CS554 Project Ideas

GeMTC:OpenMTC – Support MTC Applications on Accelerators

Overview

GeMTC is a CUDA based GPU framework which allows Many-Task Computing(MTC) workloads to run efficiently on NVIDIA GPUs. However, NVIDIA is only one manufacturer of hardware accelerators; other brands and manufacturers include AMD GPUs and the Intel Xeon Phi. OpenCL is one possible way to program GPUs, others include (CUDA and OpenACC.) OpenCL is an open standard, which means that most compute devices are capable of running OpenCL code including both NVIDIA GPUs and AMD GPUs. This project aims to provide MTC support for a wider variety of accelerator architectures, including NVIDIA GPUs, AMD GPUs, and Intel Xeon Phi. For this project you will potentially re-write write the back-end of GeMTC with different approaches (e.g. OpenCL, OpenACC, OpenMP) to enable MTC workloads on accelerators from NVIDIA, AMD, and Intel. The GeMTC interface should be maintained. You will also be responsible for writing several test applications that utilize this software stack as well as some high level tests other developers can run to assert code is functioning properly.

Relevant Systems and Reading Material

GeMTC – http://datasys.cs.iit.edu/projects/GeMTC

Xeon Phi - http://software.intel.com/en-us/mic-developer

Swift – http://swift-lang.org

Preferred/Required Skills

No GPU programming skills required!

Preferred: OpenMP, Threaded programming. Required: C

Project Mentor

I am a 3rd year Ph.D. student and 2013 Starr/Fieldhouse Research Fellow from the Department of Computer Science at the Illinois Institute of Technology. I work as a Research Assistant in the Data-Intensive Distributed Systems Laboratory, a Teaching Assistant for the Department of Computer Science, and a Guest Graduate Student Researcher at Argonne National Laboratory.

I am involved in the GeMTC project, which aims to provide improved programmability and efficiency of hardware accelerators (GPGPUs, Intel Xeon Phi) in the Distributed Systems and High-Performance Computing spaces.

More information can be found at http://datasys.cs.iit.edu/~skrieder and http://datasys.cs.iit.edu