

Debian 9.9 install for MPD (Botic optional)

I advise to read this manual first before starting.

There are some configuration option which needs to be understand and maybe make some notes which part is needed or not.

Use your Windows PC for first steps:

Visit <https://beagleboard.org/latest-images> and select the required image file.

LXQT version is needed when using Graphical Desktop and IoT version is when using the BBB headless and log-in via SSH Terminal (PuTTY)

IoT version is preferred.

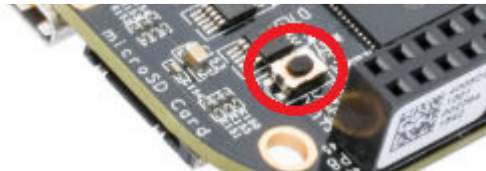
Please note that the image file is compressed (like a ZIP file) and you need to unzip it first with a program like "7ZIP" (free download from internet)

The compressed size is approx. 800 Mb and uncompressed 3,5 Gb.

Use program "Win32Diskimager" (free download from internet) to select the 3.5 Gb image file and copy it to and micro-SD-card (select correct Drive-letter for card) and press the button "Write"

When Win32Diskimager is finished, close the program and remove SD-card.

Insert SD card in BeagleBone, hold "boot button" above the SD-card and power up.



At start all 4 LED's on BBB will light and then you can release the boot button.

The boot button forces the BBB to boot from SD-card even when functioning OS is on EMMC.



At first time booting from SD-card after 1-2 minutes the BBB should be running and connected with your LAN.

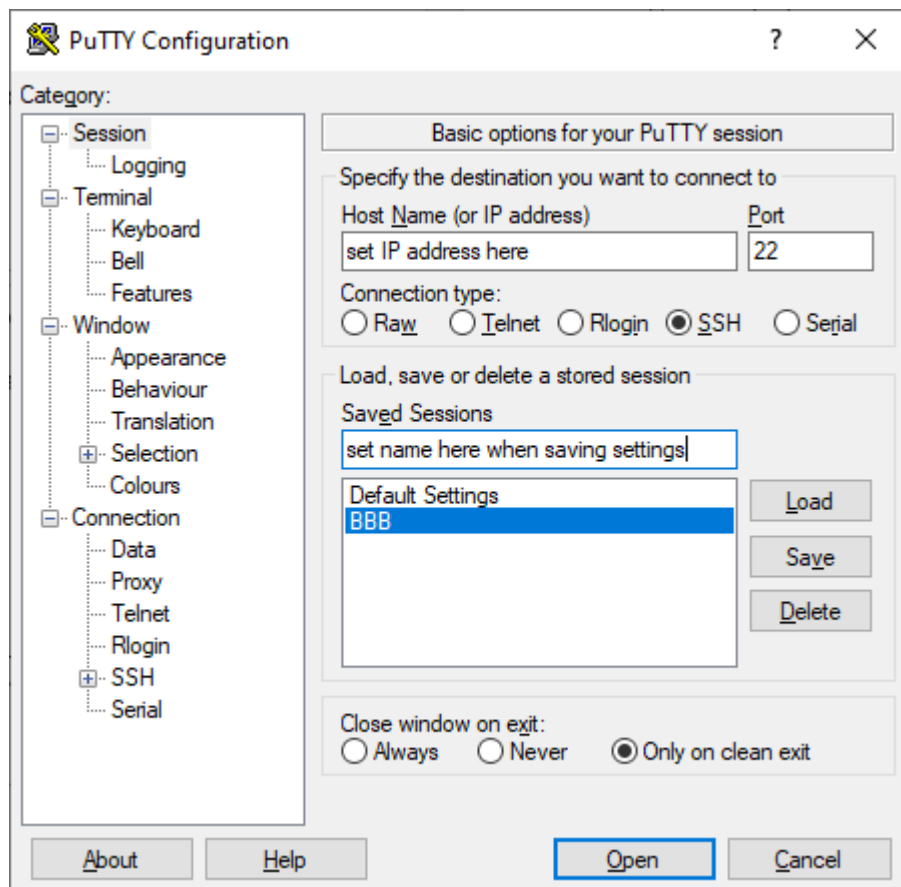
Find the IP address of the BBB:

Use an IP scanner like "Advanced IP Scanner" (free download from internet) and look for device "arm" or "Texas Instruments"

Connect to the BBB using "PuTTY" (free download from internet)
Set the IP address for BBB and keep port 22 and SSH as setting.

Smart would be to save the session so you can select it easier the next time.

Press "Open" and your first time working with Linux starts now !!



PuTTY will open a terminal screen (similar like Microsoft DOS before Windows was standard)

All text in red is what you need to type yourself as command and press "Enter"

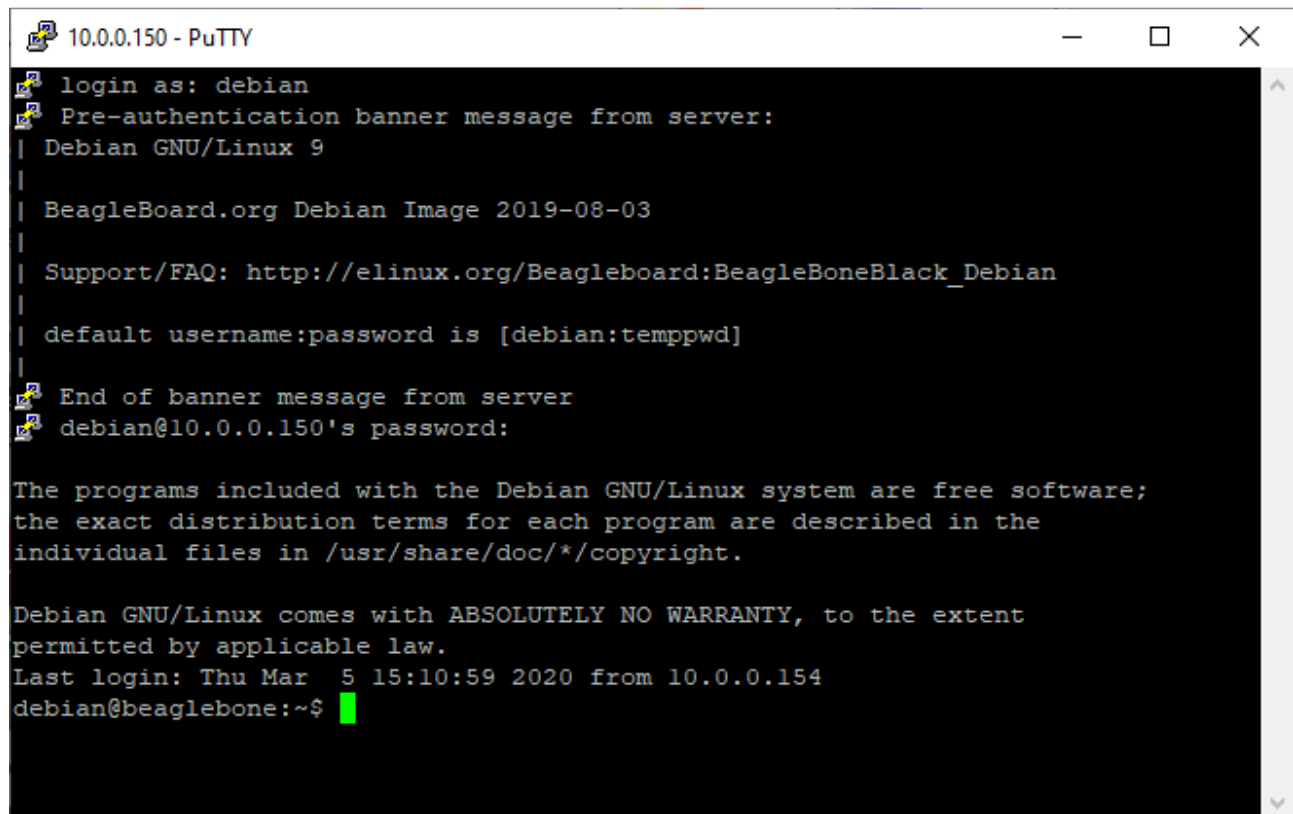
If you are not confident with re-typing long and strange commands copy / paste is done like this:

Copy a command from this document is standard Windows (select with mouse and type "Ctrl+C") but to paste in Linux you only need to right-click with your mouse on the green cursor to paste the text/command.

The other way around is selecting some text in Linux with your mouse is already enough to copy it and you can paste it in Windows as usual with "Ctrl+V" or right-click again in Linux if you want to copy text from one Linux file to another.

Login: **debian**
Password: **temppwd**

After successful login you are here:



```
10.0.0.150 - PuTTY
login as: debian
Pre-authentication banner message from server:
| Debian GNU/Linux 9
|
| BeagleBoard.org Debian Image 2019-08-03
|
| Support/FAQ: http://elinux.org/Beagleboard:BeagleBoneBlack_Debian
|
| default username:password is [debian:temppwd]
|
End of banner message from server
debian@10.0.0.150's password:

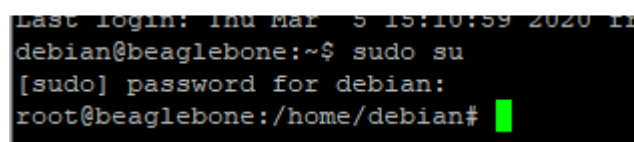
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Mar  5 15:10:59 2020 from 10.0.0.154
debian@beaglebone:~$
```

When connected you have limited access or rights.

To get administrator rights please type: **sudo su**

And confirm again when prompted with password **temppwd**



```
Last login: Thu Mar  5 15:10:59 2020 from 10.0.0.154
debian@beaglebone:~$ sudo su
[sudo] password for debian:
root@beaglebone:/home/debian#
```

You can see the change from **debian@beaglebone** to **root@beaglebone**.

Root is the standard administrator (super-user) account.

When you start a new PuTTY session you always need to activate again with **sudo su**

=====

Please realise that you are running Linux from the SD card, which is relatively slow, and less expected lifetime of the SD-card compared of running of the onboard flash memory EMMC.

EMMc will give faster boot and file handling.

Please note that only BBB rev. C will have enough memory on EMMC (4 GB) and older BBB up to rev. B have only 2GB and there the 3.6GB image on the SD-card will not fit.

You better keep running from SD-card for now anyway until we completely finish the configuration.

When completed we can still copy the SD-card to EMMC (BBB rev. C !!) but then the SD-card can be re-used again (do not change the files and keep it safe) when you need to re-flash if you by accident removed some files or other configuration mistakes later in EMMC.

To copy the SD-card now to EMMC and continue configuration in EMMC can be done too but when you need to re-flash you also need to repeat all following steps again ... your choice. My preference is to create an SD-card with the final configuration.

The benefit to run of the SD-card is when you need to change hardware just put the card in the new BBB and it will work immediately like usual.

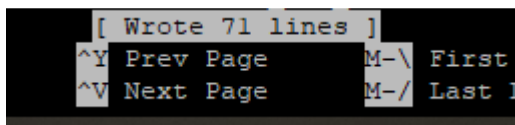
=====

How to edit files in Linux:

nano = edit tool for any file

After editing a file **always** confirm with **Ctrl+O** (save) + "Enter" and **Ctrl-X** (close file)

You will see after Ctrl+O and "Enter" at the bottom confirmation that the file was saved by mentioning "Wrote xx lines" :



If it shows "access denied" you probably forgot to activate the administrator rights earlier by **sudo su**

To copy SD-card configuration to EMMC: → only for BBB rev. C with 4GB EMMC !!

type: **nano /boot/uEnv.txt**

remove "#" at the beginning of this line: (at the bottom of the file) to activate the EMMC flasher:

```
#cmdline=init=/opt/scripts/tools/eMMC/init-eMMC-flasher-v3.sh
```

type: **reboot**

hold "boot button" again at start-up until all 4 led's light up

It can take a minute but the led's will light in "Nightrider / Kitt" sequence

After some minutes when led's go out the copy to EMMC is finished, remove power, remove SD card and re-power again, the BBB should boot from EMMC.

Login **debian** / **temppwd**

sudo su (**temppwd**)

If you made a mistake by trying to flash to a 2GB EMMC when EMMC is full all 4 led's will start blinking on/off simultaneously.

If you are not familiar with Linux it will be very hard to edit /boot/uEnv.txt now and put "#" again at the beginning of the EMMC flasher to de-activate this.

→ **#cmdline=init=/opt/scripts/tools/eMMC/init-eMMC-flasher-v3.sh**

I guess you better start all over again and forget the part about flashing to EMMC or buy a BeagleBone rev. C with 4GB EMMC.

=====

To continue configuration:

apt-get update

This will update the library index of all the Linux software packages which is available on the internet

apt-get upgrade

This will update all software to the newest version as the "apt-get update" above also provides version information so Linux knows what needs to be updated.

This process can take quite some time and it will ask you if you want to continue so press "y" when asked.

You can also confirm "Yes" automatically by typing **apt-get upgrade -y** so it will do the upgrade without questions. This also works when installing programs with command

"apt-get install name-of-program -y"

sudo apt autoremove (Debian 9)

apt-get autoremove (Debian 8)

Removes unnecessary packages which are not needed anymore after upgrade.

Set correct time and timezone: **dpkg-reconfigure tzdata**

Select your region and then select nearby city which fits your time-zone.

Do you remember the old but very useful DOS program "Norton Commander" ??

Linux has the same called "Midnight Commander" or **mc** in Linux.

If you know how to use it then it is a very easy tool otherwise keep using the typed commands in red text.

How to use **mc** is found here: <https://midnight-commander.org/wiki/doc>

To install:

apt-get install mc -y → -y = "Yes" to continue installation

After installation type **mc** and press "Enter" to start the program:

```
root@beaglebone:/home/debian# mc
```

Instead of using "**nano**" you can now find the file in Midnight Commander and open (edit) it there by pressing "F4".

F3 is a safe way of viewing the file first without risk of changing anything. F3 also closes the file again.

To install Music Player Daemon (MPD) and the client (MPC):

apt-get install mpd mpc -y

To prepare the BeagleBone for accessing your music over your LAN network:

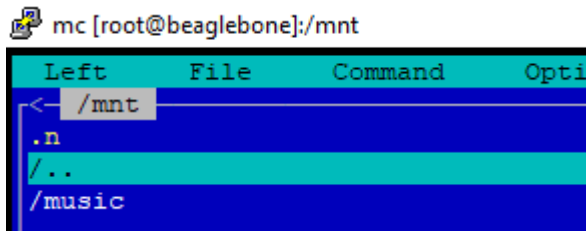
cifs-utils is needed for file access over the network when music files are on a NAS or external computer:

apt-get install cifs-utils -y

Create a Music directory as folder in /mnt:

mkdir /mnt/music

This is how it looks like in mc:



```
mc [root@beaglebone]:/mnt
Left      File      Command      Opti
<-- /mnt
.n
/..
/music
```

Linux needs external drives to be linked to their internal file system by the command "mount" for which the folder /mnt is mostly used.

Linux works with NFS to access external folders so you need to activate this on your NAS or external computer.

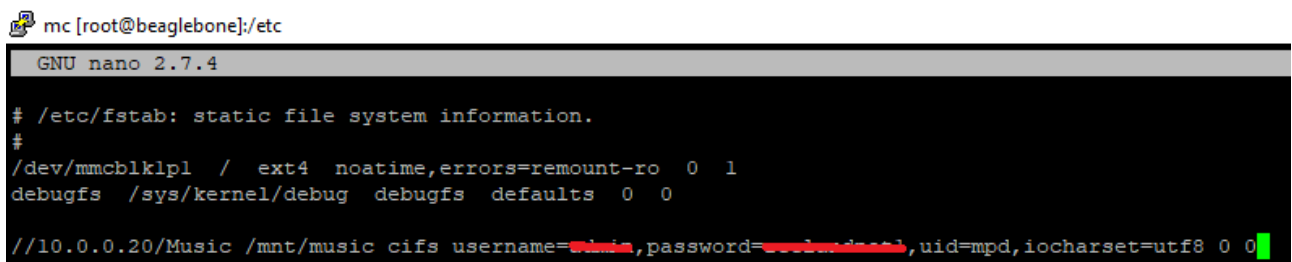
To link the external drive automatically during boot we need to set this in the file fstab:

nano /etc/fstab

add line: `//IPAddressNAS/Folder /mnt/music cifs`

`username=???,password=???,uid=mpd,ioccharset=utf8 0 0`

(make sure this is in one line but my text editor breaks it in 2 lines when writing this instruction)



```
GNU nano 2.7.4
# /etc/fstab: static file system information.
#
/dev/mmcblk1p1 / ext4 noatime,errors=remount-ro 0 1
debugfs /sys/kernel/debug debugfs defaults 0 0
//10.0.0.20/Music /mnt/music cifs username=admin,password=123456789,uid=mpd,ioccharset=utf8 0 0
```

The username and password is only necessary when you have set so on your shared drives or folders on your NAS.

To activate the "mounting" of the NAS to /mnt/music:

mount -a

Now you should see your music folders identical as on your NAS: (here in **mc**)

```
#enable uboot overlays=1
mc [root@beaglebone]:/mnt/music

Left      File      Command      Options
<-- /mnt/music
.n
/..
/ABBA
/ABC
/Adele
/Alanis Morissette
/Alexander O'Neal
/Alicia Keys
```

reboot

Check again folder /mnt/music/ if the Music files/folders are still present.
I had some issues keeping "mount -a" stick after reboot so I always check.

Some NAS or OS on external file servers need special options for the mount in /etc/fstab ...
here you are on your own but there is enough "fstab" mount information on the internet
related to your NAD or file server.

To configure MPD: (this is when using USB DAC ... for I2S output also follow with the Botic section.

nano /etc/mpd.conf → change the following

music_directory	change to: "/mnt/music"
port	"6600" (remove # at start of line)
auto_update	"yes" (remove # at start of line)

Audio output: (alsa)

name	change to "Name_of_your_DAC"
device	"hw:1,0" (make sure it is set as "hw:1,0" and remove # at start of line)
mixer_type	"hardware" (remove # at start of line)

Device hw:1,0 is the DAC connected to the USB port of the BeagleBone.

Find a suitable MPD app for your Android or IOS devise (or Windows client if controlled via a PC) set the required settings and you should be able to play your music.

Almost every App loads the album covers from the original music folders.
For this the http protocol is used so make sure http is also enabled on the shared music drive/folders.

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Botic: what is it ?

Botic is an add-on program/driver to Debian to have the I2S signal (and more) available on the 40-pin header so avoiding USB.

See:

<http://bbb.ieero.com/>

<https://www.diyaudio.com/forums/twisted-pear/258254-support-botic-linux-driver.html>

<https://github.com/miero/linux-beagleboard-botic>

Now you can use the USB port for something else like a thumb-drive with music or an external harddisk with even more music.

This external harddisk can contain all your music so you do not need to do all the "music over LAN network" related steps as shown above.

See the article about "how to mount USB storage" on hifiduino how to mount your direct connected storage devices (website link at the end of this instructions)

How to install Botic:

To download Botic:

wget http://repo.ieero.com/botic/pool/main/l/linux-upstream/linux-image-4.8.13-botic7-rc3_1_armhf.deb

You can check here if there are any newer Botic versions to download:

<http://repo.ieero.com/botic/pool/main/l/linux-upstream/>

To unpack (install) Botic:

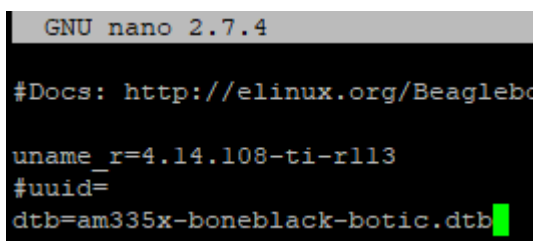
dpkg -i linux-image-4.8.13-botic7-rc3_1_armhf.deb

To activate Botic:

nano /boot/uEnv.txt

Remove "#" before dtb= and complete line like this: dtb=am335x-boneblack-botic.dtb

And add # before this line: "enable_uboot_cape_universal=1" further down this file.



```
GNU nano 2.7.4
#Docs: http://elinux.org/Beaglebo
uname_r=4.14.108-ti-r113
#uuid=
dtb=am335x-boneblack-botic.dtb
```

nano /etc/mpd.conf → change the following

Audio output: (alsa)

device "hw:0,0"

Device hw:0,0 is for using I2S out from 40 pin header instead of sending audio over USB

reboot

To see the actual (default) Botic settings: `grep . /sys/module/snd_soc_botic/parameters/*`

If a Botic parameter needs to be changed: `nano /boot/uEnv.txt`

Add the parameters at the end of this line: `cmdline=coherent....`
`snd_soc_botic/parameters/???` as described by Miero

<http://bbb.ieero.com/>

and DIYaudio topic

<https://www.diyaudio.com/forums/twisted-pear/258254-support-botic-linux-driver.html>

Example when using 22+24MHz clocks instead of 45+49 MHz

```
###0-Boot Overlays###
cmdline=coherent_pool=1M net.ifnames=0 rng_core.default_quality=100 quiet snd_soc_botic/parameters/clk_44kl=22579200 sr
k_44kl=22579200 snd_soc_botic/parameters/clk_48k=24576000 snd_soc_botic.ext_masterclk=3
```

Make sure you continue at the same line and add each additional parameter with a space between the parameters.

Reboot

Now you are ready to play 😊

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Other useful commands:

Power down BBB	: shutdown now
PCM output Botic	: cat /proc/asound/Botic/pcm0p/sub0/hw_params (only when music is playing)
MPD status	: systemctl status mpd
MPD restart	: sudo /etc/init.d/mpd restart
system resources	: top ("q" to exit)
Exit SSH console	: exit
check Debian version	: cat /etc/debian_version
check MPD version	: mpd --version

How to mount SD-card, USB stick or USB harddisk:

<https://hifiduino.wordpress.com/2014/03/19/beaglebone-black-accessing-usb-and-usb-storage/>

General note:

As I am not a Linux specialist (merely put all fragments of information together from the internet) I hope this manual is useful for many novice Linux / Botic users.

Sometimes it can be helpful having an extra SD-card and installing an older Linux version.

Like mentioned I had some issues with "mount -a" not sticking after reboot what apparently was not the case with Debian 8 ... why ?? I have no clue but feel free to experiment if you run into issues.

Having 2 cards, one with Debian 8 and one with Debian 9 or one without and one with Botic makes you very flexible for testing until everything works perfect 😊