

An OpenCL Framework for Heterogeneous Task Mapping

HiWi position or (Bachelor-)/Masterthesis

Research field

In heterogeneous systems, the workload of an application can be distributed to several, more or less, specialized devices (such as CPUs, GPUs, FPGAs, TPUs etc.). A central design step is the decision which task should be executed by which device, known as the task mapping problem. Depending on the structure of a task, some devices are more suited for a fast execution. However, the best device is not necessarily the best mapping choice. Communication overhead as well dependency relations between tasks can lead to a situation in which the best solution for the overall system is based on suboptimal mapping choices for single tasks.

Research topic

The goal of the project/thesis is to create a framework in OpenCL through which the individual tasks of a system can be mapped interchangeably on the CPU or the GPU. In the end, the framework should enable the user to easily evaluate the characteristics of different task mappings, given implementations of the single tasks, in particular with respect to the memory usage and communication overhead. Furthermore it should be designed in a way that allows it to be extended by further devices later on.

Work plan

- Create a concept for the framework.
- Implement the framework in OpenCL
- Test the framework using small task graph examples.

Required skills

- The ability to generalize from a given problem formulation.
- (Basic) knowledge of Programming (preferably C/C++)
- Preferably knowledge in OpenCL / GPU programming

Contact



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