

Quantum Computing Simulation on FPGA

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Since 2017 we started R&D on co-designing (HW/SW) computational systems, targeting mainly FPGAs. We developed over the years several solutions for computational acceleration on FPGAs, including, but not limited to, the creation of a full framework for building FPGA-based modular architectures, namely the BondMachine project.

The problems addressed by these solutions range from the standard application to the complex neural network inference with a reduced precision. We can analyze the performance of the developed solutions in terms of speedup, latency, and power consumption.

In this talk, we will present the activities of the last year, focusing on how we are using the developed framework and the acquired know-how to create a FPGA-based quantum computer simulator: `bmqsim`.

`bmqsim` is a simulator for quantum circuits running on FPGAs. It can produce several target backends, some based on the BondMachine framework, others based on different High Level Synthesis tools.

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