

# Embedded Systems

## Appendix A - Microchip Tools

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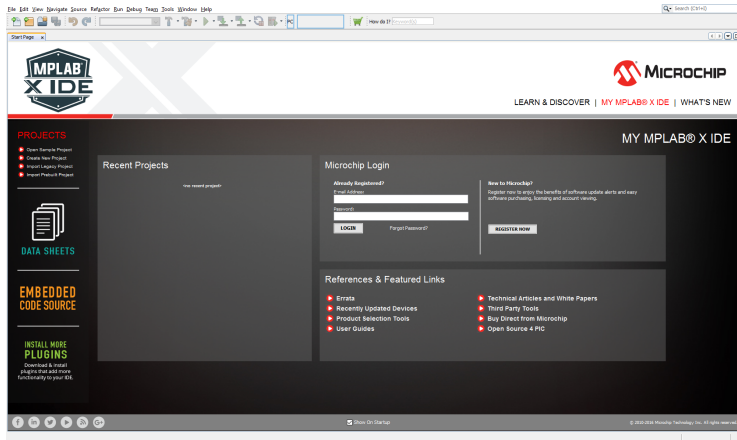
- ▶ **MPLAB X IDE:**

<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

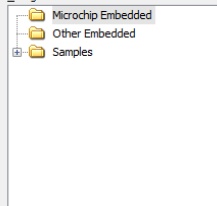
## Steps

1. Choose Project
2. ...

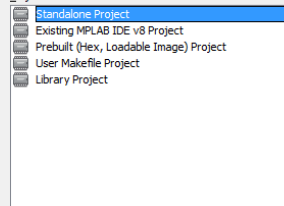
## Choose Project

Filter:

### Categories:



### Projects:



### Description:

Creates a new standalone application project. It uses an IDE-generated makefile to build your project.

< Back

Next >

Finish


Cancel

Help

# Creating a new Project III

**Steps**

1. Choose Project
- 2. Select Device**
3. Select Header
4. Select Tool
5. Select Plugin Board
6. Select Compiler
7. Select Project Name and Folder



**Select Device**

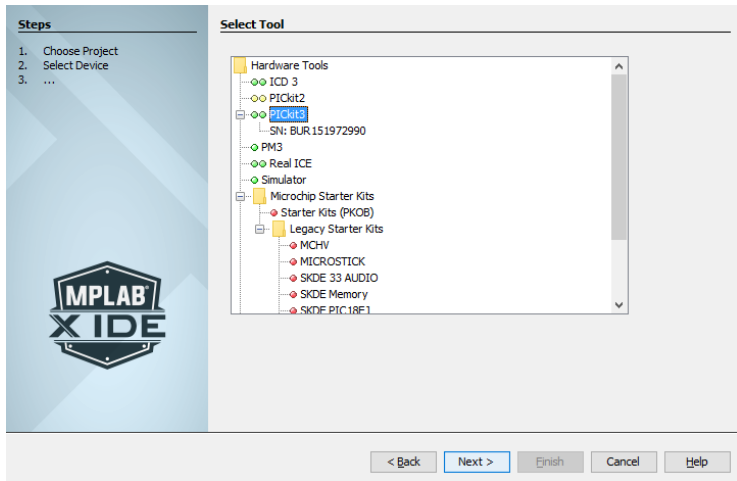
Family:

Device:

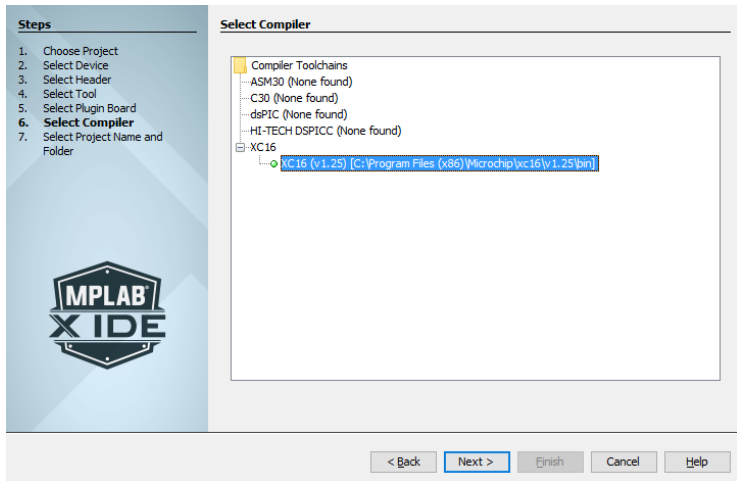
Filtering All Elements:

- dsPIC30F4011

# Creating a new Project IV




# Creating a new Project V



# Creating a new Project VI

**Steps**

1. Choose Project
2. Select Device
3. Select Header
4. Select Tool
5. Select Plugin Board
6. Select Compiler
7. **Select Project Name and Folder**



**Select Project Name and Folder**

Project Name:

Project Location:

Project Folder:

☐ Overwrite existing project.

☐ Also delete sources.

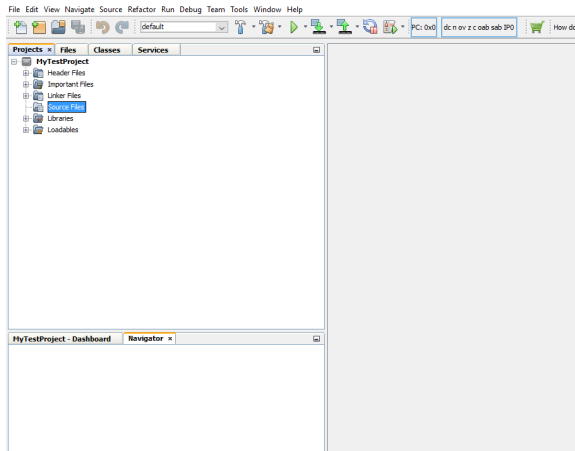
☒ Set as main project

☐ Use project location as the project folder

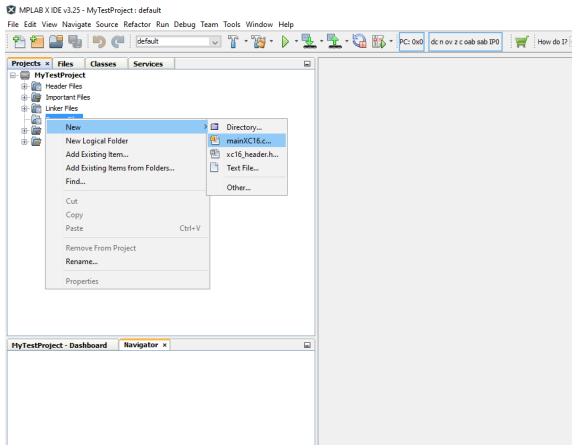
Encoding:



# Creating a new Project VII



# Creating a new Project VIII



# Creating a new Project IX

## Steps

1. Choose File Type
2. **Name and Location**

### Name and Location

File Name:

Extension:

☐ Set this Extension as Default

Project:

Folder:

Created File:

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Next >

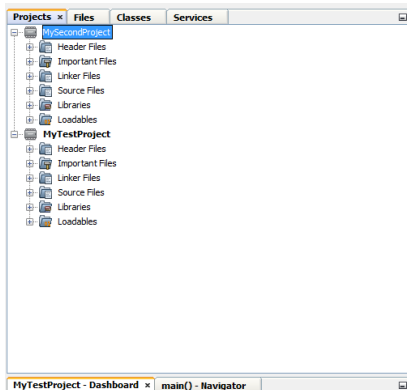
Finish

Cancel

Help

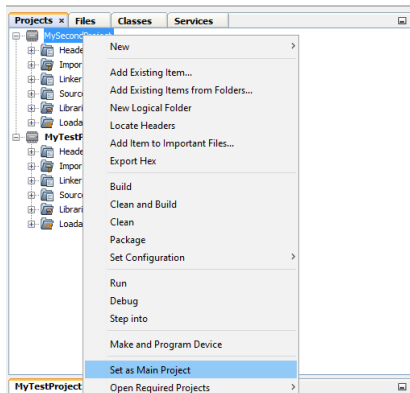
# Multiple Projects I

Now the IDE is set to compile “MyTestProject”



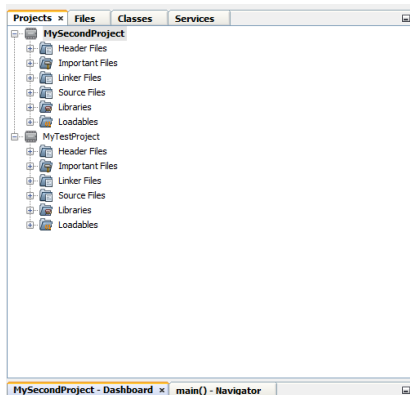
## Multiple Projects II

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



The screenshot shows the 'MyTestProject - Dashboard' window with the 'main() - Navigator' tab selected. The dashboard displays the following information:

- 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

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	FWDI	003F	FWFSB	WDTPSB_16	WDI Prescaler B	1:16
			FWPSA	WDTPSA_512	WDI Prescaler A	1:512
			WDI	WDI_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
			MCLR	MCLR_EN	Master Clear Enable	Enabled
F8000A	FGS	0007	GWPR	GWPR_OFF	General Code Segment Write Protect	Disabled
			GCP	CODE_PROT_OFF	General Segment Code Protection	Disabled
F8000C	FICD	C003	ICS	ICS_PG0	Comm Channel Select	Use FGC/EMUC and FGD/...

Memory: Configuration Bits    Format: Read/Write    Generate Source Code to Output

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



### Oscillator Source:

- ▶ if set to Internal Fast RC:  $F_{osc} = 8 \text{ MHz}$  approximately
- ▶ if set to Primary Oscillator: then the Primary Oscillator Mode option determines  $F_{osc}$

### 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,  $F_{osc} = 7.3728 \text{ MHz}$

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)

// FWDTP
#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)

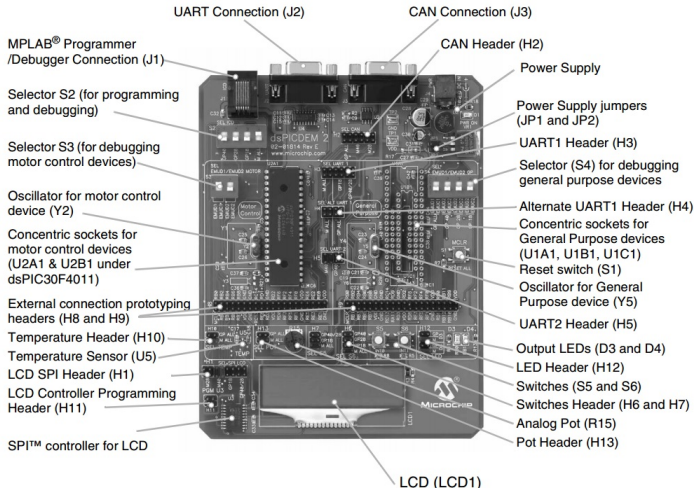
// FBORPOR
#pragma config FPWRT = PWRT_64    // POR Timer Value (64ms)
#pragma config BODENV = BORV20   // Brown Out Voltage (Reserved)
#pragma config BOREN = PBOR.ON    // PBOR Enable (Enabled)
#pragma config LPOL = PWMxL.ACT_HI // Low—side PWM Output Polarity (Active High)
#pragma config HPOL = PWMxH.ACT_HI // 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





- ▶ **Microchip Answers:** <http://microchip.wikidot.com/>
- ▶ **Installing MPLAB X:** <http://microchip.wikidot.com/mplabx:installation>
- ▶ **Installing XC16:** <http://microchip.wikidot.com/xcl6:installation>
- ▶ **New project tutorial:** <http://microchip.wikidot.com/tls0101:start>