# Setup Tutorial for the Raspberry Pi and the MassMine Platform

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## 1.1 About

This supplementary tutorial is designed to be used in conjunction with Aaron Beveridge and Nicolas van Horn's *Re-Programmable Rhetorics* chapter, "Big"Big Data, Tiny Computers: Making Data-Driven Methods Accessible with a Raspberry Pi" by Aaron Beveridge and Nicholas Van Horn. Under the supervision of the collection co-editor, Steve Holmes, and the approval of the chapter authors, this tutorial was heavily revised, improved, and user tested by three Texas Tech BA students whose work merits co-author credit for this document: Steven Burns, Cody Palmer, and Joseph R. Harris at Texas Tech University.

## 1.2 Introduction

In this document, we provide a tutorial on how to install MassMine on a Raspberry Pi 3 (**Rpi**) and how to setup the Rpi to allow you to manage your data collection from another computer (using SSH). Figure 1 below shows just how small the Rpi is and how it can fit in various places without taking up nearly any space, with its measurements being 3x7 cm, roughly.



**Figure 1.** Authors' photograph of the Rpi model in this tutorial

This setup is ideal for humanities and social science data labs with limited funding, where researchers need to ensure their on-going data collection efforts will not be disturbed or accidentally shut down. Many scholars may not have the resources to dedicate an entire computer purely to data collection, and the cheaper Rpi board allows for scholars or students to have a dedicated machine at a fraction of the cost (and energy use) of a new PC. Because

MassMine requires very little computing resources to collect, compress, and archive data, connecting the Rpi to an external drive provides the perfect alternative for long-term data collection projects.

## 1.3 Before You Begin

Although the final setup will be headless, a temporary monitor, keyboard, and mouse will be needed during installation. After the installation is finished, the Rpi can be accessed remotely over SSH from other computers on a network, allowing researchers to unplug all these devices and control the Rpi from another computer. However, until setup is complete, researchers must work with the Rpi directly.

## 2.1 Install Raspbian Jessie with Pixel Operating System on Your Rpi

As required by the Rpi, a micro SD memory card (Figure 2) will be needed to install the operating system. To install the Raspbian operating system, follow the most up-to-date instructions at the official Raspbian website (https://www.raspberrypi.org/downloads/raspberry-pi-os/).



**Figure 2.** Authors' photograph of a micro SD memory card

## 2.2 Open a Terminal (ctrl-alt-t) in Raspbian, and Then Build MassMine from Source

After the Raspbian OS is installed on the SD card, insert the SD card into the bottom of the Rpi, and then plug in the ethernet cable (connected to an internet router), keyboard, mouse, and monitor (HDMI). After all these components are plugged in, power up the device by inserting the power source (micro USB) into the Rpi.

## 2.3.1 Installing and Running MassMine

To install **MassMine** on your **RPi**, we will use three programs that come with the standard OS installation: the Chromium Browser, the File Manager, and the Terminal (usually known as the command line).

Figure 3 shows where you can find easy access icons for them at the top-left corner of your screen:
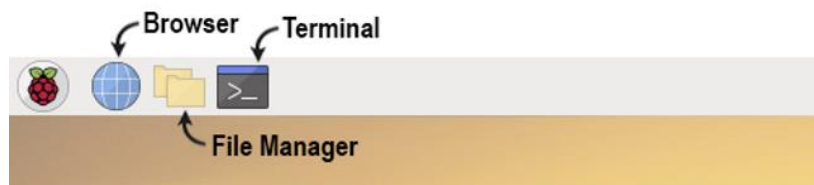
**Figure 3.** Screen capture of icon location

**2.3.2** Using the Chromium Browser, navigate to **massmine.org**, look for the installation instructions on the left-side menu (Figure 4), and then download the installer for Rpi.
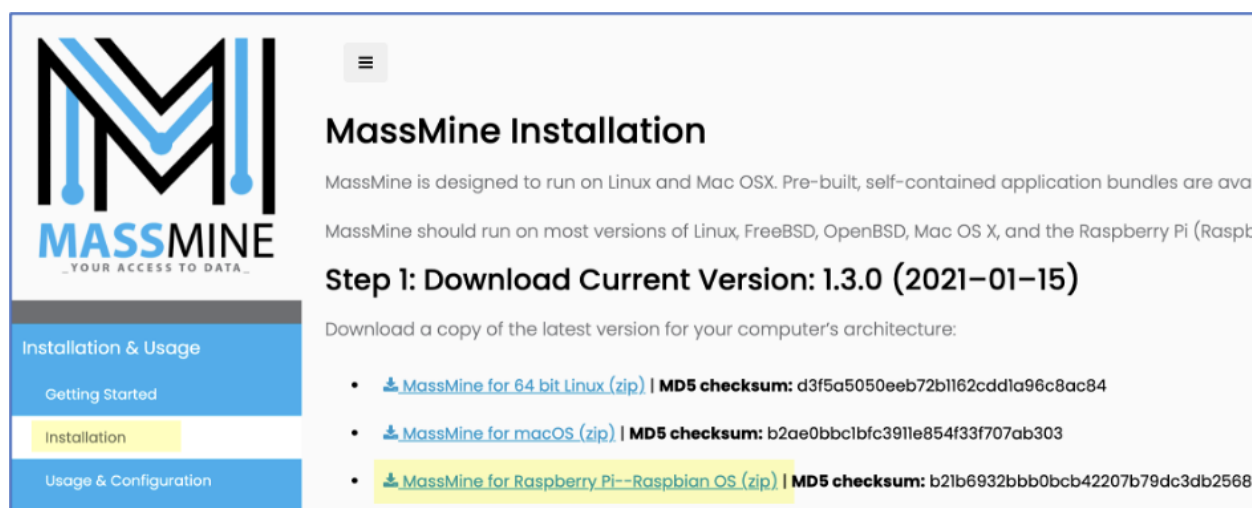


**Figure 4.** Screencapture of MassMine with yellow highlighted installation links

**2.3.3** After the download is complete, you should be able to find the .zip file in your downloads folder using the File Manager (Figure 5). Right-click the file and select "Extract Here", which will create a new "massmine" folder right next to it.
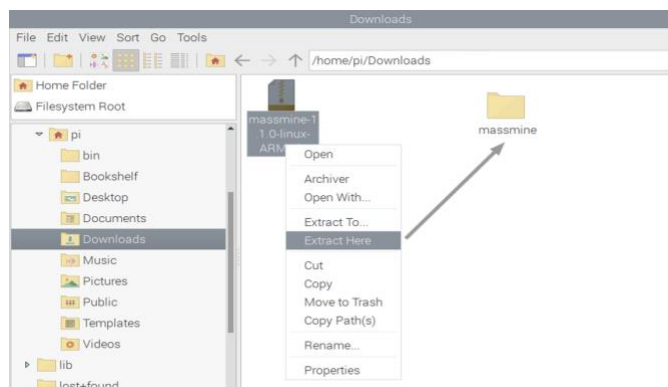


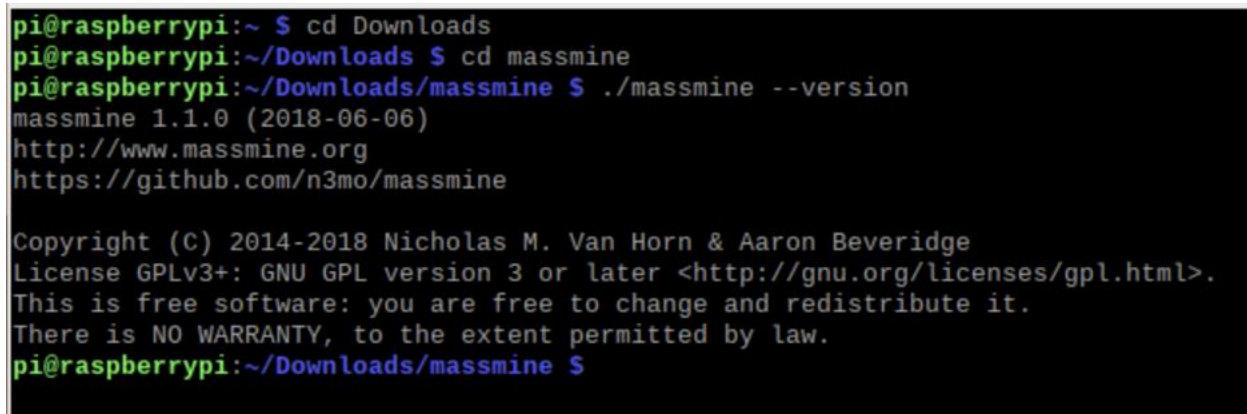**Figure 5.** Screen capture of downloaded files location

**TIP:** If you can't find the Downloads folder, look for a folder called home and then a subfolder called pi. The Downloads folder should be inside of it.

## 3.1 Accessing the RPi through the Terminal Shell

At this point, you should be able to run MassMine using the Terminal. Open a terminal window and enter the following commands:

```
cd Downloads
cd massmine
./massmine --version
```

The first two commands simply take you to the folder where the massmine executable is located (**cd** stands for change directory), and the last one runs it. You should get the following output shown in Figure 6.



**Figure 6.** Screen capture of terminal command state for tutorial step 3.1

**TIP:** Watch the casing. Only the D in Downloads is uppercase, everything else should be in lowercase. Also, make sure you use a forward slash in the third command (/) and not a backslash (\).

## 3.2 Creating a Global Command for MassMine

Having to go to the Downloads/massmine folder every time we want to run it is not very convenient. It's a good idea to create a global command called "massmine" that we can run from any folder.

Using the Terminal, run the following commands to create it (Figure 7). If you still have the Terminal open from the previous task, you can skip the first two commands because you're already in the right folder.

```
cd Downloads
cd massmine
sudo ln -s `pwd`/massmine /usr/local/bin
```

```
pi@raspberrypi:~ $ cd Downloads
pi@raspberrypi:~/Downloads $ cd massmine
pi@raspberrypi:~/Downloads/massmine $ sudo ln -s `pwd`/massmine /usr/local/bin
pi@raspberrypi:~/Downloads/massmine $
```

**Figure 7.** Screen capture of terminal screen state to establish the required connection

**TIP:** The terminal may ask for a password. The default password is raspberry if you haven't changed it. Also, make sure you type `pwd` using backquotes, not 'pwd' or 'pwd'. As always, watch the casing and the forward slashes.

You won't get any feedback from the command line if it works, but now you can close this Terminal window, open a new one and run massmine right away as the very first command (Figure 8).

```
massmine --version
```

```
pi@raspberrypi:~ $ massmine --version
massmine 1.1.0 (2018-06-06)
http://www.massmine.org
https://github.com/n3mo/massmine

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License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
pi@raspberrypi:~ $
```

**Figure 8.** Screen capture of terminal state after the command sequence in tutorial step 3.2 has been executed
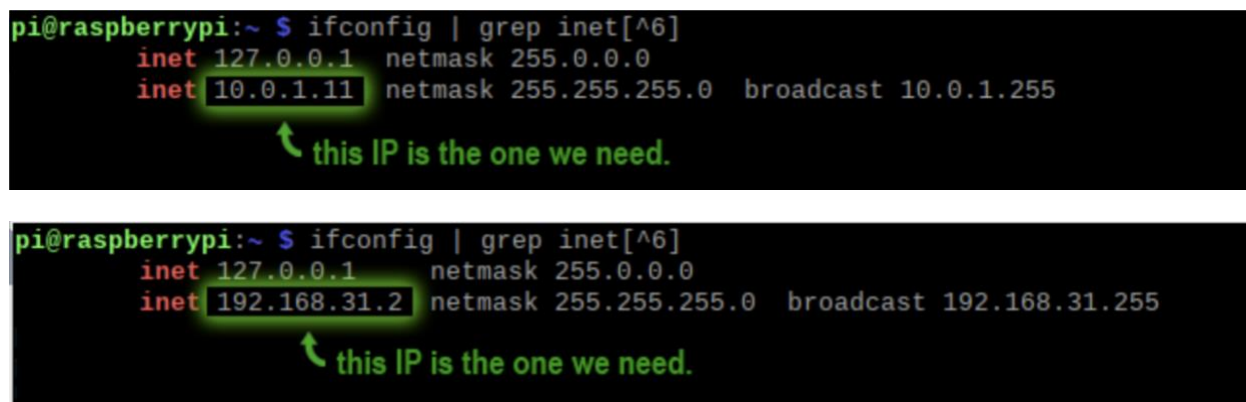
## 4.3 Finding Your Rpi's Address on the Network

We need to find your Rpi's IP address on the network. Open a Terminal window and enter this command:

```
ifconfig | grep inet[^6]
```

This command will print a couple lines and one of those contains the address we're looking for. IP addresses look like a sequence of four numbers separated by dots. One of the lines (usually the first one) will contain the address 127.0.0.1, but that's not the one we need. Most of the time the address you need will start with 192.168... or 10.0... but it will really depend on your network.

Please examine the IP addresses in Figure 9 closely to help you determine your IP:

```
pi@raspberrypi:~ $ ifconfig | grep inet[^6]
        inet 127.0.0.1   netmask 255.0.0.0
        inet 10.0.1.11  netmask 255.255.255.0  broadcast 10.0.1.255
                  ↳ this IP is the one we need.

pi@raspberrypi:~ $ ifconfig | grep inet[^6]
        inet 127.0.0.1      netmask 255.0.0.0
        inet 192.168.31.2  netmask 255.255.255.0  broadcast 192.168.31.255
                  ↳ this IP is the one we need.
```

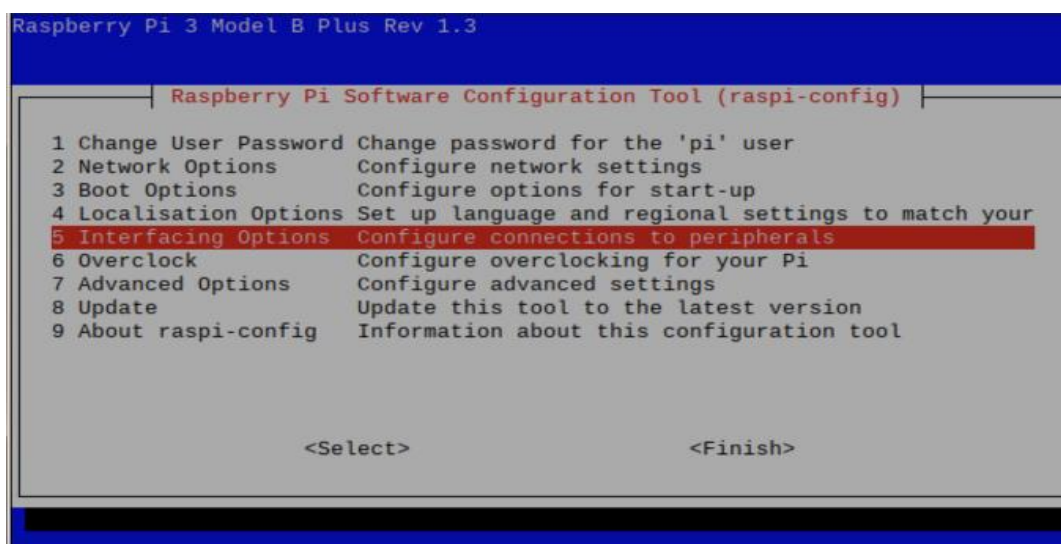**Figure 9.** Screen capture of the Rpi IP address location

Once you find your IP address, write it down.

## 4.4 Enabling SSH on Your Rpi

SSH is used to run commands on your Rpi from a different computer. The Rpi ships with SSH disabled so you must enable it manually. Open a Terminal window and run the following command.

```
sudo raspi-config
```

This will open a graphical user interface with multiple options, as Figure 10 demonstrates. Select "Interfacing Options" from the menu, then "SSH", and then <Yes> to enable it.



```
Raspberry Pi 3 Model B Plus Rev 1.3

      ┌──────── Raspberry Pi Software Configuration Tool (raspi-config) ────────┐
      │                                                                         │
      │  1 Change User Password Change password for the 'pi' user              │
      │  2 Network Options      Configure network settings                     │
      │  3 Boot Options         Configure options for start-up                 │
      │  4 Localisation Options Set up language and regional settings to match your│
      │  5 Interfacing Options  Configure connections to peripherals           │
      │  6 Overclock            Configure overclocking for your Pi             │
      │  7 Advanced Options     Configure advanced settings                    │
      │  8 Update               Update this tool to the latest version         │
      │  9 About raspi-config   Information about this configuration tool       │
      │                                                                         │
      │                                                                         │
      │                                                                         │
      │            <Select>                        <Finish>                     │
      │                                                                         │
      └─────────────────────────────────────────────────────────────────────────┘
```
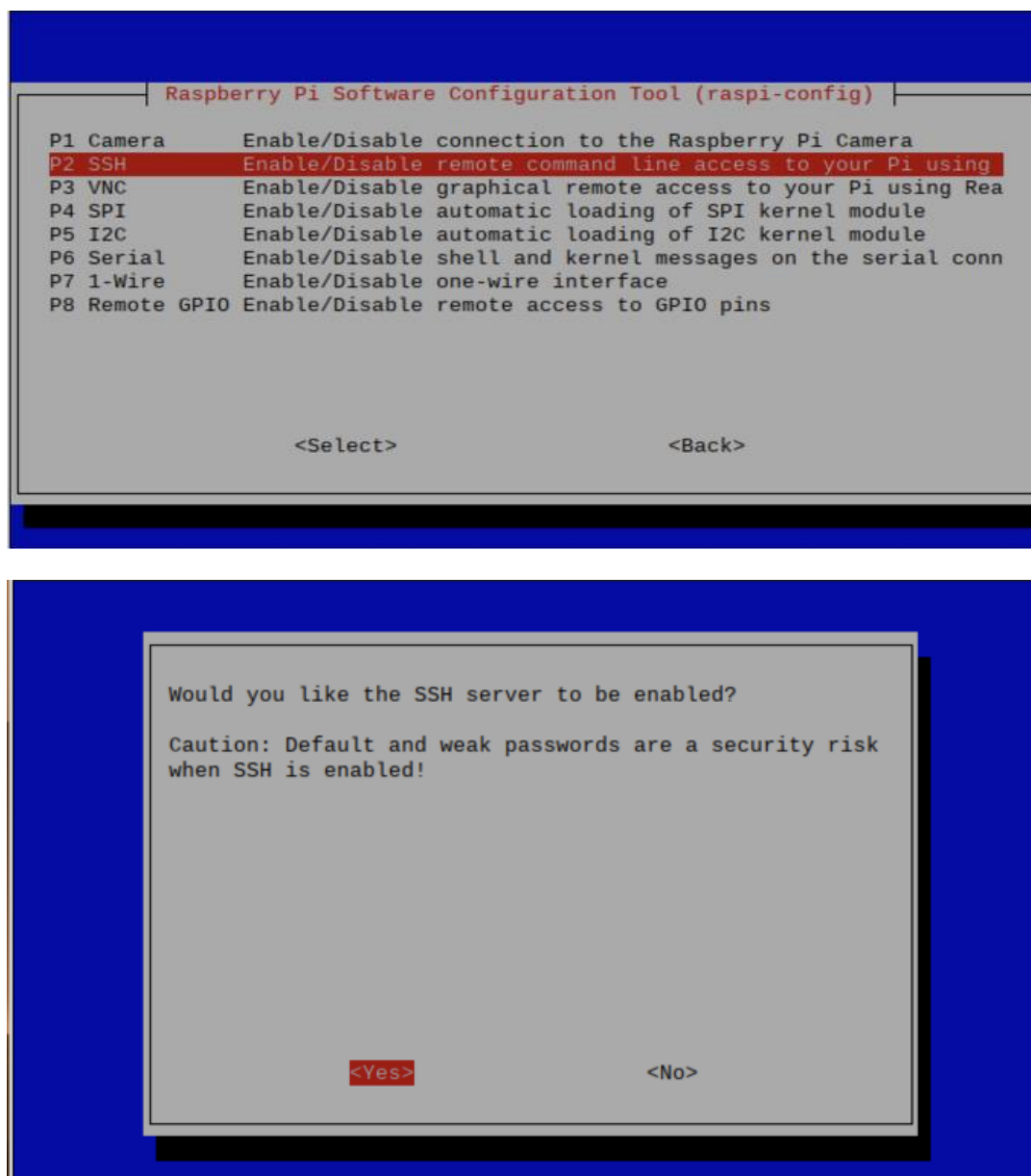
**Figure 10.** Screen captures of command prompt selections in tutorial step 4.4 to enable SSH

After selecting **<Yes>** you can click the ESC key to go back to the command line.

## 4.5 **Connecting from a Different Computer Using SSH**

Windows doesn't support SSH natively, so you must download third-party software to use it. Download PuTTY from **putty.org** and install it on your computer (Figure 11). If your Windows computer is fairly recent, you probably need the version labeled **64-bit x86**. If you are unsure, just go for the **32-bit x86** version, which will run in most computers even if they are 64-bit.

## Package files

You probably want one of these. They include versions of all the PuTTY utilities.

(Not sure whether you want the 32-bit or the 64-bit version? Read the FAQ entry.)

**MSI ('Windows Installer')**

| | | | |
|---|---|---|---|
| 64-bit x86: | putty-64bit-0.76-installer.msi | (or by FTP) | (signature) |
| 64-bit Arm: | putty-arm64-0.76-installer.msi | (or by FTP) | (signature) |
| 32-bit x86: | putty-0.76-installer.msi | (or by FTP) | (signature) |

**Figure 11.** Screen capture of PuTTY installation links from the website with highlights to designate 32- and 64-bit versions specified in tutorial step 4.5

After PuTTY is installed, you can run it, enter the IP Address you wrote down for your Rpi, and click **Open** (Figure 12).
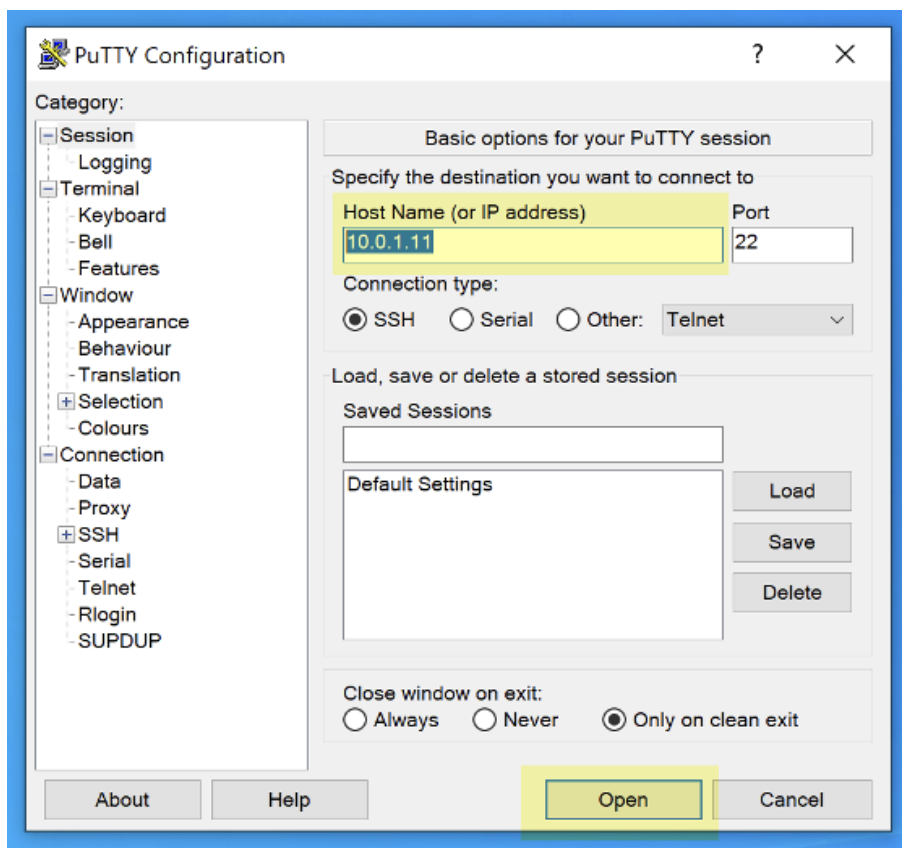
**Figure 12.** Screen capture of the Open step in a PuTTY session

If you receive a warning or a security alert during step 4.5, click the "Accept" button (Figure 13).
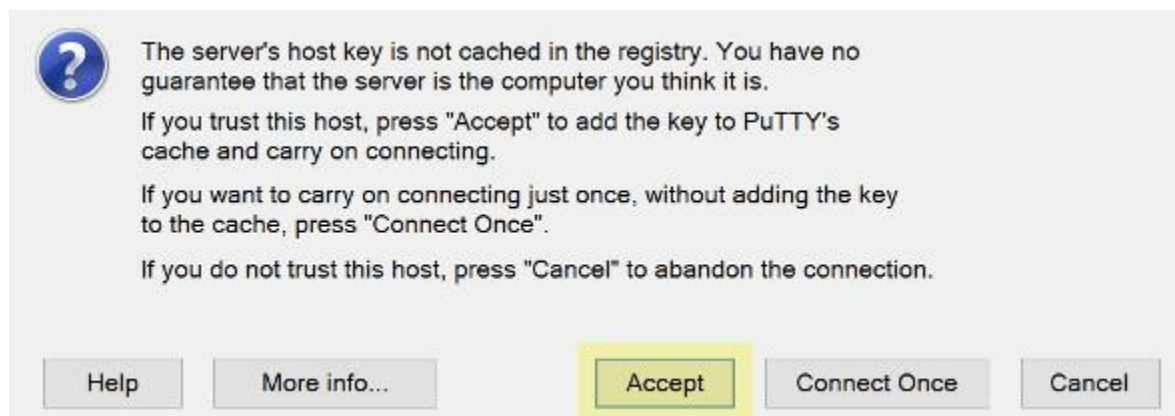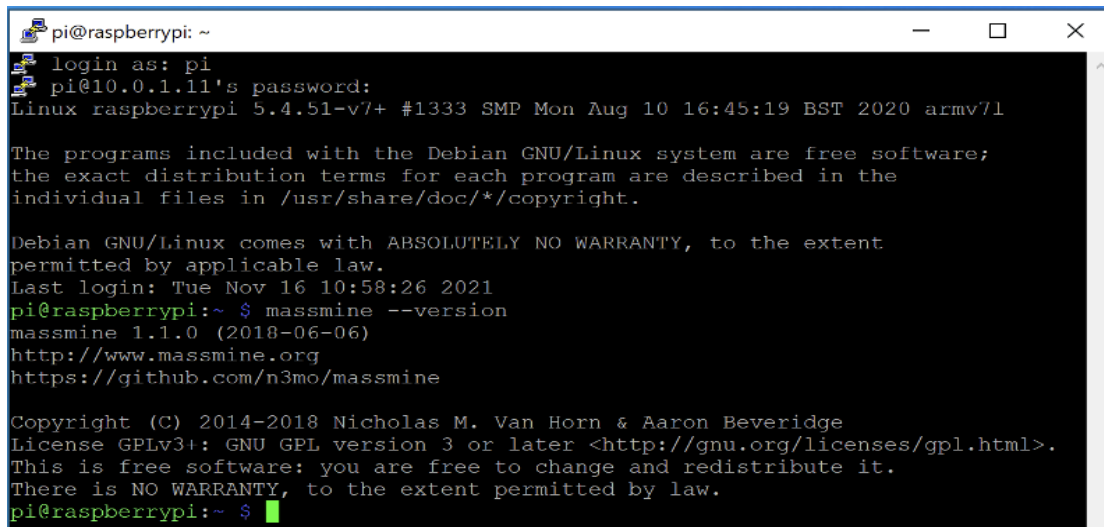
**Figure 13.** Screen capture that highlights the Accept button if a warning screen is encountered during step 4.5

Next, you will be prompted for a login and a password. Your login should be **pi**, and your password is either the default password (**raspberry**) or the one you specified (Figure 14).



**Figure 14.** Screen capture of password input for the PuTTY interface

After completing this step, you can use the resulting window as if it were your Rpi's Terminal (Figure 15).

**Figure 15.** Screen capture of terminal with a "ready-to-use" Rpi installation for MassMine

**--End of Tutorial--**