

# Technical Writing

## Research Paper Topic Suggestions

The purpose of the research paper topic is to support the generation of computational data which will be displayed informatively in the paper. At most, a few hours of programming should be required to generate these data. Input data could be random or from any source.

- The effect of different loop orderings (there are 6) for the matrix multiplication of various sizes of large matrices ( $\sim 1K \times 1K$ ) on execution time.
- The effect of loop unrolling to the point of instruction cache thrashing.
- Comparing different compression algorithms/functions/programs on different data measuring compression ratios, time for compression, time for decompression. Some compression functions have levels, e.g. gzip.
- The effect of using adjacency lists vs adjacency matrices for a connected graph algorithm.
- Compare Prim vs Kruskal algorithms for the MST of a connected graph.
- The effect of using different implementations (e.g. array vs linked-list) for sorted container operations.
- Comparison of different sorting algorithms on various data sizes, degree of partial ordering, degree of repeated values, etc.
- Hybrid sorting algorithms: what would be the optimal base case size for a hybrid quicksort implementation that switches to a simpler (often quadratic) sorting algorithm when the interval size is at or below the base case size. Candidate iterative low-overhead sorts include bubble, shaker, insertion, selection, shell – compare the performance of these candidate iterative sorts in this context.
- Compare the effect on execution time of implementations of algorithms in different programming languages – these algorithms could be from a library written in that language.
- Comparison of recursion with memorization vs iterative versions of algorithms.
- Compare the performance of different tree-based intrusive associative containers in the Boost C++ library  
[[https://www.boost.org/doc/libs/1\\_75\\_0/doc/html/intrusive/presenting\\_containers.html](https://www.boost.org/doc/libs/1_75_0/doc/html/intrusive/presenting_containers.html)]
- Comparing disk latencies of HDD and SSD drives for sequential and random access.