Lab 4: Input/Output

OBJECTIVES

You will debug this program as your Lab 4

If both switches SW1 and SW2 are pressed, the LED should be blue

If just SW1 switch is pressed, the LED should be red

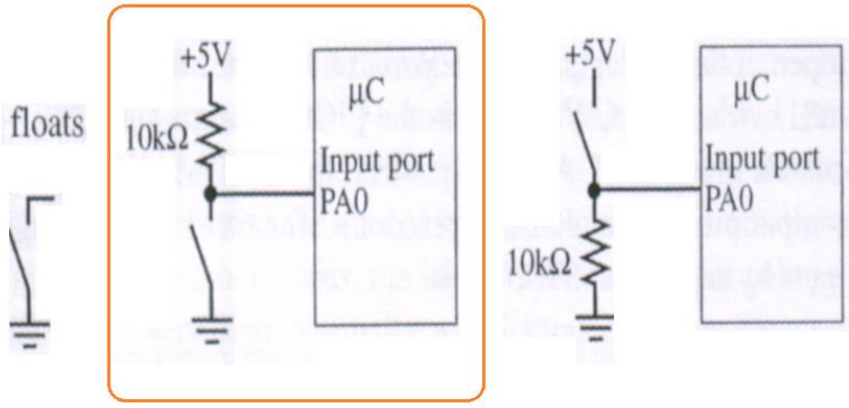
If just SW2 switch is pressed, the LED should be green

If neither SW1 or SW2 is pressed, the LED should be off

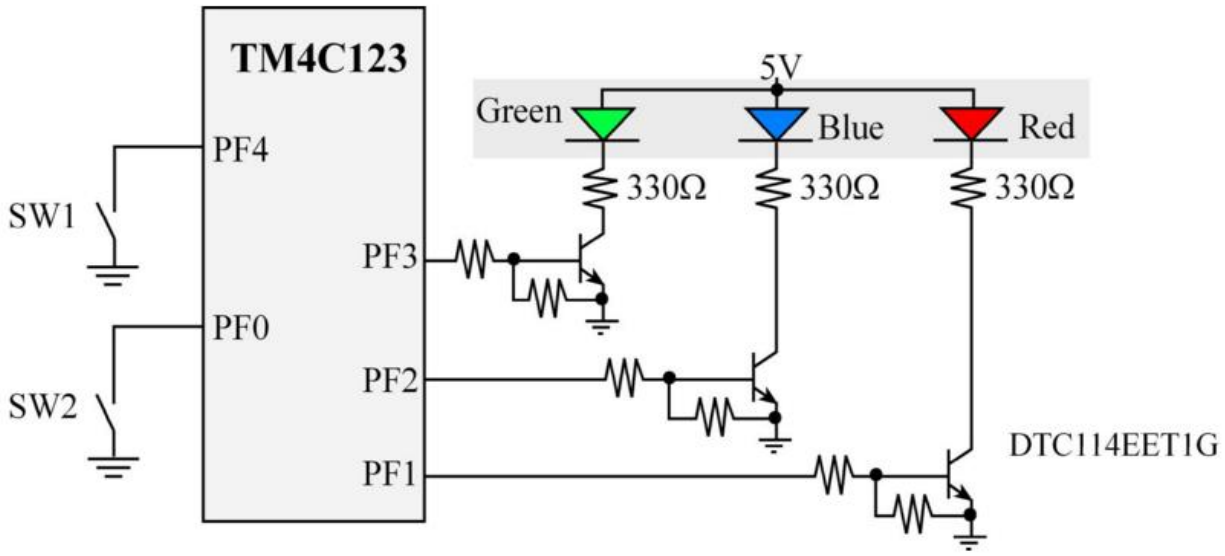
Switch Input	LED Output
Both switches SW1 and SW2 are pressed	The LED should be blue
Just SW1 switch is pressed	The LED should be red
Just SW2 switch is pressed	The LED should be green
Neither SW1 or SW2 is pressed	The LED should be off

MATERIALS/EQUIPMENT NEEDED

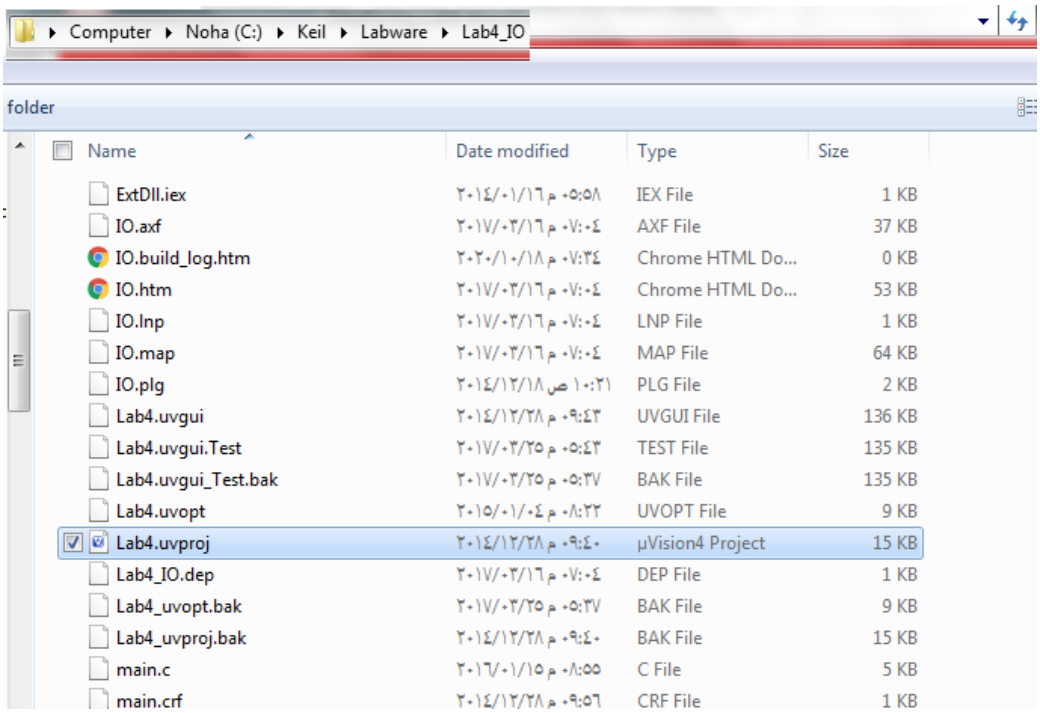
- Keil µVision Integrated Development Environment (IDE) for the ARM.

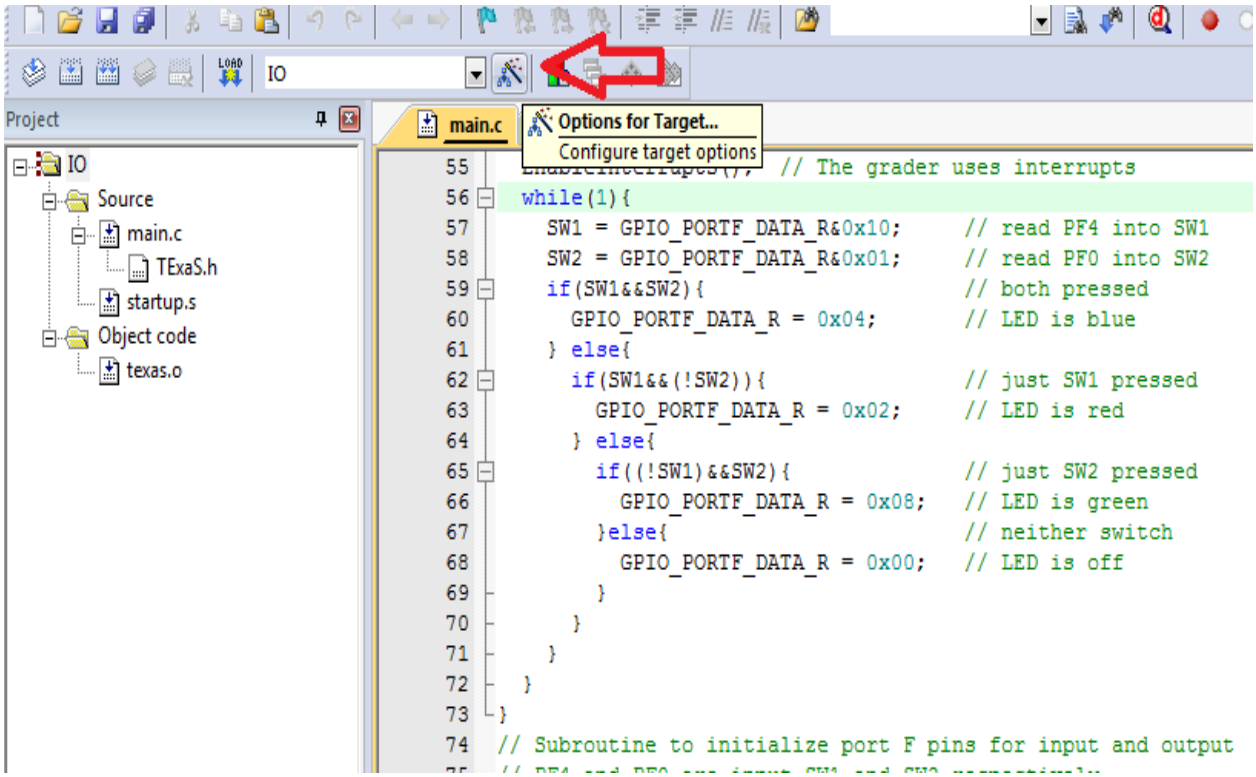


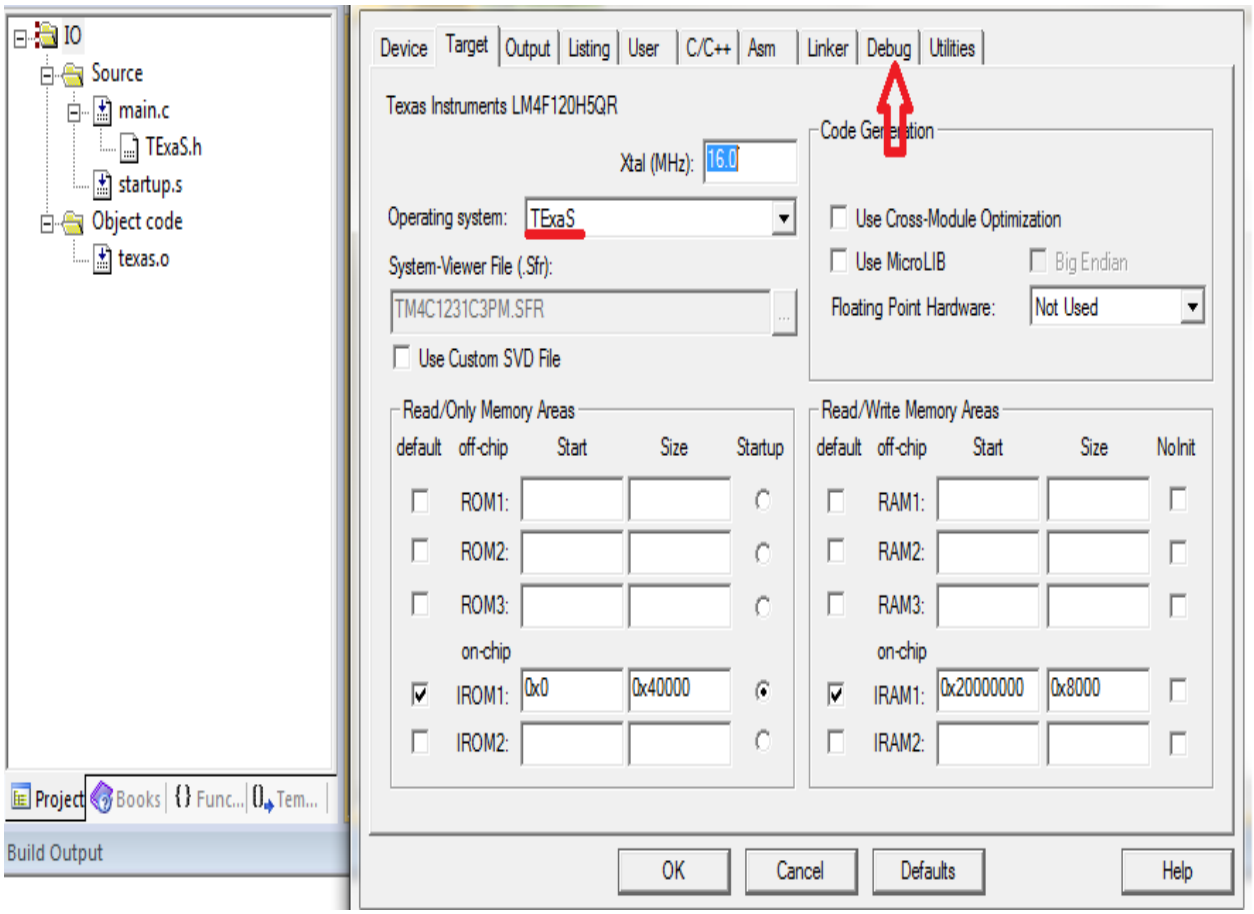
PROCEDURE

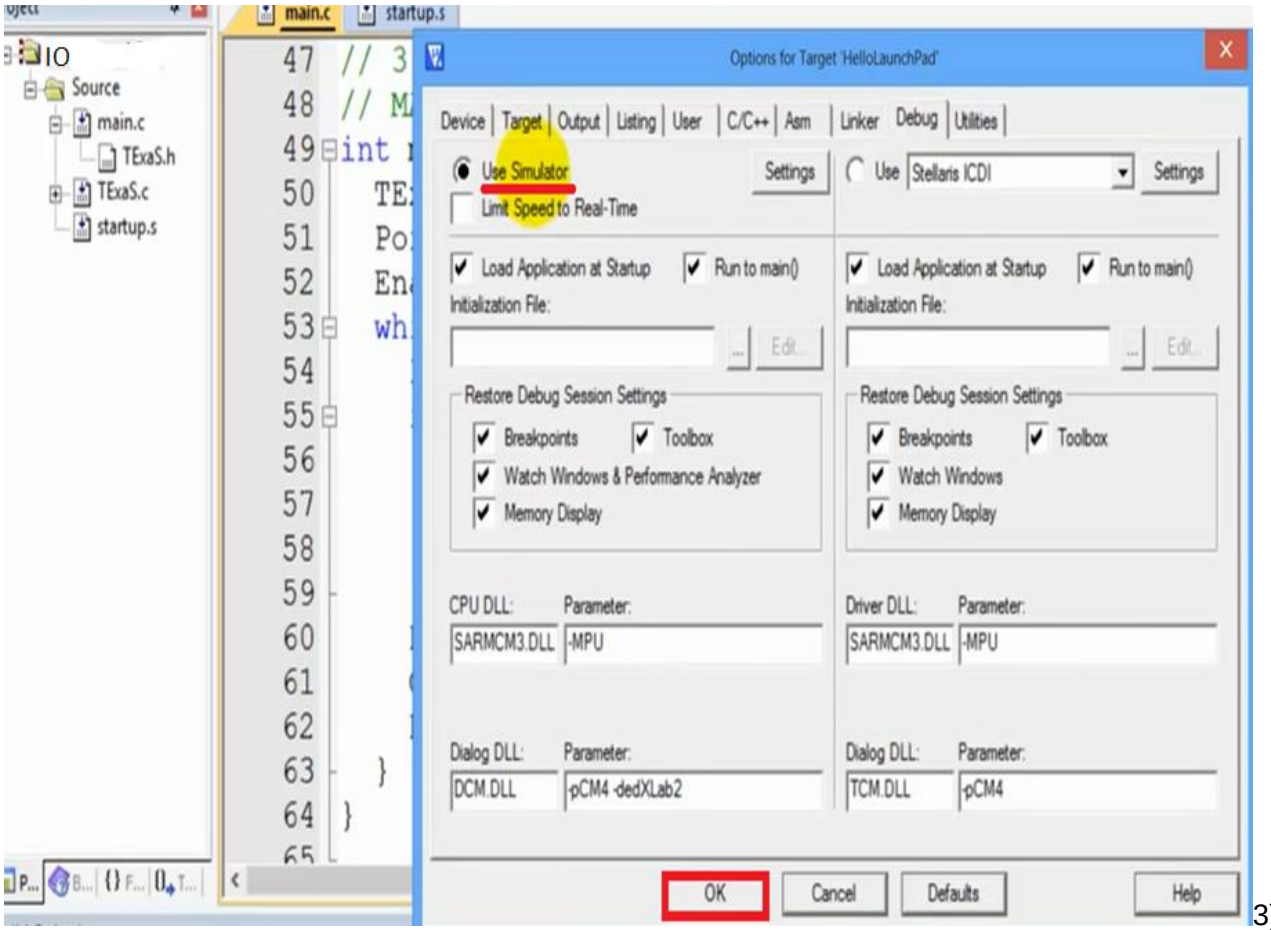


			PF7	PF6	PF5	PF4	PF3	PF2	PF1	PF0
// red	R	0x02	0	0	0	0	0	0	1	0
// blue	B	0x04	0	0	0	0	0	1	0	0
// green	G	0x08	0	0	0	0	1	0	0	0



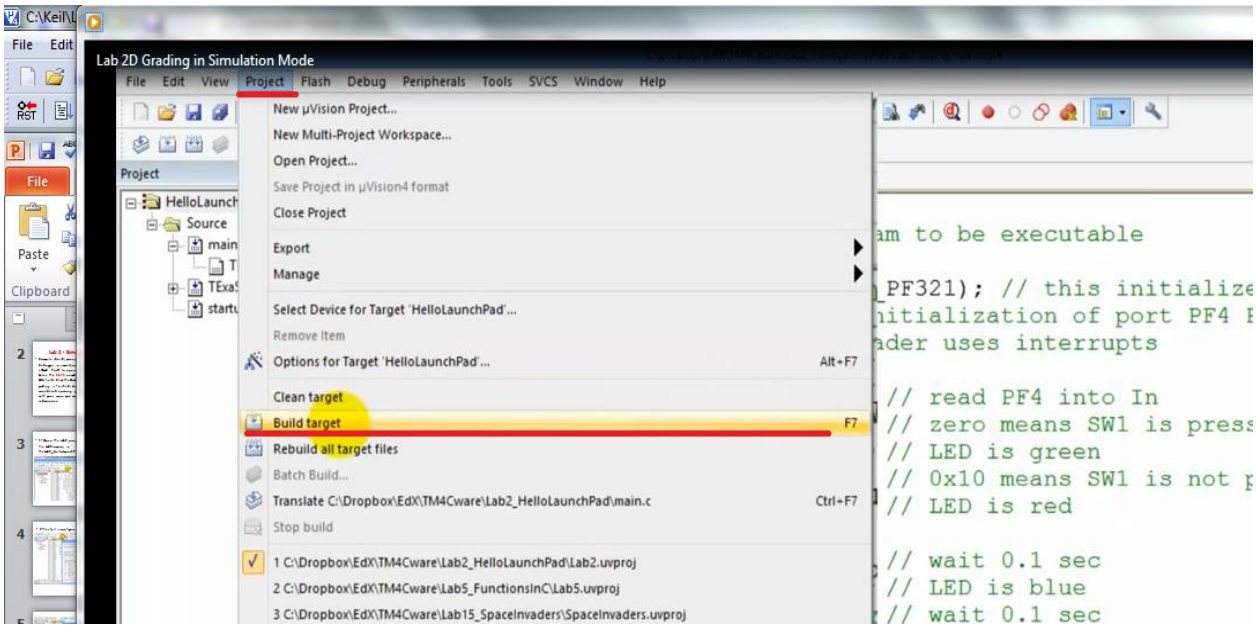

IO
Project
IO
Source
main.c
TExaS.h
startup.s
Object code
texas.o
main.c
Options for Target...
Configure target options
55 // The grader uses interrupts
56 while(1){
57 SW1 = GPIO_PORTF_DATA_R&0x10; // read PF4 into SW1
58 SW2 = GPIO_PORTF_DATA_R&0x01; // read PF0 into SW2
59 if(SW1&&SW2){ // both pressed
60 GPIO_PORTF_DATA_R = 0x04; // LED is blue
61 } else{
62 if(SW1&&(!SW2)){ // just SW1 pressed
63 GPIO_PORTF_DATA_R = 0x02; // LED is red
64 } else{
65 if((!SW1)&&SW2){ // just SW2 pressed
66 GPIO_PORTF_DATA_R = 0x08; // LED is green
67 }else{ // neither switch
68 GPIO_PORTF_DATA_R = 0x00; // LED is off
69 }
70 }
71 }
72 }
73 }
74 // Subroutine to initialize port F pins for input and output

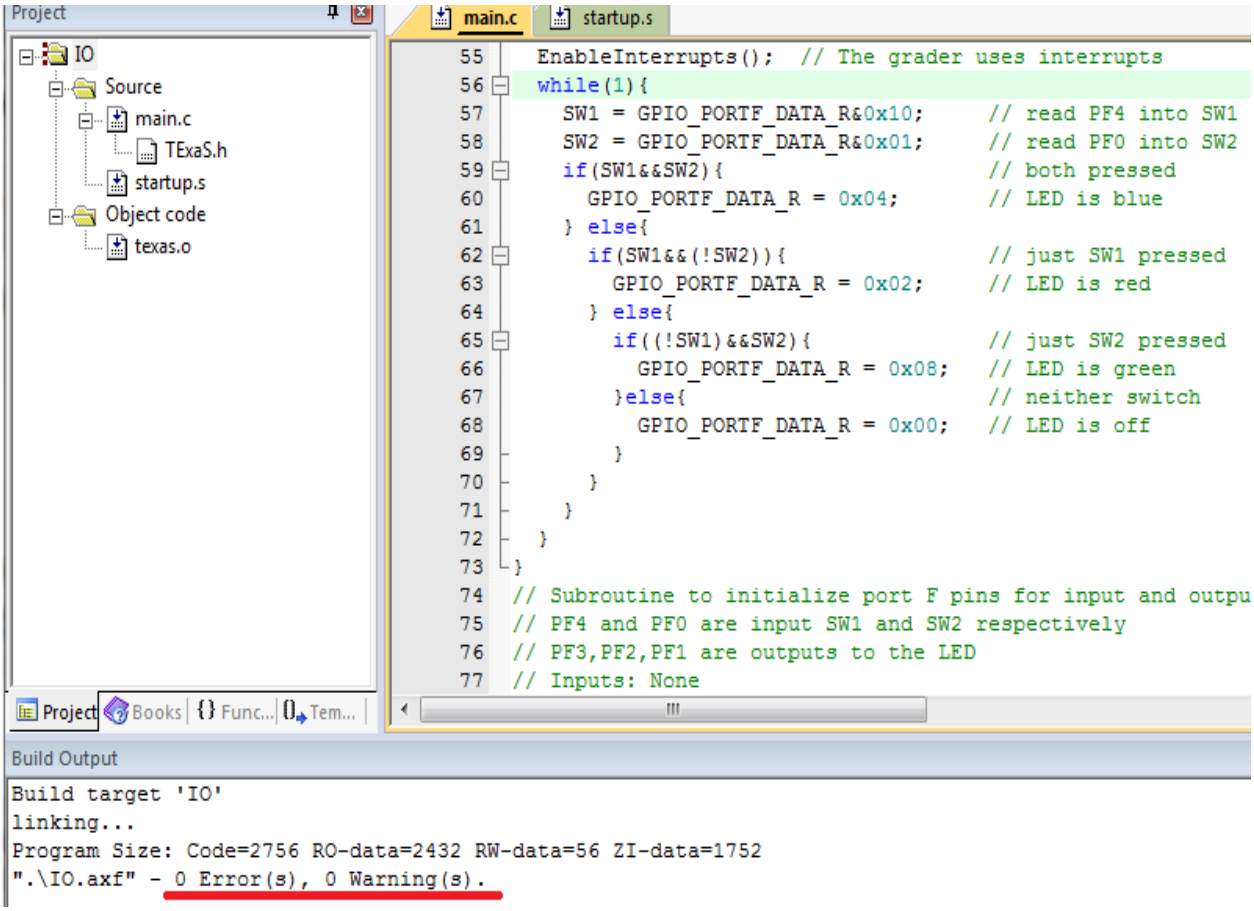

IO
Source
main.c
TExaS.h
startup.s
Object code
texas.o
Project
Books
Func...
Tem...
Build Output
Device
Target
Output
Listing
User
C/C++
Asm
Linker
Debug
Utilities
Texas Instruments LM4F120H5QR
Xtal (MHz): 16.0
Operating system: TExaS
System-Viewer File (.Sfr):
TM4C1231C3PM.SFR
Use Custom SVD File
Code Generation
Use Cross-Module Optimization
Use MicroLIB
Big Endian
Floating Point Hardware: Not Used
Read/Only Memory Areas
default off-chip Start Size Startup
ROM1:
ROM2:
ROM3:
on-chip
IROM1: 0x0 0x40000
IROM2:
Read/Write Memory Areas
default off-chip Start Size NoInit
RAM1:
RAM2:
RAM3:
on-chip
IRAM1: 0x20000000 0x8000
IRAM2:
OK
Cancel
Defaults
Help



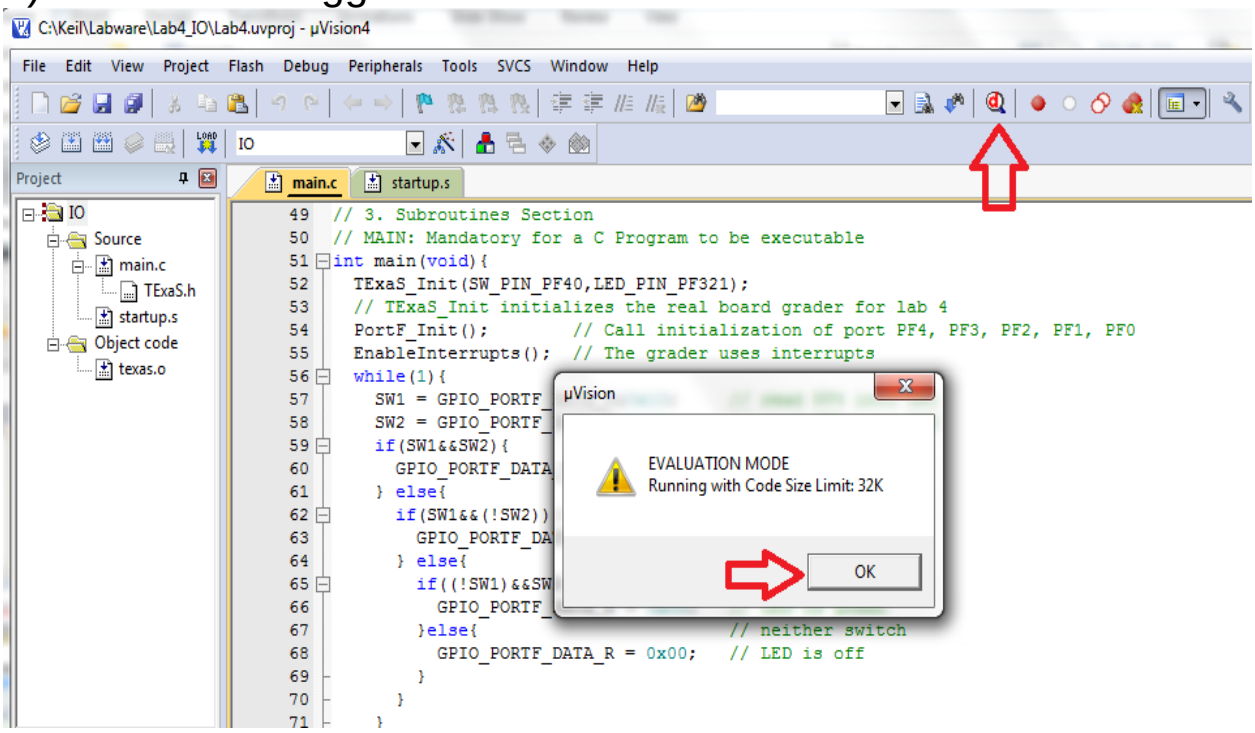
3)

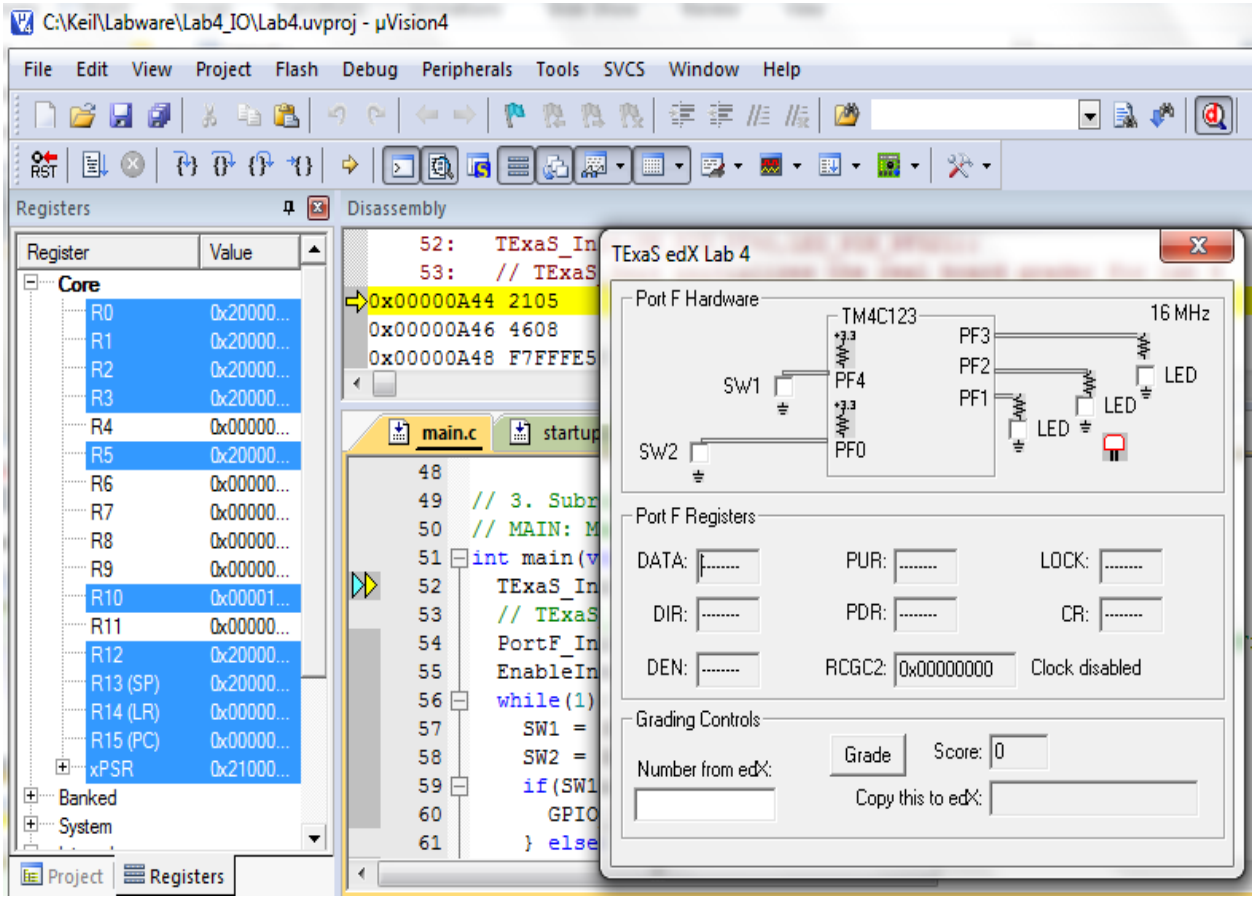
3- Build the project

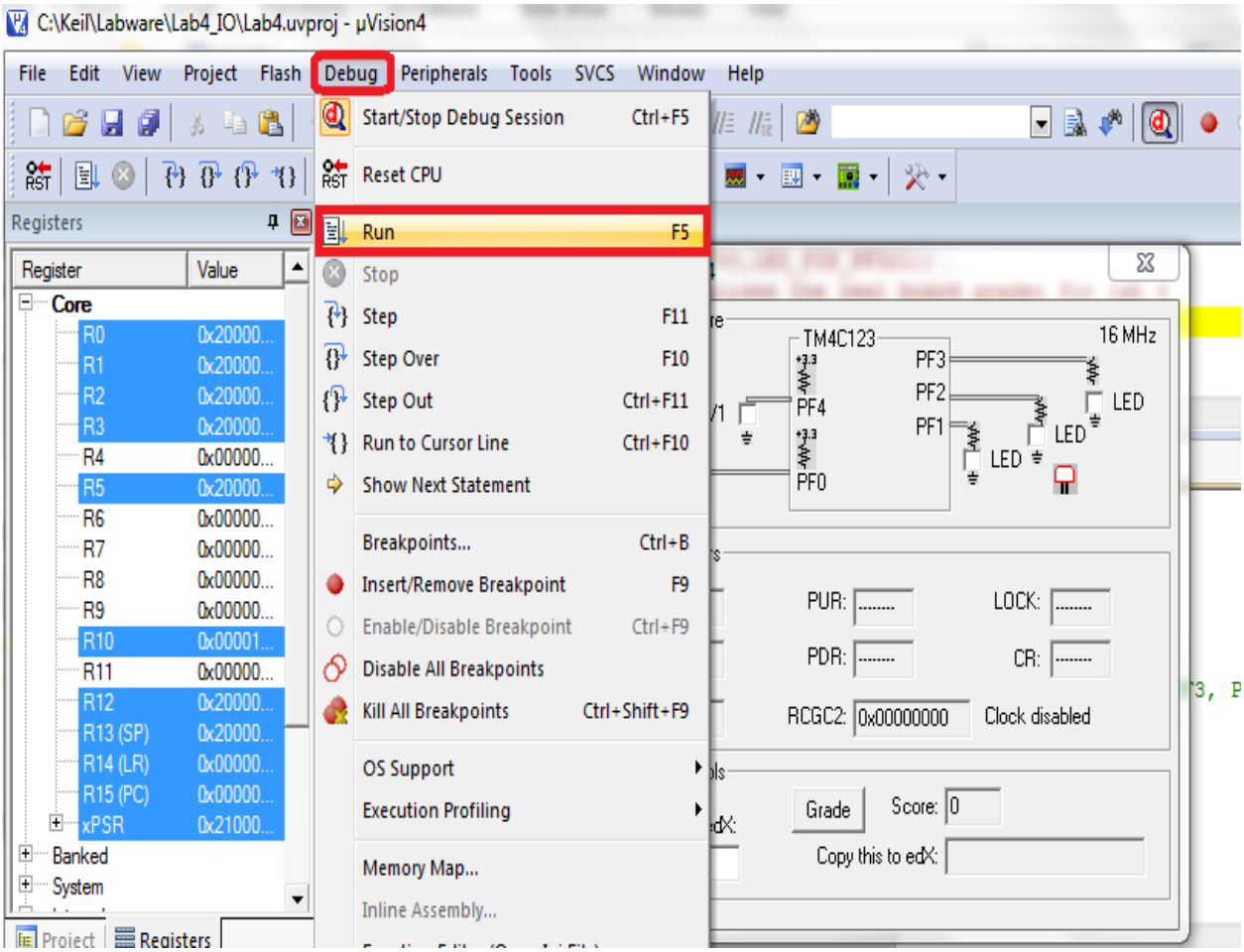


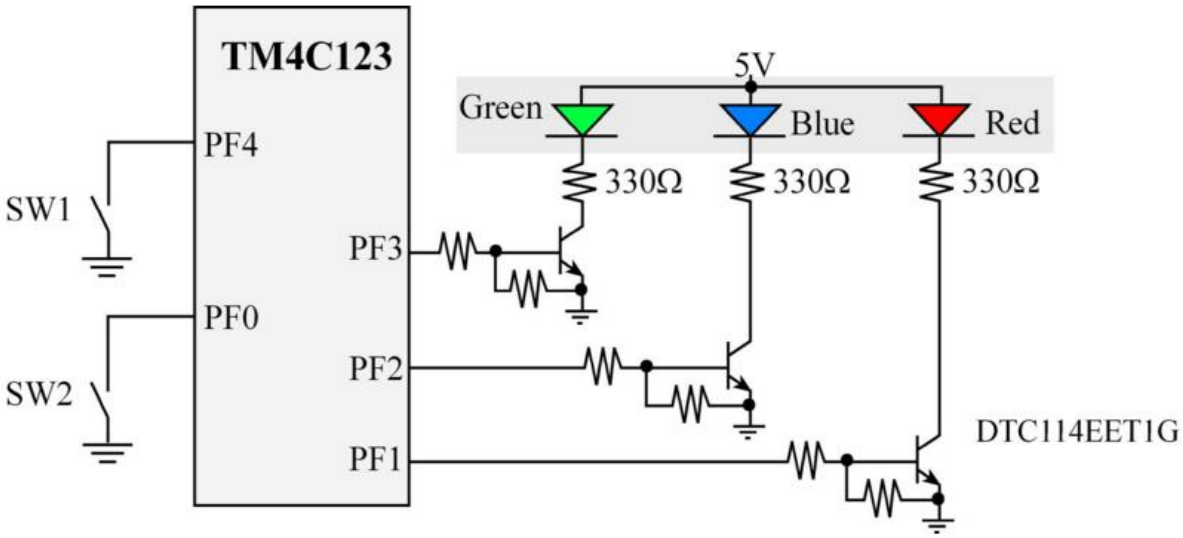


4) Start the debugger in simulation mode




C:\Keil\Labware\Lab4_IO\Lab4.uvproj - µVision4
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Registers
Register
Value
Core
R0
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13 (SP)
R14 (LR)
R15 (PC)
xPSR
Banked
System
Project
Registers
Disassembly
0x00000A44 2105
0x00000A46 4608
0x00000A48 F7FFFE5
main.c
startup
// 3. Subr
// MAIN: M
int main(v
TExaS_In
// TExaS
PortF_In
EnableIn
while(1)
SW1 =
SW2 =
if(SW1
GPIO
} else
TExaS edX Lab 4
Port F Hardware
TM4C123
16 MHz
SW1
SW2
PF4
PF0
PF3
PF2
PF1
LED
Port F Registers
DATA:
PUR:
LOCK:
DIR:
PDR:
CR:
DEN:
RCGC2:
0x00000000
Clock disabled
Grading Controls
Number from edX:
Grade
Score:
0
Copy this to edX:


C:\Keil\Labware\Lab4_IO\Lab4.uvproj - µVision4
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Start/Stop Debug Session Ctrl+F5
Reset CPU
Run F5
Stop
Step F11
Step Over F10
Step Out Ctrl+F11
Run to Cursor Line Ctrl+F10
Show Next Statement
Breakpoints... Ctrl+B
Insert/Remove Breakpoint F9
Enable/Disable Breakpoint Ctrl+F9
Disable All Breakpoints
Kill All Breakpoints Ctrl+Shift+F9
OS Support
Execution Profiling
Memory Map...
Inline Assembly...
Registers
Register
Value
Core
R0
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13 (SP)
R14 (LR)
R15 (PC)
xPSR
Banked
System
Project
Registers
TM4C123
16 MHz
PF4
PF0
PF3
PF2
PF1
LED
PUR:
LOCK:
PDR:
CR:
RCGC2:
0x00000000
Clock disabled
Grade
Score:
0
Copy this to edX:




```
EnableInterrupts();  // The grader uses interrupts
while(1){
  SW1 = GPIO_PORTF_DATA_R&0x10;      // read PF4 into SW1
  SW2 = GPIO_PORTF_DATA_R&0x01;      // read PF0 into SW2
  if(SW1&&SW2){                      // both pressed
    GPIO_PORTF_DATA_R = 0x04;        // LED is blue
  } else{
    if(SW1&&(!SW2)){                 // just SW1 pressed
      GPIO_PORTF_DATA_R = 0x02;      // LED is red
    } else{
      if((!SW1)&&SW2){               // just SW2 pressed
        GPIO_PORTF_DATA_R = 0x08;    // LED is green
      }else{                         // neither switch
        GPIO_PORTF_DATA_R = 0x00;    // LED is off
      }
    }
```