ENSIAS

SÉCURITÉ D'UN RASPBERRY PI

Réalisé par :

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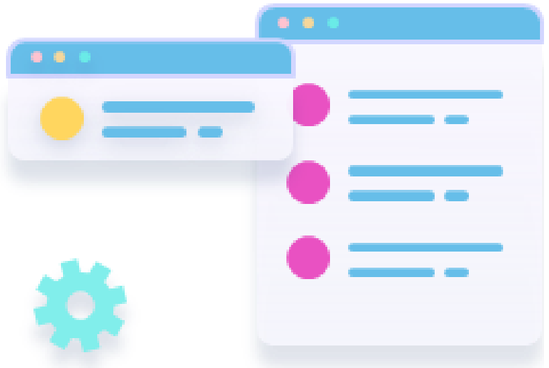
Membres du jury :

M. BERQIA Amine

M. HABBANI Ahmed

PLAN



Introduction

1 Le Raspberry Pi

2 Les systèmes de détection d'intrusion

3 L'IDS Suricata

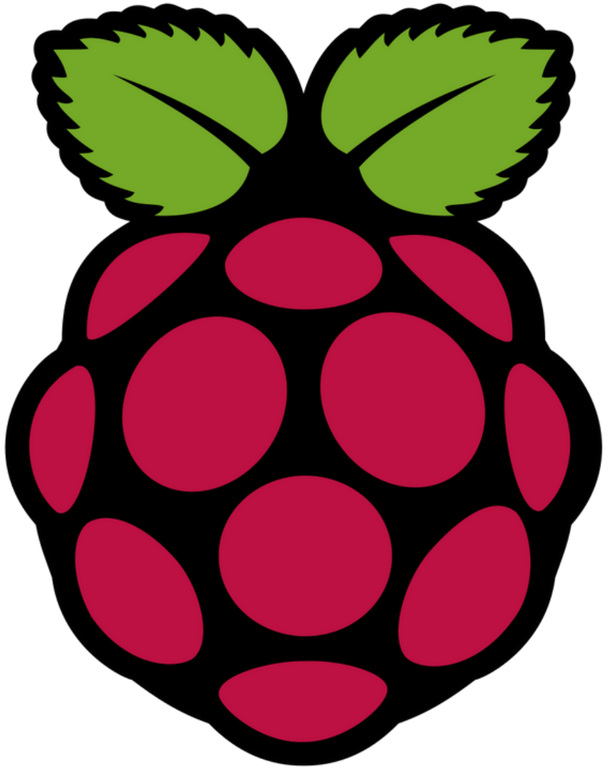
4 La prise en main de Raspberry PI

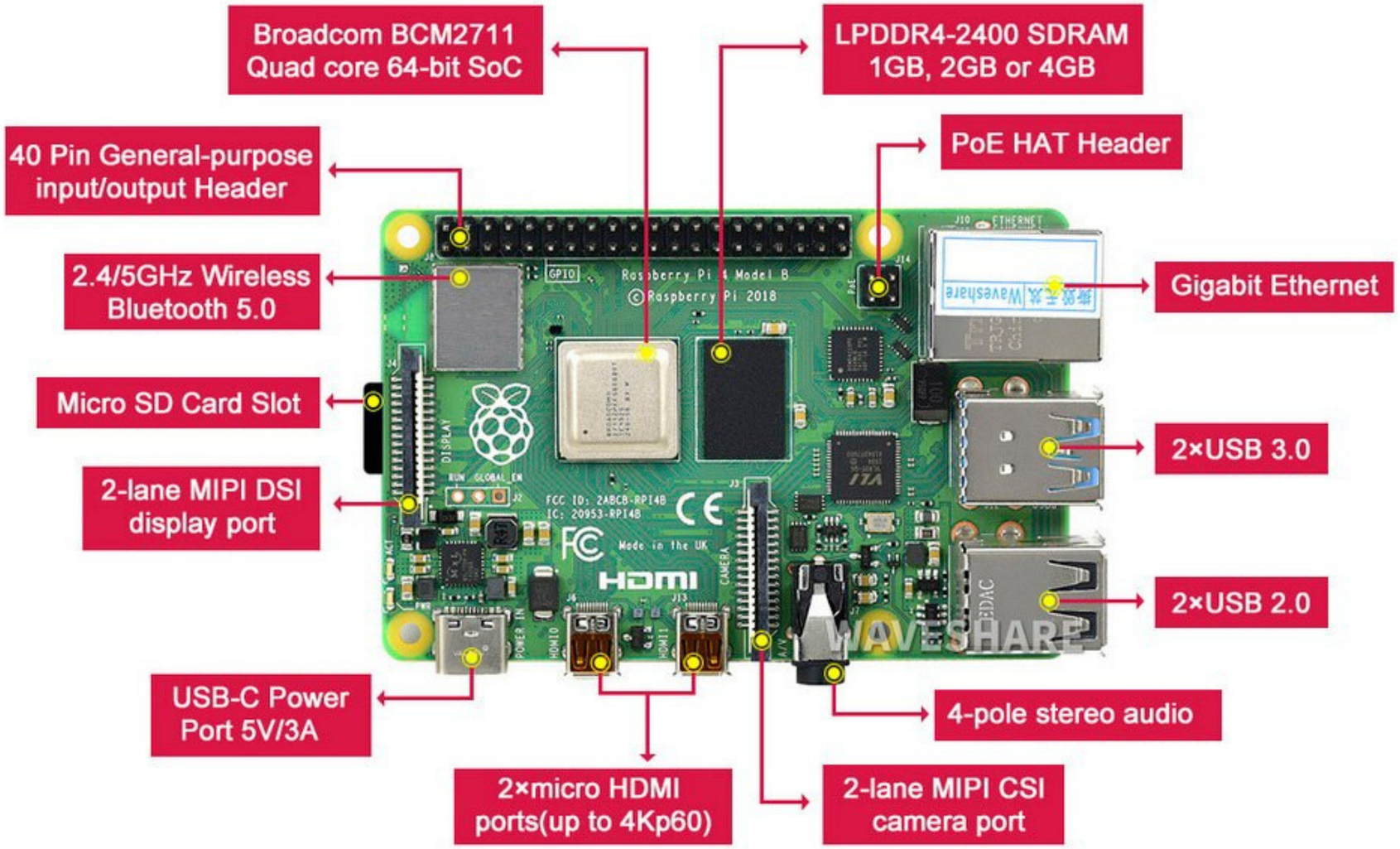
Conclusion

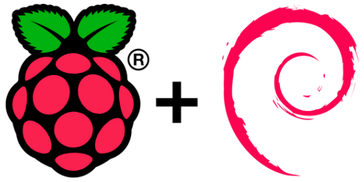
Introduction

Objectif

1 Le Raspberry Pi



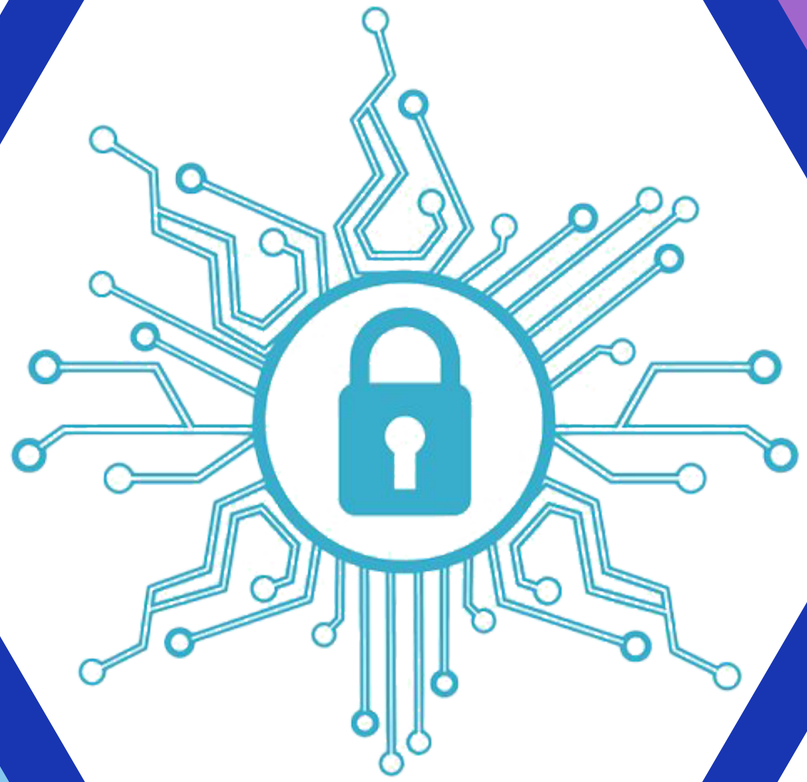

Broadcom BCM2711
Quad core 64-bit SoC
LPDDR4-2400 SDRAM
1GB, 2GB or 4GB
40 Pin General-purpose
input/output Header
PoE HAT Header
2.4/5GHz Wireless
Bluetooth 5.0
Gigabit Ethernet
Micro SD Card Slot
2×USB 3.0
2-lane MIPI DSI
display port
2×USB 2.0
USB-C Power
Port 5V/3A
4-pole stereo audio
2×micro HDMI
ports(up to 4Kp60)
2-lane MIPI CSI
camera port



Raspbian

Software

2 Les systèmes de détection d'intrusion



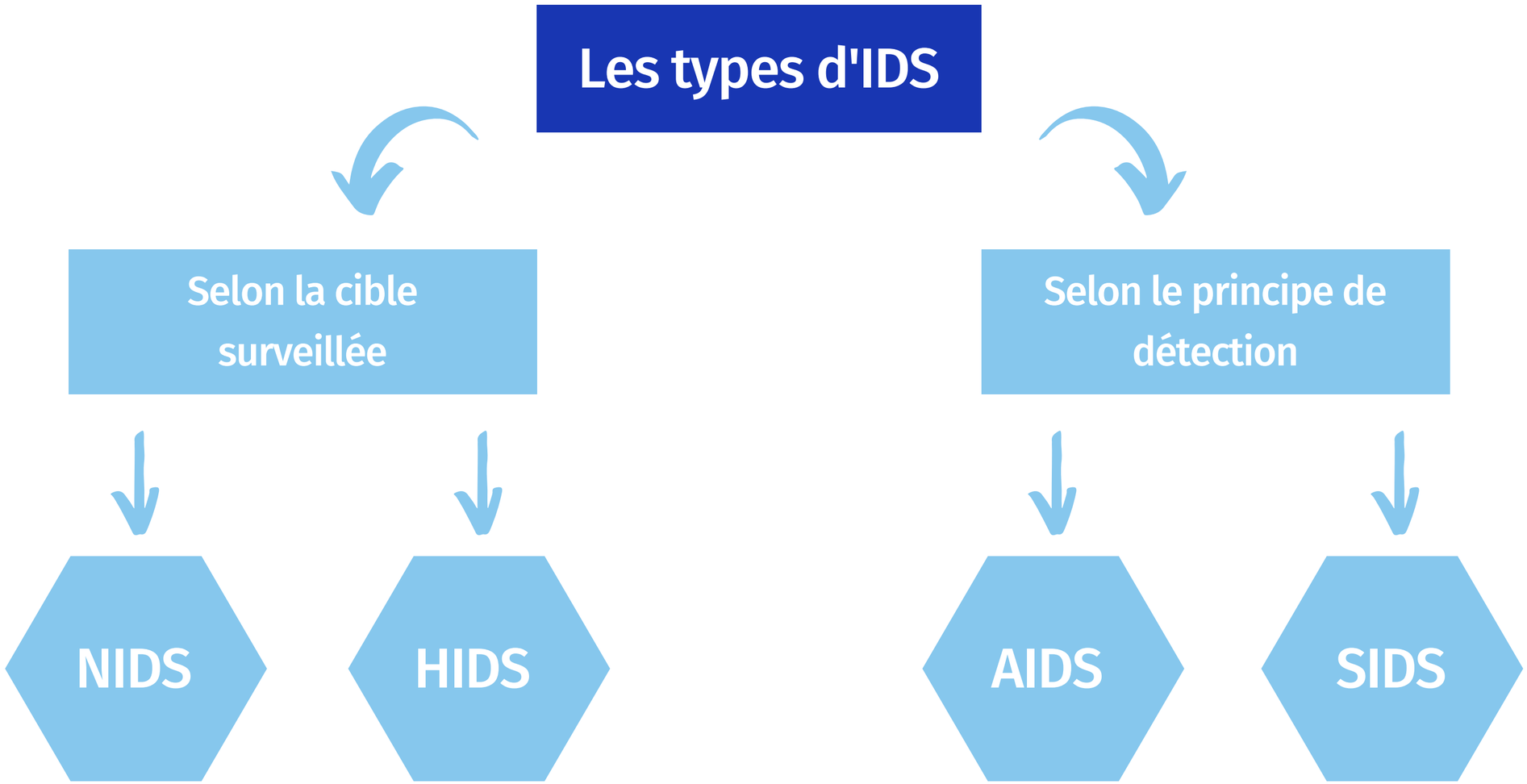
I D S

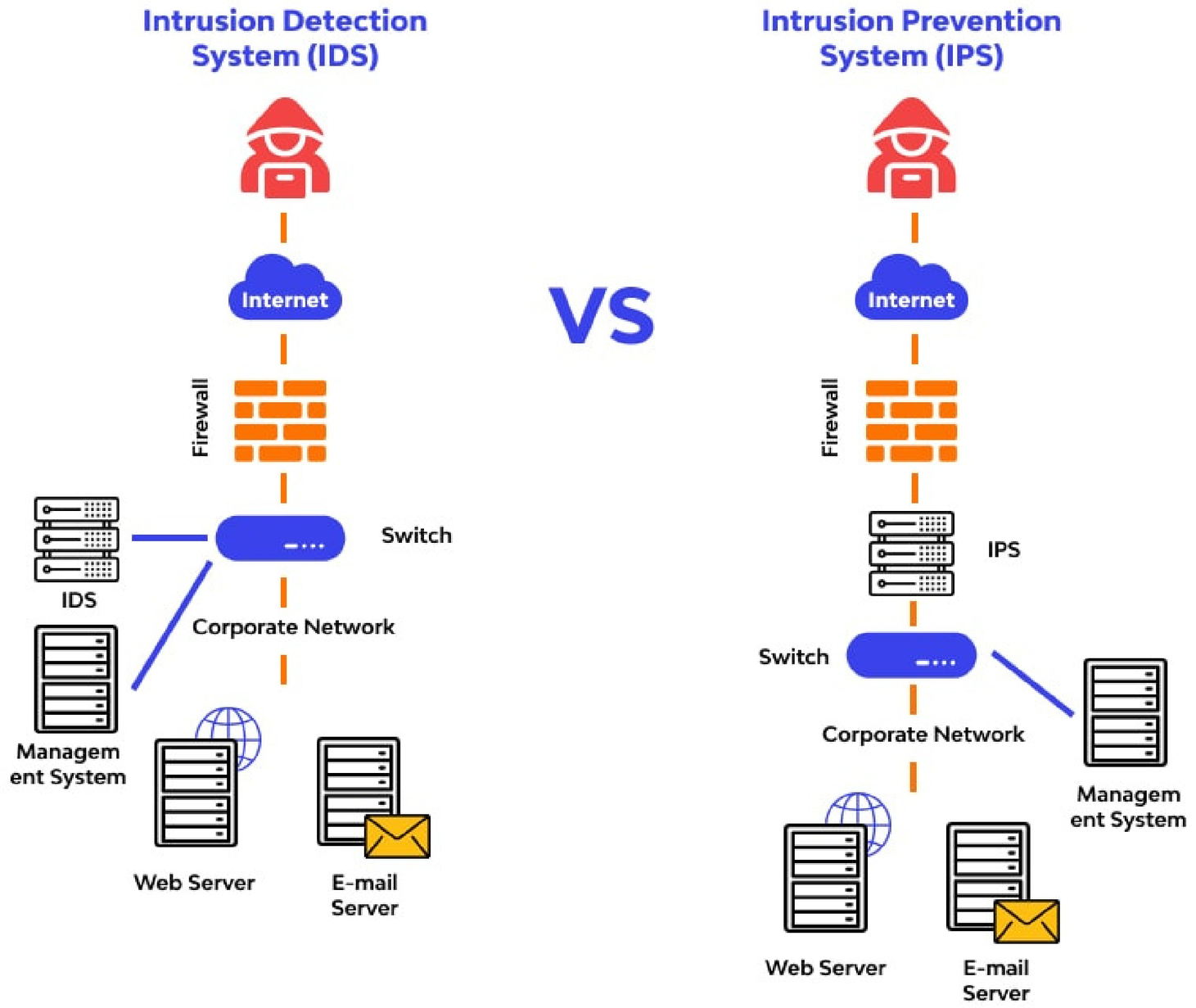
Intrusion

Detection

System

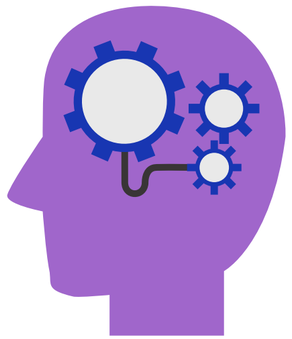
Les types d'IDS




Intrusion Detection System (IDS)
Internet
Firewall
Switch
IDS
Corporate Network
Managem ent System
Web Server
E-mail Server
VS
Intrusion Prevention System (IPS)
Internet
Firewall
IPS
Switch
Corporate Network
Managem ent System
Web Server
E-mail Server

3 L'IDS Suricata

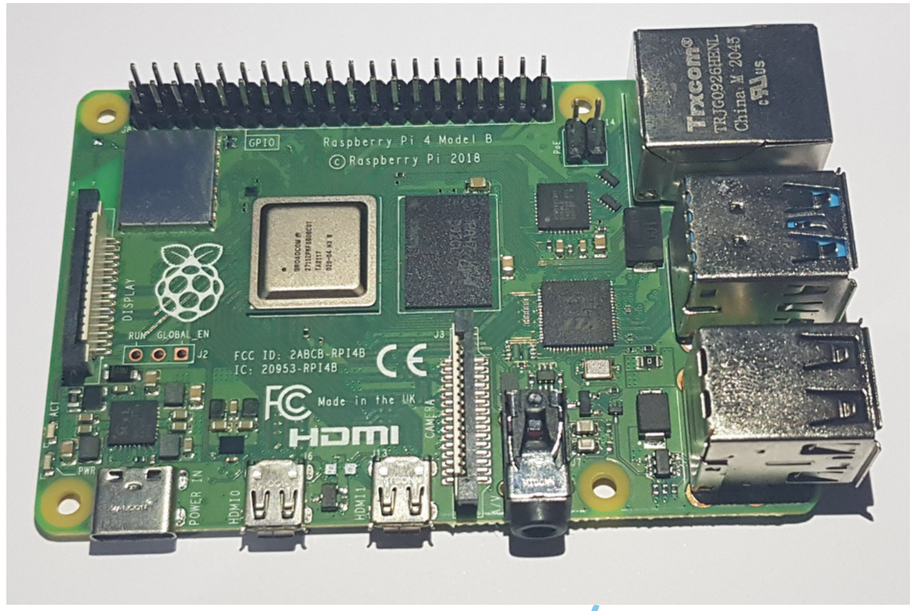
SURICATA




The action
drop tcp $HOME_NET any -> $EXTERNAL_NET any (msg:”ET TROJAN Likely Bot Nick in IRC (USA +..)”;
flow:established,to_server; flowbits:isset,is_proto_irc; content:”NICK “; pcre:”/NICK .*USA.*[0-9]
{3,}/i”; reference:url,doc.emergingthreats.net/2008124; classtype:trojan-activity; sid:2008124;
rev:2;)
The header
The options

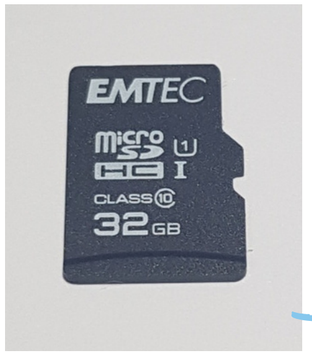
4 La prise en main de Raspberry Pi

Matériel utilisé :



RPi 4 model B

Cable HDMI



Carte SD

Chargeur Type C

1 - Installation de Raspberry OS :

Raspberry Pi

For home | For industry | Hardware | Software | Documentation | News | Forums | Foundation

Raspberry Pi OS

Your Raspberry Pi needs an operating system to work. This is it. Raspberry Pi OS (previously called Raspbian) is our official supported operating system.

1 - Installation de Raspberry OS :

Raspberry Pi

For home | For industry | Hardware | Software | Documentation | News | Forums | Foundation

Raspberry Pi OS

Your Raspberry Pi needs a
work. This is it. Raspberry
Raspbian) is our official su
system.

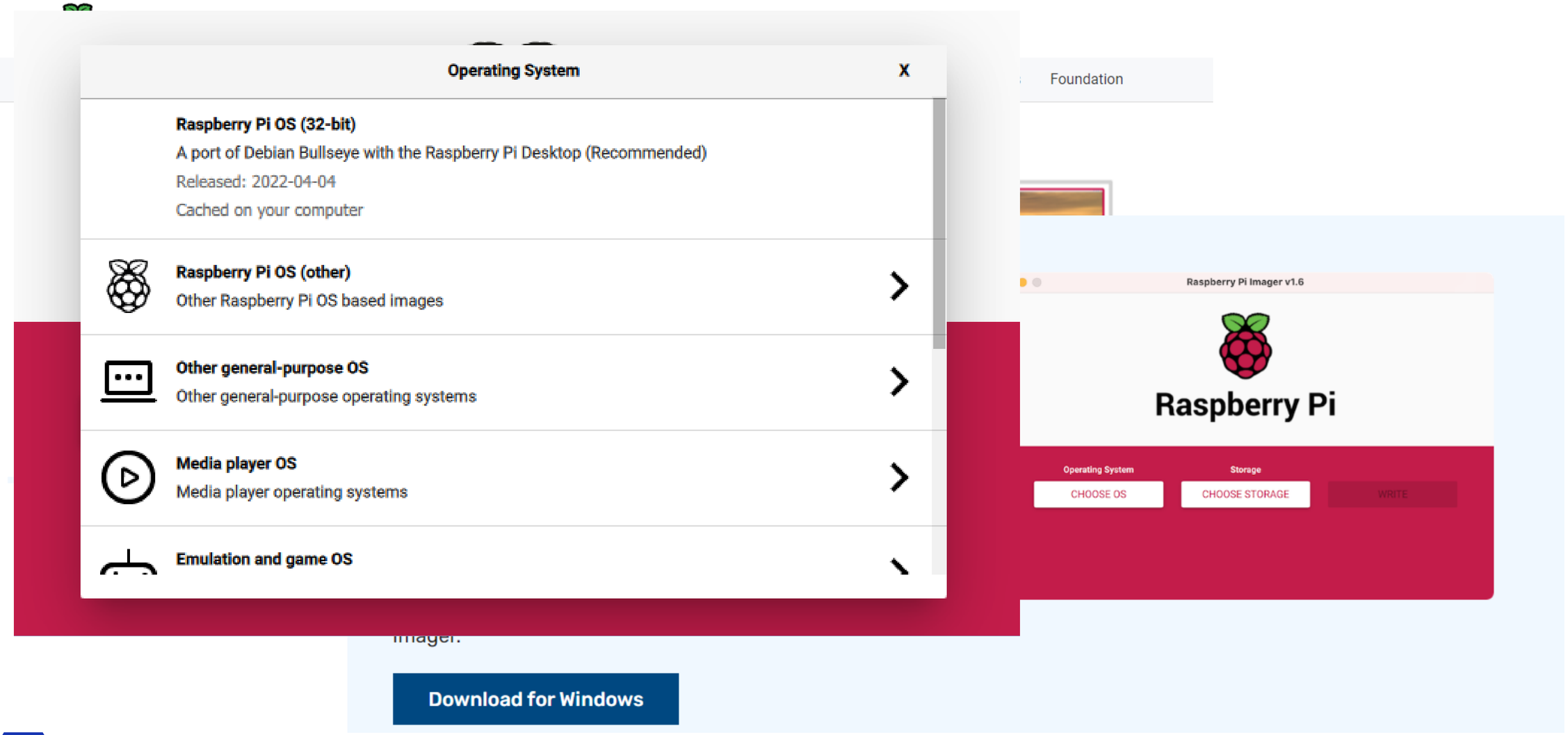
Install Raspberry Pi OS using Raspberry Pi Imager

Raspberry Pi Imager is the quick and easy way to install Raspberry Pi OS and other operating systems to a microSD card, ready to use with your Raspberry Pi. Watch our 45-second video to learn how to install an operating system using Raspberry Pi Imager.

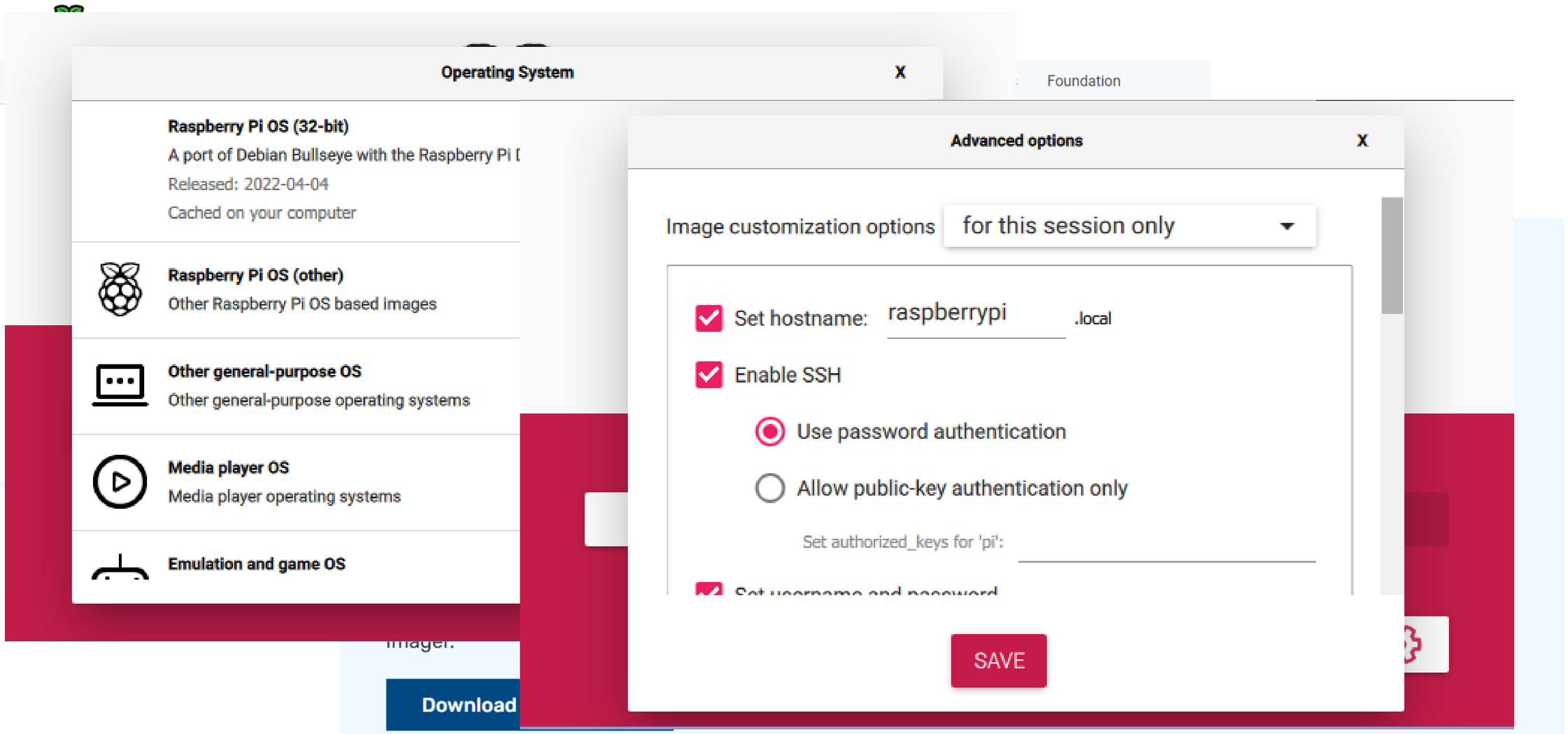
Download and install Raspberry Pi Imager to a computer with an SD card reader. Put the SD card you'll use with your Raspberry Pi into the reader and run Raspberry Pi Imager.

Download for Windows

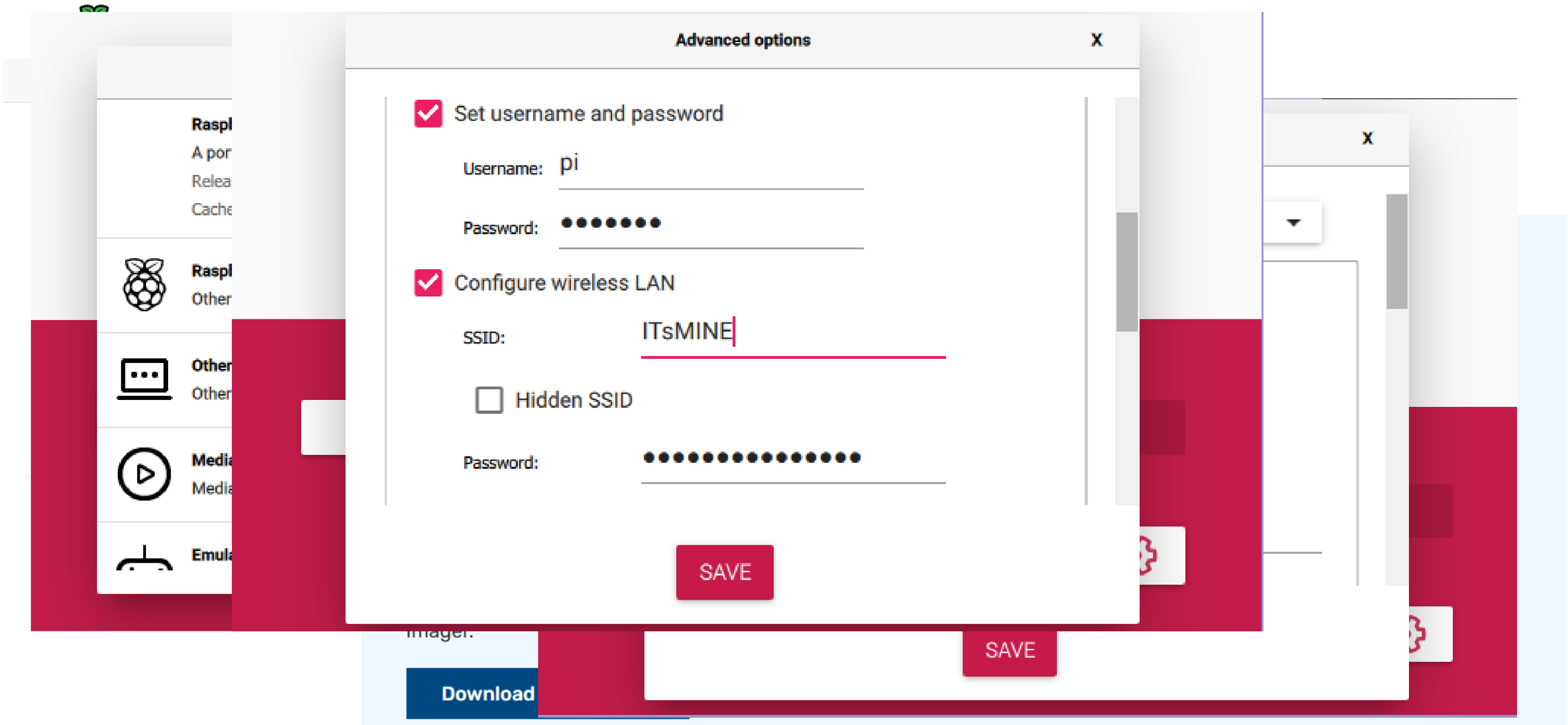
1 - Installation de Raspberry OS :



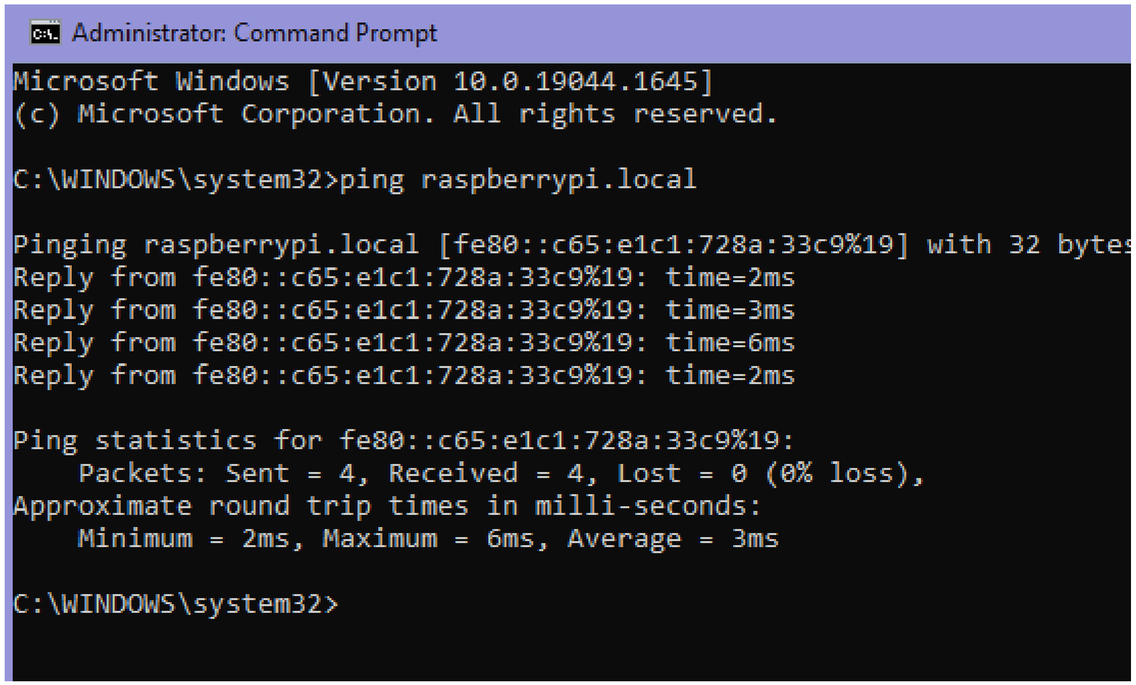
1 - Installation de Raspberry OS :



1 - Installation de Raspberry OS :



2 - Configuration du Raspberry Pi :



2 - Configuration du Raspberry Pi :

Administrator: Command Prompt

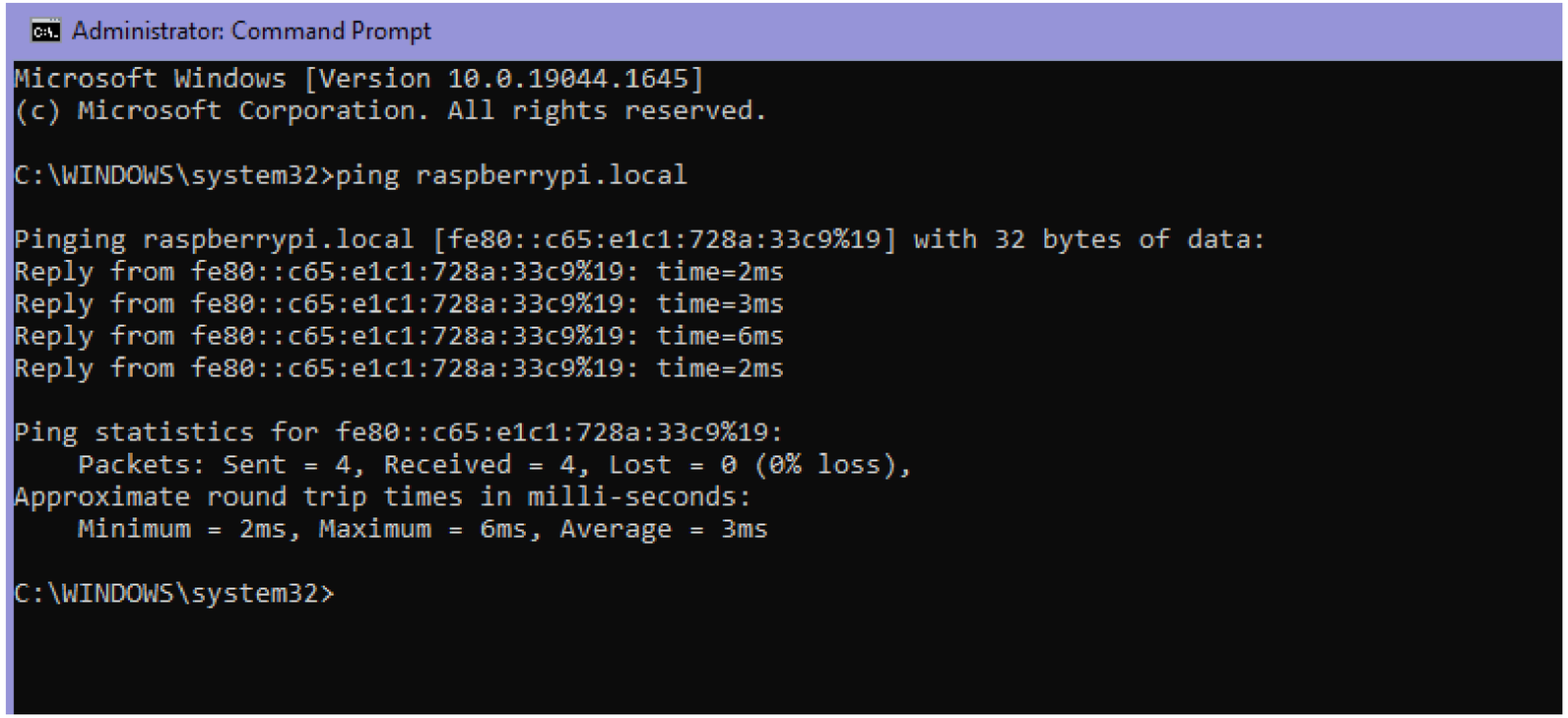
```
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping raspberrypi.local

Pinging raspberrypi.local [fe80::c65:e1c1:728a:33c9%19] with 32 bytes
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=3ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=6ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms

Ping statistics for fe80::c65:e1c1:728a:33c9%19:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 6ms, Average = 3ms

C:\WINDOWS\system32>
```


Administrator: Command Prompt
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.
C:\WINDOWS\system32>ping raspberrypi.local
Pinging raspberrypi.local [fe80::c65:e1c1:728a:33c9%19] with 32 bytes of data:
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=3ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=6ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms
Ping statistics for fe80::c65:e1c1:728a:33c9%19:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
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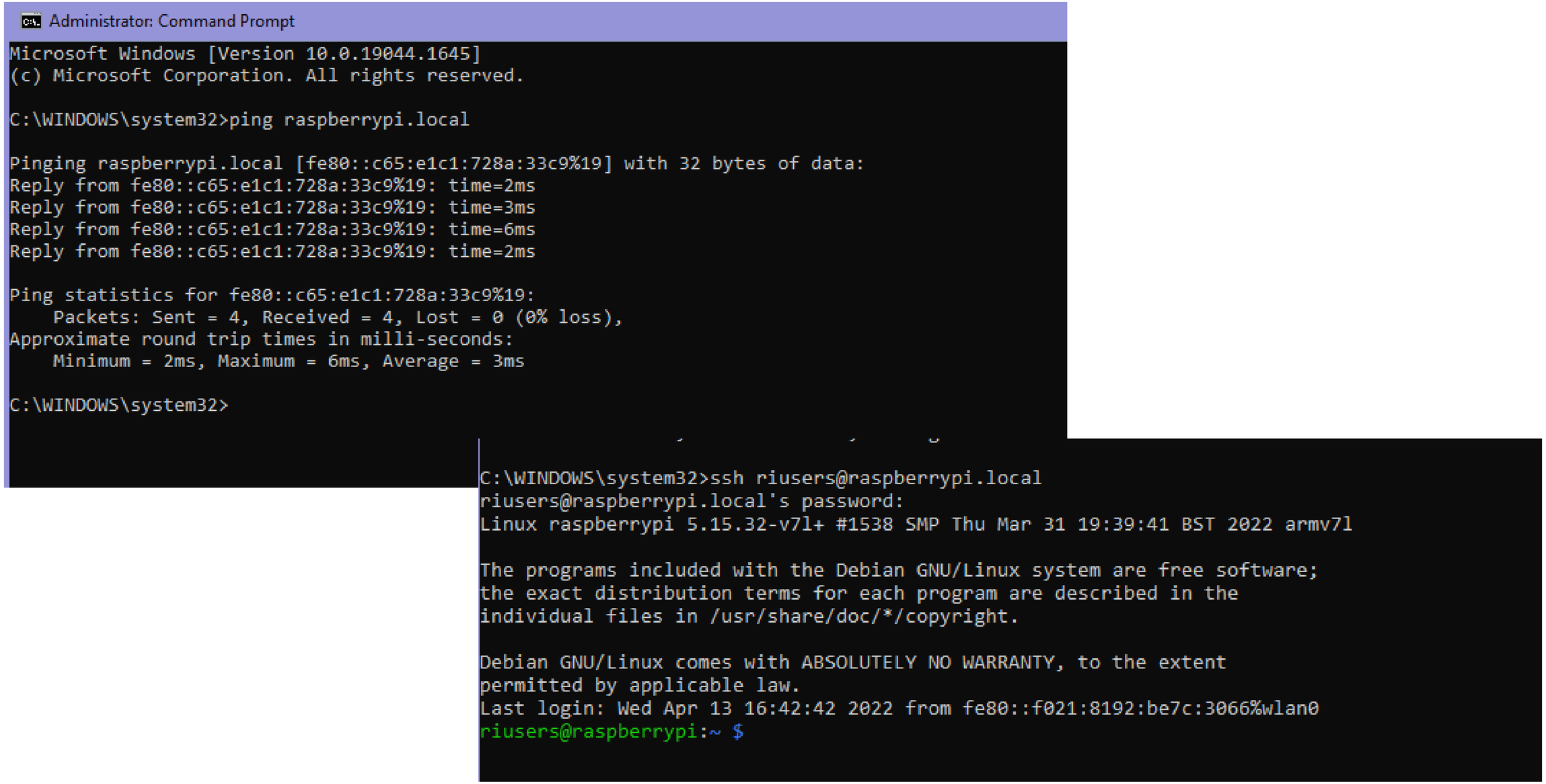
C:\WINDOWS\system32>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Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.
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Pinging raspberrypi.local [fe80::c65:e1c1:728a:33c9%19] with 32 bytes of data:
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms
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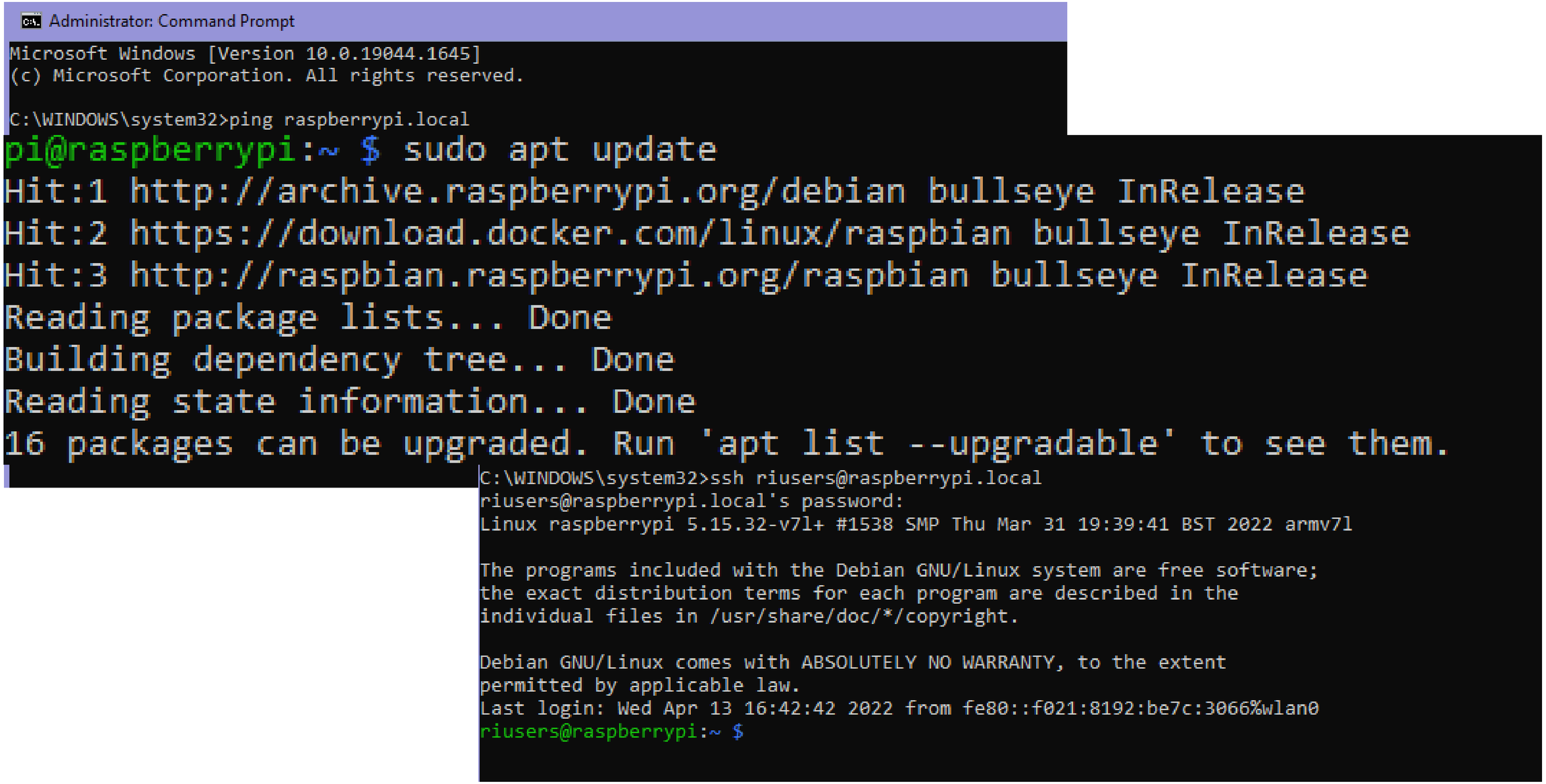
Reply from fe80::c65:e1c1:728a:33c9%19: time=6ms
Reply from fe80::c65:e1c1:728a:33c9%19: time=2ms
Ping statistics for fe80::c65:e1c1:728a:33c9%19:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 6ms, Average = 3ms
C:\WINDOWS\system32>
C:\WINDOWS\system32>ssh riusers@raspberrypi.local
riusers@raspberrypi.local's password:
Linux raspberrypi 5.15.32-v7l+ #1538 SMP Thu Mar 31 19:39:41 BST 2022 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: Wed Apr 13 16:42:42 2022 from fe80::f021:8192:be7c:3066%wlan0
riusers@raspberrypi:~ $


Administrator: Command Prompt
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.
C:\WINDOWS\system32>ping raspberrypi.local
pi@raspberrypi:~ $ sudo apt update
Hit:1 http://archive.raspberrypi.org/debian bullseye InRelease
Hit:2 https://download.docker.com/linux/raspbian bullseye InRelease
Hit:3 http://raspbian.raspberrypi.org/raspbian bullseye InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
16 packages can be upgraded. Run 'apt list --upgradable' to see them.
C:\WINDOWS\system32>ssh riusers@raspberrypi.local
riusers@raspberrypi.local's password:
Linux raspberrypi 5.15.32-v7l+ #1538 SMP Thu Mar 31 19:39:41 BST 2022 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: Wed Apr 13 16:42:42 2022 from fe80::f021:8192:be7c:3066%wlan0
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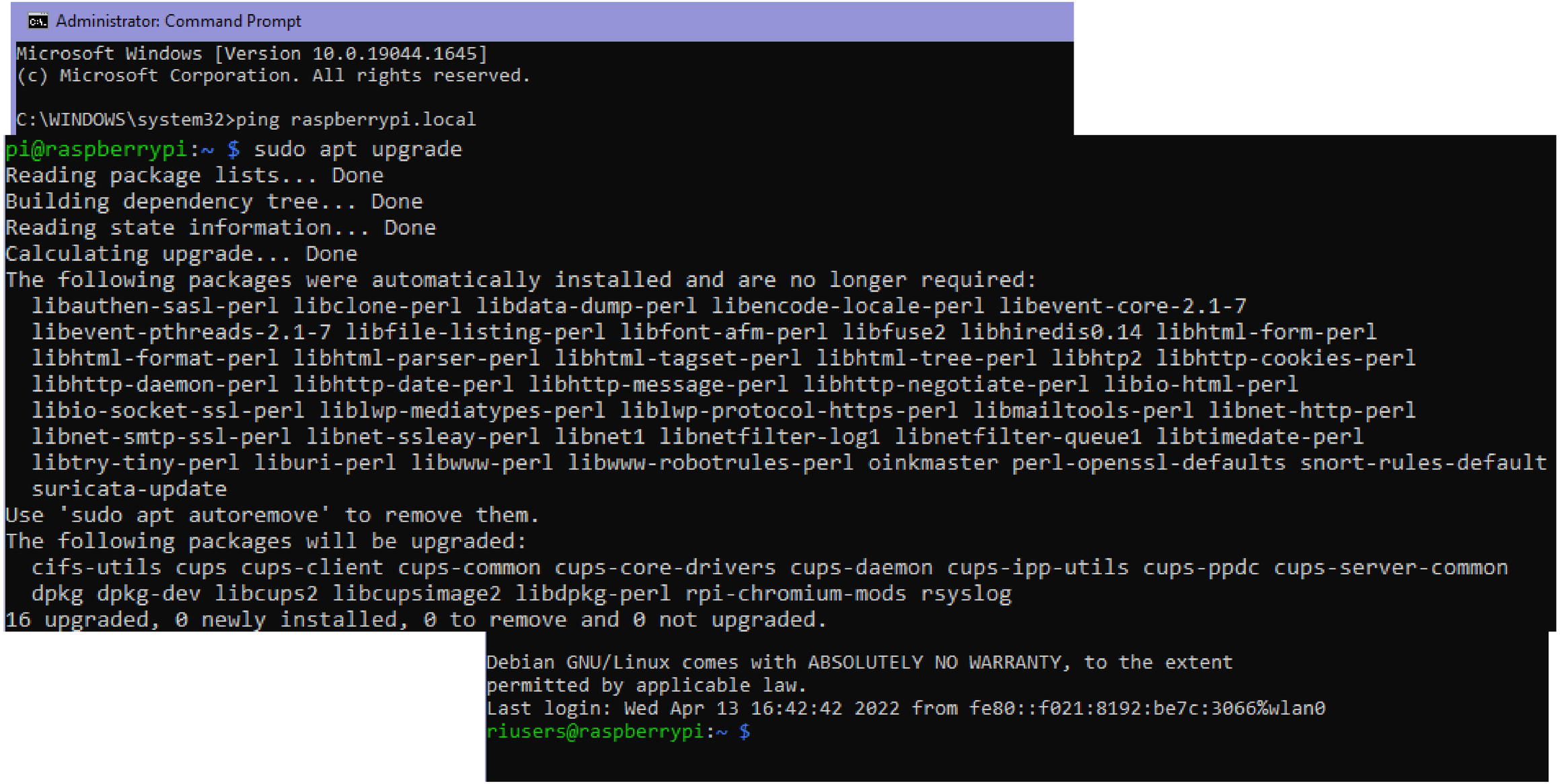
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.
C:\WINDOWS\system32>ping raspberrypi.local
pi@raspberrypi:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
libauthen-sasl-perl libclone-perl libdata-dump-perl libencode-locale-perl libevent-core-2.1-7
libevent-pthreads-2.1-7 libfile-listing-perl libfont-afm-perl libfuse2 libhiredis0.14 libhtml-form-perl
libhtml-format-perl libhtml-parser-perl libhtml-tagset-perl libhtml-tree-perl libhtp2 libhttp-cookies-perl
libhttp-daemon-perl libhttp-date-perl libhttp-message-perl libhttp-negotiate-perl libio-html-perl
libio-socket-ssl-perl liblwp-mediatypes-perl liblwp-protocol-https-perl libmailtools-perl libnet-http-perl
libnet-smtp-ssl-perl libnet-ssleay-perl libnet1 libnetfilter-log1 libnetfilter-queue1 libtimedate-perl
libtry-tiny-perl liburi-perl libwww-perl libwww-robotrules-perl oinkmaster perl-openssl-defaults snort-rules-default
suricata-update
Use 'sudo apt autoremove' to remove them.
The following packages will be upgraded:
cifs-utils cups cups-client cups-common cups-core-drivers cups-daemon cups-ipp-utils cups-ppdc cups-server-common
dpkg dpkg-dev libcups2 libcupsimage2 libdpkg-perl rpi-chromium-mods rsyslog
16 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Apr 13 16:42:42 2022 from fe80::f021:8192:be7c:3066%wlan0
riusers@raspberrypi:~ $

```
pi@raspberrypi:~ $ sudo /usr/sbin/useradd --groups sudo -m riusers
pi@raspberrypi:~ $ whoiam
-bash: whoiam: command not found
pi@raspberrypi:~ $ whoami
pi
pi@raspberrypi:~ $ sudo passwd riusers
New password:
Retype new password:
passwd: password updated successfully
pi@raspberrypi:~ $
```

3 - Installation de Suricata IDS :

3 - Installation de Suricata IDS :

```
riusers@raspberrypi:~/suricata-6.0.1 $ hostname -I
10.1.6.117 172.17.0.1
riusers@raspberrypi:~/suricata-6.0.1 $ sudo nano /etc/suricata/suricata.yaml
[sudo] password for riusers:
```

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10.1.6.117 172.17.0.1
riusers@raspberrypi:~/suricata-6.0.1 $ sudo nano /etc/suricata/suricata.yaml
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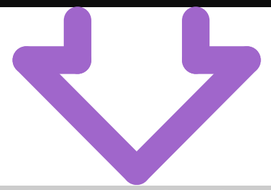
10.1.6.117 172.17.0.1
riusers@raspberrypi:~/suricata-6.0.1 $ sudo nano /etc/suricata/suricata.yaml
[sudo] password for riusers:
```



```
  GNU nano 5.4                    /etc/suricata/suricata.yaml
%YAML 1.1
---

# Suricata configuration file. In addition to the comments describing all
# options in this file, full documentation can be found at:
# https://suricata.readthedocs.io/en/latest/configuration/suricata-yaml.html

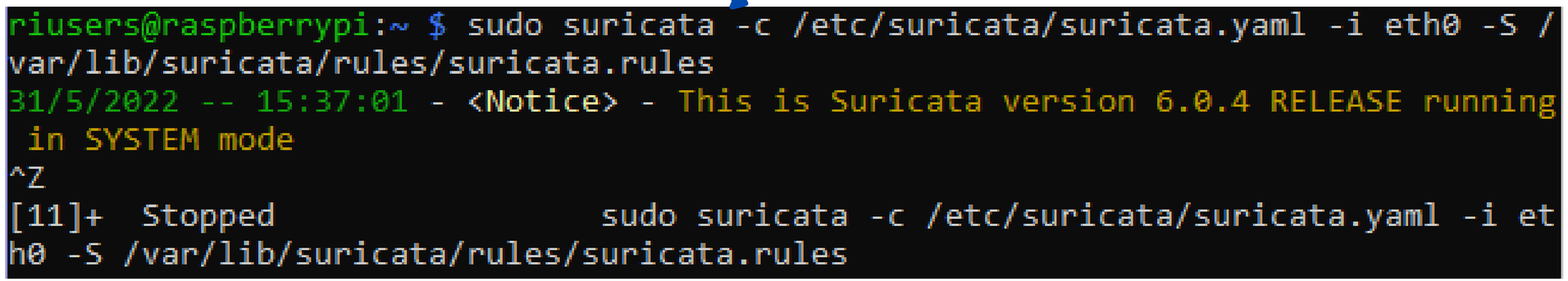
##
## Step 1: Inform Suricata about your network
##

vars:
  # more specific is better for alert accuracy and performance
  address-groups:
    HOME_NET: "[192.168.1.101]"
    #HOME_NET: "[192.168.0.0/16]"
    #HOME_NET: "[10.0.0.0/8]"
    #HOME_NET: "[172.16.0.0/12]"
    #HOME_NET: "any"

    EXTERNAL_NET: "!$HOME_NET"
    #EXTERNAL_NET: "any"
```

4 - Lancement de Suricata IDS :

fichier de configuration à utiliser



4 - Lancement de Suricata IDS :

interface Ethernet à surveiller

```
riusers@raspberrypi:~ $ sudo suricata -c /etc/suricata/suricata.yaml -i eth0 -S /
var/lib/suricata/rules/suricata.rules
31/5/2022 -- 15:37:01 - <Notice> - This is Suricata version 6.0.4 RELEASE running
 in SYSTEM mode
^Z
[11]+  Stopped                 sudo suricata -c /etc/suricata/suricata.yaml -i et
h0 -S /var/lib/suricata/rules/suricata.rules
```

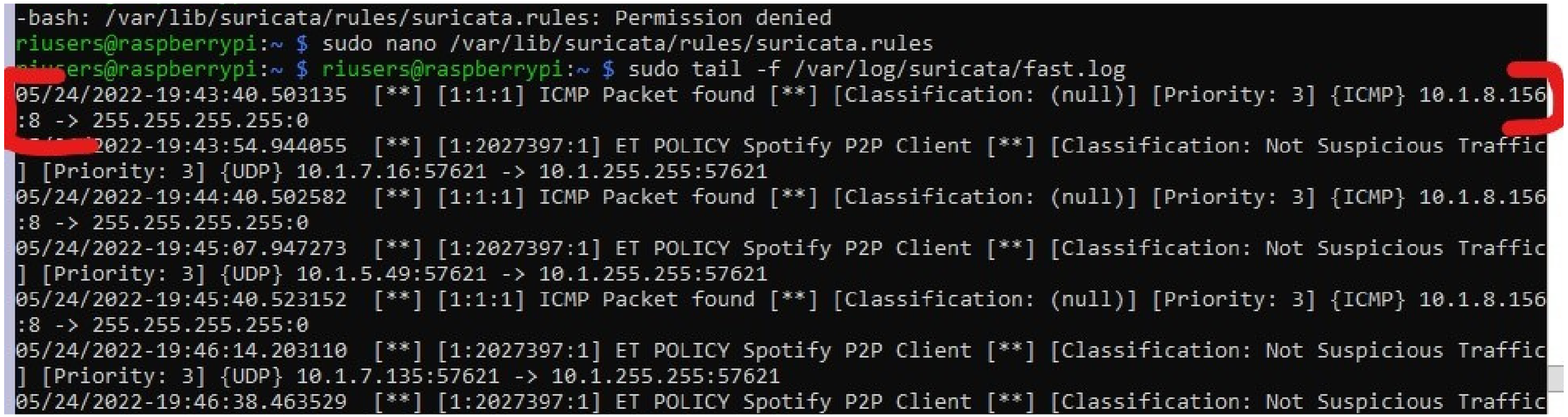
4 - Lancement de Suricata IDS :

fichier contenant les règles à utiliser

```
riusers@raspberrypi:~ $ sudo suricata -c /etc/suricata/suricata.yaml -i eth0 -S /
var/lib/suricata/rules/suricata.rules
31/5/2022 -- 15:37:01 - <Notice> - This is Suricata version 6.0.4 RELEASE running
 in SYSTEM mode
^Z
[11]+  Stopped                 sudo suricata -c /etc/suricata/suricata.yaml -i et
h0 -S /var/lib/suricata/rules/suricata.rules
```

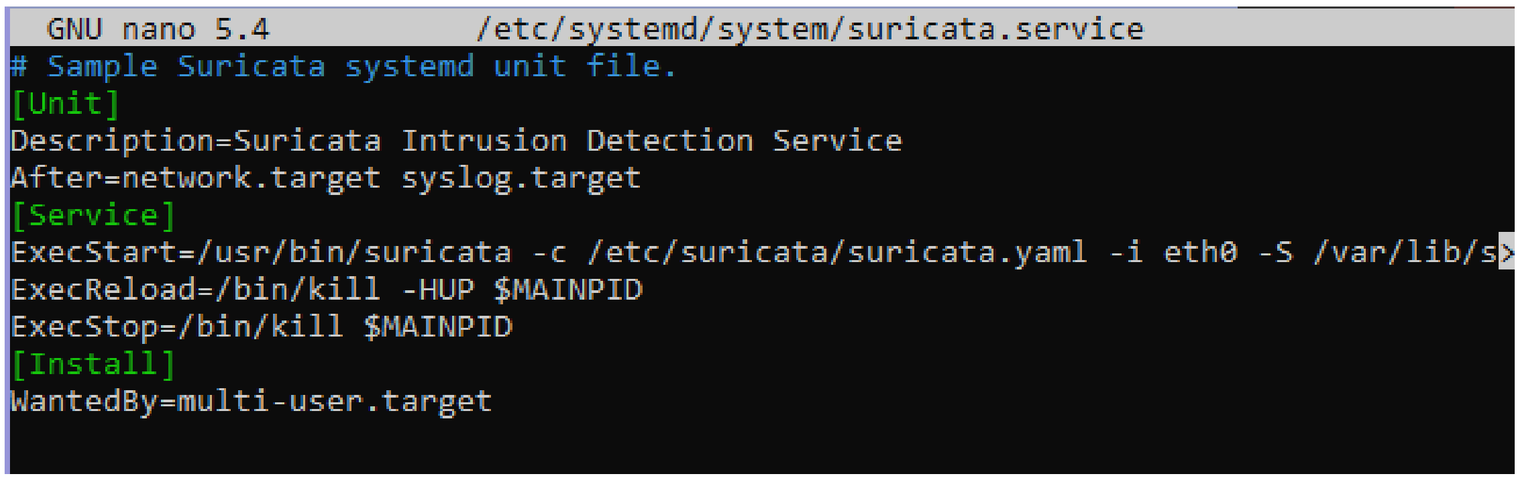
5 - Test de Suricata IDS :

la règle : alert icmp any any -gt ; any any (msg : ”ICMP Packet found” ; sid : 1 ; rev : 1 ;)



6 - Utilisation du Suricata en mode service

Création du fichier dans : /etc/systemd/system/suricata.service



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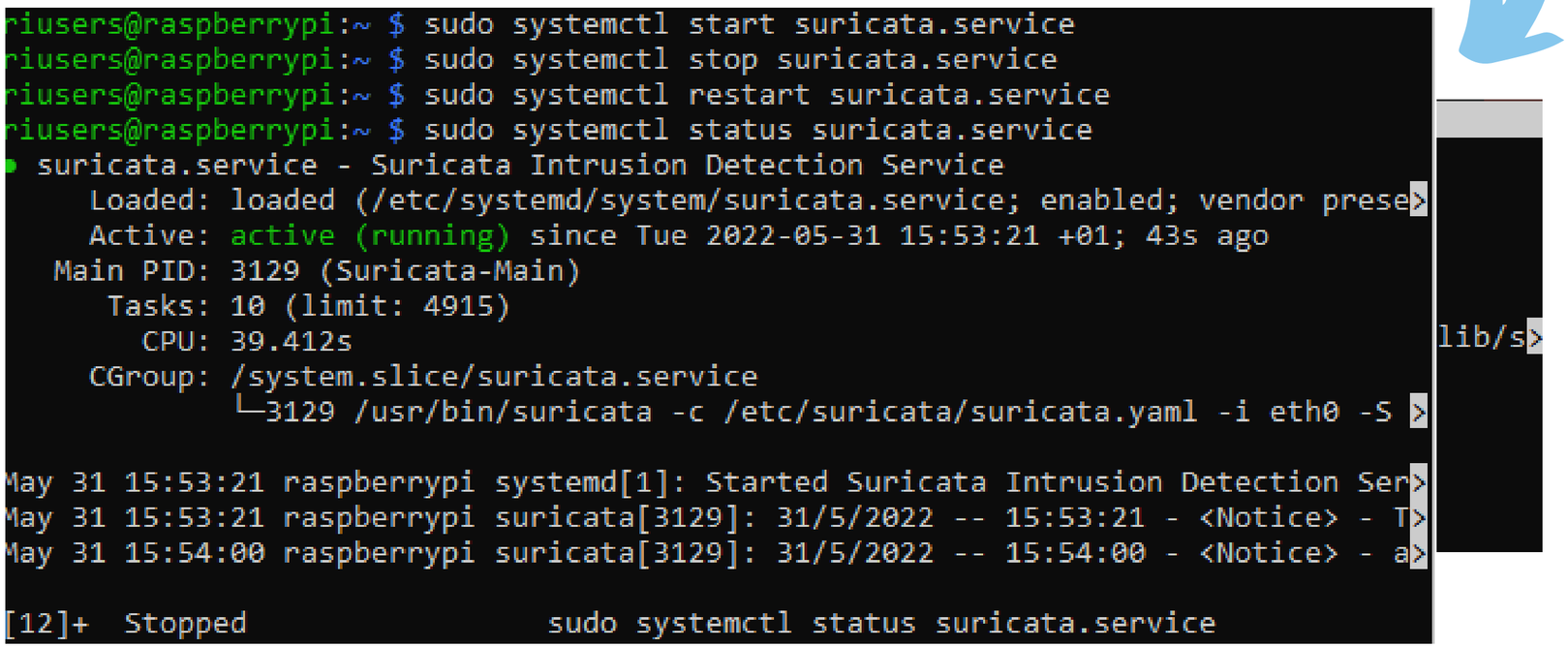
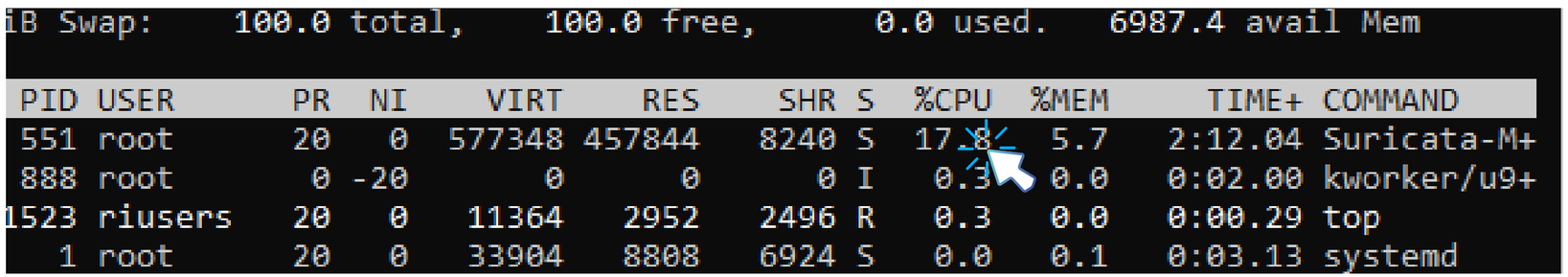
Création du fichier dans : /etc/systemd/system/suricata.service



7 - Utilisation des ressources du Raspberry Pi

Utilisation de processeur



7 - Utilisation des ressources du Raspberry Pi

Utilisation de la mémoire

```
iusers@raspberrypi:~ $ free
               total        used        free      shared  buff/cache   available
em:          8088496      676720     6792020       22456      619756     7155052
wap:          102396           0      102396
```

7 - Utilisation des ressources du Raspberry Pi

Utilisation de la carte SD

```
riusers@raspberrypi:~ $ df
Filesystem     1K-blocks    Used Available Use% Mounted on
/dev/root       29583108 5633125  22693940  20% /
devtmpfs         3879384       0   3879384   0% /dev
tmpfs            4044248       0   4044248   0% /dev/shm
tmpfs            1617700    1244   1616456   1% /run
tmpfs               5120       4      5116   1% /run/lock
/dev/mmcblk0p1    258095   50413    207683  20% /boot
tmpfs             808848      20    808828   1% /run/user/1000
tmpfs             808848      16    808832   1% /run/user/1001
```

Conclusion

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