

HW #3

CS410/510: Introduction to Performance Measurement, Modeling and
Analysis

Due February 6, 2019

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Part A: Hands-on Experience with pthreads(Class Partner : AJ Wood)

- (1) Compare the performance of the sequential version to the performance of the pthreads version. What can you conclude about whether or not one is faster? [hint: use confidence intervals]
- (2) How many runs do you need to measure to be able to specify a reasonable confidence interval at 90% confidence? At 95% confidence?

Part B: Using python for statistics *Write python code to solve the following problems.*

- (1) Comparing 3 servers

Program	S1 exec time (sec)	S2 exec time (sec)	S3 exec time (sec)	# Instructions
1	33.4	28.8	28.3	1.45×10^{10}
2	19.9	22.1	25.3	7.97×10^9
3	6.5	5.3	4.7	3.11×10^9
4	84.3	75.8	80.1	3.77×10^{10}
5	101.1	99.4	7.2	4.56×10^{10}

- a Calculate the mean for the 3 different Systems S1, S2, S3

Mean for the 3 different systems S1, S2, S3
S1 Mean = 49.040000
S2 Mean = 46.280000
S3 Mean = 29.120000

- b Calculate the average across the 3 systems of the MIPS rate for each of Programs 1-5

Average across the 3 systems of the MIPS rate for each of Program
Program 1 | RunTime Mean: 30.166667(sec) MIPS Mean: 480.662983(MIPS)
Program 2 | RunTime Mean: 22.433333(sec) MIPS Mean: 355.274889(MIPS)
Program 3 | RunTime Mean: 5.500000(sec) MIPS Mean: 565.454545(MIPS)
Program 4 | RunTime Mean: 80.066667(sec) MIPS Mean: 470.857619(MIPS)
Program 5 | RunTime Mean: 69.233333(sec) MIPS Mean: 658.642273(MIPS)

- c Using S3 as the basis system, calculate the average speedup for S1 and S2

Average speedup for S1 and S2 with S3 as baseline
S1 Average Speed up = -68.406593%
S2 Average Speed up = -58.928571%

- d Determine the coefficient of variation of the execution times for each of the 3 systems

Coefficient of variation of the execution times
S1 Coef. of Variation = 0.844275
S2 Coef. of Variation = 0.854986
S3 Coef. of Variation = 1.043166

(2) Reporting Meaningful Results

We want to determine, on average, how long it takes to write a file of a particular size to a disk drive.

We take 8 measurements: 8.0 7.0 5.0 9.0 9.5 11.3 5.2 8.5

- a Calculate a 90% confidence interval for the mean time.

8 sample t-score = 1.895 (from df = 7 and A = 0.05)

90% confidence interval for mean time(c1, c2) = (6.500573, 9.374427)

- b How many measurements would be required to be 90% confident that the mean value is within 7% of the actual value?

Measurements for 90% confidence with 7% error

n = 15