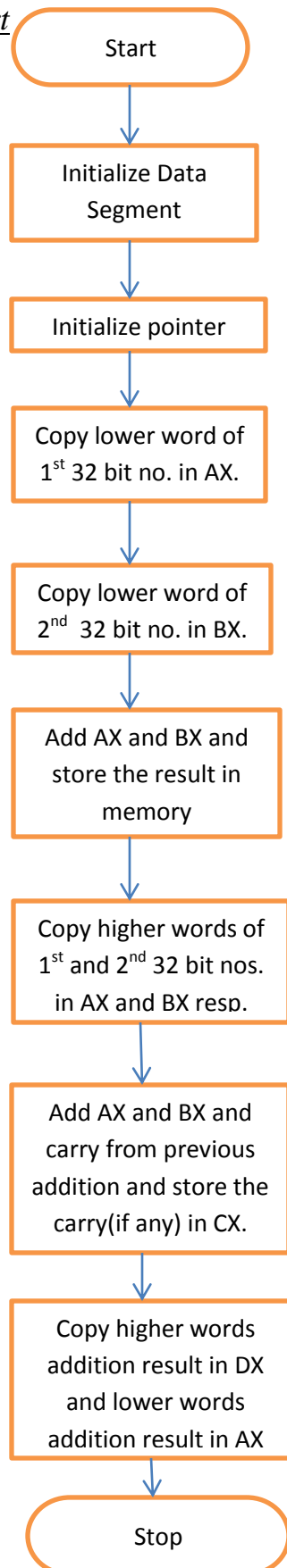


Q. Write an assembly language program to add two 32 bit numbers and also draw the flowchart.----- **10 marks**

Soln. Program:

```
MOV AX,2000H
MOV DS,AX
MOV SI,0000H
MOV AX,[SI]
MOV BX,[SI+4]
MOV CX,0000H
MOV DX,0000H
CLC
ADD AX,BX
MOV [SI+8],AX
MOV AX,[SI+2]
MOV BX,[SI+6]
ADC AX,BX
JNC L2
INC CX
L2:MOV DX,AX
MOV AX,[SI+8]
HLT
```

Flowchart



Explanation: In the above program ,the two 32 bit numbers are stored in consecutive memory locations, i.e. if the **first 32 bit number is 12345678H** and the **second 32 bit number is FFFFFFFFH** then they will appear in the memory in the following way:

<i>Physical Address</i>	<i>Data</i>
20000	78
20001	56
20002	34
20003	12
20004	FF
20005	FF
20006	FF
20007	FF

1. When MOV AX,[SI] is executed , 78 which is located at SI,i.e. address 20000, is copied to AL and 56 which is located at SI+1,i.e. address 20001, is copied to AH.
2. When MOV BX,[SI+4] is executed, FF which is located at SI+4,i.e. address 20004, is copied to BL and FF which is located at SI+5,i.e. address 20005,is copied to BH.
3. When ADD AX,BX is executed , 5678(copied in AX) is added to FFFF(copied in BX).
4. The addition result will be stored AX and if any carry, then the carry flag in the flag register will be set to 1.
5. The AX contents are copied to a memory location with the instruction MOV [SI+8],AX. This forms the lower word of the final result of addition.
6. 34, which is located at SI+2,i.e. address 20002, is copied to AL and 12, which is located at SI+3,i.e. address 20003, is copied to AH, with the help of the instruction MOV AX,[SI+2].
7. FF, which is located at SI+6,i.e. address 20006, is copied to BL and FF, which is located at SI+7,i.e. address 20007, is copied to BH, with the help of the instruction MOV BX,[SI+6].
8. With ADC AX,BX 1234 will be added to FFFF, with any carry generated from the lower words addition(5678+FFFF).

9. Copy the result of addition in DX, which forms the higher word of the final result of addition.
10. Increment the CX register by 1, if any carry is generated .
11. So the final result is read in the following way:

CX	DX	AX
0001	1234	5677

i.e. the final result is 112345677H.