Scope:

Electronic Identity Card Reader (eID)

SUBJECT:

Installation on Raspberry (Debian)

Version: 0

Electronic Identity Card Reader (eID)

Installation on Raspberry (Debian)

Revision History

Revision	Date	Description
0.0	20-09-2023	Draft
1.0	25-09-2023	First Release

Associated Documents

Description

Electronic Identity Card Reader (eID)

Installation on Raspberry (Debian)

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1 Introduction

Two methods for installing a smart ID card reader driver on a Raspberry Pi are provided in this document.

The methods described:

- Using the Open Source Smart Card Library (OpenSC).
- Using the Belgian eID software module

The methods approaches are slightly different for the Raspberry Debian version and Pi Model. The installation's description begins with a summary of these points.

The installation was tested using a Belgian Identity card and an OneSpan Digipass 905 (aka Vasco 905) card reader, with various Raspberry Pi models and OS versions.

Figure 1: OneSpan 905 Card reader

2 Raspberry Models and OS

2.1 Raspberry Models

Current supported Raspberry models are:

- Pi Pico
- Pi Zero
- Pi Zero W
- Pi Zero 2W
- Pi 1 +
- Pi 1B+
- Pi 3A+
- Pi 3B
- Pi 3B+
- Pi 4B

Despite being out-dated, the Pi 2B model is still usable under certain conditions (typically by replacing the Chromium web browser with a Firefox one for this topic).

There are 32/64 bits architecture models, these are:

- Pi Zero 2 W
- Pi 3A
- Pi 3B
- Pi 3B+
- Pi 3A+

- Pi 4

2.1.1 Check Model capabilities

The following command can be used to check the capabilities of a 32/64-bit CPU Raspberry model:

```
lscpu | grep Architecture
```

Response of a 32 bits CPU is:

```
Architecture:        armv7l
```

Response of a 32/64 bits CPU is:

```
Architecture:        aarch64
```

2.2 Raspberry OS

The Debian version (as for September 2023) of the Raspberry OS comes in two flavours:

- Debian Version 11 or bullseye
- Debian Legacy Version 5.10 or buster

Version 11 (bullseye) is also available for 32 and 64 models

2.2.1 Check OS Version

- Debian buster

```
cat /etc/os-release
PRETTY_NAME="Raspbian GNU/Linux 10 (buster)"
NAME="Raspbian GNU/Linux"
VERSION_ID="10"
VERSION="10 (buster)"
VERSION_CODENAME=buster
ID=raspbian
ID_LIKE=debian
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL=http://www.raspbian.org/RaspbianBugs
```

- Debian bullseye

```
cat /etc/os-release
PRETTY_NAME="Debian GNU/Linux 11 (bullseye)"
NAME="Debian GNU/Linux"
VERSION_ID="11"
VERSION="11 (bullseye)"
VERSION_CODENAME=bullseye
ID=debian
HOME_URL="https://www.debian.org/"
SUPPORT_URL="https://www.debian.org/support"
BUG_REPORT_URL="https://bugs.debian.org/"
```

3 Web Browsers

Different default Web browsers are installed depending on the Debian version.

For

- buster: Firefox ESR
- bullseye: Chromium

However for the Model Pi 2B with bullseye, the default Chromium browser is not working, it is therefore recommended removing the default Chromium browser and replace it by the Firefox one (see Removing Chromium Web browser on page 25).

4 Test Environment

The smart eID card implementation (OpenSC and Belgian eID module) was tested in the following environment:

- Pi 2B – Debian buster - Firefox
- Pi 2B – Debian bullseye 32 bits- Firefox
- Pi 4 – Debian bullseye 64 Bits – Firefox and Chromium

The WEB browser and authority site are used to authenticate an ID card while connected to its web site. The integration of the eID card driver configuration with the browser is necessary.

The Pi 2B, using the buster or bullseye OS needs the Firefox browser rather than Chromium one.

Note: Firefox ESR is still currently working with all versions of Raspberry models and OS

Before starting the installation, it is recommended to update the Raspberry libraries by doing the following:

```
sudo apt update
```

and

```
sudo apt upgrade
```

and

```
sudo apt dist-upgrade
```

and

```
sudo reboot
```

IMPORTANT: The following procedures require the ID card reader to be connected to one USB port on the Raspberry Pi.

5 Method 1: OpenSC Installation Procedure

5.1 Install the opensc package

1. Verify if opensc package is not already installed (look for opensc-pkcs11.so and onepin-opensc-pkcs11.so)

   - Debian buster or bullseye 32 bits

```
ls /usr/lib/arm-linux-gnueabihf/*pkcs11.so
/usr/lib/arm-linux-gnueabihf/onepin-opensc-pkcs11.so
/usr/lib/arm-linux-gnueabihf/opensc-pkcs11.so
```

   - Debian bullseye 64 bits

```
ls /usr/lib/aarch64-linux-gnu/o*.so
/usr/lib/aarch64-linux-gnu/onepin-opensc-pkcs11.so
/usr/lib/aarch64-linux-gnu/opensc-pkcs11.so
```

2. If not proceed with the installation

```
sudo apt install opensc pcscd
```

5.2 Verify opensc installation

1. Check that the opensc files are installed in the correct directory as mentioned above.
2. Also check opensc version

- Debian buster

```
opensc-tool -i
  OpenSC 0.19.0 [gcc  8.3.0]
  Enabled     features:     locking     zlib     readline     openssl
  pcsc(libpcsclite.so.1)
```

- Debian bullseye

```
opensc-tool -i
OpenSC 0.21.0 [gcc  10.2.0]
Enabled features: locking zlib readline openssl
pcsc(libpcsclite.so.1)
```

5.3 Check eID card reader and ID card

- Check card reader with eID reader connected

```
opensc-tool -l
  # Detected readers (pcsc)
  Nr.  Card  Features  Name
  0    No              VASCO DP905v1.1 00 00
```

- Check card reader with ID card inserted (here Belgian ID card)

```
opensc-tool --reader 0 --name
Belpic cards
opensc-tool --reader 0 --atr
3b:98:13:40:0a:a5:03:01:01:01:ad:13:11
```

5.4 Installing opensc driver with Firefox

If needed, install Firefox, for that, see Installing Firefox on page 24.

1. Start Firefox from the Raspberry Internet Menu
2. From the Firefox right pull-down menu select Settings

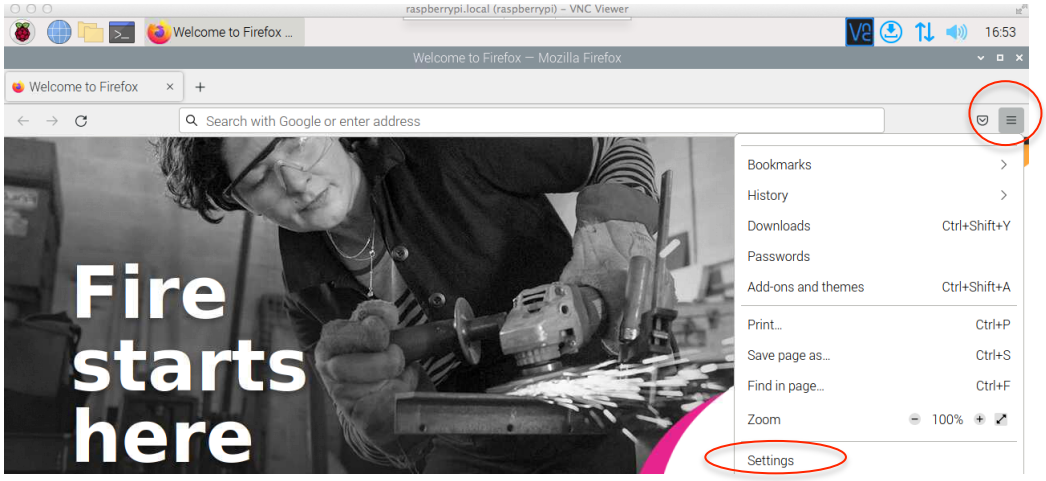

Figure 2: Accessing the Firefox Settings

3. Select Privacy & Security

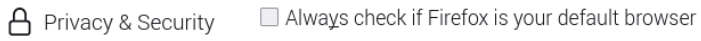

Figure 3: Firefox Private & Security

4. Find Certificates options

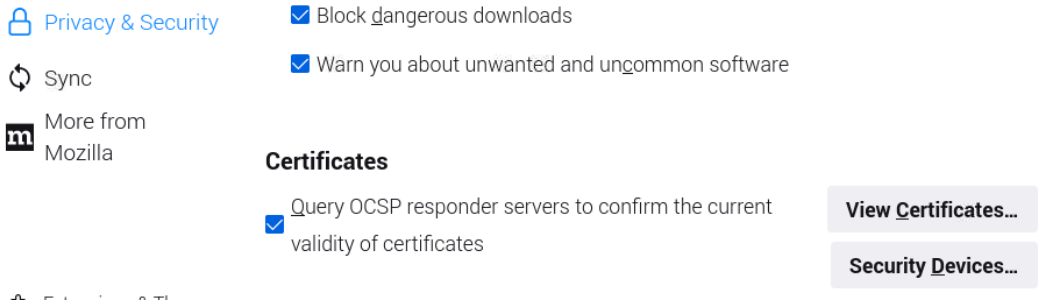

Figure 4: Firefox Certificate

5. Select Security Devices

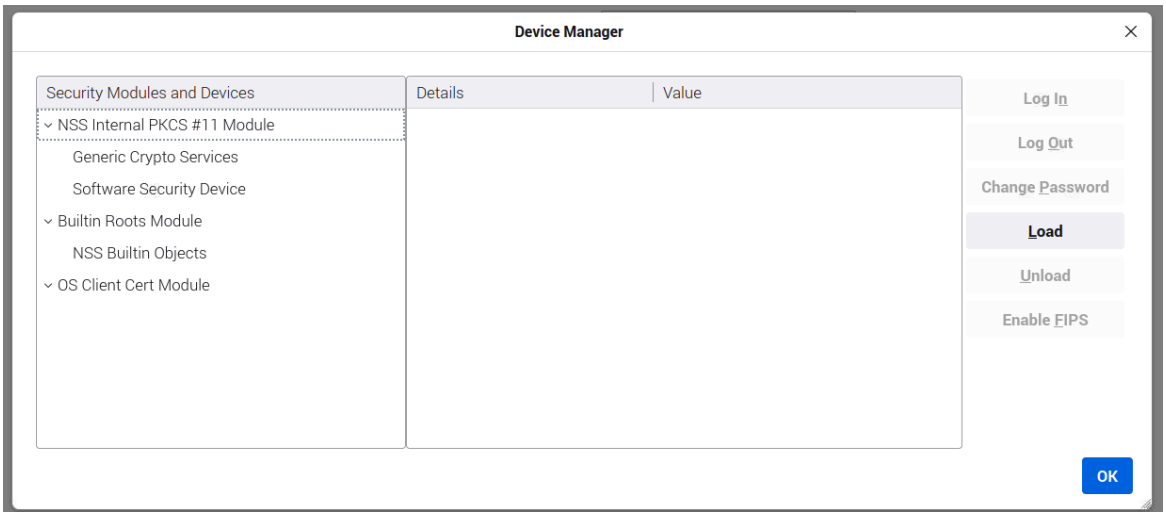

Figure 5: Firefox Security Modules and Devices

6. Load the opensc module

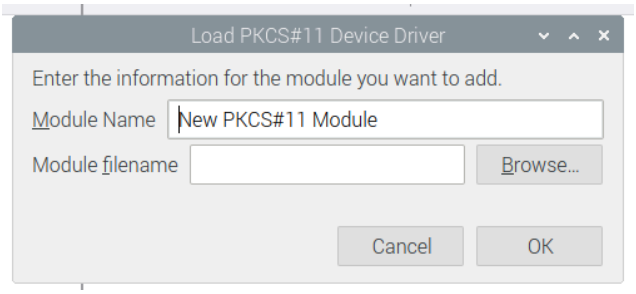

Figure 6: Firefox Load Device Driver

- Modify the Module Name as: OpenSC PKCS#11 Modules

Note: Actually two driver modules are available:

- *opensc-pkcs11.so and onepin-opensc-pkcs11.so*

As far as we understand the onepin-opensc is used for eID cards with only one PIN (Personal Identifier Number). This is the one used in the following example

- Browse the Module file name to find:
  - For Debian 32 bits (buster and bullseye)

    `/usr/lib/arm-linux-gnueabihf/one-opensc-pkcs11.so`
  - For Debian 64 bits bullseye

    `/usr/lib/aarch64-linux-gnu/one-opensc-pkcs11.so`

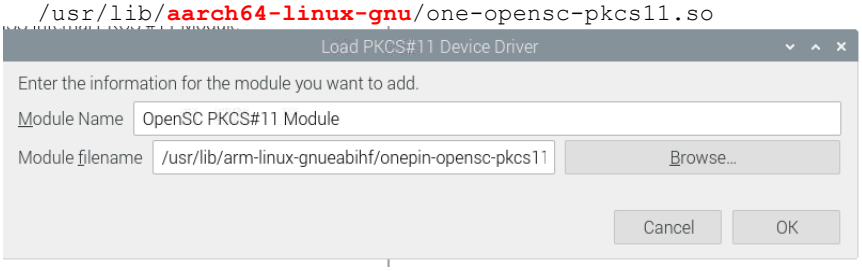

Figure 7: Firefox Load Device Driver: OpenSC onepin module

7. Load the module OK
8. Check the configuration

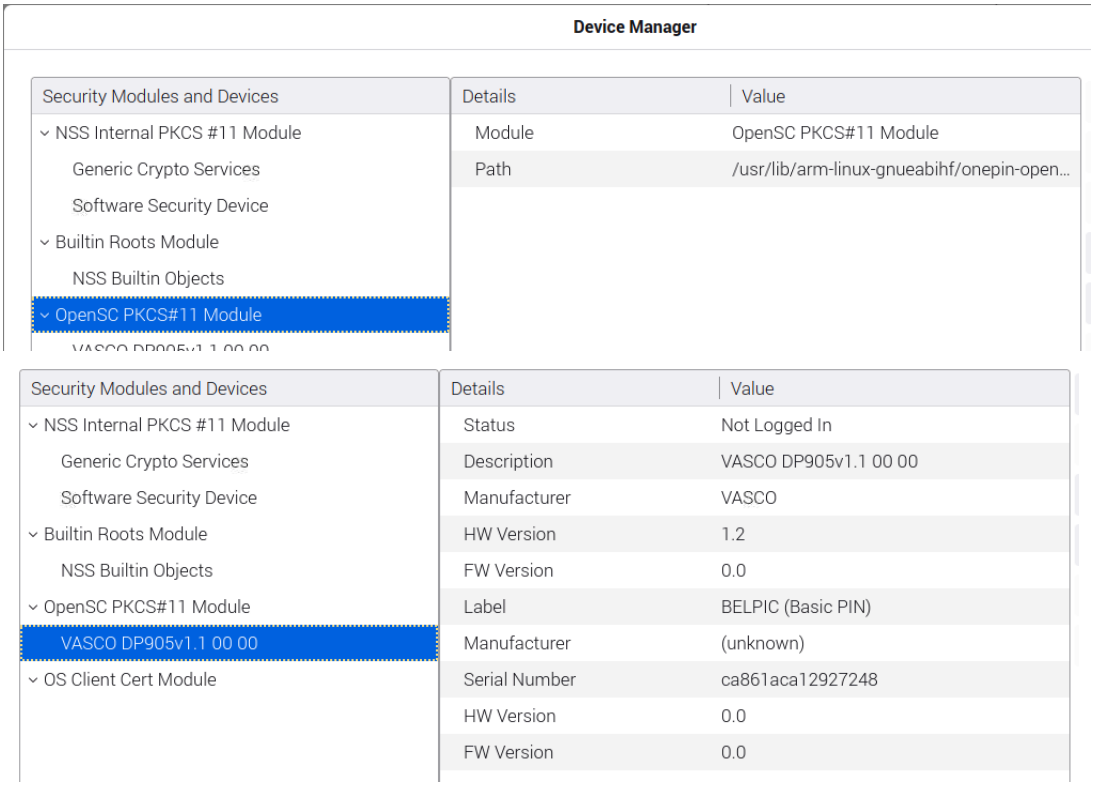

Figure 8: Firefox OpenSC module Check

5.5 Installing opensc driver with Chromium

To configure security modules in Chromium, the opensource (openSC) driver must be added manually to the Network Security Service Module Database (.pki/nssdb).

5.5.1 Install Network Security Service Library

1. Check if the Network Security Service library is installed
   - Debian buster

```
dpkg -l | grep libnss3-tools
```

```
ii   libnss3-tools                                  2:3.42.1-1+deb10u6
armhf        Network Security Service tools
```

- Debian bullseye

```
dpkg -l | grep libnss3-tools
ii   libnss3-tools                                  2:3.61-1+deb11u3
arm64        Network Security Service tools
```

2. If not install the package

```
sudo apt install libnss3-tools
```

5.5.2 Update the Network Security Service Database

The network security database is automatically created when Chromium is **accesses for the first time.**

1. Start Chromium to create the nss database
2. **IMPORTANT: Quit the Chromium application before updating it**
3. Check if the nss database exist

```
ls $HOME/.pki
```

```
nssdb
```

4. Add the opensc driver module to the network security service database
   - Debian buster

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -add eID -libfile /usr/lib/arm-linux-gnueabihf/opensc-pkcs11.so
```

   - Debian bullseye

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -add eID -libfile /usr/lib/aarch64-linux-gnu/opensc-pkcs11.so
```

   When prompted just: ENTER

   - Verify the database (here with bullseye, card reader connected, and ID card inserted)

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -list eID
```

```
-----------------------------------------------------------
Name: eID
Library file: /usr/lib/aarch64-linux-gnu/opensc-pkcs11.so
Manufacturer: OpenSC Project
Description: OpenSC smartcard framework
PKCS #11 Version 2.20
Library Version: 0.21
Cipher Enable Flags: None
Default Mechanism Flags: None

  Slot: VASCO DP905v1.1 00 00
  Slot Mechanism Flags: None
  Manufacturer: VASCO
  Type: Hardware
  Version Number: 0.0
  Firmware Version: 0.0
  Status: Enabled
  Token Name: BELPIC (Basic PIN)
  Token Manufacturer: (unknown)
  Token Model: PKCS#15
  Token Serial Number: ca861aca12927248
  Token Version: 0.0
```

```
        Token Firmware Version: 0.0
        Access: NOT Write Protected
        Login Type: Login required
        User Pin: Initialized

      ------------------------------------------------------------
```

6 Method 2: Installing the Belgian eID module

See:
https://eid.belgium.be/en/linux-eid-software-installation
And
https://doc.ubuntu-fr.org/tutoriel/utiliser_carte_identite_electronique_belge

6.1 Install the Belgian eID package with Chromium

6.1.1 Download the Debian package

1. Using the Chromium browser go to https://eid.belgium.be/en/linux-eid-software-installation.
2. Download ei-archive.deb for Debian package, to the default $HOME/Downloads directory. The **current file** is eid-archive_2023.3_all.deb.

Or

From the command line

```
cd $HOME/Downloads
wget https://eid.belgium.be/sites/default/files/software/eid-archive_2023.3_all.deb
```

3. Verify the download

```
ls
```

```
eid-archive_2023.3_all.deb
```

4. Install the eid-archive package

```
sudo dpkg -i eid-archive_2023.3_all.deb
```

5. Verify the eID list file

If necessary uncomment (remove #) the last line

```
cat /etc/apt/sources.list.d/eid.list
```

```
# To enable the candidate repository, uncomment the below line, put "deb" in
# front of it, and run "dpkg-reconfigure eid-archive" to enable the archive
# key.
#
# The candidate repository contains unsupported prerelease packages. Use at
# your own risk.
#
# Note, however, that the candidate repository is usually empty; it is
# used when we're preparing (and testing) a new release. Therefore, it
# should be relatively safe.
#
# There is also another "continuous" repository, for which packages get
# recompiled for each and every change to the source. This isn't listed
# (so that it can't be accidentally enabled), but the configuration is
# the same as the below, with "candidate" replaced by "continuous".
```

```
#
# http://files.eid.belgium.be/debian candidate/bullseye main

# The regular repository with released packages. This is what you should
# use.
deb https://files.eid.belgium.be/debian bullseye main
```

6. Reconfigure the package

```
sudo dpkg-reconfigure eid-archive
```

7. Update the package list

```
sudo apt-get update
```

6.1.2 Install the eID viewer

```
sudo  apt-get install eid-mw eid-viewer
```

8. Test the viewer with an ID card inserted (here a Belgian ID card)

```
eid-viewer
```

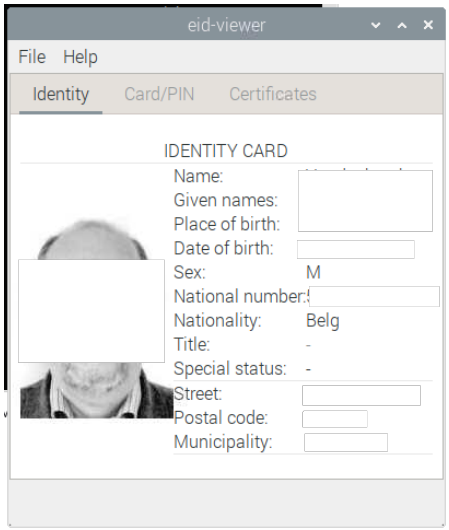

Figure 9: ID Card view

9. Alternatively start the viewer it from Raspberry Menu

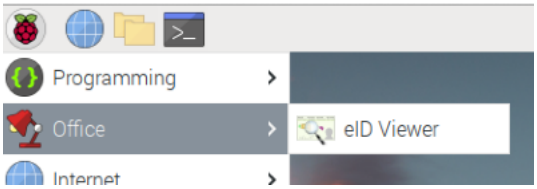

Figure 10: ID Card view- Raspberry Menu

10. Clean-up the installation

```
cd $HOME/Downloads
rm eid-archive_2023.3_all.deb
```

6.1.3 Update Chromium Web browser

To configure security modules in Chromium, the opensource (openSC) driver must be added manually to the Network Security Service Module Database (.pki/nssdb).

6.1.3.1 Install Network Security Service Library

1. Check if the Network Security Service library is installed
   - Debian buster

```
dpkg -l | grep libnss3-tools
ii   libnss3-tools                                  2:3.42.1-1+deb10u6
armhf        Network Security Service tools
```

   - Debian bullseye

```
dpkg -l | grep libnss3-tools
ii   libnss3-tools                                  2:3.61-1+deb11u3
arm64        Network Security Service tools
```

2. If not install the package

```
sudo apt install libnss3-tools
```

6.1.3.2 Update the Network Security Service Database

The network security database is automatically created when Chromium is **accesses for the first time.**

1. Start Chromium to create the nss database
2. **IMPORTANT: Quit the Chromium application**
3. Check if the nss database exist
   - Debian buster of bullseye 32 bits

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -add "Belgium eID" -libfile
/usr/lib/arm-linux-gnueabihf/libbeidpkcs11.so.0
```

   - Debian bullseye 64 bits

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -add "Belgium eID" -libfile
/usr/lib/aarch64-linux-gnu/libbeidpkcs11.so.0
```

   When prompted just: ENTER

4. Verify (here with bullseye, card reader connected, and ID card NOT inserted)

```
modutil -dbdir sql:$HOME/.pki/nssdb/ -list "Belgium eID"
-------------------------------------------------------------
Name: Belgium eID
Library file: /usr/lib/arm-linux-gnueabihf/libbeidpkcs11.so.0
Manufacturer: Belgium Government
Description: Belgium eID PKCS#11 interface v2
PKCS #11 Version 2.40
Library Version: 5.1
Cipher Enable Flags: None
Default Mechanism Flags: None

  Slot: VASCO DP905v1.1 00 00
  Slot Mechanism Flags: None
  Manufacturer: _ID_
  Type: Hardware
  Version Number: 1.0
  Firmware Version: 1.0
  Status: Enabled
ERROR: Unable to get information about token "".
```

6.2 Install the Belgian eID package with Firefox

6.2.1 Install the Belgium eID add-on

1. Start Firefox browser
2. Install the Belgian eID add-on (Add to Firefox) when connecting to:

   https://addons.mozilla.org/en-US/firefox/addon/belgium-eid/

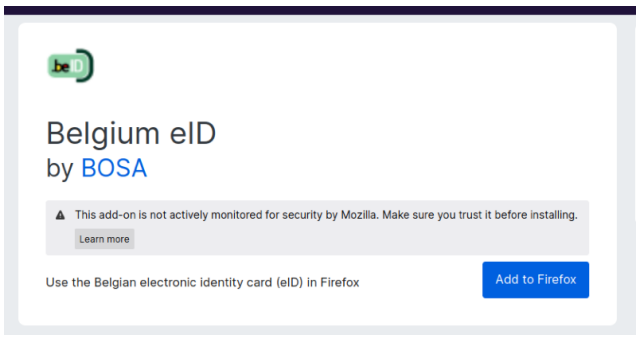

Figure 11: Firefox Belgian eID add-on

1. Answer the questions Add and Okay

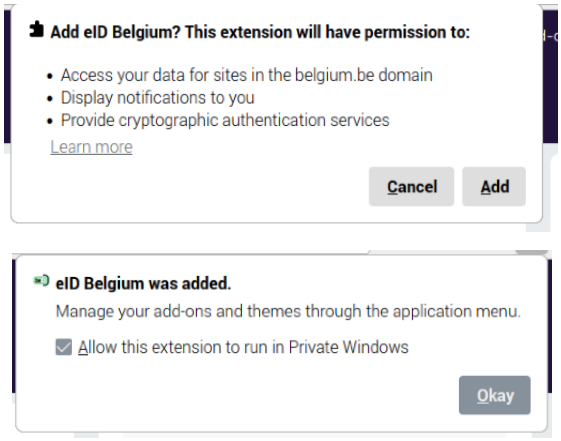

Figure 12: Firefox add-on - installation finalisation

6.2.2 Download the Debian package

1. With the Firefox browser go to https://eid.belgium.be/en/linux-eid-software-installation.
2. Download ei-archive.deb for Debian package, to $HOME/Downloads directory. The **current file** is eid-archive_2023.3_all.deb.

Or

From the command line

```
cd $HOME/Downloads
wget https://eid.belgium.be/sites/default/files/software/eid-archive_2023.3_all.deb
```

3. Verify the download

```
ls
```

```
eid-archive_2023.3_all.deb
```

4. Install the package

```
sudo dpkg -i eid-archive_2023.3_all.deb
```

5. Verify the eID list

   If necessary uncomment (remove #) the last line

```
cat /etc/apt/sources.list.d/eid.list
# To enable the candidate repository, uncomment the below line, put "deb"
in
# front of it, and run "dpkg-reconfigure eid-archive" to enable the
archive
# key.
#
# The candidate repository contains unsupported prerelease packages. Use
at
# your own risk.
#
# Note, however, that the candidate repository is usually empty; it is
# used when we're preparing (and testing) a new release. Therefore, it
# should be relatively safe.
#
# There is also another "continuous" repository, for which packages get
# recompiled for each and every change to the source. This isn't listed
# (so that it can't be accidentally enabled), but the configuration is
# the same as the below, with "candidate" replaced by "continuous".
#
# http://files.eid.belgium.be/debian candidate/bullseye main

# The regular repository with released packages. This is what you should
# use.
deb https://files.eid.belgium.be/debian bullseye main
```

6. Reconfigure the package

```
sudo dpkg-reconfigure eid-archive
```

7. Update the package list

```
sudo apt-get update
```

6.2.2.1 Install the eID viewer

```
sudo  apt-get install eid-mw eid-viewer
```

8. Test the viewer with an ID card inserted (here a Belgian ID card)

```
eid-viewer
```

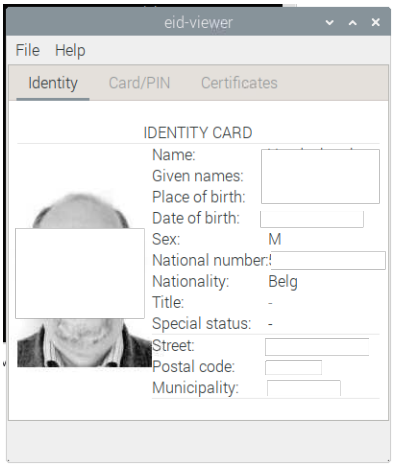

Figure 13: ID Card view

9. Alternatively load it from the Raspberry Menu

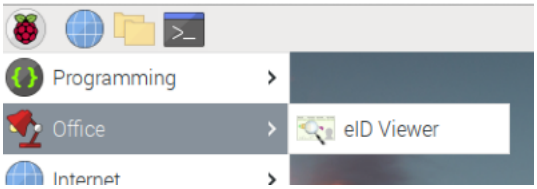

Figure 14: ID Card view- Raspberry Menu

10. Clean-up the installation

```
cd $HOME/Downloads
rm eid-archive_2023.3_all.deb
```

6.2.3 Verify the Firefox Web browser configuration

1. Start Firefox from the Raspberry Internet Menu
2. From the Firefox right pull-down menu select Settings

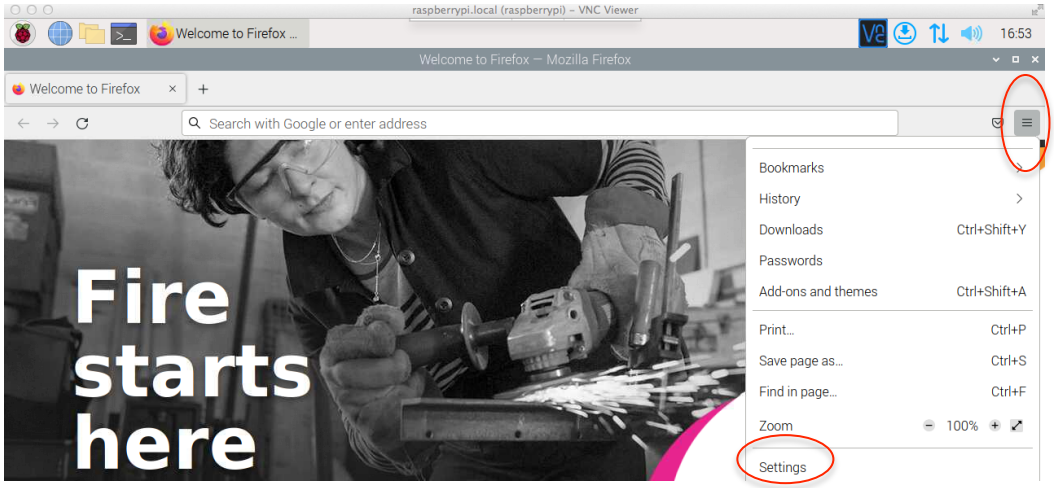

Figure 15: Accessing the Firefox Settings

3. Select Privacy & Security

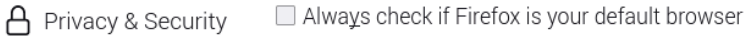

Figure 16: Firefox Private & Security

4. Find Certificates options

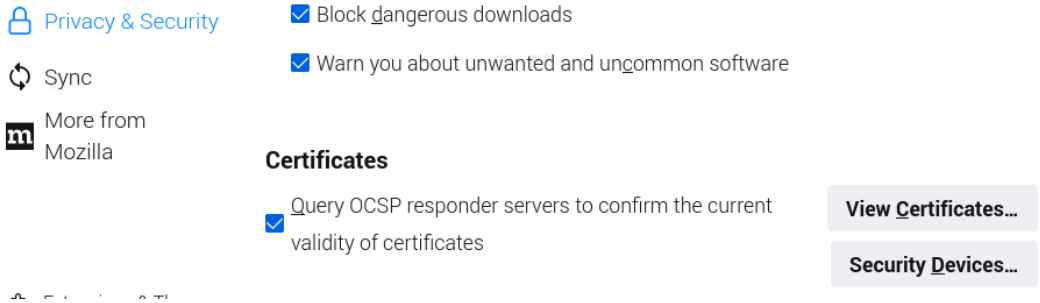

Figure 17: Firefox Certificate

5. Select Security Devices

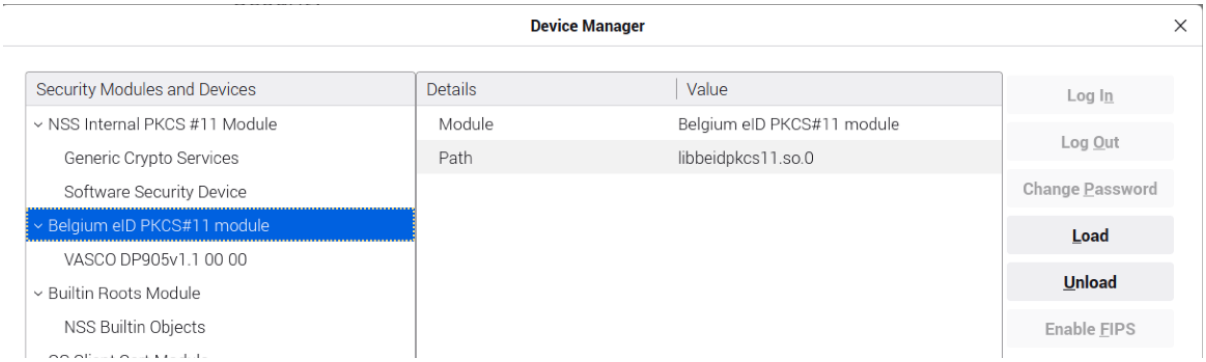

Figure 18: Firefox Security Modules and Devices

6. Perform a test (see Belgian eID login - **Error! Reference source not found.** on page **Error! Bookmark not defined.**)
7. Verify the Certificate
   - From the Firefox right pull-down menu select Settings
   - Find Certificates options
   - Select View Certificates

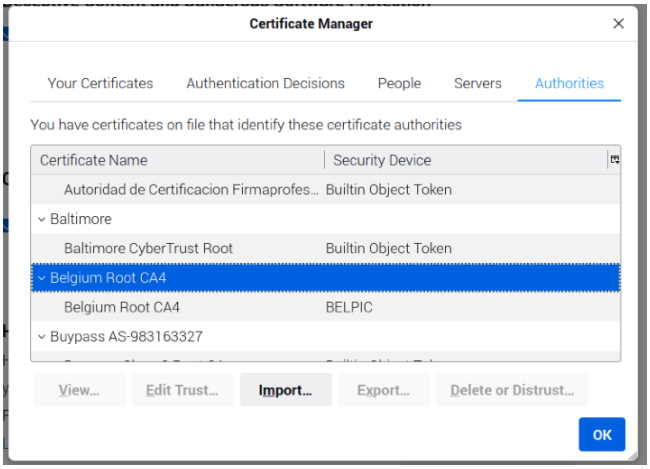

Figure 19: Firefox View Certificates – Belgium Root C4

7 Belgian eID login

IMPORTANT: Knowing the PIN card associated with the card ID is necessary to perform this test.

7.1 Test with Chromium

1. Start Chromium from the Raspberry menu
2. Go to the web site:

```
https://iamapps.belgium.be/tma/?lang=en
```

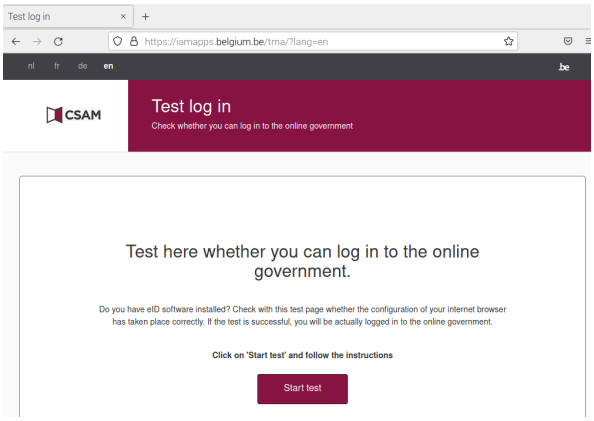

Figure 20: Belgian eID login test site

1. Start the test as specified

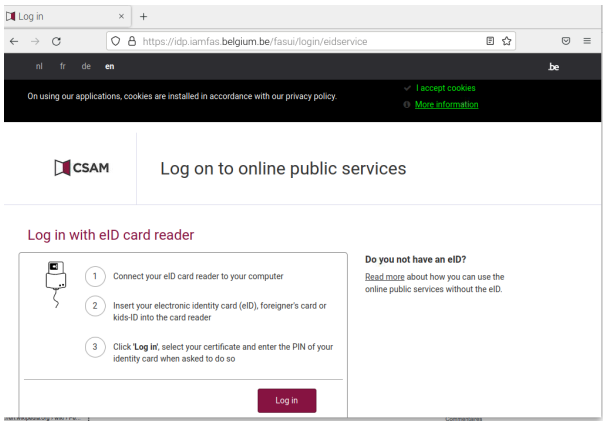

Figure 21: Belgian eID login test site - reading the eID card

1. You should receive the Select Certificate Window

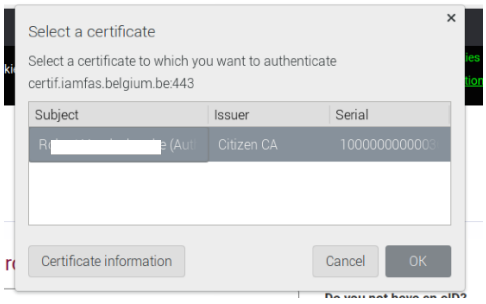

Figure 22: Belgian eID login test site – Select a Certificate

2. Depress OK
3. While card is being read, you should be prompted to enter the PIN code associated to the eID card

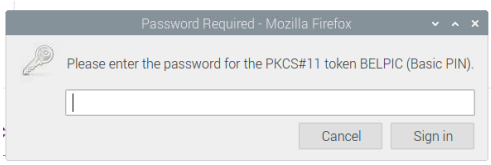

Figure 23: Belgian eID login test site – sign the eiD card with the PIN code

4. Entre the ID card PIN code and validate the Request Sign In

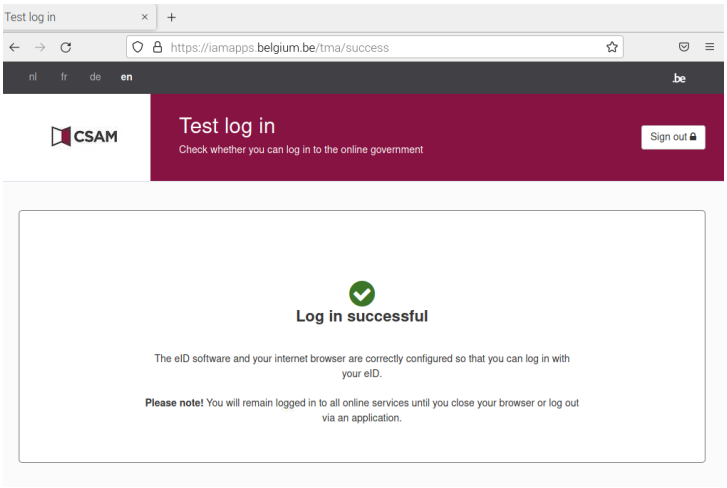

Figure 24: Belgian eID login test site – Login Successful

5. Then sign out

7.2 Test with Firefox

1. Start Firefox from the Raspberry menu
2. Go to the web site

```
https://iamapps.belgium.be/tma/?lang=en
```

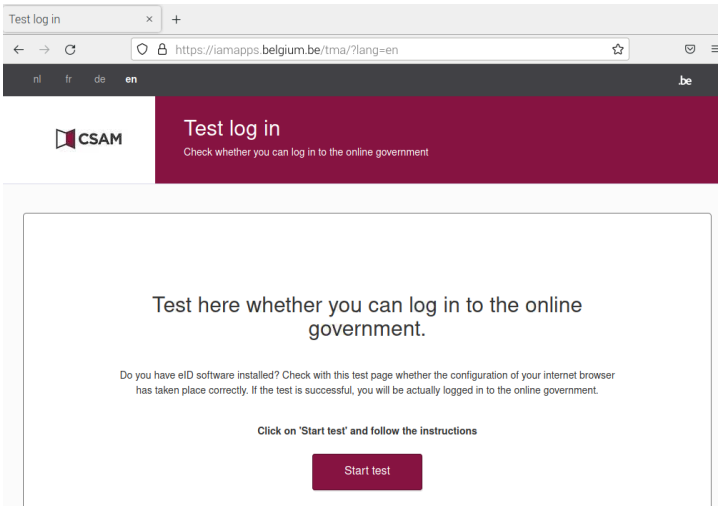

Figure 25: Belgian eID login test site

2. Start the test as specified

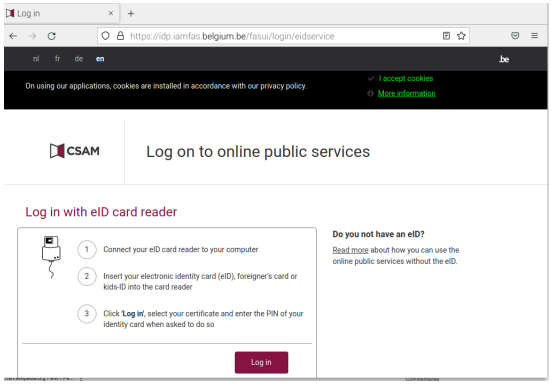

Figure 26: Belgian eID login test site - reading the eID card

1. While card is being read, you should be prompted to enter the PIN code associated to the eID card

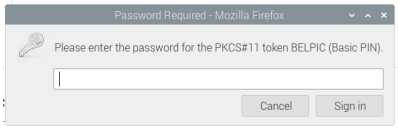

Figure 27: Belgian eID login test site – sign the eiD card with the PIN code

3. You should receive the User Identification Request window

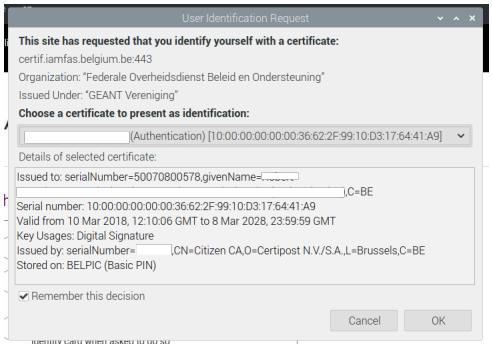

Figure 28: Belgian eID login test site – User Identification Request

4. Validate the Request OK

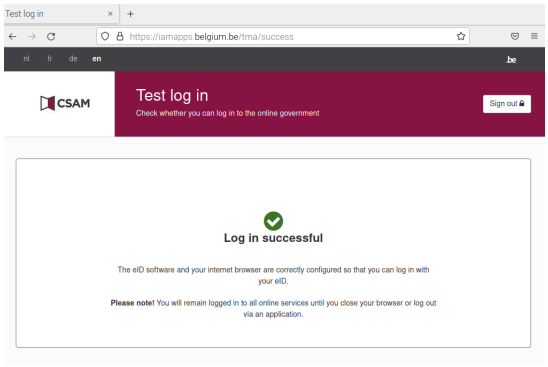

Figure 29: Belgian eID login test site – Login Successful

5. Then sign out

8 Installing Firefox

The buster version uses Firefox as the default web browser, not bullseye.

If required (typically for a bullseye on Pi 2B), here is a method for installing.

1. From the Raspberry Menu start the Add / Remove Software application

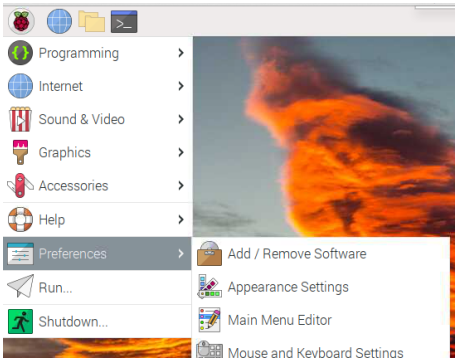

Figure 30: Raspberry Add / Remove Software

1. From the Options search for Firefox (Type Firefox + Enter)
   - Select ☑ the appropriate item
   - Depress Apply to install the package
   - Validate the installation by authenticating the user

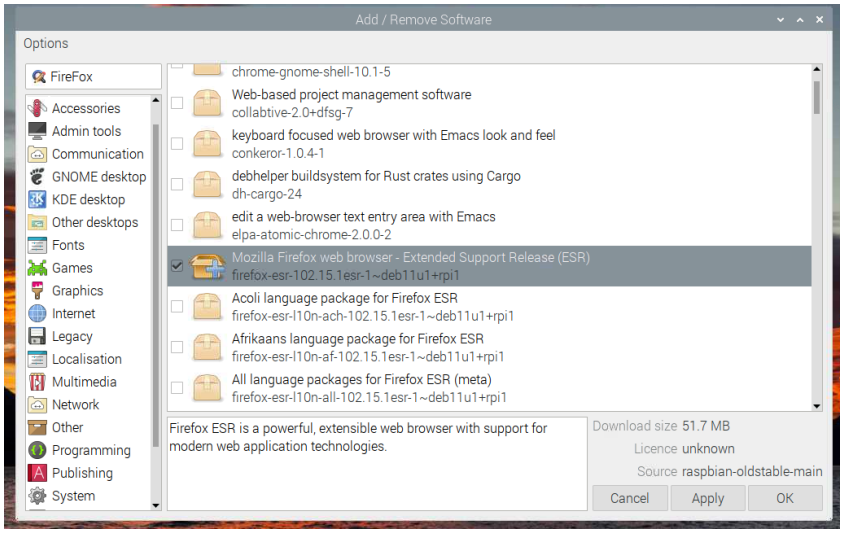

Figure 31: Add / Remove Software Search for Firefox

2. After installation
   - Cancel the Add / Remote Software application
   - Launch Firefox from the Internet Raspberry Menu

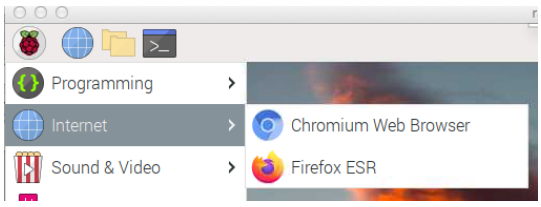

Figure 32: Accessing the Firefox application

9 Removing Chromium Web browser

This should be performed for a Raspberry PI 2B because Chromium is unusable.

1. From the Raspberry Menu start the Add / Remove Software application

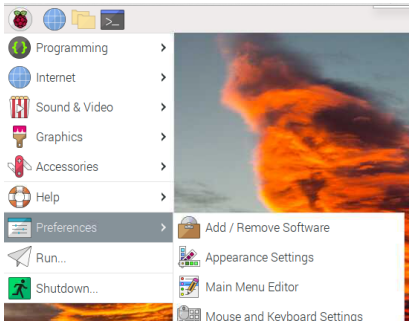

Figure 33: Raspberry Add / Remove Software

2. From the Options search for Chromium (type Chromium + **Enter**)
   - Check for the select ☑ items (scroll down to view all packages)

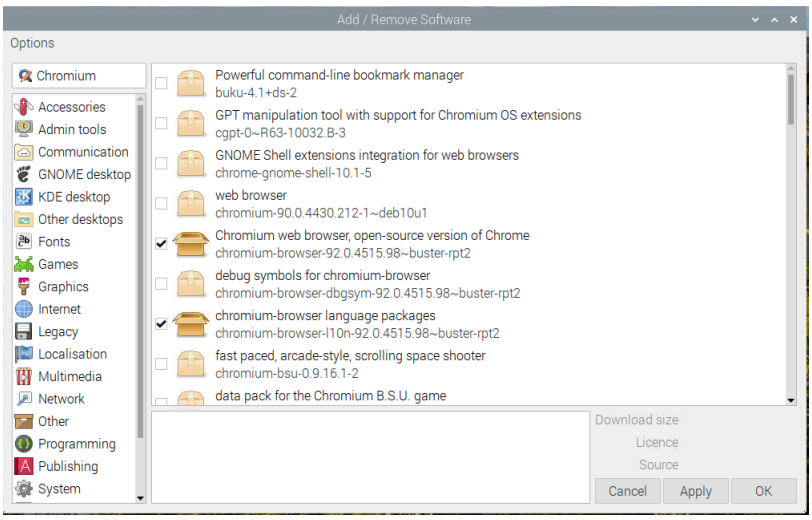

Figure 34: Raspberry Add / Remove Software – Find Chromium packages

- Deselect the installed packages
- Confirm removal by Continue

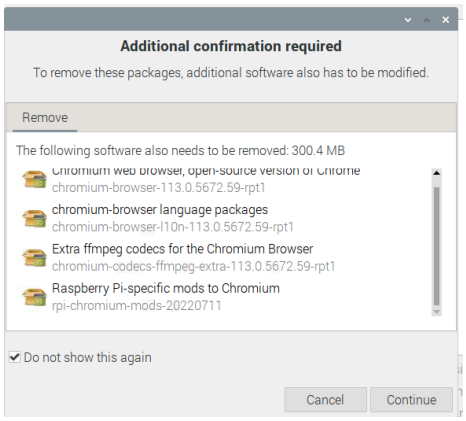

Figure 35: Raspberry Add / Remove Software Chromium removal confirmation

- Validate the installation by authenticating the user

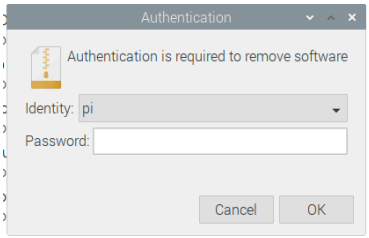

Figure 36: Raspberry Add / Remove Software – Remove package authentication request

10 Appendix

10.1 References

https://github.com/OpenSC/OpenSC/wiki/Quick-Start-with-OpenSC