first try – Introduction to TI Code Composer Studio v7 IDE and

TI TMS320F28027 Piccolo Microcontroller

NOTE: THIS DOC IS WRITTEN ASSUMING A LAUNCHPAD IS BEING USE; IF YOU HAVE ANOTHER PLATFORM, THERE SHOULD BE ONLY MINOR DIFFERENCES TO WATCH OUT FOR

NOTE: THIS DOC IS WRITTEN ASSUMING CCS VERSION 7; IF YOU ARE USING AN EARLIER VERSION THERE SHOULD BE ONLY MINOR DIFFERENCES TO WATCH OUT FOR

In this lab you will learn how to:

- Create a Project in Code Composer Studio v7 that is targeted for the TMS320F28027 Piccolo LaunchPad
- Create a C code .c Source File for your Project by using the Editor
- Build (Compile and Link) your code to generate an executable .out file
- Launch the Debugger and Load the executable into processor RAM
- Observe the assembly code that corresponds to your C code
- Observe the 28027_RAM_Ink.cmd file to see how the various section of memory are allocated
- Find where the linker places the initialized and uninitialized sections of code and variables by viewing the memory map .map file
- Set a breakpoint and jump through your code
- Single step through your code
- Observe the local variables in the Variables window

You are to submit:

Answers to any questions that are posed in this handout or on the whiteboard. (In your document that you submit, repeat the question above each answer and list them in the same order as presented in this handout.)

Plug In Your LaunchPad

Connect your LaunchPad to a working USB port on the PC via an extender cable.

A new LaunchPad should flash the four blue LEDs in sequence and red LED should be on.

Creating a New Project

Double-click on Code Composer Studio v7 icon

Do not install any "newly discovered products" (at least for this lab) \rightarrow cancel

Clipse Launcher	×
Select a directory as workspace Code Composer Studio uses the workspace directory to stor	re its preferences and development artifacts.
 Workspace D:\Work\TI\Code Composer □ Use this as the default and do not ask again ▼ Recent Workspaces 	▼ <u>B</u> rowse
workspace v7	OK Cancel

Select a workspace (do "File-Switch Workspace-Other) if a window didn't automatically pop up)

e.g. D:\Work\TI\Code Composer

 \square Use this as the default and do not ask again ightarrow uncheck if this appears

ОК

You can close "Getting Started" window or "Resource Explorer" window or "CCS App Center" window if any comes up

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Create a new CCS project:

Configure new project (fill in information as shown):

😵 New CCS Project	
CCS Project Create a new CCS Project.	
Target: 2802x Piccolo	 ▼ TMS320F28027 ▼
Connection Texas Instruments XDS100v1 USB Debug	Probe ▼ Verify
🖆 C28XX [C2000]	
Project name: first_try	
Use <u>d</u> efault location	
Location: C:\work\TI\Code Composer\fire	st_try Browse
Compiler version: TI v16.9.5.LTS	▼ <u>M</u> ore
 Project templates and examples type filter text Empty Project Empty Project (with main.c) Empty Assembly-only Project Empty RTSC Project SYS/BIOS Empt TI Target Examples System Analyzer (UIA) 	Creates an empty project fully initialized for the selected device.
Open <u>Resource Explorer</u> to browse a wide selection of	example projects Next > Finish Cancel

Finish

Project "first_try" (Click View-Project Explorer if necessary)



Configure project for "Debug" and set "first_try" as the Active Project

pe filter text	General			
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	Compiler version:	TI v16.9.5.LTS	•	More
	Output type:	Executable	▼	
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	Runtime support library	; <automatic></automatic>	•	Browse

if not already set up (right-click name of project to access Build Settings)

Create new source file called "main.c" (right-click name of project to access menu)

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Use the Editor to enter the code exactly as shown below

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	<pre>19 20 c = 0; 21 for(i = 0; i < length; i++) 22 { 23 c += array[i]; 24 } //endfor 25 26 return c; 27 } //endadd</pre>

Code Composer - CCS Edit - first_try/main.c - Code Composer Studio File Edit View Navigate Project Run Scripts Window Help 📑 👻 🔚 🕼 🔦 🕶 💋 🖆 New CCS Project... Mew Energia Sketch... 🏊 Project Explorer 🙁 ain.c 🖾 Examples... ▲ Ist first_try [Active - Del] nt add(void); Build Project 🧲 ⊿ 🔊 Includes nt array[] = {0, 2, 4, 6, 8}, length; Description Descripti Description Description Description Description Descr Ctrl+B > id main(void) 🕒 first_try **Build Configurations** Debug
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 length : int
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Try to Build Project (i.e., Compile & Link) the code

Observe any warnings and/or errors in the Problems window

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Fix any warnings or errors

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: : C /first_try/main.c			

Build the code again

Observe the executable .out file that has been generated

Try inserting a syntax error into the code that will cause an error (not just a warning) and Build again and see if a new .out file is created

Launch the Debugger

 (the executable will be loaded into the target processor)

 Code Composer - CCS Edit - first_try/main.c - Code Composer Studio

 File Edit View Navigate Project Run Scripts Window Help

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The Perspective (the view) changes from "Edit" to "Debug"

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The Program Counter has been set to point to the beginning of main

You can look at the C code and the corresponding Assembly¹ code at the same time

You can change back to the Edit Perspective by clicking here

¹ If not already open, use View-Disassembly to open the Disassembly window.

(D) (C)



In the Edit Perspective, Look at the Linker Command File

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Observe the four sections of interest

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Look at the Memory Map .map File

Observe the locations of the four sections of interest

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A 28027_RAM_Ink.cmd	56 .reset	0	003fffc0	00000002	DSECT
a c man.c	57	1.0	003fffc0	00000002	rts2800 ml.lib : boot28.obj (.reset)
erray: int[]	58				
length : int	.stack	1	00000400	00000300	UNINITIALIZED
add(void) : int	60		66666466	00000300	HOLE
main(void): void	61				
2010-0111-0120-0111-0120	ebss.	1	00009900	00000010	UNINTIALIZED
	6.2		00000900	00000006	main.op) (.eps)
	65		00003900	00000000	· lock old (else: lock)
	66		0008898e	80000002	: lock.obj (.ebss: unlock)
	67				
	-			-	
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	CD1 Build Consol	e (first_t	vi.		3 items
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	"C:\\ti\\ccsv	7\\ut1	ls\\bin\\gmai	ce" -k -1 4 a	11 -0
	gmake[1]: 'fi	rst_tr	y.out' is up	to date.	

Explain the differences between the four memory sections of interest. Point out any differences between them when the program is loaded into processor RAM versus processor Flash.

Code Composer - CCS Edit - first_try/Debug/firs	t_try.map - Code Composer Studio	
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loo sources.mk	128 0 00000050 cinit_	
lasubdir_rules.mk	130 abs ffffffffinit	
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	142 0 0000808b _add	
	1431 00008901 _array	
	146 0 00008056 exit	
	147 1 00008900 _length	
	148 0 0000807d _main	
	149.0 000080e8 _memcpy	*
	4	•
	CDT Build Console [Inst_dy]	
	**** Build of configuration Debug for project first try	h Loc

	"C:\\ti\\ccsv7\\utils\bin\\gmake" -k -j 4 all -0	
1 1	amskall: 'first try out' is up to data	
	Writable Insert 31:1	
L		

Observe locations in memory of variables and functions

Why aren't the variables "average", "i", and "c" in the list?

In the Debug Perspective, Set a Breakpoint (e.g. in the **for** loop in **add()**

You can change back to the Debug Perspective by clicking here

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Debug 31		*	00+ Variables 22 Rg Ex	pressions IIII Reg	gisters		() 4 8 [[] 년 () 7 7 7
first_try [Code Comp	oser Studio - Device Debugging]		Name	Type	Value	Location	
Prevas Instruments main() at main _args_main() at c_int00() at bo	xDS100v1 USB Debug Probe/C28xx (Suspen xc6 0x0007D t args_main.c61 0x00811D ot28.asm:261 0x008052 (the entry point was	led - SW Breakpoint) reached)	(v)+ average	int	0	0x00000403@Deta	
main.c 22 28027_RA	Mjink.cmd 🔛 first_try.map	- 0	Disessembly 22		1	inter location here	
2	Breakpoint (Code Composer Studio)		Breakpoint	4008	SP, #2		
Sint array[] = {	nney[] = (Open Declaration FB		Hardware Breakpoint	izeof(arr	ray);		
void main(void)	Cut	Ctrl+X	Pardware watchpoint	HOVE	(0x0, 4	10×05, UNC	
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average - z 🗸	Use Spaces for Tab		005887: 00C080C	6 FFC	XAR7, 1	ISSOIV	
2	Declarations		13 for(;	;); //infinite	e loop	1. 100	
<pre>for(;;); //</pre>	References		(SL1:				
<pre>4 } //modealr 6</pre>	Search Text		00505a: 6F00	58	C\$L1, U	INC	
int add(void)	Search rea		add():				
· · · · · · · ·	Run to Line	Ctrf+R	00808b: FE02	ADDB	SP, #2		
,	Move to Line		20 c = 0 00505c1 2842	HOW	*-SP[2]	. #8	
0 C = 0; 17	Add Watch Expression		21 for(i	= 0; i < len	gth; i++)		
1 tor(1 = 0;	Preferences		00505d; 2541 05585c; 7615822	A MOV	-SP[1]	, #0	
C +x all my			005090: 9200	MOV	AL, BO	00	
1 } //endfor			000001: 5441	CHIP	AL, *-9	P[1]	
f return c;			005093: 3801	SETC	501	10	
7 } //endadd			923 c	+= array[i];			
• · · · · · · · · · · · · · · · · · · ·			C\$L2:	1 500621	VARA .	0.002001	
			605096: A8A9	HOVE	BACC,)	CAR4	
			005097: 8141	ADD	ACC, *	SP[1]	
			000090: 8AA9 000099: 9204	MOVL.	XAR4, (ACC (ARATE)	
			00809a: 7242	400	*-SP[2]	, AL	
			21 for(1	= 0; i < leng	gth; 1++)		

Code Composer - CCS Debug - first_try/main.c - Code Composer Studio		and the second		-	
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🎋 Debug 🛿 🧏 🗸 🖓 🗖 🗖	(x)= Variables 60 Expression	ns 📲 Registers 😡 Brea	akpoints 😒	💣 🕶 💥 💥 🤐 👻 🔌	
# Irst_try [Code Composer Studio - Device Debugging]	Identity	Name	Condition	Count	Action
 ▲ de leas instruments XUS100/1 USB Debug Probe/C28xx (Suspended - SW Breakpoint) ■ main() at main.cc 6000807D ■ args_main() at args_main.cs81 0x00811D ■ c_int00() at boot28.asm/261 0x008052 (the entry point was reached) 	🛛 🔽 🥬 main.c, line 23 ((Breakpoint		0 (0)	Remain Halted
i main.c ⊠ i 28027_RAM_Ink.cmd i first_try.map □	₩ Disassembly 🛙		Enter location here		③ ☐ ≝ ▼ □ □
<pre>1int add(void);</pre>	main():				•
<pre>3 int array[] = {0, 2, 4, 6, 8}, length; 4 5void main(void) 7 int average; 9 length = sizeof(array); 10 average = add() / length; 11 average = awerage; //suppress warning 12 for(;;); //infinite loop 14 } //sedmain 15 int add(void) 17 { 18 int 1, c; 19 c = 0; 21 for(1 = 0; i < length; i++) 22 c <= array[1]; 23 //endfoc 25 return c; 27 } //sedmaid</pre>	0 0 9 length 1 761F0224 0 0 average 0 0 0 average 0 0 0 average 0 0 0 0 0 average 0 0	ADDB SP, sizeof(array); MOVW DP, MOVB @0x0 = add() / length; LCR add MOVW DP, MOV AH, FFC XARA MOVSP () i < length; MOVSP MOVSP () i < length; MOV AL, CNP AL, SB C\$L1 MOV AL, CNP AL; B C\$L3 SETC SXM MOVL XAR4 MOVL XAR4 MOVL XAR4 MOVL XAR4 MOVL XAR4 MOVL XAR4 MOV AL, ADDSP () i < length; I+1) MOV AL, ADDSP () i < length; I+1) () I < length; ()	#2 #0x224 #0x224 @0x0 @0x0 [1], AL , UNC #2 [2], #0 [1], #0 #0x224 @0x24 @0x24 @0x24 @0x24 @0x24 @0x24 @0x24 @0x24 @0x24 @0x24 #		
★ > 1	4	* ch		<u>R</u>	•
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CCS Debug - first_try/main.c - Code Composer Studio . _ 0 <u>_ X</u> <u>File Edit View Project Tools Run Scripts Window Help</u> 📑 र 🔄 🔞 🖉 🔅 र 🗔 % 🖉 र 🔊 🐑 💣 र 🔗 र 😭 🎭 CCS Debug 📑 🕻 🐃 - -🕸 Debug 🛙 🔌 🕪 🗉 📕 🎘 👁 🚴 👁 🥀 🌸 🗸 🍪 🖉 🖓 🖓 🖓 🛛 🖗 first_try [Code Composer Studio - Device Debugging] 💣 🕶 🗶 🎇 🌮 😔 🔌 🗏 🖻 🚍 🛸 🍸 a 🔊 Texas Instruments XDS100v1 USB Emulator/C28xx (Suspended - SW Breakpoint) Name Count Identity Condition Action add() at main.c:23 0x00805A 📝 🥷 main.c, line 2 Breakpoint 0 (0) **Remain Halted** main() at main.c:10 0x00804B _args_main() at args_main.c:92 0x0080A3 (_args_main has only skeletal debug info) ~ - 8 🚺 main.c 🛛 Enter location here Disassembly 🔀 1 int add(void); 9,23 c += array[i]; C\$DW\$L\$_add\$2\$B, C\$L2: * int array[] = {0, 2, 4, 6, 8}, length; 0805a: SXM 3B01 8F008901 SETC XAR4, #0x008901 ACC, *-SP[1] @XAR4, ACC AL, *+XAR4[0] *-SP[2], AL 00805h MOVI 008050: 00805d: 00805e: 008060: 008061: 8541 560100A4 92C4 MOV ADDL MOV 5 void main(void) II int average; 7242 ADD length = sizeof(array); average = add() / length; average = average; //suppress warning 21 for(i = 0; i < length; i++) INC *-SP[1] 10 008062: 0A41 INC MOV 9200 5441 62F5 AL, @0x0 AL, *-SP[1] C\$L2, GT 008063: 008063: 008064: 008065: 26 CMP SB 12 13 for(;;); / 14 } //endmai 15 16 int add(void) for(;;); //infinite loop } //endmain return c; C\$DW\$L\$_add\$2\$E, C\$L3: ...+2 MOV } //endadd FE82 AL, *-SP[2] 008066: 27 { int i, c; 008067: 008068: 18 SUBB SP, #2 0006 I\$\$DIV: LRETR c = 0; for(i = 0; i < length; i++)</pre> 008069: MOVZ AR4, @AH 5CA8 71A9 AR4, @AH AH, @AL @AR6, AH SXM ACC, @AL ACC AR5, @AL ACC, @AR4 00806a: 00806b: XOR i c += array[i]; 23 97A6 MOV 3B01 85A9 FF56 5DA9 85A4 SETC MOV ABS MOVZ } //endfo 00806c: 00806d: 00806e: 00806e: 00806f: 008070: return c; } //endadd MOV 008071: FF56 ABS ACC 📫 🖹 🛛 Licensed : 74 🛙

Run or Resume until Breakpoint encountered

		Single	Step			
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Code Composer - CCS Debug - first_try/mein.c - Code Composer Studie		A AND THE CALLER	sume A	all wanted and		
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□•₩0 \$• ₽ 0 \$• ₹• 0 >==(,,)>.#		8 · B D · C	·		Qu	ick Access 🗧 🗃 🖏 🚱
Debug 30 Step Into (FS)	FD	00- Variables 🕂 Expressio	ns III Registers 4	a Breakpoints II	· XEBGX	HES SED
# 😨 first_try (Code Composer Studio < Device Debugging)		Identity	Name	Condition	Count	Action
Press Internets: ISS100-USB Debug Probe/C28x (Supported - SW Be End 004 memin:C20 000004 main() at main:C10 000004 main() at main:C10 000010 cjint00 at boot22.sum201 0.000110 cjint00 at boot22.sum201 0.000152 (the entry point was reached)	akpoint)	7 & main.c, line 23 (l	Breakpoint		0.01	Remain Halted
👔 main.c 💷 🍃 28027, RAM jink.cmd 🛛 first, try.map		E Disassembly 22		Enter location here	() 6 6 3 3 3.	
<pre>ist arroy[] = (0, 2, 4, 6, 6), length; Svid mat(vid) {</pre>		• 000000000000000000000000000000000000	NOVL ACO ACO NOVL ACO NOVL NOV NOV ACO NOV ACO NOV ACO NOV ACO NOV ACO NOV ACO NOVL ACON NOVL NOVL N	0.044, messenses 0.044, messenses (C. 2001) Xana, pacci (A), *x0A4(a) (-1), A, (-1), A, (-2), (1) (-2), A, (-2), (2) (-2), A, (-2), (2) (-2), (2), (2) (-2), (2), (2), (2) (-2), (2), (2), (2), (2),		
- E.		1000-d. (1717	1990	are avens		, *
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Observe Local Variables in "Variables" Window

				Yell	<mark>ow</mark> m	eans the v	value	has upo from the	lated (ch e previou	ianged) is value
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t≱ Debug ⊠	* ▽ - □	(×)= Variables	🛛 🙀 Expre	ssions 1919 Reg	gisters 💁 🛙	Breakpoints		‱ ⇒ta	8 1 2 2	~
a 💱 first_try [Code Composer Studio - Device Debugging]		Name		Туре	Value	Location				
Texas Instruments XDS100v1 USB Debug Probe/C28xx (Suspende add) at main cv22.0-000004	d - SW Breakpoint)	(×)= c		int	6	0x00000408@Data				
main() at main.c:25 0x008084		(x)= i		int	3	0x00000409@Data				
_args_main() at args_main.c:81 0x00811D										
c_int00() at boot28.asm261 0x008052 (the entry point was re	ached)									
🖻 main.c 🔀 🍃 28027_RAM_Ink.cmd 📄 first_try.map		🔜 Disassem	bly 🔀			Enter location here	ß	8 A SQ	3. 🔿 📑 🖻	~
<pre>1int add(void);</pre>	*		C\$L2:							^
2 3 int array[] = {0, 2, 4, 6, 8}, length;		♥ 008094: 008096:	A8A9	MOVL	@ACC	, #0X008901 , XAR4				
4 Evoid main(void)		008097:	8141	ADD	ACC,	*-SP[1]				
6 {		008098:	8AA9 92C4	MOVL	AL,	, @ACC *+XAR4[0]				
7 int average;		00809a:	7242	ADD	*-SP	[2], AL				
<pre>o length = sizeof(array);</pre>		21 00809b;	for(1 = 0A41	0; 1 < leng INC	gth; 1++) *-SP	[1]				E
<pre>10 average = add() / length;</pre>		00809c:	9200	MOV	AL, (00×0				
11 average = average; //suppress warning 12		00809d:	5441 6256	CMP	AL, '	*-SP[1]				
<pre>13 for(;;); //infinite loop</pre>		26	return	c;	CPL2	, 01				
14 } //endmain		002005.	C\$L3:	MOV		* 50[2]				
16 int add(void)		27	9242 } //end	add	AL,	-SP[2]				
17 {		0080a0:	FE82	SUBB	SP, ‡	#2				
18 int 1, C; 19		0080a1: 50	0006 {	LRETR						
20 c = 0;			copy_in():							
21 tor(1 = 0; 1 < length; 1++) 22 {		0080a2:	B2BD AABD	MOVL	*SP+- *SP+-	+, XAR1 + XAR2				
23 c += array[i];		0080a4:	A2BD	MOVL	*SP+-	+, XAR3				
24 } //endfor		0080a5:	FE08	ADDB	SP, 4	#8				
26 return c;		0080a6: 0080a7:	5ACB	MOVE	AR2.	, шляка *+XAR3[1]				
27 } //endadd		53	for (i =	0; i < tp-:	>num_recs	; i++)				
28		0080a8:	D100 6E15	MOVB	XAR1	, #0x0				
		55	COPY_	RECORD crp =	= tp->rec:	s[i];				
		0020	C\$L1:	MOV/7	40.5	Acp				
		0080aa: 0080ab:	2901	CLRC	SXM	-vew				
		0080ac:	560303A1	MOV	ACC,	@AR1 << 3				
	-	0080ae:	DC88	SUBB	XAR4	, #8				-
<) - F		<							•
							82			

Observe values changing when you Single Step

or Run(Resume)-Breakpoint-Run(Resume)-Breakpoint...

			Te	ermir	nate					
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ts Debug 🖂	Termina	te (Ctrl+F2)	(x)- Variable	s 23 of Expre	ssions IIII Re	gisters 💁 B	reakpoints	20 4年1		000
\$ \$ first_try [Code Composer Studio - D: \$ \$ Texas: Instruments XDS1004, US\$ \$ \$ Texas: Instruments XDS1004, US\$ \$ \$ addl) at main.c23 0.000894 \$ main() at main.c20 0.000894 \$ main() at may, main.c2 \$ c_int000, at ang, main.c2 \$ c_int000, at boot28.asm/261 0	avice Debugging] Debug Probe/C28xx (Suspende 11 0x00811D x008052 (the entry point was re	d - SW Breakpoint) sched)	Name Dai c Dai i		Type int int	Value 12 4	Location 0x00000408@Data 0x00000409@Data			
main.c 13 28027_RAM_Ink.cmd 1 int add/yoid):	irst_try.map		🕎 Disasser	nbly 🛙			Enter location here	1) (1)	2.9 11 5	1
<pre>int array[] + {0, 2, 4, 6, 0} int array[] + {0, 2, 4, 6, 0} ivoid main(void) if { int average; urray[] + sizeof(array); wordsg - add() / length; wordsg - add() / length; int average; if or(j;); //infinite loop for(j;); //infinite loop for(j</pre>	, length; ress warning +)		 000041: 000040: 000040: 0000490: 0000490: 0000490: 0000490: 0000490: 0000490: 20 0000490: 0000490: 26 0000490: 0000401: 50 0000401: 0000401: 50 0000401: 0000401: 53 0000401: 53 0000401: 55 0000401: 0000401: 55 	BF083591 A6A0 8141 84A9 92C4 7242 7242 7242 7242 7242 7242 7242 7	MOVL ADD MOVL MOVL MOVL MOVL MOV MOV MOV SIDE MOV ADD SUBE LRETR MOVL MOVL	XARA, @ACC, XARA, acC, XARA, acC, XARA, acC, XARA, acC, AL, " CS12, AL, " CS12, AL, " SP, = "SP++ "SP+	PaceBog91 XA04 *.sp[1] gACC +XA04[0] 2], AL 1] brd 57 [2] 2 , XA01 , XA02 , XA03 gCAA g			

0.000 -1000	-	Connect Target	Ctrl	Alt-C	D 🔁 🔹 🕹	e - 3.	0					Quick Acce	55 E	8 I I I I I
to Debug 😂		Disconnect Larget	Cth	AR+D	les 12 Of Expres	sions IIII R	legisters 00 l	Breakpoints			to ote 1	al ra re	10	
a 🐨 first try ICode Composer Stu	2	Nettore beoug state		745+1	and a second second	Turne	Value	Incation				and the second		
a 🧬 Texas Instruments XDS10	8	Load				int	12	0-00000408/20.044						
add() at main.c:23 0x0		Resume		F8		int	4	0x00000409@Data						
main() at main.c10 0	111	Suspend		Alt+F8										
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iel main.c 🔅 🌛 28027_RAM_Ink.	1	Stepleto		IS T		S		Enter location here		20	25 165	3.31	3.6	A P C
lint add(void);	2	Shap Churc		66	C\$L2:	44/74 (1)	VIDA	60.000003						
] int array[] = {0, 2, 4,	-	Accemble Stee Inte	Chil-S	10	A8A9	MOVL	BACC	XAR4						
4	2	Assembly step into	Cui+a		8141	ADD	ACC,	"-SP[1]						
5 VOID MAIN(VOID)	1	Assembly step over	C01+3	nat+ro	9204	MOVE	XAR4	WARGE AND A LONG						
7 int average;	-12	Step Return		*/	7242	ADD	*-SP	[2], AL						11
a length - sizeof/acc		Eun to Line		Ctrl+R	for(1 =	0; 1 < le	ngth; 1++)							
10 average = add() / le		Free Run		Ctrl+F8	9286	MOV	AL,	B0x0						1
11 average = average; /		Step Into Selection		1	5441	CMP	AL,	-SP[1]						
13 for(11); //infinite		Clock			62F6	SD	C\$L2	, GT						
14 } //endmain		Advanced			C\$L3:	,								
15		- sources		1000	9242	MOV	AL,	*-5P[2]						
17 (8	Debug		F11	FEB2	SUBB	SP. 1	#2						
18 int i, c;		Debug History			0006	LRETR								
20 c = 0:		Debug As			(in():									
<pre>21 for(i = 0; i < lengt</pre>		Debug Configurations			8280	MOVE	*SP+-	, XAR1						
22 {					AABD	MOVIL	*5P+	, XAR2						
24 } //endfor		Toggle Breakpoint	Cbl+	shift+B	FEES	ADDB	SP.	AANS a						
25	8	Skip All Breakpoints	Ctrl	-AR-B	8244	MOVL	XAR3	BXAR4						
20 return c; 27 } //epdadd	-14	Remove All Breakpoints		- 1	: SACB	MOVZ	AR2,	**XAR3[1]						
28		Breakpoint Types		- 21	: D100	MOVB	XAR1	6x6a						
		New Breakpoint (Code Composer Studio)			: 6F15	50	C\$L3	LINC						
	-			>>	COPY_R	ECORD crp	= tp-prec	s[1];						
				0000aa	SCAD	MOVZ	AR4,	@SP						
				0000ab	2981	CLRC	5301	A181 44 3						
				0050ac	DC88	SUBB	XAR4	#8						10
				6500-2		400-	100	BUINS.						
									162					
2000									17.0	7				

Reset Processor

How can you set the Program Counter back to the beginning of main after you Reset the processor?

What is the difference between Reset and Restart?

Code Composer - CCS Debug - first_try/main.c - Code Composer Studio	the same	th Chapter	a harden	Aat	And in case	STATISTICS. SAME	
r Edit View Project Tools Run Scripts Window Help							
) • 🗟 🖏 • 🖉 🖾 🕸 • 🚀 • 🖾 🕒 🖷 🙇 🐟 .e 🕮 🚺	0 💩 - 🕷	010	s 🖌 +i a. k	3)		Q	uick Access 🔡 😰 🐯
Debug 🐹 🧏 👻 🖛 (Do-Variable	es 🐴 Expressio	ons IIII Registe	rs 🗣 Brea	kpoints 👯	 I = 1 = 2 = 3 I = 1 = 2 I = 2<!--</th--><th></th>	
G first_try [Code Composer Studio - Device Debugging]	Identity		Name		Condition	Count	Action
Texas Instruments XDS100v1 USB Debug Probe/C28xx (Suspended - SW Breakpoint)		main.c, line 23 ((C Breakpoint			0	Remain Halted
add) at main.c.23 0x00094					Breakpoint (Code C	Composer Studio)	
args main() at args main.c810x00811D				67	Go to File		
c_int00() at boot28.asm:261 0x008052 (the entry point was reached)					T-CALL.		-
					Enable		
					Disable		
					Remove		
main.c 🖾 🍃 28027_RAM_Ink.cmd 👔 first_try.map 🦈 🗖	Disasse	mbly 🖾		- R	Remove All		000 0
1 int add(void); -		C\$L2:			Select All	Ctrl+A	(a)
2 The second - (0, 2, 4, 4, 6) to second	\$ 883894:	85008901	MOVE	1 10	Copy	Ctrl+C	
4	0050961	8141	ADD	- <u>5</u> -9	Paste	Ctrl+V	
5 void main(void)	003098:	8449	MOVIL	1.59	Attach Breakpoint 1	To Debug Context	
6 (7 int average:	00100+	9204	MOV	1	Reset Counter		100
8	21	for(i	= 0; i < leng	th; 🐑	Refresh		
<pre>9 length = sizeof(array); 0 accesses = add() / langth;</pre>	008095:	0441	INC	1.0			1
average = average; //suppress warning	= 00809d:	5441	CMP	10.	Import Breakpoints	han	
2	00309e:	62F6	58	(- 0	Export Breakpoints.	-	
4 } //endmain	26	(SL):	c;		Breakpoint Properti	es	
5	00809f:	9242	MOV	AL,	*-SP[2]		
() Int add(vold)	27	} //ent	SUBB	50.	#2		
8 int 1, c;	6638a1:	0005	LRETR	~ *			
3	58	(
<pre>for(i = 0; i < length; i++)</pre>	0088852:	8280	MOVE	*SP+	+, XAR1		
2 (an annaulil:	005003:	AABD	MOVIL	*59+	+, XAR2		
4) //endfor	0030341	FE08	ADDB	50,	#8		
5	0080a6:	82.44	MOVL	XAR3	, @XAR4		
return c; (7) //endadd	0050a7:	for (1 -	MOVZ	AR2,	"+XAR3[1]		
18	005045:	D100	MOVE	XAR1	, #8x8		
	000089:	6F15	SB	CSLJ	, UNC		
		C\$L1:	"uccount cub a	- sp. n ec			
	0000aa;	SCAD	MOVZ	A84,	(SP)		
	0050301	560303A1	MOV	ACC.	BAR1 << 3		
	0000ae;	DC88	SUDD	XAR4	, #8		-
4	normal.	4 10112	Arterio	see.	BAVUS		

Turn Off Breakpoint

What is the difference between Disable and Remove?

How much memory does your main.c code (the code you type in) use? Explain how you determined this.

Explore and investigate to find **two more features** (not mentioned in this handout) of Code Composer Studio and document them.