Lab1 PE and eGUI with CW10.3

Luis Casado
FAE

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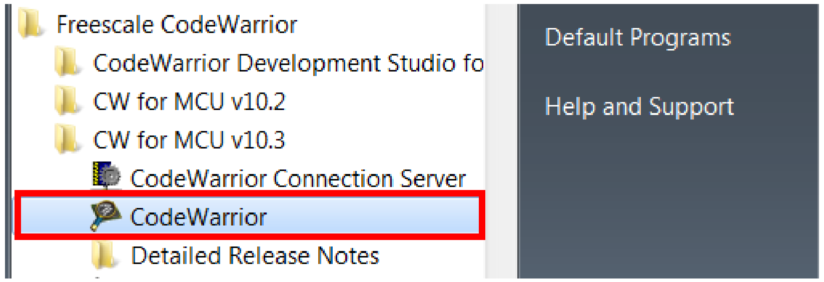
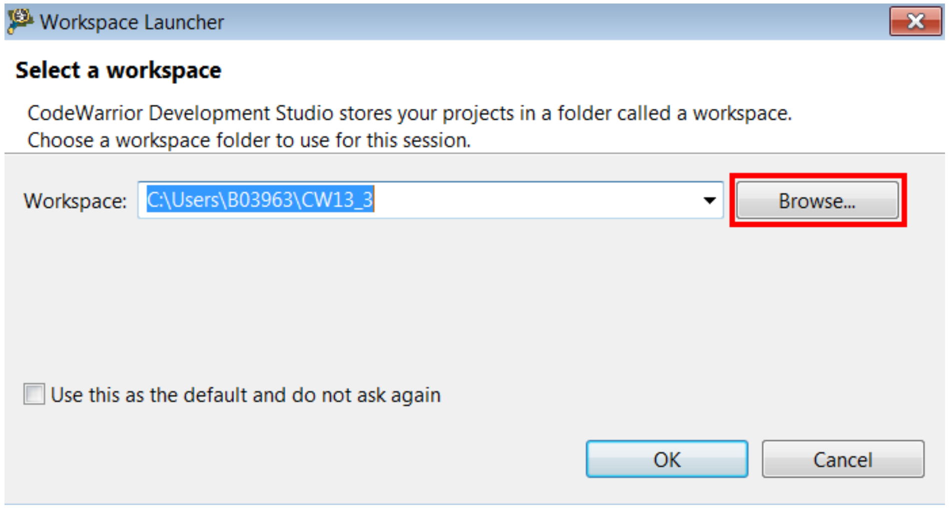
CW MCU v10.3

- Open **CW for MCU v10.3**



- Create a New Workspace for this session- **Click Browse..**


Workspace Launcher

Select a workspace

CodeWarrior Development Studio stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

Workspace: C:\Users\B03963\CW13_3

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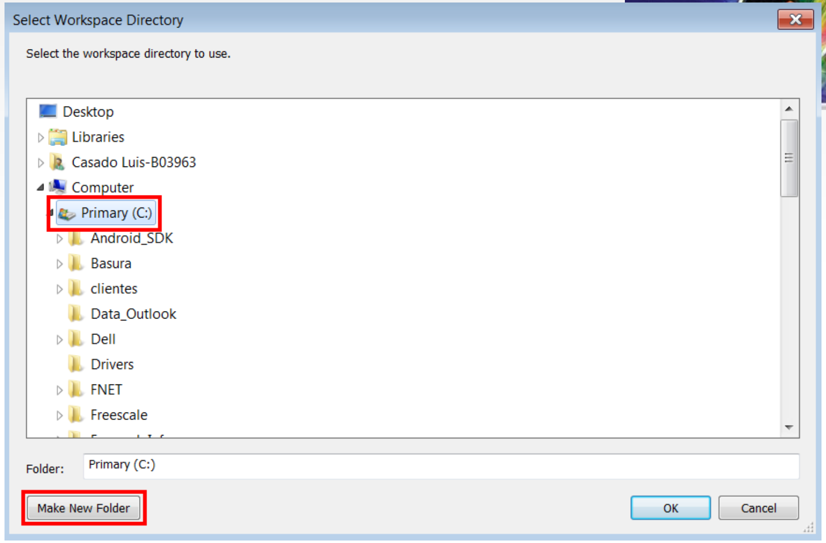
CW MCU v10.3

- Select **c:\** and **“Make New Folder”**

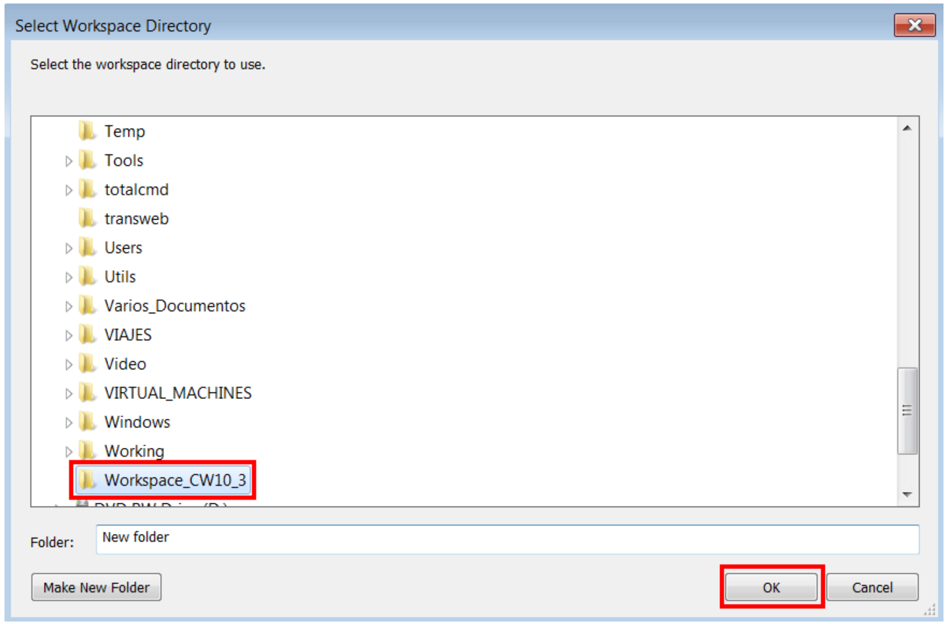


Select Workspace Directory

Select the workspace directory to use.

Folder: Primary (C:)

- Give name **“Workspace_CW10_3”** and OK



Select Workspace Directory

Select the workspace directory to use.

Folder: New folder

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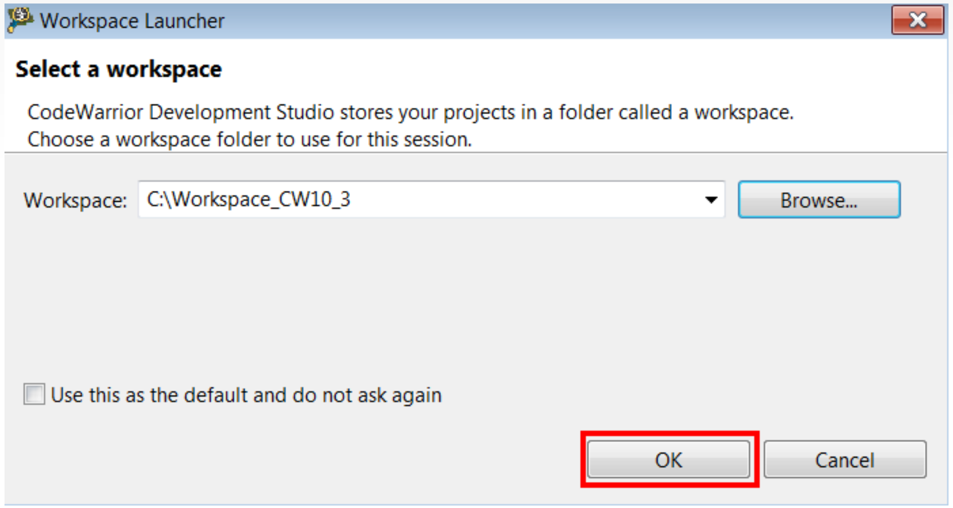
CW MCU v10.3

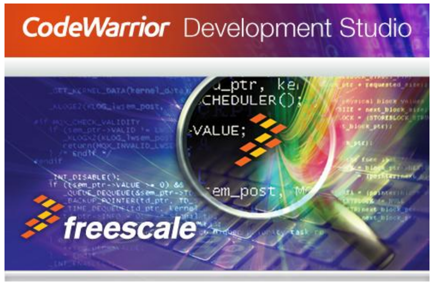
- **Click OK**


Workspace Launcher

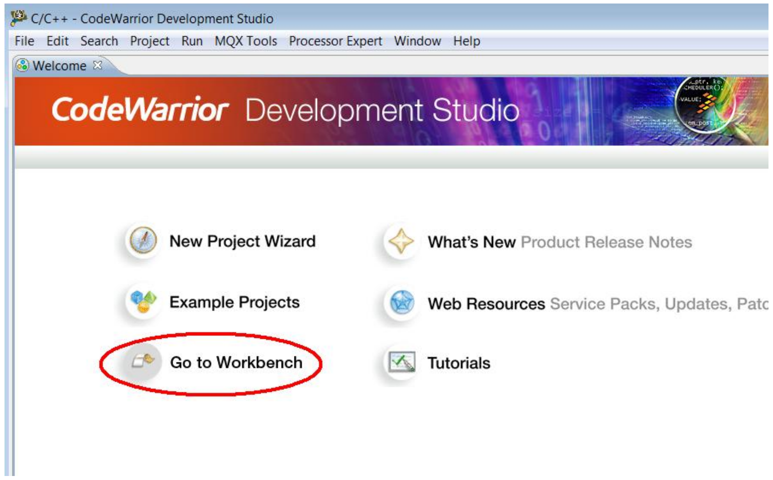
Select a workspace

CodeWarrior Development Studio stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

Workspace: C:\Workspace_CW10_3



- Click Go to **Workbench**


C/C++ - CodeWarrior Development Studio
File Edit Search Project Run MQX Tools Processor Expert Window Help
Welcome
CodeWarrior Development Studio
New Project Wizard
What's New Product Release Notes
Example Projects
Web Resources Service Packs, Updates, Patc
Go to Workbench
Tutorials

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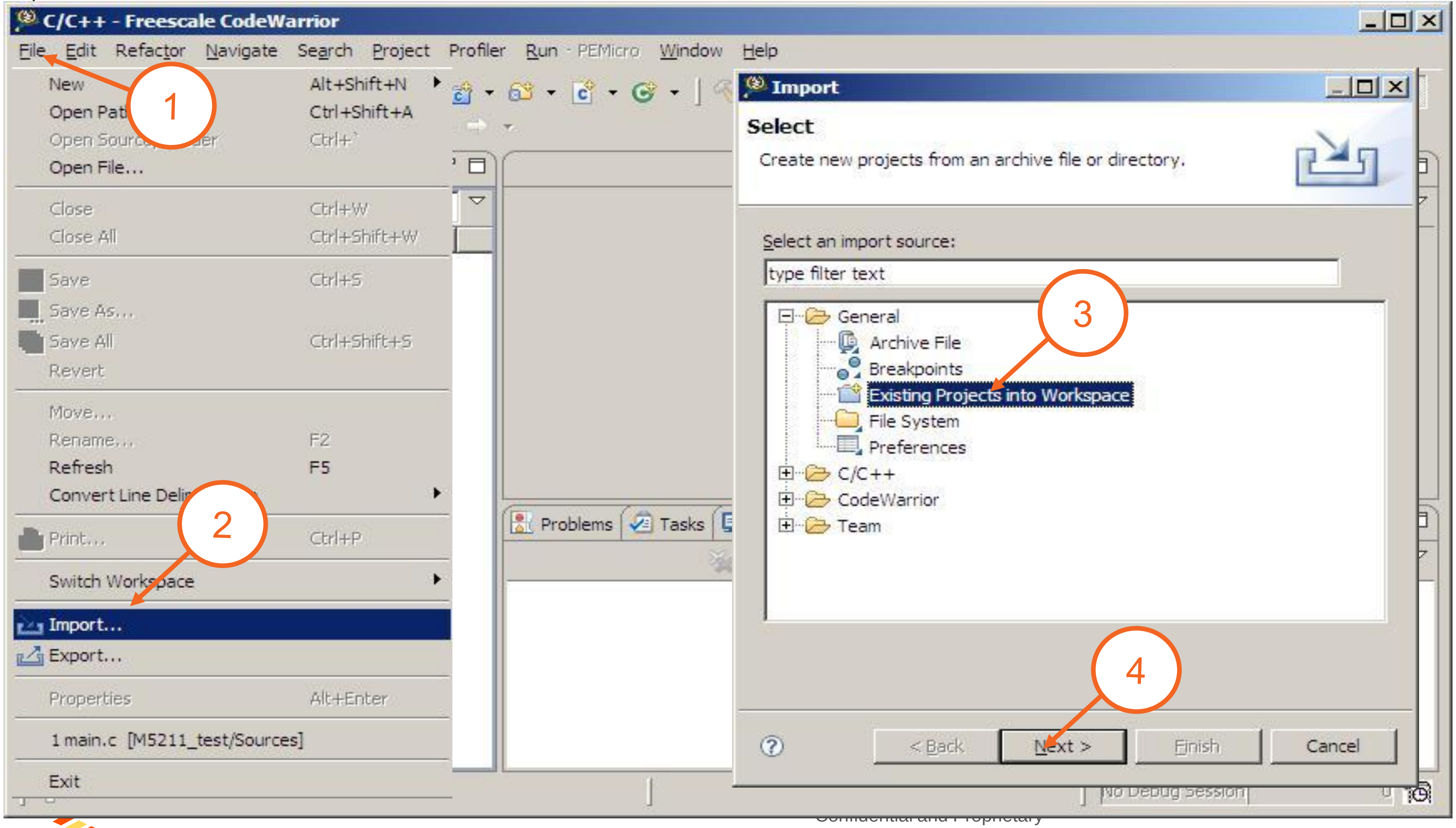
Import Existing Project



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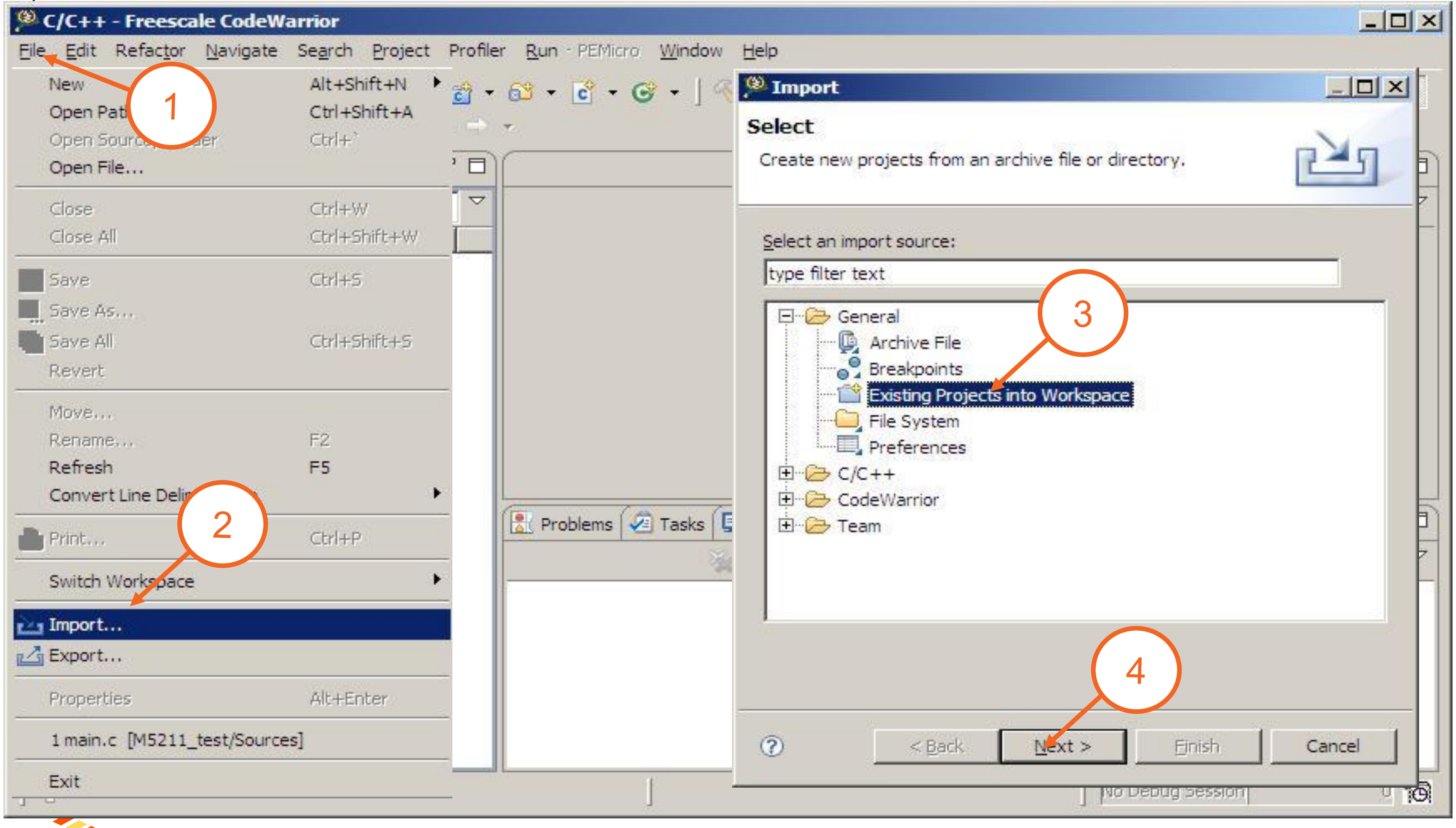
Import Existing Project



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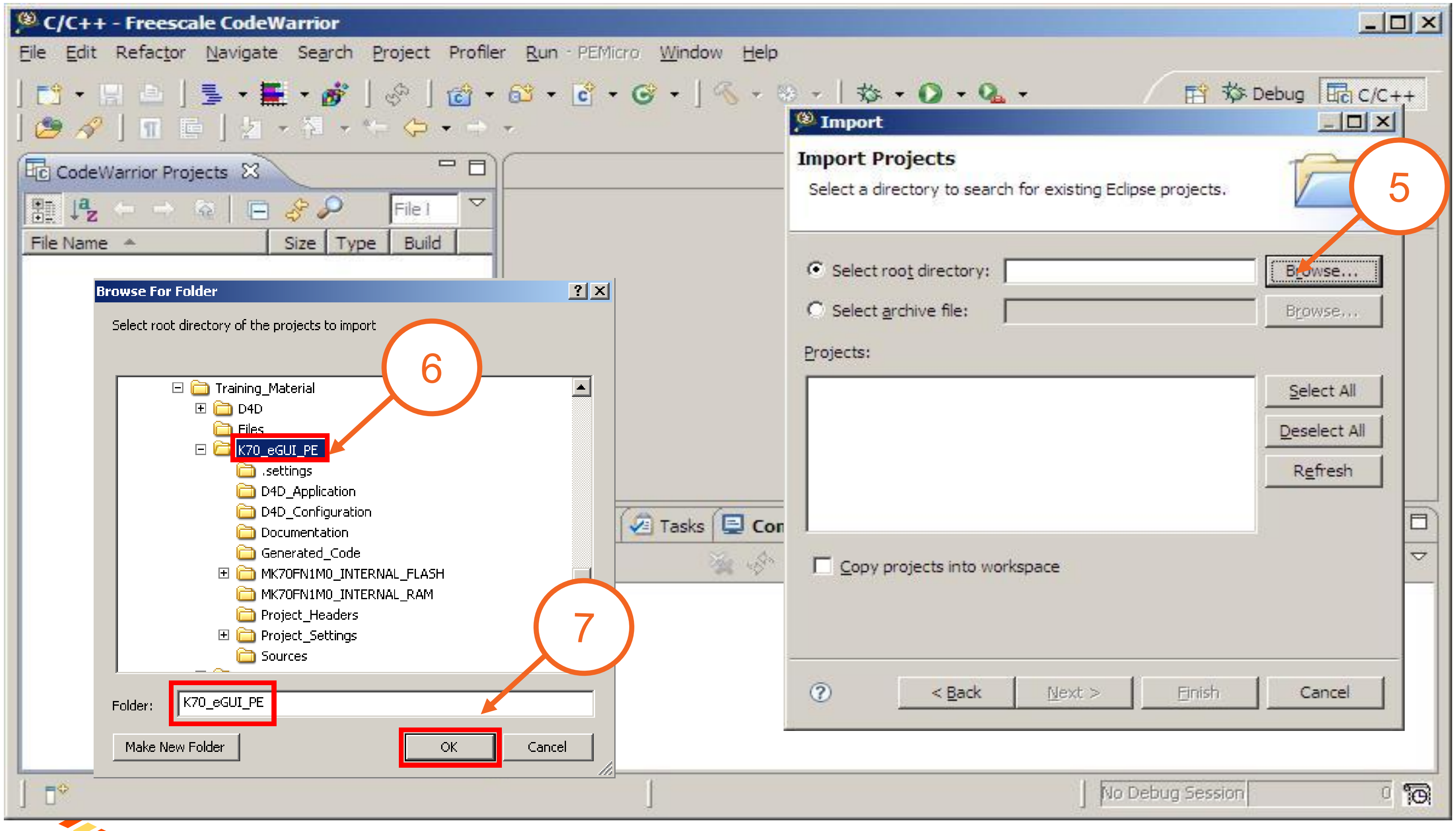
Import Existing Project

Browse to :

C:\Hands_on_Kinetis\Lab1\Training_Material\K70_eGUI_PE



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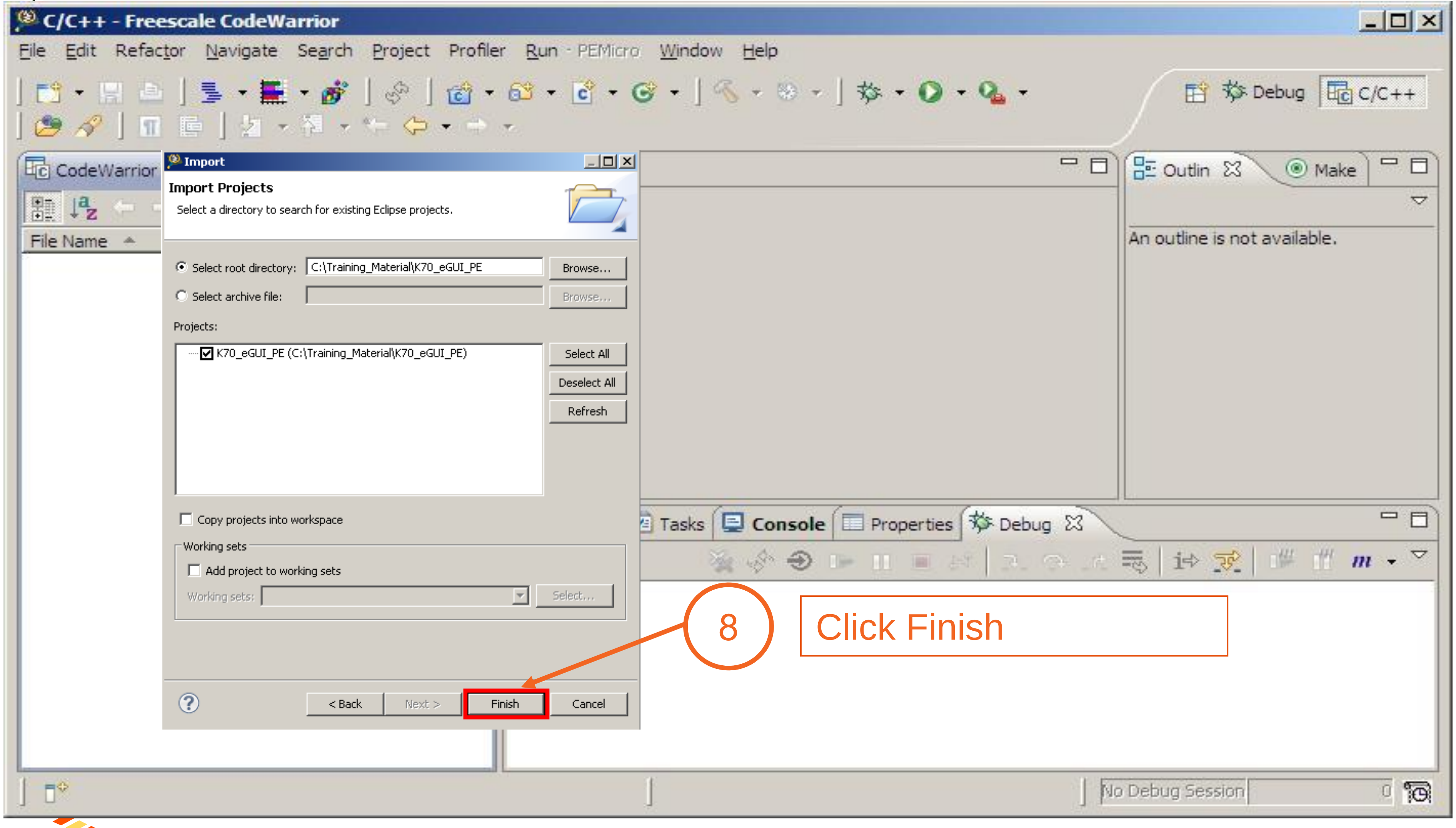
Import Existing Project



C/C++ - Freescale CodeWarrior

File Edit Refactor Navigate Search Project Profiler Run PEMicro Window Help

Import

Import Projects

Select a directory to search for existing Eclipse projects.

(●) Select root directory: C:\Training_Material\K70_eGUI_PE [Browse...]

( ) Select archive file: [Browse...]

Projects:

[✓] K70_eGUI_PE (C:\Training_Material\K70_eGUI_PE)

[Select All] [Deselect All] [Refresh]

[ ] Copy projects into workspace

Working sets

[ ] Add project to working sets

Working sets: [Select...]

[< Back] [Next >] [Finish] [Cancel]

An outline is not available.

No Debug Session

8

Click Finish

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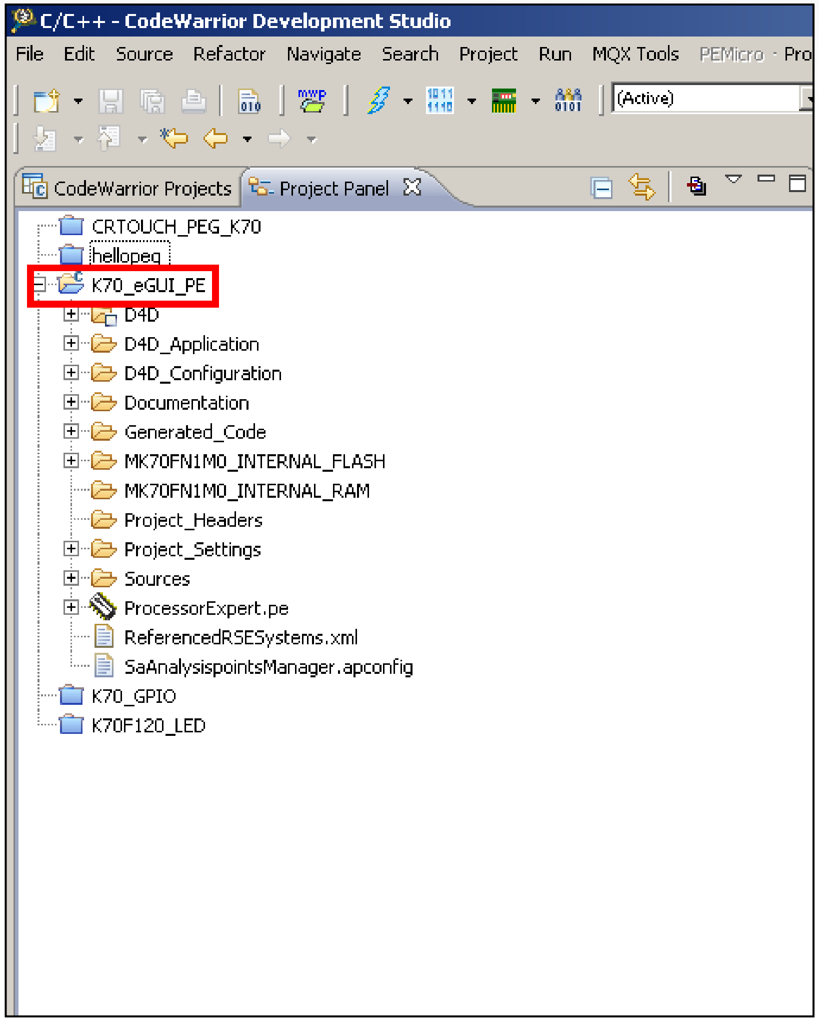
Import Existing Project



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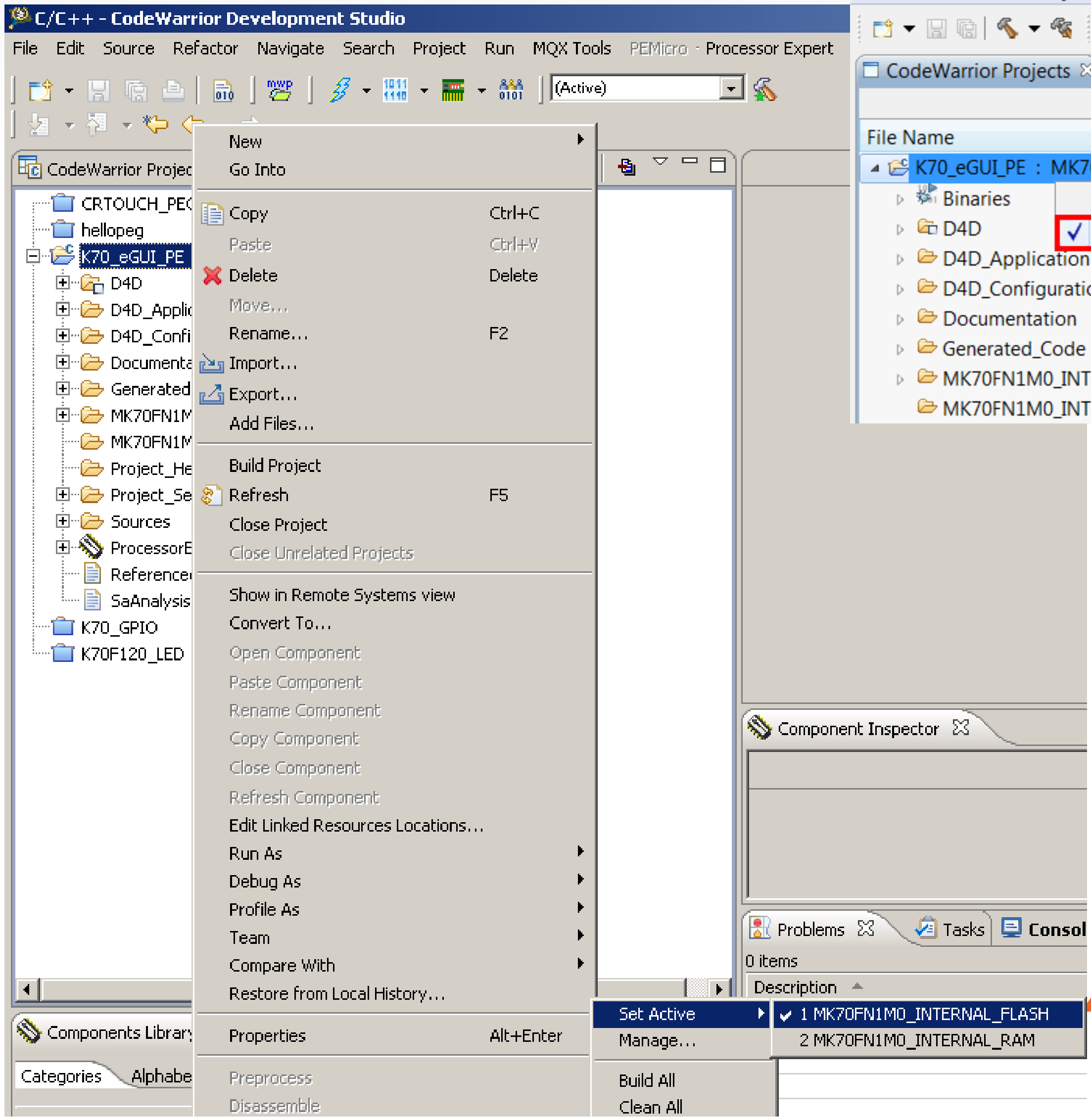
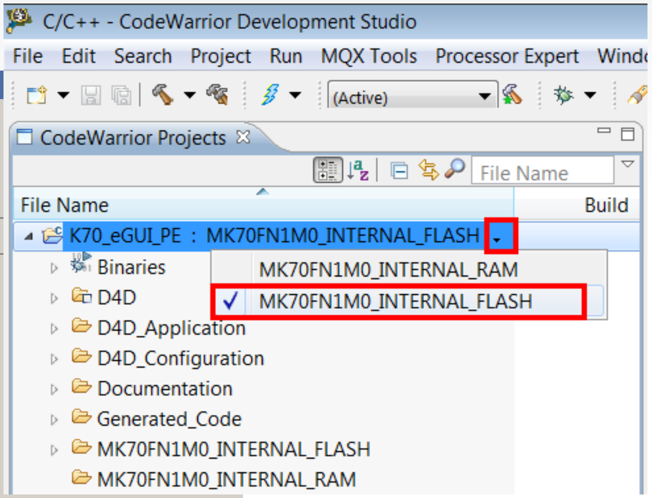
Build Project





Check that Active Build Configuration is in FLASH

1

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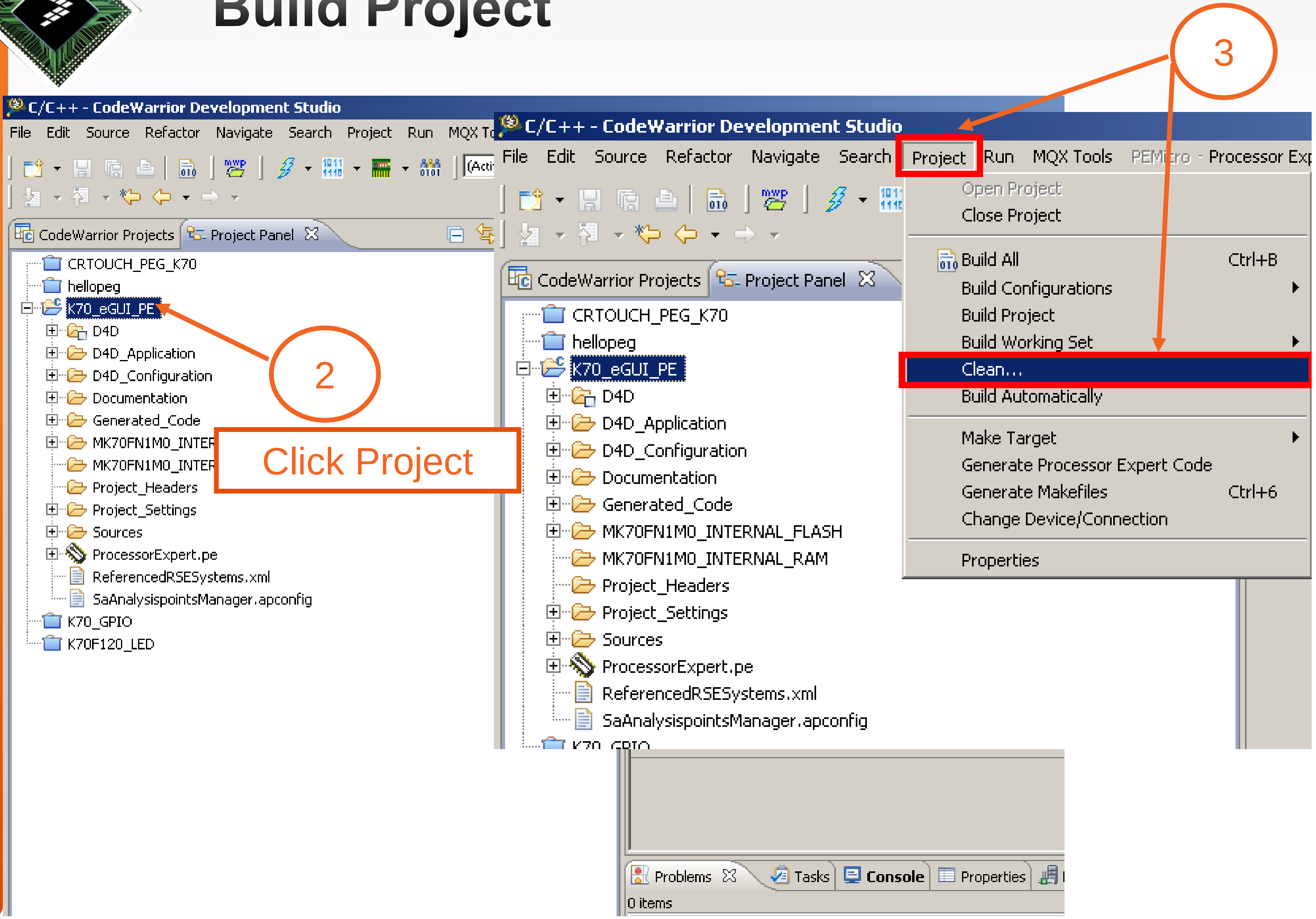
Build Project

Click Project -> Clean



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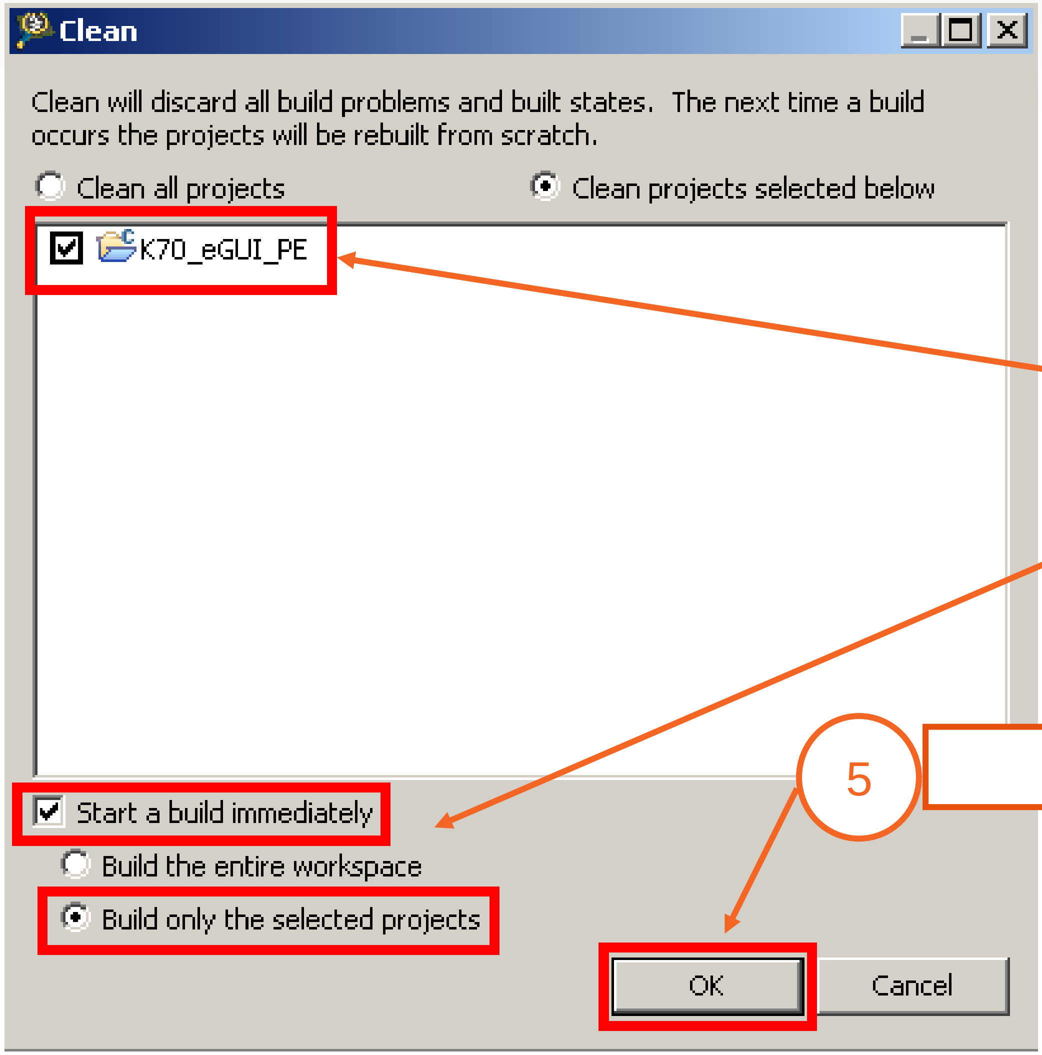
Build Project



Clean

Clean will discard all build problems and built states. The next time a build occurs the projects will be rebuilt from scratch.

[ ] Clean all projects [✓ Clean projects selected below]

[✓] K70_eGUI_PE

[✓] Start a build immediately

[ ] Build the entire workspace [✓ Build only the selected projects]

4 Select Project, Star Build immediately and Build only selected projects

5 Click Ok

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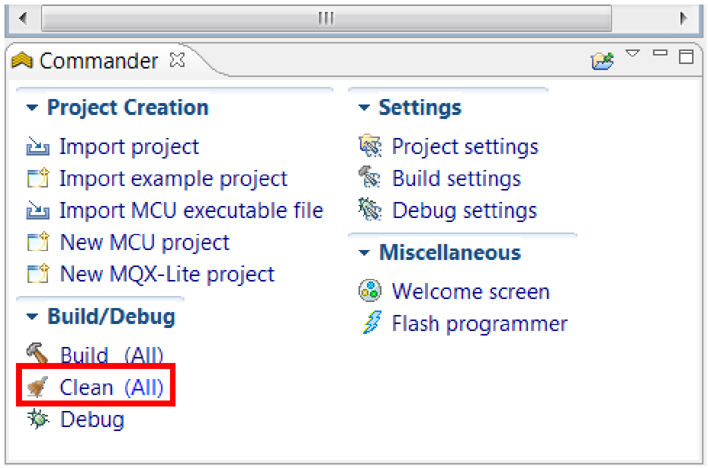
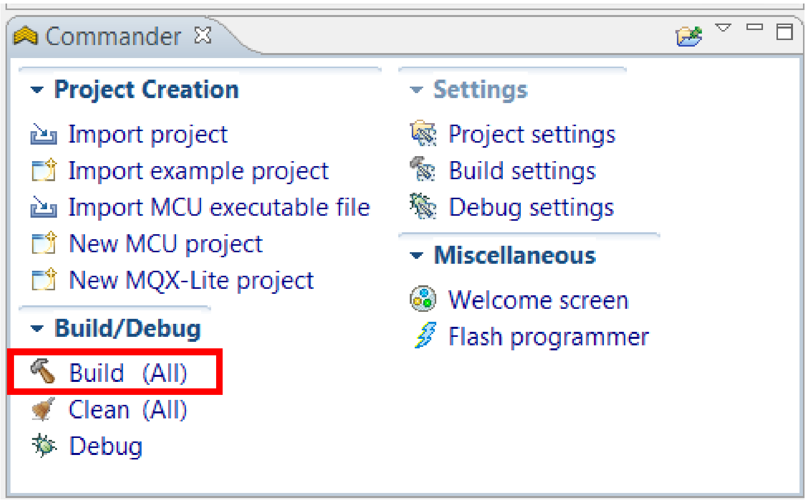
CodeWarrior Development Studio

You can use the Commander View to clean and Build the project





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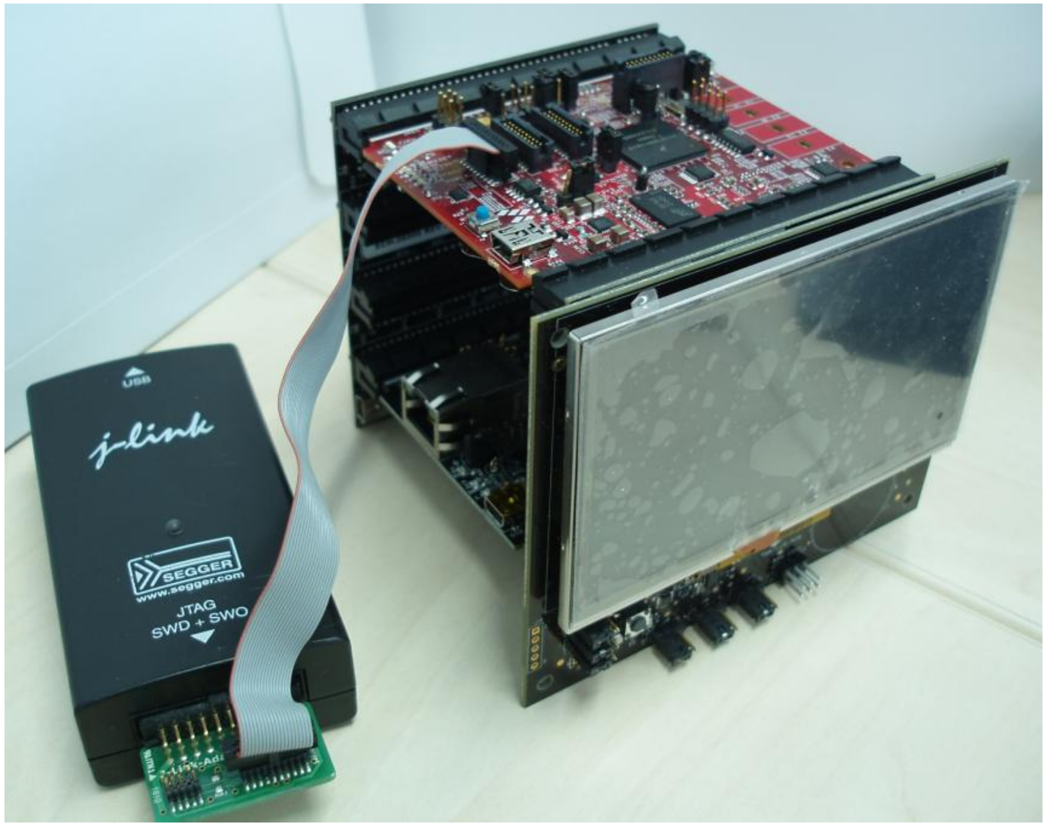
Prepare your hardware

- Prepare your Tower System:
  - Connect **TWR-SER** and **TWR-K70F120M** to **TWR-ELEV** (Primary and Secondary with **TWR-LCD-RGB** attached)



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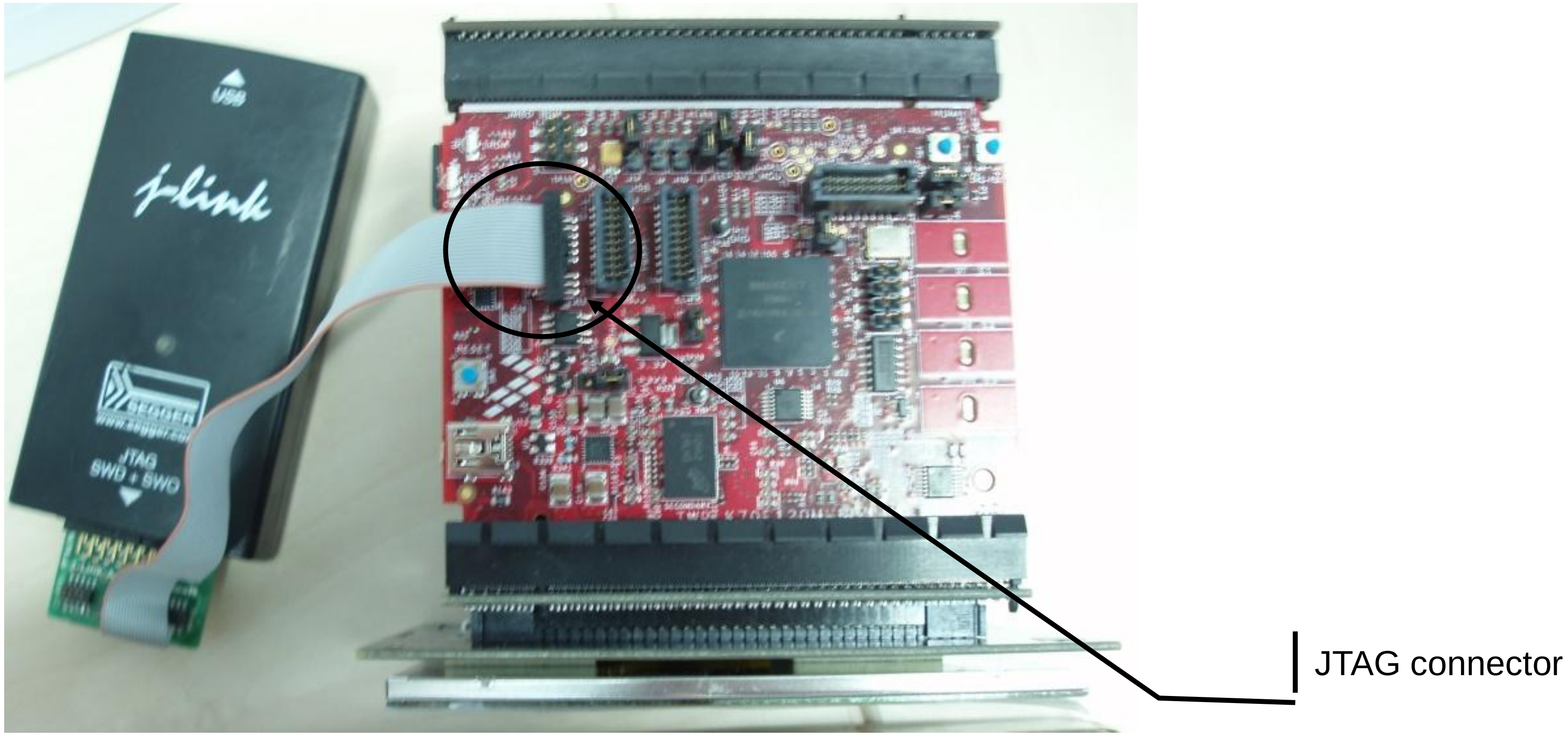
Connect Segger J-Link

- Kinetis **TWR-K70F120** Tower Kit
- Segger J-Link probe



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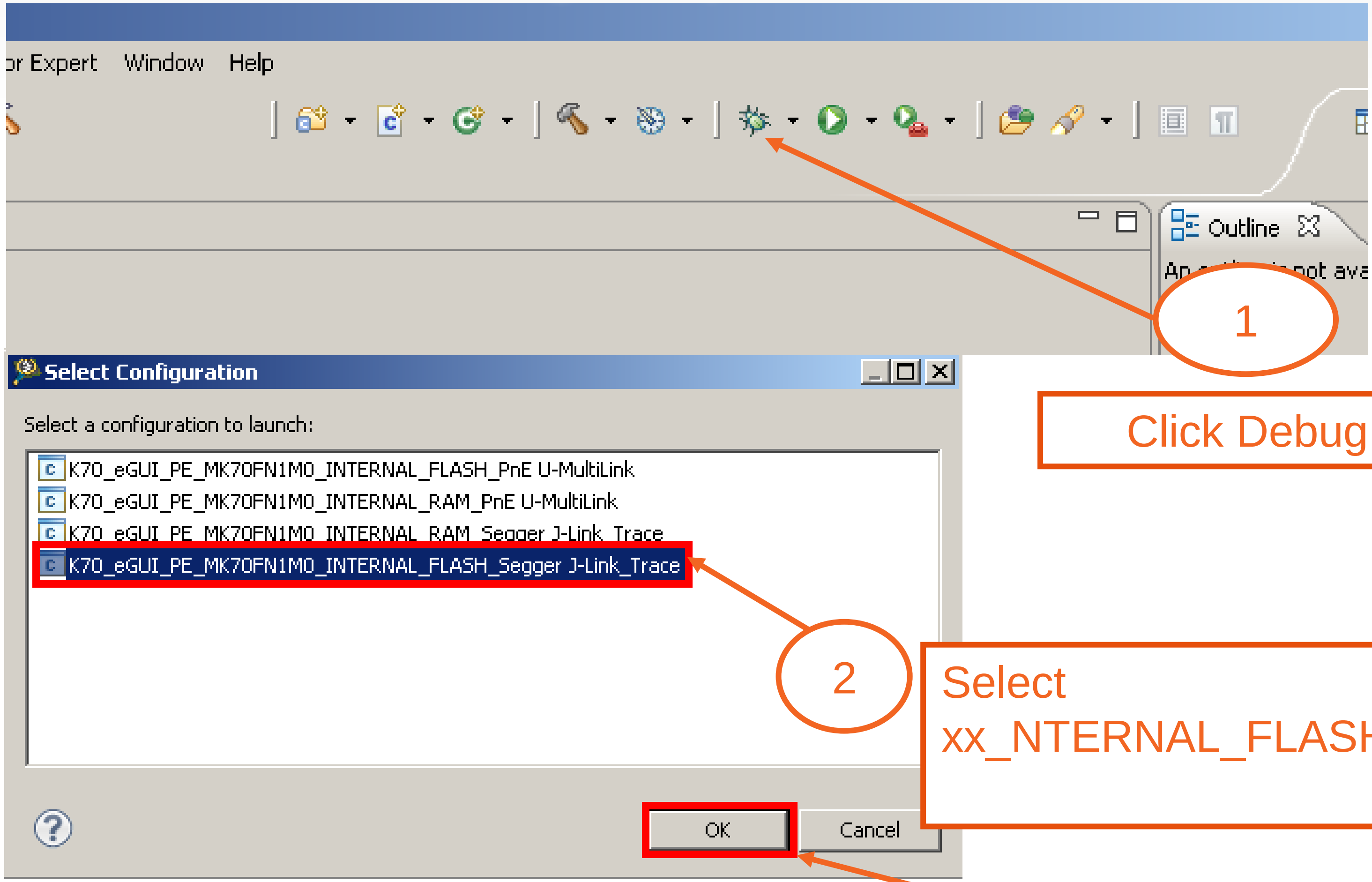
Run and debug Project



Select a configuration to launch:

K70_eGUI_PE_MK70FN1M0_INTERNAL_FLASH_PnE U-MultiLink
K70_eGUI_PE_MK70FN1M0_INTERNAL_RAM_PnE U-MultiLink
K70_eGUI_PE_MK70FN1M0_INTERNAL_RAM_Segger J-Link_Trace
K70_eGUI_PE_MK70FN1M0_INTERNAL_FLASH_Segger J-Link_Trace

Click Debug icon

Select xx_NTERNAL_FLASH_Segger_xx

OK

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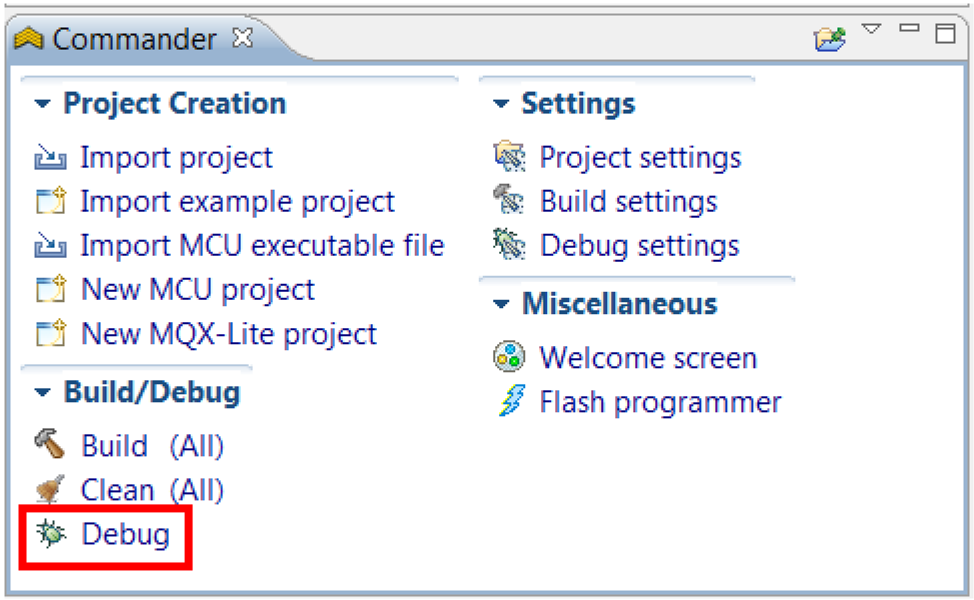
…Or using the commander View



Commander

Project Creation

- Import project
- Import example project
- Import MCU executable file
- New MCU project
- New MQX-Lite project

Build/Debug

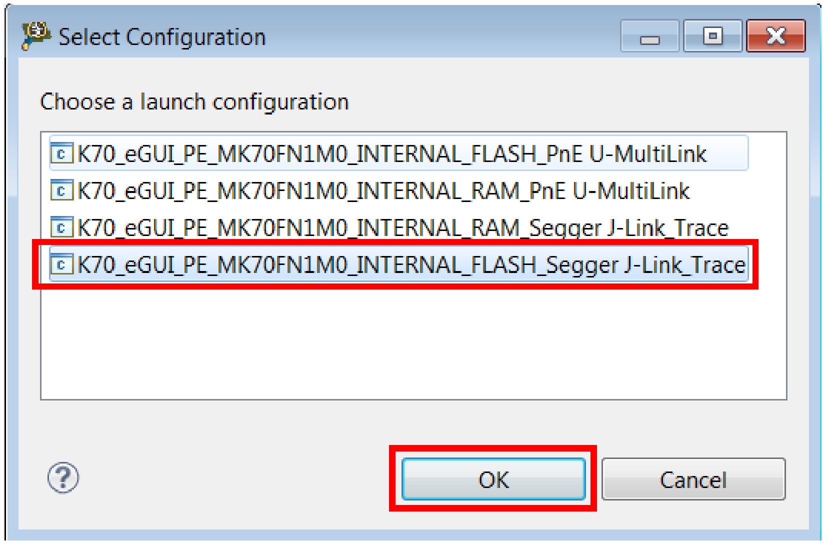
- Build (All)
- Clean (All)
- Debug

Settings

- Project settings
- Build settings
- Debug settings

Miscellaneous

- Welcome screen
- Flash programmer



Select Configuration

Choose a launch configuration

- K70_eGUI_PE_MK70FN1M0_INTERNAL_FLASH_PnE U-MultiLink
- K70_eGUI_PE_MK70FN1M0_INTERNAL_RAM_PnE U-MultiLink
- K70_eGUI_PE_MK70FN1M0_INTERNAL_RAM_Segger J-Link_Trace
- K70_eGUI_PE_MK70FN1M0_INTERNAL_FLASH_Segger J-Link_Trace

OK Cancel

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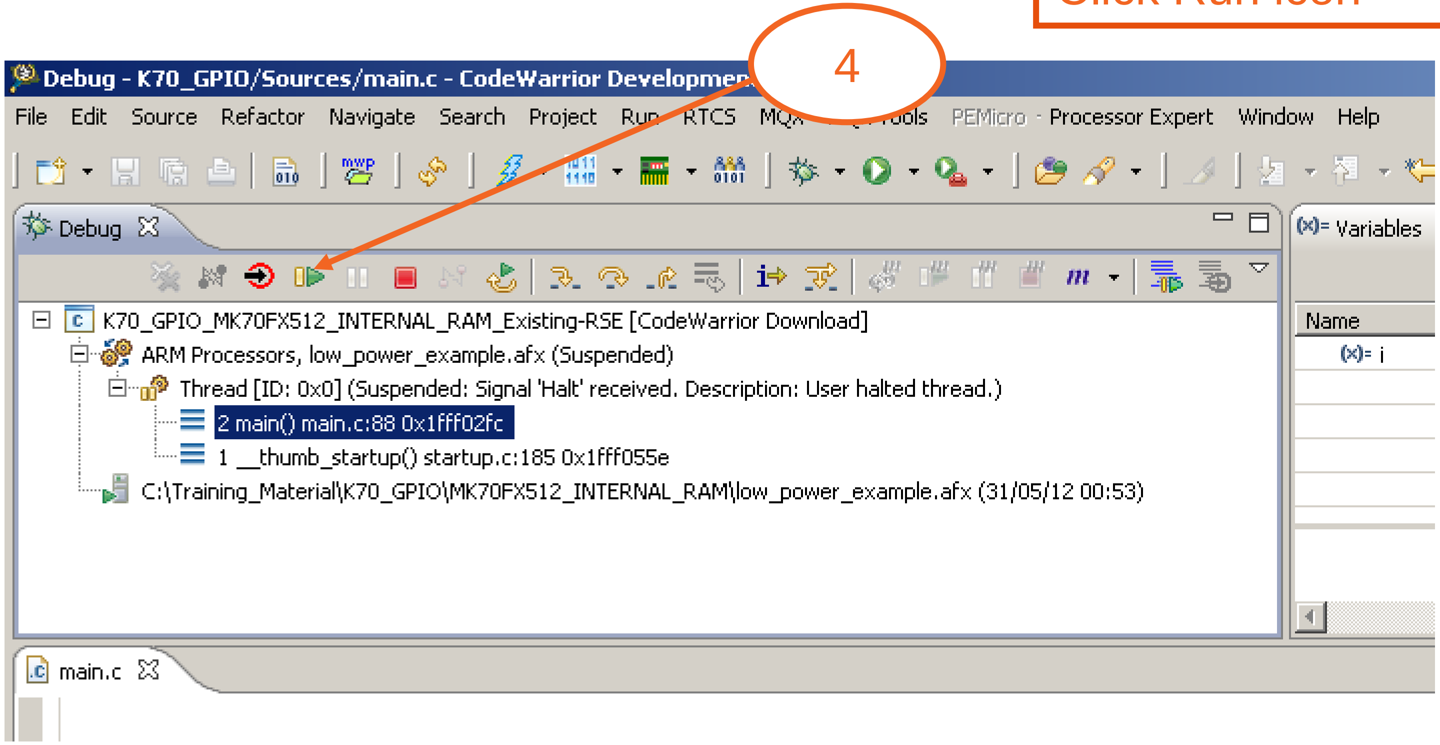
Run and debug Project

Click Run icon


4
Debug - K70_GPIO/Sources/main.c - CodeWarrior Developmen
File Edit Source Refactor Navigate Search Project Run RTCS MQX Tools PEMicro Processor Expert Window Help
Debug
Variables
Name
main.c

K70_GPIO_MK70FX512_INTERNAL_RAM_Existing-RSE [CodeWarrior Download]
ARM Processors, low_power_example.afx (Suspended)
Thread [ID: 0x0] (Suspended: Signal 'Halt' received. Description: User halted thread.)
2 main() main.c:88 0x1fff02fc
1 __thumb_startup() startup.c:185 0x1fff055e
C:\Training_Material\K70_GPIO\MK70FX512_INTERNAL_RAM\low_power_example.afx (31/05/12 00:53)

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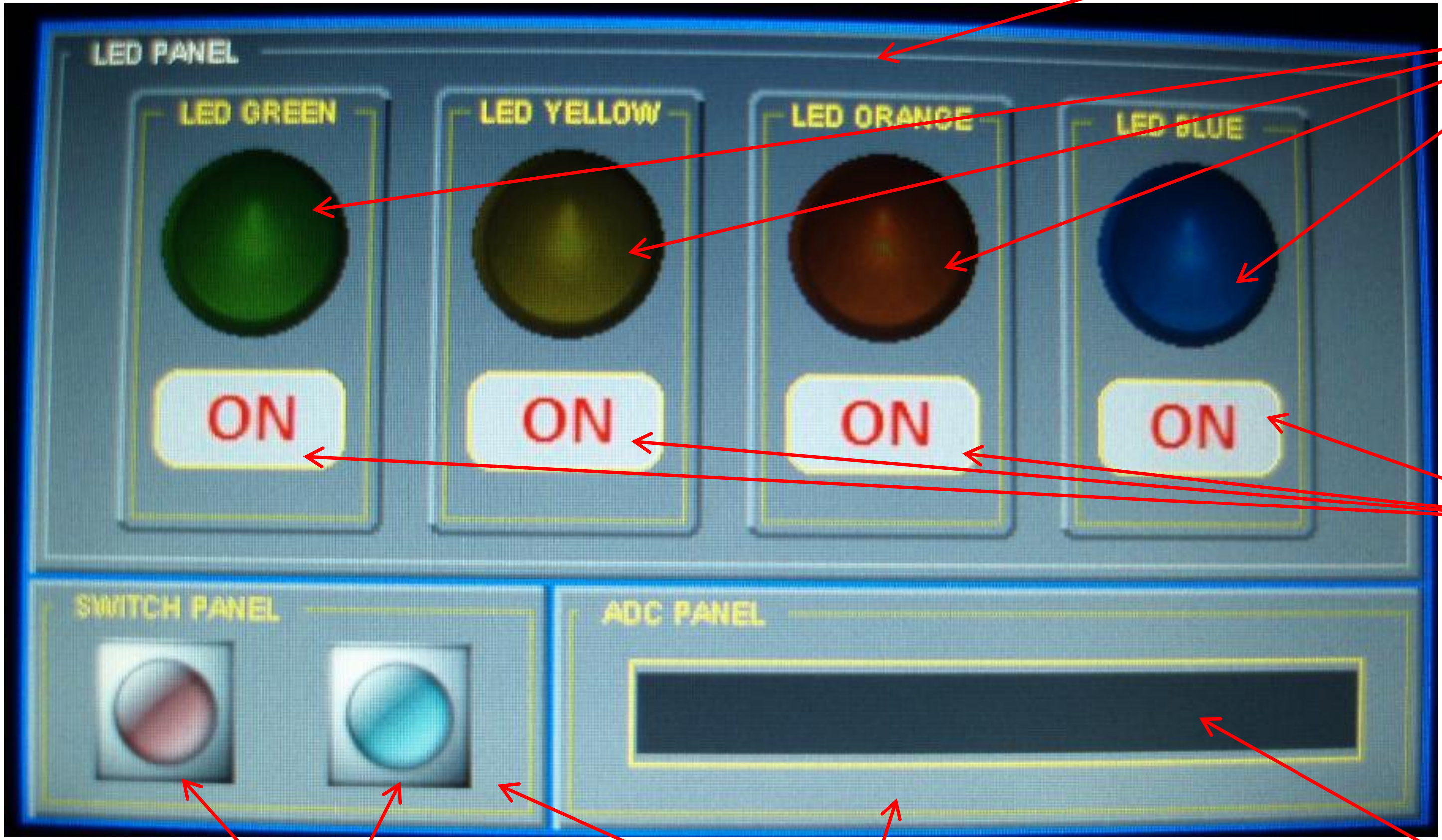
Run Template Application



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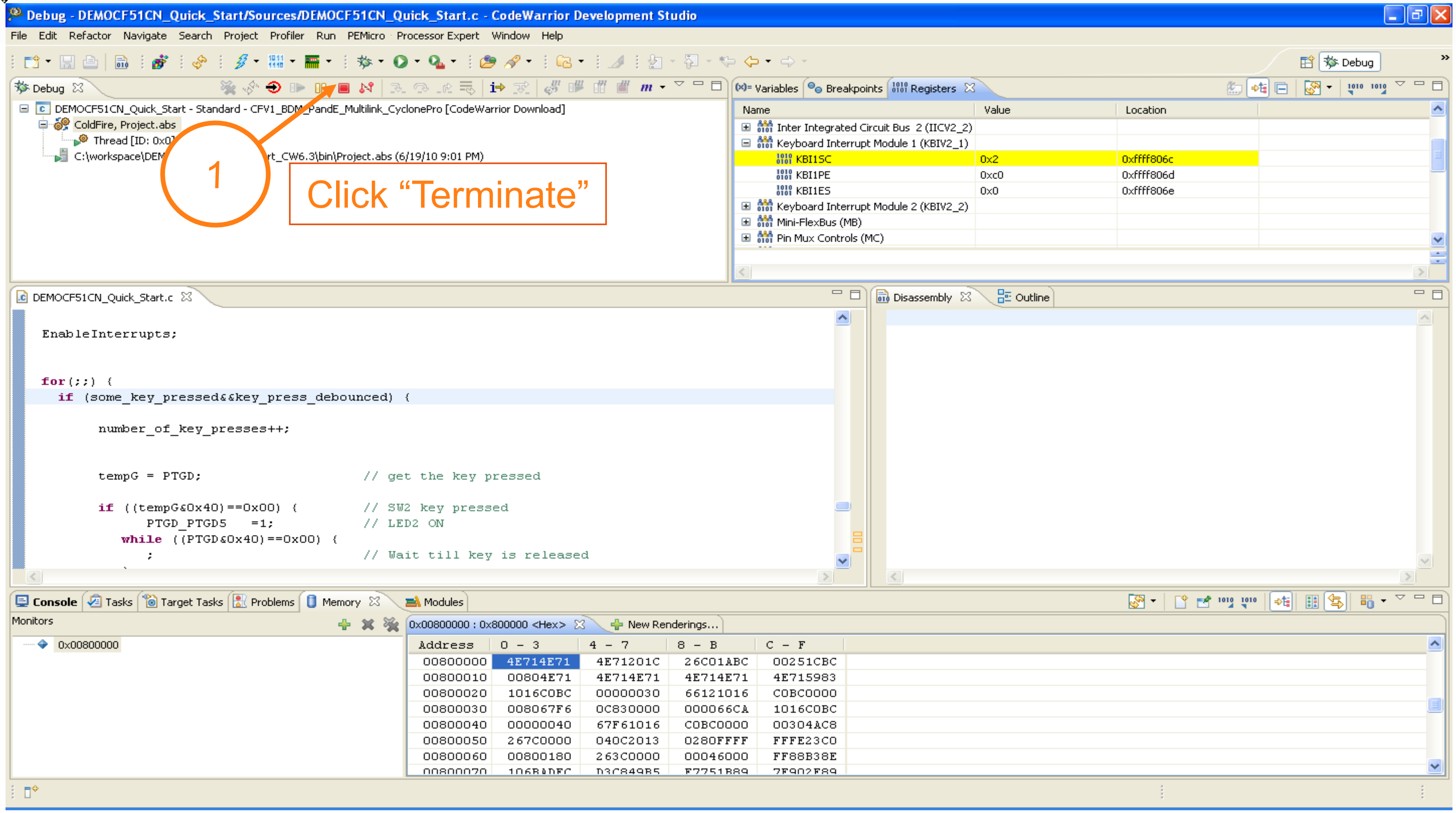
Terminate the Project


Debug - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio
File Edit Refactor Navigate Search Project Profiler Run PEMicro Processor Expert Window Help
Debug
1
Click "Terminate"
Variables
Breakpoints
Registers
Disassembly
Outline
Console
Tasks
Target Tasks
Problems
Memory
Modules
Monitors
New Renderings...

```
DEMOCF51CN_Quick_Start - Standard - CFV1_BDM_PandE_Multilink_CyclonePro [CodeWarrior Download]
  ColdFire, Project.abs
    Thread [ID: 0x0]
  C:\workspace\DEM...rt_CW6.3\bin\Project.abs (6/19/10 9:01 PM)
```

Name	Value	Location
Inter Integrated Circuit Bus 2 (IICV2_2)		
Keyboard Interrupt Module 1 (KBIV2_1)		
KBI1SC	0x2	0xffff806c
KBI1PE	0xc0	0xffff806d
KBI1ES	0x0	0xffff806e
Keyboard Interrupt Module 2 (KBIV2_2)		
Mini-FlexBus (MB)		
Pin Mux Controls (MC)		

DEMOCF51CN_Quick_Start.c

```
EnableInterrupts;


for(;;) {
  if (some_key_pressed&&key_press_debounced) {

      number_of_key_presses++;


      tempG = PTGD;                    // get the key pressed

      if ((tempG&0x40)==0x00) {        // SW2 key pressed
            PTGD_PTGD5    =1;          // LED2 ON
        while ((PTGD&0x40)==0x00) {
            ;                          // Wait till key is released
```

0x00800000

0x00800000 : 0x800000 <Hex>

```
Address    0 - 3     4 - 7     8 - B     C - F
00800000   4E714E71  4E71201C  26C01ABC  00251CBC
00800010   00804E71  4E714E71  4E714E71  4E715983
00800020   1016C0BC  00000030  66121016  C0BC0000
00800030   008067F6  0C830000  000066CA  1016C0BC
00800040   00000040  67F61016  C0BC0000  00304AC8
00800050   267C0000  040C2013  0280FFFF  FFFE23C0
00800060   00800180  263C0000  00046000  FF88B38E
00800070   106BADFC  D3C849B5  F7751B89  7F902F89
```

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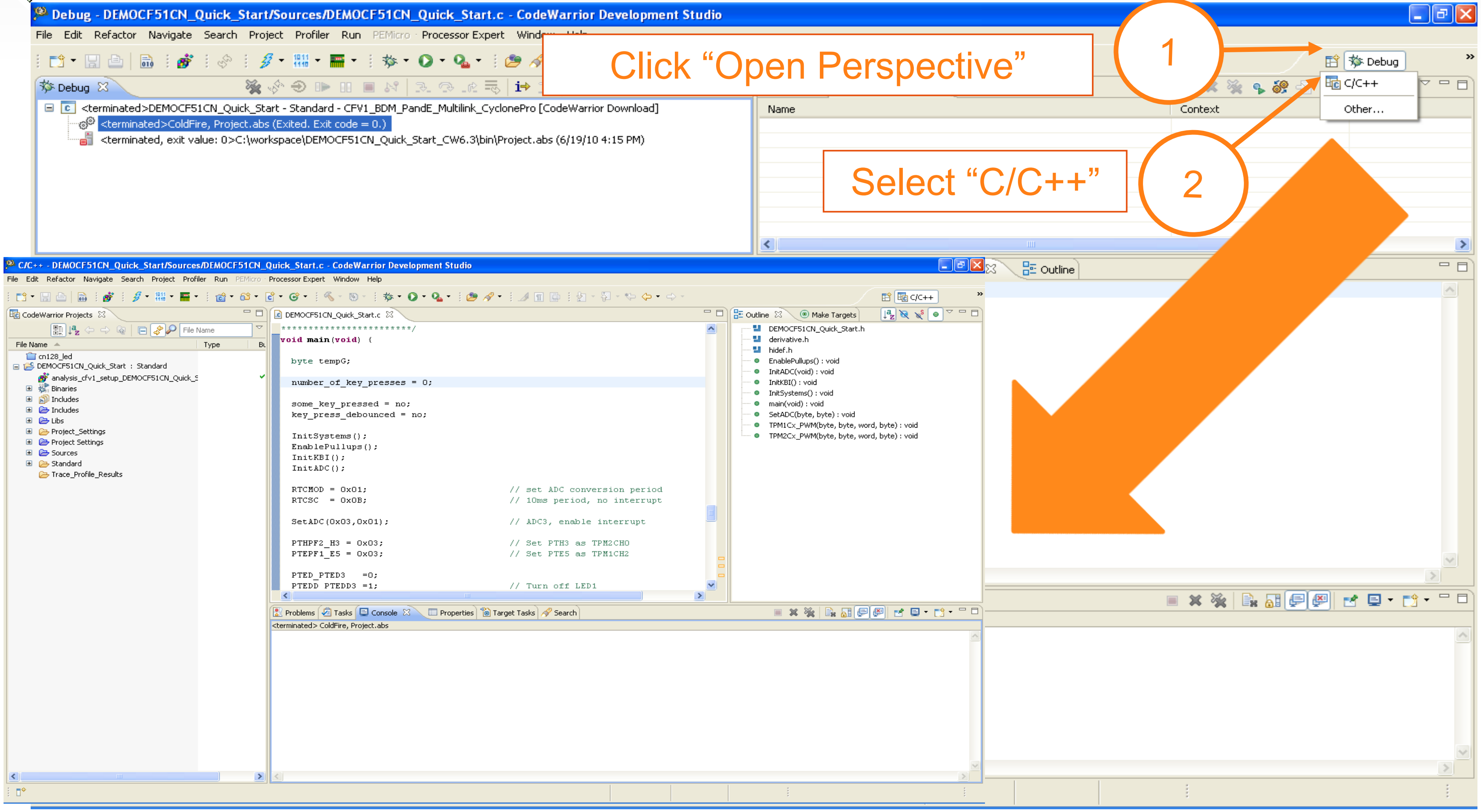
Change Perspective


Debug - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio
File Edit Refactor Navigate Search Project Profiler Run PEMicro Processor Expert Window Help
Click "Open Perspective"
1
Debug
C/C++
Other...
Select "C/C++"
2
Name
Context
C/C++ - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio
CodeWarrior Projects
DEMOCF51CN_Quick_Start.c
Outline
Make Targets
Problems
Tasks
Console
Properties
Target Tasks
Search

```
<terminated>DEMOCF51CN_Quick_Start - Standard - CFV1_BDM_PandE_Multilink_CyclonePro [CodeWarrior Download]
  <terminated>ColdFire, Project.abs (Exited. Exit code = 0.)
  <terminated, exit value: 0>C:\workspace\DEMOCF51CN_Quick_Start_CW6.3\bin\Project.abs (6/19/10 4:15 PM)
```

```
File Name                                   Type
  cn128_led
  DEMOCF51CN_Quick_Start : Standard
    analysis_cfv1_setup_DEMOCF51CN_Quick_S
    Binaries
    Includes
    Includes
    Libs
    Project_Settings
    Project Settings
    Sources
    Standard
    Trace_Profile_Results
```

```
************************/
void main(void) {

  byte tempG;

  number_of_key_presses = 0;

  some_key_pressed = no;
  key_press_debounced = no;

  InitSystems();
  EnablePullups();
  InitKBI();
  InitADC();

  RTCMOD = 0x01;                       // set ADC conversion period
  RTCSC  = 0x0B;                       // 10ms period, no interrupt

  SetADC(0x03,0x01);                   // ADC3, enable interrupt

  PTHPF2_H3 = 0x03;                    // Set PTH3 as TPM2CH0
  PTEPF1_E5 = 0x03;                    // Set PTE5 as TPM1CH2

  PTED_PTED3   =0;
  PTEDD PTEDD3 =1;                     // Turn off LED1
```

```
DEMOCF51CN_Quick_Start.h
derivative.h
hidef.h
EnablePullups() : void
InitADC(void) : void
InitKBI() : void
InitSystems() : void
main(void) : void
SetADC(byte, byte) : void
TPM1Cx_PWM(byte, byte, word, byte) : void
TPM2Cx_PWM(byte, byte, word, byte) : void
```

```
<terminated> ColdFire, Project.abs
```

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Add LED Output Components

- We have to add 4 **BitIO** Components, one for each LED in the **TWR-K70F120N**
- We will associate the LED On/Off to the status of the Led icons in **eGUI** Application (Led Panel)
- When any of the “**CheckBox object**” is touched, we change the icon image and set the GPIO port to On/Off

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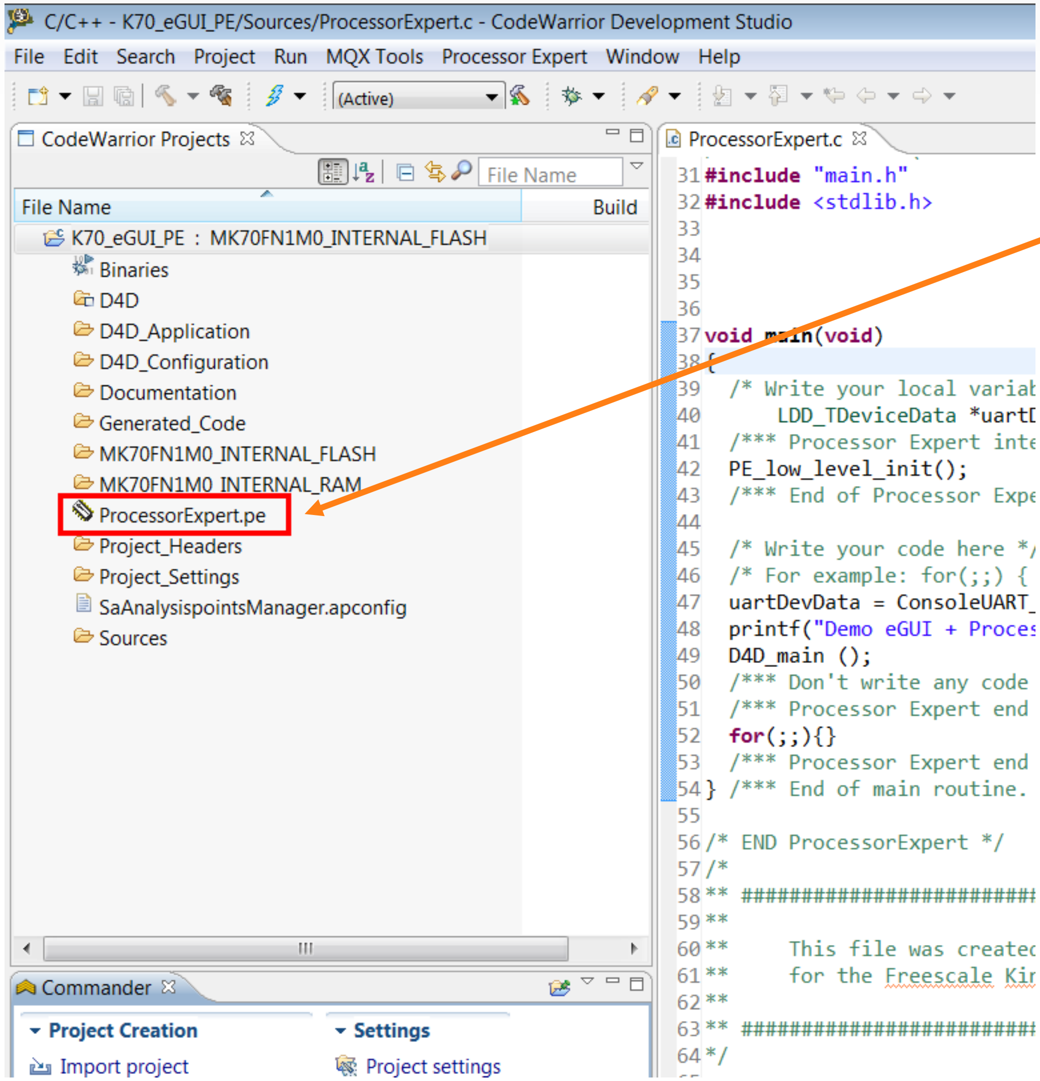
Processor Expert Views



```
#include "main.h"
#include <stdlib.h>




void main(void)
{
  /* Write your local variat
      LDD_TDeviceData *uartI
  /*** Processor Expert inte
  PE_low_level_init();
  /*** End of Processor Expe

  /* Write your code here */
  /* For example: for(;;) {
  uartDevData = ConsoleUART_
  printf("Demo eGUI + Proces
  D4D_main ();
  /*** Don't write any code
  /*** Processor Expert end
  for(;;){}
  /*** Processor Expert end
} /*** End of main routine.

/* END ProcessorExpert */
/*
** ########################
**
**     This file was createc
**     for the Freescale Kir
**
** ########################
*/
```

1

Duble Click on ProcessorExpert.pe

23

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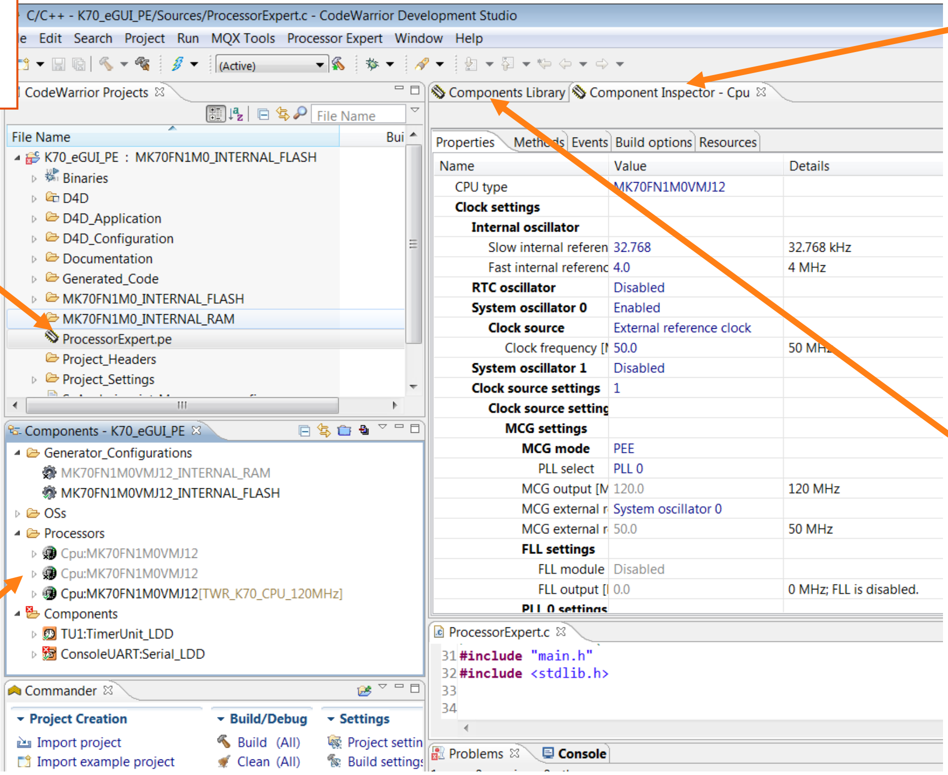
Processor Expert Views

Processor Expert file in project

Component Inspector

Library of Components

Components in your project


C/C++ - K70_eGUI_PE/Sources/ProcessorExpert.c - CodeWarrior Development Studio
e Edit Search Project Run MQX Tools Processor Expert Window Help
(Active)
CodeWarrior Projects
File Name
Bui

- K70_eGUI_PE : MK70FN1M0_INTERNAL_FLASH
  - Binaries
  - D4D
  - D4D_Application
  - D4D_Configuration
  - Documentation
  - Generated_Code
  - MK70FN1M0_INTERNAL_FLASH
  - MK70FN1M0_INTERNAL_RAM
  - ProcessorExpert.pe
  - Project_Headers
  - Project_Settings

- Generator_Configurations
  - MK70FN1M0VMJ12_INTERNAL_RAM
  - MK70FN1M0VMJ12_INTERNAL_FLASH
- OSs
- Processors
  - Cpu:MK70FN1M0VMJ12
  - Cpu:MK70FN1M0VMJ12
  - Cpu:MK70FN1M0VMJ12[TWR_K70_CPU_120MHz]
- Components
  - TU1:TimerUnit_LDD
  - ConsoleUART:Serial_LDD

Name	Value	Details
CPU type	MK70FN1M0VMJ12	
Clock settings		
Internal oscillator		
Slow internal referen	32.768	32.768 kHz
Fast internal referenc	4.0	4 MHz
RTC oscillator	Disabled	
System oscillator 0	Enabled	
Clock source	External reference clock	
Clock frequency [l	50.0	50 MHz
System oscillator 1	Disabled	
Clock source settings	1	
Clock source setting		
MCG settings		
MCG mode	PEE	
PLL select	PLL 0	
MCG output [M	120.0	120 MHz
MCG external r	System oscillator 0	
MCG external r	50.0	50 MHz
FLL settings		
FLL module	Disabled	
FLL output [l	0.0	0 MHz; FLL is disabled.
PLL 0 settings		

```
#include "main.h"
#include <stdlib.h>
```

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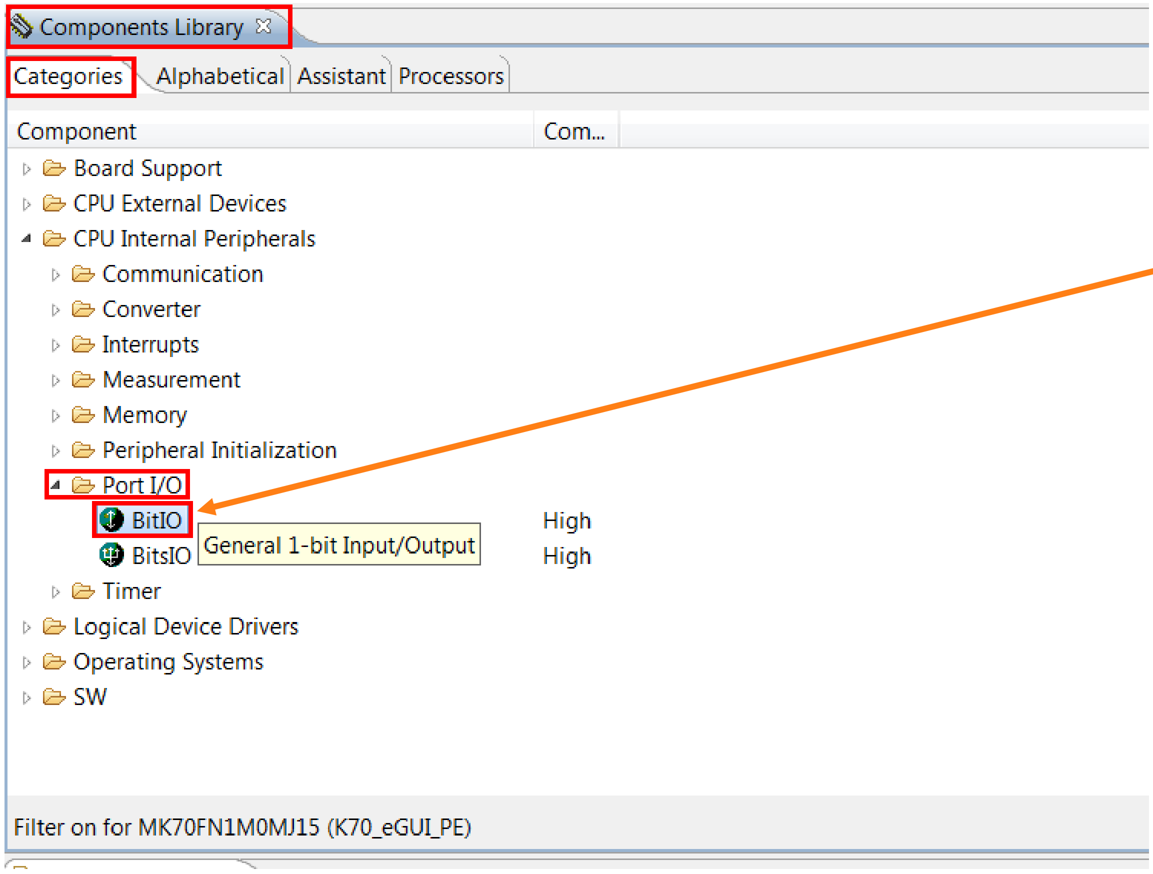
Add LED Output Components

- Go to Components Library and double click in **BitIO**



Components Library

Categories | Alphabetical | Assistant | Processors

Component	Com...
Board Support	
CPU External Devices	
CPU Internal Peripherals	
Communication	
Converter	
Interrupts	
Measurement	
Memory	
Peripheral Initialization	
Port I/O	
BitIO	High
BitsIO	High
Timer	
Logical Device Drivers	
Operating Systems	
SW	

General 1-bit Input/Output

Filter on for MK70FN1M0MJ15 (K70_eGUI_PE)

Duble Click on BitIO

1

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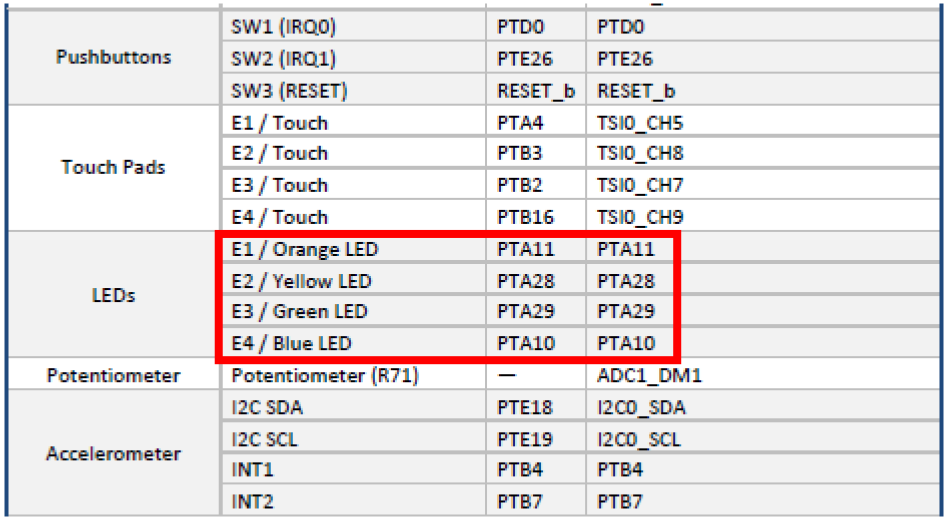
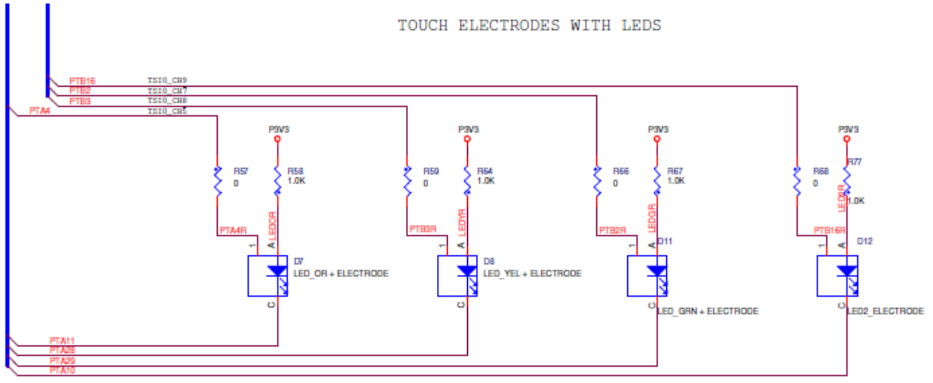
CodeWarrior Development Studio

Add LED Output Components

- Click in the new component added to project
- Edit the component fields to associate to **LED GREEN** (PTA29)

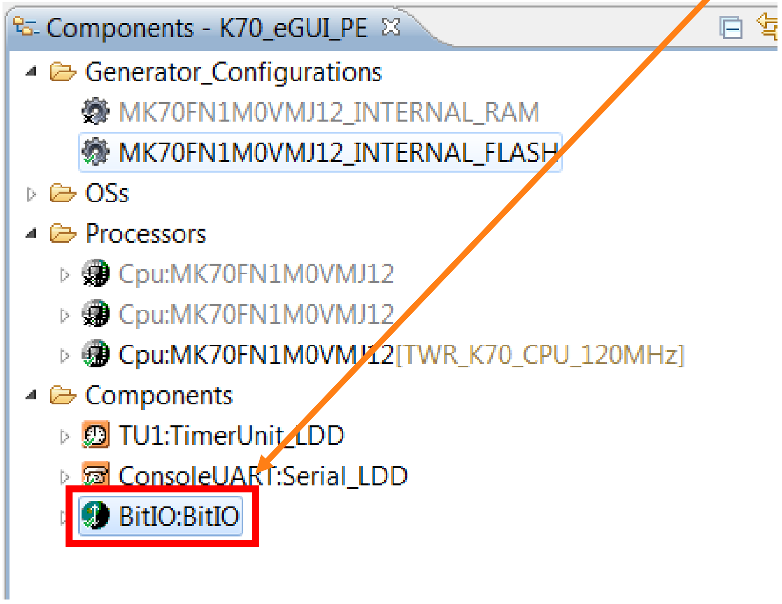


Pushbuttons	SW1 (IRQ0)	PTD0	PTD0
	SW2 (IRQ1)	PTE26	PTE26
	SW3 (RESET)	RESET_b	RESET_b
Touch Pads	E1 / Touch	PTA4	TSI0_CH5
	E2 / Touch	PTB3	TSI0_CH8
	E3 / Touch	PTB2	TSI0_CH7
	E4 / Touch	PTB16	TSI0_CH9
LEDs	E1 / Orange LED	PTA11	PTA11
	E2 / Yellow LED	PTA28	PTA28
	E3 / Green LED	PTA29	PTA29
	E4 / Blue LED	PTA10	PTA10
Potentiometer	Potentiometer (R71)	—	ADC1_DM1
Accelerometer	I2C SDA	PTE18	I2C0_SDA
	I2C SCL	PTE19	I2C0_SCL
	INT1	PTB4	PTB4
	INT2	PTB7	PTB7



Click on BitIO

2



Components - K70_eGUI_PE

- Generator_Configurations
  - MK70FN1M0VMJ12_INTERNAL_RAM
  - MK70FN1M0VMJ12_INTERNAL_FLASH
- OSs
- Processors
  - Cpu:MK70FN1M0VMJ12
  - Cpu:MK70FN1M0VMJ12
  - Cpu:MK70FN1M0VMJ12[TWR_K70_CPU_120MHz]
- Components
  - TU1:TimerUnit_LDD
  - ConsoleUART:Serial_LDD
  - BitIO:BitIO

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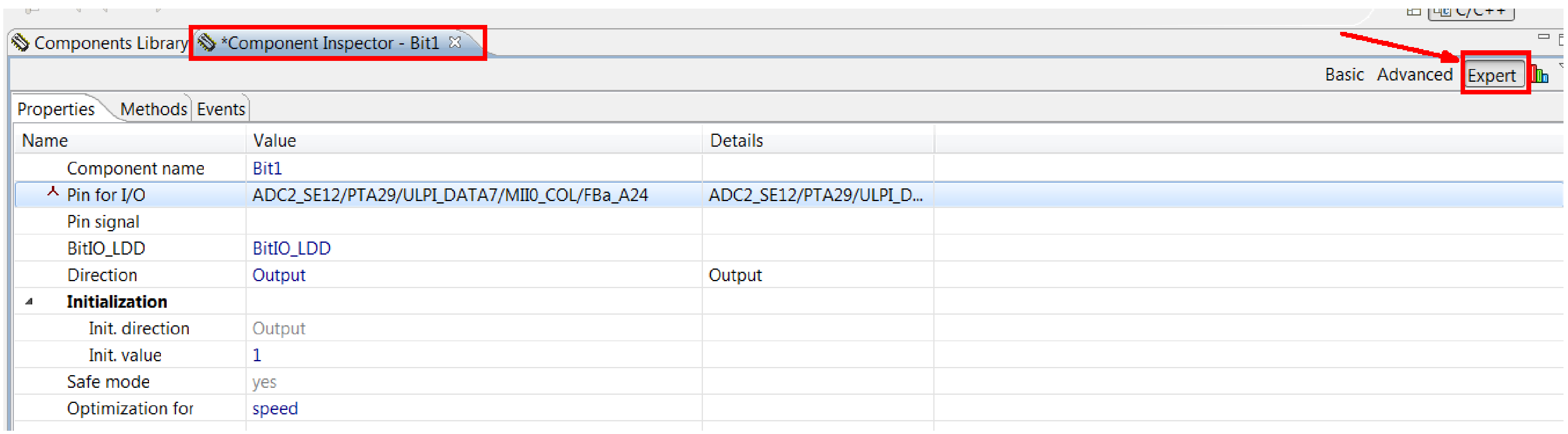
Add LED Output Components

- Change to **'Expert Mode'** in Components inspector



Name	Value	Details
Component name	Bit1	
Pin for I/O	ADC2_SE12/PTA29/ULPI_DATA7/MII0_COL/FBa_A24	ADC2_SE12/PTA29/ULPI_D...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Output	Output
Initialization		
Init. direction	Output	
Init. value	1	
Safe mode	yes	
Optimization for	speed	

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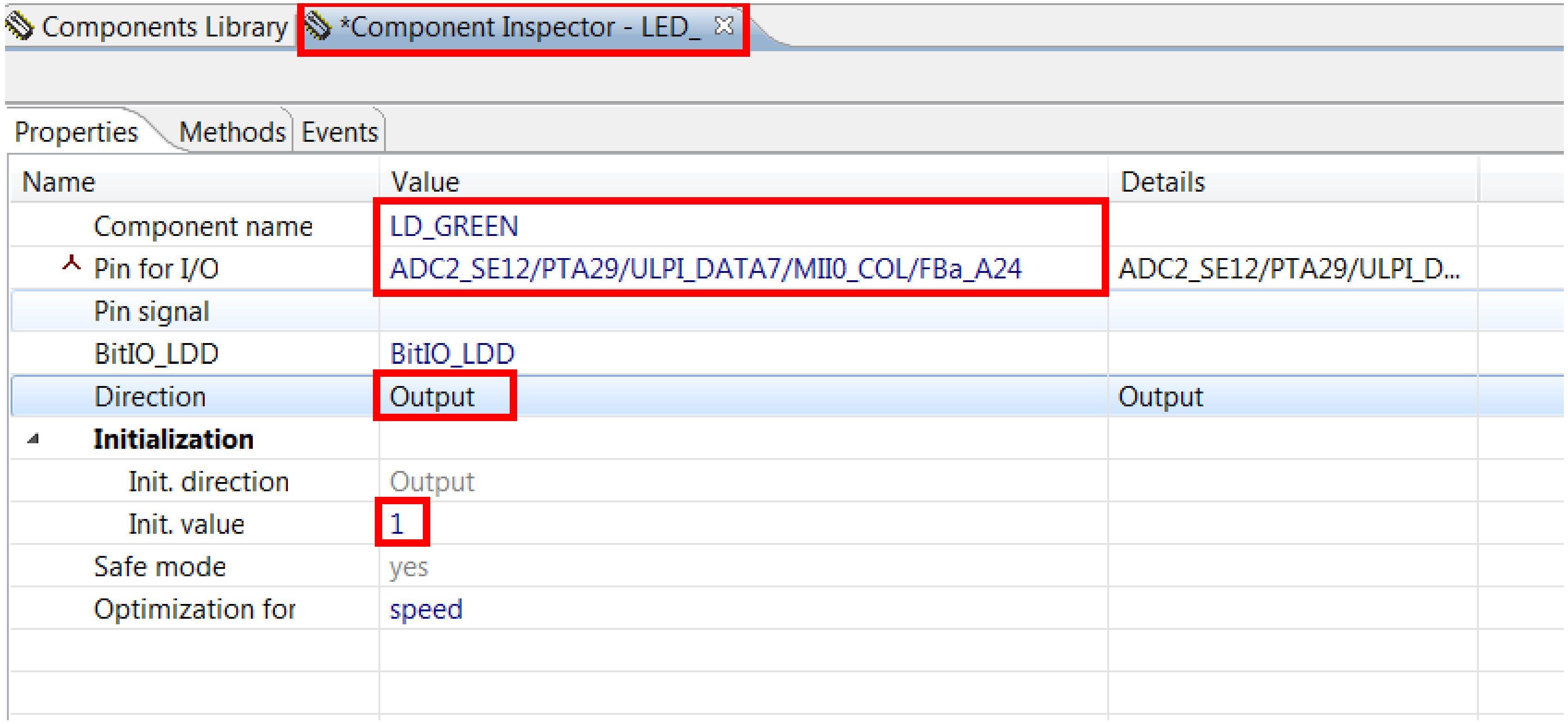
Add LED Output Components

- Changes the values in **Component Inspector**



Components Library | *Component Inspector - LED_

Properties | Methods | Events

Name	Value	Details
Component name	LD_GREEN	
Pin for I/O	ADC2_SE12/PTA29/ULPI_DATA7/MII0_COL/FBa_A24	ADC2_SE12/PTA29/ULPI_D...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Output	Output
Initialization		
Init. direction	Output	
Init. value	1	
Safe mode	yes	
Optimization for	speed	

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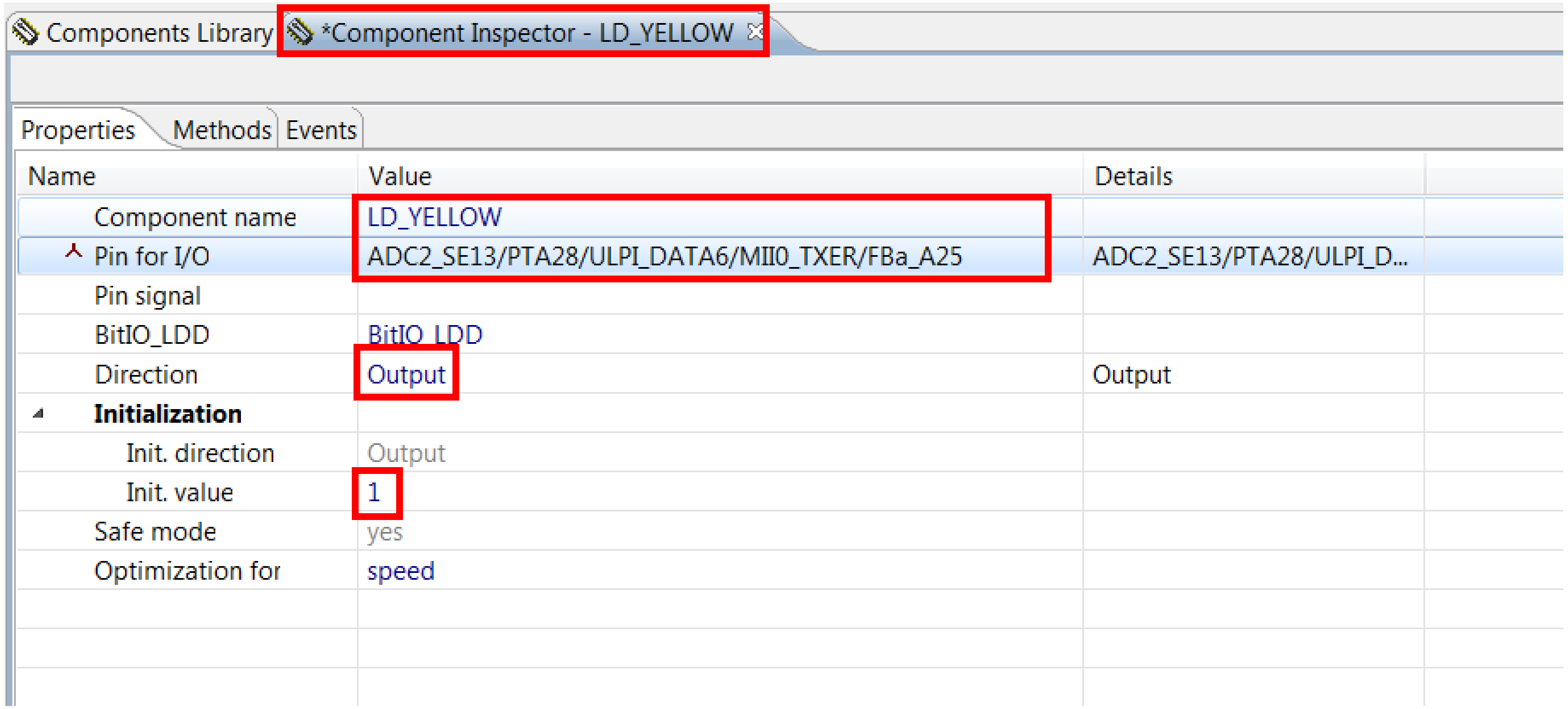
Add LED Output Components

- **Repeat** the same steps to add the rest of LED components



Name	Value	Details
Component name	LD_YELLOW	
Pin for I/O	ADC2_SE13/PTA28/ULPI_DATA6/MII0_TXER/FBa_A25	ADC2_SE13/PTA28/ULPI_D...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Output	Output
Initialization		
Init. direction	Output	
Init. value	1	
Safe mode	yes	
Optimization for	speed	

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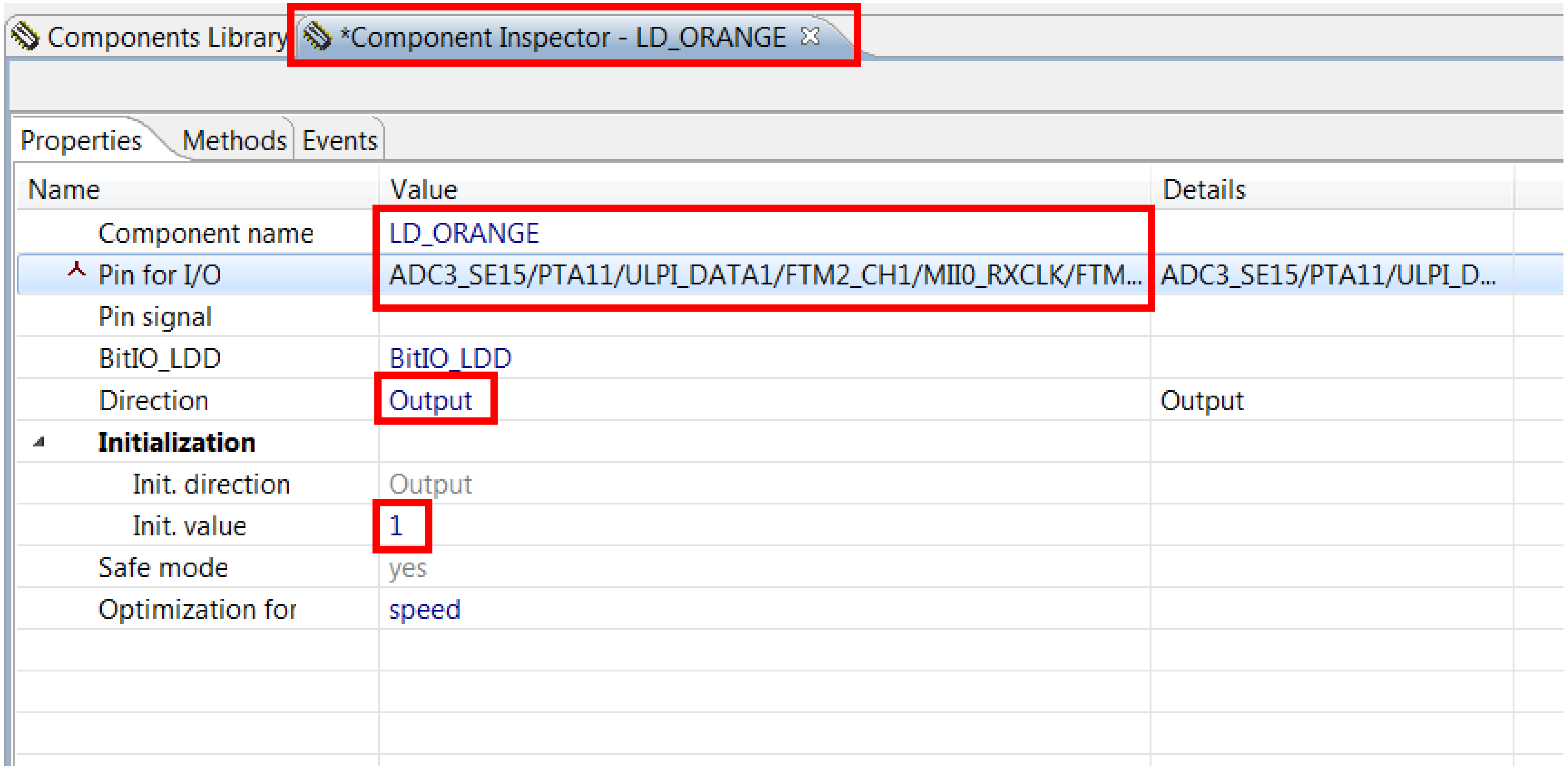
Add LED Output Components

- **Repeat** the same steps to add the rest of LED components



Components Library | *Component Inspector - LD_ORANGE

Properties | Methods | Events

Name	Value	Details
Component name	LD_ORANGE	
Pin for I/O	ADC3_SE15/PTA11/ULPI_DATA1/FTM2_CH1/MII0_RXCLK/FTM...	ADC3_SE15/PTA11/ULPI_D...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Output	Output
Initialization		
Init. direction	Output	
Init. value	1	
Safe mode	yes	
Optimization for	speed	

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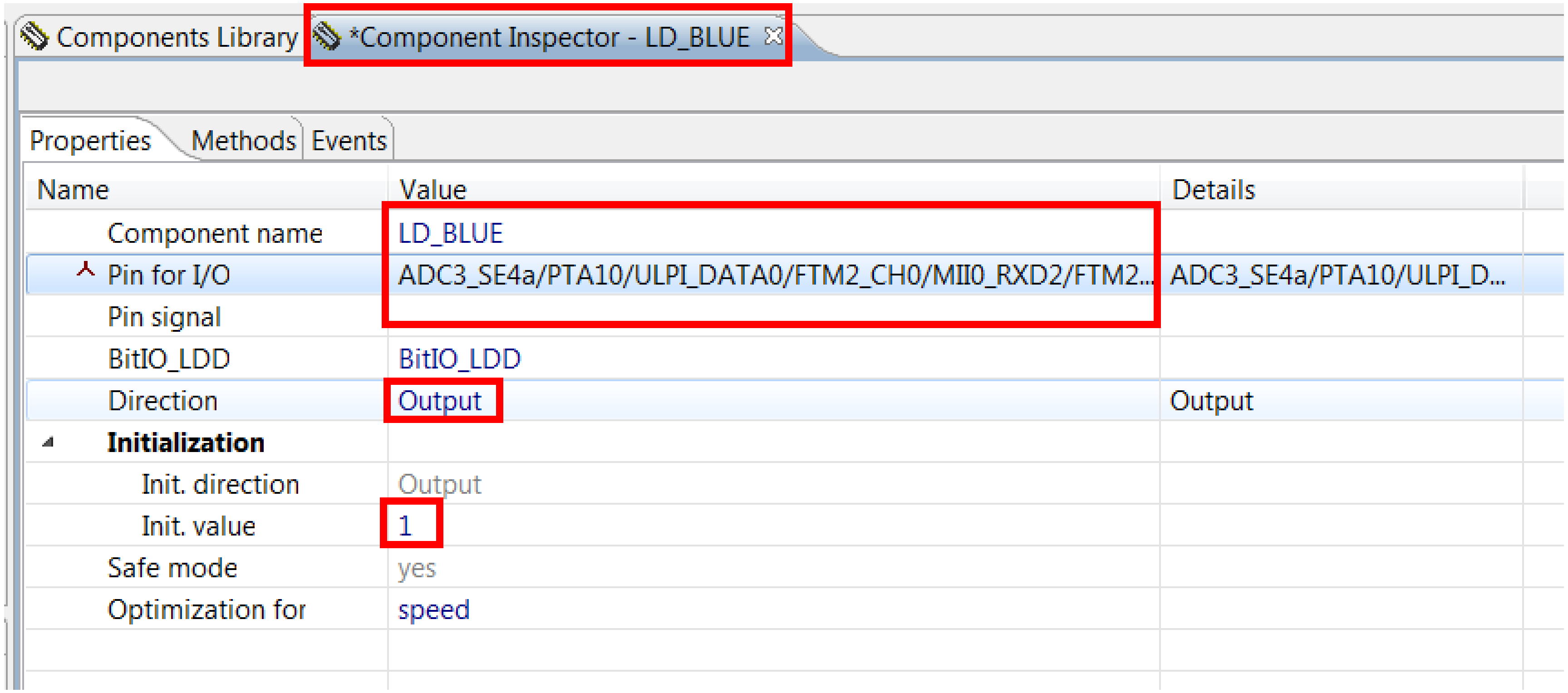
Add LED Output Components

- **Repeat** the same steps to add the rest of LED components



Components Library | *Component Inspector - LD_BLUE

Properties | Methods | Events

Name	Value	Details
Component name	LD_BLUE	
Pin for I/O	ADC3_SE4a/PTA10/ULPI_DATA0/FTM2_CH0/MII0_RXD2/FTM2...	ADC3_SE4a/PTA10/ULPI_D...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Output	Output
Initialization		
Init. direction	Output	
Init. value	1	
Safe mode	yes	
Optimization for	speed	

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Add SW Input Components

- We have to add 2 **BitIO** Components, one for each Push - Button in the **TWR-K70F120N**

- We will associate the LED On/Off to the status of the Led icons in **eGUI** Application (Switch Panel)

- When any of the "**Push Button**" is pressed, we change the icon image in the Switch Panel.

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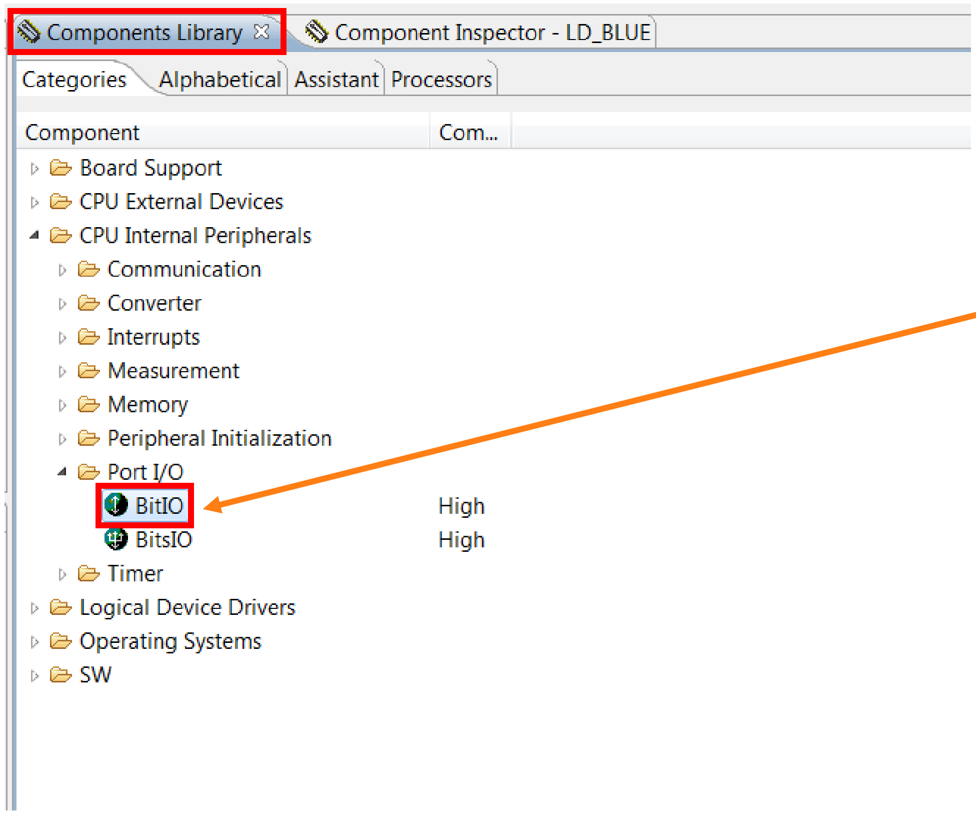
Add SW Input Components

- Add two additional **BitIO** that will be associated to **SW1** and **SW2**


Components Library
Component Inspector - LD_BLUE
Categories Alphabetical Assistant Processors

Component	Com...
Board Support	
CPU External Devices	
CPU Internal Peripherals	
Communication	
Converter	
Interrupts	
Measurement	
Memory	
Peripheral Initialization	
Port I/O	
BitIO	High
BitsIO	High
Timer	
Logical Device Drivers	
Operating Systems	
SW	

Double Click on BitIO

1

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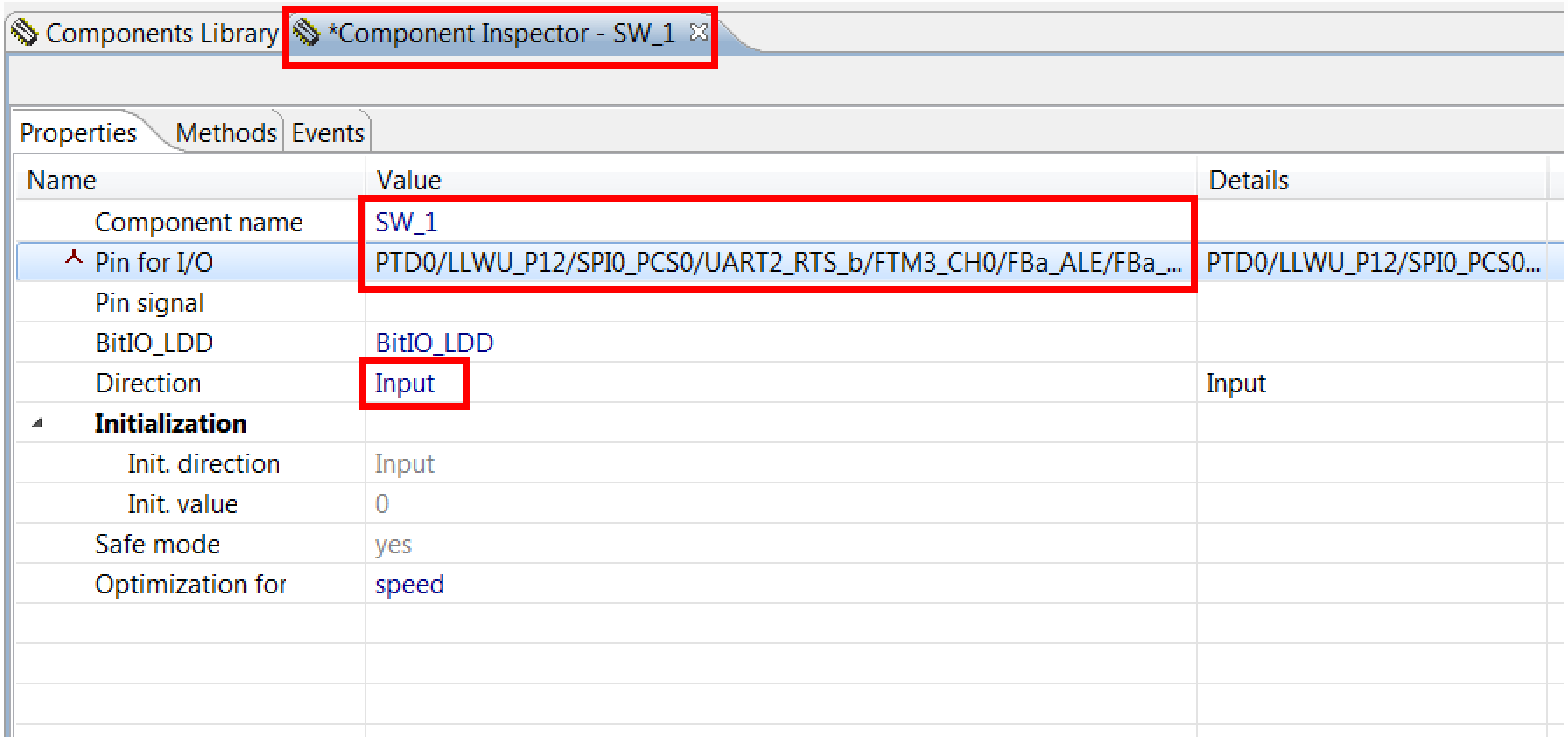
Add SW Input Components



Components Library | *Component Inspector - SW_1

Properties | Methods | Events

Name	Value	Details
Component name	SW_1	
Pin for I/O	PTD0/LLWU_P12/SPI0_PCS0/UART2_RTS_b/FTM3_CH0/FBa_ALE/FBa_...	PTD0/LLWU_P12/SPI0_PCS0...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Input	Input
Initialization		
Init. direction	Input	
Init. value	0	
Safe mode	yes	
Optimization for	speed	

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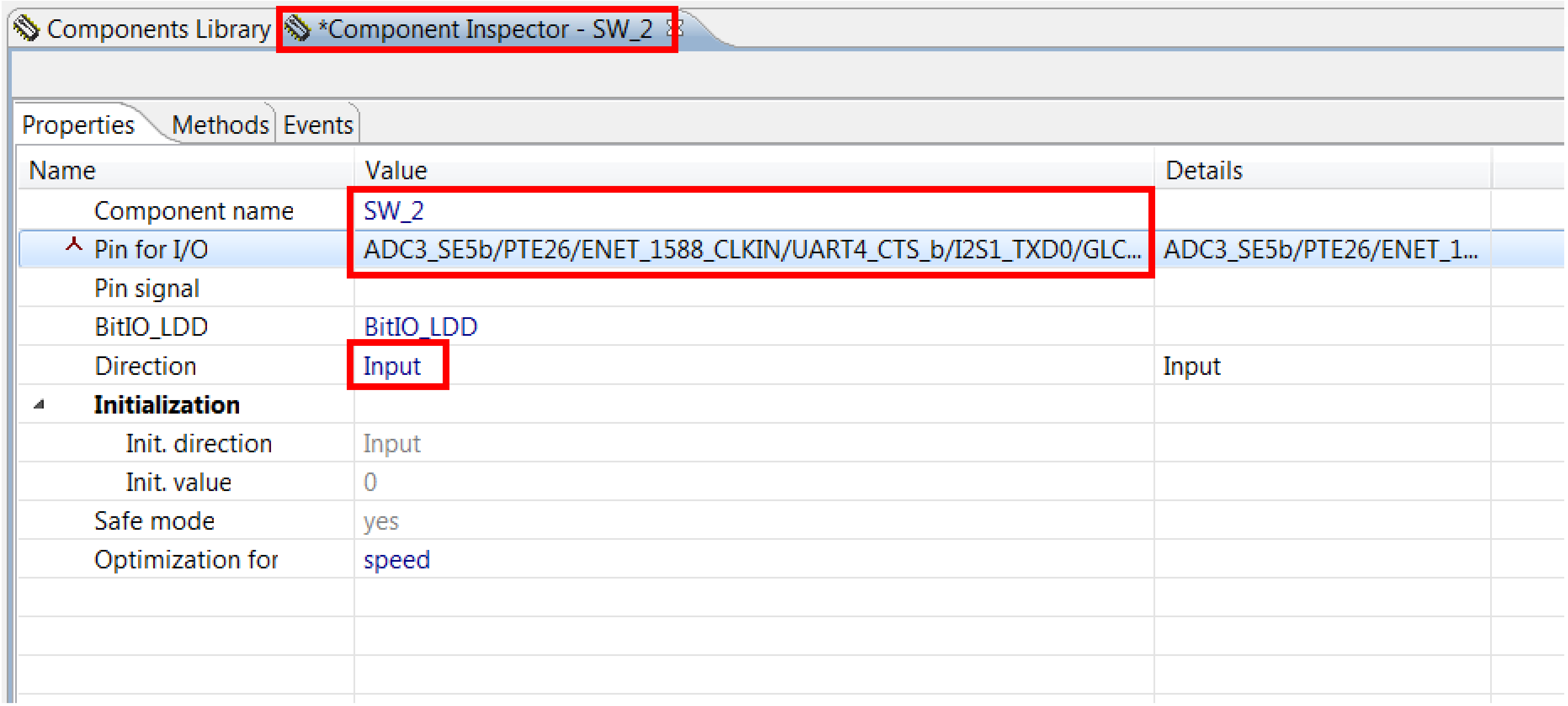
Add SW Input Components



Components Library | *Component Inspector - SW_2

Properties | Methods | Events

Name	Value	Details
Component name	SW_2	
Pin for I/O	ADC3_SE5b/PTE26/ENET_1588_CLKIN/UART4_CTS_b/I2S1_TXD0/GLC...	ADC3_SE5b/PTE26/ENET_1...
Pin signal		
BitIO_LDD	BitIO_LDD	
Direction	Input	Input
Initialization		
Init. direction	Input	
Init. value	0	
Safe mode	yes	
Optimization for	speed	

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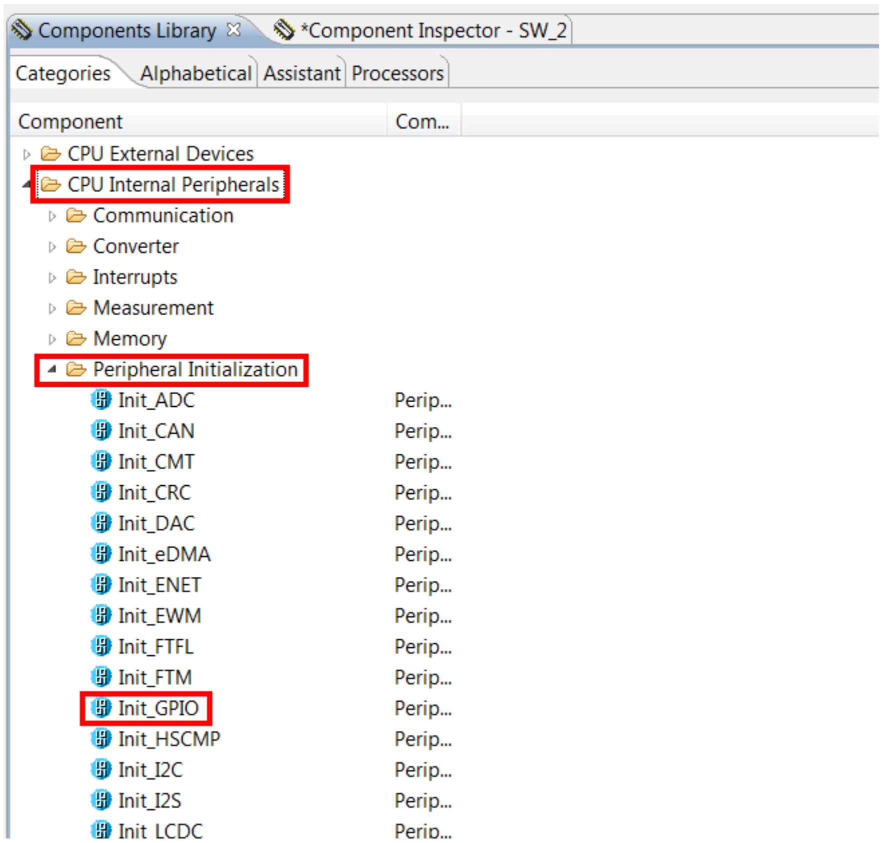
Add SW Input Components

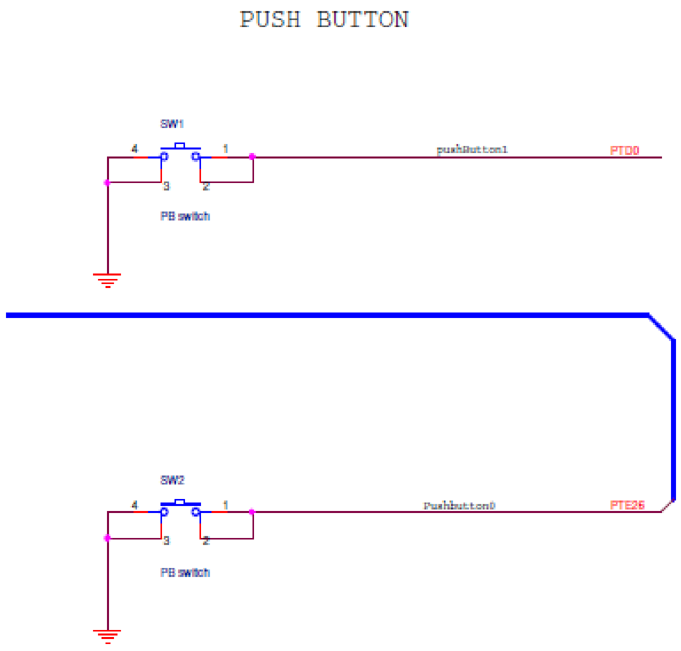
- We need to enable Pull-up resistor for **SW1** and **SW2** pins
- Go to Components Library and expand **Peripheral Initialization**



Components Library | *Component Inspector - SW_2

Categories | Alphabetical | Assistant | Processors

Component	Com...
▷ CPU External Devices	
◢ CPU Internal Peripherals	
▷ Communication	
▷ Converter	
▷ Interrupts	
▷ Measurement	
▷ Memory	
◢ Peripheral Initialization	
Init_ADC	Perip...
Init_CAN	Perip...
Init_CMT	Perip...
Init_CRC	Perip...
Init_DAC	Perip...
Init_eDMA	Perip...
Init_ENET	Perip...
Init_EWM	Perip...
Init_FTFL	Perip...
Init_FTM	Perip...
Init_GPIO	Perip...
Init_HSCMP	Perip...
Init_I2C	Perip...
Init_I2S	Perip...
Init_LCDC	Perip...



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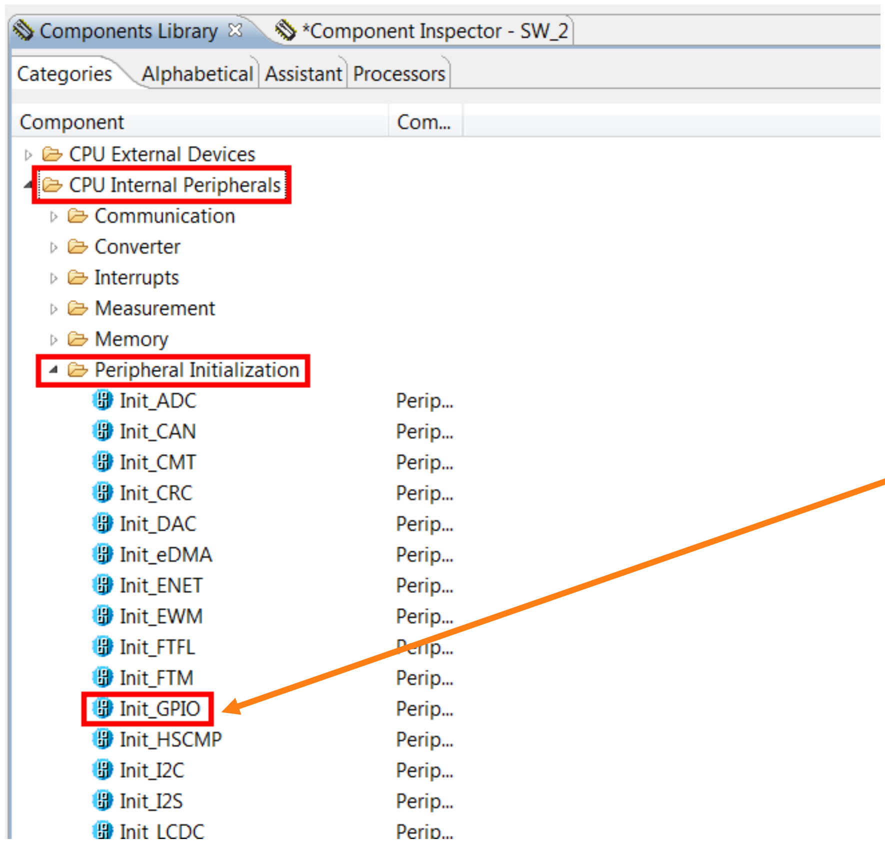
Add SW Input Components

- Add two **Init_GPIO**



Component	Com...
CPU External Devices	
CPU Internal Peripherals	
Communication	
Converter	
Interrupts	
Measurement	
Memory	
Peripheral Initialization	
Init_ADC	Perip...
Init_CAN	Perip...
Init_CMT	Perip...
Init_CRC	Perip...
Init_DAC	Perip...
Init_eDMA	Perip...
Init_ENET	Perip...
Init_EWM	Perip...
Init_FTFL	Perip...
Init_FTM	Perip...
Init_GPIO	Perip...
Init_HSCMP	Perip...
Init_I2C	Perip...
Init_I2S	Perip...
Init_LCDC	Perip...

Double Click on Init_GPIO

1

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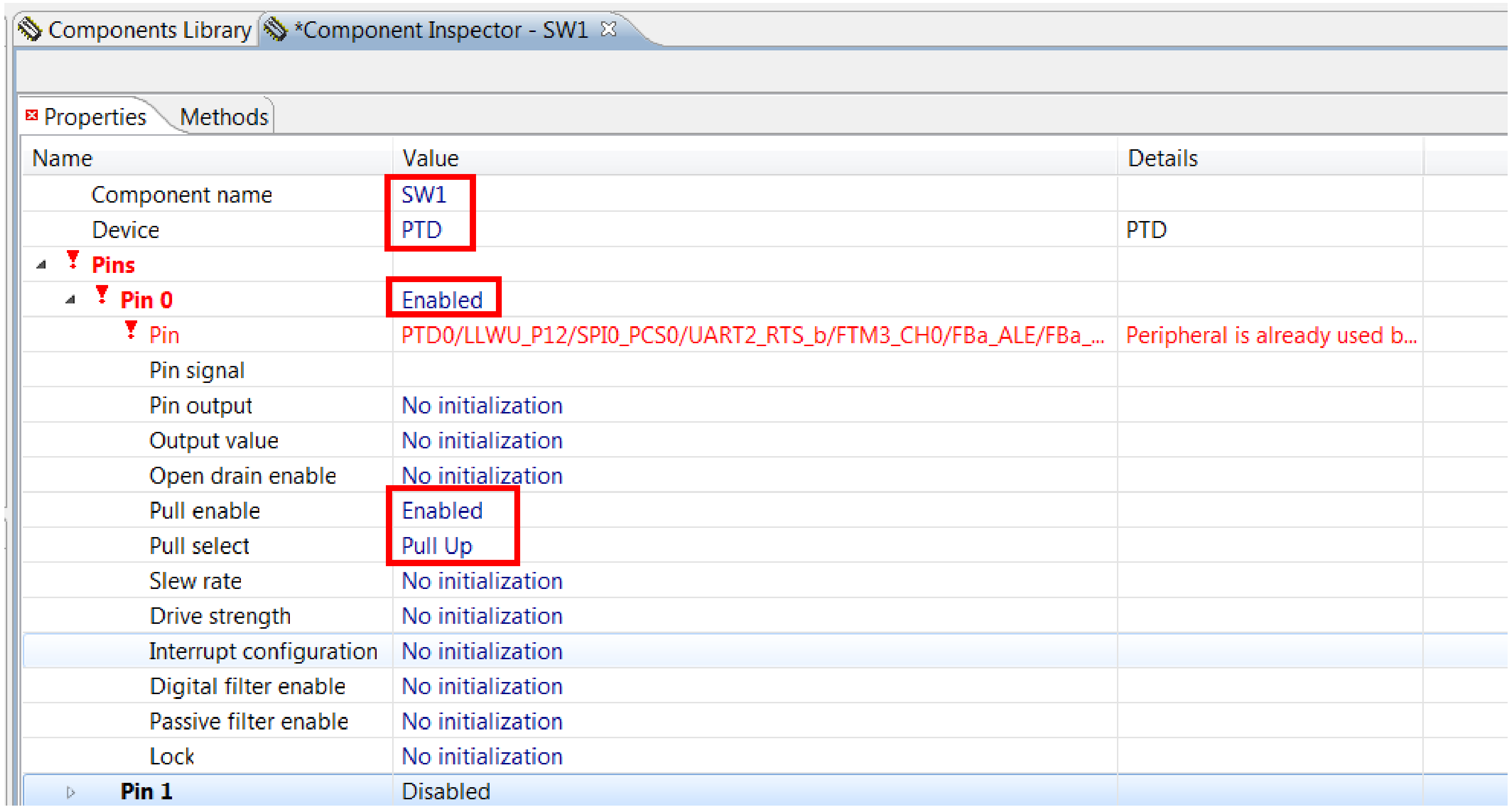
Add SW Input Components

- Click on **Init_GPIO** and Edit Component



Components Library | *Component Inspector - SW1

Properties | Methods

Name	Value	Details
Component name	SW1	
Device	PTD	PTD
Pins		
Pin 0	Enabled	
Pin	PTD0/LLWU_P12/SPI0_PCS0/UART2_RTS_b/FTM3_CH0/FBa_ALE/FBa_...	Peripheral is already used b...
Pin signal		
Pin output	No initialization	
Output value	No initialization	
Open drain enable	No initialization	
Pull enable	Enabled	
Pull select	Pull Up	
Slew rate	No initialization	
Drive strength	No initialization	
Interrupt configuration	No initialization	
Digital filter enable	No initialization	
Passive filter enable	No initialization	
Lock	No initialization	
Pin 1	Disabled	

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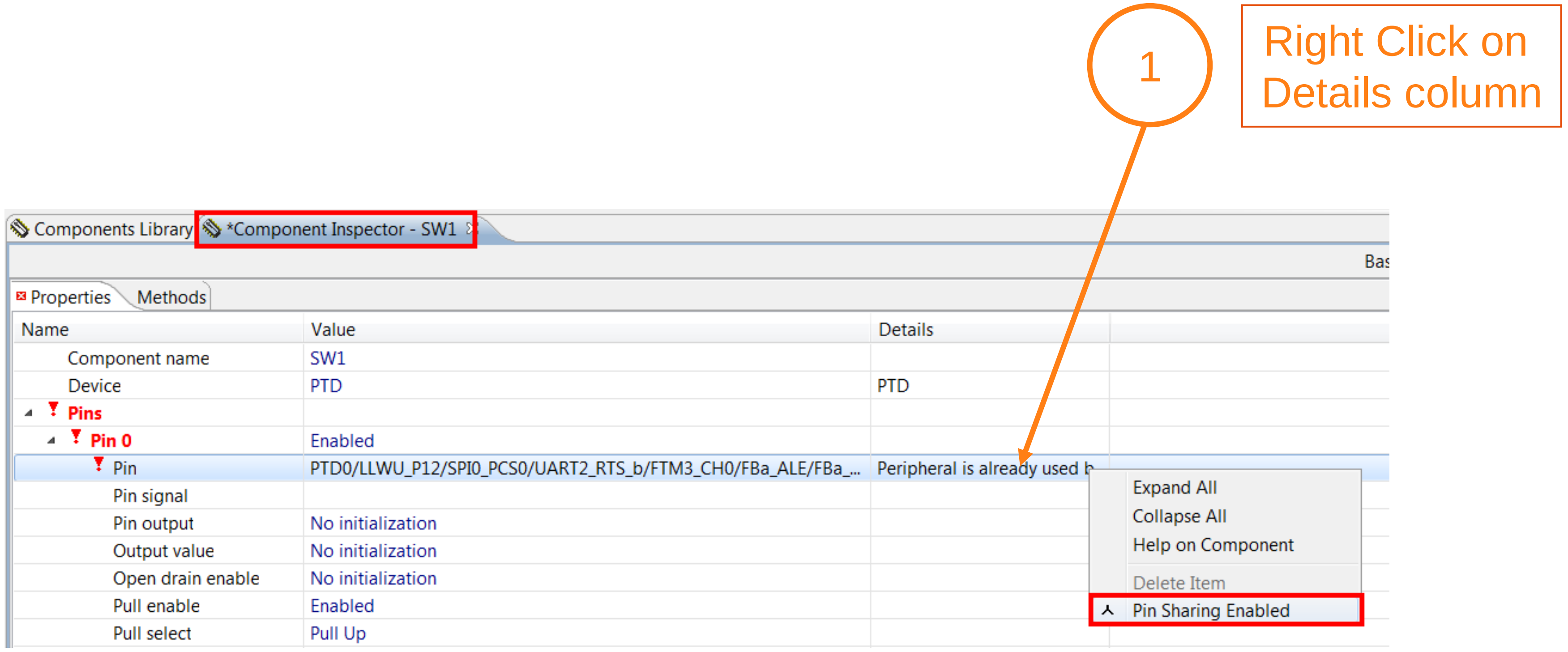
Add SW Input Components

- We have a conflict as we are using two components for the same pin (**PTD0**)
- Right click on Pin item where error is reported. Enable “**Pin Sharing Enabled**” by single click on this command.



Name	Value	Details
Component name	SW1	
Device	PTD	PTD
Pins		
Pin 0	Enabled	
Pin	PTD0/LLWU_P12/SPI0_PCS0/UART2_RTS_b/FTM3_CH0/FBa_ALE/FBa_...	Peripheral is already used b
Pin signal		
Pin output	No initialization	
Output value	No initialization	
Open drain enable	No initialization	
Pull enable	Enabled	
Pull select	Pull Up	

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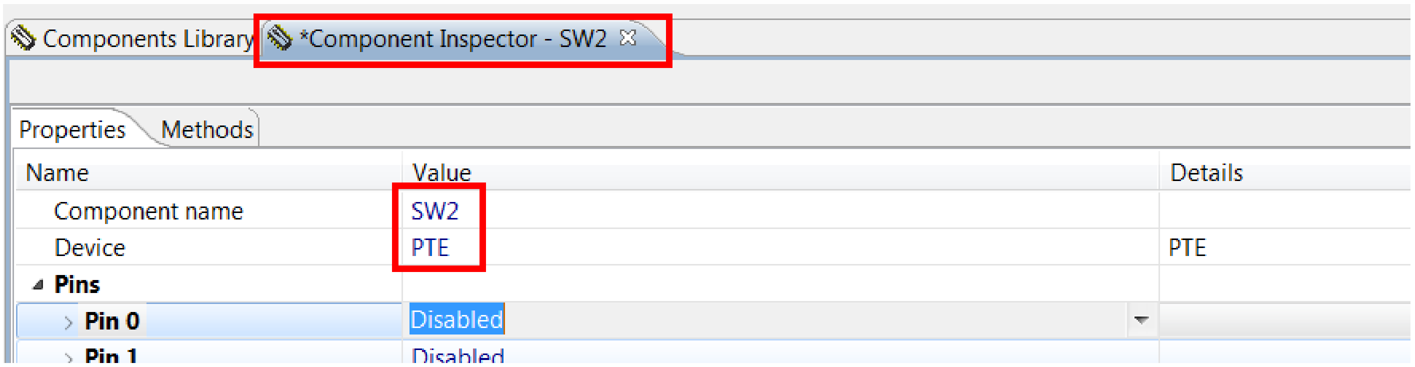
Add SW Input Components

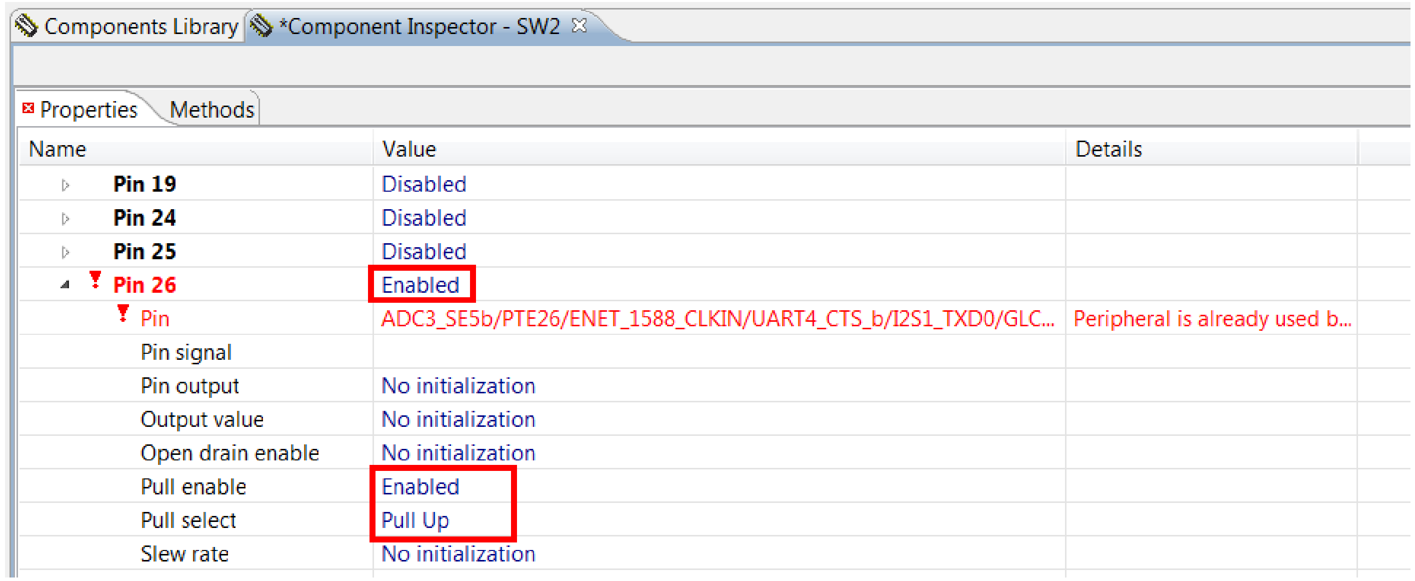
- Click on **Init_GPIO** and Edit Component



Components Library | *Component Inspector - SW2

Properties | Methods

Name	Value	Details
Component name	SW2	
Device	PTE	PTE
Pins		
Pin 0	Disabled	
Pin 1	Disabled	



Components Library | *Component Inspector - SW2

Properties | Methods

Name	Value	Details
Pin 19	Disabled	
Pin 24	Disabled	
Pin 25	Disabled	
Pin 26	Enabled	
Pin	ADC3_SE5b/PTE26/ENET_1588_CLKIN/UART4_CTS_b/I2S1_TXD0/GLC...	Peripheral is already used b...
Pin signal		
Pin output	No initialization	
Output value	No initialization	
Open drain enable	No initialization	
Pull enable	Enabled	
Pull select	Pull Up	
Slew rate	No initialization	

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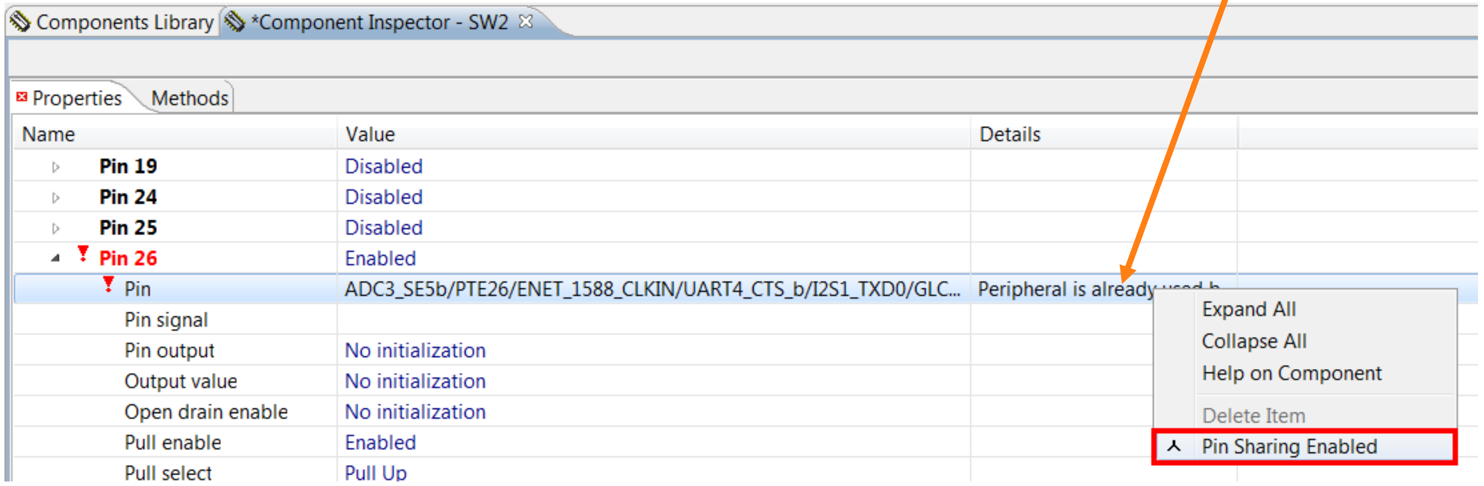
Add SW Input Components

- We have a conflict as we are using two components for the same pin (**PTE26**)
- Right click on Pin item where error is reported. Enable "**Pin Sharing Enabled**" by single click on this command.

1

Right Click on Details column



Name	Value	Details
Pin 19	Disabled	
Pin 24	Disabled	
Pin 25	Disabled	
Pin 26	Enabled	
Pin	ADC3_SE5b/PTE26/ENET_1588_CLKIN/UART4_CTS_b/I2S1_TXD0/GLC...	Peripheral is already used b
Pin signal		
Pin output	No initialization	
Output value	No initialization	
Open drain enable	No initialization	
Pull enable	Enabled	
Pull select	Pull Up	

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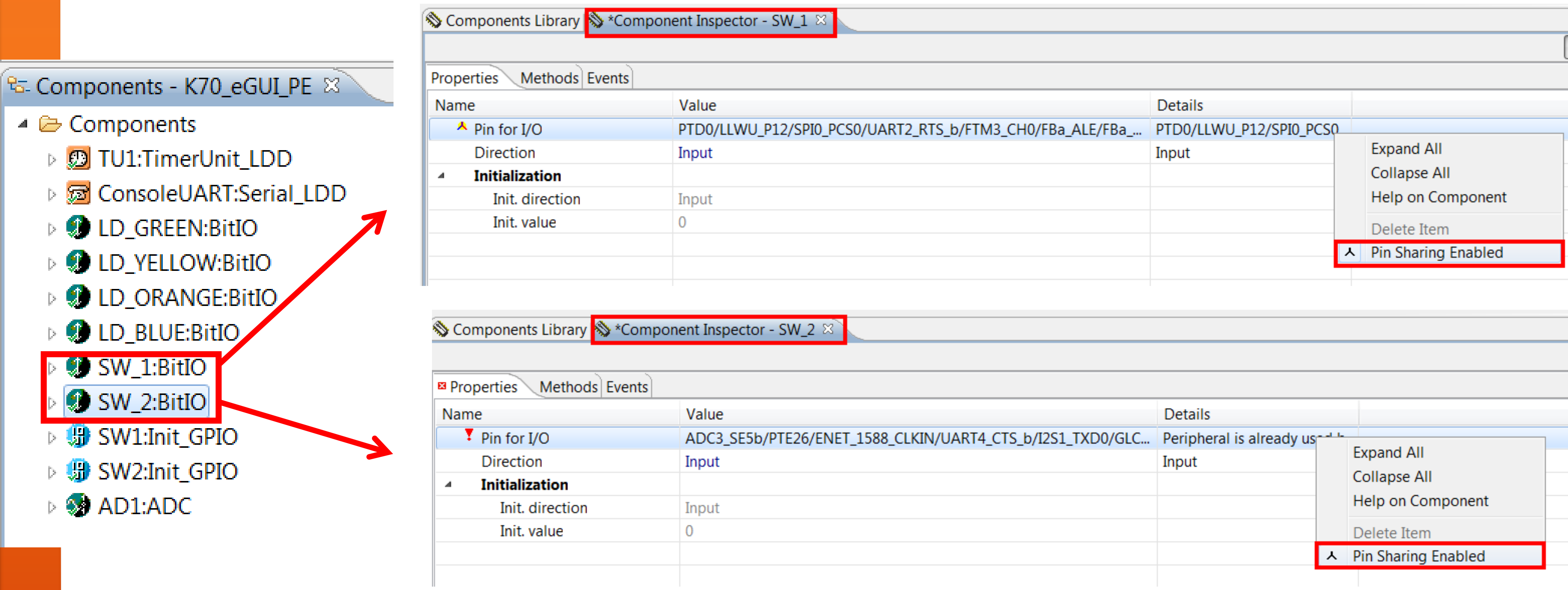
Add SW Input Components

- Got to **SW_1** and **SW_2 BitIO** components and enable **Pin Sharing**



Components - K70_eGUI_PE

- Components
  - TU1:TimerUnit_LDD
  - ConsoleUART:Serial_LDD
  - LD_GREEN:BitIO
  - LD_YELLOW:BitIO
  - LD_ORANGE:BitIO
  - LD_BLUE:BitIO
  - SW_1:BitIO
  - SW_2:BitIO
  - SW1:Init_GPIO
  - SW2:Init_GPIO
  - AD1:ADC

Components Library | *Component Inspector - SW_1

Properties | Methods | Events

Name	Value	Details
Pin for I/O	PTD0/LLWU_P12/SPI0_PCS0/UART2_RTS_b/FTM3_CH0/FBa_ALE/FBa_...	PTD0/LLWU_P12/SPI0_PCS0
Direction	Input	Input
Initialization		
Init. direction	Input	
Init. value	0	

Components Library | *Component Inspector - SW_2

Properties | Methods | Events

Name	Value	Details
Pin for I/O	ADC3_SE5b/PTE26/ENET_1588_CLKIN/UART4_CTS_b/I2S1_TXD0/GLC...	Peripheral is already us
Direction	Input	Input
Initialization		
Init. direction	Input	
Init. value	0	

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Add ADC Input Component

- We have to add **ADC** Component to measure the voltage in the Potentiometer of **TWR-K70F120N**
- We will associate the Potentiometer to the status of the Slider in **eGUI** Application (ADC Panel)
- When the "**Pot**" is changed, we change the Slider value in the ADC Panel.

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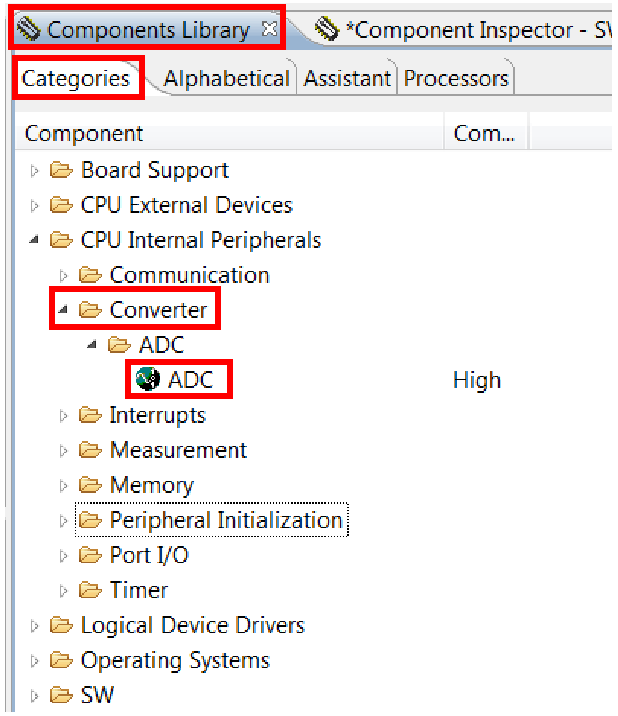
Add ADC Input Component

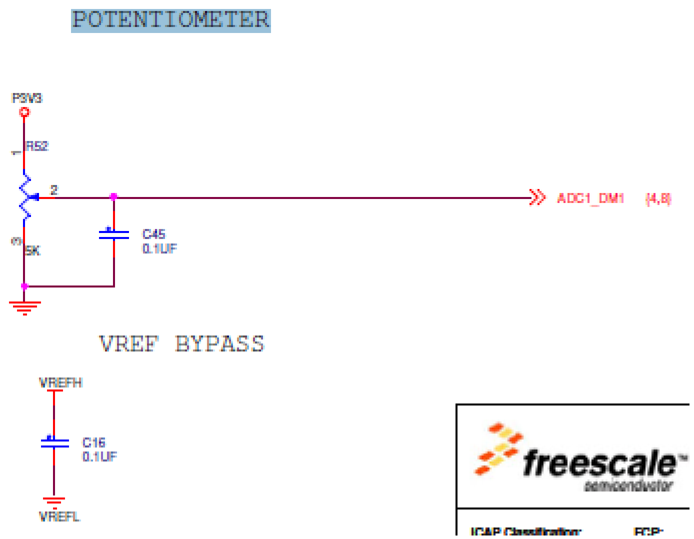
- Go to Components Library and double click in **ADC**

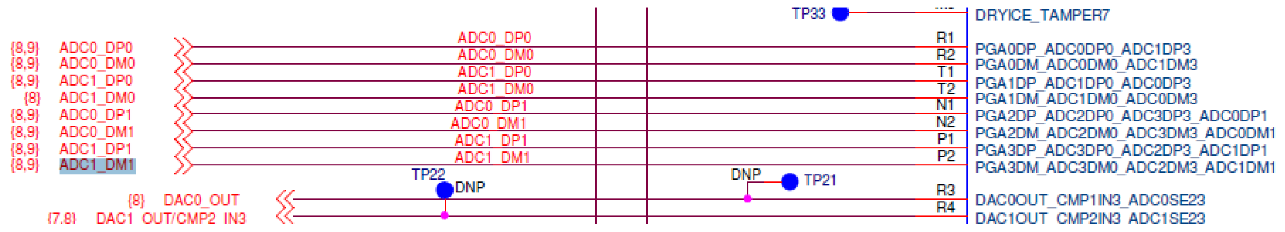


Components Library | *Component Inspector - S

Categories | Alphabetical | Assistant | Processors

Component	Com...
Board Support	
CPU External Devices	
CPU Internal Peripherals	
Communication	
Converter	
ADC	
ADC	High
Interrupts	
Measurement	
Memory	
Peripheral Initialization	
Port I/O	
Timer	
Logical Device Drivers	
Operating Systems	
SW	





TP33
DRYICE_TAMPER7
{8,9} ADC0_DP0
{8,9} ADC0_DM0
{8,9} ADC1_DP0
{8} ADC1_DM0
{8,9} ADC0_DP1
{8,9} ADC0_DM1
{8,9} ADC1_DP1
{8,9} ADC1_DM1
R1 PGA0DP_ADC0DP0_ADC1DP3
R2 PGA0DM_ADC0DM0_ADC1DM3
T1 PGA1DP_ADC1DP0_ADC0DP3
T2 PGA1DM_ADC1DM0_ADC0DM3
N1 PGA2DP_ADC2DP0_ADC3DP3_ADC0DP1
N2 PGA2DM_ADC2DM0_ADC3DM3_ADC0DM1
P1 PGA3DP_ADC3DP0_ADC2DP3_ADC1DP1
P2 PGA3DM_ADC3DM0_ADC2DM3_ADC1DM1
TP22 DNP
DNP TP21
{8} DAC0_OUT
{7,8} DAC1_OUT/CMP2_IN3
R3 DAC0OUT_CMP1IN3_ADC0SE23
R4 DAC1OUT_CMP2IN3_ADC1SE23

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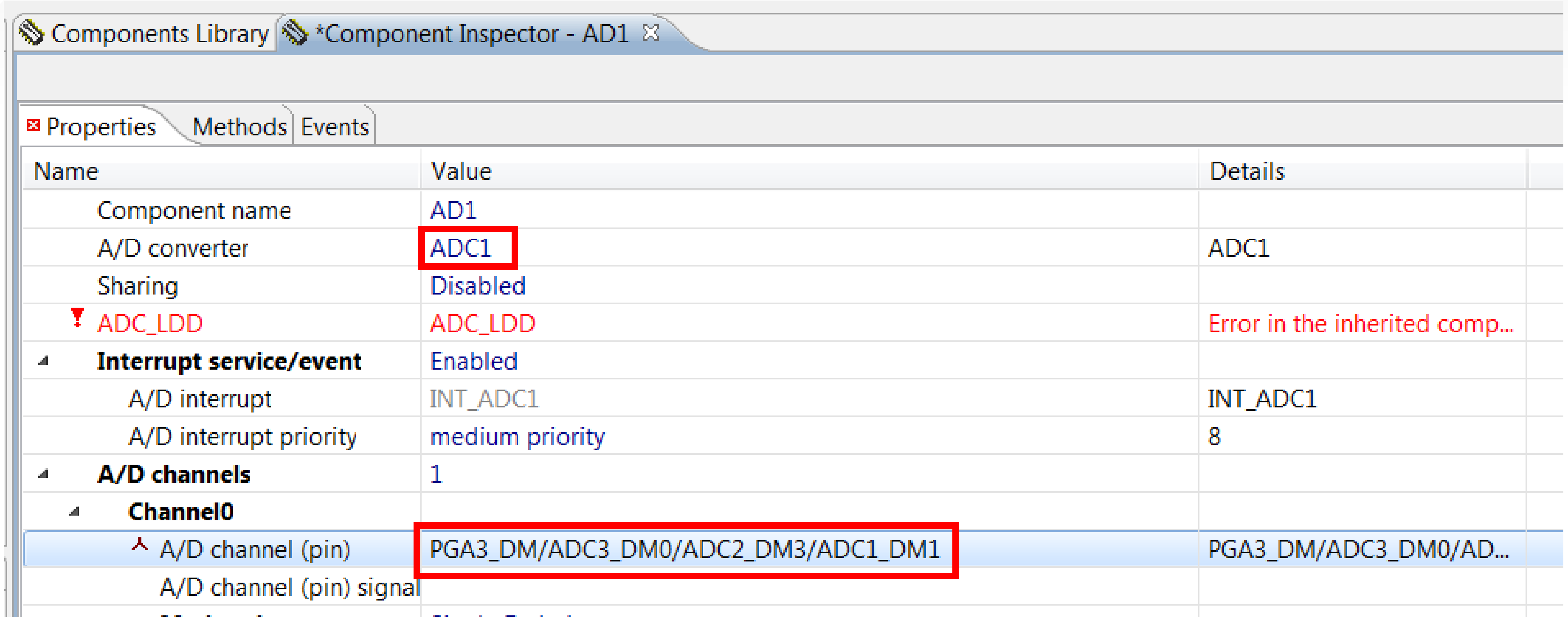
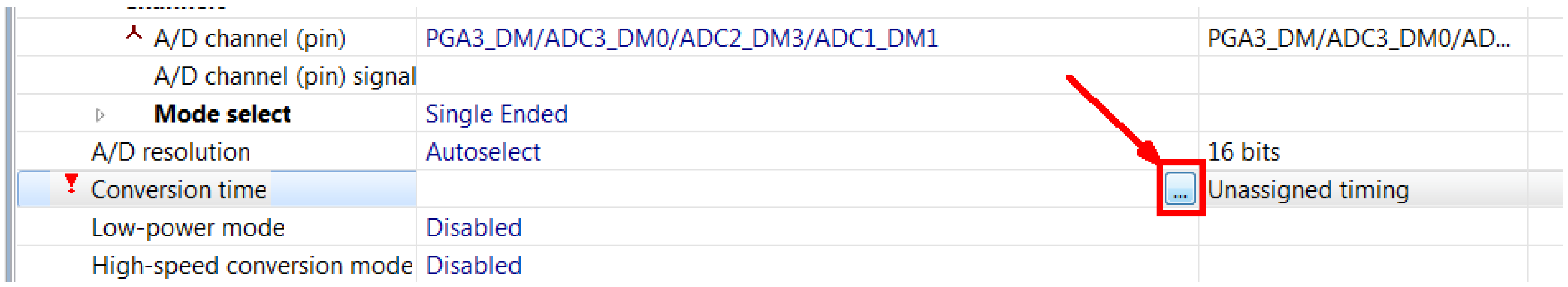
Add ADC Input Component



Components Library | *Component Inspector - AD1

Properties | Methods | Events

Name	Value	Details
Component name	AD1	
A/D converter	ADC1	ADC1
Sharing	Disabled	
ADC_LDD	ADC_LDD	Error in the inherited comp...
Interrupt service/event	Enabled	
A/D interrupt	INT_ADC1	INT_ADC1
A/D interrupt priority	medium priority	8
A/D channels	1	
Channel0		
A/D channel (pin)	PGA3_DM/ADC3_DM0/ADC2_DM3/ADC1_DM1	PGA3_DM/ADC3_DM0/AD...
A/D channel (pin) signal		



Name	Value	Details
A/D channel (pin)	PGA3_DM/ADC3_DM0/ADC2_DM3/ADC1_DM1	PGA3_DM/ADC3_DM0/AD...
A/D channel (pin) signal		
Mode select	Single Ended	
A/D resolution	Autoselect	16 bits
Conversion time	...	Unassigned timing
Low-power mode	Disabled	
High-speed conversion mode	Disabled	

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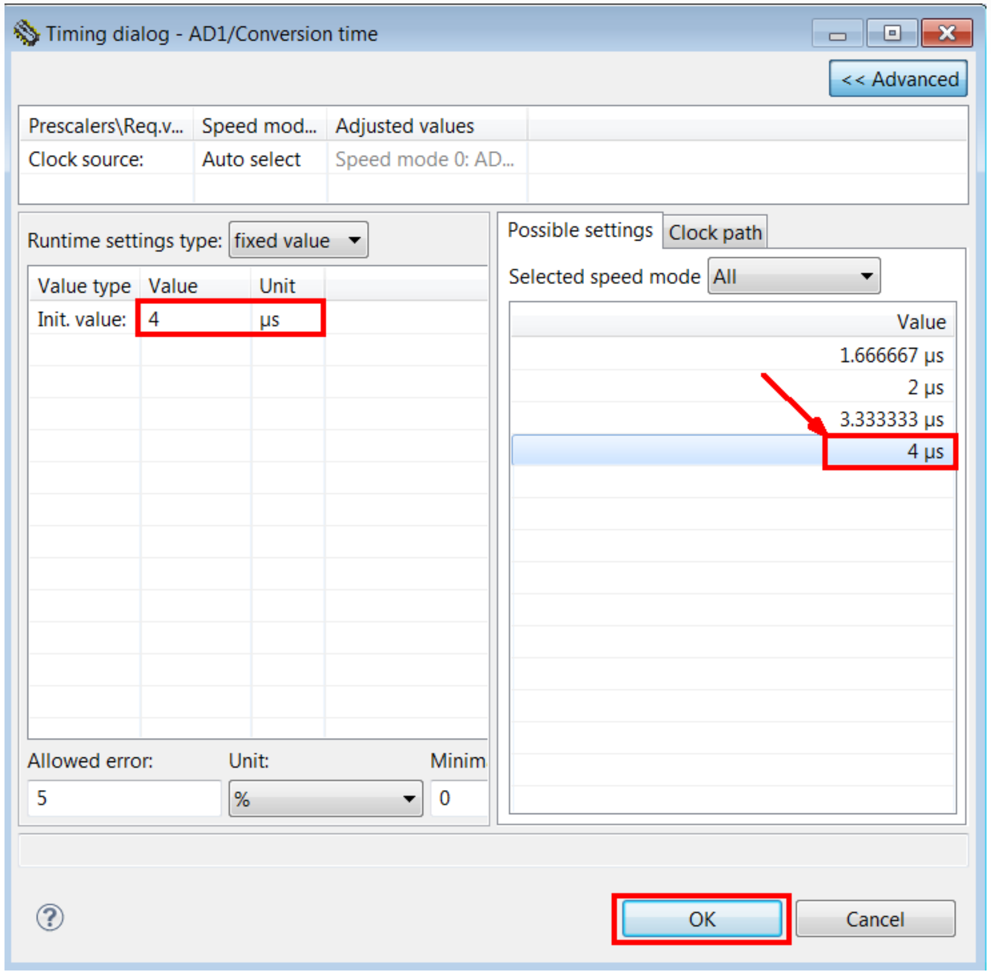
Add ADC Input Component



Timing dialog - AD1/Conversion time

<< Advanced

Prescalers\Req.v...	Speed mod...	Adjusted values
Clock source:	Auto select	Speed mode 0: AD...

Runtime settings type: fixed value

Value type	Value	Unit
Init. value:	4	µs

Allowed error: 5 Unit: % Minim 0

Possible settings | Clock path

Selected speed mode All

Value
1.666667 µs
2 µs
3.333333 µs
4 µs

OK Cancel

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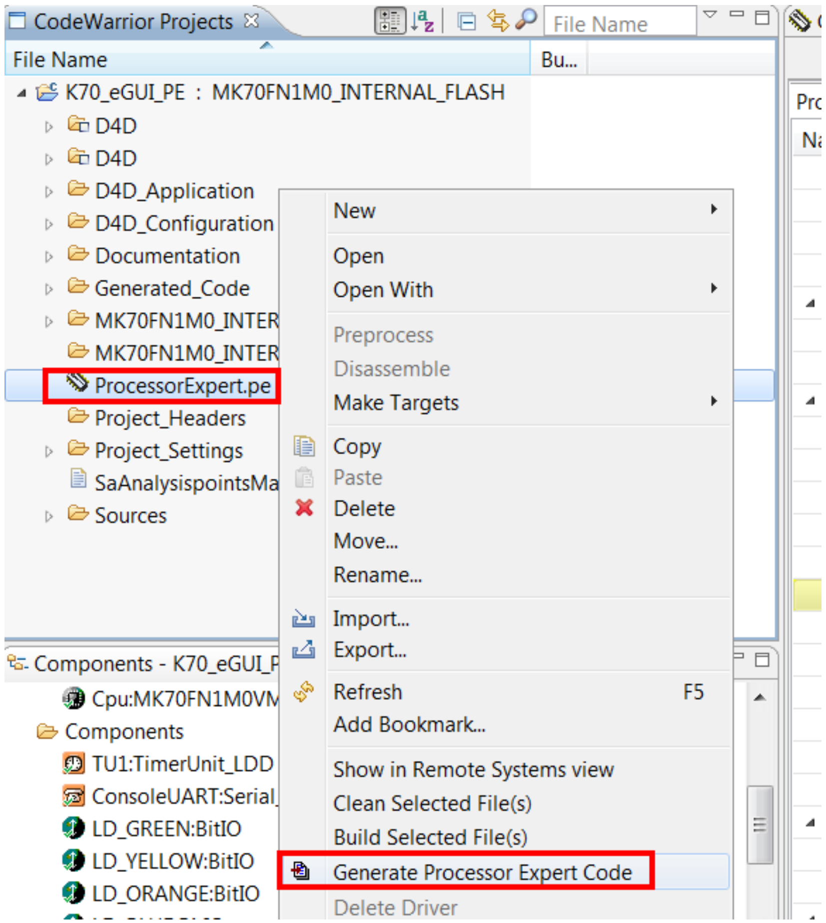
Generate Processor Expert Code

- Right Click over **ProcessorExpert.pe** and "**Generate Processor Expert Code**"



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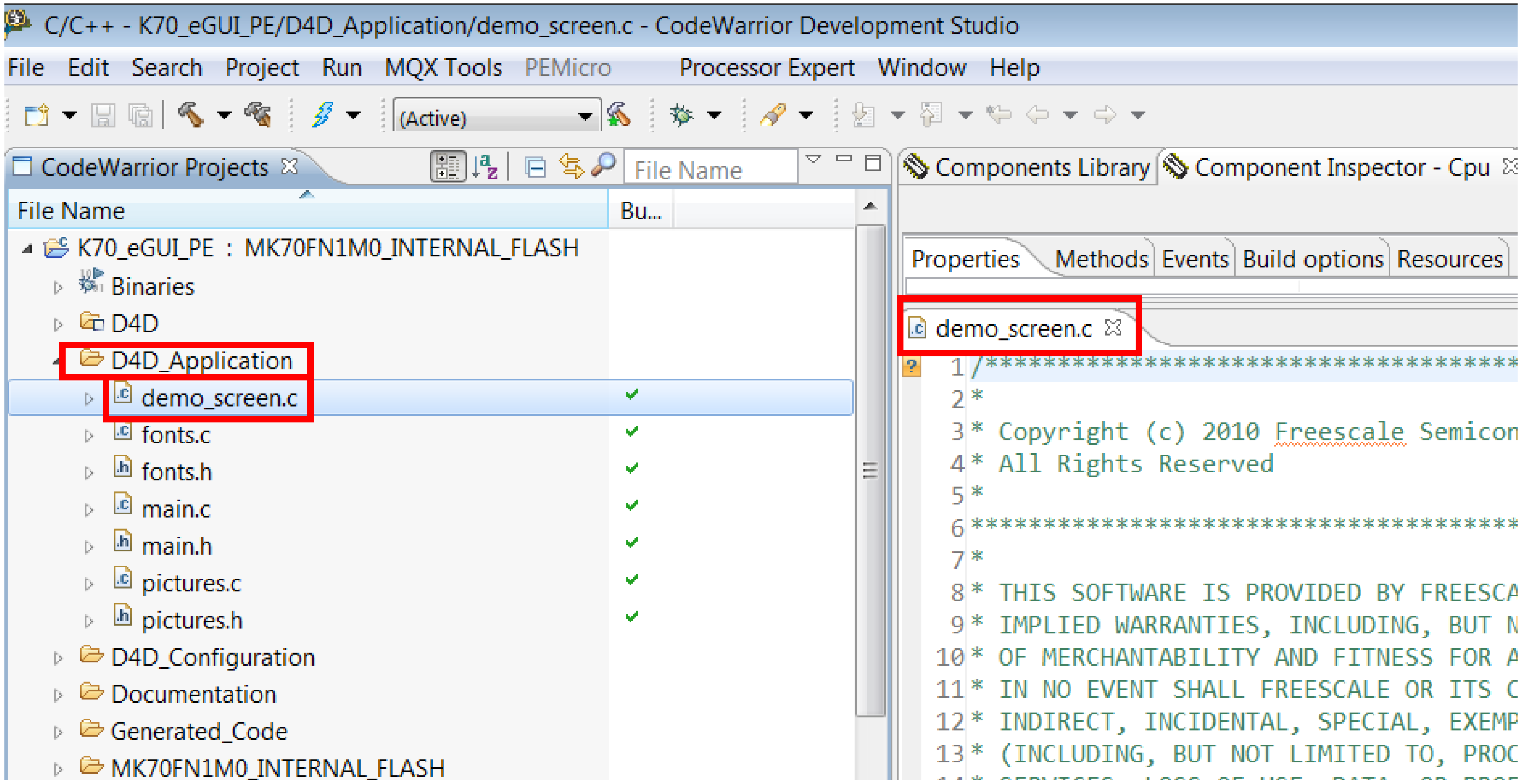
Add Components Code

- Open **demo_screen.c**



C/C++ - K70_eGUI_PE/D4D_Application/demo_screen.c - CodeWarrior Development Studio

File Edit Search Project Run MQX Tools PEMicro Processor Expert Window Help

CodeWarrior Projects

File Name	Bu...
K70_eGUI_PE : MK70FN1M0_INTERNAL_FLASH	
Binaries	
D4D	
D4D_Application	
demo_screen.c	✓
fonts.c	✓
fonts.h	✓
main.c	✓
main.h	✓
pictures.c	✓
pictures.h	✓
D4D_Configuration	
Documentation	
Generated_Code	
MK70FN1M0_INTERNAL_FLASH	

Components Library | Component Inspector - Cpu

Properties | Methods | Events | Build options | Resources

demo_screen.c

```
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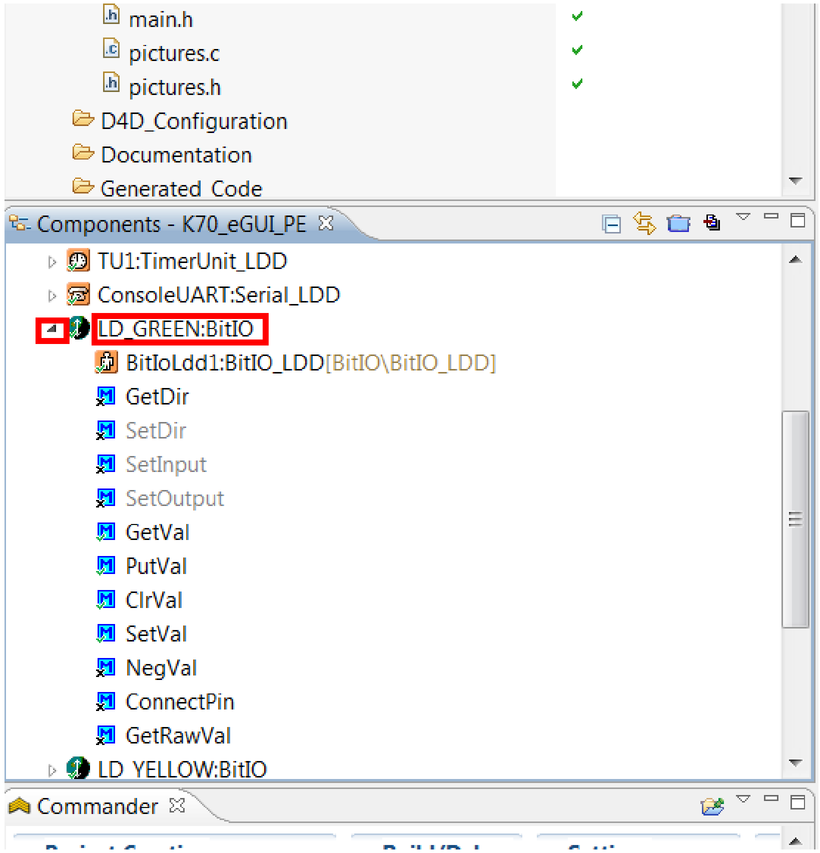
Add Components Code

- Expand the **LD_GREEN** Component in your **project**


main.h
pictures.c
pictures.h
D4D_Configuration
Documentation
Generated_Code
Components - K70_eGUI_PE
TU1:TimerUnit_LDD
ConsoleUART:Serial_LDD
LD_GREEN:BitIO
BitIoLdd1:BitIO_LDD[BitIO\BitIO_LDD]
GetDir
SetDir
SetInput
SetOutput
GetVal
PutVal
ClrVal
SetVal
NegVal
ConnectPin
GetRawVal
LD_YELLOW:BitIO
Commander

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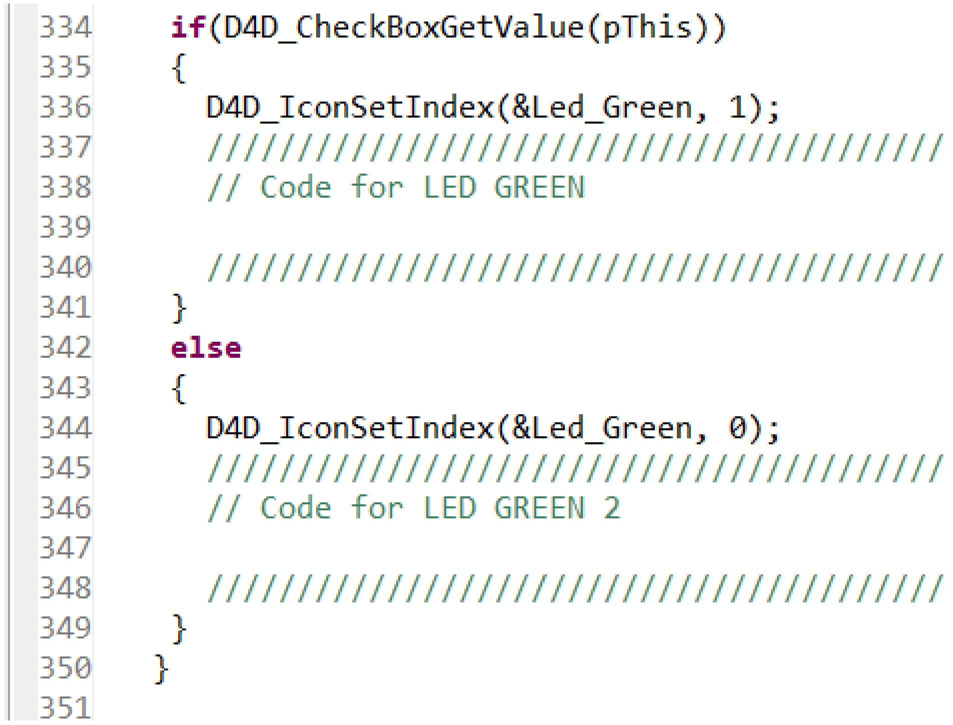
Add Components Code

- Search in code for **LED GREEN comments**
- Add code in **void OnChange_CheckBox** function



```
    if(D4D_CheckBoxGetValue(pThis))
    {
      D4D_IconSetIndex(&Led_Green, 1);
      /////////////////////////////////////////
      // Code for LED GREEN

      /////////////////////////////////////////
    }
    else
    {
      D4D_IconSetIndex(&Led_Green, 0);
      /////////////////////////////////////////
      // Code for LED GREEN 2

      /////////////////////////////////////////
    }
  }
```

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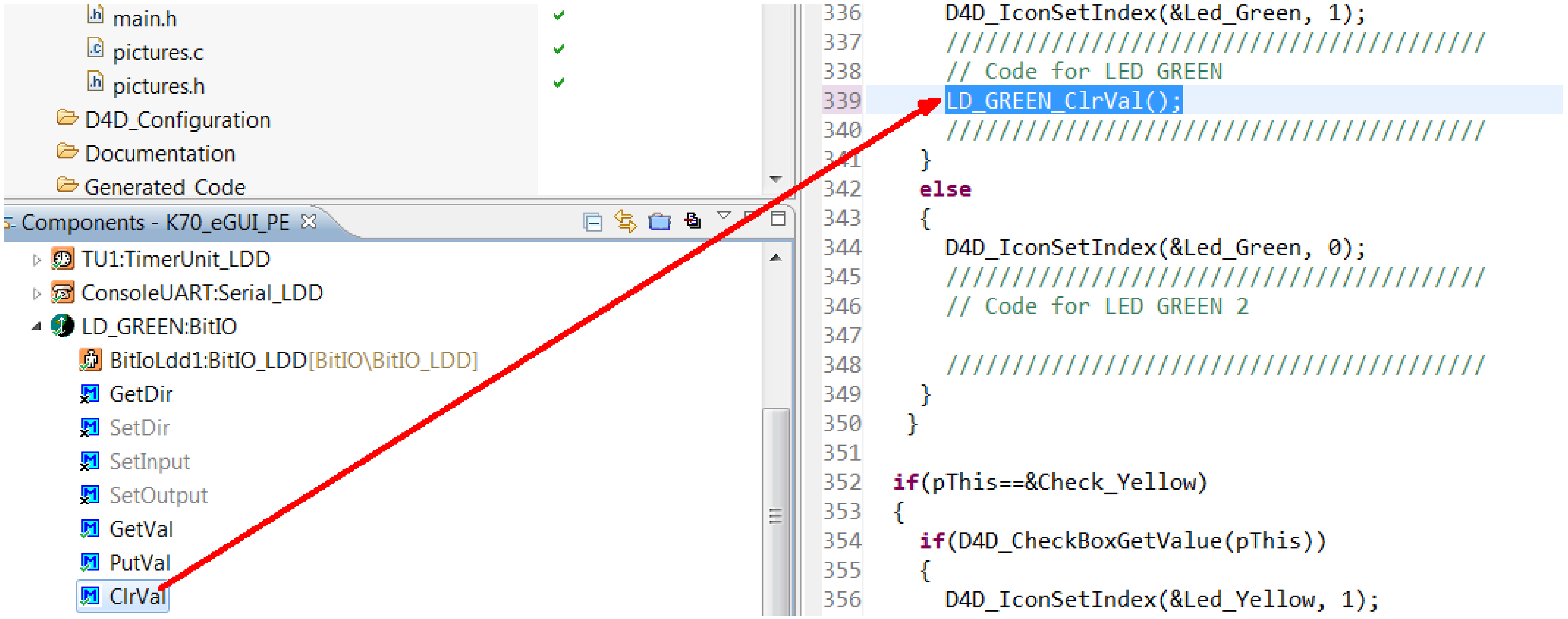
Add Components Code

- “Drag and Drop” **ClrVal** function



```
      D4D_IconSetIndex(&Led_Green, 1);
      /////////////////////////////////////////
      // Code for LED GREEN
      LD_GREEN_ClrVal();
      /////////////////////////////////////////
    }
    else
    {
      D4D_IconSetIndex(&Led_Green, 0);
      /////////////////////////////////////////
      // Code for LED GREEN 2

      /////////////////////////////////////////
    }
  }

  if(pThis==&Check_Yellow)
  {
    if(D4D_CheckBoxGetValue(pThis))
    {
      D4D_IconSetIndex(&Led_Yellow, 1);
```

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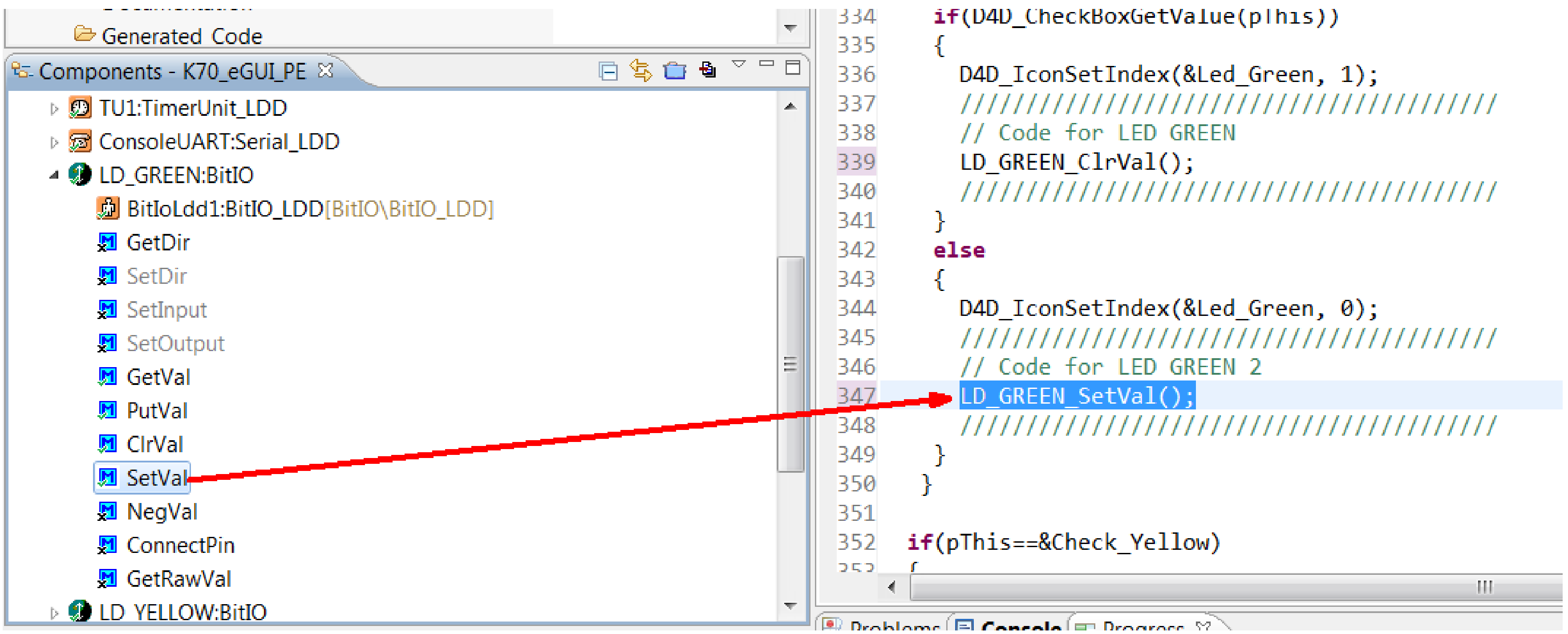
Add Components Code

- “Drag and Drop” **SetVal** function



Generated Code

Components - K70_eGUI_PE

- TU1:TimerUnit_LDD
- ConsoleUART:Serial_LDD
- LD_GREEN:BitIO
  - BitIoLdd1:BitIO_LDD[BitIO\BitIO_LDD]
  - GetDir
  - SetDir
  - SetInput
  - SetOutput
  - GetVal
  - PutVal
  - ClrVal
  - SetVal
  - NegVal
  - ConnectPin
  - GetRawVal
- LD_YELLOW:BitIO

```
    if(D4D_CheckBoxGetValue(pThis))
    {
      D4D_IconSetIndex(&Led_Green, 1);
      /////////////////////////////////////////
      // Code for LED GREEN
      LD_GREEN_ClrVal();
      /////////////////////////////////////////
    }
    else
    {
      D4D_IconSetIndex(&Led_Green, 0);
      /////////////////////////////////////////
      // Code for LED GREEN 2
      LD_GREEN_SetVal();
      /////////////////////////////////////////
    }
   }

  if(pThis==&Check_Yellow)
```

Problems Console Progress

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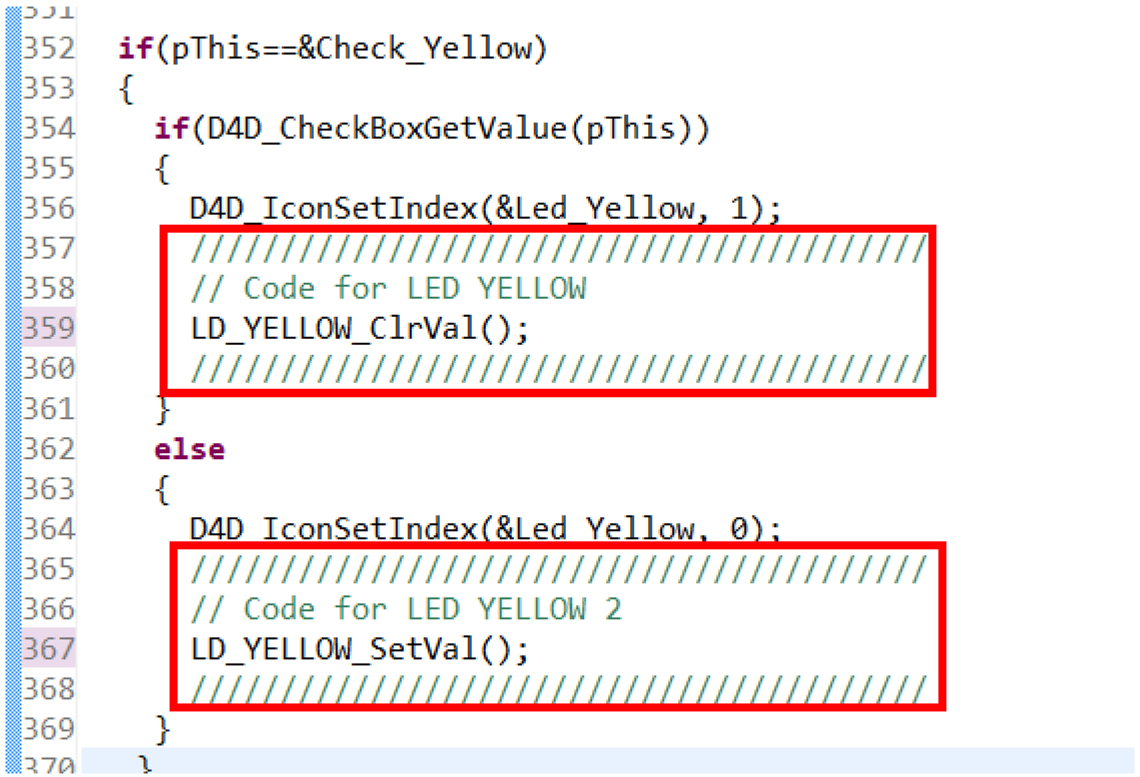
Add Components Code

- Add code for **Orange, Yellow and Blue LED's in the same way**



```
if(pThis==&Check_Yellow)
{
  if(D4D_CheckBoxGetValue(pThis))
  {
    D4D_IconSetIndex(&Led_Yellow, 1);
    /////////////////////////////////////////
    // Code for LED YELLOW
    LD_YELLOW_ClrVal();
    /////////////////////////////////////////
  }
  else
  {
    D4D_IconSetIndex(&Led_Yellow, 0);
    /////////////////////////////////////////
    // Code for LED YELLOW 2
    LD_YELLOW_SetVal();
    /////////////////////////////////////////
  }
}
```

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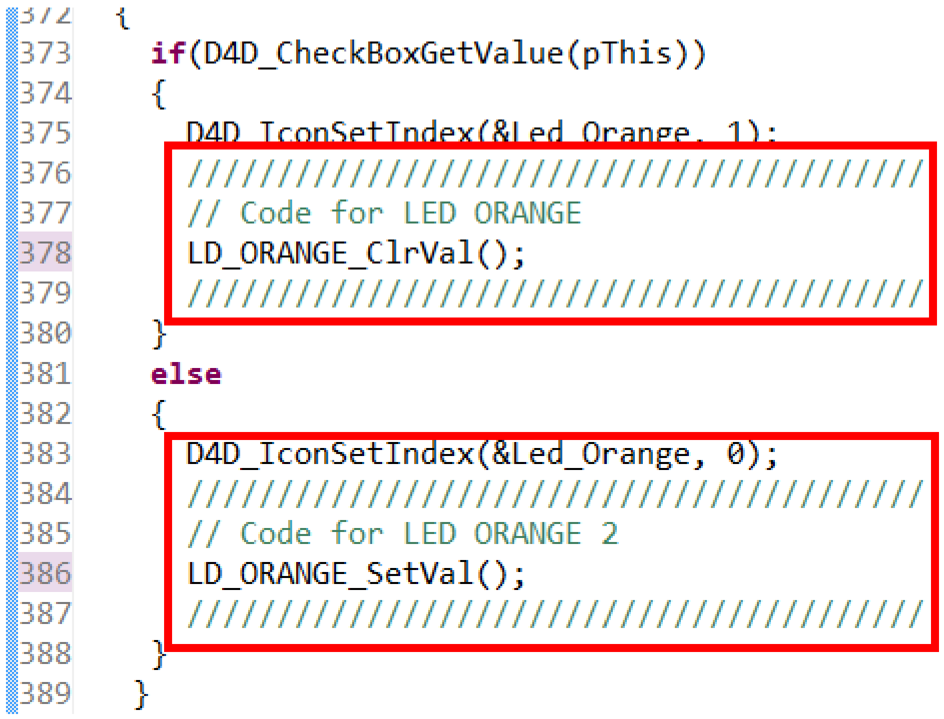
Add Components Code

- Add code for **Orange, Yellow and Blue LED’s in the same way**



```
  {
    if(D4D_CheckBoxGetValue(pThis))
    {
      D4D_IconSetIndex(&Led_Orange, 1);
      //////////////////////////////////////////
      // Code for LED ORANGE
      LD_ORANGE_ClrVal();
      //////////////////////////////////////////
    }
    else
    {
      D4D_IconSetIndex(&Led_Orange, 0);
      //////////////////////////////////////////
      // Code for LED ORANGE 2
      LD_ORANGE_SetVal();
      //////////////////////////////////////////
    }
  }
```

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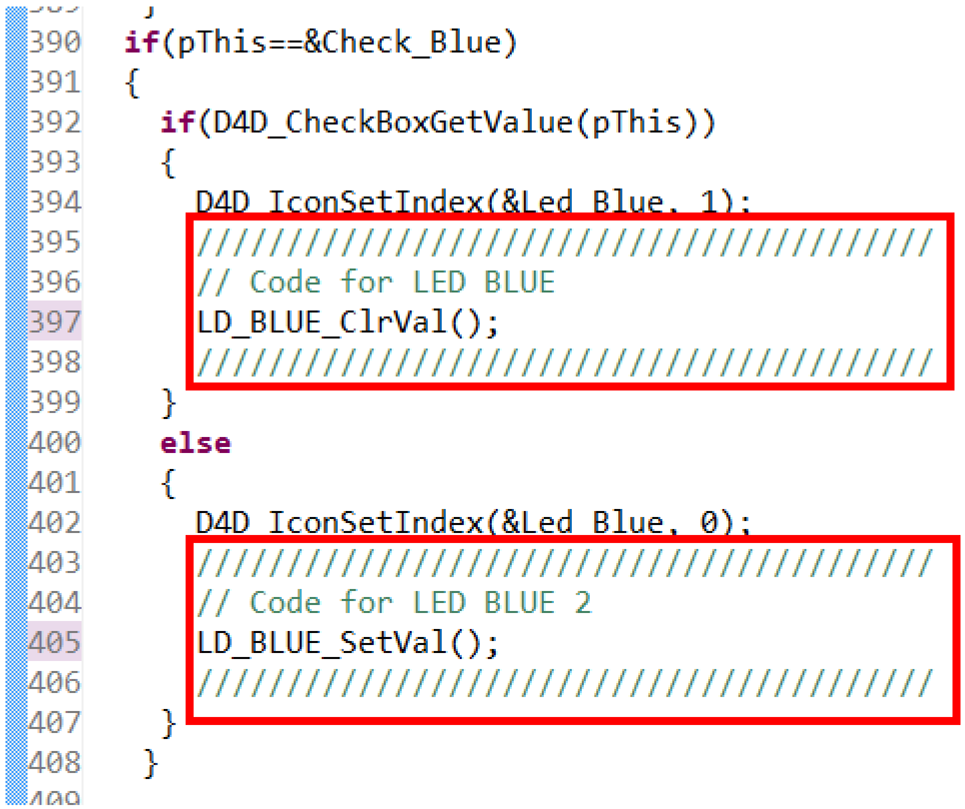
Add Components Code

- Add code for **Orange, Yellow and Blue LED's in the same way**



```
  if(pThis==&Check_Blue)
  {
    if(D4D_CheckBoxGetValue(pThis))
    {
      D4D_IconSetIndex(&Led_Blue, 1);
      ///////////////////////////////////////////
      // Code for LED BLUE
      LD_BLUE_ClrVal();
      ///////////////////////////////////////////
    }
    else
    {
      D4D_IconSetIndex(&Led_Blue, 0);
      ///////////////////////////////////////////
      // Code for LED BLUE 2
      LD_BLUE_SetVal();
      ///////////////////////////////////////////
    }
  }
```

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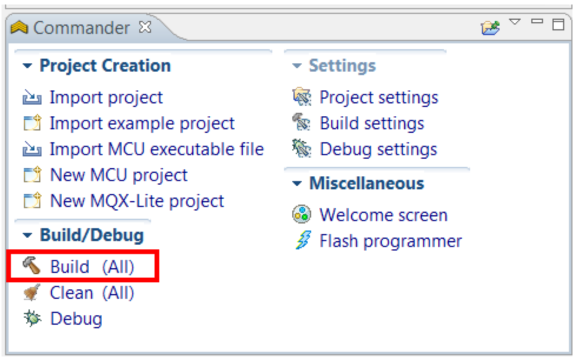
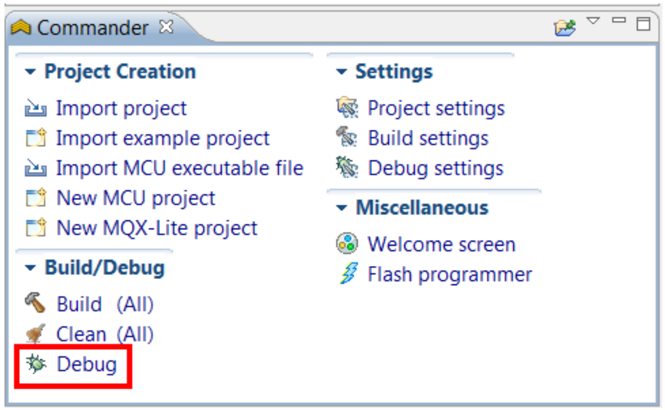
Test LED’s

- **Build** Project
- **Debug** Project
- **Check** that you can switch on-off board LED’s





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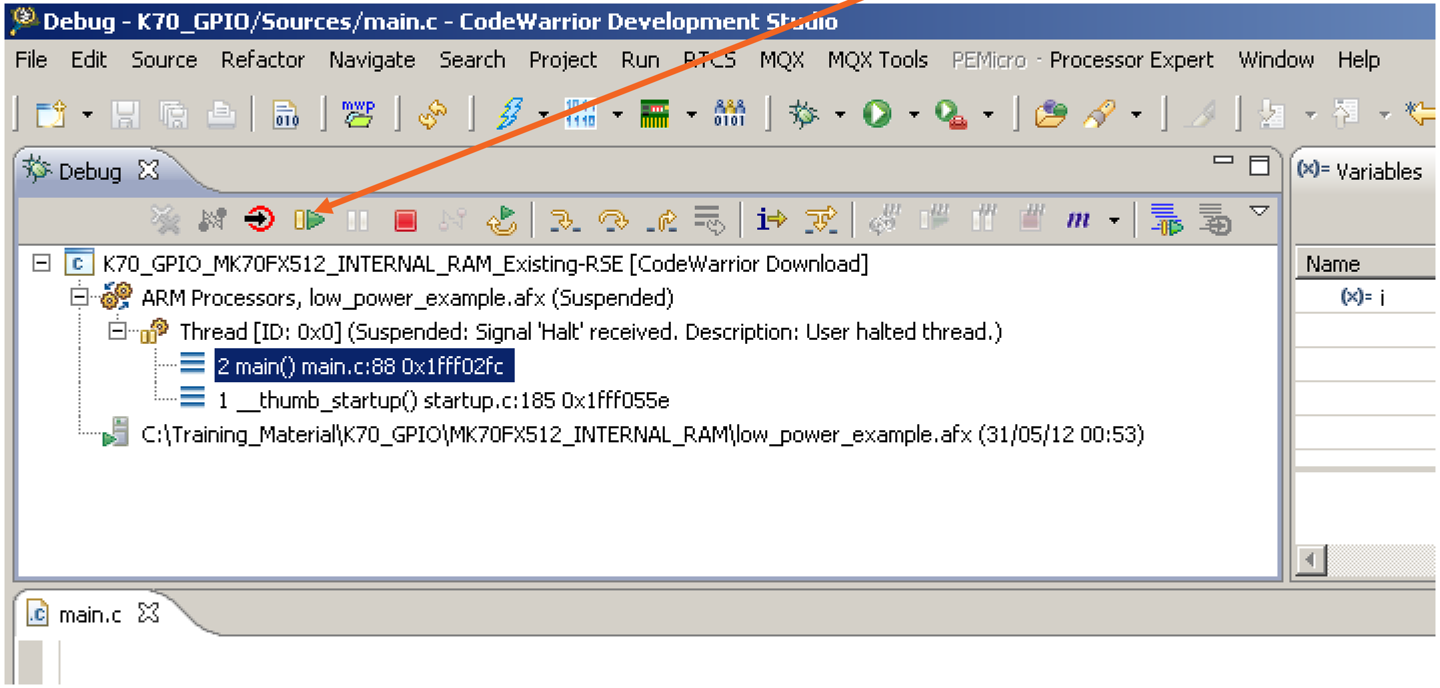
Run and debug Project

Click Run icon


Debug - K70_GPIO/Sources/main.c - CodeWarrior Development Studio

File Edit Source Refactor Navigate Search Project Run RTCS MQX MQX Tools PEMicro Processor Expert Window Help
Debug
Variables
Name
i
main.c

K70_GPIO_MK70FX512_INTERNAL_RAM_Existing-RSE [CodeWarrior Download]
ARM Processors, low_power_example.afx (Suspended)
Thread [ID: 0x0] (Suspended: Signal 'Halt' received. Description: User halted thread.)
2 main() main.c:88 0x1fff02fc
1 __thumb_startup() startup.c:185 0x1fff055e
C:\Training_Material\K70_GPIO\MK70FX512_INTERNAL_RAM\low_power_example.afx (31/05/12 00:53)

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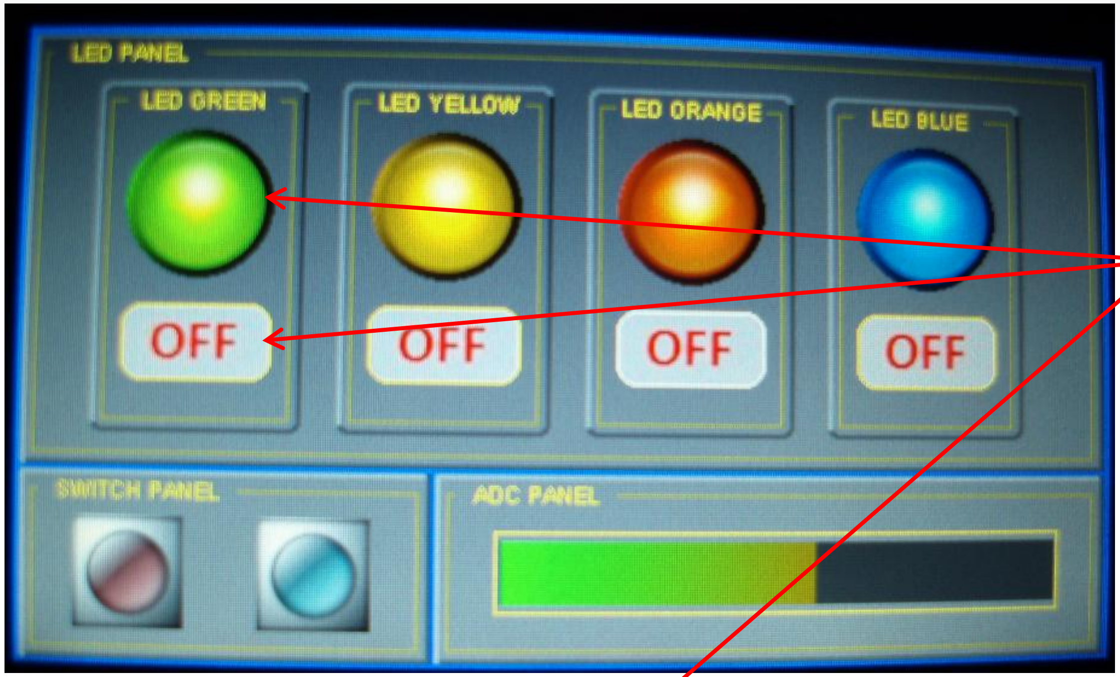
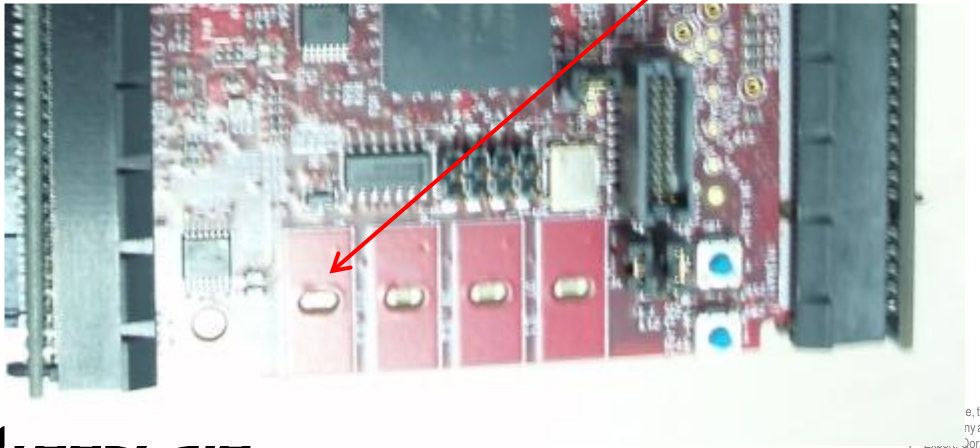
Test LED's



Touch CheckBox to switch On/Off Board LED



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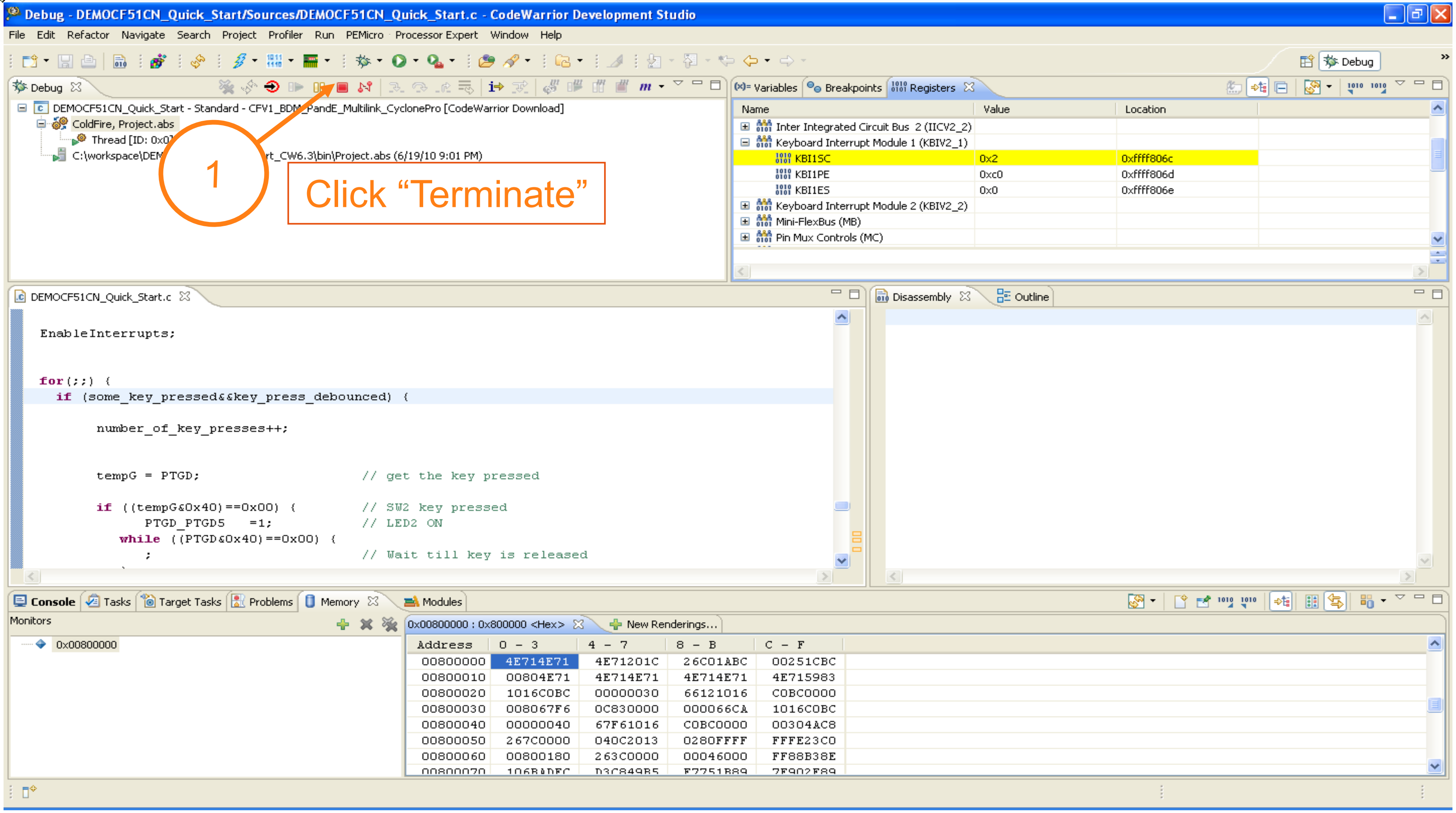
Terminate the Project


Debug - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio
File Edit Refactor Navigate Search Project Profiler Run PEMicro Processor Expert Window Help
Debug
1
Click “Terminate”
Variables
Breakpoints
Registers
DEMOCF51CN_Quick_Start.c
Disassembly
Outline
Console
Tasks
Target Tasks
Problems
Memory
Modules
Monitors
0x00800000
0x00800000 : 0x800000 <Hex>
New Renderings...

```
DEMOCF51CN_Quick_Start - Standard - CFV1_BDM_PandE_Multilink_CyclonePro [CodeWarrior Download]
  ColdFire, Project.abs
    Thread [ID: 0x0...
  C:\workspace\DEM...rt_CW6.3\bin\Project.abs (6/19/10 9:01 PM)
```

Name	Value	Location
Inter Integrated Circuit Bus 2 (IICV2_2)		
Keyboard Interrupt Module 1 (KBIV2_1)		
KBI1SC	0x2	0xffff806c
KBI1PE	0xc0	0xffff806d
KBI1ES	0x0	0xffff806e
Keyboard Interrupt Module 2 (KBIV2_2)		
Mini-FlexBus (MB)		
Pin Mux Controls (MC)		

```
 EnableInterrupts;


 for(;;) {
   if (some_key_pressed&&key_press_debounced) {

        number_of_key_presses++;


        tempG = PTGD;                     // get the key pressed

        if ((tempG&0x40)==0x00) {         // SW2 key pressed
               PTGD_PTGD5    =1;          // LED2 ON
            while ((PTGD&0x40)==0x00) {
               ;                          // Wait till key is released
```

```
Address   0 - 3     4 - 7     8 - B     C - F
00800000  4E714E71  4E71201C  26C01ABC  00251CBC
00800010  00804E71  4E714E71  4E714E71  4E715983
00800020  1016C0BC  00000030  66121016  C0BC0000
00800030  008067F6  0C830000  000066CA  1016C0BC
00800040  00000040  67F61016  C0BC0000  00304AC8
00800050  267C0000  040C2013  0280FFFF  FFFE23C0
00800060  00800180  263C0000  00046000  FF88B38E
00800070  106BADFC  D3C849B5  F7751B89  7F902F89
```

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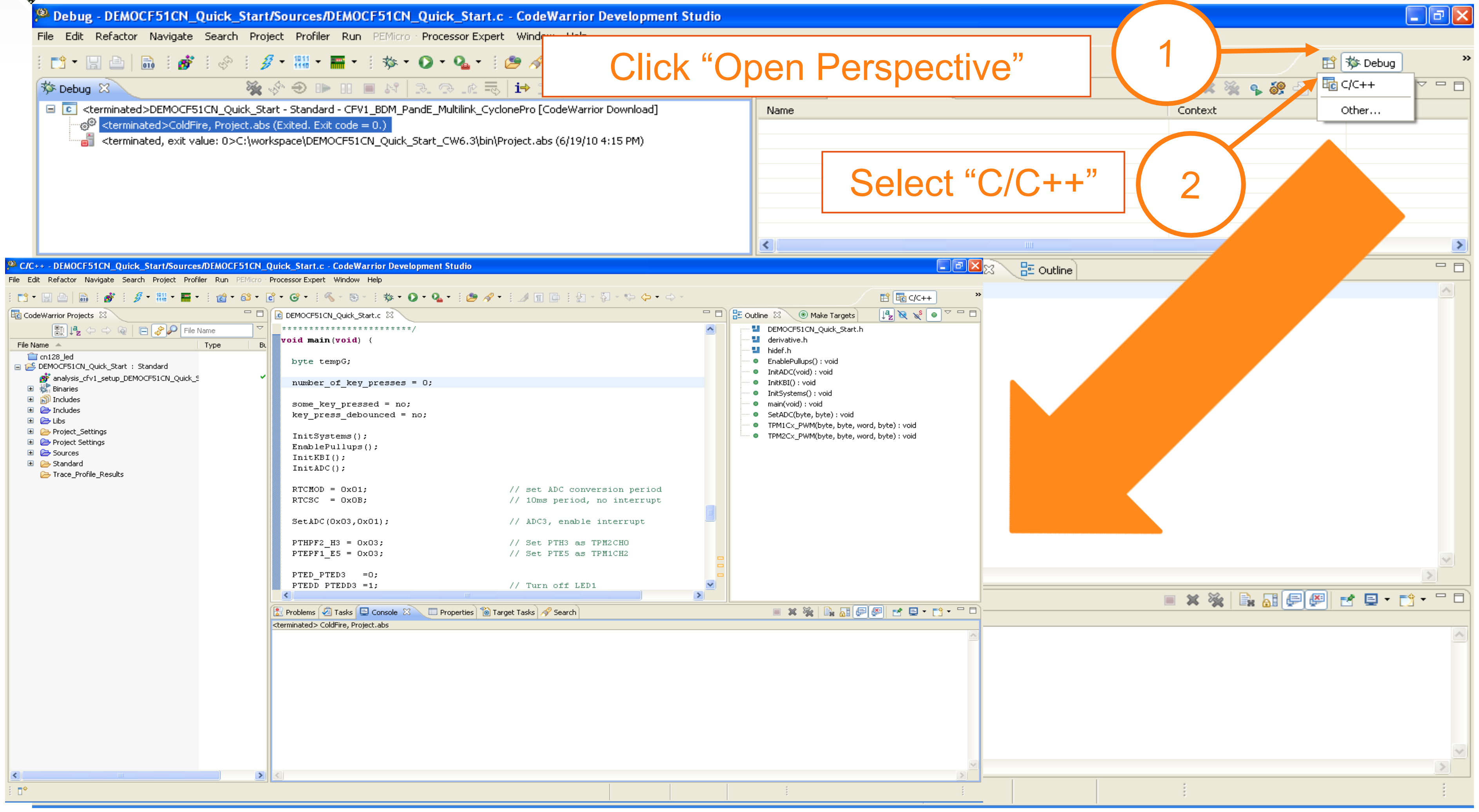
Change Perspective



Debug - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio

```
<terminated>DEMOCF51CN_Quick_Start - Standard - CFV1_BDM_PandE_Multilink_CyclonePro [CodeWarrior Download]
  <terminated>ColdFire, Project.abs (Exited. Exit code = 0.)
  <terminated, exit value: 0>C:\workspace\DEMOCF51CN_Quick_Start_CW6.3\bin\Project.abs (6/19/10 4:15 PM)
```

C/C++ - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio

CodeWarrior Projects:

```
cn128_led
DEMOCF51CN_Quick_Start : Standard
  analysis_cfv1_setup_DEMOCF51CN_Quick_S
  Binaries
  Includes
  Includes
  Libs
  Project_Settings
  Project Settings
  Sources
  Standard
  Trace_Profile_Results
```

DEMOCF51CN_Quick_Start.c:

```c
************************/
void main(void) {

  byte tempG;

  number_of_key_presses = 0;

  some_key_pressed = no;
  key_press_debounced = no;

  InitSystems();
  EnablePullups();
  InitKBI();
  InitADC();

  RTCMOD = 0x01;                          // set ADC conversion period
  RTCSC  = 0x0B;                          // 10ms period, no interrupt

  SetADC(0x03,0x01);                      // ADC3, enable interrupt

  PTHPF2_H3 = 0x03;                       // Set PTH3 as TPM2CH0
  PTEPF1_E5 = 0x03;                       // Set PTE5 as TPM1CH2

  PTED_PTED3   =0;
  PTEDD PTEDD3 =1;                        // Turn off LED1
```

Outline:

```
DEMOCF51CN_Quick_Start.h
derivative.h
hidef.h
EnablePullups() : void
InitADC(void) : void
InitKBI() : void
InitSystems() : void
main(void) : void
SetADC(byte, byte) : void
TPM1Cx_PWM(byte, byte, word, byte) : void
TPM2Cx_PWM(byte, byte, word, byte) : void
```

Console:

```
<terminated> ColdFire, Project.abs
```

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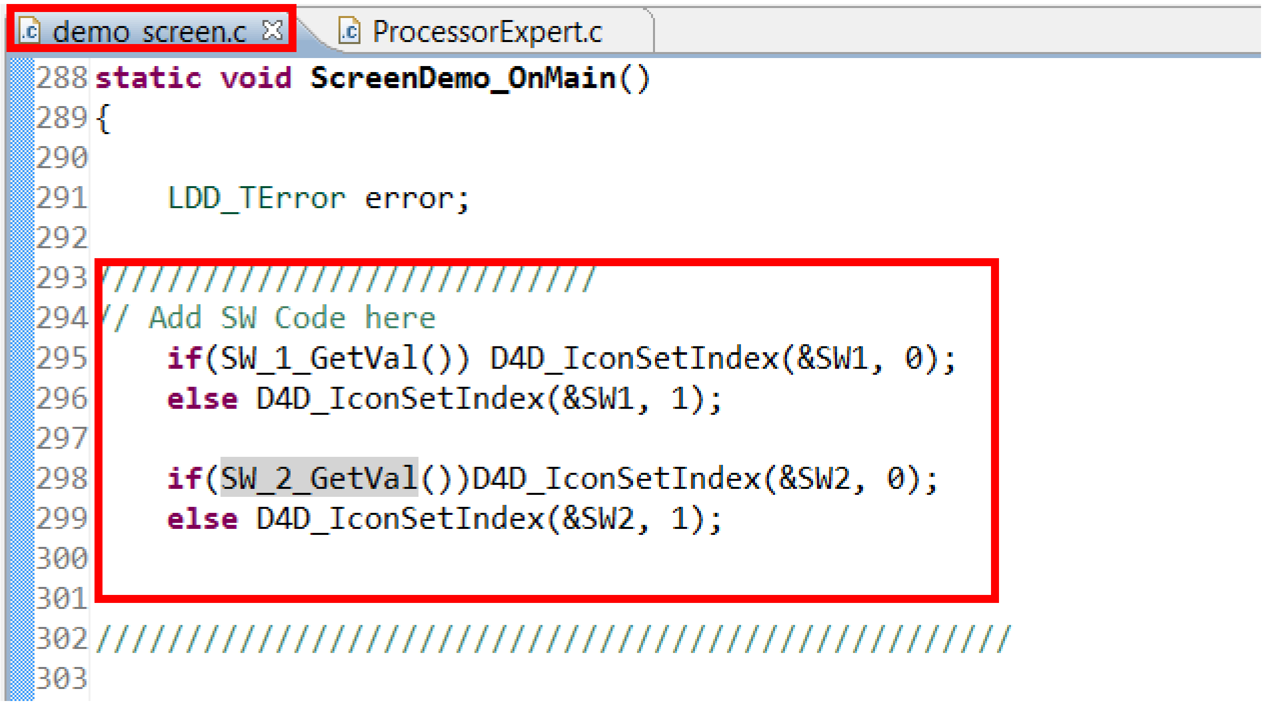
Add Components Code

- Add code for **SW1** and **SW2**
- Add code in **static void ScreenDemo_OnMain()** function



```
static void ScreenDemo_OnMain()
{

    LDD_TError error;

//////////////////////////////
// Add SW Code here
    if(SW_1_GetVal()) D4D_IconSetIndex(&SW1, 0);
    else D4D_IconSetIndex(&SW1, 1);

    if(SW_2_GetVal())D4D_IconSetIndex(&SW2, 0);
    else D4D_IconSetIndex(&SW2, 1);


///////////////////////////////////////////////////
```

You can use Copy&Paste_lab1.txt file

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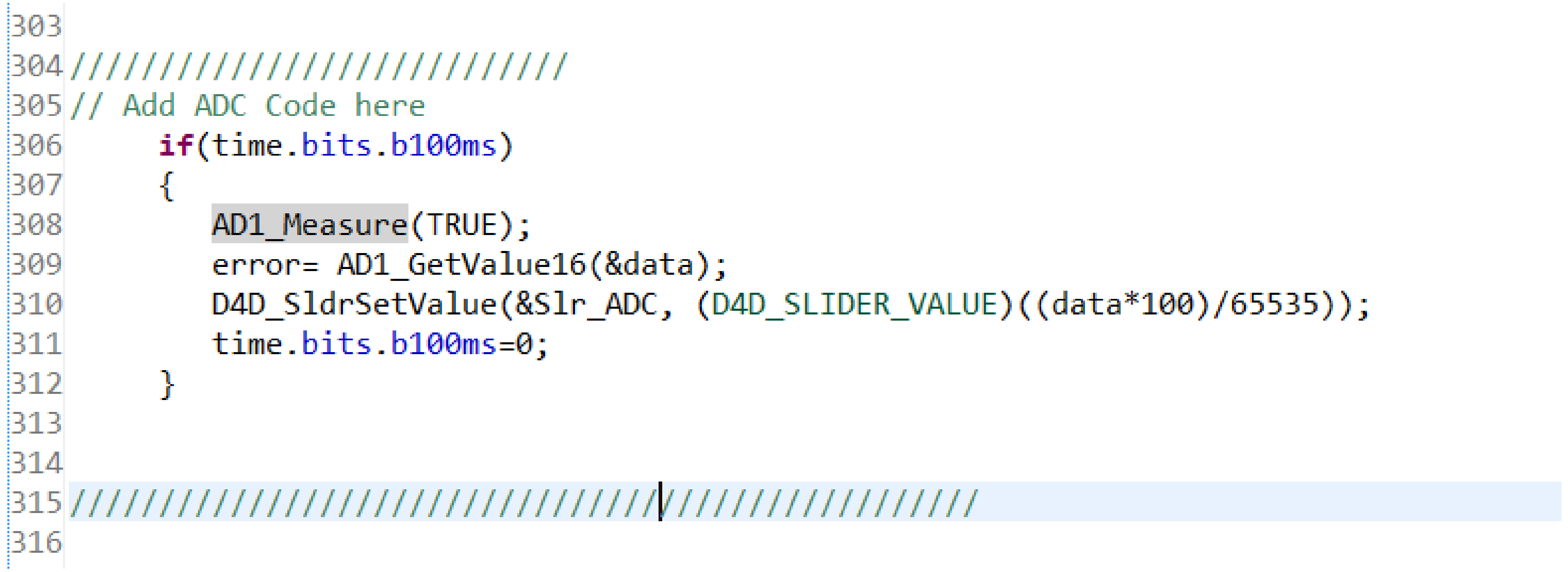
Add Components Code

- Add code for the **ADC** channel (**Pot**)



```

//////////////////////////////
// Add ADC Code here
     if(time.bits.b100ms)
     {
        AD1_Measure(TRUE);
        error= AD1_GetValue16(&data);
        D4D_SldrSetValue(&Slr_ADC, (D4D_SLIDER_VALUE)((data*100)/65535));
        time.bits.b100ms=0;
     }


/////////////////////////////////////////////////////

```

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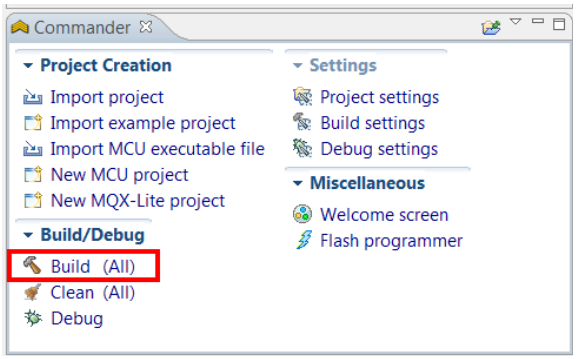
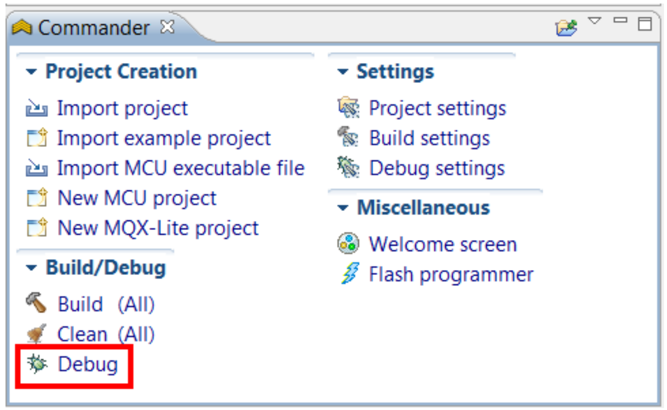
Test Application

- **Build** Project
- **Debug** Project
- **Check** that full application is running as expected





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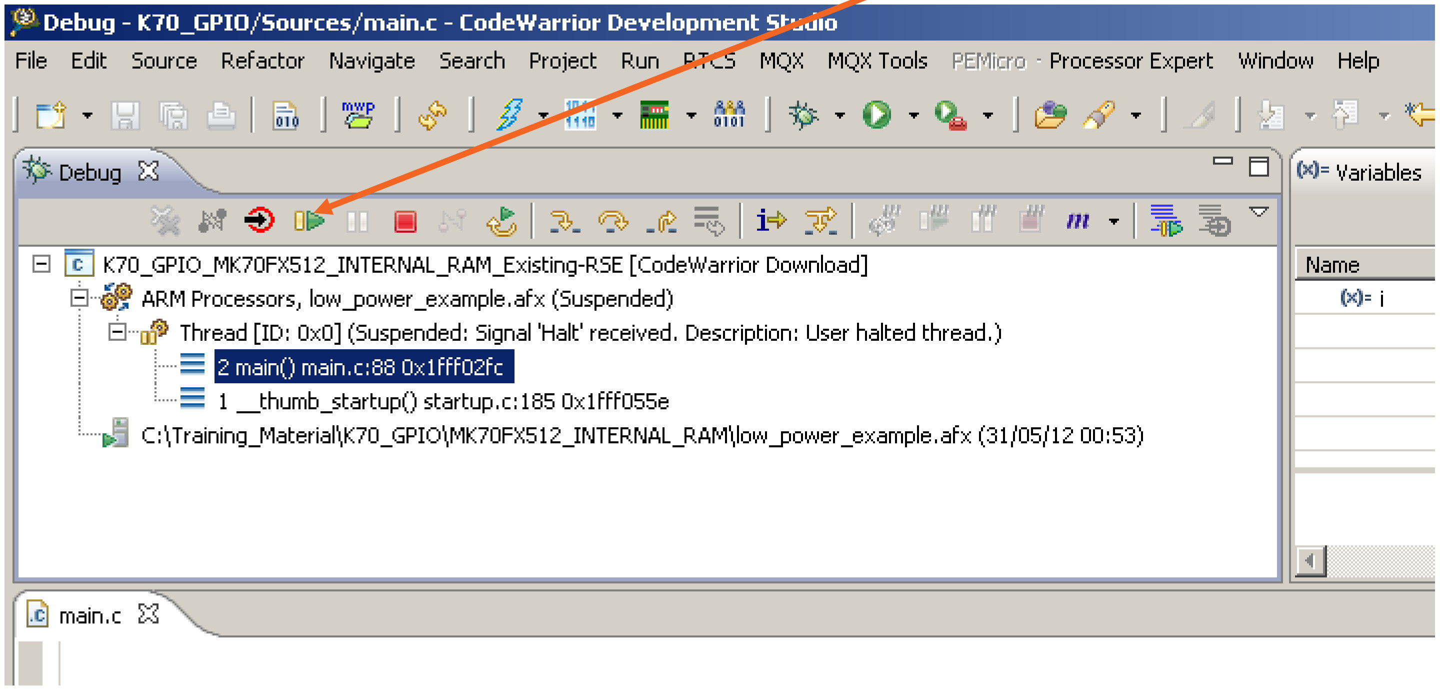
Run and debug Project

Click Run icon



Debug - K70_GPIO/Sources/main.c - CodeWarrior Development Studio

File Edit Source Refactor Navigate Search Project Run RTCS MQX MQX Tools PEMicro Processor Expert Window Help
Debug
Variables
Name
(x)= i
main.c

```
K70_GPIO_MK70FX512_INTERNAL_RAM_Existing-RSE [CodeWarrior Download]
  ARM Processors, low_power_example.afx (Suspended)
    Thread [ID: 0x0] (Suspended: Signal 'Halt' received. Description: User halted thread.)
      2 main() main.c:88 0x1fff02fc
      1 __thumb_startup() startup.c:185 0x1fff055e
  C:\Training_Material\K70_GPIO\MK70FX512_INTERNAL_RAM\low_power_example.afx (31/05/12 00:53)
```

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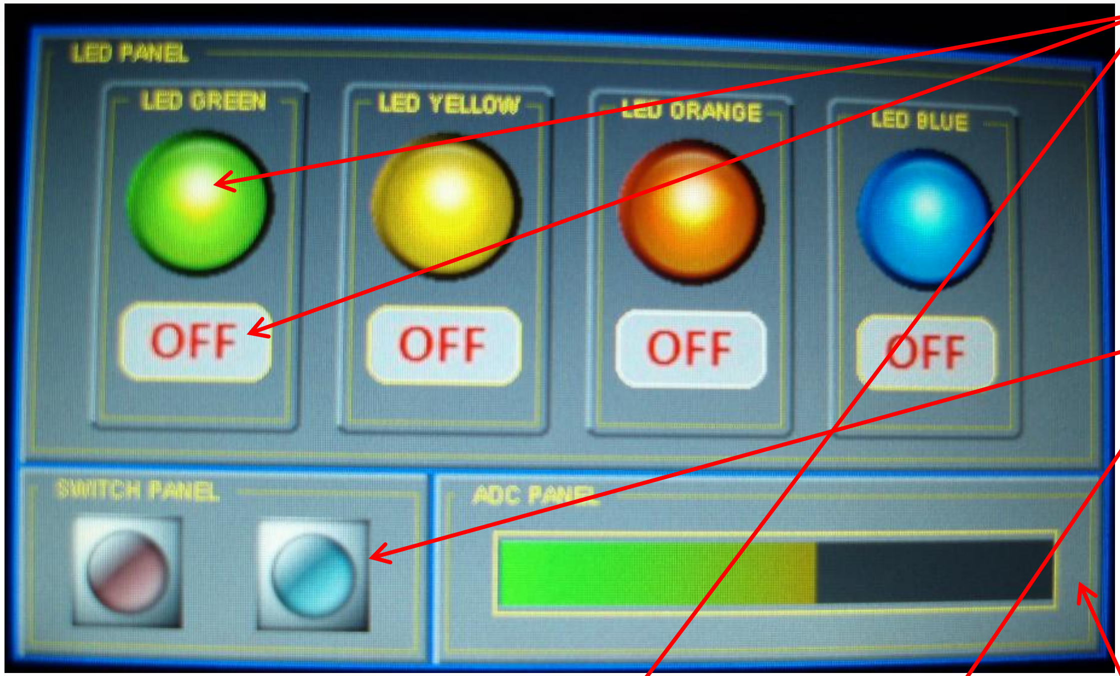
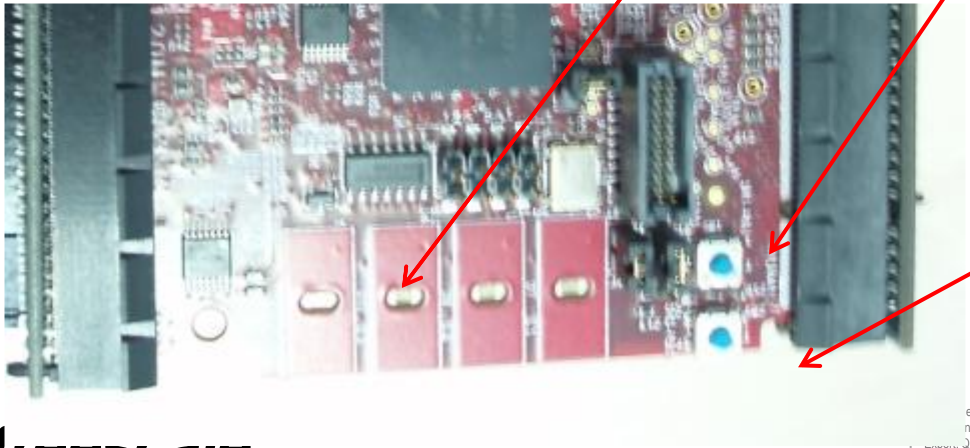
Run the New Application





Touch CheckBox to switch On/Off Board LED

Push SW1/SW2

Move POT to change Slider

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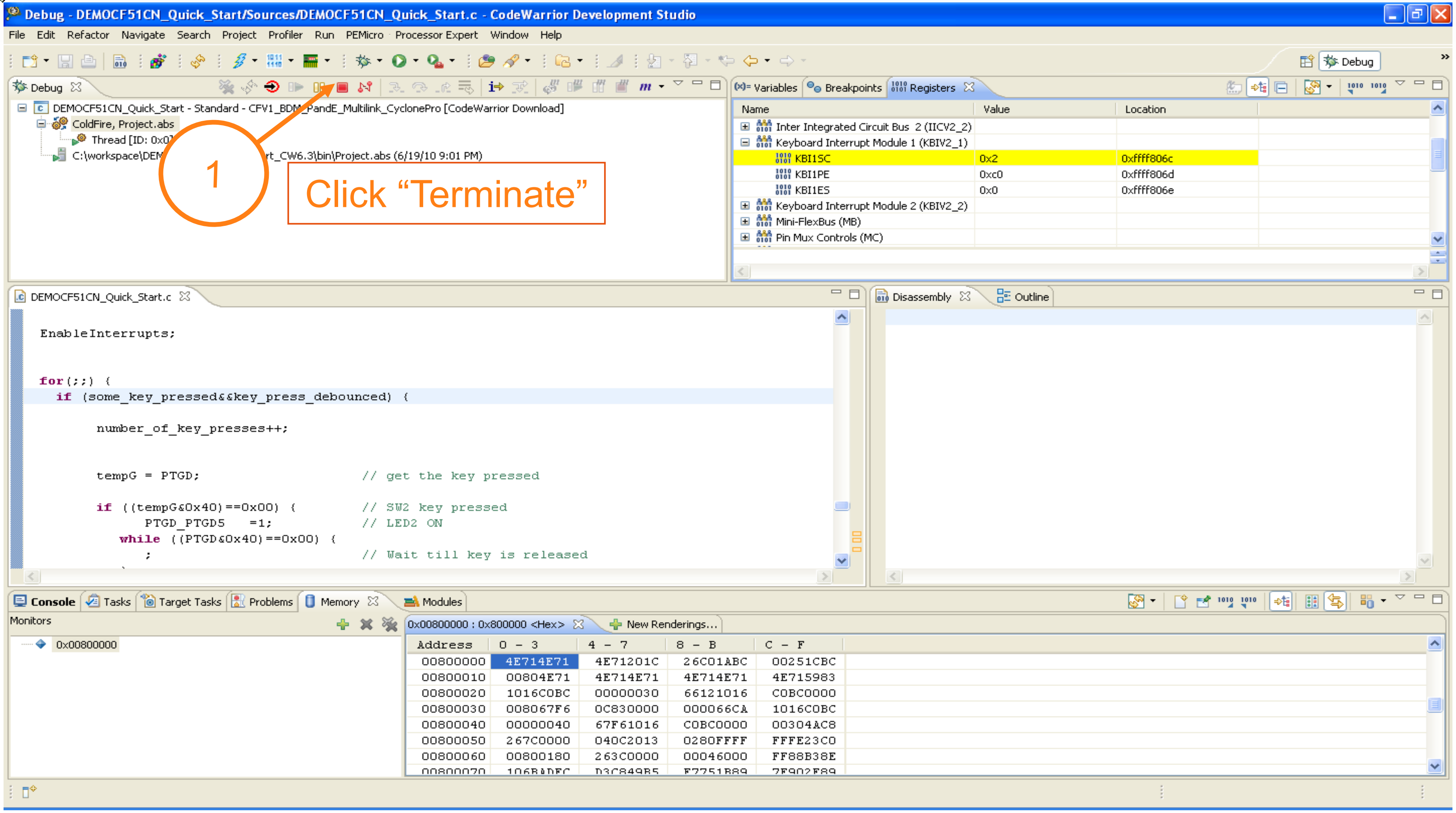
Terminate the Project


Debug - DEMOCF51CN_Quick_Start/Sources/DEMOCF51CN_Quick_Start.c - CodeWarrior Development Studio
File Edit Refactor Navigate Search Project Profiler Run PEMicro Processor Expert Window Help
Debug
1
Click “Terminate”
Variables
Breakpoints
Registers
Disassembly
Outline
Console
Tasks
Target Tasks
Problems
Memory
Modules
Monitors
New Renderings...

```
DEMOCF51CN_Quick_Start - Standard - CFV1_BDM_PandE_Multilink_CyclonePro [CodeWarrior Download]
  ColdFire, Project.abs
    Thread [ID: 0x0]
  C:\workspace\DEM...rt_CW6.3\bin\Project.abs (6/19/10 9:01 PM)
```

Name	Value	Location
Inter Integrated Circuit Bus 2 (IICV2_2)		
Keyboard Interrupt Module 1 (KBIV2_1)		
KBI1SC	0x2	0xffff806c
KBI1PE	0xc0	0xffff806d
KBI1ES	0x0	0xffff806e
Keyboard Interrupt Module 2 (KBIV2_2)		
Mini-FlexBus (MB)		
Pin Mux Controls (MC)		

DEMOCF51CN_Quick_Start.c

```
EnableInterrupts;


for(;;) {
  if (some_key_pressed&&key_press_debounced) {

       number_of_key_presses++;


       tempG = PTGD;                    // get the key pressed

       if ((tempG&0x40)==0x00) {        // SW2 key pressed
             PTGD_PTGD5    =1;          // LED2 ON
         while ((PTGD&0x40)==0x00) {
             ;                          // Wait till key is released
```

0x00800000

0x00800000 : 0x800000 <Hex>

```
Address    0 - 3      4 - 7      8 - B      C - F
00800000   4E714E71   4E71201C   26C01ABC   00251CBC
00800010   00804E71   4E714E71   4E714E71   4E715983
00800020   1016C0BC   00000030   66121016   C0BC0000
00800030   008067F6   0C830000   000066CA   1016C0BC
00800040   00000040   67F61016   C0BC0000   00304AC8
00800050   267C0000   040C2013   0280FFFF   FFFE23C0
00800060   00800180   263C0000   00046000   FF88B38E
00800070   106BADFC   D3C849B5   F7751B89   7F902F89
```

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