



Internet Of Things

Getting Started with Raspberry Pi




RaspberryPi

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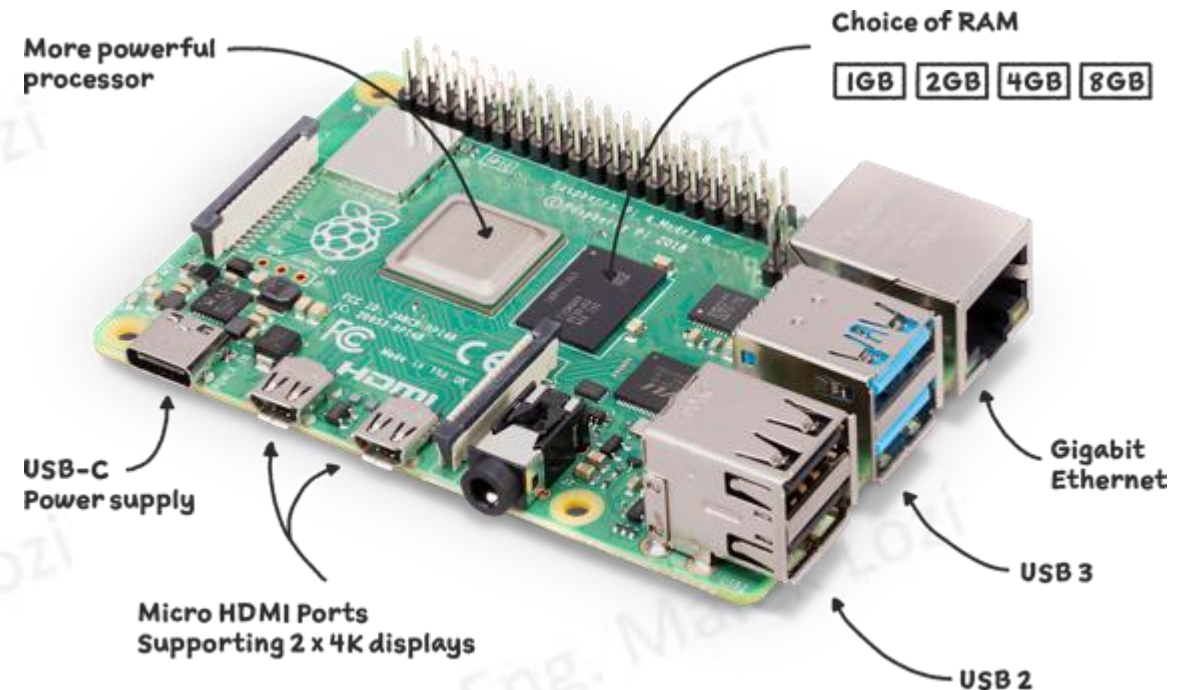
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Introduction

- Raspberry Pi is a credit card sized minicomputer
- Can do basically anything a computer can do
- It has two things going for it
 - The size
 - Readily accessible GPIO pins
- Low power computer

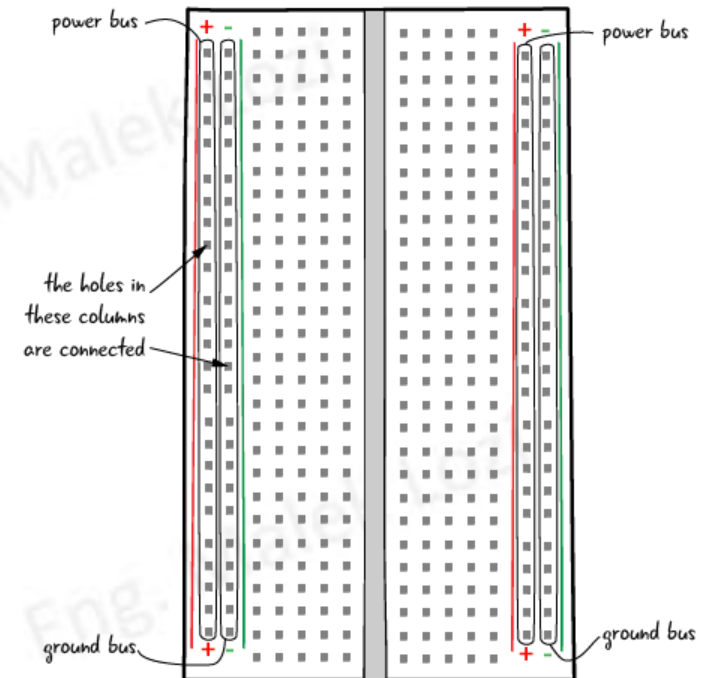


Introduction

- **GPIO stands for General Purpose Input Output**
- **GPIOs can do many things like control other devices**
 - **Turn ON and OFF lights**
 - **Move servo motors**
 - **Read sensor data**
- **Due to its size, it can be used in different applications like IOT**
- **We will work with Raspberry Pi 4 model B**

Additional things that we need Breadboard

- It's used to provide an easy way to connect and test electronic components
- We will use it to connect components with the Raspberry Pi



Additional things that we need

- USB type C power supply
- Micro SD card with flashed OS on it
- Keyboard
- Mouse
- Monitor

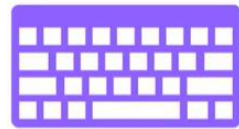
Raspberry Pi OS

- After powering up the Raspberry Pi you will see the Desktop



Raspberry Pi Configuration

- We are going to use raspi-config tool
- raspi-config is a configuration tool in Raspbian
- It enable us to configure various settings



Keyboard Layout



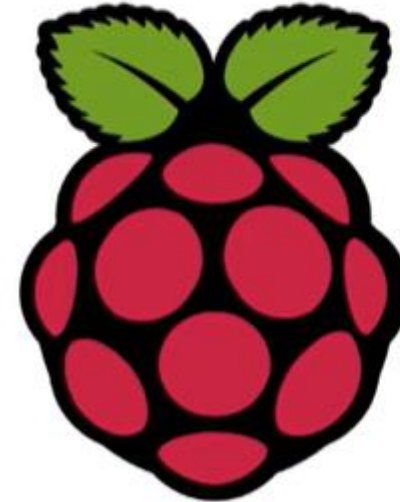
Time Zone



Pi Password

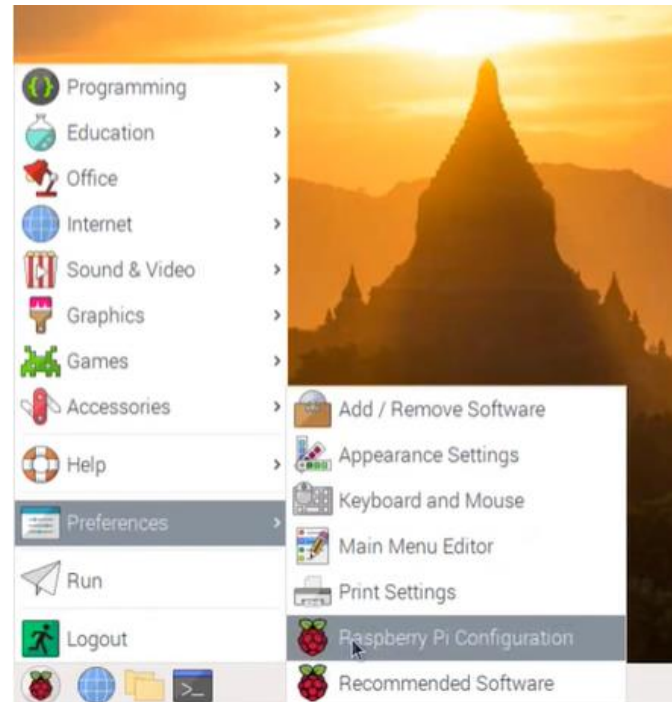


SSH Access



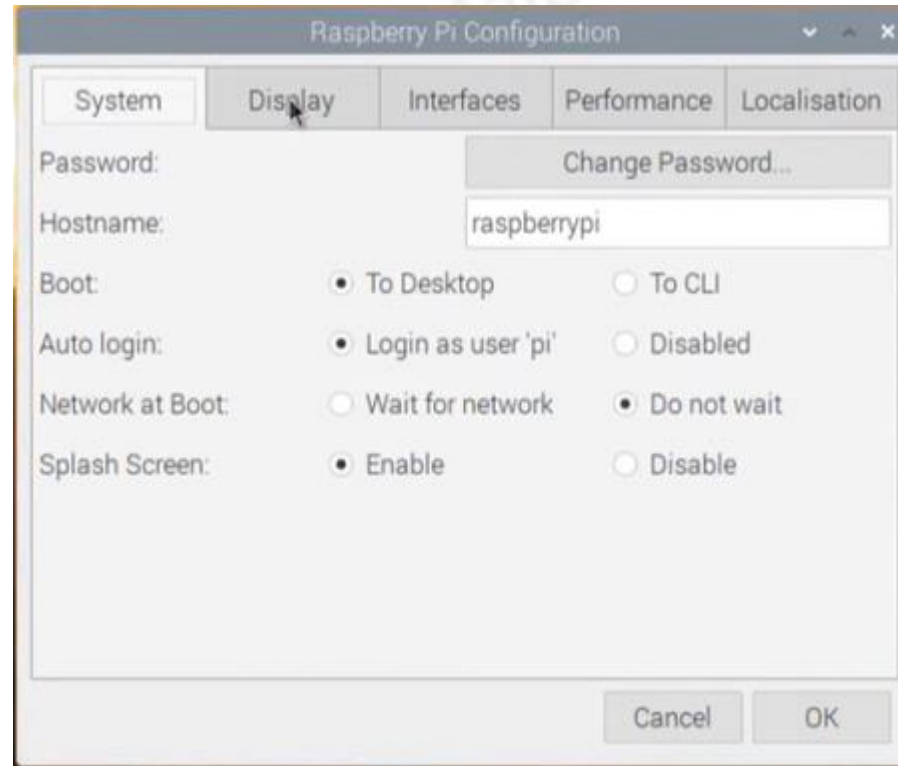
Raspberry Pi Configuration

- We can access raspi-config tool in two ways
 - Through terminal
 - Raspberry Pi configuration GUI



Raspberry Pi Configuration GUI

- You can check the five different tabs: System, Display, Interface, Performance, Localisation

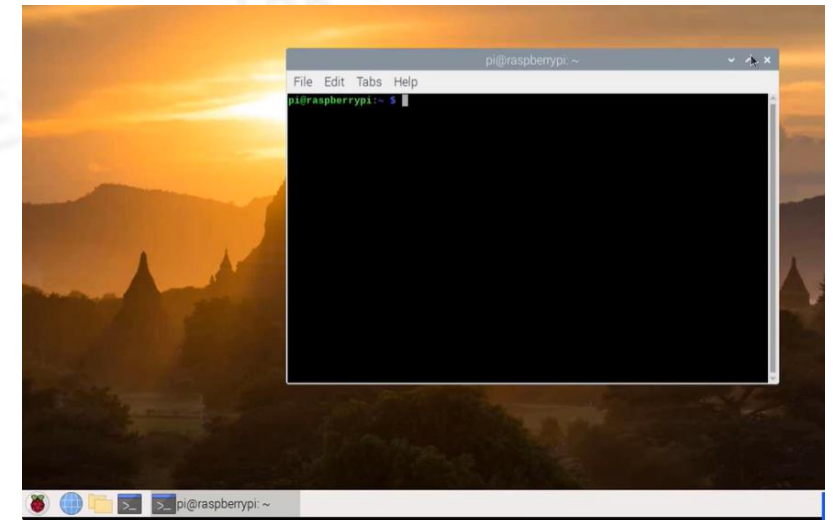


Raspberry Pi Configuration CLI

- We can launch the CLI (terminal) by clicking the icon shown below



- Then the terminal will show up

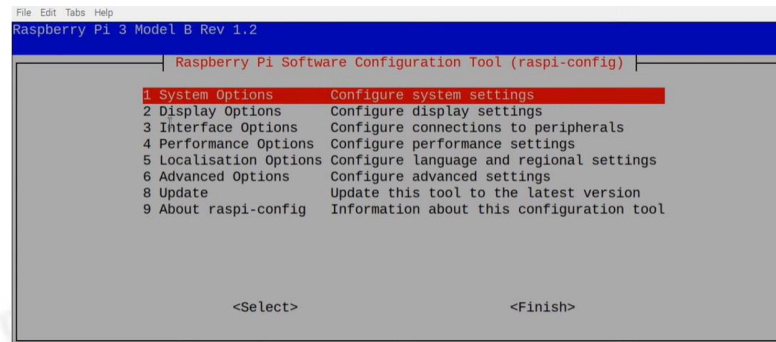


Raspberry Pi Configuration CLI

- In the terminal, you can write Linux commands to interact with the OS
- You can write “sudo raspi-config”

```
pi@raspberrypi:~ $ sudo raspi-config
```

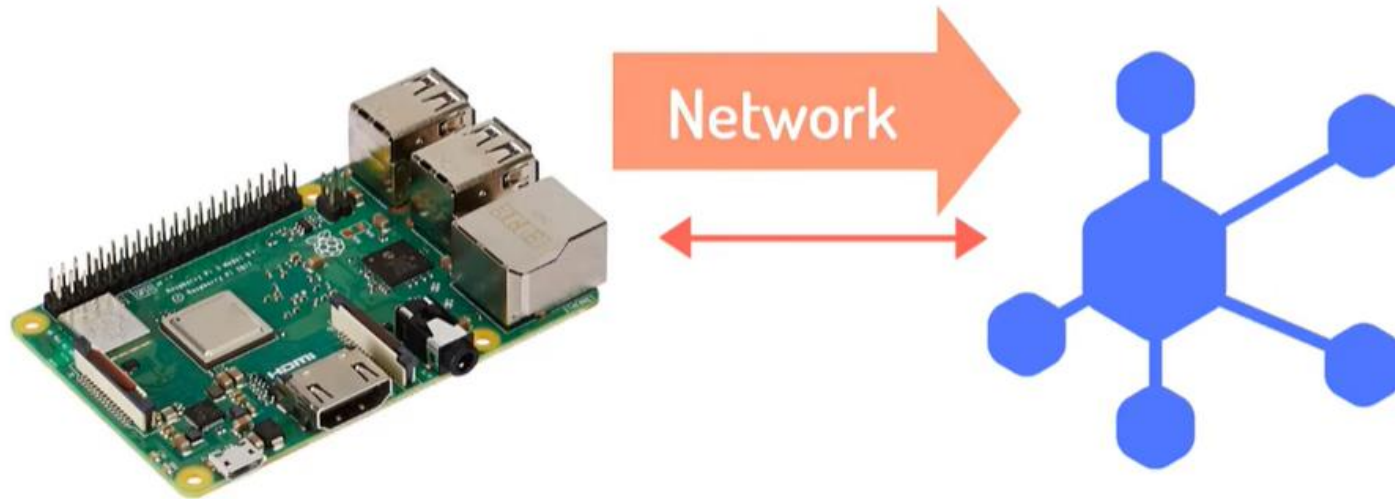
- then the Raspberry Pi configuration menu will open
- You can use keyboard arrows to navigate the options



Raspberry Pi Networking

- Raspberry Pi is designed to connect to the internet

Networking



Raspberry Pi Networking

- To connect it to a network, we have two communication technologies on the board

Networking



Raspberry Pi Networking

- This ability to connect to the internet, is one of the key features that makes it widely used in different applications



Internet of Things



Home Automation



Web Server

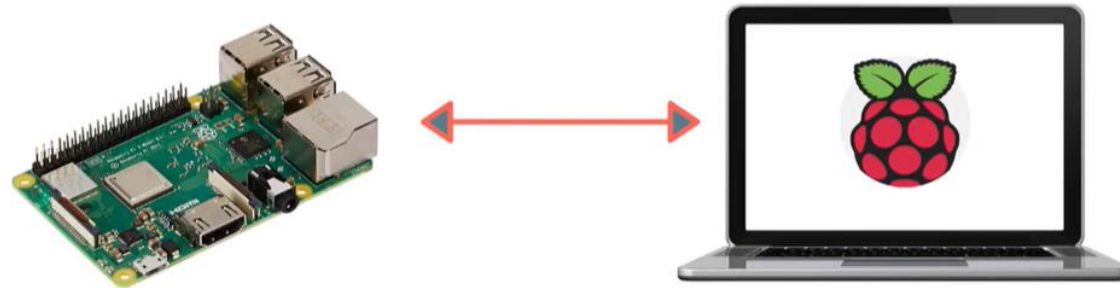


Network Monitoring

Raspberry Pi Networking

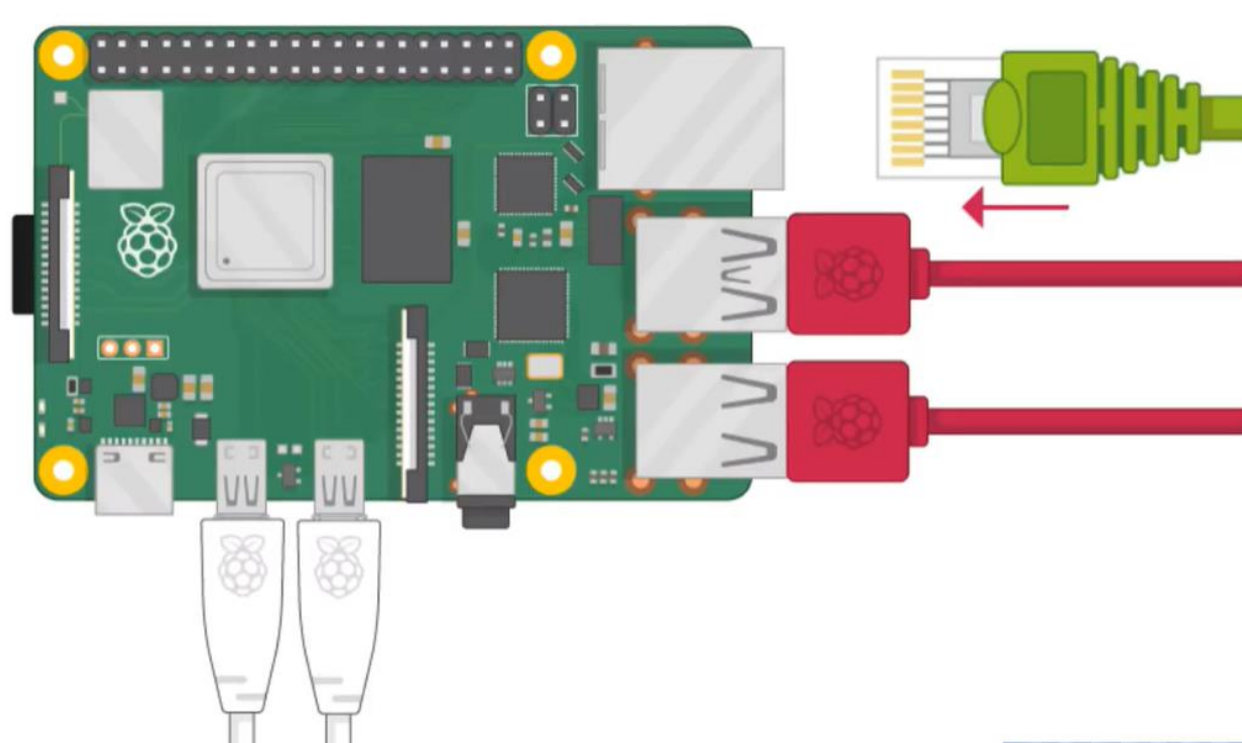
- Connecting to internet enables us to access our Raspberry Pi remotely from any other computer

Remote Desktop sharing



Raspberry Pi Networking

- To connect it to the internet, we need ethernet cable connected to a router
- Or we can use its onboard WiFi



Raspberry Pi Networking

- To connect to using WiFi, click on the following icon at the down right corner



- You will see all available WiFi networks
- We can check the IP address by using “ifconfig” command on the terminal

```
pi@raspberrypi:~ $ ifconfig
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether b8:27:eb:1a:45:41 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 36 bytes 3756 (3.6 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 36 bytes 3756 (3.6 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.10 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::7fc2:b155:d3ea:6676 prefixlen 64 scopeid 0x20<link>
    inet6 fd51:42f8:caae:d92e::ff prefixlen 64 scopeid 0x0<global>
    ether b8:27:eb:4f:10:14 txqueuelen 1000 (Ethernet)
    RX packets 8301 bytes 593659 (579.7 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 5956 bytes 1568511 (1.4 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

pi@raspberrypi:~ $
```

Raspberry Pi

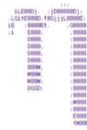
Basic Linux commands

- **Exercise**: using the terminal, create a text file and write your full name, university ID and your major inside it, this text file should be inside folder called IOT located at the desktop

Raspberry Pi

Nano text editor

- There are different text editors that we can use in the CLI



Nano

VI EDITOR



emacs Editor

- We will learn how to use nano text editor

```
...  
iLE88Dj. :jD88888Dj:  
.LGitE888D.f8GjjjL8888E;  
iE :8888Et. .G8888.  
;i E888, ,8888,  
D888, :8888:  
D888, :8888:  
D888, :8888:  
D888, :8888:  
888W, :8888:  
W88W, :8888:  
W88W: :8888:  
DGGD: :8888:  
:8888:  
:W888:  
:8888:  
E888i  
tW88D
```

Nano Text
Editor

Raspberry Pi

Nano text editor

- To create a new text file, write “nano filename.ext”
- Here, we are creating a text file called “innova.txt”

```
pi@raspberrypi:~/appleton $ nano innova.txt
```

- The file will be opened, write your text



```
GNU nano 2.7.4 File: innova.txt Modified
hello welcome
learning nano editor
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos ^Y Prev Page
^X Exit ^R Read File ^N Replace ^U Uncut Text ^T To Spell ^_ Go To Line ^V Next Page
```

Raspberry Pi

Nano text editor

- To save the file, press CTRL+O then press enter
- To close the file, press CTRL+X
- To open the file again, you can write “nano filename.ext”
- You can check more options on the bottom line

Any Questions???