CODERS Module 1

Flexible problem-solving

Activity 1.1
Scavenger Hunt

Module 1.1
Computing Concepts

What is a computer?

Hardware

Physical components of a computer

mouse

keyboard

monitor

ram

motherboard

hard-drive

central processing unit (CPU)

Software

Set of instructions, procedures, and routines that enable the computer to perform tasks.

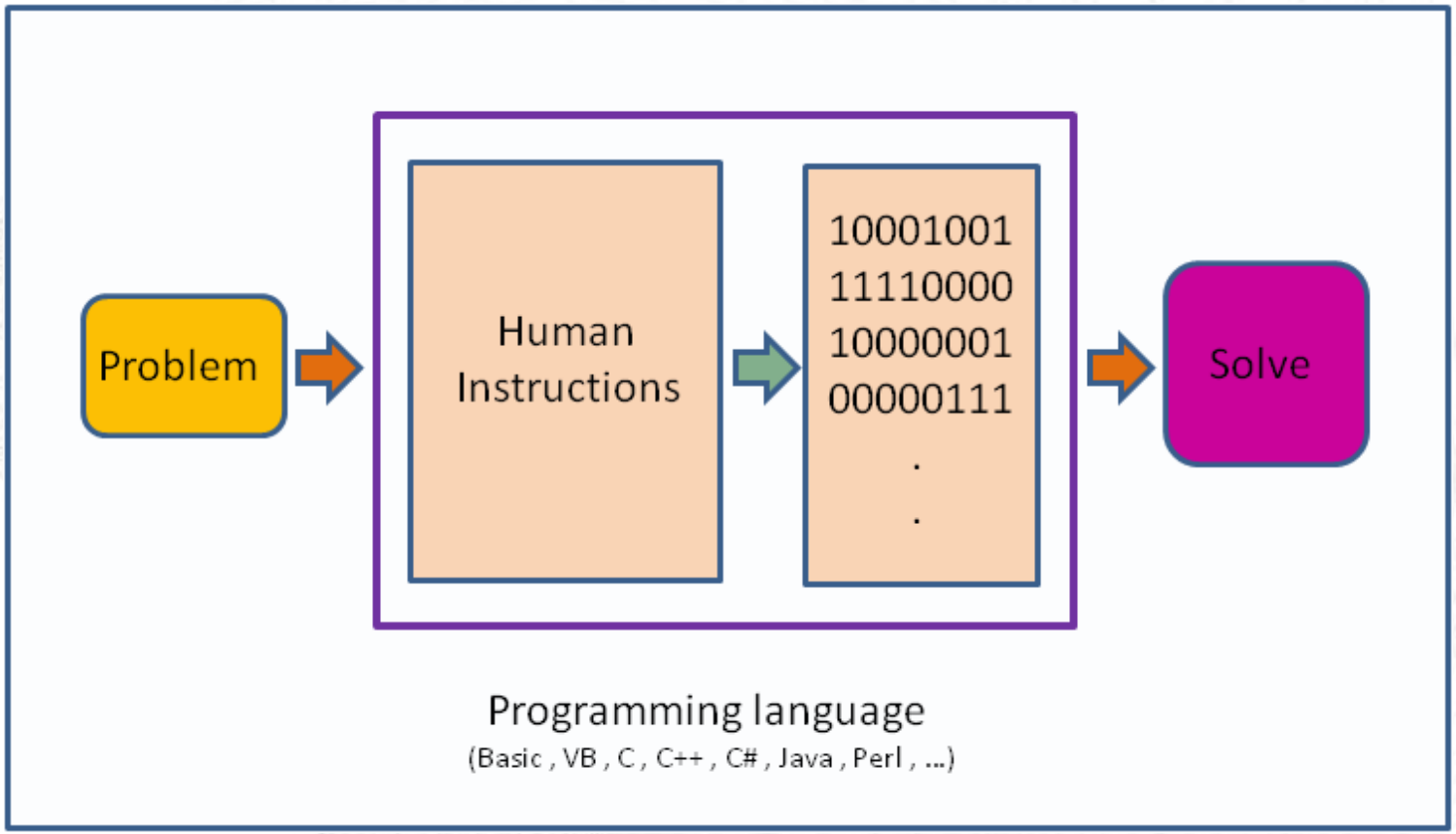
System software

macOS®, Microsoft Windows, Linux®, Android™

Application software

Microsoft Word, Google Maps™, Gmail™

Programming Language

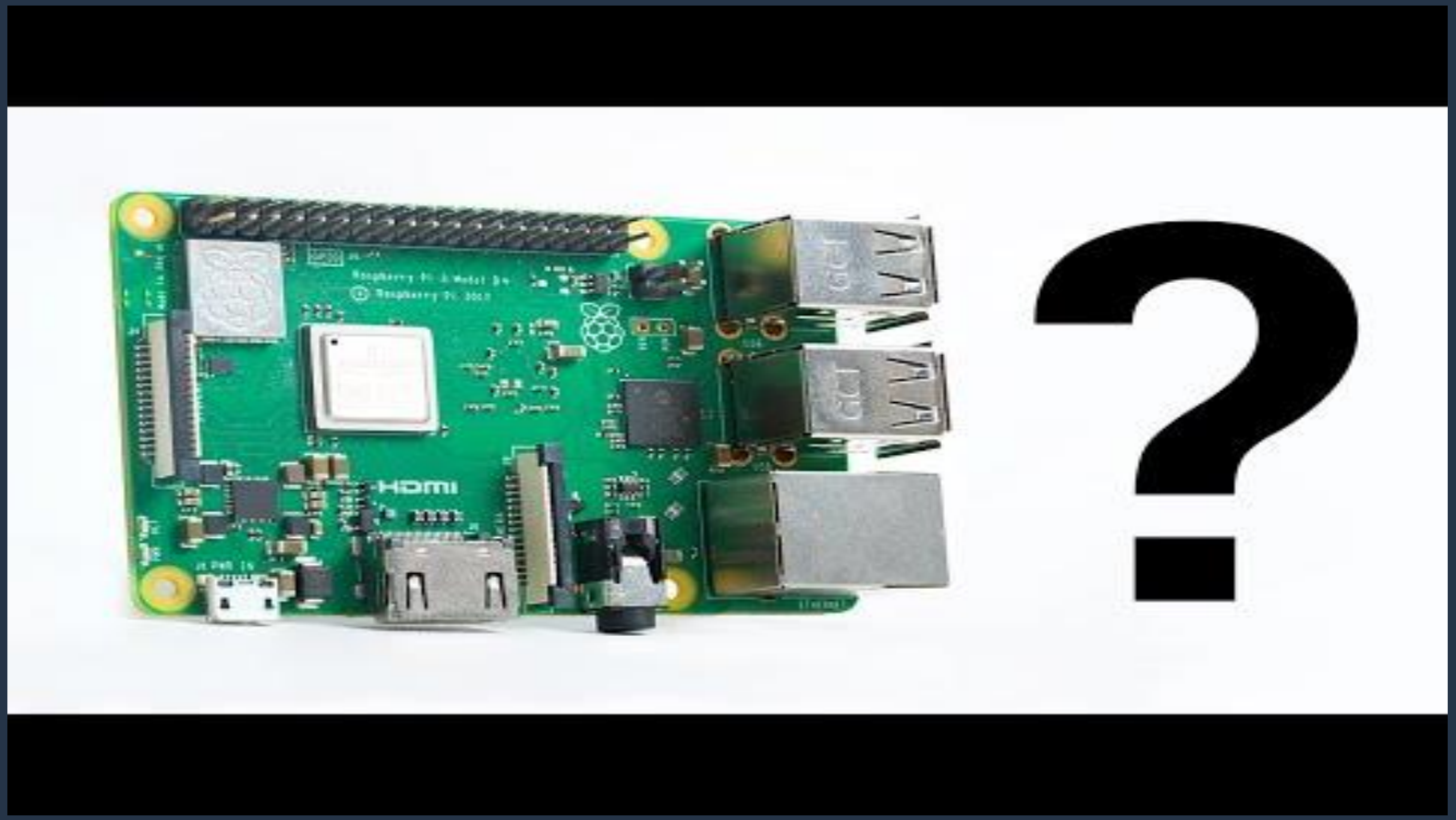


1010 Module 1.2
1010 CODERS Kit

CODERS Kit

Raspberry Pi Setup

Introduction



Introduction

This module will walk you through setting up the Raspberry Pi 4 provided with CODERS kit in ten simple steps.

This process should require less than 30 minutes.

Hardware components

Included in the kit:

1. USB-C power supply cable with on/off switch

2. Case

3. Fan (silver screws)

4. Type-C card reader (used to reformat microSD)

5. Preloaded 32 GB Micro SD memory card

6. Heat sink stickers

7. Raspberry Pi 4 unit (black screws)

Hardware components

Included in the kit:

7. Keyboard

8. HDMI to micro HDMI converter cables (2) for monitor or television screen

9. Mouse

Raspberry Pi 4 (RPi)

CPU
central processing unit (processor)

GPIO
general-purpose input/output

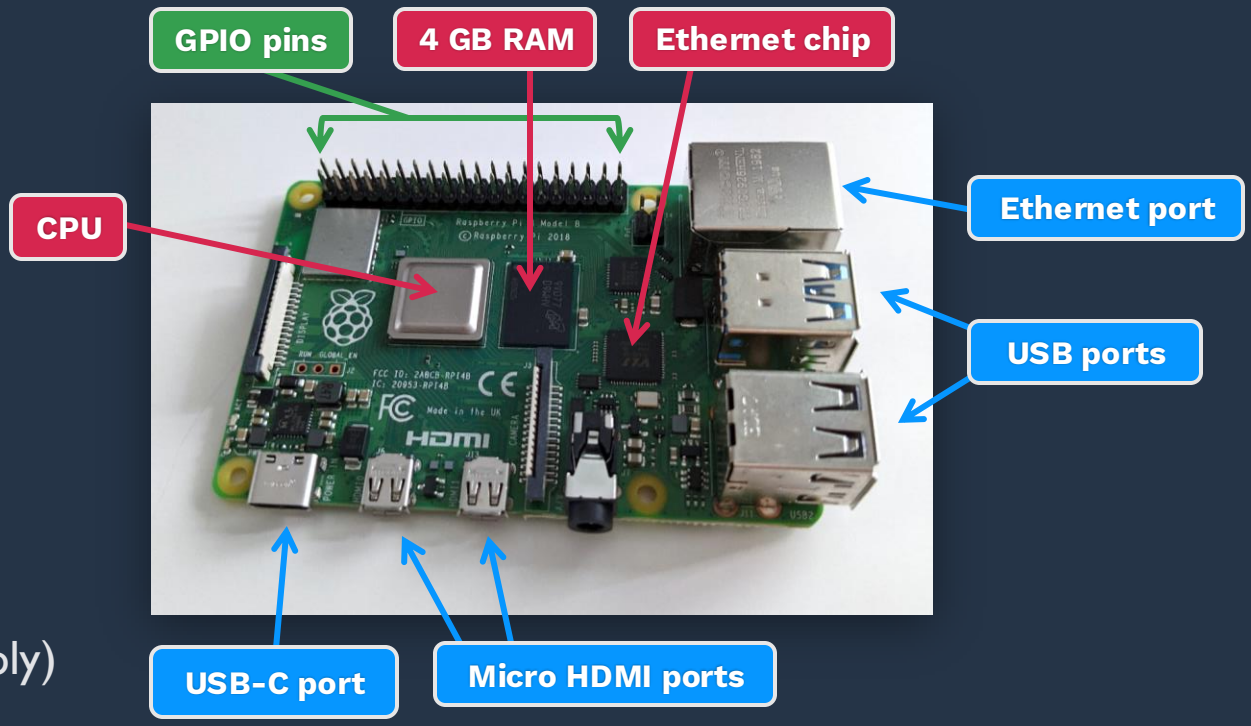
GB
gigabytes

RAM
random access memory

USB
universal serial bus

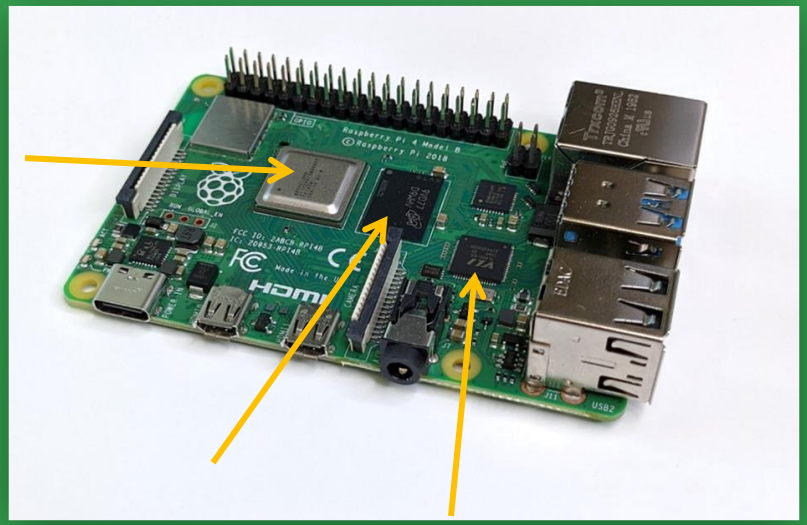
USB-C
USB, type C (for power supply)

HDMI
high-definition multimedia interface



Install Heatsinks

Heatsinks help dissipate heat during operation. To install, remove the adhesive backing from the copper pieces. Apply these to the CPU, RAM, and ethernet chip.



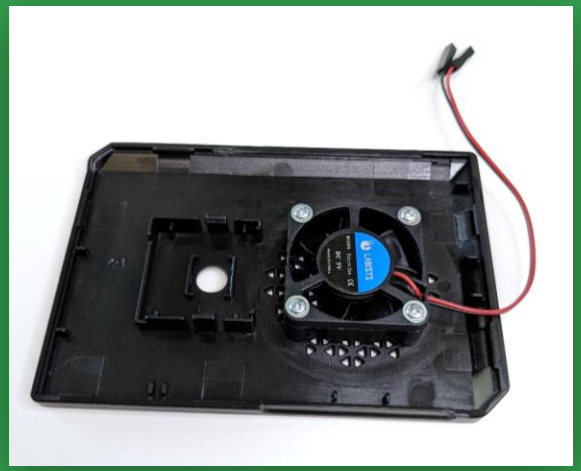
BEFORE

AFTER

Install Fan

The fan also helps cool components. Lower the fan onto the posts on lid of the case. Use silver screws to secure the fan in place.

BEFORE

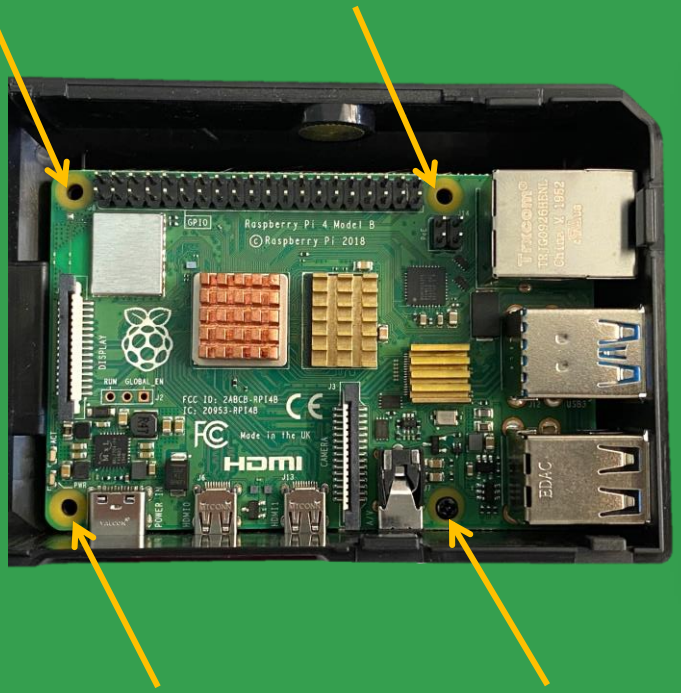


AFTER

Install RPi in case

Lower the RPi into case. Be sure ports and screw holes are aligned and apply downward pressure when turning the screwdriver to avoid stripping screws.

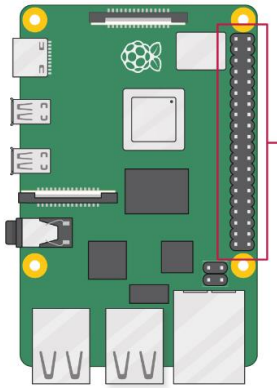
BEFORE

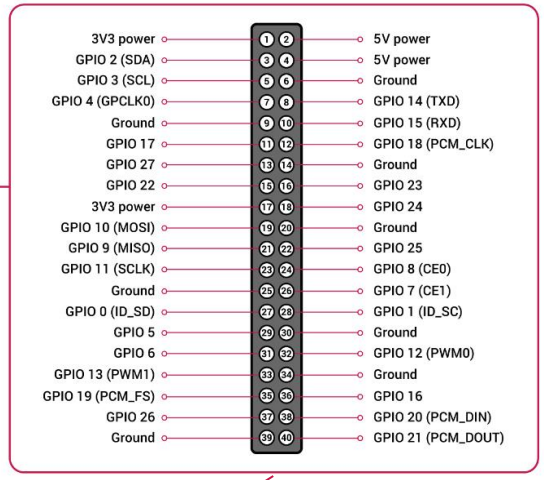


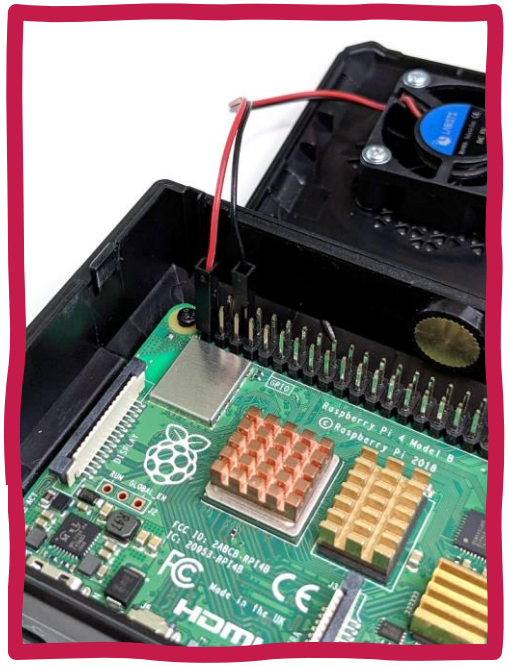
AFTER

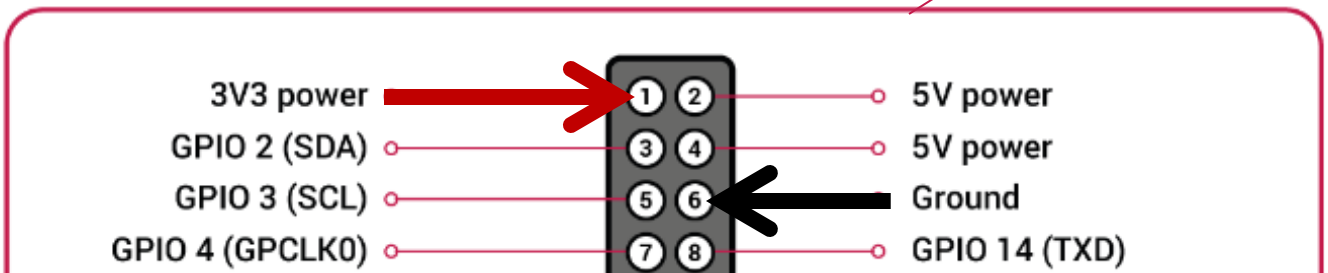
Connect fan to GPIO pins

To power fan, connect red wire to pin 1 (3V3 power) and black wire to pin 6 (Ground).









Insert microSD

Snap the case shut, then insert microSD card.

BEFORE

AFTER

Connect input

Plug in USB cables for the mouse and keyboard provided into RPi.

Connect output

Plug in HDMI into a screen (monitor or TV, not provided) and insert the Micro HDMI into the RPi.

Connect power supply

Behind panel, underneath table, unplug the three-pronged cord. In its place, plug in the power supply cable. Insert cable into USB-C port.

Turn on screen and RPi

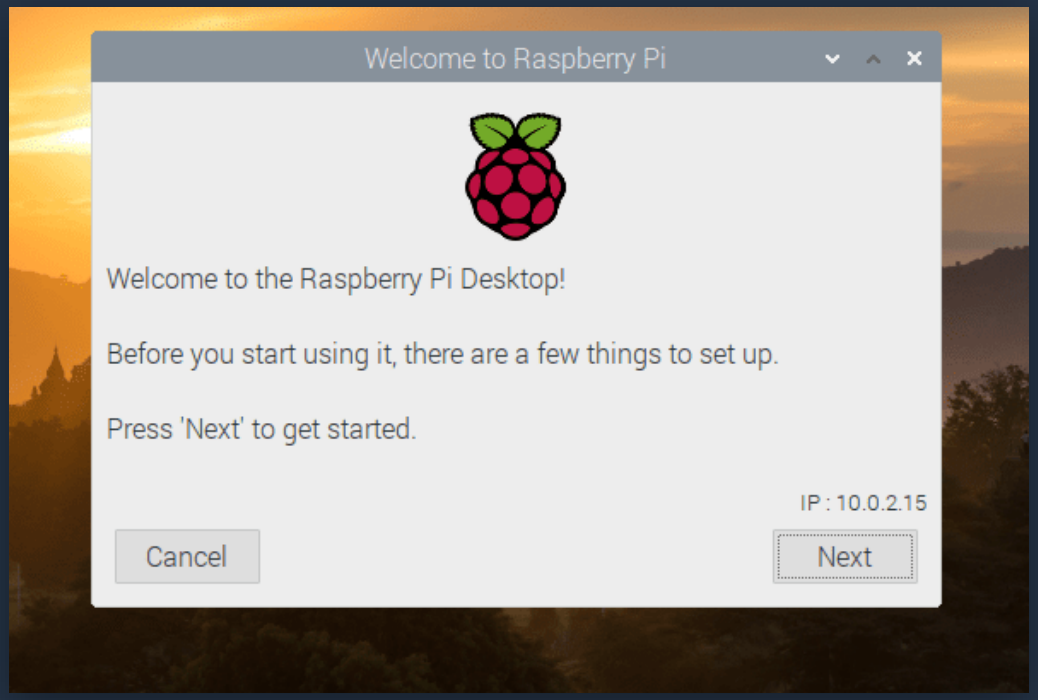
Turn on screen. Flip the switch on the power supply cord. You should hear the fan and see the startup screen for Raspbian.

If you don't hear the fan, check that the power cable is fully connected and the fan is properly plugged into the pins.

If the startup screen doesn't appear but you hear the fan, try removing the microSD card and putting it back in. It may not be seated properly.

Setup Operating System

The installation wizard will walk you through setup process, covered in the following slides.



Configure Settings

Once online, you'll be prompted to set country, language, and timezone.

Set Password

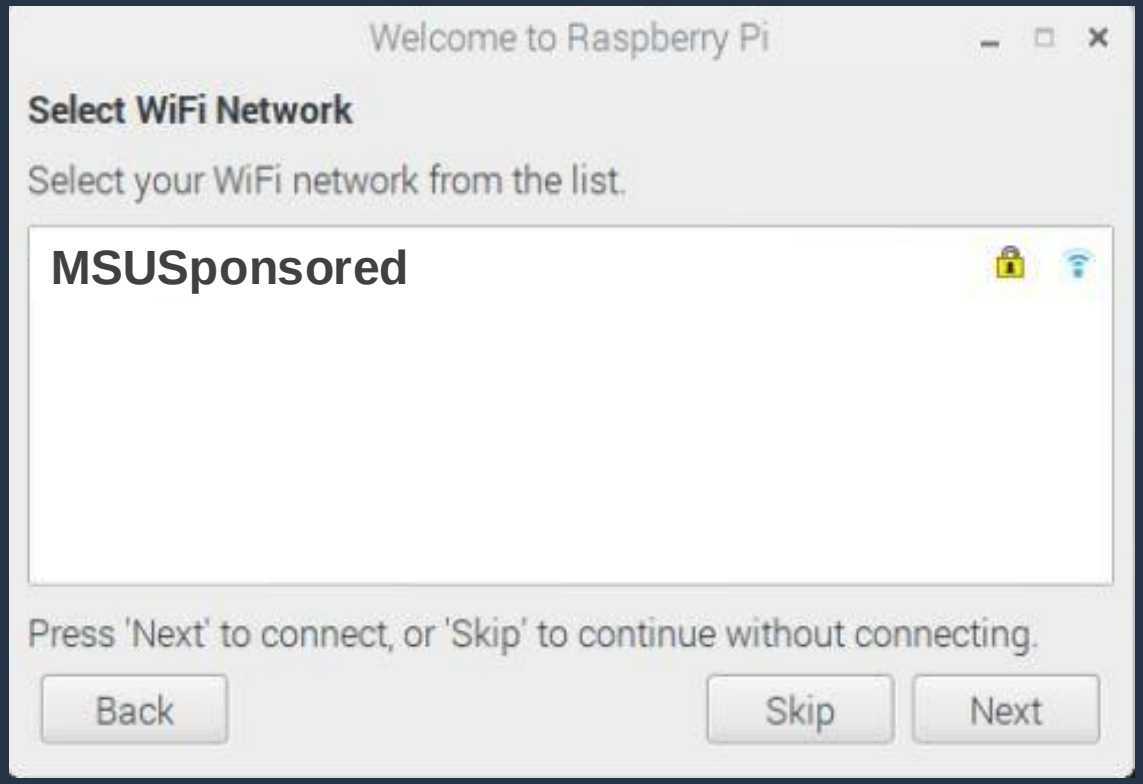
Change password to something memorable.

Configure display

If you see a black border, check the box before clicking “Next”.

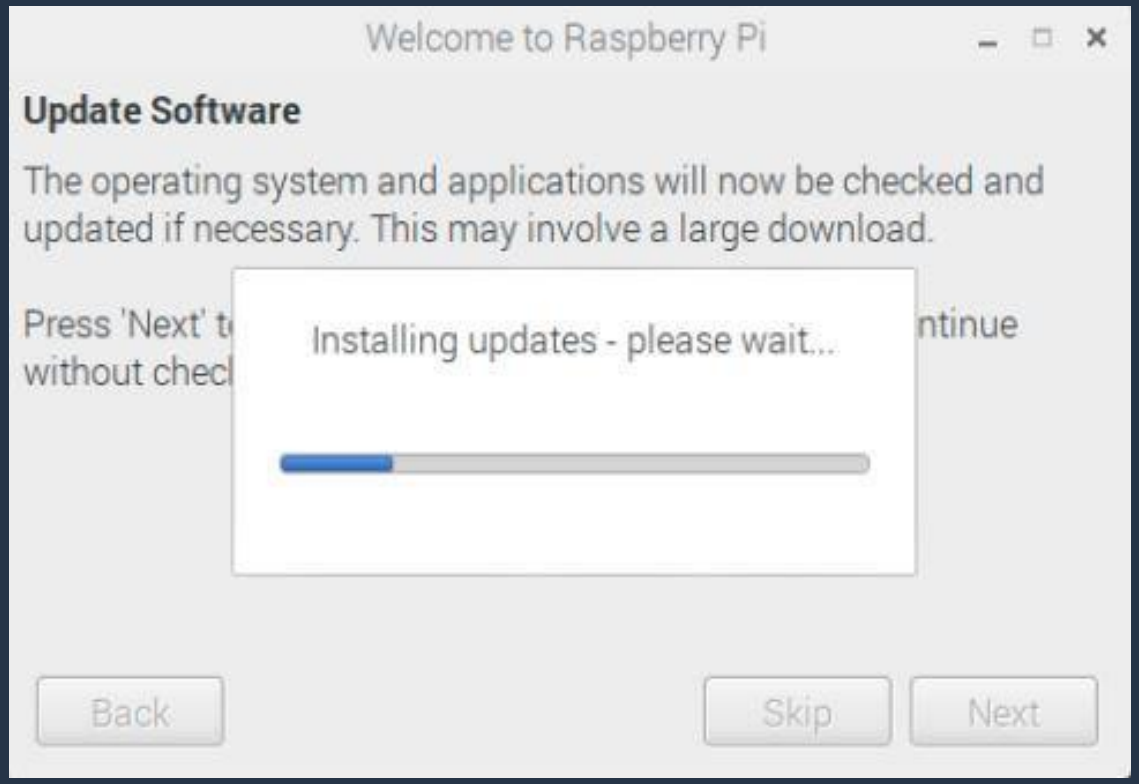
Connect to WiFi

Enter WiFi password from card provided to join MSUSponsored.



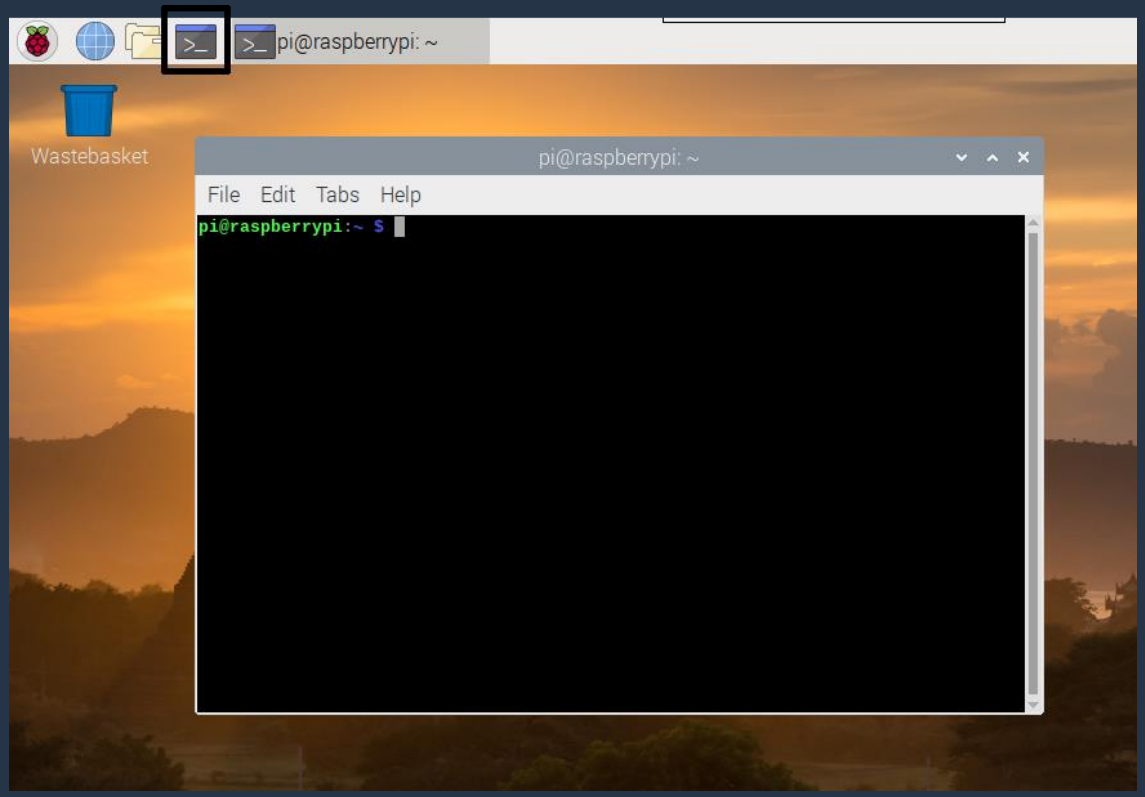
Update software

Go ahead and perform software updates. Once these have started, you may take a ten-minute break.



Open terminal

Next, we will download and enable a package to secure RPi by entering commands into the terminal. Click fourth icon from top left.



Enter commands

Type each command where the cursor appears after the following:

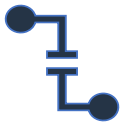
```
pi@raspberrypi:~ $
```

After each command, hit enter key

Install firewall

```
sudo apt install ufw
```

As super user, do (sudo) install uncomplicated firewall (ufw) using advanced package tool (apt)



Enable firewall

```
sudo ufw enable
```

As super user, enable ufw package

Limit logins

```
sudo ufw limit ssh/tcp
```

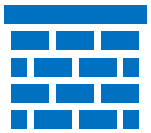
Limits connection to secure shell (ssh) using terminal control protocol (tcp) to six times in a row

FINAL STEP - SECURE RASPBERRY PI

Type each command given below where the cursor appears after

```
pi@raspberrypi: ~ $
```

Then click enter



Install firewall

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sudo apt install ufw
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As super user, do (sudo) install uncomplicated firewall (ufw) using advanced package tool (apt)

Enable firewall

```
sudo ufw enable
```

As super user, enable ufw package

Limit logins

```
sudo ufw limit
ssh/tcp
```

Limits connection if attempted six or more times in a row

Securing Raspberry Pi

1. To install firewall, type: sudo apt install ufw
   And, hit Enter.

2. To enable the firewall, type: sudo ufw enable
   And, hit Enter.

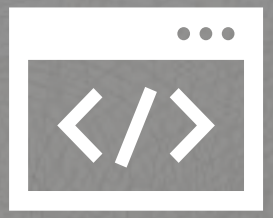
3. To limit login attempts on ssh port using tcp:
   sudo ufw limit ssh/tcp
   And, hit Enter.

Activity 1-2
Airport

Airport scenario

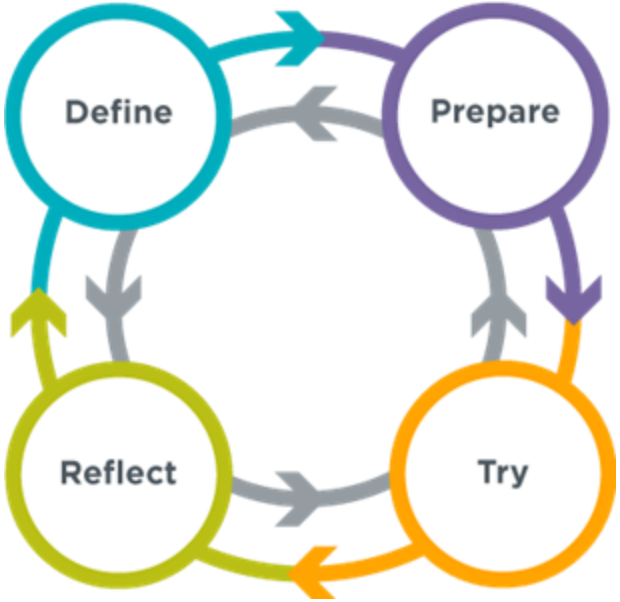
A sibling is arriving soon by plane for a visit. They are not familiar with the area where you live. They ask you for help.

What are the steps they need to take to get to your house?



Module 1.3
Algorithms

Remember Computer Programming?



Define - determine objective, related factors

Prepare - specify elements, determine tools, design process

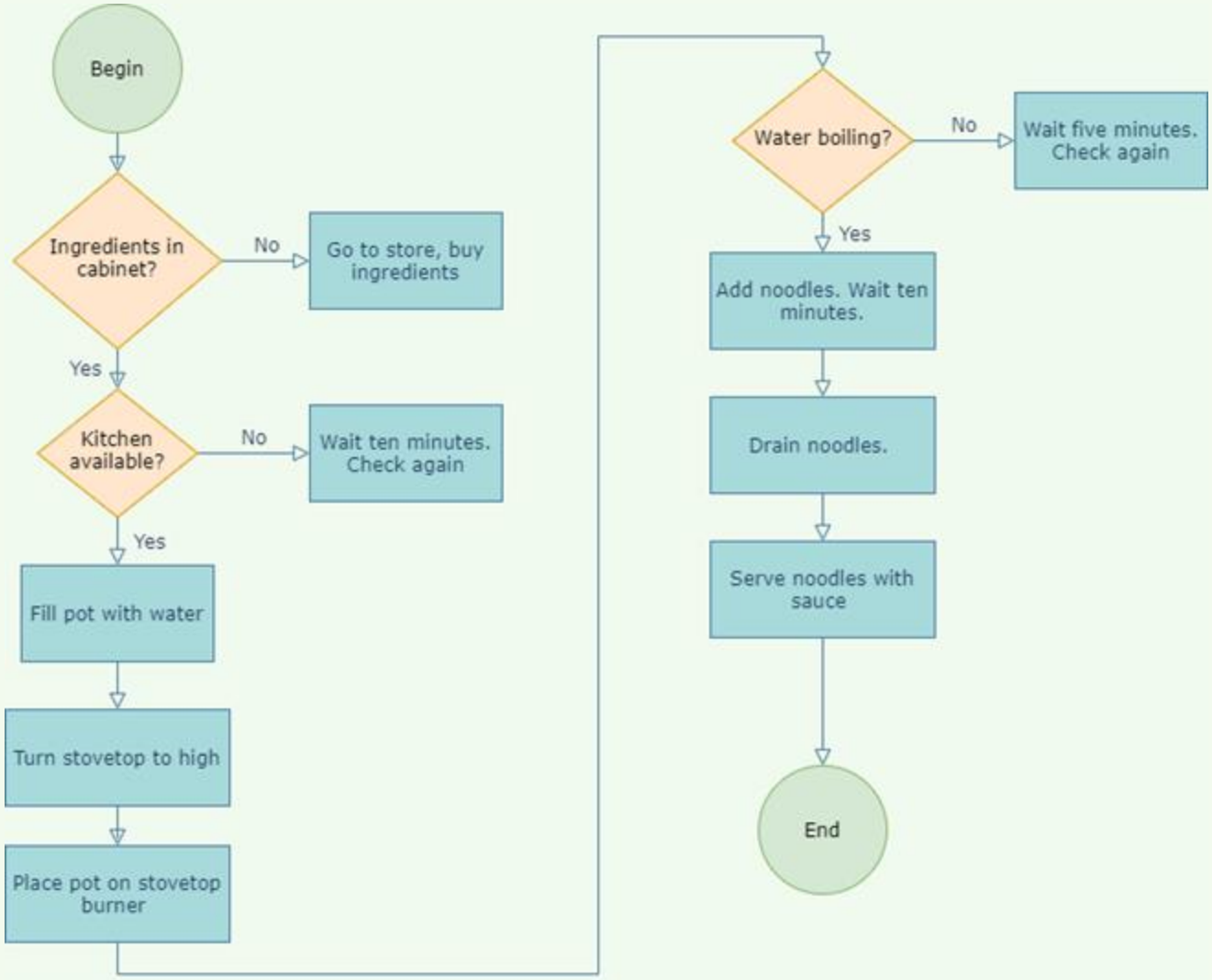
Try – code and execute

Reflect - evaluate performance in meeting objective

Note. Image above and conceptual basis adapted from CS Discoveries 2020 - 2021, open-source lesson plans provided by Code.org (https://code.org/educate/csd), mapped to standards developed by the Computer Science Teachers Association (CSTA). Licensed under CC BY-NC-SA 4.0.

What are the steps to make spaghetti for yourself?

A flow chart for making spaghetti



Is your Raspberry Pi working?

Goal: Draw a flowchart to represent the steps that you will take to ensure that it is working without touching it!