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# Modular and Scalable Control System for Atomic Array Quantum Computers

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Atom Computing has selected the MicroTCA platform to implement the control system for its quantum computers.

We start with a brief introduction of atomic arrays as a hardware platform for quantum computation and highlight the driving requirements for the control system. We also discuss how the control system fits into the technology stack of a quantum computer.

We then introduce the hardware components of the control system. In order to speed up the development, we employed a large number of COTS components. However, for performance-critical applications, we developed custom elements, most notably a RFSoC-based AMC, which is the fundamental building block that generates RF pulses and controls the suite of lasers necessary to cool and trap the atoms and encode them into qubits. In addition, we designed and built an RTM board that distributes digital triggers, as well as precision ADC and DAC FMC boards that servo a collection of electro-optical elements that manipulate the laser light. The talk continues with an overview of the gateware, firmware, and software of Atom Computing's control system and highlights how MicroTCA features facilitate the integration of hardware with the rest of the system. We conclude by sharing our experiences operating MicroTCA systems to control quantum computers.

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