SimonsAlgorithm

February 14, 2021

[1]:
```
%matplotlib inline
# Importing standard Qiskit libraries
from qiskit import QuantumCircuit, execute, Aer, IBMQ
from qiskit.compiler import transpile, assemble
from qiskit.visualization import *

# Loading your IBM Q account(s)
provider = IBMQ.load_account()
```

```
C:\Users\lenovo\anaconda3\lib\site-
packages\qiskit\providers\ibmq\ibmqfactory.py:192: UserWarning: Timestamps in
IBMQ backend properties, jobs, and job results are all now in local time instead
of UTC.
  warnings.warn('Timestamps in IBMQ backend properties, jobs, and job results '
```

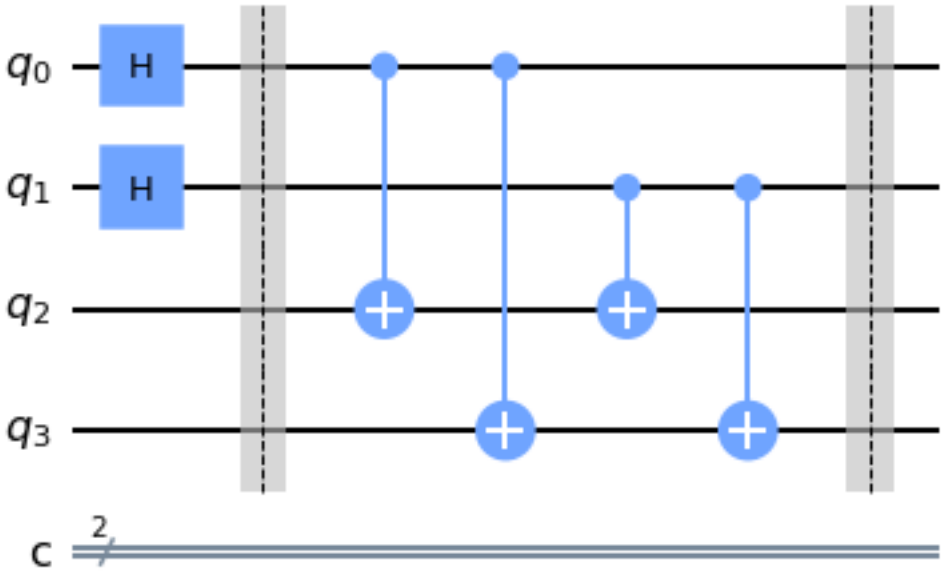
[7]:
```
qSimon = QuantumCircuit(4, 2)
qSimon.h(0)
qSimon.h(1)
qSimon.barrier()
qSimon.draw()
```

[7]:
```
q_0:  H

q_1:  H

q_2:

q_3:

c: 2/
```

[8]:
```
qSimon.cx(0,2)
qSimon.cx(0,3)
qSimon.cx(1,2)
qSimon.cx(1,3)
qSimon.barrier()
```

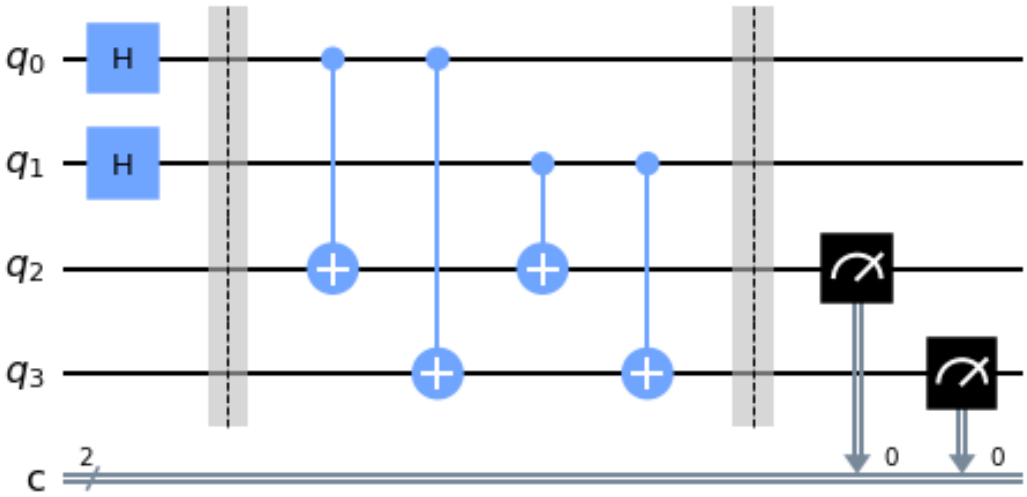
```
qSimon.draw('mpl')
```

[8]:



[9]:
```
qSimon.measure(2,0)
qSimon.measure(3,0)
qSimon.draw('mpl')
```

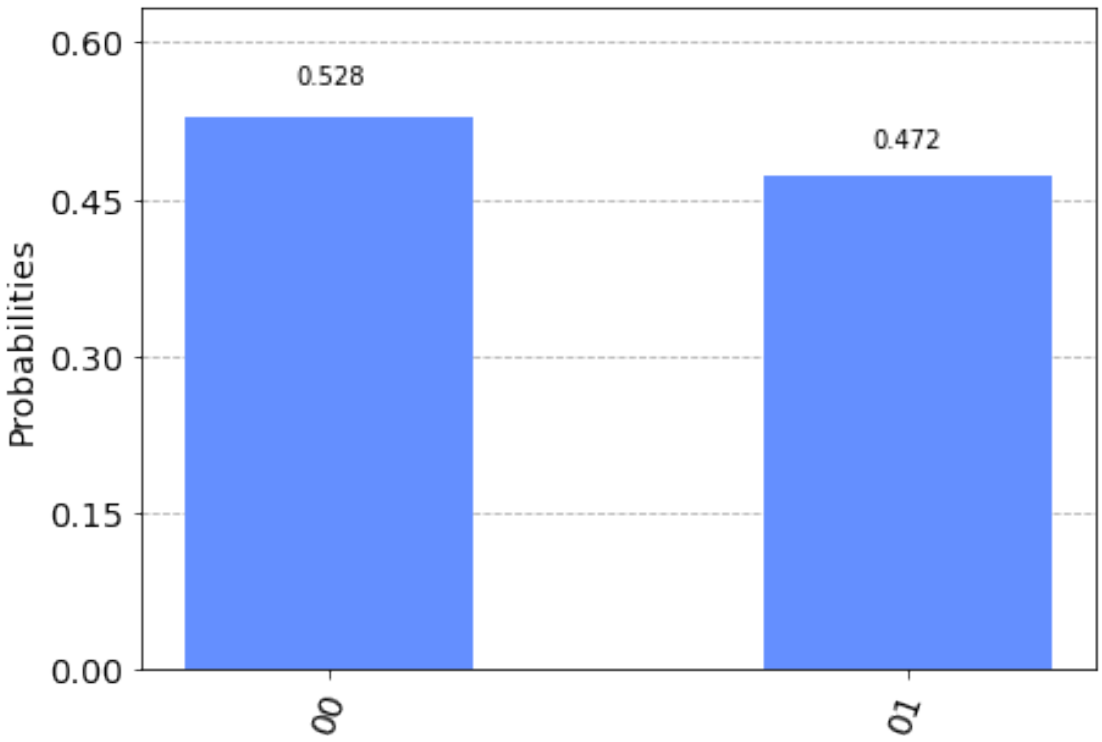
[9]:



0.1 Running it on a local quantum simulator

[10]:
```
backend = Aer.get_backend('qasm_simulator')
result = execute(qSimon, backend = backend, shots = 1024).result()
counts = result.get_counts()
plot_histogram(counts)
```

[10]:



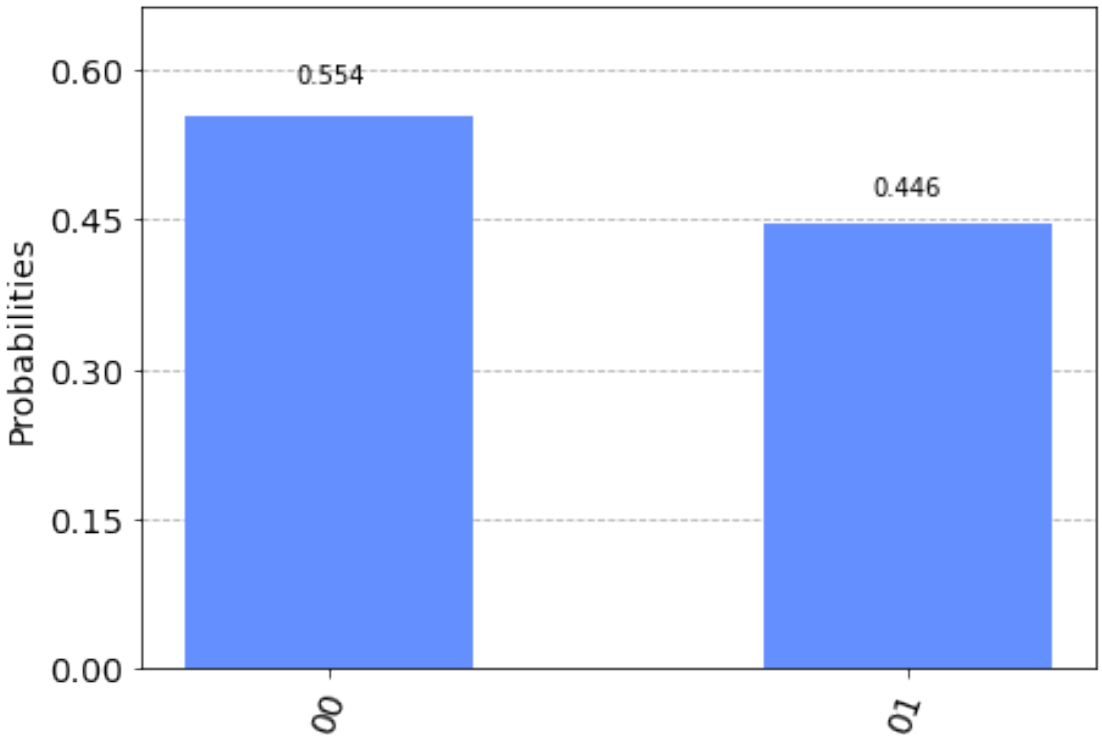
0.2 Running it on a IBM Q quantum computer

[11]:
```
from qiskit.tools.monitor import job_monitor
qProvider = IBMQ.get_provider();
qComp = qProvider.get_backend('ibmq_santiago')
job = execute(qSimon, backend = qComp, shots = 1024)
job_monitor(job)
```

```
Job Status: job has successfully run
```

[12]:
```
counts = job.result().get_counts()
plot_histogram(counts)
```

[12]:


0.60
0.45
0.30
0.15
0.00
Probabilities
0.554
0.446
00
01