Lesson 1 - Creating a C18 Project with MPLAB

Objectives

- To build a C18 project
- Identify the location of C18 program files

Preparation:

Microchip's MPLAB IDE and MPLAB C18 compiler are required for this and all the lessons. It is assumed that these have already been installed as instructed in an earlier lesson.

Required Resources:

Computer with MPLAB and C18 PIC18F4520 datasheet

Procedure

In this lab a project will be created that is compiled under C18. The program is essentially an empty program shell, but it illustrates the procedure for creating a new C18 project and compiling it under MPLAB.

Note:

It is highly recommended that each project be saved under a separate directory. This will ensure that all project related files are accessible from the same folder.

- 1. Create a new folder on computer drive and name it lesson1
- 2. Open a MPLAB session

3. Click on the **Project** Menu and select **Project Wizard**



Project Wizard dialog box opens.



Device Selection

Click on the **Next** button and the dialog box for the first step appears.

Project Wizard		×
Step One: Select a device		۱ ش
	Device:	
	< Back Next > Cancel	Help

In the **Device** drop down list box a processor is identified. If list box does not show the correct device, click on the down arrow to select the device of interest. It can be done in one of the two ways:

- Scrolling through the devices list
- Entering the correct name of the device in the list box.

Here the device of interest is PIC18F4520, so it is selected from the drop down list box (scrolling up or down as needed).

Project Wizard Step One: Select a device			×
	Device: PIC18F1320	•	
	PIC18F4520 PIC18F4523 PIC18F4525 PIC18F4539 PIC18F4550 PIC18F4553 PIC18F458 PIC18F4580		
	PIC18F4585 PIC18F4585 PIC18F45J10 PIC18F45J11 PIC18F45J50	Cancel	Help

Having selected the correct device, click the **Next** button to advance to the next step.

Language Tool Suite Selection

Step two of the dialog box opens, displaying the current language tool suite in effect.

Project Wizard	<
Step Two: Select a language toolsuite	
Active Toolsuite: Microchip MPASM Toolsuite Toolsuite Contents MPASM Assembler (mpasmwin.exe) v5.34 MPLINK Object Linker (mplink.exe) v4.34 MPLIB Librarian (mplib.exe)	>
Location C:\Program Files\Microchip\MPASM Suite\MPAsmWin.exe Browse Store tool locations in project	
Help! My Suite Isn't Listed! Show all installed toolsuites < Back Next > Cancel Help	_

The current toolsuite (ActiveToolsuite) is MPASM Toolsuite, which is not the desired Toolsuite.

Again using dropdown list box select **C18 Toolsuite**

Project Wizard		X
Step Two: Select a languag	je toolsuite	الله ش
Active Toolsuite:	Microchip MPASM Toolsuite	T
Toolsuite Contents MPASM Assem MPLINK Objec MPLIB Librarian	B Knudsen Data CC5X B Knudsen Data CC8E Byte Craft Assembler & C Compiler CCS C Compiler for PIC10/12/14/16/18/24/dsPIC30/dsP IAR PIC18 IAB Sustems Midrange	1C33
Location	Microchip C18 Toolsuite Microchip MPASM Toolsuite	Prowee
Store tool locati	ons in project	blowse
Help! MySui	te Isn't Listed! 🔲 Show all inst	talled toolsuites
	< Back Next > Cancel	Help

Toolsuite Contents

The active Toolsuite is changed to C18.

Project Wizard
Step Two: Select a language toolsuite
Active Toolsuite: Microchip C18 Toolsuite Toolsuite Contents MPASM Assembler (mpasmwin.exe) v5.34 MPLINK Object Linker (mplink.exe) v4.34 MPLAB C18 C Compiler (mcc18.exe) v3.34 VDUD Literation (mclific curr)
C:\MCC18\mpasm\MPASM\/IN.exe Browse
Store tool locations in project
Help! My Suite Isn't Listed!
< Back Next > Cancel Help

The Toolsuite has 4 components:

- Assembler
- Object Linker
- C Compiler
- Librarian

The files associated with these components are identified in the location box. As the assembler file has been highlighted in the Toolsuite Contents, its location is being identified in the **Location** box as:

C\MCC18\mpasm\MPASMWIN.exe.

If the Object Linker file is highlighted, its location is identified in the **Location** box.

Project Wizard	×
Step Two: Select a language toolsuite	₿ _₽
Active Toolsuite: Microchip C18 Toolsuite Toolsuite Contents	•
MPASM Assembler (mpasmwin.exe) v5.34 MPLINK Object Linker (mplink.exe) v4.34 MPLAB C18 C Compiler (mcc18.exe) v3.34 MDLID Literative (mclift and)	
C:\MCC18\bin\mplink.exe Browse	e
Help! My Suite Isn't Listed!	olsuites
< Back Next > Cancel	Help

It is a good idea to become familiar with the location of each of these four files (components) of MPLAB C18 Toolsuite.

To Do: Highlight each component and view the file location.

Manually Locating Toolsuite Components

Sometimes, the location box may indicate a wrong location, or it may be empty. This could be the result of either the previous project using a different Toolsuite or because of the action of another user of the computer. In this case, the components can manually be located. The following screen shot shows a situation, where this action may be necessary.

Project Wizard			×
Step Two: Select a language toolsu	ite	<u>بر</u> الله پې	ş
Active Toolsuite: Microc Toolsuite Contents MPASM Assembler (mp MPLINK Object Linker MPLAB C18 C Compiler MPLUD Liberting (mplich	hip C18 Toolsuite asmwin.exe) (mplink.exe) r (mcc18.exe) v3.34	▼ 	
		Browse	
Help! My Suite Isn't L	isted!	Show all installed toolsuites	
	< Back Next >	Cancel Help	

Here first two components have not been located and MPLAB has places an 'X' besides each one of the two.

In this case the location, where these two components are located has to be identified correctly.

To locate the first highlighted components (MPASM) click the **Browse** button.

A dialog box opens.

Select Langua	age-Tool Executa	able	? ×
Look in: 🥌	Local Disk (C:)	💽 🗿 🏂 🖻	•
Arduino Cadence Documents Eclipse_C Eclipse_Jav	: and Settings /a	 Jennic LPCXpresso MCC18 Micro Framework Microchip Application Libraries Microchip Solutions 	Microchip My WS nxp OrCAD Program F SG
File name:	Executable Files	([*] .exe)	Dpen Cancel

Browse to the folder where MCC18 has been installed. MPASMWIN is contained in mpasm sub-folder of MCC18.

Select Langu	age-Tool Executable	? ×
Look in: 间	MCC18 💽 🕝 😰 🖽 •	,
Din Cpp C doc C example C h C h	ibpopt mpasm src UNWISE	
File name:	MPASMWIN Op	en
Files of type:	Executable Files (*.exe)	

Open mpasm folder:

Select Language-Tool Executable	? ×
Look in: 📴 mpasm 🔽 🔇 🤌 🔛	•
File server	
	ben
Files of type: Executable Files (*.exe) Ca	ncel

MPASMWIN file is located in this folder. Highlight it

Select Language-Tool Executable	? ×
Look in: 🗀 mpasm 💽 🧿 🤌 📖	•
MPASMWIN	
File name: MPASMWIN 0p	en l
Files of type: Executable Files (*.exe)	

The file name is shown in the **File name:** box now click the **Open** button.

The Step two of Project Wizard dialog box appears again. This time the MPASMWIN has been identified on the computer and the 'X' mark has been removed from the Assembler component.

Project Wizard	×
Step Two: Select a language toolsuite	r Solution Solution
Active Toolsuite: Microchip C18 Toolsuite Toolsuite Contents MPASM Assembler (mpasmwin.exe) v5.34 MPLINK Object Linker (mplink.exe) MPLAB C18 C Compiler (mcc18.exe) v3.34 MPLINE Likewice (mclik.exe)	
Cocation C:\MCC18\mpasm\MPASMWIN.exe Store tool locations in project Help! My Suite Isn't Listed!	Browse
< Back	Next > Cancel Help

Similarly, using the Browse button, locate the next missing component. It is located in **bin** sub-folder of MCC18.

Select Langu	age-Tool Executable	<u>? ×</u>
Look in: 间) MCC18 🔽 🖸 🖄 📂 🕻	
i bin cpp i doc example h i b	ြဲ libpopt ြဲ mpasm ြဲ src 쥀 UNWISE	
File name:		Open
Files of type:	Executable Files (*.exe)	Cancel

Open the bin sub-folder and identify the mplink.exe file. It is helpful to drag the Select Language dialog box to the side of the Project wizard dialog box to see the required file name (as shown below)

Project Wizard Step Two: Select a language toolsuite	×	
Active Toolsuite: Microchip C18 Toolsuite	Select Language-Tool Executable Look in: 📴 bin	?× • • • • • • • • • • • • • • • • • • •
Applied Contents MPASM Assembler (mpasmwin, exe) v5.34 MPLINK Object Linker (mplink, exe) MPLAB C18 C Compiler (mcc18.exe) v3.34 MOULD Character (mcBaracter) Location Store tool locations in project	LKR mp2cod mplink mp2hex Ccpp18 mplib mcc18 mplink mcc18-extended mcc18-traditional	Date Created: 10/20/2009 11:24 PM Size: 957 KB
Help! My Suite Isn't Listed!	File name: mplink Files of type: Executable Files (*.exe)	Open Cancel
< Back Next >	Cancel Help	

Notes:

- It is important that the Toolsuite location be correctly specified for C18 Toolsuite
- The location of each of the 4 files needed by C18 Toolsuite needs to be individually verified
- All these files need to come from the same MCC18 folder.
- Multiple versions of these files with same name(s) are sometimes located in different folders. <u>These are not interchangeable and only the files from MCC18 folder can be used.</u>
- The location of MCC18 folder varies from computer to computer and depends upon the installation. The following two paths are commonly encountered:
 - C:\MCC18
 - C:\Program Files\Microchip\MCC18
- It is imperative that the above should be (quickly) checked, every time a new project is built.
- Once the Toolsuite location has been correctly identified, subsequent project builds should automatically identify the correct location of these components, unless the same computer, at times, is being used with different Toolsuite.

After all components have been correctly identified, the Step two dialog box will look like as follows(repeated):

Project Wizard	X
Step Two: Select a language toolsuite	ير چرچ
Active Toolsuite: Microchip C18 Toolsuite Toolsuite Contents MPASM Assembler (mpasmwin.exe) v5.34 MPLINK Object Linker (mplink.exe) v4.34 MPLAB C18 C Compiler (mcc18.exe) v3.34 Column Location	
C:\MCC18\mpasm\MPASMWIN.exe Store tool locations in project	Browse
Help! My Suite Isn't Listed!	stalled toolsuites
< Back Next > Cancel	Help

Click on the next button to go to Step Three of the dialog box.

The Step Three dialog box appears.

Project Wizard	×
Step Three: Create a new project, or reconfigure the active project?	ال چ
Create New Project File	Browse
C Reconfigure Active Project	
 Make changes without saving Save changes to existing project file 	
C Save changes to another project file	
	Browse
< Back Next >	Cancel Help

The project location shows an empty box. Clcik on the Browse button and point it to the folder Lesson 1 that was created at the start.

The folder opens

Save Project As		? ×
Save in: 🗀 Lesson1 💽 📀 💋	1 🖻	
Creenshots		
I		
File name:	> L	Save
Save as type: MPLAB IDE Project Files (*.mcp)		Cancel
Jump to: D:\SG\College\DIGL3018\EX\Data Acquisil 💌	1	
	l .	

Enter the project name 'lesson_1' and click **Save** button.

Do not add any extension. An extension of 'mcp' will automatically be added to the project name.

Save Project As	<u>?</u> ×
Save in: 🗀 Lesson1 💽 😋 🏂 📂 🖽 -	
Creenshots	
File name: lesson_1 Save	
Save as type: MPLAB IDE Project Files (*.mcp)	el
Jump to: D:\SG\College\DIGL3018\EX\Data Acquisi	

The Project Wizard dialog box returns, displaying the name of newly created project.

Project Wizard	×
Step Three: Create a new project, or reconfigure the active project?	<u>بر</u> ا
Create New Project File	
	BIOWSE
C Reconfigure Active Project	
C Make changes without saving	
C Save changes to existing project file	
C Save changes to another project file	
	Browse
< Back Next > Can	cel Help

Step Four of Project Wizard is reached. This allows addition of any existing files to the project folder. Since, there are no existing files, simply click on the Next button to advance to the next step.



The project summary page appears, listing the following items:

- The device (PIC18F4520 in this case)
- The Toolsuite (Microchip C18)
- The project folder path and the project file name (lesson_1.mcp)

Project Wizard		X
33	Summary	
59	Click `Finish' to create/configure the project with these parameters.	
(D)A	Project Parameters	
1 Contraction	Device: PIC18F4520	
	Toolsuite: Microchip C18 Toolsuite	
	File: D:\C18 Programming\Lesson1\lesson_1.mcp	
	A new workspace will be created, and the new project added to that workspace.	
	< Back Finish Cancel Help	

Verify that the summary page provides the correct information, else go back and make necessary corrections. Once satisfied, click the **Finish** button.

The MPLAB screen shows the project screen.



- The project name is shown in top status bar (lesson_1)
- A project panel appears showing the names of various folders that may be used with the project
- An output panel that will display the output of C18 compiler, during the build process.

Source File

Every project has to have a minimum of one source file. Currently, the **Source Files** folder in project panel (accessible through View \rightarrow Project, if closed) is empty, as it contains no source file.

The next step is to add a source file.

Addition of a Source file

Highlight the **Source Files** folder in project panel.



From File menu select Add New File to Project.

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File Edit View Projec	t Debugger Progr	ammer Tools Configure Window Help					
New	Ctrl+N	1					
Add New File to Projec	:t						
Open	Ctrl+0	Dutput					
Close	Ctrl+E	ild Version Control Find in Files					
Save	Ctrl+S						
Save As							
Save All	Ctrl+Shift+S						

A dialog box opens.

Browse it to the project folder (lesson_1).



It can be seen that it contains 3 files related to the project that MPLAB has automatically created.

In the **File name** box enter the name of the source file. It will be named as **first.c** (for a lack of a better name).

Note:

It is important that the '.c' extension be added. This practice will save headaches later on.

iesson_1 - MPLAB IDE v8.40 - less File Edit View Project Debugger Pr	on_1.mcw rogrammer Tools Configure Window Help
	🕯 🗰 🚚 🌹 Debug 💽 💣 🚘 🔛 🧠 🐑 🚳 🖽
esson_1.mcw	Add New File to Project
🖃 🧰 lesson_1.mcp*	Save in: 🗀 Lesson1 📃 📀 🍺 📂 🖽 -
Source Files Header Files Dipect Files Library Files Linker Script Other Files Files	Screenshots Nesson_1 Nesson_1 lesson_1 lesson_1.mcs
	File name: first.c Save
	Save as type: All Files (*.*)
	Jump to: D:\C18 Programming\Lesson1\

Click the **Save** button.

The source file is created and added to the project as indicated in the project panel.

An editor panel (Editor panel) also opens with name of the project and source file indicated in the status bar. This is used to enter the source code (C18 code) to the project



Adding (Source) Code to Source File

- Expand the editor panel.
- Type the following code in the editor panel. (Type as is shown)

📉 lesson_1 - MPLAB IDE v8.40 File Edit View Project Debugger Programmer Tools Configure Window Help Debug 🔄 💣 🚅 🔛 🧠 📅 🚯 💼 🚺 🗅 🚅 🔚 | 🐰 🐂 🛍 | 🎒 👫 🗯 📮 🥊 | lesson_1. Save File D:\C18 Programming\Lesson1\first.c* _ 🗆 🗵 😑 🧰 lesson_1.mcp ٠ Name: S Gupta 🗄 📖 Source Files Date: April 25, 2010 🛄 🔛 first.c File: first.c 🚞 Header Files Starting with C18 Programming 🔲 Object Files 🔲 Library Files 🔲 Linker Script #include <p18f4520.h> 🔲 Other Files void main (void) { 💘 Symbols Files

Once, finished with entering the code, click on the Floppy icon and save the file.

Building the Project

Although, it is an empty project, it can still be built.

Click on the **Build All** icon and build the project.

Observe the output Window, there should be no errors, otherwise check the source code and build again.



On a successful build the output panel indicates a success "BUILD SUCCEEDED"

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File	Edit View Project Debugger Programmer Tools Configure Window Help	
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	Output	×
	uild Version Control Find in Files	
	lean: Deleting intermediary and output files. lean: Deleted file "D:\C18 Programming\Lesson1\first.o". lean: Deleted file "D:\C18 Programming\Lesson1\lesson_1.cof". lean: Deleted file "D:\C18 Programming\Lesson1\lesson_1.hex". lean: Done.	
	xecuting: "C\MCC18\bin\mcc18.exe"-p=18F4520 "first.c"-fo="first.o"-DDEBUG-OuOtObOpOrOdOpa- xecuting: "C\MCC18\bin\mplink.exe"/p18F4520/l"C\MCC18\lib" "first.o"/u_CRUNTIME/u_DEBUG/zMPLAB_BUILD PLINK 4.34, Linker opyright (c) 2009 Microchip Technology Inc. rrors : 0	
	P2HEX 4.34, COFF to HEX File Converter opyright (c) 2009 Microchip Technology Inc. rrors : 0	
	oaded D:\C18 Programming\Lesson1\lesson_1.cof.	
	UILD SUCCEEDED	-

Congratulations! The project has been successfully built.

Closing the Project

The project should always be properly closed.

Click on **Project** \rightarrow **Close** to properly close the project (saving all required MPLAB files)

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File Ed	lit	View	Project	Debugger	Programmer	Tools	Conf	igure Window Help
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		Obje Libra Linke Othe	e Clean a Locate Headers ^E Export Makefile ^E Build All Make Build Configuration Build Options	n	Ctrl+F10 F10	<pre>************************/ <p18f4520.h> (void)</p18f4520.h></pre>		
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MPLAB window with no projects opened is displayed.

MPLAB IDE v8.40												
File	E	Edit	View	Project	Debugger	Programmer	Tools	Configure	Window	Help		
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Click on **File→ Exit** to close MPLAB session.

MPLAB IDE v8.40												
File	Edit	View	Project	Debugger	Programmer	Tools	Configure	Window	Help			
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This terminates the MPLAB session.

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This concludes Lab1. ***