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MADALGO seminar by Norbert Zeh, Dalhousie University

**Optimal Cache-Oblivious Range Reporting Requires Superlinear Space**

**Abstract:**

In recent years, a number of cache-oblivious range search structures for 3-sided range reporting in the plane, 3-d dominance reporting, and 3-d halfspace range reporting with the optimal query bound of  $O(\log_B N + K/B)$  I/O's have been developed. These structures use  $O(N \log N)$  space, while the best cache-aware structures for these problems use (almost) linear space. This raises the question whether linear-space cache-oblivious structures with the optimal query bound exist for these problems. We give a negative answer to this question by proving that  $\Omega(N (\log \log N)^\epsilon)$  space is necessary to achieve the optimal query bound cache-obliviously. This is the first result that provides a gap between the resource consumption of a cache-oblivious algorithm or data structure and its cache-aware counterpart that grows with the input size.

Joint work with:

Peyman Afshani  
Chris Hamilton