

System-on-Chip (SoC) Raspberry Pi Setup

Computer Architecture Exploitation and Security

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L*abs must be submitted by the due date for full credit. After due date late submissions will be accepted for a period of one week (seven days) and the grade will be reduced by ten percent (10%) per day after due day.* ***Assignments that are submitted more than seven days late will receive a grade of zero (0).***

I certify that the work submitted in this assignment is my own and that it has not been taken in whole or in part from any other source. I understand that the penalty for plagiarism will include a grade of zero (0) for this assignment plus disciplinary action in accordance with SAIT policies.

Computer Architecture Exploitation and Security

The Raspberry Pi 4 OS options

Objectives

This lab focuses on setting up the Raspberry Pi:

* Headless option
* Setup as a desktop

.

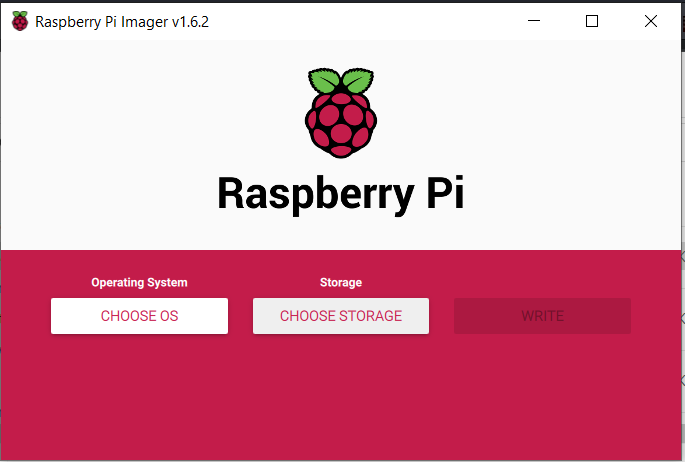
Background Information

* [Raspberry Pi 4 + Ubuntu 20.04 LTS - A Quick, Headless/Cable-less Install - YouTube](https://www.youtube.com/watch?v=dJTqd90bwsI)
* [Kali Linux 2020 headless installation on Raspberry Pi (Wifi + SSH) - YouTube](https://www.youtube.com/watch?v=VXxb_F1Vb7Y)
* [Introducing Raspberry Pi Imager, our new imaging utility - Raspberry Pi](https://www.raspberrypi.org/blog/raspberry-pi-imager-imaging-utility/)
* [Ubuntu for ARM | Download | Ubuntu](https://ubuntu.com/download/server/arm)
* [Setting up a Raspberry Pi headless - Raspberry Pi Documentation](https://www.raspberrypi.org/documentation/configuration/wireless/headless.md)
* [Raspberry Pi OS – Raspberry Pi](https://www.raspberrypi.org/software/)

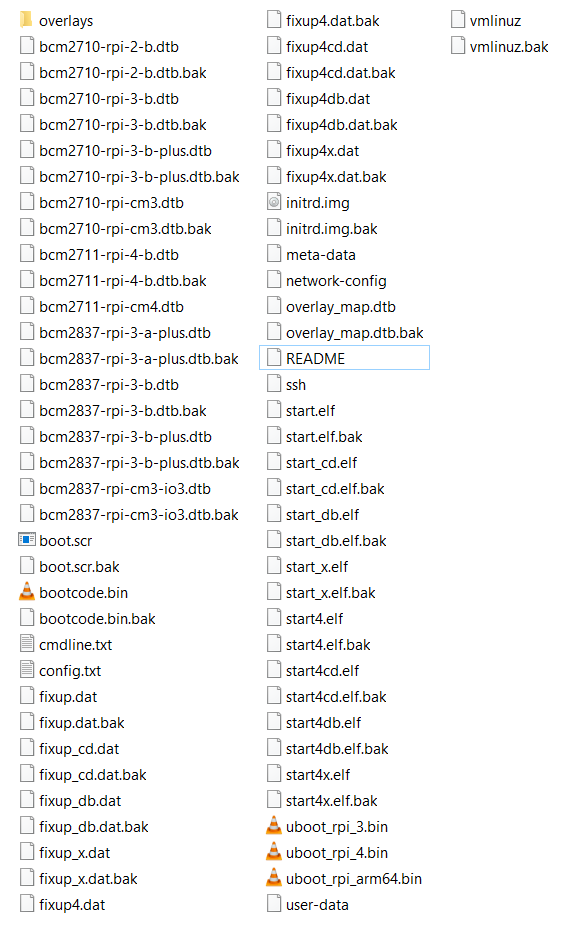
READ THE ENTIRE DOCUMENT PRIOR TO STARTING YOUR RASPBERRY PI SETUP

# Headless with Ubuntu Server

* Go to the following link [Ubuntu for ARM | Download | Ubuntu](https://ubuntu.com/download/server/arm)
* Download the Ubuntu Server 2x.y, I tested with Ubuntu Server 20 but the latest should work this way as well.
* Download the imager software: [Raspberry Pi OS – Raspberry Pi](https://www.raspberrypi.org/software/)
* Install the Raspberry Pi imager utility
  + You can use any other imager available (Rufus, Belena Etcher etc)
* Open the imager



* Select the button “Choose OS”
* Locate the Ubuntu Server software downloaded
* Click the button “Choose Storage”
  + **IMPORTANT** Select your SD card, for windows this should be automatically chosen
* Click the **WRITE** button
  + This will take some time, during which the software will verify that the image was properly written to the SD card before ejecting it
* After completing the process of imaging your SD card
  + Remove and reinsert the SD card
  + You will get a pop-up similar to the below



We need to create 3 files if they don’t already exist:

network-config

ssh

user-data

ssh – This file will be empty, confirm that there isn’t a file extension when you create it.

**network-config** will contain the following information:

**YOUR\_NETWORK\_SSID** - should be the name of your wireless network.

**YOUR\_NETWORK\_PWD** - Should be the password you use to connect a new device to your wireless network

version: 2

renderer: networkd

wifis:

wlan0:

#hidden: true # only in netplan 0.100

dhcp4: true

access-points:

"**YOUR\_NETWORK\_SSID**\"\n scan\_ssid=1\n# \"hack!":

password: "**YOUR\_NETWORK\_PWD**"

**user-data** will contain the following information after modifying some fields

1. At the beginning of the file find the section that looks like the text box below, change it to match the textbox provided:

# https://cloudinit.readthedocs.io/

#

# Some additional examples are provided in comments below the default

# configuration.

# On first boot, set the (default) ubuntu user's password to "ubuntu" and

# expire user passwords

chpasswd:

expire: false

list:

- ubuntu:ubuntu

# Enable password authentication with the SSH daemon

ssh\_pwauth: true

1. At the end of the file find the section: **“Run arbitrary commands at rc.local like time”**

The section should below the following code:

## Run arbitrary commands at rc.local like time

runcmd:

- [ sudo, cp, /boot/firmware/network-config, /etc/netplan/01-netcfg.yml ]

- [ sudo, netplan, generate ]

- [ sudo, netplan, apply ]

#- [ wget, "http://ubuntu.com", -O, /run/mydir/index.html ]

power\_state:

mode: reboot

After completing above eject the SD card and insert it into your Raspberry Pi. Power on the device.

You will need a way to determine the IP Address of the Raspberry Pi.

Method 1:

Login to your home router and find the newest device that was added

Method 2:

Perform a ping sweep on your network using PowerShell to find all the IP Address. The best approach is to perform a ping sweep prior to powering up the Raspberry Pi and then after. Otherwise you will need to make a guess and then test the login.

Ping Sweep: [SANS Penetration Testing | Pen Test Poster: "White Board" - PowerShell - Ping Sweeper! | SANS Institute](https://www.sans.org/blog/pen-test-poster-white-board-powershell-ping-sweeper/)

1..255 | % {echo "**Network**.$\_"; ping -n 1 -w **5** 192.168.1.$\_} | Select-String ttl

Change Network to be the network portion of your machines IP address. If your machine IP is 10.1.1.25, Network above should be replaced with **10.1.1**

The number 5 says how long to wait for a ping response. 5 seconds is a bit too short for some devices but anything longer will make the ping sweep seem like forever.

# Headless with Kali Linux (some folks mentioned that this doesn’t work).

## If the following instructions don’t work, try the following links:

1. <https://www.reddit.com/r/Kalilinux/comments/lbcem7/tutorial_raspberry_pi_kali_20204_headless_install/>

Or

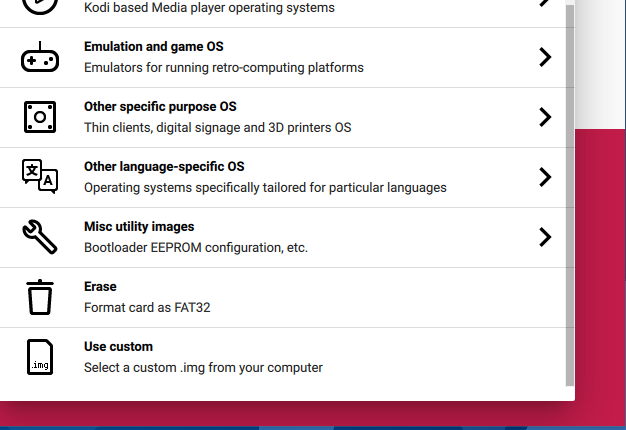
1. <https://www.youtube.com/watch?v=VXxb_F1Vb7Y> (This is not in English but the operations performed in way that makes it easy to follow).

## Instructions

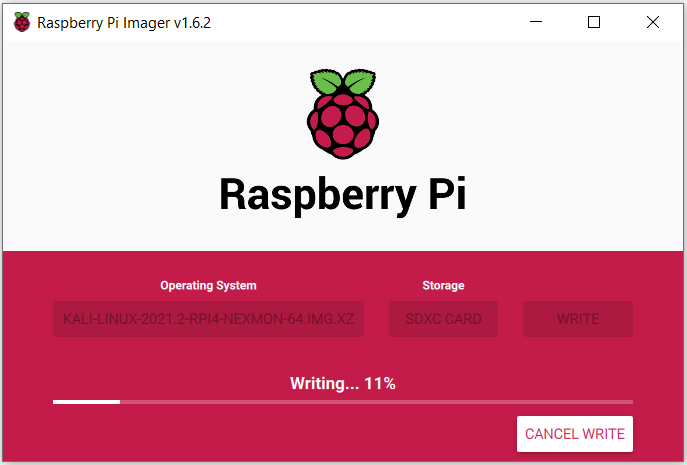
* Go to the following link <https://www.kali.org/get-kali/#kali-arm>
* Download the Kali 64 version for you Pi.



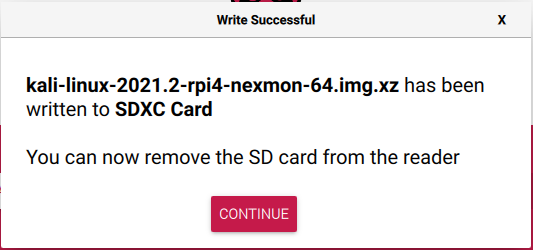
* Download the imager software: [Raspberry Pi OS – Raspberry Pi](https://www.raspberrypi.org/software/)
* Open the imager
* Select the button “Choose OS”
* Locate the image file you downloaded



* Click the button “Choose Storage”
  + **IMPORTANT** Select your SD card, for windows this should be automatically chosen
* Click the **WRITE** button
  + This will take some time, during which the software will verify that the image was properly written to the SD card before ejecting it
* The image below show that the Kali OS was chosen and the SD card was selected.



* After completing the process of imaging your SD card
  + You should see an image similar to the one below

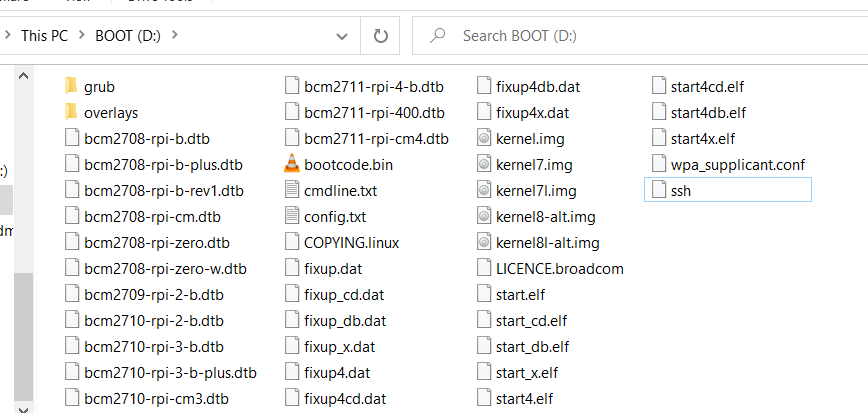


* + Click continue
  + Remove and reinsert the SD card

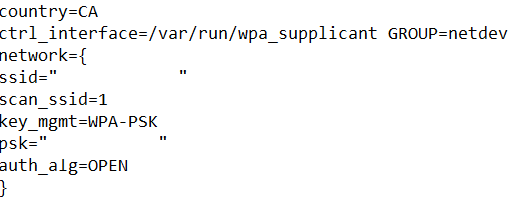
## You will need to modify a few files to complete the setup.

After the “Write” operation is completed

* Remove the SD card and reinsert it
* On your host machine (Windows) open Explorer to find a new drive created
  + Confirm that the new folder contains an empty **ssh** file



* Notice also that there is a wpa\_supplicant.conf file which will contain the following content:



**WiFi\_Password**

**WiFi\_Name**

* The WiFi\_name is the name you use to connect to your wireless network router
* The WiFi\_Password is the PreSharedKey 8-64 characters you use to authenticate to your router so that you can get access to the internet.

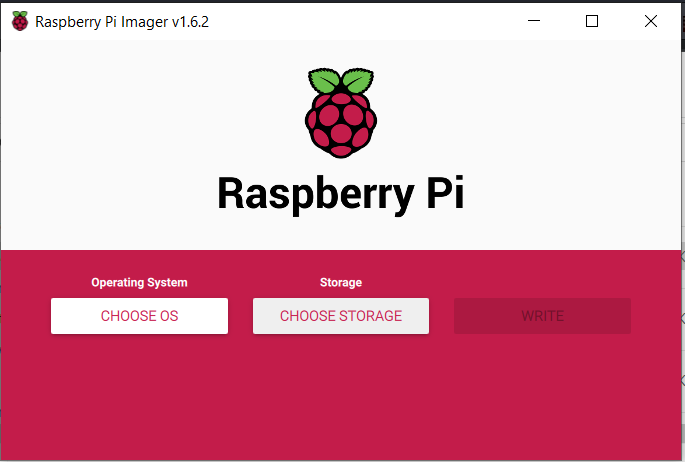
# EASIEST: Headed using Wireless or Ethernet cable

By far this is the easiest setup.

In order to proceed make sure that you have an extra keyboard, mouse and monitor.

1. Connect your USB keyboard and mouse to the USB ports of your Raspberry Pi
2. Connect the Power adapter
3. Connect the HDMI port closest to the power connector

* Download any image or Choose from the available images for the Pi
  + Pick a **64bit OS** so that you can follow along with the labs
* Open the imager



* Select the button “Choose OS”
* Click the button “Choose Storage”
  + **IMPORTANT** Select your SD card, for windows this should be automatically chosen
* Click the **WRITE** button
  + This will take some time, during which the software will verify that the image was properly written to the SD card before ejecting it
* After completing the process of imaging your SD card
  + Remove and reinsert the SD card
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1. Insert the SD card into your Raspberry Pi and power it on.
2. Follow the setup steps presented
3. Login

# Post installation

Now that you have the Raspberry Pi running. It is time to perform some setup so that you can use it for the labs.

1. sudo apt-get update
2. sudo apt-get upgrade
3. sudo apt-get install gcc binutils build-essential gdb

Reboot the device