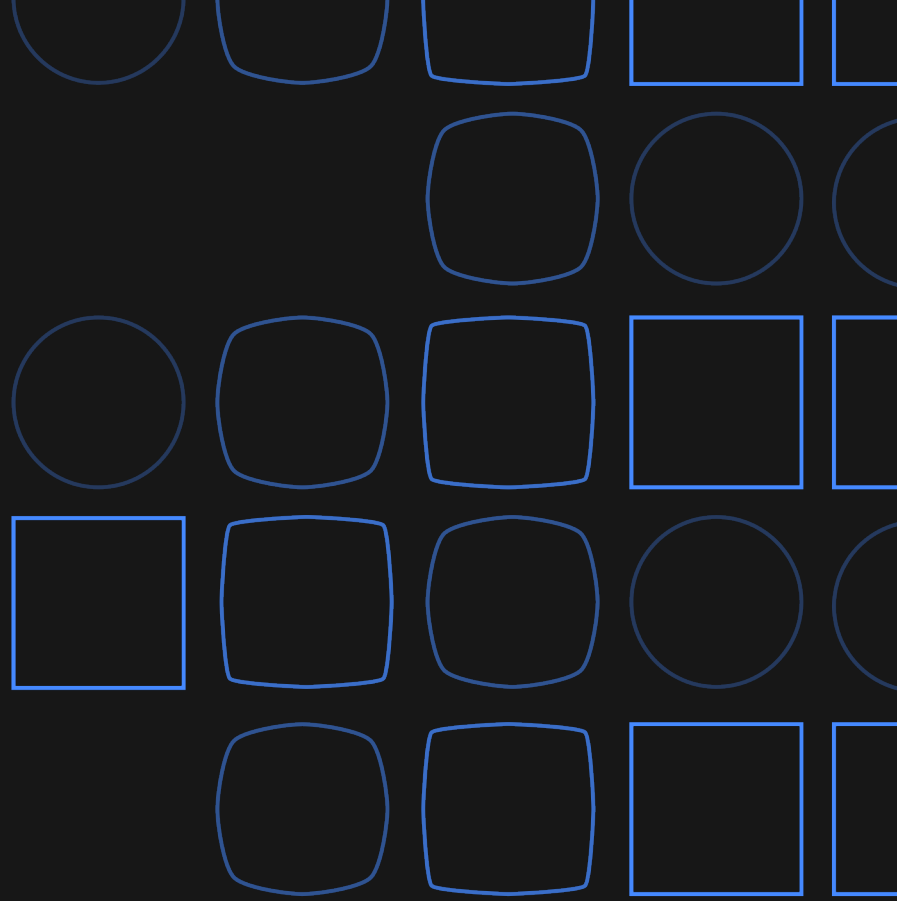
Qiskit workshop for PC5228

Junye Huang

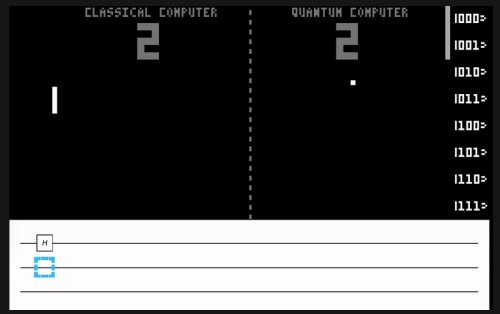
Quantum Developer Advocate

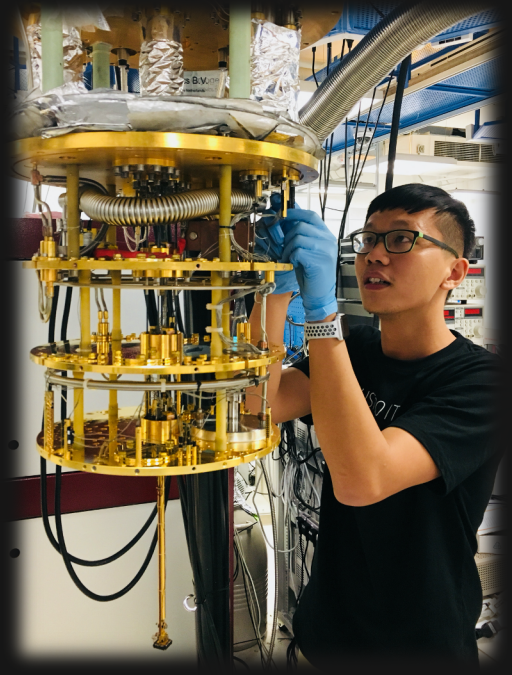


IBM **Quantum**

About me

- Quantum developer advocate focusing on quantum education
- PhD candidate in experimental low temperature physics at NUS
- Participant of the first Qiskit Camp
- Organized the first university Qiskit hackathon in the world
- Co-creator of quantum games: QPong, QPong Arcade, QiskitBlocks, ...





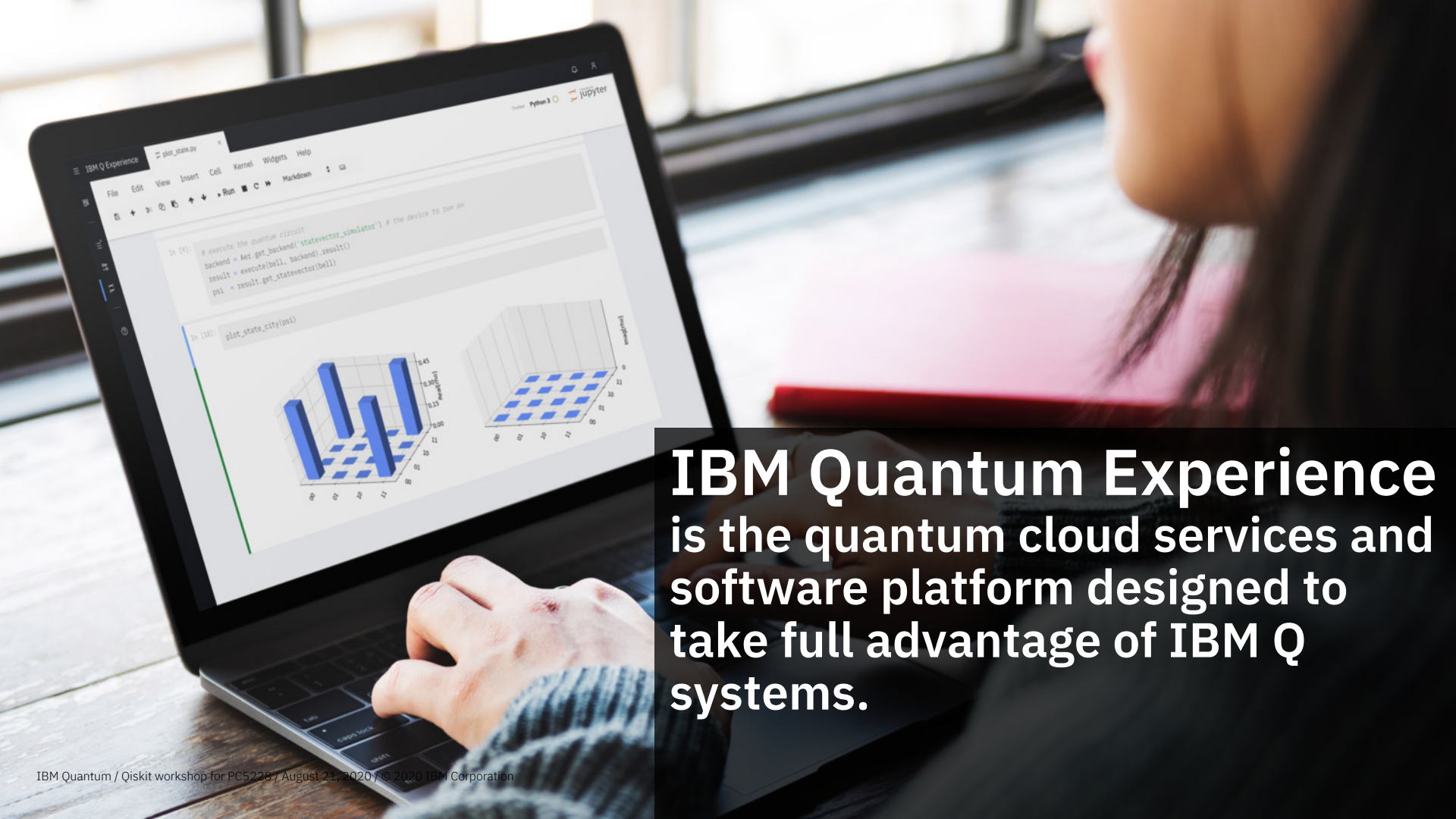
Schedule

Date	Start	End	Subject
21 Aug	12:00	13:30	Introduction to Qiskit and IBM Quantum Experience
18 Sep	12:00	14:00	Quantum algorithms: Deutsch-Josza and Grover algorithm
6 Nov	12:00	14:00	Quantum applications: Simulating Molecules using Variational Quantum Eigensolver (VQE)

All sessions will be recorded

Session 1: Introduction to Qiskit and IBM Quantum Experience

Start	End	Duration	Subject
12:00	12:10	0:10	Opening and Overview
12:10	12:40	0:30	IBM Quantum Experience • Overview • Circuit composer • Hardware backends
12:40	12:45	0:05	Break
12:45	13:15	0:30	Qiskit | Quantum Information Science Kit • Overview • Qiskit tutorials • Qiskit textbook
13:15	13:30	0:15	Qiskit Community



IBM Quantum Experience

is the quantum cloud services and software platform designed to take full advantage of IBM Q systems.

IBM Quantum Experience

Quantum circuits

200 B+

Users

250 k+

Client partners

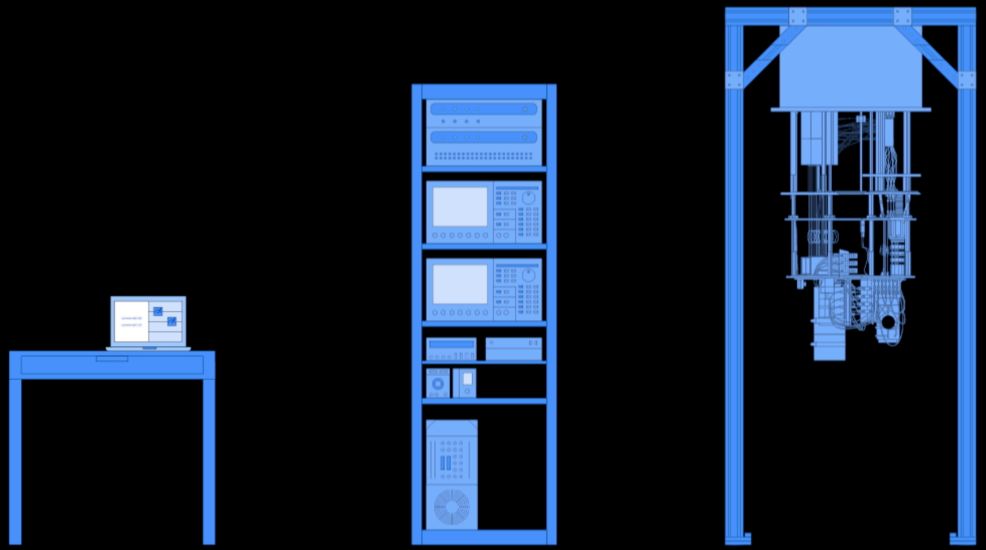
115+

Research papers

250+

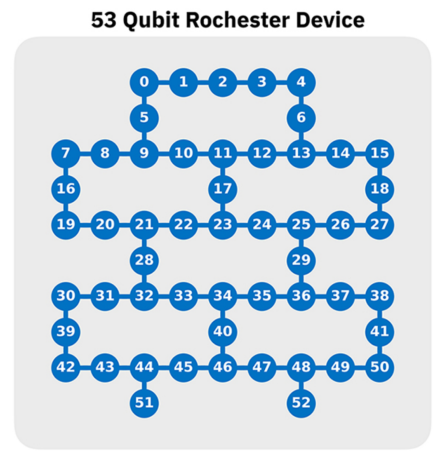
Quantum systems

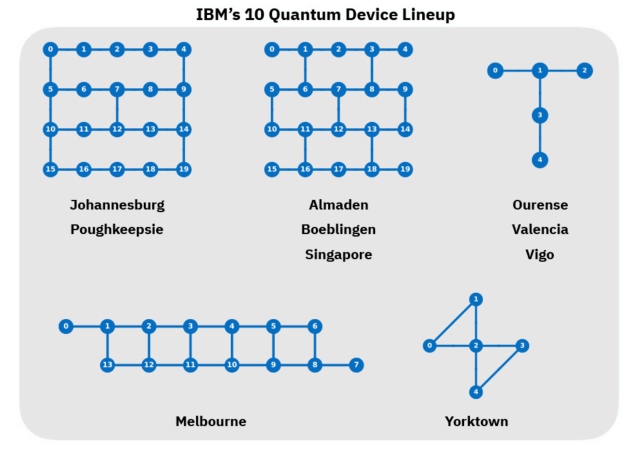
22+

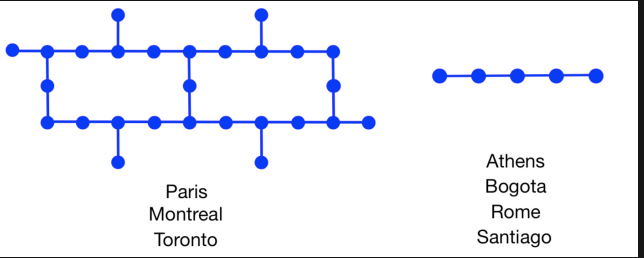


IBM Q

IBM Quantum Systems



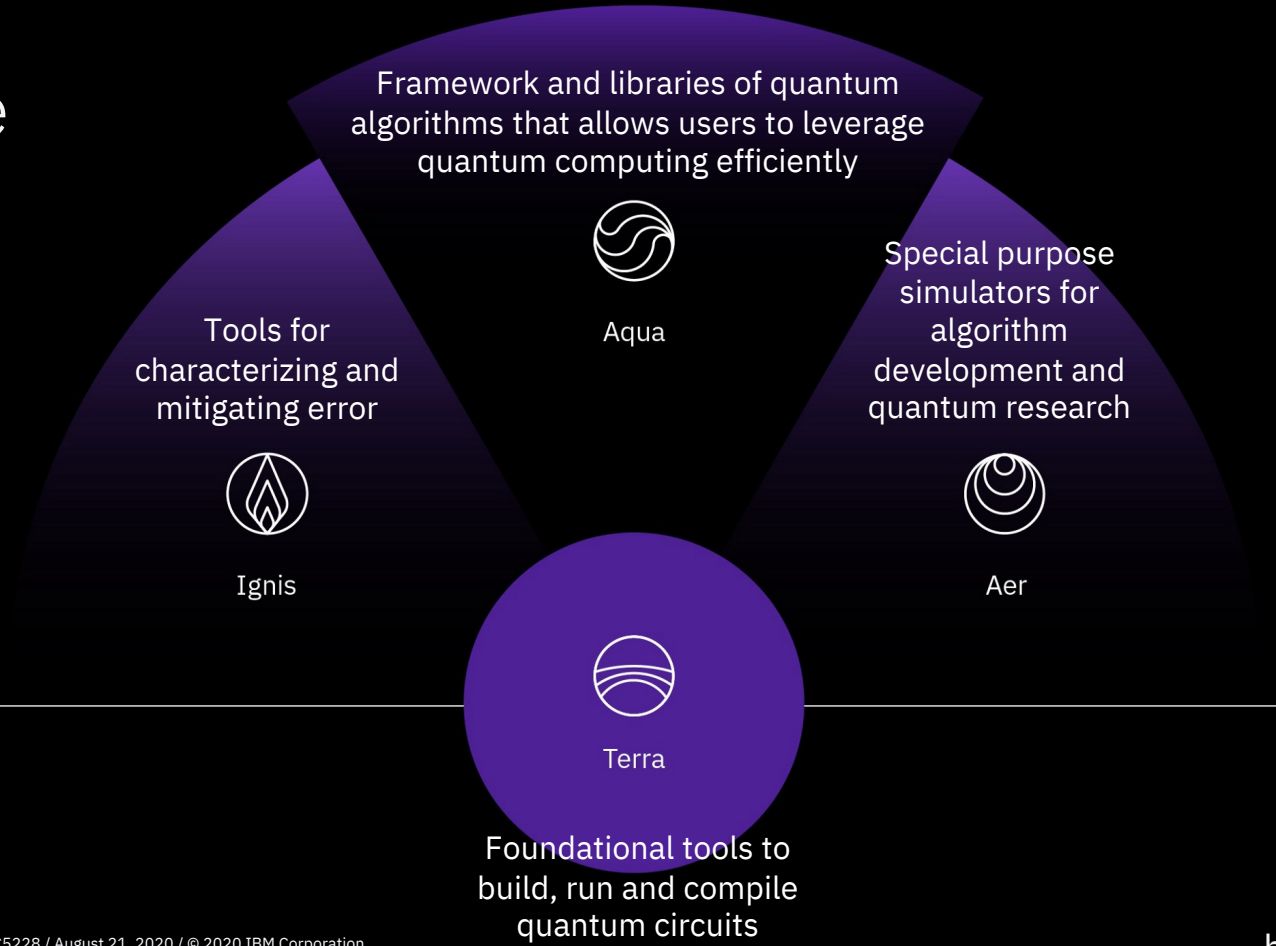




Open access: 10 systems

Premium access: 22+ systems

Qiskit software stack



Qiskit

Hardware

https://qiskit.org/

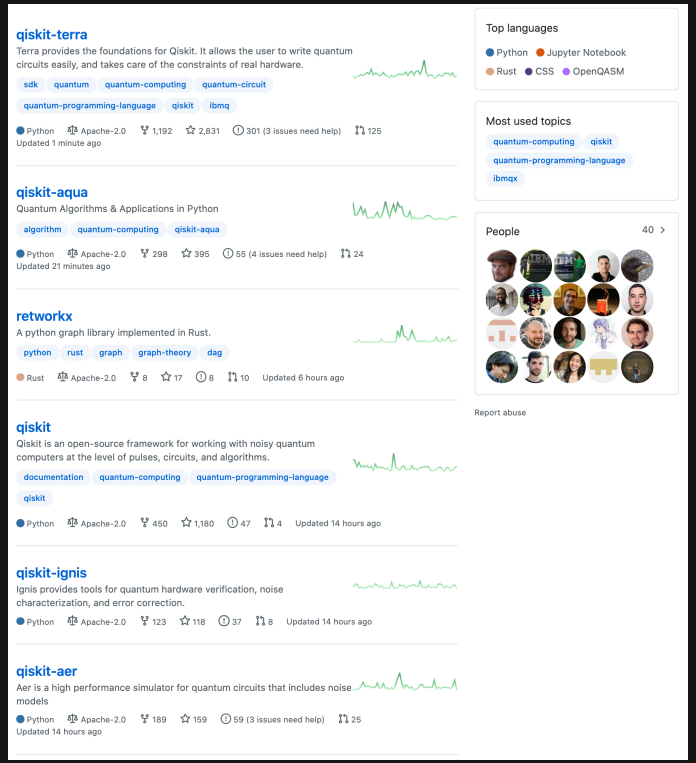
What can you do with Qiskit?

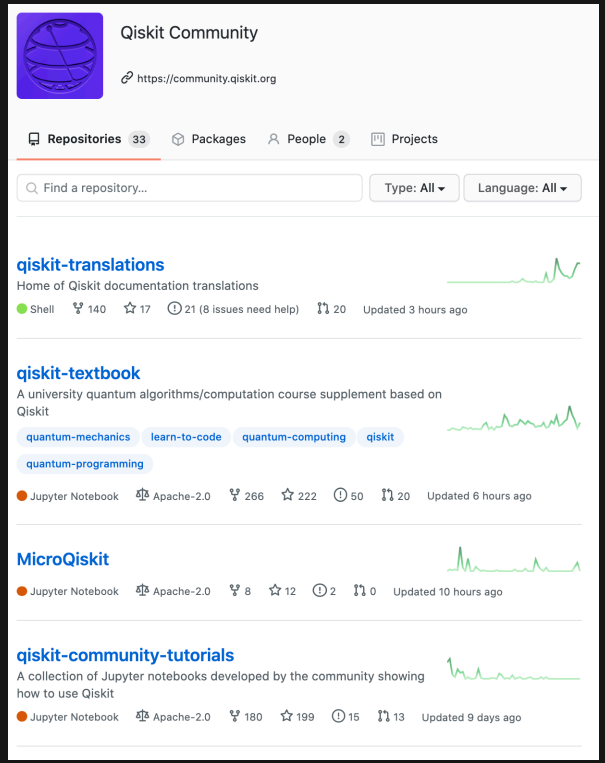
Originally QISKit: Quantum Information Science Kit

- Compose quantum programs at the level of circuits and pulses
- Circuit transpilation
- Execute quantum programs using simulators and real devices
- Study noise models
- Perform benchmarking tests (T1, T2 measurement, Randomized Benchmarking, Quantum Volume)
- Run quantum algorithms (Deutsch-Jozsa, VQE, Grover)
- Study quantum applications (optimization, finance, chemistry, QML)

Ref: Qiskit Documentation

Open source

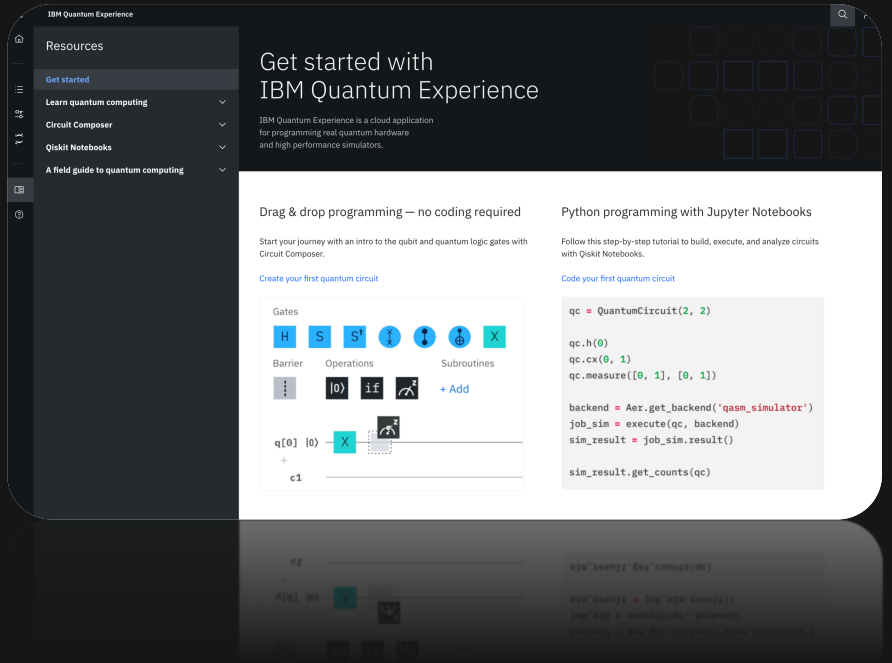




200+ contributors inside and outside IBM

Qiskit fundamentals

- Install Python and Qiskit link
- Register IBM Quantum Experience link
- Run Qiskit code in Jupyter notebook link
  - On simulators
  - On real devices



Ref: Coding with Qiskit Ep.2 & Ep.3

Qiskit textbook

- For university quantum computation course
- Open source and collaborative
- Run algorithms with Qiskit
- Interactive on IBM Quantum Experience with one click

Ref: Qiskit textbook