HW1

February 1, 2023

1 Homework 1

1.0.1 Instructions:

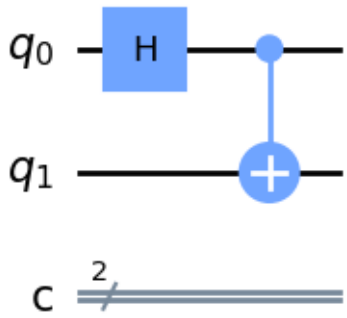
Run each block to constuct the circuit. In block 3, uncomment the final 3 lines to simulate the circuit. When you are done, attach a pdf of the completed notebook (with the circuit diagrams and histogram) to your homework submission.

[2]:
```
# Setup for quiskit

import qiskit
from qiskit import *
import numpy as np
from qiskit import QuantumCircuit, transpile, assemble, Aer, IBMQ
from qiskit.visualization import plot_histogram, plot_bloch_multivector
import matplotlib
```

In this block you will initialize the registers, create the a circuit with hadamard and CNOT gates, and print out the circuit.

[3]:
```
n=2 # number of qubits

q=QuantumRegister(2,"q") # opens two quantum registers
c=ClassicalRegister(2,"c") # opens two classical registers

circuit=QuantumCircuit(q,c) # initializes the circuit

circuit.h(q[0]) # hadamard on the first qubit
circuit.cx(q[0],q[1]) # CNOT from the first qubit to the second

circuit.draw(output="mpl") # output the circuit diagram
```

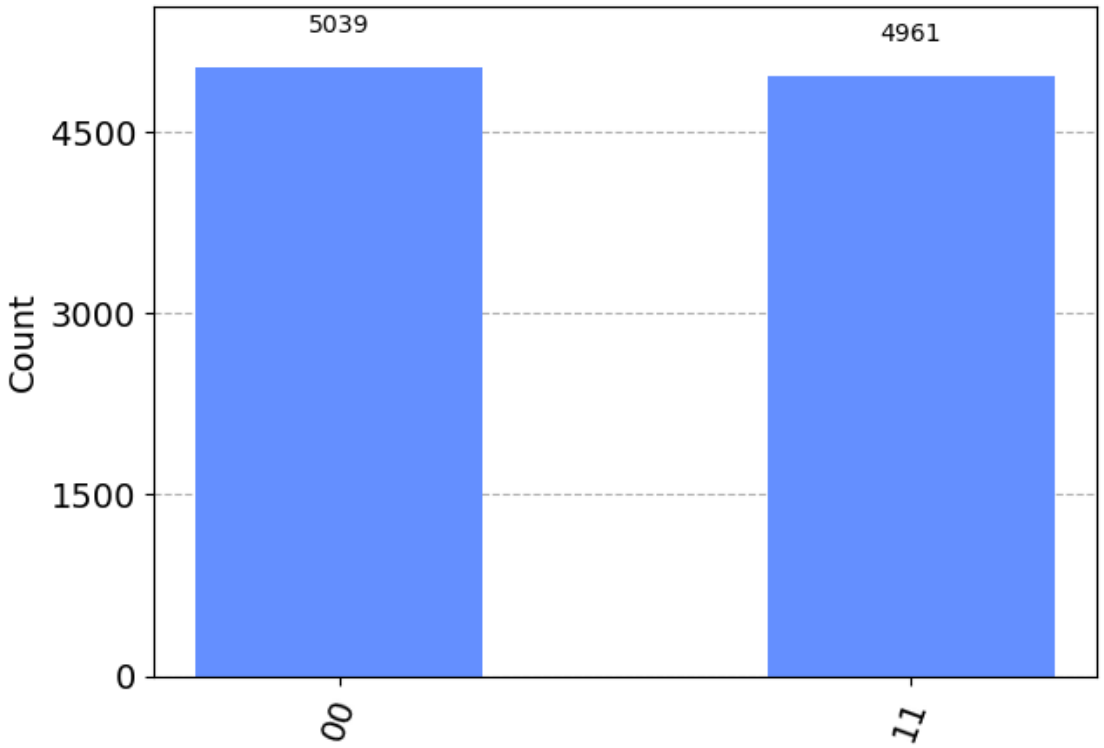
[3]:



In this block you will measure the qubits and run a simulation of the circuit.

[4]:
```
n=2

q=QuantumRegister(2,"q")
c=ClassicalRegister(2,"c")

circuit=QuantumCircuit(q,c)

circuit.h(q[0])
circuit.cx(q[0],q[1])

# above is the same as block 2

circuit.measure(q[0],c[0]) # measure first qubit and store in the first␣
 ↪classical register
circuit.measure(q[1],c[1]) # measure second qubit and store in the second␣
 ↪classical register

backend= Aer.get_backend('qasm_simulator') # initialize simulator
shots=10000 # number of trials

circuit.draw(output="mpl") # draw circuit

### UNCOMENT THE LINES BELOW ###

result=execute(circuit, backend=backend, shots=shots).result() # run simulation
counts=result.get_counts()
plot_histogram(counts) # plot histogram of results
```

[4]: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