Configure Your Raspberry Pi for Breezy4Pi

Unboxing Your Raspberry Pi

The documentation that comes with your Raspberry Pi will direct you on how to load the operating system and to upgrade the Pi to the latest software revisions. Therefore, there is no need to repeat those instructions here.

Breezy4Pi runs on top of the Raspbian distribution and so it is recommended that you use this flavor of Linux. We also recommend that you use at least a 8GB micro SD card. Since cards are so inexpensive these days, the larger the card you can afford, the better.

Once you've unboxed your Pi and have tested it out per its accompanying documentation, then we will be ready to configure it for Breezy4Pi.

Recommendations upon initial boot up (Raspi-config):

1. Expand Filesystem
2. Internationalization Options
    a. Change Timezone (Follow prompts for your area)
3. Advanced Options
    a. A2 Hostname (optional if you wish to change from raspberrypi or if you want to host more than one Pi)

Setup to use US English Keyboard

Do this to be able to use the pipe character '|'

1. Navigate to etc/default – "cd /etc/default"
2. Use Vi to edit the 'keyboard' file: 'sudo vi keyboard'
    a. Cursor down to 'XKBLAYOUT' and between the quotes where it says 'gp'.
    b. Change to insert mode by pressing 'i'.
    c. Remove 'gp' and replace with 'us'.
    d. Press 'Escape' key to exit Insert mode.
    e. Type ':wq' to save the update file and quit vi.
    f. Restart the Raspberry Pi

Upon reboot, your username will be 'pi' (unless you changed it in raspi-config) and your password will be 'raspberry'.

Install WiringPi

Is wiring pi already installed? Use

Please follow the installation instructions given on the WiringPi website: http://wiringpi.com/download-and-install/

Install Pi4J

Please follow the installation instructions given on the Pi4J website: http://pi4j.com/install.html

Enable I2C

I2C is a multi-device bus used to connect low-speed peripherals to computers and embedded systems. The Raspberry Pi supports this interface on its GPIO header and it is a great way to connect sensors and devices. Once configured you can connect more than one device without using up additional pins on the header.

Before using I2C it needs to be configured. This technique has changed slightly with the latest version of Raspbian so I've updated this article.

Step 1 – Enable i2c using raspi-config utility

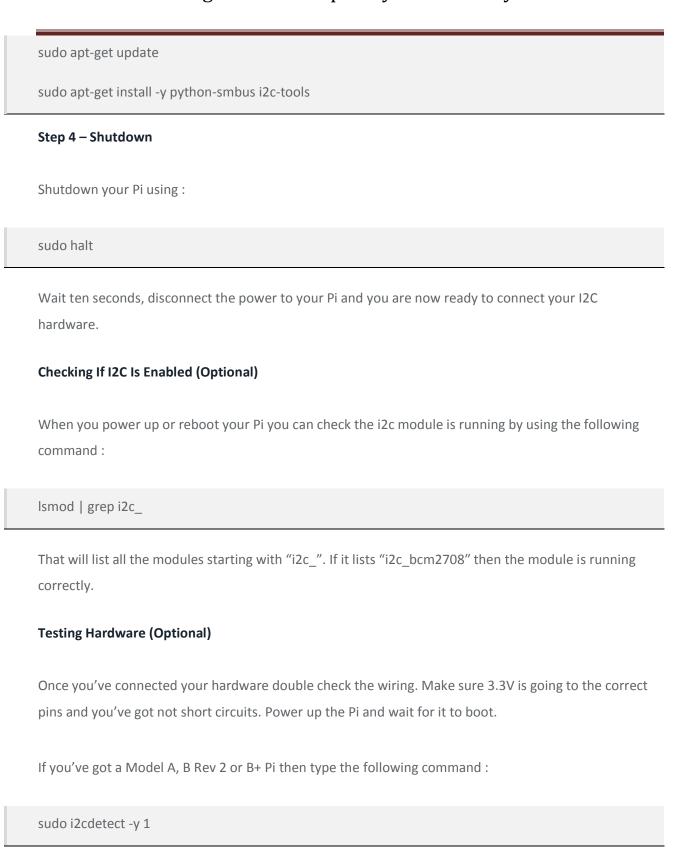From the command line type :

```
sudo raspi-config
```

This will launch the raspi-config utility.

Now complete the following steps :

- Select "8 Advanced Options"
- Select "A7 I2C"
- Select "Yes"

The screen will ask if you want the interface to be enabled :

- Select "Yes"
- Select "Ok"

The screen will ask if you want the module to be loaded by default :

- Select "Yes"

The screen will state the module will be loaded by default :

- Select "Ok"
- Select "Finish" to return to the command line

When you next reboot the I2C module will be loaded.

Step 2 – Manually Edit Module File

Next we need to edit the modules file using :

```
sudo nano /etc/modules
```

and add the following two lines :

```
i2c-bcm2708

i2c-dev
```

Use CTRL-X, then Y, then RETURN to save the file and exit.

Step 3 – Install Utilities

To help debugging and allow the i2c interface to be used within Python we can install "python-smbus" and "i2c-tools" :

```
sudo apt-get update

sudo apt-get install -y python-smbus i2c-tools
```

Step 4 – Shutdown

Shutdown your Pi using :

```
sudo halt
```

Wait ten seconds, disconnect the power to your Pi and you are now ready to connect your I2C hardware.

Checking If I2C Is Enabled (Optional)

When you power up or reboot your Pi you can check the i2c module is running by using the following command :

```
lsmod | grep i2c_
```

That will list all the modules starting with "i2c_". If it lists "i2c_bcm2708" then the module is running correctly.

Testing Hardware (Optional)

Once you've connected your hardware double check the wiring. Make sure 3.3V is going to the correct pins and you've got not short circuits. Power up the Pi and wait for it to boot.

If you've got a Model A, B Rev 2 or B+ Pi then type the following command :
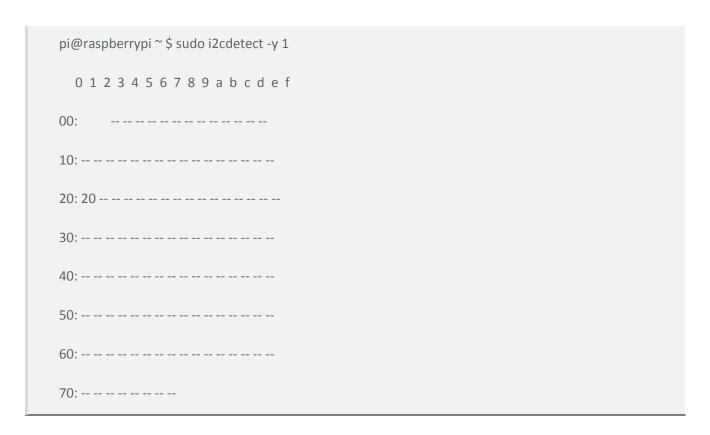
```
sudo i2cdetect -y 1
```

If you've got an original Model B Rev 1 Pi then type the following command :

```
sudo i2cdetect -y 0
```

Why the difference? Between the Rev 1 and Rev 2 versions of the Pi they changed the signals that went to Pin 3 and Pin 5 on the GPIO header. This changed the device number that needs to be used with I2C from 0 to 1.

I used a Pi 2 Model B with a sensor connected and my output looked like this :

```
pi@raspberrypi ~ $ sudo i2cdetect -y 1

     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f

00:          -- -- -- -- -- -- -- -- -- -- -- --

10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

20: 20 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

70: -- -- -- -- -- -- -- --
```

This shows that I've got one device connected and its address is 0x20 (32 in decimal).

Install Tomee from Apache

1. From the command line, type 'startx' to start the desktop
2. Click on the icon for the web browser.
3. Navigate to http://tomee.apache.org/downloads.html
4. Download the latest revision of Apache TomEE plus in the 'tar.gz' format. Follow their instructions for download. Once the tar file has downloaded, then the Xarchiver should pop-up showing the proper Apache Tomee plus file to extract.
5. Click on the 'Extract Files' icon. Another dialog will pop-up. Click on 'Extract' the files will get copied to '/home/pi/Downloads'
6. When done extracting, close the Xarchiver. To return to command line, you can either reboot or open up the 'LXTerminal' by clicking on its icon.
7. Navigate to the /Downloads directory
8. Type 'mv apache-tomee-plus-revision_number tomcat'
9. Copy tomcat to /opt folder: 'sudo cp –r tomcat /opt'
10. Navigate to the '/opt' folder.
11. Copy the pi4j jars to tomcat lib: 'sudo cp –r pi4j/lib/*.* tomcat/lib
12. Navigate to /opt/tomcat/
    a. Remove Session persistence: 'nano conf/context.xml'
    b. uncomment out <Manager pathname="" /> line
    c. Type ^X y <return>
13. Setup the admin username and password:
    a. Navigate to /opt/tomcat/conf
    b. Type 'sudo cp tomcat-users.xml tomcat-users-original.xml'
    c. Type 'sudo nano tomcat-users.xml'
    d. Comment out the existing <role.../> and <user.../> tags
    e. Add the following:
        i. <role rolename="manager-gui"/>
        ii. <role rolename="manager-script"/>
        iii. <user username="system" password="raspberry" roles="manager-gui, manager-script/>
14. Modfiy 'server.xml'
    a. Sudo cp server.xml server-original.xml
    b. Sudo nano server.xml
    c. Scroll down to the tag <Server port="8005" shutdown="SHUTDOWN">
    d. On the next line place the following:
        i. <!—TomEE plugin for Tomcat →
        ii. <Listener className="org.apache.tomee.catalina.ServerListener"/>

To determine the Pi's IP address, look for the string, "My IP address is". It will contain the IP address. It will appear right before the login prompt at boot up.

Get Tomee to auto boot

Create the following file, 'tomcat' and save to /etc/init.d. 'sudo nano tomcat':

```bash
#!/bin/bash

### BEGIN INIT INFO
# Provides:        tomcat7
# Required-Start:  $network
# Required-Stop:   $network
# Default-Start:   2 3 4 5
# Default-Stop:    0 1 6
# Short-Description: Start/Stop Tomcat server
### END INIT INFO

echo "Attempting to start Tomcat"

case "$1" in
  start)
    echo "Starting Tomcat"
    sh /opt/tomcat/bin/startup.sh
    echo "Tomcat is alive"
    ;;
  stop)
    echo "Stopping Tomcat"
    sh /opt/tomcat/bin/shutdown.sh
    echo "Tomcat is dead"
    ;;
  *)
    echo "Usage: /etc/init.d/tomcat7 {start|stop}"
    exit 1
    ;;
esac

exit 0
```

While in etc/init.d, do the following:

1. sudo chmod 755 tomcat
2. sudo update-rc.d tomcat defaults
3. reboot the server for changes to take affect

Now tomcat should boot automatically. This assumes that tomcat (TomEE) was installed in /opt/tomcat directory.

You can now use the following commands to start and stop tomcat from the command line:

- Sudo service tomcat start – starts the server
- Sudo service tomcat stop – stops the server.

To see if Tomcat is present you can either test it in the Pi's desktop web browser:

1. 'startx'

2. Click on the browser icon
3. Type: localhost:8080. The Tomcat splash page should now show up.

Installing Breezy4Pi

Currently, Breezy4Pi is only available through download from the breezy4pi.com website. Check the 'Downloads' tab for the most current release.

When you download Breezy4Pi, you will notice that it is packaged in a ZIP file. You will need to extract the WAR file in order to deploy it to your TomEE server. You may download either directly to your Raspberry Pi using its desktop interface and web browser or to whatever machine that has internet connectivity. Once it's download and extracted, you can then use the TomEE management tool to deploy the WAR file:

1. In your web browser, navigate to the TomEE URL. If you're on the Raspberry Pi, enter localhost:8080 in the browser's address field. Otherwise, enter the IP address of the Raspberry Pi followed by ':8080". Either method should take you to the TomEE splash page.
2. Click on the 'Manager App' button on the right hand side of the screen. You may be prompted to enter the username and password that you configured earlier in the 'tomcat-users.xml'. If the entry is correct, you will be taken to the 'Tomcat Web Application Manager' page.
3. Scroll down until you see the section, 'War file to deploy'. Click on 'Choose File' button to select the Breez4Pi WAR file. Click on 'Deploy' to deploy the WAR file. Deployment will take a minute or two.
4. Once deployed, you will notice that 'BreezyWeb' has been added to the list of applications. Off to the right 'Stop', 'Reload', and 'Undeploy' will all be active buttons while 'Start' is not. This indicates that Breezy has booted up properly.
5. Clicking on the link for BreezyWeb will take you to the home page of the application.
6. You are now ready to begin.

Applying Updates

If you have an update to Breez4Pi that you wish to deploy you must first undeploy the current version. It is suggested you do the following:

1. Stop all macros that are currently executing.
2. Undeploy the currently application using the Tomcat Web Application Manager.
3. Deploy your Breezy4Pi update.
4. Stop then start Tomcat from the Raspberry Pi command line using:
    a. Sudo service tomcat stop
    b. Sudo service tomcat start

References:

Raspberry Pi organization:
http://www.raspberrypi.org

WiringPi:
http://wiringpi.com/

Pi4J:
http://pi4j.com/

Enabling the I2C interface:
http://www.raspberrypi-spy.co.uk/2014/11/enabling-the-i2c-interface-on-the-raspberry-pi/

TomEE:
http://tomee.apache.org/apache-tomee.html