Università degli studi di Roma Tor Vergata

Facoltà di Ingegneria

Roma2LUG
Linux User Group

Roma2LUG Incontra

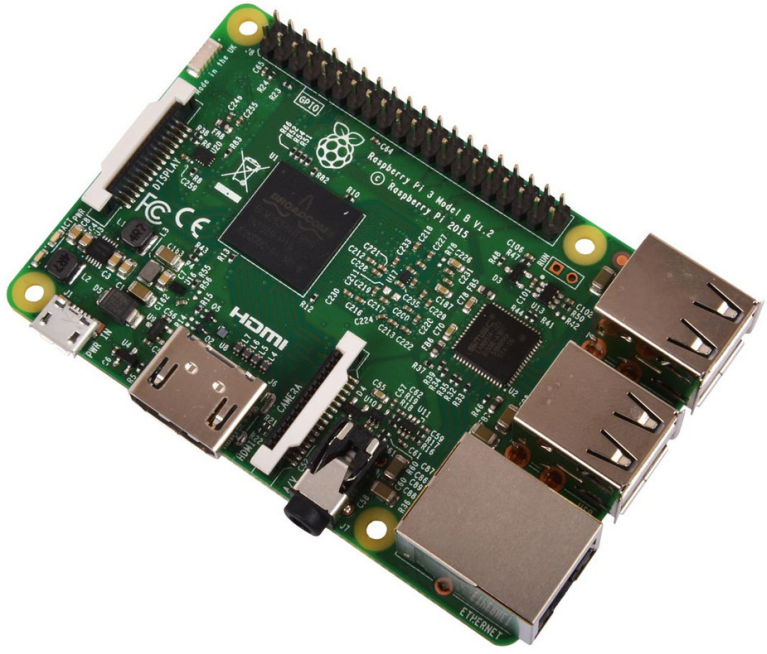
Music On Linux

Speaker
Giulia Cassarà

Speaker
Emanuele Savo

OpenStack

Esempio di topologia virtuale realizzabile sulla piattaforma IaaS

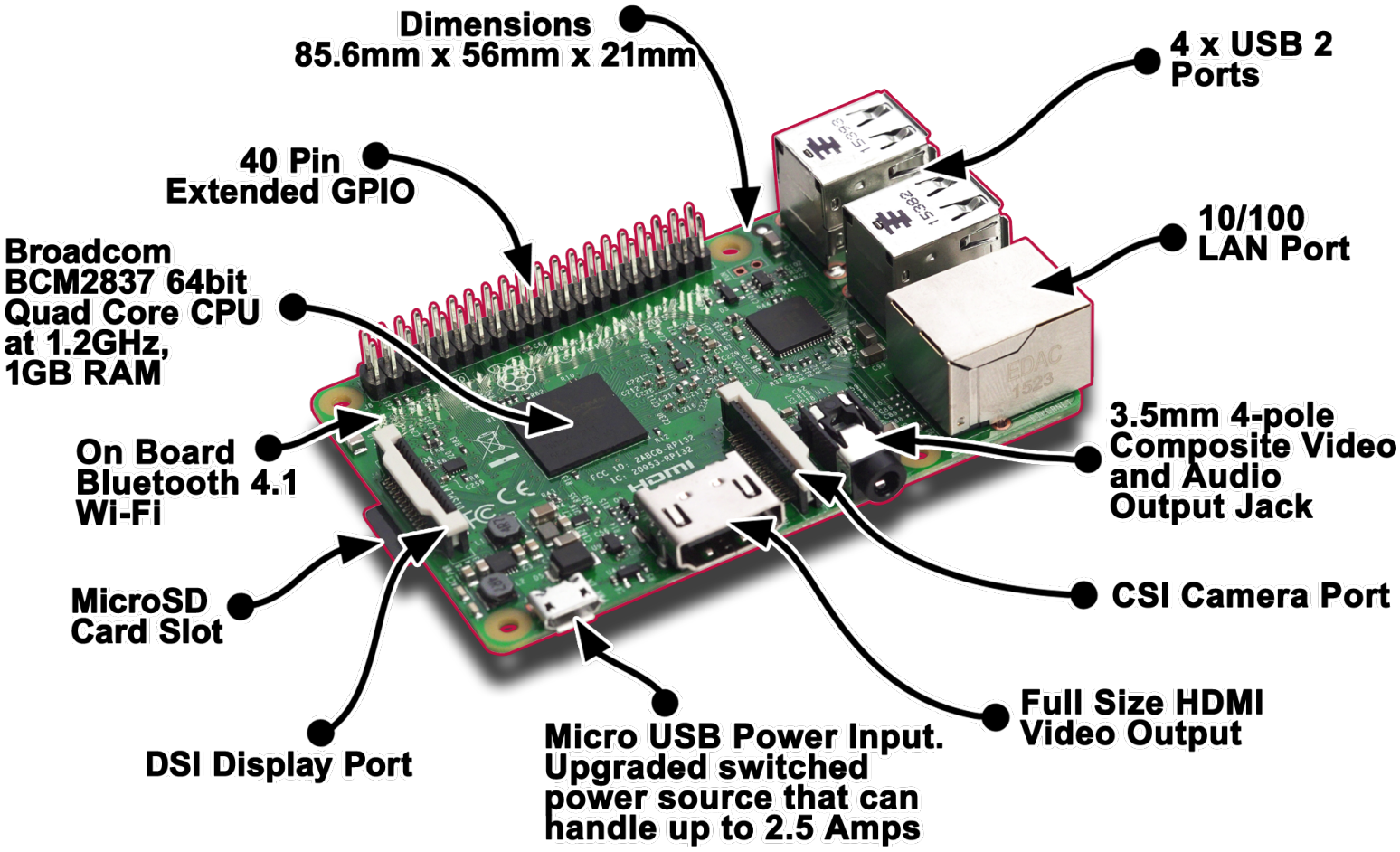


Studio Piattaforma IaaS

- Born as a MiniPC
- Can reproduce HD movies
- The main difference with a PC are the GPIO ports

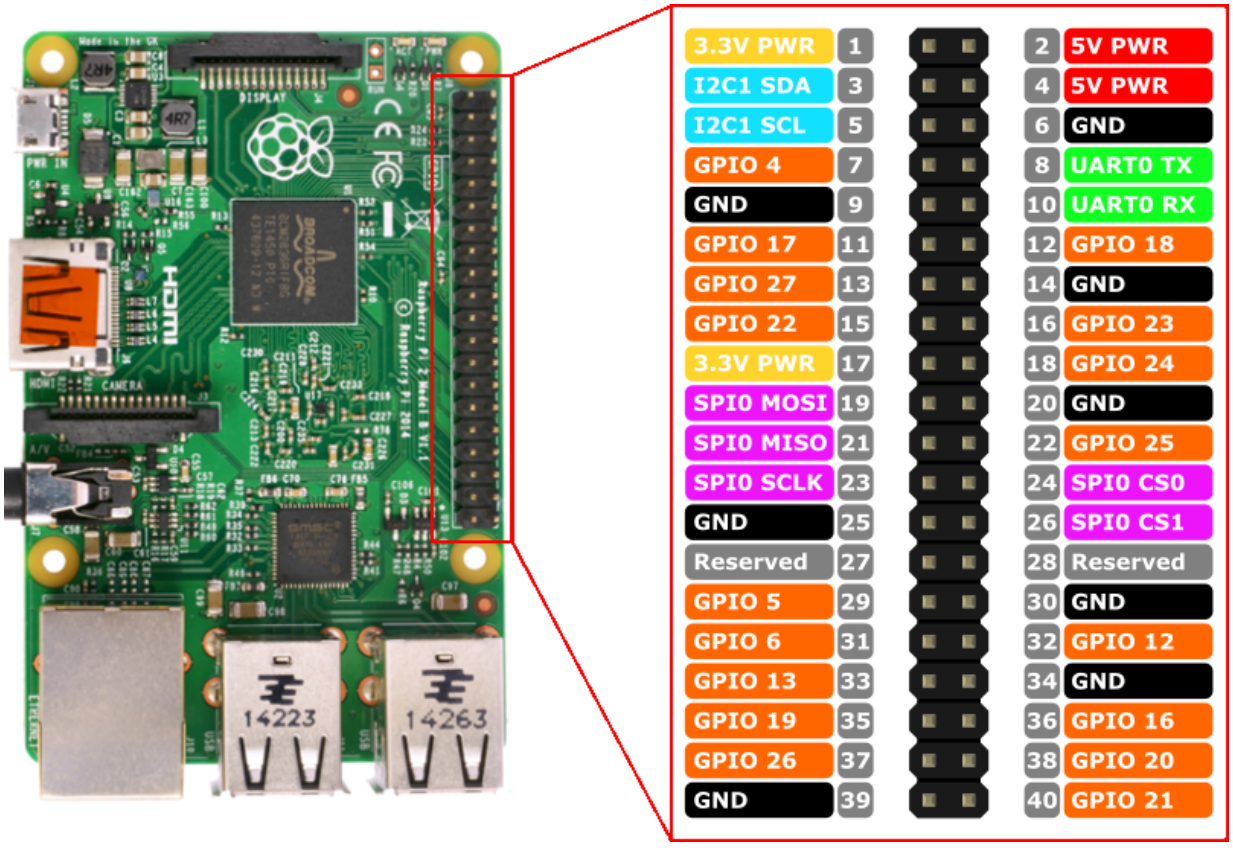
OpenStack

Esempio di topologia virtuale realizzabile sulla piattaforma IaaS



OpenStack

Esempio di topologia virtuale realizzabile sulla piattaforma IaaS



Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

AAAAAAAAAAAAAAAAAAAAAAAAAA

- Download Raspbian OS for the Raspberry Pi

```
$ wget https://downloads.raspberrypi.org/
    raspbian_lite_latest
```

- Unzip Raspbian OS for the Raspberry Pi

```
$ unzip xxxx-xx-xx-raspbian-jessie-lite.zip
```

Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

Studio Piattaforma IaaS

- Insert SD card
- Search for device name of the SD card with this command:

```
$ sudo fdisk -l
```

- Search for info about your SD card. *Warning, be careful!*

```
Disk /dev/mmcblk0: 14,5 GiB, 15523119104 bytes, 30318592 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytesa
Disklabel type: dos
Disk identifier: 0x6f92008e
```

- Replace mmcblk0 with device name of your SD

```
$ sudo dd \
  if=/xxxx-xx-xx-raspbian-jessie-lite.img \
  of=/dev/mmcblk0
```

Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

Studio Piattaforma IaaS

- Connect ethernet cable to the Raspberry Pi
- Connect HDMI cable to the Raspberry Pi
- Connect micro USB power cable to the Raspberry Pi
- Waiting for coplete boot...
- Login
  - user: pi
  - password: raspberry
- Execute these commands:

```
$ sudo apt-get update
$ sudo apt-get dist-upgrade -y
$ sudo apt-get install rpi-upate -y
```

Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

Studio Piattaforma IaaS

- Config Raspbian OS with this tool

```
$ sudo raspi-config
```

  - Expand Filesystem
  - Internationalisation Options
    - Change Locale
    - Change Timezone
    - Change Keyboard Layout
    - Change wifi Country

```
$ sudo reboot
```

- Update Raspberry Pi firmware

```
$ sudo rpi-update
$ sudo reboot
```

Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

Studio Piattaforma IaaS

- Install library for gpio and other tools

```
$ sudo apt-get install wiringpi git vim
```

- Download the scripts

```
$ git clone https://github.com/Roma2Lug-
    Projects/MusicOnLinux.git
```

- Open the script

```
$ cd MusicOnLinux
$ vim keyboard.sh
$ vim smario.sh
```

Suite di benchmark CRD (Cpu Ram Disk)

Loader & Worker

Studio Piattaforma IaaS

- Give execute permission

```
$ chmod +x keyboard.sh
$ chmod +x smario.sh
```

- Execute the scripts!

```
$ ./keyboard.sh
$ ./smario.sh
```

Keyboard.sh


```
#! /bin/bash
tone () {
local note="$1"
local duration="$2"
if test "$note" -eq 0; then
  gpio -g mode 18 in
else
  local period="$(perl -e"printf '%.0f
    ',600000/440/2**(( $note-69)/12 )")"
  gpio -g mode 18 pwm
  gpio pwmr "$(( period ))"
  gpio -g pwm 18 "$(( period/2 ))"
  gpio pwm-ms
  sleep $duration
  tone 0
fi
}
```

Keyboard.sh nel dettaglio

```
#!/bin/bash

tone () {
        local note="$1"
        local duration="$2"
        if test "$note" -eq 0; then
        gpio -g mode 18 in
```

- first parameter: note
- second parameter: duration of the note
- If the note is 0 I put the GPIO in input mode, so the speaker doesn't make any sound.

Keyboard.sh nel dettaglio(1)

```
else
    local period="$(perl -e"printf '%.0f
        ',600000/440/2**(( $note-69)/12 )")"
```

- We use the formula below to obtain the frequency of the note.

$$K \cdot \frac{440}{2^{\frac{X-69}{12}}} \tag{1}$$

- K=600.000 is a hardware constant.
- The twelfth root of two or $\sqrt[12]{2}$ is an algebraic irrational number. It is most important in music theory, where it represents the frequency ratio of a semitone in twelve-tone equal temperament.
- X is our note, encoded in ASCII. note 'A' = 69 and has a frequency of 440 Hz.

Keyboard.sh nel dettaglio(2)

```
gpio -g mode 18 pwm
    gpio pwmr "$(( period ))"
    gpio -g pwm 18 "$(( period/2 ))"
    gpio pwm-ms
    sleep $duration
    tone 0
```

- K=600.000 is a hardware constant.
- The twelfth root of two or $\sqrt[12]{2}$ is an algebraic irrational number. It is most important in music theory, where it represents the frequency ratio of a semitone in twelve-tone equal temperament.
- X is our note, encoded in ASCII. note 'A' = 69 and has a frequency of 440 Hz.

Grazie per l'attenzione