

Initializing BeagleBone Black for use with KHAN

ME 2984

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1 Requirements

These instructions will initialize your BBB for use on KHAN, including imaging an SD card with the proper version of Ubuntu, flashing the BBB with Ubuntu, and changing your username, hostname, and password through SSH. This will require the following:

1. BeagleBone Black
2. Computer with Windows (this tested on Windows 7 and 8.1)
3. Micro SD card - 2GB or larger
4. Micro SD card reader for computer
5. USB to Mini USB Cable

2 Imaging the SD Card

The first step is to get the Micro SD card set up to carry the Ubuntu installer for the BeagleBone Black. The following process assumes you are using Windows. There are methods to image the SD card using Ubuntu, but will require googling skills for yourself.

2.1 Downloading and installing necessary software and files

1. Put the micro SD card into the adapter and put it in your computers SD card slot.
2. Download the most up-to-date image of Ubuntu 14.04 for the BBB. At time of writing, this image is located at here¹.

¹<https://rcn-ee.com/rootfs/2015-09-11/flasher/BBB-eMMC-flasher-ubuntu-14.04.3-console-armhf-2015-09-11-2gb.img.xz>

3. You will need an archive manager to extract the Ubuntu image. It is recommended to use either WinRAR² or 7-Zip³.
4. Extract the BBB Ubuntu files with your archive manager of choice. Keep track of the extracted file destination, as you'll need it in a moment.
5. You will need to install DiskImager⁴ to create a bootable disk image.

2.2 Write Ubuntu image to SD card

CAUTION!!! DiskImager is generally a very safe piece of software, and will only let you write to removable devices. However, if for some reason it sees your C: drive as removable media, it will let you write to that. This will delete your hard drive. In the off chance that this is the case, proceed with caution and maybe use another computer instead.

1. Run DiskImager as Administrator by right clicking it in the start menu and choosing Run as Administrator.
2. Select the extracted BBB Ubuntu 14.04 file to use as the image file, and the Micro SD card as the device, and write the image file to the card. This should take a few minutes.
3. Eject the card from your computer and take it out.
4. Put the card back your computer. If Ubuntu was successfully installed, your computer should not recognize it as a disk (Windows may prompt to format your disk, do not do comply this is the best verification we have that Ubuntu is properly installed).
5. Eject the card from your computer and take it out again.

3 Flashing your BeagleBone

1. Insert micro SD card into your BeagleBone.
2. There are three buttons on the Beaglebone that all look alike except for text. Two buttons labeled reset and power are near the Ethernet port, while the other is on the opposite side of the board, and is unlabeled. This is the boot select button. While holding the boot select button down, connect the power supply to the Beaglebone. Once the power lights turn on, you may release the power button. This series of action automatically enters the BeagleBone into boot installation mode, forcing it to boot off the Micro SD card and install Ubuntu. The visible sign of this is that the lights will flash in a cylon pattern (back and forth). After a

²<http://www.rarlab.com/download.htm>

³<http://www.7-zip.org/>

⁴<http://skylineservers.dl.sourceforge.net/project/win32diskimager/Archive/Win32DiskImager-0.9.5-install.exe>

while, it should stabilize and all power lights will remain solid, indicating Ubuntu has finished installation.

3. Following the Ubuntu installation, remove power from the BeagleBone to shut it down.
4. Remove SD card from BeagleBone.

Note: on future boots, you should not hold the boot select button, since Ubuntu is already installed.

4 Prepping your BeagleBone

While you now have Ubuntu on your Beaglebone, you don't have a way to use it. This section will use an SSH connection to setup your BeagleBone. If you don't know what SSH is, it's basically a way to connect to another computer over a network or wired connection; in this case, connecting your computer to your beaglebone over the USB cable.

4.1 SSH into BeagleBone

This section overviews how to establish an SSH connection with your BeagleBone, using either Ubuntu/Linux or Windows. You will need the following default Ubuntu login information:

```
$default_ip_address: 192.168.7.2
$default_username: ubuntu
$default_password: tempwd
```

4.1.1 SSH in Ubuntu

1. Connect the BeagleBone to your computer using the USB cable. This also serves as a power source, so you don't actually need anything else plugged in.
2. The SSH command structure is `ssh username@ip-address`. In this case, you will use:

```
ssh $default_username@$default_ip_address
```

3. When prompted, enter the `$default_password`.

4.1.2 SSH in Windows

1. Connect the BeagleBone to your computer using the USB cable. This also serves as a power source, so you don't actually need anything else plugged in.

2. Windows does not have a native SSH client, therefore, you will need to download one. For the purposes of this guide, download `putty.exe` from the PuTTY download site⁵. Note: this is a straight-up `.exe`, no installing required, so you can just run that file.
3. Run `putty.exe`, set up a new connection using


```
default_port = 22
hostname = $default_ip_address
```
4. Open the connection. This should bring you to a terminal, which is your BeagleBone Ubuntu terminal.
5. When/if you get a popup talking about an RSA key and SSH keys and Putty, click yes.
6. It will ask you for a username and password. Use the `$default_username` and `$default_password` defined above.

Issues with PuTTY? If the PuTTY connection times out, power cycle the BeagleBone (remove and re-enter the usb cable) and try again. It has taken some users numerous power cycles before PuTTY works.

If you are still not able to connect after a few power cycles, it may be because certain versions of Windows require specific BeagleBone drivers.

1. Visit beagleboard.org/getting-started⁶ and install drivers (step 2).
2. You may need to disable signed drivers to install them:
 - (a) Search for Advanced Startup
 - (b) Click the Restart now button under the Advanced startup section.
 - (c) You will momentarily see the restarting screen, then it will switch to a blue screen titled "Choose an option"
 - (d) Click the Troubleshoot button.
 - (e) Click Advanced options.
 - (f) Click Startup Settings
 - (g) Click Restart
 - (h) You should then see a Startup Settings screen after your computer reboots.
 - (i) Press 7 or F7 on your keyboard to Disable driver signature enforcement
 - (j) Now Windows 8 will continue starting up.
 - (k) Log-in as normal, and then run `BONE.D64.exe` again
 - (l) You should see 4 warning dialogs about "unsigned driver installation", click OK for all of them.

⁵<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

⁶beagleboard.org/getting-started[{beagleboard.org/getting-started](http://beagleboard.org/getting-started)

4.2 Change the hostname and username of the BeagleBone

We now have to name our Beagle Bone. We are going to change the hostname (name of computer and how other computers refer to it) and make a new user (you)

1. Change the hostname⁷.
 - (a) **Note:** an easy way to restart is using `sudo reboot`
 - (b) **Note:** for the `sudo -H gedit...` command you will not be successful. `gedit` is a graphical editor and `ssh` does not support graphics. Some common terminal editors that you will have to use are `nano`, `vi`, `vim`, `emacs` -`nw` (I would default to `nano` if you are not familiar with others. So just replace `gedit` with `nano` in that command.
2. Add a new user for yourself⁸.
3. Now give yourself elevated permissions (add to `sudoers`)⁹.
4. Reboot

⁷<http://askubuntu.com/questions/87665/how-do-i-change-the-hostname-without-a-restart>

⁸<https://help.ubuntu.com/community/AddUsersHowto>

⁹<http://askubuntu.com/questions/7477/how-can-i-add-a-new-user-as-sudoer-using-the-command-line>