15/5/2025
Project ideas

Some proposals

Λ8

Συστήματα & Λογισμικό Υψηλών Επιδόσεων

Study and implement

OpenMP, MPI and GPUs for parallelizing:

1. Merge sort
2. SUMMA matrix multiply
    1. Uses submatrices and variations to increase performance
    2. Some improvements have been proposed (COSMA is the most recent)
    3. It is for dense matrices; we could consider another topic which deals with what happens for *sparse matrices*.
3. Sudoku: create puzzles and solve puzzles

Convert existing code to C and parallelize

1. NAS Parallel Benchmarks (NBP)
   - Initially written in Fortran
   - Older version (2.3) re-written in C and parallelized with OpenMP [unofficially]
   - New versions (3.4.x) contain some benchmarks in C, not all parallelized with OpenMP
   - Newer github repos exit that have used C++
   - Need to get newer versions, convert C++ to C and use OpenMP wherever missing
2. HeCBench – a very recent suite of benchmarks
   1. Has collected a huge amount of previous benchmarks and re-wrote some
   2. Implemented in SyCL, HIP, CUDA and OpenMP
   3. OpenMP uses C++ (99,9% seems to be plain C) and offloads to GPUs
3. Intel code samples – mostly C++
4. Mini proxy apps: LULESH and others – mostly C++

Your choice

- Suggest an existing application you want to parallelize
- Suggest a topic your like