Master's Thesis

Development of a Generic Framework for Linux Task Offloading to Hardware on a Multicore Architecture.

An upcoming trend in development of compute architecture can be seen over the last years. Next to the ever-increasing number of cores in one system, dedicated hardware accelerators for a specific task are getting increasingly widespread. These hardware accelerators are designed to outperform a general-purpose CPU resulting in a performance increase as well as a relief of the CPU. One challenging task for utilizing the accelerator efficiently is the implementation of a performant interface in addition to a way to notify the issuing task after completion the task in a hardware accelerator. This work focuses on the implementation and evaluation of a generic framework for offloading tasks to a hardware accelerator integrated in Linux on a heterogeneous architecture. This framework should also include a performant solution to put the issuing task in case of a blocking implementation into a sleep state, being woken up by the hardware accelerator after completion. The proof of concept should be accomplished by integrating the framework, software- as well as hardware-wise, into a heterogeneous architecture simulated in full system simulation using Gem5.

The goal of this work is to develop a generic framework for task offloading to hardware integrated in a multicore architecture using a Linux Operating System. Combined with the development, a related work analysis for existing similar approaches is part of this work.

Prerequisites

To successfully complete this work, you should have:

- good programming skills in Python and C/C++,
- basic knowledge about Git,
- first experience with the Linux environment.

The student is expected to be highly motivated and independent.

Advisors

Lars Nolte