BeagleBone Tutorial: Introduction

Table of Contents

Introduction

This tutorial will guide users through the following tasks:

1. Examination of an overview of the BeagleBone
2. Connecting the BeagleBone to a personal computer
3. Learning how to access the Linux Operating System Shell of the BeagleBone

List of Required Equipment and Materials

1. 1x BeagleBone
2. 2x USB 2.0 A-Male to Micro B Cable (micro USB cable)
3. 1x Personal Computer with
    1. At least 1x USB 2.0 or 3.0 port
    2. Windows (Windows 8 or newer) **OR**
    3. Mac OS X (Mountain Lion or newer) **OR**
    4. Linux

BeagleBone Overview

The BeagleBone is a credit-card sized, low-power computer that is designed to lower the barriers to entry for a range of inventors, entrepreneurs, and consumer product designers to rapidly prototype. There are several versions of the BeagleBone board, such as the BeagleBone Black. In this tutorial set, we will be using the **BeagleBone Green Wireless**, which provides WiFi and Bluetooth Low Energy capabilities. Such capabilities make the BeagleBone Green Wireless platform great for "Internet-of-Thing" (IoT) applications.

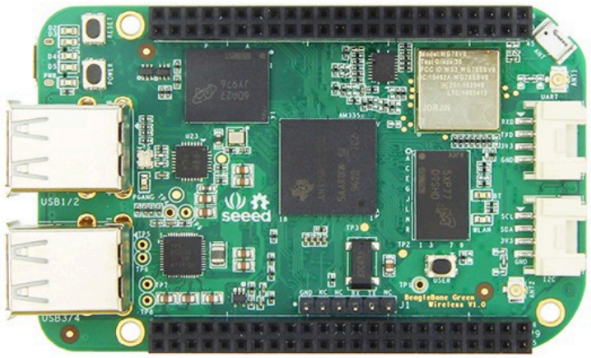

Figure 1. BeagleBone Green Wireless

Key Features of BeagleBone Green Wireless

- **Processor: AM335x 1GHz ARM® Cortex-A8**
  - 512MB DDR3 RAM
  - 4GB 8-bit eMMC on-board flash storage
  - 3D graphics accelerator
  - NEON floating-point accelerator
  - 2x PRU 32-bit microcontrollers
- **Connectivity**
  - USB client for power and communications
  - USB host with 4-port hub
  - WiFi 802.11 b/g/n 2.4GHz
  - Bluetooth 4.1 with BLE
  - 2x 46 pin headers
  - 2x Grove connectors (I2C and UART)

http://wiki.seeed.cc/BeagleBone_Green_Wireless/

Getting Started

The BeagleBone is a computer with an operating system just like your PC or Mac that runs Windows or macOS. You log into the operating system to interact with your PC or Mac. Similarly, you need to log into its operating system to interact with your BeagleBone. In this section, you will learn about the hardware and software setups that are required to log into your BeagleBone.

Hardware Setup

1. Connect a micro USB cable to your BeagleBone.

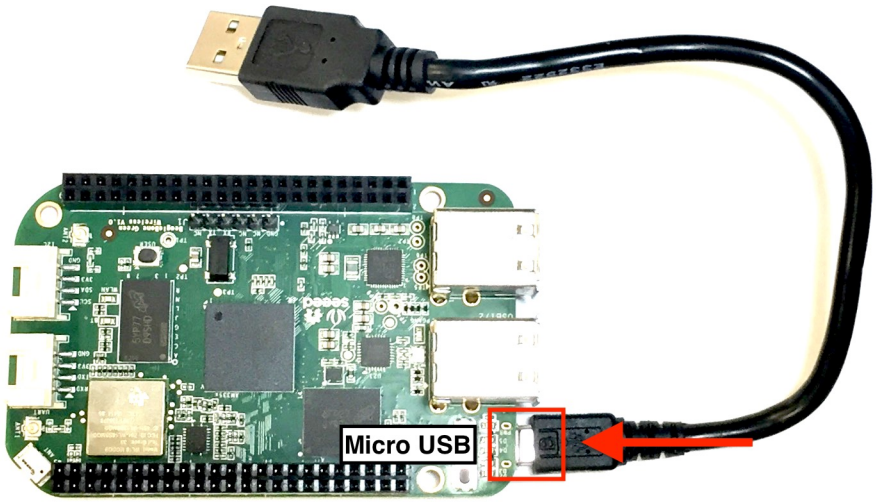

Figure 2. Connecting the micro USB cable to the BeagleBone

2. Connect the other end of the micro USB cable to your computer. Your BeagleBone powers on.

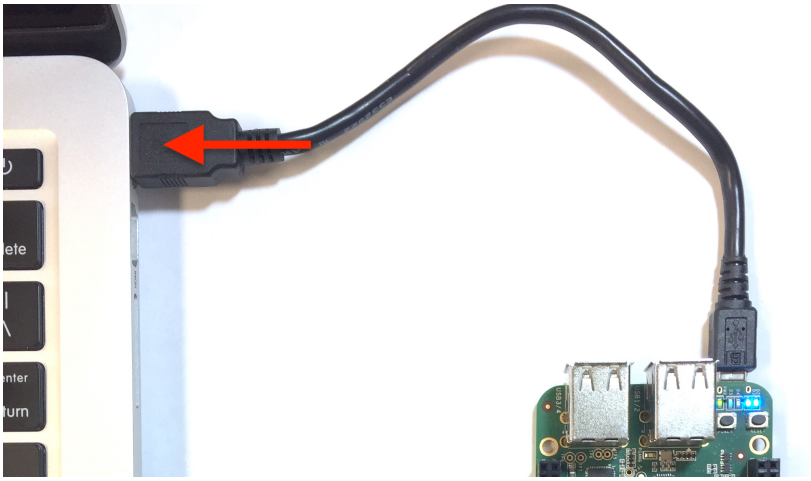

Figure 3. Connecting the BeagleBone to a computer

Software Setup for Windows Users

1. This section applies only to Windows operating system computers. Please skip this section if your personal computer does not use the **Windows** operating system.

2. Open File Explorer and navigate to D:\Drivers\Windows.

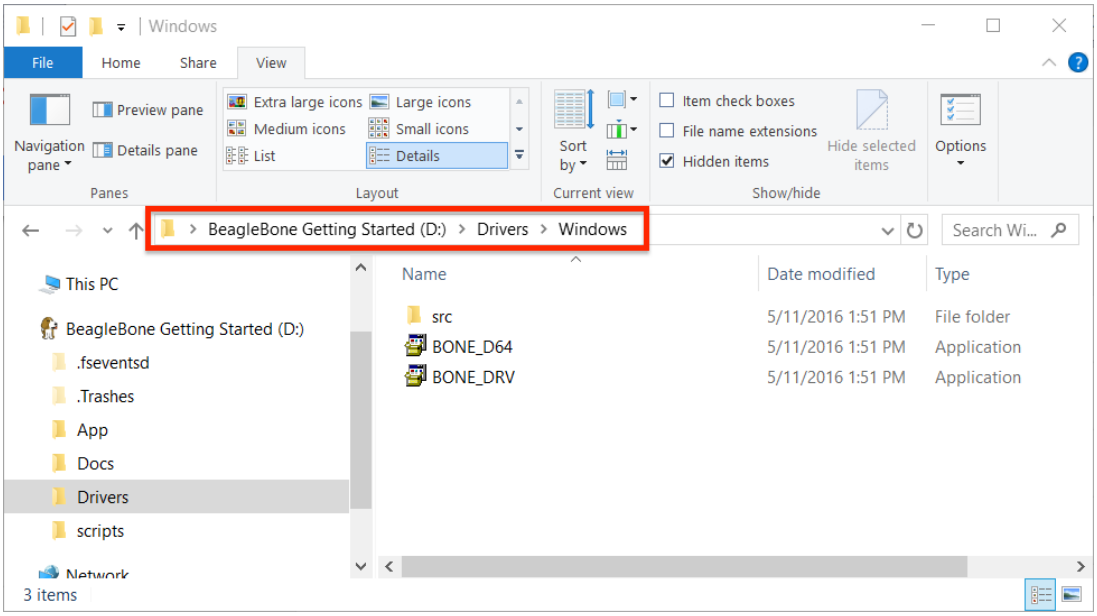

Figure 4. Windows drivers

3. The folder contains the drivers for Windows.

   If your Windows version is 64-bit, double-click **BONE_D64** to install the driver. If your Windows version is 32-bit, double-click **BONE_DRV** to install the driver.

   If you are unsure for the version, try the 64-bit installer first.

4. If you encounter any problem during the driver installation, please refer to the document labelled ***A Troubleshooting Guide for BeagleBone Network Access and Firmware Update*** on the BeagleBone wiki for more details.

5. Now you need to connect to the BeagleBone via the Secure Shell (SSH) connection. You have two options for the SSH client here: 1) Chrome, 2) PuTTY.

Option 1: Chrome (Step 6 – Step 13)

6. Download and install the latest Chrome browser from the following website:

   https://www.google.com/chrome/browser/desktop/index.html

7. Open a Chrome browser on your PC and go to the following webpage:

   https://chrome.google.com/webstore/detail/secure-shell/pnhechapfaindjhompbnflcldabbghjo?hl=en

8. Select **"+ ADD TO CHROME**". Then, click "**Add app**" on the pop-up window to install the extension.

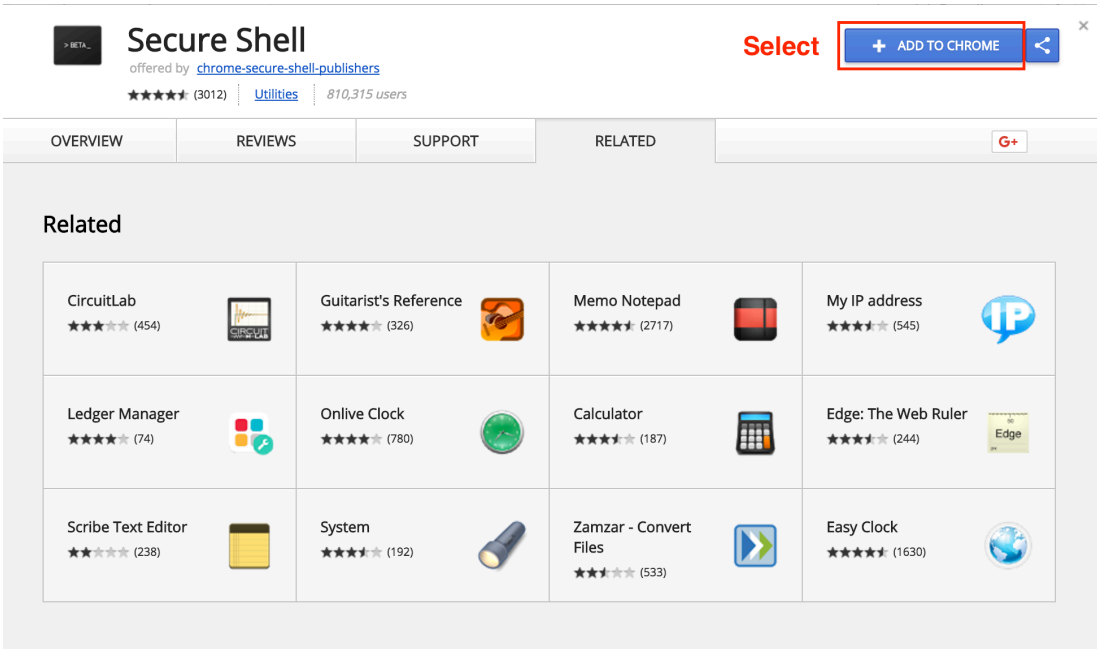

Figure 5. Adding the Secure Shell extension to your Chrome browser.

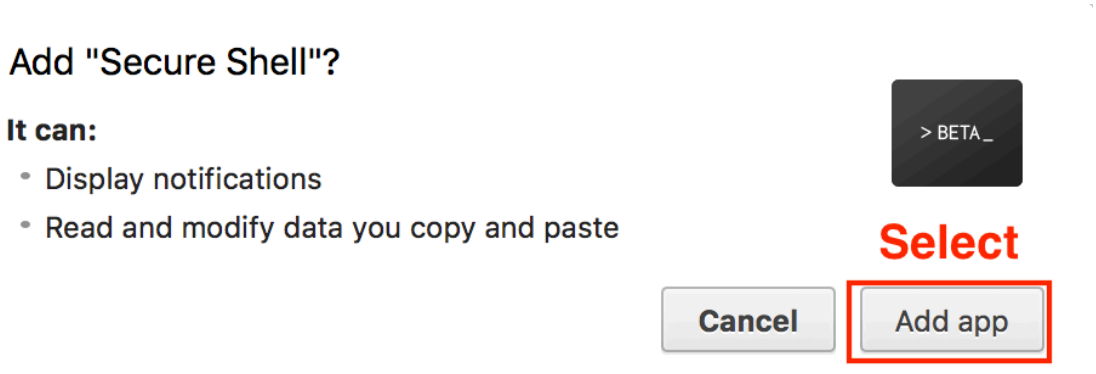

Figure 6. Selecting "Add app" in the pop-up window.

9. Open a new tab in the Chrome browser, type "ssh" in the address bar, and then type space. The address bar should display "Secure Shell" as shown in **Figure 7**.

Figure 7. "Secure Shell" shown in the address bar.

10. Type **root@192.168.7.2** in the address bar and press enter.

```
Connecting to root@192.168.7.2...
Loading NaCl plugin... done.
The authenticity of host '192.168.7.2 (192.168.7.2)' can't be established.
ECDSA key fingerprint is SHA256:aakHRh5mm/1VdKx5b5kRbqmU2mje3Vu4j/NksPUWmMQ.
Are you sure you want to continue connecting (yes/no)?
```

Figure 8. Login screen.

11. Enter **yes** to proceed. This message appears only this time.

```
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.7.2' (ECDSA) to the list of known hosts.
Debian GNU/Linux 8

BeagleBoard.org Debian Image 2017-03-19

Support/FAQ: http://elinux.org/Beagleboard:BeagleBoneBlack_Debian

default username:password is [debian:temppwd]

root@192.168.7.2's password:
```

Figure 9. Login screen.

12. Type your password and press "Enter". Note that you will not get any feedback, such as asterisks (*), when you enter the password. Linux system does this so that someone who sees your screen cannot see the length of your password, improving the security.

```
root@192.168.7.2's password:

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: Mon Oct  2 17:19:15 2017 from 192.168.6.1
root@beaglebone:~#
```

Figure 10. Logging in BeagleBone.

13. You have successfully logged into the BeagleBone's operating system.

Option 2: PuTTY (Step 14 – Step 20)

You can skip Option 2 if you have completed Option 1.

14. Download and install the PuTTY program on your personal computer.

    http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

15. Open the PuTTY program.

    Select **Session** from the category on the left and select **SSH** as the connection type. Then, type **192.168.7.2** in **Host Name** box and **22** in **Port** box.

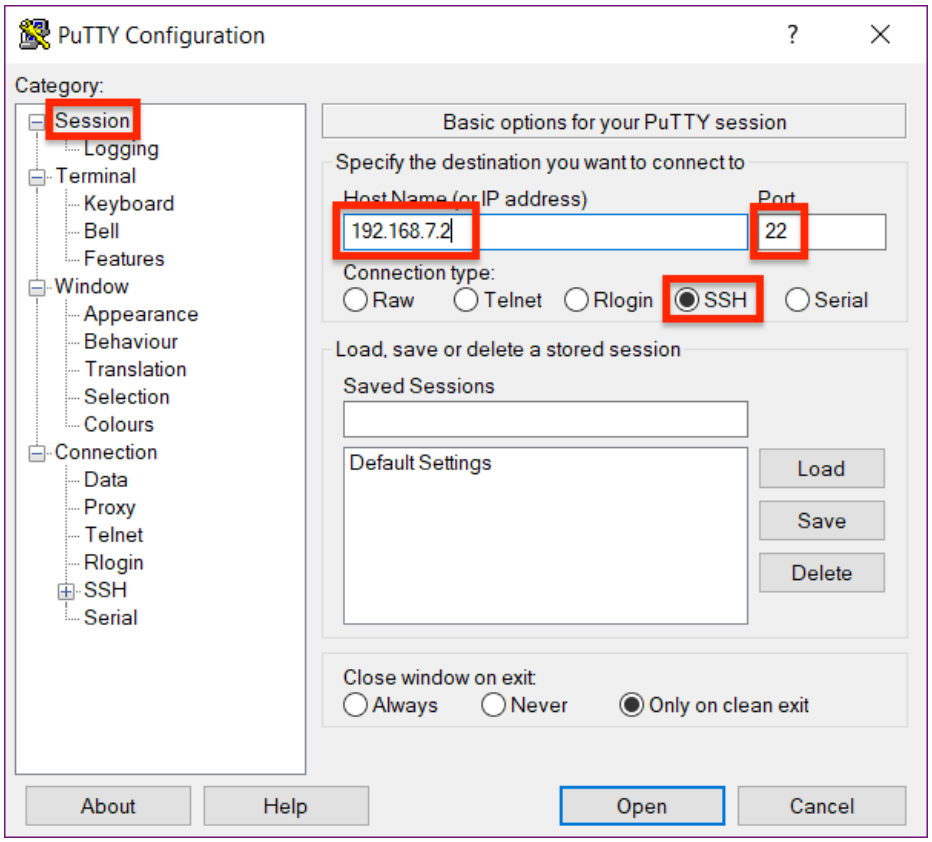

Figure 11. PuTTY

16. Click **Open** and you will see the following popup. This window appears only this time.

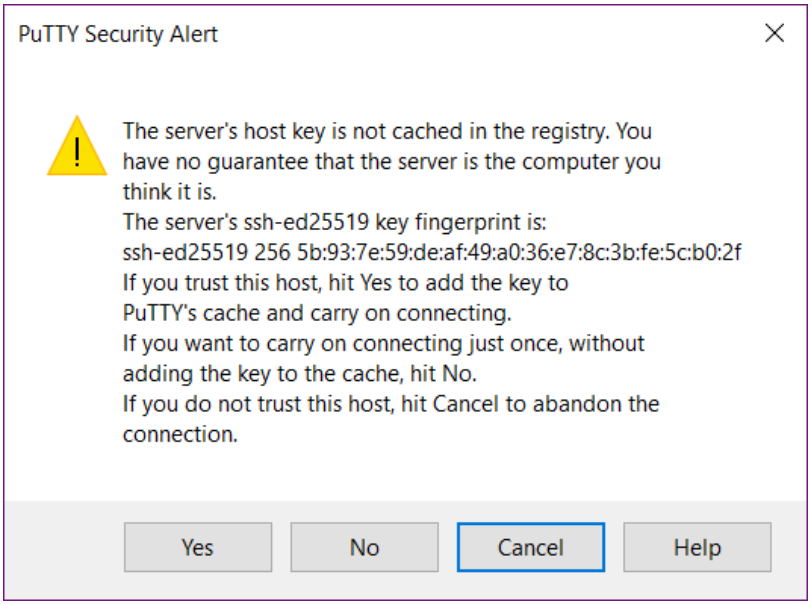

Figure 12. Popup window

17. Click **Yes**. The following login screen appears.

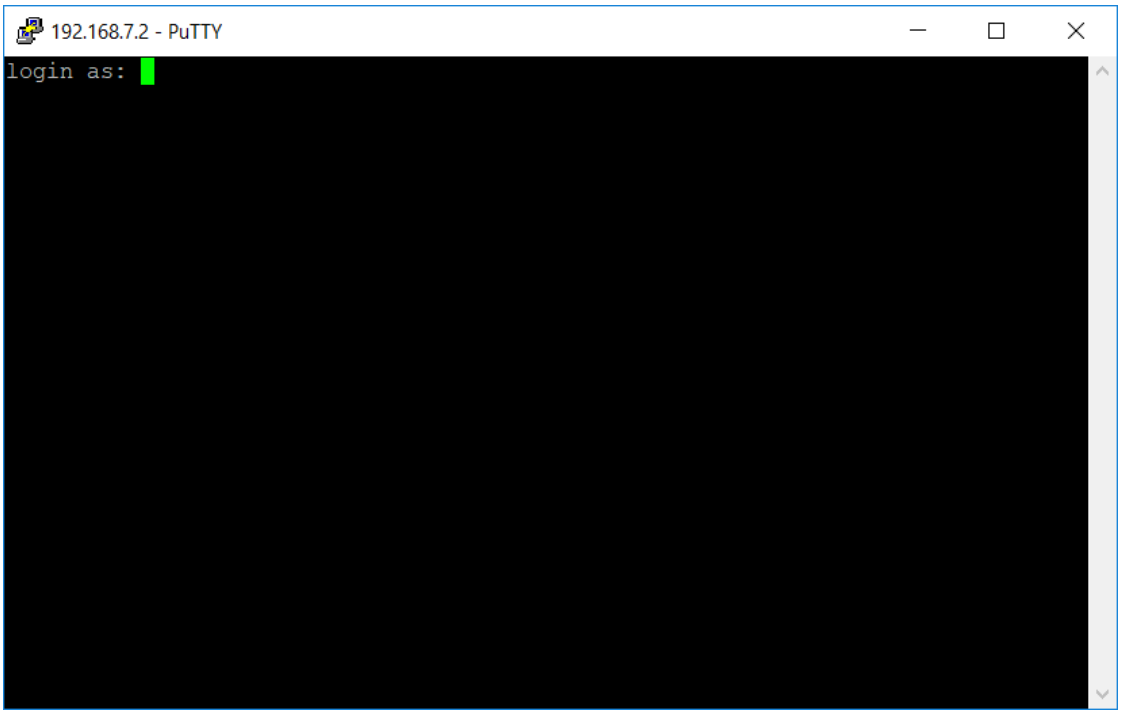

Figure 13. Login screen

18. Enter **root** and enter your password if you are asked for it.

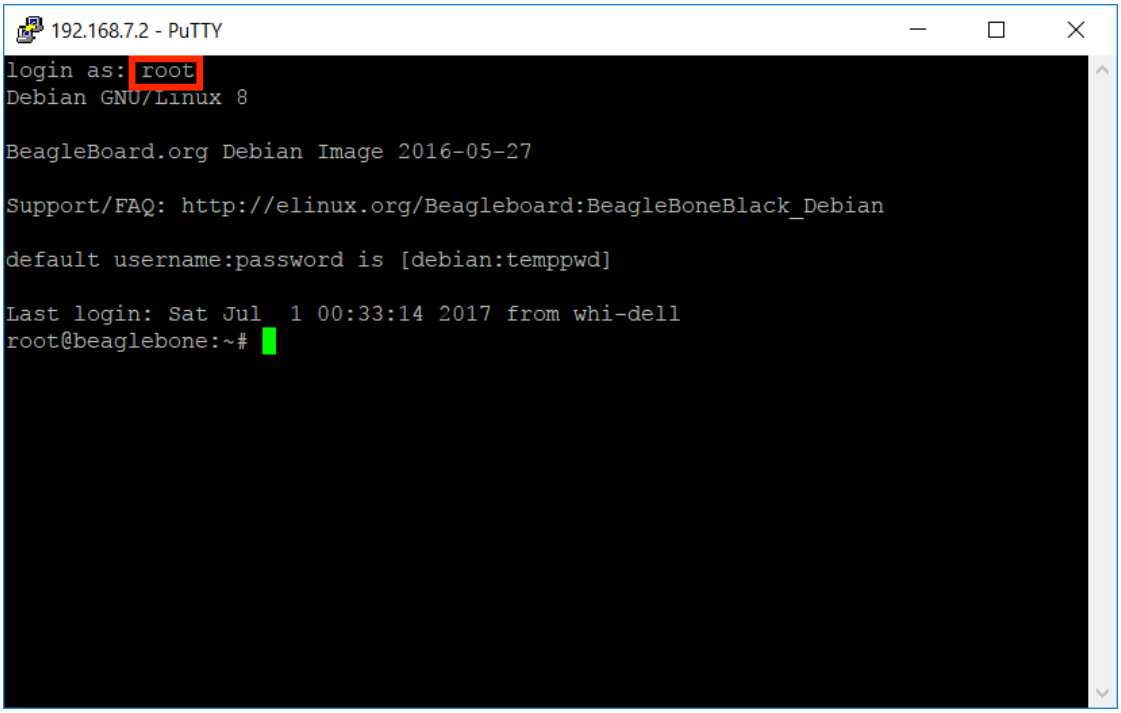

Figure 14. Login screen

19. Note that you will not get any feedback, such as asterisks (*), when you enter the password. Linux system does this so that someone who sees your screen cannot see the length of your password, improving the security of your system.

20. You have successfully logged into the BeagleBone's operating system.

Software Setup for Mac Users

1. Open Finder and navigate to the Mac OS X driver folder in the BeagleBone as shown below.

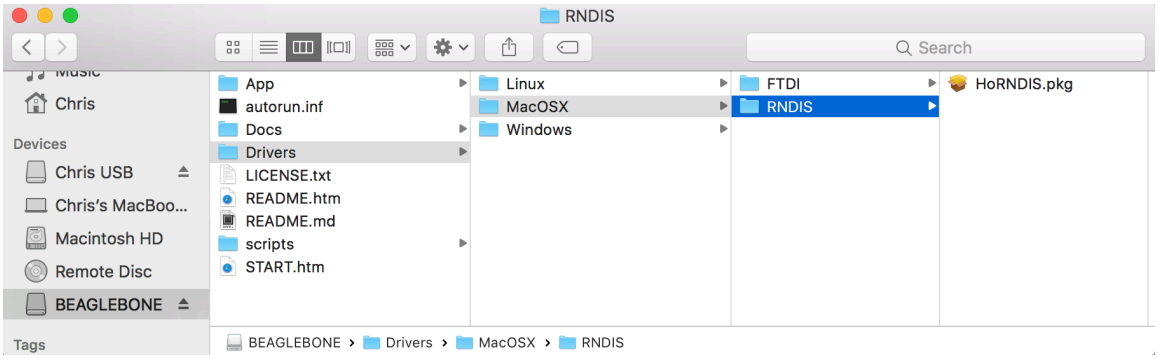

Figure 15. Mac driver

2. Use HoRNDIS.pkg to install the driver.

3. If you encounter any problem during the driver installation, please refer to the document labelled ***A Troubleshooting Guide for BeagleBone Network Access and Firmware Update*** on the BeagleBone wiki for more details.

4. Open the Terminal utility. You may search "terminal" from Spotlight.

5. Enter **ssh root@192.168.6.2**

```
Your Computer      $ ssh root@192.168.6.2
The authenticity of host '192.168.6.2 (192.168.6.2)' can't be established.
ECDSA key fingerprint is SHA256:vqV3gulzy+uyMNhE6m1649mWEaCTR23YT90dAbpJHyA.
Are you sure you want to continue connecting (yes/no)?
```

Figure 16. Terminal screen

6. Enter **yes** to proceed. This message appears only this time.

```
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.6.2' (ECDSA) to the list of known hosts.
Debian GNU/Linux 8

BeagleBoard.org Debian Image 2017-03-19

Support/FAQ: http://elinux.org/Beagleboard:BeagleBoneBlack_Debian

default username:password is [debian:temppwd]

root@192.168.6.2's password:
```

Figure 17. SSH session

7. Type your password and press “Enter”. Note that you will not get any feedback, such as asterisks (*), when you enter the password. Linux system does this so that someone who sees your screen cannot see the length of your password, improving the security of your system.

Figure 18. Logging in Beaglebone

8. You have successfully logged into the BeagleBone’s operating system!

Linux Operating System

1. Unlike Windows or Mac, no drivers are required to access the BeagleBone from Linux.
2. Open Terminal. The shortcut on Ubuntu is Ctrl + Alt + t.
3. Enter **ssh root@192.168.7.2**

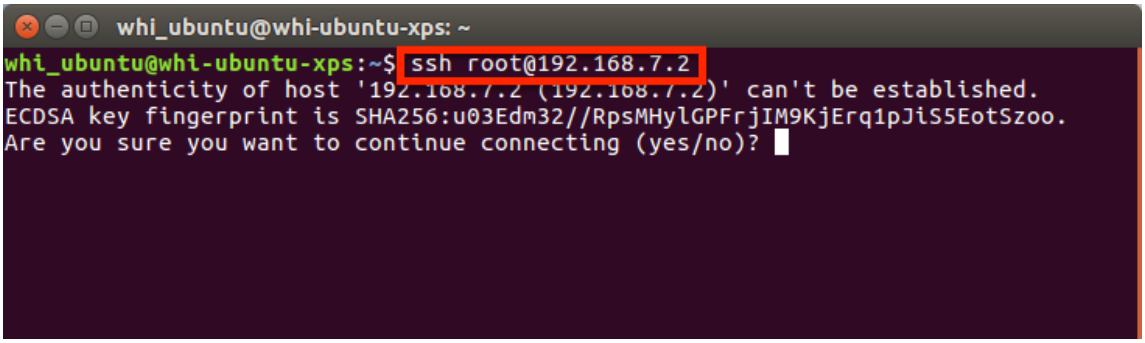

Figure 13. Terminal screen

4. Enter **yes** to proceed. This message appears only this time.
5. You have successfully logged into the BeagleBone's operating system.

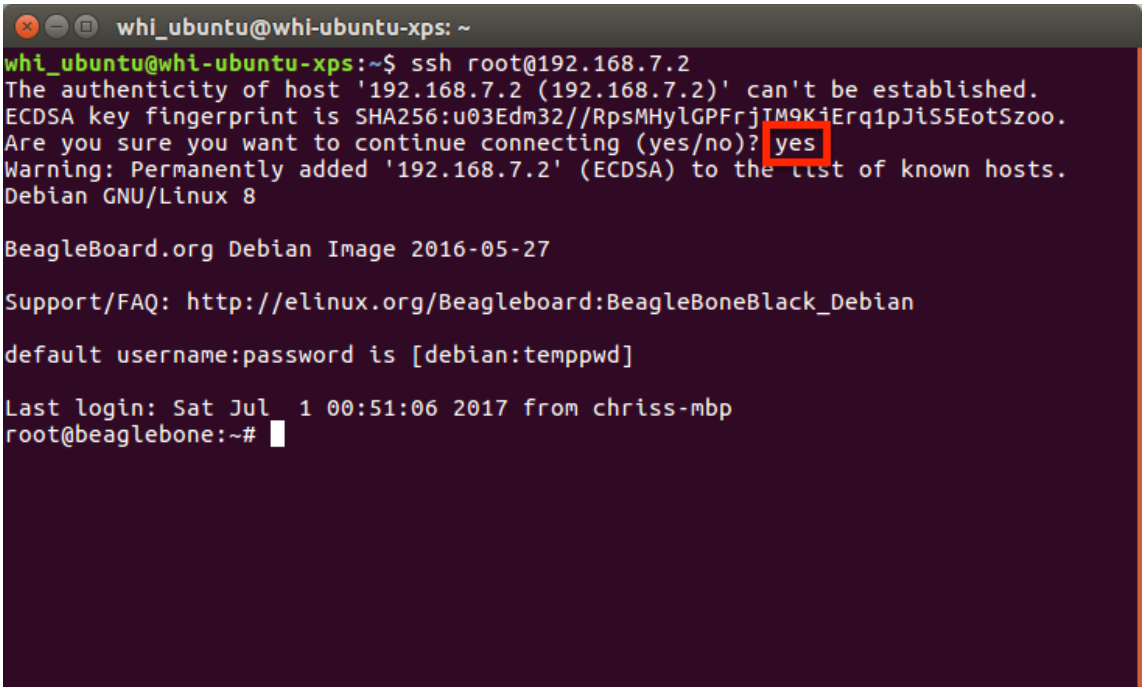

Figure 14. Terminal screen