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EXPERIMENT NO 10

Title of experiment : Largest and smallest number in an array of data.

Equipment required : GNU Simulator.

Theory :

Algorithm for only smallest number.

1. Load the address of the first element of the array in HL pair.
2. Move the count to B - reg.
3. Increment the pointer.
4. Get the first data in A - reg.
5. Decrement the count.
6. Increment the pointer.
7. Compare the content of memory addressed by HL pair with that of A - reg.
8. If carry = 1, go to step 10 or if Carry = 0 go to step 9.
9. Move the content of memory addressed by HL to A - reg.
10. Decrement the count.
11. Check for Zero of the count. If ZF = 0, go to step 6, or if ZF = 1 go to next step.
12. Store the smallest data in memory.
13. Terminate the program.

Algorithm for only largest number.

1. Load H-L pair with address of first operand's memory location.
2. Move the first operand from memory to accumulator.
3. Increment H-L pair to point to next memory location.
4. Move the second operand from memory to register B.
5. Compare B with A.
 - If carry?
 - Yes → Move data from register B to accumulator.
 - No → Increment H-L pair.
6. Move the result from accumulator to memory.

Program code :

;smallest of n numbers

```
LXI H,1100
MOV C,M
INX H
DCR C
MOV A,M
loop: INX H
CMP M
JC skip
MOV A,M
skip: DCR C
JNZ loop
STA 1109
HLT
```

;largest of n numbers

LXI H,1100

MOV C,M

INX H

DCR C

MOV A,M

loop: INX H

CMP M

JNC skip

MOV A,M

skip: DCR C

JNZ loop

STA 1109

HLT

Smallest of n numbers :

GNUSim8085 - 8085 Microprocessor Simulator

File Reset Assembler Debug Help

Registers

Register	Value
A	0C
BC	00 00
DE	00 00
HL	04 51
PSW	00 00
PC	42 15
SP	FF FF
Int-Reg	00

Flag

Flag	Value
S	0
Z	1
AC	0
P	1
C	1

Decimal - Hex Conversion

Decimal: 0 Hex: 0

I/O Ports

Memory

Load me at:

```
1 ;smallest of n numbers
2 LXI H,1100
3 MOV C,M
4 INX H
5 DCR C
6 MOV A,M
7 loop: INX H
8 CMP M
9 JC skip
10 MOV A,M
11 skip: DCR C
12 JNZ loop
13 STA 1109
14 HLT
```

Start: 1100 OK

Address (Hex)	Address	Data
044C	1100	5
044D	1101	27
044E	1102	65
044F	1103	43
0450	1104	12
0451	1105	32
0452	1106	0
0453	1107	0
0454	1108	12
0455	1109	0
0456	1110	0
0457	1111	0

Line No Assembler Message

0 Program assembled successfully

Simulator: Idle

Largest of n numbers :

The screenshot displays the GNUSim8085 - 8085 Microprocessor Simulator interface. The main window shows the assembly code for finding the largest of n numbers. The code is as follows:

```
1 ;largest of n numbers
2 LXI H,1100
3 MOV C,M
4 INX H
5 DCR C
6 MOV A,M
7 loop: INX H
8 CMP M
9 JNC skip
10 MOV A,M
11 skip: DCR C
12 JNZ loop
13 STA 1109
14 HLT
```

The left panel shows the registers and flags. The registers are: A (41), BC (00 00), DE (00 00), HL (04 51), PSW (00 00), PC (42 15), SP (FF FF), and Int-Reg (00). The flags are: S (0), Z (1), AC (0), P (1), and C (0). The bottom panel shows the I/O Ports and Memory sections, both with a value of 0. The right panel shows the Memory window with a table of addresses and data:

Address (Hex)	Address	Data
044C	1100	5
044D	1101	27
044E	1102	65
044F	1103	43
0450	1104	12
0451	1105	32
0452	1106	0
0453	1107	0
0454	1108	0
0455	1109	65
0456	1110	0
0457	1111	0

The bottom status bar indicates "Simulator: Idle".

Conclusion : These are ways to design subtractor and comparator.