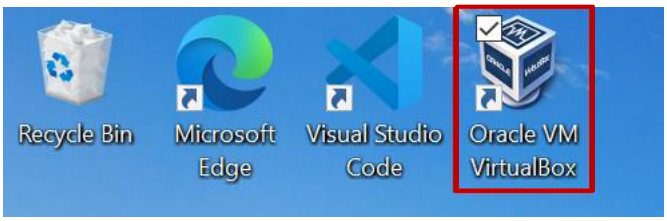
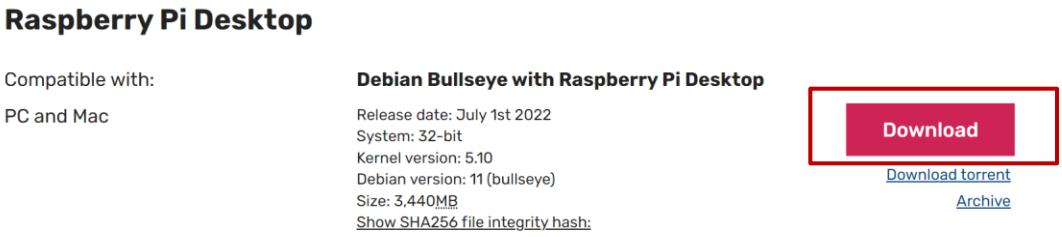
WEEK10 HW1 - Raspberry Pi emulator + VirtualBox + Sense HAT Emulator

Step1. Install VirtualBox on Windows10 by this link.

After installation is done, a shortcut will show up on your desktop.



Step2. Download Raspberry Pi Desktop by this link.

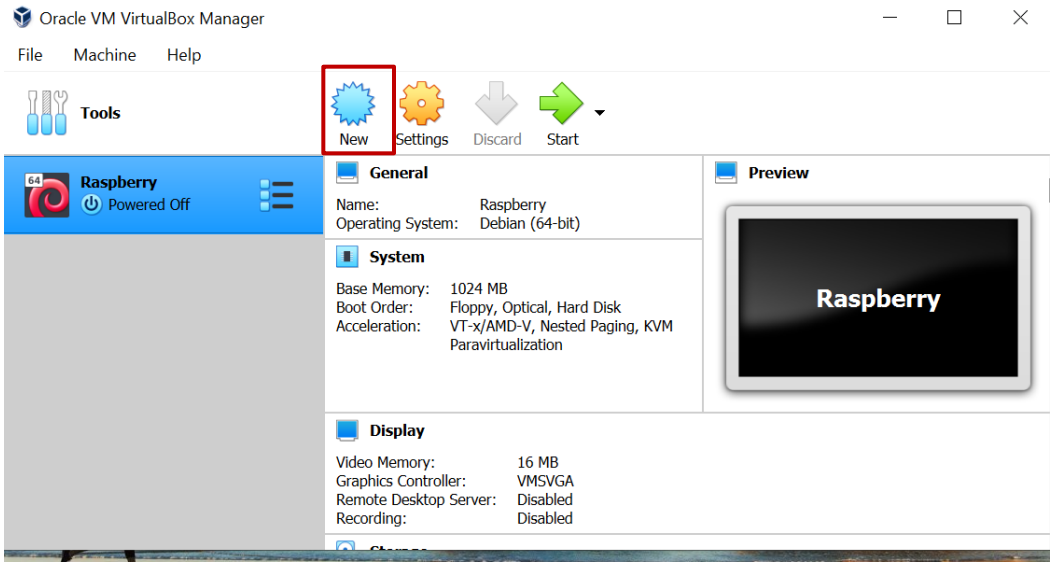


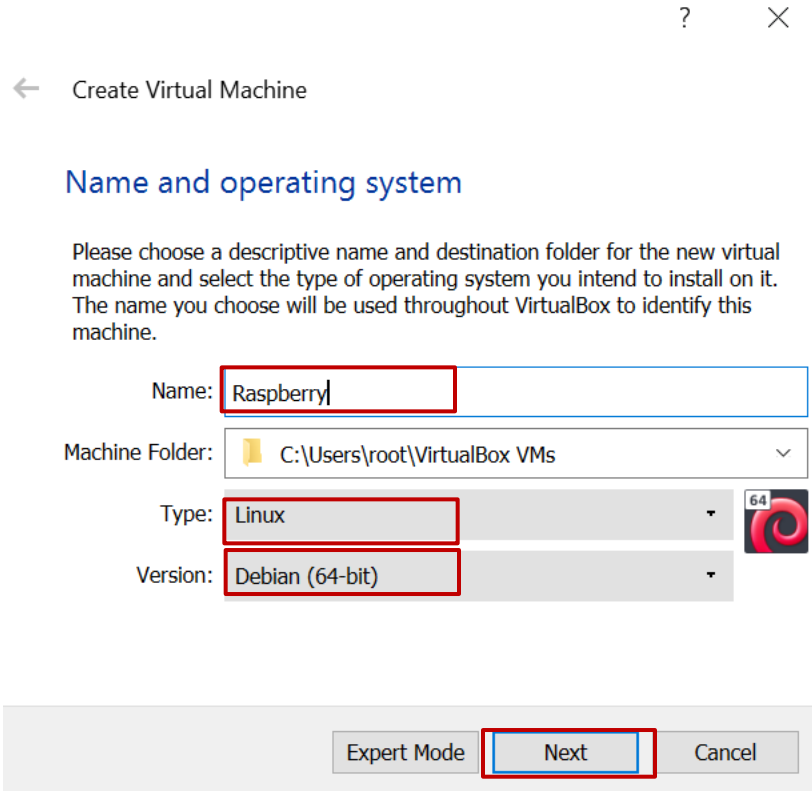
Step3. Enable Intel's VT-x or AMD's AMD-V visualization.

If your notebook model is Lenovo T450S, you may refer to this link to enable this setting.

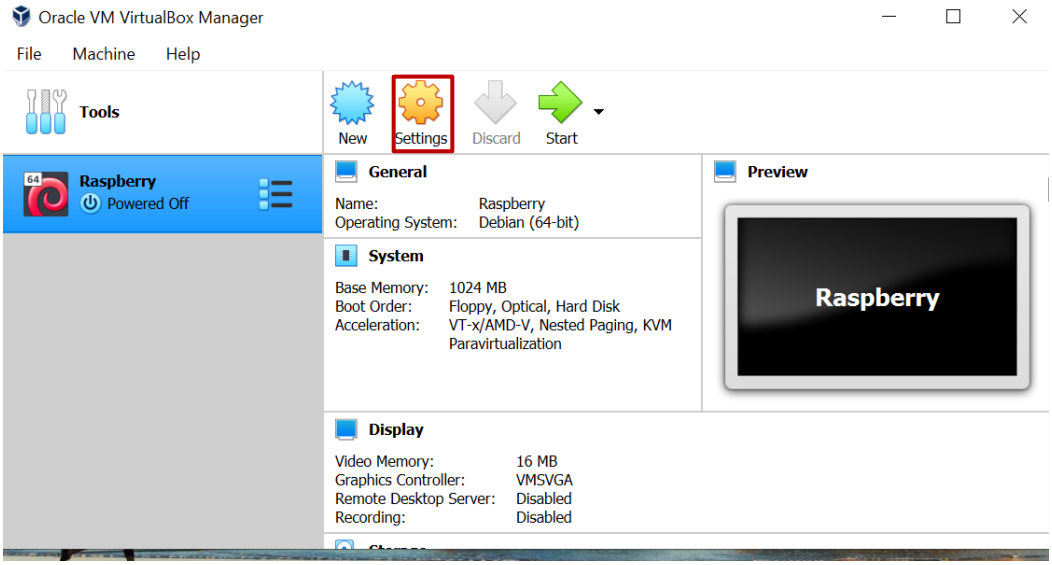
Step4. Create a virtual machine for Raspberry Pi Desktop.

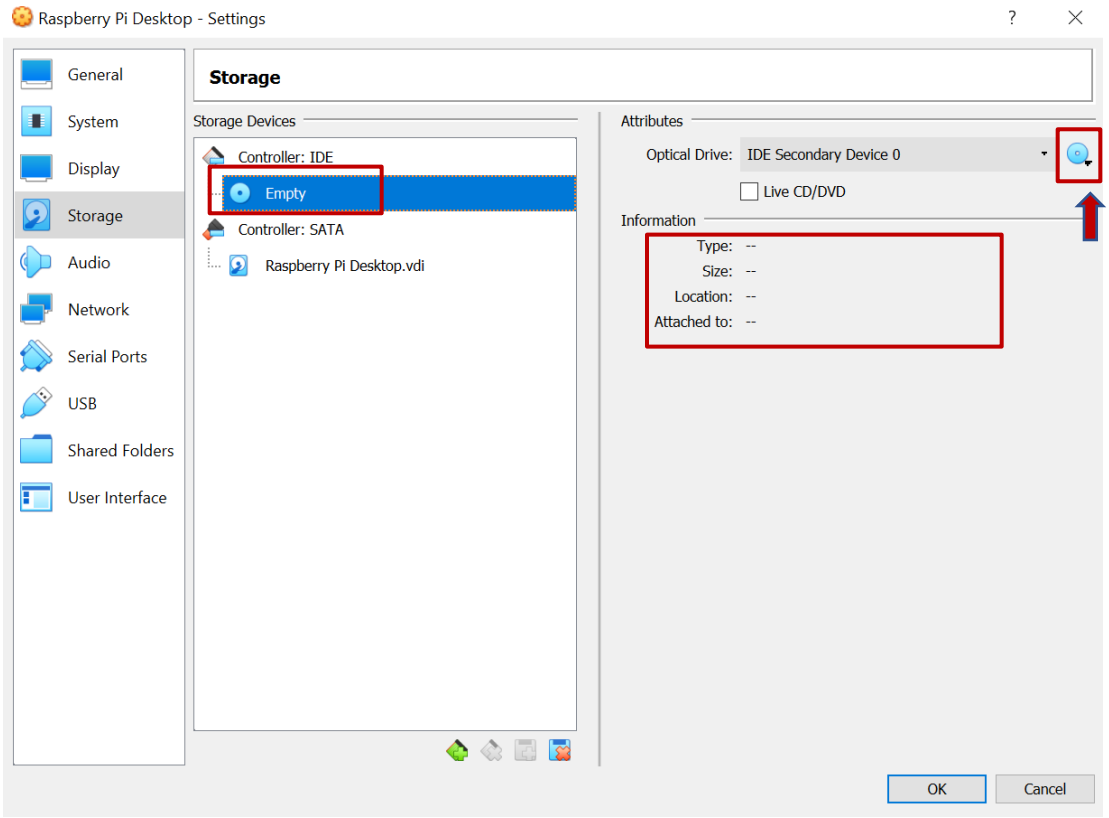
Open VirtualBox, follow the instructions to create a new virtual machine.


Oracle VM VirtualBox Manager
File
Machine
Help
Tools
New
Settings
Discard
Start
Raspberry
Powered Off
General
Name: Raspberry
Operating System: Debian (64-bit)
System
Base Memory: 1024 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, KVM
Paravirtualization
Preview
Raspberry
Display
Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled

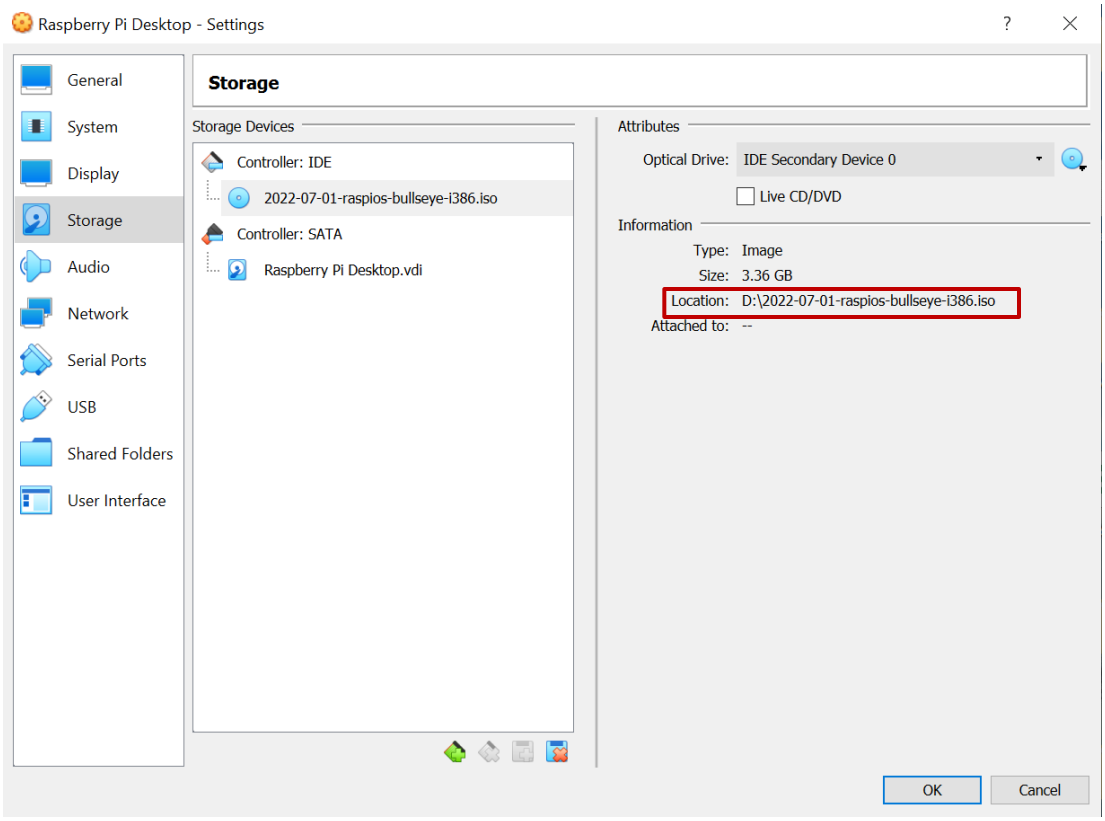

Create Virtual Machine
Name and operating system
Please choose a descriptive name and destination folder for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.
Name: Raspberry
Machine Folder: C:\Users\root\VirtualBox VMs
Type: Linux
Version: Debian (64-bit)
Expert Mode
Next
Cancel

Click the setting → Storage → Controller IDE: Empty

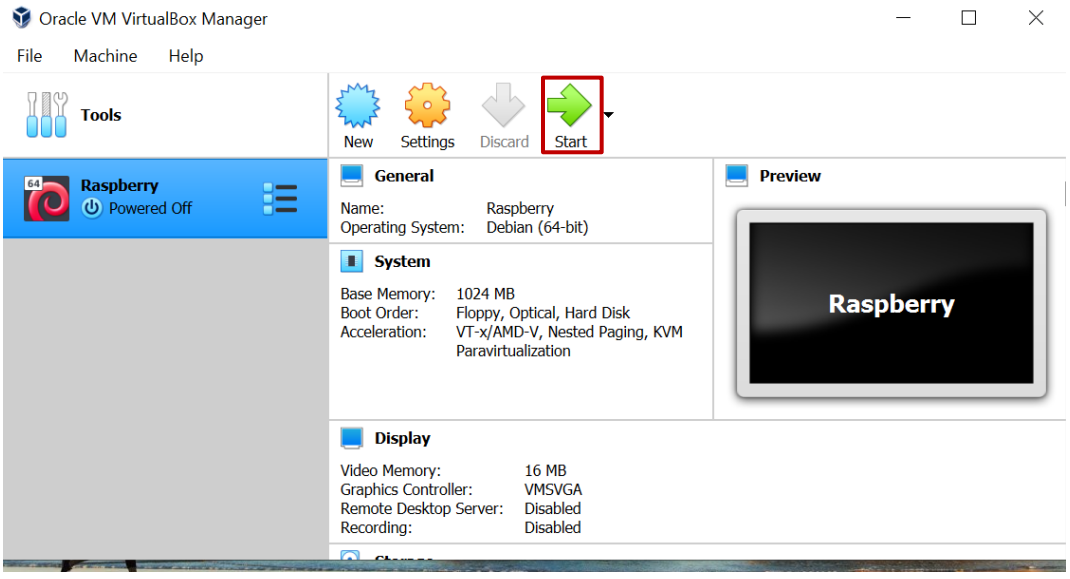


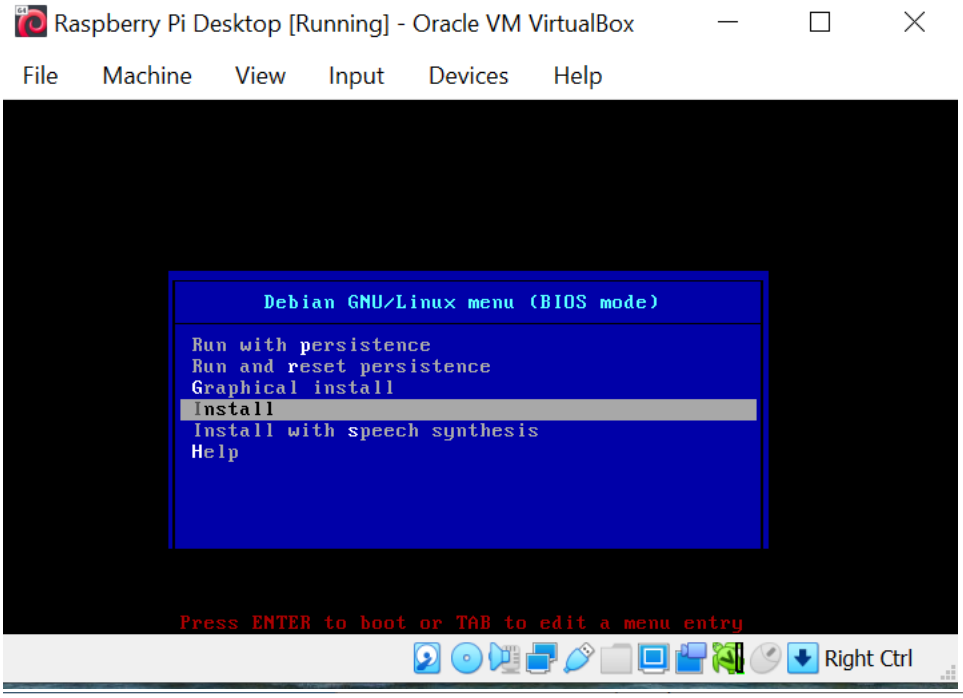


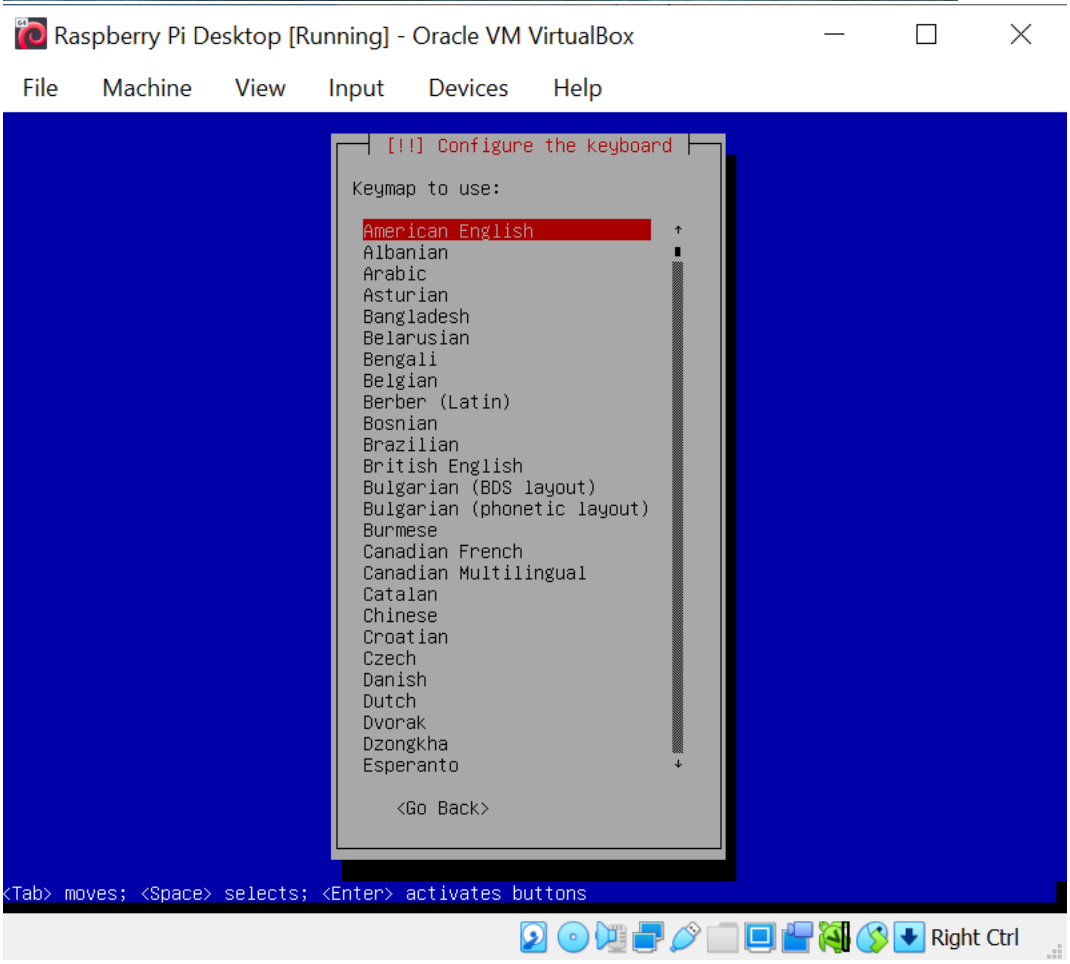
Please choose the *.iso file you downloaded in step2 as the drive.
Then you will see the location information in the below snapshot:

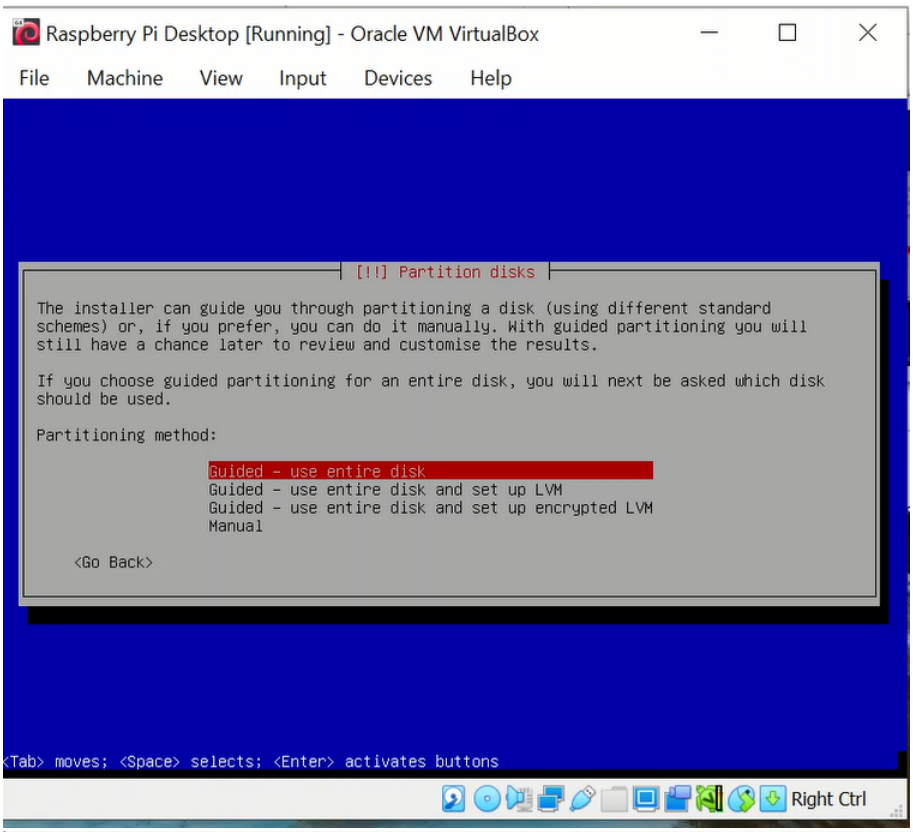


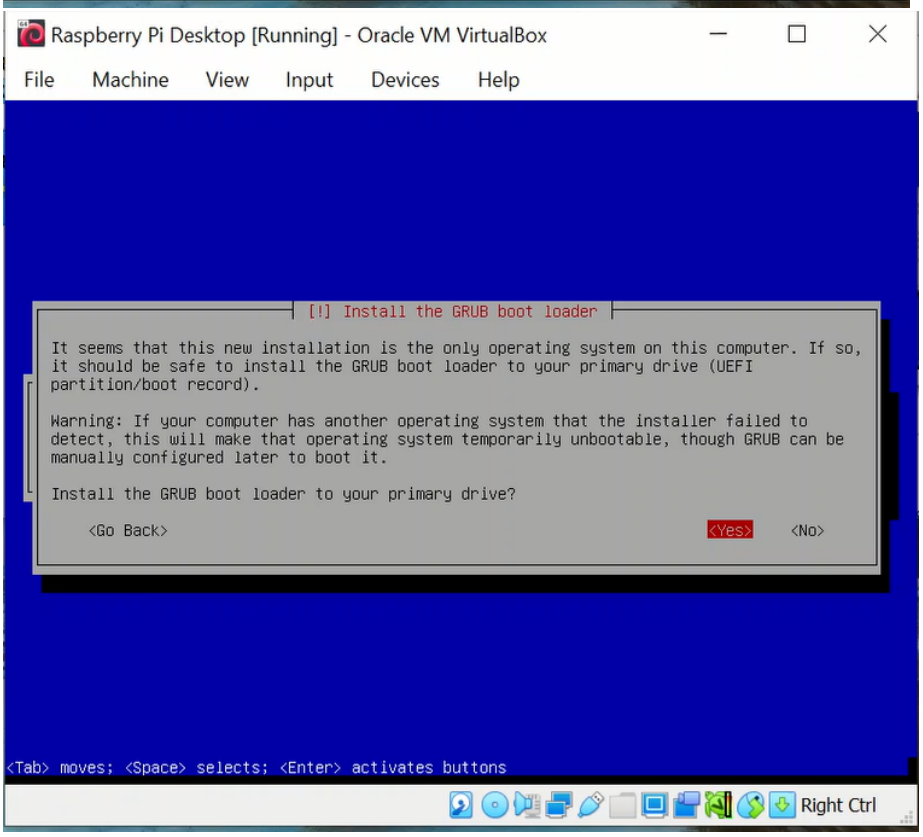
Click Start to install raspberry pi desktop to VirtualBox.

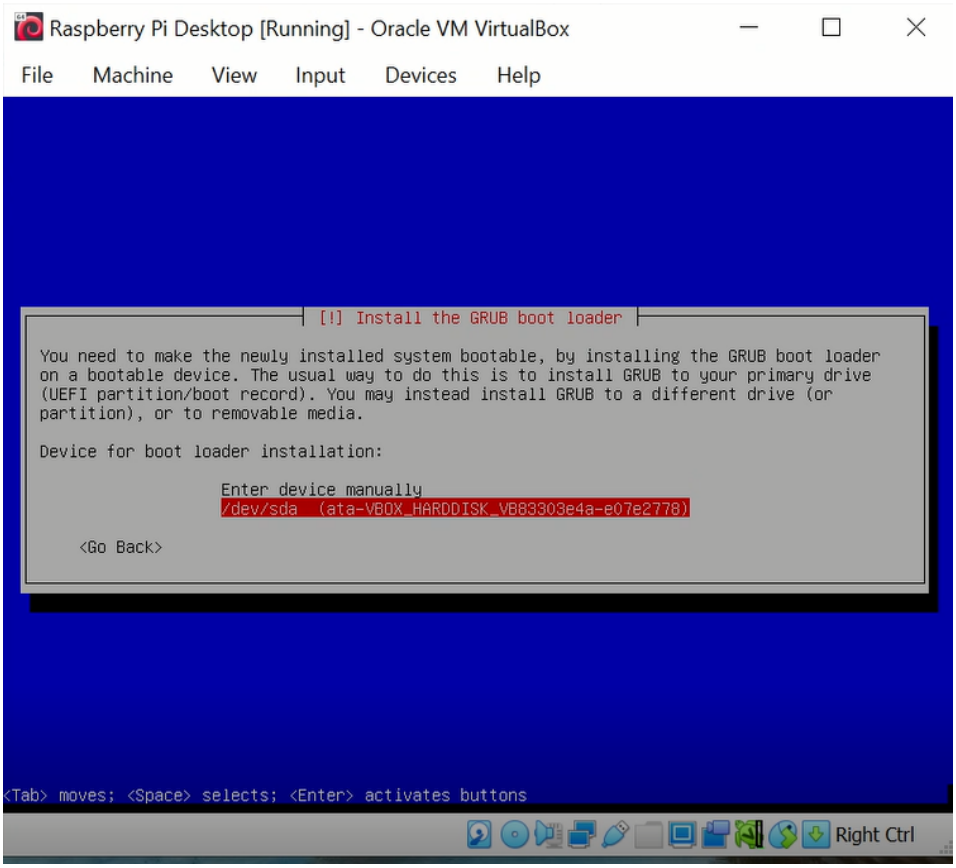


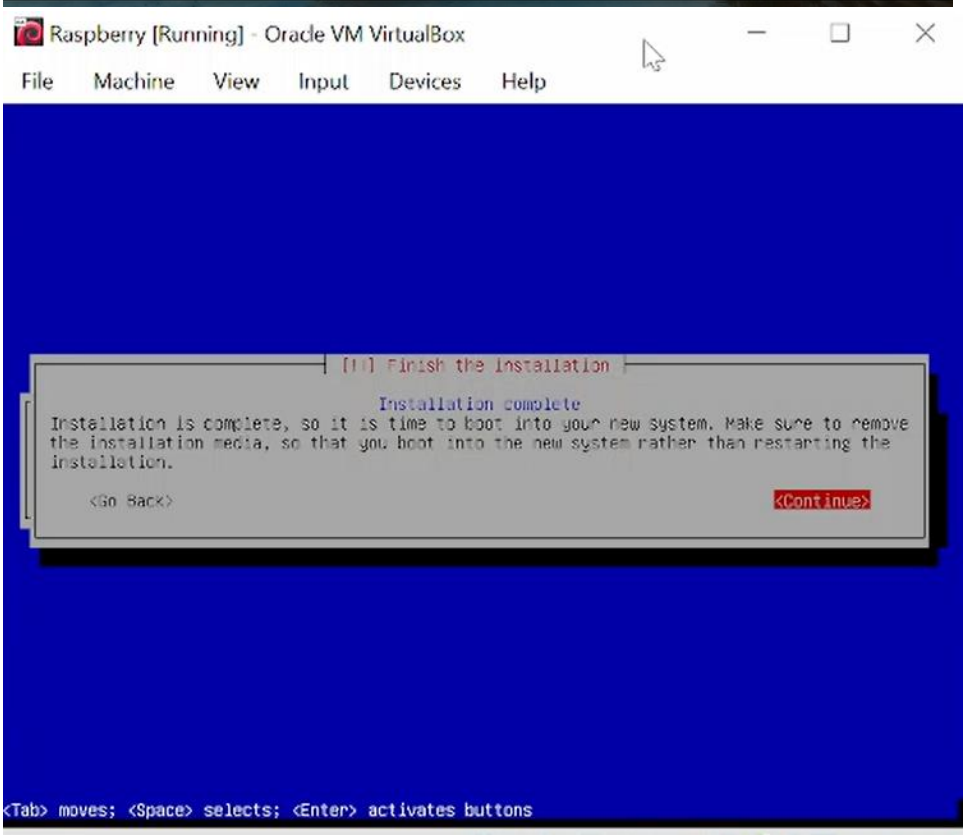

Raspberry Pi Desktop [Running] - Oracle VM VirtualBox
File
Machine
View
Input
Devices
Help
Debian GNU/Linux menu (BIOS mode)
Run with persistence
Run and reset persistence
Graphical install
Install
Install with speech synthesis
Help
Press ENTER to boot or TAB to edit a menu entry
Right Ctrl


Raspberry Pi Desktop [Running] - Oracle VM VirtualBox
File
Machine
View
Input
Devices
Help
[!!] Configure the keyboard
Keymap to use:
American English
Albanian
Arabic
Asturian
Bangladesh
Belarusian
Bengali
Belgian
Berber (Latin)
Bosnian
Brazilian
British English
Bulgarian (BDS layout)
Bulgarian (phonetic layout)
Burmese
Canadian French
Canadian Multilingual
Catalan
Chinese
Croatian
Czech
Danish
Dutch
Dvorak
Dzongkha
Esperanto
<Go Back>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


Raspberry Pi Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Partition disks
The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.
If you choose guided partitioning for an entire disk, you will next be asked which disk should be used.
Partitioning method:
Guided - use entire disk
Guided - use entire disk and set up LVM
Guided - use entire disk and set up encrypted LVM
Manual
<Go Back>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

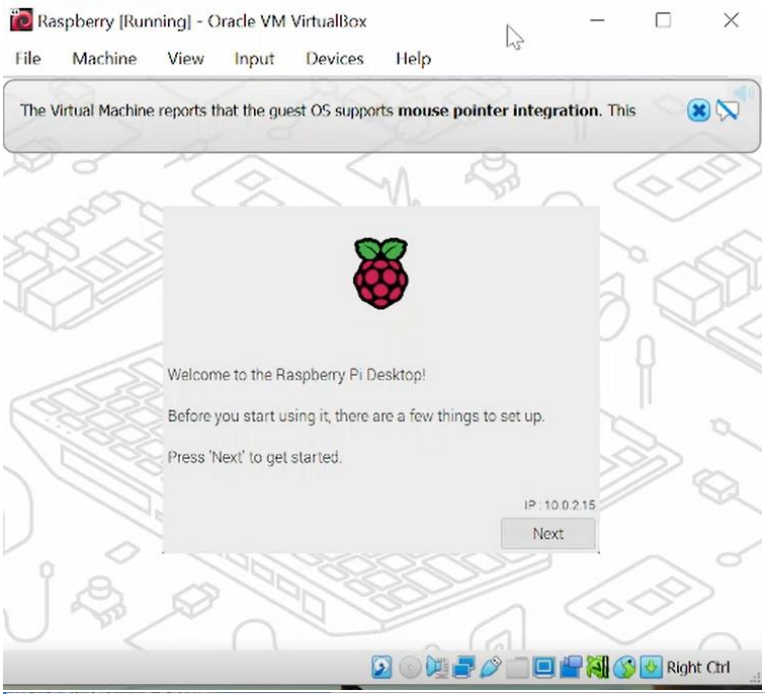

Raspberry Pi Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Install the GRUB boot loader
It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to your primary drive (UEFI partition/boot 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?
<Go Back>
<Yes>
<No>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

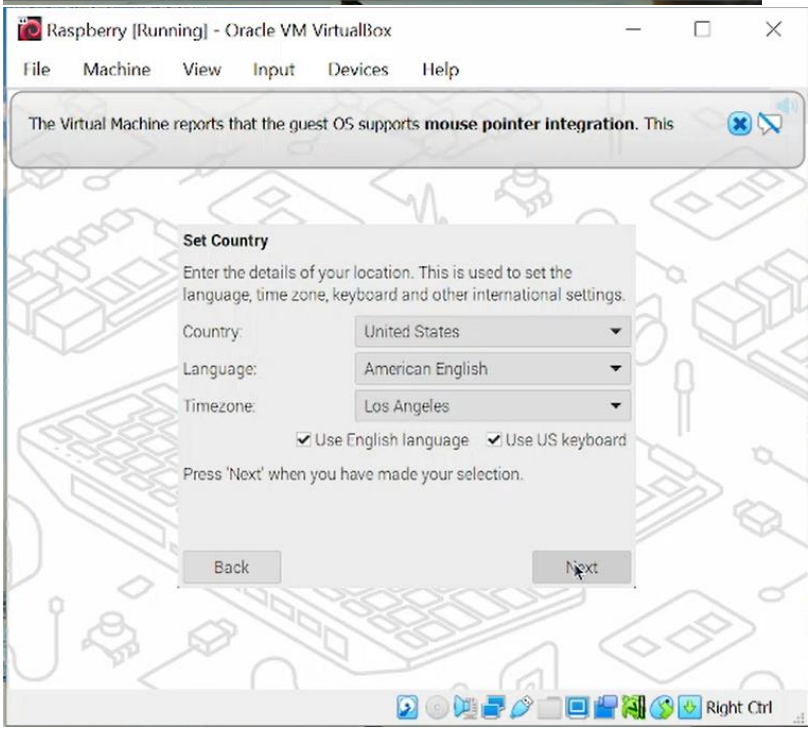

Raspberry Pi Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Install the GRUB boot loader
You need to make the newly installed system bootable, by installing the GRUB boot loader on a bootable device. The usual way to do this is to install GRUB to your primary drive (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_VB83303e4a-e07e2778)
<Go Back>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

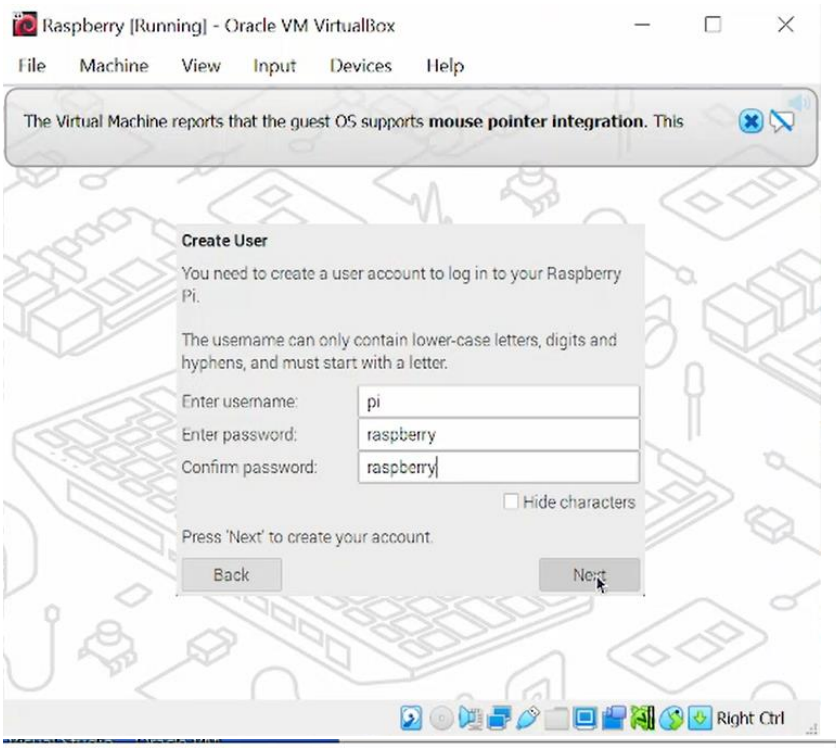

Raspberry [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Finish the installation
Installation complete
Installation is complete, so it is time to boot into your new system. Make sure to remove the installation media, so that you boot into the new system rather than restarting the installation.
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons

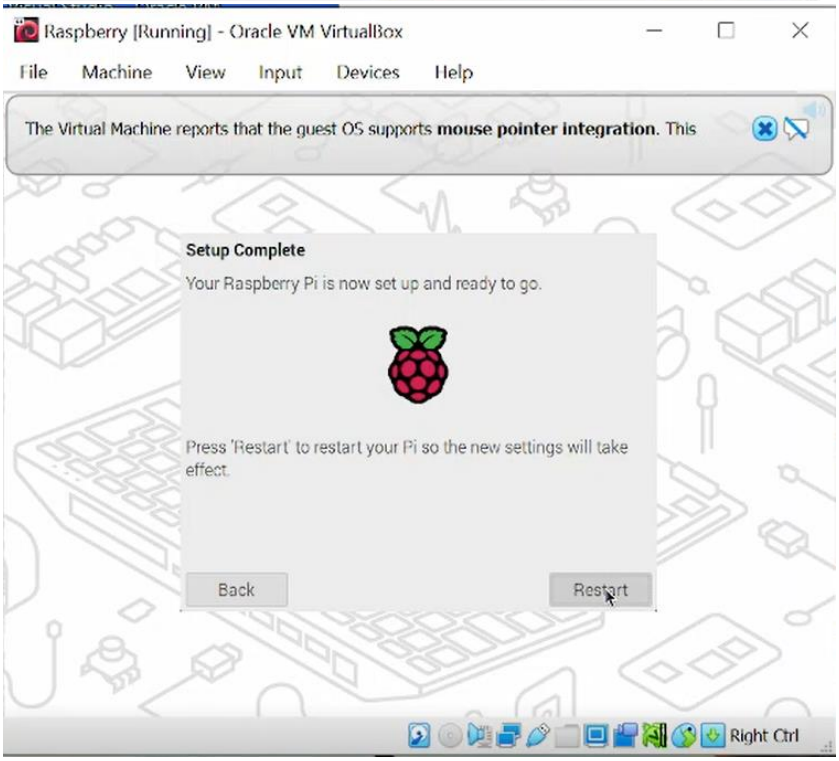
Now, you have installed the raspberry pi desktop sunccessfully.

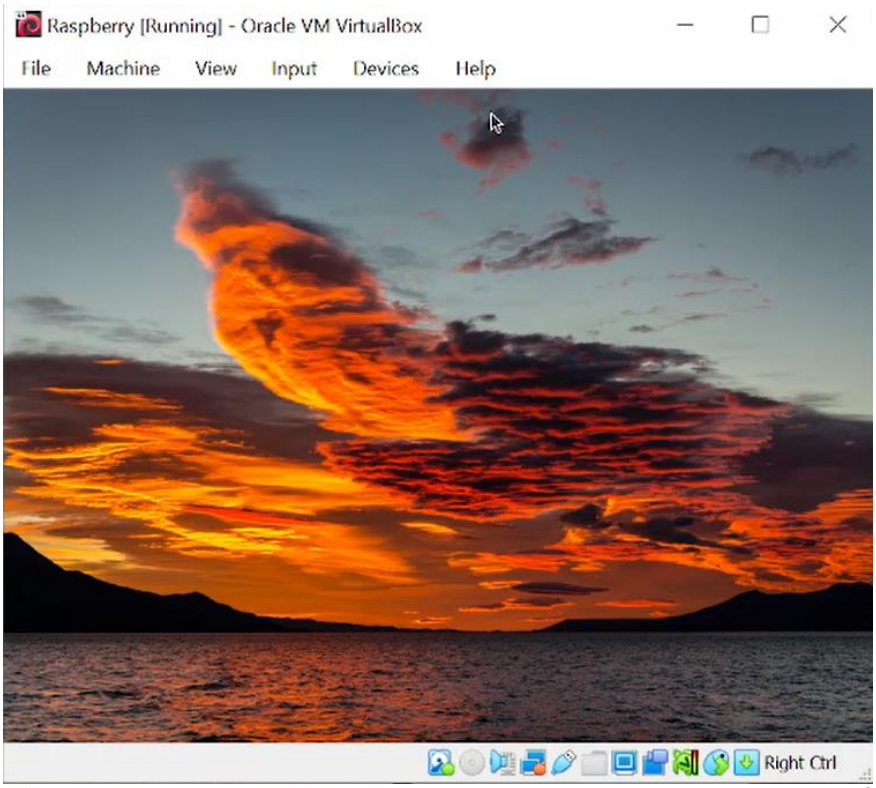
Step5. Configure Raspberry Pi Desktop.

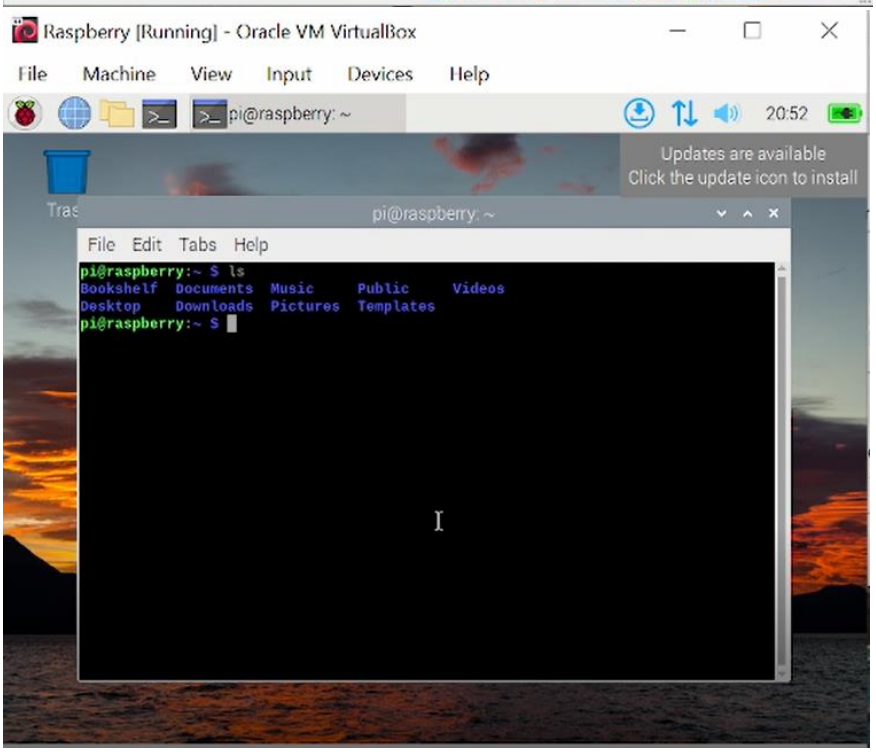




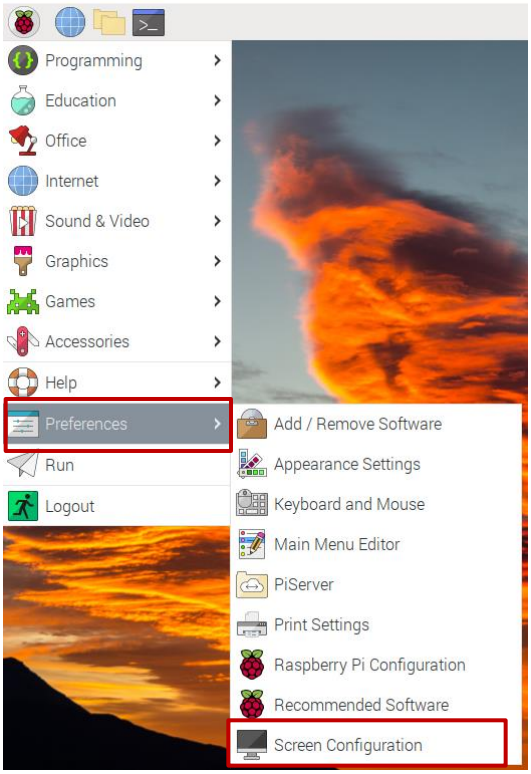

Raspberry [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
The Virtual Machine reports that the guest OS supports mouse pointer integration. This
Create User
You need to create a user account to log in to your Raspberry Pi.
The username can only contain lower-case letters, digits and hyphens, and must start with a letter.
Enter username: pi
Enter password: raspberry
Confirm password: raspberry
Hide characters
Press 'Next' to create your account.
Back
Next
Right Ctrl

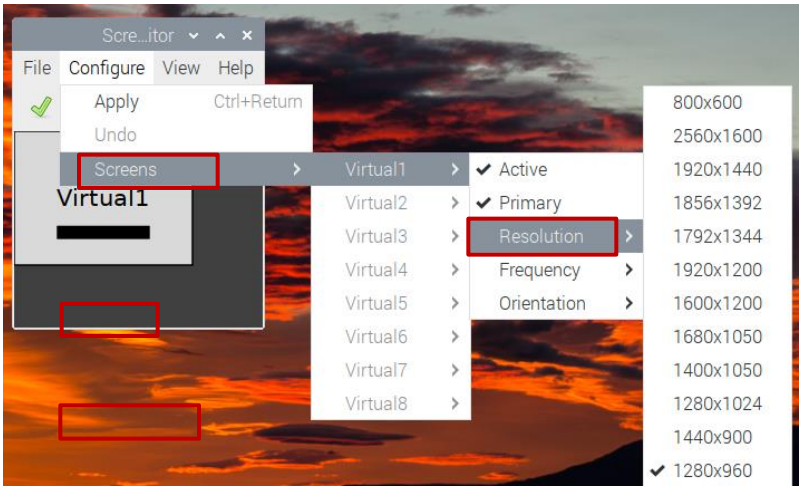

Raspberry [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
The Virtual Machine reports that the guest OS supports mouse pointer integration. This
Setup Complete
Your Raspberry Pi is now set up and ready to go.
Press 'Restart' to restart your Pi so the new settings will take effect.
Back
Restart
Right Ctrl

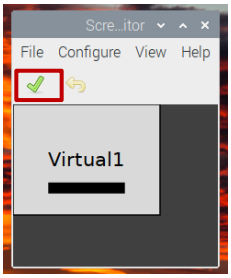

Raspberry [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Right Ctrl


Raspberry [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
pi@raspberry: ~
20:52
Updates are available
Click the update icon to install
pi@raspberry: ~
File Edit Tabs Help
pi@raspberry:~ $ ls
Bookshelf Documents Music Public Videos
Desktop Downloads Pictures Templates
pi@raspberry:~ $

Step6. Configure Resolution for Raspberry Pi Desktop.

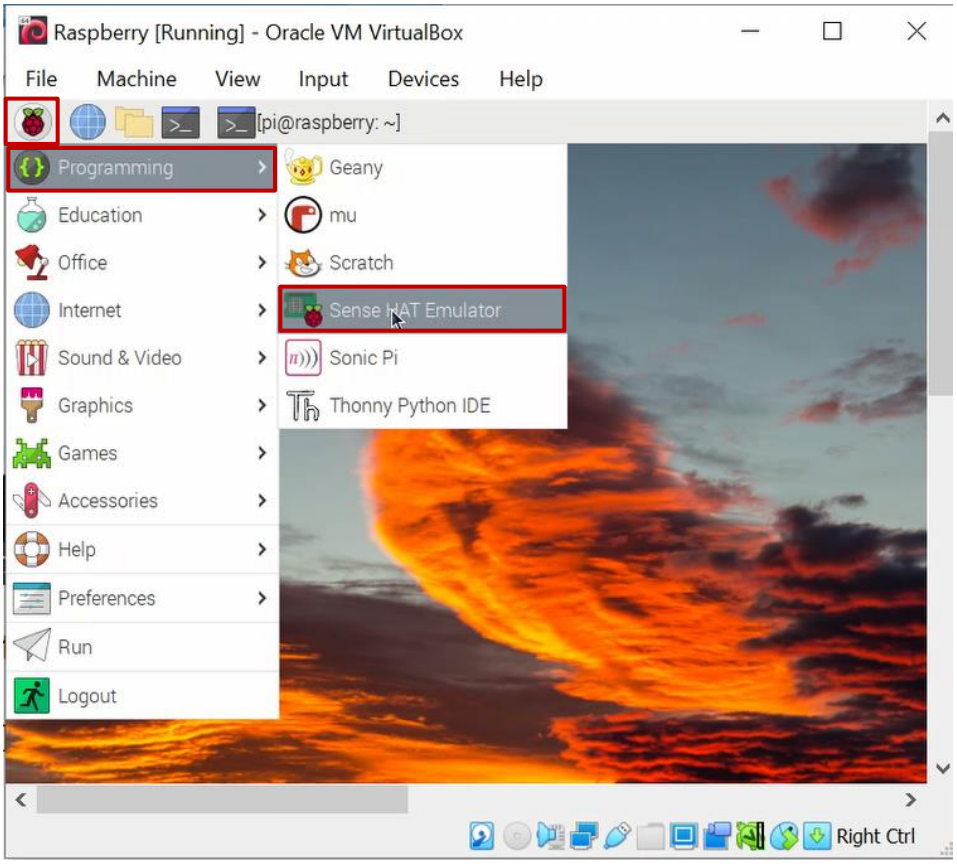






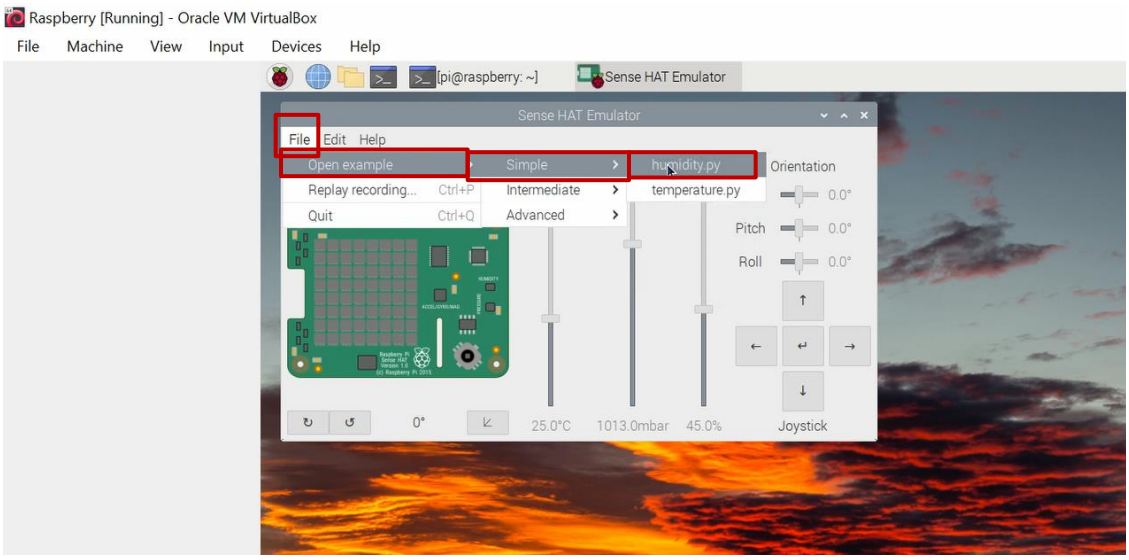
Step7. Run example code to test Sense Hat Emulator.

Start up Sense Hat Emulator

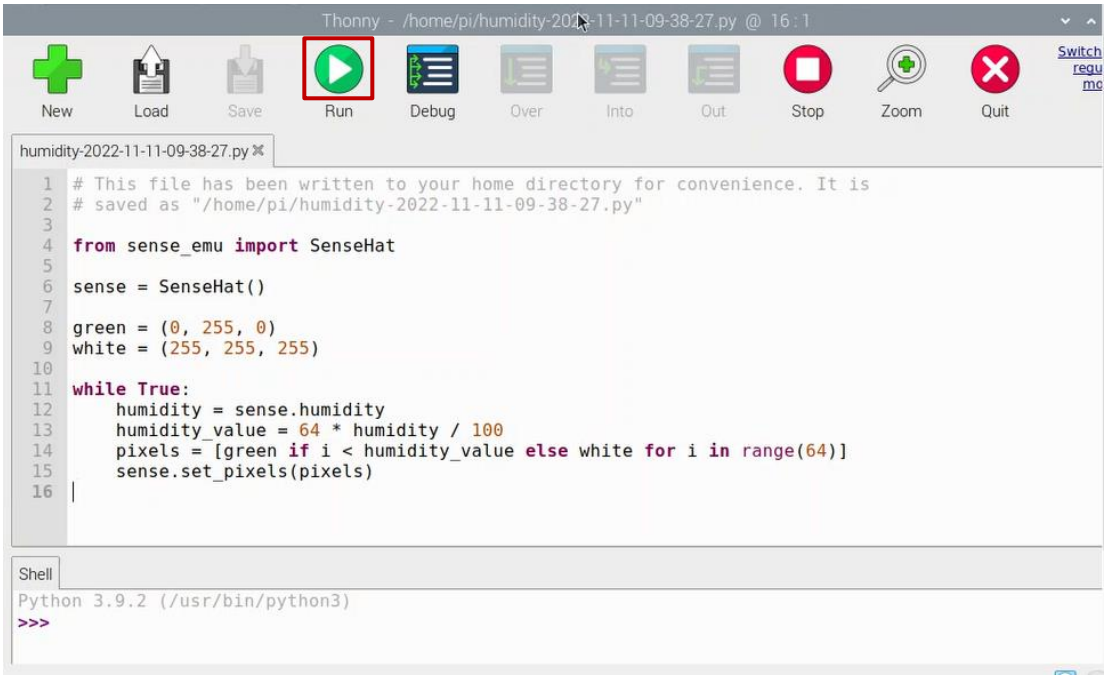


Open the example code, e.g., humidty.py

This program adjusts the number of green and white pixels displayed on the LED, depending on the detected humidity.

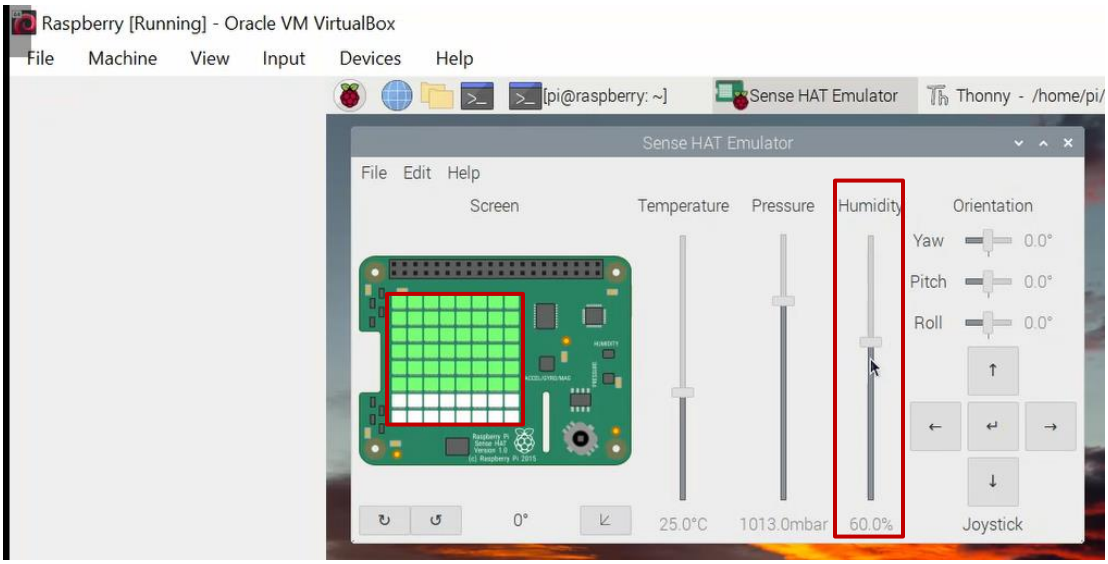


Click the button “Run” to run the program.

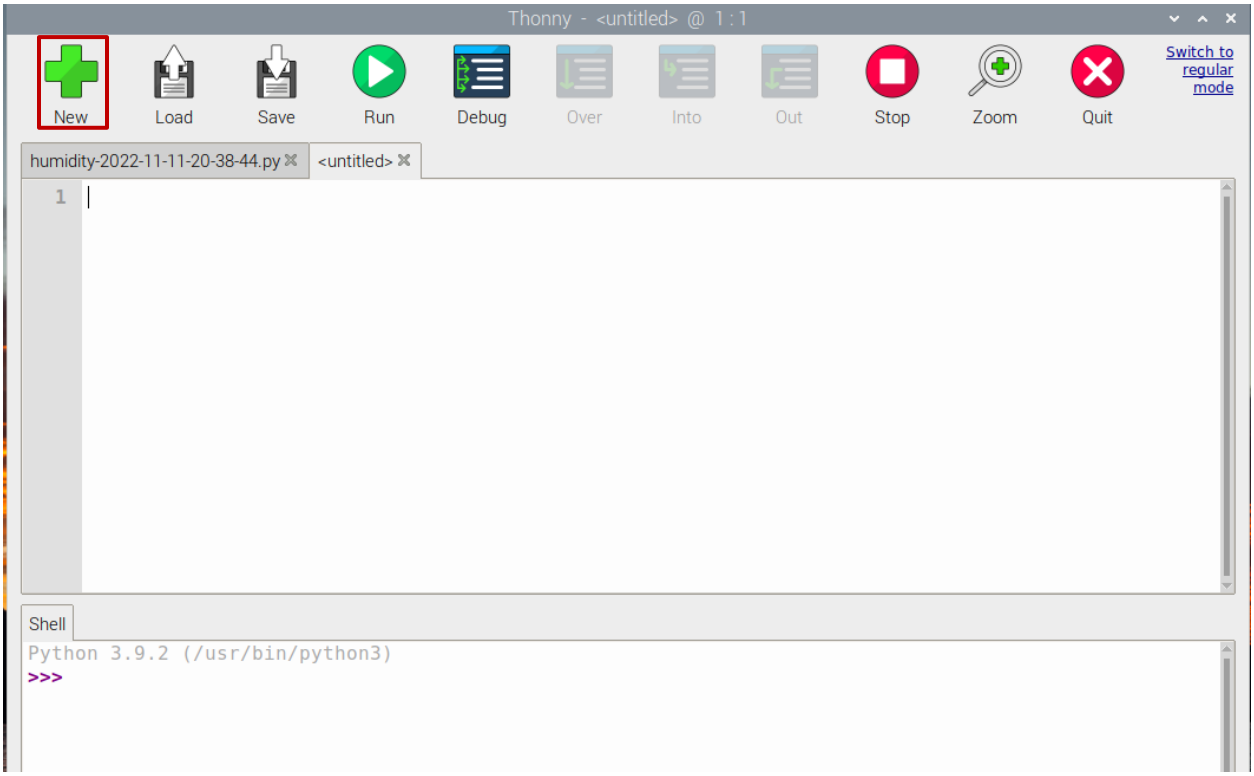


Display the result.

We can see that the numbers of green LEDs will change based on the humidity.



We may also create our own program.



DONE!!!