



## **WB32F10x 搭建 GCC 开发环境**

**常州韦斯佰瑞电子科技有限公司**

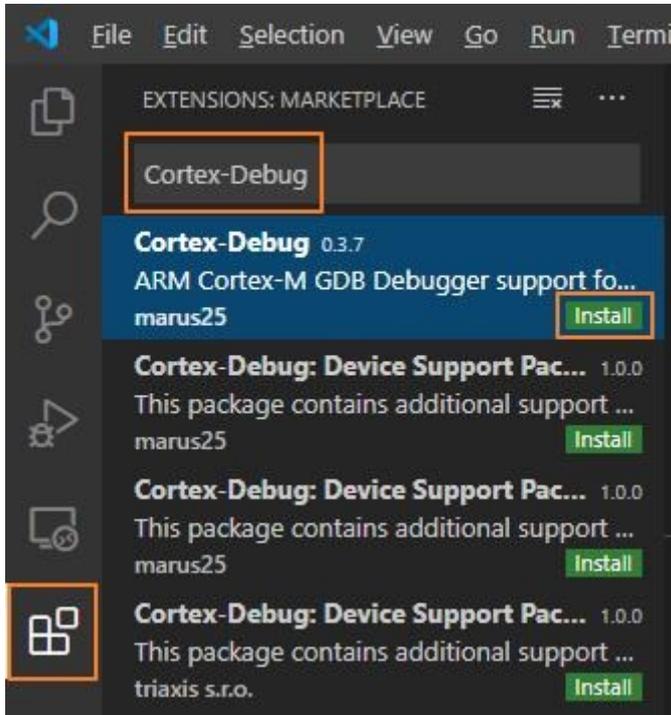
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## 1 安装必要软件

Step 01. 安装 Visual Studio Code: <https://code.visualstudio.com/>

VS Code 安装完成后, 打开 VS Code 软件安装 **Cortex-Debug** 扩展插件。



Step 02. 需要一个 J-Link 下载调试工具, 并安装 J-Link 驱动程序:

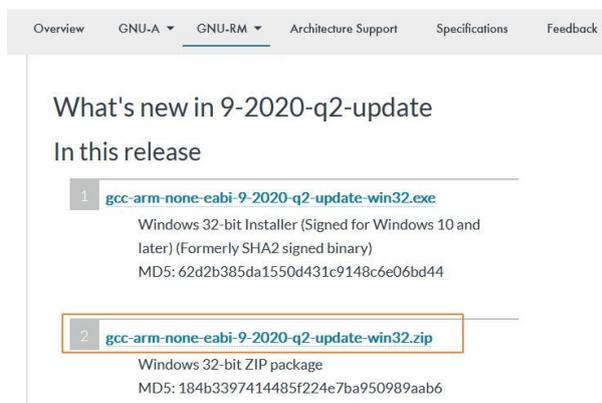
<https://www.segger.com/downloads/jlink>

Step 03. 新建一个文件夹用于存放开发需要用到的工具。在本教程中新建文件夹的路径是:

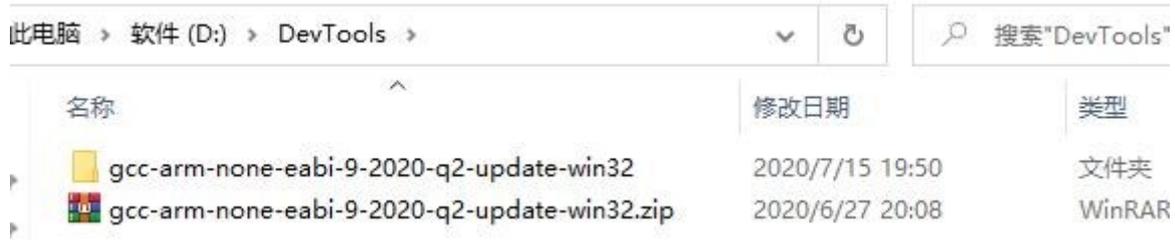
D:\DevTools

Step 04. 下载 GCC-ARM 编译工具链压缩包, 并将其放在 D:\DevTools 文件夹中:

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

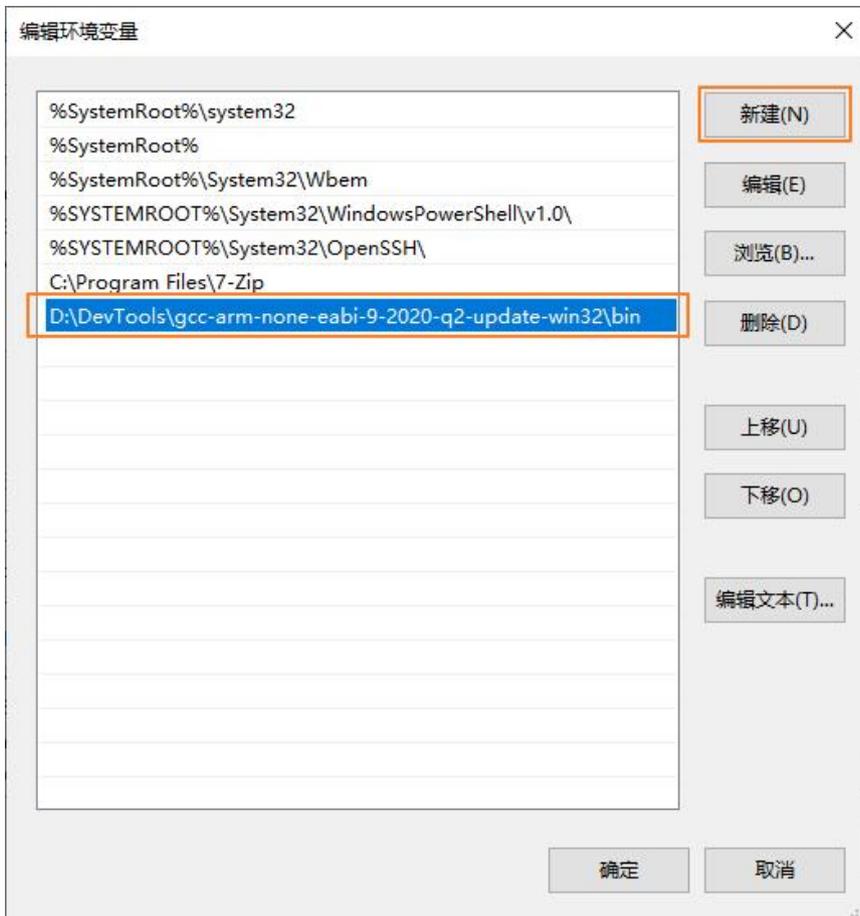
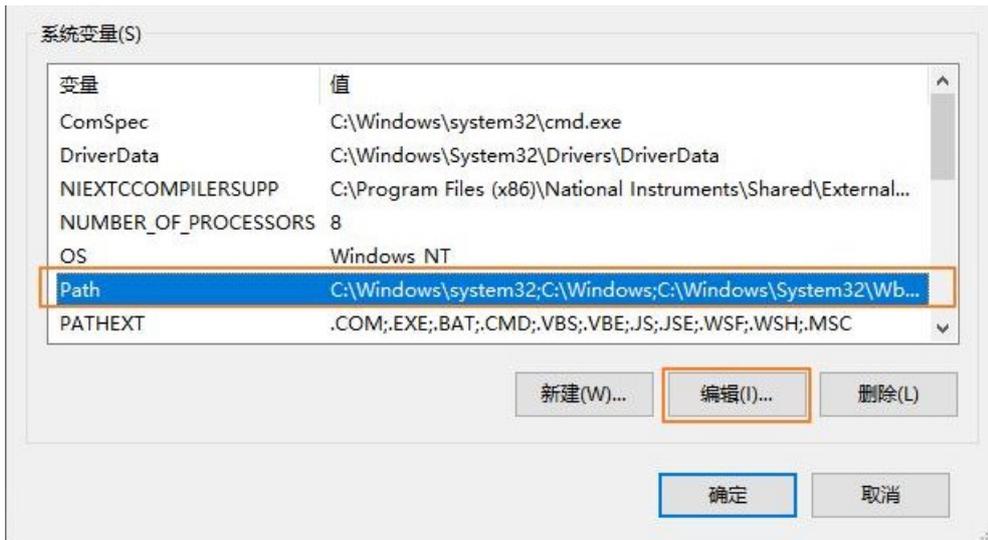


下载后解压 `gcc-arm-none-eabi-9-2020-q2-update-win32.zip` 到 `D:\DevTools` 中。



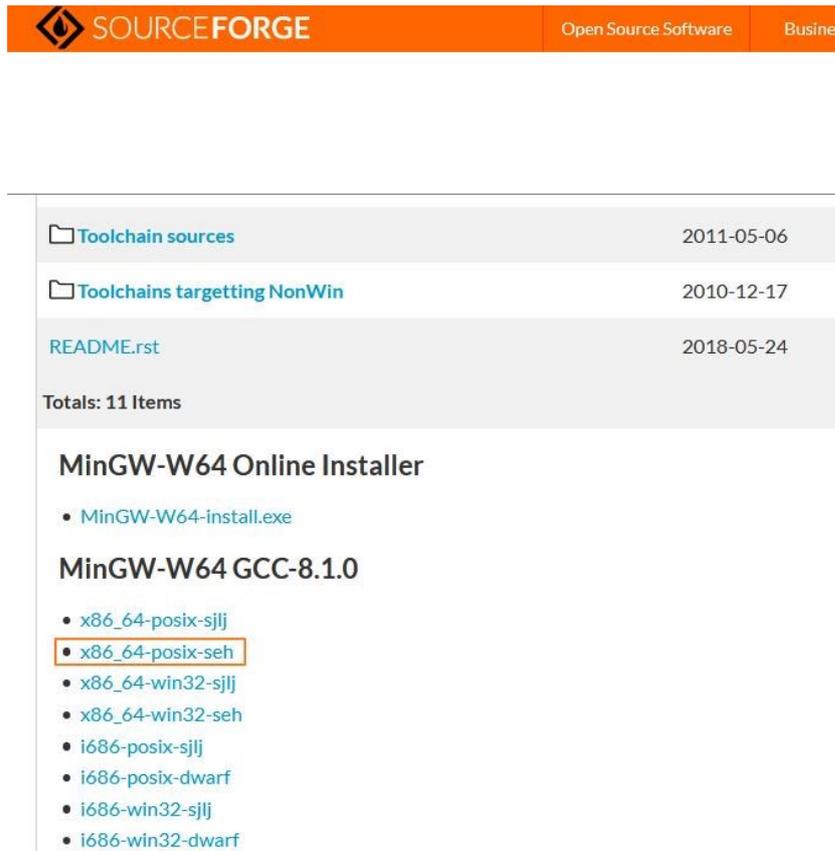
然后将路径 `D:\DevTools\gcc-arm-none-eabi-9-2020-q2-update-win32\bin` 添加到系统环境变量中



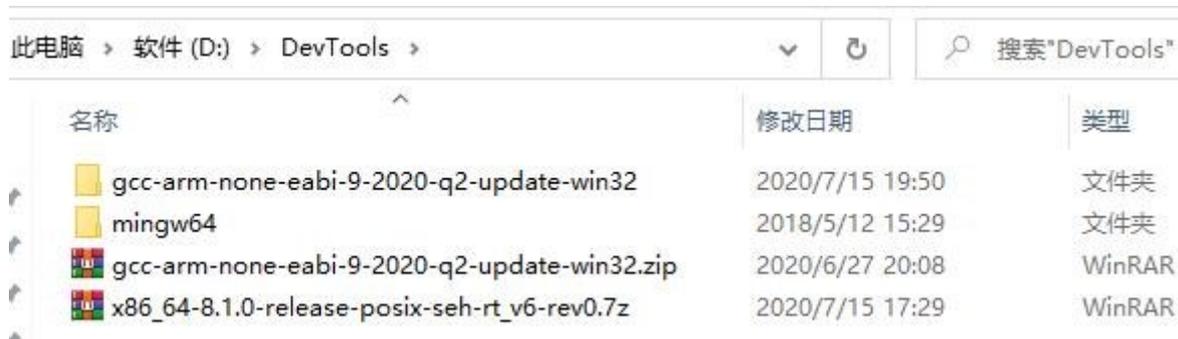


Step 05. 下载 **MinGW-W64** 离线压缩包:

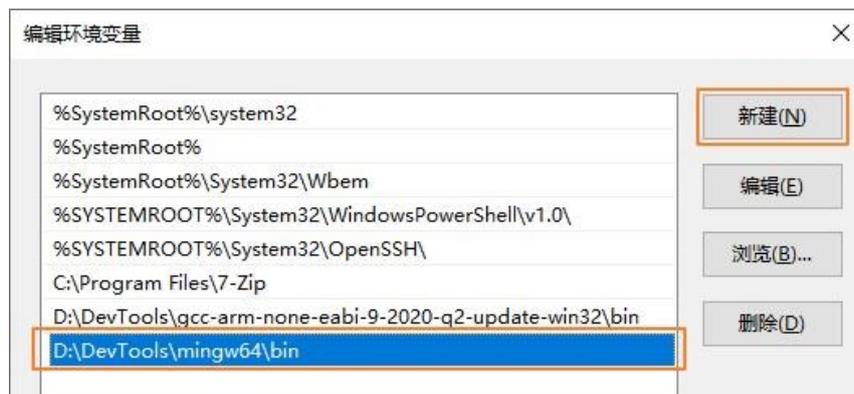
<https://sourceforge.net/projects/mingw-w64/files/>



解压 MinGW-W64 离线压缩包 **x86\_64-8.1.0-release-posix-seh-rt\_v6-rev0.7z** 到 D:\DevTools 中



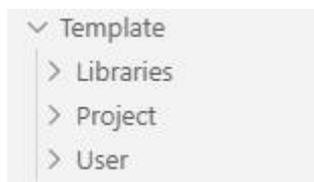
然后将路径 `D:\DevTools\mingw64\bin` 添加到系统环境变量中：



## 2 建立工程和编译

Step 01. 新建一个文件夹命名为 **Template** 的文件夹用以存放整个工程源码。

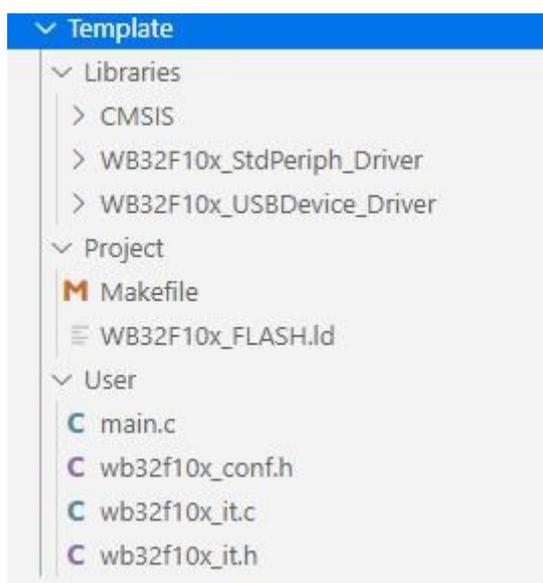
Step 02. 在 **Template** 文件夹中新建 **Libraries**, **Project** 和 **User** 三个子文件夹（当然用户可定义自己工程目录结构）



Step 03. 将 WB32F10x 标准固件库中 **Libraries** 目录中的内容复制到 Template\Libraries 目录中。

Step 04. 将 WB32F10x 标准固件库中 Project\WB32F10x\_StdPeriph\_Template 目录中 **main.c**, **wb32f10x\_conf.h**, **wb32f10x\_it.c**, **wb32f10x\_it.h** 文件复制到 Template\User 目录中。

Step 05. 将 Project\WB32F10x\_StdPeriph\_Template\GCC 中的 **Makefile**, **WB32F10x\_FLASH.ld** 复制到 Template\Project 目录中。



Step 06.使用 VS Code 打开 Template 目录，对 Makefile 文件做如下修改

```
M Makefile X
Project > M Makefile
34 #####
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_sfm.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 X
Project > M Makefile
109 # C defines
110 C_DEFS = \
111 -DUSE_STDPERIPH_DRIVER \
112 -DMAINCLK_FREQ_96MHz
113
114
115 # AS includes
116 AS_INCLUDES =
117
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.** 根据您使用的型号，在 WB32F10x\_FLASH.Id 文件中配置 Flash 和 SRAM 大小，图中以 256KB Flash 和 36KBSRAM 举例（其他型号容量配置可参照下表）。

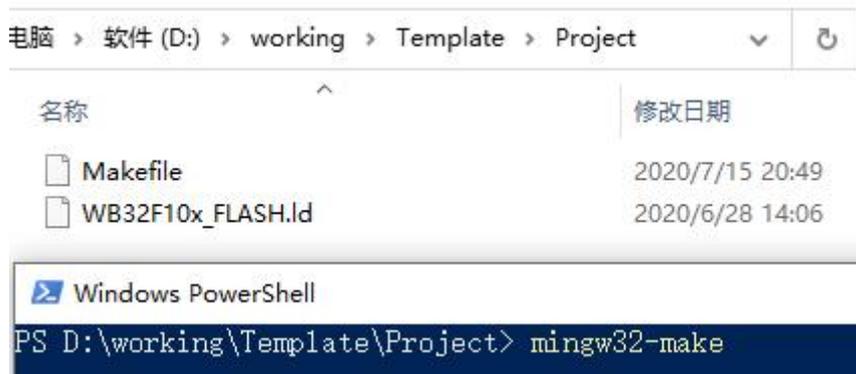
```

WB32F10x_FLASH.Id x
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 = 0x08000000;
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 = 0x00004000;
54  __HEAP_SIZE = 0x0000C000;
55
56  /*
57  *----- <<< end of configuration section >>> -----
58  */
--

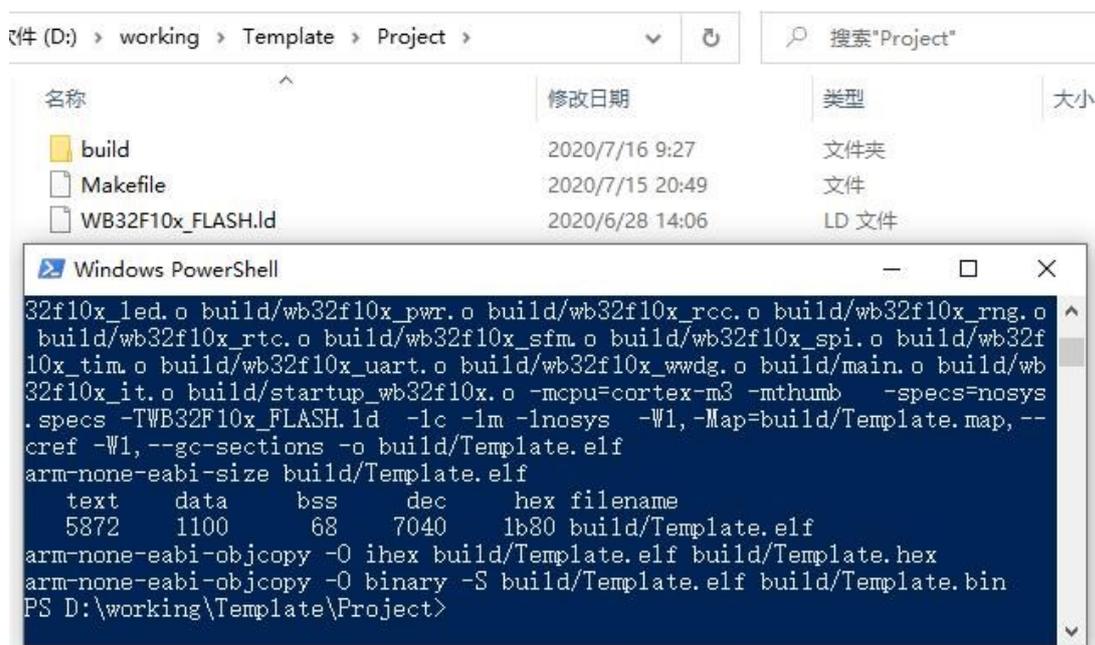
```

型号	Flash 大小	SRAM 大小
WB32F10xx6 / WB32F11xx6	0x8000 (32KB)	0x3000 (12KB)
WB32F10xx8 / WB32F11xx6	0x10000 (64KB)	0x5000 (20KB)
WB32F10xx9 / WB32F11xx9	0x18000 (96KB)	0x7000 (28KB)
WB32F10xxB / WB32F11xxB	0x20000 (128KB)	0x7000 (28KB)
WB32F10xxC / WB32F11xxC	0x40000 (256KB)	0x9000 (36KB)

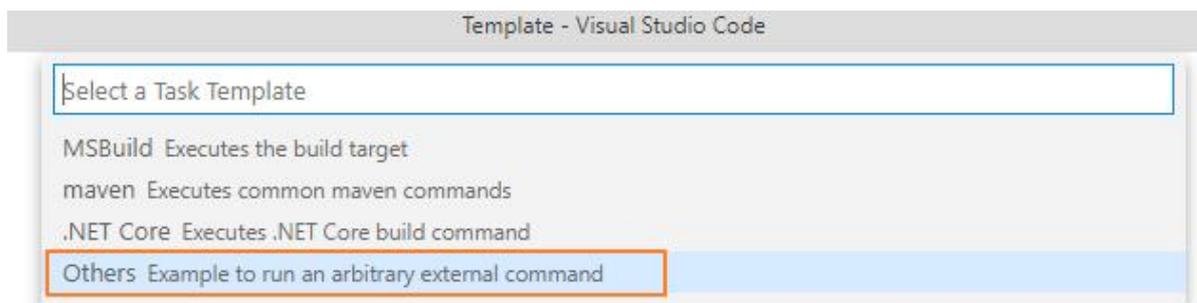
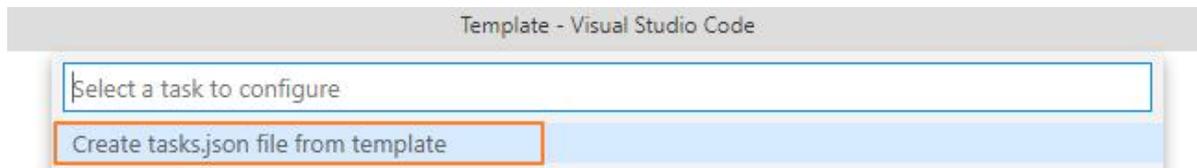
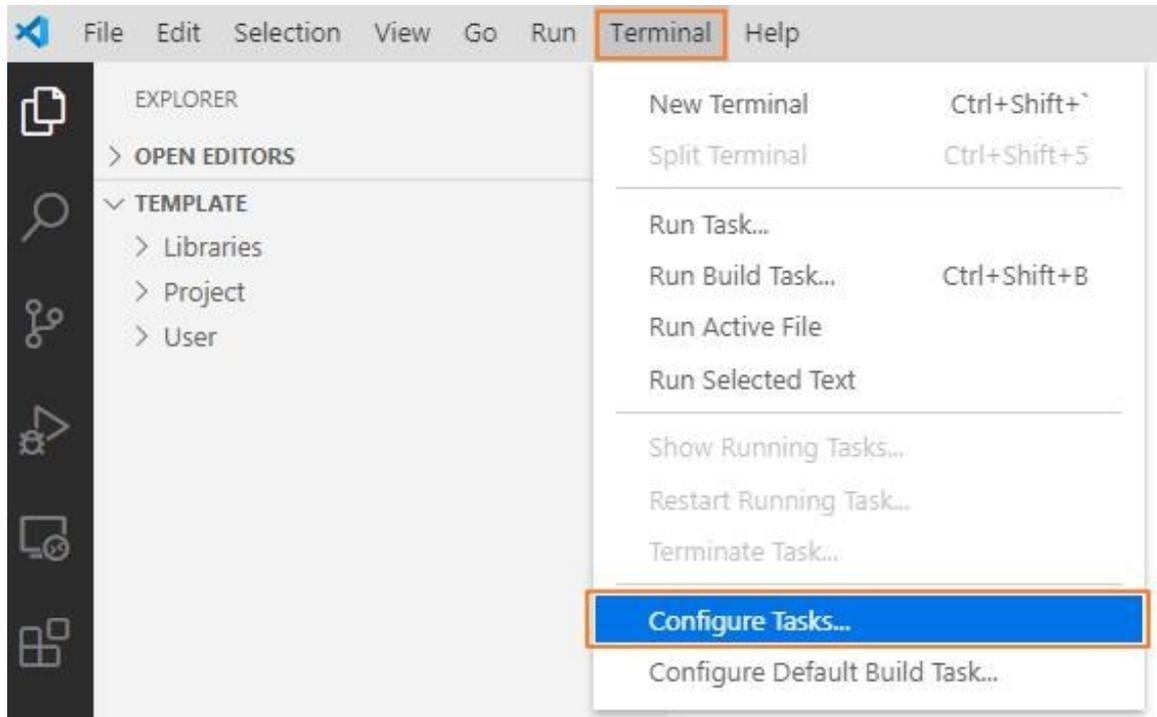
Step 08. 在 `Template\Project` 目录中打开命令行，输入 `mingw32-make`，开始编译：



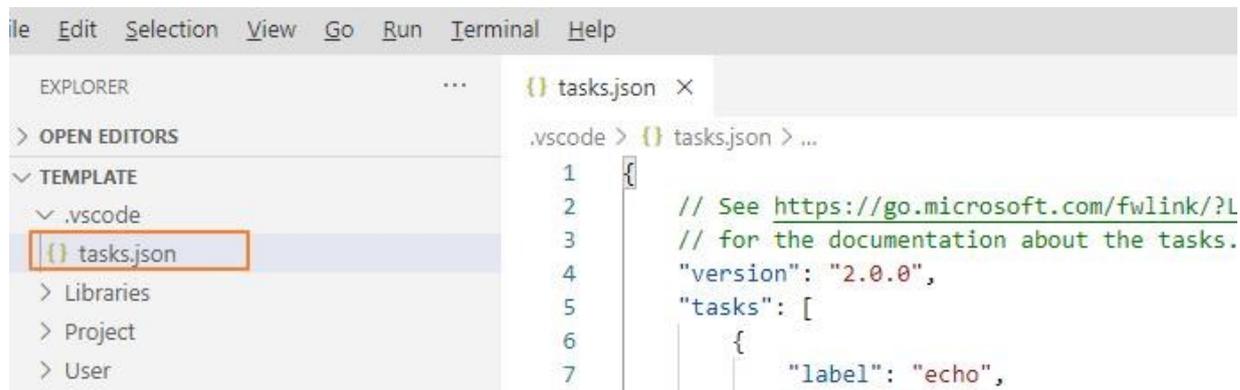
编译成功后，输出如下：



Step 09. 在上一步我们已经能够成功编译 WB32F10x 的工程源码了，为了在 VS Code 中简化编译这一步骤，我们需要在 VS Code 中创建一个任务。步骤如下所示：

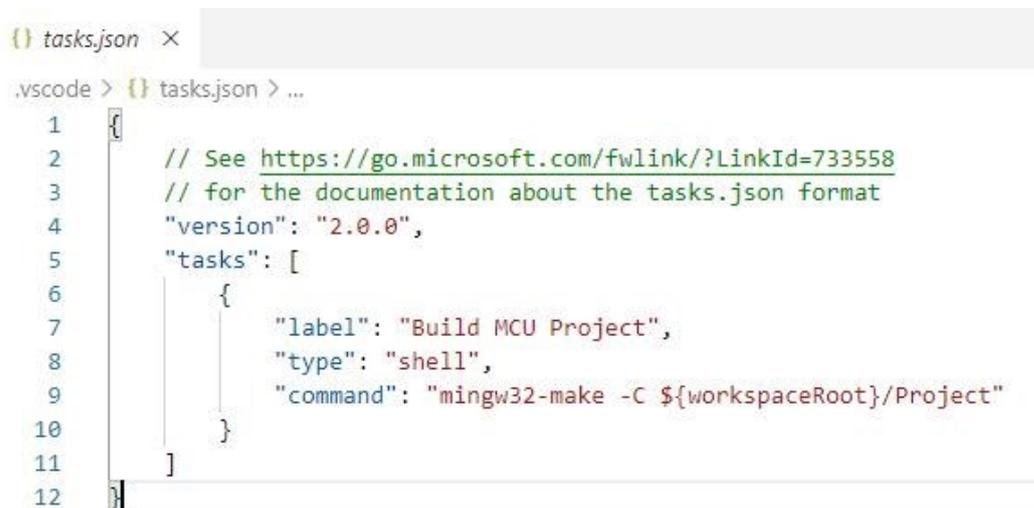


此时，在.vscode 目录中就出现了一个 tasks.json



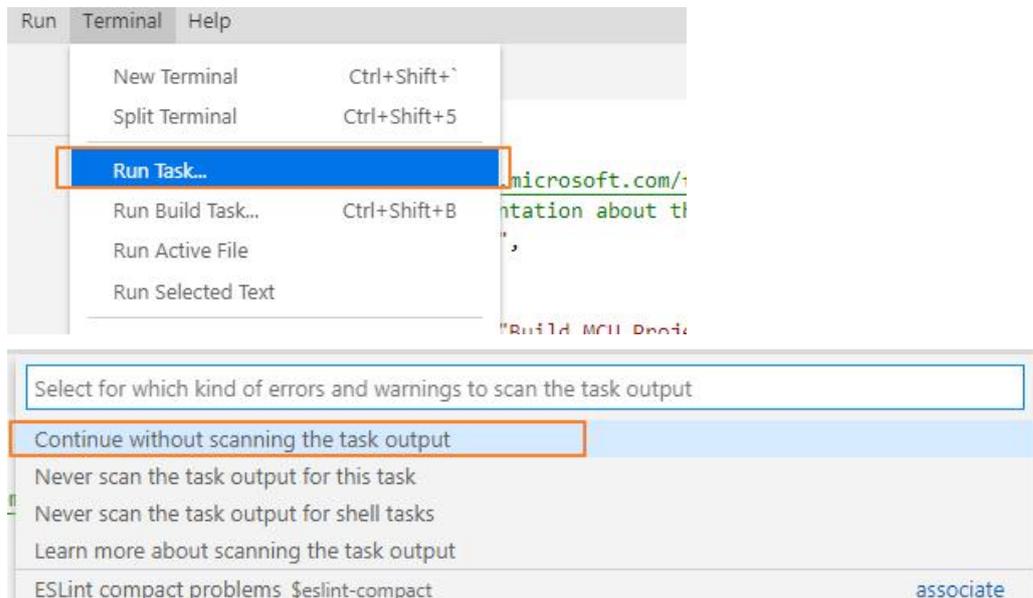
```
File Edit Selection View Go Run Terminal Help
EXPLORER ... {} tasks.json x
> OPEN EDITORS
TEMPLATE
  .vscode
  {} tasks.json
  Libraries
  Project
  User
.vscode > {} tasks.json > ...
1 {}
2 // See https://go.microsoft.com/fwlink/?L
3 // for the documentation about the tasks.
4 "version": "2.0.0",
5 "tasks": [
6   {
7     "label": "echo",
```

修改 tasks.json 为如下内容:



```
{} tasks.json x
.vscode > {} tasks.json > ...
1 {}
2 // See https://go.microsoft.com/fwlink/?LinkId=733558
3 // for the documentation about the tasks.json format
4 "version": "2.0.0",
5 "tasks": [
6   {
7     "label": "Build MCU Project",
8     "type": "shell",
9     "command": "mingw32-make -C ${workspaceRoot}/Project"
10  }
11 ]
12
```

Step 10. 运行上一步在 VS Code 中创建的任务:



然后可以看到任务开始运行，并打印输出结果。

```

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/CMSIS/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_fsmc.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.

```

### 3 配置调试环境

**Step 01.** 在 J-Link 安装目录 `C:\Program Files (x86)\SEGGER\JLink_V614b\Devices` 中新建一个名为 **WestBerryTech** 的文件夹；并在 `WestBerryTech` 文件夹中新建一个名为 **WB32F10x** 的文件夹。

**Step 02.** 将 WB32F10x 的烧录算法文件 **WB32F10x\_256.FLM** 复制到

`C:\Program Files(x86)\SEGGER\JLink_V614b\Devices\WestBerryTech\WB32F10x` 文件夹中



**Step 03.** 在 `C:\Program Files (x86)\SEGGER\JLink_V614b\JLinkDevices.xml` 文件中添加 WB32F10x 的信息并保存。

<Device>

```
<ChipInfo Vendor="WestBerryTech" Name="WB32F10x" Core="JLINK_CORE_CORTEX_M3"
WorkRAMAddr="0x20000000" WorkRAMSize="0x1000" />
```

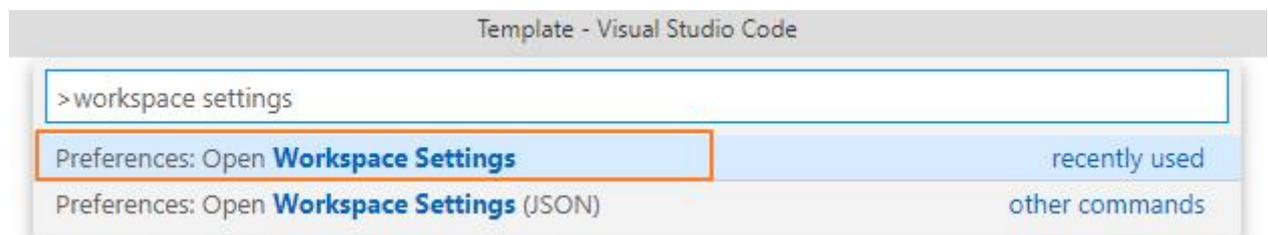
```
<FlashBankInfo Name="Internal Flash" BaseAddr="0x08000000" MaxSize="0x40000"
Loader="Devices\WestBerryTech\WB32F10x\WB32F10x_256.FLM"
```

```
LoaderType="FLASH_ALGO_TYPE_CMSIS" AlwaysPresent="1" />
```

</Device>



**Step 04.** 在 VS Code 中配置 JLink GDBServer 的路径



Settings ×

Search settings

User **Workspace**

Commonly Used

- > Text Editor
- > Workbench
- > Window
- > Features
- > Application
- ▼ Extensions
  - C/C++
  - Cortex-Debug Co...**
  - CSS
  - Emmet
  - Git
  - GitHub
  - Grunt
  - Gulp
  - Hex Editor
  - HTML
  - Jake
  - JavaScript Debugger
  - JSON
  - LESS
  - Markdown
  - Merge Conflict
  - Node debug

## Cortex-Debug Configuration

**Arm Toolchain Path**  
Path to the GCC Arm Toolchain (standard prefix is "arm-none-eabi" - can be set through the armToolchainPrefix setting) to use. If not set the tools must be on the system path. Do not include the executable file name in this path.  
[Edit in settings.json](#)

**Arm Toolchain Prefix**  
The prefix to use for the arm toolchain - the standard release from arm uses "arm-none-eabi" but alternative toolchains may use different prefix. Currently the gdb and objdump tools are needed.  
[Edit in settings.json](#)

**Enable Telemetry**  
 Enable Telemetry for the Cortex-Debug Extension. Reporting will also respect the global telemetry.enableTelemetry setting.

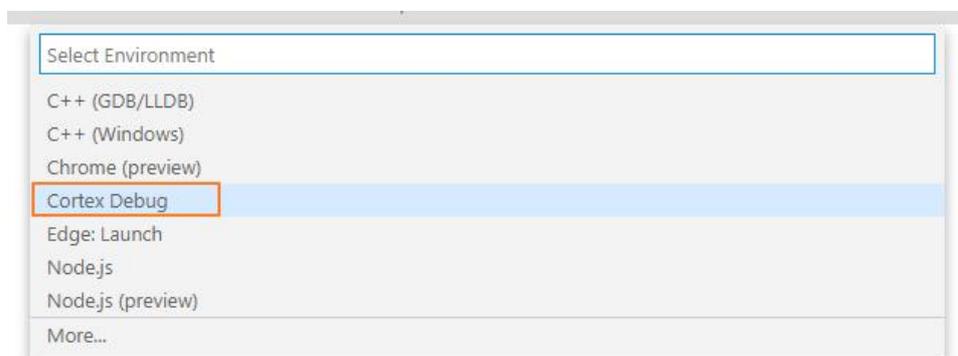
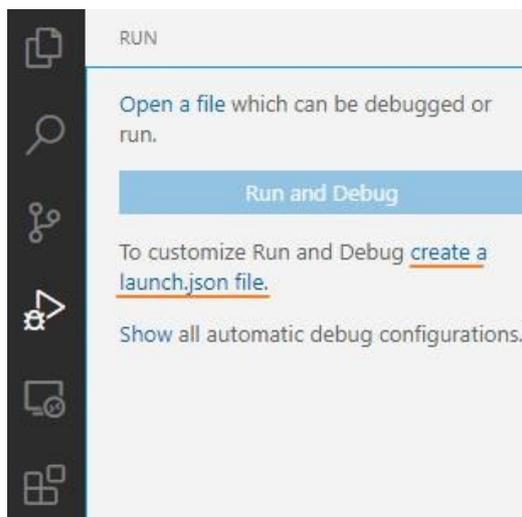
**Flatten Anonymous**  
 If true, anonymous unions/structs are flattened in their parent data structure

**JLink GDBServer Path**  
Path to the JLink GDB Server. If not set then JLinkGDBServer (JLinkGDBServerCL.exe on Windows) must be on the system path.  
[Edit in settings.json](#)

Settings × settings.json ×

```
.vscode > settings.json > ...
1  {
2    "cortex-debug.JLinkGDBServerPath": "C:/Program Files (x86)/SEGGER/JLink_V614b/JLinkGDBServerCL.exe"
3  }
```

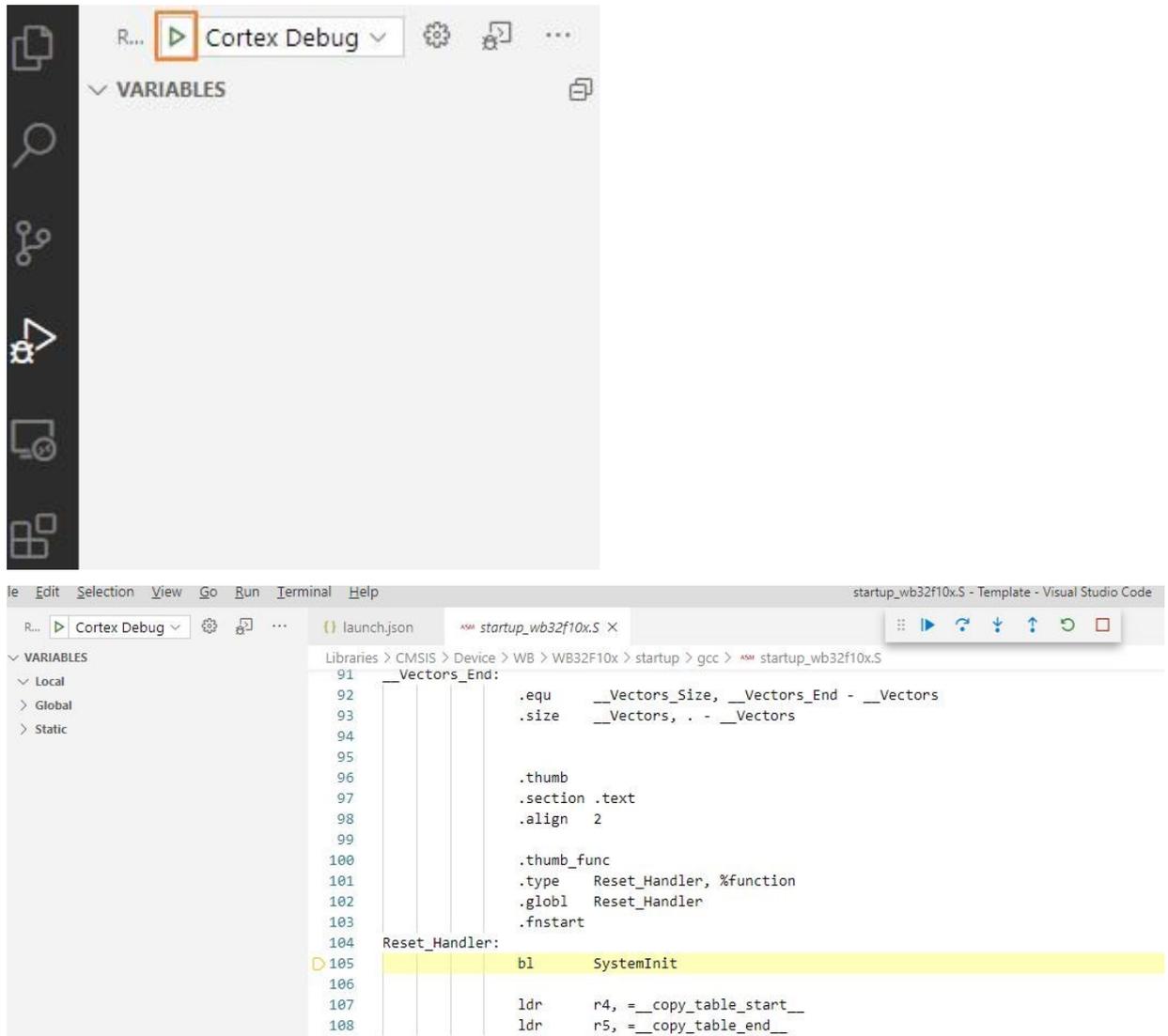
## Step 05. 创建调试启动配置文件



修改如下:

```
{ launch.json X
.vscode > {} launch.json > ...
1  {
2    // Use IntelliSense to learn about possible attributes.
3    // Hover to view descriptions of existing attributes.
4    // For more information, visit: https://go.microsoft.com/fwlink/?linkid=845120
5    "version": "0.2.0",
6    "configurations": [
7      {
8        "name": "Cortex Debug",
9        "cwd": "${workspaceRoot}",
10       "executable": "./Project/build/Template.elf",
11       "request": "launch",
12       "type": "cortex-debug",
13       "servertype": "jlink",
14       "device": "WB32F10x",
15       "interface": "swd"
16     }
17   ]
18 }
```

Step 06. 使用 J-Link 下载调试工具通过 SWD 连接到 WB 芯片，并在 VS Code 中开始调试



## 版本历史

Revision	Date	Description
1.2	2020/09/05	Initial Release

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