Embedded Systems
Appendix A - Microchip Tools

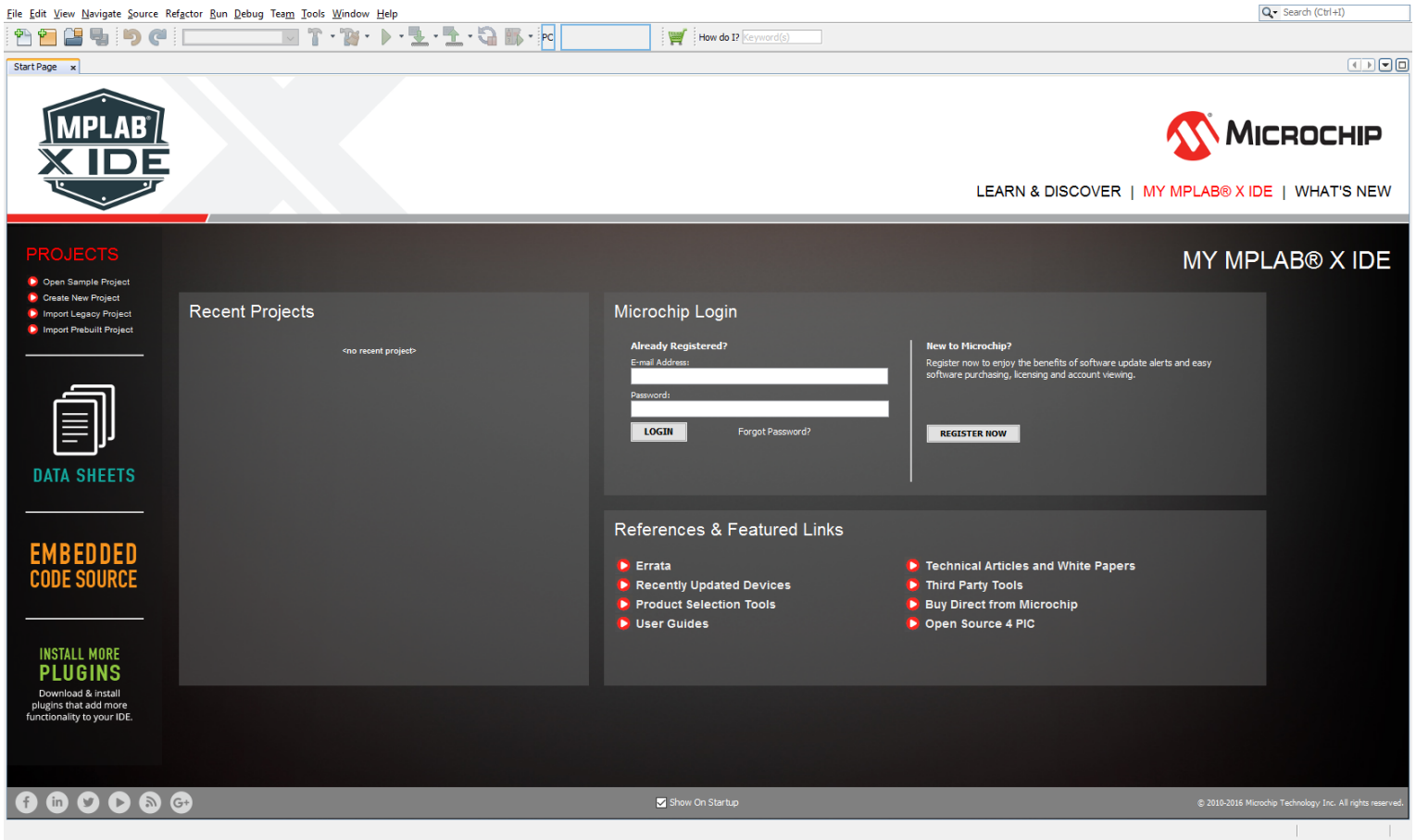
Enrico Simetti

ISME - Interuniversity Research Center on Integrated Systems for Marine Enviroment
DIBRIS - Department of Computer Science, Bioengineering, Robotics and System Engineering
University of Genova, Italy
enrico.simetti@unige.it

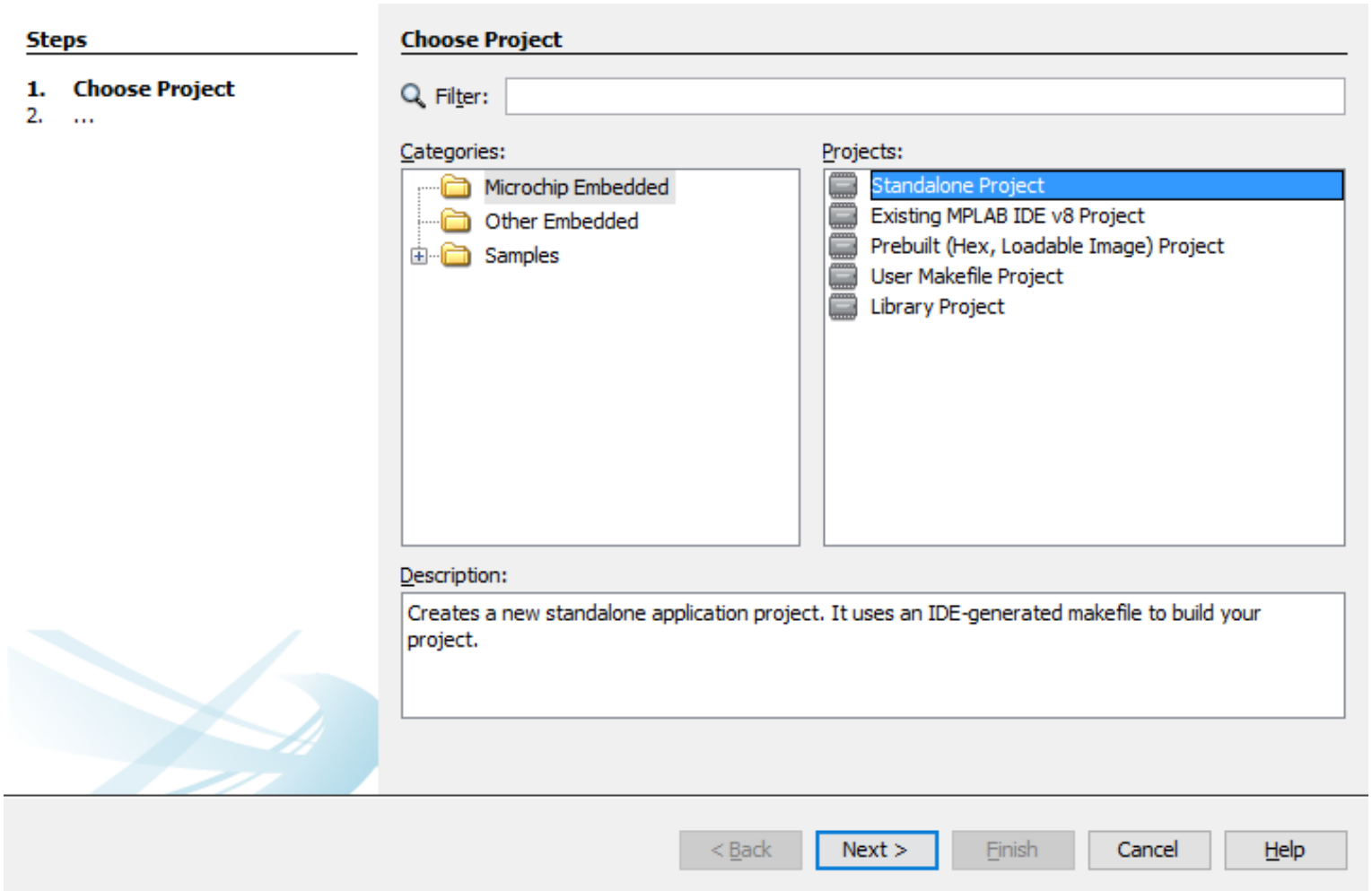
Installing the Tools

- MPLAB X IDE:
  `http://www.microchip.com/mplab/mplab-x-ide`
- XC16 Compiler:
  `http://www.microchip.com/mplab/compilers`

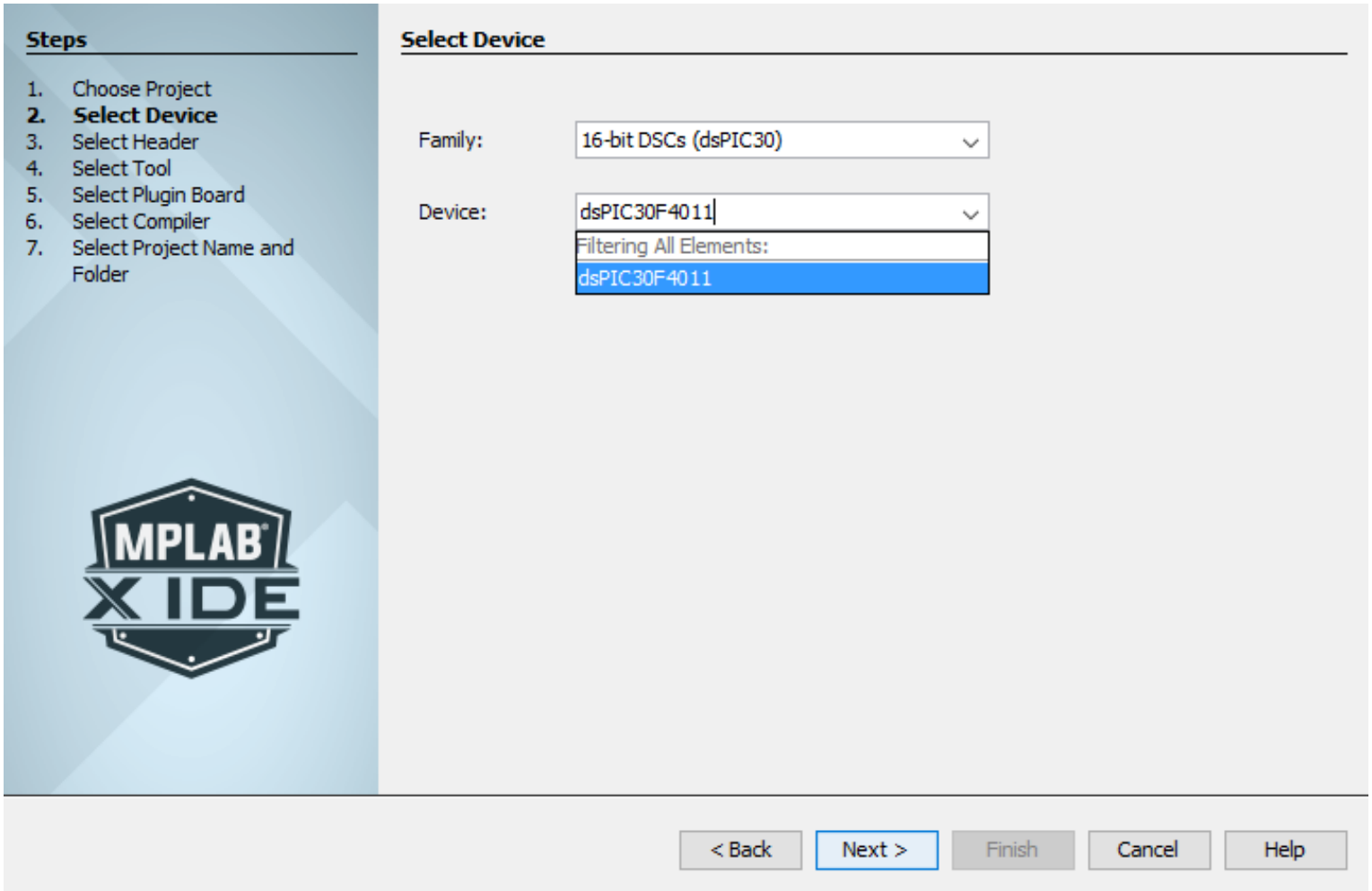
Creating a new Project I



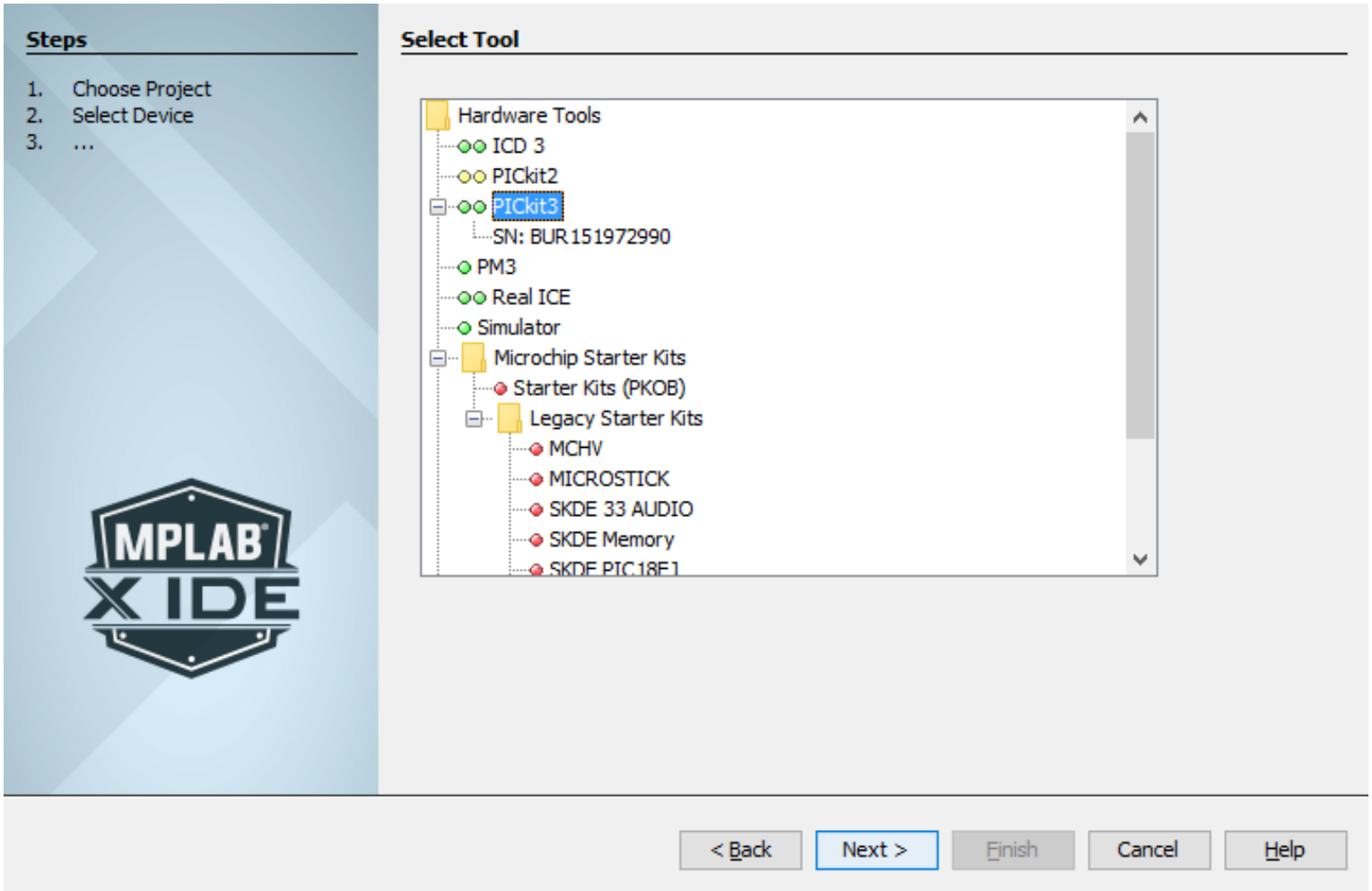
Creating a new Project II



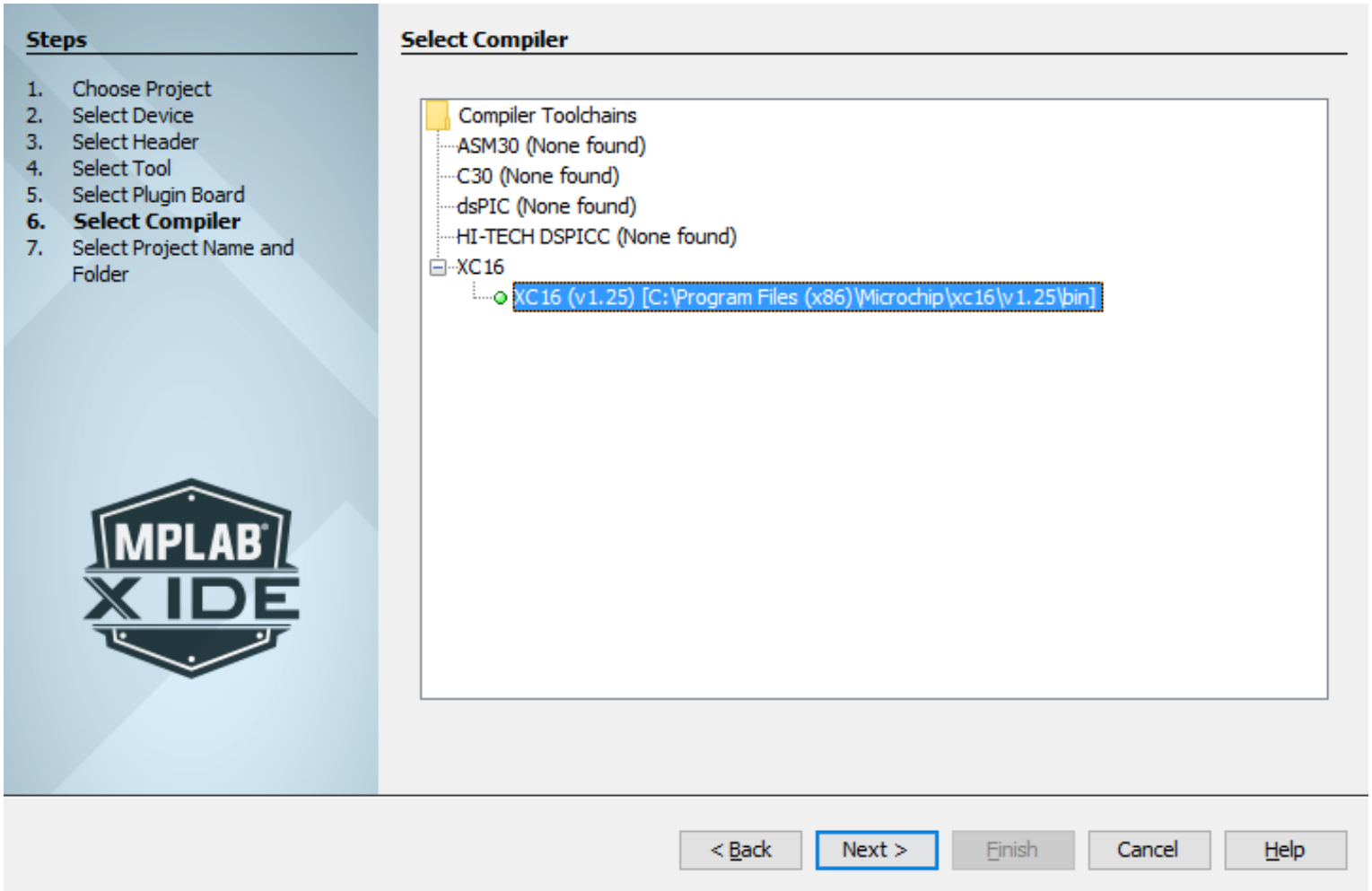
Creating a new Project III



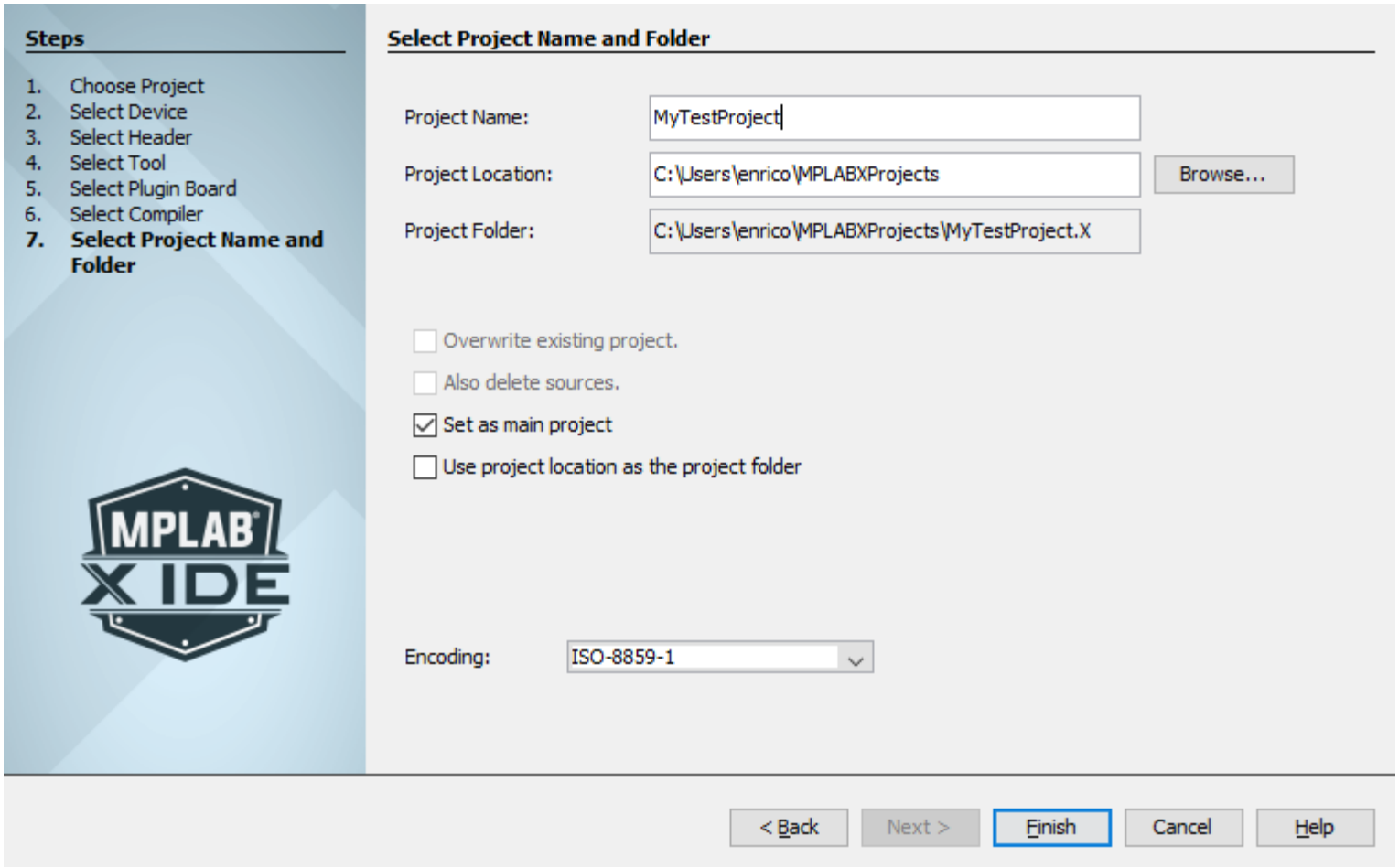
Creating a new Project IV



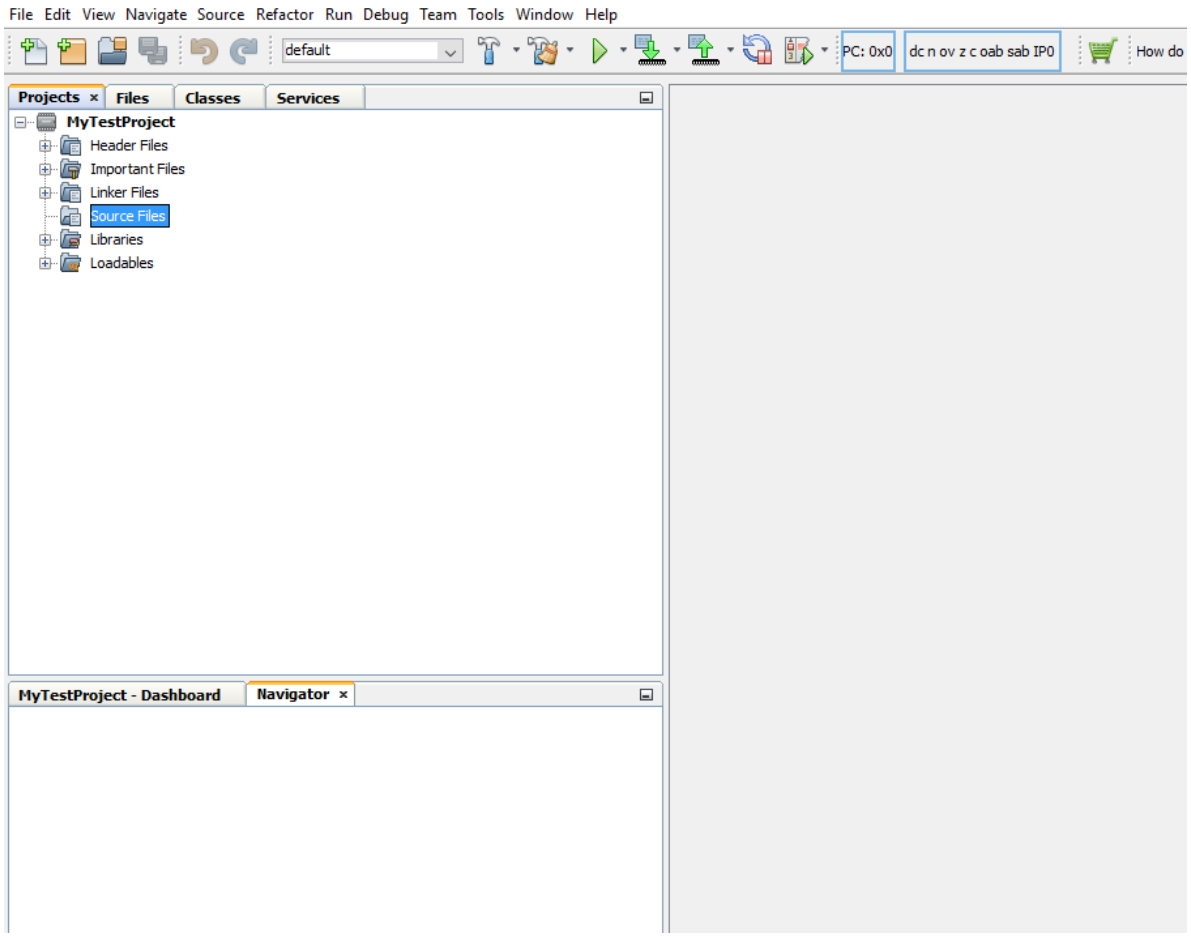
Creating a new Project V



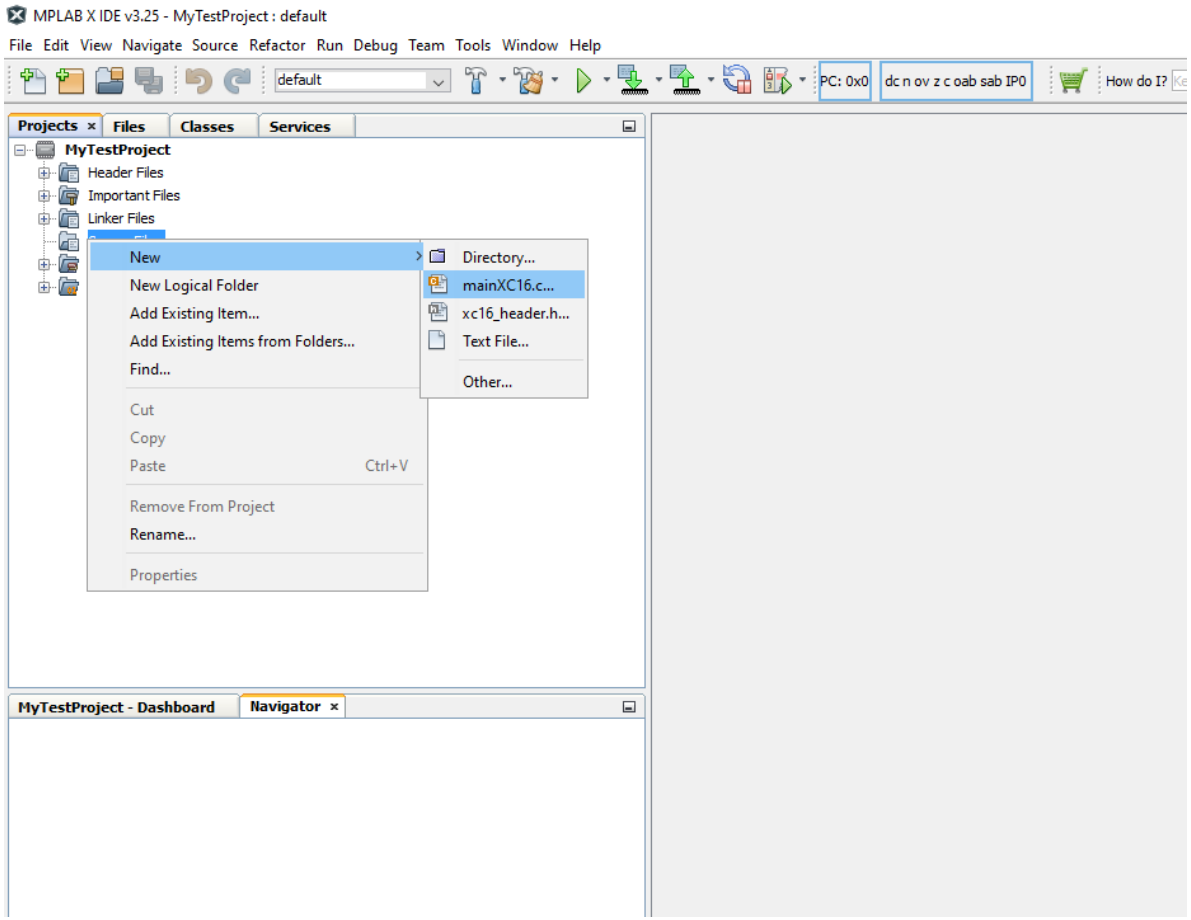
Creating a new Project VI



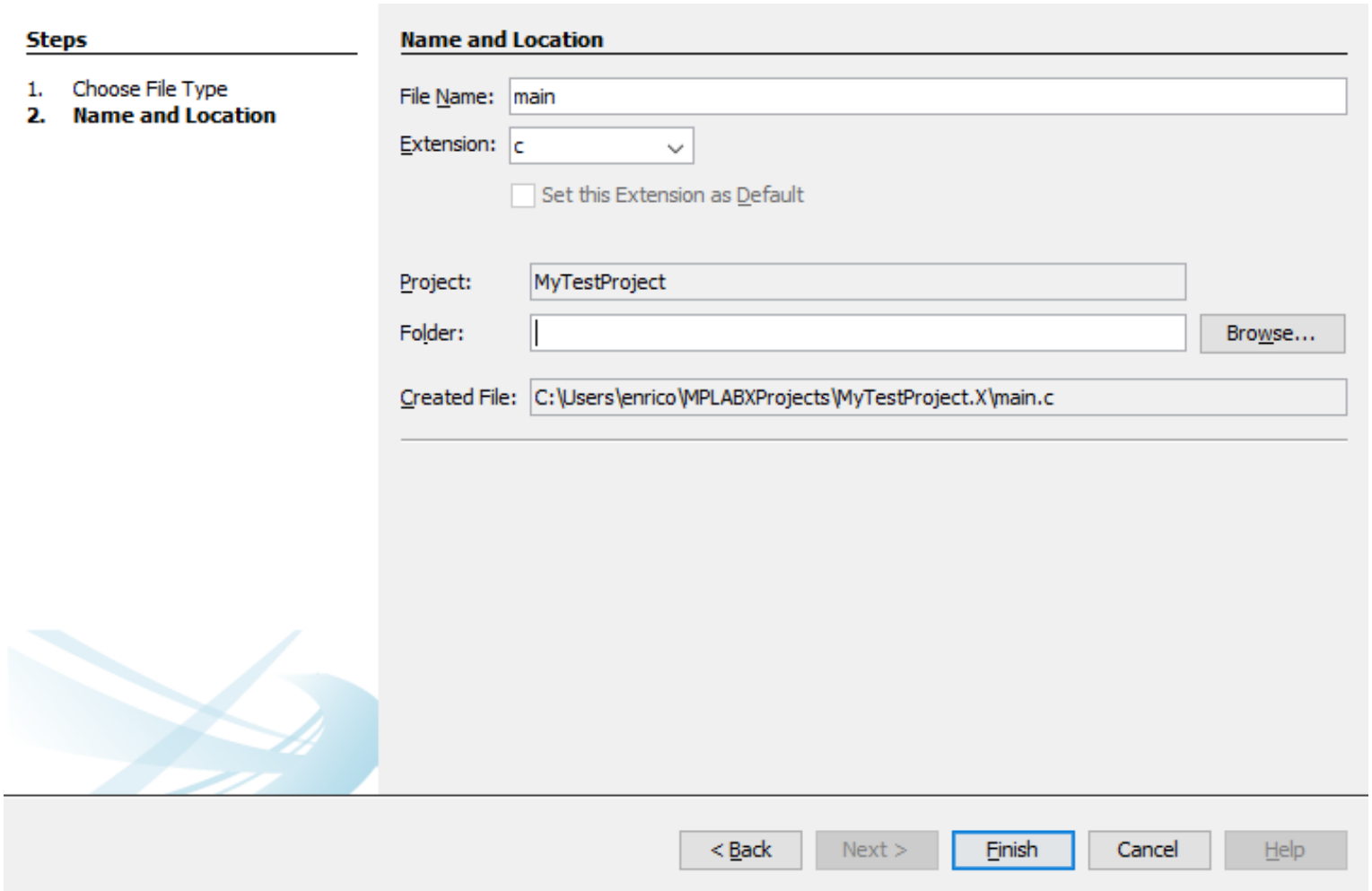
Creating a new Project VII



Creating a new Project VIII

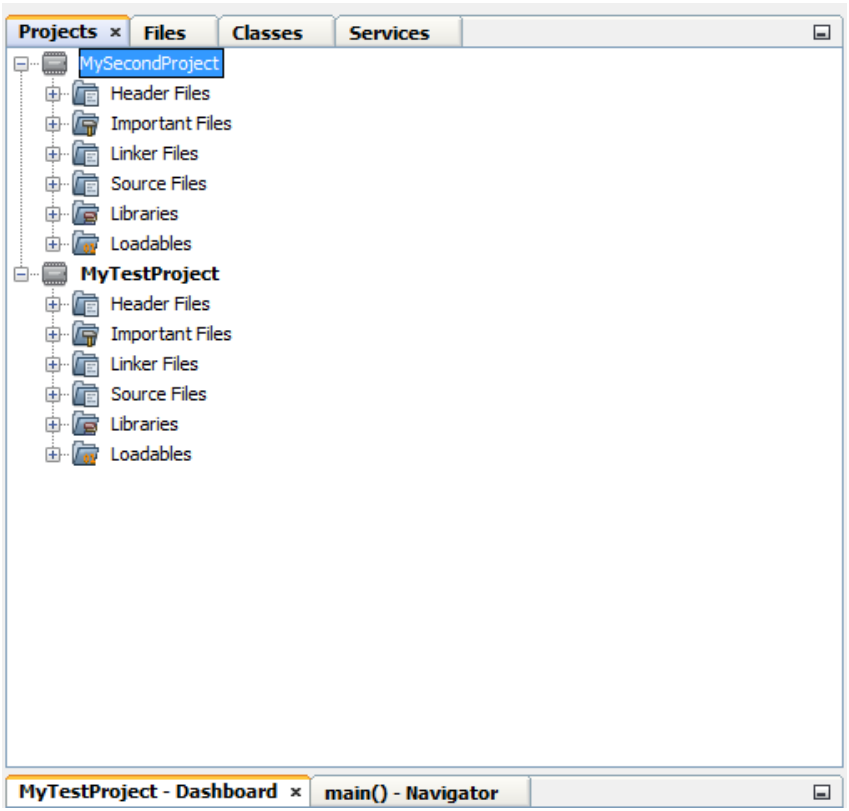


Creating a new Project IX



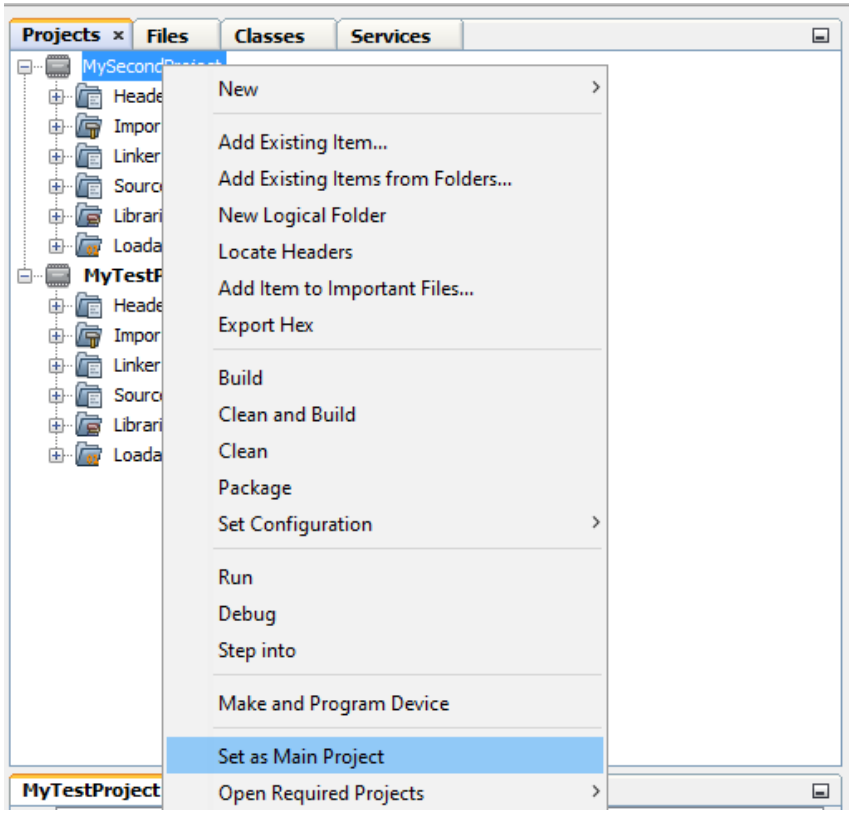
Multiple Projects I

Now the IDE is set to compile “MyTestProject”



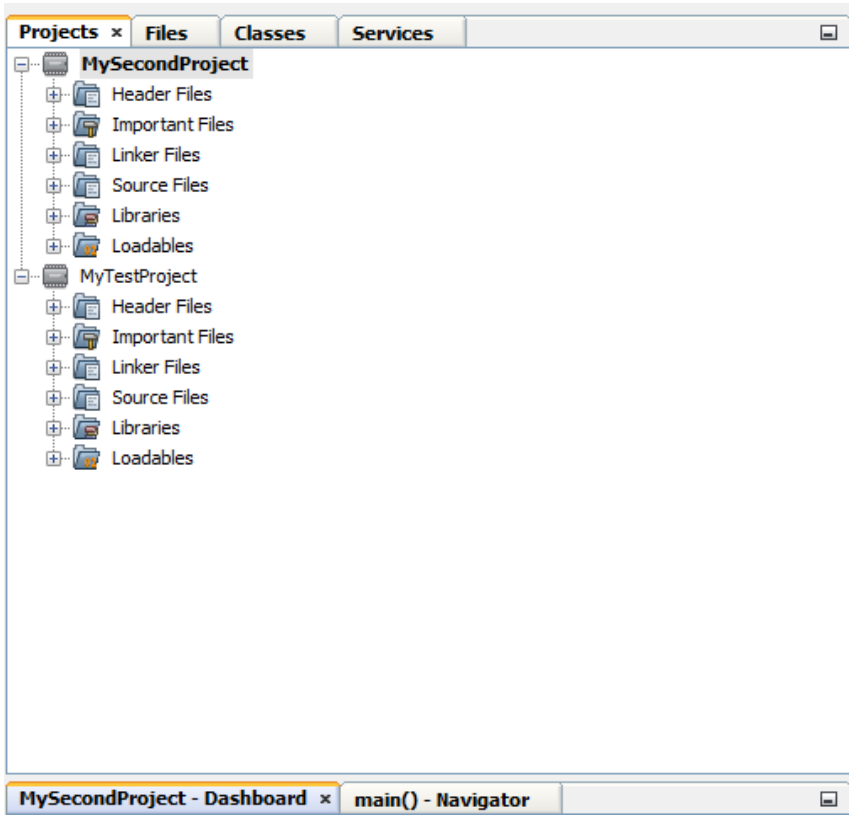
Multiple Projects II

If I want to compile “MySecondProject”, right click and select “Set as Main Project”

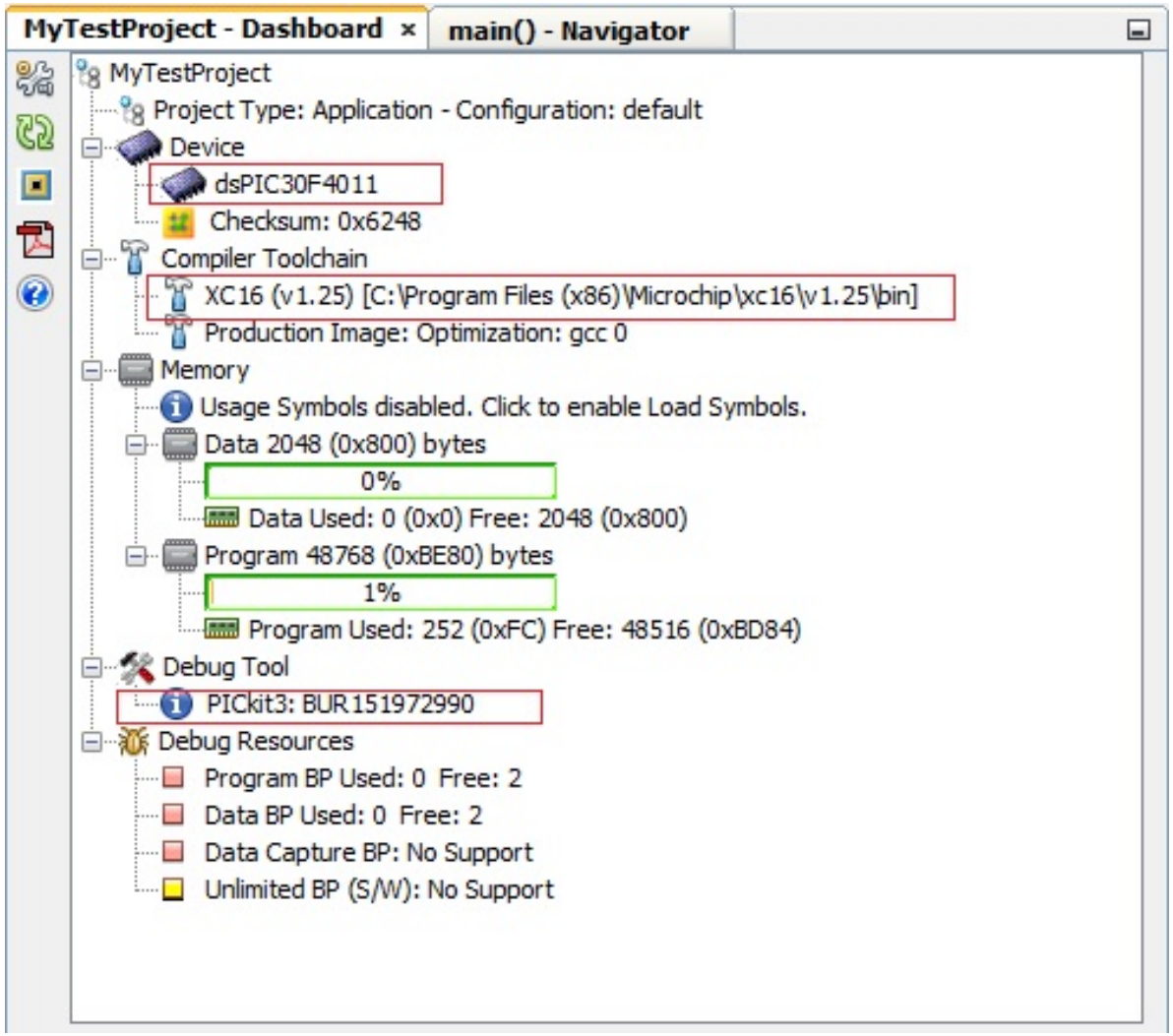


Multiple Projects III

Now “MySecondProject” is written in **bold** indicating that it is the main project

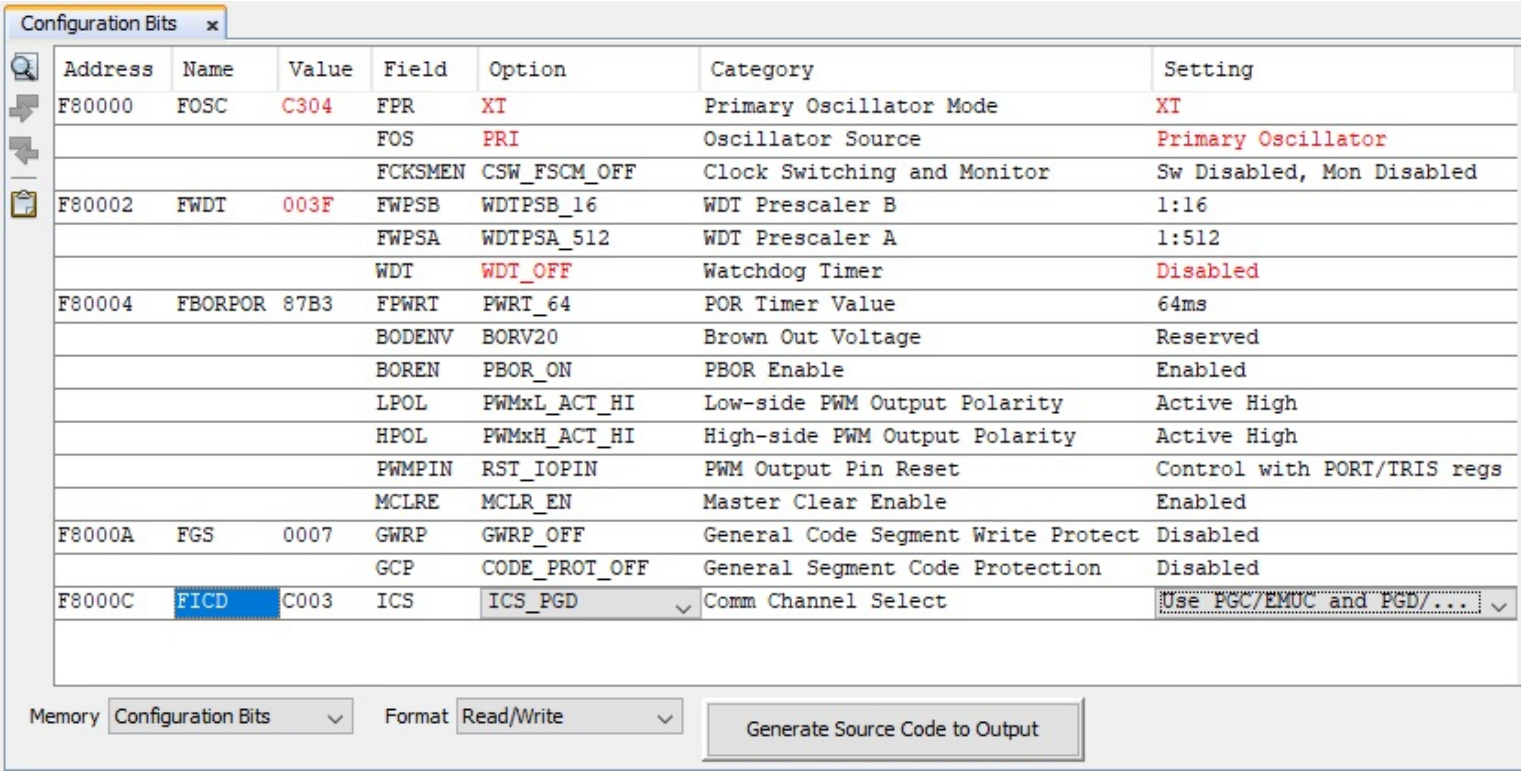


Dashboard


MyTestProject - Dashboard
main() - Navigator
MyTestProject
Project Type: Application - Configuration: default
Device
dsPIC30F4011
Checksum: 0x6248
Compiler Toolchain
XC16 (v1.25) [C:\Program Files (x86)\Microchip\xc16\v1.25\bin]
Production Image: Optimization: gcc 0
Memory
Usage Symbols disabled. Click to enable Load Symbols.
Data 2048 (0x800) bytes
0%
Data Used: 0 (0x0) Free: 2048 (0x800)
Program 48768 (0xBE80) bytes
1%
Program Used: 252 (0xFC) Free: 48516 (0xBD84)
Debug Tool
PICkit3: BUR151972990
Debug Resources
Program BP Used: 0 Free: 2
Data BP Used: 0 Free: 2
Data Capture BP: No Support
Unlimited BP (S/W): No Support

Configuration Bits I

Window → Pic Memory Views → Configuration bits



Address	Name	Value	Field	Option	Category	Setting
F80000	FOSC	C304	FPR	XT	Primary Oscillator Mode	XT
			FOS	PRI	Oscillator Source	Primary Oscillator
			FCKSMEN	CSW_FSCM_OFF	Clock Switching and Monitor	Sw Disabled, Mon Disabled
F80002	FWDT	003F	FWPSB	WDTPSB_16	WDT Prescaler B	1:16
			FWPSA	WDTPSA_512	WDT Prescaler A	1:512
			WDT	WDT_OFF	Watchdog Timer	Disabled
F80004	FBORPOR	87B3	FPWRT	PWRT_64	POR Timer Value	64ms
			BODENV	BORV20	Brown Out Voltage	Reserved
			BOREN	PBOR_ON	PBOR Enable	Enabled
			LPOL	PWMxL_ACT_HI	Low-side PWM Output Polarity	Active High
			HPOL	PWMxH_ACT_HI	High-side PWM Output Polarity	Active High
			PWMPIN	RST_IOPIN	PWM Output Pin Reset	Control with PORT/TRIS regs
			MCLRE	MCLR_EN	Master Clear Enable	Enabled
F8000A	FGS	0007	GWRP	GWRP_OFF	General Code Segment Write Protect	Disabled
			GCP	CODE_PROT_OFF	General Segment Code Protection	Disabled
F8000C	FICD	C003	ICS	ICS_PGD	Comm Channel Select	Use PGC/EMUC and PGD/...

Disable the watchdog!
Set Oscillator source = Primary Oscillator
Set Primary oscillator = XT

Configuration Bits II

Oscillator Source:

- if set to Internal Fast RC: Fosc = 8 MHz approximately
- if set to Primary Oscillator: then the Primary Oscillator Mode option determines Fosc

Primary Oscillator Mode:

- Only considered if Oscillator Source = Primary Oscillator
- can be used to select the XT source (external) with PPL options
- can be used to select the FRC with PLL options

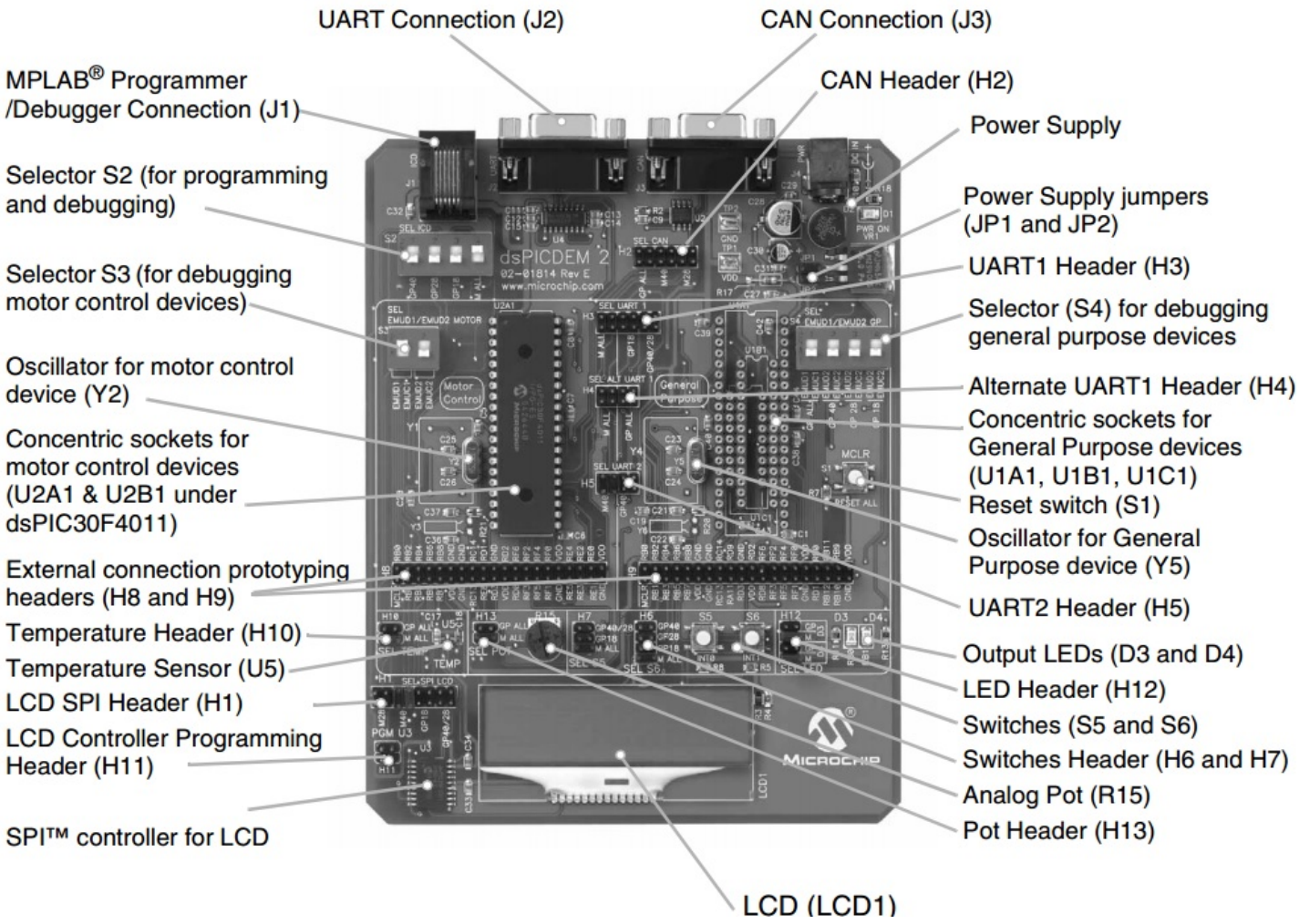
With Primary Oscillator = XT, Fosc = 7.3728 MHz

After setting the bits, press “Generate source code to output” and then cut and paste to the main.c file

Example configuration bits

```
#include <xc.h>

// FOSC
#pragma config FPR = XT                 // Primary Oscillator Mode (XT)
#pragma config FOS = PRI                // Oscillator  Source (Primary Oscillator)
#pragma config FCKSMEN = CSW_FSCM_OFF   // Clock Switching and Monitor (Sw Disabled, Mon Disabled)

// FWDT
#pragma config FWPSB = WDTPSB_16        // WDT Prescaler B (1:16)
#pragma config FWPSA = WDTPSA_512       // WDT Prescaler A (1:512)
#pragma config WDT = WDT_OFF            // Watchdog Timer (Disabled)

// FBORPOR
#pragma config FPWRT = PWRT_64          // POR Timer Value (64ms)
#pragma config BODENV = BORV20          // Brown Out Voltage (Reserved)
#pragma config BOREN = PBOR_ON          // PBOR Enable (Enabled)
#pragma config LPOL = PWMxL_ACT_HI      // Low-side PWM Output Polarity (Active High)
#pragma config HPOL = PWMxH_ACT_HI      // High-side PWM Output Polarity (Active High)
#pragma config PWMPIN = RST_IOPIN       // PWM Output Pin Reset (Control with PORT/TRIS regs)
#pragma config MCLRE = MCLR_EN          // Master Clear Enable (Enabled)

// FGS
#pragma config GWRP = GWRP_OFF          // General Code Segment Write Protect (Disabled)
#pragma config GCP = CODE_PROT_OFF      // General Segment Code Protection (Disabled)

// FICD
#pragma config ICS = ICS_PGD            // Comm Channel Select (Use PGC/EMUC and PGD/EMUD)

int  main(void) {
return  0;
}
```

dsPICDEM2 board



pickit3 Programmer

Further Online Resources

- Microchip Answers: `http://microchip.wikidot.com/`
- Installing MPLAB X: `http://microchip.wikidot.com/mplabx:installation`
- Installing XC16: `http://microchip.wikidot.com/xc16:installation`
- New project tutorial: `http://microchip.wikidot.com/tls0101:start`