

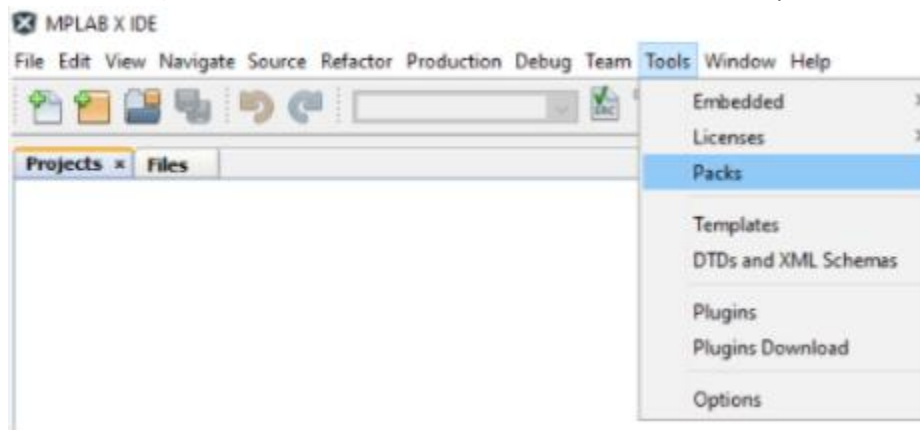


MPLAB® Code Configurator Setup for Software Development on PIC32CX_BZ2/WBZ45x

Pre-requisite: Clone the EA71C53A repo available at <https://github.com/MicrochipTech/EA71C53A>

1. Install MPLAB x IDE, instructions available in EA71C53A\MPLAB X IDE folder
2. Install XC32 Compiler, instructions available in EA71C53A\Compiler
3. Install Device Family Part Pack, located in EA71C53A\MPLAB X IDE

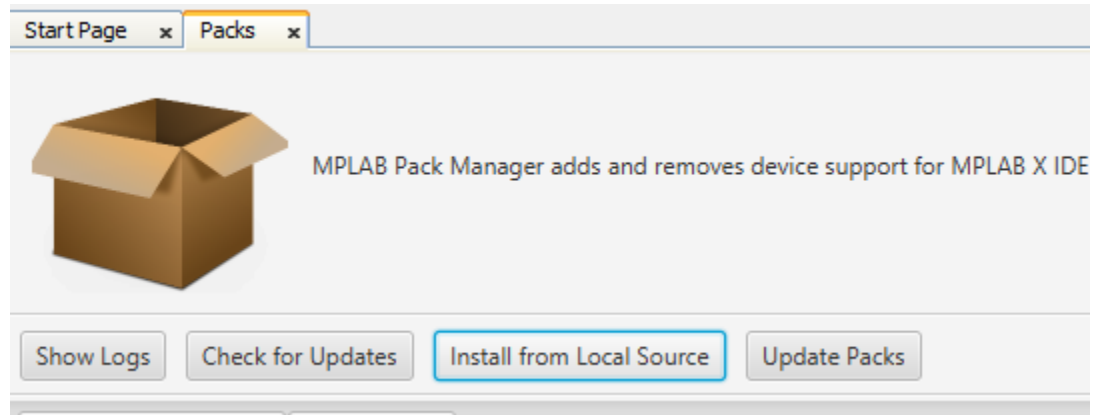
Device Family Packs are device description files (.PIC files for PIC® devices, .ATDF files for AVR® and SAM devices), which contain SFR names, memory regions, programming information. Device-dependent source code files (i.e., peripheral header files) are being moved to DFPs. XC8 (AVR target) and XC32 (SAM target) are implemented today. Libraries will be part of the DFP on XC8 (AVR, CSTARTUP) and XC32 – XC16 will store the libraries in the compiler directory.



3.1 Open the MPLAB X IDE and select Tools > Packs

3.2 Click “Install from Local Source”

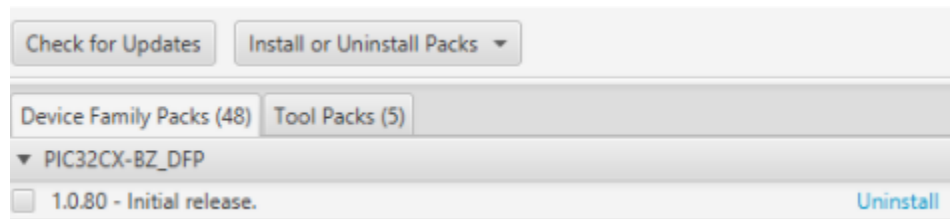




3.3 **Locate (EA71C53A\MPLAB X IDE) and select the device family pack **Microchip.PIC32CX-BZ_DFP-1.0.xx** in **MPLAB X IDE** directory**

Local Disk (C:) > EA71C53A > MPLAB X IDE				
	Name	Date modified	Type	Size
	Microchip.PIC32CX-BZ_DFP-1.0.80	1/27/2022 10:55 PM	Atmel Pack File	3,504 KB
	MPLABX_IDE	1/26/2022 7:47 PM	Adobe Acrobat D...	86 KB

3.4 **Verify** the installation of device family pack by searching in the window – search for “bz” keyword



Restart MPLAB X IDE

4. Exclude Device checks for kits (Tools -> Options -> Embedded)





Options

General Editor Fonts & Colors Keymap **Embedded** Team Appearance Plugins Miscellaneous

Generic Settings Project Options Build Tools MISRA Check Managed Tools Suppressible Messages Diagnostics Other

Projects Folder: C:\Users\c17143\MPLAB\Projects

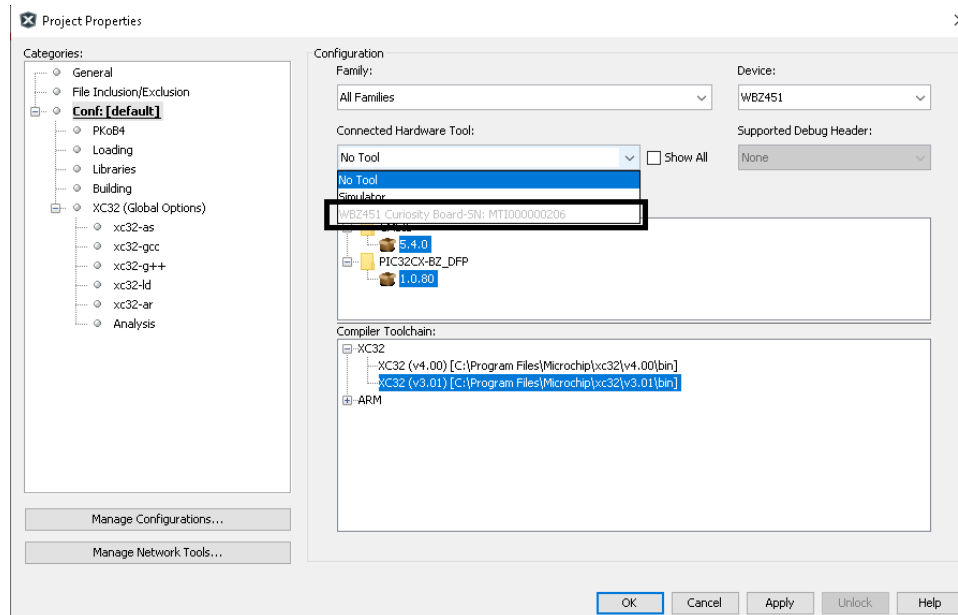
Maintain active connection to hardware tool	<input checked="" type="checkbox"/>
Read Device Memory To File: Export only memory used	<input type="checkbox"/>
Silent build	<input type="checkbox"/>
Enable alternate watch list views during debug sessions	<input type="checkbox"/>
Disable auto refresh for call stack view during debug sessions.	<input type="checkbox"/>
On mouse-over structure and array expressions during a debug se...	<input checked="" type="checkbox"/>
Show unresolvable variable names in watch window during debug s...	<input type="checkbox"/>
Enable Gathering of Compiler symbols	<input checked="" type="checkbox"/>
On mouse-over source lines in editor, evaluate break point status.	SHIFT+Mouse
Hold-off period before memory view synchronization: Give priority t...	1 Second
Debug Reset @ (Following reset action during paused debug sess...	Main
Debug startup (Following debug project action)	Run
Default Charset	ISO-8859-1
Exclude device checks for kits	<input checked="" type="checkbox"/>
XC Code Coverage Report Type	HTML

Export... Import... OK Apply Cancel Help

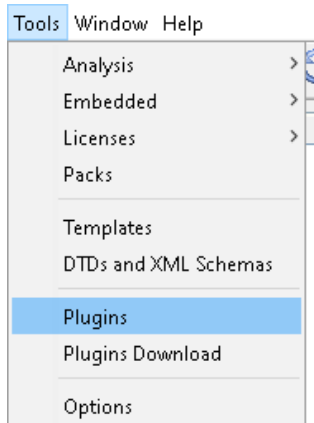
Note: Some preproduction boards might have "PIC32CX1012BZ25048" Soc Name programmed on PKOB4 this, if the device checks for kits is not enabled, user will not be able to choose the PKOB4 to program the WBZ451 module on the Curiosity Board

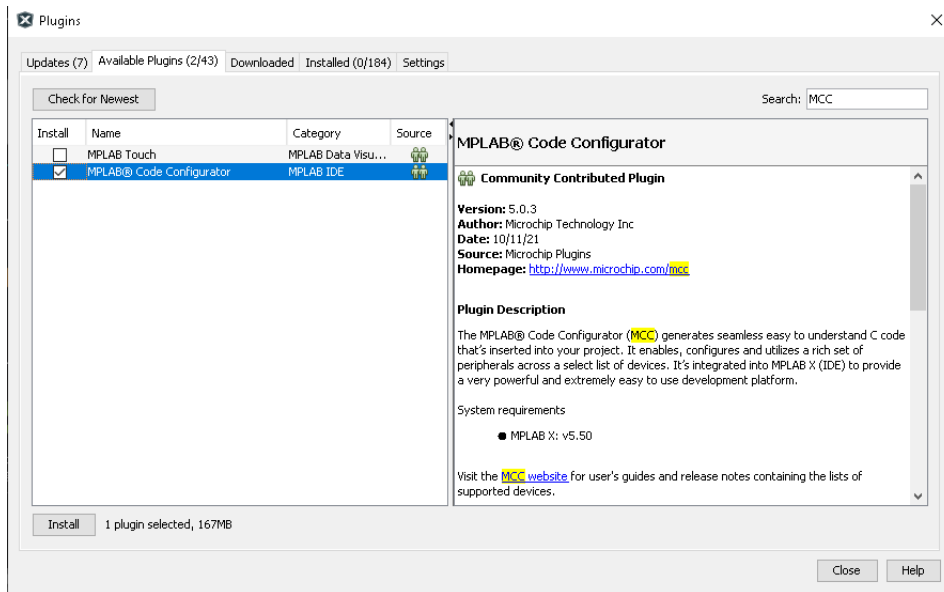
User cannot select the Kit (It will appear greyed out) in Programming options if "Exclude Device Checks" is not enabled





5. Install MCC plugin in the IDE, restart the IDE after installation

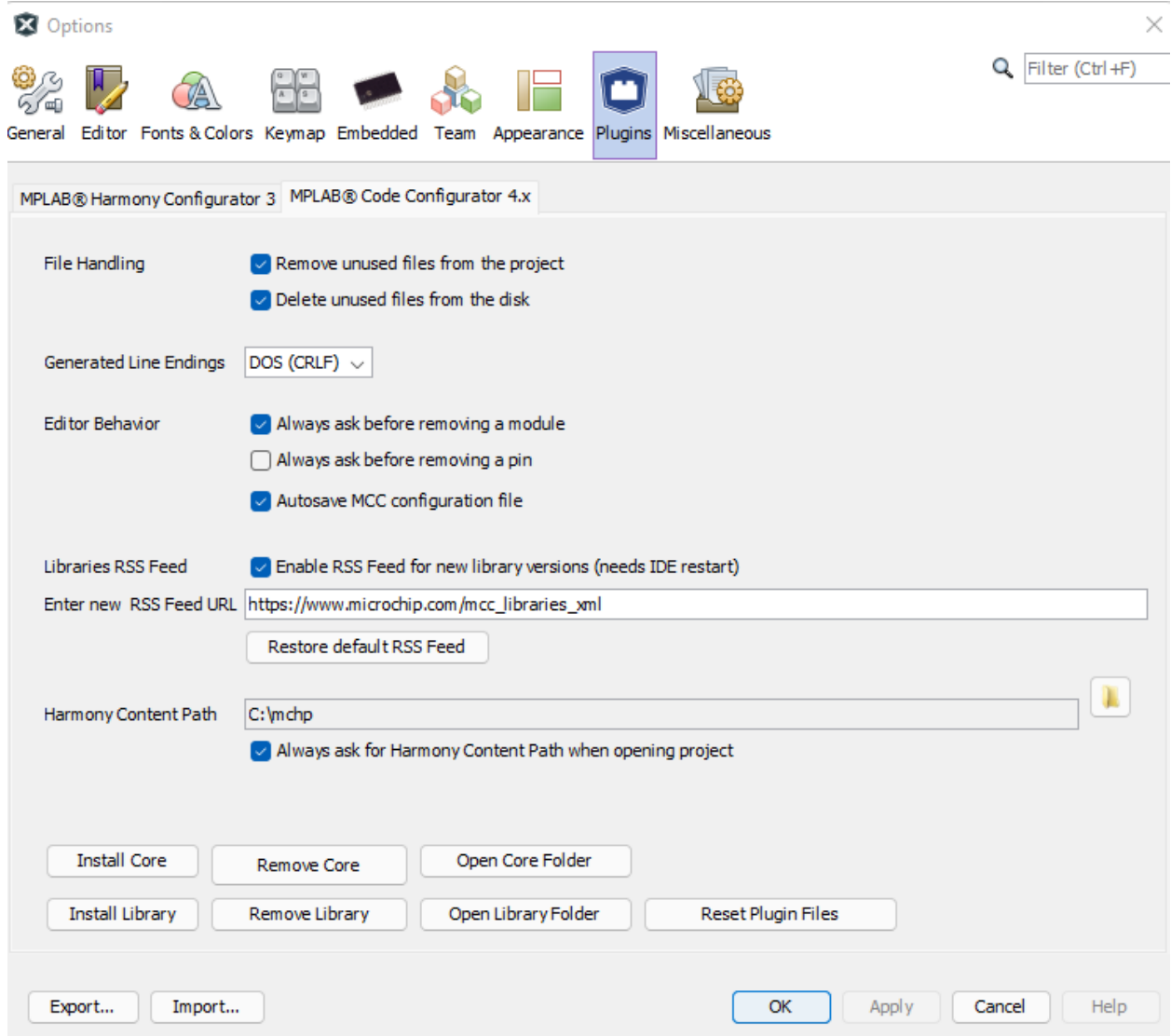




6. Configure the Plugin Options

Several aspects of the operation of the MCC can be managed by using the "Options" panel (see figure below), which can be invoked by clicking Tools → Options → Plugins → MPLAB Code Configurator in the menu bar of the MPLAB X IDE.





Note: “Harmony Content Path” should be in root directory (maximum 1 folder deep and folder name cannot exceed 4 letters)

For example -> **C:\mchp** or **C:\test** are **acceptable** “Harmony Content Path”



C:\Microchip
C:\test\microchip **are not acceptable** path choices.

This note is added to avoid a known issue of Maximum File path, see [here](#) for more information

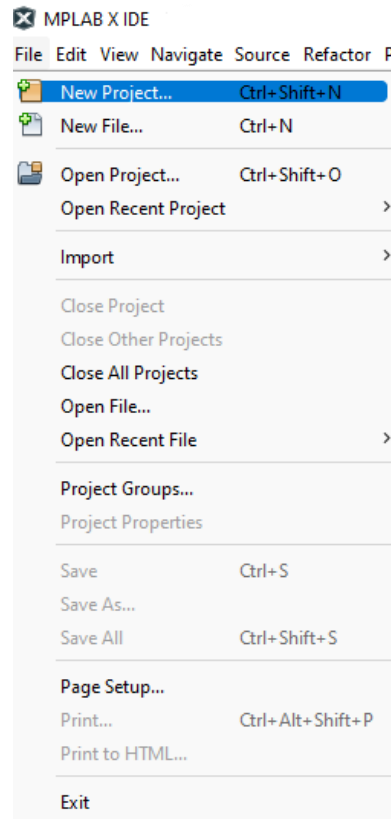




7. Clone the Harmony repositories (required content for SW Development) using MCC Content Manager Wizard

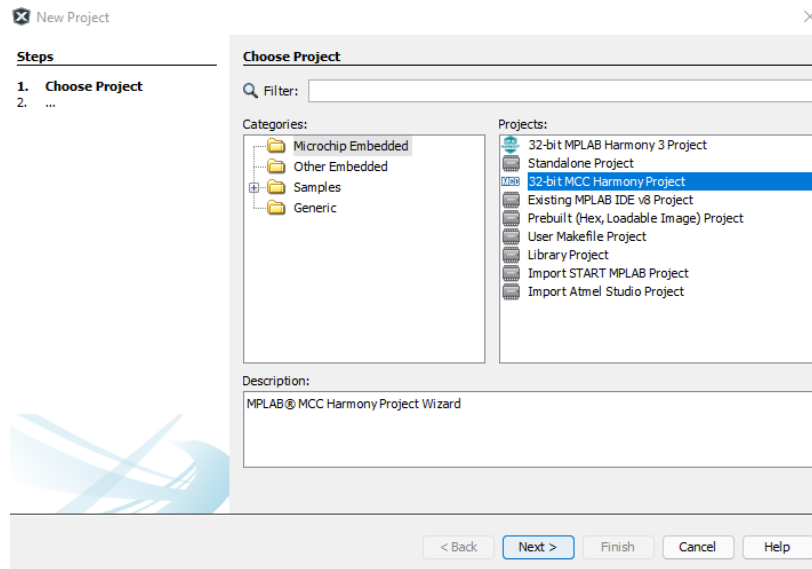
- 7.1 Create a new “MCC Harmony” project (In order to clone the Harmony repositories user needs to create an empty project and clone the required repositories)

- 7.1.1 Select “New Project”

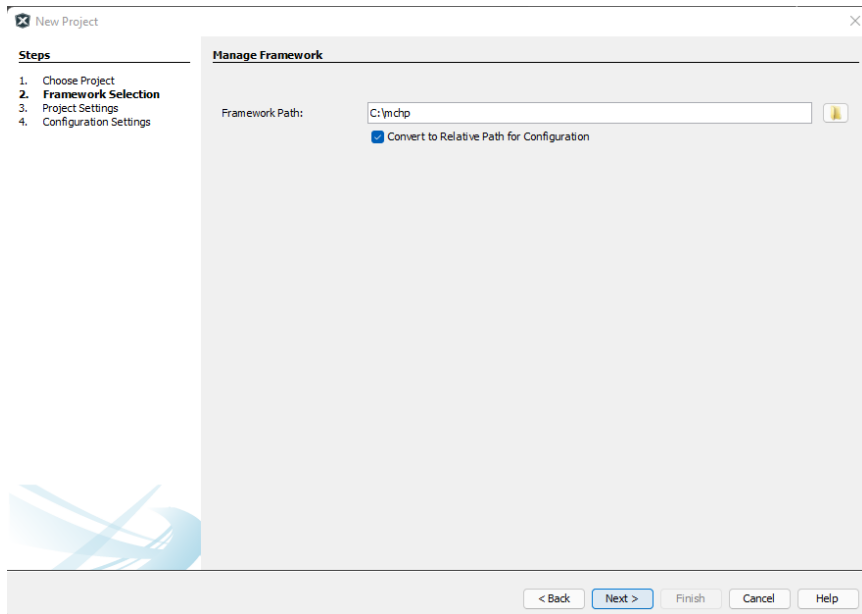


- 7.1.2 Select “32-bit MCC Harmony Project”





7.1.3 Framework Selection



7.1.4 Project Settings





New Project

Steps

1. Choose Project
2. Framework Selection
3. **Project Settings**
4. Configuration Settings

Name and Location

Location: C:\Users\user\HarmonyProjects\MyProject_4

Folder: newProject

Name:

Path: C:\Users\user\HarmonyProjects\MyProject_4\firmware\newProject.X

Show Visual Help

< Back Next > Finish Cancel Help

7.1.5 Configuration Settings

New Project

Steps

1. Choose Project
2. Framework Selection
3. Project Settings
4. **Configuration Settings**

Configuration Settings

Name: default

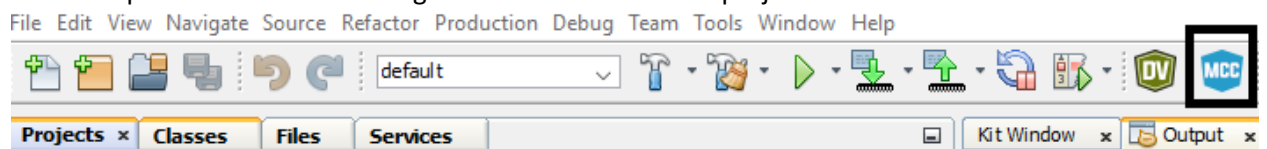
Device Family: WBZ Target Device: WB2451

Device Filter:

Show Visual Help

< Back Next > Finish Cancel Help

7.2 Open “MPLAB Code Configurator” after creation of project



MCC content manager window will appear in IDE

7.3 Select “MPLAB Harmony” from the content manager window





MCC Content Manager Wizard

1. Content Type 2. Required Device Content

Select a Content Type

MCC Melody ⓘ Supports the MCC Builder Supports content versioning at driver level An Iteration of MCC Generated Code Works both on- and off-line Release notes and supported devices Select MCC Melody	MCC Classic ⓘ Development process you are accustomed to All components and libraries that you have used before Release notes and supported devices Select MCC Classic	MPLAB® Harmony ⓘ Embedded Software Development Framework for 32-bit Microcontrollers and Microprocessors Release notes and supported devices Select MPLAB Harmony
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Library support may be a key factor in your choice of MCC flavor:

> MCC Melody and MCC Classic - Library Summary	> MPLAB Harmony - Library Summary
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Still unsure which content type is right for your project?

[See More Details](#)

Select “Optional Content” as shown below





Optional Content

Select optional content to be made available in Device Resources for selection

Optional Content		
Component	Version	Description
> <input type="checkbox"/> Harmony Bootloader		
> <input type="checkbox"/> Harmony Chip Support Package		
> <input type="checkbox"/> Harmony Networking Stack and Solutions		
> <input type="checkbox"/> Harmony USB solutions		
▼ <input checked="" type="checkbox"/> Harmony Core		
<input checked="" type="checkbox"/> bsp	3.10.0	
<input checked="" type="checkbox"/> core	3.10.0	
<input checked="" type="checkbox"/> zlib	1.2.11	
▼ <input checked="" type="checkbox"/> Harmony Cryptography solutions		
<input checked="" type="checkbox"/> crypto	3.7.5	
<input type="checkbox"/> crypto_apps_encrypt_decrypt	3.7.1	
<input type="checkbox"/> crypto_apps_large_hash	3.7.1	
<input type="checkbox"/> crypto_apps_speed_test	3.7.1	
> <input type="checkbox"/> Harmony Aerospace solutions		
> <input type="checkbox"/> Harmony Graphics (Aria) solutions		
> <input type="checkbox"/> Harmony CryptoAuthLib solutions		
> <input type="checkbox"/> arm Mbed OS		
> <input type="checkbox"/> Harmony Capacitive Touch solutions		
> <input type="checkbox"/> Harmony littlefs solutions		
> <input type="checkbox"/> Harmony AWS solutions		
▼ <input checked="" type="checkbox"/> Harmony WolfSSL solutions		
<input type="checkbox"/> wolfMQTT	1.7.1	
<input type="checkbox"/> wolfssh	1.4.1	
<input checked="" type="checkbox"/> wolfssl	4.7.0	
> <input type="checkbox"/> X2C for Harmony		
▼ <input checked="" type="checkbox"/> CMSIS FreeRTOS		
<input checked="" type="checkbox"/> CMSIS-FreeRTOS	10.3.1	

Ensure all components are selected as displayed below (ignore versions for now). Version selection will be done at a later stage





Kit Window

Output

Start Page

Content Manager

MCC Content Manager Wizard

[1. Content Type](#)
[2. Required Device Content](#)

Finish

Required Content

Some required content must be downloaded. The following content will be downloaded when you click on "Finish".
To change content versions later, access the Content Manager from Device Resources.

Component	Version
csp	3.10.0
mhc	3.8.2
quick_docs	1.4.0
dev_packs	3.10.0
bsp	3.10.0
core	3.10.0
CMSIS-FreeRTOS	10.3.1
crypto	3.7.5
zlib	1.2.11
wolfssl	4.7.0

Select "Finish" The downloading of selected components from harmony repositories will take some minutes.

If all the selected components are cloned successfully, MCC logs in IDE will display this information

Output

Search Results

Kits

Configuration Loading Error

MPLAB® Code Configurator

MCC Log

```

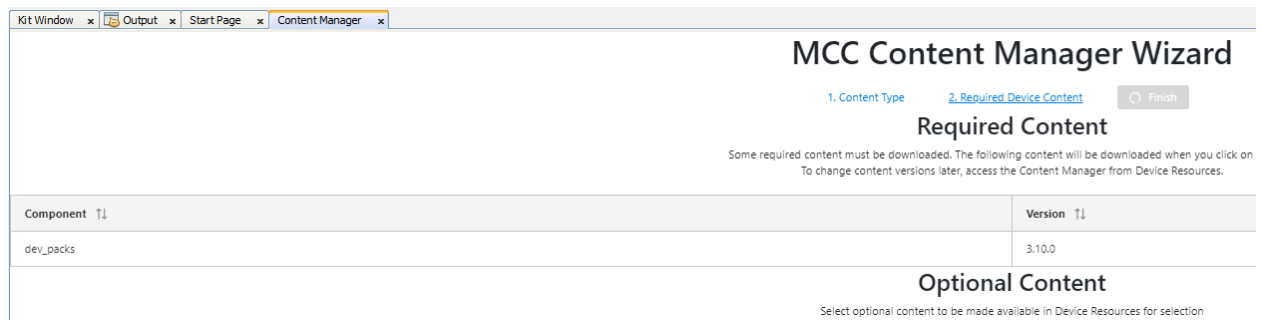
21:55:43.015    INFO: Available content:
Device provider: (CLASSIC) com.microchip.mcc.harmony.Harmony3Library 1.0.3 @ C:\Users\cl7143\.mcc\libraries\harmony3library-1.0.3.mc3lib
Content mode: HARMONY
Content:
(CLASSIC) com.microchip.mcc.harmony.Harmony3Library 1.0.3 @ C:\Users\cl7143\.mcc\libraries\harmony3library-1.0.3.mc3lib
(HARMONY) CMSIS-FreeRTOS 10.3.1 @ C:\mchp\CMSIS-FreeRTOS
(HARMONY) bsp 3.10.0 @ C:\mchp\bsp
(HARMONY) core 3.10.0 @ C:\mchp\core
(HARMONY) crypto 3.7.5 @ C:\mchp\crypto
(HARMONY) csp 3.10.0 @ C:\mchp\csp
(HARMONY) dev_packs 3.10.0 @ C:\mchp\dev_packs
(HARMONY) mhc 3.8.2 @ C:\mchp\mhc
(HARMONY) quick_docs 1.4.0 @ C:\mchp\quick_docs
(HARMONY) wolfssl 4.7.0 @ C:\mchp\wolfssl
(HARMONY) zlib 1.2.11 @ C:\mchp\zlib
21:55:43.066    INFO: Adding library com.microchip.mcc.harmony.Harmony3Library v1.0.3
21:55:43.070    INFO: Loading libraries : Start
21:55:43.078    INFO: Adding library com.microchip.mcc.harmony.Harmony3Library v1.0.3
21:55:43.187    INFO: Loading library "com.microchip.mcc.harmony.Harmony3Library", version 1.0.3, revision unknown, built from core version 5.3.0-melody-test-q.
21:55:43.188    INFO: Loading libraries : Success

```

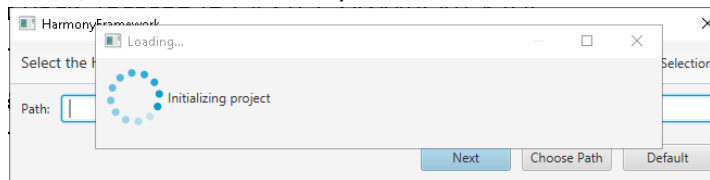
If in the process a failure to download a particular component appears, try redownloading again only the component that failed to download.

For example, if user received a prompt from MCC saying "dev_packs" was not download, close the MCC reopen MCC again and start from step 3, with the "dev_packs" as the only missing component for downloading and select "Finish"

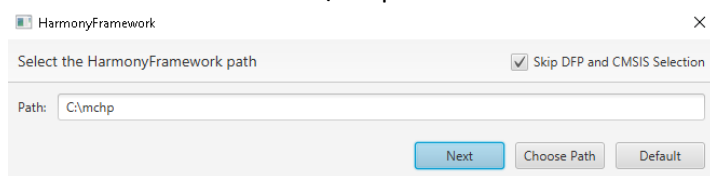




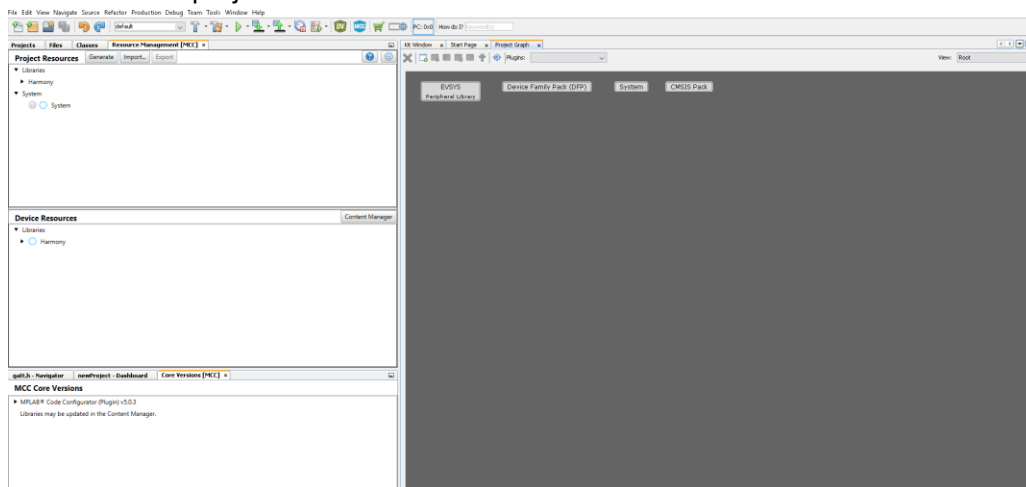
8. Select/Confirm the Harmony Framework Path



Note: Framework Path selection window appears beneath the Initializing Project pop-up, users should Choose Path as “C:\mchp”



Project Graph Window will appear after choosing the framework path and successful initialization of project



9. Change content versions as mentioned below in the table using the content manager from Device Resources and select “Apply”





The screenshot displays the 'Harmony Core' catalog interface. At the top, there are tabs for 'Window', 'Start Page', 'Project Graph', and 'Content Manager'. A search bar labeled 'Type to Search Globally...' is present. The main content area lists various software components organized into categories:

- > Harmony USB solutions**
- ▼ Harmony Core**
 - core**: Version 3.10.0, Latest
 - core_apps_pic32cm_mc00**: Available
 - core_apps_pic32mk**: Available
 - core_apps_pic32mm**: Available
 - core_apps_pic32mx**: Available
 - core_apps_pic32mz_da**: Available
 - core_apps_pic32mz_ef**: Available
 - core_apps_pic32mz_w1**: Available
 - core_apps_sam_9x60**: Available
 - core_apps_sam_a5d2**: Available
 - core_apps_sam_c20_c21**: Available
 - core_apps_sam_d20**: Available
 - core_apps_sam_d21_da1**: Available
 - core_apps_sam_d5x_e5x**: Available
 - core_apps_sam_e70_s70_v70_v71**: Available
 - core_apps_sam_g55**: Available
 - core_apps_sam_ha1**: Available
 - core_apps_sam_i10_i11**: Available
 - core_apps_sam_i21**: Available
 - core_apps_sam_i22**: Available
 - core_apps_sam_th71**: Available
- > Harmony Motor Control solutions**
- > Harmony Class B solutions**
- > Harmony Audio solutions**
- > Harmony Wireless solutions**
- > Harmony Graphics solutions**
- > Harmony Mbed OS Port**
- ▼ Harmony Tools**
 - mhc**: Version 3.8.0, Update
 - bsp**: Version 3.10.0, Latest
- > Harmony Amazon FreeRTOS solutions**
- > Harmony Micrium u**
- > Harmony reference material**
- ▼ Harmony Cryptography solutions**
 - crypto**: Version 3.7.2, Update
 - crypto_apps_encrypt_decrypt**: Available
 - crypto_apps_large_hash**: Available
 - crypto_apps_speed_test**: Available
- > Harmony Aerospace solutions**
- > Harmony Graphics (Aria) solutions**
- > Harmony CryptoAuthLib solutions**
- > arm Mbed OS**
- > Harmony Capacitive Touch solutions**
- > Harmony littlefs solutions**
- > Harmony AWS solutions**
- > MCC Harmony Core**
- ▼ Harmony WolfSSL solutions**
 - wolfMQTT**: Available
 - wolfssh**: Available
 - wolfssl**: Version 4.7.0, Latest
- > X2C for Harmony**
- ▼ CMSIS FreeRTOS**
 - CMSIS-FreeRTOS**: Version 10.3.1, Latest
 - zlib**: Version 1.2.11, Latest
 - dev_packs**: Version 3.10.0, Latest
- > Harmony Azure RTOS solutions**

Each component entry includes a version dropdown menu and a status indicator (Latest, Update, or Available). The interface also features navigation icons at the bottom right.

Package	Version	Location
MPLAB X IDE	5.50	IDE folder
XC32	3.01	Compiler folder
MCC Plugin	5.0.3	MPLAB X IDE > Tools > Plugins



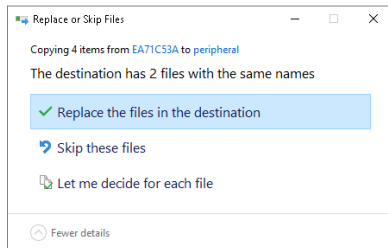
csp	3.10.0	MPLAB® Code Configurator Content Manager
core	3.10.0	MPLAB® Code Configurator Content Manager
mhc	3.8.0	MPLAB® Code Configurator Content Manager
dev_packs	3.10.0	MPLAB® Code Configurator Content Manager
bsp	3.10.0	MPLAB® Code Configurator Content Manager
CMSIS-FreeRTOS	10.3.1	MPLAB® Code Configurator Content Manager
crypto	3.7.2	MPLAB® Code Configurator Content Manager
wolfssl	4.7.0	MPLAB® Code Configurator Content Manager
wireless	211211	EA71C53A\H3
PIC32CX-BZ_DFP	1.0.80	EA71C53A \MPLAB X IDE



Wireless_system_pic32cxbz_wbz		EA71C53A \H3\
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Note: The component versions mentioned above are the versions with which this entire package was tested on by Microchip. User can also choose to get the latest versions (csp, core etc) of components available in Content Manager. Care must be taken that all the components mentioned in the above table are cloned/downloaded using content manager.

10. After successfully checking out the right version of content/components, Harmony Framework needs to be selected again and Project will be reinitialized with the new versions of content
 - Follow instructions mentioned in step 7 -
11. Copy the “clk_pic32cx_bz” folder located in “EA71C53A\” folder to “C:\mchp\csp\peripheral” folder, A prompt will appear warning destination has same file names - Select "Replace the file in the destination".



12. Copy the “wireless__” folders (3) located in “EA71C53A\H3” to “C:\mchp”
Here is an example of how the folder should look like after copying the “wireless__” content





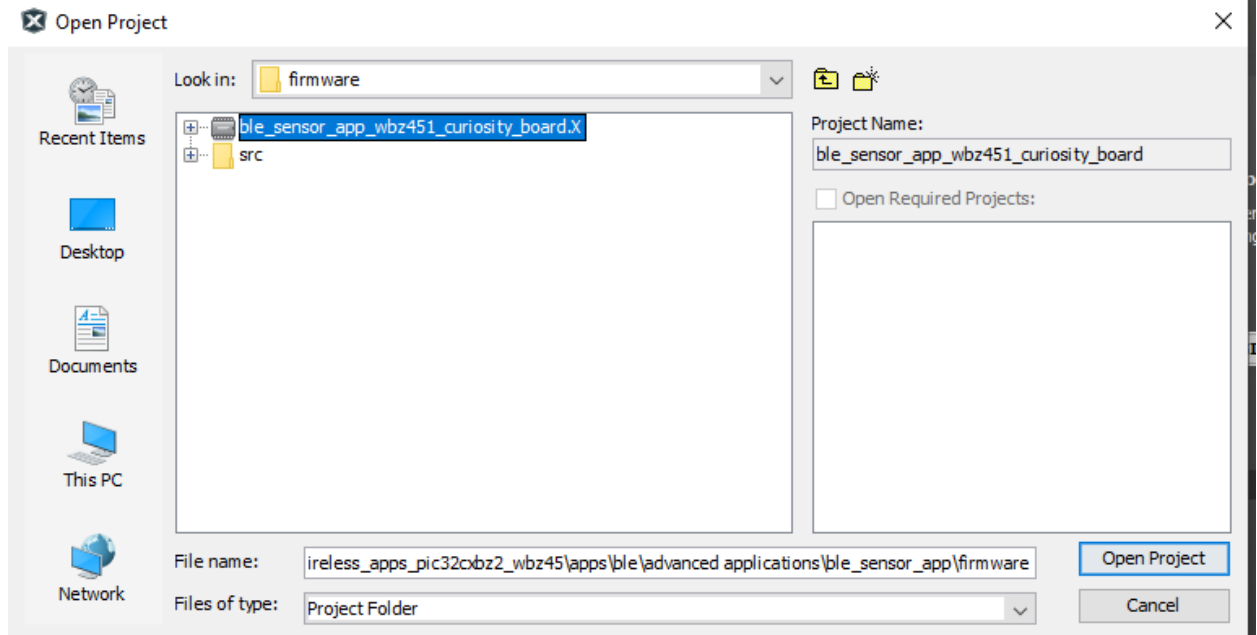
> Local Disk (C:) > mchp

Name	Date modified	Type
zlib	1/29/2022 9:31 PM	File folder
wolfssl	1/29/2022 9:35 PM	File folder
wireless_system_pic32cxbz_wbz	1/29/2022 10:19 PM	File folder
wireless_apps_pic32cxbz2_wbz45	1/29/2022 10:19 PM	File folder
wireless	1/29/2022 10:15 PM	File folder
quick_docs	1/29/2022 9:32 PM	File folder
mhc	1/29/2022 9:32 PM	File folder
dev_packs	1/29/2022 9:52 PM	File folder
csp	1/29/2022 9:35 PM	File folder
crypto	1/29/2022 9:32 PM	File folder
core	1/29/2022 9:33 PM	File folder
content_manager_artifacts	1/29/2022 9:29 PM	File folder
CMSIS-FreeRTOS	1/29/2022 9:36 PM	File folder
bsp	1/29/2022 9:31 PM	File folder

Next Steps

13. Open existing application examples/ develop a new application – visit -
mchp\wireless_apps_pic32cxbz2_wbz45\apps\
 - 13.1 Connect Curiosity Board to the PC using usb cable
 - 13.2 Open MPLAB IDE
 - 13.3 Select **File > Open Project**
 - 13.4 Select the project from C:\mchp\wireless_apps_pic32cxbz2_wbz45\apps\ble\advanced applications\ble_sensor_app\firmware
14. How to open, build and program an existing application example
Pre-requisites: Complete steps 1-11





Information related to the workings of the application example are available in readme.md file available in the ble_sensor_app folder or Getting Started html

13.5 Open Project Properties

13.5.1 Select WBZ451 Curiosity Board as hardware tool for programming

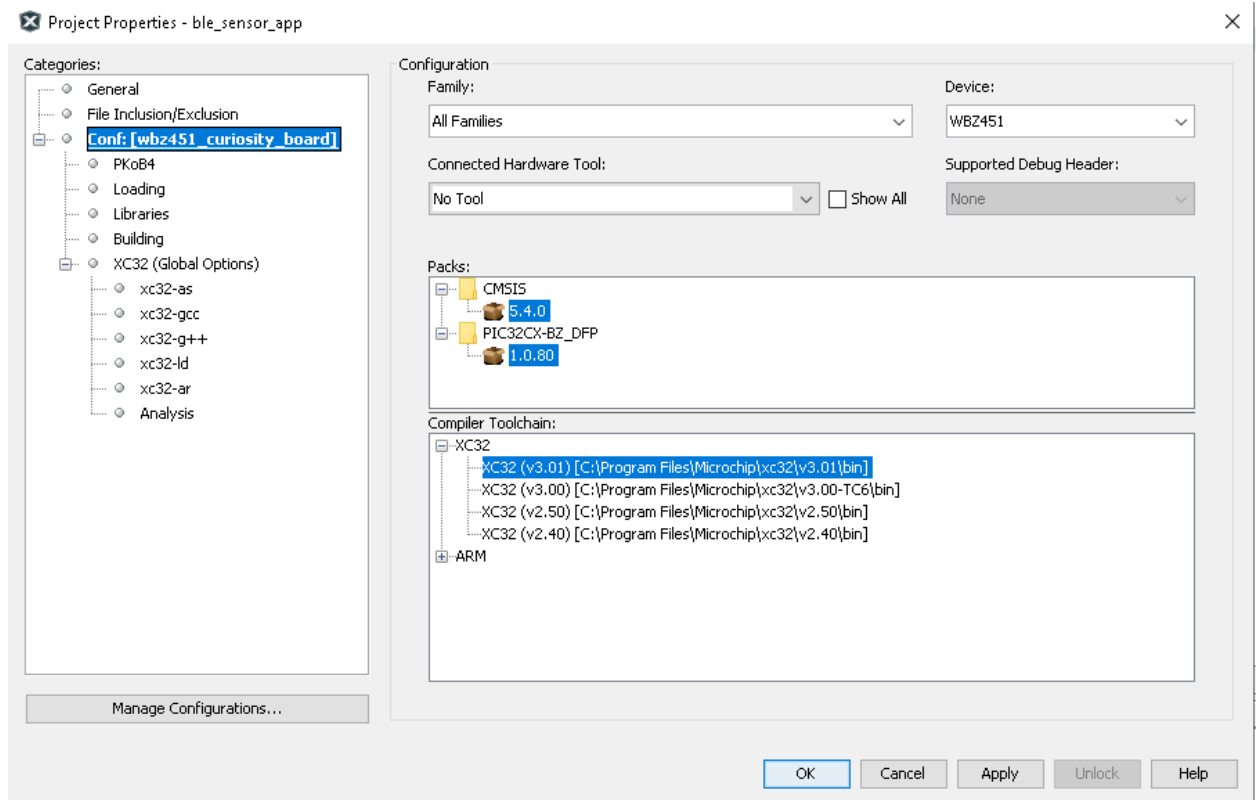
13.5.2 Ensure DFP v1.0.xx is selected and CMSIS v5.4.0

Note: DFP version should match the version mentioned in table 1

13.5.3 select XC32 v3.01 compiler (in case user has several versions of XC32 compilers installed)

Note: Compiler version should match the version mentioned in table 1





13.6 Select option **Build Project** in IDE to compile the application example

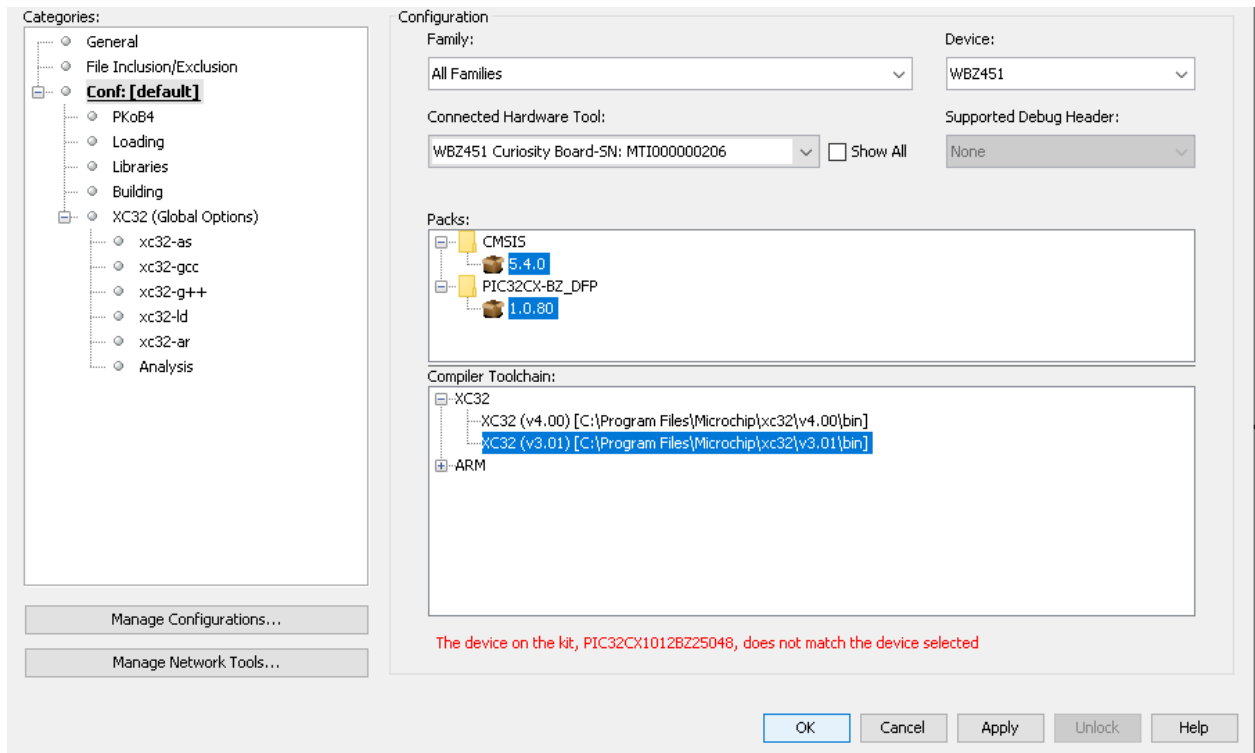


Build Project

13.7 Plug the Curiosity Development board to PC using usb cable

13.8 Select the “Connected Hardware Tool” in properties and Select “Apply”





Note: The message in red can be ignored as the project built for WBZ451 will directly run on the Curiosity board. WBZ451 is an RF module based of PIC32CX1012BZ25048 Soc

13.9 Select option **Run Project** in IDE to program the target – the onboard debugger will program the example application

Run Project

Note: A smartphone App might be needed to explore the full feature set of Application examples, users can refer to readme.md (markdown reader recommended) available in respective Application Example folder or Getting Started html points to the instructions of the Application example

