

Keil μ Vision 5 Setup

Prepared by

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Signal Stream Inc

Go to keil.com and click on download

The screenshot shows the Keil Embedded Development Tools website. The browser's address bar displays <https://www.keil.com>. The website's header features the 'arm KEIL' logo and a navigation menu with the following items: Home, Products, Download (highlighted with a red rectangle), Events, Support, and Videos. A search bar is located to the right of the navigation menu.

The main content area is titled 'Embedded Development Tools' and includes several promotional sections:

- ULINKplus**: Debug adapter for power optimization and test automation.
- arm DESIGNSTART**: Creating a custom chip has never been easier...
- arm KEIL MDK**: Best tools for STM32F0, STM32G0, and STM32L0 available for free!

Below these sections is a video player titled 'Multi-core debugging with MDK' showing a diagram of a multi-core system with Cortex-M4 and Cortex-M0+ cores.

The left sidebar contains the following sections:

- Product Information**: Product Overview, Supported Microcontrollers, Shows and Seminars.
- Technical Support**: Support Knowledgebase, Product Manuals, Application Notes, Discussion Forum.
- Software Downloads**: Product Downloads, File Downloads.
- Other Information**: Books, Links.
- Contact Information**: Corporate, Sales Channels, Distributors.

The right sidebar contains the following sections:

- News**:
 - embedded world 2019 Retrospective
 - MDK supports STMicroelectronics STM32MP1
 - MDK editions for Nuvoton devices
- Updates**:
 - MDK-ARM V5.27
 - Notify Me! Receive e-mail when new updates are available.
- Events**:
 - 4/18/2019: LPC5500 Cortex-M33 Workshop

Click on Product download

The screenshot shows the 'Keil Downloads' website. The browser's address bar displays 'https://www.keil.com/download/'. The website's header features the 'arm KEIL' logo and a navigation menu with links to 'Products', 'Download', 'Events', 'Support', and 'Videos'. A search bar is also present. The main content area is titled 'Overview' and contains two sections: 'Product Downloads' (highlighted with a red box) and 'File Downloads'. The 'Product Downloads' section includes a CD icon and text stating 'Download current and previous versions of the Keil development tools.' The 'File Downloads' section includes a folder icon and text stating 'Download example projects and various utilities which enable you to extend the capabilities of your Keil development tools.' The footer contains a grid of links categorized under 'Products', 'Downloads', 'Support', and 'Contact', along with a copyright notice and the 'arm' logo.

Keil Downloads

https://www.keil.com/download/


arm KEIL

Products Download Events Support Videos

Search Keil...


Overview

Keil downloads include software products and updates, example programs and various utilities you may use to learn about or extend the capabilities of your Keil development tools.



Product Downloads

Download current and previous versions of the Keil development tools.



File Downloads

Download example projects and various utilities which enable you to extend the capabilities of your Keil development tools.

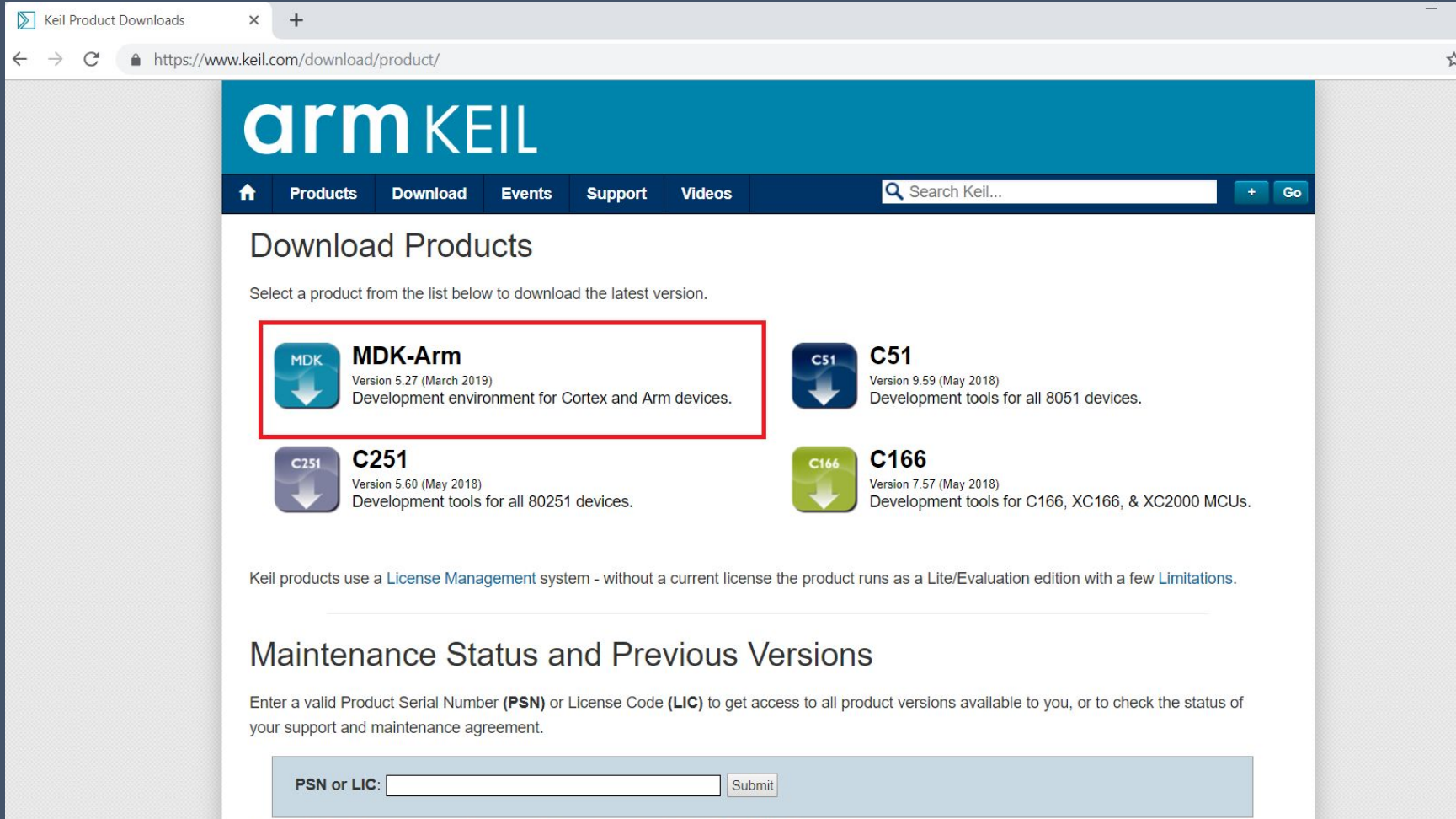
Products	Downloads	Support	Contact
Development Tools	MDK-Arm	Knowledgebase	Distributors
Arm	C51	Discussion Forum	Request a Quote
C166	C166	Product Manuals	Sales Contacts
C51	C251	Application Notes	
C251	File downloads		
µVision IDE and Debugger			
Hardware & Collateral			
ULINK Debug Adaptors			
Evaluation Boards			
Product Brochures			
Device Database			
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arm

Click on MKD-ARM



The screenshot shows a web browser window with the address bar displaying "https://www.keil.com/download/product/". The page features a blue header with the "arm KEIL" logo. Below the header is a navigation bar with links for Home, Products, Download, Events, Support, and Videos, along with a search bar. The main content area is titled "Download Products" and includes a sub-header "Select a product from the list below to download the latest version." Four product cards are displayed: MDK-Arm (Version 5.27, March 2019), C51 (Version 9.59, May 2018), C251 (Version 5.60, May 2018), and C166 (Version 7.57, May 2018). The MDK-Arm card is highlighted with a red rectangular box. Below the product cards, a note states that Keil products use a License Management system. At the bottom, there is a section for "Maintenance Status and Previous Versions" with a form to enter a Product Serial Number (PSN) or License Code (LIC) and a "Submit" button.

Keil Product Downloads

https://www.keil.com/download/product/


arm KEIL


Home Products Download Events Support Videos


Search Keil...


Download Products

Select a product from the list below to download the latest version.

**MDK-Arm**
Version 5.27 (March 2019)
Development environment for Cortex and Arm devices.

**C51**
Version 9.59 (May 2018)
Development tools for all 8051 devices.

**C251**
Version 5.60 (May 2018)
Development tools for all 80251 devices.

**C166**
Version 7.57 (May 2018)
Development tools for C166, XC166, & XC2000 MCUs.

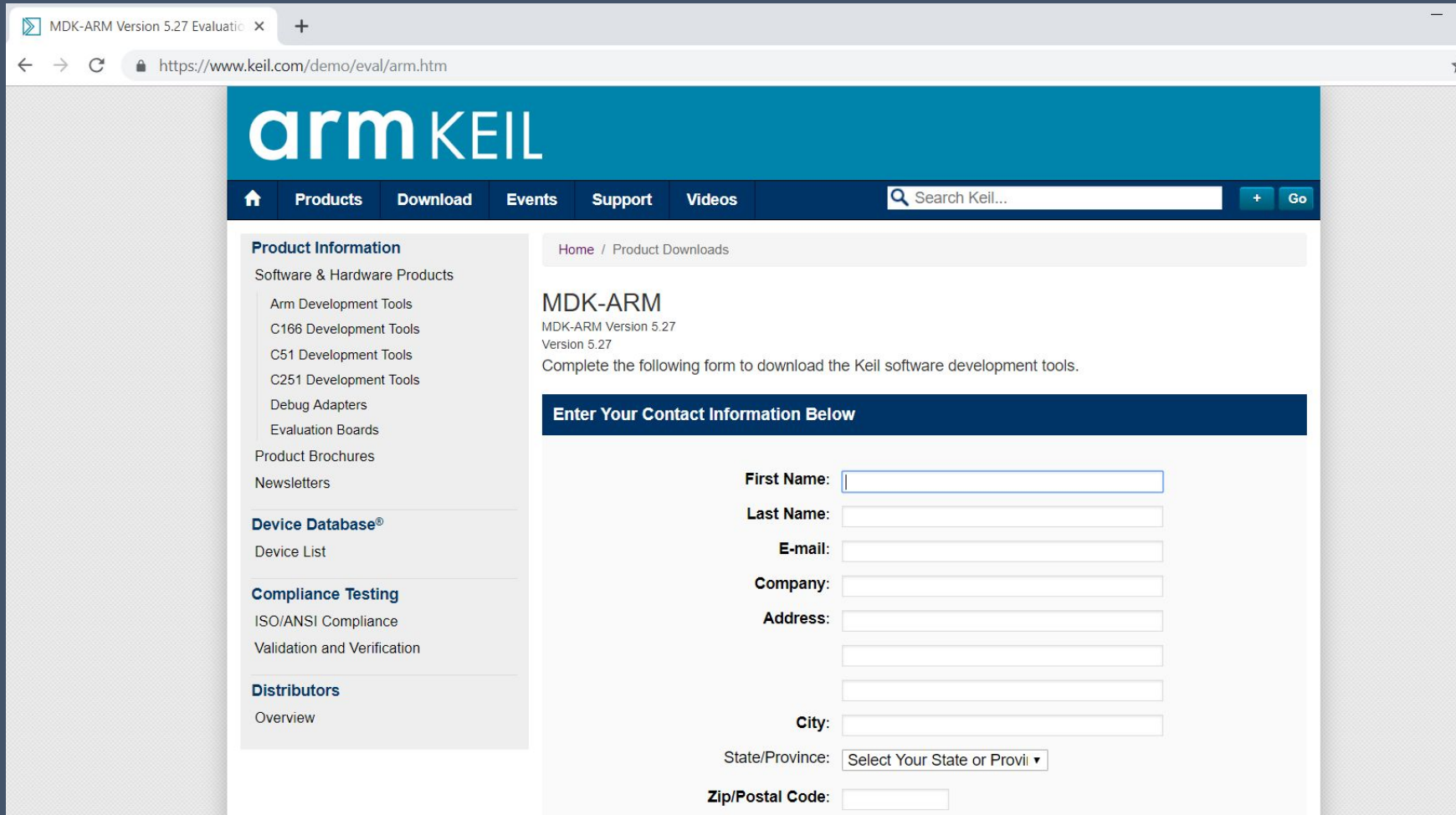
Keil products use a [License Management](#) system - without a current license the product runs as a Lite/Evaluation edition with a few [Limitations](#).

Maintenance Status and Previous Versions

Enter a valid Product Serial Number (**PSN**) or License Code (**LIC**) to get access to all product versions available to you, or to check the status of your support and maintenance agreement.

PSN or LIC:

Enter Information & Submit



The screenshot shows a web browser window with the URL <https://www.keil.com/demo/eval/arm.htm>. The page features the 'arm KEIL' logo and a navigation menu with links to Home, Products, Download, Events, Support, and Videos. A search bar is also present. The main content area is titled 'MDK-ARM' and 'MDK-ARM Version 5.27'. It includes a breadcrumb trail 'Home / Product Downloads' and a message: 'Complete the following form to download the Keil software development tools.' Below this is a section titled 'Enter Your Contact Information Below' containing a form with the following fields: First Name, Last Name, E-mail, Company, Address (three lines), City, State/Province (a dropdown menu), and Zip/Postal Code.

MDK-ARM Version 5.27 Evaluatic x +

← → ↻ 🔒 <https://www.keil.com/demo/eval/arm.htm> ☆

arm KEIL

🏠 Products Download Events Support Videos 🔍 Search Keil... + Go

Product Information
Software & Hardware Products
Arm Development Tools
C166 Development Tools
C51 Development Tools
C251 Development Tools
Debug Adapters
Evaluation Boards
Product Brochures
Newsletters

Device Database®
Device List

Compliance Testing
ISO/ANSI Compliance
Validation and Verification

Distributors
Overview

Home / Product Downloads

MDK-ARM

MDK-ARM Version 5.27
Version 5.27

Complete the following form to download the Keil software development tools.

Enter Your Contact Information Below

First Name:

Last Name:

E-mail:

Company:

Address:

City:

State/Province:

Zip/Postal Code:

Click MDK527.EXE & it will start downloading

The screenshot shows a web browser window with the URL <https://www.keil.com/demo/eval/arm.htm#/DOWNLOAD>. The page features the 'arm KEIL' logo and a navigation menu with links to Home, Products, Download, Events, Support, and Videos. A search bar is also present. The left sidebar contains sections for Product Information, Device Database, Compliance Testing, and Distributors. The main content area is titled 'MDK-ARM' and provides instructions for installation. A red rectangle highlights the 'MDK527.EXE (821.254K)' download button, which also shows the date 'Thursday, March 21, 2019'.

MDK-ARM Version 5.27 Evaluation

https://www.keil.com/demo/eval/arm.htm#/DOWNLOAD

arm KEIL

Home Products Download Events Support Videos Search Keil... + Go

Product Information

Software & Hardware Products

- Arm Development Tools
- C166 Development Tools
- C51 Development Tools
- C251 Development Tools
- Debug Adapters
- Evaluation Boards
- Product Brochures
- Newsletters

Device Database®

Device List

Compliance Testing

ISO/ANSI Compliance
Validation and Verification

Distributors

Overview

Home / Product Downloads

MDK-ARM

MDK-ARM Version 5.27
Version 5.27

- Review the [hardware requirements](#) before installing this software.
- Note the [limitations of the evaluation tools](#).
- [Further installation instructions for MDK5](#)

(MD5:cf5871426d3e3f0c8e9492c364d1629e)

To install the MDK-ARM Software...

- Right-click on **MDK527.EXE** and save it to your computer.
- PDF files may be opened with Acrobat Reader.
- ZIP files may be opened with PKZIP or WINZIP.

MDK527.EXE (821.254K)
Thursday, March 21, 2019

- If you are evaluating the tools, be sure to [request a quote](#) for the full version of the tools.

- Install downloaded file and run Keil
- After successful installation you will need to add Device specific Files to create a new project in keil. For that go to the pack Installer window. Search STM32F446re in search bar, select STM32F446RETx & install Keil::STM32F4xx_DFP pack.

Pack Installer - C:\Keil_v5\ARM\PACK

File Packs Window Help

Device: STM32F446RETx

1. Search stm32f446re

Search: stm32f446re

2. Click on STM32F446RETx

3. Install Keil::STM32F4xx_DFP

Pack	Action	Description
Device Specific 2 Packs		
Keil::STM32F4xx_DFP	Up to date	STMicroelectronics STM32F4 Series Device Support, Drivers and Examples
Keil::STM32NUCLEO_BSP	Install	STMicroelectronics Nucleo Boards Support and Examples
Generic 39 Packs		
Alibaba::AliOSThings	Install	AliOS Things software pack
ARM::AMP	Install	Software components for inter processor communication (Asymmetric Multi Pro
ARM::CMSIS	Up to date	CMSIS (Cortex Microcontroller Software Interface Standard)
ARM::CMSIS-Driver	Update	CMSIS Drivers for external devices
ARM::CMSIS-Driver_Valida...	Install	CMSIS-Driver Validation
ARM::CMSIS-FreeRTOS	Install	Bundle of FreeRTOS for Cortex-M and Cortex-A
ARM::CMSIS-RTOS_Validat...	Install	CMSIS-RTOS Validation
ARM::mbedClient	Install	ARM mbed Client for Cortex-M devices
ARM::mbedTLS	Install	ARM mbed Cryptographic and SSL/TLS library for Cortex-M devices
ARM::minar	Install	mbed OS Scheduler for Cortex-M devices

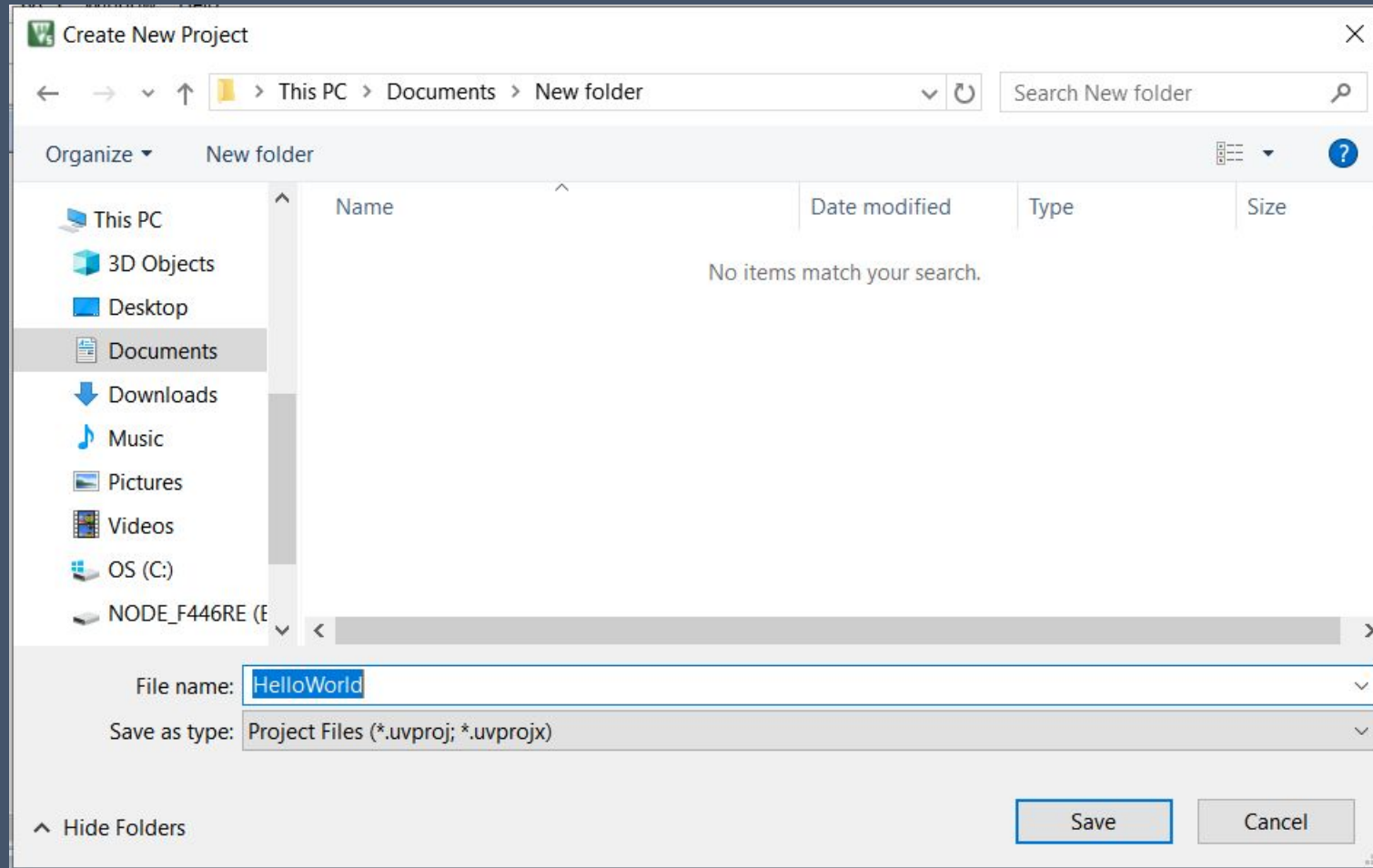
Output

Update available for ARM::CMSIS-Driver (installed: 2.3.0, available: 2.4.1)
Update available for Keil::ARM_Compiler (installed: 1.6.0, available: 1.6.1)
Update available for Keil::MDK-Middleware (installed: 7.7.0, available: 7.9.0)

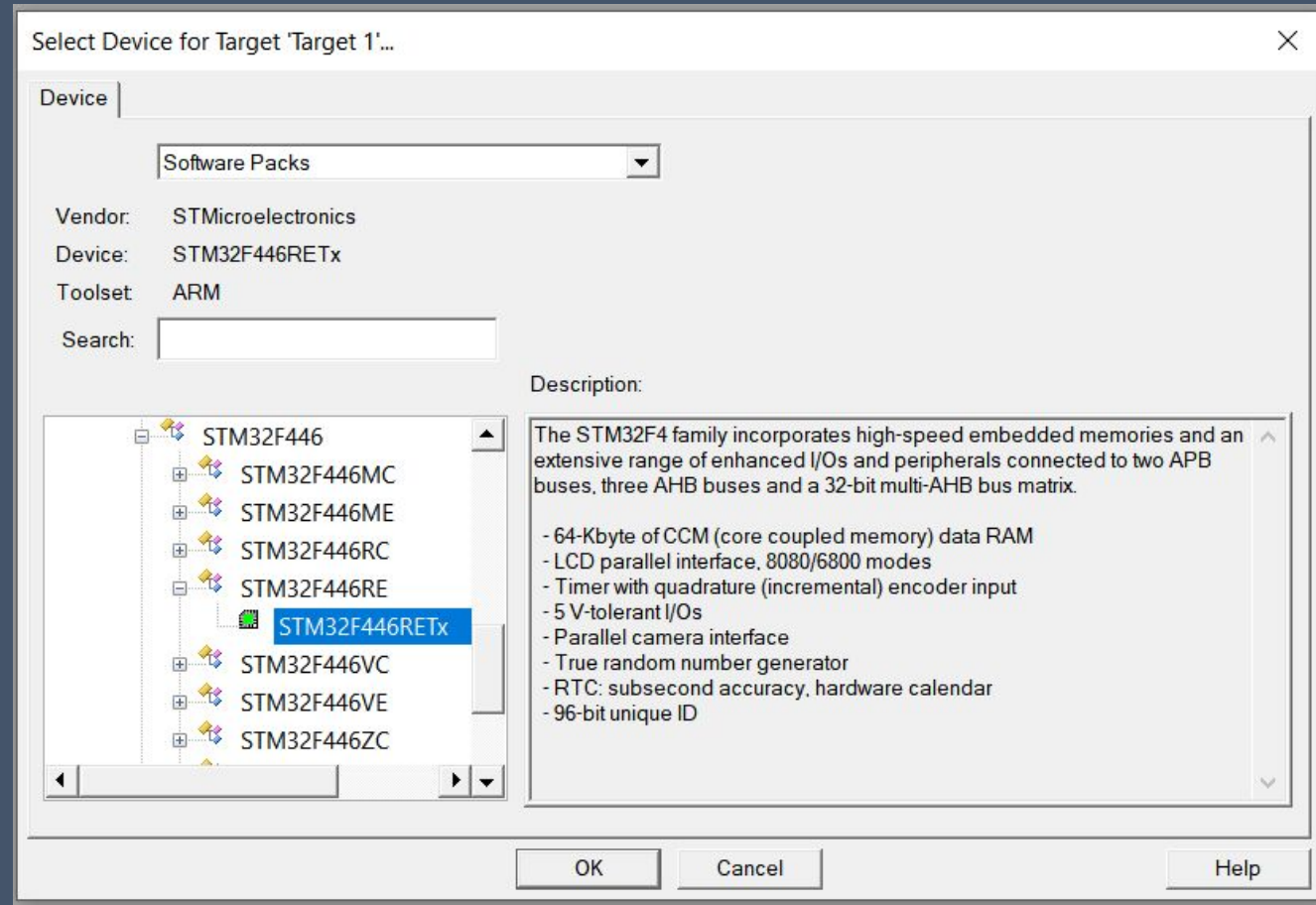
Ready

ONLINE

- To create a new project, in the menu bar click on Select Project→ New Uvision project.
- Create a new folder for your project and give your project a name. In The Figure below, the project is named as “HelloWorld” and saved in “New Folder”.
- Click on Save.



- Once the project is saved you will get a screen requiring you to choose a target. Locate STMicroelectronics and find STM32F446RETx. Click on OK



- Selecting the run-time environment.
Find CMSIS → Core and Device → Startup and click those checkboxes (Fig. A).
Then click OK you will get Fig. B.

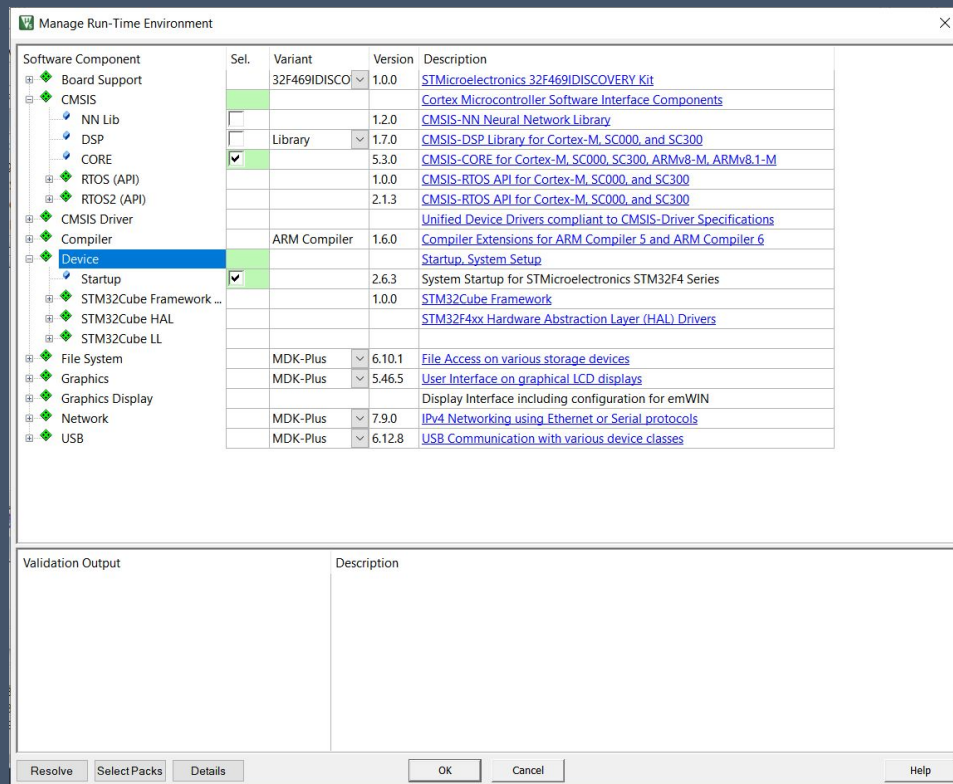


Fig. A

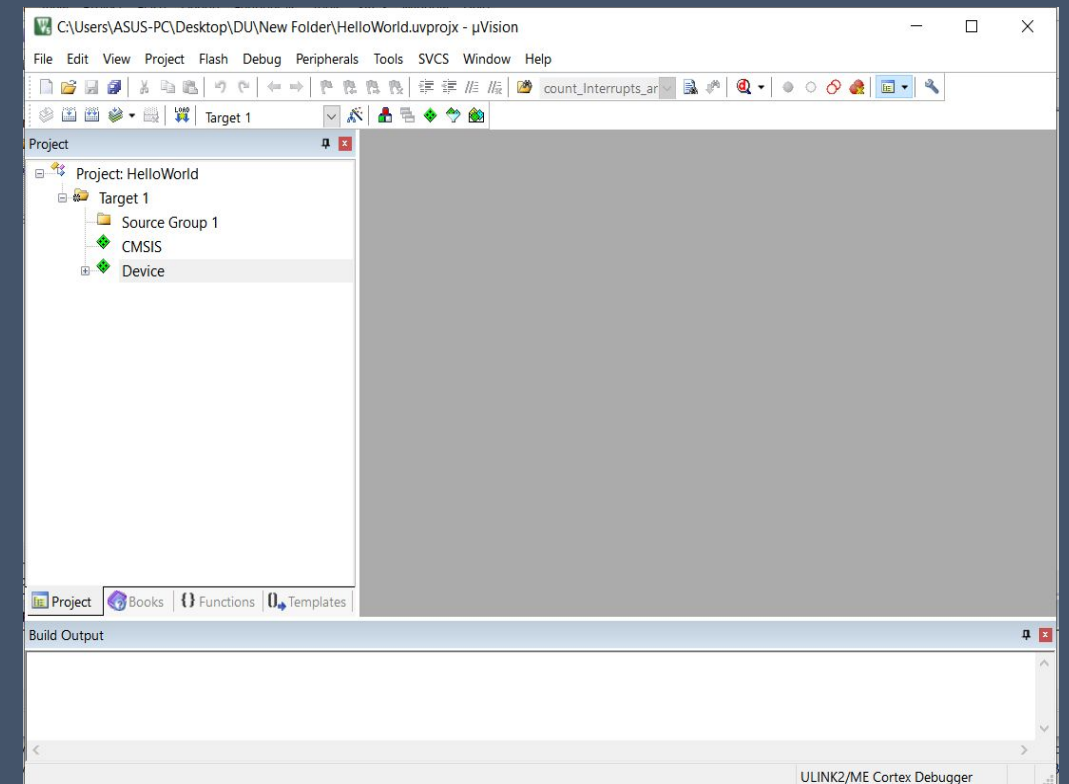


Fig. B

The next step adds the necessary files to the project. You will need to add two files to your project.

A) You main c-code file B) A supporting dot-h file

- Right click on source group 1 (Fig. A)
- select Add new item to source group 1. By doing so Fig. B will appear.
- select C file/ Header file
- give a name (in this case name is given as main) & click ok.

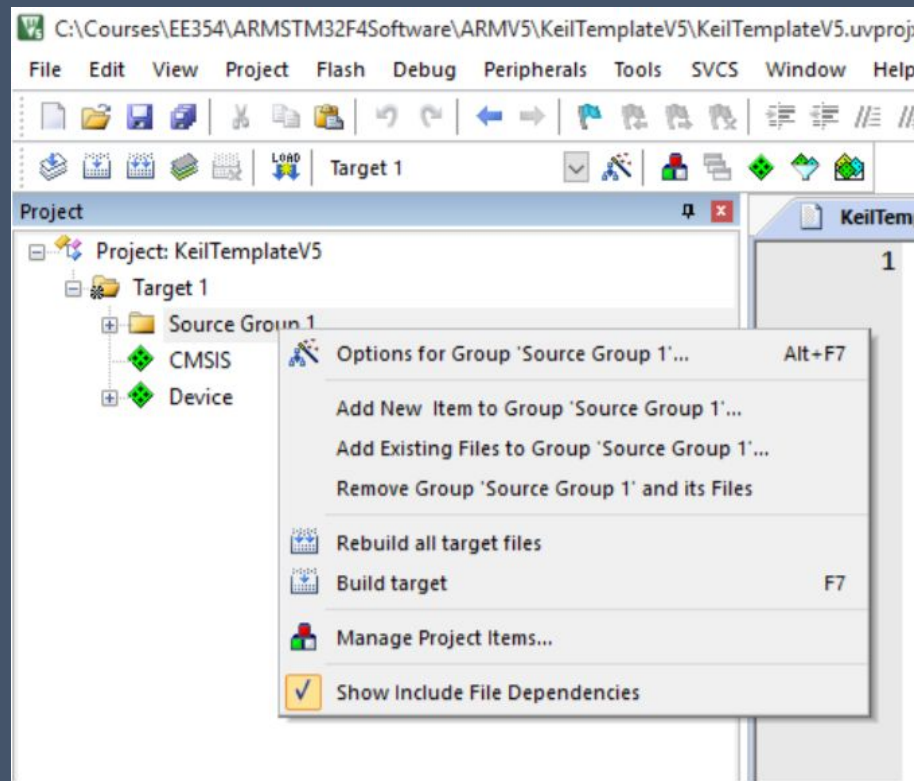


Fig. A

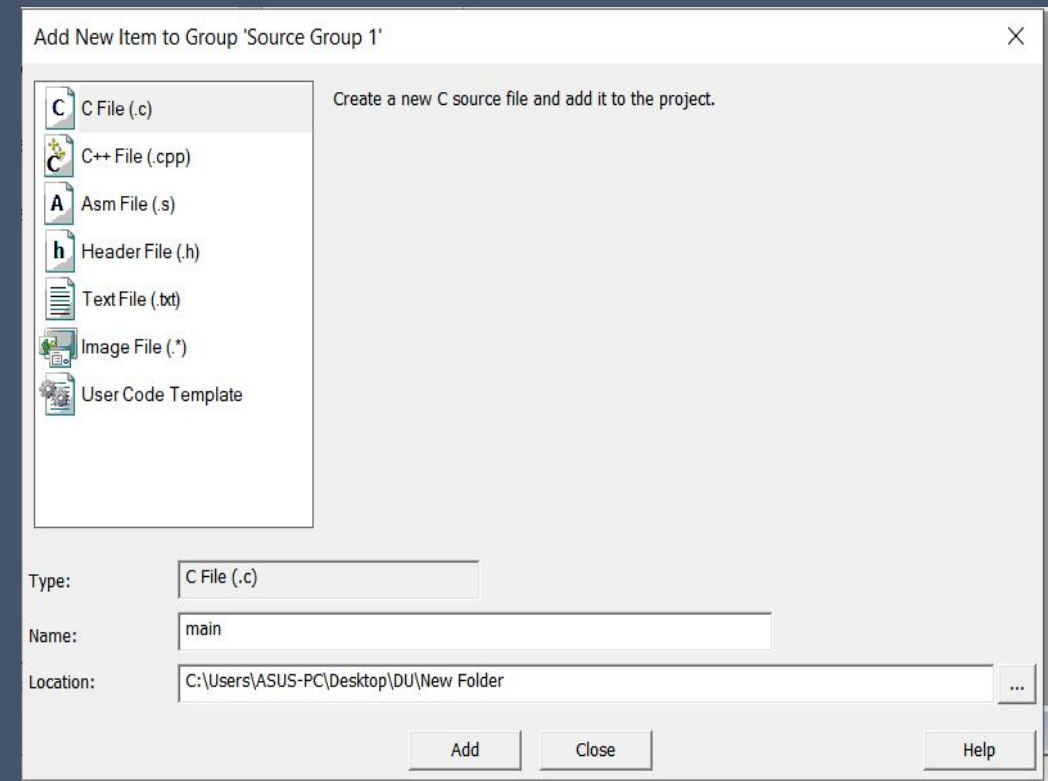
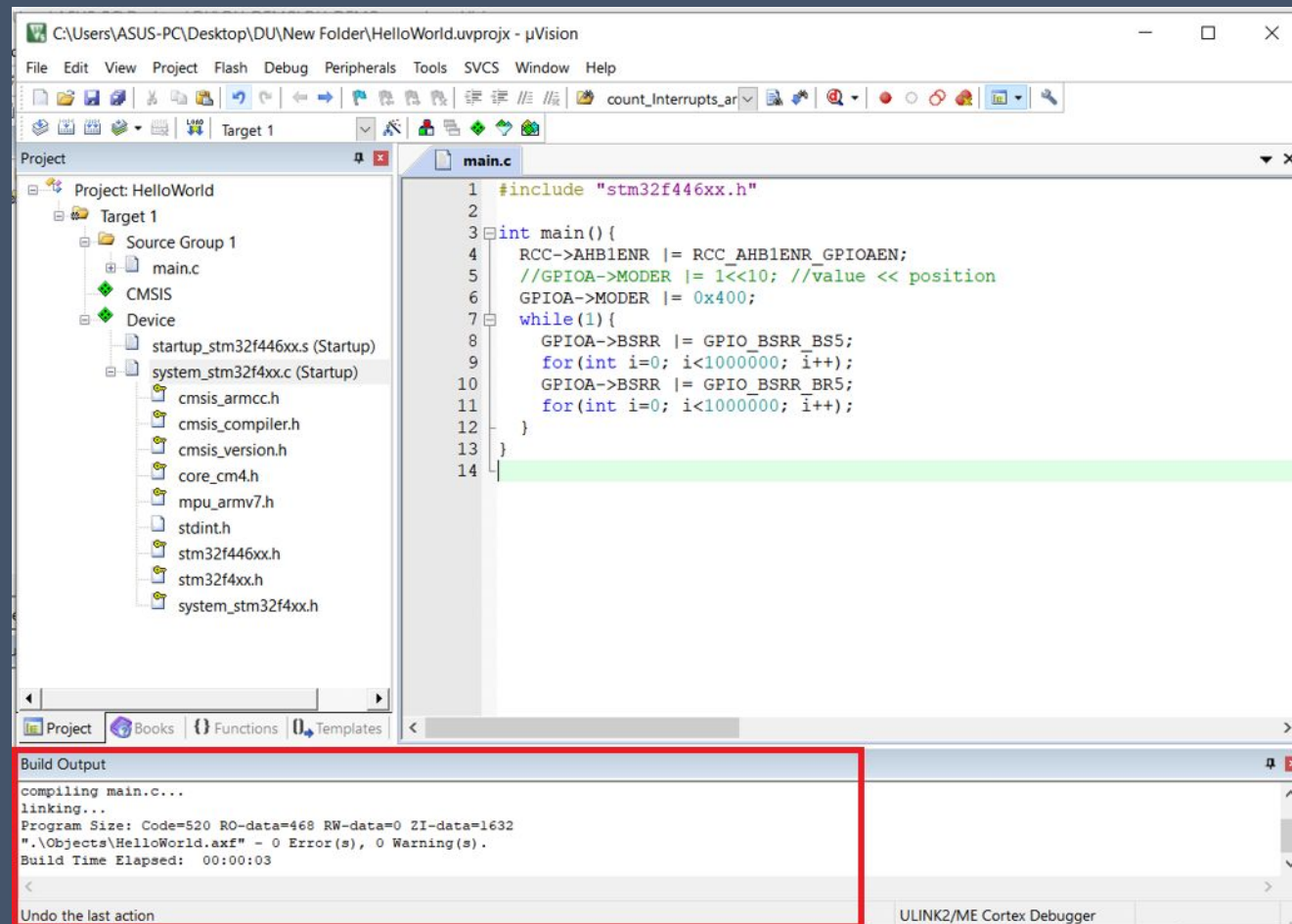


Fig. B

- At this point we are ready to enter the c-code for the project.
- Click on the newly created c file under Source Group 1 and write program.
- After entering the c-code click on Project→Build Target to save and compile your code.
- If everything is ok you will see 0 Error, 0 warning in the Build output window. (You may get a warning about needing a blank line as the last line in the code. This means a blank line with no spaces. You can add it or just ignore the warning.)



- You are now ready to load the project code onto the Nucleo board.
- Connect the board with a USB cable to your computer.
- If your computer does not recognize the board you will have to download the driver and install it.
- With your board successfully plugged in we will need to change the project options to use STLink.
- Follow Fig. A, Target window will appear (Fig. B)

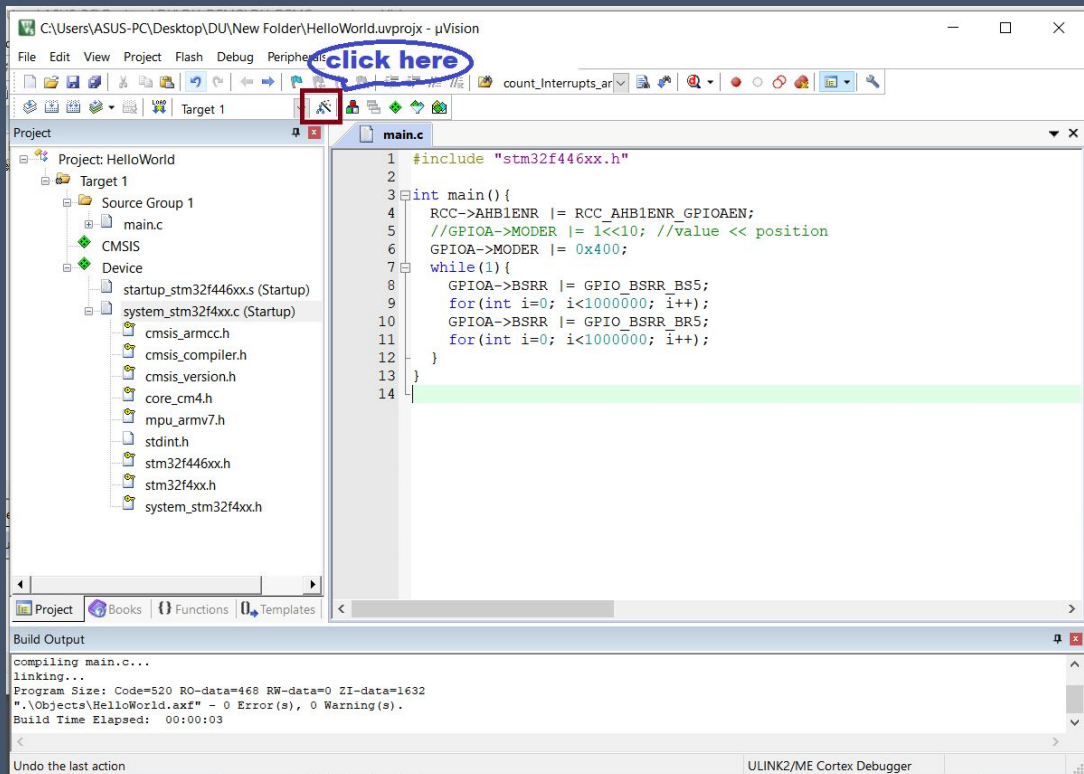


Fig. A

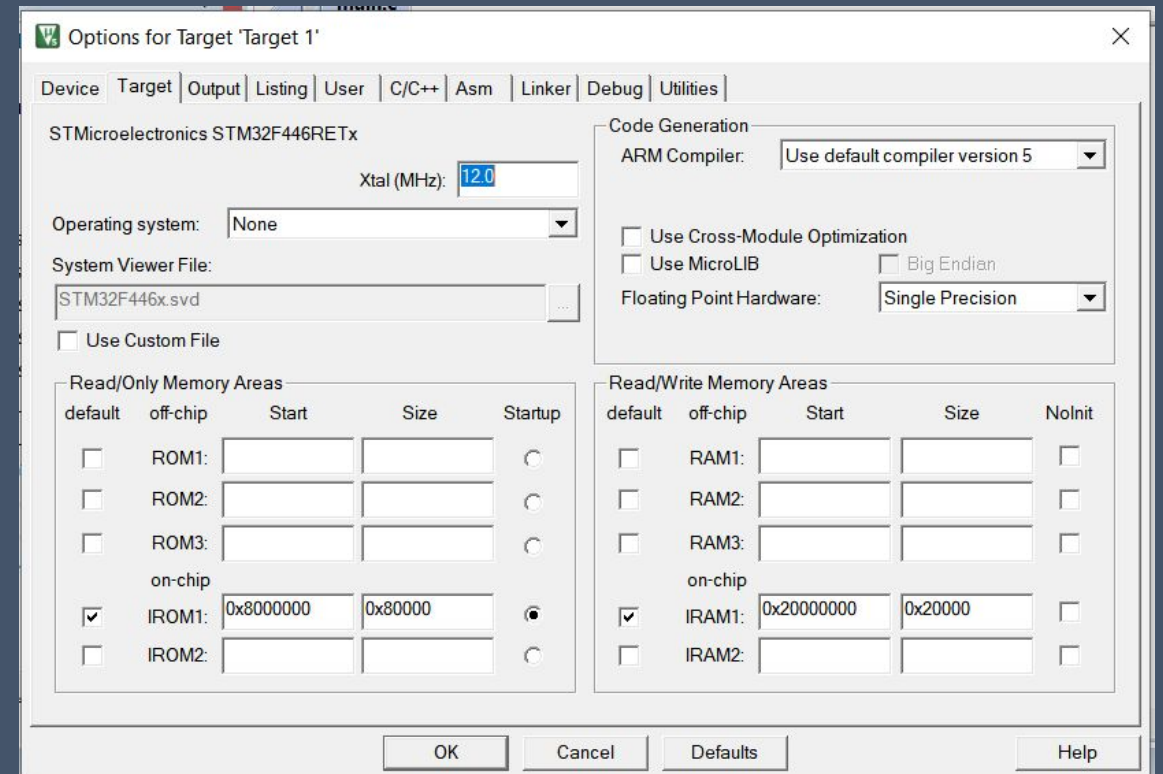


Fig. B

- In Target window Go to debug tab.
- Select ST-Link Debugger from Drop down list shown in Fig. A. Also click on the radio button labeled Use so that the Use Simulator button is not chosen.
- Click on the setting button just next to it. The setting should look like that shown in Fig. B. If not, be sure your board is plugged in and you have debug option set up as shown in Fig. A.
- Click on OK for the target options and get back to the window with the c-code in it.

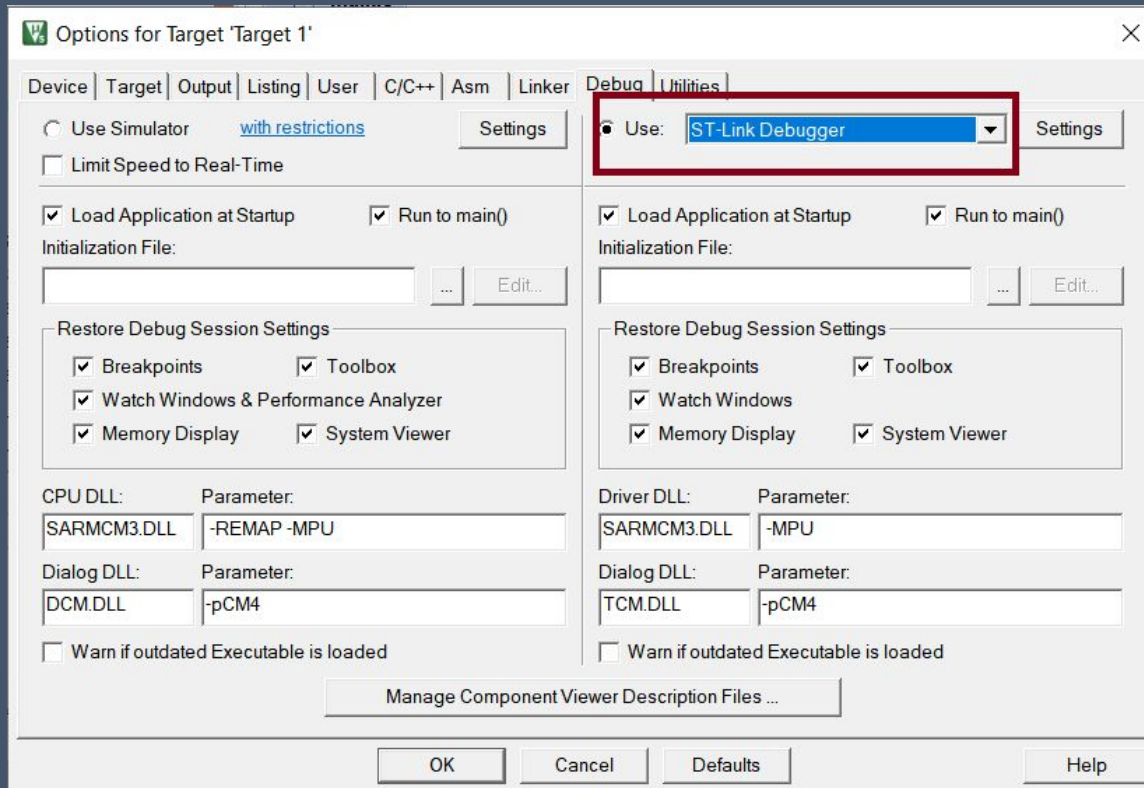


Fig. A

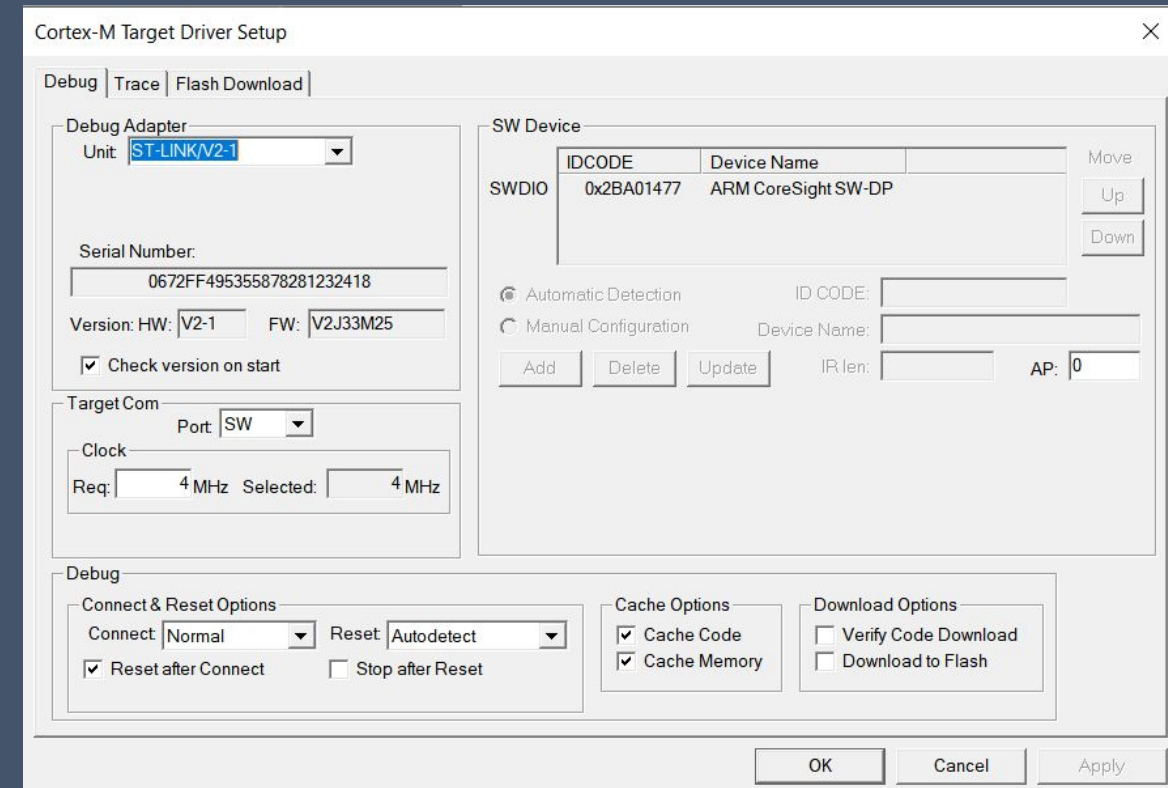


Fig. B

- At this point you are ready to upload your code to the board and run your program. To do this click on the Button shown in Fig. A
- If you want to debug your code click on the button shown in Fig. B

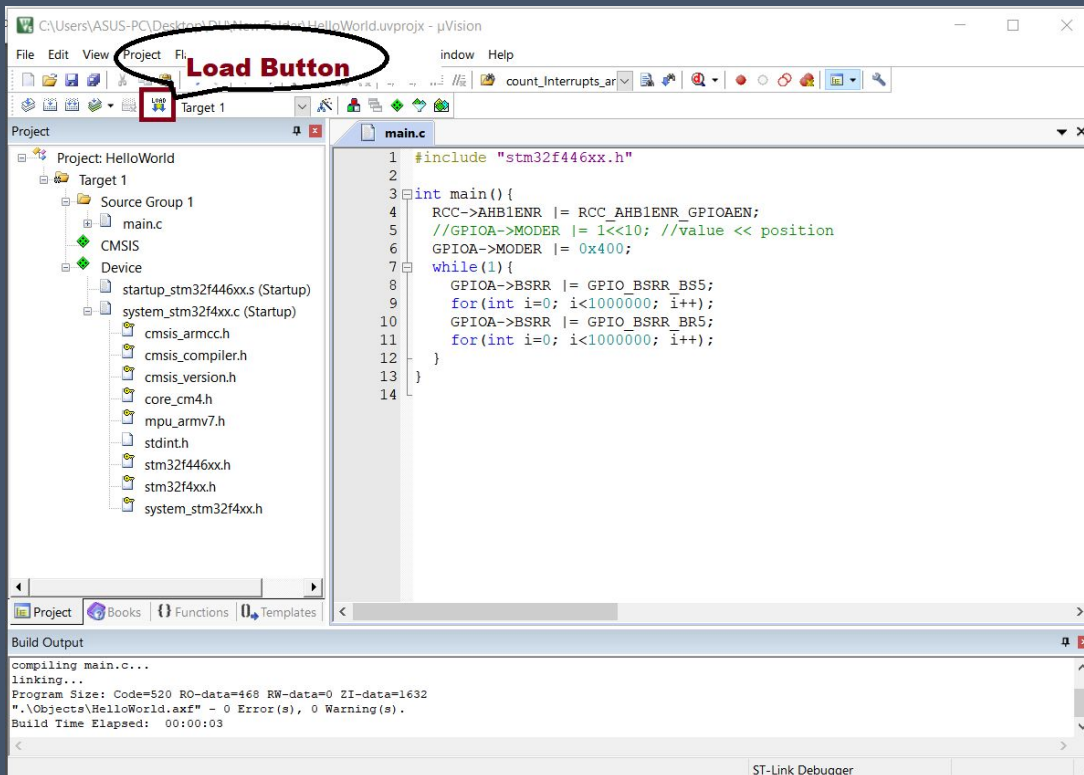


Fig. A

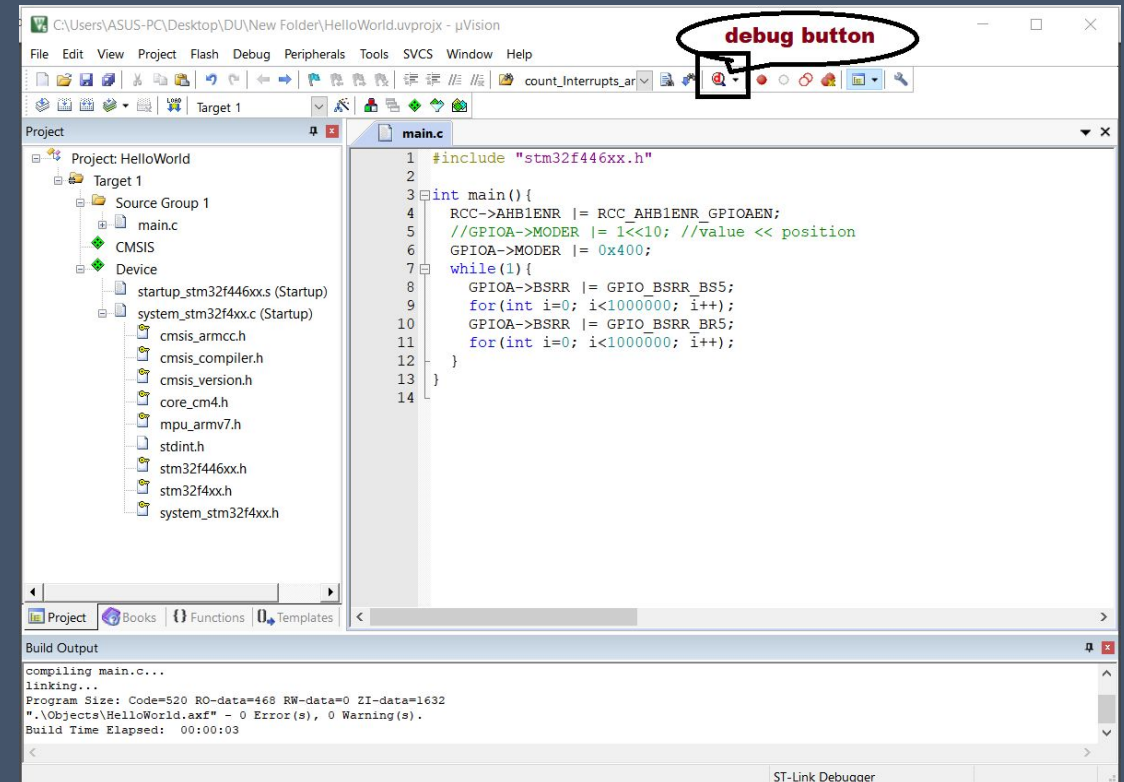
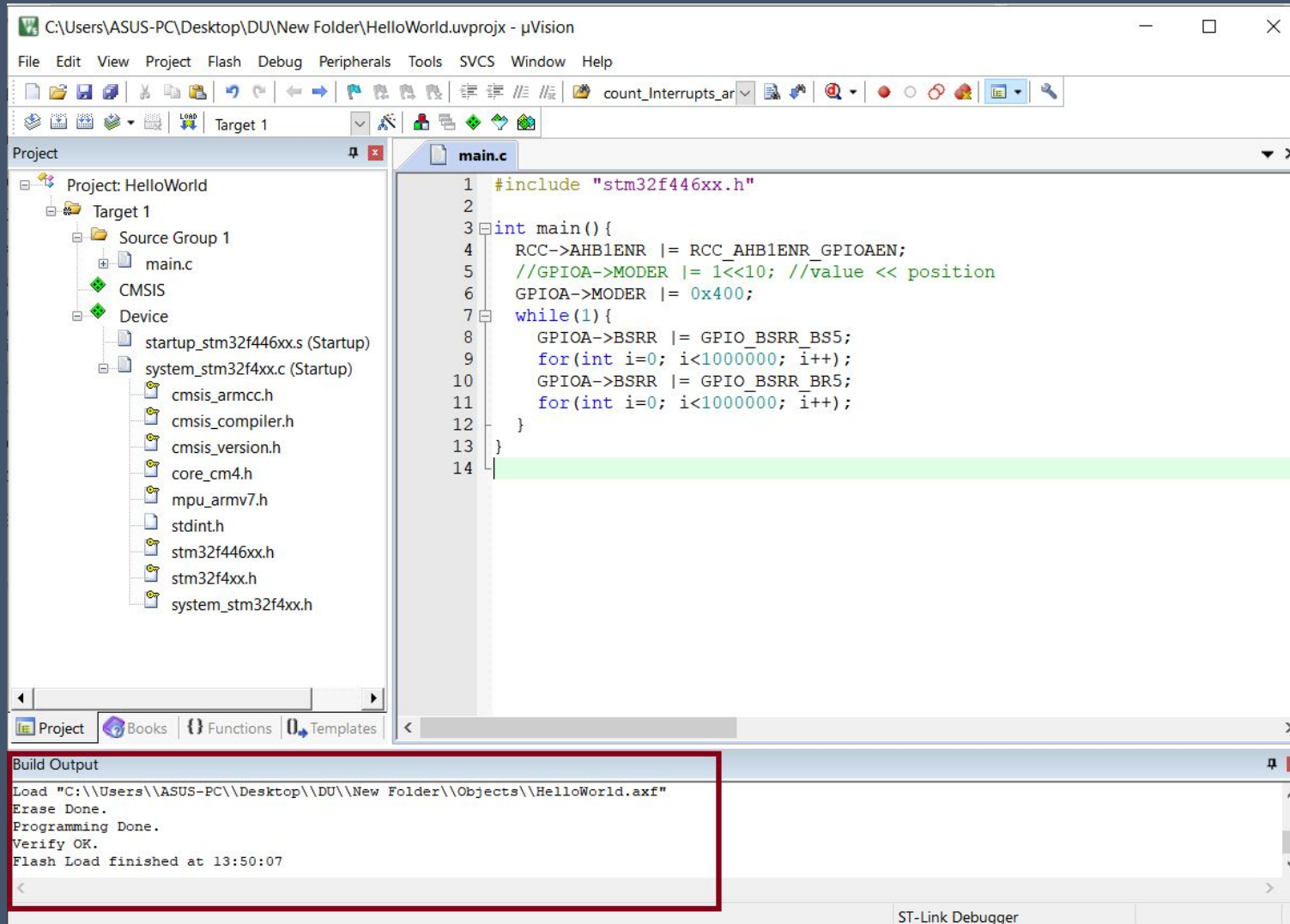
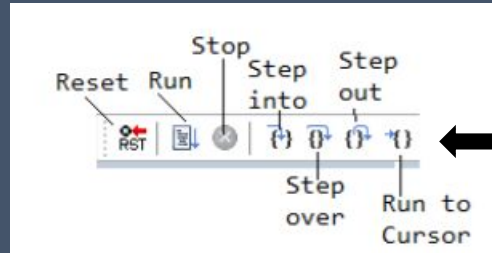


Fig. B

- If program is loaded successfully in the board you will get this message in the “Build Output” window shown in the figure below.



- Debug window will look like this in the figure shown below.



C:\Users\ASUS-PC\Desktop\DU\New Folder\HelloWorld.uvprojx - µVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

count_interrupts_ar

Registers

Register	Value
Core	
R0	0x20000060
R1	0x20000260
R2	0x20000260
R3	0x20000260
R4	0x00000000
R5	0x20000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x080003DC
R11	0x00000000
R12	0x20000040
R13 (SP)	0x20000660
R14 (LR)	0x08000237
R15 (PC)	0x08000368
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged

Disassembly

0x08000366 2400 DCW 0x2400
4: RCC->AHB1ENR |= RCC_AHB1ENR_GPIOAEN;
5: //GPIOA->MODER |= 1<<10; //value << position
→ 0x08000368 4812 LDR r0,[pc,#72] ; @0x080003B4
0x0800036A 6800 LDR r0,[r0,#0x00]

Assembler code

Current location

Main Program

```
1 #include "stm32f446xx.h"
2
3 int main()
4 {
5     RCC->AHB1ENR |= RCC_AHB1ENR_GPIOAEN;
6     //GPIOA->MODER |= 1<<10; //value << position
7     GPIOA->MODER |= 0x400;
8     while(1){
9         GPIOA->BSRR |= GPIO_BSRR_BS5;
10        for(int i=0; i<1000000; i++);
11        GPIOA->BSRR |= GPIO_BSRR_BR5;
12        for(int i=0; i<1000000; i++);
13    }
14 }
```

Registers & Content

Stack and Memory window

Command window

Running with Code Size Limit: 32K
Load "C:\\Users\\ASUS-PC\\Desktop\\DU\\New Folder\\Objects\\HelloWorld."

Call Stack + Locals

Name	Location/Value	Type
main	0x08000368	int f()
i	<not in scope>	auto - int
i	<not in scope>	auto - int

ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess

Call Stack + Locals Trace Exceptions Event Counters Memory 1

ST-Link Debugger t1: 0.00010300 sec

Thank You