

## CMPT 376 Project 2 Draft

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### 1. Written documentation

# Code your first quantum circuit

Learn to code your first quantum circuit without downloading anything to your computer, by using Qiskit notebooks embedded within IBM Quantum Experience. While you can benefit from having some familiarity with [Python](#) and [quantum computing](#), you can get a sense of the big picture without those prerequisites.

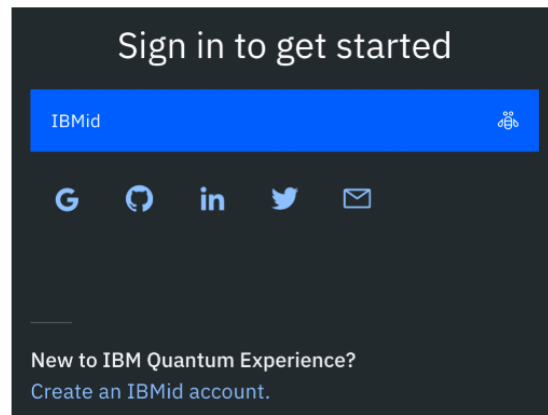
To code a quantum circuit with Qiskit, you follow three high-level steps:

- **Build:** design a quantum circuit that represents the problem you are considering.
- **Execute:** run experiments on different backends, either systems or simulators.
- **Analyze:** calculate summary statistics and visualize the results of experiments.

These instructions guide you through building a circuit with example code in a Qiskit Notebook, executing your program, and analyzing the results. You will then learn in greater detail how each component of the program functions.

### Sign in to IBM Quantum Experience

1. Go to [IBM Quantum Experience](#).
2. Sign in or Create an IBMid account.



## 2. Code documentation

### Code Snippet 1

```
# Build
#-----

# Create a Quantum Circuit acting on the q register
circuit = QuantumCircuit(2, 2)

# Add a H gate on qubit 0
circuit.h(0)

# Add a CX (CNOT) gate on control qubit 0 and target qubit 1
circuit.cx(0, 1)

# Map the quantum measurement to the classical bits
circuit.measure([0,1], [0,1])

# Execute
#-----

# Use Aer's qasm_simulator
simulator = Aer.get_backend('qasm_simulator')

# Execute the circuit on the qasm simulator
job = execute(circuit, simulator, shots=1000)

# Grab results from the job
result = job.result()

# Return counts
counts = result.get_counts(circuit)
print("\nTotal count for 00 and 11 are:",counts)

# Analyze
#-----

# Draw the circuit
circuit.draw()
```

Total count for 00 and 11 are: {'00': 479, '11': 521}

### 3. Community documentation

Quantum Computing

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Use this tag for questions about IBM's quantum processors which are accessible online. DO NOT use this for questions about general Qiskit issues. As of July 2018, there are five processors on the IBM Q Experience: two 5-qubit processors, one 16-qubit processor and two 20-qubit processors (only available to hubs, partners, and members of the IBM Q network).

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Are  $cRz$  with angle  $\pi$  and  $cZ$  equal on the IBM Quantum Experience?

I was trying to implement the 2-qubit Grover algorithm without the auxiliary bit. Before finding the gate symbol for the controlled  $Z$ , I worked with the controlled  $Rz$ . The gate ...

qiskit circuit-construction ibm-q-experience grovers-algorithm

asked 2 days ago

Daniel Müssig 175 5

10 votes

1 answer

2k views

Which subatomic particle does each company use in quantum computing?

Probably each company (Google, Amazon, Intel, IBM, Microsoft, D-Wave and so on) uses a mix of subatomic particles and technologies. I would like to know which particles/technologies are used by each ...

ibm-q-experience physical-realization d-wave google-sycamore

asked Feb 27 at 19:32

Felipe Rojo Amadeo 123 5

4 votes

1 answer

306 views

How can I get the entire histogram in a 5 qubit program done in IBM quantum experience machine?

I have run a program on an IBM quantum experience machine which involves 5 qubits. Obviously when I measure the whole system I have 32 results but the machine only represents 20 in the histogram. In ...

programming ibm-q-experience

asked Feb 27 at 10:08

user10202 41 1

0 votes

0 answers

35 views

How can I find the fidelity of preparation?

I want to know the fidelity (or error rate) of the preparation  $|0\rangle$ . How can I have it?

quantum-state qiskit ibm-q-experience fidelity

asked Feb 27 at 1:39

Yongsoo 1

2 votes

1 answer

51 views

Why I am not getting approximate equiprobable states in the following circuit on IBM Q simulator?

I have the following circuit which consists of symmetric modules. I compiled the circuit in IBM Quantum experience backend - ibmq\_qasm\_simulator, 8192 shots. The result is not equiprobable. Why? Since ...

circuit-construction ibm-q-experience

asked Feb 25 at 14:10

Adam Levine 393 10

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