High-Performance Computing

Laboratory 5:

Matrix-vector optimization

Objective:

- memory access optimization in a simple matrix-vector procedure

Tasks:

1) Create a working directory (eg. lab_5) .
2) Copy and extract files.
3) Execute the my_program and measure the time of execution for different compiler optimization options (eg. O0 and O3)
4) Obtain the assembler code files for different levels of compiler optimization (eg. O0 and O3)
    - gcc -S -O0 mat_vec.c
    - cp mat_vec.s mat_vec.gcc_O0
5) Analysis and the comparison of the obtained assembler codes:
    a) Select the code snippets corresponding to each instruction in C (you can use https://godbolt.org/ after changing the options to get the same code as on your local computer).
    b) Count the number of memory accesses in the code.
6) Create a new procedure mat_vec_1 with a more optimal access, execute, measure the time and analyze the assembler for the fastest code obtained.
7) Measure the performance of the worst and best code and compare it with the theoretical values.

Assessment:

- Class attendance and a report with all results and assembler analysis

Additional information:

- Intel,
- AMD,
- Short