COMPUTER ARCHITERTURE ASSIGNMENT

Processor Design

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PROGRAMS OPTED:

We have opted for a program which does the following computations on an array:

1. It calculates the maximum element of the array.
2. It also calculates the minimum element of the array.
3. Along with this we have also computed the mean value(average) of the array.

4. It also calculates the range of the array that is (max-min).
5. We have also calculated the coefficient of dispersion which is an tool which help us to know the extent of variation of data and it is calculated using the formula: (Max-Min)/(Max+Min).

EXPLANATION:

We have written our assembler and processor in programming language python.

In assembler we created a dictionary which comprises of Instructions as keys and their opcodes as values which has helped us to generate a binary text file for our assembly text file.

In assembler we have also created a function which does the string slicing and helps us to get the key value pairs.

In processor we have basically 3 major functions:

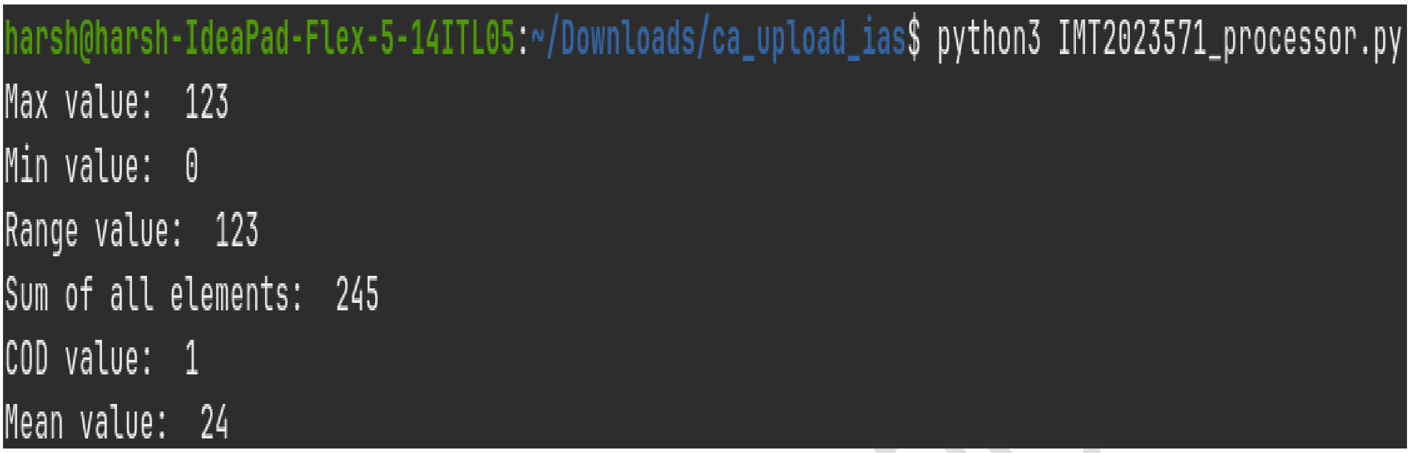
1. First function is fetch which helps us to load instruction in IR and data memory address in MAR.(We have also shown the intermediate steps in our function).
2. Second function is decode which takes the opcode from IR and calls “Execute” function.
3. Third function is execute which sends the above opcode to their corresponding function.

We have defined the instructions as functions.

EXTRA INSTRUCTIONS OPTED:

SYMBOL	OPCODE	DESCRIPTION
lt	“11110000”	It stores 1 in Accumulator(AC) if the value in the accumulator is less than the value at the memory passed into it.
gt	“11111000”	It stores 1 in Accumulator(AC) if the value in the accumulator is greater than the value at the memory passed into it.
return	“11111100”	It helps us to print corresponding values.

RESULT SCREENSHOT:



```
harsh@harsh-IdeaPad-Flex-5-14ITL05:~/Downloads/ca_upload_ias$ python3 IMT2023571_processor.py
Max value:  123
Min value:  0
Range value:  123
Sum of all elements:  245
COD value:  1
Mean value:  24
```