

Question 3 - Instruction Set 3 – x295++

B. Compiling and assembling a C program using our x295++ instruction set

Table 1

C program	x295++ assembly program	x295++ machine code program
z = (x + y) * (x - y)	LOAD x, r0	1010 000 XXX XXXXXX 0000 <Src 12 bits>
	LOAD y, r1	1010 001 XXX XXXXXX 0000 <Src 12 bits>
	COPY y, r2	1001 010 001 XXXXXX
	ADD x, r2	0001 010 000 XXXXXX
	SUB x, y	0010 001 000 XXXXXX
	MUL r2, y	0011 001 010 XXXXXX
	STORE y, z	1011 XXX 001 XXXXXX 0000 <Src 12 bits>

C. Evaluating our x295++ instruction set using Memory Traffic criteria

Table 2

x295++ program (1 assembly instruction/ machine code instruction per row)	Fetch (number of word size memory accesses) + Provide an explanation explaining the count	Decode/Execute (number of word size memory accesses) + Provide an explanation explaining the count
Assembly instruction: LOAD x, r0 Machine code instruction: 1010 000 XXX XXXXXX 0000 <Src 12 bits>	Count: 2 Explanation: LOAD format is made of 32 bits (2 words)	Count: 1 Explanation: LOAD instruction accesses memory once, example: - LOAD a, rC = rC <- M[a]
Assembly instruction: LOAD y, r1 Machine code instruction: 1010 001 XXX XXXXXX 0000 <Src 12 bits>	Count: 2 Explanation: LOAD format is made of 32 bits (2 words)	Count: 1 Explanation: LOAD instruction accesses memory once, example: - LOAD a, rC = rC <- M[a]
Assembly instruction: COPY y, r2 Machine code instruction: 1001 010 001 XXXXXX	Count: 1 Explanation: COPY format is made of 16 bits (1 word)	Count: 0 Explanation: COPY instruction does not access memory
Assembly instruction: ADD x, r2 Machine code instruction:	Count: 1 Explanation: ADD format is made of 16 bits (1 word)	Count: 0 Explanation: ADD instruction does not access memory

0001 010 000 XXXXXX		
Assembly instruction: SUB x, y Machine code instruction: 0010 001 000 XXXXXX	Count: 1 Explanation: SUB format is made of 16 bits (1 word)	Count: 0 Explanation: SUB instruction does not access memory
Assembly instruction: MUL r2, y Machine code instruction: 0011 001 010 XXXXXX	Count: 1 Explanation: MUL format is made of 16 bits (1 word)	Count: 0 Explanation: MUL instruction does not access memory
Assembly instruction: STORE y, z Machine code instruction: 1011 XXX 001 XXXXXX 0000 <Src 12 bits>	Count: 2 Explanation: STORE format is made of 32 bits (2 words)	Count: 1 Explanation: STORE instruction accesses memory once, example: - STORE rA, c = M[c] <- rA
Grand Total: 13	Total: 10	Total: 3

Once completed, submit it on Crowdmark as your answer to Question 3.