



# Keil Tutorial

## Outline

1. Download & Install Keil
2. Create Project
3. Build Project & Download to Microprocessor

- Download & Install

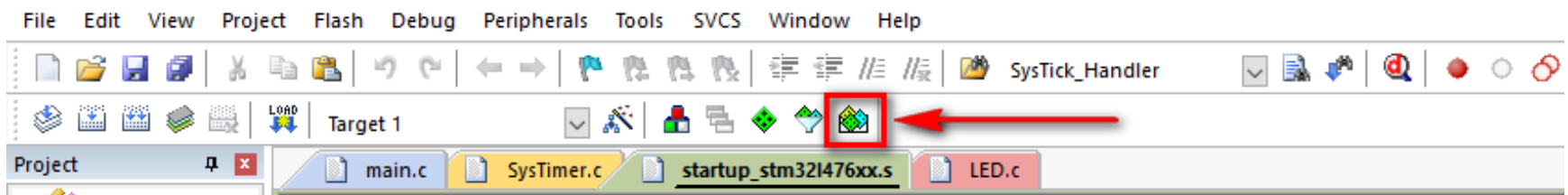
The Keil MDK-Lite could be downloaded and installed (<http://www2.keil.com/mdk5/editions/lite>)

## MDK-Lite Edition

MDK-Lite is the complete software development suite for Arm®-based microcontrollers. It features software development for microcontrollers based on Arm Cortex®-M and selected Arm Cortex-R processors. It is intended for product evaluation, small projects, and the educational market. It is restricted to 32 KByte code size.

A blue rectangular button with a white download icon (a downward arrow) and the text "Download & Install". The button is highlighted with a red rectangular border.

- Select Packages





### • Packages Needed

Pack Installer - e:\Keil\_v5\ARM\PACK

File Packs Window Help

Device: STMicroelectronics - STM32L476VGTx

Devices Boards

Search: [X] [Folder Icon]

Device	Summary
STM32L476MG	1 Device
STM32L476QE	1 Device
STM32L476QG	1 Device
STM32L476RC	1 Device
STM32L476RE	1 Device
STM32L476RG	1 Device
STM32L476VC	1 Device
STM32L476VE	1 Device
STM32L476VG	1 Device
STM32L476VGTx	ARM Cortex-M4, 80 MHz, 128 kB RAM, 1 ...
STM32L476ZE	1 Device
STM32L476ZG	1 Device
STM32L485	1 Device
STM32L486	5 Devices
STM32L496	7 Devices
STM32W1 Series	5 Devices
Texas Instruments	350 Devices
Toshiba	91 Devices
Zilog	7 Devices

Packs Examples

Pack	Action	Description
Device Specific	2 Packs	STM32L476VGTx selected
Keil::STM32L4xx_DFP	Up to date	STMicroelectronics STM32L4 Series Device Support, Drivers and Examples
Keil::STM32NUCLEO_B...	Install	STMicroelectronics Nucleo Boards Support and Examples
Generic	22 Packs	
ARM::AMP	Install	Software components for inter processor communication
ARM::CMSIS	Up to date	CMSIS (Cortex Microcontroller Software Interface Standard)
ARM::CMSIS-Driver_Va...	Install	CMSIS-Driver Validation
ARM::CMSIS-FreeRTOS	Install	Bundle of FreeRTOS for Cortex-M and Cortex-A
ARM::CMSIS-RTOS_Va...	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
ARM::minar	Install	mbed OS Scheduler for Cortex-M devices
Huawei::LiteOS	Install	Huawei LiteOS kernel Software Pack
Keil::ARM_Compiler	Update	Keil ARM Compiler extensions for ARM Compiler 5
Keil::Jansson	Install	Jansson is a C library for encoding, decoding and manipulating JSON
Keil::MDK-Middleware	Up to date	Middleware for Keil MDK-Professional and MDK-Plus
lwIP::lwIP	Install	lwIP is a light-weight implementation of the TCP/IP
Micrium::RTOS	Install	Micrium software components
Oryx-Embedded::Midd...	Install	Middleware Package (CycloneTCP, CycloneSSL and CycloneMQ)
RealTimeLogic::SharkS...	Install	SharkSSL-Lite is a super small and super fast pre-compiled SSL library
RealTimeLogic::SMQ	Install	Simple Message Queues (SMQ) is an easy to use IoT
redlogix::redBlocks-Si...	Install	C Target Library for the redBlocks WYSIWYG SiL

Output

Refresh Pack descriptions

Update available for Keil::ARM\_Compiler (installed: 1.3.1, available: 1.3.3)

Refresh Pack descriptions

Update available for Keil::ARM\_Compiler (installed: 1.3.1, available: 1.3.3)

Ready

ONLINE



- **Install ST-Link Driver**
  - Disconnect the board from computer
  - Go to the directory C:\Keil\_v5\ARM\STLink\USBDriver
  - Run stlink\_winusb\_install.bat in administrator mode
  - Connect the discovery kit to computer. The discovery kit should be correctly recognized as “STMicroelectronics STLink dongle.”

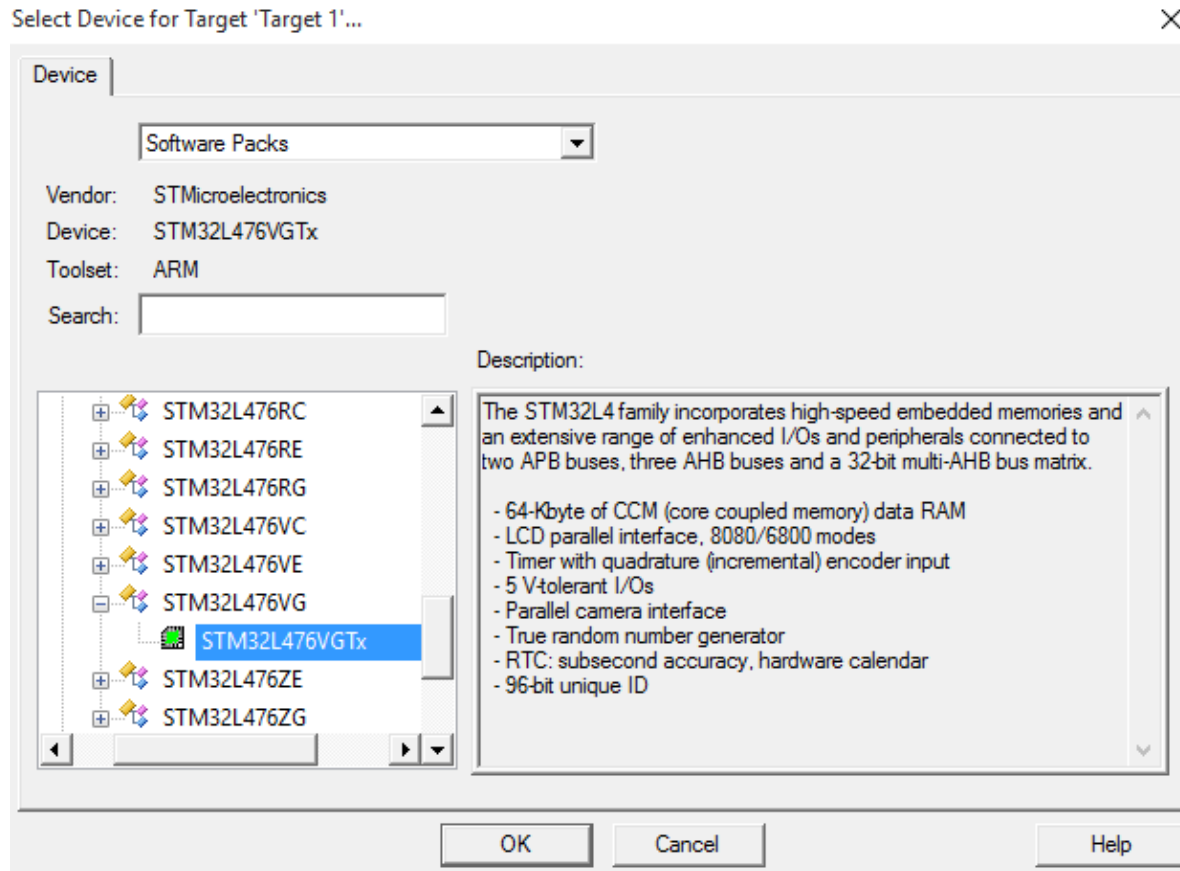


## Outline

1. Download & Install
2. Create Project
3. Download to Microcontroller

- **Create a New Project**

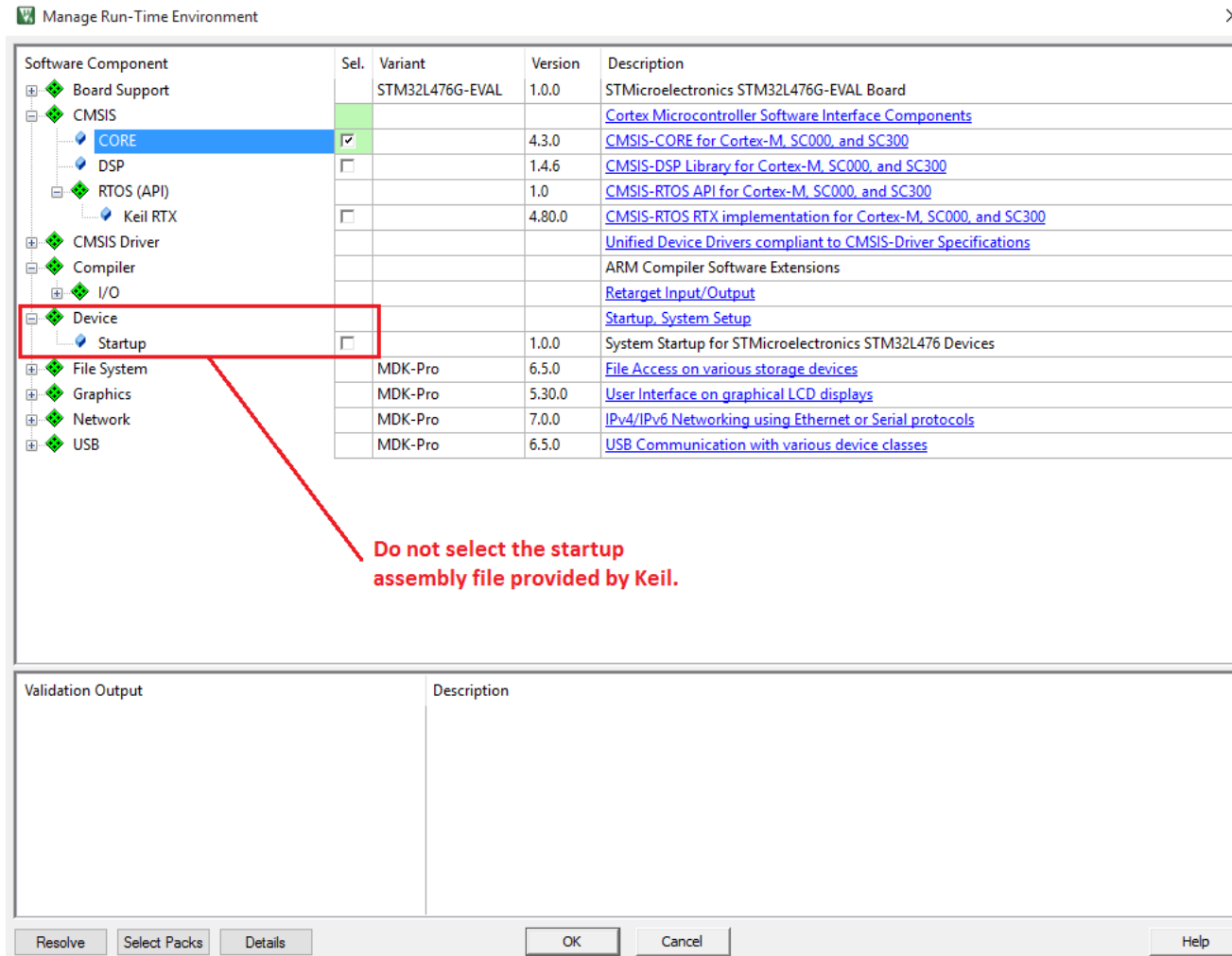
From the menu **Project** → **New  $\mu$ Vision Project**



If the targeted processor is not in the list, follow “**Packages Needed**” section to install the package



### • Create a New Project



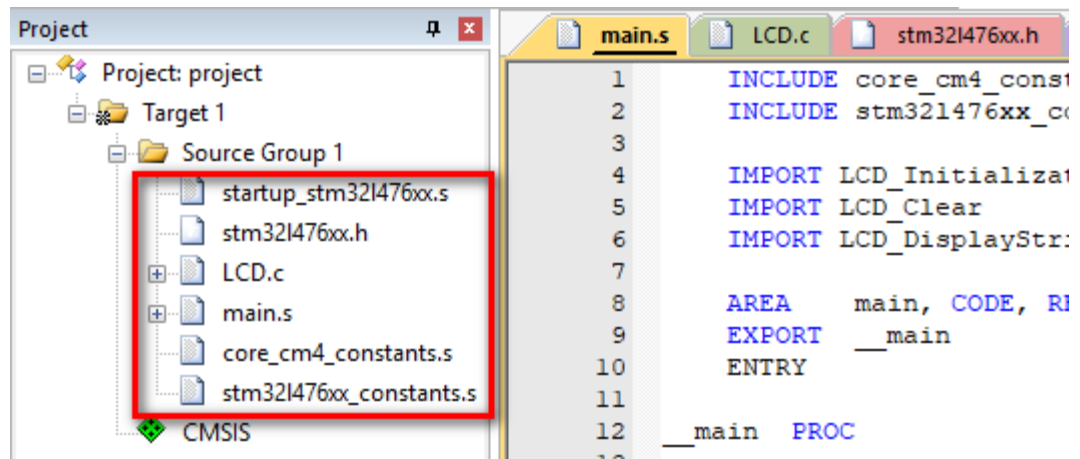
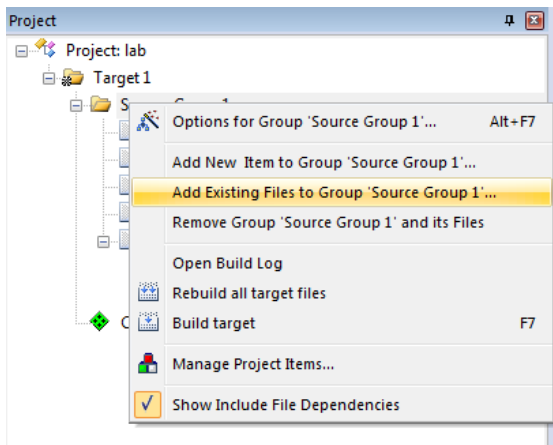


## • Create a New Project

### 1. Download the following files from CourseWeb:

- **startup\_stm32l476xx.s**
- **main.s**
- **stm32l476xx.h**
- **core\_cm4\_constrants.s**
- **stm32l476xx\_constants.s**
- **LCD.c**
- **LCD.h**

### 2. Add all the files (except for LCD.h) to the project

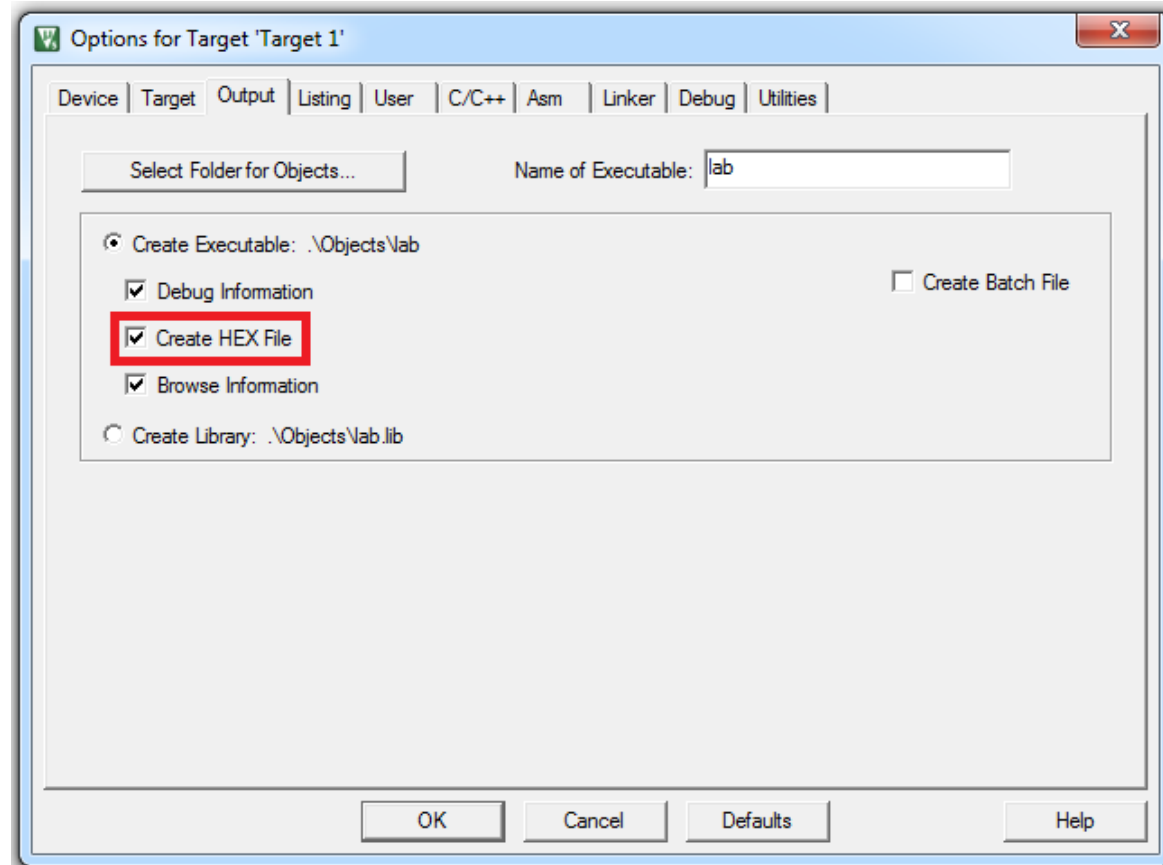






- **Create a New Project**

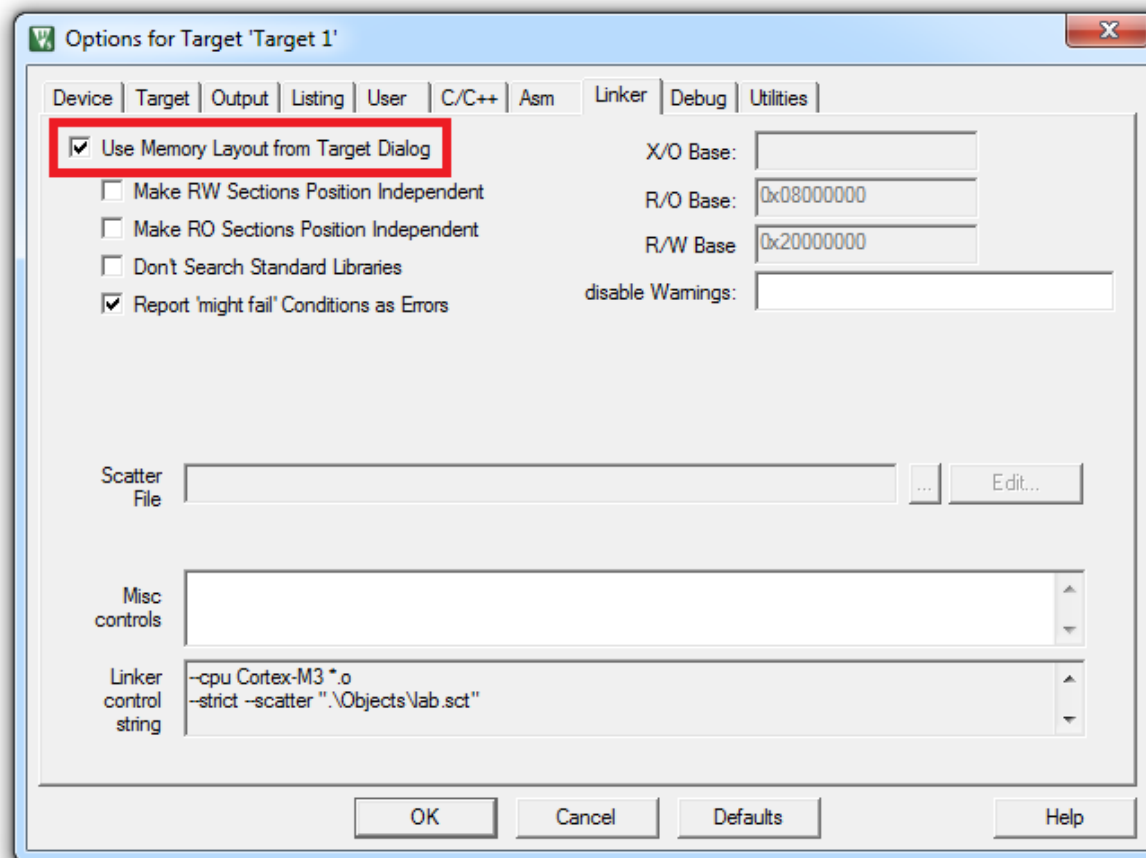
From the menu, click **Project** → **Option for Target**, Go to the **Output** page, select “**Create HEX file**”





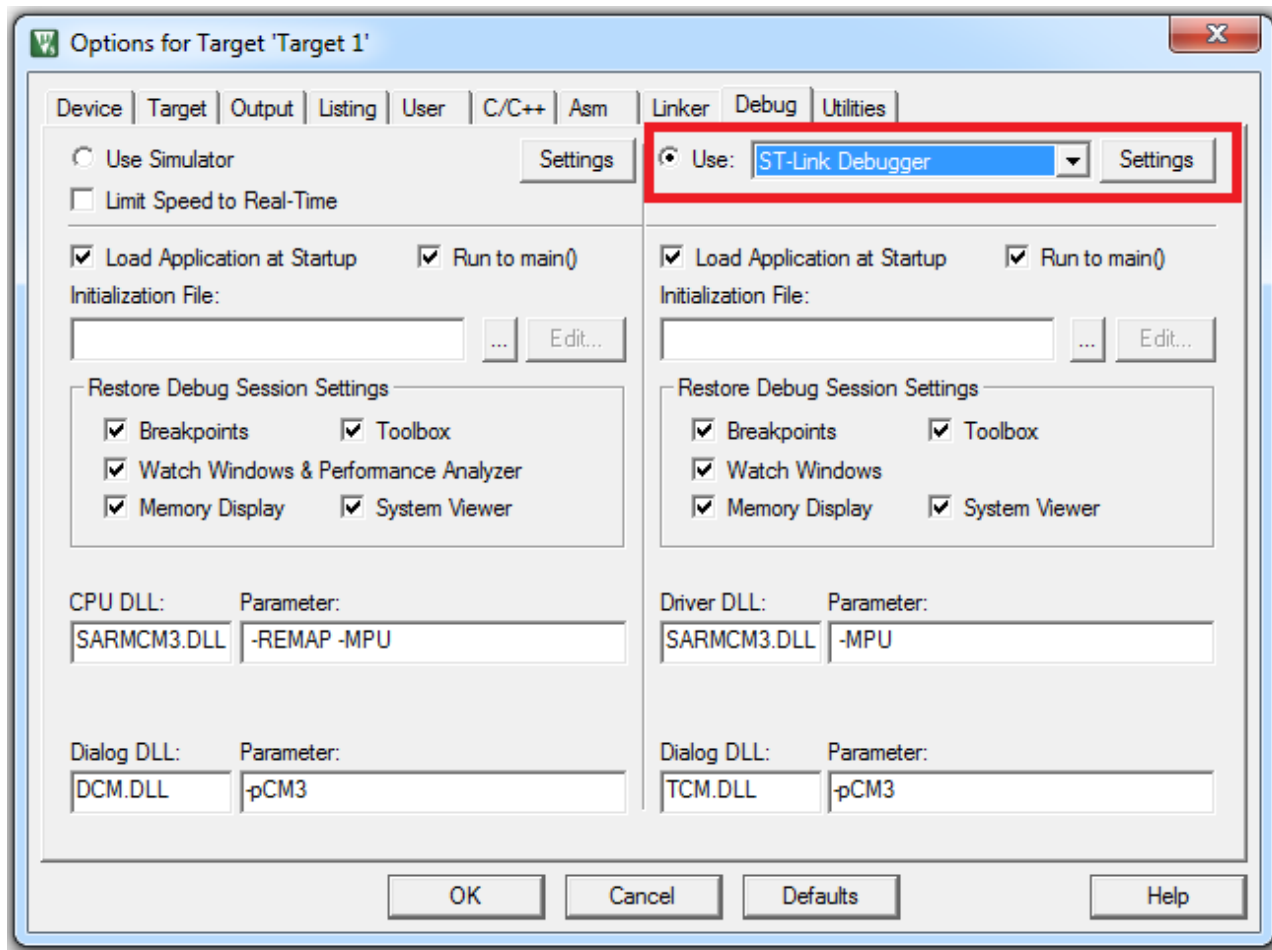
- **Create a New Project**

Go to the **Linker** page, select **“Use Memory Layout from Target Dialog”**



- **Create a New Project**

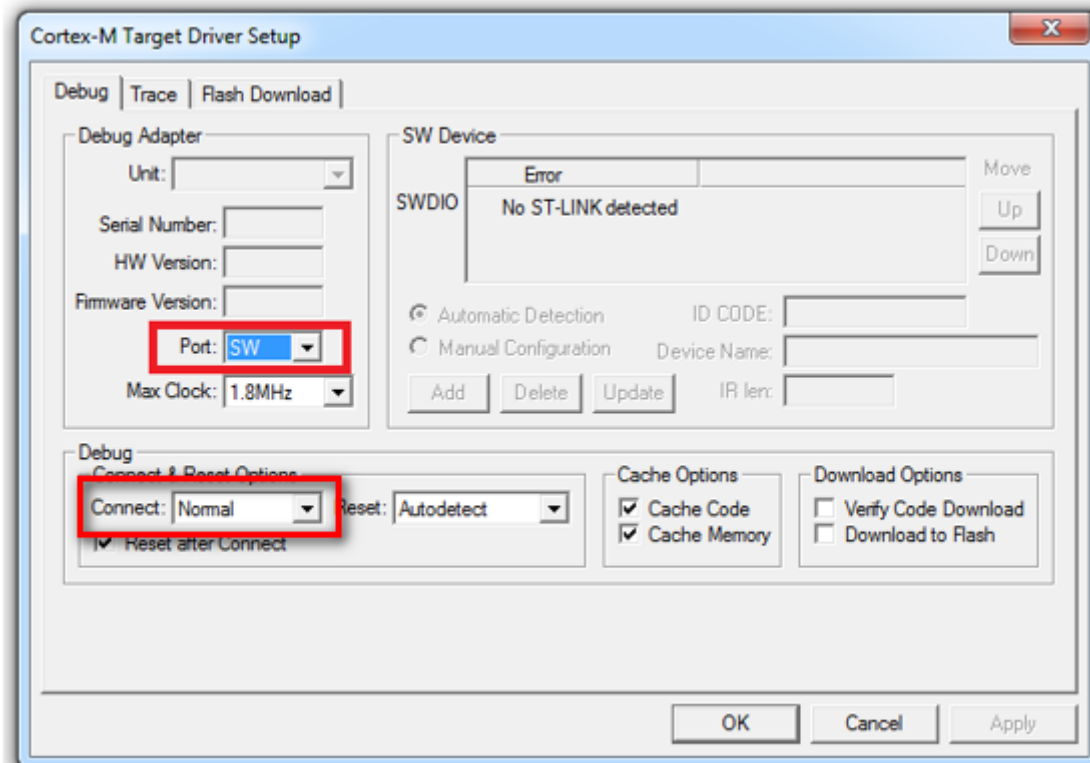
Go to the **Debug** page, select “**ST-Link Debugger**”





- **Create a New Project**

Click “**Settings**” and select “**SW**” (Serial Wire) as the port.



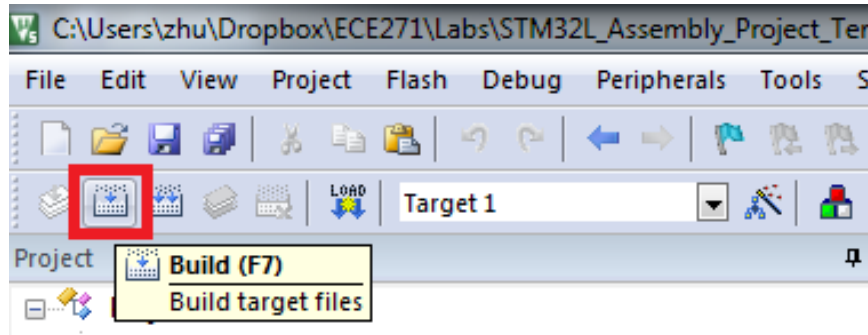


## Outline

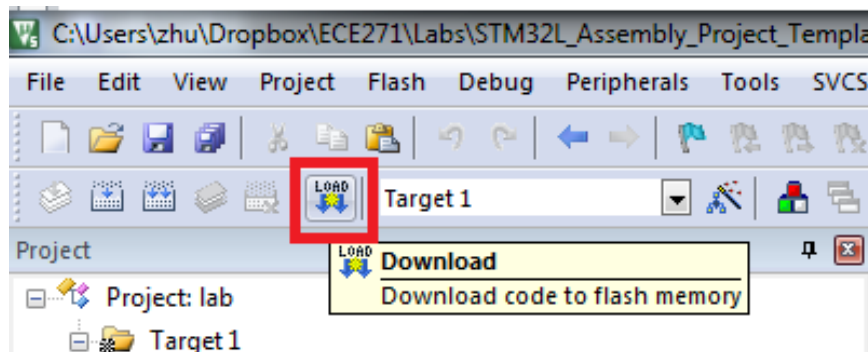
1. Download & Install
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- **Build Project**

Build the program:

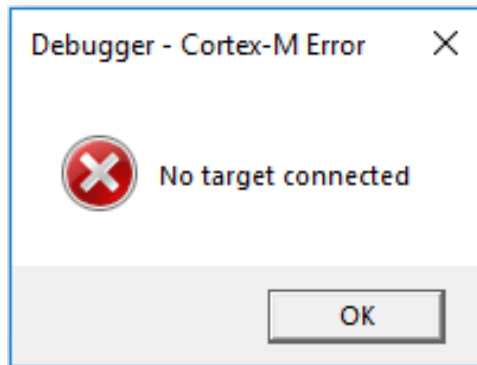


Connect your discovery kit to the computer and download the program to the STM32L processor.

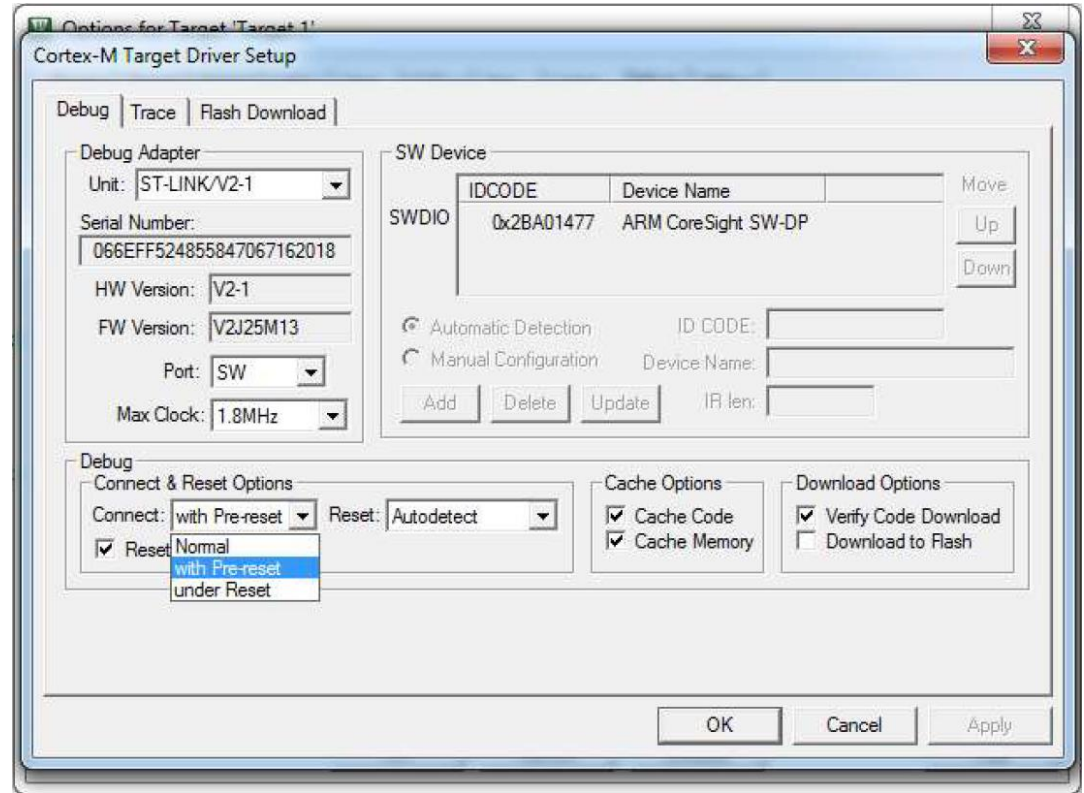


Run the program: click the black button on the board

- Problem Solving: Target Not Found



ERROR



1. Plug the board into your PC
2. Set **Pre-reset** mode.
3. **HOLD** the **RESET** button on your board, click Download in menu Flash.
4. **RELEASE RESET** button.





- **Display Your Name**

In main.s, replace ECE1770 with your last name

```
28 ; Replace ECE1770 with your last name
29 str DCB "ECE1770",0
30     END
31
```

Build & Download again. Your name will be displayed on the LCD