Università
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Facoltà
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Software Atelier: Simulation, Data Science & Supercomputing **2018**

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Project Proposal

1. Topic

Evaluating large scale particle simulations with OpenACC

2. Domain

Physics

3. Abstract

The simulation of particle systems has become essential for visualizing the behaviour of relevant physical systems, ranging from simulations of molecular dynamics to simulations of colliding galaxies. Performing realistic simulations require to consider a large number of particles, leading to immense computational costs. Simulating such systems thus require increasingly long time frames and performing increasingly complex simulations may become intractable for single-core simulation tools. Thus, it is essential to develop simulation tools which scale with the number of bodies used in a simulation. A possible approach for scalable simulation tools is to distribute the workload among different parallel threads available in currently available accelerators. This paper aims to explore the efficiency and scalability of parallelization based on the OpenACC programming standard, which is a directive based standard for parallel computing that offloads the computational kernels to a GPU accelerator.

4. Goal

The goal of this project is to optimize particle simulation runtime using OpenACC parallelization to study scaling with an increasing number of particles.

5. Plan

The plan for our project is as follows (date format is DD.MM.YY). We note that it may change as we progress:

Task	*Begin date*	*End date*
Study Patrick Zulian's material	14.03.18	18.03.18
Develop serial code	19.03.18	28.03.18
Work on presentation for week 4/5	19.03.18	28.03.18
Investigate parallelization methods	19.03.18	28.03.18
Implement OpenACC in the serial code	29.03.18	18.04.18
Gather results & begin white paper	19.04.18	25.04.18
Finalize white paper	26.04.18	21.05.18
Prepare final presentation	22.05.18	05.06.18
Prepare project poster	22.05.18	15.06.18

6. Deliverables

The deliverables, based on our project plan, are the following:

- Project proposal
- Project plan (this document)
- White paper
- Project poster

Please note that the project proposal has already been delivered.

7. Milestones

The milestones, based on our project plan, are the following:

- Develop serial code
- Implement OpenACC in the serial code
- Gather results & begin white paper
- Finalize white paper
- Project poster

8. Contact Details

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