--- Master Project ---

Compiler-based Exploitation of Local Memory

Description

GPU programming models distinguish between different types of memory that are exposed to the programmer. *Local Memory* is one of them. Because it is on-chip it can be accessed with a much lower latency compared to the off-chip global memory. A distinct property of local memory is that the memory is shared among all threads in a work group. If there is *data reuse* across threads, this type of memory can be used to accelerate the execution of a program.

In this master project possibilities of compiler-based automatic utilization of local memory shall be explored. There are two major objectives:

1. Exploration of possibilities to recognize input data that is eligible to be prefetched to local memory in order to accelerate the subsequent execution of the kernel.
2. Transformation of kernels to make use of local memory, and exploration of local memory configurations.

Required Skills

- profound C++ experience
- intermediate compiler construction skills
- basic knowledge of the OpenCL/CUDA programming model
- preferable LLVM development experience

References

Fang et al. Grover: Looking for Performance Improvement by Disabling Local Memory Usage in OpenCL Kernels. 2014.

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