<p style="text-align:center">Milestone Report for
Research on Oblivious Algorithms
15-400, Spring 2021</p>

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https://mkpjnx.github.io/ObliviousSort/</p>

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1 Progress Update

I am close to finishing the parallel version of the bucket oblivious sort. The last part of this involves a cache-oblivious matrix transpose in the random permutation algorithm. I have run some tests locally as a sanity check and found noticeable but sublinear speedup ($3\times$) on my 8-core laptop. I have also set up an AWS instance with more cores to investigate scaling with respect to thread count and problem size.

This week I will be writing some evaluation tests to record the performance of our oblivious sorting algorithm. I will measure its running time and investigate its parallelism. Specifically, parts of the algorithm are inherently serial, and we can infer the fraction of the running time spent in these regions using Amdahl's Law.

2 Looking Forward

Because of a busy week of project deadlines and midterms, We are slightly behind schedule on the evaluation of the parallel algorithm, however, I plan on having the figures ready by our meeting on 3/16. After the meeting, me and Marcia will likely each focus on one of two tasks: a.) more detailed analyses of the performance scaling and comparing against bitonic sort, and b.) additional implementation-specific enhancements mentioned in the previous progress report.

Though we have not yet investigated cache complexity, we are designing our implementation with this in mind. This will likely be the focus of our investigations in the coming weeks after evaluating performance.

3 Milestone Adjustments

We are on schedule with the parallel version implementation, but because there is only two instead of three members, we are deferring graph algorithms using this primitive until later.

4 Resources Required

I was able to use AWS credits to set up an instance. This will be a useful testing platform moving forward.