Using CodeWarrior V4.5 Assembler with Adapt9S12X and Serial Monitor

This document assumes that CodeWarrior has already been installed on your PC. It further assumes that you have all the necessary hardware, and you just need some assistance in starting to use CodeWarrior.

Download from Freescale's website. http://www.freescale.com/webapp/sps/site/homepage.jsp?nodeld=012726

Getting Started:



Click on the Metrowerks IDE icon ^{CodeWarrior IDE.Ink} to get started. You'll notice that the IDE is greyed out to indicate a blank working space.



New Project:

Let's create a new project by clicking on File menu. File-New as shown below.



On the project tab select HC(S)12 New Project Wizard.

Set
*

Project Name:

Type a project name called **Test**. Click on the New Folder icon to create a **test** subfolder in which to save the *test.mcp* file.

Create New Pi	roject		? ×
Save in: 🔯	test	- + 🗈	r 🖬 🕂
		Up C	ne Level
File name:	test		Save
Save as type:	Project Files (*.mcp)	•	Cancel
Create Fold	ler		1.

The setup of the folders is now complete, as show. Press **OK** to continue.

HC(S)12 New Project Wizard	Project name:
HCS12 Stationery	test
	Location;
	C:\test\test Set
	Add to Project:
	Project:

New Project Wizard – Page 1 press Next > to continue



Selecting the MCU:

Scroll up or down to locate the MCU of interest. In this example, we're using Adapt9S12XDP512, so select the MCU type as **MC9S12XDP512**. Then click **Next >** to continue.

Derivatives	
MC9512Q32	
MC9512Q64	
MC9512Q96	
MC9512T64	
MC9512UF32	
MC9512XA128	
MC9512XA256	
MC9512XA512	
MC9512XD128	
MC9S12XD256	
MC9S12XD64	
MC9512XDG128	
MC9512XDP512	
MC9512XD1256	
MC9512XD1384	10.0
	MC9512Q32 MC9512Q64 MC9512Q96 MC9512UF32 MC9512UF32 MC9512XA128 MC9512XA256 MC9512XA512 MC9512XD128 MC9512XD256 MC9512XD64 MC9512XDF12 MC9512XDF12 MC9512XDF12 MC9512XDF12 MC9512XDF34

XGATE option:

In this example XGATE is not selected, rather the single core option is checked. The reason for this is that XGATE is an advanced feature of the MCU that won't be covered in this document.



In this example the **Assembly** box is selected as shown. You may select **C** or **C++** according to your preference. Click Next to continue.



Absolute or Relocatable:

In this example the Relocatable assembly is selected as shown. Click Next to continue.



Serial Monitor:

Adapt9S12XDP512 is pre-programmed with a modified version of Freescale's Serial monitor. However CW V4.5 does not have the Serial Monitor option. Check-mark the Full chip Simulation then click *Finish* to continue.



Setup Complete:

Below is the IDE after the setup is completed.



Files Tab:

Note that a new window pane is added. These contain the **Files**, **Link Order** and **Targets** tabs.

The Files tab contains 6 subfolders called **Sources**, **Prm**, **Linker Map**, **Libraries**, **Debugger Project File** and **Debugger Cmd Files**.

Clicking the + icon reveals the contents of these subfolders. The **Sources** folder contains the working files. By default CodeWarrior creates a file called *main.asm*. The **Prm** folder contains programming parameters. Please note that this document will only touch on the most important aspects of the IDE. You should do further reading to gain a better understanding of how to use CodeWarrior.

Double click on filename *main.asm* to see what it contains.



Debug:

Connect a serial cable between *COM 1* on your PC and Adapt9S12XDP512. Make sure the Run/Load switch on the board is in the Load position. Power up the board, and you'll notice that the PWR (Green) LED is ON.



Select the Project Menu. Project-Debug as shown below.

CodeWarrior will immediately initiate the Debugger screen.

😸 True-Time Simulator & Real-Time Debug	ger C:\test\test\Full_Chip_Simulatio	n.ini			• <u> </u>
File View Run HCS12X FCS Component Pri	ocedure Window Help				
	<u>→</u>				
S Source			Assembly		-OX
HC12 C:\test\test\bin\main.dbg		Line: 16265	HC12 Entry		
main: Entry:		<u>*</u>	C000 LDS #8448 C003 ANDCC #239 C005 LDX #1 C008 STX 0x2100		1
LDS #_SEG_END_SSTAU CLI EndlessLoop:	<pre>CK ; initialize the stack p ; enable interrupts</pre>	pointer	COOB BSR *+16 COOD STD 0x2102 CO10 LDX 0x2100	;abs = 0xCO1B	*
LDX #1	; X contains counter	_	Register		- O ×
STX Counter	; update global.		HC12 CPU Cycles: 0 D DFDF A DI	B DF	Auto
🔀 Data		<u>-0×</u>	IX DFDF IY DFD1 IP COOO PC COO) PPAGE FE	
HC12 Counter undefined int FiboRes undefined int	Auto	Symb Global	SP DFDD IPL (EPAGE FE GPAGE () CCR SXHINZVC) DIRECT 0 RPA	GE FD
			Procedure		-OX
			HC12		14
in Command			Entry ()		
<pre>!// After load the commands writ done .\cmd\Full_Chip_Simulation_</pre>	ten below will be executed postload.cmd		Memory	Auto	X
Postload command file correctly	executed.		000080 00 00 00 20 05 000088 00 00 00 00 00 000090 00 00 00 00 00	00 00 00 00 FF FF 00 00 00	
		• •	000098 00 00 00 00 00 0000A0 00 00 00 00 00	00 00 00	
For Help, press F1	HC12 2.000000 MHz 0		MC9512XDP512 dor	e .\cmd\Full_Chip_Simulatic	n_postload.cr //

True Time Simulator and Real-Time Debugger:

The default setting is for Full Chip simulation. For Serial monitor press the *Component* menu then *Set Connection* as shown.

True-Time Simulator & Real-Time Debugger	C:\test\test\Full_Chip_Simulation.ir	ú		*B_D×
File View Run HCS12X FCS Component Procedu	ure Window Help			
□ 😂 🖬 👗 📴 🐻 Open	F			
S Source		- 🗆 ×	Assembly	_ _ N
HC12 C:\test\test\bin\main.c Fonts	L	ine: 16265	HC12 Entry	
Background Color.		<u> </u>	C000 LDS #8448	<u> </u>
Entry:			C003 ANDCC #239	
			C008 STX 0x2100	
LDS #_SEG_END_SSTACK	; initialize the stack poi	nter	COOB BSR *+16	;abs = 0xC01B
CLI	; enable interrupts		COOD STD 0x2102 CO10 LDX 0x2100	
EndlessLoop:				<u> </u>
LDX #1	; X contains counter		Register	_ _ _×
STX Counter	; update global.	-	HC12 CPU Cycles: 0	Auto
		• //	D DFDF A DF	B DF
🔁 Data		-OX	IX DFDF IY DFDF	DDACE FE
HC12	Auto Syr	nb Global	SP DFDD IPL 0	CCR SXHINZVC
Counter undefined int			EPAGE FE GPAGE 0	DIRECT O RPAGE FD
FiboRes undefined int				
			P Procedure	X
1			HC12	
Command		- = ×	Entry ()	
!// After load the commands written	below will be executed		Memory	_ _ _×
done .\cmd\Full_Chip_Simulation_post	load. cmd			Auto Logical
Postload command file correctly exec	uted.		000080 00 00 00 20 05 0	
l (m)				00 FF FF
		-	000098 00 00 00 00 00 00 00	00 00 00
		▶ //.	0000A0 00 00 00 00 00 0	00 00 00
Set a new target	HC12 2.000000 MHz 0		MC9512XDP512 done	.\cmd\Full Chip Simulation postload.cr

Select the **Connection** to be **HCS12 Serial Monitor** as shown.

Processor		
HC12	•	ОК
Connection		
Full Chip Simulation	•	Cancel
Abatron BDI	25	
HCS12 Serial Monitor		
P&E Multilink/Cyclone Pro		Help
Full Chip Simulation SofTec HCS12		
CAProgram Files/Freescale/CW for HC12		

The **Set Connection** will change accordingly. Click OK to continue.



Notice that the window has changed.

🐻 True-Time Simulator & Real-Time Debugger C:\test\test\Full_Chip_Simulation.ini		•	
File View Run MONITOR-HCS12 Component Source Window Help			
S Source		Assembly	
HC12		HC12	
		COOO LDS #8443 COO3 ANDCC #239 COO5 LDX #1 COO8 STX 0x2100 COOB BSR *+16 ;abs = 0xC01B COOD STD 0x2102 CO10 LDX 0x2100	<u> </u>
		Register	- U X
Data HC12 Auto Symb	Global	HC12 D O A O B O IX 0 IY 0 P PAGE FE FE SP 4000 IPL 0 CCR SXHINZYC EPAGE FE GPAGE FE GPAGE O RPAGE FE SHADON IPL 0 CCR SXHINZYC SXHINZYC <t< td=""><td>Auto</td></t<>	Auto
		Procedure	
Eng Command			
MC9512XDP512 first silicon revision backward compatibility engaged. Startup command file does not exist.		Memory Auto	X Logical
Target Ready		000080 0F 0F 00 20 05 00 00 00	_
in>	_	000090 00 00 00 00 00 00 00 00	
	• • //	000098 00 00 00 00 00 00 00 00 00	_
For Help, press F1 Automatic (breakpoints, watchpoints, and trace possible)		MC9512XDP512 Target Ready	1.

Erasing and Programming:

The next step is to setup the erasing and programming. Click on **MONITOR-HCS12** menu then Load... as shown.

📙 True-Time Si	mulator & Real-Time Debugger C:\t	est\test\Full_Chip_Simulation.ini			• B _ D ×
File View Run	MONITOR-HCS12 Component Source	Window Help			
	Reset Ctrl+R	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>			
Source	Setup			Assembly	
HC12	Communication	1		HC12	
	Select Derivative			C000 LDS #8448	-
	Command Files	1		C003 ANDCC #239 C005 LDX #1	
	Debugging Memory Map			C008 STX 0x2100	
	Trigger Module Settings			COOD STD 0x2102	ans = oxcorb
	Bus Trace			C010 LDX 0x2100	
	Select Core 🕨]	ŀ	Register	
		-		HC12	Auto
				D O A	0 B 0
Data				IX 0 IY	0
HC12		Auto Symb	Global	SP 4000 IPL	0 CCR SXHINZVC
				EPAGE FE GPAGE	0 DIRECT 0 RPAGE FD
			ŀ	D Procedure	
				HC12	
1					
in Command					
MCOS12VDP5	12 first silicon revision bec	ward compatibility angaged		Manary	
nessi2/015	12 THESE STITCOM LEVISION DAG	ward compacibility engaged.			
Startup co	mmand file does not exist. dv			000080 05 05 00 20	
				000088 80 00 00 00	00 00 FF FF
in>			-		0 00 00 00
			► //.	0000A0 00 00 00 0A0000	
Load a new applica	tion Automatic (breakp	oints, watchpoints, and trace possible)		MC9S12XDP512	Farget Ready

A Load Executable File explorer opens:

oad Executable File			? ×
Look in: 🔁 test		- E C	÷ 🎫 -
🚞 bin			
🚞 cmd			
interes interes			
🗖 test_Data			
			- 1
-ile name:			Upen
Files of type: Execut	ables (*.abs; *.elf)	•	Cancel
Advanced Command	ls		
Load Code	Load Symbols	Verify Code	
- Open and Load Cod	e Options		
Automatically en	ase and program into	FLASH and EEPROM	
Verifu memoru in	age after loading cor	le .	
Complete ima	ne		
C East but a of a	ge sale loaded block (fee	tool.	
 Prist byte or e 	ach loaded block has	uen)	
🗖 Run after succe	ssful load		
Stop at Funct	ion -		
		10	

Double click on the **bin** subfolder to reveal Full_Chip_Simulator

oad Executa	ble File	? ×
Look in: 📔	i bin 💌 🗢 🔁 🕻	*
Full_Chip_	Simulation.abs	
File name:	Full_Chip_Simulation.abs	Open
Files of type:	Executables (*.abs; *.elf)	Cancel
Advanced	Commands	
Load Co	de Load Symbols Verify Code	
_ Open and I	pad Code Options	
Autom	atically erase and program into FLASH and EEPROM	
- Verifu	nemori image after loading code	
C Com	nlete image	
C Enst	bute of each loaded block (faster)	
111.00	ayte of eden loaded block (raster)	
🗖 Run al	ter successful load	
🗖 Stop	at Function	

The next step is to setup erasing and programming. Click on **MONITOR-HCS12** menu, then select Communication... as shown.

📙 True-Time Si	mulator & Real-Time Debugger C:\	test\test\Full_Chip_Simulation.ini				· · · ·
File View Run	MONITOR-HCS12 Component Source	e Window Help				
niela	Load Ctrl+L					
	Reset Ctrl+R					
S Source	Setup			Assembly		
HC12 C:\test	Communication	Lin	e: 16265	HC12 Entry		100
main:	Select Derivative			C000 LDS #844	8	_
Entry:	Command Files			C003 ANDCC #239 C005 LDX #1		
	Debugging Memory Map	initialize the stack noint	er	C008 STX 0x21	00 •abs = 0xC01B	
	Trigger Module Settings	enable interrupts		COOD STD 0x21	02	
EndlessLoo	Bus Trace			COID LDX 0X21	00	-
	Select Core	X contains counter		Register		
CouterLoop	: 2754 Countrol			HC12		Auto
	SIX Councer	; updace giobai.			0 B 0	
			/// النت	IX 0 IY	0	
🔂 Data				IP COOO PC	COOO PPAGE FE	
HC12	jmain.dbg	Auto Symb	Global	SP 4000 IPL	0 CCR SXHINZVC	
Counter -	-16869 int			EPAGE FE GPAG	E O DIRECT O R	PAGE FD
FiboRes	-7051 int					
						1-1-1
				P Procedure		
				HC12		
Command				Entry ()		
Commente						
Startun co	mmand file does not exist.			Memory		
Target Rea	dy				Auto	
Preload co	mmand file does not exist.				, Auto	
Postload c	ommand file does not exist.) 05 00 00 00) 00 00 FF FF	: 7
in>				000090 00 00 00 00	00 00 00 00	
			<u> </u>	000098 00 00 00 00	00 00 00 00	••
	14	10 V. 10 V.		10000A0 00 00 00 00		·· 🔟
	Automatic (break	points, watchpoints, and trace possible)		MC9512XDP512	Target Ready	1

Select the COM port that is available on your PC. In this example it is COM1

Monitor Setup	×
Monitor Communication Load Options	- 25
HOST Serial Communication Port:	
Please select in this dialog the serial communication port used to connect to the hardware.	
HOST Serial Communication Port:	
Communication protocol	
Show Monitor TX/RX	
OK Cancel	

Next click on the Load Options tab as shown. Check the *Enable Automatic Erase Flash on Load* as shown.

onitor Setup		
Monitor Communication	Load Options	
Application Loading 0	ptions	-
Enable Automatio	c Erase Flash on Load	
By default, the Monit when a load is perfor To disable this featur	or DLL will automatically erase the med. e, uncheck the checkbox.	flash
	ОК	Cancel

Make sure the board's Run/Load switch is in the Load position. Then apply power, or press the RESET button on the module if it is already powered up. Press *OK* to continue.

The MCU will be erased then programmed. At the end of erase and programming the True time Sim will display the code, as shown.

Sile View Rup MONI	or & Real-Time Debugger	C:\test\test\Full_Chip_Simulation.in	i		*B_D×
		국 국 국 구] 🏵			
Source				Assembly	- D X
HC12 C:\test\test\bir	n\main.dbg	L	ine: 16266	HC12 Entry	
Entry:			×	COOO ORCC #16 COO2 LDS #844 COO5 LDY #330	8
LDS CLI Endlessloon:	#SEG_END_SSTACK	; initialize the stack poin ; enable interrupts	nter	C008 LDAB #127 C00A STAB 0x10 C00C LDX #435 C00F LDAB #251	2
LDX	#1	; X contains counter			×
CouterLoop: STX BSR	Counter CalcFibo	; update global.		Register	Auto
			ار ا	IX 0 IY	0
Data	main.dbg	Auto Syn	ib Global	IP C000 PC SP 4000 IPL	COOO PPAGE FE O CCR SXHINZVC
Counter 15899 FiboRes 3328	int int			EPAGE FE GPAG	E O DIRECT O RPAGE FD
				P Procedure	×
				Fature ()	
in Command				Encry ()	
MC9S12XDP512 fi	rst silicon revision	backward compatibility engage	<u>م</u>	Memory	_ _ _×
Startum command	file does not evist			1	Auto Logical
Target Ready	THE GES HOU EXIST.		-	000080 OF OF 00 20 000088 80 00 00 00	0 05 00 00 00
in>			-		
•				00000A0 00 00 00 00	00 00 00 00
For Help, press F1	Automatic (br	eakpoints, watchpoints, and trace possible)	MC9512XDP512	Target Ready

This concludes the demonstration.