Project Creation in µVision IDE

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Summary

This tutorial takes the following the kits as an example of creating a project in Keil IDE for assembly programs.

- Discovery kit with STM32L152RCT6 MCU (Cortex-M3)
- Discovery kit with STM32L476VG MCU (Cortex-M4 with FPU and DSP)

Note that the project does not use the default startup files provided by Keil. You need to download a modified version of *startup_stm32l1xx_md.s* or *startup_stm32l476xx.s* from the book website: http://web.eece.maine.edu/~zhu/book/lab.php.

Identifying Target Processor

Kit	Processor	Core	Flash	RAM
STM32L1 Discovery Kit	STM32L152RBT6	Cortex-M3	128 KB	16 KB
STM32L1 Discovery Kit	STM32L152RCT6	Cortex-M3	256 KB	32 KB
STM32L4 Discovery Kit	STM32L476VG	Cortex-M4 (DSP + FPU)	1 MB	128 KB

Steps to create a new project in Keil

- 1. From the menu **Project** \rightarrow **New** µVision Project
- 2. Give the project a name and select its storage directory. In this tutorial, the project is named as "lab".
- 3. If you use the STM32L1 Discovery Kit, select the device **STM32L1 Series**, and then select **STM32L152RC** or STM32L152RB as the CPU. If you use the STM32L4 Discovery Kit, select the device **STM32L4 Series**, and then select **STM32L4476VGTx**.

Select Device for Target 'Target 1'		×
Device		
Software Packs Vendor: STMicroelectronics Device: STM32L476VGTx Toolset: ARM		
Search:	Description:	
** \$TM32L476RC ** \$TM32L476RE ** \$TM32L476RG ** \$TM32L476RG ** \$TM32L476VC ** \$TM32L476VC ** \$TM32L476VC ** \$TM32L476VG ** \$TM32L476VG ** \$TM32L476VG ** \$TM32L476VG ** \$TM32L476ZG * \$TM32L476ZG	The STM32L4 family incorporates high-speed embedded memories and an extensive range of enhanced I/Os and peripherals connected to two APB buses, three AHB buses and a 32-bit multi-AHB bus matrix. - 64-Kbyte of CCM (core coupled memory) data RAM - LCD parallel interface, 8080/6800 modes - Timer with quadrature (incremental) encoder input - 5 V-tolerant I/Os - Parallel camera interface - True random number generator - RTC: subsecond accuracy, hardware calendar - 96-bit unique ID	
	OK Cancel Help	

If did not see the targeted processor in the list, click the "Pack Installer" button and install the component Keil::STM32L1xx_DFP or Keil::STM32L4xx_DFP.

4. Select **CMSIS Core** only. Do NOT select "Device Startup". Instead, you should use the one provided by the course website.

Board Support STM32L4766-EVAL 1.0.0 STMicroelectronics STM32L4766-EVAL Board CMSIS Cortex Miscocontroller Software Interface Components OBP CMSIS-CORE for Cortex-M. SCOOD, and SC300 Kortos (API) 1.0 CMSIS-DSP Library for Cortex-M. SCOOD, and SC300 Kortos (API) 1.0 CMSIS-DSP Library for Cortex-M. SCOOD, and SC300 Kortos (API) 1.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 Kortos (API) 4.80.0 CMSIS-Britos API for Cortex-M. SCOOD, and SC300 VO Retarget Input/Output Portocortex-M. Scood API for Cortex-M. SCOOD, and SC300 VO Retarget Input/Output Portocortex-M. Scood API for Cortex-M. SCOOD, and SC300 VO Retarget Input/Output. Portocortex-M. Scood API for Cortex-M. SCOOD For for STMS2L476 Devices File System	tware Component	Sel.	Variant	Version	Description	
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CORE SP CORE CORE					Cortex Microcontroller Software Interface Components	
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	🖃 🚸 RTOS (API)			1.0	CMSIS-RTOS API for Cortex-M, SC000, and SC300	
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- 5. If you are **STM32L1 discovery kit**, add the following source code files into the project. Right click the "**Source Group**" and select "Add Existing Files to Group." You can download the following source codes from the textbook website and adds into the project if you are creating an assembly-based project.
 - **startup_stm32l1xx_md**.s
 - core_cm3_constant.s
 - stm32l1xx_constants.s
 - stm32l1xx_tim_constants.s
 - main.s

If you use **STM32L4 discovery kit**, add the following source code files into the assembly-based project.

- core_cm4_constants.s
- stm32l476xx_constants.s
- startup_stm32l476xx.s
- main.s

If you are creating a C project, then you should include the following:

- startup_stm32l1xx_md.s or startup_stm32l476xx.s
- main.c.



6. Set Project Properties

From the menu, click **Project** \rightarrow **Option for Target**, Go to the **Output** page, select "Create HEX file"

Options for Target 'Target 1'	×
Device Target Output Listing User C/C++ Asm	Linker Debug Utilities
Select Folder for Objects Name of	Executable: lab
 Create Executable: .\Objects\lab Debug Information Create HEX File Browse Information Create Library: .\Objects\lab.lib 	Create Batch File
ОК Са	ncel Defaults Help

Go to the Linker page, select "Use Memory Layout from Target Dialog"

Options for	Target 'Target 1'		×
Device Targe	t Output Listing User C/C++ Asm	Linker Debug Utilities	
Vise Mem Make Dont Repo	ory Layout from Target Dialog RW Sections Position Independent RO Sections Position Independent Search Standard Libraries t 'might fail' Conditions as Errors	X/O Base: R/O Base: R/W Base 0x20000000 disable Warnings:	
Scatter File Misc controls			Edit
Linker control string	cpu Cortex-M3 *.o strictscatter ".\Objects\Vab.sct"		* •
	ОК	Cancel Defaults	Help

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

Device Target Output Listing User C/C++ Asm	Linker Debug Utilities
C Use Simulator Settings Settings Settings	• Use: ST-Link Debugger Settings
Load Application at Startup Initialization File: Load Application File: Initialization File: Load Application File: Initialization File: Initiane File: Initialization File: Initi	Load Application at Startup Initialization File: Edit
Restore Debug Session Settings Image: Breakpoints Image: Toolbox Image: Breakpoints Image:	Restore Debug Session Settings Breakpoints Toolbox Watch Windows Memory Display System Viewer
CPU DLL: Parameter: SARMCM3.DLL -REMAP -MPU	Driver DLL: Parameter: SARMCM3.DLL -MPU
Dialog DLL: Parameter: DCM.DLL PCM3	Dialog DLL: Parameter: TCM.DLL -pCM3
ОК Са	ncel Defaults Help

Click "Settings" and select "SW" (Serial Wire) as the port.

Debug Trace Flash Download Debug Adapter Unit:	SW Device		
Serial Number: HW Version:	Down		
Firmware Version: Image: Automatic Detection ID CODE: Port: SW Image: SW Image: SW Max Clock: 1.8MHz Image: Add Delete Update IR len:			
Connect & Reset Options Connect: Normal Re	set: Autodetect Cache Options Cache Code Cache Code Cache Memory Download Options Download to Flash		

Go to the **Flash Download** page, and verity that **STM32L1xx On-chip Flash** is selected in the Programming Algorithm. If not, click "Add" and select STM32L1xx On-chip flash in the popped dialog.

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STM32L1 Discovery Kit

STM32L4 Discovery Kit

7. Compile and run your project Build the program:



You can ignore the following warning when the linking stage:

.\Objects\lab.sct(8): warning: L6314W: No section matches pattern *(InRoot\$\$Sections).

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

