# Virtualized Home Lab using VirtualBox

Created by Hasan Williams

I set up a virtualized environment using VirtualBox, where I created two virtual machines: one running Ubuntu and the other running Kali Linux. First, I downloaded and installed VirtualBox along with the Extension Pack for additional features. Then, I downloaded the Ubuntu and Kali Linux ISOs and created new virtual machines for each.

For networking, I configured a NAT network in VirtualBox, which allows both VMs to access the internet while keeping them isolated from my host machine. I installed and configured UFW (uncomplicated firewall) on the Ubuntu VM to manage network traffic, enabling SSH and specific IP access. On the Kali Linux VM, I installed tools like Nmap and Wireshark to perform network scans and capture traffic.

This setup lets me securely manage and monitor network activity within the virtual environment, providing a robust platform for testing and development.

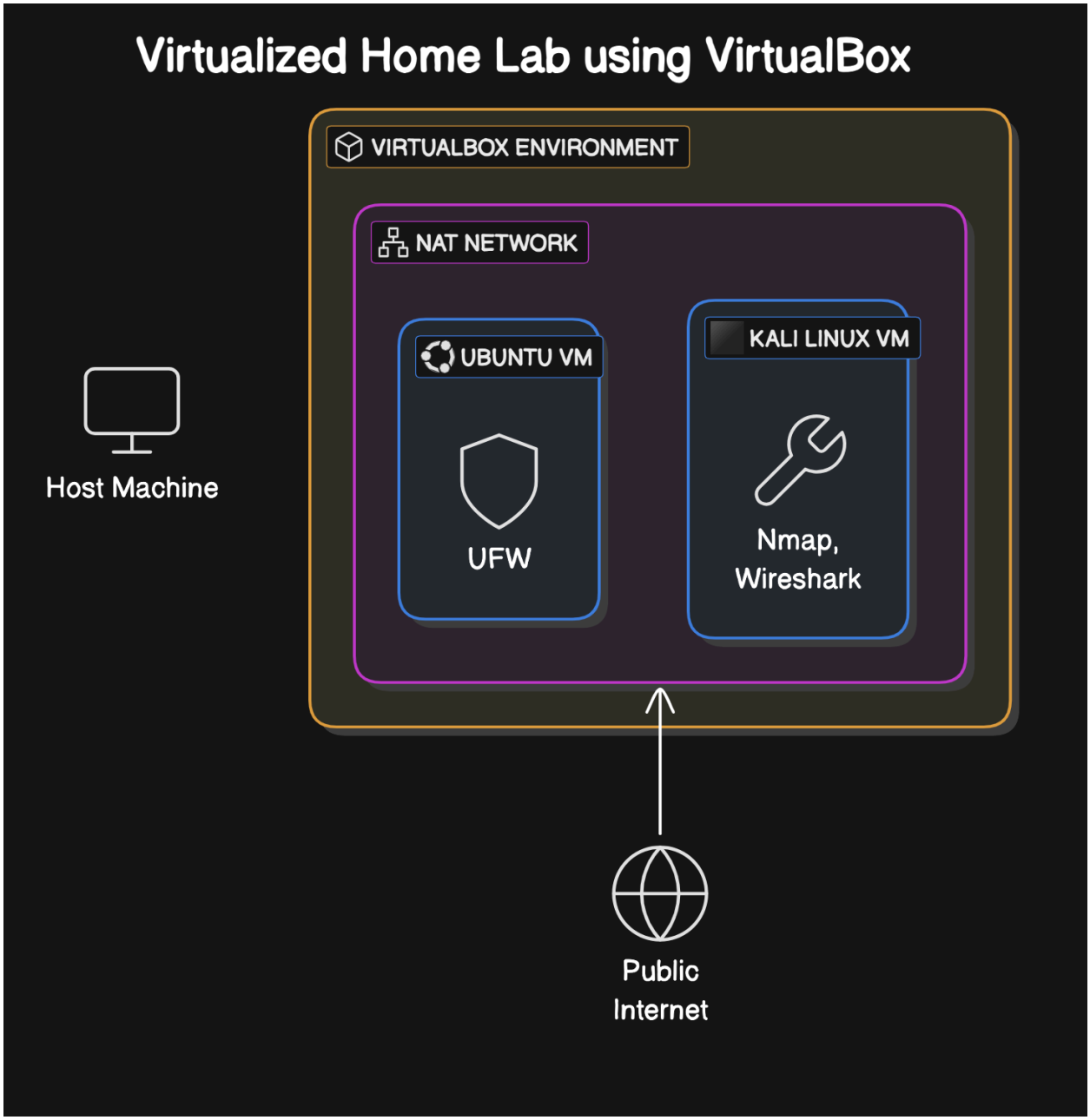
**Technologies Used:**

- VirtualBox - For creating and managing virtual machines.
- Ubuntu - As one of the operating systems for the virtual machine.
- Kali Linux - As the other operating system, used for security testing.
- NAT Network - Configured in VirtualBox for internet access and isolation.
- UFW (Uncomplicated Firewall) - Used on Ubuntu for managing firewall rules.
- Nmap - A network scanning tool used on Kali Linux.
- Wireshark - A tool for capturing and analyzing network traffic.
- Metasploit Framework - For security testing and exploitation (installed on Kali Linux).

**What I've Learned:**

- Virtualization - How to set up and manage virtual machines using VirtualBox.
- Operating System Installation - Installing and configuring Ubuntu and Kali Linux.
- Network Configuration - Setting up a NAT network to manage internet access and isolation for VMs.
- Firewall Management - Using FW on Ubuntu to control network traffic and enhance security.
- Network Scanning and Analysis - Using Nmap for scanning networks and Wireshark for capturing and analyzing traffic.
- Security Testing Basics - using Kali Linux and Metasploit for penetration testing and security assessments.

This homelab provided hands-on experience with virtualization, network management, and security tools, enhancing my skills in setting up and maintaining a secure and functional virtual environment.


Virtualized Home Lab using VirtualBox
VIRTUALBOX ENVIRONMENT
NAT NETWORK
UBUNTU VM
UFW
KALI LINUX VM
Nmap,
Wireshark
Host Machine
Public
Internet


VirtualBox
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Community
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macOS / Intel hosts
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Solaris 11 IPS hosts
Platform packages are released under the terms of the GPL version 3
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VirtualBox 7.1.4 Extension Pack
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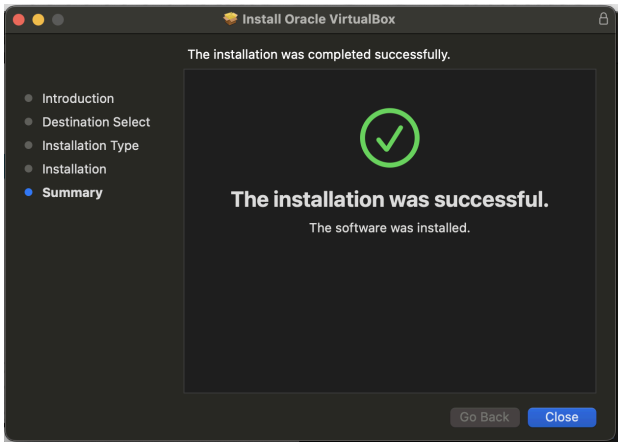
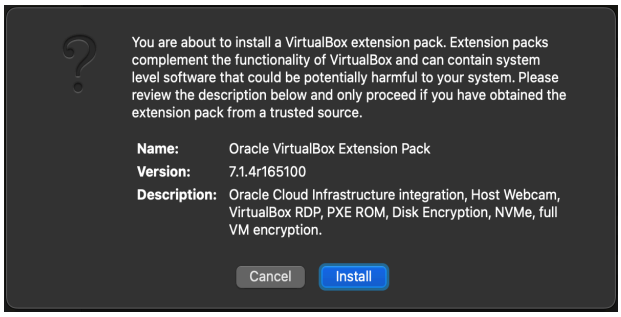
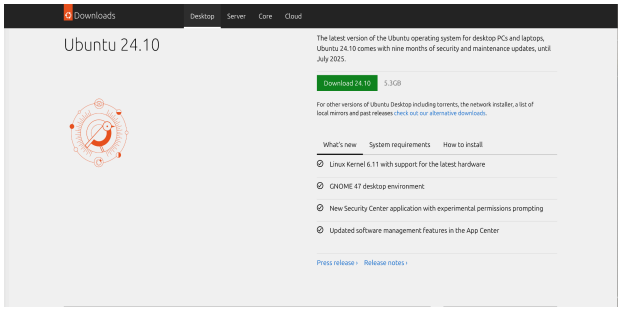
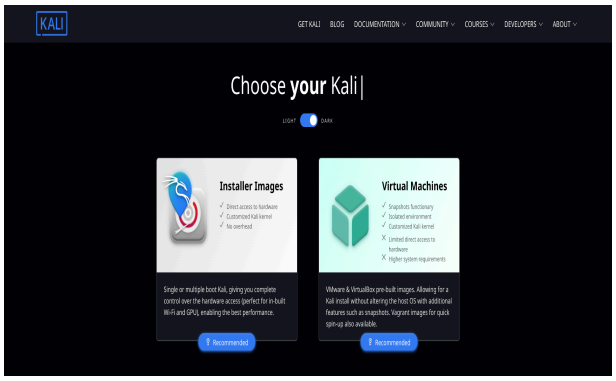
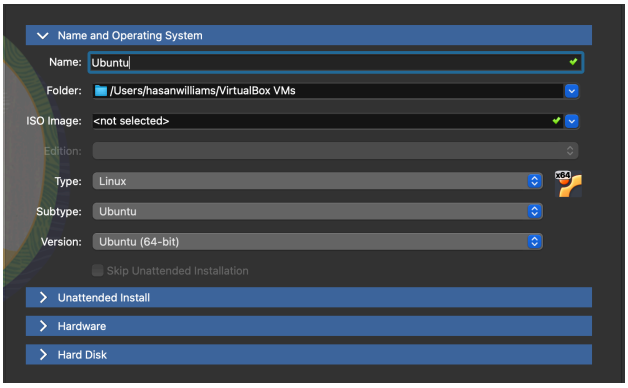
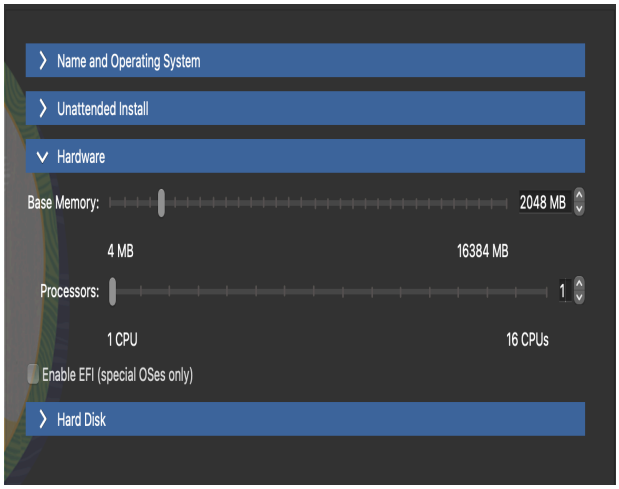

Install Oracle VirtualBox
The installation was completed successfully.
Introduction
Destination Select
Installation Type
Installation
Summary
The installation was successful.
The software was installed.
Go Back
Close

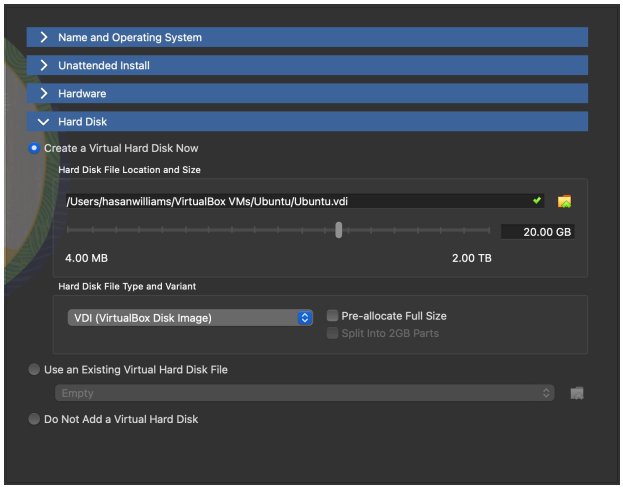

You are about to install a VirtualBox extension pack. Extension packs complement the functionality of VirtualBox and can contain system level software that could be potentially harmful to your system. Please review the description below and only proceed if you have obtained the extension pack from a trusted source.
Name: Oracle VirtualBox Extension Pack
Version: 7.1.4r165100
Description: Oracle Cloud Infrastructure integration, Host Webcam, VirtualBox RDP, PXE ROM, Disk Encryption, NVMe, full VM encryption.
Cancel
Install

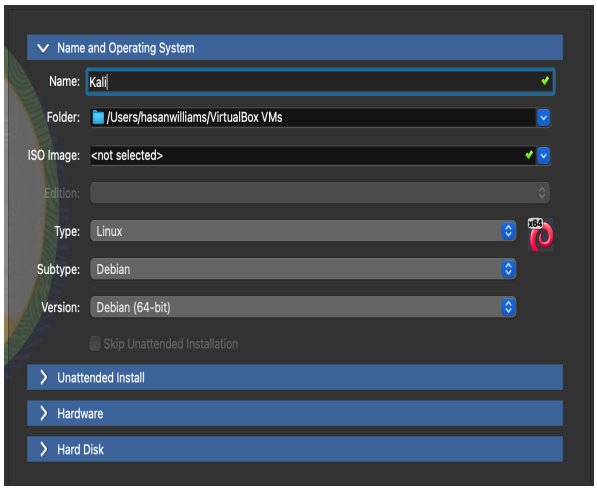

Downloads
Desktop
Server
Core
Cloud
Ubuntu 24.10
The latest version of the Ubuntu operating system for desktop PCs and laptops, Ubuntu 24.10 comes with nine months of security and maintenance updates, until July 2025.
Download 24.10
5.3GB
For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors and past releases check out our alternative downloads.
What's new
System requirements
How to install
Linux Kernel 6.11 with support for the latest hardware
GNOME 47 desktop environment
New Security Center application with experimental permissions prompting
Updated software management features in the App Center
Press release
Release notes

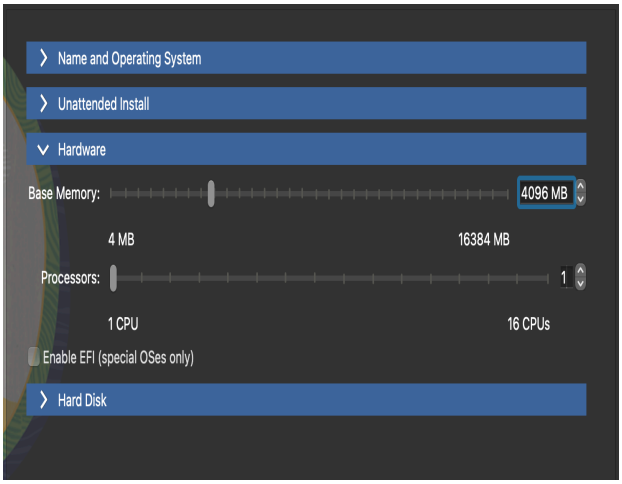

KALI
GET KALI
BLOG
DOCUMENTATION
COMMUNITY
COURSES
DEVELOPERS
ABOUT
Choose your Kali
LIGHT
DARK
Installer Images
Single or multiple boot Kali, giving you complete control over the hardware access (perfect for in-built Wi-Fi and GPU), enabling the best performance.
Recommended
Virtual Machines
VMware & VirtualBox pre-built images. Allowing for a Kali install without altering the host OS with additional features such as snapshots. Vagrant images for quick spin-up also available.
Recommended

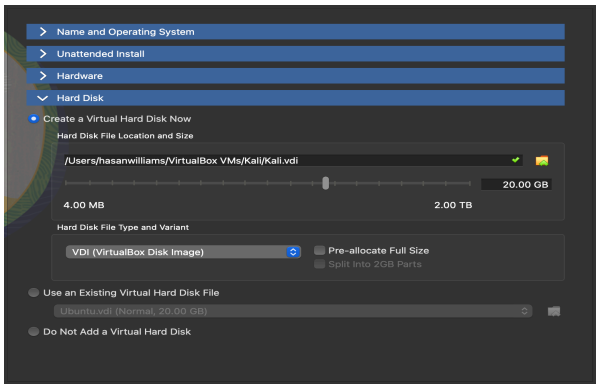

Name and Operating System
Name: Ubuntu
Folder: /Users/hasanwilliams/VirtualBox VMs
ISO Image: <not selected>
Edition:
Type: Linux
Subtype: Ubuntu
Version: Ubuntu (64-bit)
Skip Unattended Installation
Unattended Install
Hardware
Hard Disk

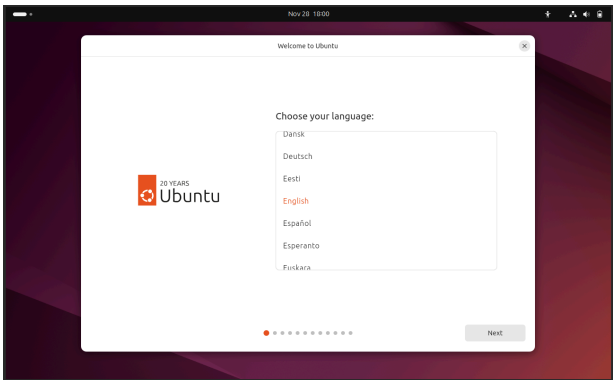

Name and Operating System
Unattended Install
Hardware
Base Memory: 2048 MB
4 MB
16384 MB
Processors: 1
1 CPU
16 CPUs
Enable EFI (special OSes only)
Hard Disk

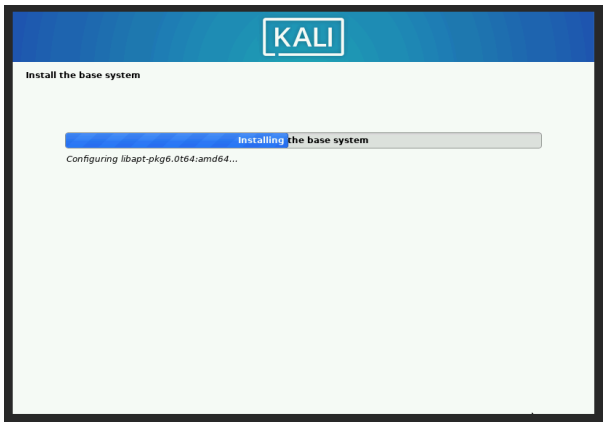

Name and Operating System
Unattended Install
Hardware
Hard Disk
Create a Virtual Hard Disk Now
Hard Disk File Location and Size
/Users/hasanwilliams/VirtualBox VMs/Ubuntu/Ubuntu.vdi
20.00 GB
4.00 MB
2.00 TB
Hard Disk File Type and Variant
VDI (VirtualBox Disk Image)
Pre-allocate Full Size
Split Into 2GB Parts
Use an Existing Virtual Hard Disk File
Empty
Do Not Add a Virtual Hard Disk

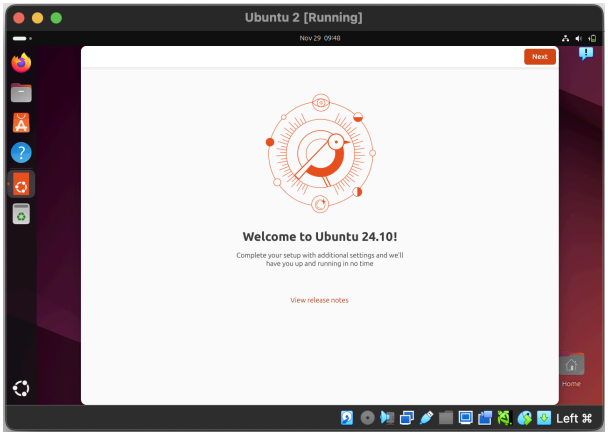

Name and Operating System
Name: Kali
Folder: /Users/hasanwilliams/VirtualBox VMs
ISO Image: <not selected>
Edition:
Type: Linux
Subtype: Debian
Version: Debian (64-bit)
Skip Unattended Installation
Unattended Install
Hardware
Hard Disk

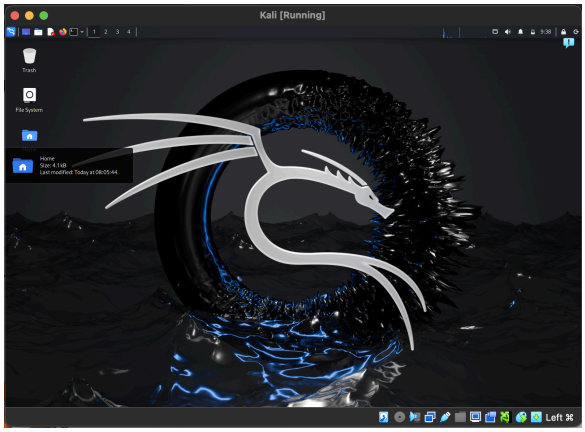

Name and Operating System
Unattended Install
Hardware
Base Memory: 4096 MB
4 MB
16384 MB
Processors: 1
1 CPU
16 CPUs
Enable EFI (special OSes only)
Hard Disk

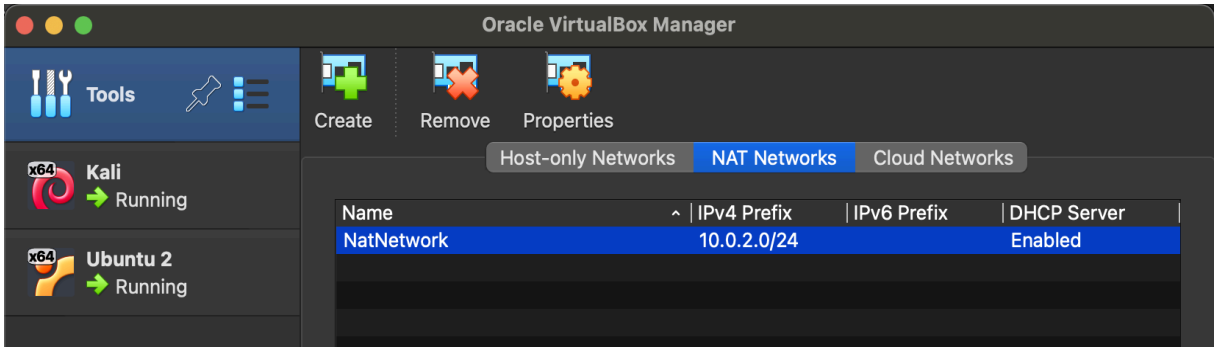

Name and Operating System
Unattended Install
Hardware
Hard Disk
Create a Virtual Hard Disk Now
Hard Disk File Location and Size
/Users/hasanwilliams/VirtualBox VMs/Kali/Kali.vdi
20.00 GB
4.00 MB
2.00 TB
Hard Disk File Type and Variant
VDI (VirtualBox Disk Image)
Pre-allocate Full Size
Split into 2GB Parts
Use an Existing Virtual Hard Disk File
Ubuntu.vdi (Normal, 20.00 GB)
Do Not Add a Virtual Hard Disk

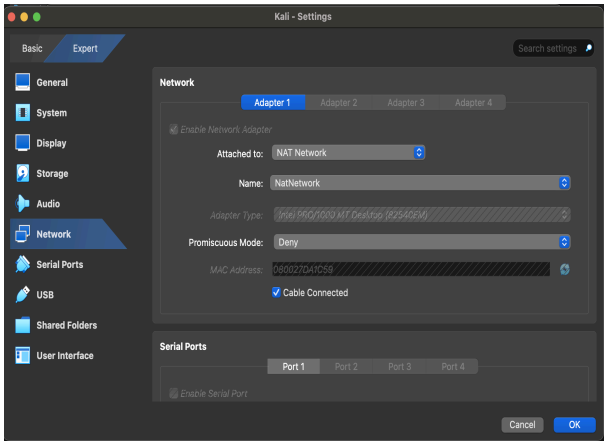

Welcome to Ubuntu
Choose your language:
Dansk
Deutsch
Eesti
English
Español
Esperanto
Euskara
20 YEARS
Ubuntu
Next

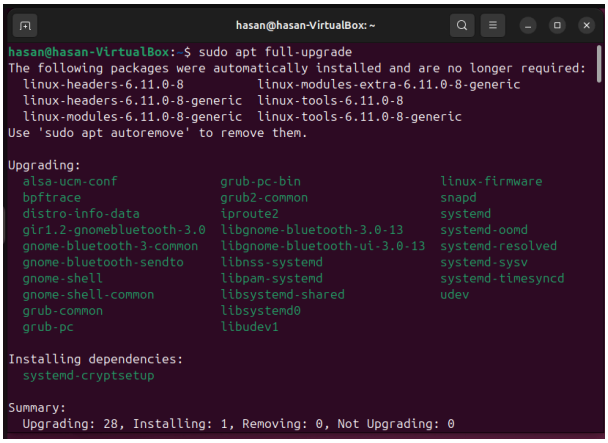

KALI
Install the base system
Installing the base system
Configuring libapt-pkg6.0t64:amd64...

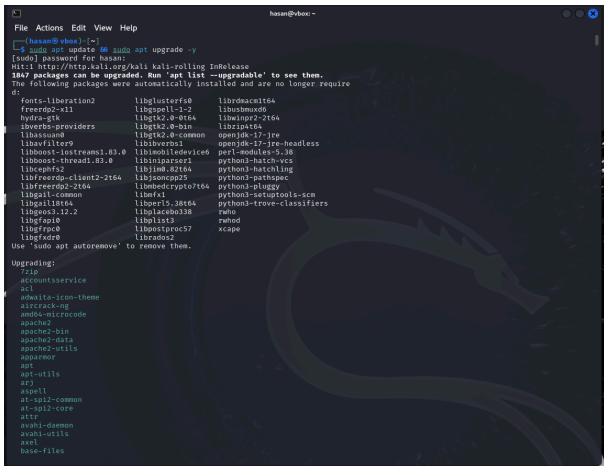

Ubuntu 2 [Running]
Next
Welcome to Ubuntu 24.10!
Complete your setup with additional settings and we'll have you up and running in no time
View release notes
Home
Left ⌘


Kali [Running]

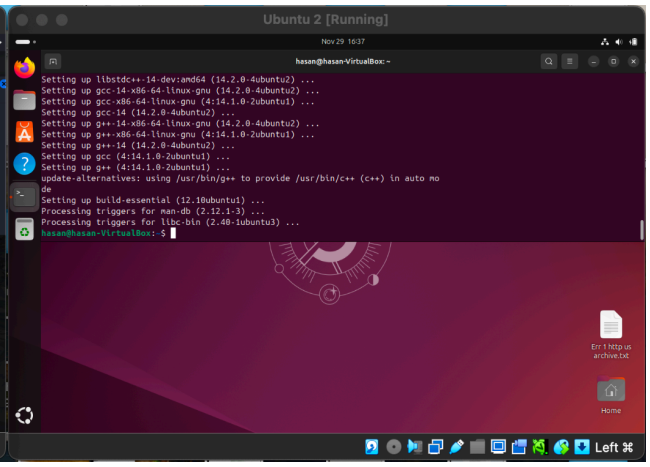

Oracle VirtualBox Manager
Tools
Create
Remove
Properties
Host-only Networks
NAT Networks
Cloud Networks
Kali
Running
Ubuntu 2
Running
Name
IPv4 Prefix
IPv6 Prefix
DHCP Server
NatNetwork
10.0.2.0/24
Enabled


Kali - Settings
Basic
Expert
Search settings
General
System
Display
Storage
Audio
Network
Serial Ports
USB
Shared Folders
User Interface
Network
Adapter 1
Adapter 2
Adapter 3
Adapter 4
Enable Network Adapter
Attached to:
NAT Network
Name:
NatNetwork
Adapter Type:
Intel PRO/1000 MT Desktop (82540EM)
Promiscuous Mode:
Deny
MAC Address:
080027D41C59
Cable Connected
Serial Ports
Port 1
Port 2
Port 3
Port 4
Enable Serial Port
Cancel
OK


hasan@hasan-VirtualBox: ~
hasan@hasan-VirtualBox:~$ sudo apt full-upgrade
The following packages were automatically installed and are no longer required:
linux-headers-6.11.0-8
linux-modules-extra-6.11.0-8-generic
linux-headers-6.11.0-8-generic
linux-tools-6.11.0-8
linux-modules-6.11.0-8-generic
linux-tools-6.11.0-8-generic
Use 'sudo apt autoremove' to remove them.
Upgrading:
alsa-ucm-conf
bpftrace
distro-info-data
gir1.2-gnomebluetooth-3.0
gnome-bluetooth-3-common
gnome-bluetooth-sendto
gnome-shell
gnome-shell-common
grub-common
grub-pc
grub-pc-bin
grub2-common
iproute2
libgnome-bluetooth-3.0-13
libgnome-bluetooth-ui-3.0-13
libnss-systemd
libpam-systemd
libsystemd-shared
libsystemd0
libudev1
linux-firmware
snapd
systemd
systemd-oomd
systemd-resolved
systemd-sysv
systemd-timesyncd
udev
Installing dependencies:
systemd-cryptsetup
Summary:
Upgrading: 28, Installing: 1, Removing: 0, Not Upgrading: 0


File Actions Edit View Help
Upgrading:
Use 'sudo apt autoremove' to remove them.

```
┌──(hasan㉿vbox)-[~]
└─$ sudo apt install -y nmap wireshark metasploit-framework
[sudo] password for hasan:
```


```
┌──(hasan㉿vbox)-[~]
└─$ nmap -A 10.0.2.15
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-11-29 19:44 EST
Nmap scan report for 10.0.2.15
Host is up (0.0011s latency).
Not shown: 999 filtered tcp ports (no-response)
PORT   STATE  SERVICE VERSION
22/tcp closed ssh
MAC Address: 08:00:27:34:FF:0A (Oracle VirtualBox virtual NIC)
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port
Device type: general purpose|specialized
Running: Linux 2.6.X, VMware ESX Server 3.X
OS CPE: cpe:/o:linux:linux_kernel:2.6.11 cpe:/o:vmware:esx:3.0:2
OS details: Linux 2.6.11, Linux 2.6.18, Linux 2.6.18.8 (openSUSE 10.2), Linux 2.6.18.8 (openSUSE 10.2, SMP), Lin
ux 2.6.20.6, Linux 2.6.23, Linux 2.6.39, VMware ESX Server 3.0.2
Network Distance: 1 hop

TRACEROUTE
HOP RTT     ADDRESS
1   1.14 ms 10.0.2.15

OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 10.89 seconds

┌──(hasan㉿vbox)-[~]
└─$
```

```
hasan@hasan-VirtualBox:~$ sudo apt install ufw
[sudo] password for hasan:
ufw is already the newest version (0.36.2-6).
ufw set to manually installed.
The following packages were automatically installed and are no longer required:
  linux-headers-6.11.0-8          linux-modules-6.11.0-8-generic        linux-tools-6.11.0-8
  linux-headers-6.11.0-8-generic  linux-modules-extra-6.11.0-8-generic  linux-tools-6.11.0-8-generic
Use 'sudo apt autoremove' to remove them.

Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 0
hasan@hasan-VirtualBox:~$ sudo ufw enable
Firewall is active and enabled on system startup
hasan@hasan-VirtualBox:~$ sudo ufw allow ssh
Rule added
Rule added (v6)
hasan@hasan-VirtualBox:~$ sudo ufw allow from 10.0.2.15
Rule added
hasan@hasan-VirtualBox:~$ sudo ufw status
Status: active

To                         Action      From
--                         ------      ----
22/tcp                     ALLOW       Anywhere
Anywhere                   ALLOW       10.0.2.15
22/tcp (v6)                ALLOW       Anywhere (v6)
```