RASPBERRY PI

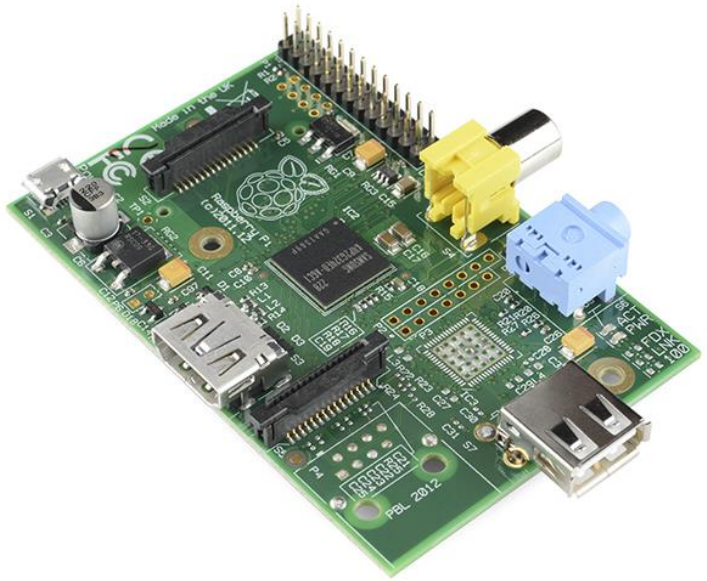
CS95003 - Applied Robotics Lab

Ing. Gerardo Carmona

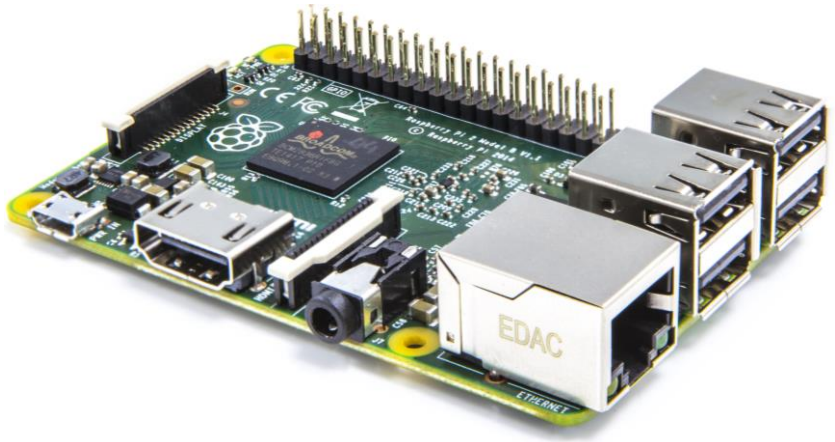
WHAT IS IT?

Raspberry Pi

Different models:



Model A



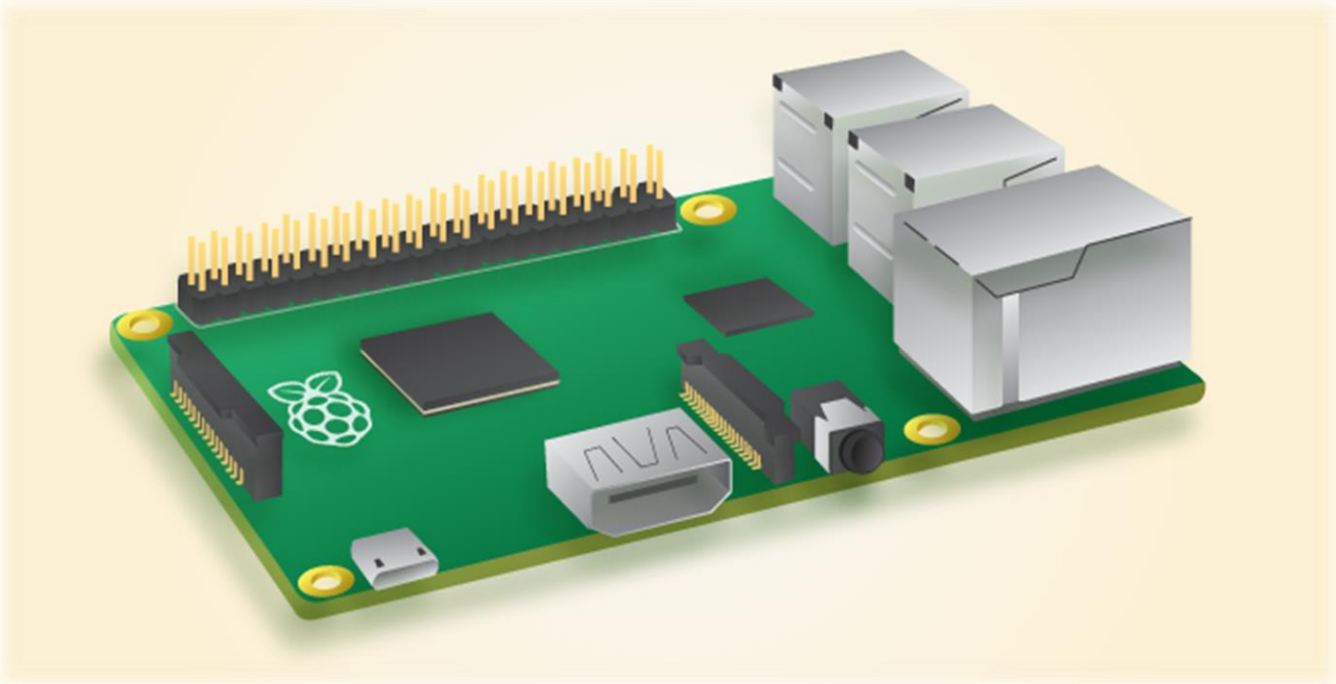
Model 2 B

Model B+

	RPI Model A	RPI Model A+	RPI Model B	RPI Model B+	RPI 2 Model B
SoC	BROADCOM BCM2835	BROADCOM BCM2835	BROADCOM BCM2835	BROADCOM BCM2835	BROADCOM BCM2836
CPU	ARM11 ARMV6 700 MHZ.	ARM11 ARMV6 700 MHZ.	ARM11 ARMV6 700 MHZ.	ARM11 ARMV6 700 MHZ.	ARM11 ARMV7 ARM CORTEX-A7 4 NÚCLEOS 900 MHZ.
GPU	BROADCOM VIDEOCORE IV 250 MHZ. OPENGL ES 2.0	BROADCOM VIDEOCORE IV 250 MHZ. OPENGL ES 2.0	BROADCOM VIDEOCORE IV 250 MHZ. OPENGL ES 2.0	BROADCOM VIDEOCORE IV 250 MHZ. OPENGL ES 2.0	BROADCOM VIDEOCORE IV 250 MHZ. OPENGL ES 2.0
RAM Memory	256 MB LPDDR SDRAM 400 MHZ.	256 MB LPDDR SDRAM 400 MHZ.	512 MB LPDDR SDRAM 400 MHZ.	512 MB LPDDR SDRAM 400 MHZ.	1 GB LPDDR2 SDRAM 450 MHZ.
USB ports	1	1	2	4	4
GPIO	26 PINES	40 PINES	26 PINES	40 PINES	40 PINES
Video	HDMI 1.4 1920X1200	HDMI 1.4 1920X1200	HDMI 1.4 1920X1200	HDMI 1.4 1920X1200	HDMI 1.4 1920X1200
Storage	SD	microSD	SD	microSD	microSD
Ethernet 10/100 MBPS	No	No	Si	Si	Si

What's outside?

- Four USB ports
- Network connection
- HDMI video output
- Audio output
- SD socket
- Micro USB power socket
- GPIOs
- Camera interface (CSI)
- Display interface (DSI)



The Processor

900 MHz quad-core ARM Cortex A7 System on a Chip (SoC), which is built on the ARM11 architecture with set instructions V7. ARM chips come in a variety of architectures with different cores configured to provide different capabilities at different price points.

It also contains 1GB RAM.

GETTING STARTED

What you'll need

- Raspberry Pi
- SD Card with at least 4 GB
- USB keyboard
- USB mouse
- Power supply
- Computer with SD card reader
- Video cable:
  - HDMI to VGA (old monitors or projectors)
  - HDMI to DVI (school monitors)
  - HDMI to HDMI (most TV's)

Power supply

- This is the most important peripheral to get right; you should use a microUSB adapter that can provide 5V and at least 700mA of current (500mA for the Model A). A cell phone charger won't cut it, even if it has the correct connector. A typical cell phone charger only provides 400mA of current or less, but check the rating marked on the back. An underpowered Pi may still seem to work but will be flaky and may fail unpredictably.
- With the current version of the Pi board, it is possible to power the Pi from a USB hub that feeds power. However, there isn't much protection circuitry so it may not be the best idea to power it over the USB ports. This is especially true if you're going to be doing electronics prototyping where you may accidentally create shorts that may draw a lot of current

Software

- **Skip this part if you have a pre-installed software on your SD card.**
- You will need a computer (mac windows or linux)
- Got to the next URL:
  - http://www.raspberrypi.org/downloads/
  - Download Raspbian in Zip or Noobs
- There are several OS that your Pi can run, most popular are:
  - NOOBS (New Out Of Box Software, recommended) (at least 8 Gb SD card recommended)
  - Raspbian (A community-created port of Debian wheezy, optimized for the Raspberry Pi) (at least 4 Gb SD card needed)

Prepare your SD card

- **Skip this part if you have a pre-installed software on your SD card.**
- For Raspbian follow the instructions on:
  - File: Pasos para instalar Raspbian.pdf
- For Noobs watch this video:
  - http://www.raspberrypi.org/help/noobs-setup/

Configuring your Pi

Configuring your Pi

- **Expand rootfs:** You should always choose this option; this will enlarge the filesystem to let you use the whole SD card.
- **Overscan:** Leave the overscan option disabled at first. If you have a high definition monitor you may find that text runs off the side of the screen. To fix this, enable the overscan and change the values to fit the image to the screen. The values indicate the amount of overscan so the display software can correct; use positive values if the image goes off the screen, negative if there are black borders around the edge of the display.
- **Keyboard:** The default keyboard settings are for a generic keyboard in a UK-style layout.

Configuring your Pi

- **Password:** It's a good idea to change the default password from *raspberry* to something a little stronger.
- **Change Locale:** If you're outside the UK you should change your locale to reflect your language and character encoding preferences. Select en_US.UTF-8 if you like US or select your best option.
- **Change timezone:** Central UTC -6:00 for Guadalajara.
- **Memory split:** This option allows you to change the amount of memory used by the CPU and the GPU. Leave the default split for now.

Configuring your Pi

- **Overclock:** You now have the option of running the processor at speeds higher than 700MHz with this option. I don't recommend to change this option, leave the default settings.
- **SSH:** This option turns on the Secure Shell (ssh) server, which will allow you to login to the Raspberry Pi remotely over a network. This is really handy, so you should turn it on.
- **Desktop Behavior:** This option lets you boot straight to the graphical desktop environment and is set to Yes by default.
- **Update:** To update your software if you are connected to the internet.

GRAPHIC MODE

Login…

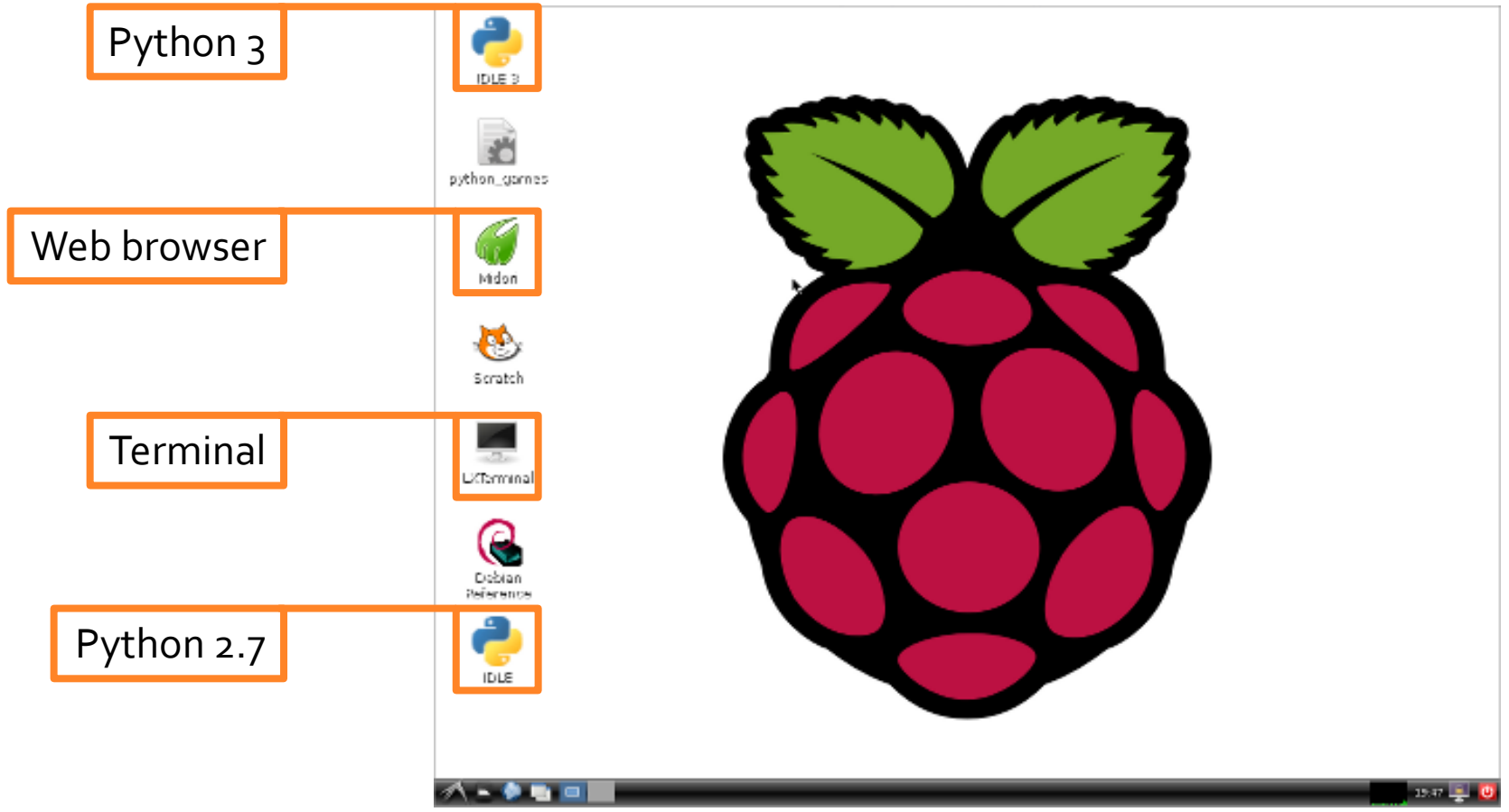
- To login to your pi use:

```
raspberrypi login: pi
Password: raspberry
```

- To start graphic mode:

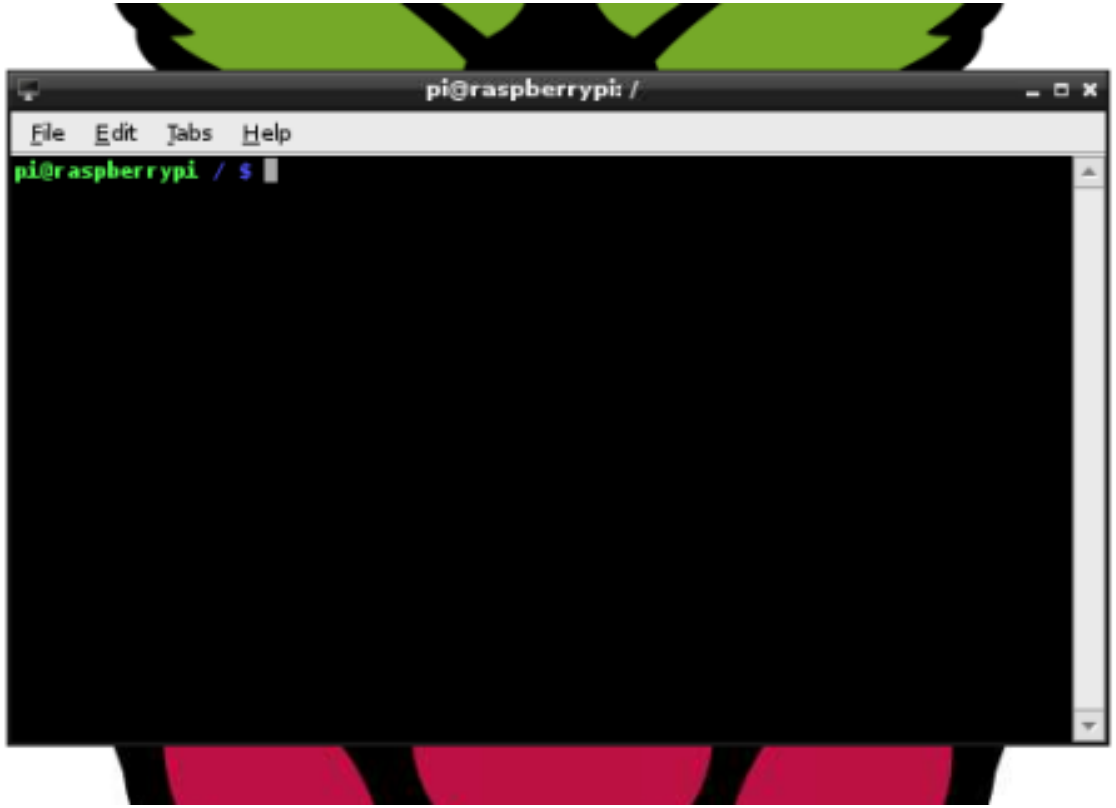
```
pi@raspberrypi~$ startx
```

Graphic Mode



Exploring

- Open Terminal



Terminal

- Some commands:

Command	Action
sudo shutdown –h now	Turn off your Pi
sudo reboot	Reboot your pi
sudo raspi–config	Open configuration window
startx	Start graphic mode
cd name_of_folder	Change to a specific directory
cd ..	Go back one directory
cd /	Go back to the main directory
ls	Display list of files and folders

- Detailed commands can be found in “Commands Shell.pdf” file.