

Performance Evolution of GPU versus CPU in Iterative Algorithms

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Objectives

- Evaluate Graphics Processing Unit (GPU) and Central Processing Unit (CPU), two of the main technologies used in high performance computing.
- Determine the advantages and disadvantages of GPU and CPU in multi-threaded applications.

Methodology

1. Develop a C+ code for an iterative program using a multi-threaded algorithm and analyze the execution times in both GPU and CPU.
2. Examine the performance of CPU and GPU under different iterative programs.

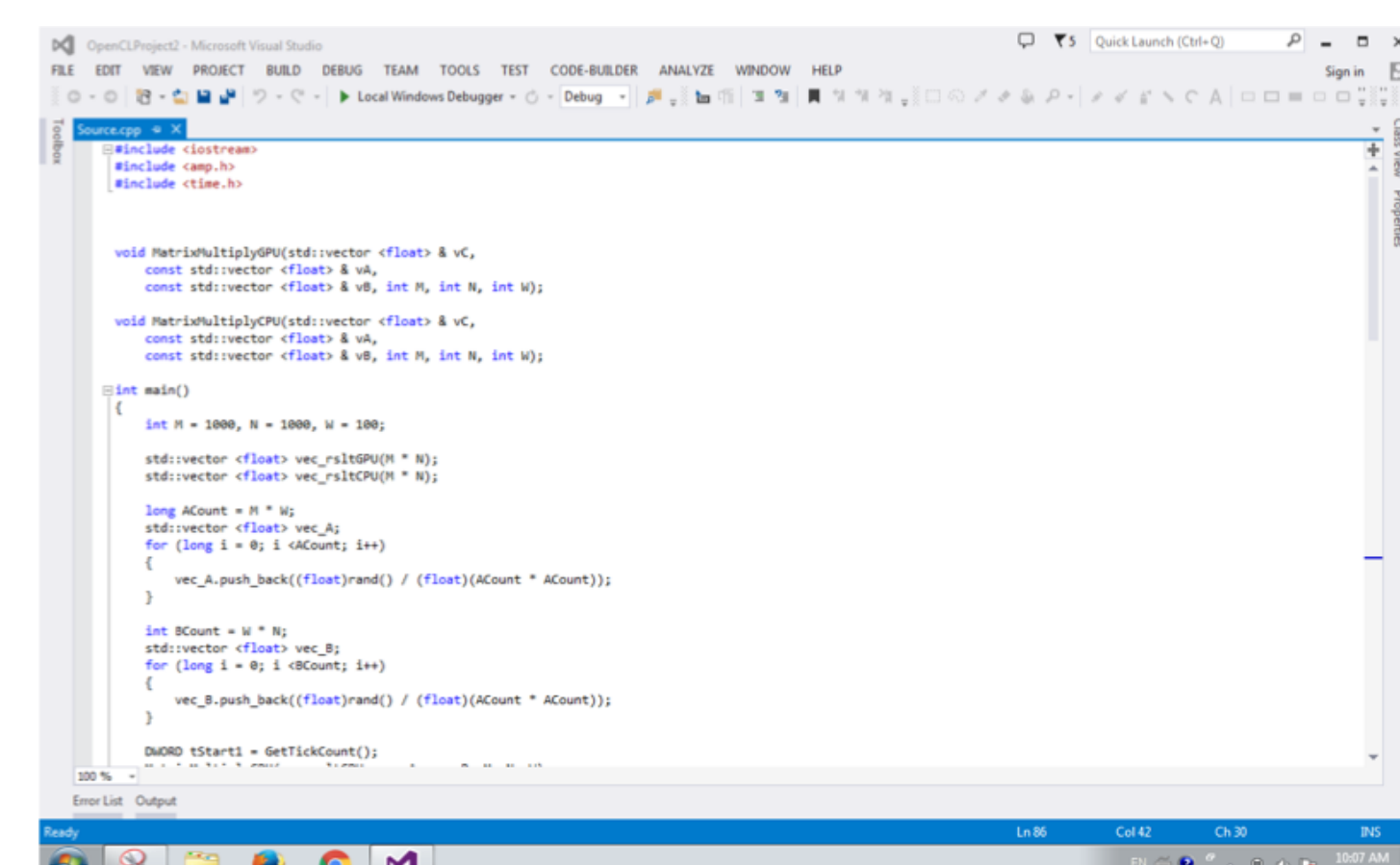
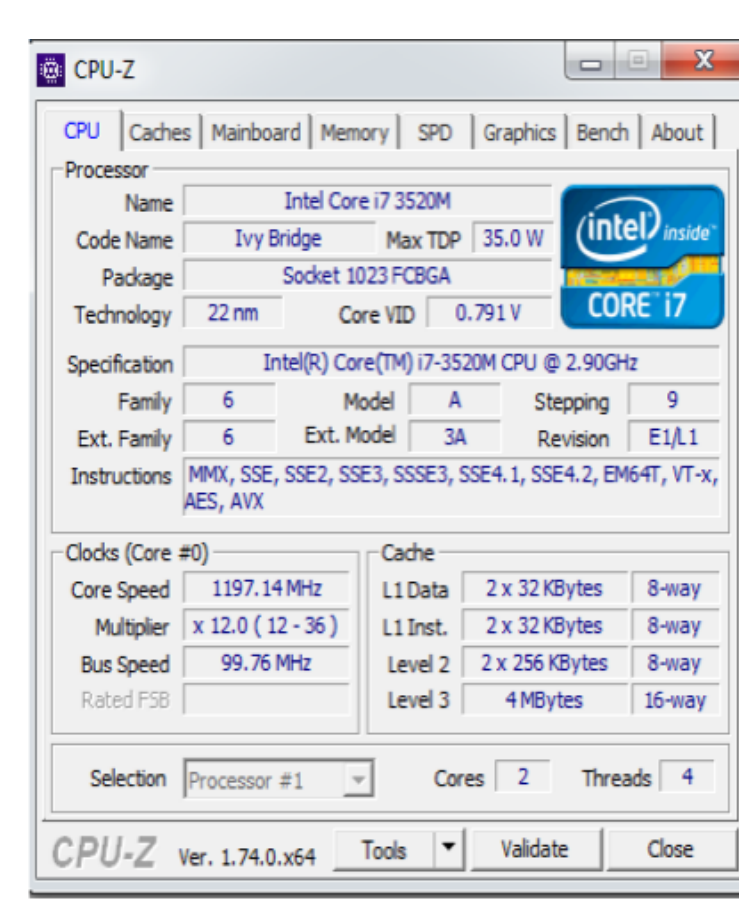
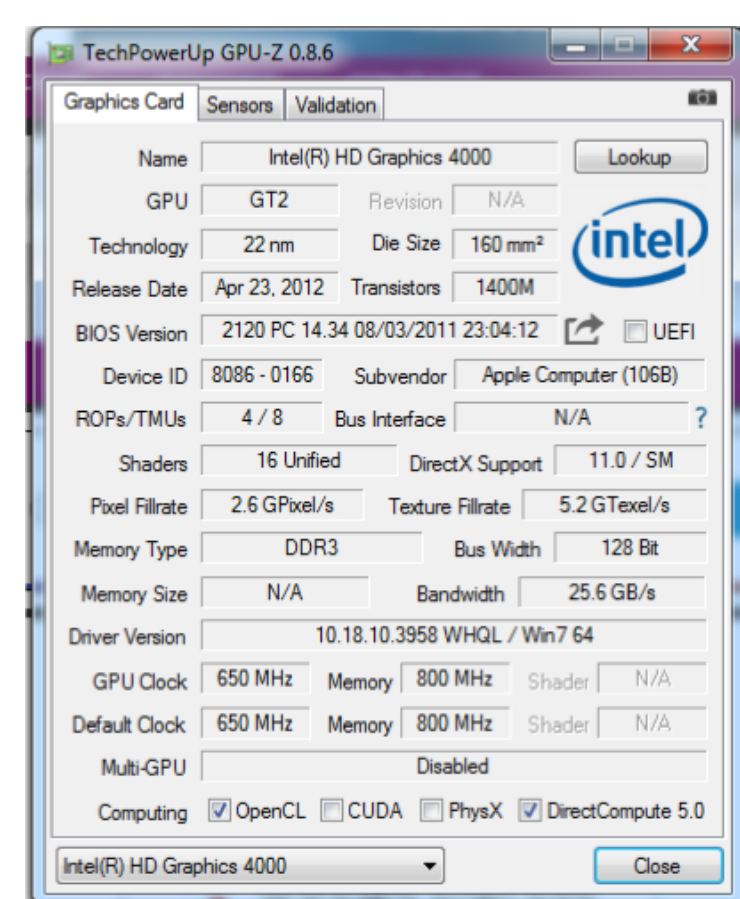


Figure 1:
GPU (Left) and CPU (Right)
Characteristics

Figure 2:
Screenshot of the code on
Visual Studio.

3. Develop the same testing platform using OpenCL and analyze the GPU and CPU performance using GPU-Intel 4000 HD and CPU Intel Core i7 3570M.

Results

Matrix multiplication and division adopted for 1 billion, 100 million, 10 million and 1 million iterations.

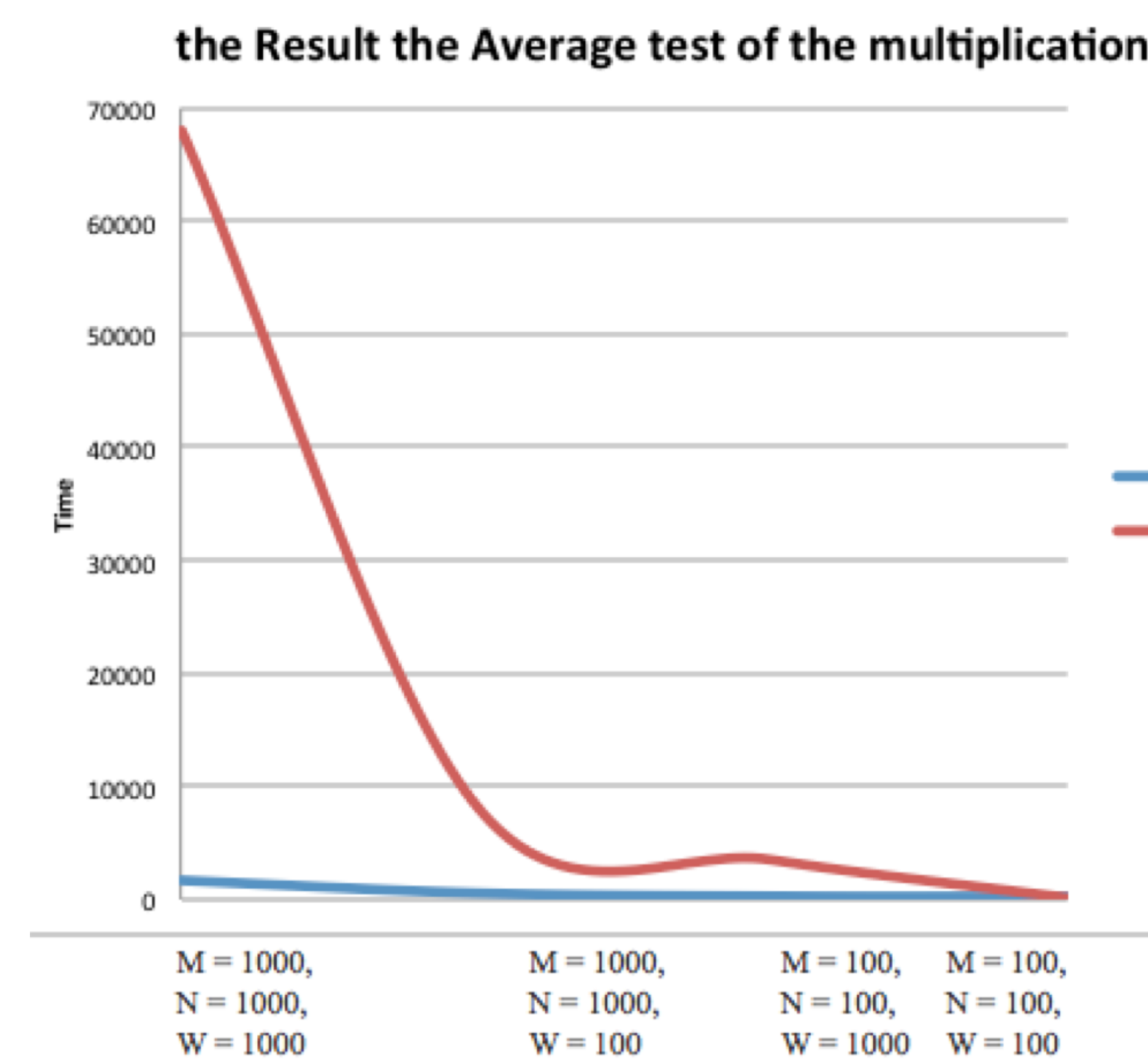


Figure 2: GPU Verse CPU
execution time in the
multiplication multi-threaded.

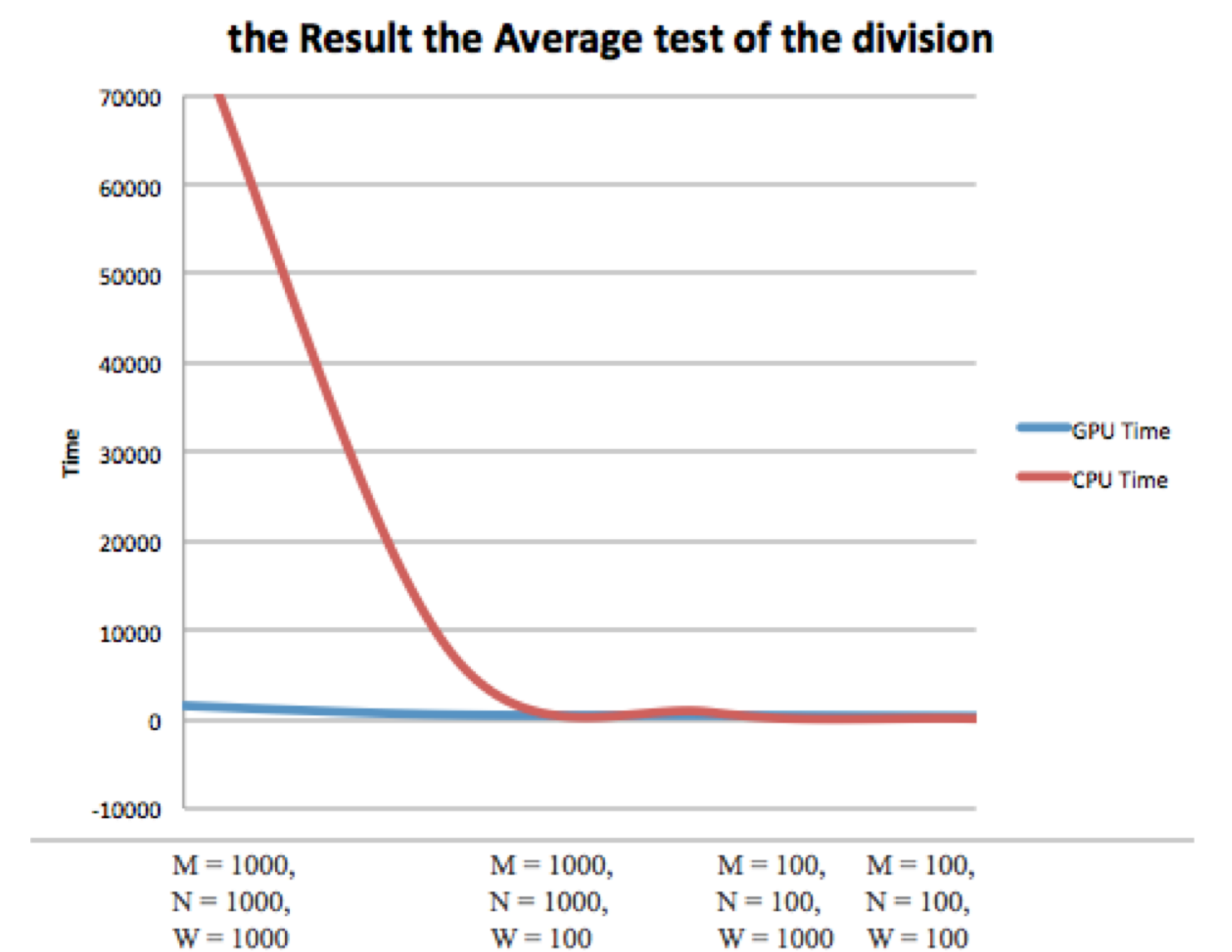


Figure 3: GPU Verse CPU
execution time in the division
multi-threaded.

Conclusions

1. CPU is more efficient in small-scale iterative algorithms.
2. GPU performance is better than CPU in large-scale parallel computing iterations.
3. The combination of a GPU and CPU can deliver much better performance.