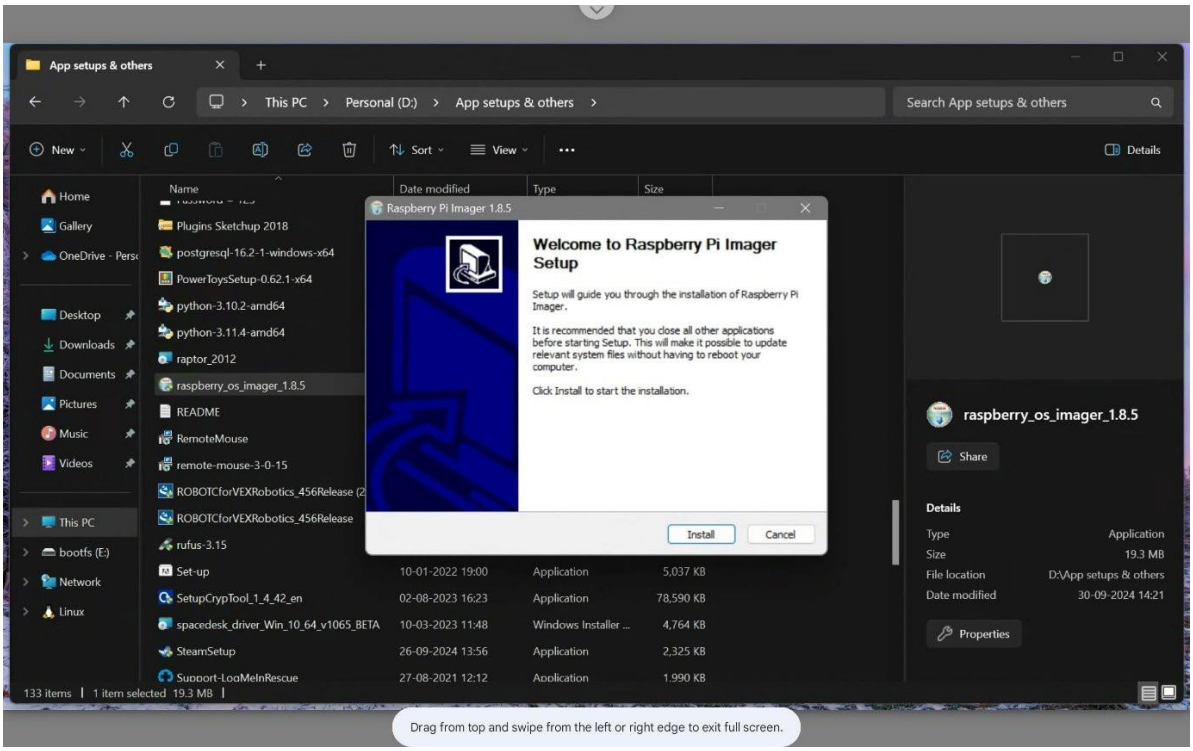
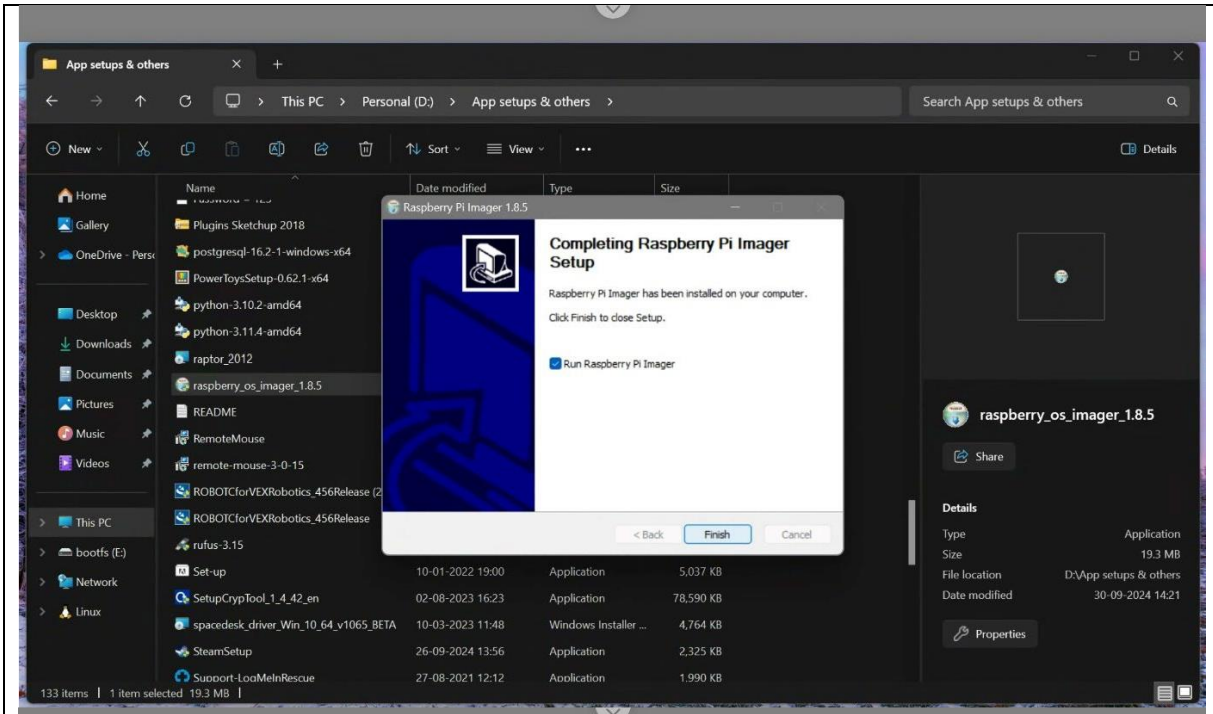
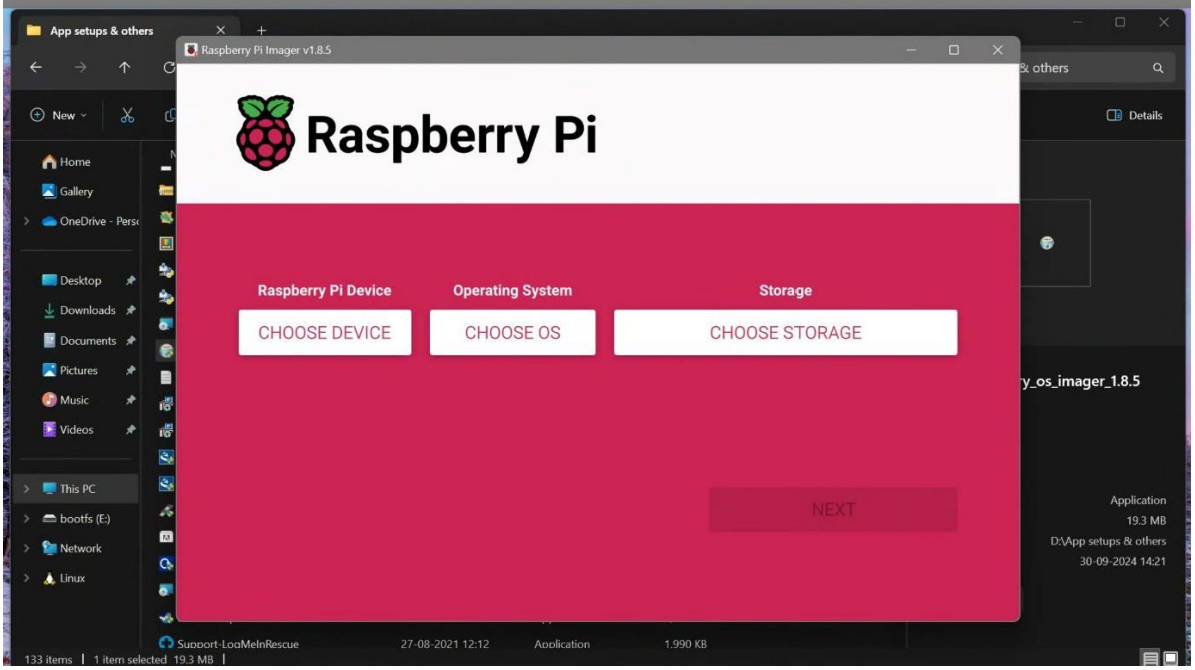
Part A
Class B Tech CSE 4th Year **Sub: Internet of Things Lab**
Aim: Raspberry Pi: To study the hardware features of the Raspberry Pi board and to install and set up the Raspbian OS (now known as Raspberry Pi OS) for initial configuration and operation.
Prerequisite: Basic Electronics
Outcome: Hands-on experience with Raspberry Pi hardware and will be capable of installing and configuring the Raspbian OS for various projects.

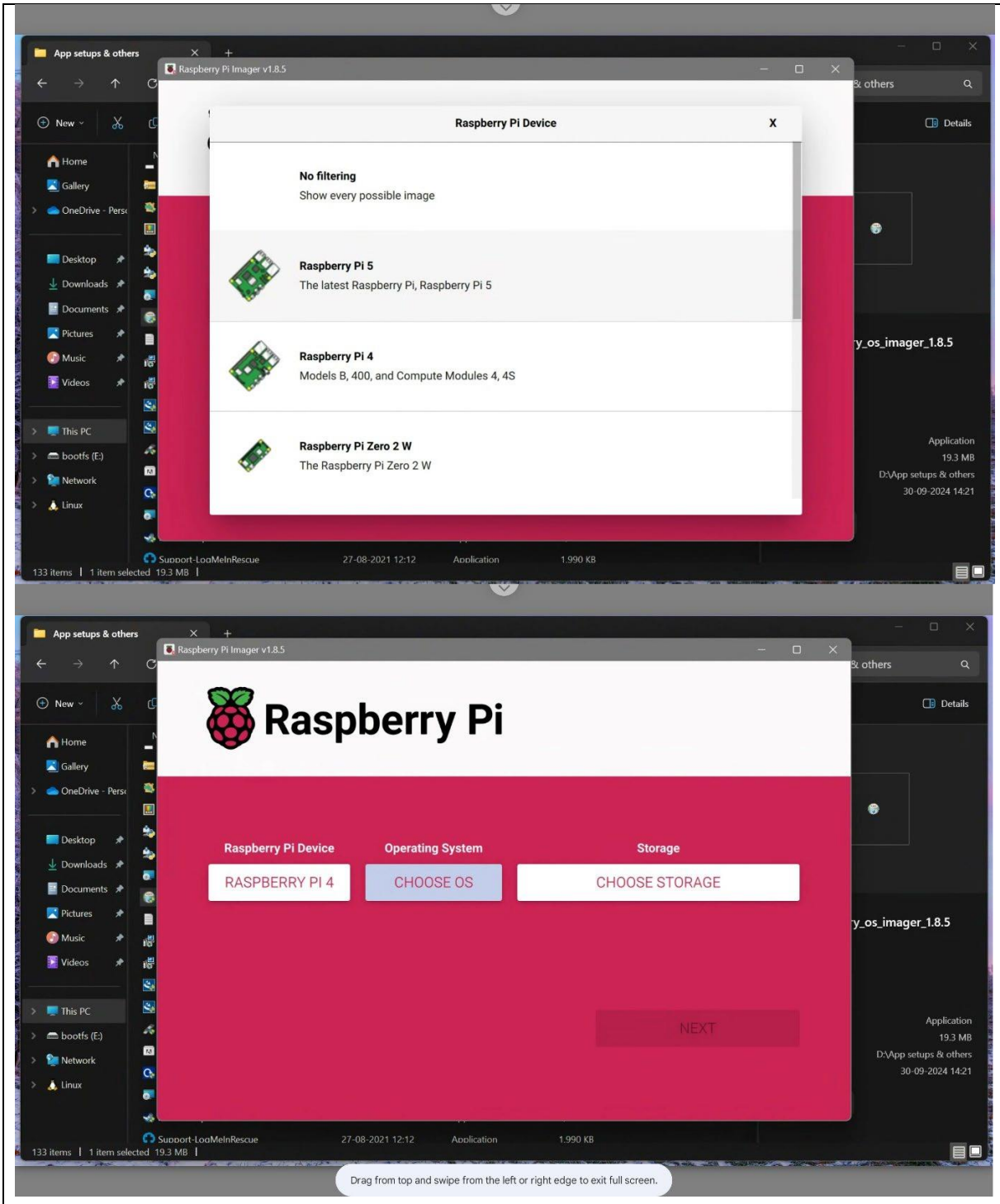
Part B

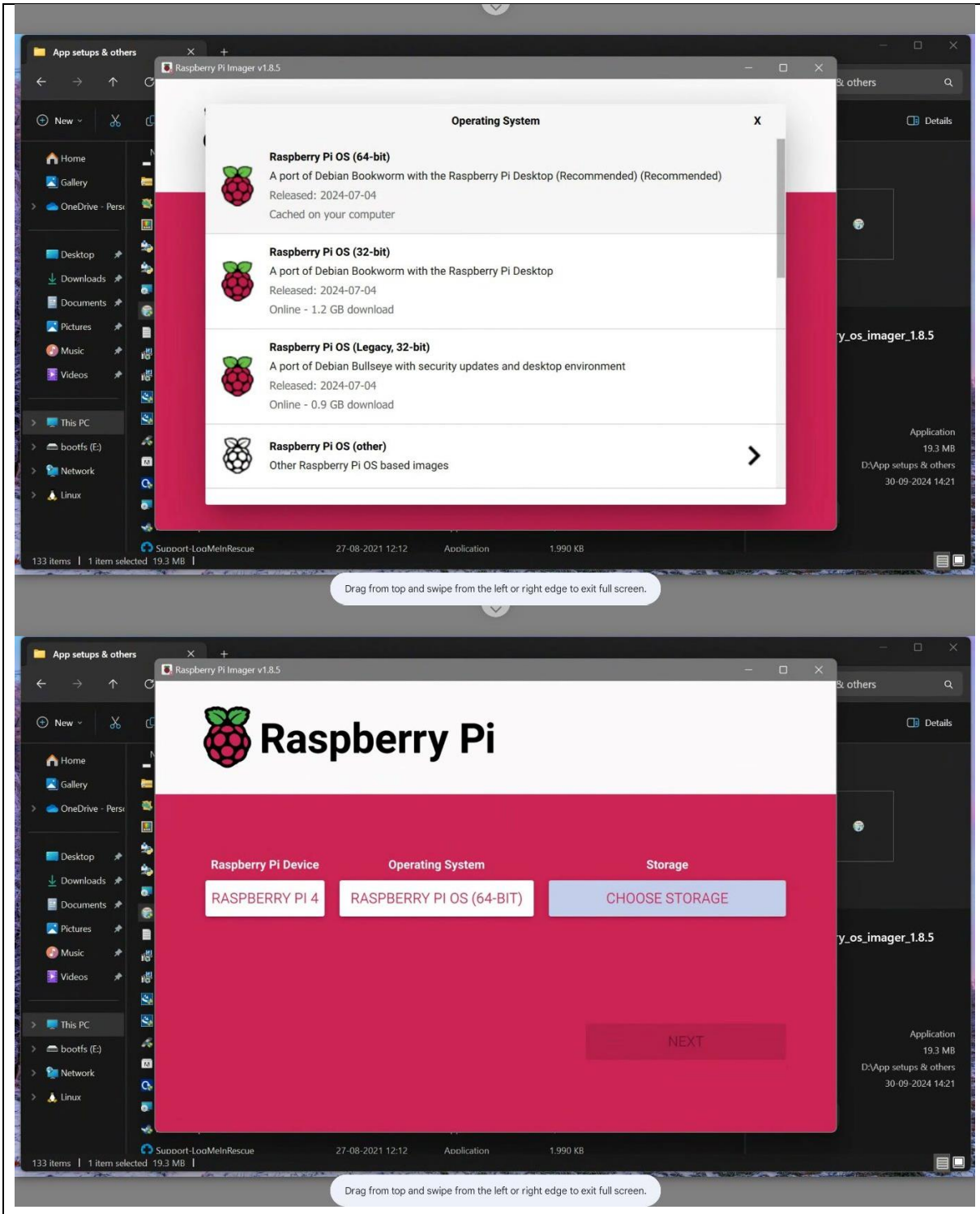
Steps:

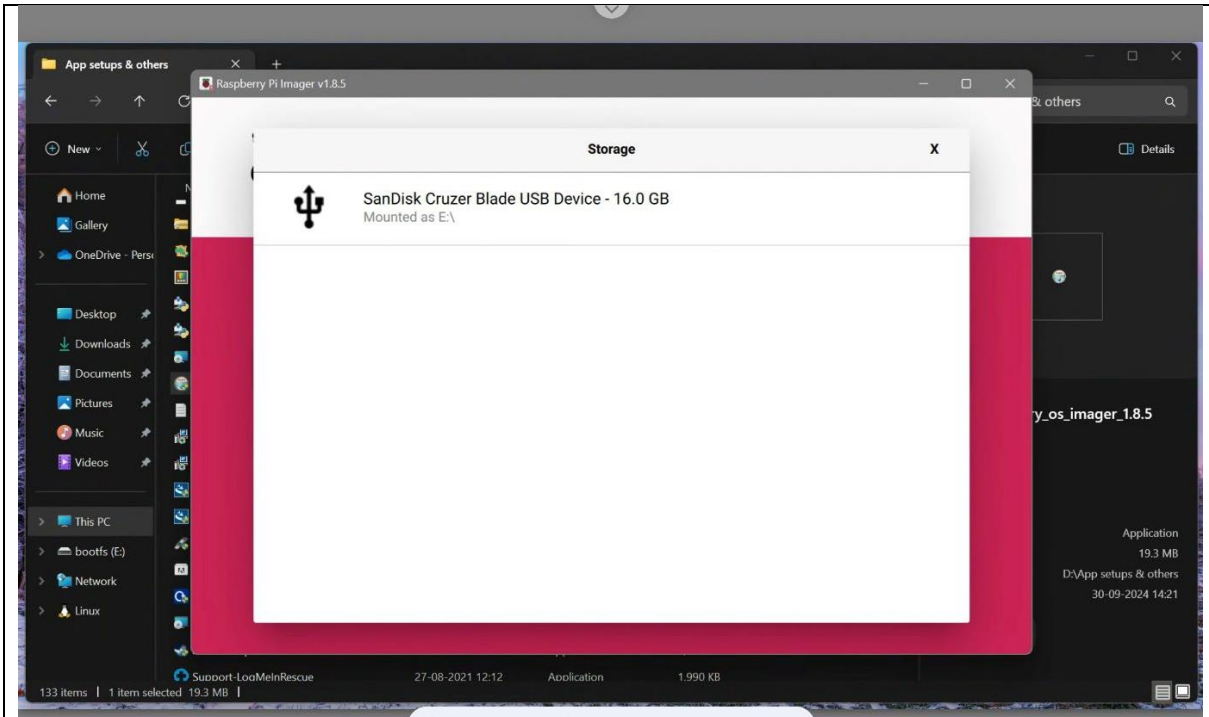


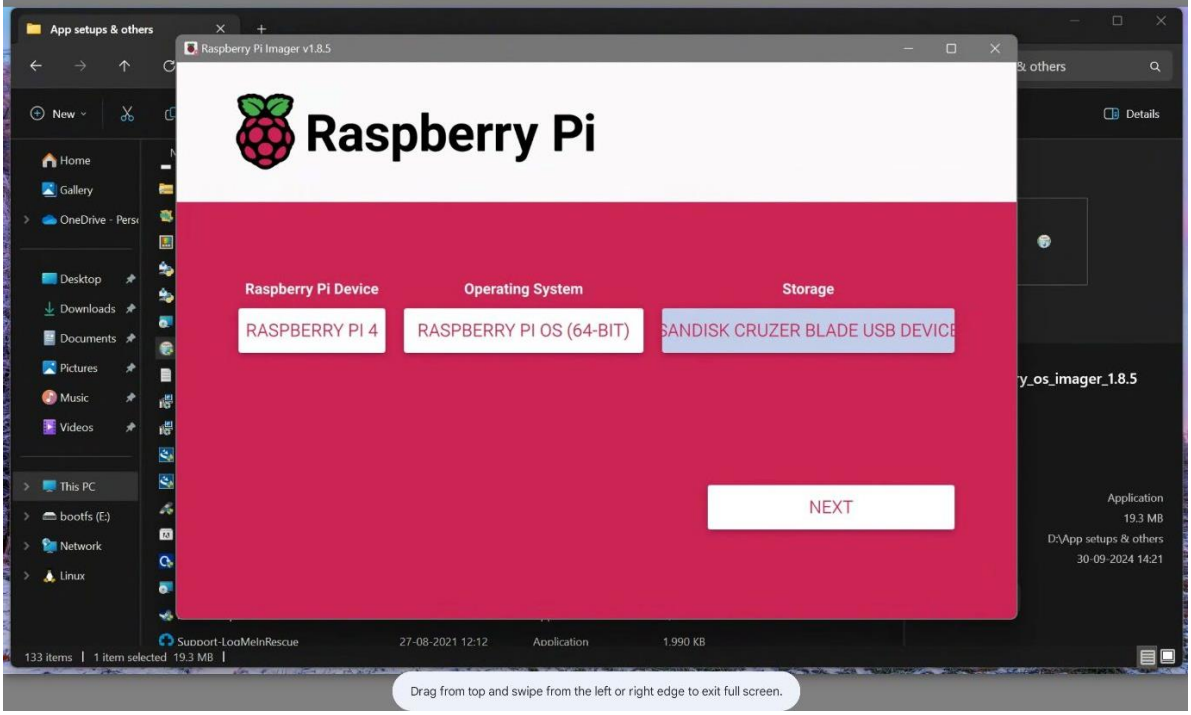

App setups & others
This PC › Personal (D:) › App setups & others ›
Search App setups & others
New
Sort
View
Details
Home
Gallery
OneDrive - Perso
Desktop
Downloads
Documents
Pictures
Music
Videos
This PC
bootfs (E:)
Network
Linux
Name
Date modified
Type
Size
Plugins Sketchup 2018
postgresql-16.2-1-windows-x64
PowerToysSetup-0.62.1-x64
python-3.10.2-amd64
python-3.11.4-amd64
raptor_2012
raspberry_os_imager_1.8.5
README
RemoteMouse
remote-mouse-3-0-15
ROBOTCforVEXRobotics_456Release
rufus-3.15
Set-up
SetupCrypTool_1_4_42_en
spacedesk_driver_Win_10_64_v1065_BETA
SteamSetup
Support-LogMeInRescue
10-01-2022 19:00 Application 5,037 KB
02-08-2023 16:23 Application 78,590 KB
10-03-2023 11:48 Windows Installer ... 4,764 KB
26-09-2024 13:56 Application 2,325 KB
27-08-2021 12:12 Application 1,990 KB
133 items | 1 item selected 19.3 MB
Raspberry Pi Imager 1.8.5
Completing Raspberry Pi Imager Setup
Raspberry Pi Imager has been installed on your computer.
Click Finish to close Setup.
Run Raspberry Pi Imager
< Back
Finish
Cancel
raspberry_os_imager_1.8.5
Share
Details
Type Application
Size 19.3 MB
File location D:\App setups & others
Date modified 30-09-2024 14:21
Properties

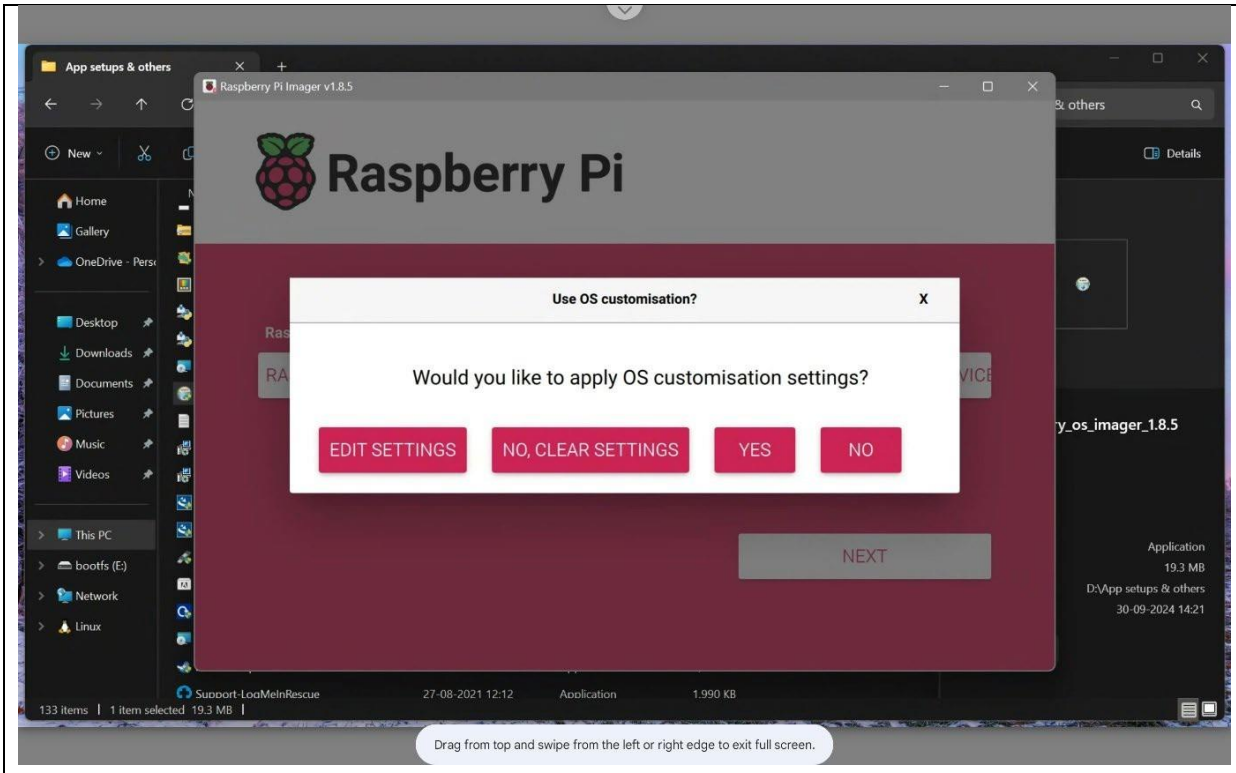

App setups & others
Raspberry Pi Imager v1.8.5
Raspberry Pi
Raspberry Pi Device
Operating System
Storage
CHOOSE DEVICE
CHOOSE OS
CHOOSE STORAGE
NEXT
Application
19.3 MB
D:\App setups & others
30-09-2024 14:21

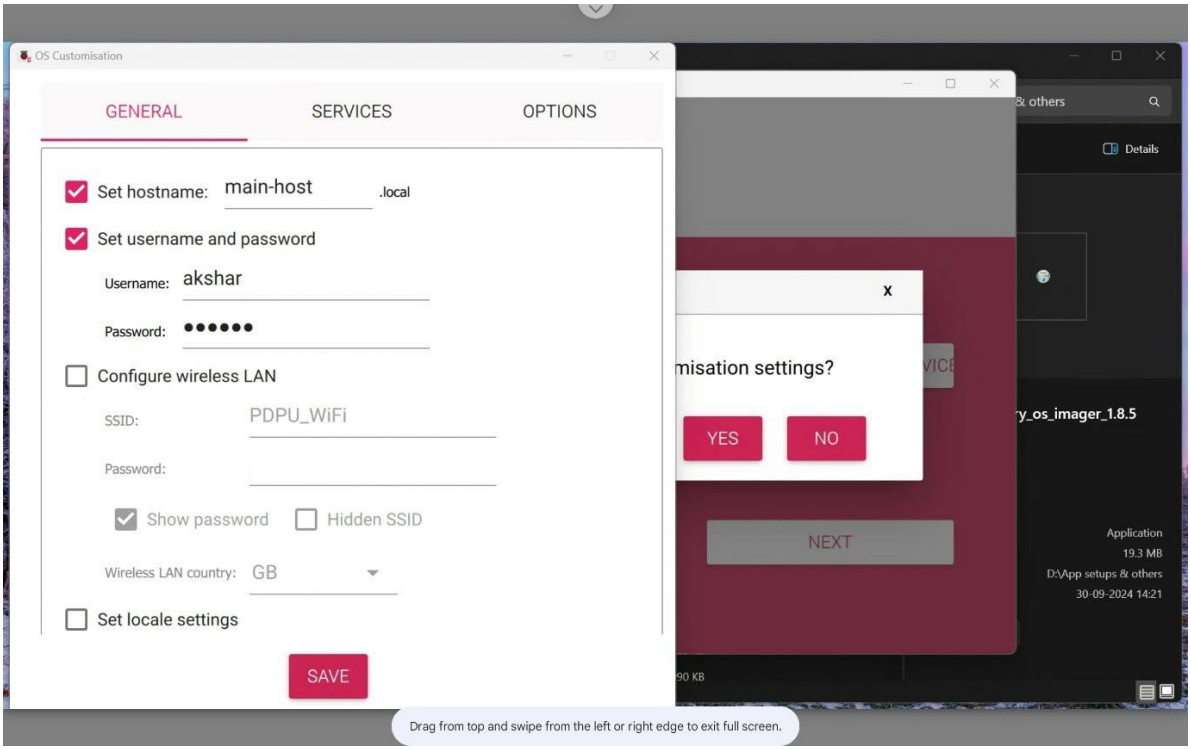

App setups & others
Raspberry Pi Imager v1.8.5
Raspberry Pi Device
X
No filtering
Show every possible image
Raspberry Pi 5
The latest Raspberry Pi, Raspberry Pi 5
Raspberry Pi 4
Models B, 400, and Compute Modules 4, 4S
Raspberry Pi Zero 2 W
The Raspberry Pi Zero 2 W
Raspberry Pi
Raspberry Pi Device
Operating System
Storage
RASPBERRY PI 4
CHOOSE OS
CHOOSE STORAGE
NEXT
Drag from top and swipe from the left or right edge to exit full screen.

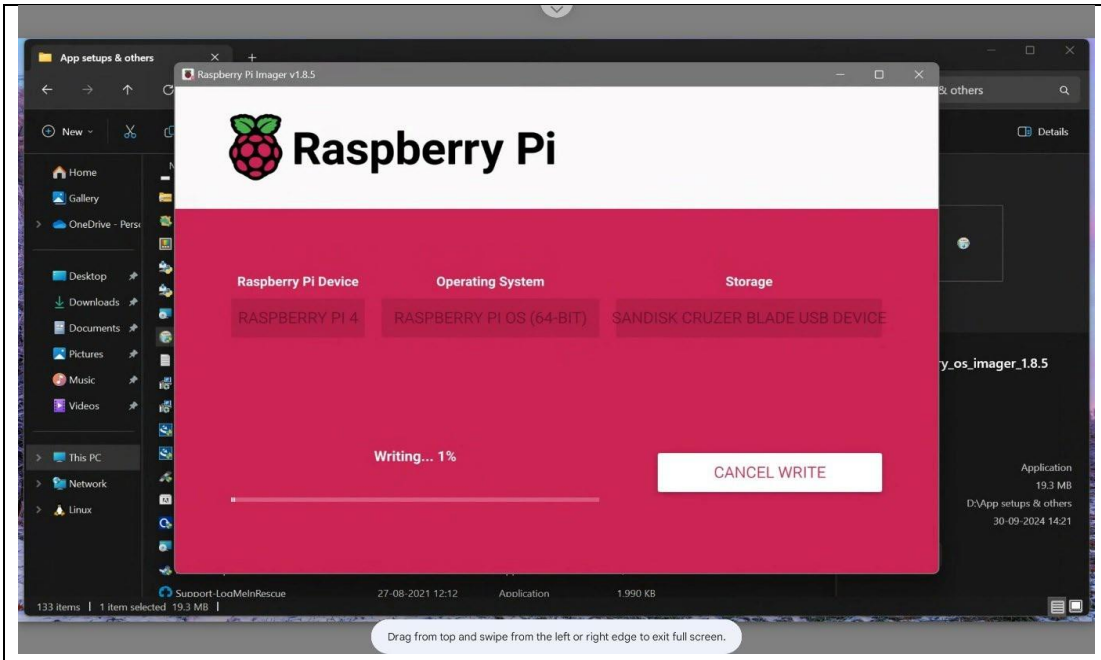

App setups & others
Raspberry Pi Imager v1.8.5
Operating System
Raspberry Pi OS (64-bit)
A port of Debian Bookworm with the Raspberry Pi Desktop (Recommended) (Recommended)
Released: 2024-07-04
Cached on your computer
Raspberry Pi OS (32-bit)
A port of Debian Bookworm with the Raspberry Pi Desktop
Released: 2024-07-04
Online - 1.2 GB download
Raspberry Pi OS (Legacy, 32-bit)
A port of Debian Bullseye with security updates and desktop environment
Released: 2024-07-04
Online - 0.9 GB download
Raspberry Pi OS (other)
Other Raspberry Pi OS based images
Drag from top and swipe from the left or right edge to exit full screen.
Raspberry Pi
Raspberry Pi Device
Operating System
Storage
RASPBERRY PI 4
RASPBERRY PI OS (64-BIT)
CHOOSE STORAGE
NEXT
Drag from top and swipe from the left or right edge to exit full screen.

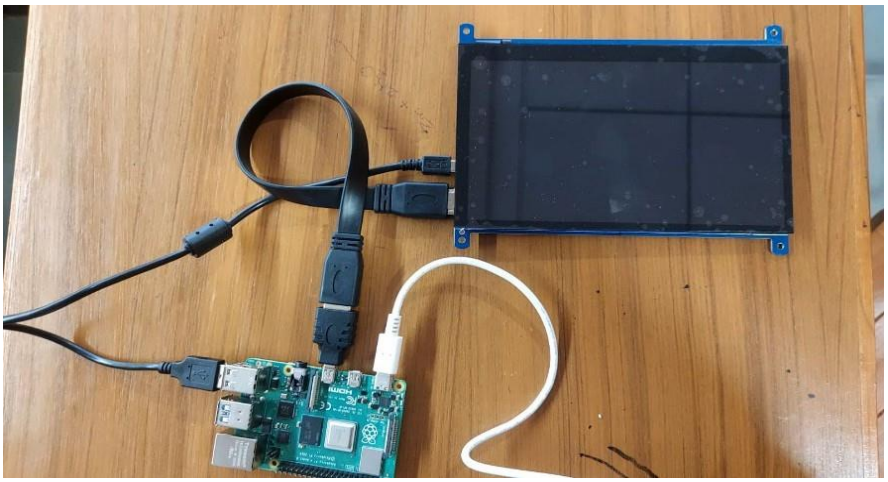

App setups & others
Raspberry Pi Imager v1.8.5
Storage
X
SanDisk Cruzer Blade USB Device - 16.0 GB
Mounted as E:\
Drag from top and swipe from the left or right edge to exit full screen.

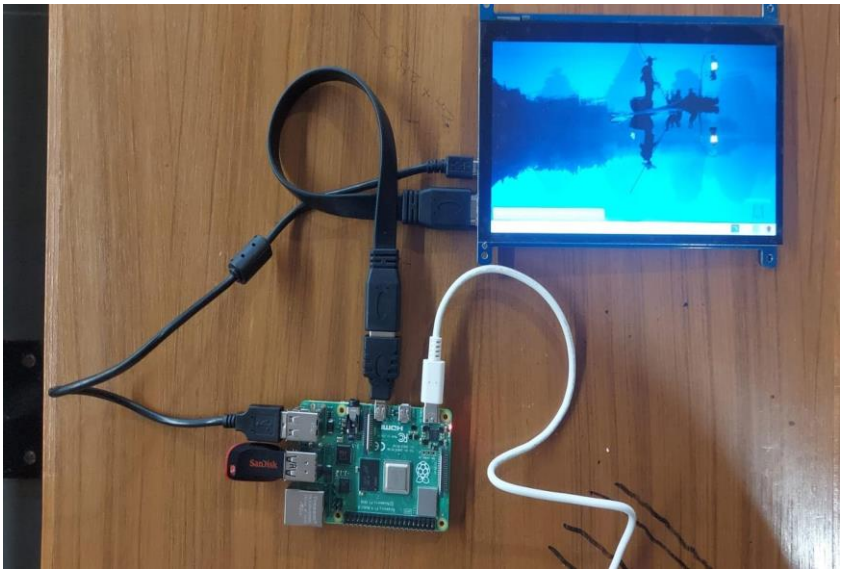

App setups & others
Raspberry Pi Imager v1.8.5
Raspberry Pi
Raspberry Pi Device
Operating System
Storage
RASPBERRY PI 4
RASPBERRY PI OS (64-BIT)
SANDISK CRUZER BLADE USB DEVICE
NEXT
Drag from top and swipe from the left or right edge to exit full screen.

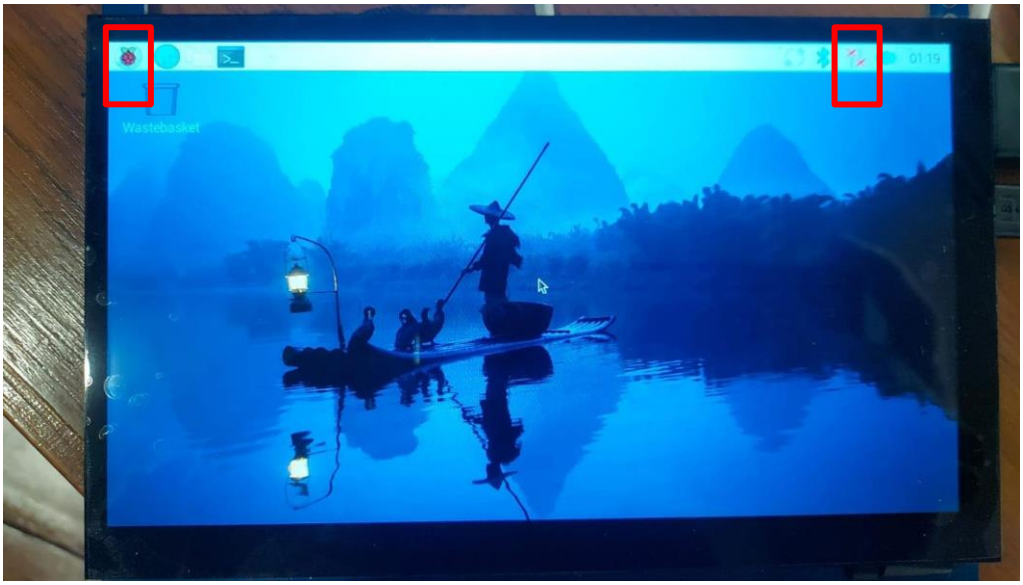

App setups & others
Raspberry Pi Imager v1.8.5
Raspberry Pi
Use OS customisation?
Would you like to apply OS customisation settings?
EDIT SETTINGS
NO, CLEAR SETTINGS
YES
NO
NEXT
Drag from top and swipe from the left or right edge to exit full screen.

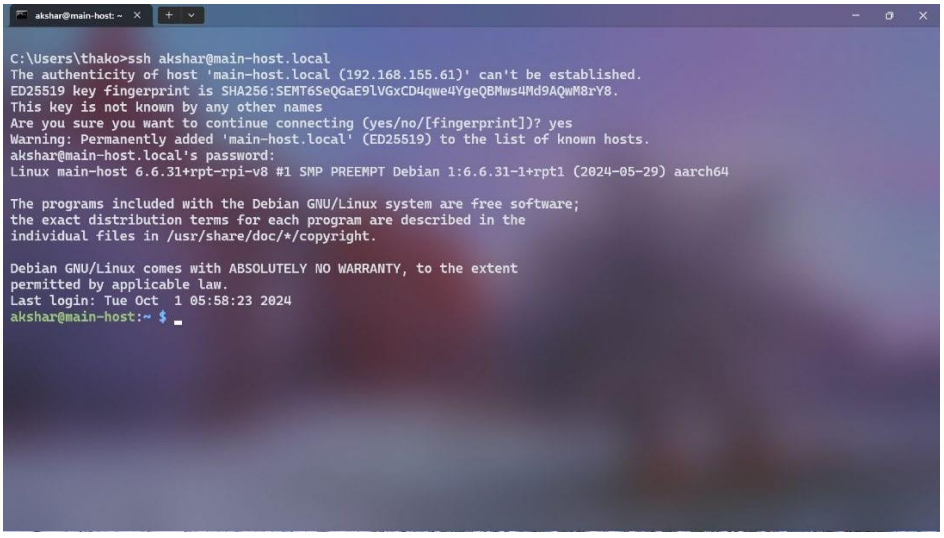

OS Customisation
GENERAL
SERVICES
OPTIONS
Set hostname: main-host .local
Set username and password
Username: akshar
Password: ••••••
Configure wireless LAN
SSID: PDPU_WiFi
Password:
Show password
Hidden SSID
Wireless LAN country: GB
Set locale settings
SAVE
YES
NO
NEXT
Drag from top and swipe from the left or right edge to exit full screen.

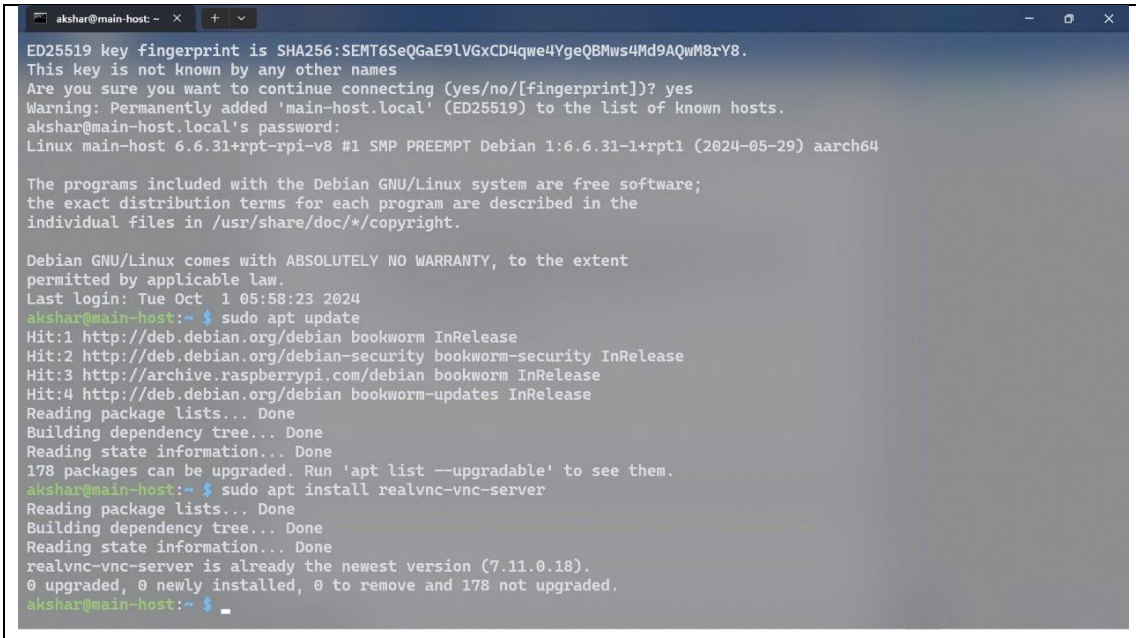

App setups & others
Raspberry Pi Imager v1.8.5
Raspberry Pi
Raspberry Pi Device
Operating System
Storage
RASPBERRY PI 4
RASPBERRY PI OS (64-BIT)
SANDISK CRUZER BLADE USB DEVICE
Writing... 1%
CANCEL WRITE
Drag from top and swipe from the left or right edge to exit full screen.

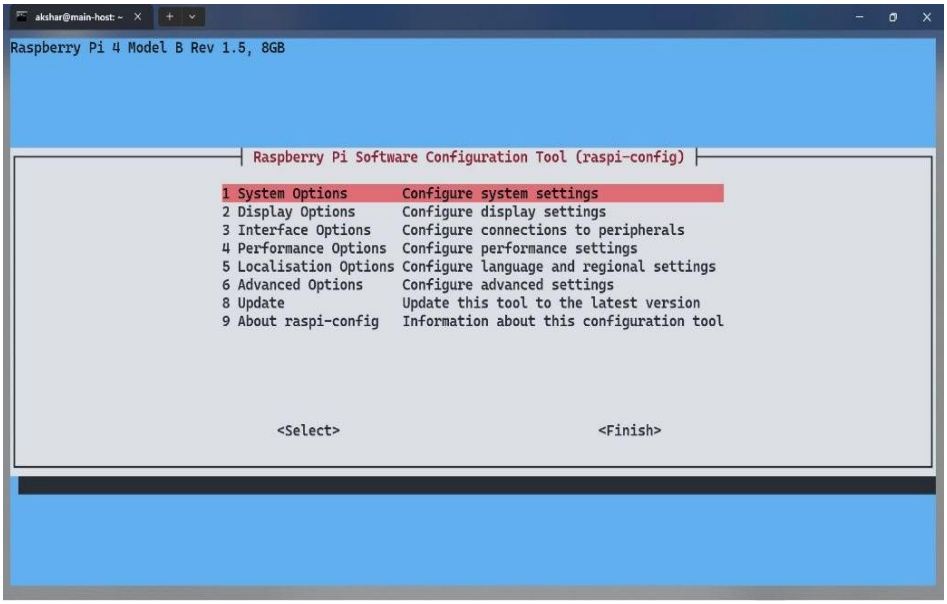




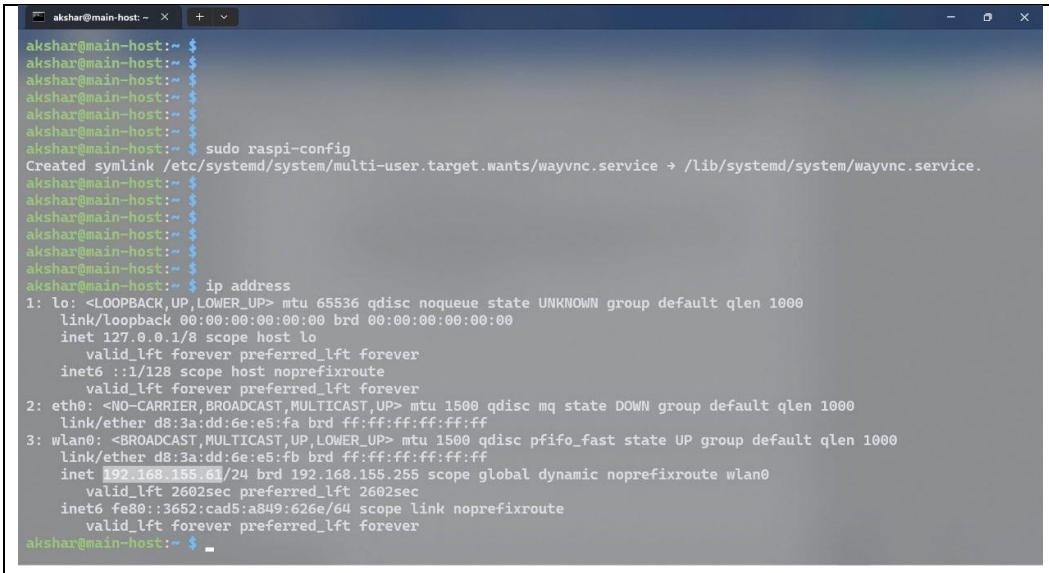

Wastebasket

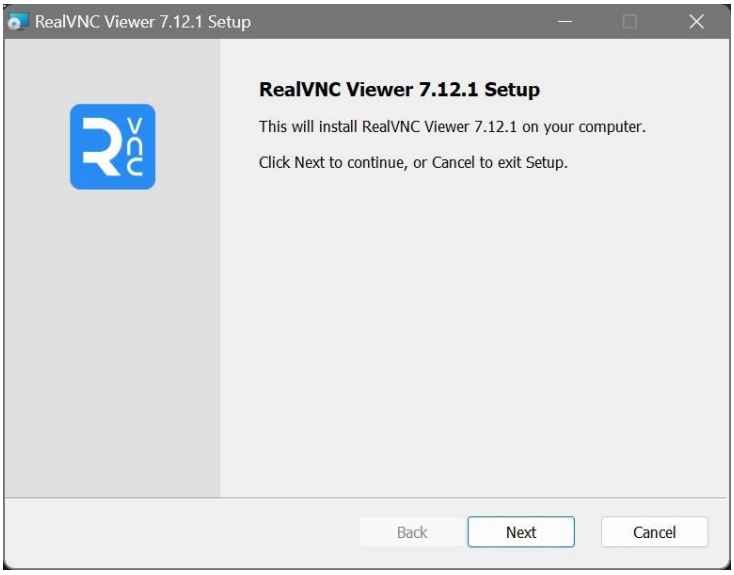

akshar@main-host: ~
C:\Users\thako>ssh akshar@main-host.local
The authenticity of host 'main-host.local (192.168.155.61)' can't be established.
ED25519 key fingerprint is SHA256:SEMT6SeQGaE9lVGxCD4qwe4YgeQBMws4Md9AQwM8rY8.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'main-host.local' (ED25519) to the list of known hosts.
akshar@main-host.local's password:
Linux main-host 6.6.31+rpt-rpi-v8 #1 SMP PREEMPT Debian 1:6.6.31-1+rpt1 (2024-05-29) aarch64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Oct 1 05:58:23 2024
akshar@main-host:~ $

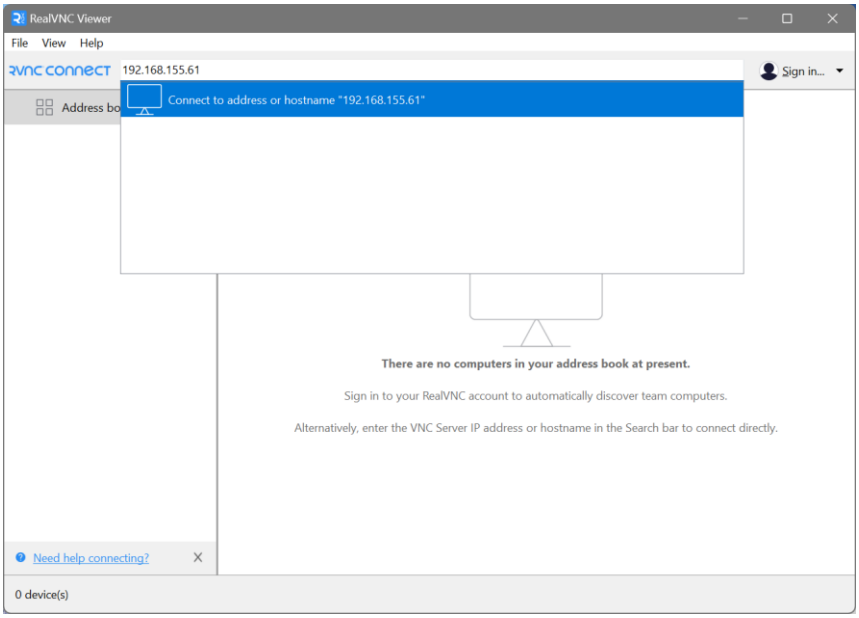

akshar@main-host: ~
ED25519 key fingerprint is SHA256:SEMT6SeQGaE9lVGxCD4qwe4YgeQBMws4Md9AQwM8rY8.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'main-host.local' (ED25519) to the list of known hosts.
akshar@main-host.local's password:
Linux main-host 6.6.31+rpt-rpi-v8 #1 SMP PREEMPT Debian 1:6.6.31-1+rpt1 (2024-05-29) aarch64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Oct 1 05:58:23 2024
akshar@main-host:~ $ sudo apt update
Hit:1 http://deb.debian.org/debian bookworm InRelease
Hit:2 http://deb.debian.org/debian-security bookworm-security InRelease
Hit:3 http://archive.raspberrypi.com/debian bookworm InRelease
Hit:4 http://deb.debian.org/debian bookworm-updates InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
178 packages can be upgraded. Run 'apt list --upgradable' to see them.
akshar@main-host:~ $ sudo apt install realvnc-vnc-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
realvnc-vnc-server is already the newest version (7.11.0.18).
0 upgraded, 0 newly installed, 0 to remove and 178 not upgraded.
akshar@main-host:~ $


akshar@main-host: ~
Raspberry Pi 4 Model B Rev 1.5, 8GB
Raspberry Pi Software Configuration Tool (raspi-config)
1 System Options Configure system settings
2 Display Options Configure display settings
3 Interface Options Configure connections to peripherals
4 Performance Options Configure performance settings
5 Localisation Options Configure language and regional settings
6 Advanced Options Configure advanced settings
8 Update Update this tool to the latest version
9 About raspi-config Information about this configuration tool
<Select>
<Finish>

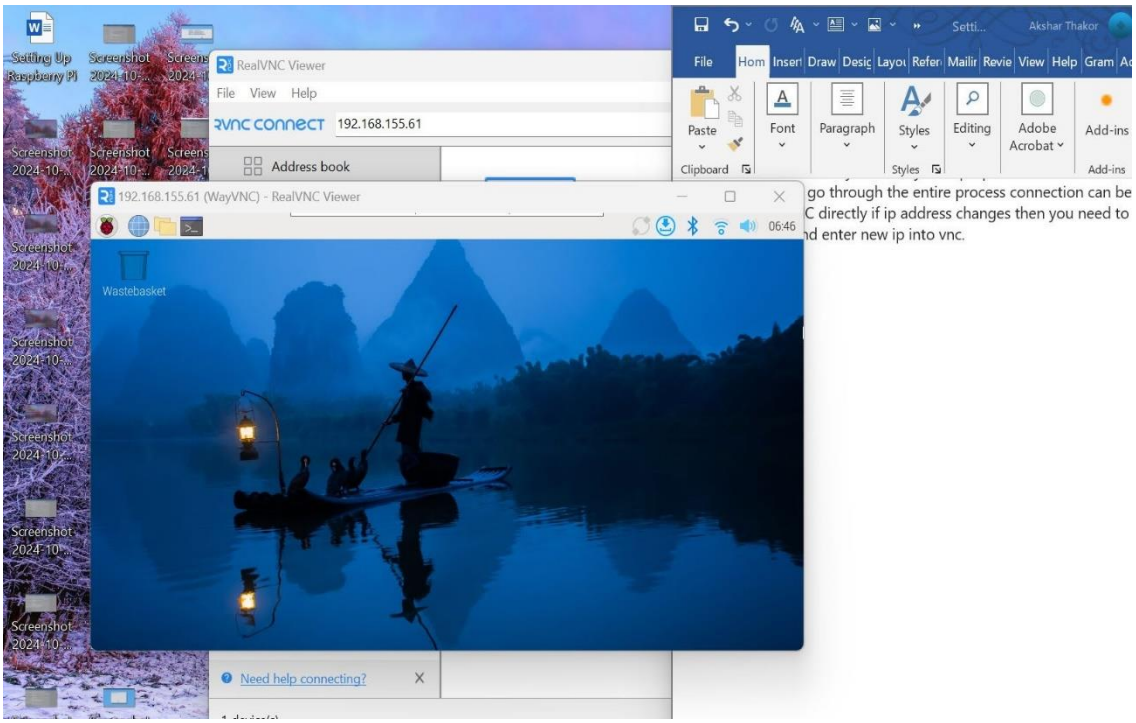

akshar@main-host: ~
The VNC Server is enabled
<Ok>


akshar@main-host: ~
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $ sudo raspi-config
Created symlink /etc/systemd/system/multi-user.target.wants/wayvnc.service → /lib/systemd/system/wayvnc.service.
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $
akshar@main-host:~ $ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft forever
inet6 ::1/128 scope host noprefixroute
valid_lft forever preferred_lft forever
2: eth0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc mq state DOWN group default qlen 1000
link/ether d8:3a:dd:6e:e5:fa brd ff:ff:ff:ff:ff:ff
3: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether d8:3a:dd:6e:e5:fb brd ff:ff:ff:ff:ff:ff
inet 192.168.155.61/24 brd 192.168.155.255 scope global dynamic noprefixroute wlan0
valid_lft 2602sec preferred_lft 2602sec
inet6 fe80::3652:cad5:a849:626e/64 scope link noprefixroute
valid_lft forever preferred_lft forever
akshar@main-host:~ $


RealVNC Viewer 7.12.1 Setup
RealVNC Viewer 7.12.1 Setup
This will install RealVNC Viewer 7.12.1 on your computer.
Click Next to continue, or Cancel to exit Setup.
Back
Next
Cancel


RealVNC Viewer
File View Help
VNC CONNECT
192.168.155.61
Sign in...
Address bo
Connect to address or hostname "192.168.155.61"
There are no computers in your address book at present.
Sign in to your RealVNC account to automatically discover team computers.
Alternatively, enter the VNC Server IP address or hostname in the Search bar to connect directly.
Need help connecting?
0 device(s)

Output:



Observation & Learning:

The Raspberry Pi board includes various I/O ports, including USB, HDMI, and GPIO pins. Raspbian OS installation was straightforward, involving downloading, writing to a microSD card, and configuring initial settings.

Conclusion:

The practical session provided essential hands-on experience with Raspberry Pi hardware and OS setup. After completing the installation, users are equipped to configure Raspbian OS and utilize the board for diverse projects.