Revision 1.0

In order to build and compile projects for the UBW32 © (developed by Brian Schmalz <u>www.schamalzhaus.com</u>) you must first setup your development environment properly. Brian provides some documentation on how to do this on his website, but I found it hard to follow. As such, I wrote this set of instructions. Hopefully you'll find it helpful if you have not solved your compiling issues yet.

** Note all instructions were tested on a Windows Vista© 32-bit Enterprise Edition Laptop.

1. Go to the following website and download the installer for Microchip's IDE "MPLAB" Microchip MPLAB Download Page

Scroll to the bottom and click of the following

link.

Title	Date Published	Size	D/L
Advanced Debugging Techniques- Lab 1 of 3	11/29/2010 11:39:00 AM	21587 KB	9
MATLAB Device Blocks for MPLAB IDE	5/5/2010 2:47:39 PM	36 KB	8
MPASM/MPLINK User's Guide	4/8/2009 3:52:41 PM	2896 KB	1
MPLAB Assembler, Linker and Utilities for PIC24 MCUs and dsPIC DSCs User's Guide	1/26/2010 10:16:32 AM	1981 KB	1
MPLAB IDE Current Release Notes	12/23/2010 4:27:36 PM	252 KB	Q
MPLAB IDE User's Guide	1/20/2009 12:09:31 PM	4232 KB	R
MPLAB IDE v8.63	12/27/2010 5:10:28 PM	113111 KB	۵Į
MPLAB IDE v8.63 PIC18F46K22 Family Debug Patch	1/24/2011 3:28:42 PM	452 KB	노랫
Quick Guide to Microchip Development Tools	3/4/2011 10:09:50 AM	582 KB	1
The MPLAB IDE Debug Tool API	5/13/2010 5:16:00 PM	171 KB	1

You'll need to unzip the folder somewhere and run the "setup.exe" file. Install MPLAB to the default folder "Microchip" in Program Files. (See below)



Notice that there are C-32 folders in there too. This is also the directory in which you will install the C-32 C-compiler suite (mine are already in there, this is your next step).

Revision 1.0

2. Next you'll need the C-Compiler for PIC32 devices. Microchip C32 Compiler Download Page

Title	Date Published	Size	D4
C32 C Compiler Examples	11/19/2009 3:46:13 PM	195 KB	4
Fix for Timer Linker Error MPLAB C for PIC32 v1.12a (see readme)	3/2/2011 12:15:06 PM	6 KB	4
MPLAB Assembler, Linker and Utilities for PIC32 MCUs User's Guide	5/27/2009 2:43:47 PM	2659 KB	1.
MPLAB C Compiler for PIC32 v1.12a in LITE Mode 🍂	1/13/2011 2:30:32 PM	79235 KB	
MPLAB C Compiler for PIC32 v1.12a upgrade 🥒	1/13/2011 2:06:00 PM	79235 KB	
MPLAB C32 C Compiler User's Guide	11/17/2009 2:52:29 PM	1559 KB	T.
MPLAB C32 C Libraries Manual	11/17/2009 2:54:15 PM	1917 KB	T.
Quick Guide to Microchip Development Tools	3/4/2011 10:09:50 AM	582 KB	12
Release Notes for MPLAB C for PIC32 vt 12	1/7/2011 2:03:23 PM	96 KB	F

At this point you'll realize you need an account to download the C32 C-Compiler. Just make an account so you can download it and get the software. Your programs won't compile without it.

- *** Install this software into the same directory in which you installed the MPLAB software! ***
- The next item you'll need it the "Microchip Applications Library" or the MAL. It contains a bunch of libraries and examples for projects designed to be loaded onto the PIC32 microcontroller.

Library	Current Version	PIC18F	PIC24F	PIC24H	dsPIC	PIC32
		(nd-8)	(16-Dff)	(16-Dft)	(16-Dft)	(3Z-DII)
JSB Framework	2.8	х	Х			х
Graphics Library	2.11		×	ж	×	х
Memory Disk Drive (MDD)	1.2.7	х	X	х	x	х
TCP/IP Stack	5.31	х	Х	х	X	x
mTouch Capacitive Touch Library	1.21	Х	X			х
Smart Card Library	1.02	х	×	х	X	X
MWI™ Development Environment	3.1.4	х	×	ж	×	×

Microchip Applic	ation Librarles		
Microchip Application Libraries v2010-10-19			
Title	Date Published	Size	D/L
Title Microchip Application Libraries Release Notes	Date Published 11/9/2010 12:41:38 PM	Size 8 KB	D/L

This needs to install to your C: directory, which should be the default location.

Install it and verify that there is a folder in there named "Microchip." This folder is referenced by the various software examples in that folder.

🖌 Organiae 👻 📗 Vrew	5 · *		_		Ŭ.
avorite Links	Name	Date modified 2/21/2011 9:55 PM	Type File Folder	Sate	
Pictures	Graphics Object Layer	2/21/2011 9:55 PM	File Folder File Folder		
Music	Graphics SSD 1926 JPEG	2/21/2011 9:55 PM	File Folder		
olders Y	HelloUS8World-BF	2/23/2011 11:30 AM	File Folder		
Public - Computer NewDisk (C:)	HIDBoot Image Decoders Demo Information Source and hex MDD File System-SD C	1/7/2011 7:31 AM 2/21/2011 9:55 PM 2/17/2011 1:29 PM 2/21/2011 9:55 PM	File Folder File Folder File Folder File Folder		
emacs.d	Microchip	2/21/2011 9:54 PM	File Folder	1	
📕 Boat	MTouchCapDemos	2/21/2011 9:55 PM	File Folder		
🗼 CS478	PIC24F Starter Kit 1	2/21/2011 9:55 PM	File Folder		
LF30	Smart Card Demo	2/21/2011 9:55 PM 2/21/2011 9:55 PM	File Folder File Folder		
Microchip Solution MSOCache Program Files	TCPIP Google PowerM TCPIP Internet Bootloa TCPIP Internet Radio A	2/21/2011 9:55 PM 2/21/2011 9:55 PM 2/21/2011 9:55 PM	File Folder File Folder File Folder		

Now, any new projects you wish to start should be saved to this "Microchip Solutions v2010-10-19" folder for the relative path references to work properly.

 Download one of Brian Schmalz's projects, "HelloUSBWorld", by clicking on the following link. <u>http://www.schmalzhaus.com/UBW32/FW/HelloUSBWorld/HelloUSBWorld.zip</u>
 Download it to the "Microchip Solutions v2010-10-19" folder that is now in your C: drive directory.
 Open up the "HelloUSBWorld.mcp" project file. This is the main project file type for MPLAB.

Revision 1.0

Constant of Later	14		_		_
Book (1995) Fishare Marie Gaptico Millatz Gaptico Millatz Gaptico Millatz Gaptico Millatz Gaptico Millatz Gaptico Millatz	Filese ad Objects Hindowerfrotte h Hindowerfrotte - Ull Hindowerfrotte - Ull Hindowe	Date markfeet 18/29/2010 7/25 AM 19/21/2011 1211 444 19/21/2011 1211 425 19/21/2010 1251 19/21/2010 1265 19/21/2010 1265 PM 10/21/2010 1265 PM 10/21/2010 1263 PM	Type The Fable File Fable C Houder Fab C Houder Fab C Houder Fab C Houder Fab C House C House C Searce C Searce BIT Fab HIX Fab HIX Fab	32x 548 548 118 618 418 N48 1148 1148 1148 1148 1148	
Graphics Entry OF Graphics Entry OF Graphics, PEG Der Graphics, Object Li Graphics, Object Li Graphics, Object Li Graphics, Division Graphics, 2013(2), Helhol/SROwald	S-ind/Weiting	1:22:29114.19 AM	Hasdap (FAL)	104]

5. This should open up MPLAB.

First select the proper device you are attempting to program.

🕂 HelioUSBWorld - MPLAB IDE v8.63		
File Edit View Project Debugger Programmer Tools (Configure Window Help	
D 📽 🖬 X 🐂 📾 🚳 🖊 🛩 🖉 🛼 📍 🛛	Select Device	🕨 🕸 🖽 📾 🙀 🤅 Checksum:
	Configuration Bits	
HelloUSBWorld.mcw	External Memory	🕮 💷 Output
HelloUSBWorld.mcp	ID Memory	Build Version Control Find in F
Source Files	Settings	SB
main.c		Te. Release build of project CA Language tool versions; pic
LICE Shock		^{EV} Mon Mar 07 00:25:30 2011



Select the device from the drop down box. A cool little feature, this window will also show you the kind of hardware programmers you may use to program the device...

HOWEVER: Should you wish not to lose Brian Schmalz's bootloader that should be loaded onto your UBW-32, DO NOT USE A HARDWARE PROGRAMMER. (PicKit2, PicKit3, RealIce, etc.) I'll get back to this at the end...



Now select the "Programmer" Tab and select "None".

Now, attempt to build the project by pressing the "Build-All" button or pressing ctrl+F10.

It may ask you which C-Compiler to use depending on whether or not you've used it before.

CHOOSE THE FOLDER CONTAINING THE "C-32 SUITE" IN YOUR PROGRAM FILES FOLDER ON THE C: DRIVE!

To	Tool-Location Discrepancy: MPLAB C32 C Compiler (pic32-gcc.exe)						
	This language	tool was in a different place last time this project was built.					
	Possible Reas	ons:					
Ĺ	 You got ti different p 	his project from another machine and the language tool was installed in a place.					
	You have changed MPLAB IDE's record of where the language tool is installed since you last built this project.						
	You may continue building with MPLAB IDE's current setting for the location of the language tool, or you may continue building with the location last used to build the project. MPLAB IDE will look for the language tool at this location for this and future builds.						
	MPLAB IDE:	m Files\Microchip\MPLAB C32 Suite\bin\pic32-gcc.exe Use This					
	Last used:	C:\Program Files\Microchip\MPLAB C32\bin\pic32-gcc Use This					
L	Last used:	C:\Program Files\Microchip\MPLAB C32\bin\pic32-gcc Use This					

Click the "Use This" button and it will attempt to compile. It will ask this for each file where the build reference is ambiguous.

Now, more than likely it will throw an error (listed in blue print) and mention that the build failed (listed in red print)

Revision 1.0

Output	- • •
Build Version Control Find in Files	
Release build of project "C\Microchip Solutions v2010-10-19\HelloUSBWorld\HelloUSBWorld.mcp' started. Language tool versions: pic32-gcc.exe v1.11(b), pic32-ld.exe v1.11(b) Mon Mar 07 00:20:02 2011	
Clean: Deleting intermediary and output files. Clean: Done. Executing: "C\/Program Files\Microchip\MPLAB C32 Suite\bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c -c "usb_descriptors.c" -o".\Objects\usb_descriptors.o" -MMD -HE".\Objects\usb_descriptors.c" -o".\Objects\usb_descriptors.c" -o".\\Objects\usb_descriptors.c" -o".\Objects\usb_descript	MF".\Objects\x "C:\Microchip "-MMD-MF".\/ o".\Objects\us MF".\Objects\/ e.o" "Objects\
Release build of project 'C:\Microchip Solutions v2010-10-19\HelloUSBWorld\HelloUSBWorld.mcp' failed. Language tool versions: pic32-gcc.exe v1.11(b), pic32-ld.exe v1.11(b) Mon Mar 07 00:20:04 2011	

(see next page)

IF THIS IS THE CASE, REFERENCE THE PROPER "INCLUDE" FOLDER IN THE PROJECT BUILD OPTIONS C:\Program Files\Microchip\MPLAB C32 Suite\pic32mx\include (as shown below)



Revision 1.0

MPLAB PIL32 Asse	mbler MPLAB PIC	32 C Compiler	MPLAB PIC32 Linke
Directories	Custom Build	Trace	PIC32 Suite
Directories and Se	arch Patho		
Show directories	for: Include Search	n Path	•
New	Delete	Down	Up
C:\Program Files	Microchip/MPLAB C32	Suite\pic32mx\i	nclude
C: Vrogram Files C: VProgram Files WilcrochipVincl	Microchip/MPLAB C32 ude	Nibigoo yaasani Apic 32mx \includi	Suite Defaults
-Build Directory Po	icy		
Assemble/Con	npile in source-file direct	ory, link in output	t directory
Assemble/Cor	npile/Link in the project	directory	

6. Now hit "Build All" or ctrl+F10 to compile, and it should compile.

Output	
Build Version Control Find in Files	
Release build of project 'C\Microchip Solutions v2010-10-19\HelloUSBWorld\HelloUSBWorld.mcp' started. Language tool versions: pic32-gcc.exe v1.11(b), pic32-ld.exe v1.11(b) Mon Mer 07 00:25:30 2011	
Clean: Deleting intermediary and output files. Clean: Done. Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "usb_descriptors.c" -o".\Objects\/usb_descriptors.o" -M Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "main.c" -o".\Dbjects\/usb_descriptors.o" -M Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c ".Microchip\/USB\/usb_device.c" -o".\Objects\/usb_descriptors.o" -M Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c ".Microchip\/USB\/usb_device.c" -o".\Objects\/usb_descriptors.o" -M Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c ".Microchip\/USB\/DCD Cevice Drive\/usb_intoiton_cdt Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c ".Microchip\/USB\/DCD Cevice Drive\/usb_intoiton_cdt Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c ".Microchip\/USB\/DCD Cevice Drive\/usb_intoiton_cdt Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "HelloUSB\/ord.c" -o".\Objects\/HelloUSB\/vorld.o" -M Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "HelloUSB\/ord.c" -o".\Objects\/usb_desc Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "HelloUSB\/ord.c" -o".\Objects\/usb_desc Executing: "C\Program Files\/icrochip\/MPLAB C32 Suite\/bin\pic32-gcc.exe" -mprocessor=32MX460F512L -x c-c "HelloUSB\/ord.d\/HelloUSB\/ord.d\/HelloUSB\/ord.et" Loaded C\/icrochip Solutions v2010-10-19\/HelloUSB\/ord.et//	MD-MF"\Objects\\ .d" -I"C\Program F ce.o" -MMD-MF".\ .c"-o".\Objects\us MO-MF".\Objects\ levice.o" "Objects\
Release build of project "C\Microchip Solutions v2010-10-19\HelloUSBWorld\HelloUSBWorld.mcp" succeeded. Language tool versions: pic32-gcc.exe v1.11(b), pic32-Id.exe v1.11(b) Mon Mer 07 00:25:32 2011	
BUILD SUCCEEDED	

(If not, check the environment path variable for Windows to ensure the following references are there)

C:\Program Files\Microchip\MPLAB C32\bin;	
C:\Program Files\Microchip\MPLAB C32 Suite\bin;	
.;	
;	
C:\Windows\system32;	
C:\Windows;	
C:\Program Files\HI-TECH Software\PICC\LITE\9.60\bi	in;

C:\Program Files\HI-TECH Software\PICC\9.80\bin

7. Sweet! This means all of the object files have been created and a loadable hex file dumped into the folder.

Favorite Links Name					
Documents Pictures Music More >> Folders Combo Demos Graphics AN1136 Graphics AN1124 Graphics AN124 Graphics AN124 Graphics External I Graphics External I Graphics Defense Graphics Detense Graphics AN124 Graphics AN124 Graphics Detense Graphics AN124 Graphics AN124 Graphics Detense Graphics Detense Graphics Detense Graphics Detense Graphics Detense Graphics Detense Graphics Sternal I Graphics Object L2 Graphics Object L2 Graphics Sternal I Graphics Sternal I Graphics Dipet L2 Graphics Sternal I Graphics Dipet L2 Graphics Sternal I Graphics Sternal I Graphics Dipet L2 Graphics Sternal I Graphics Sternal I Graphics Sternal I Graphics Sternal I Graphics Dipet L2 Graphics Sternal I Graphics Sternal I Gr	Dat 10/. 10/. 3/7. Profile.h 10/. Vorld.h 9/1 Jordil.h 9/1 Jordil.c 9/5. Jordil.c 9/5. Vorld.c 3/7. Vorld.map 3/7. Vorld.map 3/7. Vorld.mcp 3/7.	e modified 29/2010 7:35 AM (2011 12:25 AM 24/2009 11:52 3/2009 2:21 PM 24/2009 11:52 (2010 3:05 PM (2011 11:22 PM (2010 12:20 PM (2011 12:25 AM (2011 12:25 AM 2/2011 9:30 AM	Type File Folder File Folder C Header File C Header File C Header File C Source C Source C Source C Source C Source HEX File MAP File MAP File Microchip MPLAB	Size 5 KB 5 KB 1 KB 6 KB 4 KB 26 KB 13 KB 13 KB 13 KB 50 KB 3 KB 3 KB 3 KB 3 KB 3 KB 3 KB	

This is the file you will load onto the UBW32 to make it work.

 Now you need Brian Schmalz's HIDBootloader.exe file (used in loading the hex files onto the UBW32). Information about the HIDBootloader.exe can be found here: <u>UBW32BootloaderDocumentation</u>

Now all you really need is the executable bootloader file, which can be downloaded at the bottom of the documentation page. Save it anywhere you want.



NOTE: This bootloader only works if you don't clobber the bootstrap loaded into the memory onboard the device when you got it. This clobbering occurs when you use a hardware programmer such as the PicKit2, PicKit3, or RealIce.

9. Now you're ready to load the program and test to see if it worked! Open the HIDBootloader.exe.

Revision 1.0

Now another member of the team, Stephen Semmelroth, put together some great videos showing exactly how to program the device and load HelloUSBWorld, available here: <u>Bootloader Tutorial</u> <u>HelloUSBWorld Demo</u>

10. Smile. You're done!