EE 5371: Computer Systems Performance Measurement and Evaluation
University of Minnesota
Professor David J. Lilja
Fall, 2019

Homework 3
Due: See the class canvas site.

1. (10 points) The papers by Amdahl [6], Gustafson [7], and Diaz-del-Rio *et al* [8] cover a long history of what has become known as Amdahl's Law. Read these papers and then write 200-250 words that answer the following questions: What is the key difference between Gustafson's approach and Amdahl's approach? What is the fundamentally new argument that Diaz-del-Rio *et al* make? Or is their argument really just a simple extension of the arguments presented by Amdahl and Gustafson? Is Amdahl's Law still relevant in the cloud computing era? If yes, how? If no, why not? What are the benefits of each of the the different approaches presented in these papers?

2. (20 points) Compare the performance of two different computer systems using the HINT benchmark program (the source code is available on the class web site). Clearly describe the details of the two systems you use, and, following the concepts presented in Gustafson and Snell [9], describe the differences you see in the performance of the two systems. Make sure that you specifically comment on the overall performance differences you observed and the differences in the memory system performance, such as differences in cache sizes, memory hierarchy behavior, etc. Use the statistical techniques you have learned in this course where they are useful and appropriate in making these comparisons. Specifically explain how you use the concepts described in the paper by Mytkowicz *et al* [5] to guard against measurement bias.

   If you have difficulties running the Hint benchmark, try changing line 141 in `hint.c` to:

   ```
   while((itm2 - (ISIZE)0) > 0.000001)
   ```

   You also can try changing line 123 to:

   ```
   while (((tm1 - tm2) == (DSIZE)1) && (tm2 - (DSIZE)0 > 0.000001))
   ```

   You may also need to comment out line 47 in `typedefs.h`.