

STEAM CLOWN™ PRODUCTIONS

RASPBERRY PI - INTRODUCTION GETTING STARTED WITH PYTHON - SIMON MONK

A Python class for my Mechatronics Engineering @ SVCTE. Last Updated for the 2018 – 2019 school year

Last Updated: Sunday, January 27, 2019



OBJECTIVE, OVERVIEW & INTRODUCTION

- These slides are an adaption, and companion to the book by Simon Monk “Programming the Raspberry Pi – getting Started with Python”. Created to better target my SVCTE High School Mechatronics Engineering class.
 1. You will be able to connect and power on a Raspberry Pi
 2. You will navigate and update the Raspbian OS
 3. You will setup personal preferences on the Raspberry Pi
- You will not need any Raspberry Pi or Python Prior Knowledge



STEAM CLOWN™ PRODUCTIONS



See Appendix A,B,C, for Licensing & Attribution information

CC BY-NC-SA 4.0

<https://creativecommons.org/licenses/by-nc-sa/4.0/>
<https://creativecommons.org/licenses/by-nc-sa/4.0/legalcode>

GNU Public License

Any included Programming Code Is licensed under the GNU General Public License v3.0

EUPL (European Union Public Licence) Code and Content is also licensed under the EUPL 1.2 or later



RESOURCES & MATERIALS NEEDED

- Simon Monks “Programming the Raspberry Pi – Getting Started with Python”
- PC or Laptop
- Access to the Internet
- A Raspberry Pi 3 rev2 or better
- Display (DVI/HDMI) and Keyboard and Mouse



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

WHAT YOU WILL KNOW...

- Prior Knowledge & Certifications
 - You don't need to have an prior Programming or Raspberry P
 - Coding experience is helpful, but not required...
- What You Will Know & Be Able To Do
 - Connect Power-On & Start your Raspberry Pi
 - Navigate and update the Raspbian OS
 - Setup personal preferences on the Raspberry Pi



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

HOW WILL YOU BE MEASURED

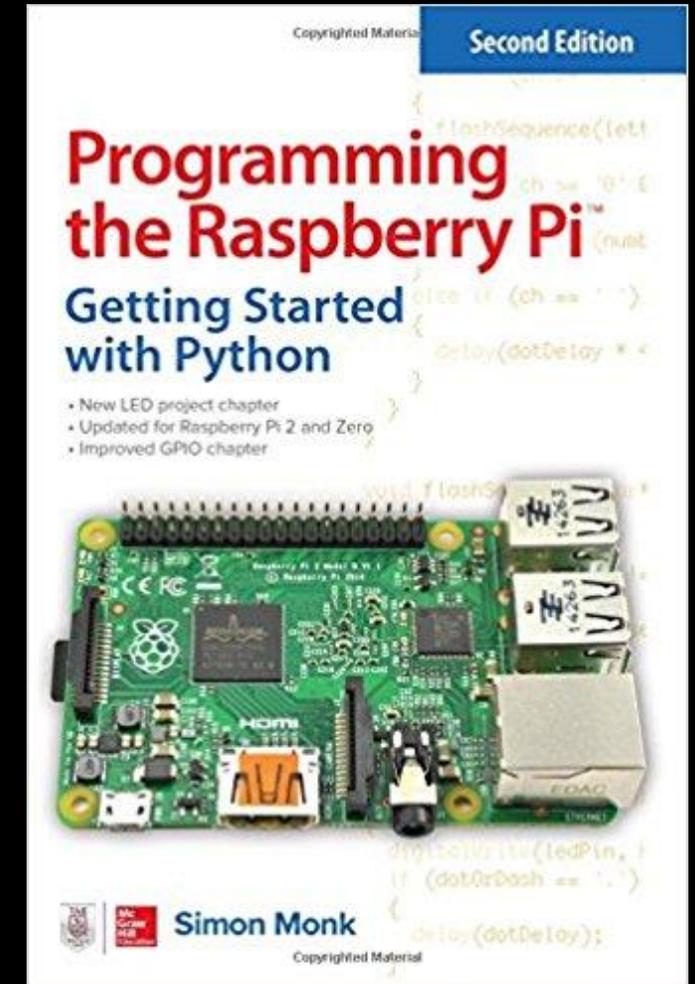
- At the end of this lesson, you will have a working Raspberry Pi.
- You will be measured by how well you have followed the lab instructions, and been able to get your hardware working.
- How will success be determined? You will be able to show me you can start and play Minecraft.

NEW WORDS OR CONCEPTS...

- Raspberry Pi
- Python

MECHATRONICS PYTHON "TEXT BOOK"

- Programming the Raspberry Pi – Getting Started with Python
- The Raspberry Pi target will be a Raspberry Pi 3 v 2 and Pi 3 model B+
- This class will target Python 3. All posted code will be targeting a python 3 compiler/interpreter

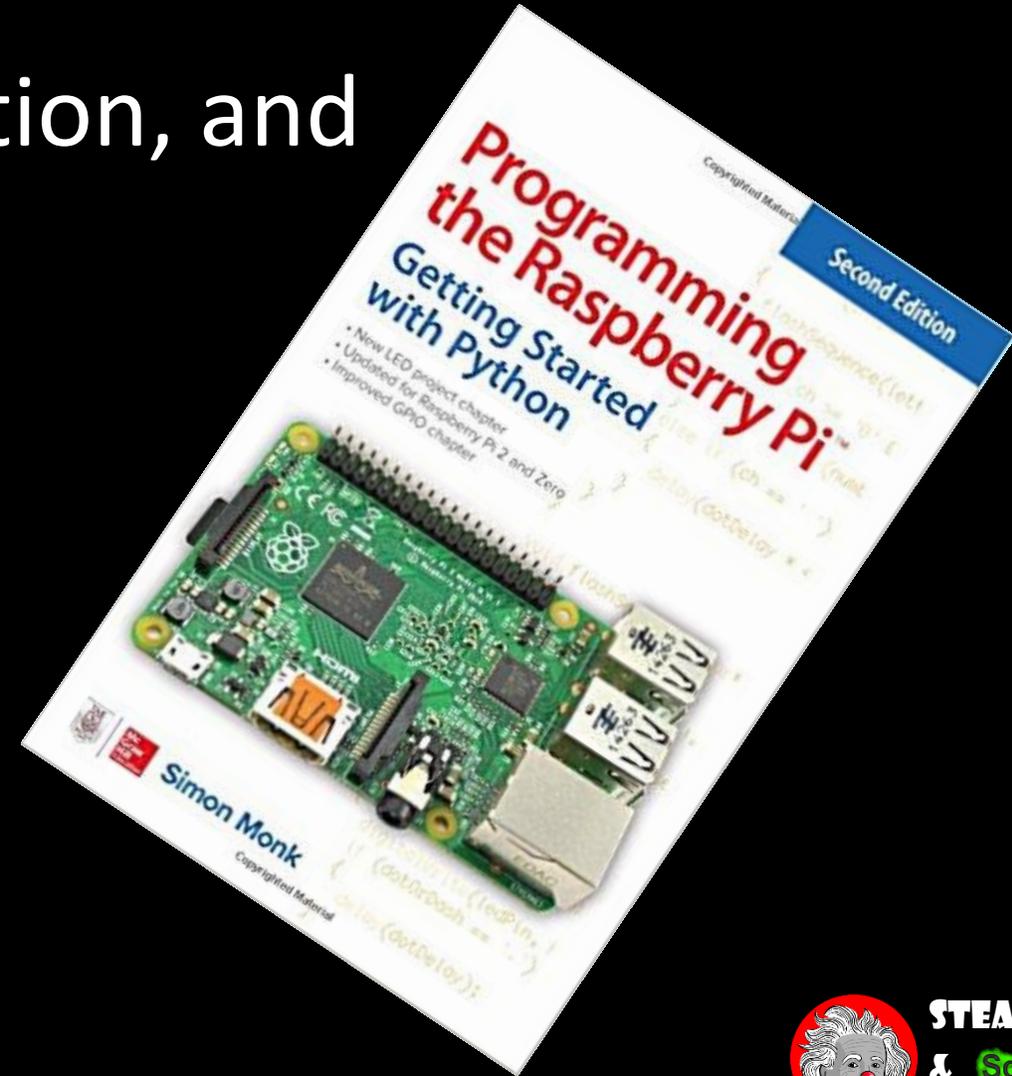


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

LAB & QUIZ

- Read the Preface, introduction, and Chapter 1 “introduction”
 - Plan on about 15 min
- Take Chapter 1 Quiz



STEAM CLOWN™
& Squeaky Hinge
PRODUCTIONS

© Copyright 2018 STEAM Clown™



STEAM CLOWN™ PRODUCTIONS

TAKE A DEEP BREATH...

We are about to hand out the Raspberry Pi's



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

CARE AND RESPONSIBILITY

- You will each get a Raspberry Pi
- You will each print a label for your Pi
- You will keep track of the Raspberry Pi, the case, the case lid, **AND** the 32 G SD Card.
- You will not unplug or move the Raspberry Pi Power adaptors...

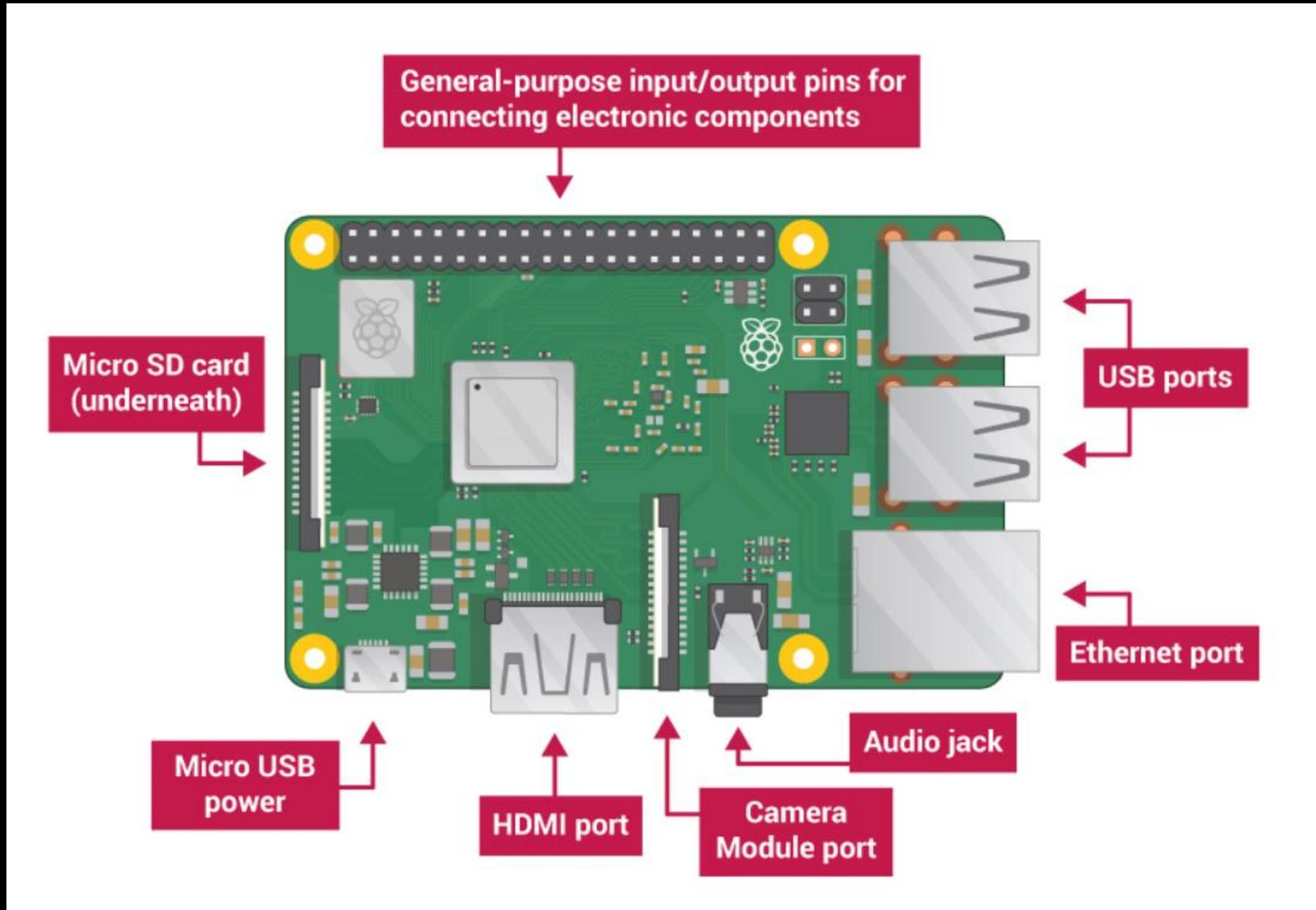
If you loose your Raspberry Pi, It will cost you \$45 to replace it, if you Loose the SD card, that's another \$12



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

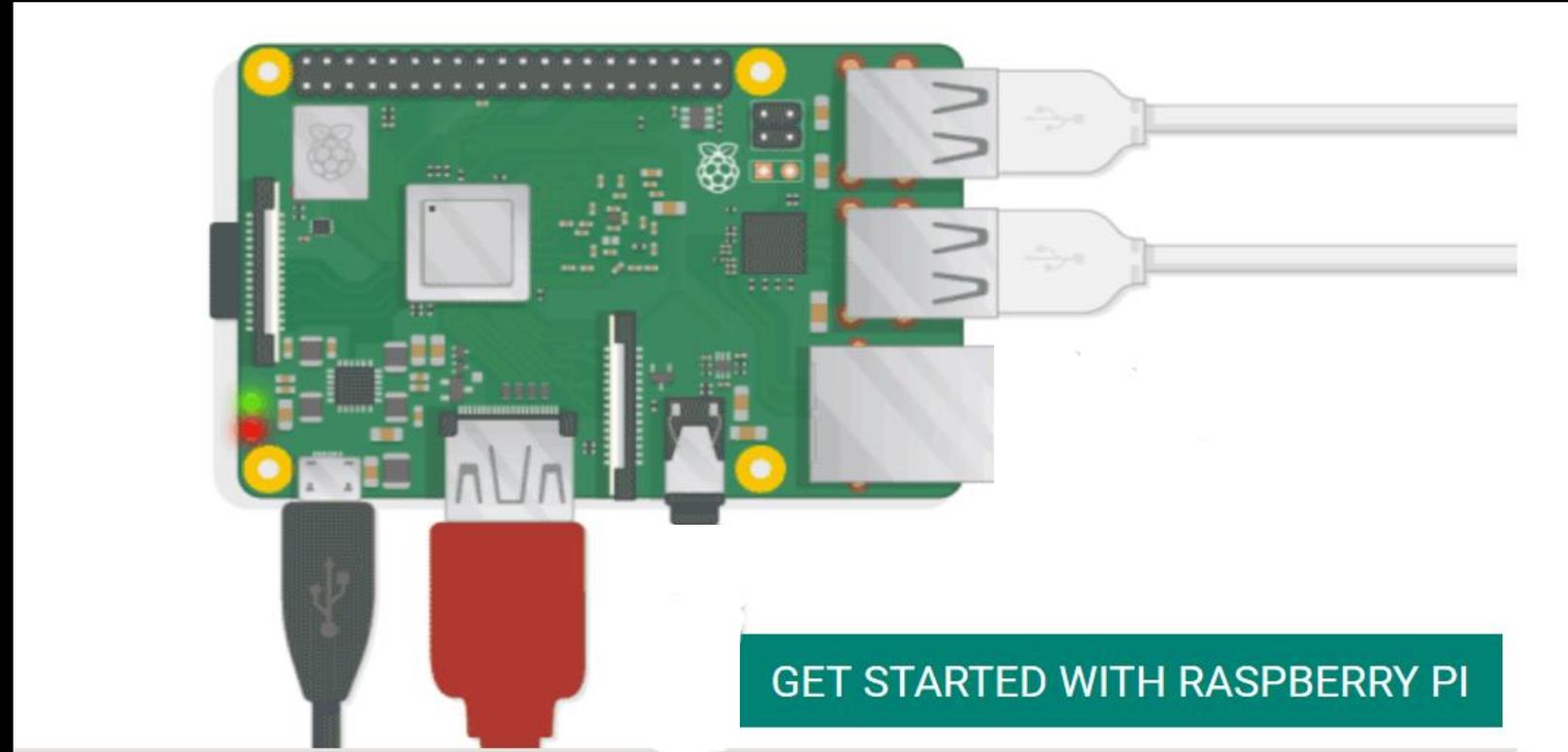
MEET YOUR RASPBERRY PI



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

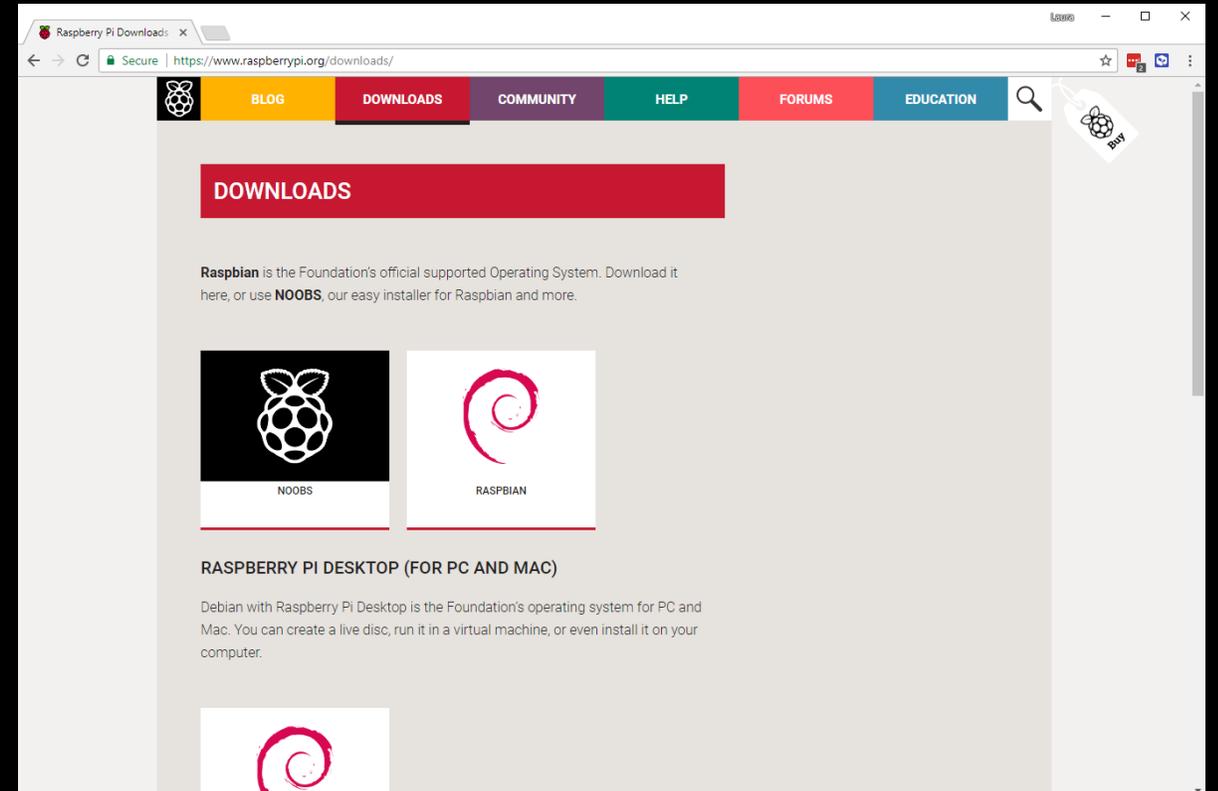
STEP BY STEP GUIDE



- Setting up your Raspberry Pi
- **DON'T PLUG ANYTHING YET!!!!!!!!!!!!!!!!!!!!**

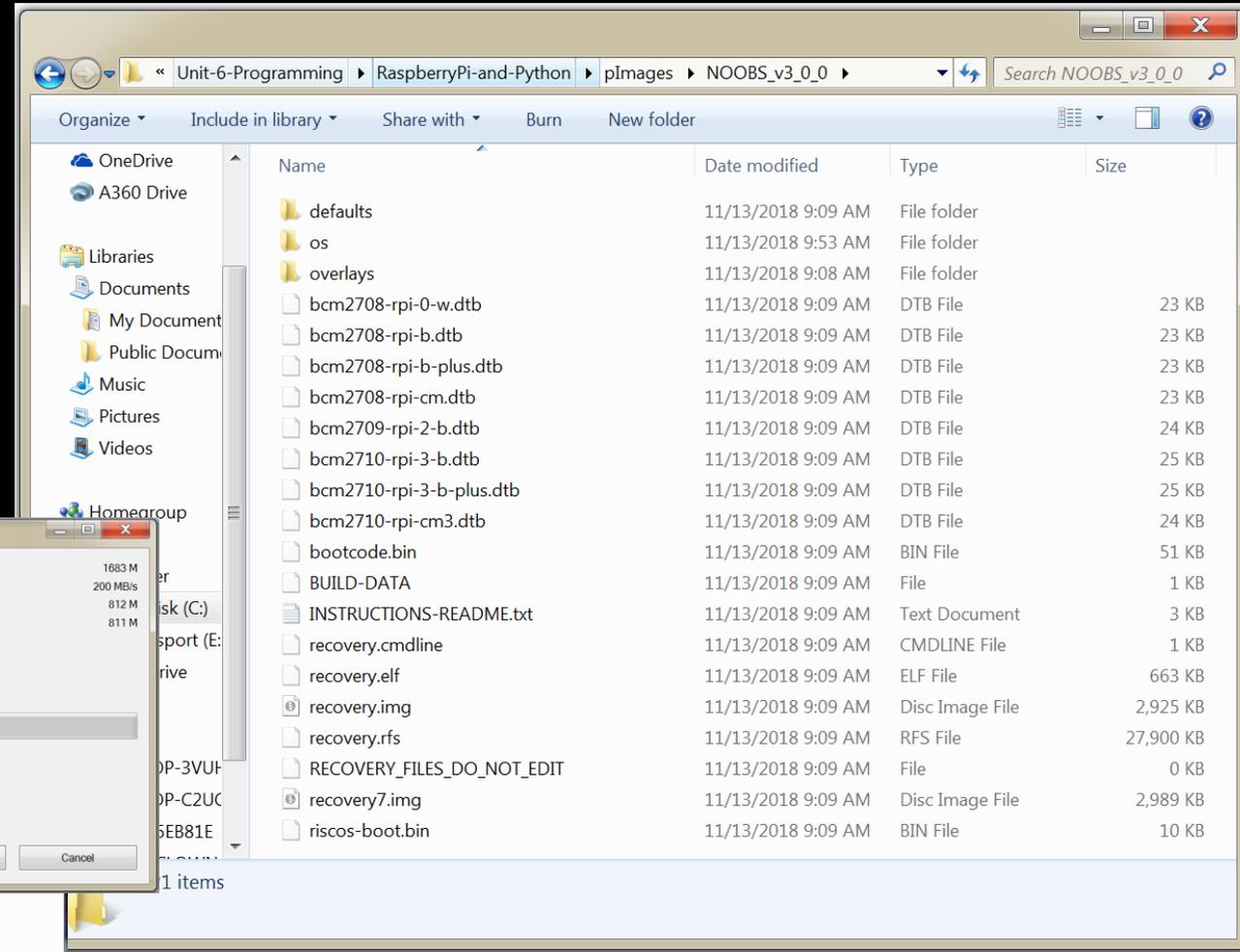
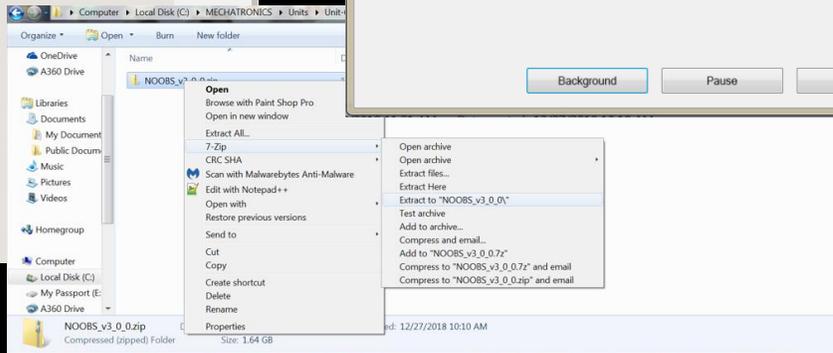
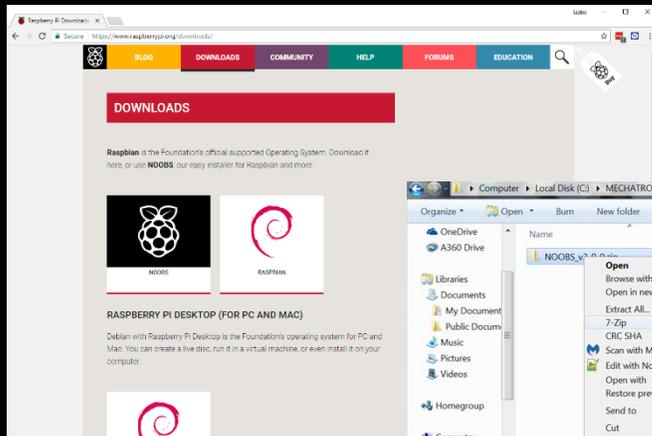
GET NOOBS

- You don't need to do this, because you have been provided with an SD card with Noobs pre-loaded.
- But if you needed to, you would follow the next slides instructions



IF YOU NEED TO GET NOOBS

- Go to the Noobs Raspberry Pi Download site and download Noobs
- UnZIP the Archive
 - 7zip works best

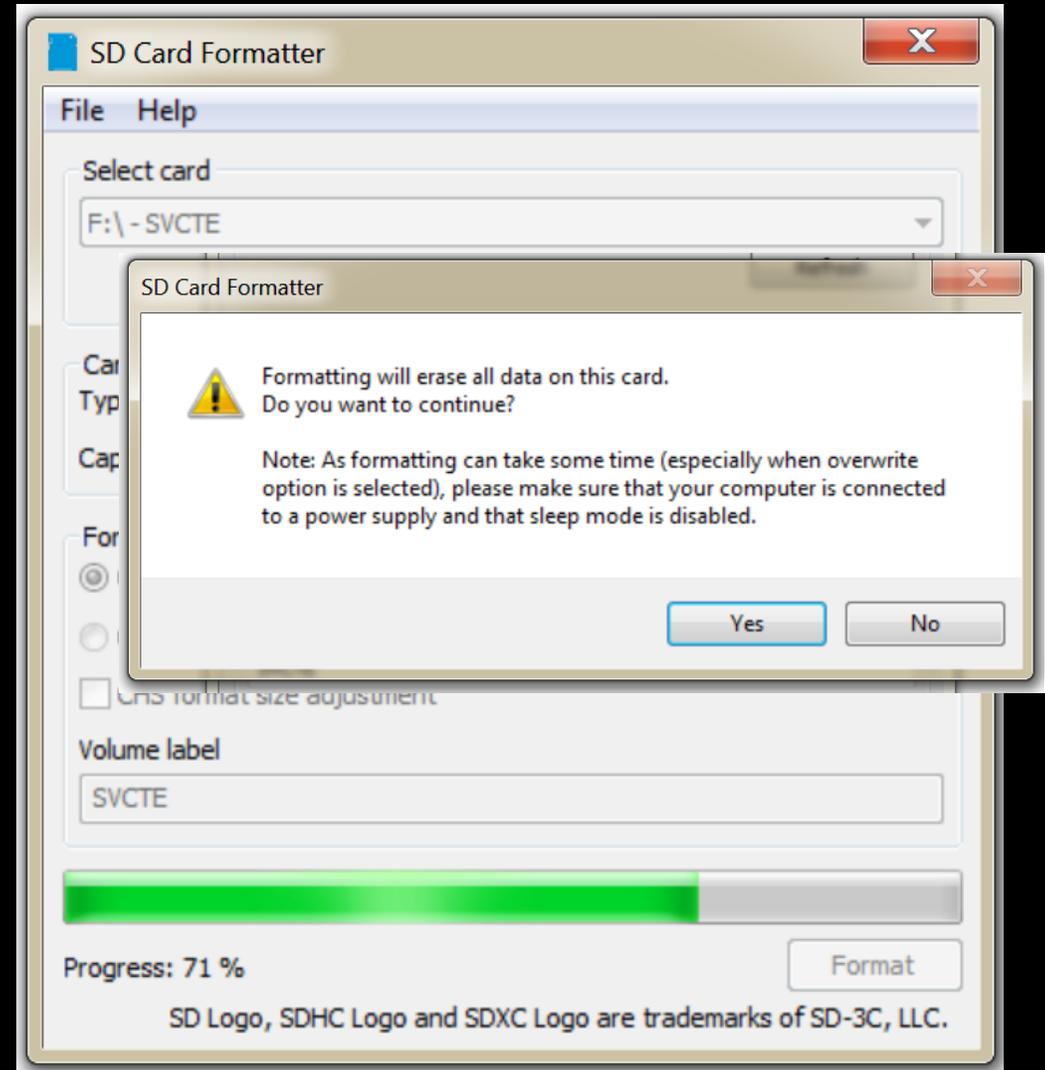


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

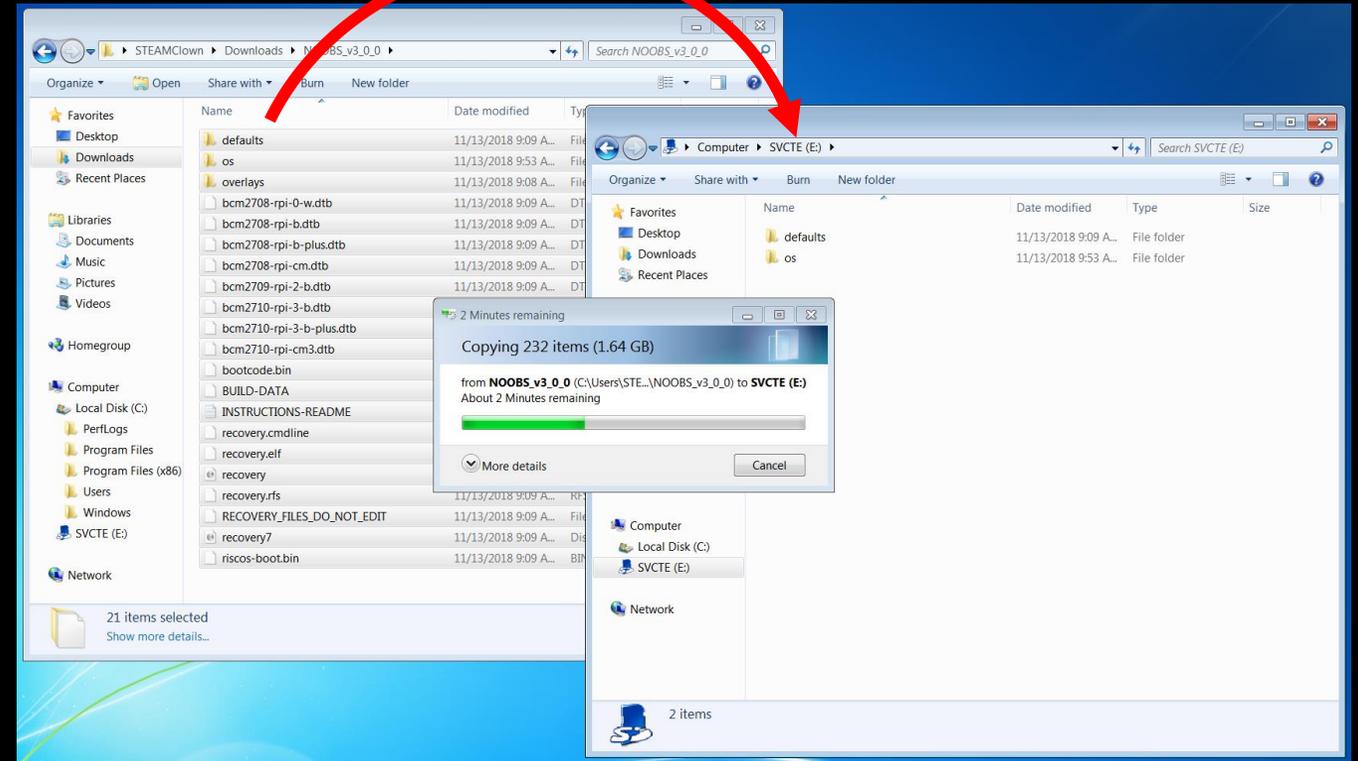
SD CARD FORMATTER

- You may want to download the SD card Formatter... It works well to fix SD cards that windows can't tell what size they are...



COPY THE CONTENT OF THE NOOBS DIR

- Select the files in the noobs directory and copy them to the top level of the SD Card



GET A RASPBERRY PI & CONNECT STUFF

- BE CAREFUL Plugging In Cables... You Brake it... You Bought it... and It will cost \$45
- DON'T Plug in the power
- Plug in the HDMI cable
- Plug in a Keyboard and Mouse
- Now Plug in power...

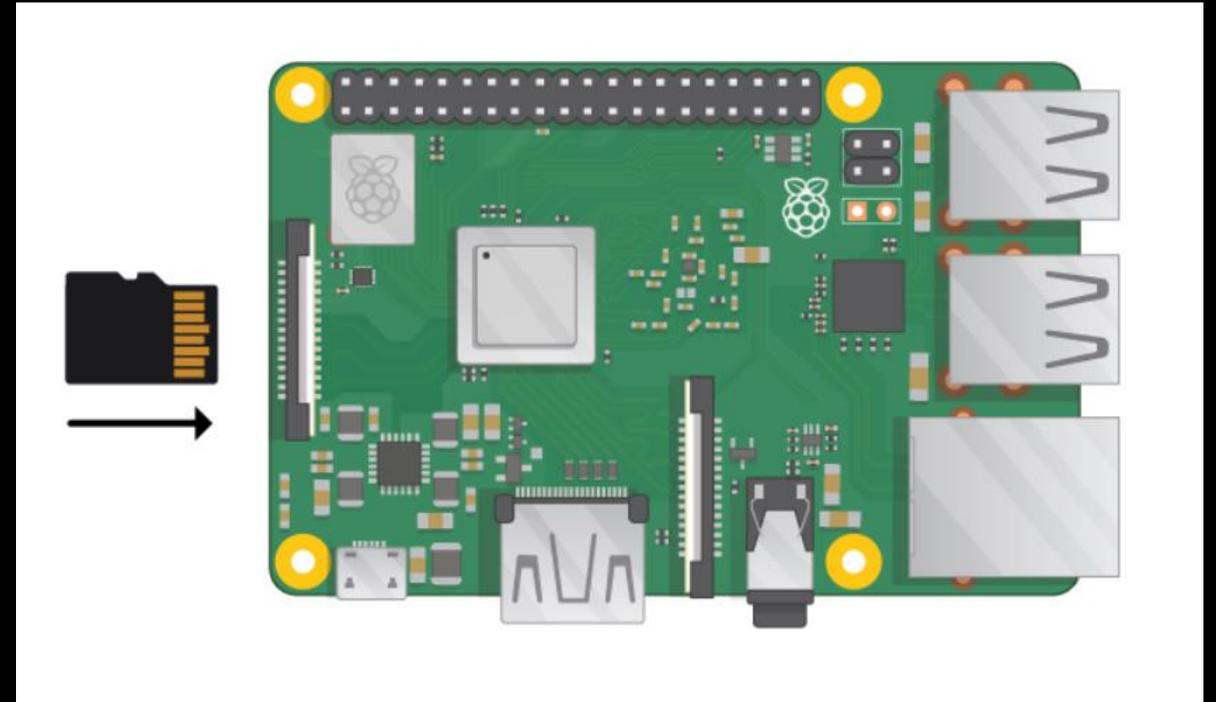


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

CHECK THAT YOU HAVE AN SD CARD

- Everyone has 32G SD Card...
- You will need to return the Raspberry Pi with an 32 G SD card or you have to buy me one...
\$12

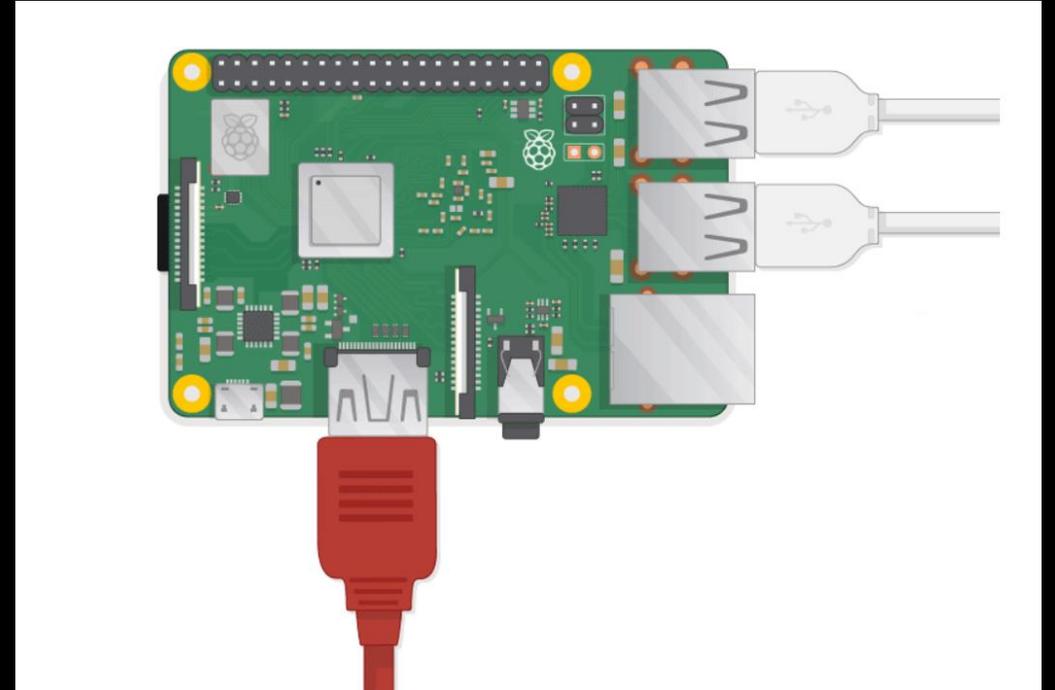


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

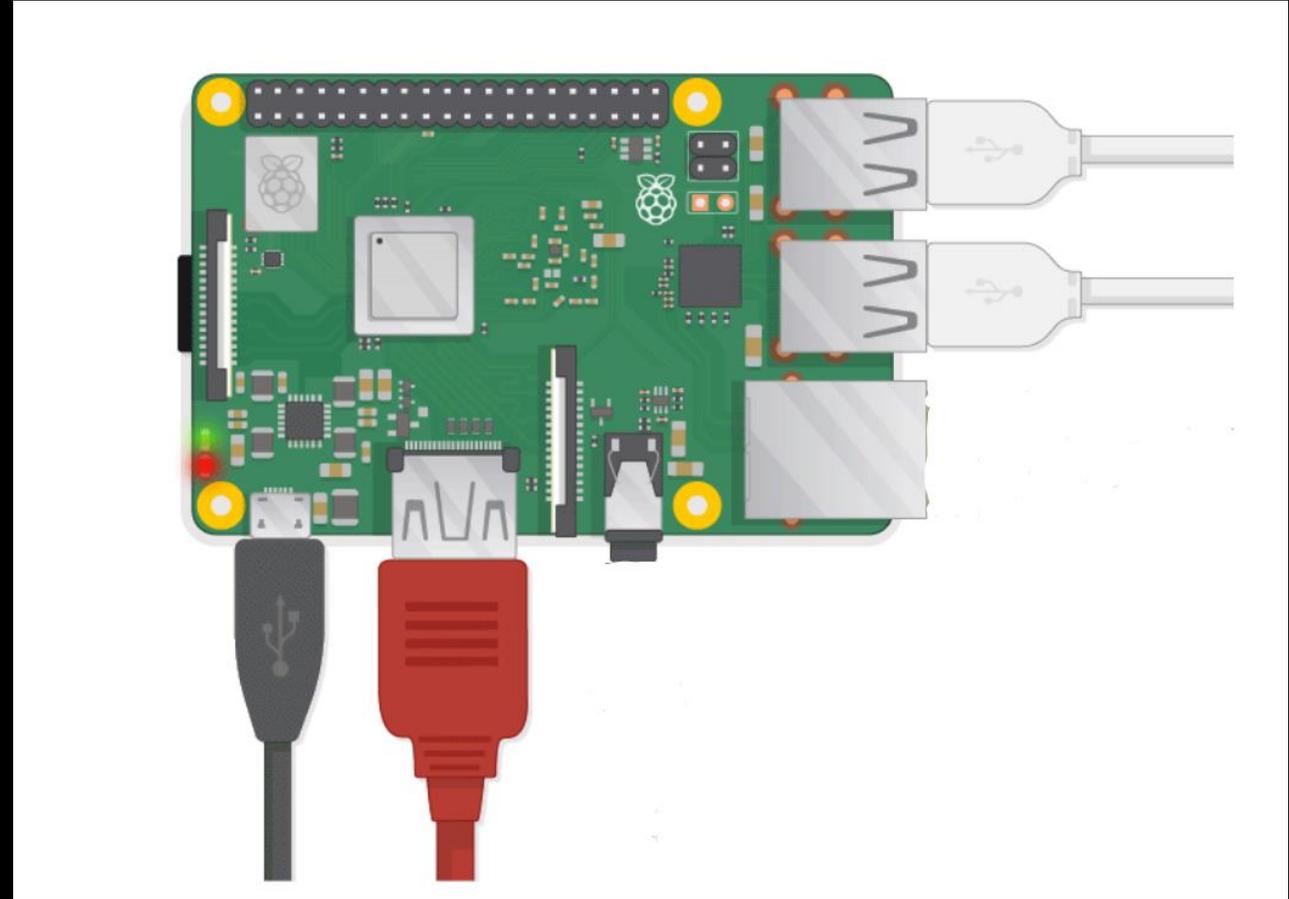
CONNECT DISPLAY, KEYBOARD, & MOUSE

- Connect a USB Mouse and Keyboard. They can be connected to any of the 4 USB ports
- Connect the HDMI cable
- **BE CAREFUL Plugging In Cables... You Brake it... You Bought it... and It will cost about \$45**



POWER IT UP...

- Connect to a Power supply with a USB Micro connector
- NOT your phone charger...
- Needs to be a 5V 700mA source

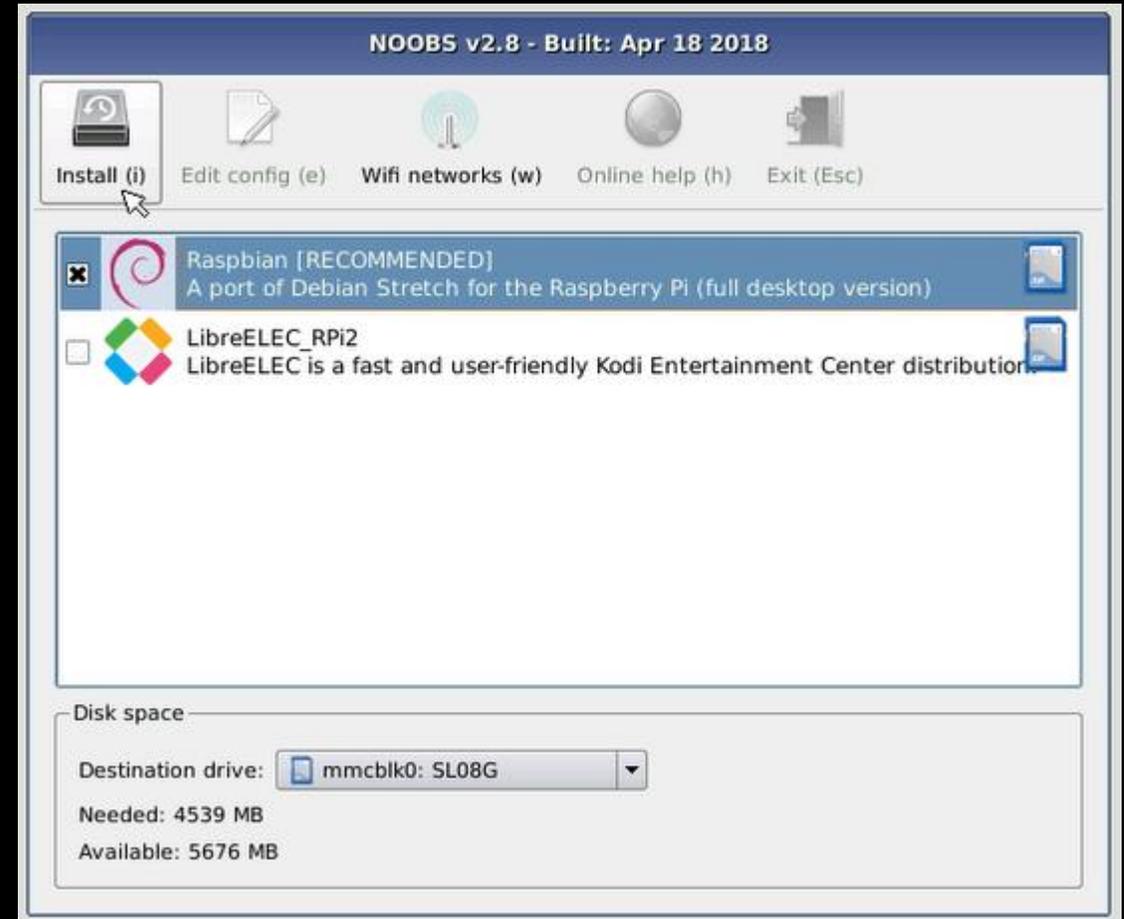


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

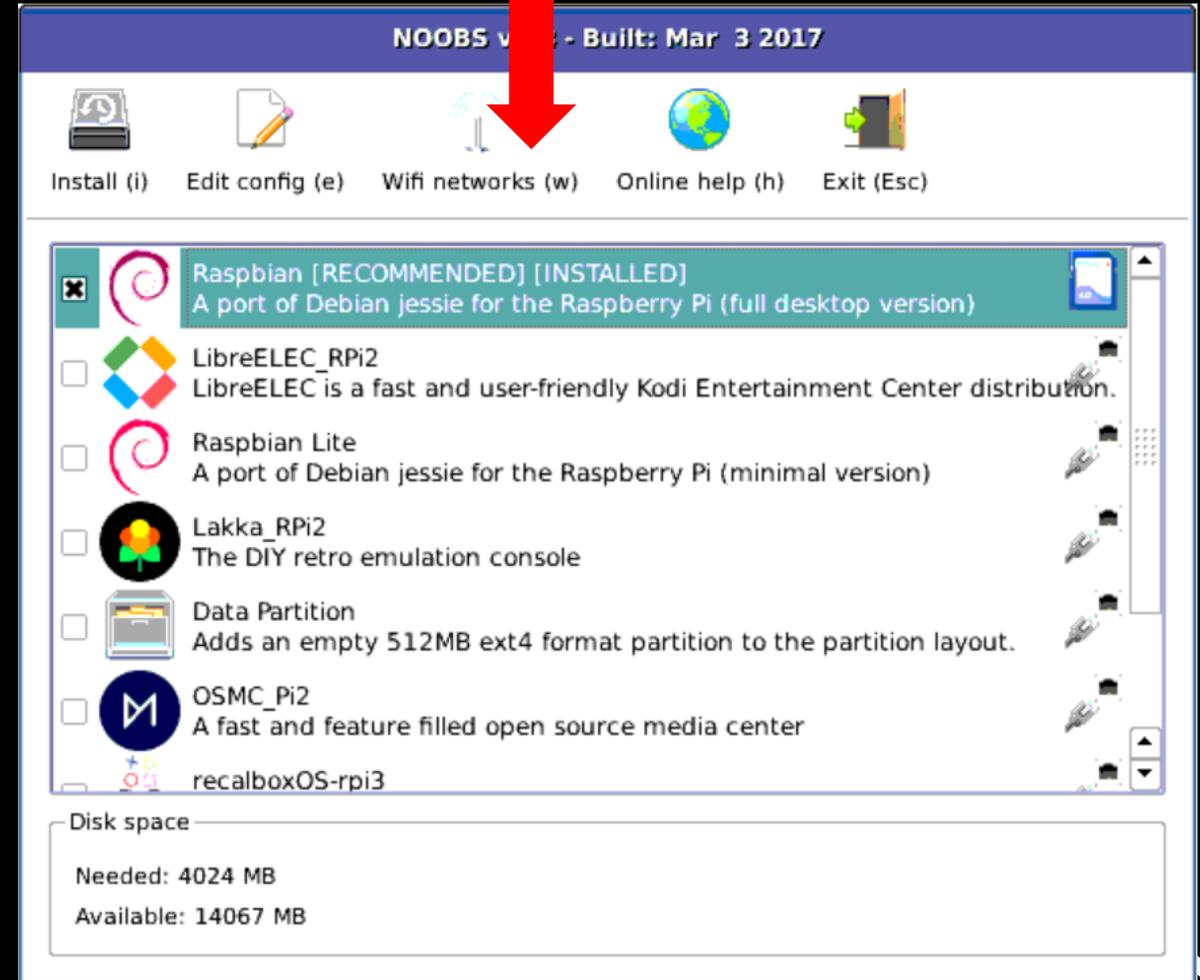
INSTALLING RASPBIAN WITH NOOBS

- Take look at the Installing Raspbian with Noobs step by step guide
- The latest Noobs (as of Jan 1 2019) is v3.0



CONNECT TO THE WIFI FIRST...

- By connecting to the internet, you will have many other OS installation options



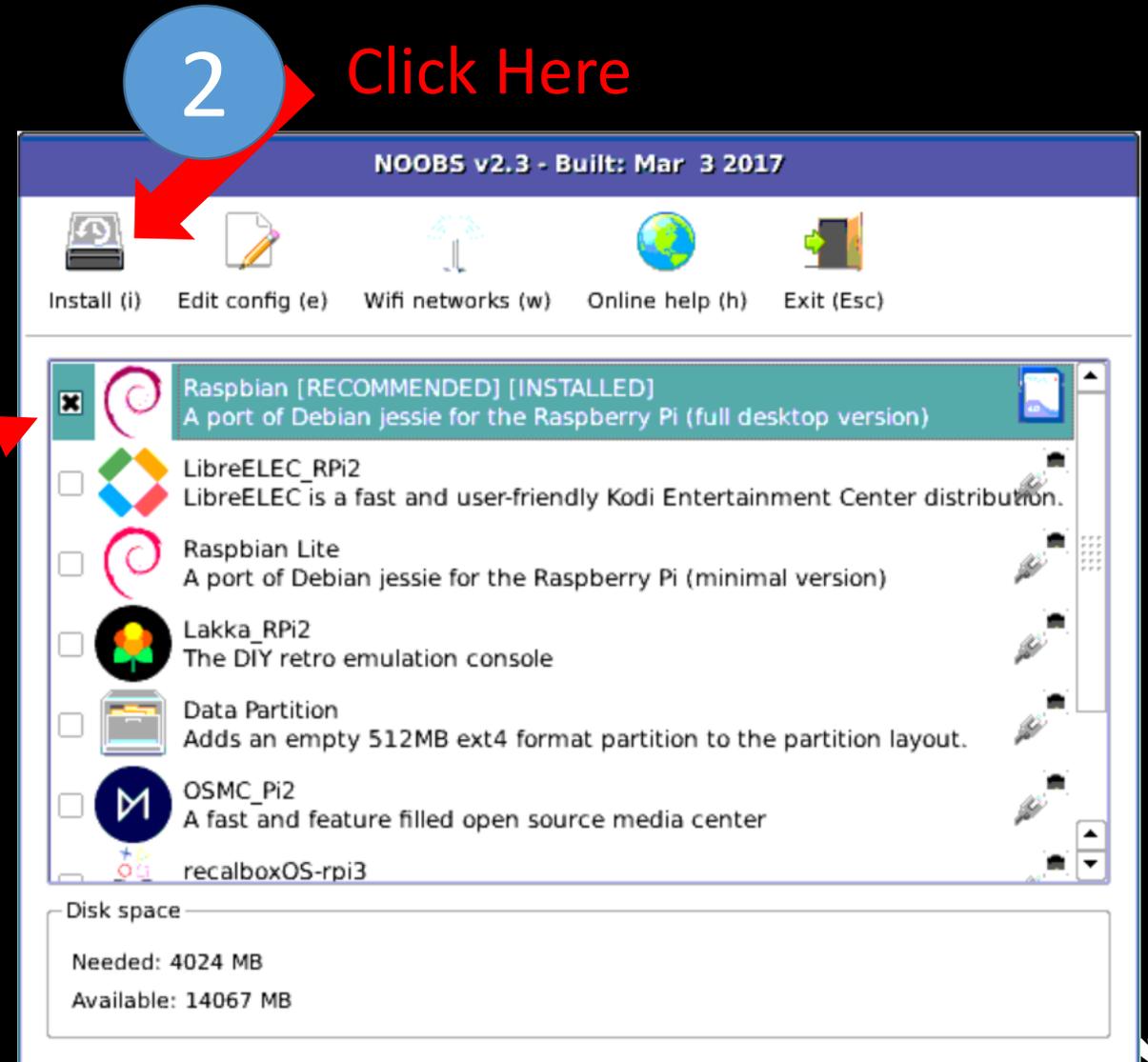
CONNECT TO THE WIFI FIRST...

- Still... We are going to install the first one...

Raspbian

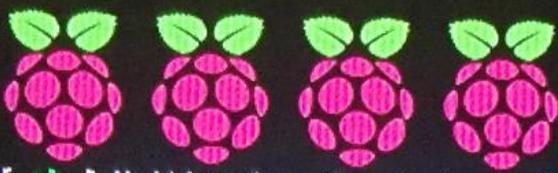
1. Check "Raspbian"
2. Then click Install

- This will take between 5-20 min... so get moving...



Squeaky Hinge
PRODUCTIONS

© Copyright 2018 STEAM Clown™



```
[ ok ] Waiting for /dev to be fully populated...done.
Starting fake hwclock: loading system time.
Thu Feb 26 18:50:09 UTC 2015
[ ok ] Setting preliminary keymap...done.
[ ok ] Activating swap...done.
[ 6.121580] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
[....] Checking root file system...fsck from util-linux 2.20.1
e2fsck 1.42.5 (29-Jul-2012)
/dev/mmcblk0p2: clean, 85289/196224 files, 648143/784640 blocks
done.
[ 6.365172] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
[ ok ] Cleaning up temporary files... /tmp.
[info] Loading kernel module snd-bcm2835.
[ ok ] Activating lum and md swap...done.
[....] Checking file systems...fsck from util-linux 2.20.1
dosfsck 3.0.13, 30 Jun 2012, FAT32, LFN
/dev/mmcblk0p1: 38 files, 1844/7161 clusters
done.
[ ok ] Mounting local filesystems...done.
[ ok ] Activating swapfile swap...done.
[ ok ] Cleaning up temporary files....
[ ok ] Setting kernel variables ...done.
[....] Starting resize2fs_once:resize2fs 1.42.5 (29-Jul-2012)
Filesystem at /dev/root is mounted on /; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 1
The filesystem on /dev/root is now 3874176 blocks long.
```

update-rc.d: using dependency based boot sequencing

```
. ok
[ ok ] Configuring network interfaces...done.
[ ok ] Cleaning up temporary files....
[ ok ] Setting up ALSA...done.
[info] Setting console screen modes.
[info] Skipping font and keymap setup (handled by console-setup).
[ ok ] Setting up console font and keymap...done.
[....] Checking if shift key is held down:Error opening '/dev/input/event*': No such file or directory
[ ok ] Switching to ondemand scaling governor.
[ ok ] Setting up X socket directories... /tmp/.X11-unix /tmp/.ICE-unix.
INIT: Entering runlevel: 2
[info] Using makefile-style concurrent boot in runlevel 2.
Error opening '/dev/input/event*': No such file or directory
```

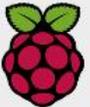


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



Welcome to Raspberry Pi



Welcome to the Raspberry Pi Desktop!
Before you start using it, there are a few things to set up.
Press 'Next' to get started.



Welcome to Raspberry Pi

Set Country

Enter the details of your location. This is used to set the language, time zone, keyboard and other international settings.

Country:

Language:

Timezone:

Use US keyboard

Press 'Next' when you have made your selection.

Set the country in which you are using your Pi



- Sudan
- Sweden
- Switzerland
- Syria
- Taiwan
- Tajikistan
- Tanzania
- Thailand
- Tunisia
- Turkey
- Turkmenistan
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States**
- Uruguay
- Uzbekistan
- Venezuela
- Vietnam
- Yemen
- Zambia
- Zimbabwe

Set Country

Enter the details of your system, including time zone, keyboard layout, and locale.

Country:

Language:

Timezone:

Press 'Next' when you are finished.





Welcome to Raspberry Pi

Set Country

Enter the details of your location. This is used to set the language, time zone, keyboard and other international settings.

Country:

Language: American English

Timezone: Cherokee

Spanish

Unami Delaware

Yiddish

Press 'Next' when you are done.



Welcome to Raspberry Pi

Set Country

Enter the details of your location. This is used to set the language, time zone, keyboard and other international settings.

Country:

Language:

Timezone:

Use US keyboard

Press 'Next' when you have made your selection.

Use the US keyboard layout instead of the default keyboard for your country



Wastebasket

Welcome to Raspberry Pi

Change Password

The default 'pi' user account currently has the password 'raspberrypi'. It is strongly recommended that you change this to a different password that only you know.

Enter new password:

Confirm new password:

Hide characters

Press 'Next' to activate your new password.

Back

Next



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



Welcome to Raspberry Pi

Select WiFi Network

Select your WiFi network from the list.

- DIRECT-445EB81E  
- GAPEGP  
- NETGEAR_EXT 
- NSA-VAN-Number-3** 

Press 'Next' to connect, or 'Skip' to continue without connecting.

Click the name of your network to select it



Wastebasket

Welcome to Raspberry Pi

Update Software

The operating system and applications will now be checked and updated if necessary. This may involve a large download.

Press 'Next' to check and update software, or 'Skip' to continue without checking.

Buttons: Back, Skip, Next



STEAM CLOWN™
& Squeaky Hinge
PRODUCTIONS

© Copyright 2018 STEAM Clown™



Wastebasket

Welcome to Raspberry Pi

Update Software

The operating system and applications will now be checked and updated if necessary. This may involve a large download.

Press 'Next' to continue without checking for updates.

Reading update list - please wait...

Progress bar: []

Buttons: Back, Skip, Next



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



Welcome to Raspberry Pi

Update Software

The operating system and applications will now be checked and updated if necessary. This may involve a large download.

Press 'Next' to continue without checking for updates.

System is up to date

OK

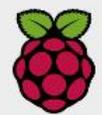
Back Skip Next



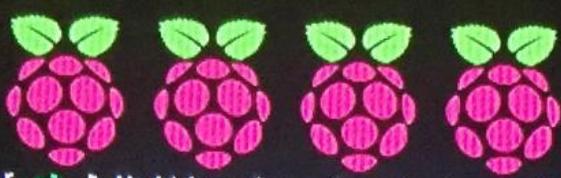
Welcome to Raspberry Pi

Setup Complete

Your Raspberry Pi is now set up and ready to go.
Press 'Reboot' to reboot your Pi for the new settings to take effect.



Back Reboot



```
[ ok ] Waiting for /dev to be fully populated...done.
Starting fake hwclock: loading system time.
Thu Feb 26 18:50:09 UTC 2015
[ ok ] Setting preliminary keymap...done.
[ ok ] Activating swap...done.
[ 6.121580] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
[....] Checking root file system...fsck from util-linux 2.20.1
e2fsck 1.42.5 (29-Jul-2012)
/dev/mmcblk0p2: clean, 85289/196224 files, 648143/784640 blocks
done.
[ 6.365172] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
[ ok ] Cleaning up temporary files... /tmp.
[info] Loading kernel module snd-bcm2835.
[ ok ] Activating lvm and md swap...done.
[....] Checking file systems...fsck from util-linux 2.20.1
dosfsck 3.0.13, 30 Jun 2012, FAT32, LFN
/dev/mmcblk0p1: 38 files, 1844/7161 clusters
done.
[ ok ] Mounting local filesystems...done.
[ ok ] Activating swapfile swap...done.
[ ok ] Cleaning up temporary files....
[ ok ] Setting kernel variables ...done.
[....] Starting resize2fs_once:resize2fs 1.42.5 (29-Jul-2012)
Filesystem at /dev/root is mounted on /; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 1
The filesystem on /dev/root is now 3874176 blocks long.
```

update-rc.d: using dependency based boot sequencing

```
. ok
[ ok ] Configuring network interfaces...done.
[ ok ] Cleaning up temporary files....
[ ok ] Setting up ALSA...done.
[info] Setting console screen modes.
[info] Skipping font and keymap setup (handled by console-setup).
[ ok ] Setting up console font and keymap...done.
[....] Checking if shift key is held down:Error opening '/dev/input/event*': No such file or directory
[ ok ] Switching to ondemand scaling governor.
[ ok ] Setting up X socket directories... /tmp/.X11-unix /tmp/.ICE-unix.
INIT: Entering runlevel: 2
[info] Using makefile-style concurrent boot in runlevel 2.
Error opening '/dev/input/event*': No such file or directory
```



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



Trash



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

PLAY AROUND... CAN YOU RUN MINECRAFT?

- Play around with the desktop and menus
- Can you get Minecraft to start?

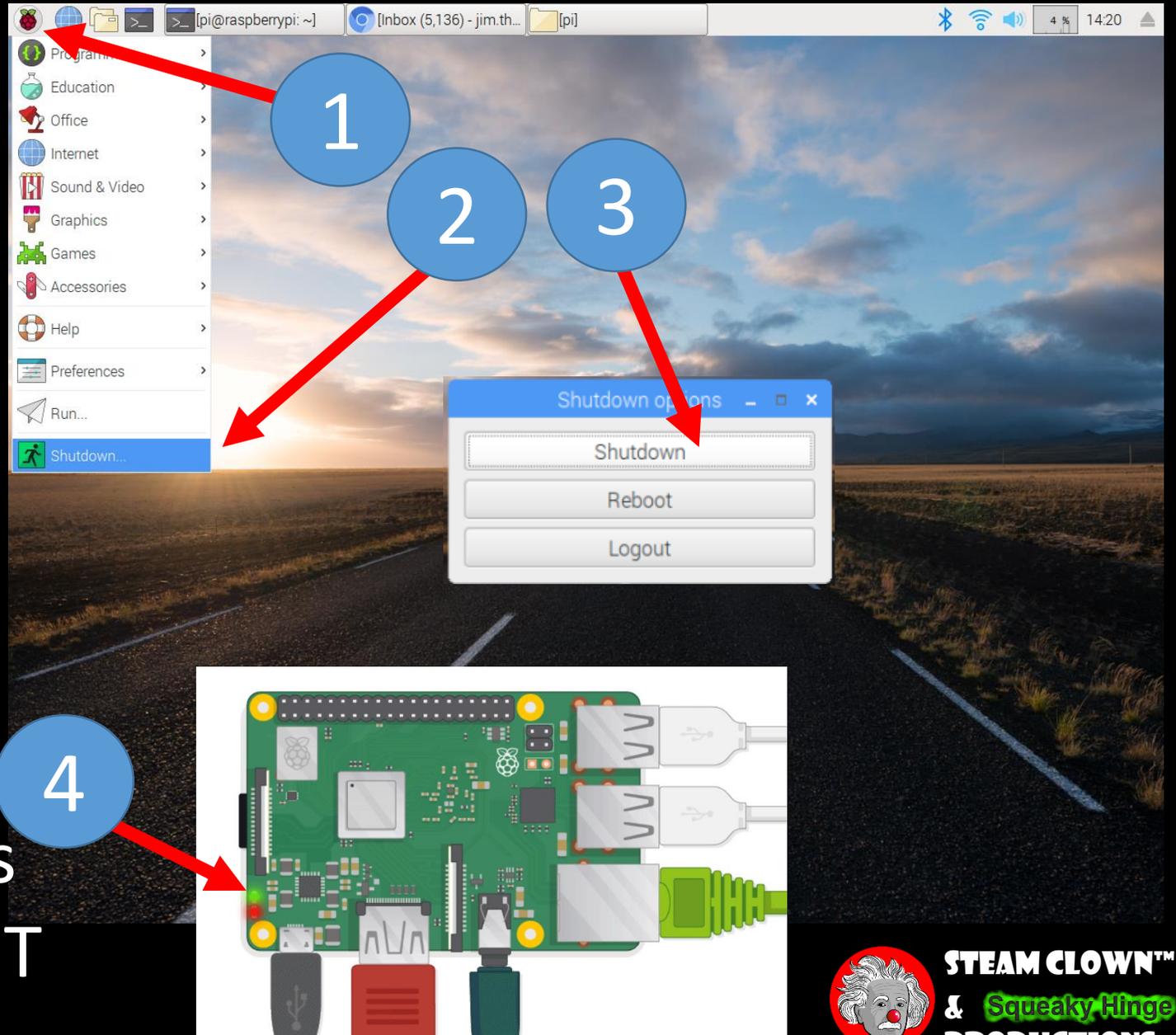


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

SHUTTING DOWN

- Why is it important to shut down properly?
- The OS is reading and writing to an SD Card... Could Crash the OS



Green LED Flashes
and then goes OUT



STEAM CLOWN™ PRODUCTIONS

SHUT DOWN NOW...



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



STEAM CLOWN™ PRODUCTIONS

REFERENCE SLIDES



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS
© Copyright 2018 STEAM Clown™



STEAM CLOWN™ PRODUCTIONS

APPENDIX



STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™



STEAM CLOWN™ PRODUCTIONS

CAN I GET A COPY OF THESE SLIDES? YES, PROBABLY...

Most presentation lecture slides can be found indexed on www.steamclown.org and maybe blogged about here on [Jim The STEAM Clown's Blog](#), and on [STEAM Clown's Mechatronics Engineering Google site](#), where you can search for the presentation title. While you are there, sign up for email updates



APPENDIX A: LICENSE & ATTRIBUTION

- This interpretation is primarily the Intellectual Property of Jim Burnham, Top STEAM Clown, at STEAMClown.org
- This presentation and content is distributed under the Creative Commons License CC-BY-NC-SA 4.0
- My best attempt to properly attribute, or reference any other sources or work I have used are listed in Appendix C



Under the following terms:



Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.



NonCommercial — You may not use the material for [commercial purposes](#).



ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the [same license](#) as the original.

No additional restrictions — You may not apply legal terms or [technological measures](#) that legally restrict others from doing anything the license permits.

Please maintain this slide with any modifications you make

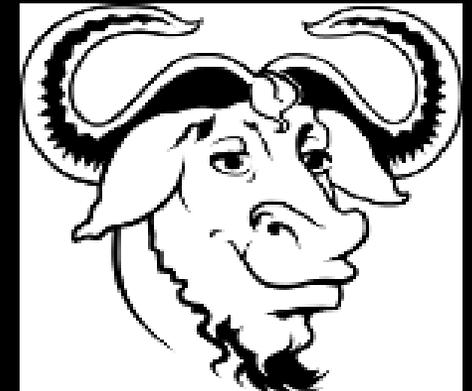


STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™

APPENDIX B: CODE LICENSE & ATTRIBUTION

- This interpretation is primarily the Intellectual Property of Jim Burnham, Top STEAM Clown, at STEAMClown.org
- The programming code found in this presentation or linked to on my Github site is distributed under the:
 - GNU General Public License v3.0
 - European Union Public Licence EUPL 1.2 or later
- My best attempt to properly attribute, or reference any other sources or work I have used are listed in Appendix C



Please maintain this slide with any modifications you make

APPENDIX C: PRIMARY SOURCES & ATTRIBUTION FOR MATERIAL USED

Please maintain this slide with any modifications you make





STEAM CLOWN™
& **Squeaky Hinge**
PRODUCTIONS

© Copyright 2018 STEAM Clown™