BAHIR DAR UNIVERSITY

BAHIR DAR INSTITUTE OF TECHNOLOGY (BiT)

FACULTY OF COMPUTING

DEPARTMENT :ITBED

NAME:Fikade Abebaw

YEAR:3rd(2018 E.C)

COURSE :OPERATING SYSTEM

Allocated Operating System: Debian

Worldwide PC Brand: ASUS ROG

1. INTRODUCTION

Background

An operatin system is system software that acts as an interface between computer hardware and users. It manages system resources such as CPU, memory, storage, and input/output devices. Among many operating systems, Linux-based systems are widely used due to their stability, security, and open-source nature.

Debian GNU/Linux is one of the oldest and most stable Linux distributions. It was developed by the Debian Project, a global community of volunteers. Debian strictly follows free software principles and provides a strong foundation for many other Linux distributions such as Ubuntu, Kali Linux, and Linux Mint.

Motivation

The motivation for selecting Debian is its reliability, long-term support, and wide usage in servers, cloud computing, and education. Installing Debian in a virtual environment helps students understand real-world operating system concepts without risking damage to physical hardware.

2. OBJECTIVES OF THE PROJECT

The main objectives of this project are:

To install Debian GNU/Linux in a virtual environment

To understand Linux system architecture and boot process

To learn disk partitioning and filesystem concepts

To practice troubleshooting during OS installation

To understand virtualization in modern operating systems

To gain confidence in Linux system usage and administration

3. HISTORICAL DEVELOPMENT OF DEBIAN

Debian was first released in 1993 by Ian Murdock. The name “Debian” comes from Debra (his wife) and Ian. Debian is governed by the Debian Social Contract, which ensures that the operating system remains free and open-source.

Debian is known for:

Stability over cutting-edge features

Large software repositories

Strong security team

Community-driven development

4. REQUIREMENTS FOR DEBIAN INSTALLATION

Hardware Requirements (Host Machine)

Component	Minimum Req
CPU	Intel/AMD 64-bit
RAM	4 GB

Storage	20 GB free disk
BIOS	Virtualization enabled
Network	Internet connection

Software Requirements

Software	Description
Debian ISO	Debian 13 (Bookworm)
Virtualization Tool	Oracle VM VirtualBox
Host	Windows / Linux

5. INSTALLATION STEPS OF DEBIAN OS (VIRTUAL ENVIRONMENT)

Step 1: Download Debian ISO

Download Debian 13(64-bit) ISO from the official Debian website.

Step 2: Install VirtualBox

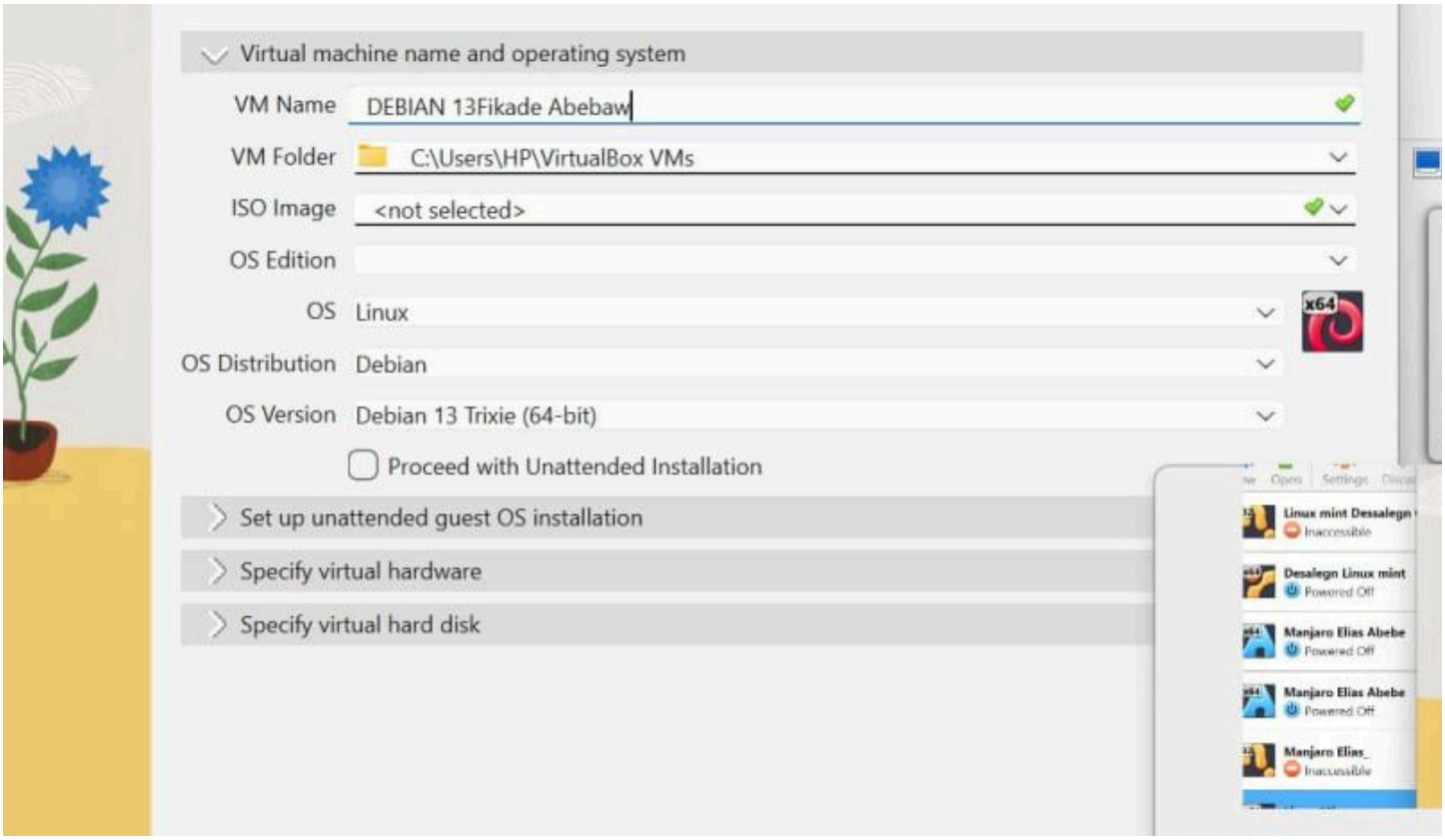
Install Oracle VM VirtualBox on the host machine.

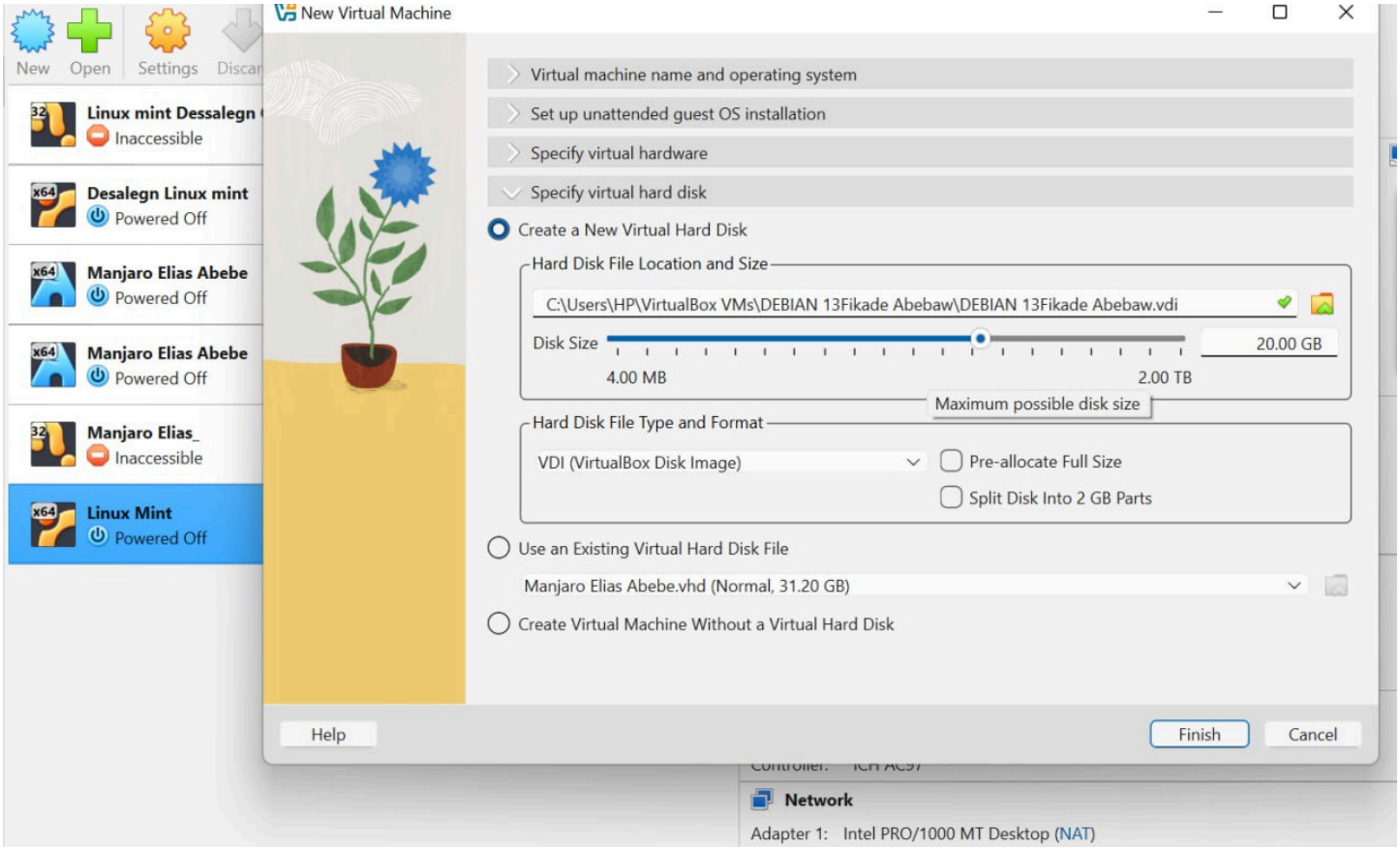
Step 3: Create Virtual Machine

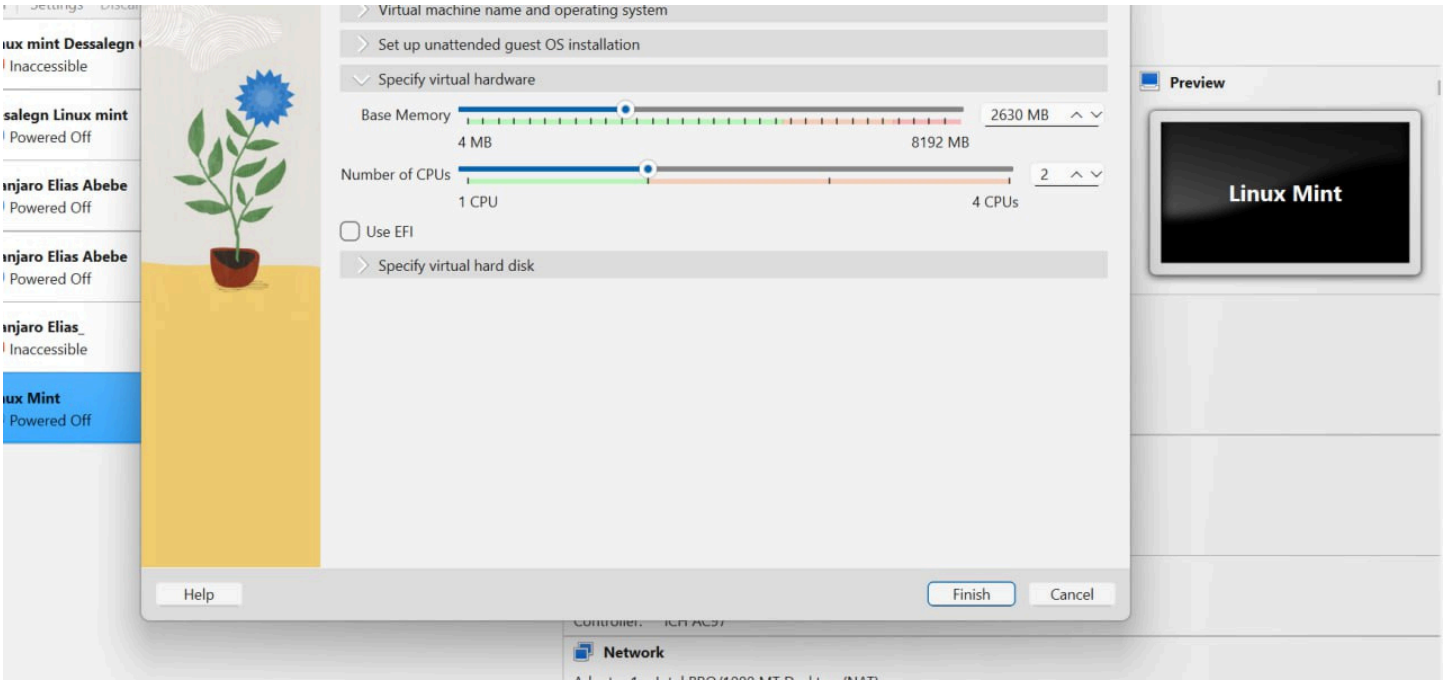
Name: Fikade-Abebaw-Debian

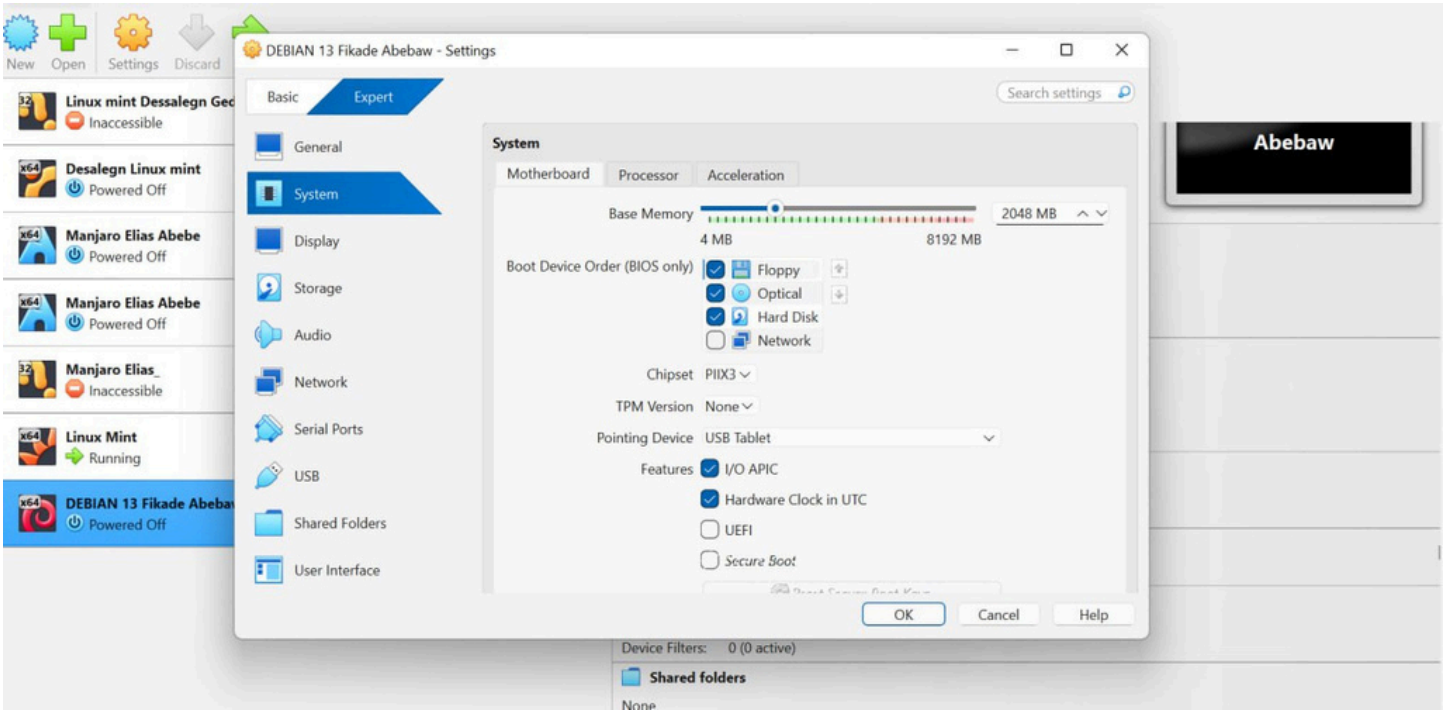
Type: Linux

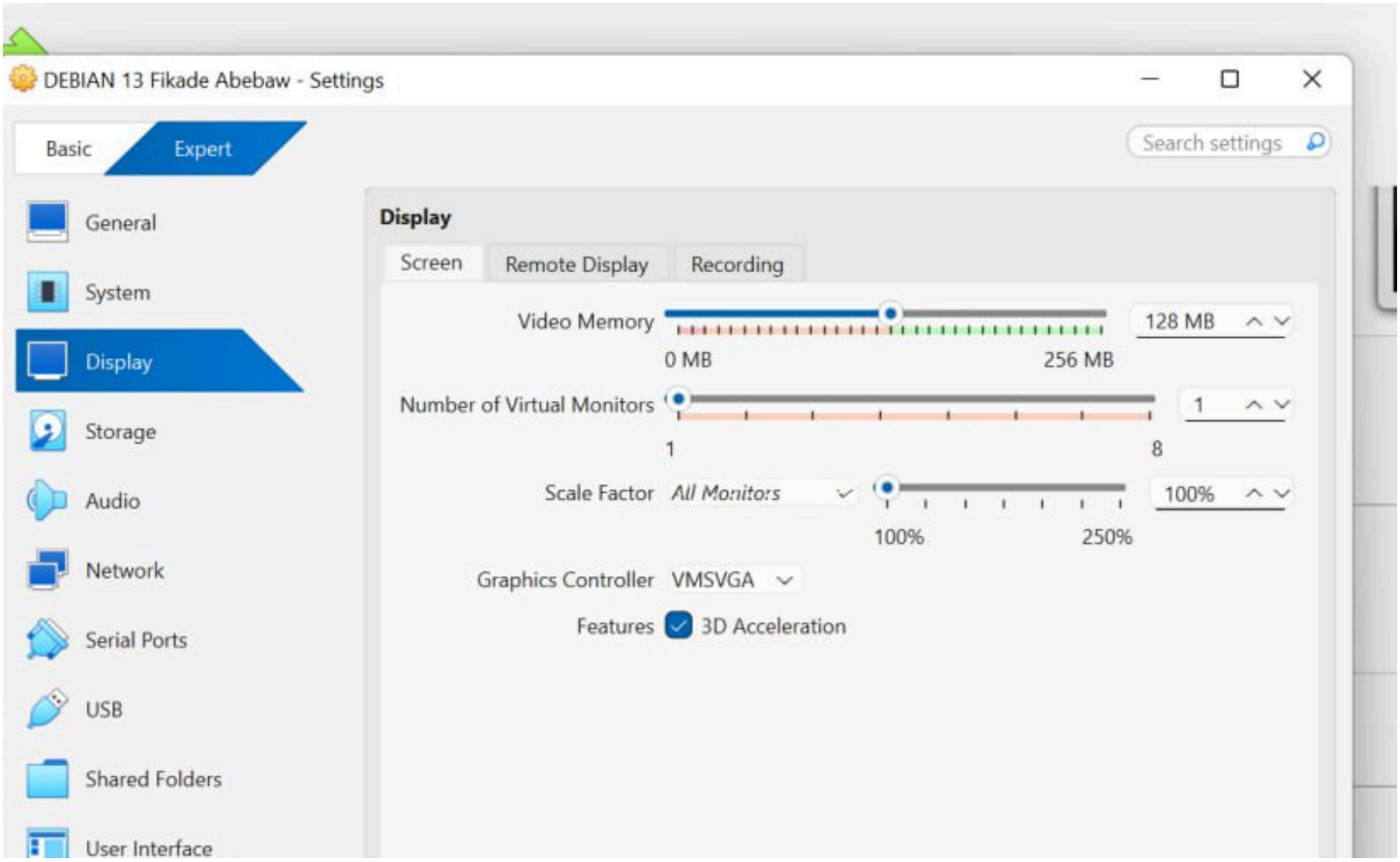
Version: Debian (64-bit)

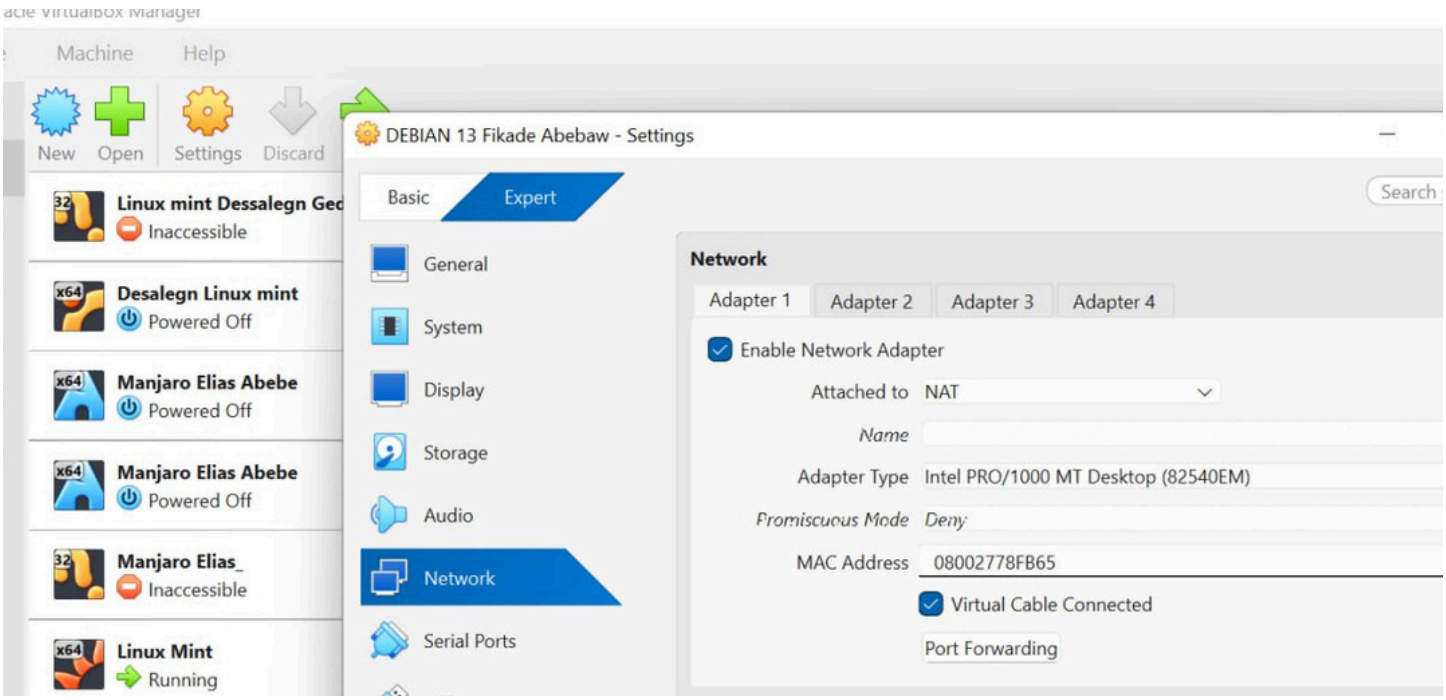

Virtual machine name and operating system
VM Name
DEBIAN 13Fikade Abebaw
VM Folder
C:\Users\HP\VirtualBox VMs
ISO Image
<not selected>
OS Edition
OS
Linux
OS Distribution
Debian
OS Version
Debian 13 Trixie (64-bit)
Proceed with Unattended Installation
Set up unattended guest OS installation
Specify virtual hardware
Specify virtual hard disk


New
Open
Settings
Linux mint Dessalegn
Inaccessible
Desalegn Linux mint
Powered Off
Manjaro Elias Abebe
Powered Off
Manjaro Elias Abebe
Powered Off
Manjaro Elias_
Inaccessible
Linux Mint
Powered Off
New Virtual Machine
Virtual machine name and operating system
Set up unattended guest OS installation
Specify virtual hardware
Specify virtual hard disk
Create a New Virtual Hard Disk
Hard Disk File Location and Size
C:\Users\HP\VirtualBox VMs\DEBIAN 13Fikade Abebaw\DEBIAN 13Fikade Abebaw.vdi
Disk Size
20.00 GB
4.00 MB
2.00 TB
Maximum possible disk size
Hard Disk File Type and Format
VDI (VirtualBox Disk Image)
Pre-allocate Full Size
Split Disk Into 2 GB Parts
Use an Existing Virtual Hard Disk File
Manjaro Elias Abebe.vhd (Normal, 31.20 GB)
Create Virtual Machine Without a Virtual Hard Disk
Help
Finish
Cancel
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)

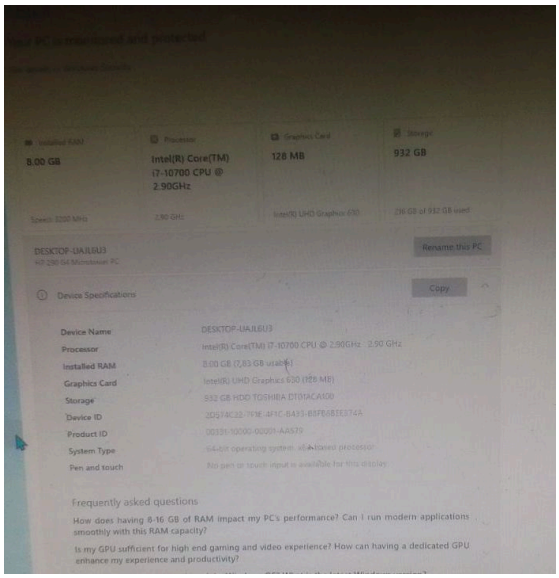

Virtual machine name and operating system
Set up unattended guest OS installation
Specify virtual hardware
Base Memory
2630 MB
4 MB
8192 MB
Number of CPUs
2
1 CPU
4 CPUs
Use EFI
Specify virtual hard disk
Preview
Linux Mint
Help
Finish
Cancel
Network
Inaccessible
Powered Off


New
Open
Settings
Discard
DEBIAN 13 Fikade Abebaw - Settings
Basic
Expert
Search settings
General
System
Display
Storage
Audio
Network
Serial Ports
USB
Shared Folders
User Interface
Motherboard
Processor
Acceleration
Base Memory
2048 MB
4 MB
8192 MB
Boot Device Order (BIOS only)
Floppy
Optical
Hard Disk
Network
Chipset
PIIX3
TPM Version
None
Pointing Device
USB Tablet
Features
I/O APIC
Hardware Clock in UTC
UEFI
Secure Boot
OK
Cancel
Help
Abebaw
Linux mint Dessalegn Ged
Desalegn Linux mint
Manjaro Elias Abebe
Manjaro Elias Abebe
Manjaro Elias_
Linux Mint
Running
DEBIAN 13 Fikade Abeba
Powered Off
Inaccessible
Device Filters: 0 (0 active)
Shared folders
None





Stepp 4: Allocate Resources



RAM: 2048 MB or higher

CPU: 2 cores

Disk: 20 GB (VDI, dynamically allocated)

Step 5: Attach ISO and Start Installation

Choose Graphical Install

Select language, region, keyboard

Step 6: User Account Creation

Create user account using full name (Fikade Abebaw) as required.

Step 7: Disk Partitioning

Guided – use entire disk

All files in one partition

Step 8: Software Selection

Debian Desktop Environment

GNOME Desktop

Standard system utilities

Step 9: Bootloader Installation

Install GRUB and restart the system.

6. ISSUES FACED DURING INSTALLATION

Problem Faced	Description9
No 64-bit option	Virtualon disabled
Network not	Adapter misconfigured
Black screen	Graphics driver issue

7. SOLUTIONS TO PROBLEMS

Problem	Solution
64-bit missing	Enable virtualization in BIOS
Network error	Use NAT adapter
Display issue	Set graphics to VMSVGA

6.FILESYSTEM SUPPORT IN DEBIAN

ext4: Default and most stable filesystem for Debian.

Btrfs: Modern filesystem with snapshot support.

ZFS: Advanced filesystem for large storage systems.

NTFS: Windows filesystem supported for compatibility.

FAT32: Simple filesystem for small removable drives.

exFAT: FAT32 alternative for large files.

HFS+: Older macOS filesystem with limited support.

APFS: Apple filesystem with very limited Linux support.

Iuse extt4 because it is fast, stable, and reliable.

9.ADVANTAGES AND DISADVANTAGES OF DEBIAN

Advantages

High stability

Strong security

Free and open source

Large package repository

Long-term support

Disadvantages

Older software versions

Requires Linux knowledge

Less beginner-friendly

10.CONCLUSION

Debian is a powerful, stable, and professional Linux operating system suitable for servers, desktops,

and education. Installing Debian in a virtual environment provided hands-on experience with Linux

installation, filesystem management, and virtualization concepts.

Virtualization in Modern Operating Systems

What is Virtualization?

Virtualization is a technology that allows multiple operating systems to run on a single physical computer by creating virtual machines.

Why Virtualization?

Efficient hardware usage

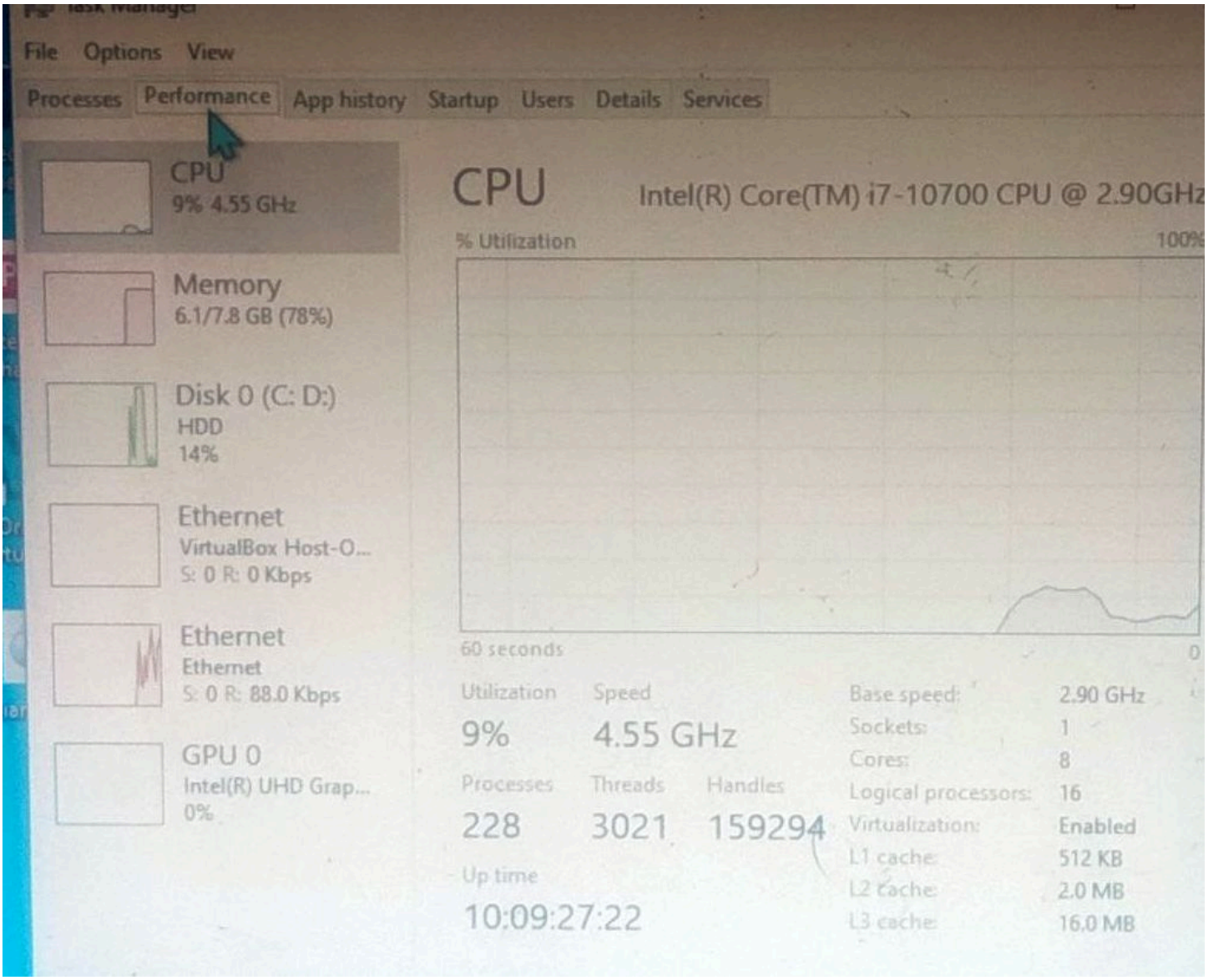
Safe OS testing

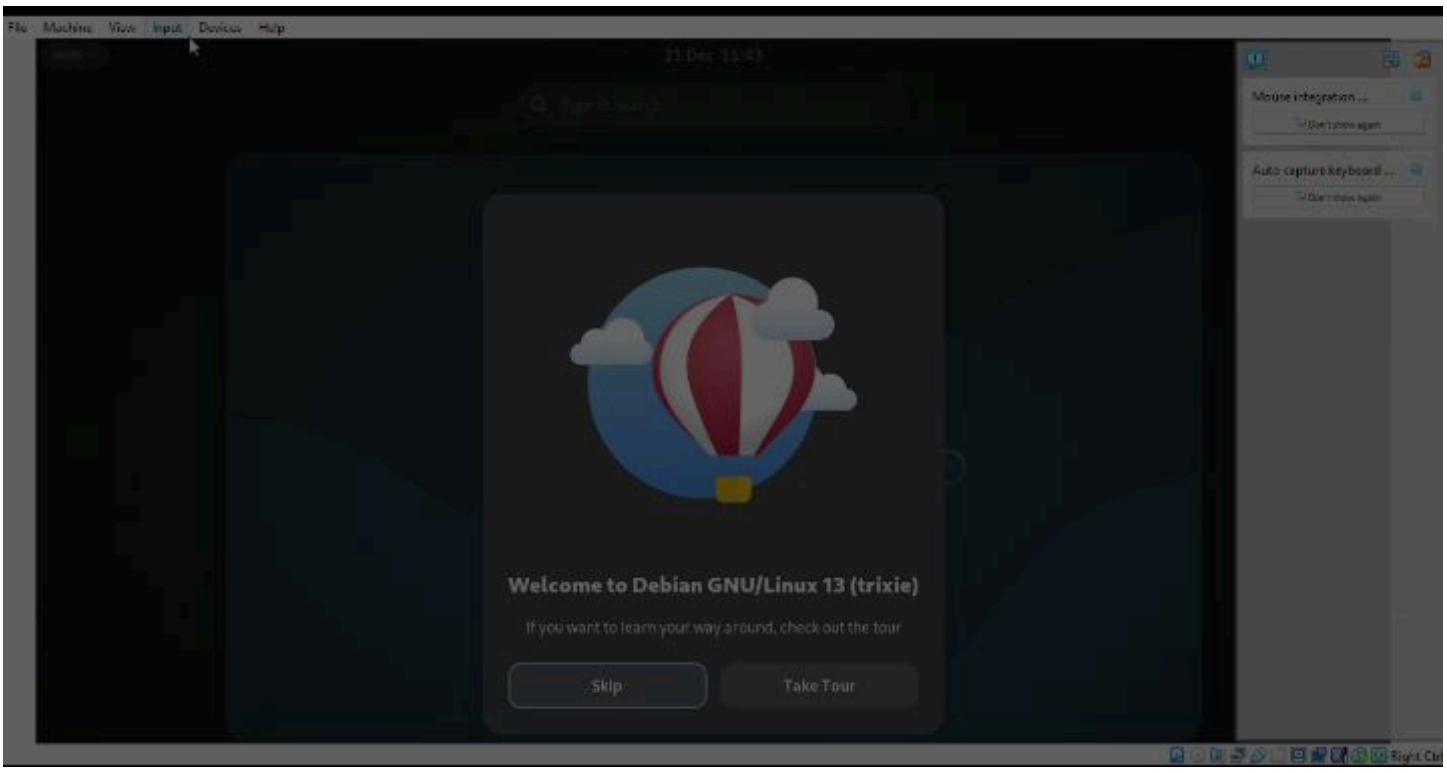
Cost reduction

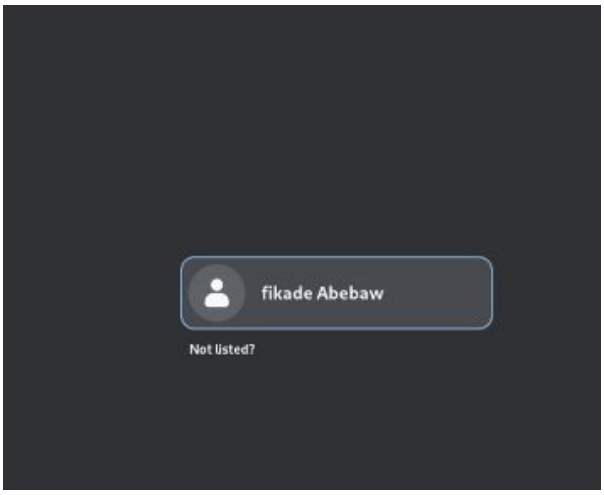
Easy backup and recovery

How Virtualization Works

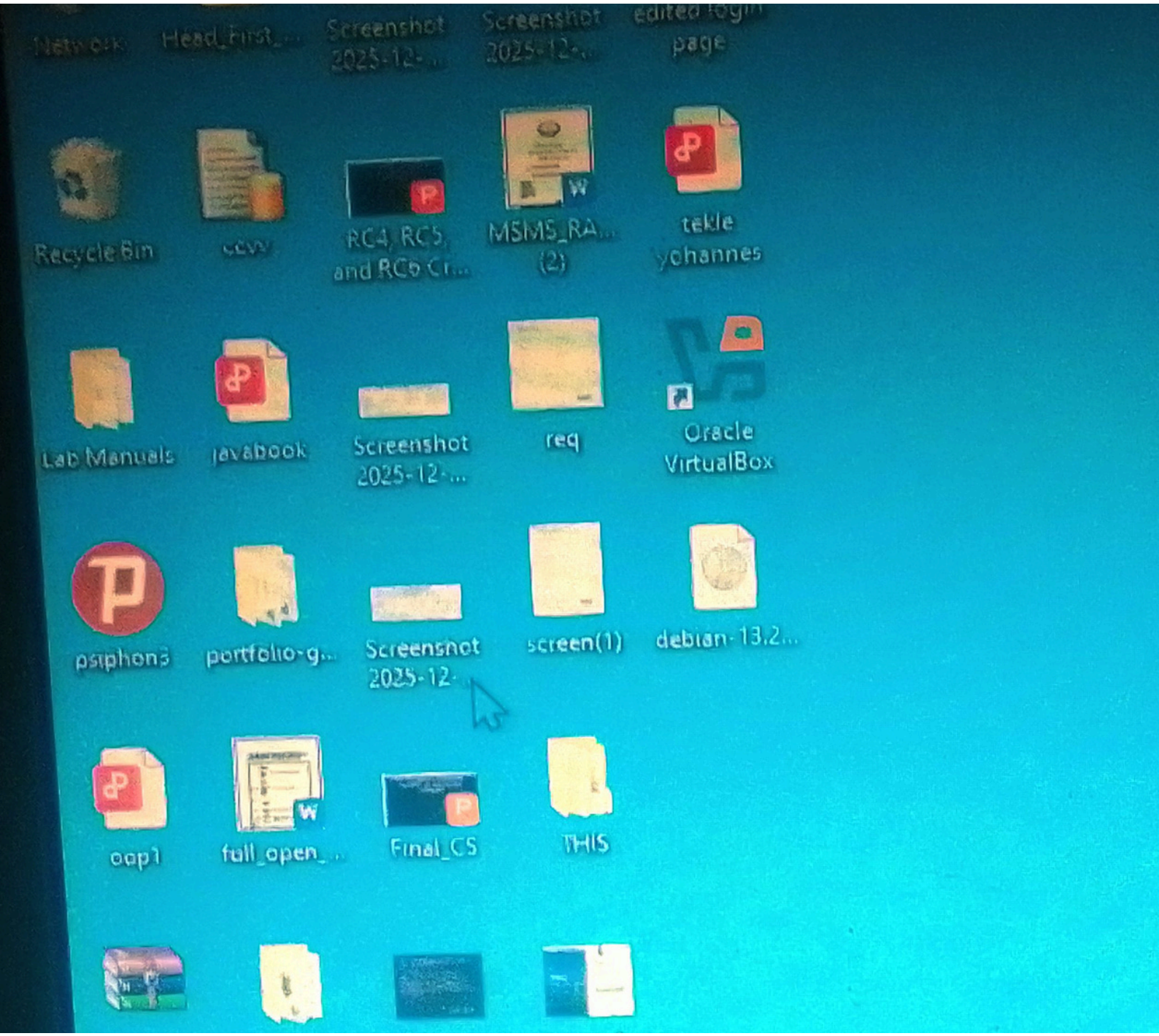
A hypervisor (VirtualBox) manages hardware resources and distributes them to virtual machines. Each VM behaves like a real computer.


File Options View
Processes Performance App history Startup Users Details Services
CPU
9% 4.55 GHz
Memory
6.1/7.8 GB (78%)
Disk 0 (C: D:)
HDD
14%
Ethernet
VirtualBox Host-O...
S: 0 R: 0 Kbps
Ethernet
Ethernet
S: 0 R: 88.0 Kbps
GPU 0
Intel(R) UHD Grap...
0%
CPU
Intel(R) Core(TM) i7-10700 CPU @ 2.90GHz
% Utilization
100%
60 seconds
0
Utilization
9%
Speed
4.55 GHz
Processes
228
Threads
3021
Handles
159294
Up time
10:09:27:22
Base speed: 2.90 GHz
Sockets: 1
Cores: 8
Logical processors: 16
Virtualization: Enabled
L1 cache: 512 KB
L2 cache: 2.0 MB
L3 cache: 16.0 MB


Welcome to Debian GNU/Linux 13 (trixie)
If you want to learn your way around, check out the tour
Skip
Take Tour



FINALY: I instaild debian 13 see below the disply screenshots



Submission date 27/04/18

Submitted to Dr Wendimu

THE END