



# Introdução ao Raspberry Pi3

## Aula 2

Arakaki, Gomi e Saraiva

PCS - Departamento de Engenharia de Computação e Sistemas Digitais  
Escola Politécnica da Universidade de São Paulo

Março, 2020

# Agenda

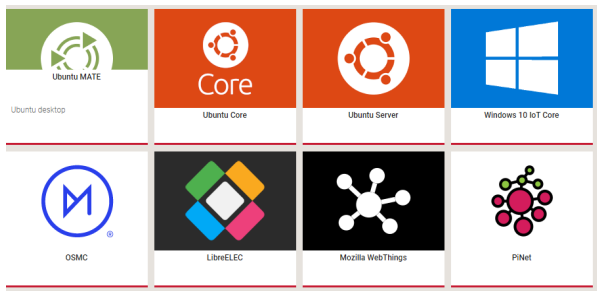
- Como começar a usar
- Instalação
- Exemplos de aplicações
- Links úteis
- Tarefa

## Como começar a usar

- Instalar o sistema operacional (SO)
- Instala-se o SO no cartão de memória conectado a um computador
- Conectar os componentes ao Raspberry
- Colocar o cartão de memória no Raspberry
- Ligar a fonte de alimentação

# Processo de Instalação do SO

- Escolha do sistema operacional
- Existem diversas opções
- Recomenda-se o Raspbian



- Raspbian
  - Distribuição baseada no Debian
  - SO oficial para todos os modelos do Raspberry Pi
  - Download:  
<https://www.raspberrypi.org/downloads/raspbian/>

# Processo de Instalação do SO

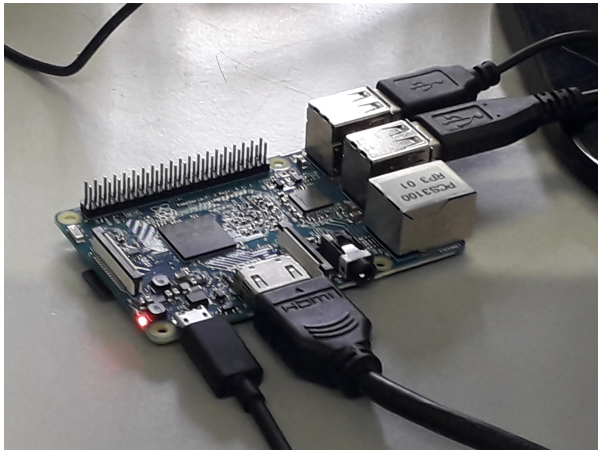
- Opção antiga: Noobs
- Escrita da imagem no cartão de memória
- Escolha do SO a ser instalado
- Download: <https://www.raspberrypi.org/downloads/noobs/>

# Preparação da Instalação

- Itens usados:
  - Raspberry Pi3
  - Fonte de alimentação 5V / 2A
  - Cartão SD (Classe 10 e mínimo de 16gb)
  - Monitor com entrada HDMI
  - Cabo HDMI
  - Mouse e teclado USB
  - Cabo de rede ou wifi

# Preparação da Instalação

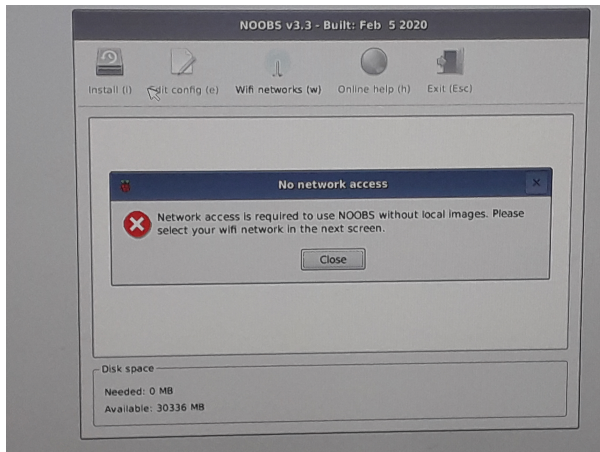
## ■ Montagem inicial





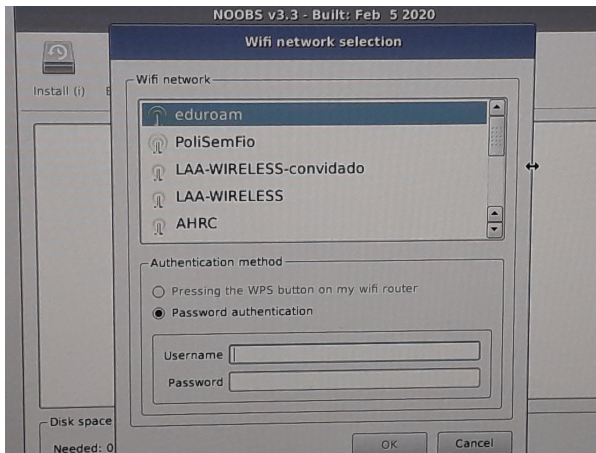
# Instalação usando o Noobs

## ■ Necessidade da rede



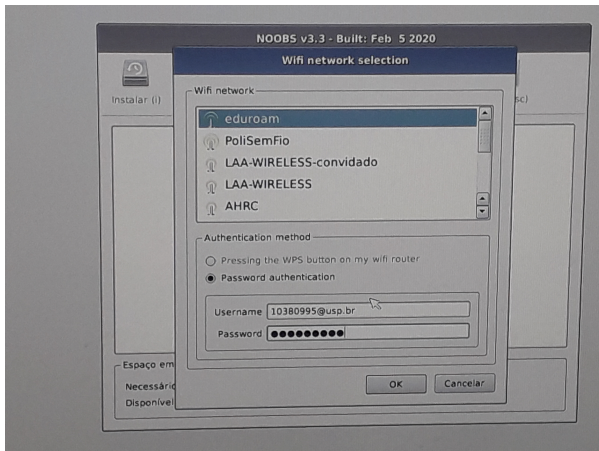
# Instalação usando o Noobs

## ■ Escolha da rede



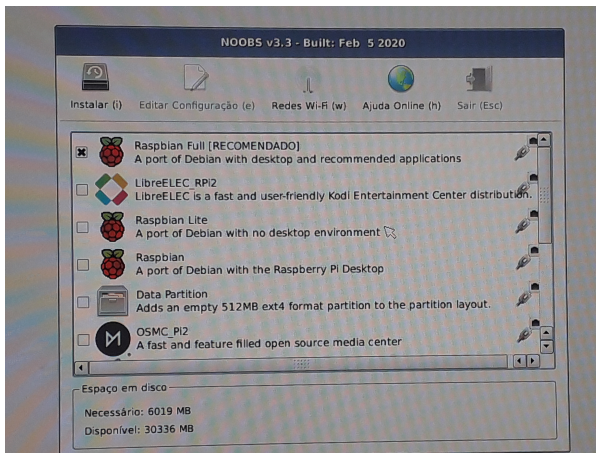
# Instalação usando o Noobs

- Se for eduroam, use seu número USP + @usp.br



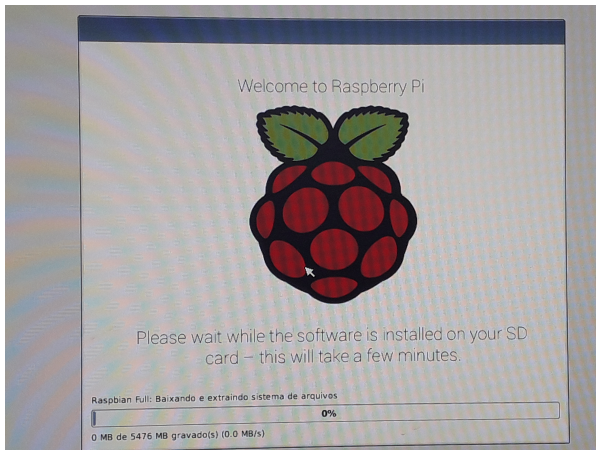
# Instalação usando o Noobs

## ■ Escolha do SO



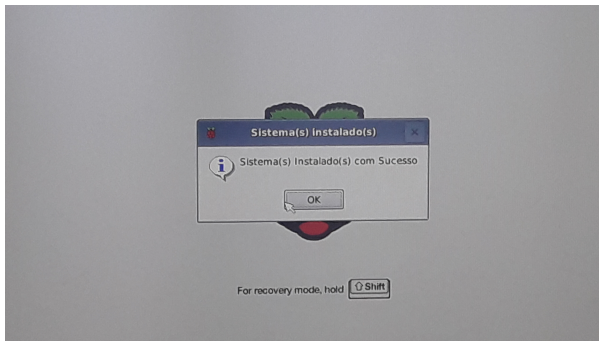
# Instalação usando o Noobs

- Velocidade depende da sua rede



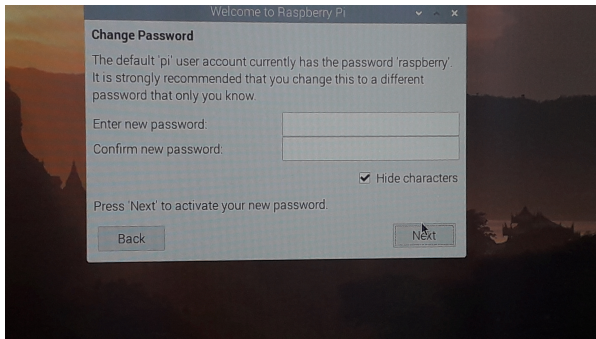
# Instalação usando o Noobs

- Na minha rede levou cerca de 40 minutos



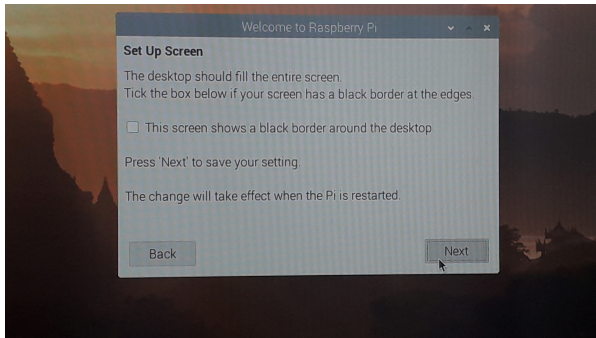
# Finalização da Instalação

## ■ Senha inicial é raspberry



# Finalização da Instalação

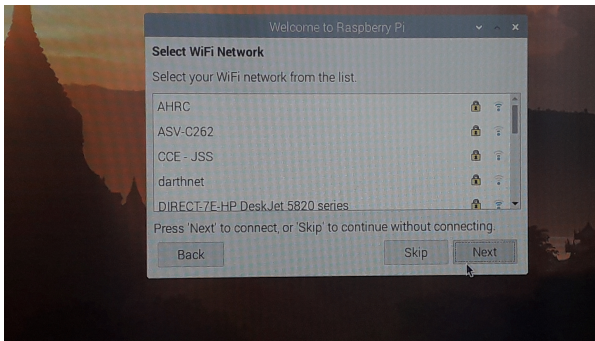
## ■ Configuração da tela





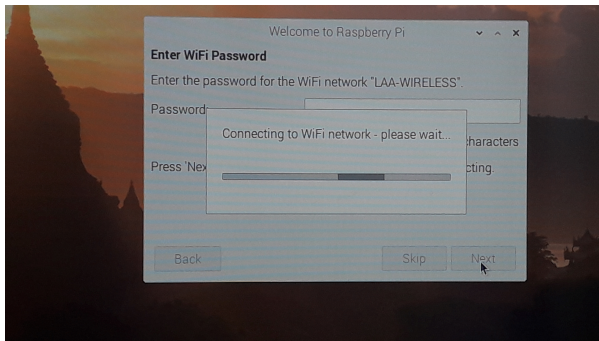
# Finalização da Instalação

## ■ Escolha da rede



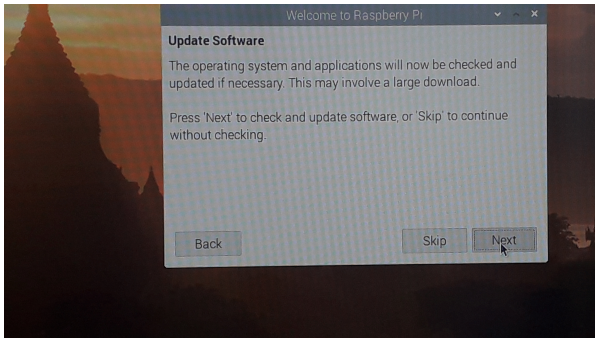
# Finalização da Instalação

## ■ Escolha da rede



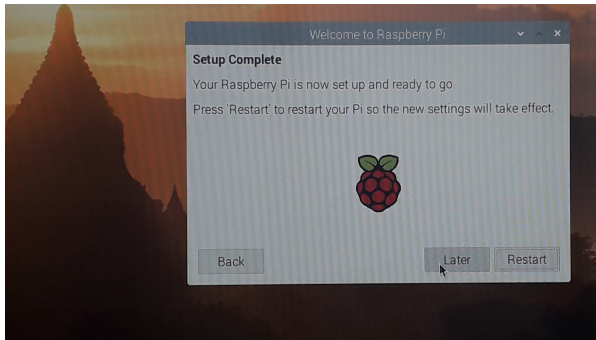
# Finalização da Instalação

## ■ Atualização dos pacotes

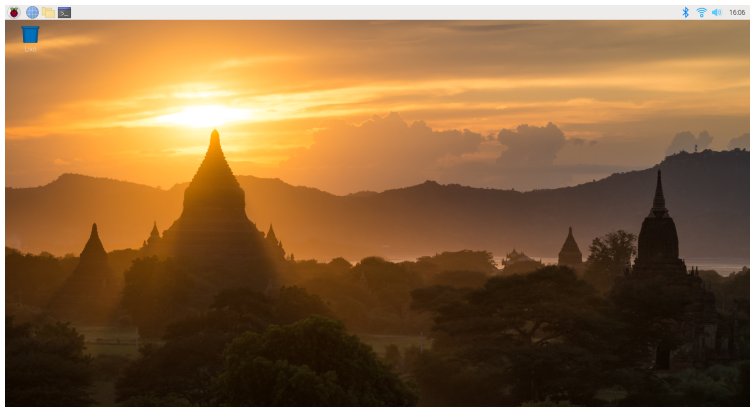


# Finalização da Instalação

## ■ Finalizado!



## ■ Tela inicial



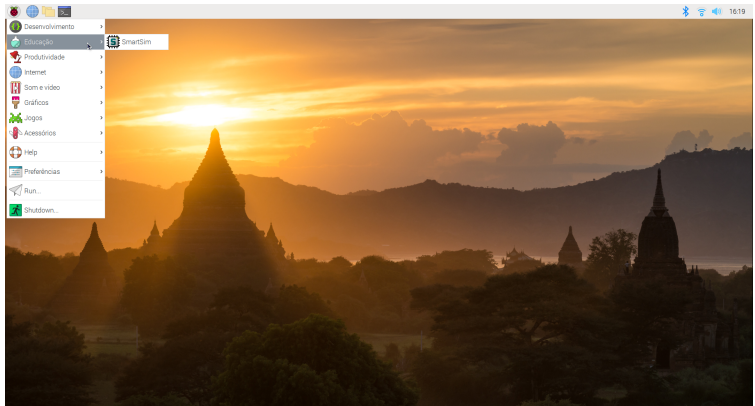
# Raspbian - Aplicativos instalados

## ■ Ferramentas de desenvolvimento



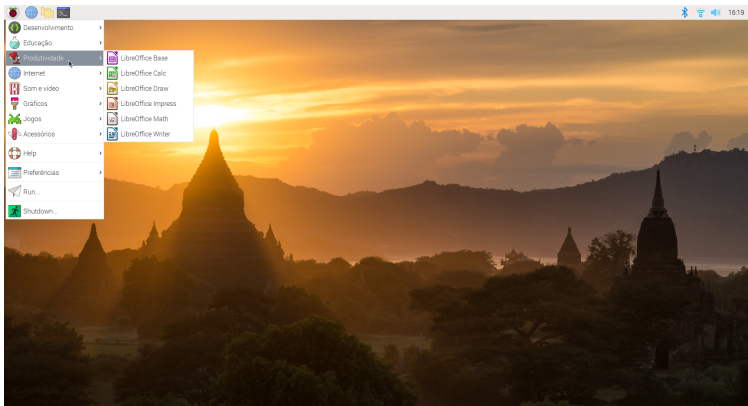
# Raspbian - Aplicativos instalados

## ■ Educação



# Raspbian - Aplicativos instalados

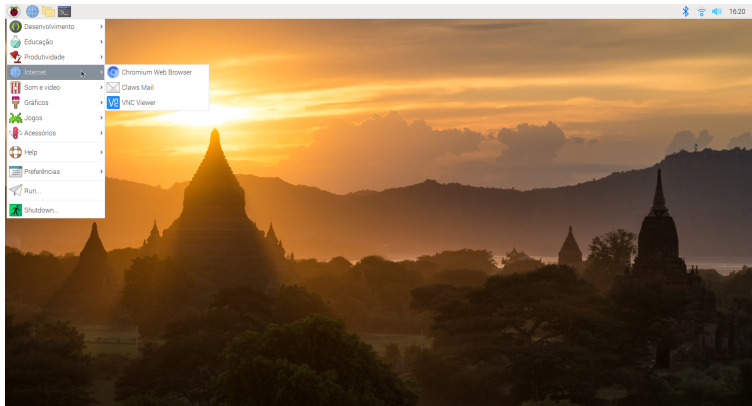
## ■ Pacote Office





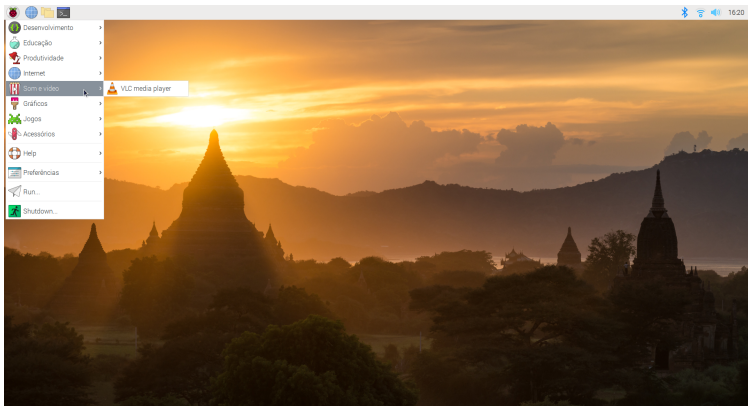
# Raspbian - Aplicativos instalados

## ■ Internet



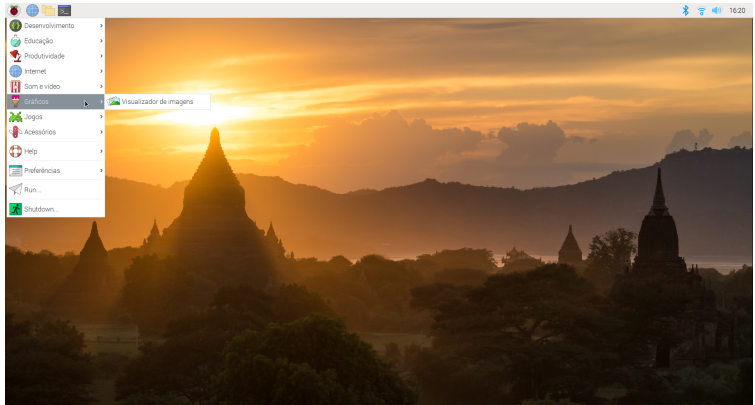
# Raspbian - Aplicativos instalados

## ■ Vídeo



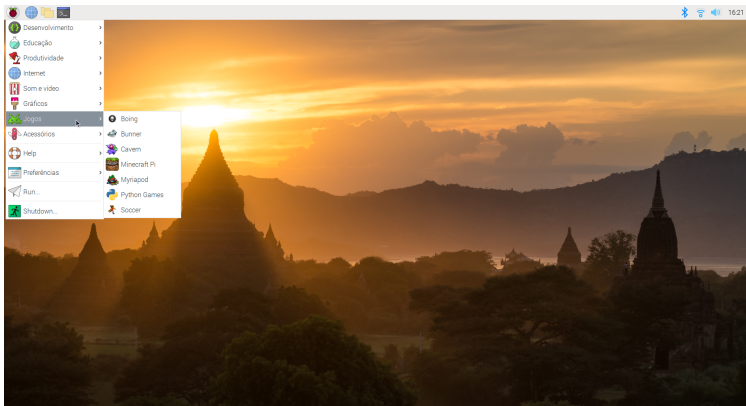
# Raspbian - Aplicativos instalados

## ■ Imagens



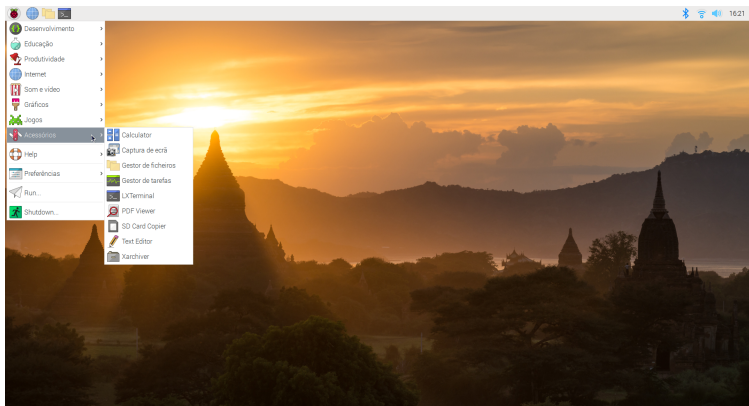
# Raspbian - Aplicativos instalados

## ■ Jogos



# Raspbian - Aplicativos instalados

## ■ Acessórios



# Navegador

## Chromium

The screenshot shows a Chromium browser window displaying the website of the Escola Politécnica (USP). The browser's address bar shows the URL `poli.usp.br`. The website header features the school's logo and name, along with social media icons for USP, Facebook, Messenger, Twitter, and YouTube. A navigation menu is visible on the left side of the header.

The main content area is divided into three columns:

- Destaques:** A large featured article titled "Professores da Poli recebem calouros e apresentam todas as possibilidades oferecidas pela Escola" with a sub-label "Destaque Notícias" and a timestamp of "1 hora ago".
- Nossa Opinião:** Two opinion pieces are listed:
  - "Jornal da USP: Inteligência artificial agiliza busca pela inovação em biblioteca" (5 horas ago).
  - "Professor Luis Sanchez comenta projeto de lei que deixa Estados definirem regras sobre licenciamento ambiental" (1 dia ago).
- Notícias:** A list of news items, including:
  - "recebidos com palestra do cientista Paulo Artaxo" (4 items).
  - "Professores da Poli recebem calouros e apresentam todas as possibilidades oferecidas pela Escola" (3 items).
  - "Jornal da USP: Inteligência artificial agiliza busca pela inovação em biblioteca" (4 items).

## ■ IDE Python

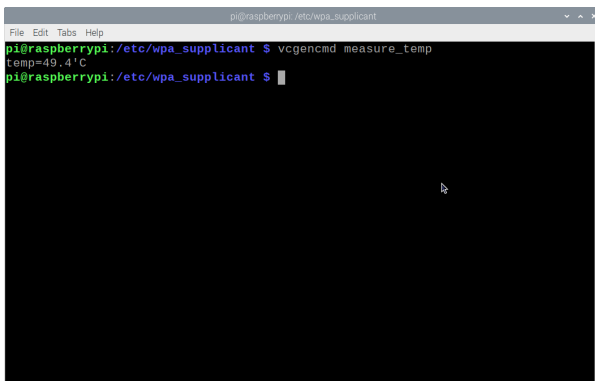
```
Thonny - /home/pi/Documents/teste.py @ 2 - 13
```

New Load Save Run Debug Over Info Out Stop Zoom Quit [Switch to regular mode](#)

```
teste.py X
1 for i in range(10):
2   print(i)
```

```
Shell
Python 3.7.3 (/usr/bin/python3)
>>> %cd /home/pi/Documents
>>> %Run teste.py
0
1
2
3
4
```

## ■ Comando simples

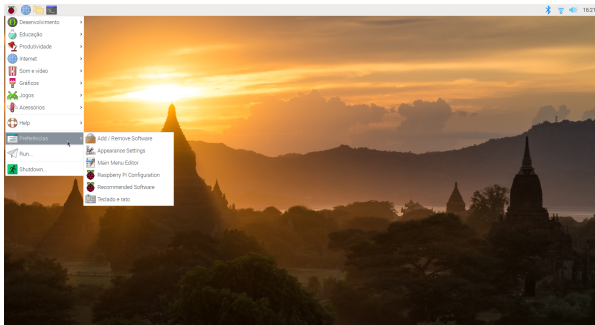


```
pi@raspberrypi: /etc/wpa_supplicant
File Edit Tabs Help
pi@raspberrypi: /etc/wpa_supplicant $ vcgencmd measure_temp
temp=49.4'C
pi@raspberrypi: /etc/wpa_supplicant $
```

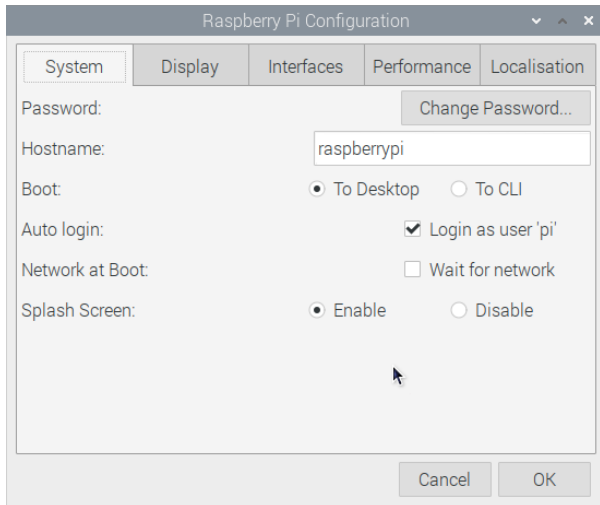


- O monitor usado apenas na instalação
- Acesso pode ser remoto
- Tipos:
  - Secure Shell (SSH)
  - Virtual Network Computing (VNC)

## ■ Clique em Raspberry Configuration

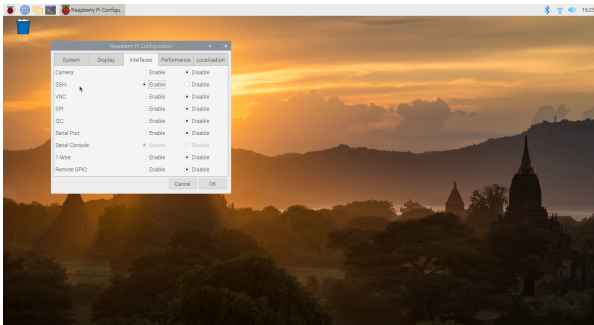


## ■ Clique em Interfaces



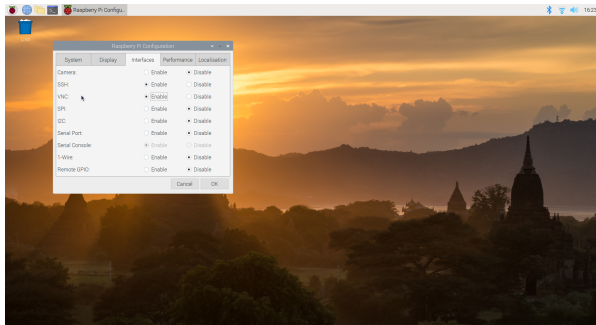
# Configuração acesso remoto

## ■ Habilitar SSH



# Configuração acesso remoto

## ■ Habilitar VNC

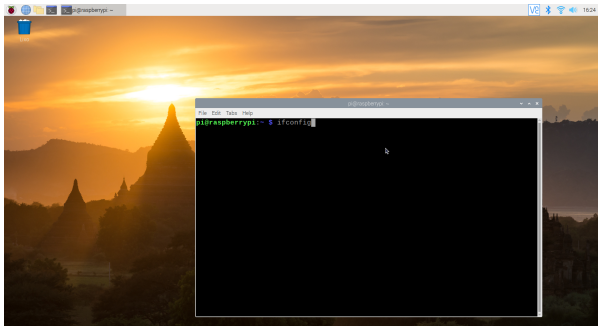


# Acesso remoto - SSH

- Usuários do Windows: devem baixar um cliente SSH
- Usuários Linux: basta usar o terminal
- Necessário identificar o IP do Raspberry

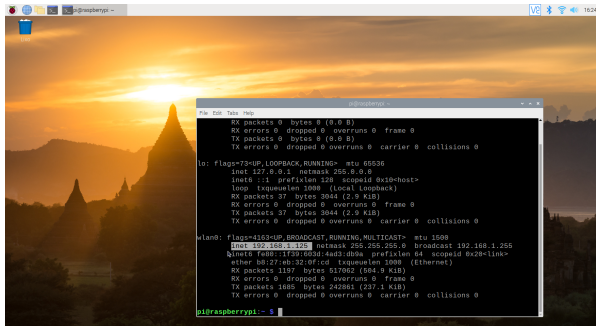
# Identificando o IP

- Identifique o IP: comando *ifconfig*



# Identificando o IP

## ■ Identifique o IP



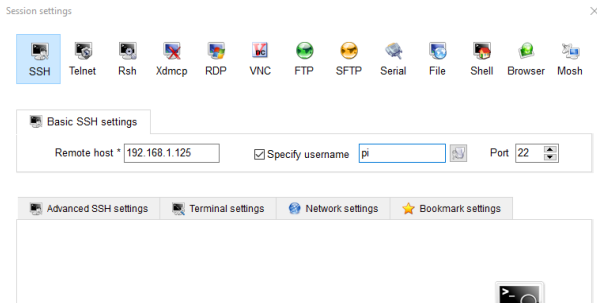
```
pi@raspberrypi:~$ ifconfig wlan0
wlan0: flags=4163<UP, BROADCAST, RUNNING, MULTICAST> mtu 1500
    inet 192.168.1.121 netmask 255.255.255.0 broadcast 192.168.1.255
    ether b8:27:eb:32:0f:cd txqueuelen 1000 (Ethernet)
    RX packets 1197 bytes 517062 (504.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1895 bytes 242861 (237.1 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

pi@raspberrypi:~$
```



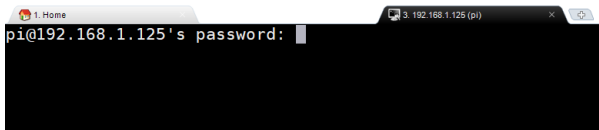
# Acesso remoto - SSH

- Para usuários do Windows: acesso via MobaXTerm
- Download do MobaXTerm  
<https://mobaxterm.mobatek.net/>



# Acesso remoto - SSH

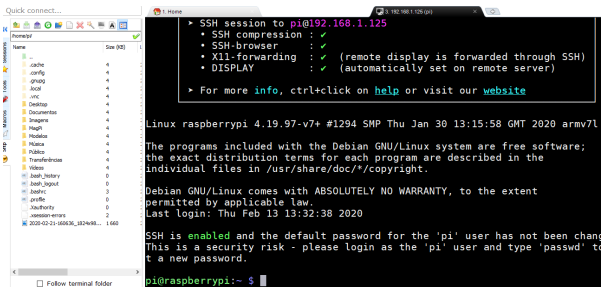
- A senha padrão é *raspberrypi*



The image shows a terminal window with a black background and white text. The prompt is `pi@192.168.1.125's password:` followed by a cursor. The window title bar shows two tabs: "1. Home" and "3. 192.168.1.125 (pi)".

# Acesso remoto - SSH

## ■ Conexão OK!



```
Quick connect...
Name Size (KB)
--
.. 4
.cachefile 4
.config 4
.gnupg 4
.local 4
.vnc 4
Desktop 4
Documents 4
Images 4
Haght 4
Hobbes 4
Hilite 4
Public 4
Transferencas 4
Videos 4
.bash_history 0
.bash_logout 0
.bashrc 3
.gitfile 0
.guifont 0
.ssh/forward 2
.ssh/ssh-errors 1 640
2020-02-21-160636_032448... 1 640
Follow terminal folder

> SSH session to pi@192.168.1.125
  * SSH compression : ✓
  * SSH-browser      : ✓
  * X11-forwarding   : ✓ (remote display is forwarded through SSH)
  * DISPLAY          : ✓ (automatically set on remote server)
  * For more info, ctrl+click on help or visit our website

Linux raspberrypi 4.19.97-v7+ #1294 SMP Thu Jan 30 13:15:58 GMT 2020 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Feb 13 13:32:38 2020

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to
set a new password.

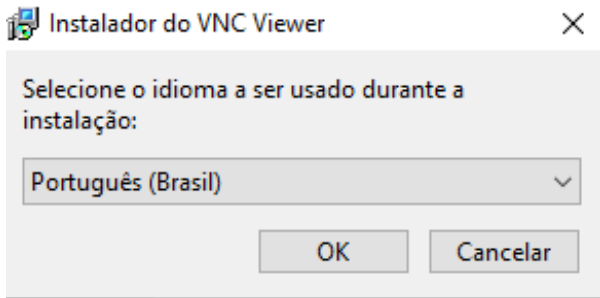
pi@raspberrypi:~$
```

# Acesso remoto - VNC

- Acesso ao sistema com ambiente gráfico
- Download do VNC Viewer:  
<https://www.realvnc.com/pt/connect/download/viewer/>

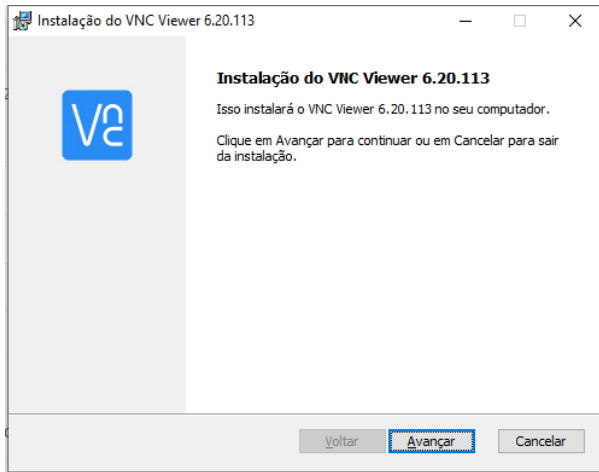
# Instalando o VNC Viewer

## ■ Passo 1



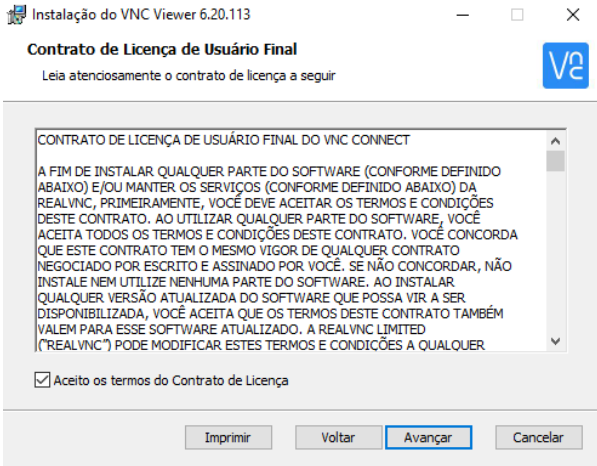
# Instalando o VNC Viewer

## ■ Passo 2



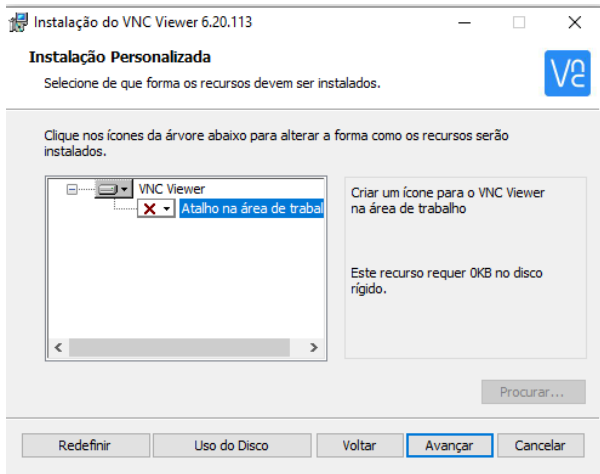
# Instalando o VNC Viewer

## ■ Passo 3



# Instalando o VNC Viewer

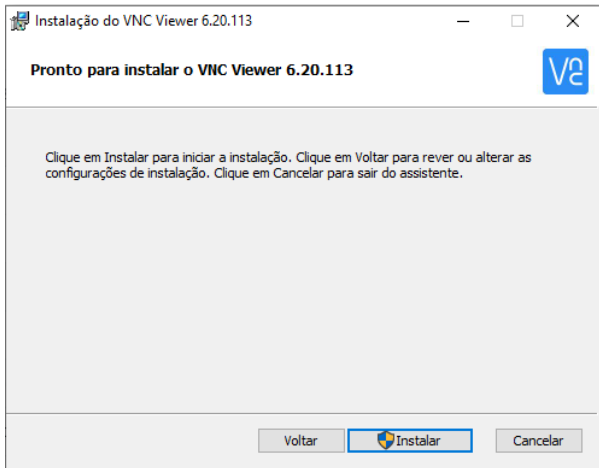
## ■ Passo 4





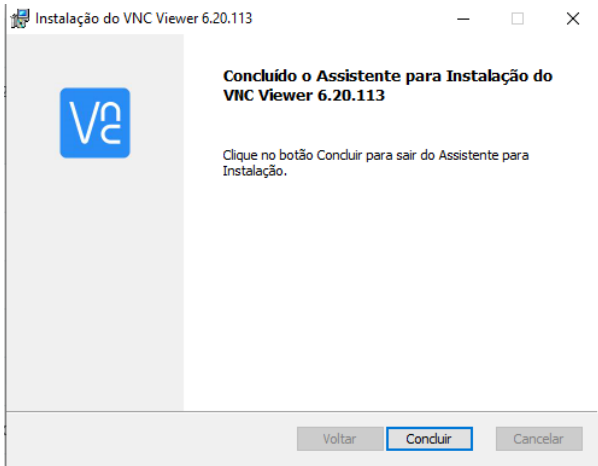
# Instalando o VNC Viewer

## ■ Passo 5



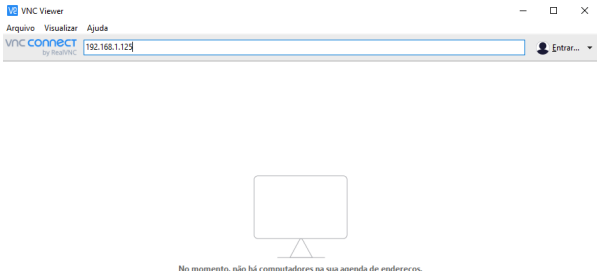
# Instalando o VNC Viewer

## Passo 6



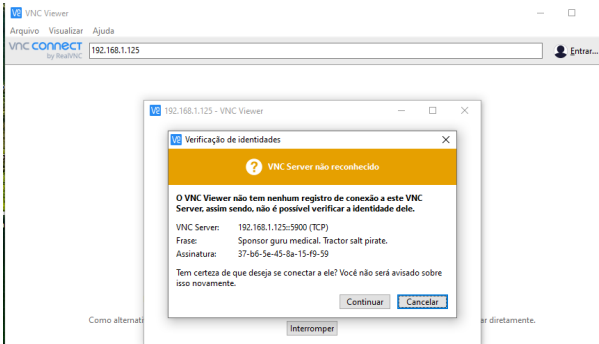
# Acesso remoto via VNC

## ■ Passo 1



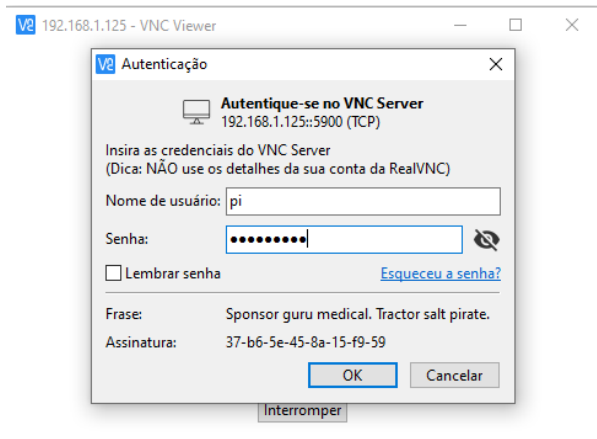
# Acesso remoto via VNC

## Passo 2



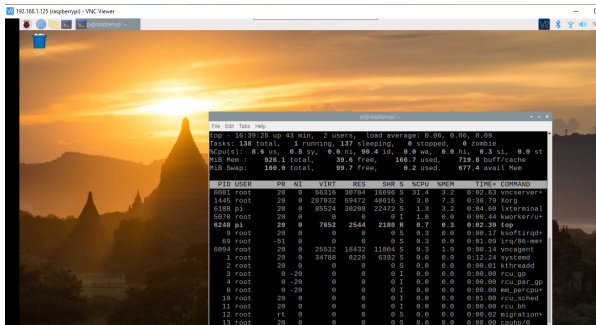
# Acesso remoto via VNC

## ■ Passo 3



# Acesso remoto via VNC

## ■ Máquina conectada!

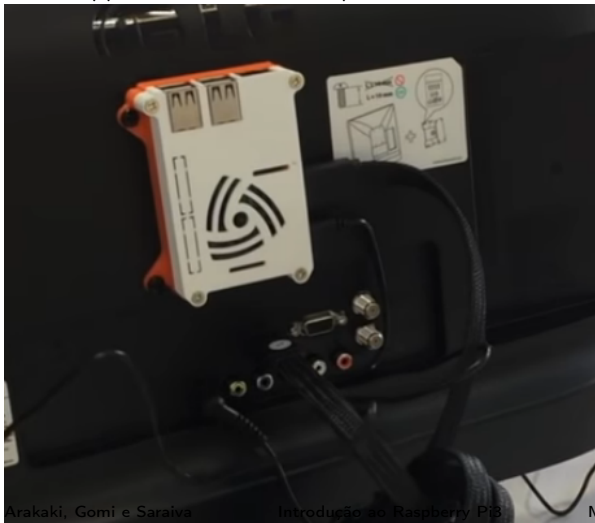


```
File Edit View Help
top 16:39:25 up 43 min, 2 users, load average: 0.06, 0.06, 0.09
Tasks: 138 total, 1 running, 137 sleeping, 0 stopped, 0 zombie
Cpu(s):  8.6 us,  0.8 sy,  0.0 ni, 99.4 id,  0.0 wa,  0.0 hi,  0.3 si,  0.0 st
Mem Mem :  926.1 total,  39.6 free,  166.7 used,  719.8 buff/cache
Mem Swap: 100.0 total,  99.7 free,  0.2 used,  677.4 avail Mem

PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM     TIME+ COMMAND
6081 root        20   0 56316 30794 16696 S 31.4   3.2   0:02.63 vncserver
1440 root        20   0 287632 69472 48616 S  3.0   7.3   0:38.79 Xorg
6188 pi         20   0 85524 36208 22472 S  1.3   3.2   0:04.69 lxterminal
5078 root        20   0   0     0     0  I  1.0   0.0   0:00.44 kworker/u
6248 pi         20   0  7652  2544  2188 R  0.7   0.3   0:02.39 top
 9 root        20   0   0     0   0  S  0.3   0.0   0:00.17 ksoftirqd
69 root       -51   0   0     0   0  S  0.3   0.0   0:01.09 irq/86-mes
6094 root        20   0 25532 18432 11864 S  0.3   1.9   0:00.16 vncagent
 1 root        20   0 34788  8220  6392 S  0.0   0.0   0:12.24 systemd
 2 root        20   0   0     0   0  S  0.0   0.0   0:00.01 kthreadd
 3 root        0 -20   0     0   0  I  0.0   0.0   0:00.00 rcu_gp
 4 root        0 -20   0     0   0  I  0.0   0.0   0:00.00 rcu_par_gp
 8 root        0 -20   0     0   0  I  0.0   0.0   0:00.00 mm_percpu
10 root        20   0   0     0   0  I  0.0   0.0   0:01.00 rcu_acked
11 root        20   0   0     0   0  I  0.0   0.0   0:00.00 rcu_bh
12 root        rt   0   0     0   0  S  0.0   0.0   0:00.02 migration+
13 root        20   0   0     0   0  S  0.0   0.0   0:00.00 cpuhp/0
```

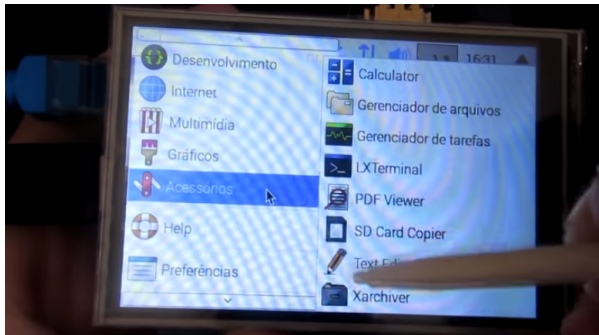
## Exemplos de aplicações

- Transformando uma TV em PC com o Raspberry Pi 3:  
<https://www.youtube.com/watch?v=PFwSfXgjm8I>



## Exemplos de aplicações

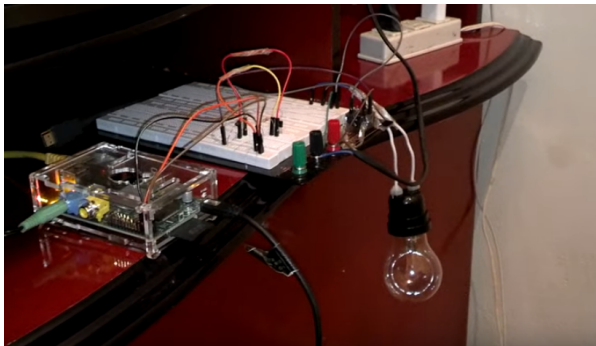
- Como Transformar a Raspberry Pi em um Mini PC de Bolso: <https://www.youtube.com/watch?v=ZtLEFAvguOQ>





## Exemplos de aplicações

- Controlando uma lâmpada usando GTalk:  
<https://www.youtube.com/watch?v=si-pfnSspJk>



- Raspberry Pi 4 Running Windows 10:  
<https://www.youtube.com/watch?v=OKCHGCOcHis>

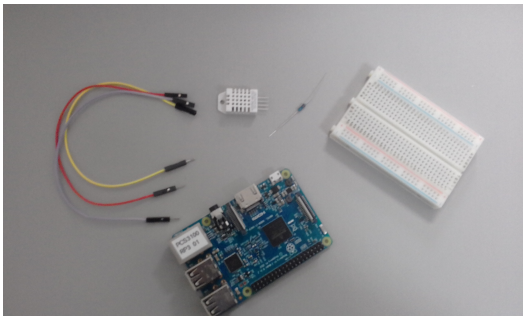
# Exemplos de aplicações

- Videogame com Raspberry Pi 0:  
<https://www.youtube.com/watch?v=oNUETIoY4hk>



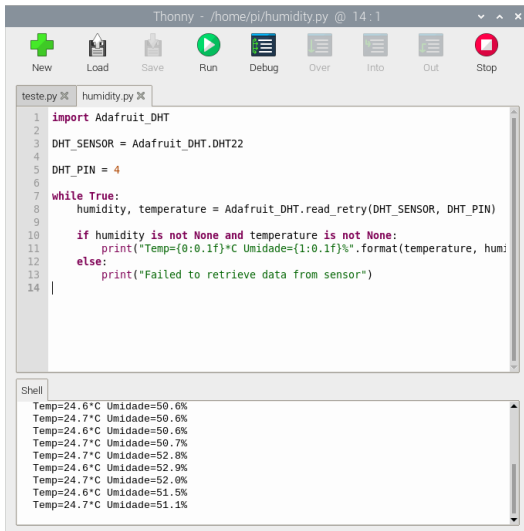
# Sensor de temperatura

- Componentes
  - Raspberry Pi3
  - Sensor de temperatura DHT22
  - Protoboard
  - Resistor 10k ohm
  - Cabos para a protoboard



# Sensor de temperatura

## ■ Script simples em Python para ler do sensor



```
Thonny - /home/pi/humidity.py @ 14:1
New Load Save Run Debug Over Into Out Stop

teste.py humidity.py
1 import Adafruit_DHT
2
3 DHT_SENSOR = Adafruit_DHT.DHT22
4
5 DHT_PIN = 4
6
7 while True:
8     humidity, temperature = Adafruit_DHT.read_retry(DHT_SENSOR, DHT_PIN)
9
10     if humidity is not None and temperature is not None:
11         print("Temp={0:0.1f}*C Umidade={1:0.1f}%".format(temperature, humi
12     else:
13         print("Failed to retrieve data from sensor")
14

Shell
Temp=24.6*C Umidade=50.6%
Temp=24.7*C Umidade=50.6%
Temp=24.6*C Umidade=50.6%
Temp=24.7*C Umidade=50.7%
Temp=24.7*C Umidade=52.8%
Temp=24.6*C Umidade=52.9%
Temp=24.7*C Umidade=52.0%
Temp=24.6*C Umidade=51.5%
Temp=24.7*C Umidade=51.1%
```

## Links úteis

- Como usar a Eduroam: <https://eduroam.usp.br/como-usar/>
- Site oficial: <https://www.raspberrypi.org/>
- Instalação: <http://tiny.cc/ieirkz>
- Sensor de temperatura: <http://tiny.cc/rolrkz>

- Tarefa do MacGyver



# Tarefa do MacGyver

- Objetivo: desenvolver uma ideia de produto
- Componentes usados:
  - Raspberry Pi3
  - Leitora RFID (distância máx de leitura: 10 cm)
  - Tags RFID



# Tarefa do MacGyver

## ■ Regras

- Grupo se reúne por 10 minutos
- Ao final, um membro de cada grupo apresenta a ideia
- Formato pitch de apresentação: 1 minuto
- Obs: usem o mesmo grupo do projeto da disciplina

Obrigado!

USP

Universidade de São Paulo



DEPARTAMENTO DE ENGENHARIA DE  
COMPUTAÇÃO E SISTEMAS DIGITAIS

PCS