atollic

AN1601: Using CMSIS-DAP and
pyOCD GDB Server

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INTRODUCTION

This document provides information on how to use CMSIS-DAP with pyOCD gdbserver with **Atollic® TrueSTUDIO®**. The instruction should be generic to more or less any board with a CMSIS-DAP debug interfacet that is supported pyOCD GDB-server. The device being used as example in this document is the NXP FRDM-KL28Z.

The pyOCD is an Open Source python 2.7 based library provided by ARM mbed for programming and debugging ARM Cortex-M microcontrollers using CMSIS-DAP. The project is being developed by ARM, its Partners and the contributions of the global ARM mbed Developer Community.

From a GDB client, you have all the features provided by gdb:

- load a .elf file

- read/write memory

- read/write core register

- set/remove hardware breakpoints

- high level stepping

More info about pyOCD can be found here:
https://pypi.python.org/pypi/pyOCD
https://developer.mbed.org/blog/entry/pyOCD-Binary-Version/

INSTALLATION

There are a number of different programs needed when using pyOCD.

- Python 2.7

- Pip

- pyOCD

INSTALL PYTHON V2.7

Python v2.7 is needed when pyOCD shall be used. Please note that Python v3.x cannot be used.

1. Python v2.7 can be downloaded from `https://www.python.org/downloads/` Atollic has used python v2.7.11 installed into: `C:\Python27`

2. **Set path to python**
   To use python the path needs to be set to the location where python is installed, e.g.
   In command-line run command `set path=C:\Python27;%PATH%`

Be extra careful with the path variable if you have multiple versions of Python installed.

INSTALL PIP

Using the pip package manager to install download and install the pyOCD-GDB-server. Pip should be bundled with python 2.7.x. But in order to use Pip the user must again add pip to the environmental path variable:

In command-line run command: `set path=C:\Python27\Scripts;%PATH%`

If `pip` was not part of your python installation, then install pip like this:

1. Download pip from:
   https://pip.pypa.io/en/stable/installing/

2. Locate and download the file <`get-pip.py`>.

3. Run the following command-line command (which may require administrator access):

   `python get-pip.py`

4. Add the pip python script path to the windows environmental path variable:

   In command-line run:
   `set path=C:\Python27\Scripts;%PATH%`

INSTALL PYOCD

The latest stable version of pyOCD may be installed via pip as follows:

1. In command-line run:

   ```
   pip install --pre -U pyocd
   ```

2. pyOCD GDb-server should now be installed. Verify that the installation was successful by enterin the following in a command-line view:

   ```
   pyocd-gdbserver –version
   ```

   This should return the version number, in this case:

   ```
   0.7.0
   ```

3. You are done installing pyOCD! On windows machines however, the user must also install a serial port driver for mbed devices using CMSIS-DAP. See next chapter.

FRDM-KL28Z BOARD WITH CMSIS-DAP

The FRDM-KL28Z board contains mbed CMSIS-DAP firmware. The mbed CMSIS-DAP driver software is normally installed when connecting the board to the PC using a USB cable.

Please note! If the driver software is not installed automatically as displayed in the screen shots below then please proceed to next section and install mbed Windows serial port manually.

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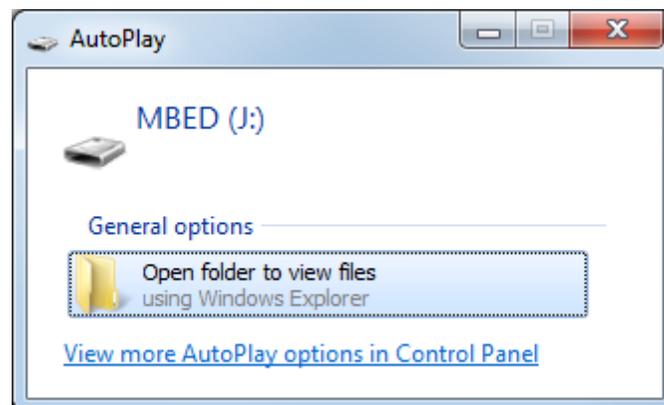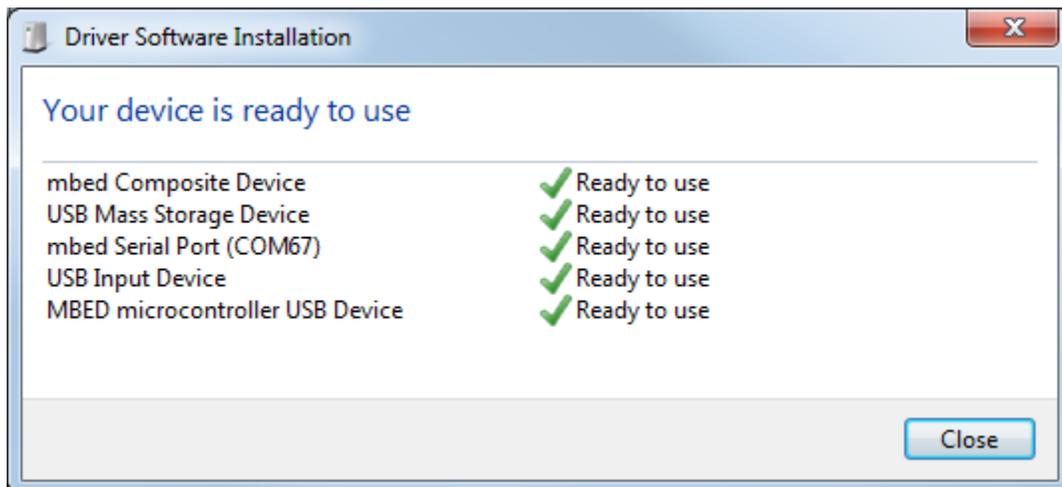
INSTALL MBED WINDOWS SERIAL PORT DRIVER

If the mbed driver software was not installed automatically as described in previous section then the mbed Windows Serial Port Driver needs to be installed manually.

1. Download the mbed Windows Serial Port Driver from:

https://developer.mbed.org/handbook/Windows-serial-configuration#1-download-the-mbed-windows-serial-port

2. Run the downloaded installer with the CMSIS-DAP board plugged in and no explorer drive windows open.

You are now done with everything that is necessary in order to make the pyOCD GDB-server able to connect to the mbed device (microcontroller) via CMSIS-DAP debug interface. Let's now setup the TrueSTUDIO debug configuration to the pyOCD GDB-server.

TRUESTUDIO PROJECT DEBUGGING

Create a TrueSTUDIO project for the board. In this case a TrueSTUDIO project for the FRDM-KL28Z board is created.

TRUESTUDIO DEBUG CONFIGURATION

When starting a debug session in TrueSTUDIO for the first time, the Debug Configuration dialog is opened. There are some updates needed here to debug using CMSIS-DAP and the pyOCD GDB-server

DEBUGGER TAB

Open the Debugger tab and update the following:

1. Select "`Generic`" as the Debug probe

2. Select `connect to remote GDB server`

3. Update `Port number` to `3333`
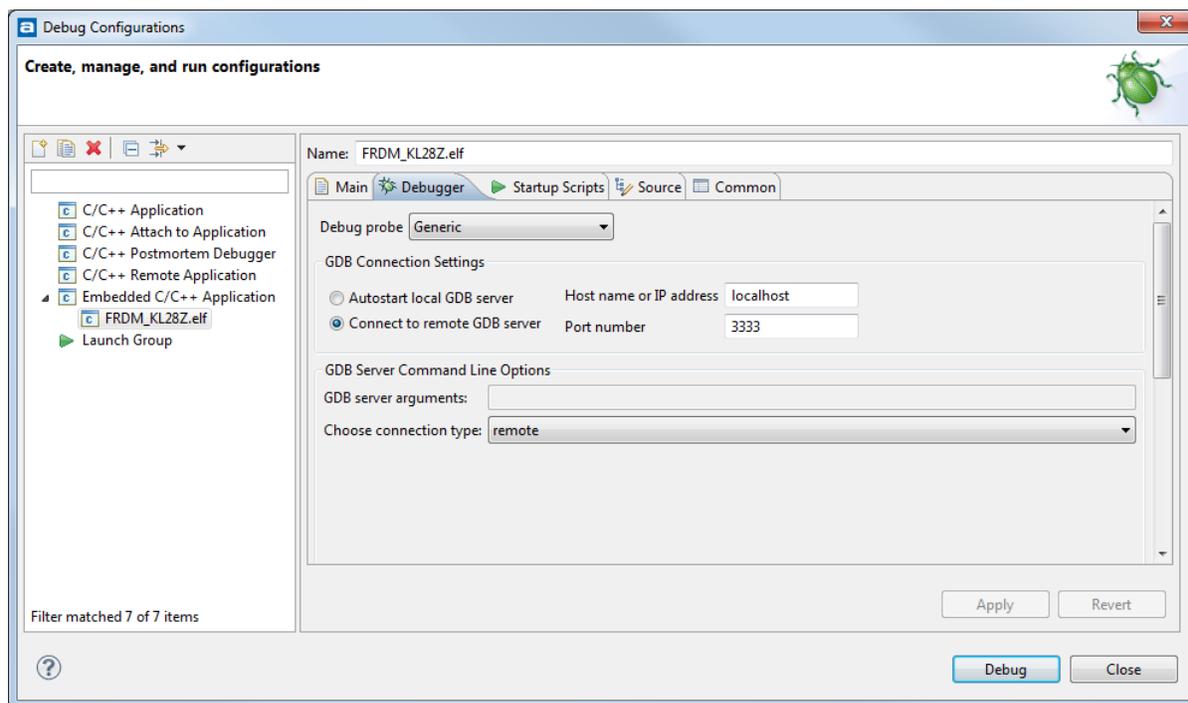
STARTUP SCRIPT TAB

The Startup Script tab contains a Debug tab. This is preloaded with a debugi startup script. This script may require some editing. For some devices the user may need to comment out the "`monitor reset`" command. This is done by pre-pending the command with a "#". So "#" is equivalent to "//" in the C language.

If your debug session fails and the CPU seem to be executin weird address, try to add # mark to comment the "`#monitor reset`" command. The GDB-server will not do a power-on-reset upon start of the debug session when this command is commented out.
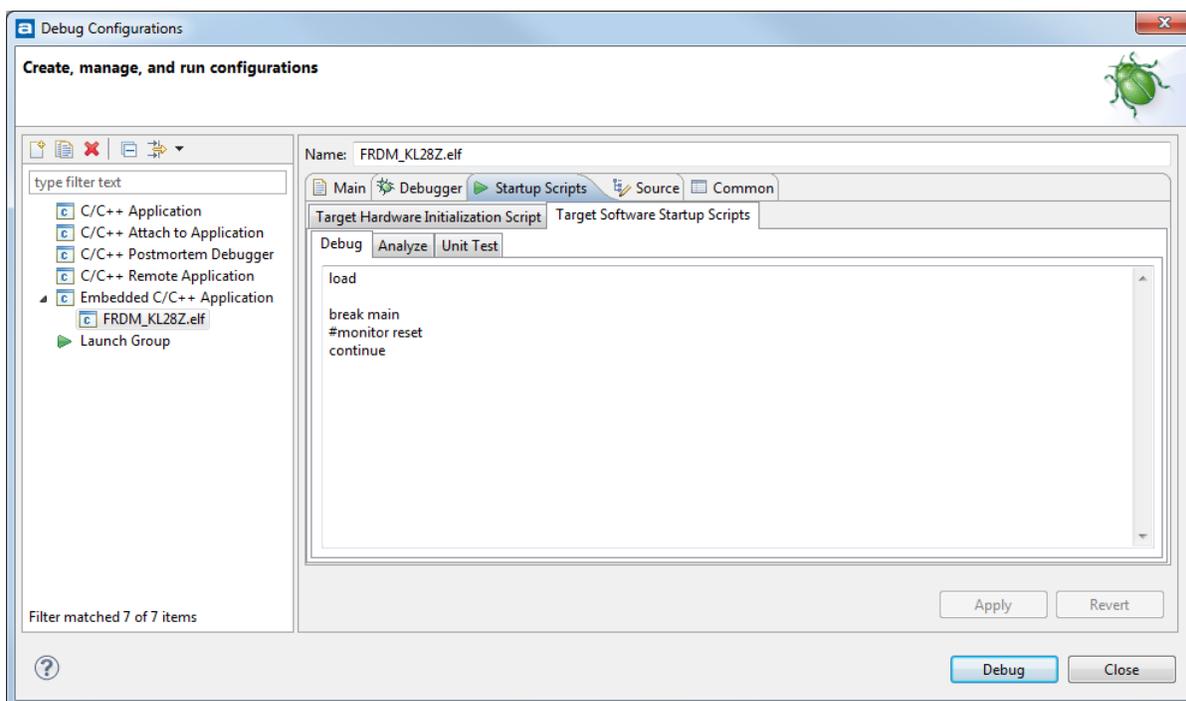
START PYOCD GDBSERVER

1. Connect the board to the PC.
   Example: Using a FRDM-KL28Z board

2. By default port 3333 is used by pyOCD gdbserver.

3. From command-line run:

```
pyocd-gdbserver
```

The output in the command-line view should look similar to this:

```
INFO:root:new board id detected:
02900203329C4E1F0000000000000000000000000CF60B377
INFO:root:board allows 5 concurrent packets
INFO:root:DAP SWD MODE initialised
INFO:root:IDCODE: 0x2BA01477
INFO:root:KL28x not in secure state
INFO:root:2 hardware breakpoints, 0 literal comparators
INFO:root:CPU core is Cortex-M0+
INFO:root:2 hardware watchpoints
INFO:root:Telnet: server started on port 4444
INFO:root:GDB server started at port:3333
```

START DEBUGGING

When the pyOCD gdbserver has been started as describe in previous section the debug session can be started in TrueSTUDIO.

If there are any problems, then please investigate if all configurations has been made according to this document. The ARM mbed web site also contains more information.