



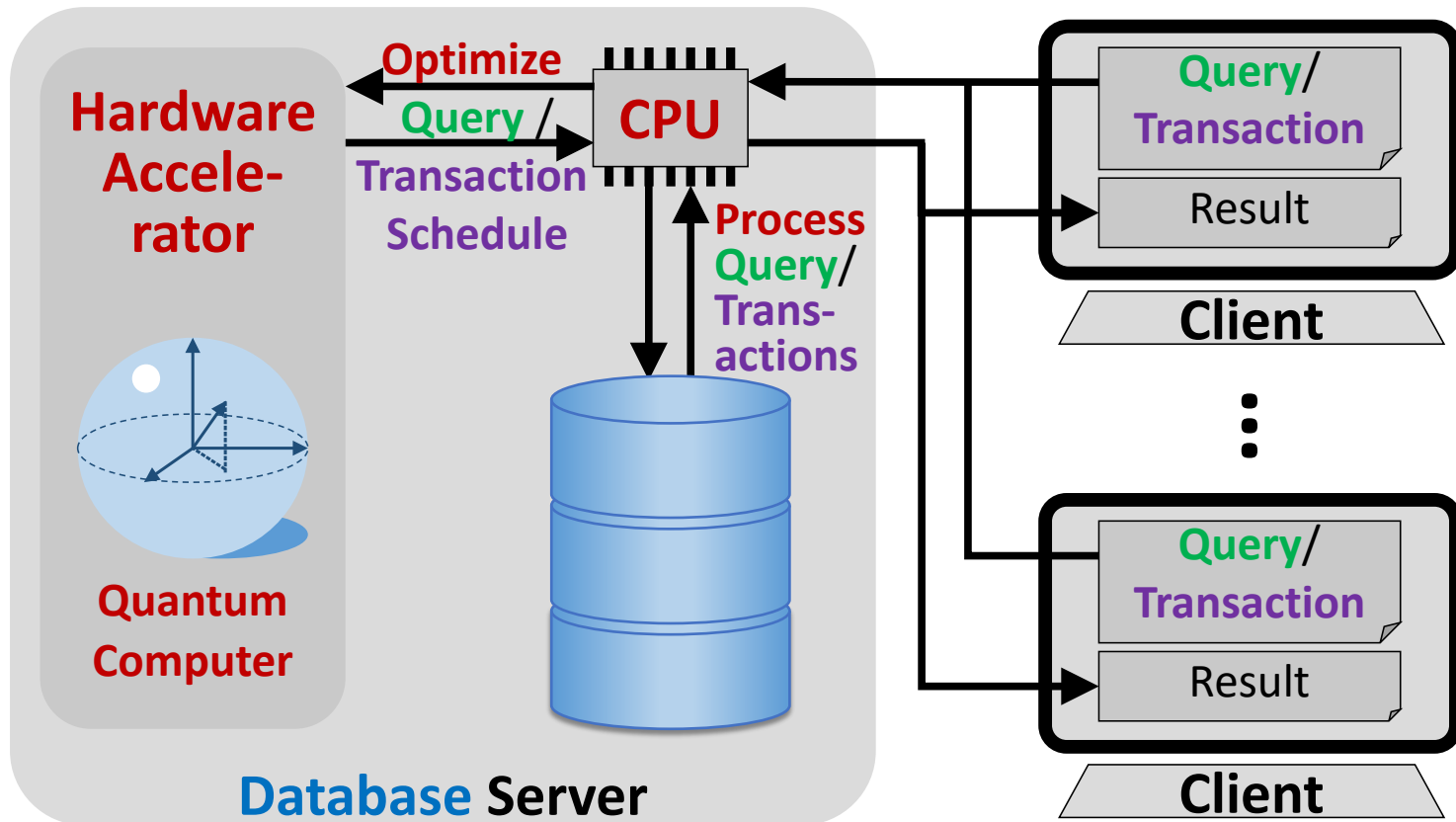
hqic Update und Networking 24.11.2022

QC4DB: Accelerating Relational Database Management Systems via Quantum Computing

Professor Dr. rer. nat. habil. Sven Groppe

<https://www.ifis.uni-luebeck.de/index.php?id=groppe>

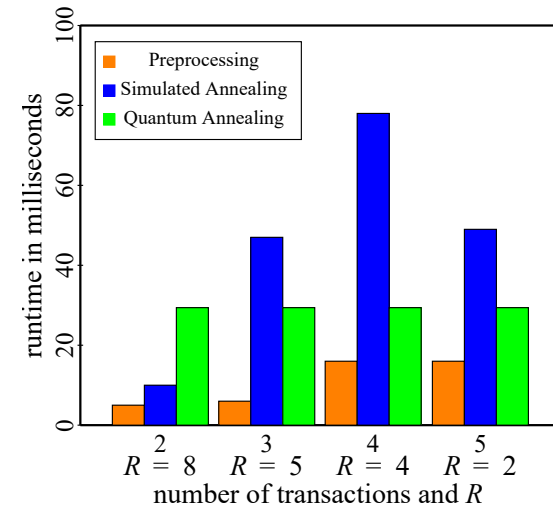
Using Hardware Accelerator for optimizing Queries / Transaction Schedules



Promising First Results

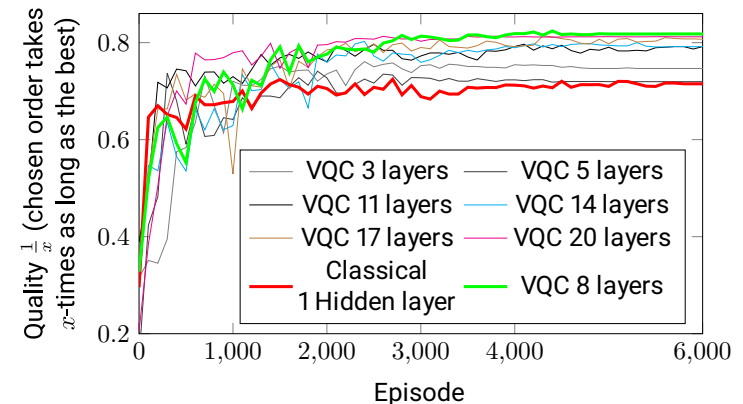
- Optimizing Transaction Schedules

- Experiments on real **Quantum Annealer** (D-Wave 2000Q cloud service)
- Versus **Simulated Annealing** on CPU
- Preprocessing time/Number of QuBits: $O((n \cdot k \cdot R)^2)$








- Optimizing Queries

- **Variational quantum circuits (VQCs)** beat classical neural networks for join order optimization



QC4DB: Accelerating Relational Database Management Systems via Quantum Computing

Name:	QC4DB: Accelerating Relational Database Management Systems via Quantum Computing	
Funded by:	BMBF, Fördermaßnahme Anwendungsnetzwerk für das Quantencomputing	
Proj. Info:	Duration: 3 years, Vol.: 1.8M Euros, Project Website@Quantentechnologien 	
Topics:	Optimizing an open source relational database management system <ul style="list-style-type: none"> • Queries • Transaction Schedules 	
Partners:	 UNIVERSITÄT ZU LÜBECK INSTITUT FÜR INFORMATIONSSYSTEME (Coord.)	
Expertises:	Hardware-Acceleration of Databases	Room Temperature Diamond Quantum Accelerators/qbOS
Website:	https://www.ifis.uni-luebeck.de 	https://quantumbrilliance.com/ 

We are open for **collaborations**:  groppe@ifis.uni-luebeck.de

Lecture "Quantum Computing" (Master Computer Science & Advanced Study Program in AI): <https://www.ifis.uni-luebeck.de/~groppe/lectures/qc> 

Impact on our metropolregion

- Leading research in accelerating databases via quantum computing
 - Draws attention to our region's world-class research in quantum computing
 - Attracts young scientists to come to Lübeck
 - More funding for future quantum computing research projects
 - Companies can easily collaborate with science about quantum computing applications and stay in/move to our region
- Quantum Computing Lecture integrated in Master Computer Science & Advanced Study Program in AI
 - Attracts more students
 - Decreases the lack of experts in quantum computing area
 - Brings expertise about quantum computing into companies of our region for developing and exploiting future quantum applications