CIRQ

Cirq is a Python software library for writing, manipulating, and optimizing quantum circuits, and then running them on quantum computers and quantum simulators. Cirq provides useful abstractions for dealing with today's noisy intermediate-scale quantum computers, where details of the hardware are vital to achieving state-of-the-art results.

Cirq is a framework for writing quantum algorithms for noisy intermediate scale quantum (NISQ) devices. Roughly speaking, NISQ devices are those with O(100) qubits that can enact O(1000) gates. Because the resources for NISQ devices are so constrained, we believe that a framework for writing programs on these devices needs to be aware of all of the architectural properties of the device on which the algorithm is written. This is in contrast to other frameworks where there is a clean separation between the abstract model being used and the details of the device.

Qubits, Operations, Moments and Circuits

In Cirq, circuits are represented by a Circuit object. Conceptually:

- A Circuit is a collection of Moments.
- A Moment is a collection of Operations that all act during the same abstract time slice.
- An Operation is a an effect that operates on a specific subset of Qubits.
- The most common type of Operation is a Gate applied to several qubits (a "GateOperation").
- The Qubits of a circuit are implicitly defined by the operations - you can't allocate qubits to a Circuit