



WB32F10x

Set Up A GCC Development Environment

(Through VS Code And J-Link)

Westberry Technology (ChangZhou) Corp., Ltd

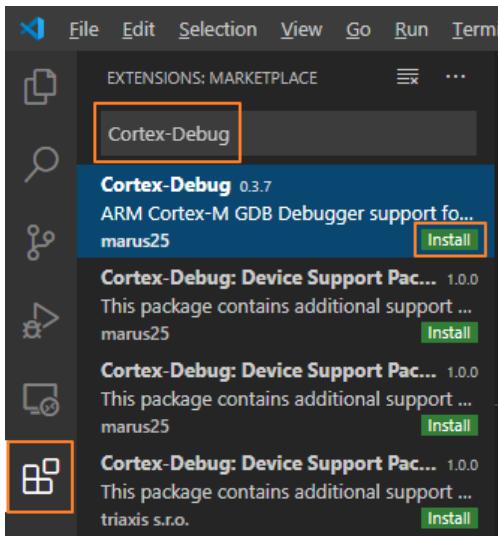
Contents

CONTENTS	II
1 INSTALL THE DEVELOPMENT ENVIRONMENT	3
2 CREATE THE PROJECT AND COMPILE	6
3 SIMPLIFY COMPILATION STEP.....	9
4 CONFIGURE THE DEBUG ENVIRONMENT	12
REVISION HISTORY	15
IMPORTANT NOTICE	16

1 Install the development environment

Step 01. Install Visual Studio Code (<https://code.visualstudio.com/>).

Step 02. Install the **Cortex-Debug** extension in Visual Studio Code.

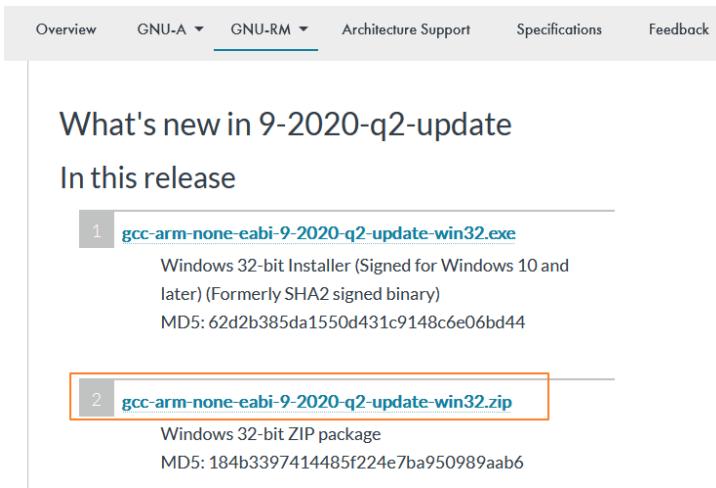


Step 03. Prepare a J-Link emulator and install the J-Link emulator driver:
(<https://www.segger.com/downloads/jlink>)

Step 04. Create a new folder to store the tools needed for development. The path to the new folder in this tutorial is D:\DevTools.

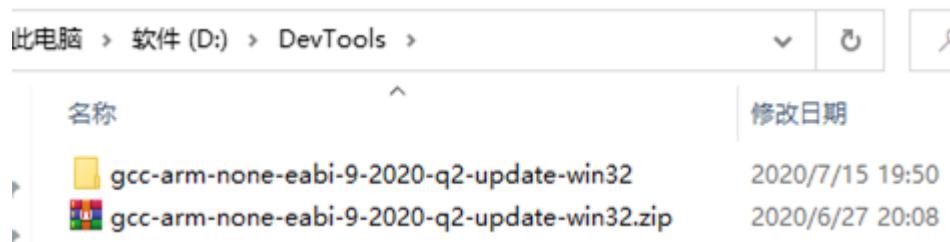
Step 05. Download the **GCC-ARM compilation toolchain** tarball and place it in the D:\DevTools folder:

(<https://developer.arm.com/tools-and-software/open-source-software/developer-tools/gnu-toolchain/gnu-arm/downloads>)

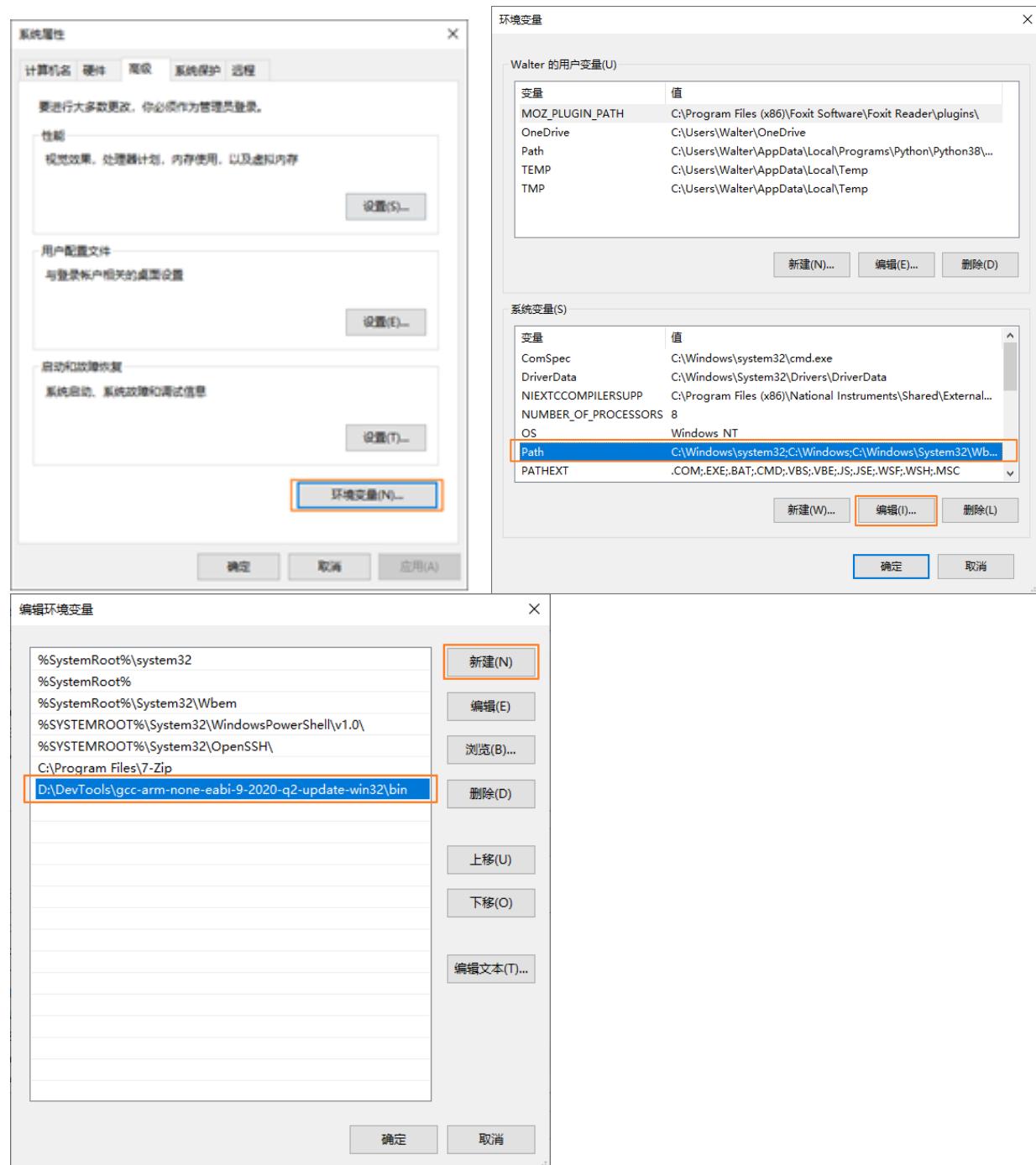


The screenshot shows the 'What's new in 9-2020-q2-update' section of the Arm GNU Toolchain download page. It lists two download options:

- 1 gcc-arm-none-eabi-9-2020-q2-update-win32.exe**
Windows 32-bit Installer (Signed for Windows 10 and later) (Formerly SHA2 signed binary)
MD5: 62d2b385da1550d431c9148c6e06bd44
- 2 gcc-arm-none-eabi-9-2020-q2-update-win32.zip**
Windows 32-bit ZIP package
MD5: 184b3397414485f224e7ba950989aab6

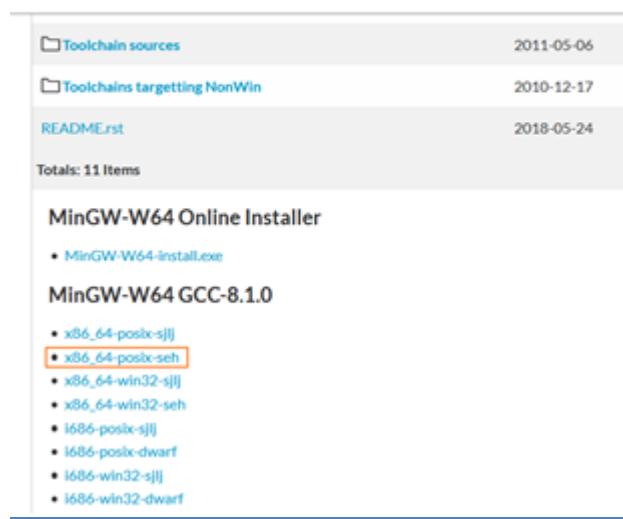
Step 06. Unzip the gcc-arm-none-eabi-9-2020-q2-update-win32.zip

Then add the path D:\DevTools\gcc-arm-none-eabi-9-2020-q2-update-win32\bin to the **System Environment Variables**



Step 07. Download the MinGW-W64 offline installer and place it in the D:\DevTools folder:

(<https://sourceforge.net/projects/mingw-w64/files/>)

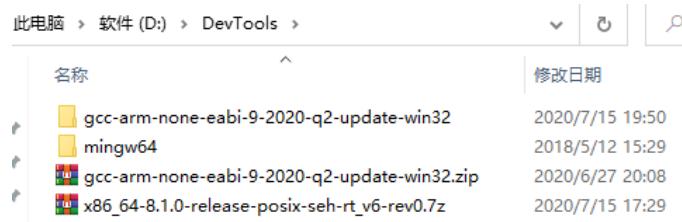
MinGW-W64 Online Installer

- MinGW-W64-install.exe

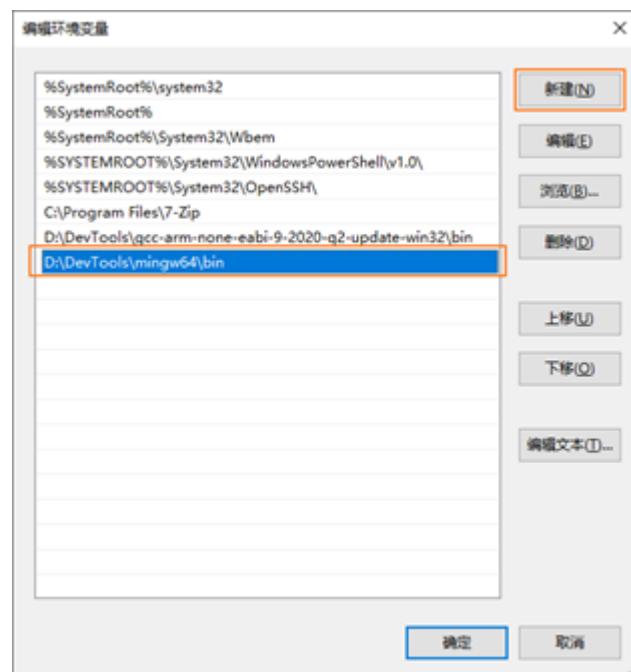
MinGW-W64 GCC-8.1.0

- x86_64-posix-sjlj
- x86_64-posix-seh**
- x86_64-win32-sjlj
- x86_64-win32-seh
- i686-posix-sjlj
- i686-posix-dwarf
- i686-win32-sjlj
- i686-win32-dwarf

Step 08. Unzip the **MinGW-W64 offline installer** (`x86_64-8.1.0-release-posix-seh-rt_v6-rev0.7z`)



Then add the path D:\DevTools\mingw64\bin to the **System Environment Variables**



2 Create the project and compile

Step 01. Create a new folder named **Template** to store all the files of the project.

Step 02. Create **Libraries**, **Project** and **User** subfolders in the **Template** folder(You can also make the project directory structure according to your own habits.).

```
▽ Template
  > Libraries
  > Project
  > User
```

Step 03. Copy the contents of **Libraries** folder (in the **WB32F10x_StdPeriph_Lib** folder) to the **Template\Libraries** folder

Step 04. Copy the contents of **Project\ WB32F10X_STDPeripher_Template** folder from the **WB32F10x_StdPeriph_Lib** folder to the **Template\User** folder.

Step 05. Copy **Makefile** file and **WB32F10x_FLASH.Id** file in **Project\WB32F10x_StdPeriph_Template\GCC** folder to **Template\Project** folder.

```
▽ Template
  ▽ Libraries
    > CMSIS
    > WB32F10x_StdPeriph_Driver
    > WB32F10x_USBDevice_Driver
  ▽ Project
    M Makefile
    └ WB32F10x_FLASH.Id
  ▽ User
    C main.c
    C wb32f10x_conf.h
    C wb32f10x_it.c
    C wb32f10x_it.h
```

Step 06. Use VS Code to open the **Template** folder and make the following modifications to the **Makefile** file.

M Makefile ×

Project > M Makefile

```

34 ##### C sources #####
35 # source
36 #####
37 # C sources
38 C_SOURCES = \
39 ../../Libraries\CMSIS/Device/WB/WB32F10x/system_wb32f10x.c \
40 ../../Libraries/WB32F10x_StdPeriph_Driver/src/misc.c \
41 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_adc.c \
42 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_anctl.c \
43 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_bkp.c \
44 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_crc.c \
45 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_dmac.c \
46 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_exti.c \
47 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_fmc.c \
48 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_gpio.c \
49 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_i2c.c \
50 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_i2s.c \
51 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_iwdg.c \
52 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_led.c \
53 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_pwr.c \
54 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_rcc.c \
55 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_rng.c \
56 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_rtc.c \
57 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_sfmc.c \
58 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_spi.c \
59 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_tim.c \
60 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_uart.c \
61 ../../Libraries/WB32F10x_StdPeriph_Driver/src/wb32f10x_wwdg.c \
62 ../User/main.c \
63 ../User/wb32f10x_it.c
64
65 # ASM sources
66 ASM_SOURCES =
67 ../../Libraries\CMSIS/Device/WB/WB32F10x/startup/gcc/startup_wb32f10x.S

```

M Makefile ×

Project > M Makefile

```

109 # C defines
110 C_DEFS = \
111 -DUSE_STDPERIPH_DRIVER \
112 -DMAINCLK_FREQ_96MHz
113
114 # AS includes
115 AS_INCLUDES =
116
117 # C includes
118 C_INCLUDES =
119 C_INCLUDES = \
120 -I../../Libraries\CMSIS/Include \
121 -I../../Libraries\CMSIS/Device/WB/WB32F10x \
122 -I../../Libraries/WB32F10x_StdPeriph_Driver/inc \
123 -I../User
124

```

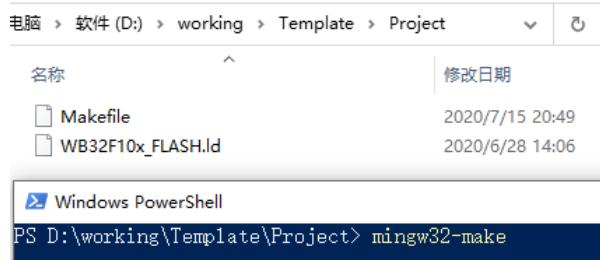
Step 07. According to the product code you use, configure the Flash and SRAM size in the WB32F10x_FLASH.Id file. The figure takes 256KB Flash and 36KB SRAM as an example (for the product capacity configuration of other codes, please refer to the table below).

```
WB32F10x_FLASH.Id
Project > WB32F10x_FLASH.Id
25 /* -----
26 |----- <<< Use Configuration Wizard in Context Menu >>> -----
27 */
28
29 /*----- Flash Configuration -----
30 <h> Flash Configuration
31 | <o0> Flash Base Address <0x0-0xFFFFFFFF:8>
32 | <o1> Flash Size (in Bytes) <0x0-0xFFFFFFFF:8>
33 </h>
34 -----
35 __ROM_BASE = 0x00000000;
36 __ROM_SIZE = 0x00040000;
37
38 /*----- Embedded RAM Configuration -----
39 <h> RAM Configuration
40 | <o0> RAM Base Address <0x0-0xFFFFFFFF:8>
41 | <o1> RAM Size (in Bytes) <0x0-0xFFFFFFFF:8>
42 </h>
43 -----
44 RAM_BASE = 0x20000000;
45 RAM_SIZE = 0x00090000;
46
47 /*----- Stack / Heap Configuration -----
48 <h> Stack / Heap Configuration
49 | <o0> Stack Size (in Bytes) <0x0-0xFFFFFFFF:8>
50 | <o1> Heap Size (in Bytes) <0x0-0xFFFFFFFF:8>
51 </h>
52 -----
53 __STACK_SIZE = 0x00000400;
54 __HEAP_SIZE = 0x00000C00;
55
56 /*
57 |----- <<< end of configuration section >>> -----
58 */
--
```

Product Code	Flash Size	SRAM Size
WB32F10xx6	0x8000 (32KB)	0x3000 (12KB)
WB32F10xx8	0x10000 (64KB)	0x5000 (20KB)
WB32F10xx9	0x18000 (96KB)	0x7000 (28KB)
WB32F10xxB	0x20000 (128KB)	0x7000 (28KB)
WB32F10xxC	0x40000 (256KB)	0x9000 (36KB)

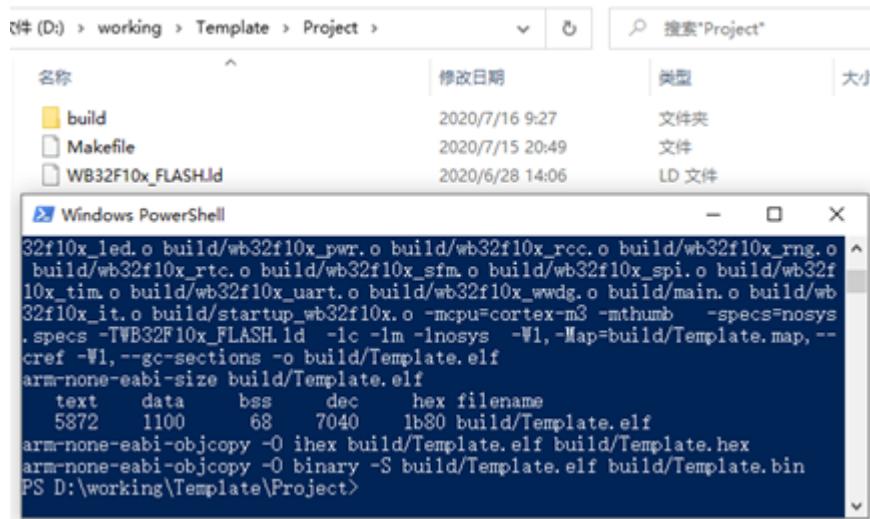
Step 08. Open the **Windows PowerShell** (command line) in the Template\Project directory.

Step 09. Enter mingw32-make and start compiling



```
PS D:\working\Template\Project> mingw32-make
```

After the compilation is successful, the output is as follows:

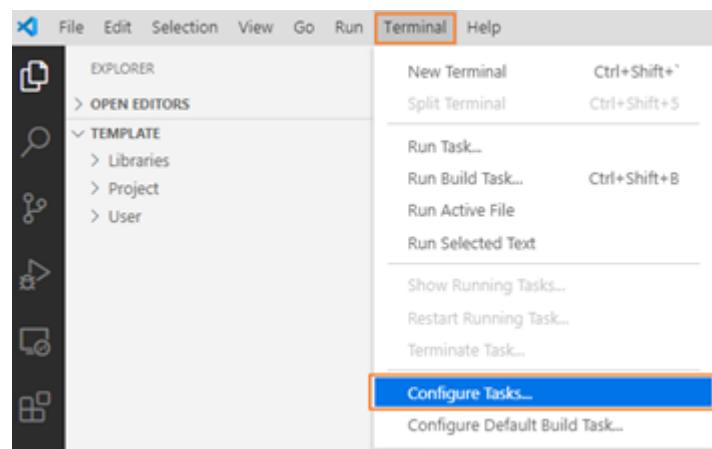


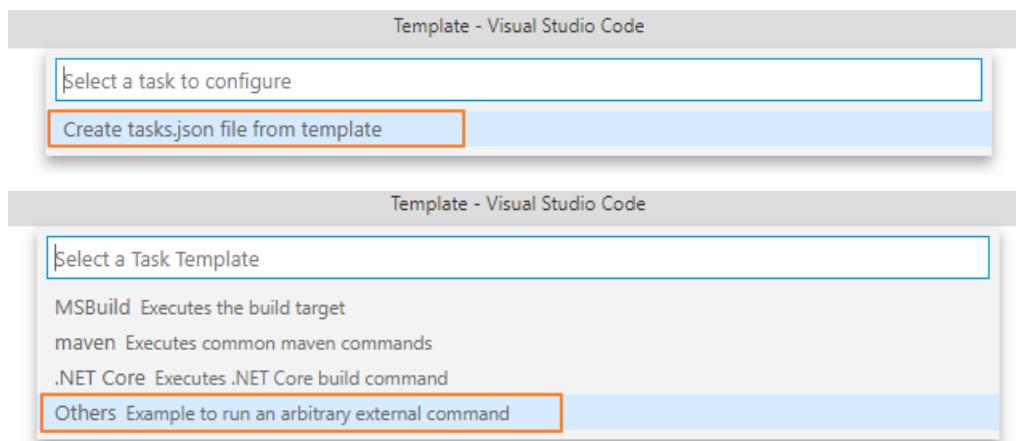
```
32f10x_1ed.o build/wb32f10x_pwr.o build/wb32f10x_rcc.o build/wb32f10x_rng.o  
build/wb32f10x_rtc.o build/wb32f10x_sfm.o build/wb32f10x_spi.o build/wb32f10x_tim.o build/wb32f10x_uart.o build/wb32f10x_wwdg.o build/main.o build/wb32f10x_it.o build/startup_wb32f10x.o -mcpu=cortex-m3 -mthumb -specs=nosys.specs -TWB32F10x_FLASH.1d -lc -lm -lnosys -Wl,-Map=build\Template.map,--cref -Wl,--gc-sections -o build\Template.elf  
arm-none-eabi-size build\Template.elf  
text data bss dec hex filename  
5872 1100 68 7040 1b80 build\Template.elf  
arm-none-eabi-objcopy -O ihex build\Template.elf build\Template.hex  
arm-none-eabi-objcopy -O binary -S build\Template.elf build\Template.bin  
PS D:\working\Template\Project>
```

3 Simplify Compilation Step

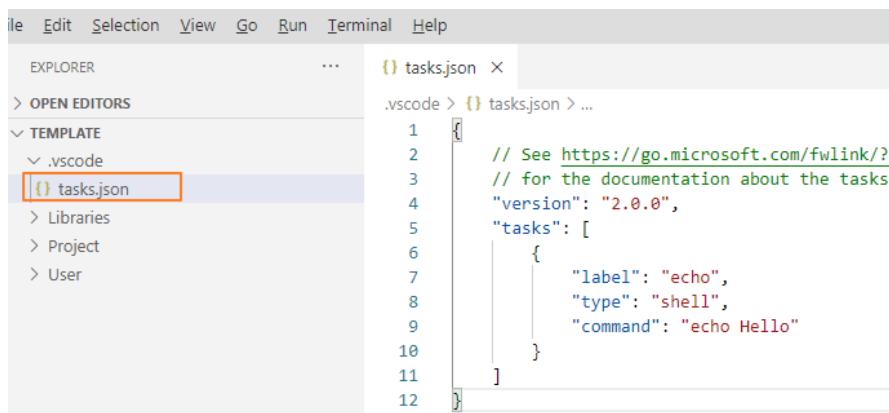
In the previous step, we have been able to successfully compile the project source code of WB32F10x. In order to simplify the compilation step in VS Code, we need to create a task in VS Code. The steps are as follows:

Step 01. As shown below:





At this point, a **tasks.json** appears in the .VS Code directory.



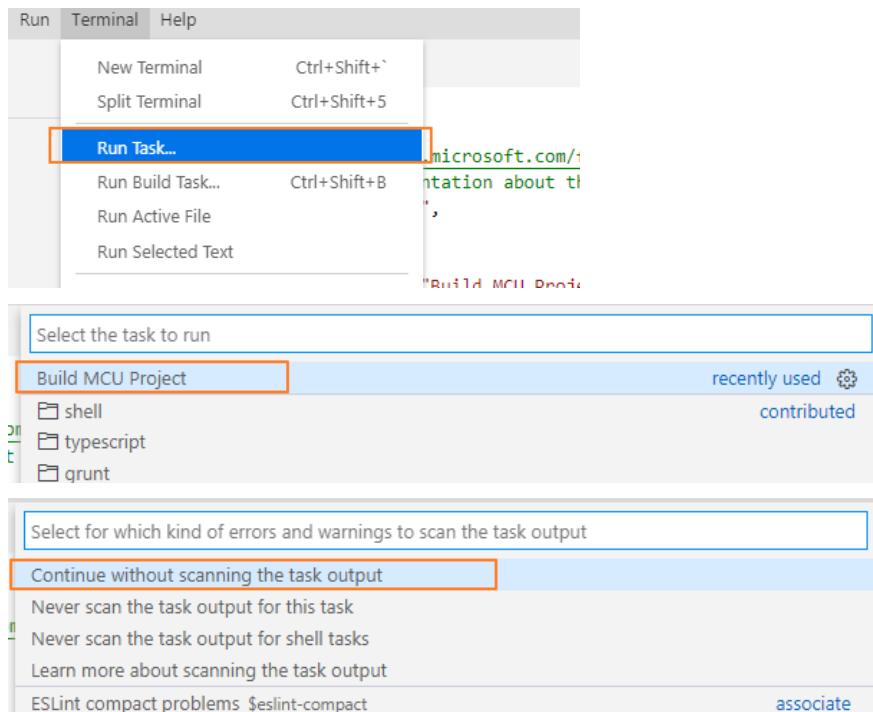
Step 02, Modify **tasks.json** to the following content

```

{
  // See https://go.microsoft.com/fwlink/?LinkId=733558
  // for the documentation about the tasks.json format
  "version": "2.0.0",
  "tasks": [
    {
      "label": "Build MCU Project",
      "type": "shell",
      "command": "mingw32-make -C ${workspaceRoot}/Project"
    }
  ]
}

```

Step 03, Run the task created in VS Code in the previous step



Then you can see the task start running and print the output:



```

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE 1: Task - Build MCU Pro ▾ + □ ⌂ ^ ×
libraries/WB32F10x_StdPeriph_Driver/inc -I../../User -Og -Wall -fdata-sections -ffunction-sections
-g -gdwarf-2 -MMD -MP -MF"build/startup_wb32f10x.d" ..../Libraries/OMSIS/Device/WB/WB32F10x/sta
rtup/gcc/startup_wb32f10x.S -o build/startup_wb32f10x.o
arm-none-eabi-gcc build/system_wb32f10x.o build/misc.o build/wb32f10x_adc.o build/wb32f10x_anc
tl.o build/wb32f10x_bkp.o build/wb32f10x_crc.o build/wb32f10x_dmac.o build/wb32f10x_exti.o bui
ld/wb32f10x_fmc.o build/wb32f10x_gpio.o build/wb32f10x_i2c.o build/wb32f10x_i2s.o build/wb32f1
0x_iwdg.o build/wb32f10x_led.o build/wb32f10x_pwr.o build/wb32f10x_rcc.o build/wb32f10x_rng.o
build/wb32f10x_rtc.o build/wb32f10x_sfm.o build/wb32f10x_spi.o build/wb32f10x_tim.o build/wb32
f10x_uart.o build/wb32f10x_wwdg.o build/main.o build/wb32f10x_it.o build/startup_wb32f10x.o -m
cpu=cortex-m3 -mthumb -specs=nosys.specs -Twb32f10x_FLASH.ld -lc -lm -lnosys -Wl,-Map=buil
d/Template.map,--cref -Wl,--gc-sections -o build/Template.elf
arm-none-eabi-size build/Template.elf
text data bss dec hex filename
5872 1100 68 7040 1b80 build/Template.elf
arm-none-eabi-objcopy -O ihex build/Template.elf build/Template.hex
arm-none-eabi-objcopy -O binary -S build/Template.elf build/Template.bin
mingw32-make: Leaving directory 'D:/working/Template/Project'

```

Terminal will be reused by tasks, press any key to close it.

4 Configure the debug environment

Step 01, Create a new folder named **WestBerryTech** in the J-Link installation directory:

C:\Program Files (x86)\SEGGER\JLink_V614b\Devices

And then create a new folder named **WB32F10x** in the **WestBerryTech** folder.

Step 02, Copy the **WB32F10x_256.FLM** (programming algorithm file) to

C:\Program Files (x86)\SEGGER\JLink_V614b\Devices\WestBerryTech\WB32F10x



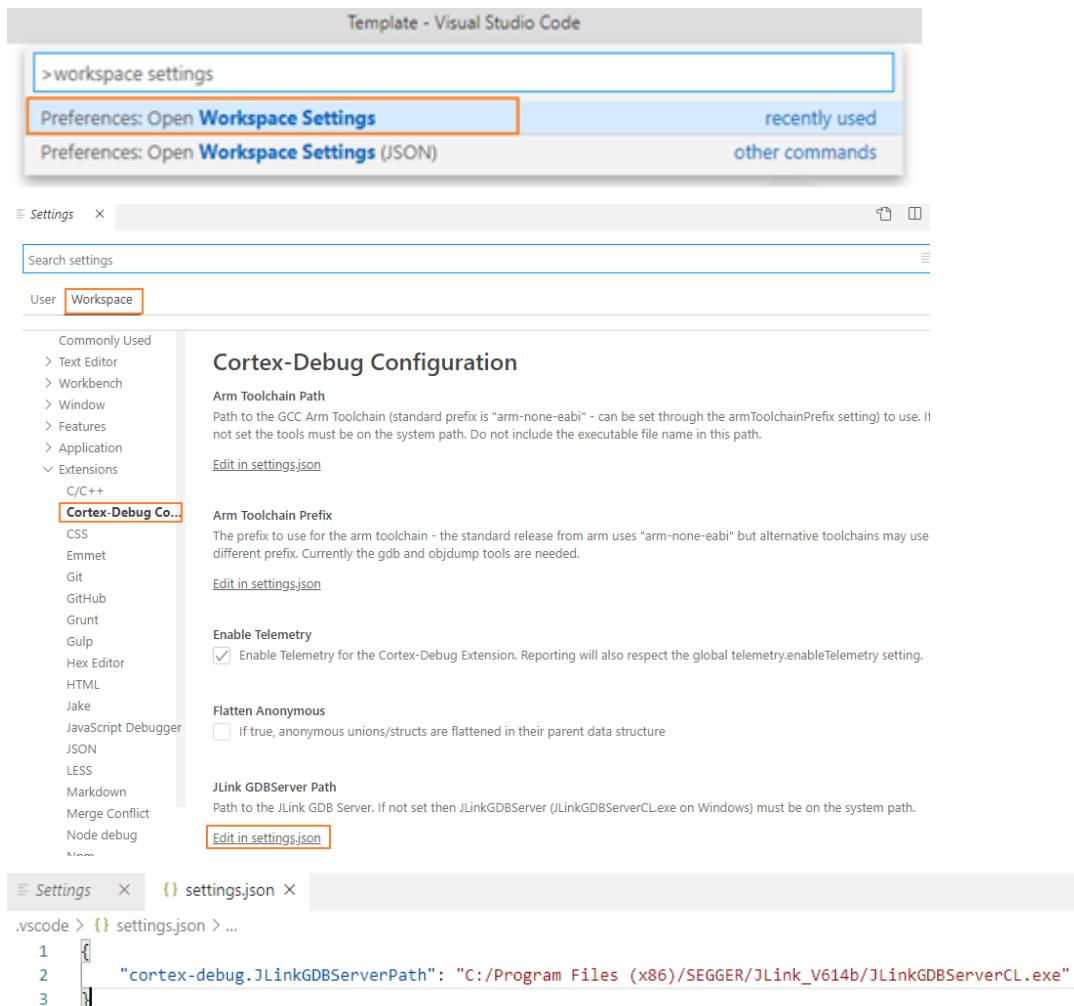
Step 03, Add WB32F10x information to **JLinkDevices.xml** file and save it.

(**JLinkDevices.xml** file is in C:\ProgramFiles(x86)\SEGGER\JLink_V614b\ path)

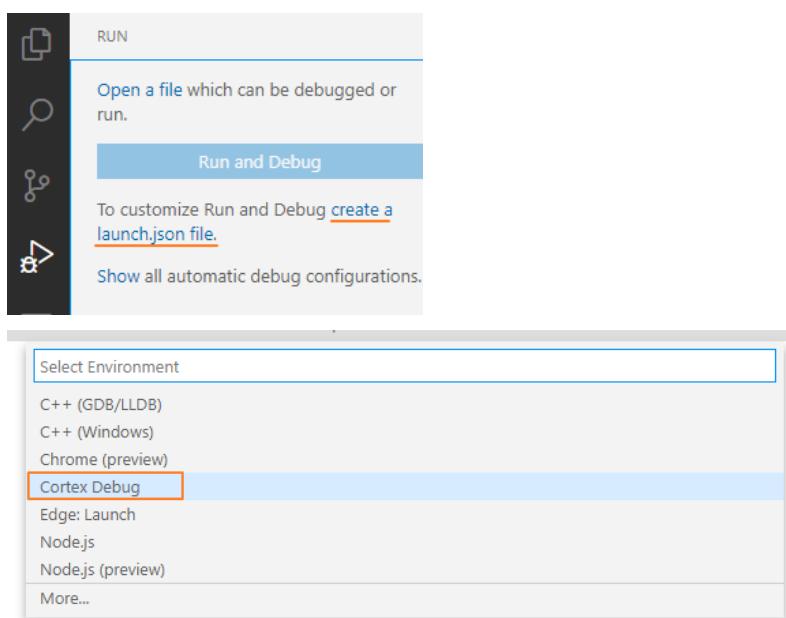
```
<Device>
    <ChipInfo Vendor="WB" Name="WB32F10x" Core="JLINK_CORE_CORTEX_M3" WorkRAMAddr="0x2000000" WorkRAMSize="0x9000" />
    <FlashBankInfo Name="Internal Flash" BaseAddr="0x08000000" MaxSize="0x40000" Loader="Devices\WestBerry\WB32F10x\WB32F10x_256.FLM"
        LoaderType="FLASH_ALGO_TYPE_CMSIS" AlwaysPresent="1" />
</Device>
```

```
1  <Database>
2      <Device>
3          <ChipInfo Vendor="WestBerryTech" Name="WB32F10x" Core="JLINK_CORE_CORTEX_M3" WorkRAMAddr="0x2000000" WorkRAMSize="0x1000" />
4              <FlashBankInfo Name="Internal Flash" BaseAddr="0x08000000" MaxSize="0x40000" Loader="Devices\WestBerry\WB32F10x\WB32F10x_256.FLM" LoaderType="FLASH_ALGO_TYPE_CMSIS" AlwaysPresent="1" />
5      </Device>
6      <Device>
7          <ChipInfo Vendor="ATMEL" Name="ATSAMA5D27" Core="JLINK_CORE_CORTEX_A5" WorkRAMAddr="0x00200000" WorkRAMSize="0x00020000" JLinkScriptFile="Devices\ATMEL\SAMAS5D2.JLinkScript" />
8              <FlashBankInfo Name="QSPI Flash" BaseAddr="0xD0000000" MaxSize="0x02000000" Loader="Devices\ATMEL\SAMAS5D2\SAMAS5D2XPLAINED_QSPI.elf" LoaderType="FLASH_ALGO_TYPE_OPEN" />
9      </Device>
```

Step 04, Configure the path to JLink GDBServer in VS Code



Step 05, Create a file to customize Run and Debug

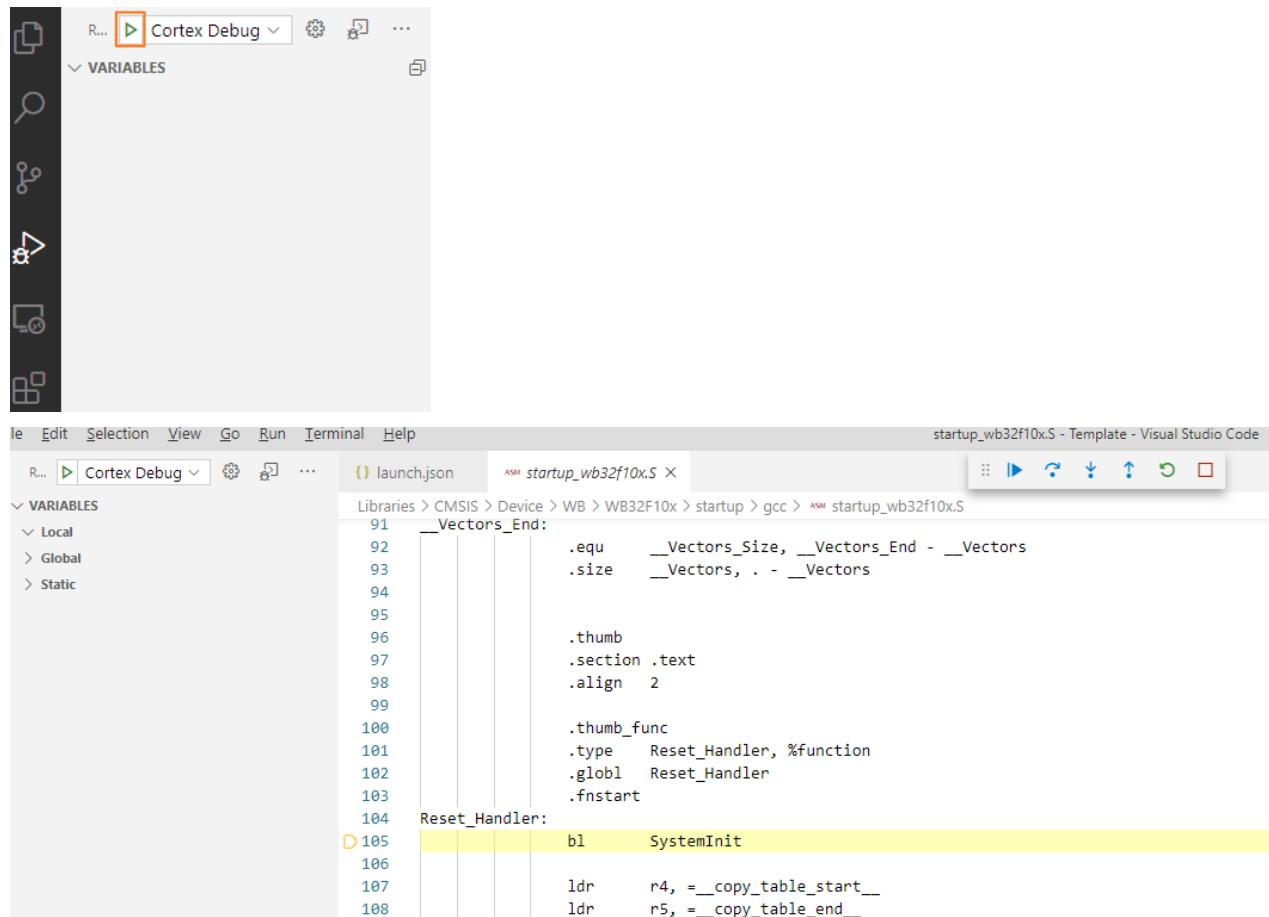


Modify as follows:

```
{
  // Use IntelliSense to learn about possible attributes.
  // Hover to view descriptions of existing attributes.
  // For more information, visit: https://go.microsoft.com/fwlink/?linkid=830346
  "version": "0.2.0",
  "configurations": [
    {
      "name": "Cortex Debug",
      "cwd": "${workspaceRoot}",
      "executable": "./Project/build/Template.elf",
      "request": "launch",
      "type": "cortex-debug",
      "serverType": "jlink",
      "device": "WB32F10x",
      "interface": "swd"
    }
  ]
}
```

Step 06, Use a J-Link emulator to connect to the WB32F10x chip via the SWD interface.

Step 07, Start debugging



Revision History

Revision	Date	Description
1.2	2022/7/5	Initial Release

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