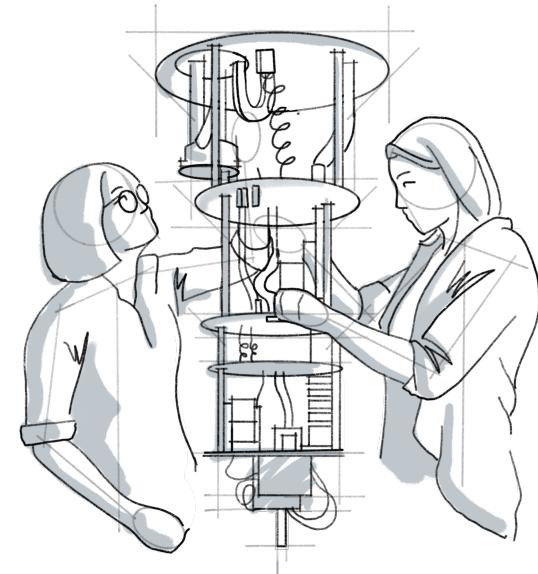


# Quantum Computing 101



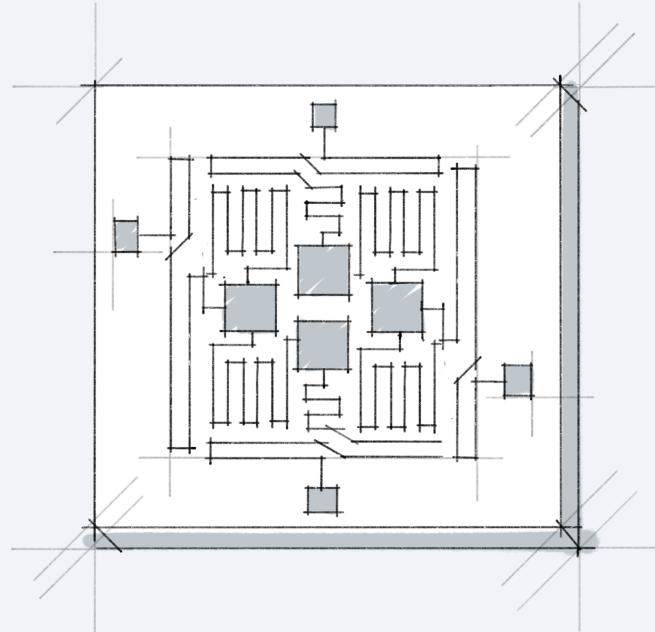
# What is Quantum Computing?

Quantum computing harnesses the phenomena of quantum mechanics to deliver a huge leap forward in computation to solve certain problems.

IBM designed quantum computers to solve complex problems that today's most powerful supercomputers cannot solve, and never will.

Until now, we've relied on supercomputers to solve most problems. These are very large classical computers, often with thousands of classical CPU and GPU cores.

However, supercomputers aren't very good at solving certain types of problems, which seem easy at first glance. This is why we need quantum computers.



# What is Qiskit?

Qiskit is an open-source SDK for working with quantum computers at the level of pulses, circuits, and application modules.

Qiskit accelerates the development of quantum applications by providing the complete set of tools needed for interacting with quantum systems and simulators.

Get started with Qiskit by visiting [qiskit.org](https://qiskit.org)

```
from qiskit import QuantumCircuit, execute
from qiskit import Aer, IBMQ
from qiskit.providers.aer.noise import NoiseModel

# Choose a real device to simulate from IBMQ provider
provider = IBMQ.load_account()
backend = provider.get_backend('ibmq_vigo')
coupling_map = backend.configuration().coupling_map

# Generate an Aer noise model for device
noise_model = NoiseModel.from_backend(backend)
basis_gates = noise_model.basis_gates

# Generate 3-qubit GHZ state
num_qubits = 3
circ = QuantumCircuit(3, 3)
circ.h(0)
circ.cx(0, 1)
circ.cx(1, 2)
circ.measure([0, 1, 2], [0, 1, 2])

# Perform noisy simulation
backend = Aer.get_backend('qasm_simulator')
job = execute(circ, backend,
              coupling_map=coupling_map,
              noise_model=noise_model,
              basis_gates=basis_gates)
result = job.result()

print(result.get_counts(0))
```

# Getting Started With Quantum Computing & Qiskit

## [Qiskit Textbook](#)

A free and opensource textbook that will teach you the concepts of quantum computing while you. Learn to use Qiskit.

## [Introduction to Quantum Computing and Quantum Hardware Course](#)

An introductory course to the world of quantum computing with exploration of key quantum algorithms and quantum hardware.

## [Coding with Qiskit](#)

A video series teaching you to install Qiskit locally, learn about quantum gates and quantum algorithms along with the latest research topics.

## [IBM Quantum Composer](#)

Build quantum circuits with a drag and drop interface and run on simulators or real quantum hardware.

## [Qiskit Medium](#)

This blog provides a nice overview of Qiskit and its direction as we explore what applications can be done with today's quantum hardware.

## [Qiskit Resources](#)

A curated repository of links to all Qiskit resources for you to dive deeper into quantum computing.

# Stay connected with us!

[Join Qiskit Slack](#)