High-Level Control for a Shuttling-Based Trapped Ion Quantum Computer

Munich Quantum Software Forum

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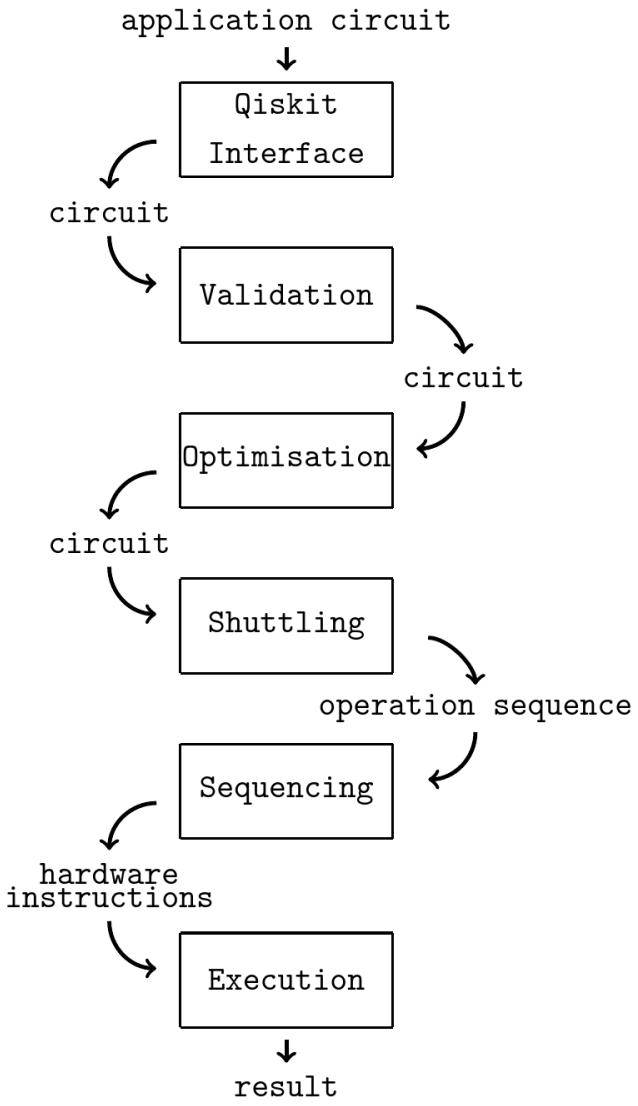
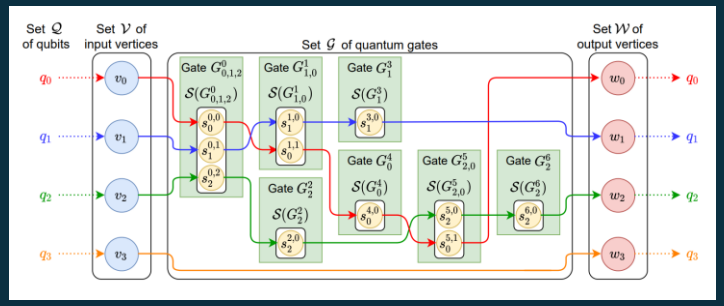
High Level Stack

Software Stack



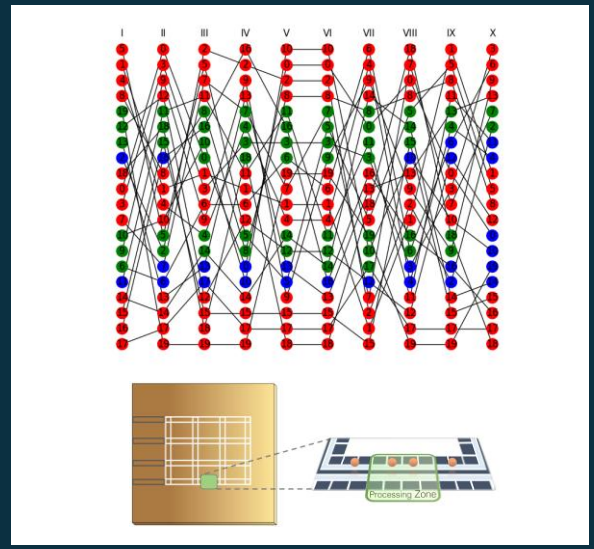
Circuit Compiler



- Given a Qiskit circuit, validate and optimise (Quantum Circuit as a Graph) using Pytket
- Convert to native gate set

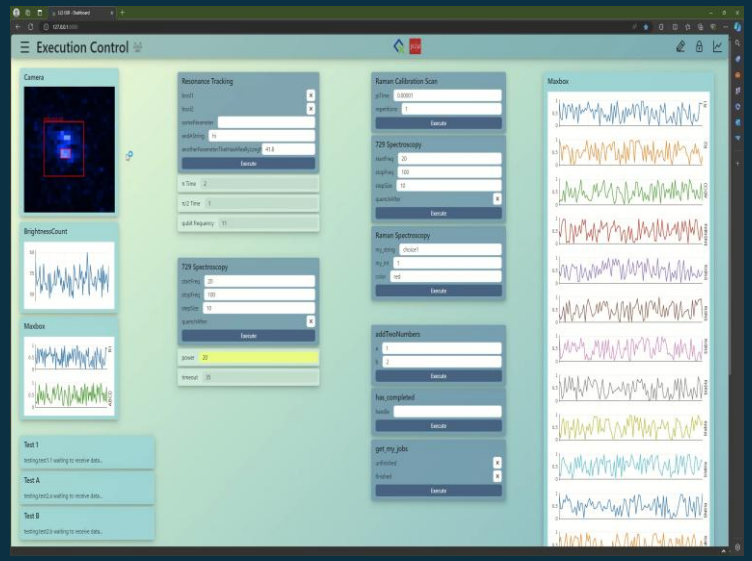
Shuttling Compiler

- Optimise shuttling of ions in segmented Paul trap
- Minimise movement of ions in the trap
- Guided by heuristic, swapping qubits
- **Goal**: Extend to two dimensions



Low Level Stack

GUI for experimental Control



- Linear segmented Paul Trap
- Qubits: $^{40}Ca^{+}$ -ions
- Laser driven operations
- **Goal**: Joint addressing and shuttling for 50-qubit quantum processor

Paul Trap