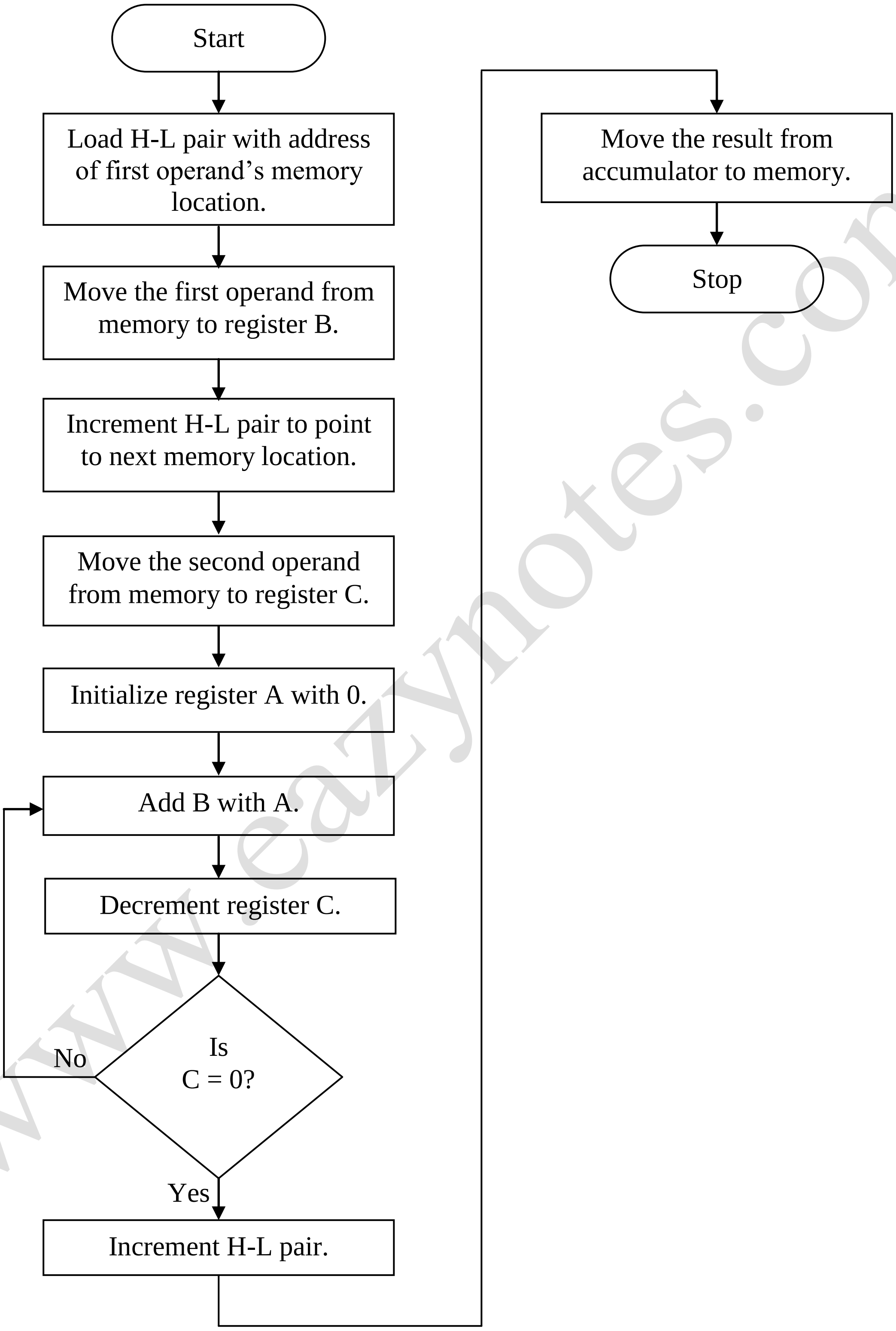
Program 16: Multiply two 8-bit numbers.

Flowchart:


Start
Load H-L pair with address of first operand's memory location.
Move the first operand from memory to register B.
Increment H-L pair to point to next memory location.
Move the second operand from memory to register C.
Initialize register A with 0.
Add B with A.
Decrement register C.
Is C = 0?
No
Yes
Increment H-L pair.
Move the result from accumulator to memory.
Stop

Program:

Address	Mnemonics	Operand	Opcode	Remarks
2000	LXI	H, 3000H	21	Load H-L pair with address 3000H.
2001			00	Lower-order of 3000H.
2002			30	Higher-order of 3000H.
2003	MOV	B, M	46	Move the 1st operand from memory to reg. B.
2004	INX	H	23	Increment H-L pair.
2005	MOV	C, M	4E	Move the 2nd operand from memory to reg. C.
2006	MVI	A, 00H	3E	Initialize accumulator with 00H.
2007			00	Immediate value 00H.
2008	ADD	B	80	Add B with A.
2009	DCR	C	0D	Decrement reg. C (counter).
200A	JNZ	2008H	C2	Jump back to address 2008H if C ≠ 0.
200B			08	Lower-order of 2008H.
200C			20	Higher-order of 2008H.
200D	INX	H	23	Increment H-L pair.
200E	MOV	M, A	77	Move the result from accumulator to memory.
200F	HLT		76	Halt.

Explanation:

- This program multiplies two operands stored in memory location 3000H and 3001H, using successive addition method.
- In successive addition method, the second operand is considered as counter, and the first number is added with itself until counter decrements to zero.
- Let us assume that the operands stored at memory location 3000H is 02H and 3001H is 05H.
- Then, by using successive addition method, we get 02H + 02H + 02H + 02H + 02H = 0AH.
- Initially, H-L pair is loaded with the address of first memory location.
- The first operand is moved to register B from memory location 3000H and H-L pair is incremented to point to next memory location.
- The second operand is moved to register C from memory location 3001H to act as counter.
- Accumulator is initialized to 00H.
- Register B is added with accumulator and the result is stored in accumulator.
- Register C (counter) is decremented by 1.
- Then, counter is checked for zero. If it hasn't become zero yet, then register B is again added with accumulator, and counter is again checked for zero.

- If counter becomes zero, then H-L pair is incremented and the result is moved from accumulator to memory location 3002H.

Output:

Before Execution:

3000H:	02H
3001H:	05H

After Execution:

3002H:	0AH