

A Linear Programming Model for Operator Mapping on FPGAs

(Bachelor-) or Masterthesis

Research field

Field Programmable Gate Arrays (FPGAs) are increasingly used in industry as they offer faster computation than CPUs or GPUs at less development time and cost than application-specific integrated circuits (ASICs). FPGAs consist of a grid of lookup tables which can be programmed to simulate any kind of logic circuit. For computing a function on an FPGA, the task graph of the function, i.e., the graph representing the necessary data flow between operations, must be mapped onto the grid of lookup tables. Finding a suitable mapping is a challenging task and topic of ongoing research.

Research topic

In your thesis you will develop a linear programming (LP) model for mapping task graphs on FPGAs. The goal is to have a program which can find near-optimal solutions for small problem sizes that can be used as a reference point for heuristical approaches. During the work you will have to identify the relevant constraints for the mapping, create a linear program and implement the model in Python such that problems can be tackled using an LP solver. The workload is aimed at a master thesis, but can also be modified to fit for a motivated bachelor student.

Work plan

- Abstractly identify and model the constraints for the mapping problem
- Create a linear program
- Implement the linear program in Python

Required skills

- Affinity for mathematics
- (Basic) knowledge of Linear Programming
- Basic programming knowledge, preferably in Python

Contact



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