The Effect of the Optimization Pass Order for Quantum Circuits in the Native Gate Set

Task Description:

When compiling a quantum computer, there are many optimizations that can be applied in an optimization sequence. However, it is not clear what kind of impact an optimization A has on a later optimization B. It might be that A boosts B, but it can also be that A makes B worse, or maybe it has no impact at all.
The idea of this thesis is to try to find out what impact optimizations have on each other.

Prerequisites:

- Prior knowledge on quantum computing
- Prior knowledge on how (quantum) compilers work is helpful but not mandatory

Overview of the Tasks:

1. Familiarize with one or more quantum compilers (apart from Qiskit's) and how to apply optimizations
2. Investigate different optimization sequence orders
3. Analyze the impact of those optimization orders for the resulting quantum circuit regarding multiple optimization criteria

Get in touch:

In case you are interested, please send a *short* e-mail (German or English) with your motivation and which prerequisites you fulfill to michelle.to@nm.ifi.lmu.de. Please do **not** send long e-mails generated by a large language model.
If you have any questions, please don't hesitate to get in touch.

Organisatorisches:

Aufgabensteller:
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Dauer der Arbeit:

- Bachelorarbeiten: 3 Monate

Anzahl Bearbeiter: 1

Betreuer:

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