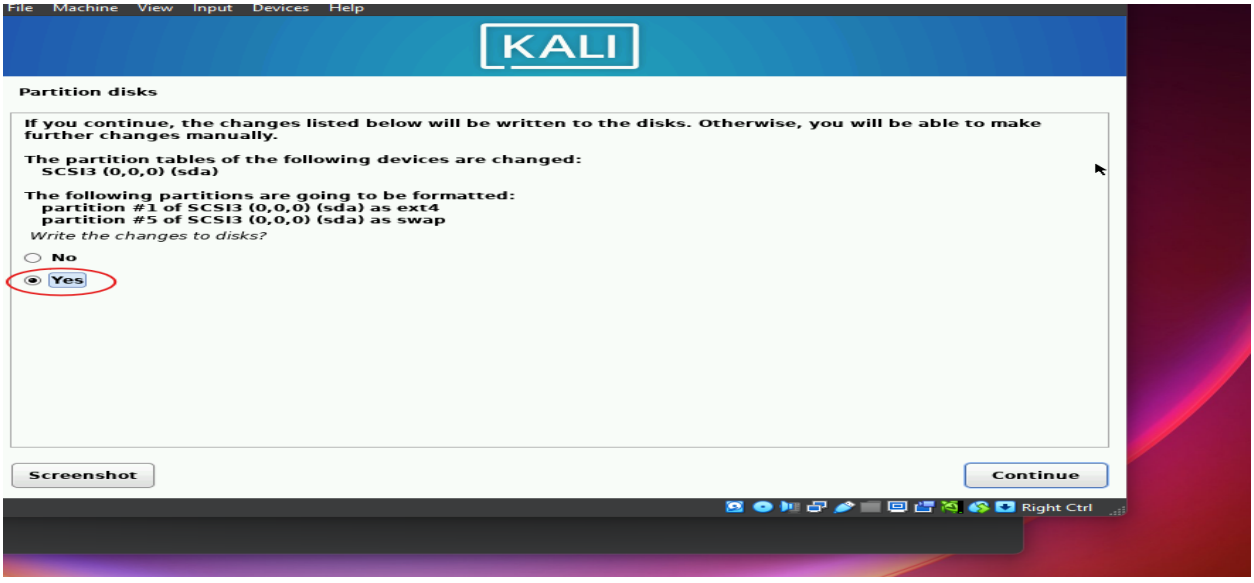

Kali Linux [Running] - Oracle VirtualBox
File Machine View Input Devices Help
KALI
Select a language
Choose the language to be used for the installation process. The selected language will also be the default language for the installed system.
Language:
Dutch - Nederlands
Dzongkha - རྫོང་ཁ
English - English
Esperanto - Esperanto
Estonian - Eesti
Finnish - Suomi
French - Français
Galician - Galego
Georgian - ქართული
German - Deutsch
Greek - Ελληνικά
Gujarati - ગુજરાતી
Hebrew - עברית
Hindi - हिन्दी
Screenshot
Go Back
Continue
Right Ctrl

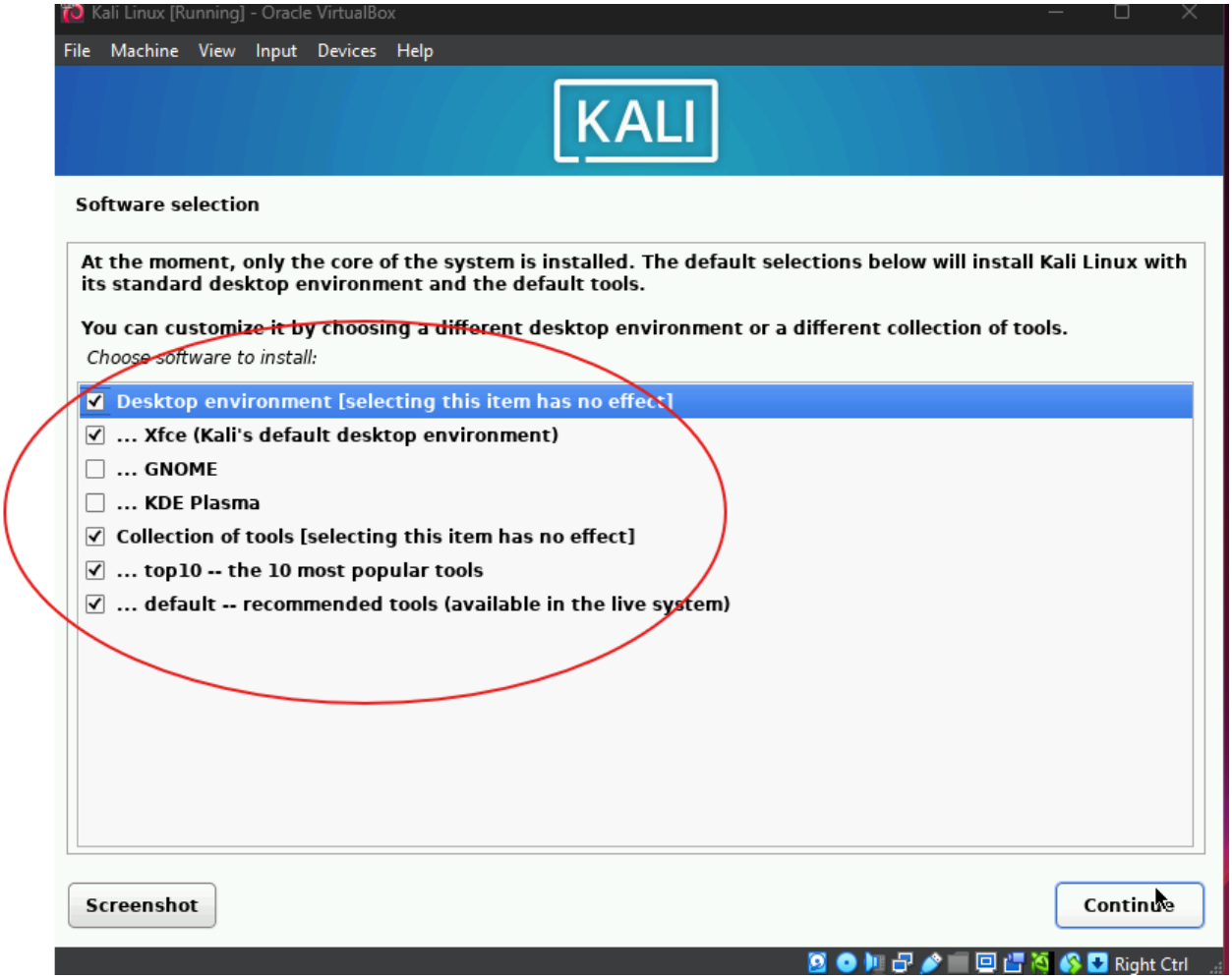

Kali Linux [Running] - Oracle VirtualBox
File Machine View Input Devices Help
KALI
Configure the network
Please enter the hostname for this system.
The hostname is a single word that identifies your system to the network. If you don't know what your hostname should be, consult your network administrator. If you are setting up your own home network, you can make something up here.
Hostname:
kali
Screenshot
Go Back
Continue
Right Ctrl


Name: Kali Linux
Kali Linux [Running] - Oracle VirtualBox
File Machine View Input Devices Help
KALI
Set up users and passwords
Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.
Username for your account:
Screenshot
Go Back
Continue
Right Ctrl

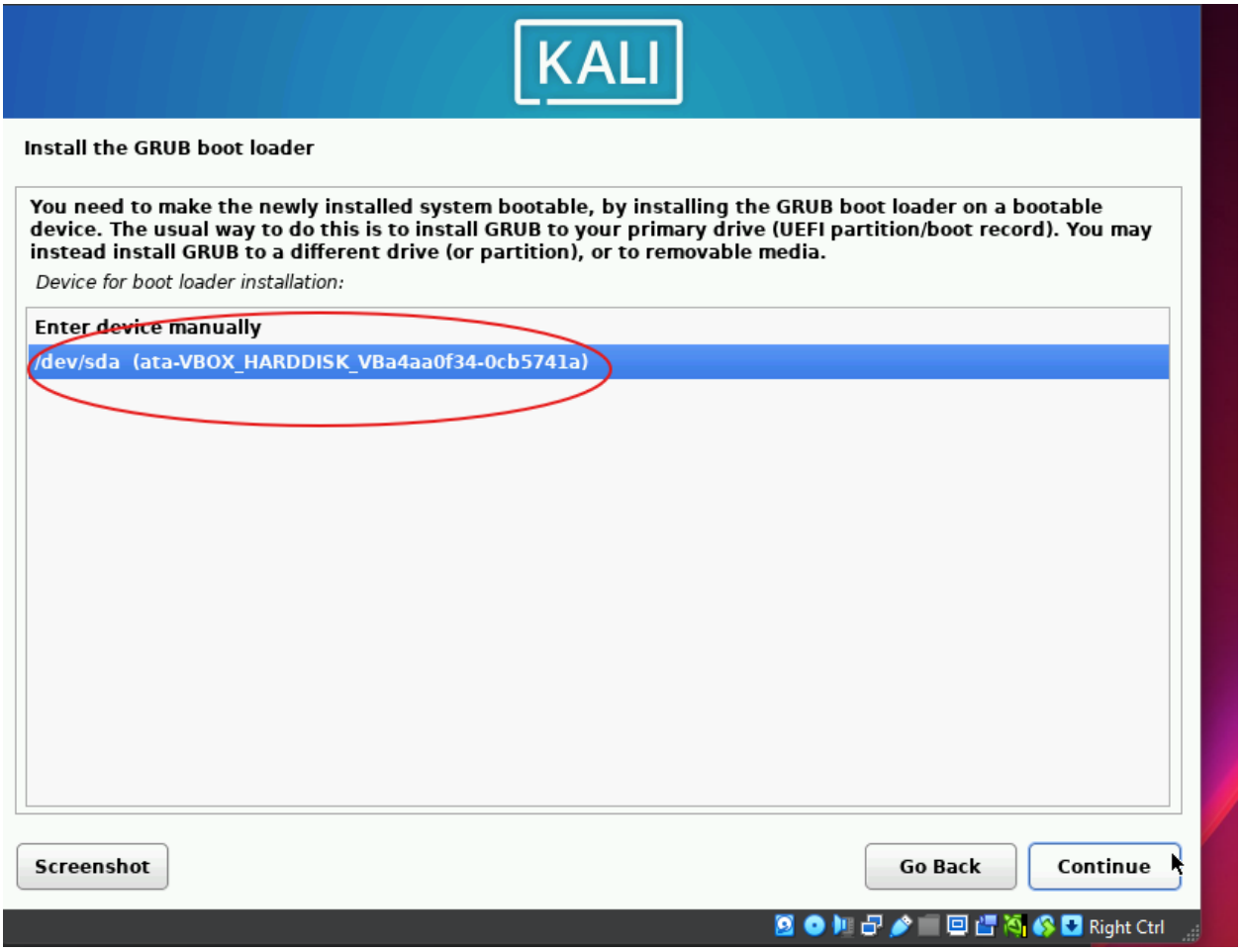

File Machine View Input Devices Help
KALI
Partition disks
Selected for partitioning:
SCSI3 (0,0,0) (sda) - ATA VBOX HARDDISK: 21.5 GB
The disk can be partitioned using one of several different schemes. If you are unsure, choose the first one.
Partitioning scheme:
All files in one partition (recommended for new users)
Separate /home partition
Separate /home, /var, and /tmp partitions
Separate /var and /srv, swap < 1GB (for servers)
Small-disk (< 10GB) partitioning scheme
Screenshot
Help
Go Back
Continue
Right Ctrl

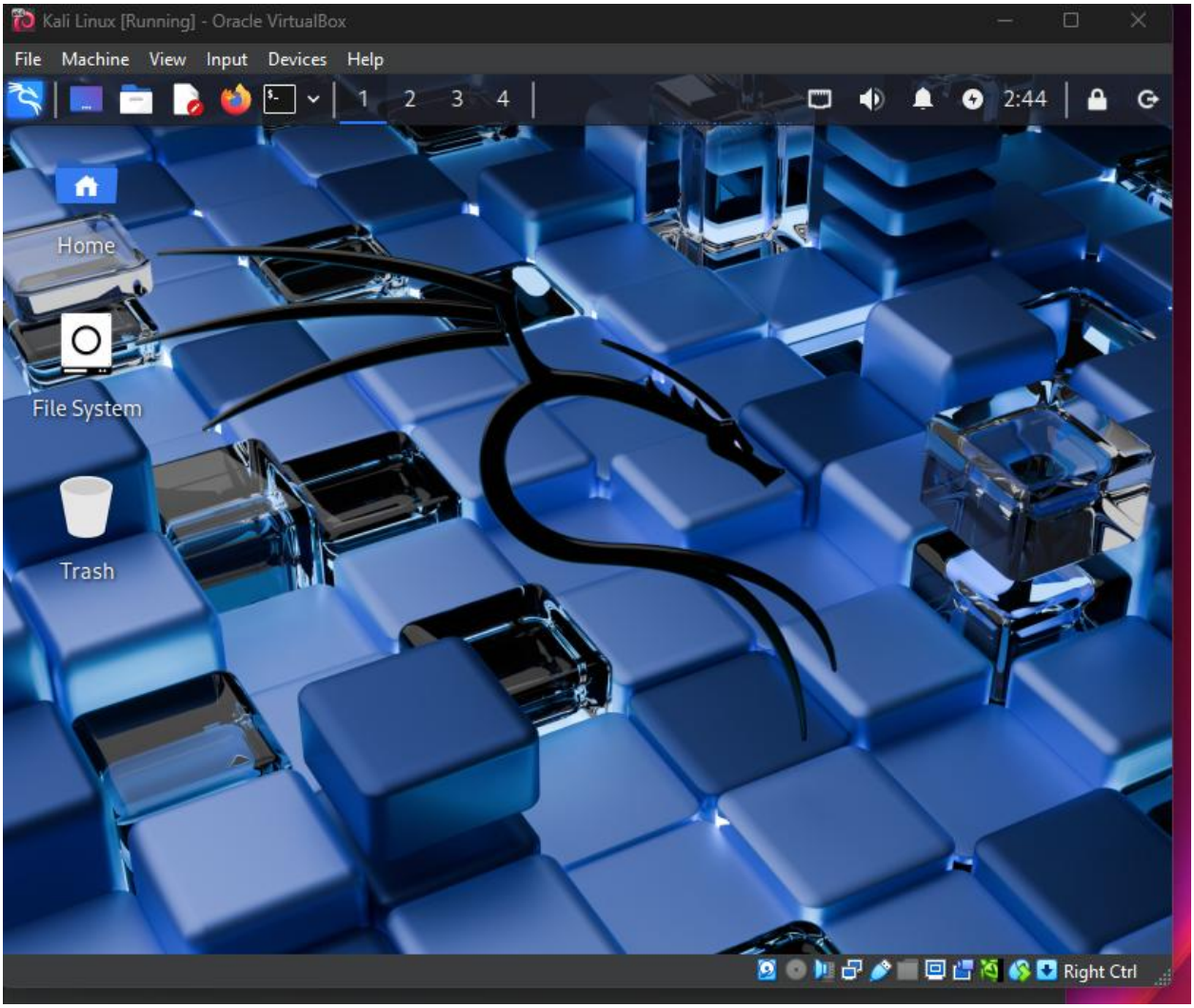

File Machine View Input Devices Help
KALI
Partition disks
This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.
Guided partitioning
Configure software RAID
Configure the Logical Volume Manager
Configure encrypted volumes
Configure iSCSI volumes
SCSI3 (0,0,0) (sda) - 21.5 GB ATA VBOX HARDDISK
> #1 primary 20.3 GB f ext4 /
> #5 logical 1.2 GB f swap swap
Undo changes to partitions
Finish partitioning and write changes to disk
Screenshot
Help
Go Back
Continue
Right Ctrl

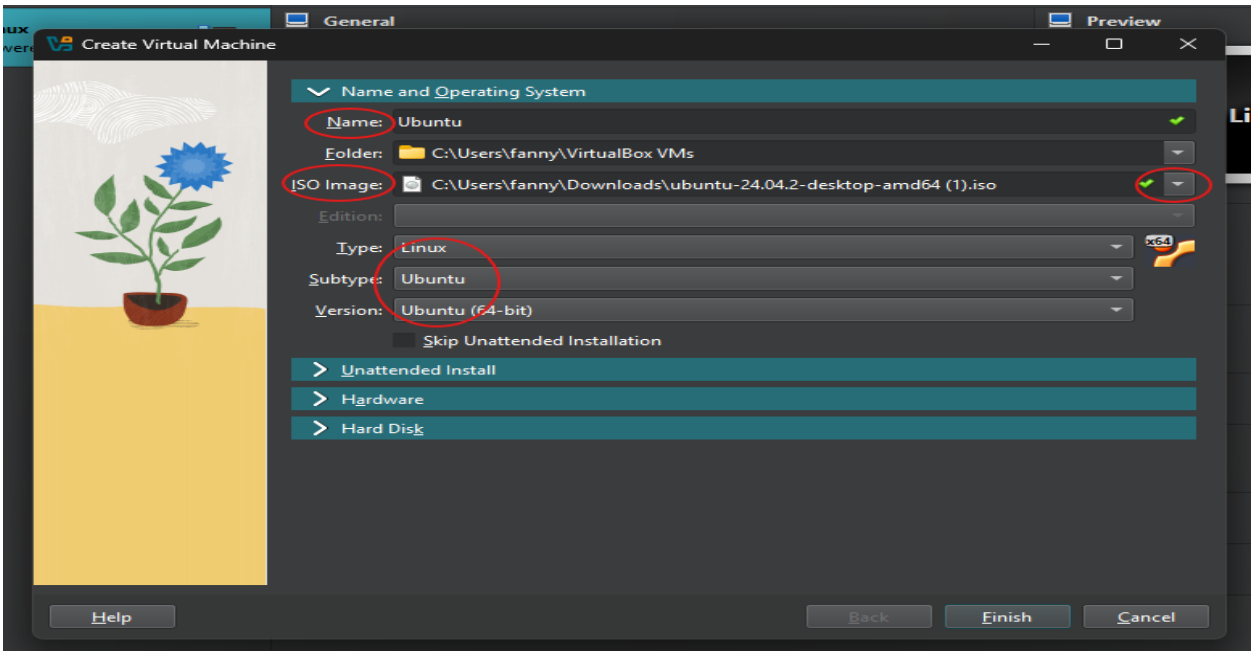

File Machine View Input Devices Help
KALI
Partition disks
If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually.
The partition tables of the following devices are changed:
SCSI3 (0,0,0) (sda)
The following partitions are going to be formatted:
partition #1 of SCSI3 (0,0,0) (sda) as ext4
partition #5 of SCSI3 (0,0,0) (sda) as swap
Write the changes to disks?
No
Yes
Screenshot
Continue
Right Ctrl

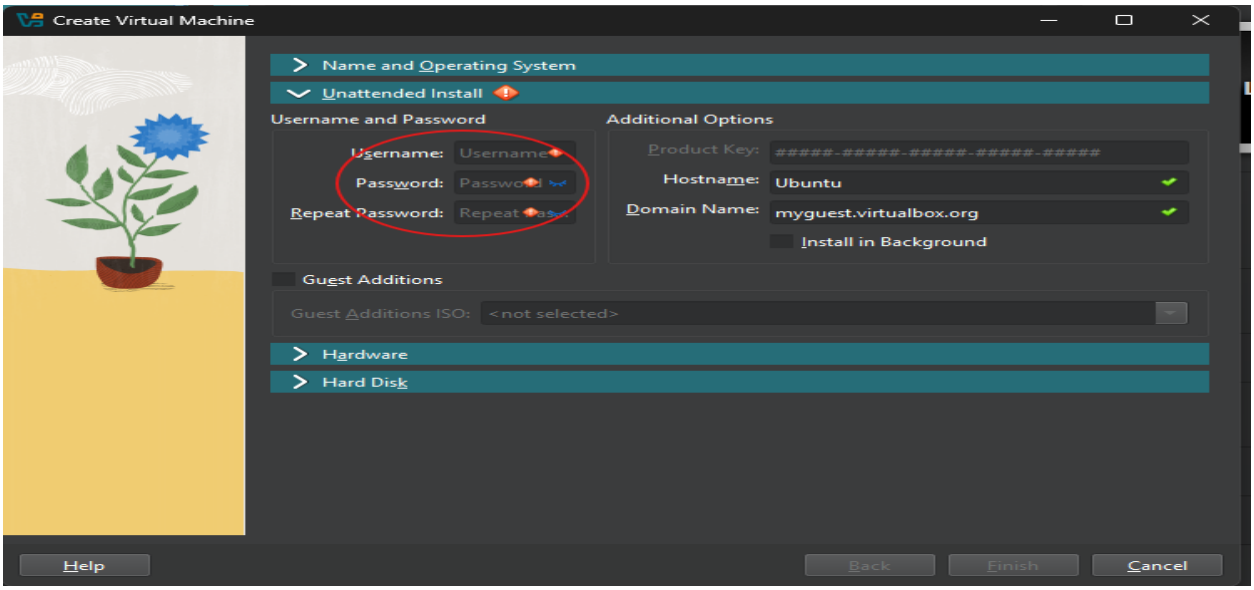

Kali Linux [Running] - Oracle VirtualBox
File Machine View Input Devices Help
KALI
Software selection
At the moment, only the core of the system is installed. The default selections below will install Kali Linux with its standard desktop environment and the default tools.
You can customize it by choosing a different desktop environment or a different collection of tools.
Choose software to install:
Desktop environment [selecting this item has no effect]
... Xfce (Kali's default desktop environment)
... GNOME
... KDE Plasma
Collection of tools [selecting this item has no effect]
... top10 -- the 10 most popular tools
... default -- recommended tools (available in the live system)
Screenshot
Continue
Right Ctrl

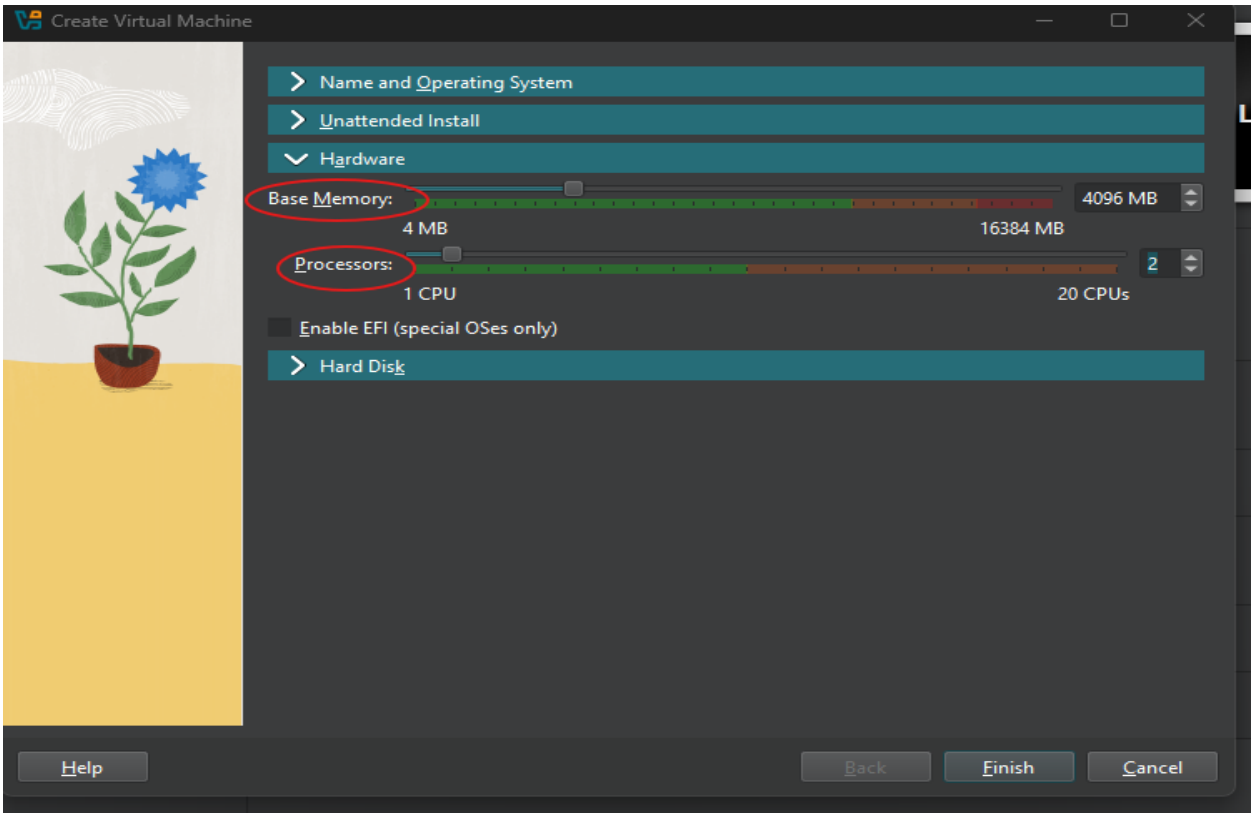

Kali Linux [Running] - Oracle VirtualBox
Machine View Input Devices Help
KALI
Install the GRUB boot loader
It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to your primary drive (UEFI partition/boot record).
Warning: If your computer has another operating system that the installer failed to detect, this will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it.
Install the GRUB boot loader to your primary drive?
No
Yes

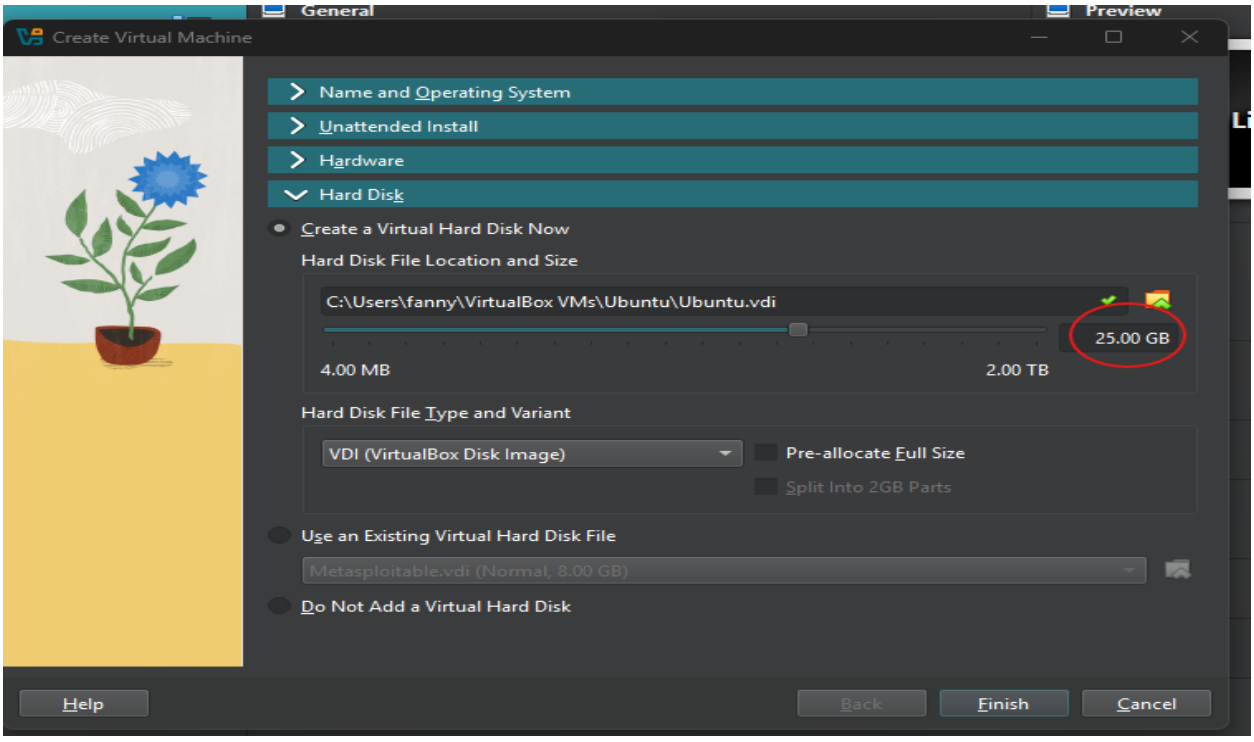

KALI
Install the GRUB boot loader
You need to make the newly installed system bootable, by installing the GRUB boot loader on a bootable device. The usual way to do this is to install GRUB to your primary drive (UEFI partition/boot record). You may instead install GRUB to a different drive (or partition), or to removable media.
Device for boot loader installation:
Enter device manually
/dev/sda (ata-VBOX_HARDDISK_VBa4aa0f34-0cb5741a)
Screenshot
Go Back
Continue
Right Ctrl

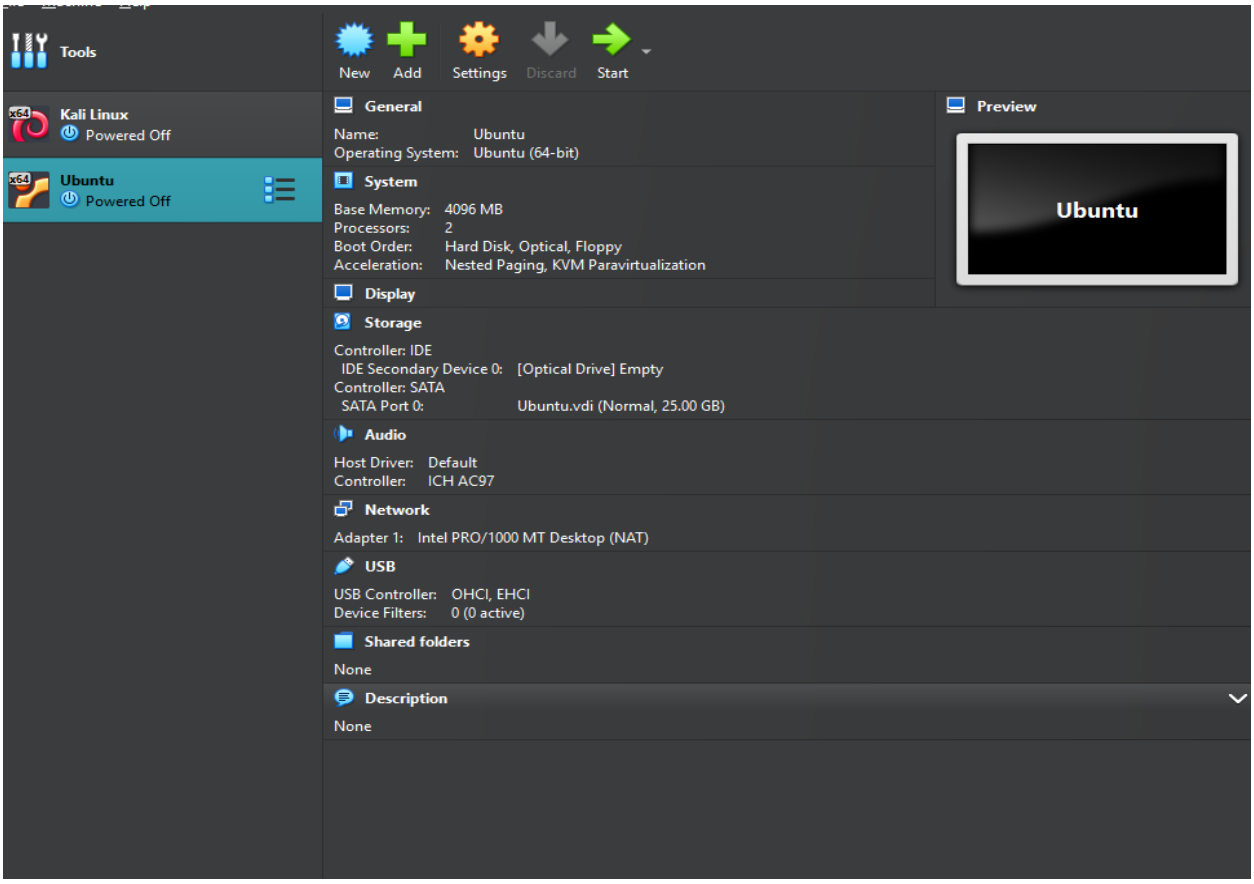

Kali Linux [Running] - Oracle VirtualBox
File Machine View Input Devices Help
1 2 3 4
2:44
Home
File System
Trash
Right Ctrl

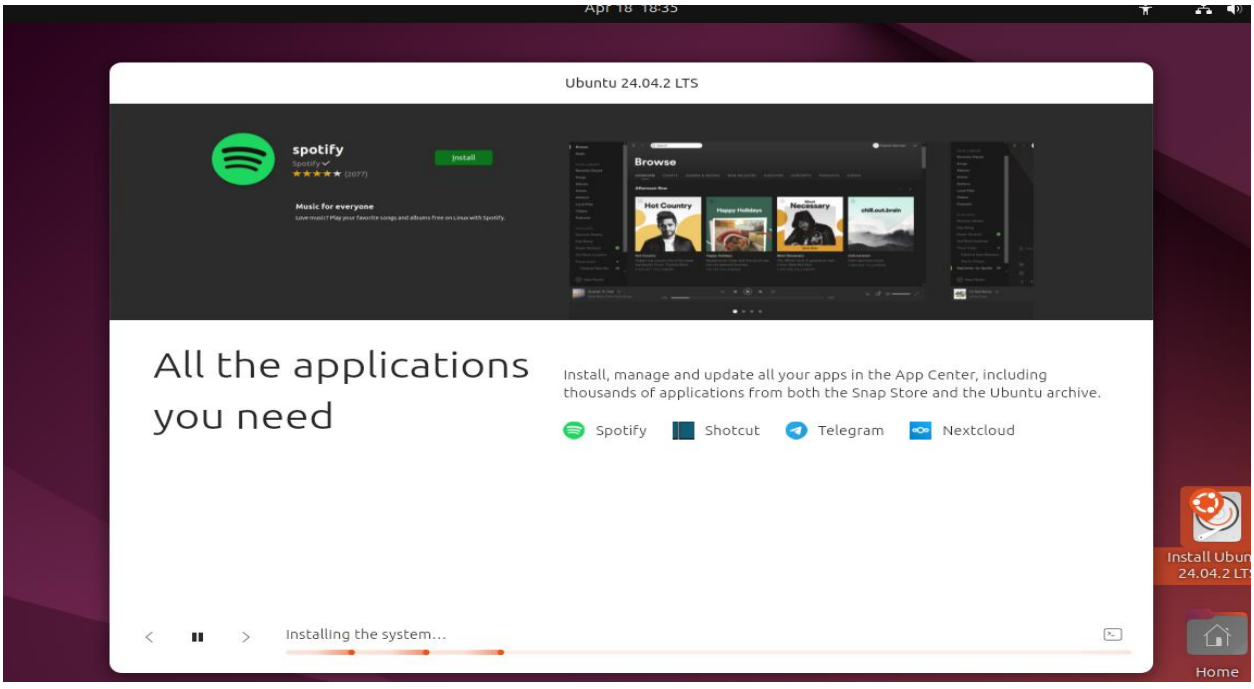

General
Preview
Create Virtual Machine
Name and Operating System
Name: Ubuntu
Folder: C:\Users\fanny\VirtualBox VMs
ISO Image: C:\Users\fanny\Downloads\ubuntu-24.04.2-desktop-amd64 (1).iso
Edition:
Type: Linux
Subtype: Ubuntu
Version: Ubuntu (64-bit)
Skip Unattended Installation
Unattended Install
Hardware
Hard Disk
Help
Back
Finish
Cancel

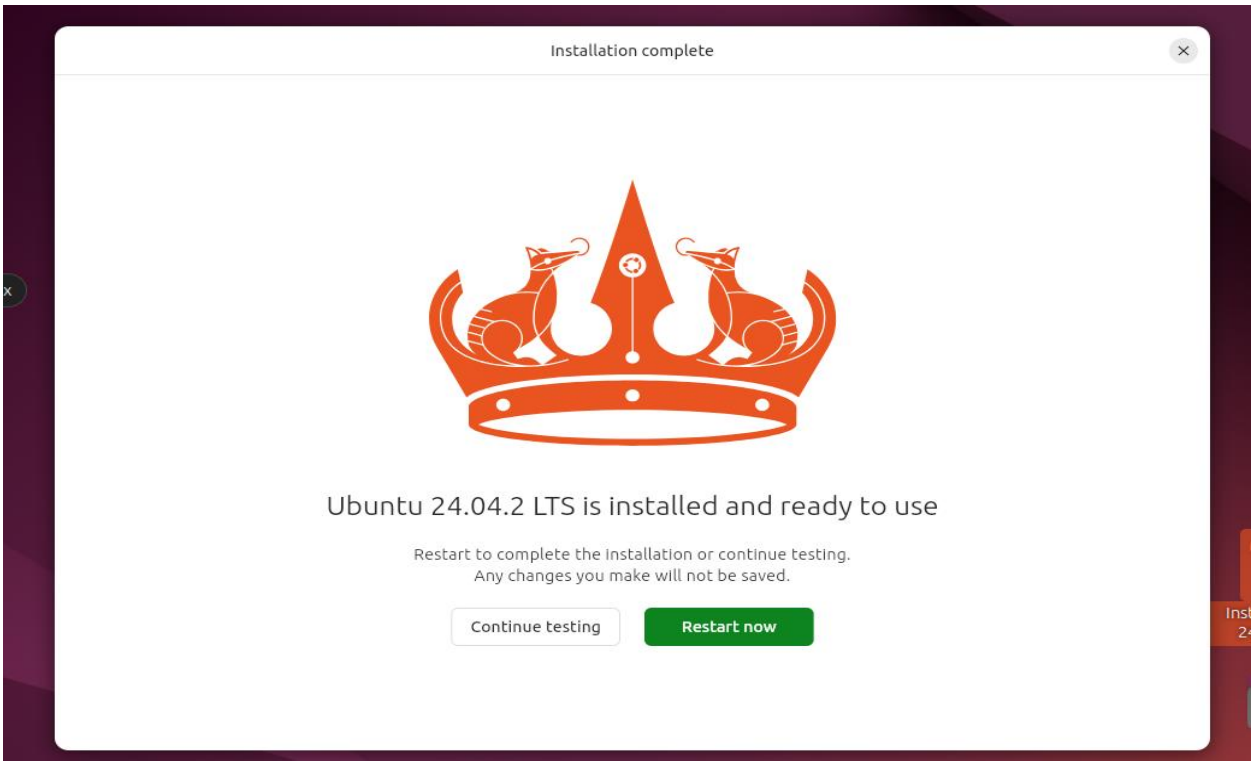

Create Virtual Machine
Name and Operating System
Unattended Install
Username and Password
Username:
Password:
Repeat Password:
Additional Options
Product Key: #####-#####-#####-#####-#####
Hostname: Ubuntu
Domain Name: myguest.virtualbox.org
Install in Background
Guest Additions
Guest Additions ISO: <not selected>
Hardware
Hard Disk
Help
Back
Finish
Cancel

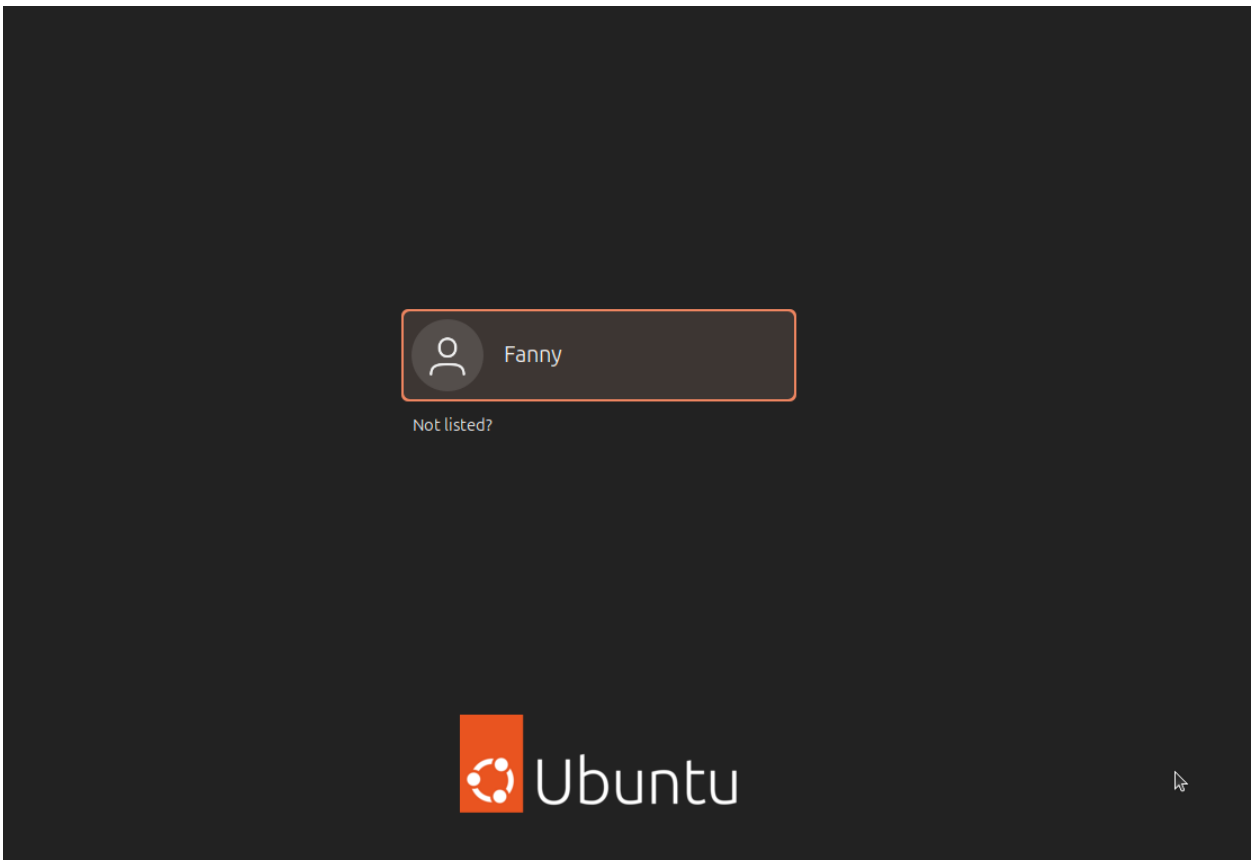

Create Virtual Machine
Name and Operating System
Unattended Install
Hardware
Base Memory:
4096 MB
4 MB
16384 MB
Processors:
2
1 CPU
20 CPUs
Enable EFI (special OSes only)
Hard Disk
Help
Back
Finish
Cancel


General
Preview
Create Virtual Machine
Name and Operating System
Unattended Install
Hardware
Hard Disk
Create a Virtual Hard Disk Now
Hard Disk File Location and Size
C:\Users\fanny\VirtualBox VMs\Ubuntu\Ubuntu.vdi
25.00 GB
4.00 MB
2.00 TB
Hard Disk File Type and Variant
VDI (VirtualBox Disk Image)
Pre-allocate Full Size
Split Into 2GB Parts
Use an Existing Virtual Hard Disk File
Metasploitable.vdi (Normal, 8.00 GB)
Do Not Add a Virtual Hard Disk
Help
Back
Finish
Cancel

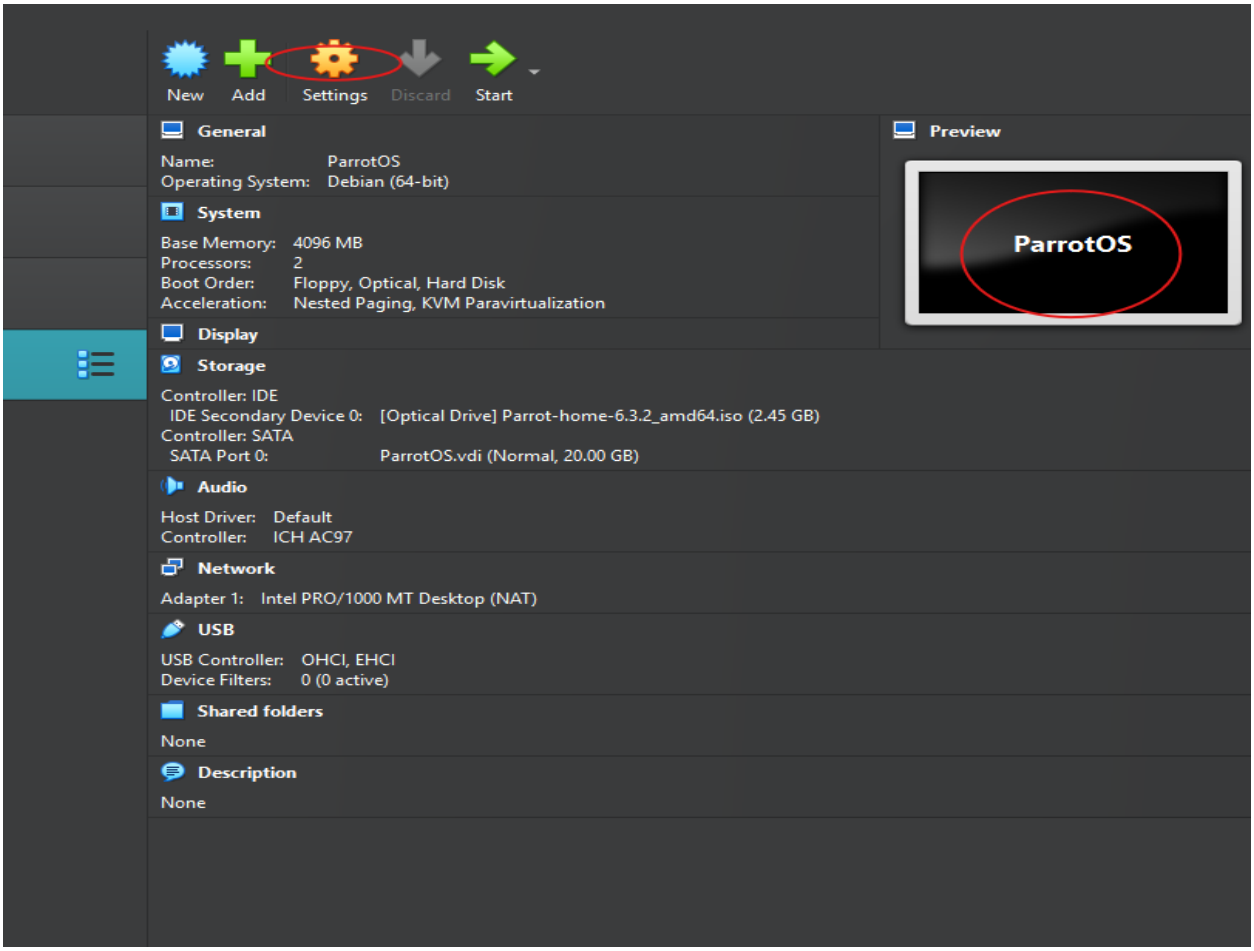

Tools
New
Add
Settings
Discard
Start
Kali Linux
Powered Off
Ubuntu
Powered Off
General
Name: Ubuntu
Operating System: Ubuntu (64-bit)
System
Base Memory: 4096 MB
Processors: 2
Boot Order: Hard Disk, Optical, Floppy
Acceleration: Nested Paging, KVM Paravirtualization
Display
Storage
Controller: IDE
IDE Secondary Device 0: [Optical Drive] Empty
Controller: SATA
SATA Port 0: Ubuntu.vdi (Normal, 25.00 GB)
Audio
Host Driver: Default
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
None
Description
None
Preview
Ubuntu

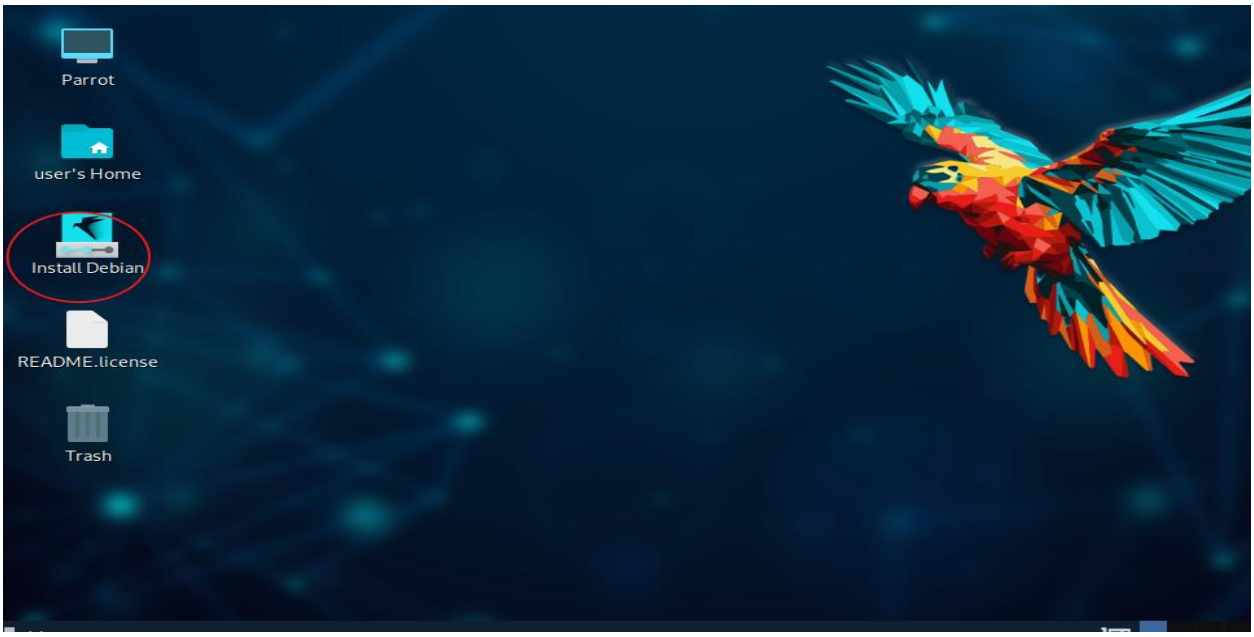

Ubuntu 24.04.2 LTS
spotify
Install
Browse
All the applications you need
Install, manage and update all your apps in the App Center, including thousands of applications from both the Snap Store and the Ubuntu archive.
Spotify
Shotcut
Telegram
Nextcloud
Installing the system...
Home

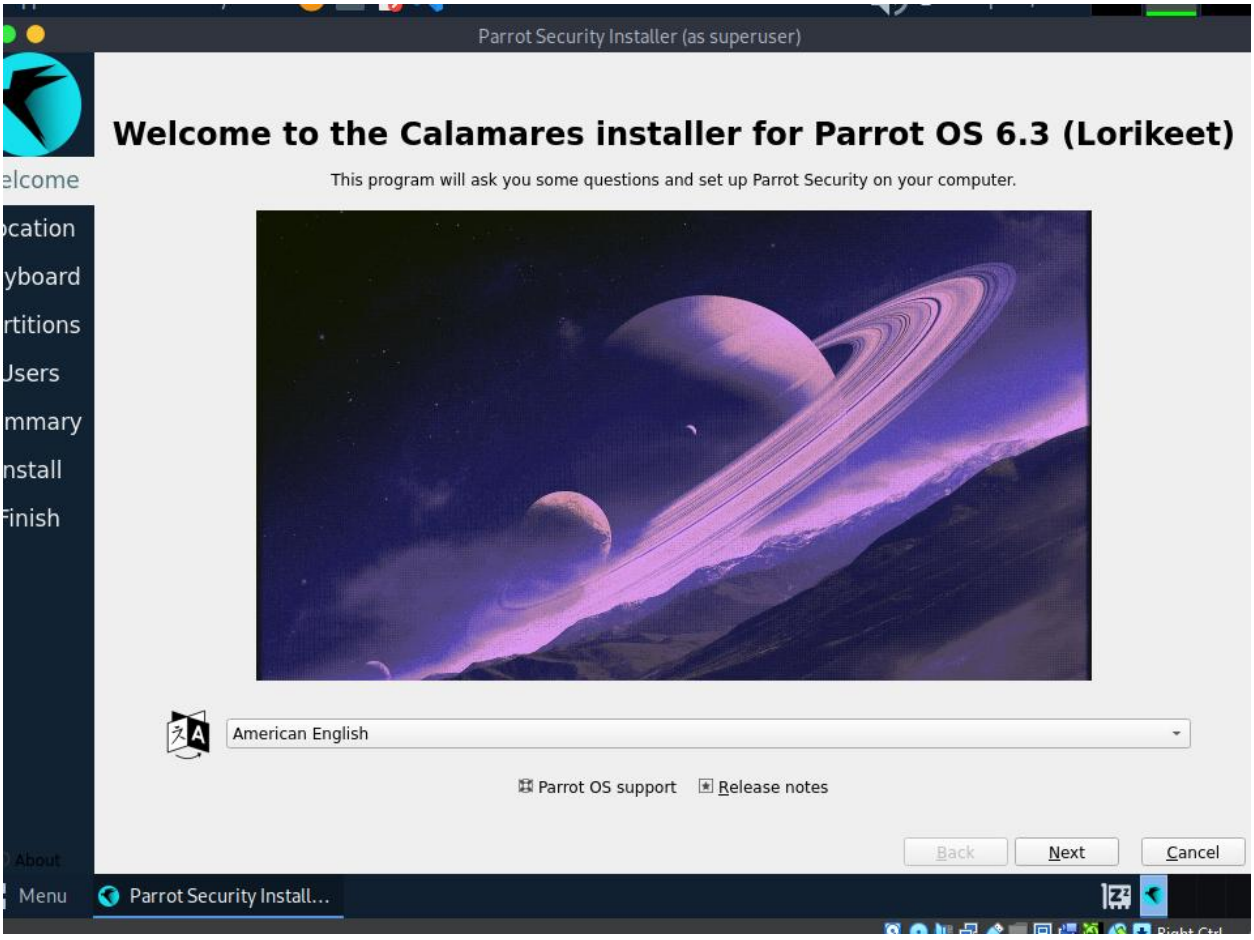

Installation complete
Ubuntu 24.04.2 LTS is installed and ready to use
Restart to complete the installation or continue testing.
Any changes you make will not be saved.
Continue testing
Restart now


Fanny
Not listed?
Ubuntu

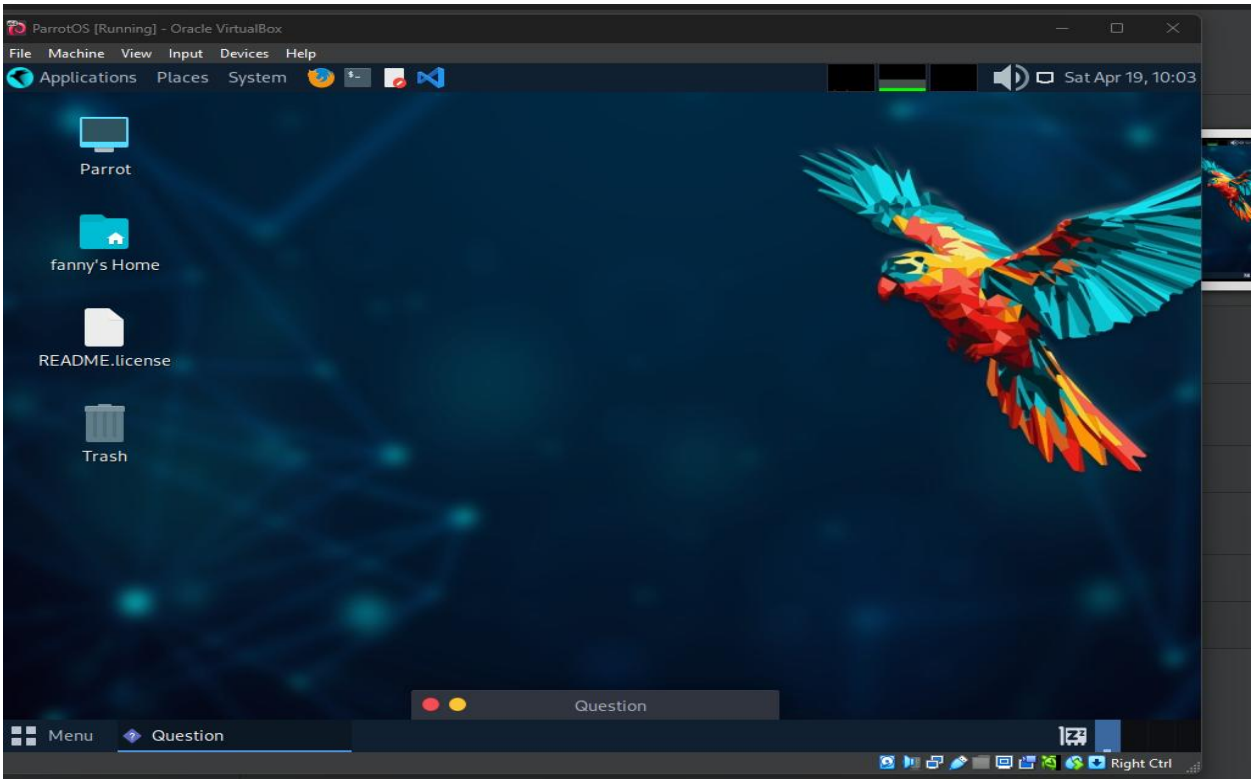

Home


New
Add
Settings
Discard
Start
General
Name: ParrotOS
Operating System: Debian (64-bit)
System
Base Memory: 4096 MB
Processors: 2
Boot Order: Floppy, Optical, Hard Disk
Acceleration: Nested Paging, KVM Paravirtualization
Display
Storage
Controller: IDE
IDE Secondary Device 0: [Optical Drive] Parrot-home-6.3.2_amd64.iso (2.45 GB)
Controller: SATA
SATA Port 0: ParrotOS.vdi (Normal, 20.00 GB)
Audio
Host Driver: Default
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
None
Description
None
Preview
ParrotOS


Parrot
user's Home
Install Debian
README.license
Trash


Parrot Security Installer (as superuser)
Welcome to the Calamares installer for Parrot OS 6.3 (Lorikeet)
This program will ask you some questions and set up Parrot Security on your computer.
elcome
cation
yboard
rtitions
Users
mmary
nstall
Finish
About
American English
Parrot OS support
Release notes
Back
Next
Cancel
Menu
Parrot Security Install...


Parrot Security Installer (as superuser)
Welcome to Parrot OS
The all-in-one framework for Cyber Security,
Software Development and Privacy Defense.
1%
Toggle log
Creating new btrfs partition on /dev/sda.
Back
Next
Cancel


ParrotOS [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat Apr 19, 10:03
Parrot
fanny's Home
README.license
Trash
Question
Menu
Question
Right Ctrl

I also installed Metasploitable 2 on the VB following the same process.

Thank you.