Ubuntu Setup Notes

2017 March 23

Bluetooth/BLE USB - Broadcom BCM20702

References:

- https://learn.adafruit.com/install-bluez-on-the-raspberry-pi/installation
- https://software.intel.com/en-us/java-for-bluetooth-le-apps
- http://www.elinux.org/RPi_Bluetooth_LE
- http://fam-haugk.de/starting-with-bluetooth-le-on-the-raspberry-pi
- http://www.bluez.org/download/
- http://www.linuxfromscratch.org/blfs/view/8.0/general/bluez.html

Scan for USB devices plugged-in:

```
~$ lsusb
Bus 001 Device 004: ID 058f:6387 Alcor Micro Corp. Flash Drive
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 005 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 004 Device 002: ID 0a5c:21e8 Broadcom Corp. BCM20702A0 Bluetooth 4.0
Bus 004 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 003 Device 002: ID 045e:0040 Microsoft Corp. Wheel Mouse Optical
Bus 003 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 002 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
```

Check current version of BlueZ (pre version 5.00)

```
~$ bluetoothd -v
5.37

Post version 5.00:
~$ bluetoothctl --version
5.37
```

Remove any old version (this clobbers hcitool, is it really necessary?):

```
~$ sudo apt-get --purge remove bluez
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer
required:
  apg cups-pk-helper gkbd-capplet libgeonames0 libgnome-bluetooth13
libgnomekbd8
  libtimezonemap-data libtimezonemap1 signon-keyring-extension ubuntu-system-
service
  unity-control-center-faces
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  bluez* gnome-bluetooth* gnome-user-share* indicator-bluetooth* pulseaudio-
module-bluetooth*
  ubuntu-desktop* unity-control-center* unity-control-center-signon*
0 upgraded, 0 newly installed, 8 to remove and 0 not upgraded.
After this operation, 11.4 MB disk space will be freed.
Do you want to continue? [Y/n] Y
(Reading database ... 210950 files and directories currently installed.)
Removing pulseaudio-module-bluetooth (1:8.0-0ubuntu3.2) ...
```

```
.
.
.
Processing triggers for dbus (1.10.6-1ubuntu3.3) ...
```

Get latest Ubuntu updates:

```
~$ sudo apt-get update
Hit:1 http://ppa.launchpad.net/webupd8team/java/ubuntu xenial InRelease
.
.
.
Fetched 1,291 kB in 6s (209 kB/s)
Reading package lists... Done
neil@Dell-B130:~$
```

Install the following (note this is a single command-line):

```
~$ sudo apt-get install -y libusb-dev libdbus-1-dev libglib2.0-dev libudev-
dev libical-dev libreadline-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer
required:
  apg cups-pk-helper gkbd-capplet libgeonames0 libgnome-bluetooth13
libgnomekbd8
  libtimezonemap-data libtimezonemap1 signon-keyring-extension ubuntu-system-
service
  unity-control-center-faces
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
.
.
.
Setting up libreadline-dev:i386 (6.3-8ubuntu2) ...
Setting up libusb-dev (2:0.1.12-28) ...
Processing triggers for libc-bin (2.23-0ubuntu5) …
```

Go to home directory:

```
~$ cd ~
```

Get latest BlueZ version (Note: check www.bluez.org/download/):

```
~$ wget https://www.kernel.org/pub/linux/bluetooth/bluez-5.44.tar.gz
--2017-03-18 10:38:51--  https://www.kernel.org/pub/linux/bluetooth/bluez-
5.44.tar.gz
Resolving www.kernel.org (www.kernel.org)... 147.75.196.57,
2604:1380:1:3600::3
Connecting to www.kernel.org (www.kernel.org)|147.75.196.57|:443...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 2520783 (2.4M) [application/x-gzip]
Saving to: ‘bluez-5.44.tar.gz’

bluez-5.44.tar.gz       100%[=============================>]   2.40M
353KB/s    in 10s

2017-03-18 10:39:02 (239 KB/s) - ‘bluez-5.44.tar.gz’ saved [2520783/2520783]
```

Unzip downloaded file:

```
~$ tar xvf bluez-5.44.tar.gz
bluez-5.44/
bluez-5.44/Makefile.plugins
bluez-5.44/emulator/
.
.
.
bluez-5.44/test/sap_client.py
bluez-5.44/test/test-thermometer
bluez-5.44/test/simple-player
```

Change to unzipped directory:

```
~$ cd bluez-5.44
```

Adafruit performed the update & lib installs here:

```
~/bluez-5.44$ sudo apt-get update

~/bluez-5.44$ sudo apt-get install -y libusb-dev libdbus-1-dev libglib2.0-dev
libudev-dev libical-dev libreadline-dev
```

Michael Haugk did this, Adafruit did not... has to do with the make linker?

```
~$ export LDFLAGS=-lrt
```

Adafruit only did the following:

```
~$ ./configure
```

If you get errors, you may try:

```
~$ ./configure --prefix=/usr --sysconfdir=/etc --localstatedir=/var --enable-
library -disable-systemd
```

sysconfdir=/etc wasn't accepted, tried this instead:

```
./configure --prefix=/usr --localstatedir=/var --enable-library -disable-
systemd
checking for a BSD-compatible install... /usr/bin/install -c
checking whether build environment is sane... yes
checking for a thread-safe mkdir -p... /bin/mkdir -p
checking for gawk... no
checking for mawk... mawk
.
.
.
config.status: creating config.h
config.status: executing depfiles commands
config.status: executing libtool commands
```

Make it

```
~$ make
  GEN      lib/bluetooth/bluetooth.h
  GEN      lib/bluetooth/hci.h
  GEN      lib/bluetooth/hci_lib.h
  GEN      lib/bluetooth/sco.h
.
.
.
  CC       tools/hid2hci.o
```

```
  CCLD     tools/hid2hci
  GEN      tools/97-hid2hci.rules
```

Install

```
~$ sudo make install
make --no-print-directory install-am
 /bin/mkdir -p '/usr/lib'
 /bin/bash ./libtool   --mode=install /usr/bin/install -c
lib/libbluetooth.la
.
.
.
id2hci.1 '/usr/share/man/man1'
 /bin/mkdir -p '/usr/share/man/man8'
 /usr/bin/install -c -m 644 src/bluetoothd.8 '/usr/share/man/man8'
 /bin/mkdir -p '/usr/lib/pkgconfig'
 /usr/bin/install -c -m 644 lib/bluez.pc '/usr/lib/pkgconfig'
 /bin/mkdir -p '/lib/udev/rules.d'
 /usr/bin/install -c -m 644 tools/97-hid2hci.rules '/lib/udev/rules.d'
 /bin/mkdir -p '/lib/udev'
  /bin/bash ./libtool   --mode=install /usr/bin/install -c tools/hid2hci
'/lib/udev'
libtool: install: /usr/bin/install -c tools/hid2hci /lib/udev/hid2hci
```

Copy (Not done with Adafruit version, not needed?)

```
~$ sudo cp attrib/gatttool /usr/bin/
~$ sudo cp ./src/bluetoothd /usr/local/bin/
```

??

Edit bluetooth.service to enable --experimental

```
sudo nano /lib/systemd/system/bluetooth.service
```

Change from:

```
[Service]
Type=dbus
BusName=org.bluez
ExecStart=/usr/local/libexec/bluetooth/bluetoothd
NotifyAccess=main
```

To:

```
[Service]
Type=dbus
BusName=org.bluez
ExecStart=/usr/local/libexec/bluetooth/bluetoothd --experimental
NotifyAccess=main
```

Save changes and exit nano:

```
Ctrl-o, Y, Ctrl-x

sudo systemctl daemon-reload

sudo systemctl restart bluetooth
```

Since BlueZ 5.0 the new version query is:

```
~$ bluetoothctl --version
5.44
```

```
systemctl status bluetooth
```

(Re)Install Depricated BlueZ tools (NOTE: see https://bugs.archlinux.org/task/53110)

~$ sudo apt install bluez

answer “N” keep current installed version

```
~$ hciconfig
hci0:   Type: BR/EDR  Bus: USB
        BD Address: 5C:F3:70:7F:1E:56  ACL MTU: 1021:8  SCO MTU: 64:1
        UP RUNNING
        RX bytes:1066 acl:0 sco:0 events:60 errors:0
        TX bytes:3268 acl:0 sco:0 commands:58 errors:0
```

If DOWN, try entering following:

```
~$ sudo hciconfig hci0 up
```

Scan for devices:

```
hcitool scan
```

Installing CMAKE

```
cmake --version

sudo apt-get --purge autoremove cmake

sudo apt-get install build-essential

cd ~

wget https://cmake.org/files/v3.7/cmake-3.7.2.tar.gz

tar xvf cmake-3.7.2.tar.gz

cd cmake-3.7.2

./configure

make

sudo make install

hash -r
```

The JDK8 variables already seem to be set correctly in Ubuntu 16.04 so maybe the following is needed for Raspberry Pi / Raspbian?

NOTE: when installing on HP-Mini, JAVA variables are not set!

```
export JAVA_HOME=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-hflt

export JAVA_AWT_LIBRARY=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-
hflt/jre/lib/arm/libawt.so

export JAVA_JVM_LIBRARY=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-
hflt/jre/lib/arm/server/libjvm.so

export JAVA_INCLUDE_PATH=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-hflt/include

export JAVA_INCLUDE_PATH2=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-
hflt/include/linux

export JAVA_AWT_INCLUDE_PATH=/usr/lib/jvm/jdk-8-oracle-arm32-vfp-hflt/include
```

Installing TinyB

```
cd ~

git clone https://github.com/intel-iot-devkit/tinyb.git

cd tinyb

mkdir build

cd build

cmake -DBUILDJAVA=ON ..

make

sudo make install
```

Cypress PSoC "Finder" BLE device address:
00:A0:50:00:00:03

Run "C" example:
cd ~/tinyb/build

sudo ./examples/hellotinyb 00:A0:50:00:00:03

Run Java example:

```
cd ~/tinyb/build

sudo su

export LD_LIBRARY_PATH=/usr/local/lib

java -cp examples/java/HelloTinyB.jar:/usr/local/lib/java/tinyb.jar
HelloTinyB 00:A0:50:00:00:03

exit
```

http://stackoverflow.com/questions/30808453/bluez-5-30-d-bus-gatt-api-simply-discover-and-connect-to-a-ble-device-in-c

https://github.com/labapart/gattlib/

https://git.kernel.org/pub/scm/bluetooth/bluez.git/tree/

https://github.com/intel-iot-devkit/tinyb/blob/master/examples/java/HelloTinyB.java