

Written document


I choose some Tutorials, walkthroughs, and guides as a sample of the written document of quantum computing.

Explainer: What is a quantum computer?

How it works, why it's so powerful, and where it's likely to be most useful first



<https://www.technologyreview.com/s/612844/what-is-quantum-computing/>



[Quantum](#)
[Network](#)
[Technology](#)
[Resources](#)

Launch IBM Quantum Experience

What is quantum computing?


Quantum computers could spur the development of new breakthroughs in science, medications to save lives, machine learning methods to diagnose illnesses sooner, materials to make more efficient devices and structures, financial strategies to live well in retirement, and algorithms to quickly direct resources such as ambulances.

But what exactly is quantum computing, and what does it take to achieve these quantum breakthroughs? Here's what you need to know.

Watch an introductory video

Cookie Preferences

<https://www.ibm.com/quantum-computing/learn/what-is-quantum-computing/>



[ADMISSIONS](#)
[ABOUT WATERLOO](#)
[FACULTIES & ACADEMICS](#)
[OFFICES & SERVICES](#)
[SUPPORT WATERLOO](#)

SEARCH

INSTITUTE FOR QUANTUM COMPUTING

Institute for Quantum Computing home

About IQC

Our people

Available positions

Research

Programs

Outreach

News

Events

INFORMATION FOR

Researchers

Students

Visitors

Media

Institute for Quantum Computing »

Quantum computing 101

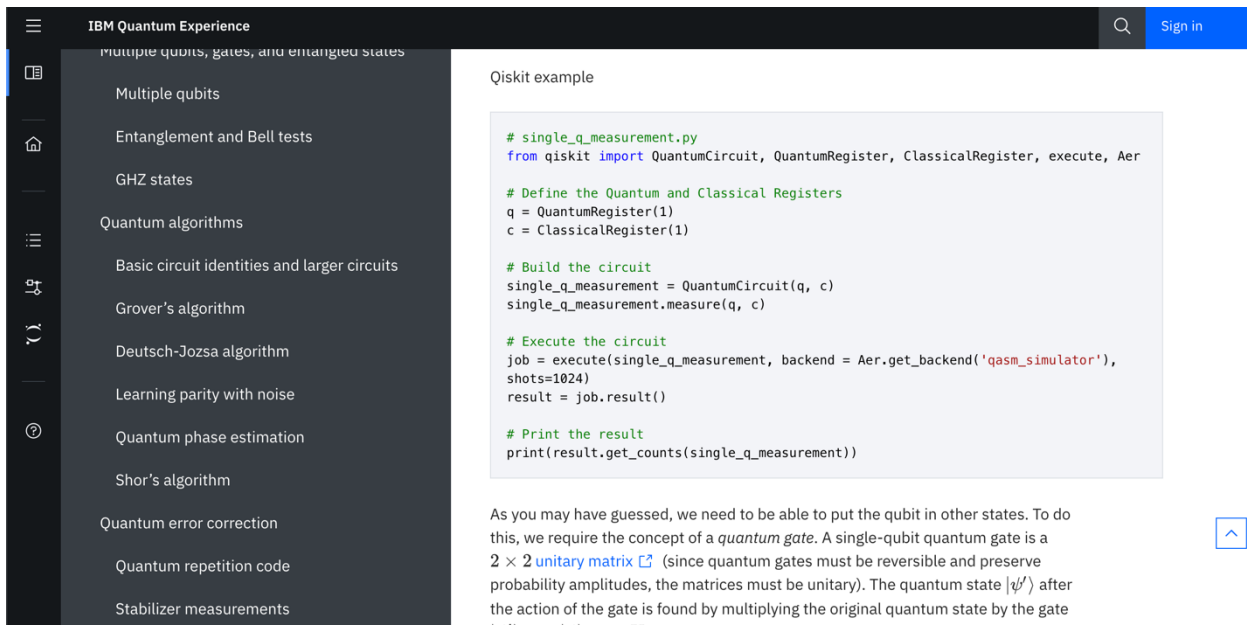
Although quantum information has been around for a long time, we're starting to see more about it in the media. We hope to give you a quickstart guide on:

- [What is quantum computing?](#)
- [Superposition and entanglement](#)
- [Why do quantum effects matter?](#)
- [What can a quantum computer do that a classical computer can't?](#)
- [But I don't want to factor very large numbers](#)
- [A quantum computer can hack into my private data?](#)
- [How can quantum mechanics create ultra-secret keys?](#)
- [What else can we do with quantum mechanics?](#)
- [Where can I get a quantum computer?](#)

<https://uwaterloo.ca/institute-for-quantum-computing/quantum-computing-101#What-is-quantum-computing>

Code document

This is an example of how to create a quantum circuit.



The screenshot shows the IBM Quantum Experience web application. On the left is a dark sidebar with a menu. The main content area is titled "Qiskit example" and contains a Python code snippet for a single-qubit measurement circuit. Below the code, there is explanatory text about quantum gates and unitary matrices.

IBM Quantum Experience

Multiple qubits, gates, and entangled states

- Multiple qubits
- Entanglement and Bell tests
- GHZ states
- Quantum algorithms
 - Basic circuit identities and larger circuits
 - Grover's algorithm
 - Deutsch-Jozsa algorithm
 - Learning parity with noise
- Quantum phase estimation
- Shor's algorithm
- Quantum error correction
- Quantum repetition code
- Stabilizer measurements

Qiskit example

```
# single_q_measurement.py
from qiskit import QuantumCircuit, QuantumRegister, ClassicalRegister, execute, Aer

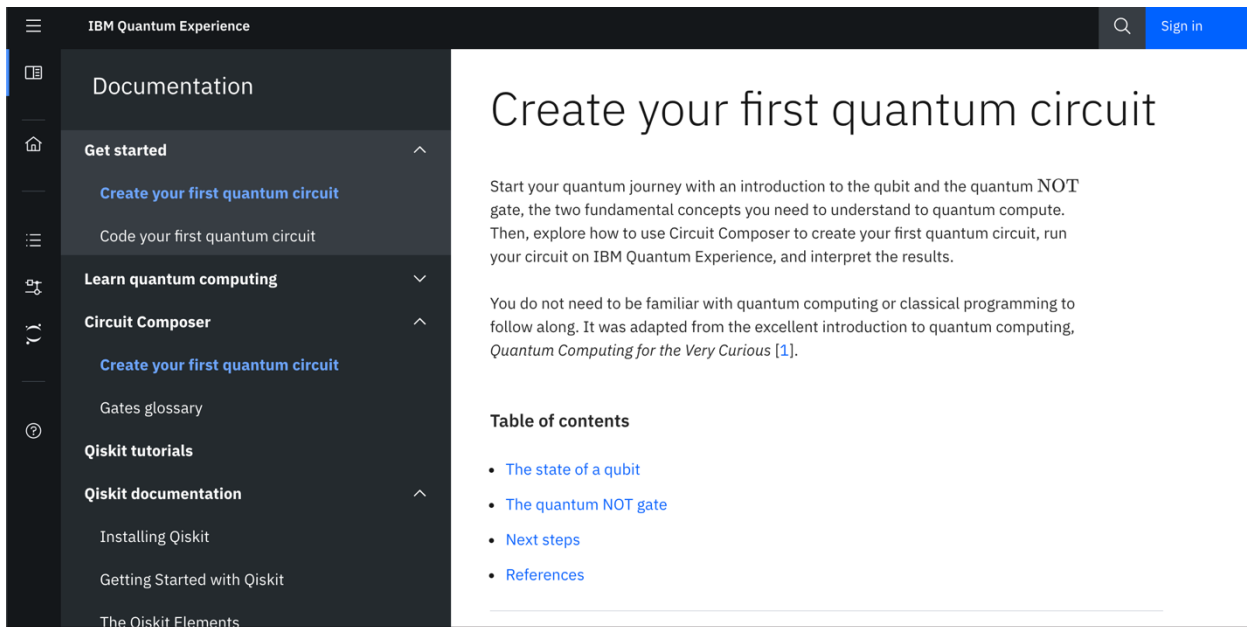
# Define the Quantum and Classical Registers
q = QuantumRegister(1)
c = ClassicalRegister(1)

# Build the circuit
single_q_measurement = QuantumCircuit(q, c)
single_q_measurement.measure(q, c)

# Execute the circuit
job = execute(single_q_measurement, backend = Aer.get_backend('qasm_simulator'),
shots=1024)
result = job.result()

# Print the result
print(result.get_counts(single_q_measurement))
```

As you may have guessed, we need to be able to put the qubit in other states. To do this, we require the concept of a *quantum gate*. A single-qubit quantum gate is a 2×2 [unitary matrix](#) (since quantum gates must be reversible and preserve probability amplitudes, the matrices must be unitary). The quantum state $|\psi'\rangle$ after the action of the gate is found by multiplying the original quantum state by the gate



The screenshot shows the IBM Quantum Experience documentation page. The left sidebar has a "Documentation" section with links to "Get started", "Learn quantum computing", "Circuit Composer", "Qiskit tutorials", and "Qiskit documentation". The main content area is titled "Create your first quantum circuit" and contains an introduction to quantum computing, a table of contents, and a list of links.

IBM Quantum Experience

Documentation

- Get started
 - Create your first quantum circuit
 - Code your first quantum circuit
- Learn quantum computing
- Circuit Composer
 - Create your first quantum circuit
 - Gates glossary
- Qiskit tutorials
- Qiskit documentation
 - Installing Qiskit
 - Getting Started with Qiskit
 - The Qiskit Elements

Create your first quantum circuit

Start your quantum journey with an introduction to the qubit and the quantum NOT gate, the two fundamental concepts you need to understand to quantum compute. Then, explore how to use Circuit Composer to create your first quantum circuit, run your circuit on IBM Quantum Experience, and interpret the results.

You do not need to be familiar with quantum computing or classical programming to follow along. It was adapted from the excellent introduction to quantum computing, *Quantum Computing for the Very Curious* [1].

Table of contents

- [The state of a qubit](#)
- [The quantum NOT gate](#)
- [Next steps](#)
- [References](#)

<https://quantum-computing.ibm.com/docs/guide/wwwq/the-qubit>

Community document

This is also an important documentation for a software. It is used for the people who involved with the project discuss questions and take some help.

Quantum Computing

Quantum Computers Flip the Script on Spin Chemistry

Recent research by IBM and University of Notre Dame serves as a new use case for quantum computing, showing that qubit noise, typically an impediment to quantum computer use, can actually be an advantage over a classical computer for chemical simulations.

[→ Continue reading](#)



Quantum Computing

IBM and Daimler use quantum computer to develop next-gen batteries

Quantum Computing



Rising above the noise: quantum-limited amplifiers empower the readout of IBM Quantum systems

A key pillar for deploying IBM Quantum systems into the cloud is the ability to read out their quantum states with high fidelity in real time. This critical capability is made possible

Quantum Computing

Quantum Takes Flight: Moving from Laboratory Demonstrations to Building Systems

Last year we at IBM declared that in order to achieve quantum advantage within the next decade, we will need to at least double the Quantum Volume of our quantum computing systems every year. What better way to start this first full week of 2020 than by announcing that we have added our fourth data point to our progress road map and achieved a system demonstrating Quantum Volume of 32.

[→ Continue reading](#)



Stack Exchange
Search on Quantum Computing...
Log in
Sign up

Home
Questions
Tags
Users
Unanswered

Explore our Questions

algorithm quantum-gate quantum-state qiskit programming
quantum-information entanglement circuit-construction ibm-q-experience
mathematics more tags

Active Hot Week Month

0 votes 0 answers 11 views

Turing Complete Equivalent for Quantum Computers - modeling singularity (e.g. black hole) with Q#

complexity-theory q# models

modified 3 hours ago Martin Vesely 2,494

1 vote 1 answer 8 views

Cirq: creating a new device with custom coupling topology?

cirq

answered 6 hours ago Craig Gidney 7,851

-1 votes 0 answers 11 views

How are algorithms for quantum computers written?

algorithm quantum-operation

asked 7 hours ago Navoneel Karmakar 1

0 votes 1 answer 14 views

Breaking cryptography with quantum computers. Is it really possible in 50 years?

quantum-information

answered 7 hours ago Martin Vesely 2,494

0 votes 1 answer 15 views

Qiskit Statevector_simulator returns different results

qiskit

modified 12 hours ago Steve Wood 84

Microsoft Azure

Build your next great app for free with Azure

Try Azure Free

Hot Network Questions

- ALTER VIEW drops Index from View
- Could a charity manufacture patented medications for free?
- I used a fork of a GitHub repository whose paper I cited -- should I also cite the fork?
- Is a dystopian surveillance state computationally possible?
- Would lightning be an effective weapon against Cybermen?
- How to best deal with cliques at the table during "downtime"?
- How to press a touch sensitive elevator button without touching it