MODEL PRACTICAL EXAM

Batch: 9 **Name:** S Vishakan

Date: 10-11-2020 **Reg. No:** 18 5001 196

AIM:

To write assembly language programs to perform the following:

1. To write an ALP using 8051 to sort a list of numbers in descending order.
2. To write an ALP using 8086 to count odd and even numbers in a list.

PROGRAM – 1: 8051 ALP – DESCENDING ORDER SORT OF A LIST:

ALGORITHM:

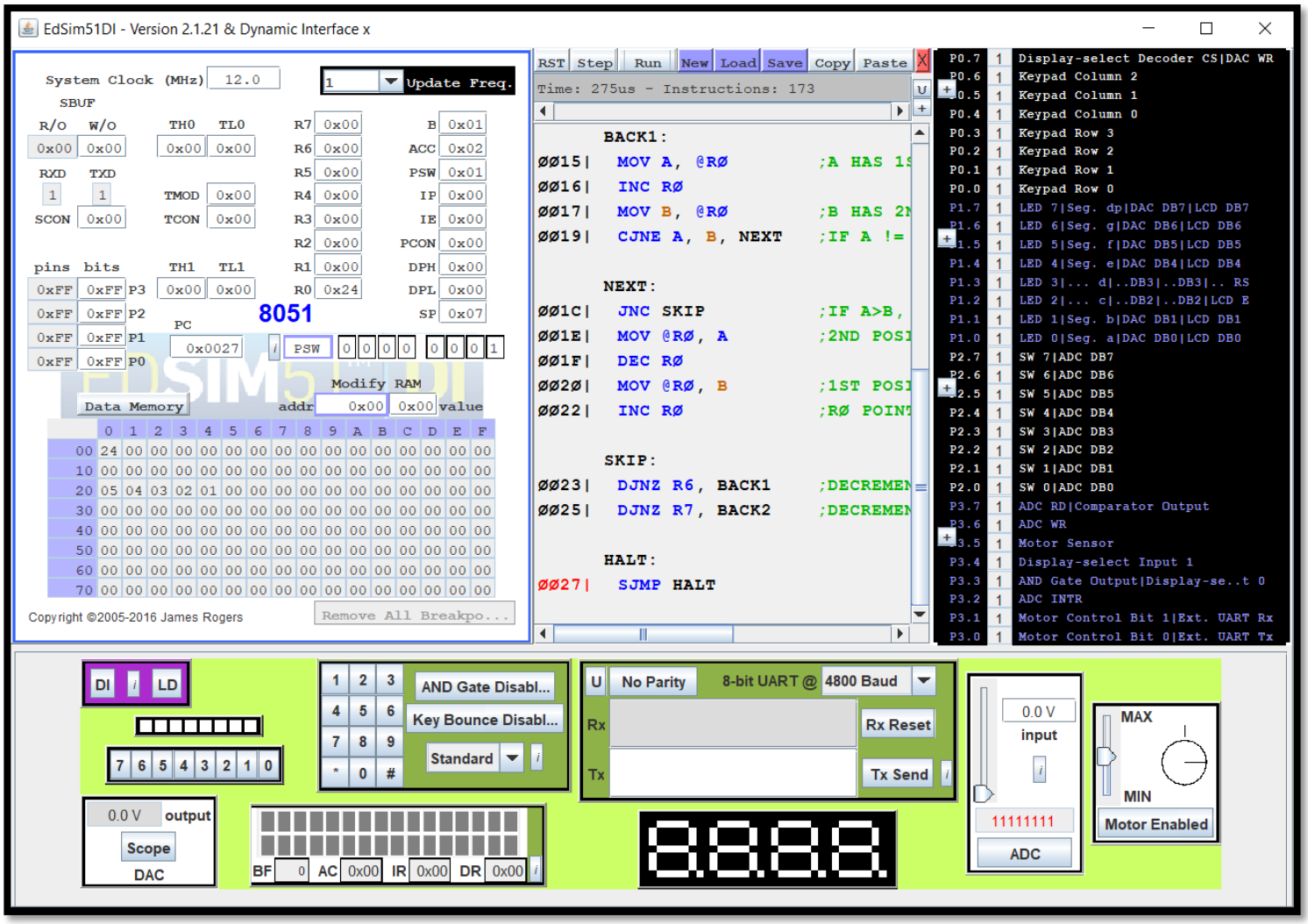
1. Begin.

2. Initialize the list in the internal memory with some values starting from a base address in the internal RAM, say 20H.
3. Store the no. of elements (count of the list) in a register, say R7.
4. Copy the count value to another register, say R6. R7 & R6 now denote the outer and inner loop count, respectively.
5. Store the base address of the list (20H) in a register, say R0.
6. While R7 ≠ 0:
    a. While R6 ≠ 0:
        i. A ← [R0].
        ii. B ← [R0 + 1].
        iii. If A < B:
            1. [R0 + 1] ← A.
            2. [R0] ← B.
        iv. Decrement R6.
    b. Decrement R7.
7. Find the descending order sorted list in the internal RAM, starting from the base address (20H) till (20H + no. of elements in the list)

8. End.

PROGRAM	COMMENTS
ORG 0	
MOV 20H, #01H	PUT 5 NUMBERS IN THE INTERNAL MEMORY.
MOV 21H, #02H	STARTING FROM 20H.
MOV 22H, #03H	ASSUME 5 NUMBERS IN THE SERIES.
MOV 23H, #04H	
MOV 24H, #05H	
START:	OUTER LOOP.
MOV R7, #04H	OUTER LOOP COUNT.
BACK2:	INNER LOOP.
MOV R6, #04H	INNER LOOP COUNT.
MOV R0, #20H	POINT TO BASE ADDRESS.
BACK1:	
MOV A, @R0	A HAS THE FIRST NUMBER.
INC R0	GO TO THE NEXT LOCATION.
MOV B, @R0	B HAS THE SECOND NUMBER.
CJNE A, B, NEXT	IF A ≠ B, THEN GO TO NEXT NUMBER.
NEXT:	
JNC SKIP	IF A > B, GO TO SKIP. ELSE SWAP A AND B.
MOV @R0, A	CURRENT LOCATION, POINTED BY R0 HAS A NOW.
DEC R0	GO TO PREVIOUS LOCATION.
MOV @R0, B	PREVIOUS LOCATION, POINTED BY R0 HAS B NOW.
INC R0	GO TO THE NEXT LOCATION.
SKIP:	
DJNZ R6, BACK1	DECREMENT R6. IF R6 ≠ 0, GO TO BACK1.
DJNZ R7, BACK2	DECREMENT R7. IF R7 ≠ 0, GO TO BACK2.
HALT:	
SJMP HALT	HALT THE PROGRAM USING AN INFINITE LOOP.

SAMPLE I/O SNAPSHOT:



PROGRAM – 2: 8086 ALP – COUNT ODD AND EVEN NUMBERS IN A LIST:

ALGORITHM:

1. Begin.

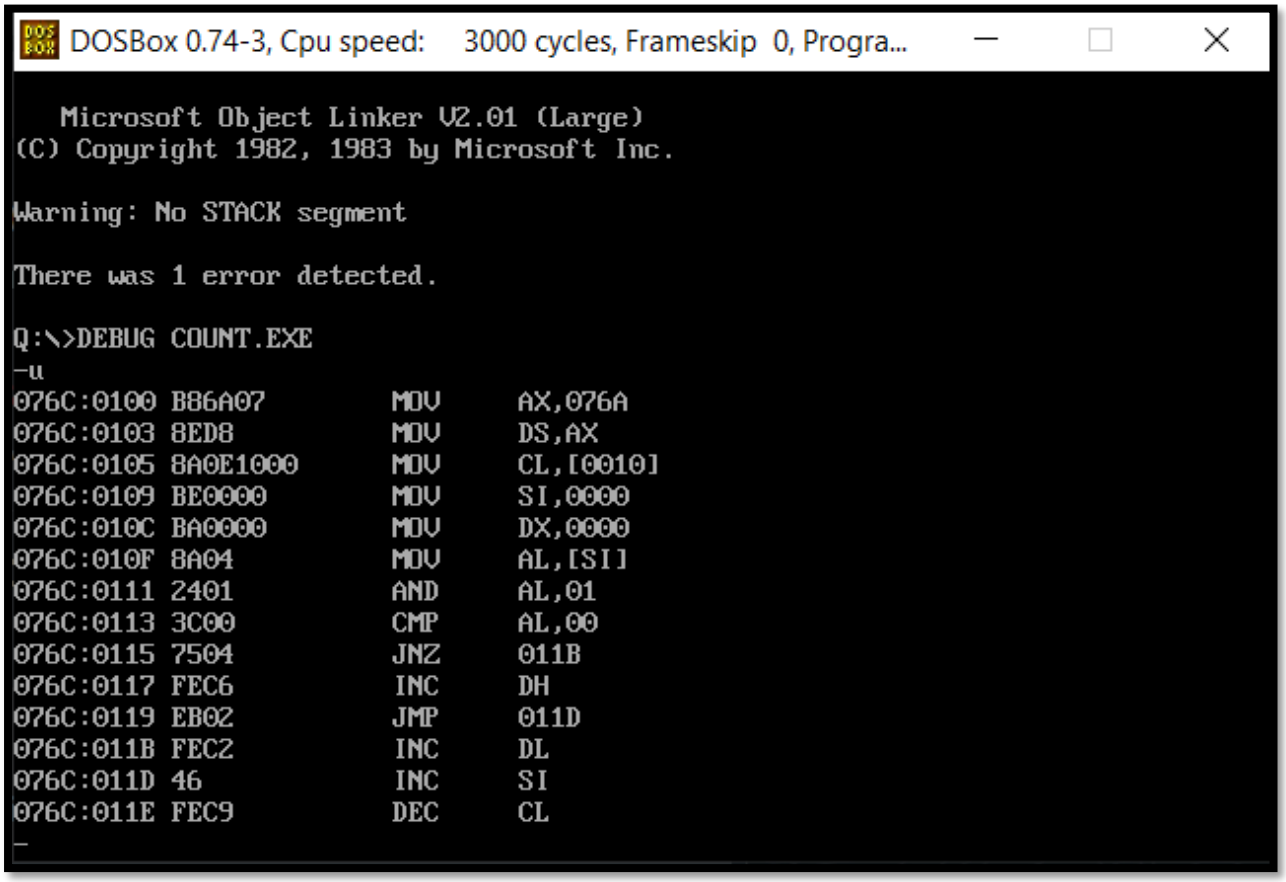
2. Initialize the data segment.
3. Initialize an array(list) *arr* with some odd and even values.
4. Initialize a variable *arr_size* with the array length.
5. Initialize variables to store the counts of odd numbers & even numbers in the list, i.e. *oddcnt* & *evencnt*.
6. Close the data segment.

7. Start the code segment.
8. Move the starting address of data segment to DS using AX register.
9. Set CL ← *arr_size*.
10. Set SI ← base address of *arr.*
11. Clear DX register.
12. While CL ≠ 0:
    a. AL ← [SI].
    b. AL ← AL & 01H.
    c. If AL = 0:
        i. DH = DH + 1. (Stores even numbers count)
    d. Else:
        i. DL = DL + 1. (Stores odd number count)
    e. SI ← SI + 1.
    f. CL ← CL – 1.
13. *oddcnt* ← DL.
14. *evencnt* ← DH.
15. Terminate the program with DOS interrupt 4CH.
16. Close the code segment.

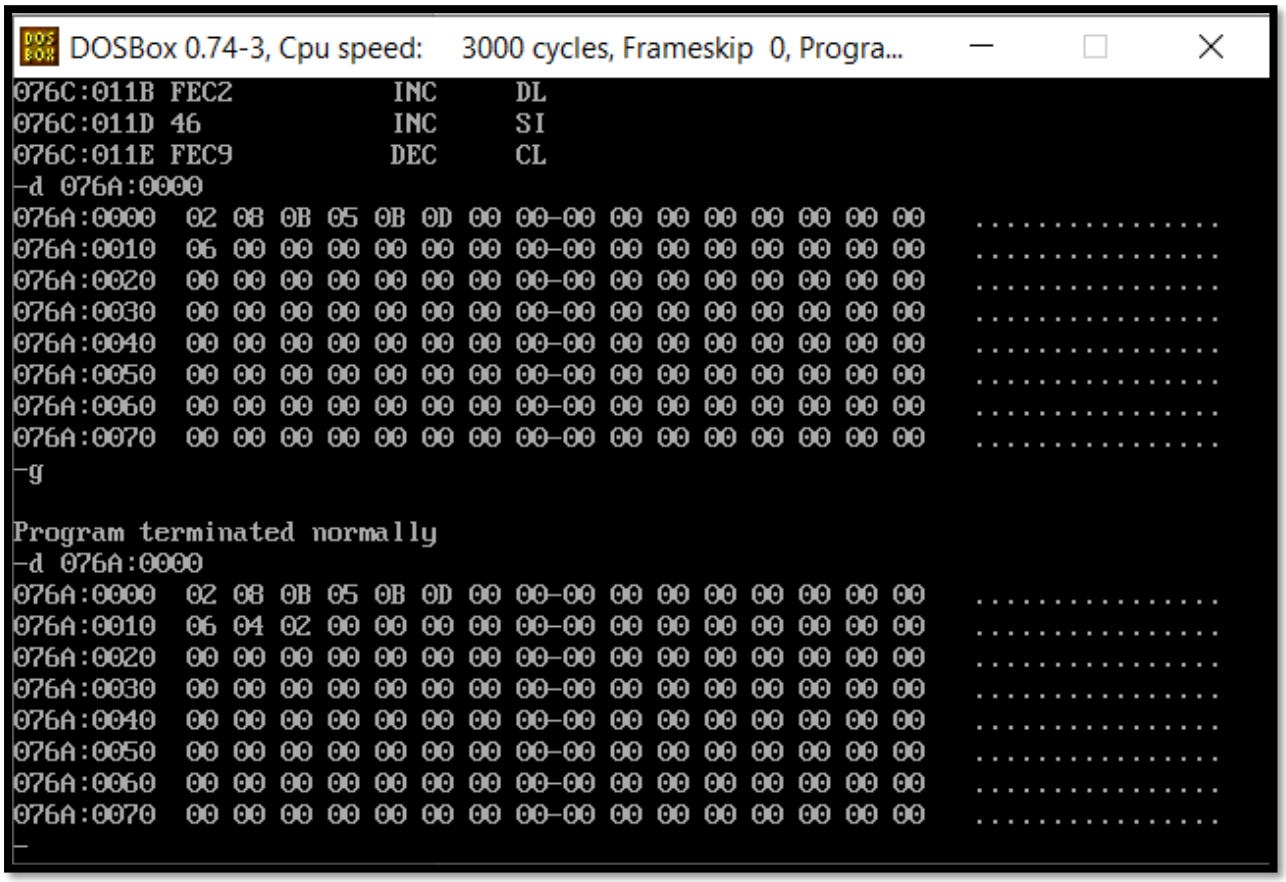
17. End.

PROGRAM	COMMENTS
ASSUME CS: CODE, DS: DATA	
DATA SEGMENT	INITIALIZE DATA SEGMENT.
ARR DB 02H, 08H, 0BH, 05H, 0BH, 0DH	ARRAY WITH 6 VALUES.
ORG 0010H	
ARR_SIZE DB 06H	*ARR_SIZE* = LENGTH OF ARRAY *ARR.*
ODDCNT DB 00H	VARIABLE TO STORE ODD NUMBER COUNT.
EVENCNT DB 00H	VARIABLE TO STORE EVEN NUMBER COUNT.
DATA ENDS	
CODE SEGMENT	
ORG 0100H	
START:	
MOV AX, DATA	
MOV DS, AX	DS POINTS TO BASE ADDRESS OF DATA SEGMENT.
MOV CL, ARR_SIZE	CL ← *ARR_SIZE*.
MOV SI, OFFSET ARR	SI HAS THE BASE ADDRESS OF LIST *ARR.*
MOV DX, 0000H	CLEAR DX. DX WILL STORE THE COUNTS.
LOOP1:	
MOV AL, [SI]	AL ← [SI]. (AL GETS THE VALUE AT LOCATION POINTED BY SI)
AND AL, 01H	(AL & 0000 0001) TO GET LAST BIT OF AL.
CMP AL, 00H	IF AL = 0 ⟹ EVEN NUMBER.
JNZ ODD	OTHERWISE, JUMP TO LABEL *ODD.*
INC DH	DH = DH + 1, FOR EVEN COUNT.
JMP SKIP	JUMP TO LABEL *SKIP.*
ODD:	
INC DL	DL = DL + 1, FOR ODD COUNT.
SKIP:	
INC SI	SI = SI + 1, TO POINT TO THE NEXT NUMBER IN LIST
DEC CL	DECREMENT CL.
CMP CL, 00H	CHECK IF CL = 0.
JNZ LOOP1	IF CL ≠ 0, GO BACK TO *LOOP1.*
HERE:	
MOV ODDCNT, DL	*ODDCNT* ← DL.
MOV EVENCNT, DH	*EVENCNT* ← DH.
MOV AH,4CH	TERMINATE THE PROGRAM WITH DOS INTERRUPT.
INT 21H	
CODE ENDS	
END START	

UNASSEMBLED CODE:



SAMPLE I/O SNAPSHOT:



RESULT:

The assembly level programs were written to perform the above specified tasks (descending order sort using 8051 & odd-even numbers count in a list using 8086 respectively), and their outputs were verified.