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Assignment -12

Title : ALP program to find i) Mean ii) Variance and iii) Standard Deviation.

Problem :

Write 80387 ALP to obtain i) Mean ii) Variance iii) Standard deviation. Also plot the histogram for the data set. The data elements are available in text file.

Objectives :

- To be able to solve mathematical problem in assembly language programming.
- To be able to handle file and data set from file in ALP
- To be able to include mathematical histograms using ALP.

Outcomes :

students will be efficient in handling and solving mathematical problems through file using ALP

S/W and H/W required :-

Linux 64 bit OS, gedit, NASM, gdb.

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Theory :

Instructions in 80387 :-

1) FINIT :- Initialize the coprocessor.

2) FLD :- Loads the stack.
FLD x :- Loads the stack with x
i.e stack[0] = x

3) FADD :- floating point addition
eg :- FADD st(0), st(1).

4) FSTP sum :- Top of stack stored to variable sum.

5) FST sum :- Top of stack stored to variable sum.

6) FADD (with no operand)
~~Add~~ top and next location and store to next location. ~~which~~ and next location is top of stack.

7) FLDZ : Load zero To stack[0].

Mathematical operations :

Mean $f = \frac{a+b+c+d+e}{5}$

Variance $g = \frac{(a-f)^2+(b-f)^2+(c-f)^2+(d-f)^2+(e-f)^2}{5}$

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Standard = $n = \sqrt{g}$

deviation (S.D)

Algorithm :

1) Create a folder which contains 1 program file and 1 text file.
2) Write all input text in the text file.
3) Define all parameters required to execute above procedure in 1st program file.
4) Define all procedures.
   a) ASCII to hex
   b) hex to ASCII
   c) Find mean
   d) Find variance.
   e) Find standard variations
5) Accept/read the data set.
6) Perform ASCII to hex.
7) Calculate mean.
8) Print hex mean value.
9) Use mean value to calculate variance.
10) Print the variance.
11) Calculate standard deviations.
12) Print hex S.D.

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Test Cases :

	Input	Expected	Actual	Result
1)	1, 2, 3	Mean = 2 Variance = 0.66 S.D = 0.8/6	Mean = 2 Variance = 0.66 SD = 0.816	Pass
2)	6, 7, 8, 9, 10	Mean = 8 Variance = 2 SD = 1.44	Mean = 8 Variance = 2 SD = 1.44	Pass

Conclusion :

From this assignment we learnt how to calculate mean, variance and standard deviation using co processor instructions.