

# STM32L100C-Discovery Board Projects

## Keil Microcontroller Development Kit for ARM (MDK-ARM) Version 5.xx

As illustrated in Figure 1, MDK-ARM Version 5.xx (*µVision5*) comprises a set of core functions:

- *Integrated Development Environment (IDE)* with project manager and editor to create projects
- *ARM C/C++ compiler and assembler* to build projects (using any combination of languages)
- *Debugger* to interactively debug projects on the target board or simulator
- *Pack installer*

One or more Software Packs must be installed, each of which provides resources (system/startup code, device drivers, etc.) for a specific family of microcontrollers. The appropriate software pack must be installed for each microcontroller family to be used.

- The required pack for this lab is *Keil::STM32L1xx\_DFP*, which supports the *STM32L100RCT6* microcontroller on the *STM32L1-Discovery* board.

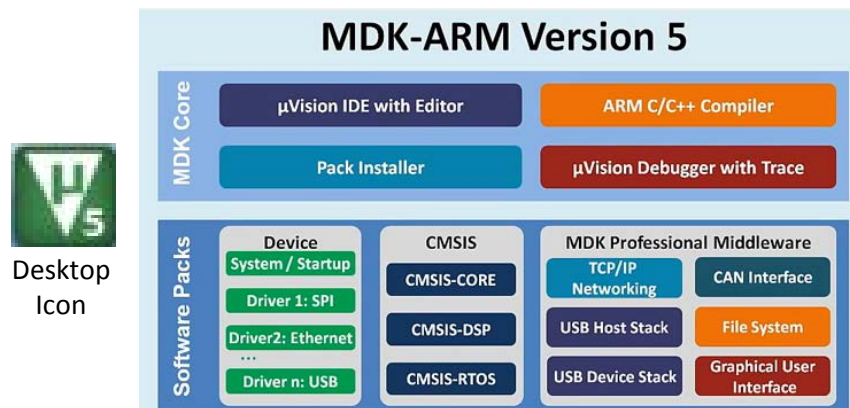


Figure 1. MDK-ARM V5.xx (*µVision5*) comprises the MDK Core and one or more Software Packs

### Notes:

- This document assumes that MDK-ARM Version 5.xx has been installed, along with the STM32L1xx device family pack and ST-Link USB driver.
- This document also assumes that projects are to be built to run on the STM32L100C-Discovery board, with programs placed in flash memory on the STM32L100RCT6 microcontroller.

## Creating a New Project for the STM32L1-Discovery Board

To create a new project, open  $\mu$ Vision5 and set up the project as follows.

1. From the menu bar select: **Project**  $\rightarrow$  **New  $\mu$ Vision Project**. In the Create New Project Window (Figure 1), navigate to the folder in which you want to create the project (create the folder if necessary), enter a project name (ex. *Lab1*), and click **Save**.

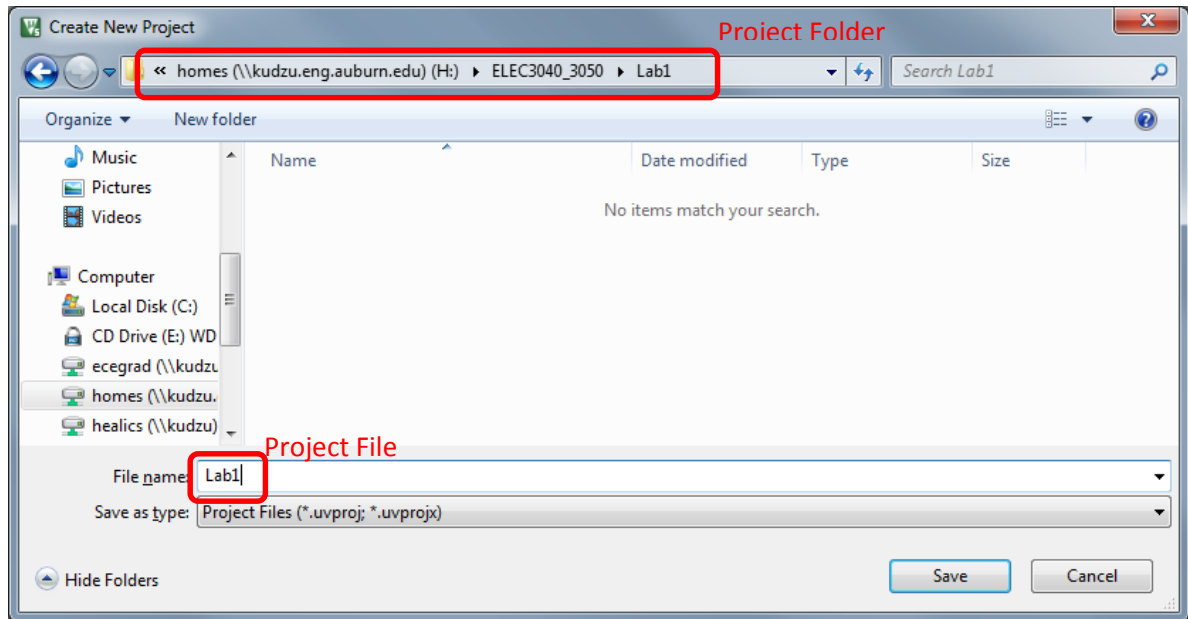
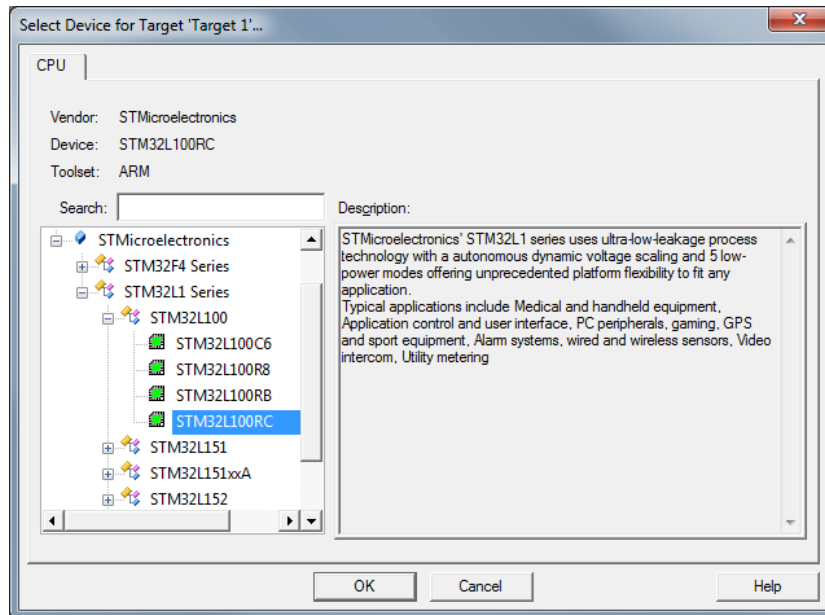


Figure 1. Creating a new  $\mu$ Vision project "Lab1"

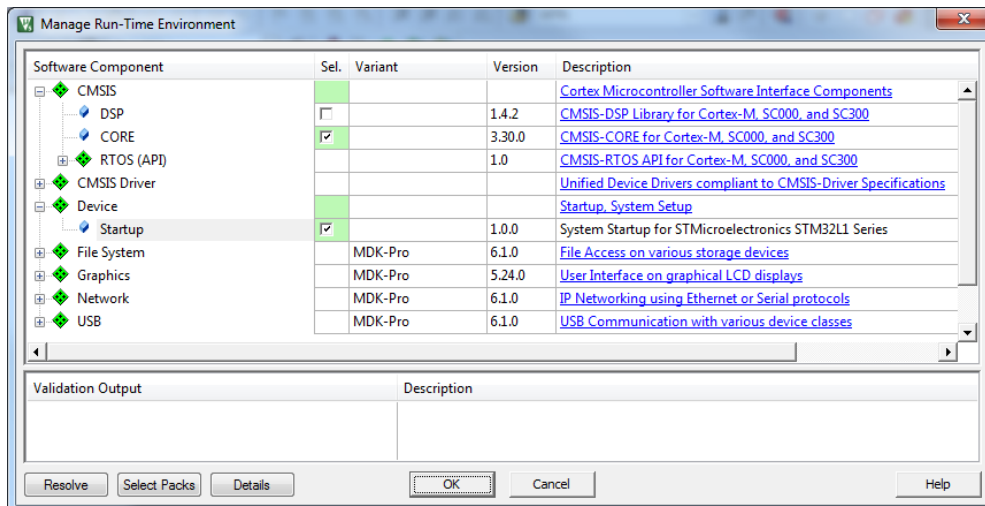
**NOTE:** It is recommended that a separate folder be created for each project.

- In the *Select Device for Target* window (Figure 2), select microcontroller **STM32L100RC**.



**Figure 2. Select the STM32L100RC microcontroller.**

- In the *Manage Run-Time Environment* window (Figure 3), add the microcontroller header and startup files to the project by selecting **CMSIS** → **CORE** and **Device** → **Startup**. (CMSIS = *Cortex Microcontroller Software Interface Standard*)



**Figure 3. Include the CMSIS CORE and Startup files in the project.**

4. In the **Project** pane of the  $\mu$ Vision5 window (Figure 4), create and add source file(s) to the project.
  - Right-click on **Source Group 1**, select *Add New Item to Group 'Source Group 1'*, select a file type (*C File (.c)* or *Asm File (.s)*), enter the file name (*Lab1.c*), and click **Add**. This creates a blank file in the editor pane, into which you can type or paste your source program.
  - Alternatively, right-click on **Source Group 1**, select *Add Existing Files to Group 'Source Group 1'*, locate and select file(s) to be added to the project and click **Add**. Click **Close** after you've added all desired source files.

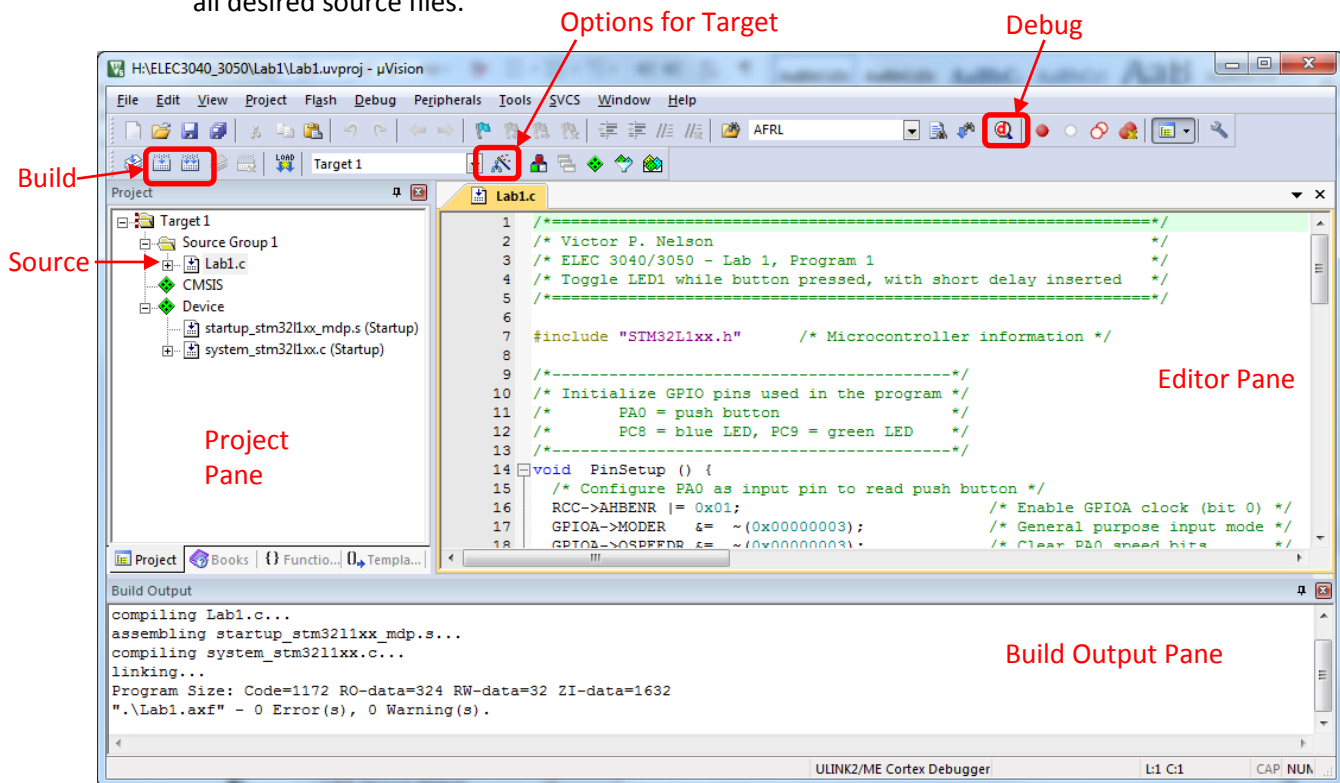


Figure 4. Add source file(s) to Source Group 1 in the Project pane, and build the project.

5. After creating and saving source files, the project must be “built” by compiling/assembling the source files, correcting any syntax errors as necessary, and then linking the files into one downloadable program. This is performed by:
  - Click on the **Build** icon above the project pane, or from the menu bar select **Project → Build Project**. This will recompile only source file(s) that have changed.
  - OR: Click on the **Rebuild** icon above the project pane, or from the menu bar select **Project → Rebuild all target files**. This will compile/assemble all source files.
6. To download the compiled program to the Discovery board, program it into the microcontroller’s flash memory, and initiate a debug session, set up the project Debug options as follows.
  - From the menu bar, select **Project → Options for Target 'Target 1'** (or click on the **Options for Target** icon next to the target name in the menu bar.)
  - Select the **Debug** tab (Figure 5), check the Use button and select **ST-Link Debugger**.

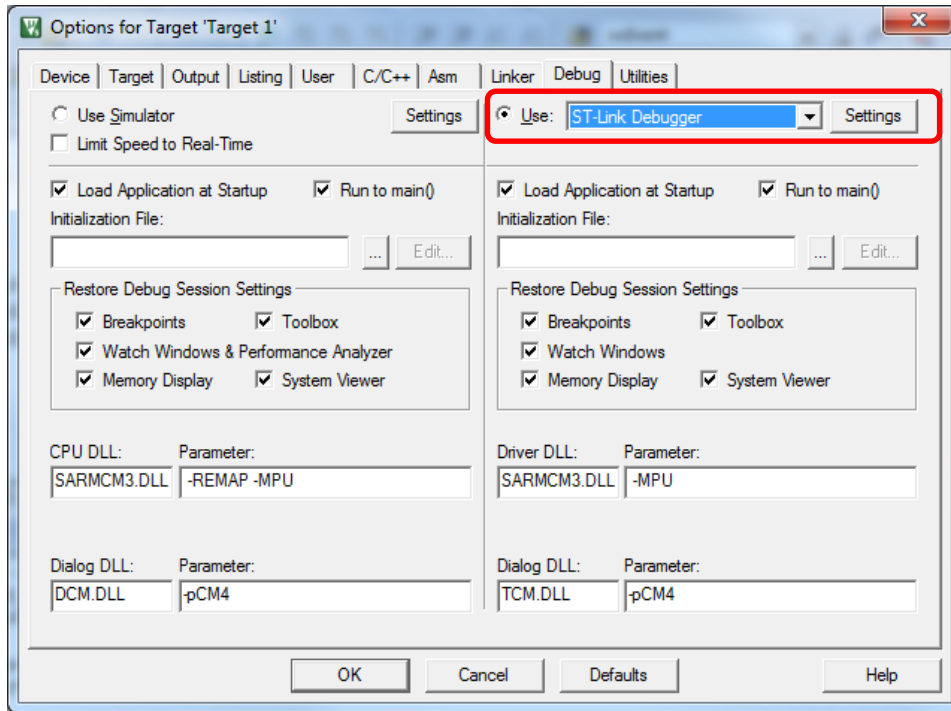


Figure 5. Target Options Debug tab. “Use ST-Link Debugger” selected.

- Click on **Settings** next to **ST-Link Debugger** to produce the Cortex-M Target Driver Setup Window (Figure 6), and select **Port SW** (Single-Wire debug) under **Debug Adapter**.

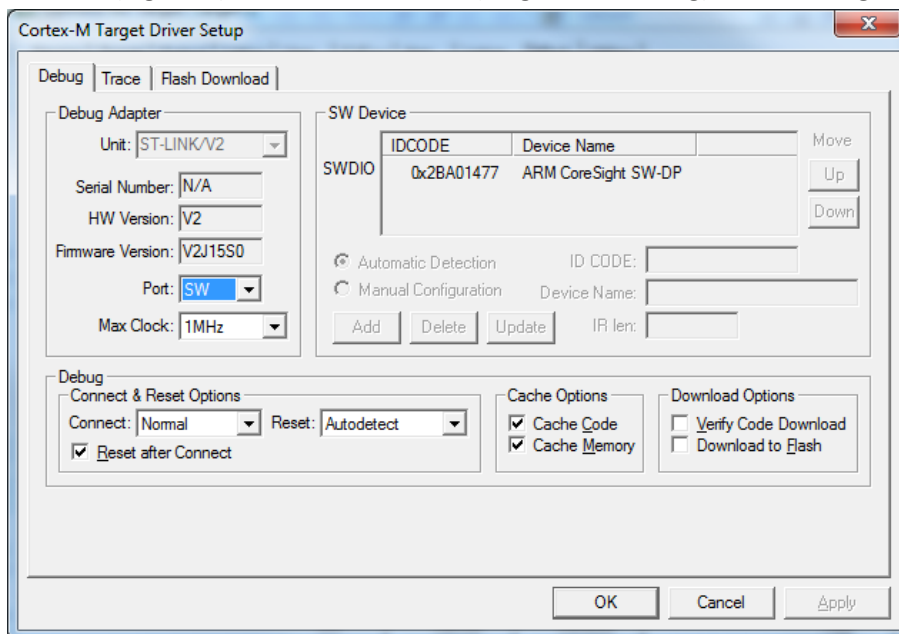


Figure 6. Single-Wire (SW) Debug Adapter port selected.

- Click on the **Flash Download** tab of the Cortex-M Target Driver Setup Window (Figure 7) and under **Programming Algorithm**, click the **ADD** button and select **STM32L1xx Med+density Flash 256K**. Then you can close the setup and options windows.

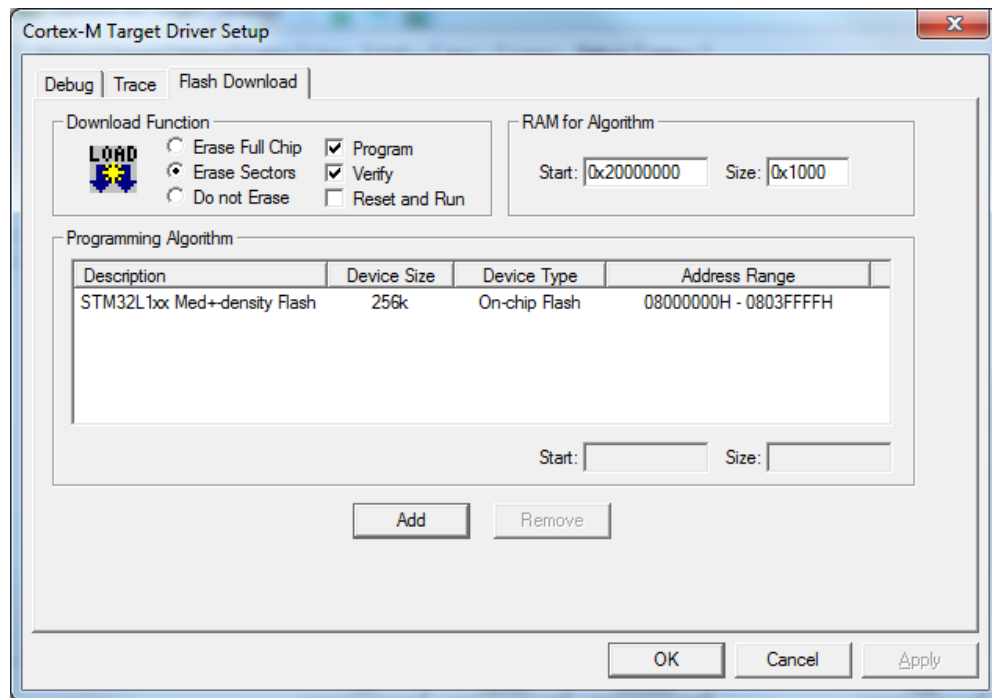


Figure 7. STM32L1xx flash programming algorithm selected

- Click the **Debug** icon in the  $\mu$ Vision5 window (Figure 4), or select **Debug**  $\rightarrow$  **Start/Stop Debug Session**. This will download the project code to the target board, program it into the microcontroller's flash memory, and open the Debug Window (Figure 8).
- At this point, you may run/stop/step the program, set breakpoints, select watch variables, etc. by clicking on buttons in the menu bar.
- Click on the **Debug** icon to stop the debug session and reenter the  $u$ Vision5 IDE.

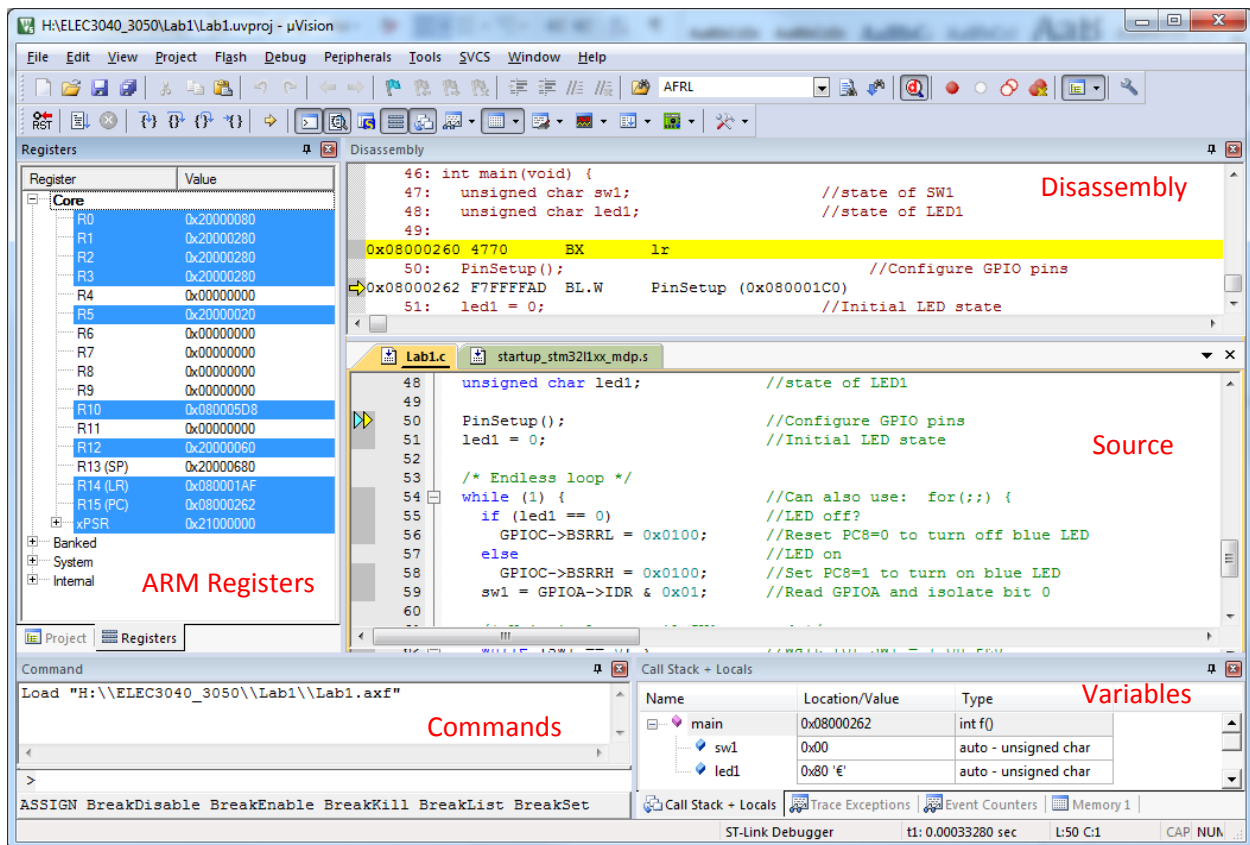


Figure 8. MDK uVision5 debug window.

For further information, refer to “Keil uVision MDK - uVision Lab for the STM32F4 Discovery Board” ([http://www.keil.com/appnotes/docs/apnt\\_230.asp](http://www.keil.com/appnotes/docs/apnt_230.asp)): App Note 230, Section 20 (Creating your own project from scratch)