ANKARA YILDIRIM BEYAZIT UNIVERSITY

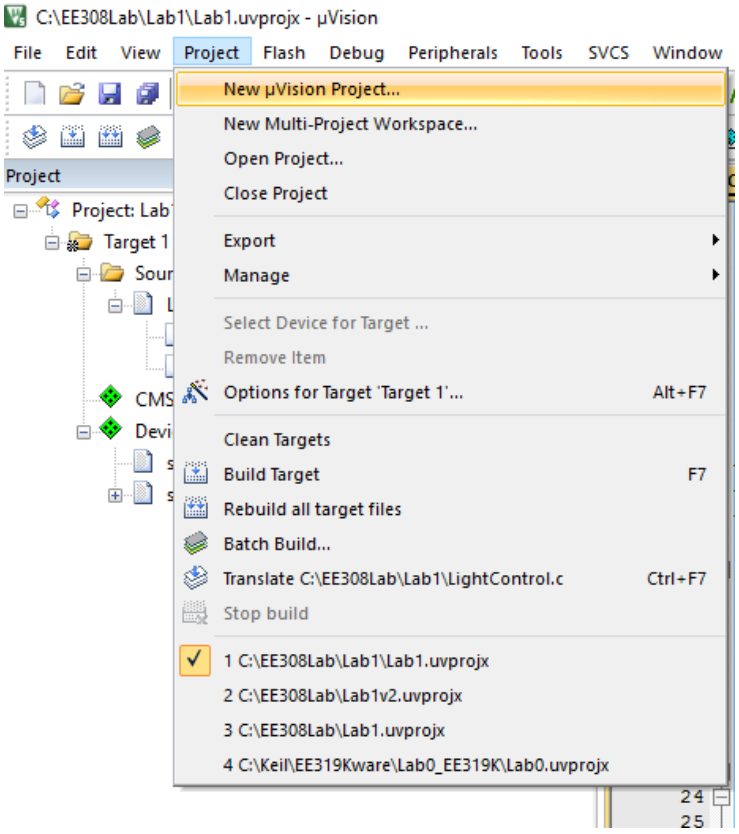
EE 308 – MICROPROCESSORS

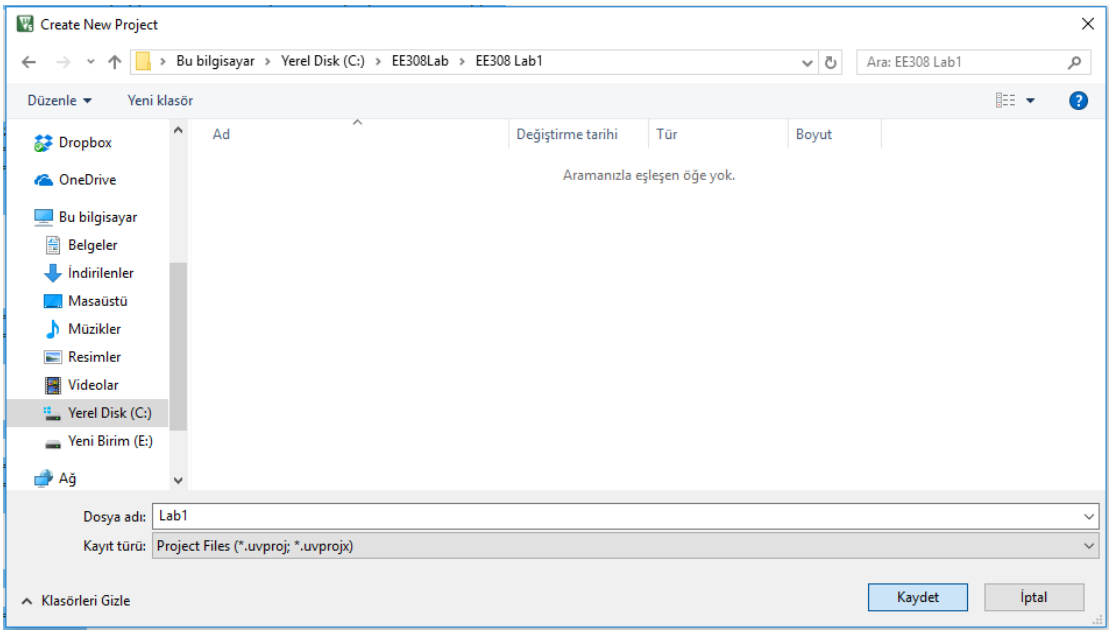
LABORATORY MANUAL – 2–

C Programming

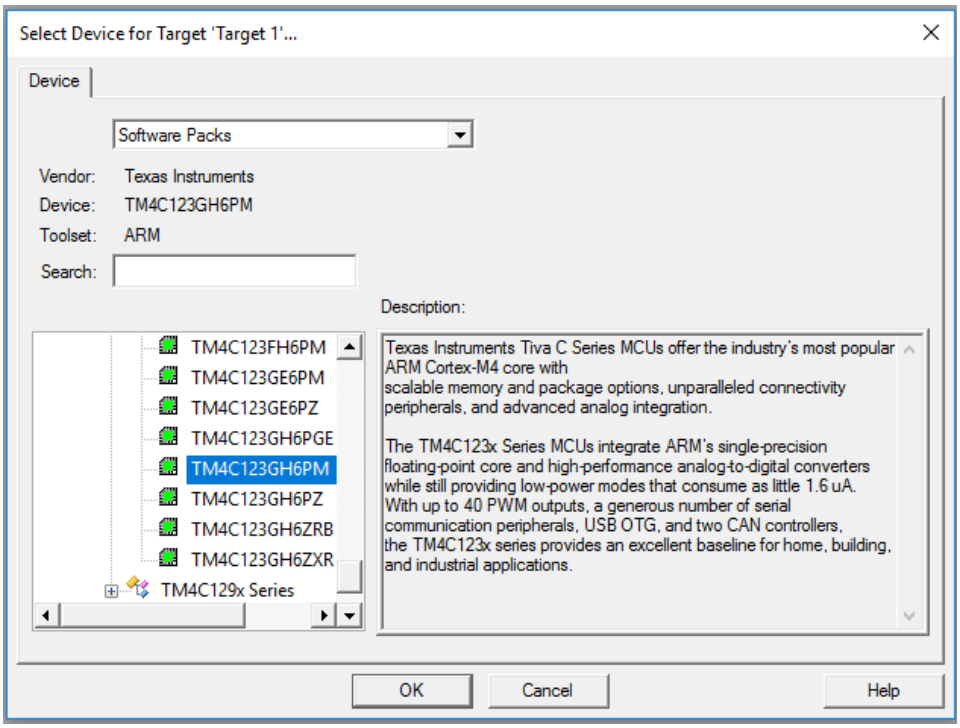
Background Work:

- Open uvision. Under project tab, click ***"New uVision Project"***. Then name and save it.

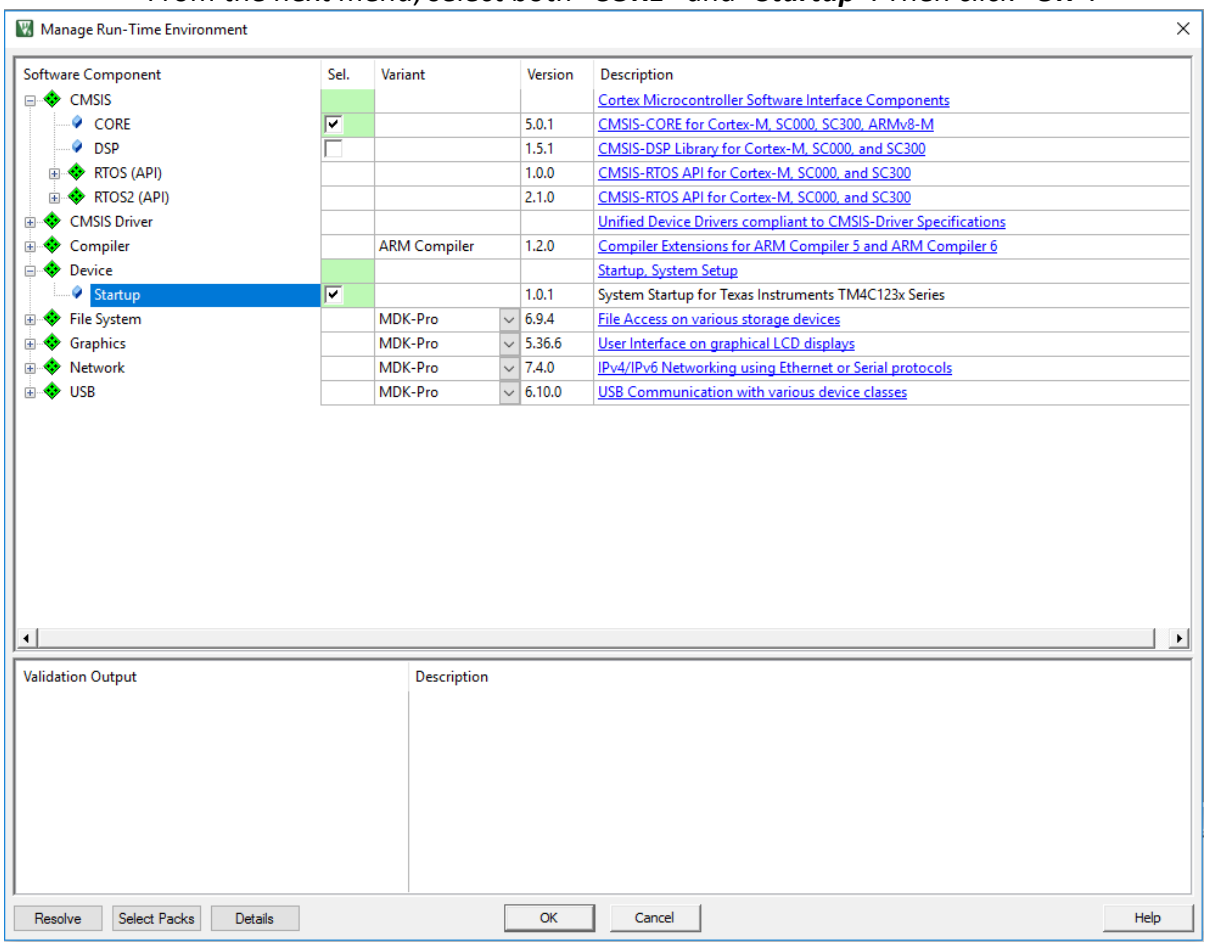




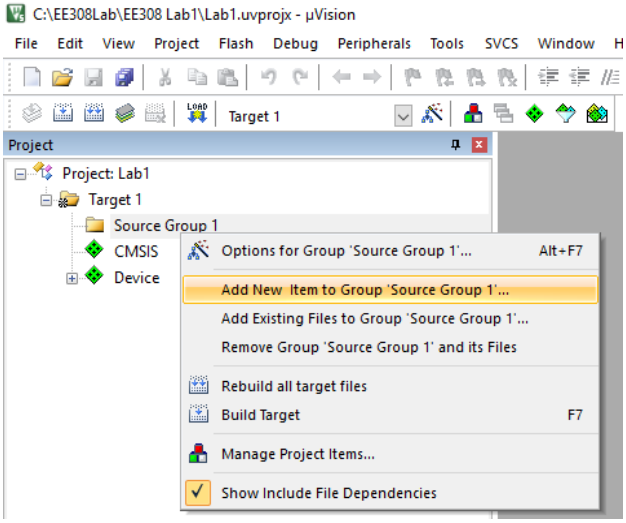
- Select your device, TM4C123GH6PM. Please choose the proper device that you use. Click ***"OK"***.

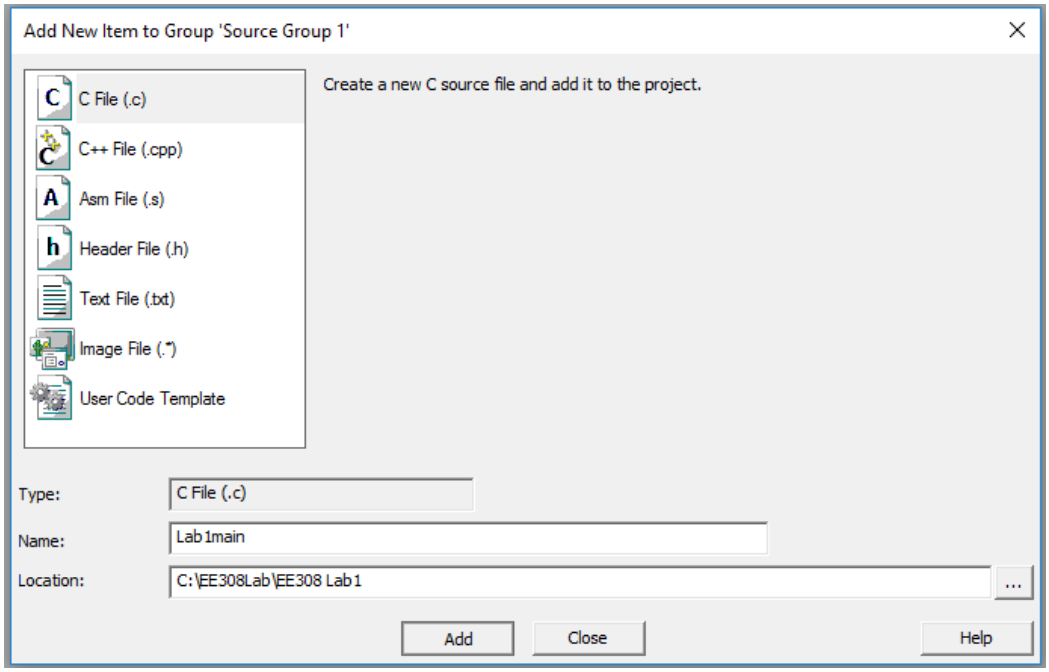


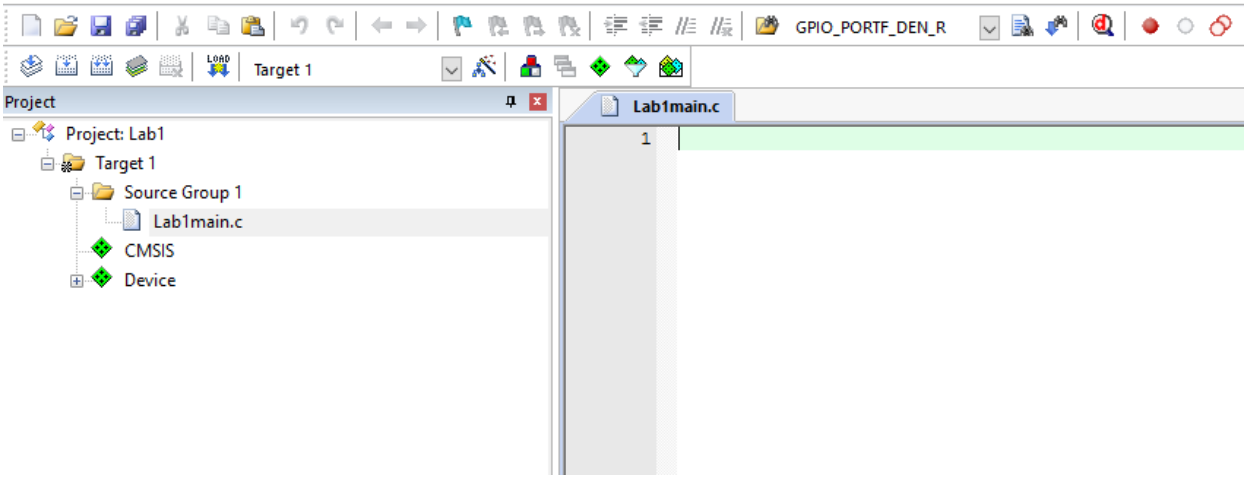
- From the next menu, select both ***"CORE"*** and ***"Startup"***. Then click ***"OK"***.



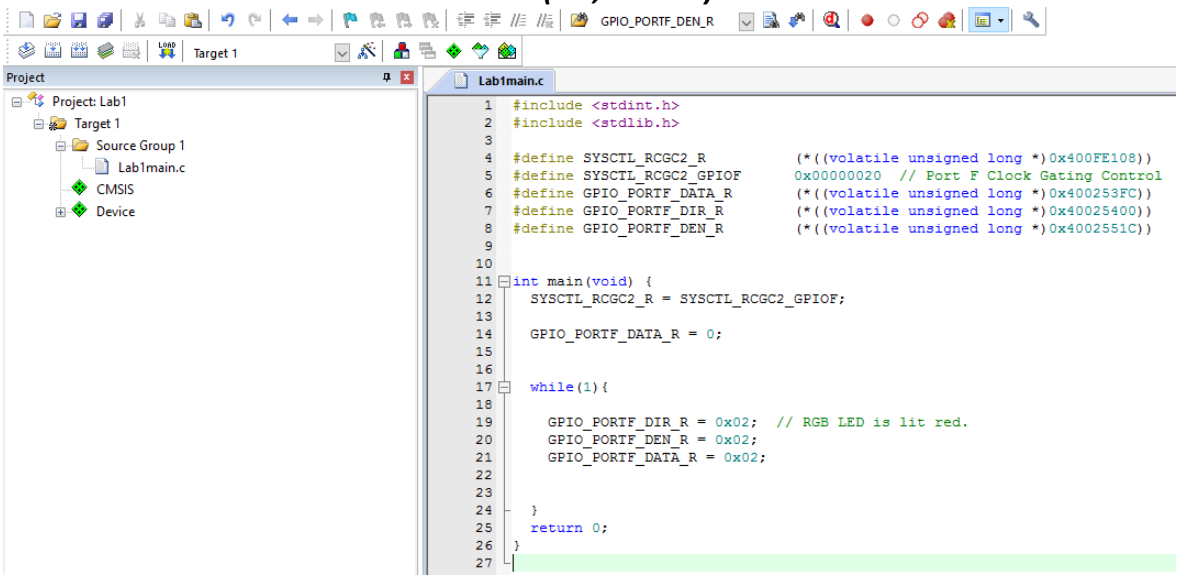
- Right click on ***Source Group 1*** and click ***"Add New Item…"*** then create a C file. An empty C file should be added to the group.



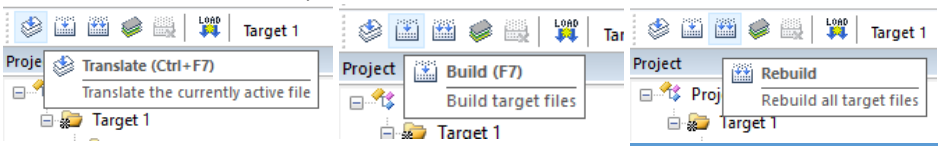




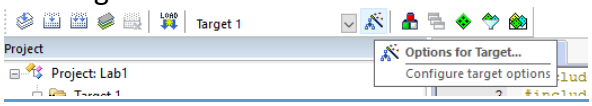
- Write the below code and save ***(i.e., CTRL+S)***.



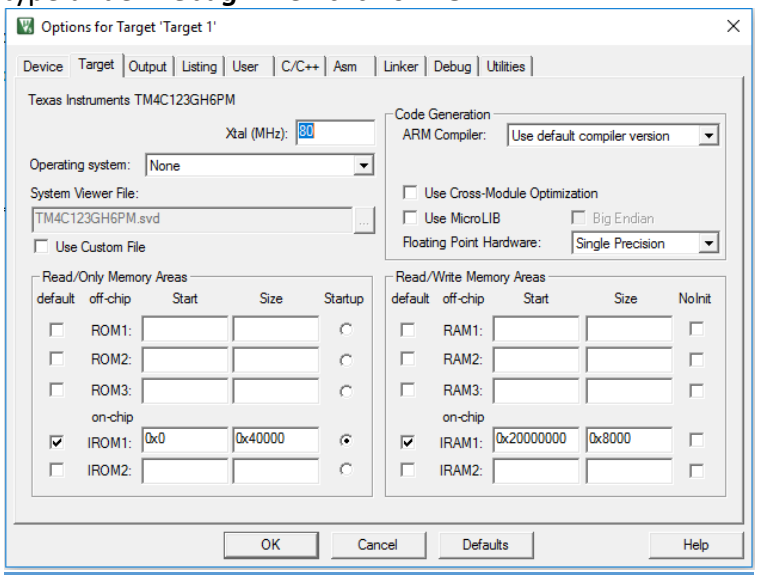
- Then click ***"Translate"***, ***"Build"*** and ***"Rebuild"*** in succession.

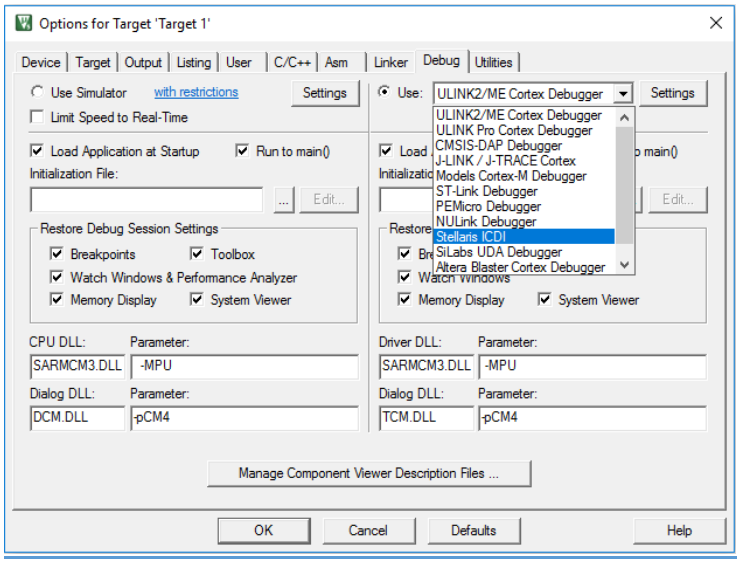


- After the project is built, click on ***"Options for Target"***. Make sure your board is connected via debug.

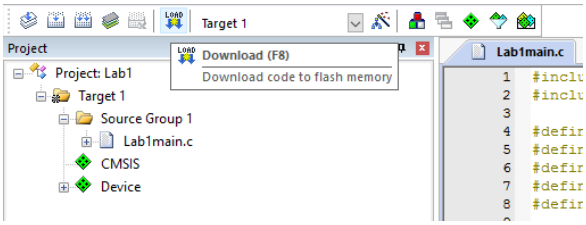


- Then adjust the clock frequency with respect to your board and change the connection type under ***Debug***. Then click on ***"OK"***.

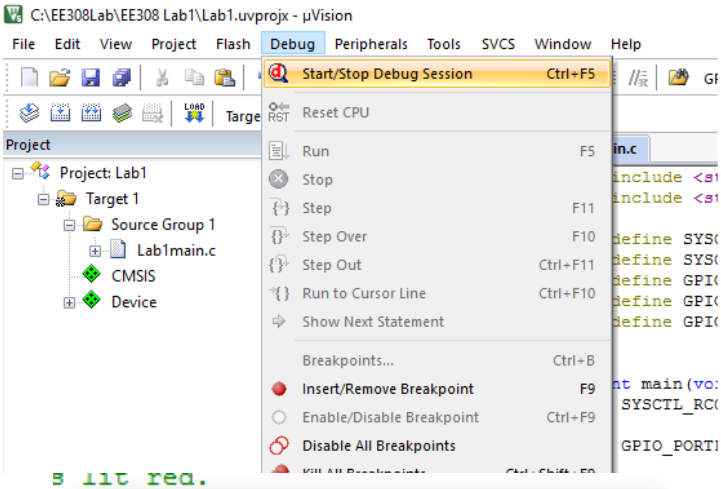


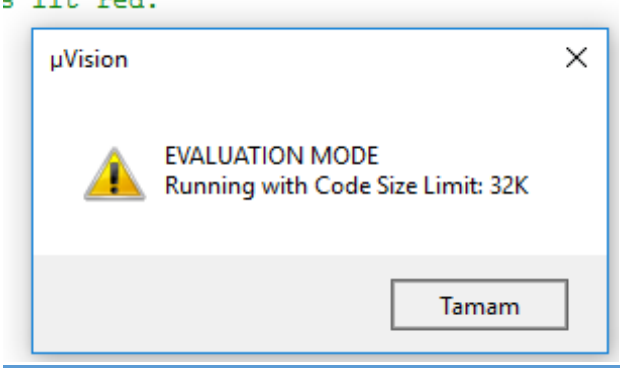


- Click on ***"Download"***.

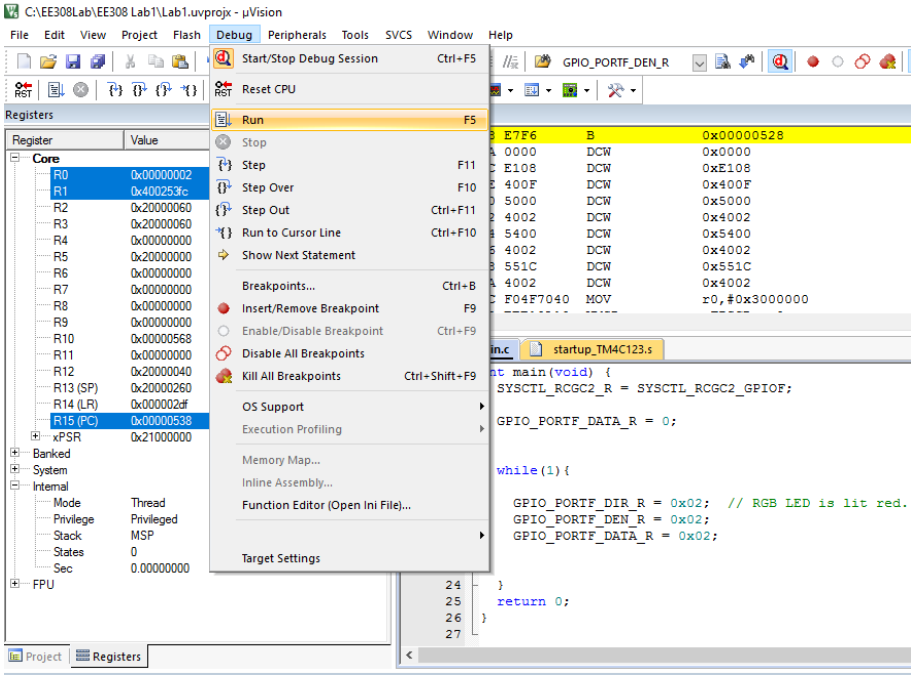


- Click ***"Start/Stop Debug Session"*** under Debug menu. Click ***OK***, if prompted with evaluation mode notice.



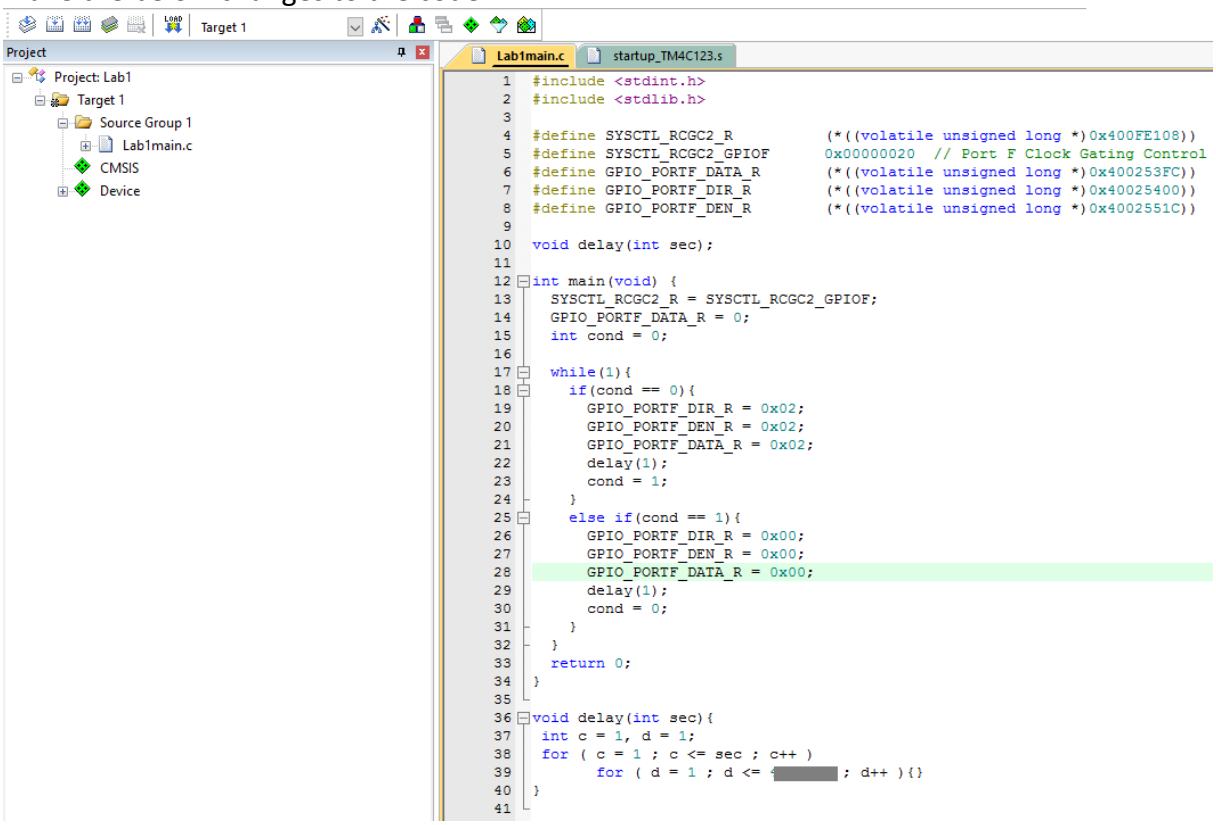


- Click ***"Run"*** in order to run the code on the board.



After the code is downloaded to board, the RGB LED will continuously light red. Let's make an improvement to our code so that the LED will be repeatedly on and off in 1 second intervals.

- Click ***"Start/Stop Debug Session"*** under Debug menu to stop debugging. Then make the below changes to the code.



Here a function named ***"delay"*** is created. On line 10, the function template is created with only the name of the function and input names inside the parenthesis. Then, on line 36, the function behavior is written. Once called (i.e., on lines 22 and 29), this function waits for 1 second. The limit for ***d*** is intentionally censored. Try to find this value by observing the LED on and off times.

Follow the steps on pages 4, 5 and 6 to download and run the code on the board.

Laboratory Work:

1. Write a C code so that the RGB LED on the board acts as a traffic light. The specifications are;
   - The LED should lit in the order; RED, YELLOW, GREEN and loop over.
   - RED light should be on for approximately 10 seconds.
   - YELLOW light should be on for approximately 3 seconds.
   - GREEN light should be on for approximately 6 seconds.

2. Make improvements on the code so that the buttons SW1 and SW2 controls the traffic light. The specifications are;
   - With each press of SW1, the traffic light durations are increased by 5 seconds. For example; with 1st press, RED is lit 15 seconds, YELLOW is lit 8 seconds and GREEN is lit 11 seconds. With 2nd press, RED is lit 20 seconds, YELLOW is lit 13 seconds and GREEN is lit 16 seconds. Once the duration of RED light reaches 30 seconds, reset to initial values with the next button press.
   - SW2 toggles the YELLOW light with each press. In other words, the traffic light will run with either 2 colors (i.e., RED, GREEN) or 3 colors (i.e, RED, YELLOW, GREEN).

Hint: *Do not forget to define the ports for and unlock the switches.*

Hint: *Color codes; RED 0x02, YELLOW 0x0A, GREEN 0x08.*