

Thesis proposal

Evolution of an open-source OpenCL runtime framework: OpenCRun

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Size of the thesis: 1/2 student(s)

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Abstract

OpenCRun is an open source runtime framework developed and maintained by Politecnico di Milano. The goal of these thesis is to extend it to support a new version of a specific target architecture and/or implement new features.

Pre-requirements

- basic/intermediate knowledge of C++11 language and idioms
- basic Linux skills
- [preferred] previous experience with OpenCL

Involved Technologies and Frameworks

- LLVM
- C++11
- OpenCL

Detailed description

OpenCRun is an open source runtime framework for the OpenCL programming language and API, which are used to develop and deploy parallel code on heterogeneous architectures (typically, CPU+GPU).

OpenCRun is developed at Politecnico di Milano by the Compiler Technology group, based on the industry-grade LLVM compiler framework (which in turn is developed by an Open Source group led by Apple and other major players in the semiconductors and software industries) and currently targets two platforms: x86_64 (more specifically, AMD Opteron quad cores with non-uniform memory access) and STMicroelectronics STHorm (a parallel embedded architecture targeting computer vision applications).

The goal of these thesis is to further the development of the OpenCRun platform, in particular by adding support and optimization for:

- PULP, the open hardware platform developed by ETH Zuerich and University of Bologna.
- Intel Xeon and Xeon Phi (x86-based heterogeneous platform for high performance computing).

These theses are in cooperation with the ANTAREX research project, an international collaboration including supercomputing centers like CINECA (Italy) and IT4i (Czech Republic), universities (ETH Zuerich, University of Porto), research centers (INRIA Rennes), and industries in the software and biotechnology sectors.