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Advisor's report on diploma thesis of Josef Matějka

The thesis of Josef Matějka presents a new cache oblivious sorting algorithm. In the setting of cache oblivious algorithms we focus on the number of transfers of data between cache and the main memory. Although cache oblivious algorithms are designed with the cache in mind they are not tuned for a particular cache structure. Rather they are designed in a way that they work well or even optimally regardless of the cache structure. The cache oblivious model was introduced in 1999.

Sorting is a fundamental algorithmic problem. For normal sorting we know myriad of algorithms but for cache oblivious model we know of only two algorithms: Funnel Sort and a certain variant of distribution sort. The two algorithms come from the seminal 1999 work which introduced the model, and since then, despite a lot of research on algorithms and data structures in this model, no new sorting algorithm was discovered.

In his thesis, Josef Matějka presents a new simple and natural algorithm for sorting in the cache oblivious model. The algorithm is augmented by analysis and experimental comparison with an implementation of Funnel Sort and standard C++-library sort.

The thesis is well written, my only complaint would be that the cache-oblivious analysis is incomplete. This is not surprising, the previous cache oblivious sorting algorithms also resorted to hand-waving type of analysis as the full analysis is rather complex. However, in a joint paper of Josef Matějka and me, which is under submission to a conference, we do provide a full analysis. The point of Josef when writing his thesis was that he wanted to write his thesis completely by himself in which he succeeded. So he did not include some parts of the analysis.

It was a great pleasure to supervise Josef during his work on this project. He is capable researcher with many original and brilliant ideas. During the whole project he was very diligent and pleasure to work with.

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Hence, I strongly recommend to accept the presented thesis as a diploma thesis.

Sincerely,

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