Qiskit Fall Fest 2025

Welcome, and Happy IYQ!!!

Natalie Hawkins
Qiskit Advocate
Seattle Quantum Computing Meetup, Founder

IBM **Quantum**

'Quantum' should

Seattle Quantum Computing Meetup
Knowledge Share, Network

QISKIT 2025 2025 FALL FEST

Sat, Oct 4, 2025, 12:30pm-2:00pm

Today’s Agenda

Qiskit Fall Fest 2025

What is it?
Who’s doing it?
SQCM FF25 Schedule

IBM Quantum, and others

IBM Hardware
IBM Roadmap
Quantum Computers
Quantum Programming

Qiskit

How to use it?

SQCM Fall Fest 2025 Activities

Coding Challenges
Hackathon Prompts
Open-Your-Choice Project
Quantum Games
Free Time

Qiskit Fall Fest – What is it?

Qiskit Fall Fest 2025

Qiskit Fall Fest is a collection of quantum computing events created and planned by university students and volunteer hosts, with support from IBM Quantum.

54 Sponsored Events
89 Extension Events +
143 Total Events

https://www.ibm.com/quantum/events/fall-fest-2025#resources

The Seattle Quantum Computing Meetup was selected as one of 150 universities or organizations to host a FF25, out of 600 applications.

https://github.com/SeattleQuantumComputingMeetup/qiskit_fall_fest_2025/tree/main

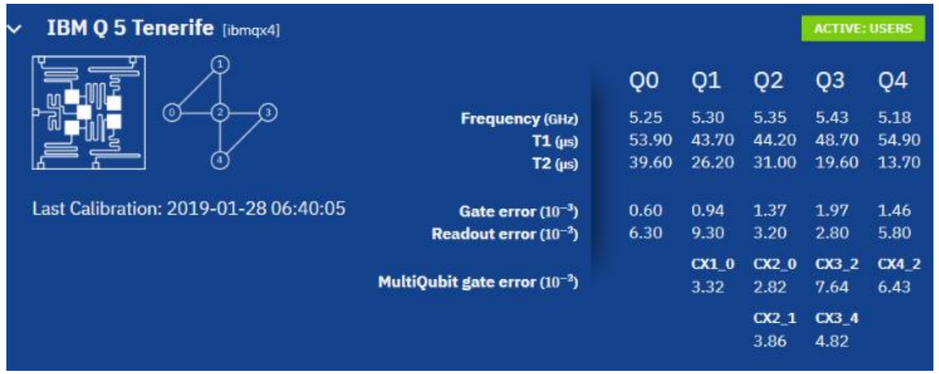
SQCM FF25 Schedule

Date	Time	Activity	Location
Sep 30	6-7:30pm PT	Fall Fest 2025 Prep - Qiskit and Quantum Computing 101	Northgate Branch, Seattle Public Library
Oct 4	12:30-2:00pm PT	Qiskit Coding Challenges, Hackathon Prompts, Game Day	Montlake Branch, Seattle Public Library
Nov 3	10:00 am PT	Deadline for Coding Challenges and Hackathon Work	submit online
By Dec 1	11:59 pm PT	Participation and Winner Certificates Will Be Awarded	delivered online

IBM Quantum and Others – hardware and software

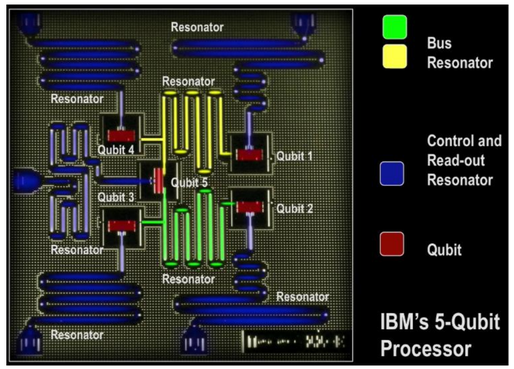
IBM Quantum, Hardware

The IBM Quantum Experience went live on May 4, 2016:

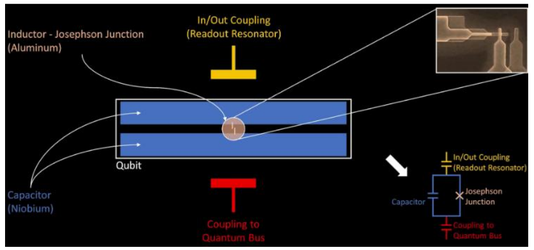


	Q0	Q1	Q2	Q3	Q4
Frequency (GHz)	5.25	5.30	5.35	5.43	5.18
T1 (µs)	53.90	43.70	44.20	48.70	54.90
T2 (µs)	39.60	26.20	31.00	19.60	13.70
Gate error (10^{-3})	0.60	0.94	1.37	1.97	1.46
Readout error (10^{-2})	6.30	9.30	3.20	2.80	5.80

MultiQubit gate error (10^{-2})				
CX1_0	CX2_0	CX3_2	CX4_2
3.32	2.82	7.64	6.43
CX2_1	CX3_4		
3.86	4.82		



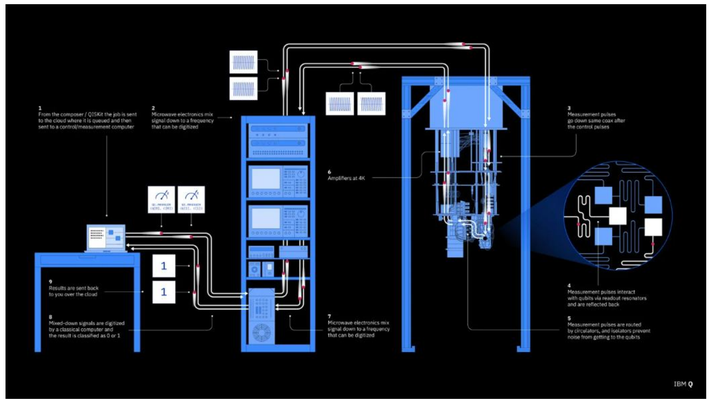
Superconducting Qubit:

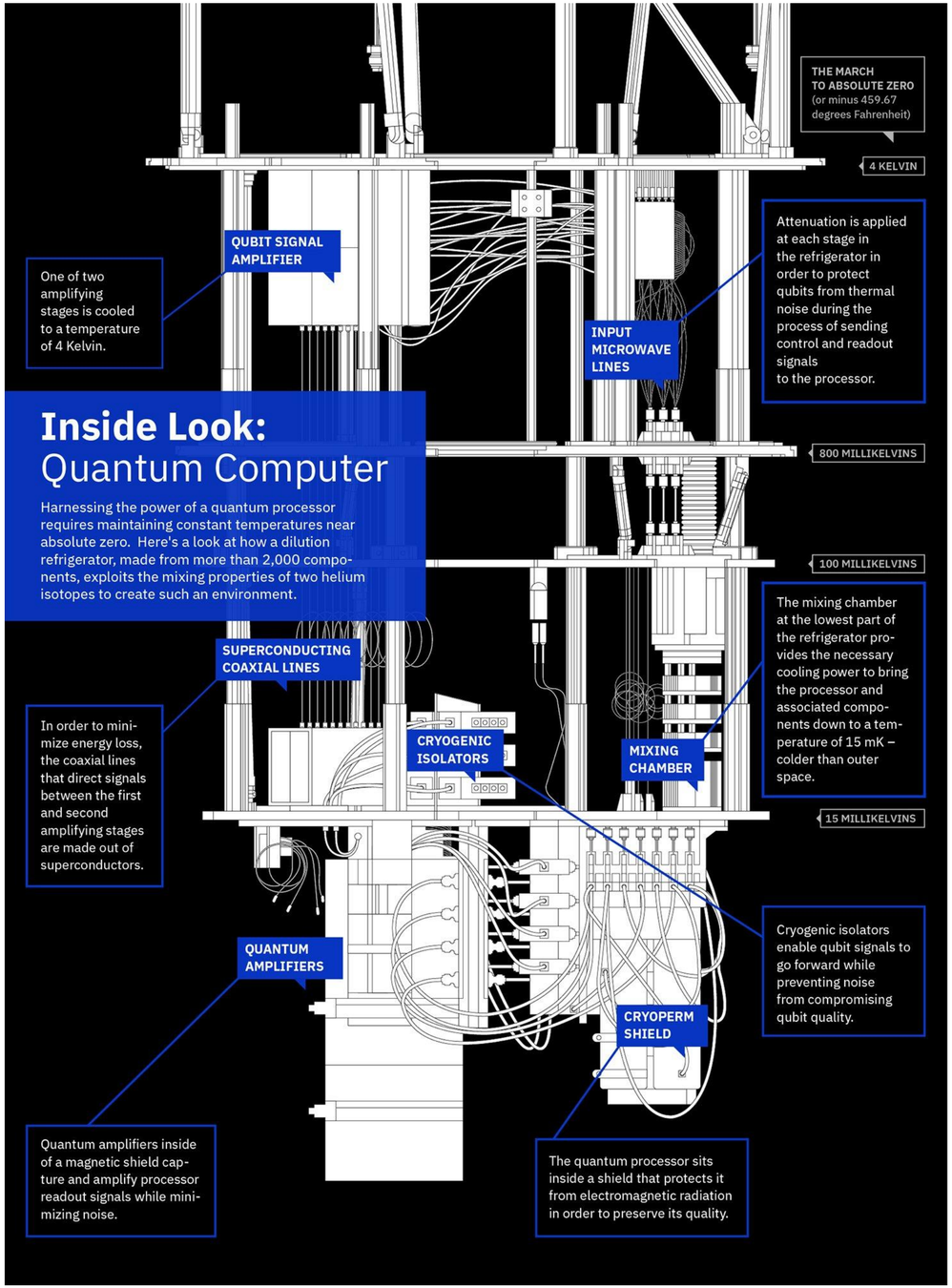


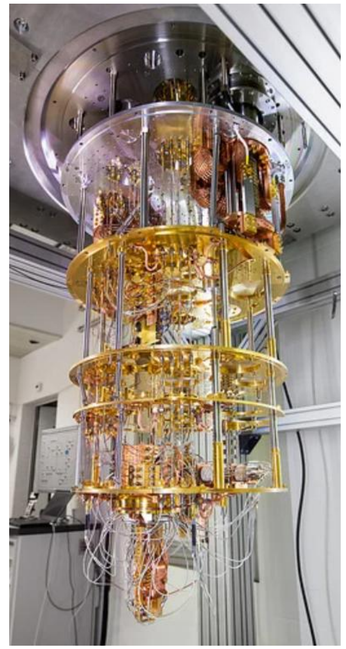
QPU: size like CPU

Qubit: millimeters

JJ: microscopic (<= micrometers)







https://electronics360.globalspec.com/article/13553/how-quantum-computers-work

IBM Quantum, Roadmap

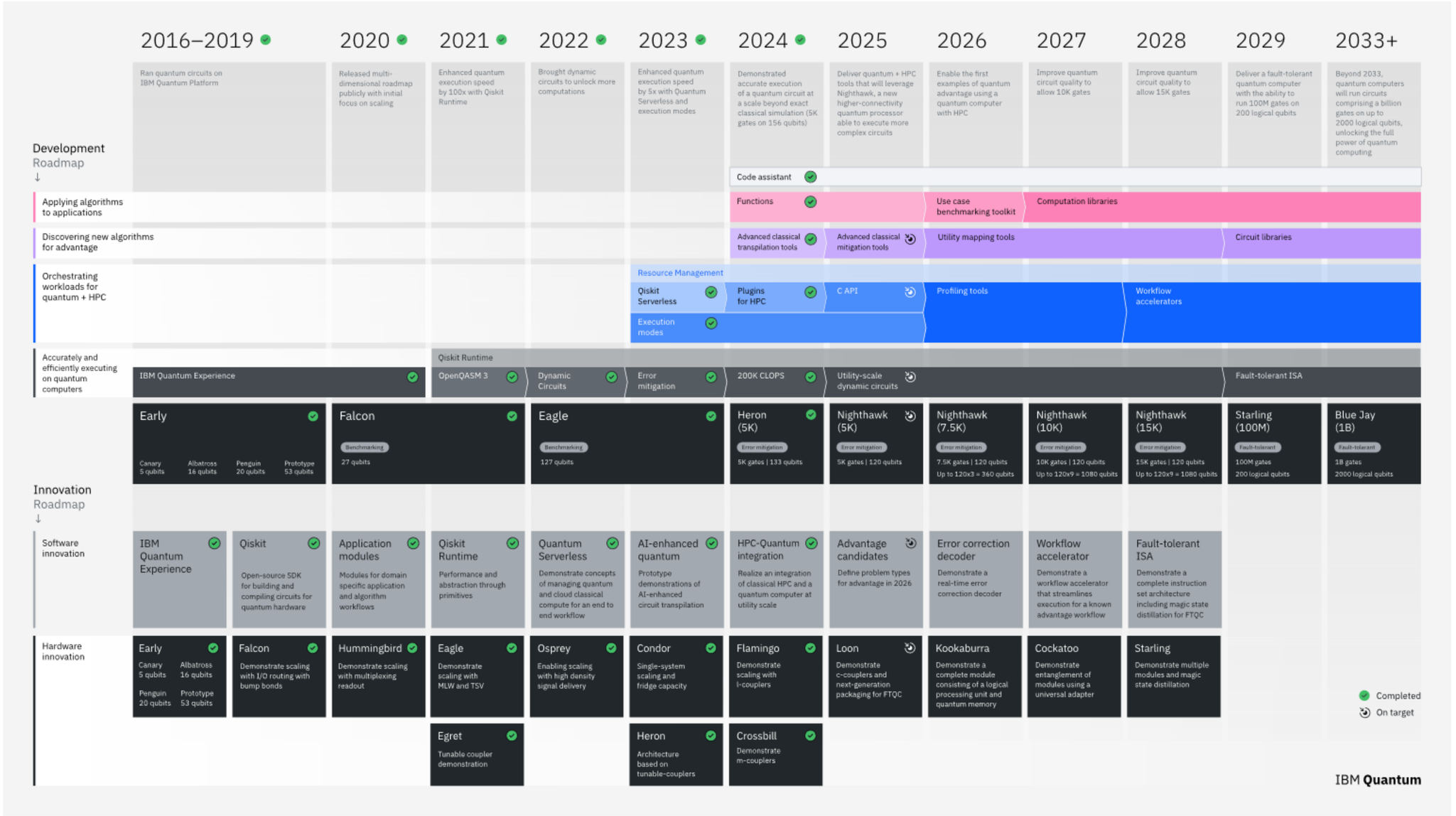


Diagram:

https://www.ibm.com/roadmaps/quantum/

Video:

https://www.ibm.com/quantum/technology#roadmap

What’s Out There?

“The development of quantum software has been strongly influenced by the open-source community, with many toolkits and frameworks—such as Qiskit, Cirq, PennyLane, and qBraid SDK—available under open licenses,” Wikipedia, Quantum Programming.

https://unitary.foundation/posts/2024_surveyresults/

Quantum Processors

There are different types of quantum processors:

- ❑ Circuit-based quantum processors - QPUs are based on the quantum circuit and quantum logic gate-based model of computing. (e.g. IBM and others)
- ❑ Annealing quantum processors - QPUs are based on quantum annealing, not to be confused with digital annealing. (e.g. D-Wave)
- ❑ Analog quantum processors - These QPUs are based on analog Hamiltonian simulation. (e.g. QuEra)

https://en.wikipedia.org/wiki/List_of_quantum_processors

Quantum Programming

Quantum programming refers to the process of designing and implementing algorithms that operate on quantum systems, typically using quantum circuits composed of quantum gates, measurements, and classical control logic.

These circuits are developed to manipulate quantum states for specific computational tasks or experimental outcomes.

Quantum programs may be executed on quantum processors, simulated on classical hardware, or implemented through laboratory instrumentation for research purposes.

There are:

- Quantum instruction sets (e.g. OpenQASM)
- Quantum software development kits (e.g. Qiskit and others)
- Quantum programming languages

https://en.wikipedia.org/wiki/Quantum_programming

Qiskit

How do I write and run Qiskit code?

Online Lab Environments

- Google Colab is the easiest
- qBraid is another option

https://quantum.cloud.ibm.com/docs/en/guides/online-lab-environments

Install Locally in a Python environment

You can run your Qiskit code on your own computer.

https://quantum.cloud.ibm.com/docs/en/guides/install-qiskit

Jupyter Notebooks

This is the most common way to get started with Qiskit code.

You can upload your notebook, or a start a new one, in Google Colab, for the easiest path as a Beginner.

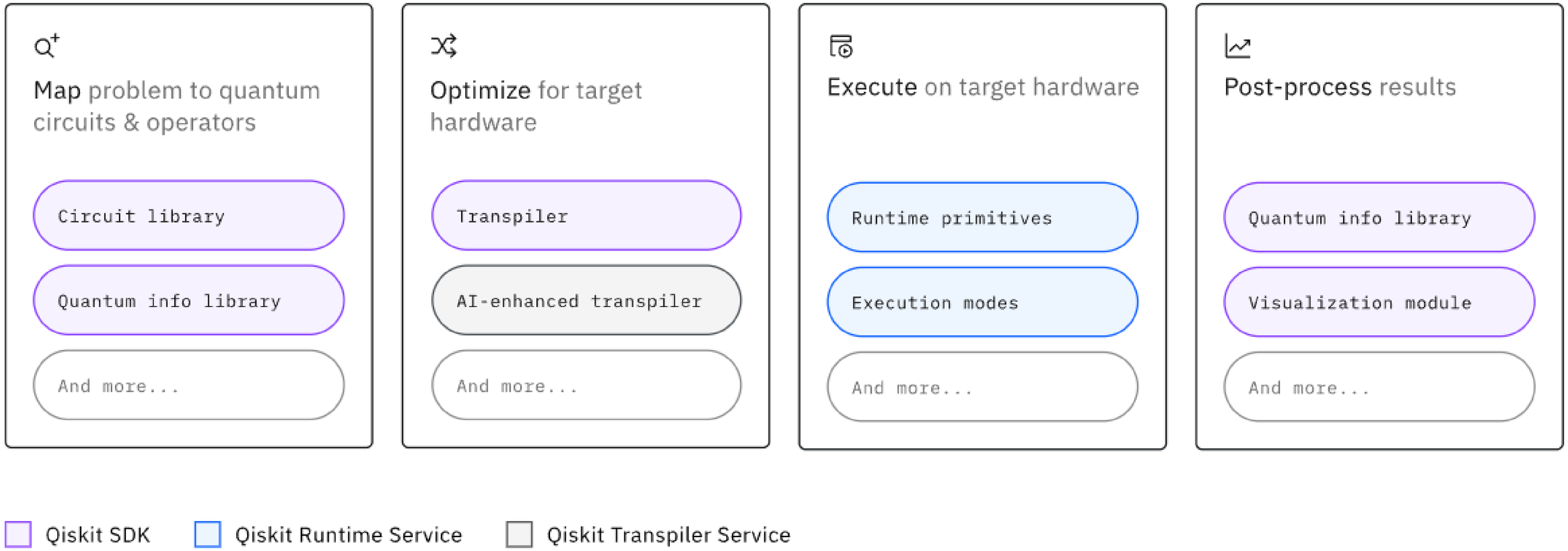
Qiskit Documentation

The IBM Quantum Platform has Guides, an API Reference, Tutorials, and other Documentation.

https://quantum.cloud.ibm.com/docs/en/guides

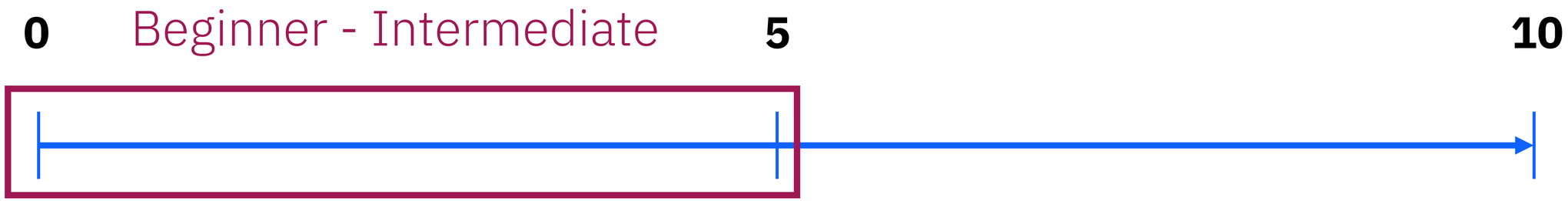
Qiskit Pattern:

The anatomy of a quantum algorithm



SQCM Fall Fest 2025 Activities

Where are you on your Quantum journey?



What's Quantum?

Reading, Videos, Science, math or hands-on coding

Papers, Active Research and development

What are the project options?

Qiskit Coding Challenges

- **Beginner Notebook** – *Qiskit 2 Fundamentals Lab*, This notebook is designed to help you get up to speed on Qiskit 2 fundamentals by providing hands-on exercises for 18 core concepts. As a bonus, in the last cell, you can run code on real IBM quantum hardware!

- **Intermediate Notebook** – *Hands-On Introduction to DiVincenzo Criteria with Qiskit 2*, Physicist David DiVincenzo outlined five key requirements for any physical implementation of a quantum computer, plus two additional criteria for quantum communication. In this notebook, we will **experience each DiVincenzo criterion through practical Qiskit demonstrations**. You will get to run circuits on simulators and real IBM Quantum devices to **explore each principle hands-on**.

https://github.com/SeattleQuantumComputingMeetup/qiskit_fall_fest_2025/tree/main/coding_challenges

Hackathon Prompts

- Cleveland Clinic – protein structure prediction
- BasQ – quantum Battleship/BombTester game
- Mila – financial application, options pricing
- Renssalear PTI – cryptography/Quantum Key Distribution

https://github.com/SeattleQuantumComputingMeetup/qiskit_fall_fest_2025/tree/main/hackathon_prompts

How do I earn a certificate from IBM Quantum?

Submit your work by sending a direct message in Discord (nhawkins), Meetup, or LinkedIn (natalie-hawkins-seattle) with either:

- a link to a github repo or other storage location containing your work
- attach your file(s)

Participation Certificate

Do one of the following:

- Attend at least one in-person SQCM FF25 event
- Complete the Beginner or Intermediate Notebook

Winner Certificate

Do one of the following:

- Complete both the Beginner and Intermediate Notebooks
- Submit work on one of the Hackathon prompts
- Submit work on a topic of your own choosing related to Quantum Computing. This could be a hackathon-like prompt, an idea for a start-up, an article or essay or piece of creative writing, an idea for a game, a type of art of any form, or any other suggestion you might have; the sky's the limit! Have fun with it!

How do spend the rest of my time here at the SQCM FF25 Kickoff?

1

Start working on the Beginner Notebook. Choose a path of uploading the notebook to an online lab environment or create a Python environment on your own machine and install Qiskit.

2

Join the SQCM Discord. Network with others, to see what they're interested in.

Find the Discord invite link under the About tab on: https://www.meetup.com/seattle-quantum-computing-meetup/

3

Read through the Hackathon Prompts, if that path interests you, or brainstorm on a topic of your own choice.

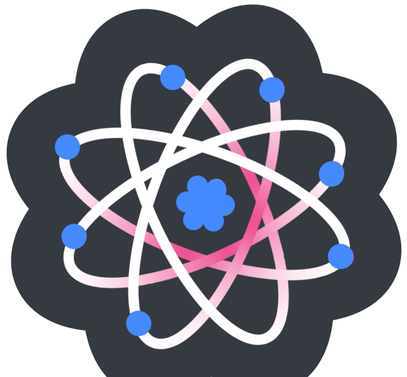
4

Try out the board game Entanglion, created by IBM Quantum Researchers, or the digital quantum game, Qpong, created by Junye Huang, Technical Integrations Engineer at IBM Quantum.

https://kirais.itch.io/qpong

Thanks for Joining the SQCM Qiskit Fall Fest!!

Century of Quantum



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