Design Automation for Quantum Computing: How to (Not) Re-invent the Wheel for an Emerging Technology

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Abstract

Quantum computers are one of the most promising new technologies which are currently investigated. With physical realizations already available to a broader audience and several potential applications on the horizon, this raises the question how to efficiently design corresponding quantum computing solutions. Can we re-use established methods from the design automation of classical systems? Or do we have to start from scratch for quantum computing? This talk aims to provide answers to these questions. We are trying to make the point that we do not have to re-invent the wheel---but that a 1:1 re-use of classical design methods also won't do the trick. The corresponding discussions are exemplified using design automation solutions and software tools from the Munich Quantum Toolkit (MQT). For more details, please see https://www.cda.cit.tum.de/research/quantum/.