

Inroduction to Computer Architecture

A project by Mano Simulator

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The program searches among a set of.,
4-bits ,numbers (array) and finds the
maximum element and saves it in the
Accumulator .

The Code with Explanation:

ORG 100

LOP, LDA PTR I /loop 1 to loop for the whole array &
check if the 'max'is less than any element

CMA / loads element to AC and complements it

INC / increments it (to get 2's complement)

ADD MAX /Adds MAX to the Ac (2's complement)

LDA LOP22

STA PTR2

LOP2, CIL /inner loop to reach the bit number 3

ISZ PTR2 /increment and skip if zero (12 times) from
bit 15 to bit 3

BUN LOP2

LDA PTR I
SZE /if the 4th bit is positive (equal zero) then
the maximum is bigger , else if the maximum is less than the
array element then the 4th bit is equal to 1 (negative).

STA MAX /if 'E'= 0 this step is skipped , else if 'E' is
1 this step is performed and the max is swapped with the
array element

ISZ PTR
ISZ CTR
BUN LOP

LDA MAX finally loads the Maximum element after
the loop is finished , and the final result is stored in the AC

HLT

MAX, DEC 0 /set Maximum to 0

PTR, HEX 150 /set ptr to a50 to point to the array

CTR, DEC -13 /set ctr to -13 to loop for the 13 elements of
the array

LOP22, DEC -12

PTR2, DEC 0

ORG 150 / the Start of the array
DEC 5

DEC 3

DEC 4

DEC 7

DEC 6

DEC 2

DEC 1

DEC 6

DEC 3

DEC 5

DEC 4

DEC 1

DEC 7

END

The Code to Run Directly :

```
        ORG 100
LOP, LDA PTR I
        CMA
        INC
        ADD MAX
        LDA LOP22
        STA PTR2
LOP2,   CIL
        ISZ PTR2
        BUN LOP2

        LDA PTR I
        SZE
        STA MAX
        ISZ PTR
        ISZ CTR
        BUN LOP
        LDA MAX
        HLT
MAX,    DEC 0
MIN,    DEC 200
PTR, HEX 150
CTR, DEC -13
LOP22,  DEC -12
PTR2,   DEC 0
        ORG 150
        DEC 5
        DEC 3
        DEC 4
```

DEC 7
DEC 6
DEC 2
DEC 1
DEC 6
DEC 3
DEC 5
DEC 4
DEC 1
DEC 7

END

Max

SC:	0	PC:	111	AR:	001		
IR:	7001	DR:	0007	AC:	0007		
TR:	0000	INPR:	00	OUTR:			
I:	0	S:	0	E:	1	R:	0
IEN:	0	FGI:	0	FGO:	0		