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 (~ 1Kx1K) 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]
* Comparing disk latencies of HDD and SSD drives for sequential and random access.