



**Universidad Autónoma de Guadalajara**

Biomedical Engineering

Peripherals and Interfaces

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*“Final project: Mynewt installation manual”*

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## Virtual Machine installation:

1. Download Ubuntu image for Virtual machine from  
<https://www.ubuntu.com/download/desktop>
2. Download and install VMware virtual machine to setup Ubuntu workspace from  
<https://www.vmware.com/mx/products/workstation-player/workstation-player-evaluation.html>
  - a. Locate the downloaded image and load it into the VM Wizard

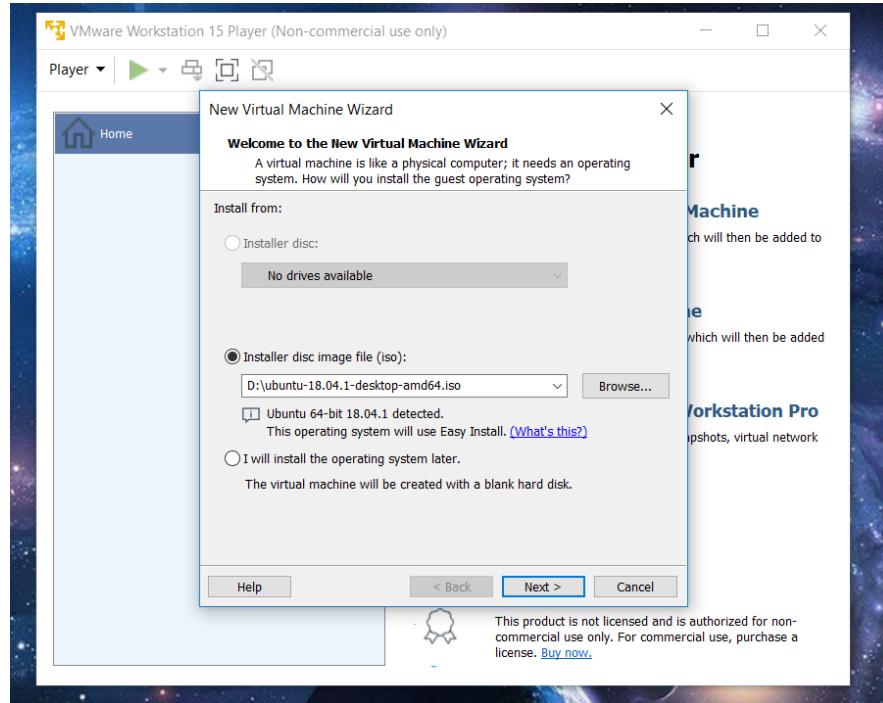


Illustration 1: Virtual Machine Wizard

- b. Introduce your Linux user credentials

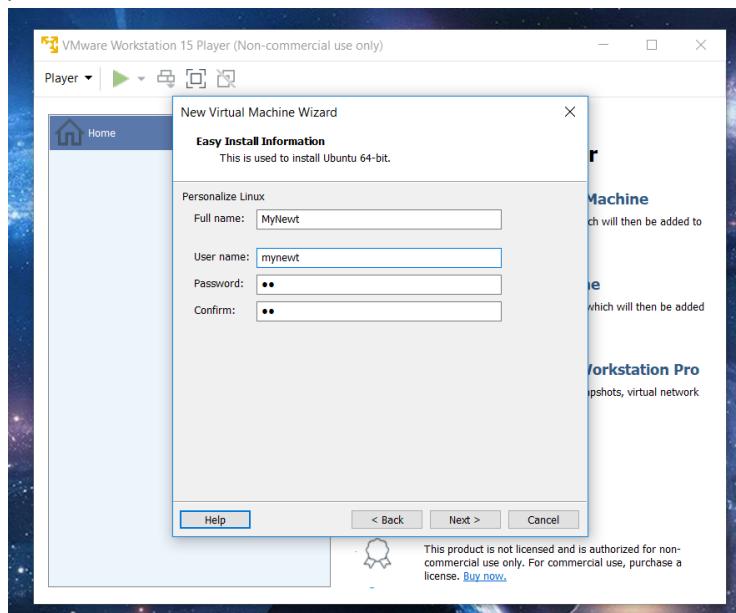
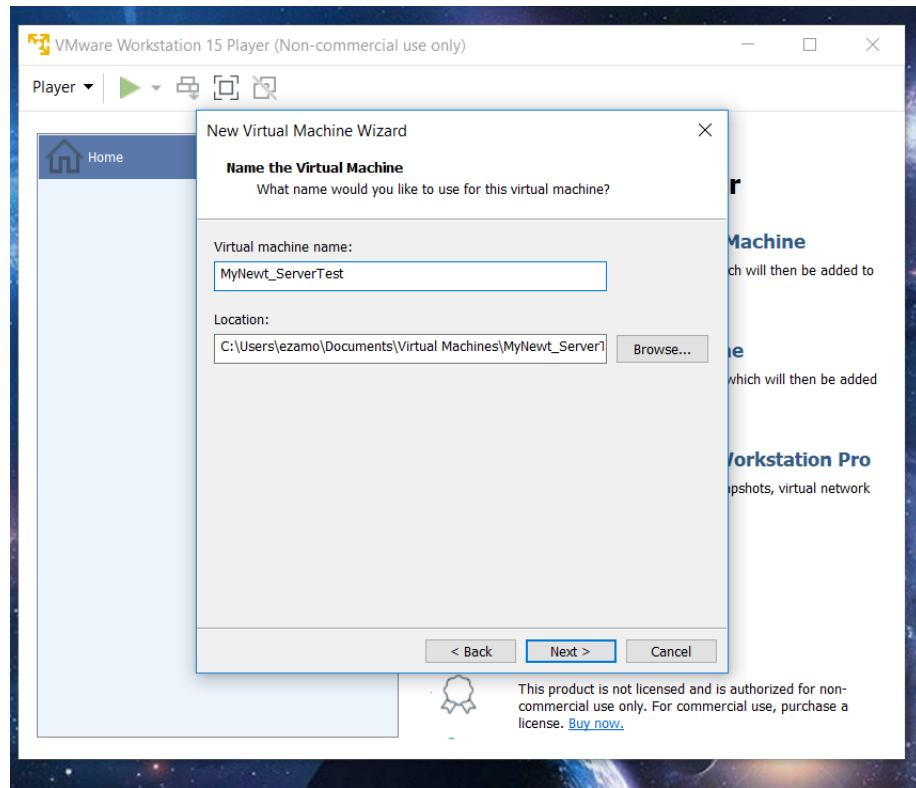


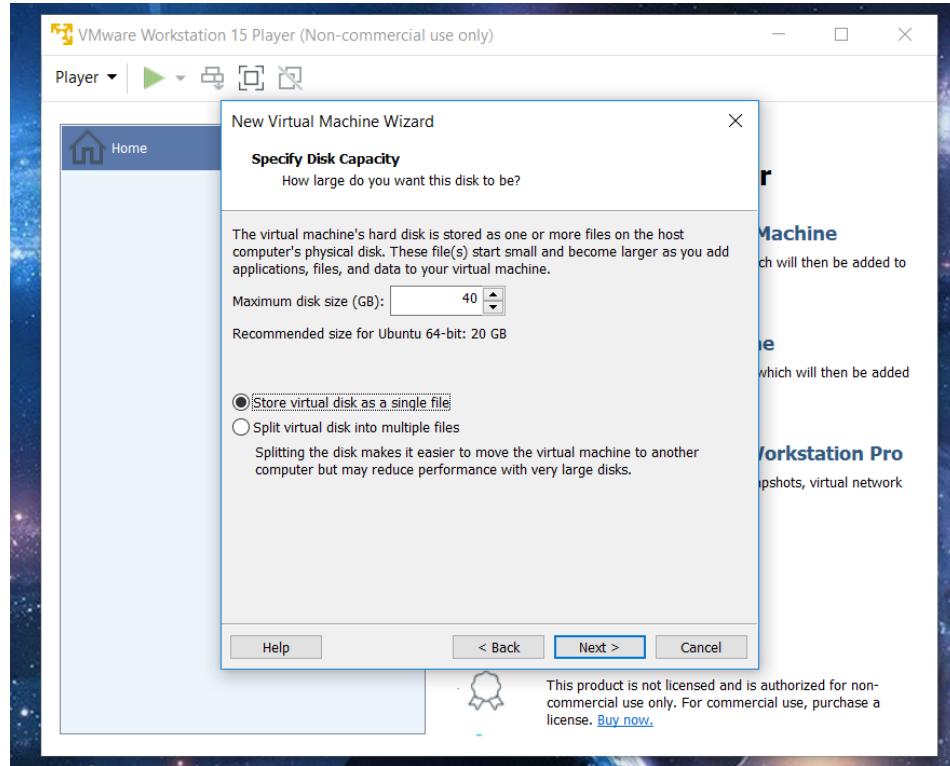
Illustration 2 Virtual Machine Wizard Credentials

- c. Name your virtual machine and assign it a directory



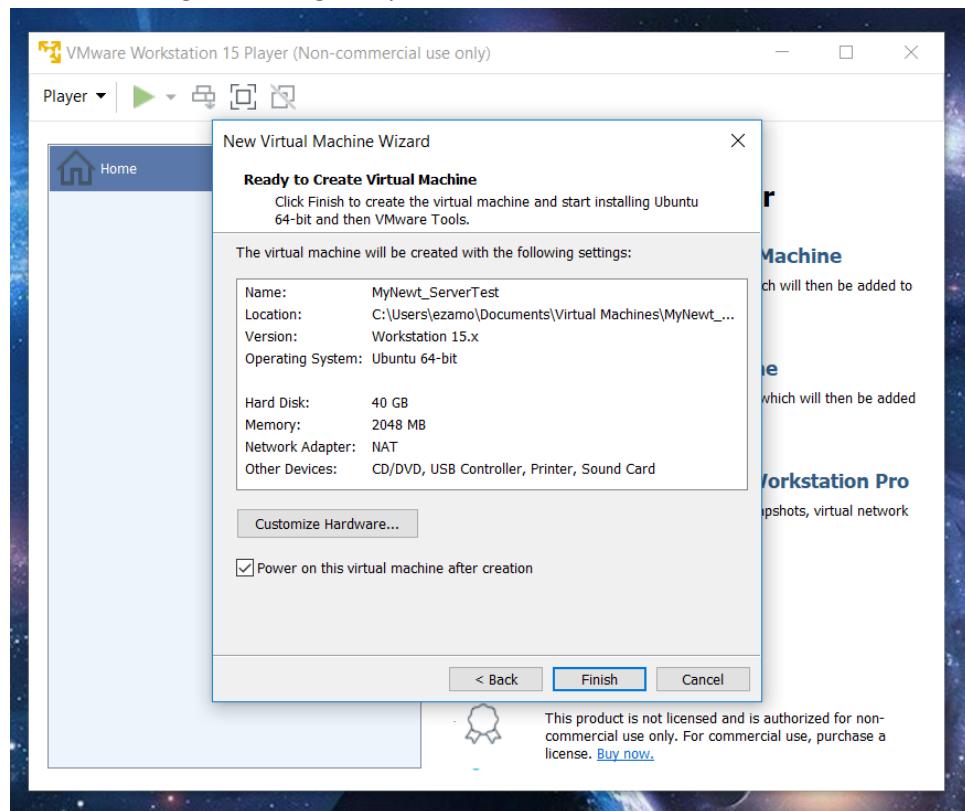
*Illustration 3 Naming the virtual machine*

- d. Assign as much disk space as desired. You can decide to store the virtual disk in a single file or split it into multiple files.



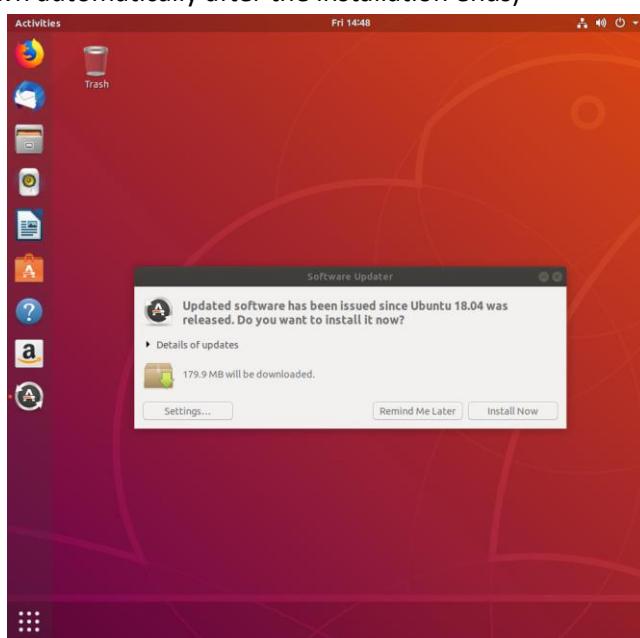
*Illustration 4 VM Wizard disk capacity specification*

- e. Check the assigned settings for your new virtual machine:



*Illustration 5 VM Wizard settings*

- f. Wait for the installation to finish and install the software updates (a message to do so will be shown automatically after the installation ends)



*Illustration 6 Software updates installation*

- g. Restart the virtual machine.
3. All ready to start Mynewt installation! Use Ctrl+Alt+t to open a terminal.

## Mynewt source and packages installation in Ubuntu 18.04.1:

1. Install the apt-transport-https package to use HTTPS to retrieve packages. In case a password is required, use the same as the one used to login to Linux.

```
$ sudo apt-get update
```

```
mynewt@ubuntu:~$ sudo apt-get update
[sudo] password for mynewt:
Hit:1 http://us.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://us.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://security.ubuntu.com/ubuntu bionic-security InRelease [83.2 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Fetched 247 kB in 1s (323 kB/s)
Reading package lists... Done
mynewt@ubuntu:~$
```

*Illustration 7 Update done successfully*

```
$ sudo apt-get install apt-transport-https
```

```
mynewt@ubuntu:~$ sudo apt-get install apt-transport-https
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  apt-transport-https
0 upgraded, 1 newly installed, 0 to remove and 4 not upgraded.
Need to get 1,692 B of archives.
After this operation, 152 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu bionic-updates/universe amd64 apt-tran
sport-https all 1.6.6 [1,692 B]
Fetched 1,692 B in 0s (6,244 B/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 161654 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_1.6.6_all.deb ...
Unpacking apt-transport-https (1.6.6) ...
Setting up apt-transport-https (1.6.6) ...
mynewt@ubuntu:~$
```

*Illustration 8 Installing packages for transport https*

2. Download the public key for the runtimeco apt repo

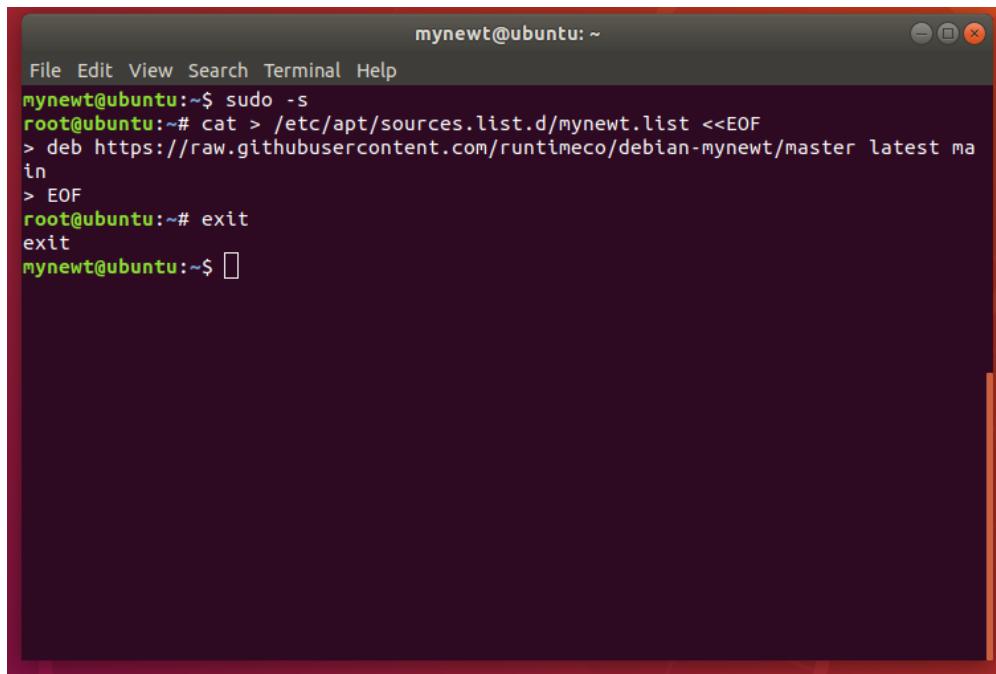
```
$ wget -qO - https://raw.githubusercontent.com/runtimeco/debian-
mynewt/master/mynewt.gpg.key | sudo apt-key add -
```

```
mynewt@ubuntu:~$ wget -qO - https://raw.githubusercontent.com/runtim eco/debian-mynewt/master/mynewt.gpg.key | sudo apt-key add -
OK
mynewt@ubuntu:~$ 
```

*Illustration 9 Runtimeco key downloading*

3. Add the repository for the binary and source packages to the mynewt.list apt source list file

```
$ sudo -s
root$ cat > /etc/apt/sources.list.d/mynewt.list <<EOF deb
https://raw.githubusercontent.com/runtim eco/debian-mynewt/master
latest main EOF
root$ exit
```



*Illustration 10 Root source packages downloading*

4. Verify the content of the source list file

```
$ more /etc/apt/sources.list.d/mynewt.list
```

```
mynewt@ubuntu:~$ more /etc/apt/sources.list.d/mynewt.list
deb https://raw.githubusercontent.com/runtim eco/debian-mynewt/master latest main
mynewt@ubuntu:~$ 
```

*Illustration 11 Source list content verification*

5. Download the latest version of newt

```
$ sudo apt-get install newt
```

```

mynewt@ubuntu:~$ sudo apt-get install newt
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  newt
0 upgraded, 1 newly installed, 0 to remove and 4 not upgraded.
Need to get 1,580 kB of archives.
After this operation, 5,660 kB of additional disk space will be used.
Get:1 https://raw.githubusercontent.com/runtimeco/debian-mynewt/master/main amd64 newt amd64 1.5.0-1 [1,580 kB]
Fetched 1,580 kB in 1s (1,268 kB/s)
Selecting previously unselected package newt.
(Reading database ... 161995 files and directories currently installed.)
Preparing to unpack .../newt_1.5.0-1_amd64.deb ...
Unpacking newt (1.5.0-1) ...
Setting up newt (1.5.0-1) ...
mynewt@ubuntu:~$ 

```

*Illustration 12 Newt installation*

- Instead, this method may be used:

- i. Download the latest version of Go

```
$ sudo apt install golang-go
```

- ii. Download and unpack the newt source

```
$ wget -P /tmp https://github.com/apache/mynewt-newt/archive/mynewt\_1\_1\_0\_tag.tar.gz
$ tar -xzf /tmp/mynewt_1_1_0_tag.tar.gz
```

- iii. Run the build.sh to build the newt tool

```
$ cd mynewt-newt-mynewt_1_1_0_tag
$ ./build.sh
$ rm /tmp/mynewt_1_1_0_tag.tar.gz
```

- iv. Move the binary to a directory in your PATH (ex, /usr/bin)

```
$ mv newt/newt /usr/bin
```

```

mynewt@ubuntu:~$ wget -P /tmp https://github.com/apache/mynewt-newt/archive/mynewt\_1\_1\_0\_tag.tar.gz
--2018-12-07 15:46:05-- https://github.com/apache/mynewt-newt/archive/mynewt\_1\_1\_0\_tag.tar.gz
Resolving github.com (github.com)... 192.30.253.113, 192.30.253.112
Connecting to github.com (github.com)|192.30.253.113|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://codeload.github.com/apache/mynewt-newt/tar.gz/mynewt\_1\_1\_0\_tag [following]
--2018-12-07 15:46:05-- https://codeload.github.com/apache/mynewt-newt/tar.gz/mynewt\_1\_1\_0\_tag
Resolving codeload.github.com (codeload.github.com)... 192.30.253.120, 192.30.253.121
Connecting to codeload.github.com (codeload.github.com)|192.30.253.120|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [application/x-gzip]
Saving to: '/tmp/mynewt_1_1_0_tag.tar.gz'

mynewt_1_1_0_tag.tar.gz    [          =>                      ]  1.78M  1.66MB/s   in 1.1s

2018-12-07 15:46:08 (1.66 MB/s) - '/tmp/mynewt_1_1_0_tag.tar.gz' saved [1869111]

mynewt@ubuntu:~$ tar -xzf /tmp/mynewt_1_1_0_tag.tar.gz
mynewt@ubuntu:~$ cd mynewt-newt-mynewt_1_1_0_tag
mynewt@ubuntu:~/mynewt-newt-mynewt_1_1_0_tag$ ./build.sh
Building newt. This may take a minute...
Successfully built executable: /home/mynewt/mynewt-newt-mynewt_1_1_0_tag/newt/newt
mynewt@ubuntu:~/mynewt-newt-mynewt_1_1_0_tag$ rm /tmp/mynewt_1_1_0_tag.tar.gz
mynewt@ubuntu:~/mynewt-newt-mynewt_1_1_0_tag$ mv newt/newt /usr/bin
mv: replace '/usr/bin/newt', overriding mode 0755 (rwxr-xr-x)?

```

*Illustration 13 Alternative Newt installation*

## 6. Check the Installed Version of Newt

```
$ which newt  
$ newt version
```

```
mynewt@ubuntu:~$ which newt  
/usr/bin/newt  
mynewt@ubuntu:~$ newt version  
Apache Newt version: 1.5.0  
mynewt@ubuntu:~$ □
```

*Illustration 14 Newt version verification*

## 7. Install gcc/libc, gdb, Git, Python2.7, Pip and pyOCD

```
$ sudo apt-get install gcc-multilib libc6-i386
```

```
Preparing to unpack .../21-lib32quadmath0_8.2.0-1ubuntu2~18.04_amd64.deb ...
Unpacking lib32quadmath0 (8.2.0-1ubuntu2~18.04) ...
Selecting previously unselected package libx32quadmath0.
Preparing to unpack .../22-libx32quadmath0_8.2.0-1ubuntu2~18.04_amd64.deb ...
Unpacking libx32quadmath0 (8.2.0-1ubuntu2~18.04) ...
Selecting previously unselected package lib32gcc-7-dev.
Preparing to unpack .../23-lib32gcc-7-dev_7.3.0-27ubuntu1~18.04_amd64.deb ...
Unpacking lib32gcc-7-dev (7.3.0-27ubuntu1~18.04) ...
Selecting previously unselected package libx32gcc-7-dev.
Preparing to unpack .../24-libx32gcc-7-dev_7.3.0-27ubuntu1~18.04_amd64.deb ...
Unpacking libx32gcc-7-dev (7.3.0-27ubuntu1~18.04) ...
Selecting previously unselected package gcc-7-multilib.
Preparing to unpack .../25-gcc-7-multilib_7.3.0-27ubuntu1~18.04_amd64.deb ...
Unpacking gcc-7-multilib (7.3.0-27ubuntu1~18.04) ...
Selecting previously unselected package gcc-multilib.
Preparing to unpack .../26-gcc-multilib_4%3a7.3.0-3ubuntu2.1_amd64.deb ...
Unpacking gcc-multilib (4:7.3.0-3ubuntu2.1) ...
Setting up libc6-x32 (2.27-3ubuntu1) ...
Setting up libx32gcc1 (1:8.2.0-1ubuntu2~18.04) ...
Setting up libc6-i386 (2.27-3ubuntu1) ...
Setting up libx32stdc++6 (8.2.0-1ubuntu2~18.04) ...
Setting up lib32atomic1 (8.2.0-1ubuntu2~18.04) ...
Setting up libx32atomic1 (8.2.0-1ubuntu2~18.04) ...
Setting up libx32gomp1 (8.2.0-1ubuntu2~18.04) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
Setting up libx32itm1 (8.2.0-1ubuntu2~18.04) ...
Setting up lib32quadmath0 (8.2.0-1ubuntu2~18.04) ...
Setting up libc6-dev-i386 (2.27-3ubuntu1) ...
Setting up libc6-dev-x32 (2.27-3ubuntu1) ...
Setting up lib32itm1 (8.2.0-1ubuntu2~18.04) ...
Setting up libx32quadmath0 (8.2.0-1ubuntu2~18.04) ...
Setting up libx32gcc1 (1:8.2.0-1ubuntu2~18.04) ...
Setting up libx32asan4 (7.3.0-27ubuntu1~18.04) ...
Setting up libx32cilkrt5 (7.3.0-27ubuntu1~18.04) ...
Setting up lib32gomp1 (8.2.0-1ubuntu2~18.04) ...
Setting up libx32ubsan0 (7.3.0-27ubuntu1~18.04) ...
Setting up lib32asan4 (7.3.0-27ubuntu1~18.04) ...
Setting up lib32mpx2 (8.2.0-1ubuntu2~18.04) ...
Setting up lib32stdc++6 (8.2.0-1ubuntu2~18.04) ...
Setting up lib32ubsan0 (7.3.0-27ubuntu1~18.04) ...
Setting up lib32cilkrt5 (7.3.0-27ubuntu1~18.04) ...
Setting up libx32gcc-7-dev (7.3.0-27ubuntu1~18.04) ...
Setting up lib32gcc-7-dev (7.3.0-27ubuntu1~18.04) ...
Setting up gcc-7-multilib (7.3.0-27ubuntu1~18.04) ...
Setting up gcc-multilib (4:7.3.0-3ubuntu2.1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
mynewt@ubuntu:~$ □
```

*Illustration 15 Gcc-multilib installation*

```
$ sudo apt-get install gdb  
  
mynewt@ubuntu:~$ sudo apt-get install gdb  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
gdb is already the newest version (8.1-0ubuntu3).  
0 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.  
mynewt@ubuntu:~$
```

*Illustration 16 GDB installation*

```
$ sudo apt install git  
  
mynewt@ubuntu:~$ sudo apt install git  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  git-man liberror-perl  
Suggested packages:  
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui gitk gitweb git-cvs  
  git-mediawiki git-svn  
The following NEW packages will be installed:  
  git git-man liberror-perl  
0 upgraded, 3 newly installed, 0 to remove and 4 not upgraded.  
Need to get 4,733 kB of archives.  
After this operation, 33.9 MB of additional disk space will be used.  
Do you want to continue? [Y/n]  
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 liberror-perl all 0.17025-1 [22.8 kB]  
Get:2 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 git-man all 1:2.17.1-1ubuntu0.4 [803 kB]  
Get:3 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 git amd64 1:2.17.1-1ubuntu0.4 [3,907 kB]  
Fetched 4,733 kB in 3s (1,757 kB/s)  
Selecting previously unselected package liberror-perl.  
(Reading database ... 176351 files and directories currently installed.)  
Preparing to unpack .../liberror-perl_0.17025-1_all.deb ...  
Unpacking liberror-perl (0.17025-1) ...  
Selecting previously unselected package git-man.  
Preparing to unpack .../git-man_1%3a2.17.1-1ubuntu0.4_all.deb ...  
Unpacking git-man (1:2.17.1-1ubuntu0.4) ...  
Selecting previously unselected package git.  
Preparing to unpack .../git_1%3a2.17.1-1ubuntu0.4_amd64.deb ...  
Unpacking git (1:2.17.1-1ubuntu0.4) ...  
Setting up git-man (1:2.17.1-1ubuntu0.4) ...  
Setting up liberror-perl (0.17025-1) ...  
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...  
Setting up git (1:2.17.1-1ubuntu0.4) ...  
mynewt@ubuntu:~$
```

*Illustration 17 GIT installation*

```
$ sudo apt install python2.7

mynewt@ubuntu:~$ sudo apt install python2.7
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python2.7-minimal
Suggested packages:
  python2.7-doc binfmt-support
The following NEW packages will be installed:
  python2.7 python2.7-minimal
0 upgraded, 2 newly installed, 0 to remove and 4 not upgraded.
Need to get 0 B/1,543 kB of archives.
After this operation, 4,182 kB of additional disk space will be used.
Do you want to continue? [Y/n]
Selecting previously unselected package python2.7-minimal.
(Reading database ... 177258 files and directories currently installed.)
Preparing to unpack .../python2.7-minimal_2.7.15~rc1-1ubuntu0.1_amd64.deb ...
Unpacking python2.7-minimal (2.7.15~rc1-1ubuntu0.1) ...
Selecting previously unselected package python2.7.
Preparing to unpack .../python2.7_2.7.15~rc1-1ubuntu0.1_amd64.deb ...
Unpacking python2.7 (2.7.15~rc1-1ubuntu0.1) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for desktop-file-utils (0.23-1ubuntu3.18.04.2) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for gnome-menus (3.13.3-11ubuntu1.1) ...
Setting up python2.7-minimal (2.7.15~rc1-1ubuntu0.1) ...
Linking and byte-compiling packages for runtime python2.7...
Setting up python2.7 (2.7.15~rc1-1ubuntu0.1) ...
mynewt@ubuntu:~$
```

Illustration 18 Python2.7 installation

```
$ sudo apt install python-setuptools
```

```
mynewt@ubuntu:~$ sudo apt install python-setuptools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libpython-stdlib python python-minimal python-pkg-resources
Suggested packages:
  python-doc python-tk python-setuptools-doc
The following NEW packages will be installed:
  libpython-stdlib python python-minimal python-pkg-resources python-setuptools
0 upgraded, 5 newly installed, 0 to remove and 4 not upgraded.
Need to get 633 kB of archives.
After this operation, 2,799 kB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-minimal amd64 2.7.15~rc1-1 [28.1 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 libpython-stdlib amd64 2.7.15~rc1-1 [7,620 B]
Get:3 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python amd64 2.7.15~rc1-1 [140 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-pkg-resources all 39.0.1-2 [128 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-setuptools all 39.0.1-2 [329 kB]
Fetched 633 kB in 1s (636 kB/s)
Selecting previously unselected package python-minimal.
(Reading database ... 177284 files and directories currently installed.)
Preparing to unpack .../python-minimal_2.7.15~rc1-1_amd64.deb ...
Unpacking python-minimal (2.7.15~rc1-1) ...
Selecting previously unselected package libpython-stdlib:amd64.
Preparing to unpack .../libpython-stdlib_2.7.15~rc1-1_amd64.deb ...
Unpacking libpython-stdlib:amd64 (2.7.15~rc1-1) ...
Setting up python-minimal (2.7.15~rc1-1) ...
Selecting previously unselected package python.
(Reading database ... 177314 files and directories currently installed.)
Preparing to unpack .../python_2.7.15~rc1-1_amd64.deb ...
Unpacking python (2.7.15~rc1-1) ...
Selecting previously unselected package python-pkg-resources.
Preparing to unpack .../python-pkg-resources_39.0.1-2_all.deb ...
Unpacking python-pkg-resources (39.0.1-2) ...
Selecting previously unselected package python-setuptools.
Preparing to unpack .../python-setuptools_39.0.1-2_all.deb ...
Unpacking python-setuptools (39.0.1-2) ...
Setting up libpython-stdlib:amd64 (2.7.15~rc1-1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Setting up python (2.7.15~rc1-1) ...
Setting up python-pkg-resources (39.0.1-2) ...
Setting up python-setuptools (39.0.1-2) ...
```

Illustration 19 Python-setuptools installation

```
$ sudo apt install python-pip
```

```
mynewt@ubuntu:~$ sudo apt install python-pip
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libexpat1-dev libpython-all-dev libpython-dev libpython2.7-dev python-all python-all-dev
  python-asn1crypto python-cffi-backend python-crypto python-cryptography python-dbus
  python-dev python-enum34 python-gi python-idna python-ipaddress python-keyring
  python-keyrings.alt python-pip-whl python-secretstorage python-six python-wheel python-xdg
  python2.7-dev
Suggested packages:
  python-crypto-doc python-cryptography-doc python-cryptography-vectors python-dbus-dbg
  python-dbus-doc python-enum34-doc python-gi-cairo libkf5wallet-bin gir1.2-gnomekeyring-1.0
  python-fs python-gdata python-keyczar python-secretstorage-doc
The following NEW packages will be installed:
  libexpat1-dev libpython-all-dev libpython-dev libpython2.7-dev python-all python-all-dev
  python-asn1crypto python-cffi-backend python-crypto python-cryptography python-dbus
  python-dev python-enum34 python-gi python-idna python-ipaddress python-keyring
  python-keyrings.alt python-pip python-pip-whl python-secretstorage python-six python-wheel
  python-xdg python2.7-dev
0 upgraded, 25 newly installed, 0 to remove and 4 not upgraded.
Need to get 31.6 MB of archives.
After this operation, 51.6 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Illustration 20 Pip installation (1/3)

```
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 libexpat1-dev amd64 2.2.5-3 [122 kB]
]
Get:2 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpython2.7-dev amd64 2.7.
15~rc1-1ubuntu0.1 [28.3 MB]
Get:3 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 libpython-dev amd64 2.7.15~rc1-1 [7
,684 B]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 libpython-all-dev amd64 2.7.15~rc1-
1 [1,092 B]
Get:5 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-all amd64 2.7.15~rc1-1 [1,07
6 B]
Get:6 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 python2.7-dev amd64 2.7.15~
rc1-1ubuntu0.1 [286 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-dev amd64 2.7.15~rc1-1 [1,25
6 B]
Get:8 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-all-dev amd64 2.7.15~rc1-1 [
1,100 B]
Get:9 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-asn1crypto all 0.24.0-1 [72.
7 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-cffi-backend amd64 1.11.5-1
[63.4 kB]
Get:11 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 python-crypto amd64 2.6.1-8ubuntu2
[244 kB]
```

Illustration 21 Pip installation (2/3)

```
Selecting previously unselected package python-secretstorage.
Preparing to unpack .../18-python-secretstorage_2.3.1-2_all.deb ...
Unpacking python-secretstorage (2.3.1-2) ...
Selecting previously unselected package python-keyring.
Preparing to unpack .../19-python-keyring_10.6.0-1_all.deb ...
Unpacking python-keyring (10.6.0-1) ...
Selecting previously unselected package python-keyrings.alt.
Preparing to unpack .../20-python-keyrings.alt_3.0-1_all.deb ...
Unpacking python-keyrings.alt (3.0-1) ...
Selecting previously unselected package python-pip-whl.
Preparing to unpack .../21-python-pip-whl_9.0.1-2.3~ubuntu1_all.deb ...
Unpacking python-pip-whl (9.0.1-2.3~ubuntu1) ...
Selecting previously unselected package python-pip.
Preparing to unpack .../22-python-pip_9.0.1-2.3~ubuntu1_all.deb ...
Unpacking python-pip (9.0.1-2.3~ubuntu1) ...
Selecting previously unselected package python-wheel.
Preparing to unpack .../23-python-wheel_0.30.0-0.2_all.deb ...
Unpacking python-wheel (0.30.0-0.2) ...
Selecting previously unselected package python-xdg.
Preparing to unpack .../24-python-xdg_0.25-4ubuntu1_all.deb ...
Unpacking python-xdg (0.25-4ubuntu1) ...
Setting up python-idna (2.6-1) ...
Setting up python-pip-whl (9.0.1-2.3~ubuntu1) ...
Setting up python-asn1crypto (0.24.0-1) ...
Setting up python-crypto (2.6.1-8ubuntu2) ...
Setting up python-wheel (0.30.0-0.2) ...
Setting up python-cffi-backend (1.11.5-1) ...
Setting up python-gi (3.26.1-2) ...
Setting up python-six (1.11.0-2) ...
Setting up python-enum34 (1.1.6-2) ...
Setting up libexpat1-dev:amd64 (2.2.5-3) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Setting up libpython2.7-dev:amd64 (2.7.15~rc1-1ubuntu0.1) ...
Setting up python-dbus (1.2.2.6-1) ...
Setting up python-ipaddress (1.0.17-1) ...
Setting up python-pip (9.0.1-2.3~ubuntu1) ...
Setting up python2.7-dev (2.7.15~rc1-1ubuntu0.1) ...
Setting up python-all (2.7.15~rc1-1) ...
Setting up python-xdg (0.25-4ubuntu1) ...
Setting up libpython-dev:amd64 (2.7.15~rc1-1) ...
Setting up python-dev (2.7.15~rc1-1) ...
Setting up libpython-all-dev:amd64 (2.7.15~rc1-1) ...
Setting up python-keyrings.alt (3.0-1) ...
Setting up python-all-dev (2.7.15~rc1-1) ...
Setting up python-cryptography (2.1.4-1ubuntu1.2) ...
Setting up python-secretstorage (2.3.1-2) ...
Setting up python-keyring (10.6.0-1) ...
mynewt@ubuntu:~$
```

Illustration 22 Pip installation (3/3)

```
$ pip install pyocd
```

```
mynewt@ubuntu:~$ pip install pyocd
Collecting pyocd
  Collecting six (from pyocd)
    Using cached https://files.pythonhosted.org/packages/67/4b/141a581104b1f6397bfa78ac9d43d8ad29a7ca43ea90a2d863fe3056e86a/six-1.11.0-py2.py3-none-any.whl
Collecting pyyaml (from pyocd)
Collecting intelhex (from pyocd)
  Using cached https://files.pythonhosted.org/packages/bf/77/bf670318b3db325c71e2ac6a90b7bcfdf9fc739b7cf6aebb31715721623e/intelhex-2.2.1-py2.py3-none-any.whl
Collecting colorama (from pyocd)
  Using cached https://files.pythonhosted.org/packages/4f/a6/728666f39bfff1719fc94c481890b2106837da9318031f71a8424b662e12/colorama-0.4.1-py2.py3-none-any.whl
Collecting websocket-client (from pyocd)
  Using cached https://files.pythonhosted.org/packages/26/2d/f749a5c82f6192d77ed061a38e02001afcba55fe8477336d26a950ab17ce/websocket_client-0.54.0-py2.py3-none-any.whl
Collecting pyelftools (from pyocd)
Collecting enum34; python_version < "3.4" (from pyocd)
  Using cached https://files.pythonhosted.org/packages/c5/db/e56e6b4bbac7c4a06de1c50de6fe1ef3810018ae11732a50f15f62c7d050/enum34-1.1.6-py2-none-any.whl
Collecting intervaltree (from pyocd)
Collecting future (from pyocd)
Collecting pyusb>=1.0.0b2 (from pyocd)
Collecting sortedcontainers (from intervaltree->pyocd)
  Using cached https://files.pythonhosted.org/packages/13/f3/cf85f7c3a2dbd1a515d51e1f1676d971abe41bba6f4ab5443240d9a78e5b/sortedcontainers-2.1.0-py2.py3-none-any.whl
Installing collected packages: six, pyyaml, intelhex, colorama, websocket-client, pyelftools, enum34, sortedcontainers, intervaltree, future, pyusb, pyocd
Successfully installed colorama-0.4.1 enum34-1.1.6 future-0.17.1 intelhex-2.2.1 intervaltree-2.1.0 pyelftools-0.25 pyocd-0.13.2 pyusb-1.0.2 pyyaml-3.13 six-1.11.0 sortedcontainers-2.1.0 websocket-client-0.54.0
mynewt@ubuntu:~$
```

Illustration 23 PyOCD installation

## 8. Install ARM Toolchain

```
$ sudo apt-get remove binutils-arm-none-eabi gcc-arm-none-eabi
```

```
mynewt@ubuntu:~$ sudo apt-get remove binutils-arm-none-eabi gcc-arm-none-eabi
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libis15 libnewlib-arm-none-eabi libnewlib-dev libstdc++-arm-none-eabi-newlib
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  binutils-arm-none-eabi gcc-arm-none-eabi
0 upgraded, 0 newly installed, 2 to remove and 4 not upgraded.
After this operation, 336 MB disk space will be freed.
Do you want to continue? [Y/n]
(Reading database ... 180722 files and directories currently installed.)
Removing gcc-arm-none-eabi (15:6.3.1+svn253039-1build1) ...
Removing binutils-arm-none-eabi (2.27-9ubuntu1+9) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
mynewt@ubuntu:~$
```

Illustration 24 Binutils-arm and gcc-arm removal

```
$ sudo add-apt-repository ppa:team-gcc-arm-embedded/ppa
```

```
mynewt@ubuntu:~$ sudo add-apt-repository ppa:team-gcc-arm-embedded/ppa
This PPA is an alternative to toolchain released at https://launchpad.net/gcc-arm-embedded. The source codes for both are same. Currently supports Ubuntu 10.04/12.04/14.04/14.10 32 and 64 bit.

Detailed explanations to Launchpad PPA can be found at https://help.launchpad.net/Packaging/. That website explains how a PPA is set up and how to add existing PPA and install software from it.

Here are quick steps to install toolchain from this PPA on Ubuntu before 14.04:

Step1: Inside Ubuntu, open a terminal and input
      "sudo add-apt-repository ppa:team-gcc-arm-embedded/ppa"

Step2: Continue to input
      "sudo apt-get update"

Step3: Continue to input to install toolchain
      "sudo apt-get install gcc-arm-embedded"

To remove installed toolchain, just input "sudo apt-get remove gnu-arm-embedded". To update the toolchain, just repeat above step2 and step3.

If it reports error message of conflict to gcc-arm-none-eabi, which is likely if upgrading from 4.x to 5+, please uninstall it first with:
      "sudo apt-get remove gcc-arm-none-eabi"

Questions should be asked at https://answers.launchpad.net/gcc-arm-embedded

Bug can be filed at https://bugs.launchpad.net/gcc-arm-embedded/+filebug. It is highly encouraged to ask question first before filing a bug.
More info: https://launchpad.net/~team-gcc-arm-embedded/+archive/ubuntu/ppa
Press [ENTER] to continue or Ctrl-c to cancel adding it.

Hit:1 http://us.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 https://raw.githubusercontent.com/runtim eco/debian-mynewt/master latest InRelease [1,791 B]
Hit:3 http://ppa.launchpad.net/team-gcc-arm-embedded/ppa/ubuntu bionic InRelease
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [83.2 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Fetched 248 kB in 1s (305 kB/s)
Reading package lists... Done
```

Illustration 25 Gcc-arm repository addition

```
$ sudo apt-get update
```

```
mynewt@ubuntu:~$ sudo apt-get update
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [83.2 kB]
Hit:2 http://us.archive.ubuntu.com/ubuntu bionic InRelease
Get:3 http://us.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Hit:4 http://ppa.launchpad.net/team-gcc-arm-embedded/ppa/ubuntu bionic InRelease
Get:5 https://raw.githubusercontent.com/runtim eco/debian-mynewt/master latest InRelease [1,791 B]
Get:6 http://us.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Fetched 248 kB in 1s (330 kB/s)
Reading package lists... Done
```

Illustration 26 Packages update

```
$ sudo apt-get install gcc-arm-none-eabi
```

```
mynewt@ubuntu:~$ sudo apt-get install gcc-arm-none-eabi
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  binutils-arm-none-eabi libisl15 libnewlib-arm-none-eabi libnewlib-dev
  libstdc++-arm-none-eabi-newlib
Suggested packages:
  libnewlib-doc
The following NEW packages will be installed:
  binutils-arm-none-eabi gcc-arm-none-eabi libisl15 libnewlib-arm-none-eabi libnewlib-dev
  libstdc++-arm-none-eabi-newlib
0 upgraded, 6 newly installed, 0 to remove and 4 not upgraded.
Need to get 114 MB of archives.
After this operation, 1,007 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libisl15 amd64 0.18-4 [548 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 binutils-arm-none-eabi amd64 2.27-9ubuntu1+9 [2,346 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 gcc-arm-none-eabi amd64 15:6.3.1+svn253039-1build1 [24.3 MB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libnewlib-dev all 2.4.0.20160527-3 [108 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libnewlib-arm-none-eabi all 2.4.0 .20160527-3 [12.0 MB]
Get:6 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libstdc++-arm-none-eabi-newlib all 15:6.3.1+svn253039-1+10 [74.8 MB]
Fetched 114 MB in 53s (2,172 kB/s)
Selecting previously unselected package libisl15:amd64.
(Reading database ... 178342 files and directories currently installed.)
Preparing to unpack .../0-libisl15_0.18-4_amd64.deb ...
Unpacking libisl15:amd64 (0.18-4) ...
Selecting previously unselected package binutils-arm-none-eabi.
Preparing to unpack .../1-binutils-arm-none-eabi_2.27-9ubuntu1+9_amd64.deb ...
Unpacking binutils-arm-none-eabi (2.27-9ubuntu1+9) ...
Selecting previously unselected package gcc-arm-none-eabi.
Preparing to unpack .../2-gcc-arm-none-eabi_15%3a6.3.1+svn253039-1build1_amd64.deb ...
Unpacking gcc-arm-none-eabi (15:6.3.1+svn253039-1build1) ...
Selecting previously unselected package libnewlib-dev.
Preparing to unpack .../3-libnewlib-dev_2.4.0.20160527-3_all.deb ...
Unpacking libnewlib-dev (2.4.0.20160527-3) ...
Selecting previously unselected package libnewlib-arm-none-eabi.
Preparing to unpack .../4-libnewlib-arm-none-eabi_2.4.0.20160527-3_all.deb ...
Unpacking libnewlib-arm-none-eabi (2.4.0.20160527-3) ...
Selecting previously unselected package libstdc++-arm-none-eabi-newlib.
Preparing to unpack .../5-libstdc++-arm-none-eabi-newlib_15%3a6.3.1+svn253039-1+10_all.deb ...
Unpacking libstdc++-arm-none-eabi-newlib (15:6.3.1+svn253039-1+10) ...
Setting up libisl15:amd64 (0.18-4)
```

Illustration 27 Gcc-arm installation (1/2)

```
libnewlib-doc
The following NEW packages will be installed:
  binutils-arm-none-eabi gcc-arm-none-eabi libisl15 libnewlib-arm-none-eabi libnewlib-dev
  libstdc++-arm-none-eabi-newlib
0 upgraded, 6 newly installed, 0 to remove and 4 not upgraded.
Need to get 114 MB of archives.
After this operation, 1,007 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libisl15 amd64 0.18-4 [548 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 binutils-arm-none-eabi amd64 2.27-9ubuntu1+9 [2,346 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 gcc-arm-none-eabi amd64 15:6.3.1+svn253039-1build1 [24.3 MB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libnewlib-dev all 2.4.0.20160527-3 [108 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libnewlib-arm-none-eabi all 2.4.0 .20160527-3 [12.0 MB]
Get:6 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 libstdc++-arm-none-eabi-newlib all 15:6.3.1+svn253039-1+10 [74.8 MB]
Fetched 114 MB in 53s (2,172 kB/s)
Selecting previously unselected package libisl15:amd64.
(Reading database ... 178342 files and directories currently installed.)
Preparing to unpack .../0-libisl15_0.18-4_amd64.deb ...
Unpacking libisl15:amd64 (0.18-4) ...
Selecting previously unselected package binutils-arm-none-eabi.
Preparing to unpack .../1-binutils-arm-none-eabi_2.27-9ubuntu1+9_amd64.deb ...
Unpacking binutils-arm-none-eabi (2.27-9ubuntu1+9) ...
Selecting previously unselected package gcc-arm-none-eabi.
Preparing to unpack .../2-gcc-arm-none-eabi_15%3a6.3.1+svn253039-1build1_amd64.deb ...
Unpacking gcc-arm-none-eabi (15:6.3.1+svn253039-1build1) ...
Selecting previously unselected package libnewlib-dev.
Preparing to unpack .../3-libnewlib-dev_2.4.0.20160527-3_all.deb ...
Unpacking libnewlib-dev (2.4.0.20160527-3) ...
Selecting previously unselected package libnewlib-arm-none-eabi.
Preparing to unpack .../4-libnewlib-arm-none-eabi_2.4.0.20160527-3_all.deb ...
Unpacking libnewlib-arm-none-eabi (2.4.0.20160527-3) ...
Selecting previously unselected package libstdc++-arm-none-eabi-newlib.
Preparing to unpack .../5-libstdc++-arm-none-eabi-newlib_15%3a6.3.1+svn253039-1+10_all.deb ...
Unpacking libstdc++-arm-none-eabi-newlib (15:6.3.1+svn253039-1+10) ...
Setting up libisl15:amd64 (0.18-4) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
Setting up libnewlib-dev (2.4.0.20160527-3) ...
Setting up binutils-arm-none-eabi (2.27-9ubuntu1+9) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Setting up libnewlib-arm-none-eabi (2.4.0.20160527-3) ...
Setting up libstdc++-arm-none-eabi-newlib (15:6.3.1+svn253039-1+10) ...
Setting up gcc-arm-none-eabi (15:6.3.1+svn253039-1build1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
```

Illustration 28 Gcc-arm installation (2/2)

## 9. Install the OpenOCD Debugger

- Download binary tarball (<https://github.com/runtim eco/openocd-binaries/raw/master/openocd-bin-0.10.0-Linux.tgz>)

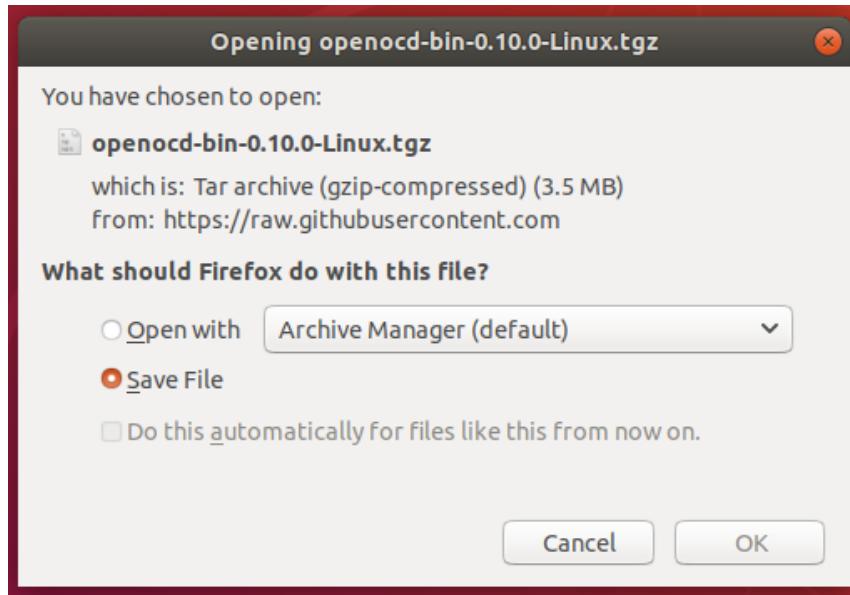


Illustration 29 OpenOCD download

- Change to the root directory  
    \$ cd /
- Untar the tarball and install it into /usr/local/bin (change ~/Downloads with your downloads directory)  
    \$ sudo tar -xpf ~/Downloads/openocd-bin-0.10.0-Linux.tgz
- Check everything was installed correctly  
    \$ which openocd  
    \$ openocd -v

```
mynewt@ubuntu:/$ cd /
mynewt@ubuntu:/$ sudo tar -xpf ~/Downloads/openocd-bin-0.10.0-Linux.tgz
mynewt@ubuntu:/$ which openocd
/usr/local/bin/openocd
```

Illustration 30 Unpacking OpenOCD

```
mynewt@ubuntu:/$ openocd -v
Open On-Chip Debugger 0.10.0
Licensed under GNU GPL v2
For bug reports, read
    http://openocd.org/doc/doxygen/bugs.html
```

Illustration 31 OpenOCD version verification

- In case of any errors, run the following command to install the shared libraries:  
    \$ sudo apt-get install libhidapi-dev:i386
10. Create your first project from your *dev* directory.
- ```
$ mkdir ~/dev
$ cd ~/dev
$ newt new myproj
$ cd myproj
```

```

mynewt@ubuntu:~/dev$ newt new myproj
Downloading project skeleton from apache/mynewt-blinky...
Downloading repository mynewt-blinky (commit: mynewt_1_5_0_tag) from https://github.com/apache/mynewt-blinky.git
Installing skeleton in myproj...
Project myproj successfully created.
mynewt@ubuntu:~/dev$ cd myproj/

```

*Illustration 32 Newt new project creation*

#### 11. Download Python API from

<https://github.com/mbedmicro/pyOCD/releases/tag/v0.13.1>

- Download *Source code (tar.gz)*.
- Untar the tarball and install it into /dev/myproj (change ~/Downloads with your downloads directory)

```

$ sudo tar -xpf ~/Downloads/pyOCD-0.13.1.tar.gz
$ cd pyOCD-0.13.1
$ sudo python2 setup.py install
$ cd ..

```

```

mynewt@ubuntu:~/dev/myproj$ sudo tar -xpf ~/Downloads/pyOCD-0.13.1.tar.gz
mynewt@ubuntu:~/dev/myproj$ cd pyOCD-0.13.1/
mynewt@ubuntu:~/dev/myproj$ sudo python2 setup.py install
/usr/lib/python2.7/distutils/dist.py:267: UserWarning: Unknown distribution option: 'long_description_content_type'
    warnings.warn(msg)
/home/mynewt/dev/myproj/pyOCD-0.13.1/.eggs/setuptools_scm-3.1.0-py2.7.egg/setuptools_scm/version.py:199: UserWarning: meta invoked without explicit configuration, will use defaults where required.
    "meta invoked without explicit configuration,"
running install
running bdist_egg
running egg_info
creating pyocd.egg-info
writing requirements to pyocd.egg-info/requirements.txt
writing pyocd.egg-info/PKG-INFO
writing top-level names to pyocd.egg-info/top_level.txt
writing dependency_links to pyocd.egg-info/dependency_links.txt
writing entry points to pyocd.egg-info/entry_points.txt
writing manifest file 'pyocd.egg-info/SOURCES.txt'
reading manifest file 'pyocd.egg-info/SOURCES.txt'
reading manifest template 'MANIFEST.in'
warning: no files found matching '*' under directory 'elf_files'
warning: no previously-included files matching '.DS_Store' found anywhere in distribution
writing manifest file 'pyocd.egg-info/SOURCES.txt'
installing library code to build/bdist.linux-x86_64/egg
running install_lib
running build_py
creating build
creating build/lib.linux-x86_64-2.7
creating build/lib.linux-x86_64-2.7/pyocd
copying pyocd/_init__.py -> build/lib.linux-x86_64-2.7/pyocd
copying pyocd/_version.py -> build/lib.linux-x86_64-2.7/pyocd
creating build/lib.linux-x86_64-2.7/pyocd/tools
copying pyocd/tools/flash_tool.py -> build/lib.linux-x86_64-2.7/pyocd/tools
copying pyocd/tools/pyocd.py -> build/lib.linux-x86_64-2.7/pyocd/tools
copying pyocd/tools/_init__.py -> build/lib.linux-x86_64-2.7/pyocd/tools
copying pyocd/tools/gdb_server.py -> build/lib.linux-x86_64-2.7/pyocd/tools
creating build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/_init__.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/common.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/argon.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/freertos.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/rtx5.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/provider.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
copying pyocd/rtos/zephyr.py -> build/lib.linux-x86_64-2.7/pyocd/rtos
creating build/lib.linux-x86_64-2.7/pyocd/coresight

```

*Illustration 33 PyOCD installation (1/2)*

```

Adding six 1.11.0 to easy-install.pth file
Using /usr/lib/python2.7/dist-packages
Searching for PyYAML==3.13
Best match: PyYAML 3.13
Adding PyYAML 3.13 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for pyusb==1.0.2
Best match: pyusb 1.0.2
Adding pyusb 1.0.2 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for pyelftools==0.25
Best match: pyelftools 0.25
Adding pyelftools 0.25 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for intervaltree==2.1.0
Best match: intervaltree 2.1.0
Adding intervaltree 2.1.0 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for intelhex==2.2.1
Best match: intelhex 2.2.1
Adding intelhex 2.2.1 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for future==0.17.1
Best match: future 0.17.1
Adding future 0.17.1 to easy-install.pth file
Installing pasteurize script to /usr/local/bin
Installing futurize script to /usr/local/bin

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for colorama==0.4.1
Best match: colorama 0.4.1
Adding colorama 0.4.1 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Searching for sortedcontainers==2.1.0
Best match: sortedcontainers 2.1.0
Adding sortedcontainers 2.1.0 to easy-install.pth file

Using /home/mynewt/.local/lib/python2.7/site-packages
Finished processing dependencies for pyocd==0.13.1
mynewt@ubuntu:~/dev/myproj/pyOCD-0.13.1$ []

```

Illustration 34 PyOCD installation (2/2)

## 12. Fetch the source repository and dependencies

```
$ newt install -v
```

```

mynewt@ubuntu:~/dev/myproj$ sudo newt install -v
[apache-mynewt-core]:
Downloading repository description
Downloading repository mynewt-core (commit: master) from https://github.com/apache/mynewt-core.git
Cloning into '/tmp/newt-repo109841602'...
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (5/5), done.
remote: Total 98690 (delta 0), reused 0 (delta 0), pack-reused 98685
Receiving objects: 100% (98690/98690), 155.56 MiB | 2.12 MiB/s, done.
Resolving deltas: 100% (60156/60156), done.
Checking out files: 100% (5498/5498), done.
Will checkout origin/master
Fetching repo mynewt-core
Download of "repository.yml" from repo:apache-mynewt-core commit:master successful
[apache-mynewt-nimble]:
Downloading repository description
Downloading repository mynewt-nimble (commit: master) from https://github.com/apache/mynewt-nimble.git
Cloning into '/tmp/newt-repo211579449'...
remote: Enumerating objects: 131, done.
remote: Counting objects: 100% (131/131), done.
remote: Compressing objects: 100% (57/57), done.
remote: Total 31905 (delta 79), reused 105 (delta 73), pack-reused 31774
Receiving objects: 100% (31905/31905), 9.27 MiB | 2.10 MiB/s, done.
Resolving deltas: 100% (18564/18564), done.
Will checkout origin/master
Fetching repo mynewt-nimble
Download of "repository.yml" from repo:apache-mynewt-nimble commit:master successful
Making the following changes to the project:
    install apache-mynewt-core (1.5.0)
    install apache-mynewt-nimble (1.0.0)
Will checkout mynewt_1_5_0_tag
Merging changes from mynewt_1_5_0_tag
Will checkout mynewt_1_5_0_tag
apache-mynewt-core successfully installed version 1.5.0
Will checkout nimble_1_0_0_tag
Merging changes from nimble_1_0_0_tag
Will checkout nimble_1_0_0_tag
apache-mynewt-nimble successfully installed version 1.0.0
mynewt@ubuntu:~/dev/myproj$ []

```

Illustration 35 Mynewt-core.git cloning

### 13. Create and load a boot target onto the board

- Create the boot target:

```
$ newt target create frdm-k64f_boot  
$ newt target set frdm-k64f_boot app=@apache-mynewt-  
core/apps/boot  
$ newt target set frdm-k64f_boot bsp=@apache-mynewt-  
core/hw/bsp/frdm-k64f  
$ newt target set frdm-k64f_boot build_profile=optimized
```

- Built the target

```
$ newt build frdm-k64f_boot
```

```
mynewt@ubuntu:~/dev/myproj$ newt target create frdm-k64f_boot  
Target targets/frdm-k64f_boot successfully created  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_boot app=@apache-mynewt-core/apps/boot  
Target targets/frdm-k64f_boot successfully set target.app to @apache-mynewt-core/apps/boot  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_boot bsp=@apache-mynewt-core/hw/bsp/frdm-k64f  
Target targets/frdm-k64f_boot successfully set target.bsp to @apache-mynewt-core/hw/bsp/frdm-k64f  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_boot build_profile=optimized  
Target targets/frdm-k64f_boot successfully set target.build_profile to optimized  
mynewt@ubuntu:~/dev/myproj$ newt build frdm-k64f_boot  
Building target targets/frdm-k64f_boot  
Compiling repos/apache-mynewt-core/apps/boot/src/boot.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/bootutil_misc.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_ec.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_ec256.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_rsa.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_validate.c  
Compiling repos/apache-mynewt-core/boot/bootutil/src/loader.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aes.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aesni.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/arc4.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aria.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/asn1parse.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/asn1write.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/base64.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/bignum.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/blowfish.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/camellia.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ccm.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/certs.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/chacha20.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/chachapoly.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cipher.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cipher_wrap.c  
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cmac.c
```

Illustration 36 Boot targets creation (1/2)

```

Compiling repos/apache-mynewt-core/libc/baselIBC/src/strncmp.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strncpy.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strndup.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strnlen.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strntolmax.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strntoumax.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strpbrk.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strrchr.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strsep.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strspn.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strstr.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtolmax.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtok.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtok_r.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtol.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtoll.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtoul.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtoull.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/strtoumax.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/tinyprintf.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/vasprintf.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/vprintf.c
Compiling repos/apache-mynewt-core/libc/baselIBC/src/vsprintf.c
Compiling repos/apache-mynewt-core/sys/flash_map/src/flash_map.c
Compiling repos/apache-mynewt-core/sys/mfg/src/mfg.c
Compiling repos/apache-mynewt-core/sys/sysinit/src/sysinit.c
Compiling repos/apache-mynewt-core/util/nem/src/mem.c
Archiving apps_boot.a
Archiving boot_bootutil.a
Archiving crypto_mbedtls.a
Archiving frdm-k64f_boot-sysinit-app.a
Archiving hw_bsp_frdm-k64f.a
Archiving hw_cmsis-core.a
Archiving hw_drivers_uart.a
Archiving hw_drivers_uart_uart_hal.a
Archiving hw_hal.a
Archiving hw_mcu_nxp.a
Archiving hw_mcu_nxp_MK64F12.a
Archiving kernel_os.a
Archiving libc_baselIBC.a
Archiving sys_flash_map.a
Archiving sys_mfg.a
Archiving sys_sysinit.a
Archiving util_mem.a
Linking /home/mynewt/dev/myproj/bin/targets/frdm-k64f_boot/app/apps/boot/boot.elf
Target successfully built: targets/frdm-k64f_boot
mynewt@ubuntu:~/dev/myproj$ 

```

Illustration 37 Boot targets creation (2/2)

- Connect the board
- Load the bootloader binary onto the board

```
$ newt load frdm-k64f_boot
```

- i. Alternatively, load the boot binary onto the board using SEGGER (download instructions at the end of the document).

- a. Enter the directory where *boot.elf.bin* is located

```
$ Cd dev/myproj/bin/targets/frdm-k64f_boot/app/apps/boot
```

- b. Enter the SEGGER CLI interface

```
$ JLinkExe -device MK64FN1M0VLL12 -speed 1000 -if SWD
```

- c. Connect to the board

```
>connect
```

```

mynewt@ubuntu:~$ cd dev/myproj/bin/targets/frdm-k64f_boot/app/apps/boot
mynewt@ubuntu:~/dev/myproj/bin/targets/frdm-k64f_boot/app/apps/boot$ JLinkExe -device MK64FN1M0VL
L12 -speed 1000 -if SWD
SEGGER J-Link Commander V6.40 (Compiled Oct 26 2018 15:08:38)
DLL version V6.40, compiled Oct 26 2018 15:08:28

Connecting to J-Link via USB...O.K.
Firmware: J-Link OpenSDA 2 compiled Oct 10 2018 16:29:19
Hardware version: V1.00
S/N: 621000000
VTref=3.300V

Type "connect" to establish a target connection, '?' for help
J-Link>connect
Device "MK64FN1M0XXX12" selected.

Connecting to target via SWD
InitTarget()
Protection bytes in flash at addr. 0x400 - 0x40F indicate that readout protection is set.
For debugger connection the device needs to be unsecured.
Note: Unsecuring will trigger a mass erase of the internal flash.
Device will be unsecured now.
Found SW-DP with ID 0x2BA01477
Scanning AP map to find all available APs
AP[2]: Stopped AP scan as end of AP map has been reached
AP[0]: AHB-AP (IDR: 0x24770011)
AP[1]: JTAG-AP (IDR: 0x001C0000)
Iterating through AP map to find AHB-AP to use
AP[0]: Core found
AP[0]: AHB-AP ROM base: 0xE00FF000
CPUID register: 0x410FC241. Implementer code: 0x41 (ARM)
Found Cortex-M4 r0p1, Little endian.
FPUnit: 6 code (BP) slots and 2 literal slots
CoreSight components:
ROMTbl[0] @ E00FF000
ROMTbl[0][0]: E000E000, CID: B105E000, PID: 000BB00C SCS-M7
ROMTbl[0][1]: E0001000, CID: B105E000, PID: 003BB002 DWT
ROMTbl[0][2]: E0002000, CID: B105E000, PID: 002BB003 FPB
ROMTbl[0][3]: E0000000, CID: B105E000, PID: 003BB001 ITM
ROMTbl[0][4]: E0040000, CID: B1059000, PID: 000BB9A1 TPIU
ROMTbl[0][5]: E0041000, CID: B1059000, PID: 000BB925 ETM
ROMTbl[0][6]: E0042000, CID: B1059000, PID: 003BB907 ETB
ROMTbl[0][7]: E0043000, CID: B1059000, PID: 001BB908 CSTF
Cortex-M4 identified.
J-Link>[]

```

*Illustration 38 JlinkExe boot flashing*

d. Erase the flash

```
>erase
```

e. Load the bootloader binary

```
>loadbin boot.elf.bin, 0x0
```

```

J-Link>erase
Erasing device...
Comparing flash [100%] Done.
Erasing flash [100%] Done.
Verifying flash [100%] Done.
J-Link: Flash download: Total time needed: 1.301s (Prepare: 0.072s, Compare: 0.000s, Erase: 1.217
s, Program: 0.000s, Verify: 0.000s, Restore: 0.011s)
Erasing done.
J-Link>loadbin boot.elf.bin 0x0
Downloading file [boot.elf.bin]...
Comparing flash [100%] Done.
Erasing flash [100%] Done.
Programming flash [100%] Done.
Verifying flash [100%] Done.
J-Link: Flash download: Bank 0 @ 0x00000000: 1 range affected (16384 bytes)
J-Link: Flash download: Total time needed: 0.557s (Prepare: 0.111s, Compare: 0.008s, Erase: 0.000
s, Program: 0.376s, Verify: 0.002s, Restore: 0.058s)
O.K.
J-Link>[]

```

*Illustration 39 JlinkExe flash erase and boot.elf.bin load*

f. Exit SEGGER CLI interface

>exit

14. Test the board by blinking a LED via Project Blinky

- Create the blinky target

```
$ newt target create frdm-k64f_blinky  
$ newt target set frdm-k64f_blinky app=apps/blinky  
$ newt target set frdm-k64f_blinky bsp=@apache-mynewt-  
core/hw/bsp/frdm-k64f  
$ newt target set frdm-k64f_blinky build_profile=debug
```

- Built the target

```
$ newt build frdm-k64f_blinky
```

```
mynewt@ubuntu:~/dev/myproj$ newt target create frdm-k64f_blinky  
Target targets/frdm-k64f_blinky successfully created  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_blinky app=apps/blinky  
Target targets/frdm-k64f_blinky successfully set target.app to apps/blinky  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_blinky bsp=@apache-mynewt-core/hw/bsp/frdm-  
k64f  
Target targets/frdm-k64f_blinky successfully set target.bsp to @apache-mynewt-core/hw/bsp/frdm-k6  
4f  
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_blinky build_profile=debug  
Target targets/frdm-k64f_blinky successfully set target.build_profile to debug  
mynewt@ubuntu:~/dev/myproj$ newt build frdm-k64f_blinky  
Building target targets/frdm-k64f_blinky  
Compiling apps/blinky/src/main.c  
Compiling bin/targets/frdm-k64f_blinky/generated/src/frdm-k64f_blinky-sysflash.c  
Compiling bin/targets/frdm-k64f_blinky/generated/src/frdm-k64f_blinky-sysinit-app.c  
Compiling repos/apache-mynewt-core/hw/bsp/frdm-k64f/src/clock_config.c  
Compiling repos/apache-mynewt-core/hw/bsp/frdm-k64f/src/hal_bsp.c  
Assembling repos/apache-mynewt-core/hw/bsp/frdm-k64f/src/arch/cortex_m4/startup_MK64F12.S  
Compiling repos/apache-mynewt-core/hw/cmsis-core/src/cmsis_nvic.c  
Compiling repos/apache-mynewt-core/hw/drivers/uart/src/uart.c  
Compiling repos/apache-mynewt-core/hw/drivers/uart/uart_hal/src/uart_hal.c  
Compiling repos/apache-mynewt-core/hw/hal/src/hal_common.c  
Compiling repos/apache-mynewt-core/hw/hal/src/hal_flash.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_adc16.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_clock.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_cmp.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_cmt.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_common.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_crc.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_dac.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_dnampc.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_dspi.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_dspi_edma.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_edma.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d  
rivers/fsl_enet.c  
Compiling repos/apache-mynewt-core/hw/mcu/nxp/src/ext/sdk-2.0-frdm-k64f_b160321/devices/MK64F12/d
```

Illustration 40 Blinky targets creation (1/2)

```

Compiling repos/apache-mynewt-core/libc/baselibc/src/strncasecmp.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strncat.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strncmp.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strncpy.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strndup.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strnlen.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strntoimax.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strntoumax.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strpbrk.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strrchr.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strsep.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strspn.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strstr.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtoimax.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtok.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtok_r.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtol.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtoll.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtoul.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtoull.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/strtoumax.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/tinyprintf.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/vasprintf.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/vprintf.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/vsprintf.c
Compiling repos/apache-mynewt-core/libc/baselibc/src/vsscanf.c
Compiling repos/apache-mynewt-core/sys/flash_map/src/flash_map.c
Compiling repos/apache-mynewt-core/sys/mfg/src/mfg.c
Compiling repos/apache-mynewt-core/sys/sysinit/src/sysinit.c
Compiling repos/apache-mynewt-core/util/mem/src/mem.c
Archiving apps_blinky.a
Archiving frdm-k64f_blinky-sysinit-app.a
Archiving hw_bsp_frdm-k64f.a
Archiving hw_cmsis-core.a
Archiving hw_drivers_uart.a
Archiving hw_drivers_uart_uart_hal.a
Archiving hw_hal.a
Archiving hw_mcu_nxp.a
Archiving hw_mcu_nxp_MK64F12.a
Archiving kernel_os.a
Archiving libc_baselibc.a
Archiving sys_flash_map.a
Archiving sys_mfg.a
Archiving sys_sysinit.a
Archiving util_mem.a
Linking /home/mynewt/dev/myproj/bin/targets/frdm-k64f_blinky/app/apps/blinky/blinky.elf
Target successfully built: targets/frdm-k64f_blinky
mynewt@ubuntu:~/dev/myproj$ 
```

Illustration 41 Blinky targets creation (2/2)

- Create the Blinky application image

```
$ newt create-image frdm-k64f_blinky 1.0.0
```

```
mynewt@ubuntu:~/dev/myproj$ newt create-image frdm-k64f_blinky 1.0.0
App image successfully generated: /home/mynewt/dev/myproj/bin/targets/frdm-k64f_blinky/app/apps/blinky/blinky.img
mynewt@ubuntu:~/dev/myproj$ 
```

Illustration 42 Blinky image creation

- Connect the board
- Load the Blinky binary onto the board

```
$ newt load frdm-k64f_blinky
```

Alternatively, load the Blinky binary onto the board using SEGGER  
(download instructions at the end of the document).

- Enter the directory where *blinky.elf.bin* is located

```
$ cd dev/myproj/bin/targets/frdm-k64f_blinky/app/apps/blinky
```

- Enter the SEGGER CLI interface
 

```
$ JLinkExe -device MK64FN1M0VLL12 -speed 1000 -if SWD
```
- Connect to the board
 

```
>connect
```
- Load the Blinky binary
 

```
>loadbin blinky.elf.bin, 0x20000
```

  - 0x20000 is the flash address where applications must be written to, according to [https://test-microplatform-docs.readthedocs.io/en/stable/fota-demo/iot-device/nxp\\_k64f.html?fbclid=IwAR1DLbVCDTi\\_mcFcSS1uXajFjdjqHmkUgfMOjU5IlmgtPqt3tST8lwPnpOo](https://test-microplatform-docs.readthedocs.io/en/stable/fota-demo/iot-device/nxp_k64f.html?fbclid=IwAR1DLbVCDTi_mcFcSS1uXajFjdjqHmkUgfMOjU5IlmgtPqt3tST8lwPnpOo)
- Run the application
 

```
>g
```
- If the LED doesn't blink, you can try resetting the board
 

```
>r
```
- Note: use >h to halt the application if needed.
- The board's LED should blink!

```
mynewt@ubuntu:~$ cd dev/myproj/bin/targets/frdm-k64f_blinky/app/apps/blinky
mynewt@ubuntu:~/dev/myproj/bin/targets/frdm-k64f_blinky/app/apps/blinky$ JLinkExe -device MK64FN1M0VLL12 -speed 1000 -if SWD
SEGGER J-Link Commander V6.40 (Compiled Oct 26 2018 15:08:38)
DLL version 6.40, compiled Oct 26 2018 15:08:28

Connecting to J-Link via USB...O.K.
Firmware: J-Link OpenSDA 2 compiled Oct 10 2018 16:29:19
Hardware version: V1.00
S/N: 621000000
VTref=3.300V

Type "connect" to establish a target connection, '?' for help
J-Link>connect
Device "MK64FN1M0XXX12" selected.

Connecting to target via SWD
InitTarget()
Found SW-DP with ID 0x2BA01477
Scanning AP map to find all available APs
AP[2]: Stopped AP scan as end of AP map has been reached
AP[0]: AHB-AP (IDR: 0x2477001)
AP[1]: JTAG-AP (IDR: 0x0001C0000)
Iterating through AP map to find AHB-AP to use
AP[0]: Core found
AP[0]: AHB-AP ROM base: 0xE000FF0000
CPUID register: 0x410FC241, Implementer code: 0x41 (ARM)
Found Cortex-M4 @ 0x00000000, Little endian.
FPUnit: 0 code (BD) slots and 2 literal slots
CoreSight components:
ROMBb[0] @ E00FF000
ROMBb[0][0]: E000E000, CID: B105E000, PID: 000BB00C SCS-M7
ROMBb[0][1]: E000E1000, CID: B105E000, PID: 003BB002 DWT
ROMBb[0][2]: E000E2000, CID: B105E000, PID: 002BB003 FPB
ROMBb[0][3]: E000E0000, CID: B105E000, PID: 003BB001 ITM
ROMBb[0][4]: E0040000, CID: B10590000, PID: 000BB9A1 TPIU
ROMBb[0][5]: E0041000, CID: B10590000, PID: 000BB925 ETM
ROMBb[0][6]: E0042000, CID: B10590000, PID: 003BB907 ETB
ROMBb[0][7]: E0043000, CID: B10590000, PID: 001BB908 CSTF
Cortex-M4 identified.
J-Link>loadbin blinky.elf.bin 0x20000
Downloading file [blinky.elf.bin]...
Comparing Flash [100%] Done.
Erasing Flash [100%] Done.
Programming Flash [100%] Done.
Verifying Flash [100%] Done.
J-Link: Flash download: Bank 0 @ 0x00000000: 1 range affected (16384 bytes)
J-Link: Flash download: Total time needed: 0.543s (Prepare: 0.072s, Compare: 0.012s, Erase: 0.037s, Program: 0.405s, Verify: 0.001s, Restore: 0.014s)
```

Illustration 43 JlinkExe blinky.elf.bin load

## Compile and run a client-server application:

- Copy the iptest directory onto the apps directory in myproj (where the blinky project is).
- You can find a resumed and commented version of main.c (the file inside src directory) in the following git: <https://github.com/ArnoldoZerecero/Practicas-Interfaces-y-Perifericos/blob/master/Mynewt%20iptest/main.c>. Feel free to use it if desired.
- Create the iptest target

```

$ newt target create frdm-k64f_iptest
$ newt target set frdm-k64f_iptest app=apps/iptest
$ newt target set frdm-k64f_iptest bsp=@apache-mynewt-
core/hw/bsp/frdm-k64f
$ newt target set frdm-k64f_iptest build_profile=debug

```

```

mynewt@ubuntu:~/dev/myproj$ newt target create frdm-k64f_iptest
Target targets/frdm-k64f_iptest successfully created
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_iptest app=apps/iptest
Target targets/frdm-k64f_iptest successfully set target.app to apps/iptest
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_iptest bsp=@apache-mynewt-core/hw/
k64f
Target targets/frdm-k64f_iptest successfully set target.bsp to @apache-mynewt-core/hw/bs
4f
mynewt@ubuntu:~/dev/myproj$ newt target set frdm-k64f_iptest build_profile=debug
Target targets/frdm-k64f_iptest successfully set target.build_profile to debug

```

*Illustration 44 Iptest targets creation*

#### 4. Built the target

```
$ newt build frdm-k64f_iptest
```

```

mynewt@ubuntu:~/dev/myproj$ newt build frdm-k64f_iptest
Building target targets/frdm-k64f_iptest
Compiling apps/iptest/src/main.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/bootutil_misc.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_ec.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_ec256.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_rsa.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/image_validate.c
Compiling repos/apache-mynewt-core/boot/bootutil/src/loader.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aes.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aesni.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/arc4.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/aria.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/asn1parse.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/asn1write.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/base64.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/bignum.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/blowfish.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/camellia.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ccm.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/certs.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/chacha20.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/chachapoly.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cipher.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cipher_wrap.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/cmac.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ctr_drbg.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/debug.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/des.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/dhm.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ecdh.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ecdsa.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ecjpake.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ecp.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/ecp_curves.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/entropy.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/entropy_poll.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/error.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/gcm.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/havege.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/hkdf.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/hmac_drbg.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/md.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/md2.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/md4.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/md5.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/md_wrap.c
Compiling repos/apache-mynewt-core/crypto/mbedtls/src/memory_buffer_alloc.c

```

*Illustration 45 Iptest compilation (1/2)*

```

Compiling repos/apache-mynewt-core/sys/log/full/src/log_shell.c
Compiling repos/apache-mynewt-core/sys/mfg/src/mfg.c
Compiling repos/apache-mynewt-core/sys/shell/src/shell.c
Compiling repos/apache-mynewt-core/sys/shell/src/shell_nlip.c
Compiling repos/apache-mynewt-core/sys/shell/src/shell_os.c
Compiling repos/apache-mynewt-core/sys/shell/src/shell_prompt.c
Compiling repos/apache-mynewt-core/sys/stats/full/src/stats.c
Compiling repos/apache-mynewt-core/sys/stats/full/src/stats_nmgr.c
Compiling repos/apache-mynewt-core/sys/stats/full/src/stats_shell.c
Compiling repos/apache-mynewt-core/sys/sysinit/src/sysinit.c
Compiling repos/apache-mynewt-core/time/datetime/src/datetime.c
Compiling repos/apache-mynewt-core/util/cbmem/src/cbmem.c
Compiling repos/apache-mynewt-core/util/crc/src/crc16.c
Compiling repos/apache-mynewt-core/util/crc/src/crc8.c
Compiling repos/apache-mynewt-core/util/mem/src/mem.c
Archiving apps_iptest.a
Archiving boot_bootutil.a
Archiving crypto_mbedtls.a
Archiving encoding_base64.a
Archiving frdm-k64f_iptest-sysinit-app.a
Archiving fs_fcb.a
Archiving hw_bsp_frdm-k64f.a
Archiving hw_cmsis-core.a
Archiving hw_drivers_uart.a
Archiving hw_drivers_uart_uart_hal.a
Archiving hw_hal.a
Archiving hw_mcu_nxp.a
Archiving hw_mcu_nxp_MK64F12.a
Archiving kernel_os.a
Archiving libc_baselibc.a
Archiving net_ip_inet_def_service.a
Archiving net_ip_mn_socket.a
Archiving sys_config.a
Archiving sys_console_full.a
Archiving sys_flash_map.a
Archiving sys_id.a
Archiving sys_log_full.a
Archiving sys_mfg.a
Archiving sys_shell.a
Archiving sys_stats_full.a
Archiving sys_sysinit.a
Archiving time_datetime.a
Archiving util_cbmem.a
Archiving util_crc.a
Archiving util_mem.a
Linking /home/mynewt/dev/myproj/bin/targets/frdm-k64f_iptest/app/apps/iptest/iptest.elf
Target successfully built: targets/frdm-k64f_iptest
mynewt@ubuntu:~/dev/myproj$ []

```

*Illustration 46 Iptest compilation (2/2)*

## 5. Create the iptest application image

```
$ newt create-image frdm-k64f_iptest 1.0.0
```

```
mynewt@ubuntu:~/dev/myproj$ newt create-image frdm-k64f_iptest 1.0.0
App image successfully generated: /home/mynewt/dev/myproj/bin/targets/frdm-k64f_iptest/app/apps/iptest/iptest.img
mynewt@ubuntu:~/dev/myproj$ []
```

*Illustration 47 Iptest image creation*

## 6. Connect the board

### 7. Load the iptest binary onto the board

- ```
newt load frdm-k64f_iptest
```

- Alternatively, load the iptest binary onto the board using SEGGER (download instructions at the end of the document).

- i. Enter the directory where *iptest.elf.bin* is located

```
$ cd dev/myproj/bin/targets/frdm-
k64f_blinky/app/apps/iptest
```

- ii. Enter the SEGGER CLI interface

```
$ JLinkExe -device MK64FN1M0VLL12 -speed 1000 -if
SWD
```

- iii. Connect to the board

```
>connect
```

- iv. Load the iptest binary

```
>loadbin iptest.elf.bin, 0x20000
```

- 0x20000 is the flash address where applications must be written to, according to [https://test-microplatform-docs.readthedocs.io/en/stable/fota-demo/iot-device/nxp\\_k64f.html?fbclid=IwAR1DLbVCDTImcFcSS1uXajFidjqHmkUgfMOjU5IlmgtPqt3tST8lwPnpOo](https://test-microplatform-docs.readthedocs.io/en/stable/fota-demo/iot-device/nxp_k64f.html?fbclid=IwAR1DLbVCDTImcFcSS1uXajFidjqHmkUgfMOjU5IlmgtPqt3tST8lwPnpOo)

v. Run the application

>g

vi. Note: use >h to halt the application if needed.

```
mynewt@ubuntu:~$ cd dev/myproj/bln/targets/frdm-k64f_ipatest/app/apps/iptest
mynewt@ubuntu:~/dev/myproj/bln/targets/frdm-k64f_ipatest/app/apps/iptest$ JLinkExe -device MK64FN1M0VLL12 -speed 1000 -if SWD
SEGGER J-Link Commander V6.40 (Compiled Oct 26 2018 15:08:38)
DLL version V6.40, compiled Oct 26 2018 15:08:28

Connecting to J-Link via USB...O.K.
Firmware: J-Link OpenSDA 2 compiled Oct 10 2018 16:29:19
Hardware version: V1.00
S/N: 621000000
Vref=3.300V

Type "connect" to establish a target connection, '?' for help
J-Link>connect
Device "MK64FN1M0XXX12" selected.

Connecting to target via SWD
InitTarget()
Found SW-DP with ID 0x2BA01477
Scanning AP map to find all available APs
AP[2]: Stopped AP scan as end of AP map has been reached
AP[0]: AHB-AP (IDR: 0x24770011)
AP[1]: JTAG-AP (IDR: 0x001C0000)
Iterating through AP map to find AHB-AP to use
AP[0]: Core found
AP[0]: AHB-AP ROM base: 0xE00FF000
CPUID register: 0x410FC241. Implementer code: 0x41 (ARM)
Found Cortex-M4 r0p1, Little endian.
FPUUnit: 6 code (BP) slots and 2 literal slots
CoreSight components:
ROMTbl[0] @ E00FF000
ROMTbl[0][0]: E000E000, CID: B105E00D, PID: 000BB00C SCS-M7
ROMTbl[0][1]: E0001000, CID: B105E00D, PID: 003BB002 DWT
ROMTbl[0][2]: E0002000, CID: B105E00D, PID: 002BB003 FPB
ROMTbl[0][3]: E0000000, CID: B105E00D, PID: 003BB001 ITM
ROMTbl[0][4]: E0040000, CID: B105900D, PID: 000BB9A1 TPIU
ROMTbl[0][5]: E0041000, CID: B105900D, PID: 000BB925 ETM
ROMTbl[0][6]: E0042000, CID: B105900D, PID: 003BB907 ETB
ROMTbl[0][7]: E0043000, CID: B105900D, PID: 001BB908 CSTF
Cortex-M identified.
J-Link>loadbin iptest.elf.bin 0x20000
Downloading file [iptest.elf.bin]...
Comparing flash [100%] Done.
Erasing flash [100%] Done.
Programming flash [100%] Done.
Verifying flash [100%] Done.
J-Link: Flash download: Bank 0 @ 0x00000000: 1 range affected (45056 bytes)
J-Link: Flash download: Total time needed: 1.044s (Prepare: 0.070s, Compare: 0.015s, Erase: 0.045s, Program: 0.896s, Verify: 0.002s, Restore: 0.014s)
```

Illustration 48 JlinkExe iptest.elf.bin load

# Reprogramming the board's OpenSDA to use SEGGER JLink V2 Firmware:

1. Install *J-Link Software and Documentation Pack* from  
<https://www.segger.com/downloads/jlink/>
  - Choose the *J-Link Software and Documentation pack for Linux, DEB installer, 64-bit* option.
  - Choose the open with “Software Install” option.

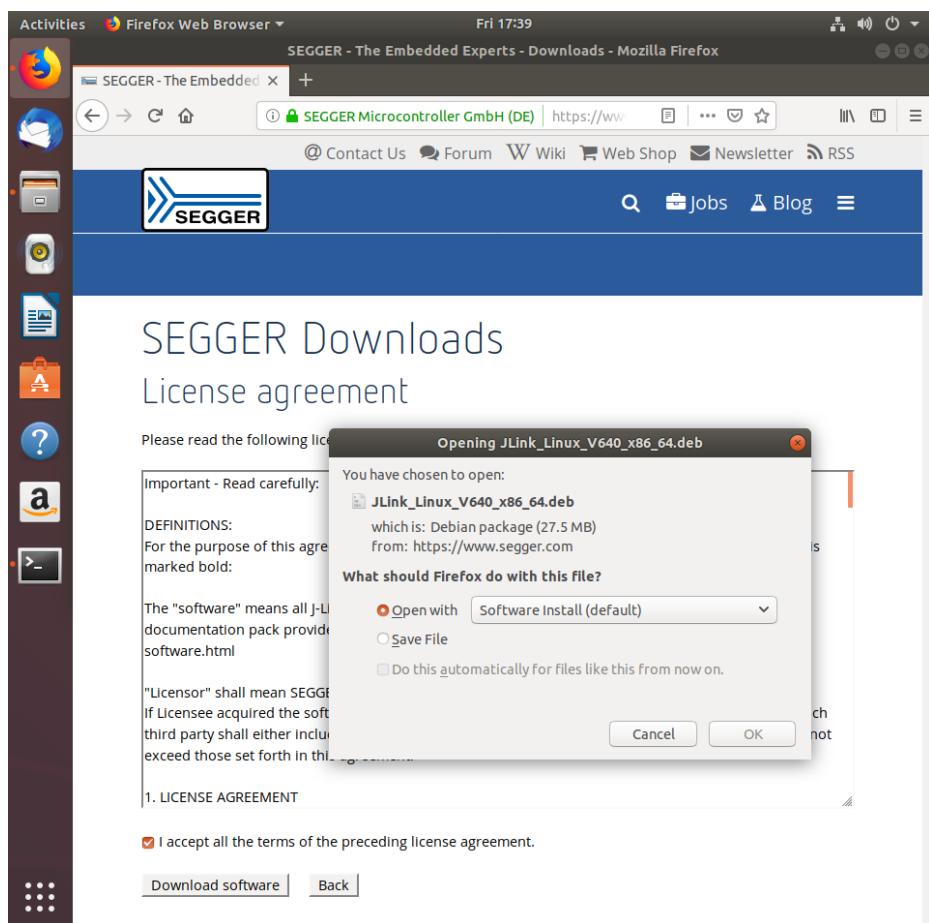


Illustration 49 Segger Jlink downloading

- The Ubuntu Software store will be opened.
- Click “Install”.

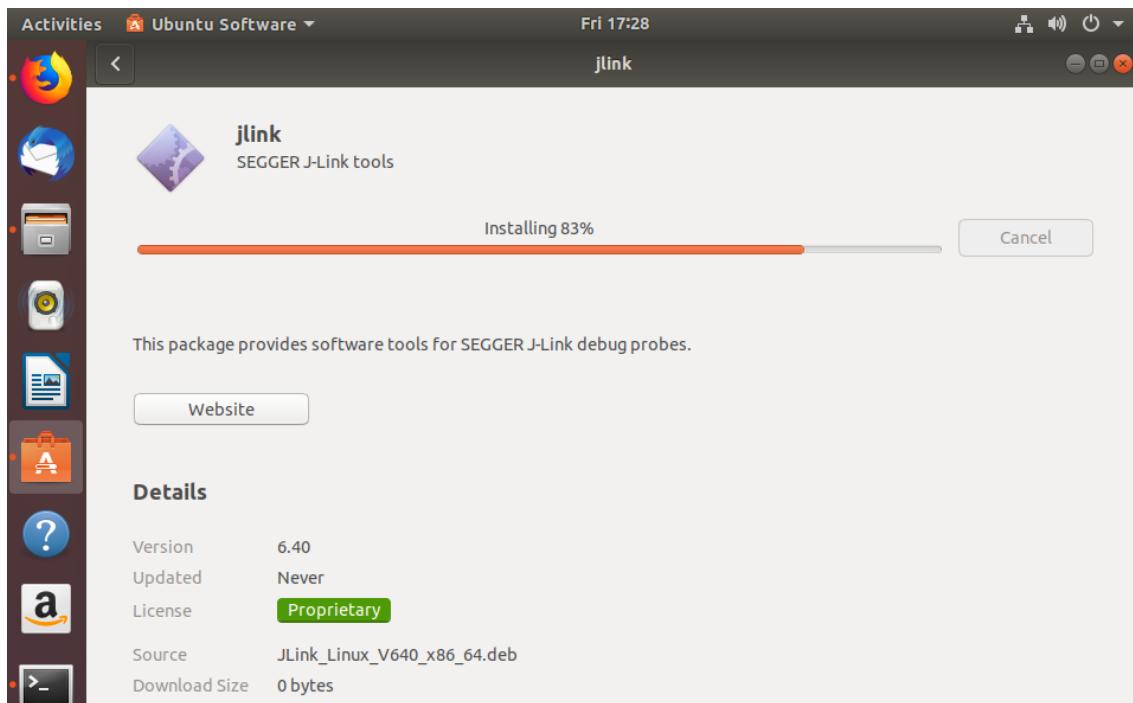


Illustration 50 Jlink installation

2. Download the binary for the additional OpenSDA Application (SEGGER JLink 2) from  
<https://www.nxp.com/support/developer-resources/run-time-software/kinetis-developer-resources/ides-for-kinetis-mcus/opensda-serial-and-debug-adapter:OPENSDA?&tid=vanOpenSDA#FRDM-K64F>
  - Follow the link to download Segger JLink V2 for the FRDM-K64F (Download Binary)
  - Reprogram your OpenSDA adapter (as indicated in the previous link from NXP)
    - i. Search for OpenSDA Board Specific Firmwares in the *Segger JLink drivers* link
    - ii. Download the one for the FRDM-K64F board
    - iii. **Note:** In case of wanting to use *newt load* again instead of SEGGER, you must reprogram the OpenSDA adapter again to use DAPLink. Instructions are found in the NXP link above.

## References and other helpful links:

### NXP FRDM-K64F (Zephyr)

[https://docs.zephyrproject.org/1.11.0/boards/arm/frdm\\_k64f/doc/frdm\\_k64f.html](https://docs.zephyrproject.org/1.11.0/boards/arm/frdm_k64f/doc/frdm_k64f.html)

### NXP OpenSDA (Zephyr)

<https://docs.zephyrproject.org/1.11.0/tools/opensda.html#nxp-opensda-pyocd>

### How to build an app with Mynewt

<https://davidgs.com/2017/building-an-app-with-apache-mynewt/>

Mynewt documentation (Go and Newtmgr installation)

<https://wiki.makerdiary.com/nrf52832-mdk/mynewt/>

[https://mynewt.apache.org/latest/misc/go\\_env.html#installing-go-and-git-on-linux](https://mynewt.apache.org/latest/misc/go_env.html#installing-go-and-git-on-linux)

Developing Mynewt Applications with Visual Studio Code

<https://mynewt.apache.org/latest/misc/ide.html>

OpenOCD

<http://openocd.org/doc/html/Debug-Adapter-Configuration.html>

Msys install

<https://github.com/msys2/msys2/wiki/MSYS2-installation>