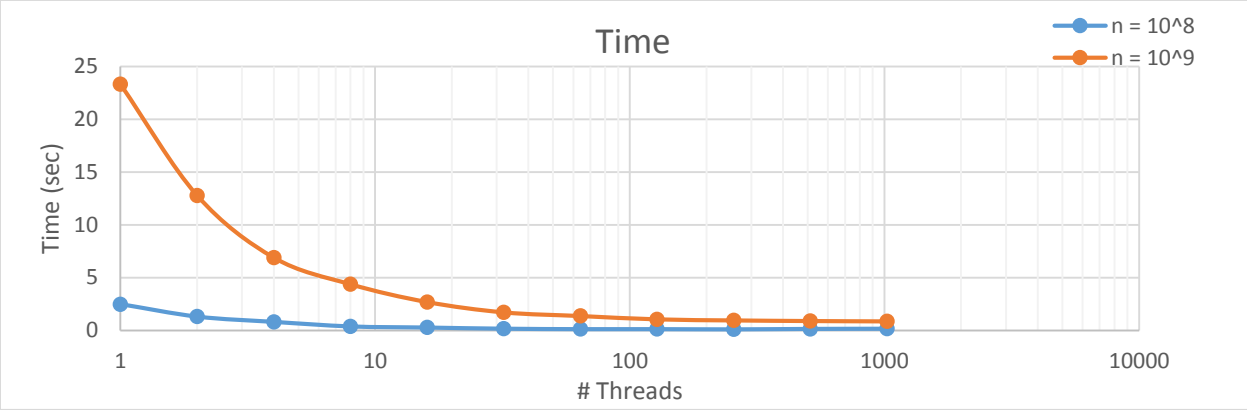
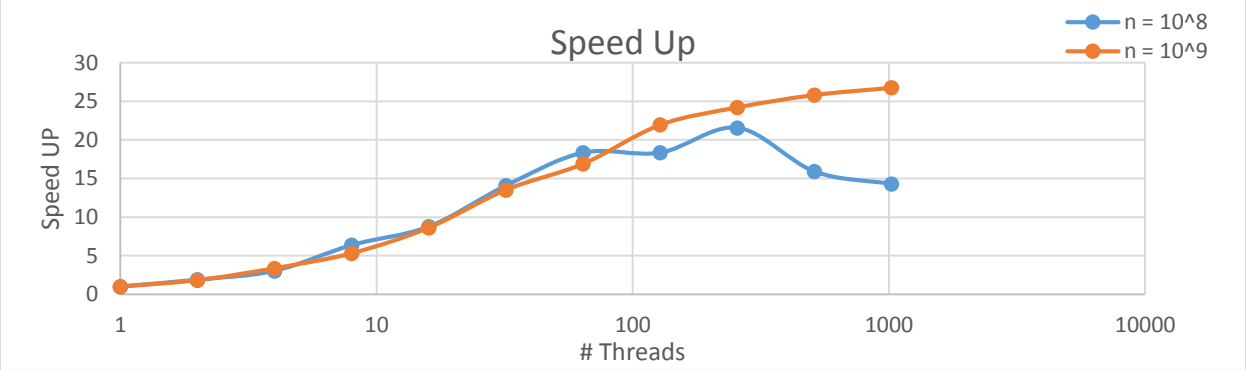
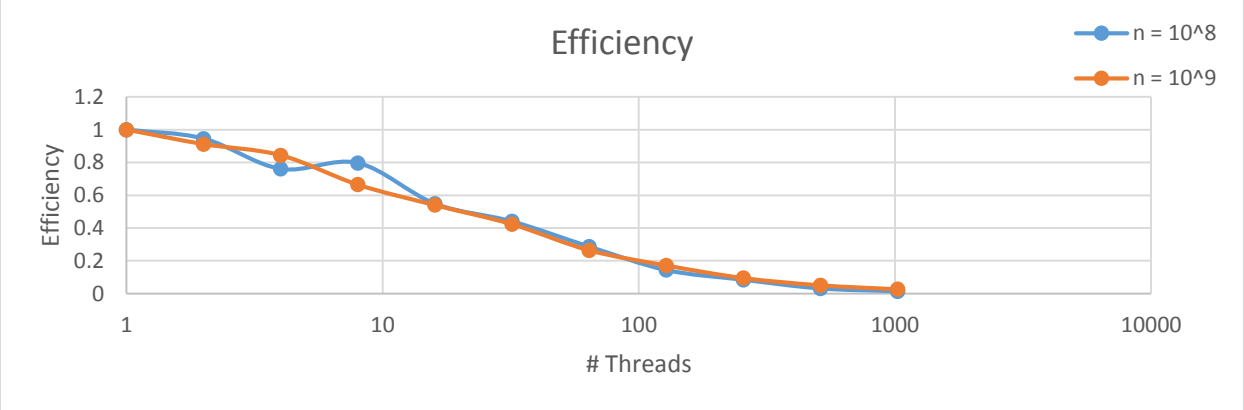
CSCE 435 Assignment 1

Zach Brown







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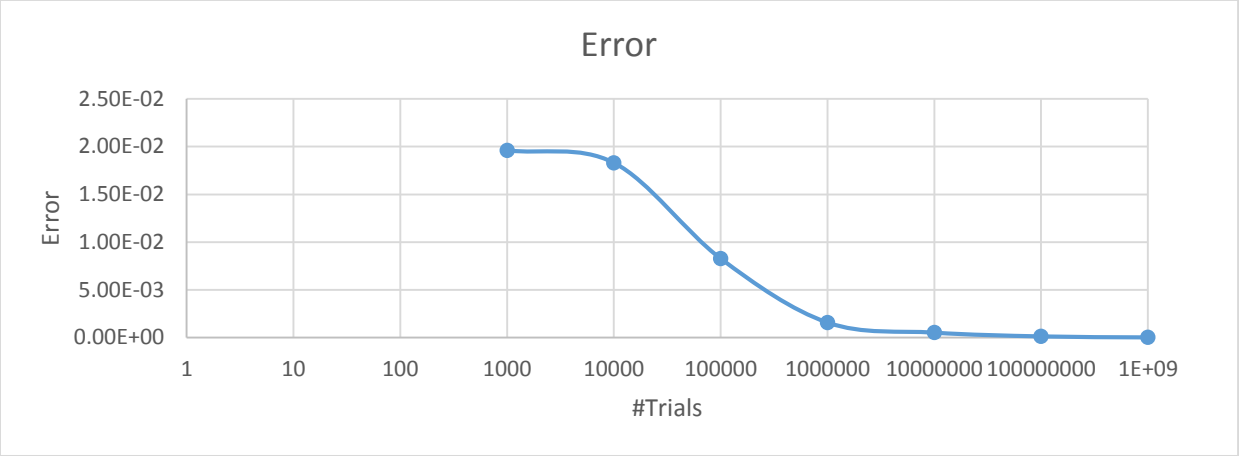

1. **(20 points) Plot execution time versus p to demonstrate how time varies with the number of threads. Use a logarithmic scale for the x-axis.**

   See Graph: Time

2. **(20 points) Plot speedup versus p to demonstrate the change in speedup with p.**

   See Graph: Speed Up

3. **(10 points) Using the definition: efficiency = speedup/p, plot efficiency versus p to demonstrate how efficiency changes as the number of threads are increased.**

   See Graph: Efficiency

4. **(10 points) What value of p minimizes the parallel runtime?**

   A P value of 256 minimizes parallel runtime for N = 10^8

5. **(10 points) Repeat the experiments with n=109 To obtain the execution time for p=2k, for k = 0, 1, …, 10. In this case, what value of p minimizes the parallel runtime?**

   A P value of 1024 minimizes parallel runtime for N=10^9. However since that that p value is the end of the range it might actually be a larger p value.

6. **(10 points Why does the runtime start to increase as p is increased beyond a certain value?)**

   The overhead of adding additional threads starts to out-weigh the diminishing return of increased parallelism.

7. **(10 points) Why is there a difference in the number of threads needed to obtain the minimum execution time for two values of n?**

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The minimum execution time is related to the value of n. Time = logP + N/p. In general as P gets larger time goes down, until logP grows faster than N/p. When N is larger that turning point occurs at a larger P

8. **(10 points) Plot error versus n to illustrate accuracy of the algorithm as a function of n. You may have to run experiments with different values of n; for example n could be chosen to be 10k, for k = 3, …, 9. Use p = 20.**

   See Graph: Error