TUM

Bachelor's Thesis

Setup of an ARM Multicore Platform with a FPGA extension using a Xilinx Zynq Board and a Linux OS.

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 completing the task in a hardware accelerator. The proof of concept is accomplished by integrating the framework, software- as well as hardware-wise, into a heterogeneous architecture simulated in a full system simulation using Gem5. This work focuses on bringing up a hardware prototyping environment to further evaluate the hardware accelerator concepts not only via a simulation but also a real hardware platform. The chosen hardware platform to setup up is a Xilinx Zynq board. This features a heterogeneous ARM multicore setup directly integrated into the ASIC, combined with programmable logic in the FPGA part of the chip. On the software side a similar setup as in the simulation environment is envisioned including the use of Linux as the operation system.

The goal of this work is to set up an ARM multicore platform using a Xilinx Zynq board with the focus on creating a similar environment to the one used in the Gem5 simulation. This includes a heterogeneous multicore architecture with a software stack using Linux as an operation system to evaluate hardware accelerator concepts.

Prerequisites

To successfully complete this work, you should have:

- good programming skills in VHDL,
- experience with microcontroller programming,
- basic knowledge about Git,
- first experience with the Linux environment.

The student is expected to be highly motivated and independent.

Advisors

Lars Nolte