

Optimizations in GPGPU using Floyd-Warshall

Mestrado de Engenharia Informática
Programação em Cluster e Multicore

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Motivations & Goals

Motivation:

- ▶ The lack of concise and simple introductions to GPGPU
- ▶ The absence of content where it can be shown some of the improvements when using GPGPU

Goals:

- ▶ To provide an informative and educative introduction to GPGPU, using the Floyd Warshall algorithm in CUDA as an example

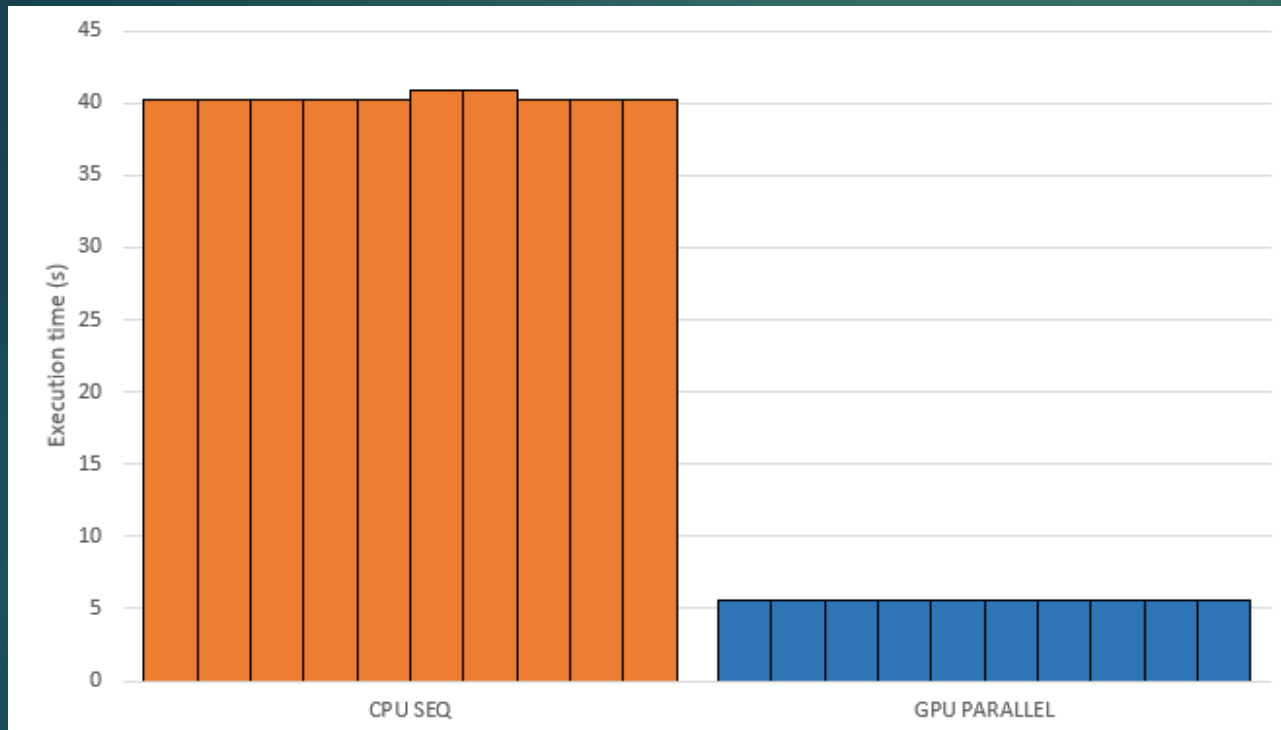
Approach

- ▶ Incremental Development
- ▶ Implemented the following
 - ▶ Sequential CPU
 - ▶ Sequential GPU
 - ▶ Parallel GPU
 - ▶ Synchronization GPU
 - ▶ Memory GPU

Biggest Challenges

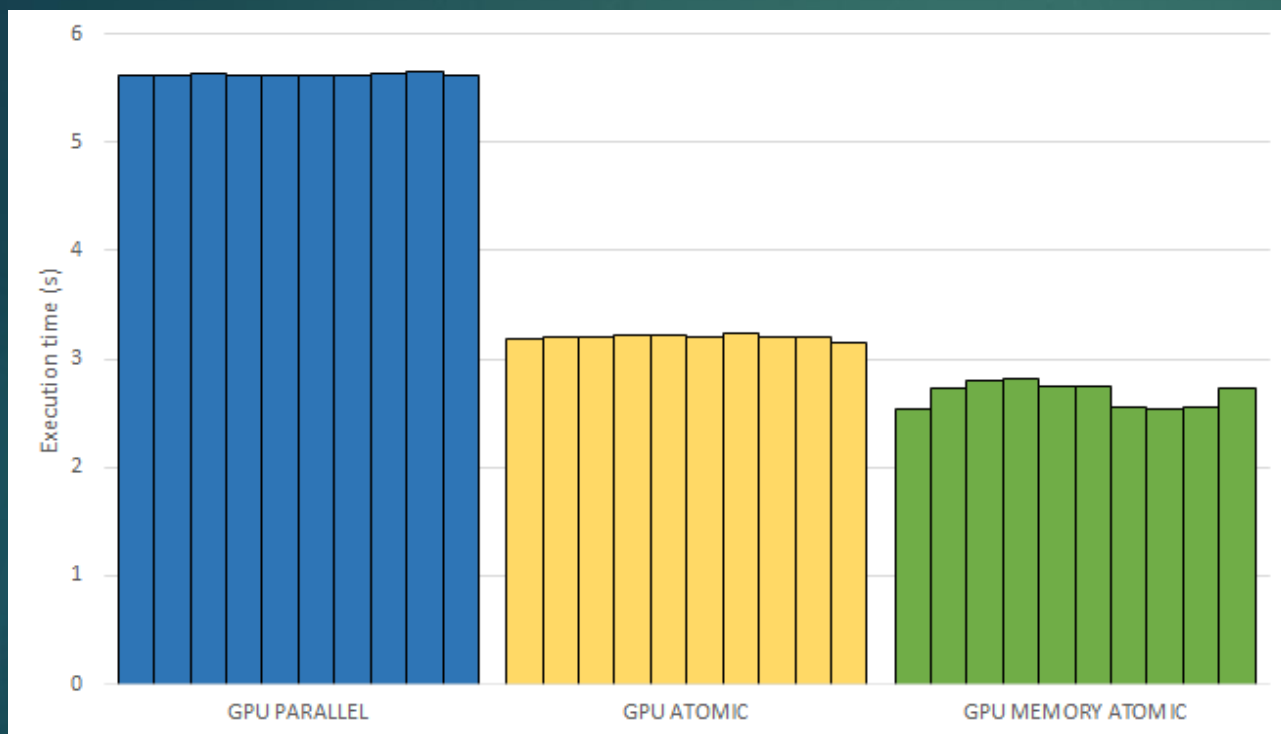
- ▶ The chosen tools to present
- ▶ How to explain them so that they can be interpreted and understood letting the reader with the capability to choose how and when to apply them

Results



- Major speedup when running the algorithm in the parallel GPU
- Speedup of around 7.2

Results



- Between implementations we can see a speedup of 1.76 and 1.19
- Speedup can be improved to approximately 12.6 by adding atomic and to 15.1 by improving memory usage

Conclusion & Future Work

- ▶ Provided a succinct introduction to GPGPU
 - ▶ Displayed the some of the improvements that can be made
 - ▶ Compared the results in order to demonstrate the impact in the overall performance
- ▶ Future Work
 - ▶ SIMD (Single Instruction Multiple Data)