Using Eclipse to program STM32 CPUs

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1 Further information if you encounter problems

- Eclipse and Plug-ins
  - http://gnuarmeclipse.livius.net/blog/plugins-install/
- Toolchain
  - GCC ARM
    - http://gnuarmeclipse.livius.net/blog/toolchain-install/
  - Build Tools (make, rm ...)
    - http://gnuarmeclipse.livius.net/blog/build-tools-windows/
  - OpenOCD
    - http://gnuarmeclipse.livius.net/blog/openocd-install/
  - ST-LINK/V2
    - http://gnuarmeclipse.livius.net/blog/openocd-install/#ST-LINKV2
- Using Linux
  - Most software is available in your distributors software repository
  - Ubuntu: eclipse, eclipse-cdt, gcc-arm-none-eabi, binutils-arm-none-eabi, libnewlib-arm-none-eabi, gdb-arm-none-eabi, openocd
  - Arch Linux: eclipse, eclipse-cdt, arm-none-eabi-gcc, arm-none-eabi-binutils, arm-none-eabi-newlib, arm-none-eabi-gdb, openocd, stlink

2 Setup Eclipse

- Download and install *Eclipse IDE for C/C++ Developers* from `https://eclipse.org`
  - Start Eclipse, create/select workspace
- Click *Help > Install New Software*
  - Work with: Luna (or later version)
- Select everything from *Mobile and Device Development* and install
- Click *Help > Install New Software > Add*
  - name: GNU ARM Eclipse Plug-ins
    URL: `http://gnuarmeclipse.sourceforge.net/updates`
  - Select: Cross Compiler; Generic Cortex-M Project Templates; OpenOCD Debugging; Packs; STM32Fx Project Templates

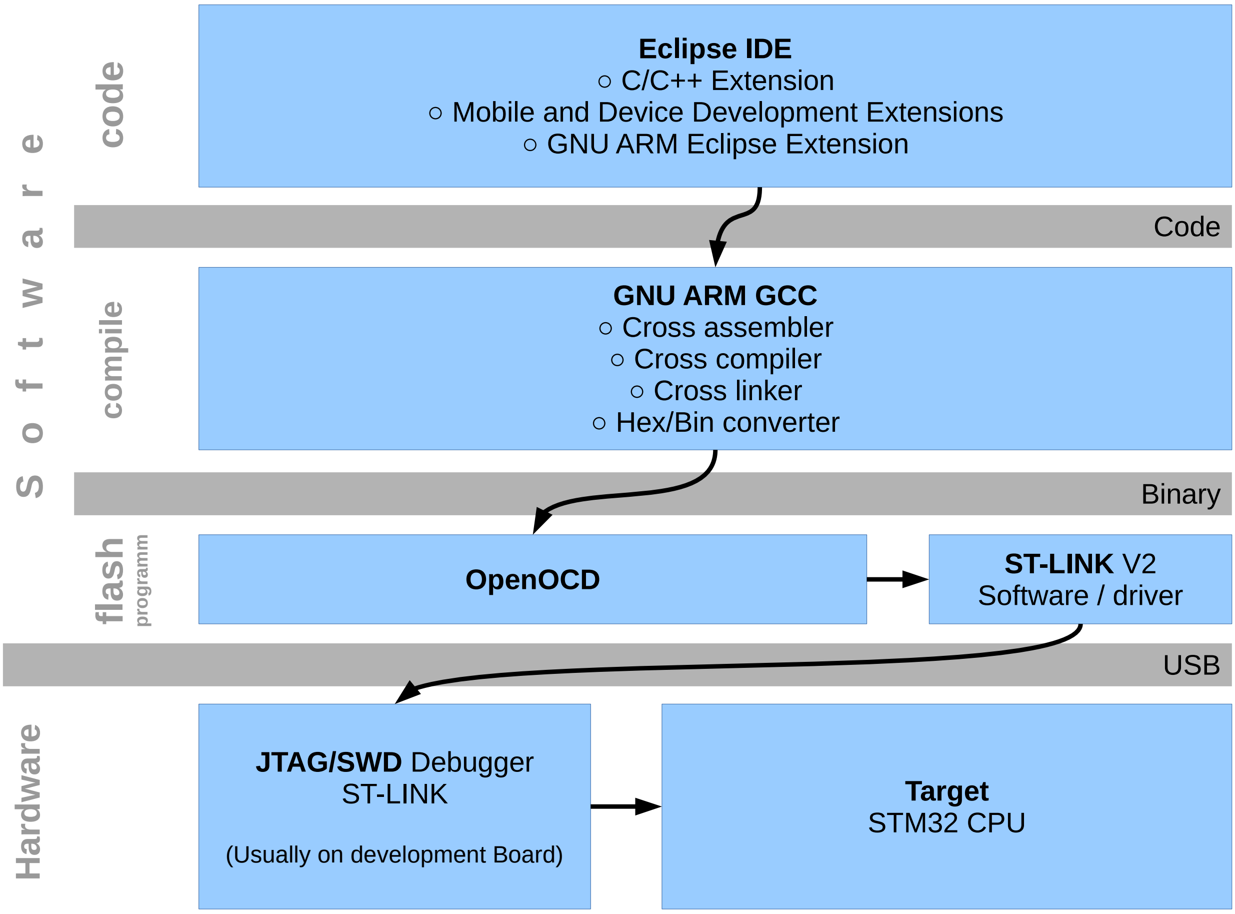
3 Setup Toolchain

- GCC ARM
  - `https://launchpad.net/gcc-arm-embedded`
  - Download ZIP package, not the installer
- OpenOCD
  - `http://sourceforge.net/projects/gnuarmeclipse/files/OpenOCD/`
  - No permissions to install?
    - Unpack bin folder with 7-ZIP, rename to *openocd*
    - Unpack $_OUTDIR into *openocd*
- ST-LINK/V2
  - Windows 7/XP: `http://www.st.com/web/catalog/tools/FM147/SC1887/PF258167`
  - Windows 8: `http://www.st.com/web/catalog/tools/FM147/SC1887/PF259459`
  - No permissions to install?
    - Driver for Windows: `https://developer.mbed.org/media/uploads/dan/stlinknucleodriversigned.zip`
    - ST-LINK Utility: -

- Build Tools (make, rm . . .)
  - `http://sourceforge.net/projects/gnuarmeclipse/files/Build%20Tools/`
  - No permissions to install? Extract bin folder with 7-ZIP and rename to *BuildTools*

4 Explanation of components

- Eclipse
  - Is a programming environment for Java developers
- Eclipse CDT
  - Is the extended version for C/C++ programmers
- GNU ARM Eclipse Plug-ins
  - Adds the support for ARM cross compile projects
- GCC ARM
  - Is the compiler (and debugger etc) for targeting the ARM CPUs
- OpenOCD
  - Is the programmer for flashing and debugging the target
- ST-LINK
  - Is the in-circuit debugger and programmer for STM8 and STM32 CPUs



5 Workaround if you have no permissions in Windows

- The problem is that Eclipse expects build tools like make and rm in the Windows PATH variable, which you can not alter because you have no permissions.
- Solution, use the Batch file provided below to start Eclipse. Basically this file changes the PATH variable and then starts Eclipse with this variable

```
rem set path, use current path where this script is
set P=%~dp0
set ECLIPSE=%P%EclipseCDT
set OPENOCD=%P%OpenOCD
set STLINK=%P%stlink
set TOOLS=%P%BuildTools
set PATH=%OPENOCD%;%STLINK%;%TOOLS%;%PATH%
start "" %ECLIPSE%\eclipse.exe
```

6 Create new project

- After installing everything, restart Eclipse and close the Welcome page
- File → New → Other → C Project
  - Project Type: *STM32F4xx C/C++ Project*
  - Toolchain: *GNU Tools for ARM Embedded Processors (arm-none-eabi-gcc)*
  - Toolchain path: where you installed GCC, the folder should contain: *arm-none-eabi, bin, lib, share*
- Window → Open Perspective → Packs
  - Update the the repos
  - Select STMicroelectronics → STM32F4 Series
    Select Keil → STM32F4xx_DFP → install latest version
  - WARNING: This is really big. The packs are stored in your active workspace Consider creating/moving your workspace to a USB drive.
- Check your external oscillator frequency (HSE_VALUE) in file in
  <projectname>\system\src\cmsis\system_stm32f4xx.c

7 Program the target

- Before compiling (first time after creating project)
  - Select *Raw Binary* in Project properties → *C/C++ Build* → *Settings* → *Tool Settings* → *Cross* → *ARM GNU Create Flash Image* → *General* → *Output file format*
  - Select the target CPU in Project properties → *C/C++ Build* → *Settings* → *Devices*
- Compile the project
  - Rightclick on project → *Build Project*
  - Watch the Console window for errors
- In *Run* → *External Tools* → *External Tools Configurations...*
  - Select *Programm* and click *new*
  - In Location enter path to OpenOCD executable or only openocd.exe if you have OpenOCD in your systems PATH variable

- In *Working Directory* enter: ${workspace_loc:${project_ name}/Debug}
- In Arguments enter:

```
-s E:\HS\OpenOCD
-f stm32f429discovery
-c "init"
-c "reset halt"
-c "sleep 100"
-c "wait_halt 2"
-c "flash write_image erase ${project_name}.bin 0x08000000"
-c "sleep 100"
-c "reset run"
-c shutdown
```

- In tab *Common*, check *Display in favourites menu*

8 Hardware Debugging

- *Run > Debug Configurations...*
  - Select *GDB OpenOCD Debugging* and click *new*
  - In Tab *Debugger* enter the following in *Config options*

```
-s E:\HS\OpenOCD
-f stm32f429discovery
```

9 Additional notes

- Optional things, you only need this if you encounter problems or if you are very bored
  - Updating hardware abstraction library and other files (stm32f4-hal)
    - Download latest STM32CubeF4 `http://www.st.com/web/en/catalog/tools/PF259243`
    - Copy Drivers\STM32F4xx_HAL_Driver\Src\* to <projectname>\system\src\stm32f4-hal
    - Copy Drivers\STM32F4xx_HAL_Driver\Inc\* to <projectname>\system\include\stm32f4-hal
    - Copy Drivers\CMSIS\Device\ST\STM32F4xx\Include\* to <projectname>\system\include\cmsis
    - Copy Drivers\CMSIS\Device\ST\STM32F4xx\Source\Templates \system_stm32f4xx.c to <projectname>\system\textbackslash src\textbackslash cmsis
    - Copy Drivers\CMSIS\Include\* to <projectname>\system\include\cmsis