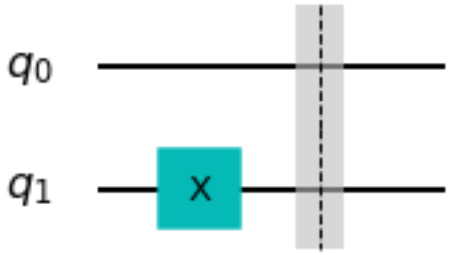
Trabalho_qiskit6

September 11, 2021

[15]:
```
import numpy as np
import math
from numpy.random import randint

from qiskit import *
from qiskit import QuantumCircuit, QuantumRegister, ClassicalRegister, execute,␣
 ↪BasicAer, IBMQ, Aer

from qiskit.visualization import plot_histogram, plot_bloch_vector,␣
 ↪plot_bloch_multivector
from qiskit.extensions import Initialize

from qiskit.quantum_info import partial_trace

from qiskit.tools.monitor import job_monitor
from qiskit.quantum_info.analysis import average_data

import matplotlib.pyplot as plt

from qiskit.providers.ibmq import least_busy
%matplotlib inline



#######imports
```

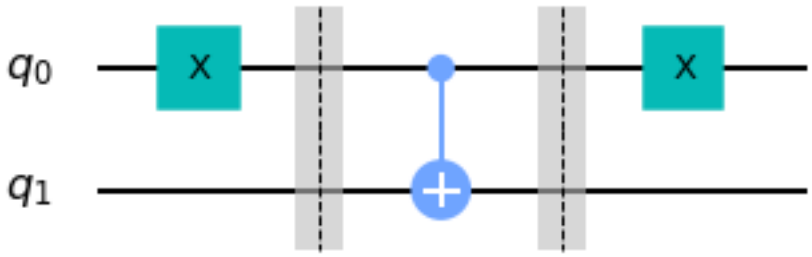
[16]:
```
n = 1

oraculo_const = QuantumCircuit(n+1)

output = np.random.randint(2)
if output == 1:
    oraculo_const.x(n)

oraculo_const.barrier()
oraculo_const.draw(output="mpl")
```

[16]:



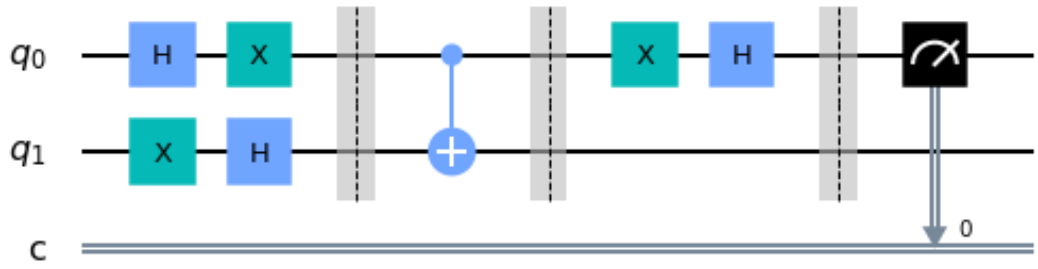
[17]:
```
oraculo_bal = QuantumCircuit(n+1)
b_str = "1"  # 1 bit


for qubit in range(len(b_str)):
    if b_str[qubit] == '1':
        oraculo_bal.x(qubit)


oraculo_bal.barrier()


for qubit in range(n):
    oraculo_bal.cx(qubit, n)

oraculo_bal.barrier()


for qubit in range(len(b_str)):
    if b_str[qubit] == '1':
        oraculo_bal.x(qubit)


oraculo_bal.draw(output='mpl')
```

[17]:



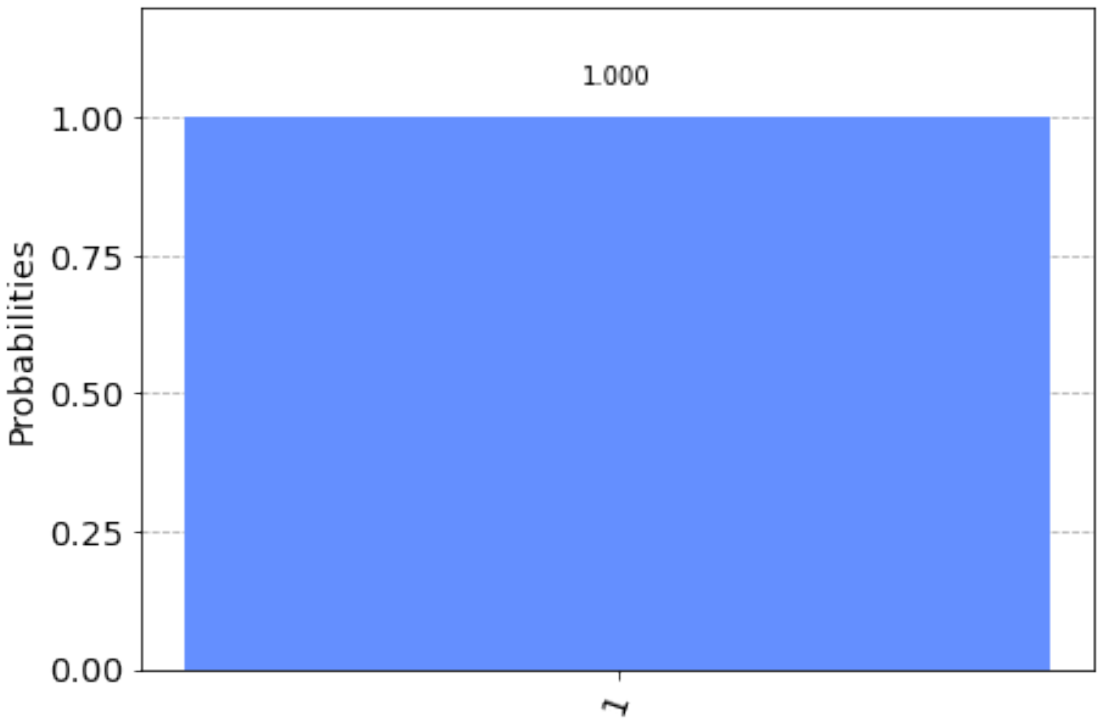
[18]:
```
# primeiro o caso balanceado
dj_circuit = QuantumCircuit(n+1, n)


for qubit in range(n):
    dj_circuit.h(qubit)


dj_circuit.x(n)
dj_circuit.h(n)


dj_circuit += oraculo_bal


for qubit in range(n):
    dj_circuit.h(qubit)
dj_circuit.barrier()


for i in range(n):
    dj_circuit.measure(i, i)


dj_circuit.draw(output="mpl")
```

[18]:



[19]:
```
#caso balanceado
backend = BasicAer.get_backend('qasm_simulator')
results = execute(dj_circuit, backend=backend, shots=1000).result()
answer = results.get_counts()
plot_histogram(answer)
```

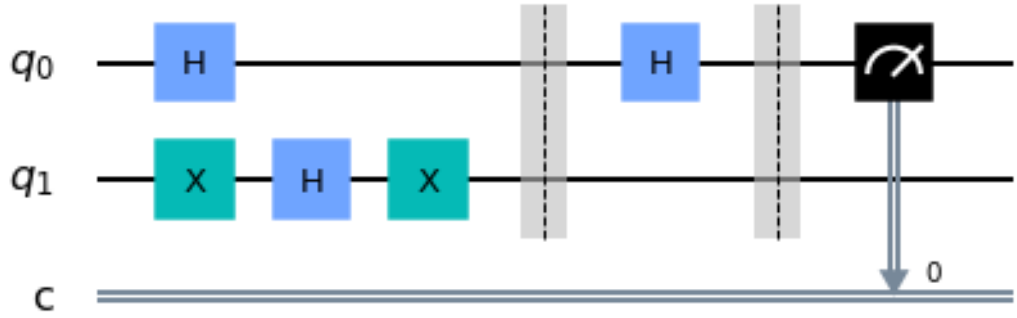
[19]:



[20]:
```
#caso constante
dj_circuit2 = QuantumCircuit(n+1, n)


for qubit in range(n):
    dj_circuit2.h(qubit)


dj_circuit2.x(n)
dj_circuit2.h(n)


dj_circuit2 += oraculo_const


for qubit in range(n):
    dj_circuit2.h(qubit)
dj_circuit2.barrier()

for i in range(n):
    dj_circuit2.measure(i, i)
```

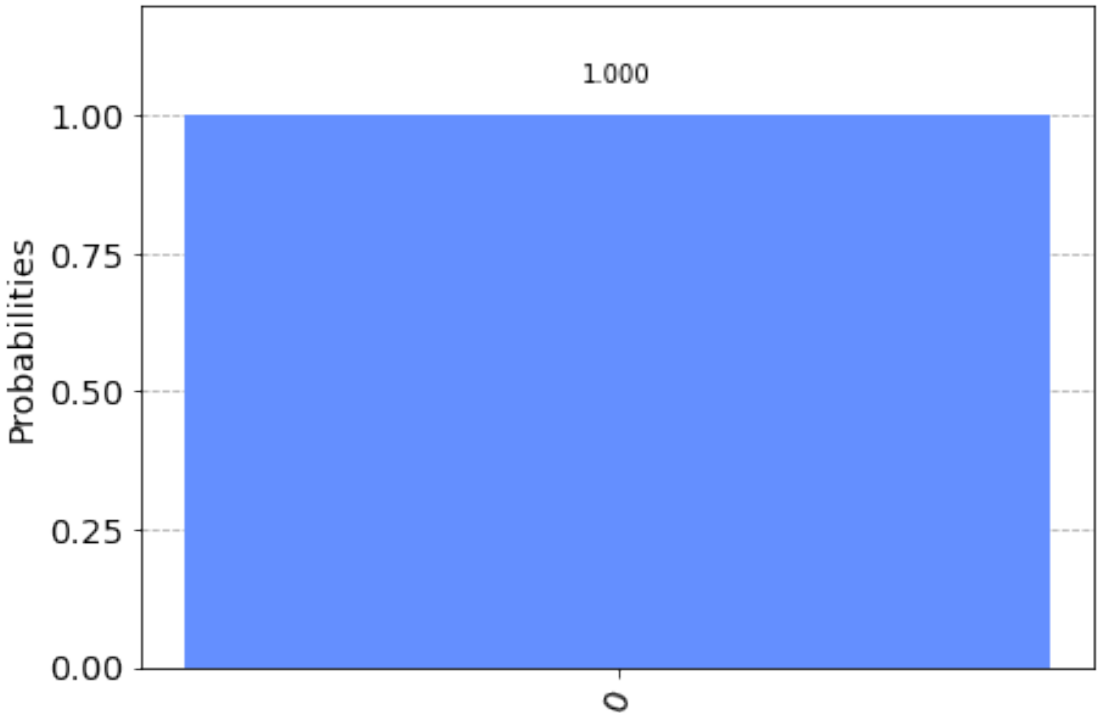
```
dj_circuit2.draw(output="mpl")
```

[20]:



[21]:
```
#caso constante
backend = BasicAer.get_backend('qasm_simulator')
results = execute(dj_circuit2, backend=backend, shots=1000).result()
answer = results.get_counts()
plot_histogram(answer)
```

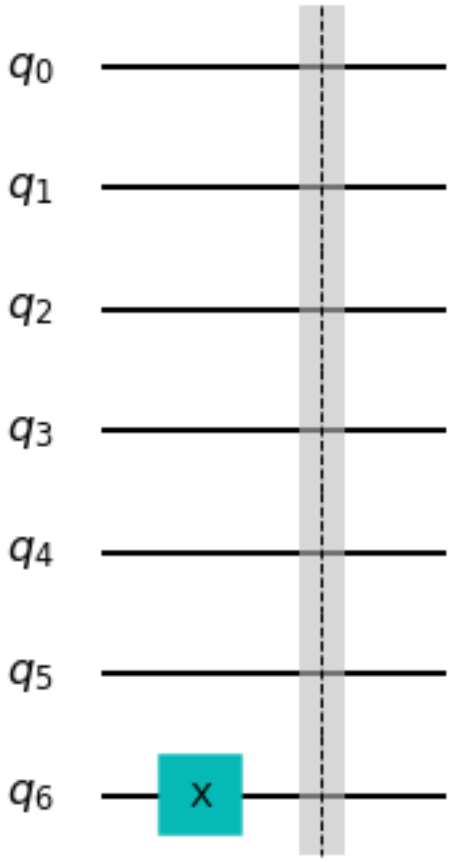
[21]:



[22]:
```
################################ questao 2.2
```

[23]:
```
n = 6

oraculo_const = QuantumCircuit(n+1)

output = np.random.randint(2)
if output == 1:
    oraculo_const.x(n)

oraculo_const.barrier()
oraculo_const.draw(output="mpl")
```

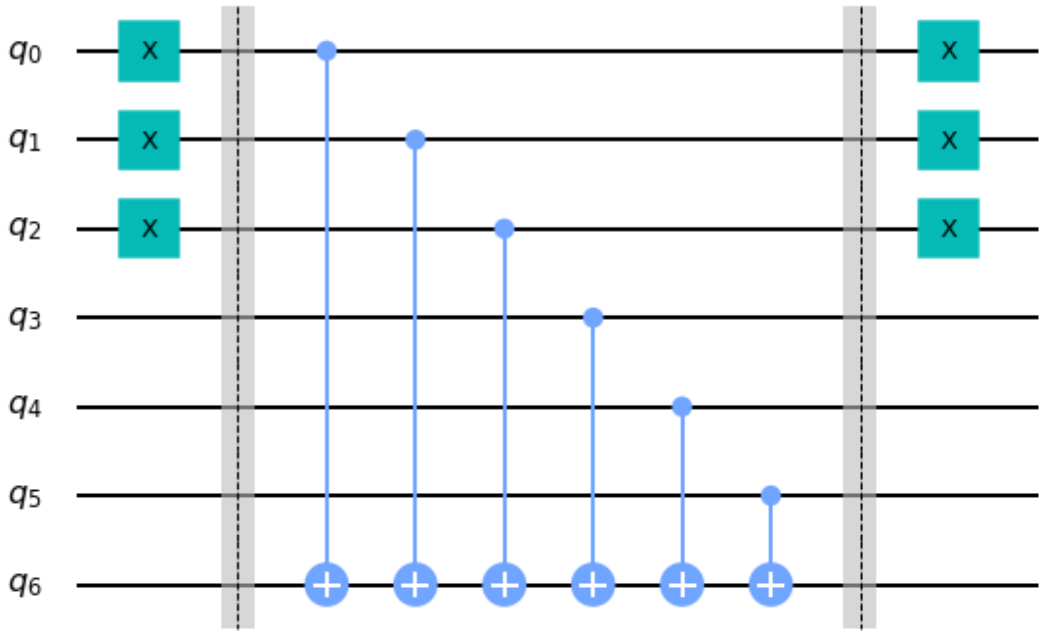
[23]:



[24]:
```
oraculo_bal = QuantumCircuit(n+1)
b_str = "111000"  # 6 bits


for qubit in range(len(b_str)):
```

```
    if b_str[qubit] == '1':
        oraculo_bal.x(qubit)


oraculo_bal.barrier()


for qubit in range(n):
    oraculo_bal.cx(qubit, n)

oraculo_bal.barrier()


for qubit in range(len(b_str)):
    if b_str[qubit] == '1':
        oraculo_bal.x(qubit)


oraculo_bal.draw(output='mpl')
```

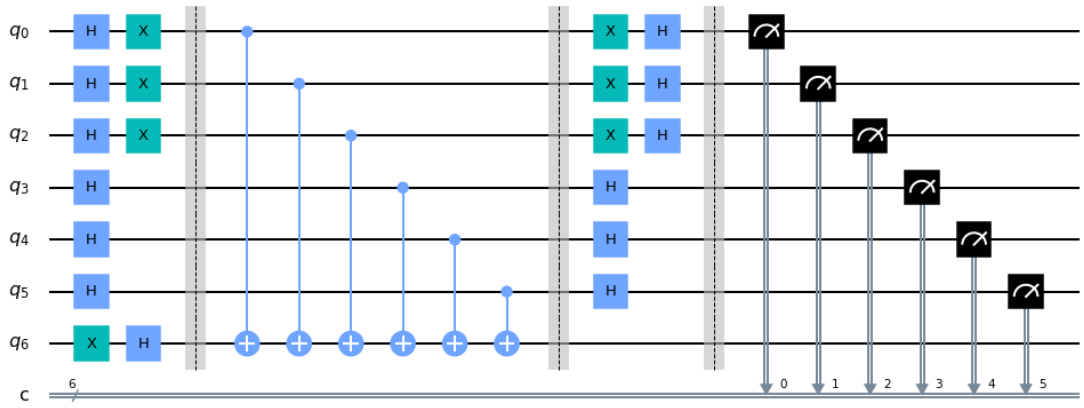
[24]:



[25]:
```
# primeiro o caso balanceado
dj_circuit3 = QuantumCircuit(n+1, n)


for qubit in range(n):
```

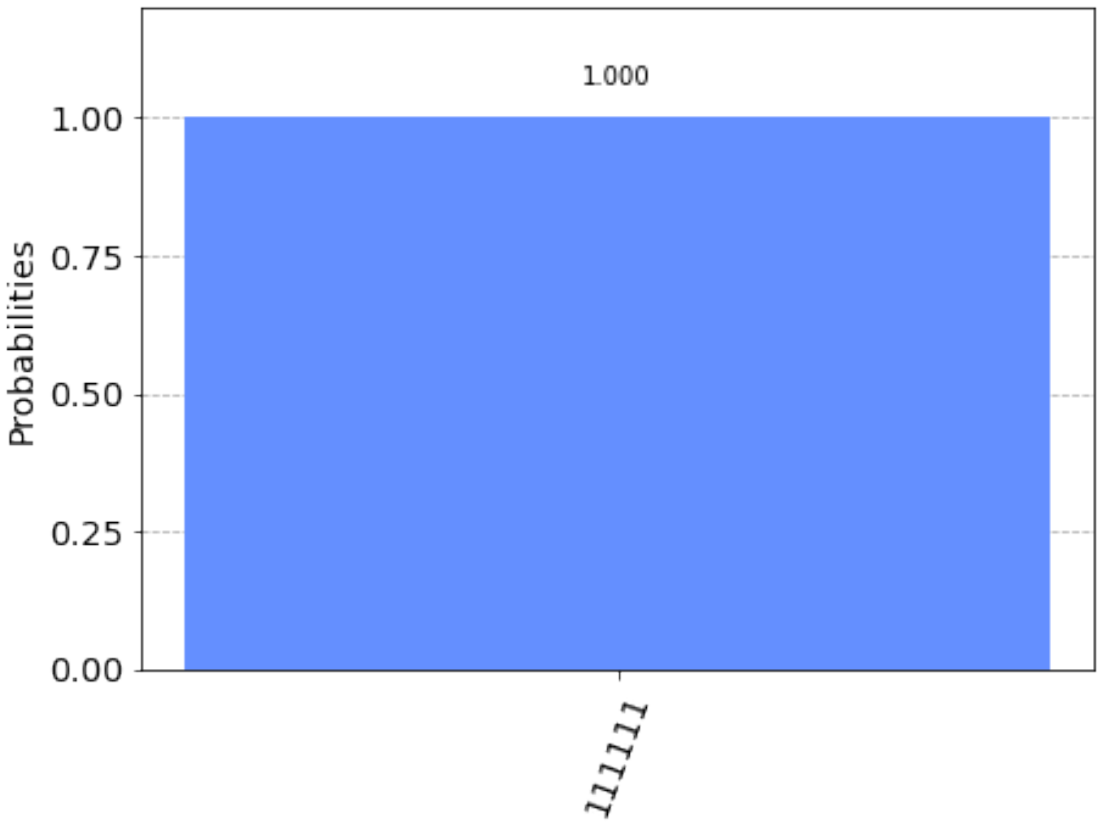
```
    dj_circuit3.h(qubit)


dj_circuit3.x(n)
dj_circuit3.h(n)


dj_circuit3 += oraculo_bal


for qubit in range(n):
    dj_circuit3.h(qubit)
dj_circuit3.barrier()


for i in range(n):
    dj_circuit3.measure(i, i)


dj_circuit3.draw(output="mpl")
```

[25]:



[26]:
```
#caso balanceado
backend = BasicAer.get_backend('qasm_simulator')
results = execute(dj_circuit3, backend=backend, shots=1000).result()
answer = results.get_counts()
plot_histogram(answer)
```

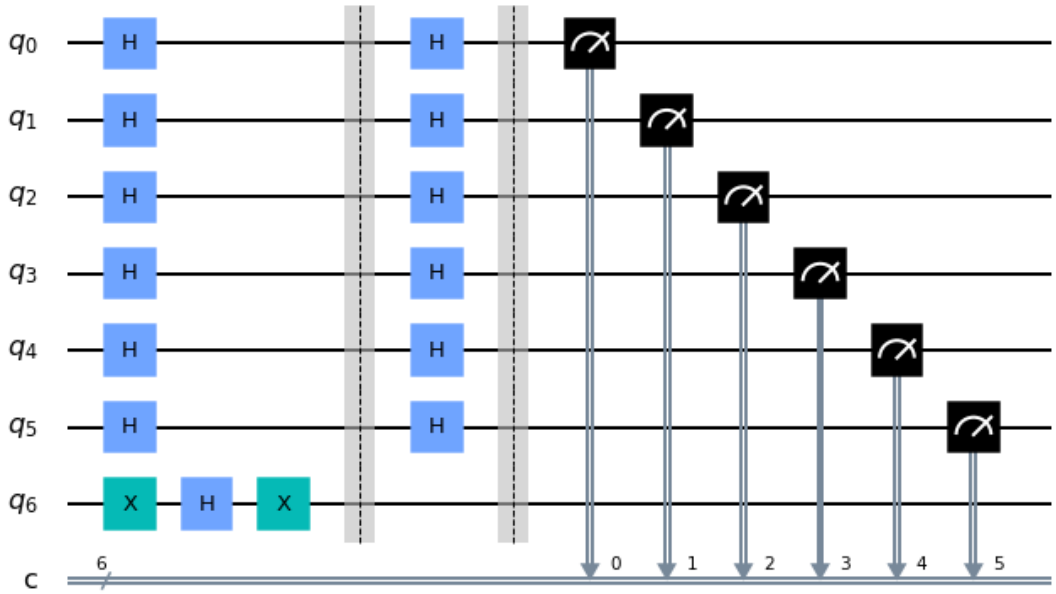
[26]:



[27]:
```
#caso constante
dj_circuit4 = QuantumCircuit(n+1, n)


for qubit in range(n):
    dj_circuit4.h(qubit)


dj_circuit4.x(n)
dj_circuit4.h(n)


dj_circuit4 += oraculo_const


for qubit in range(n):
    dj_circuit4.h(qubit)
dj_circuit4.barrier()

for i in range(n):
```

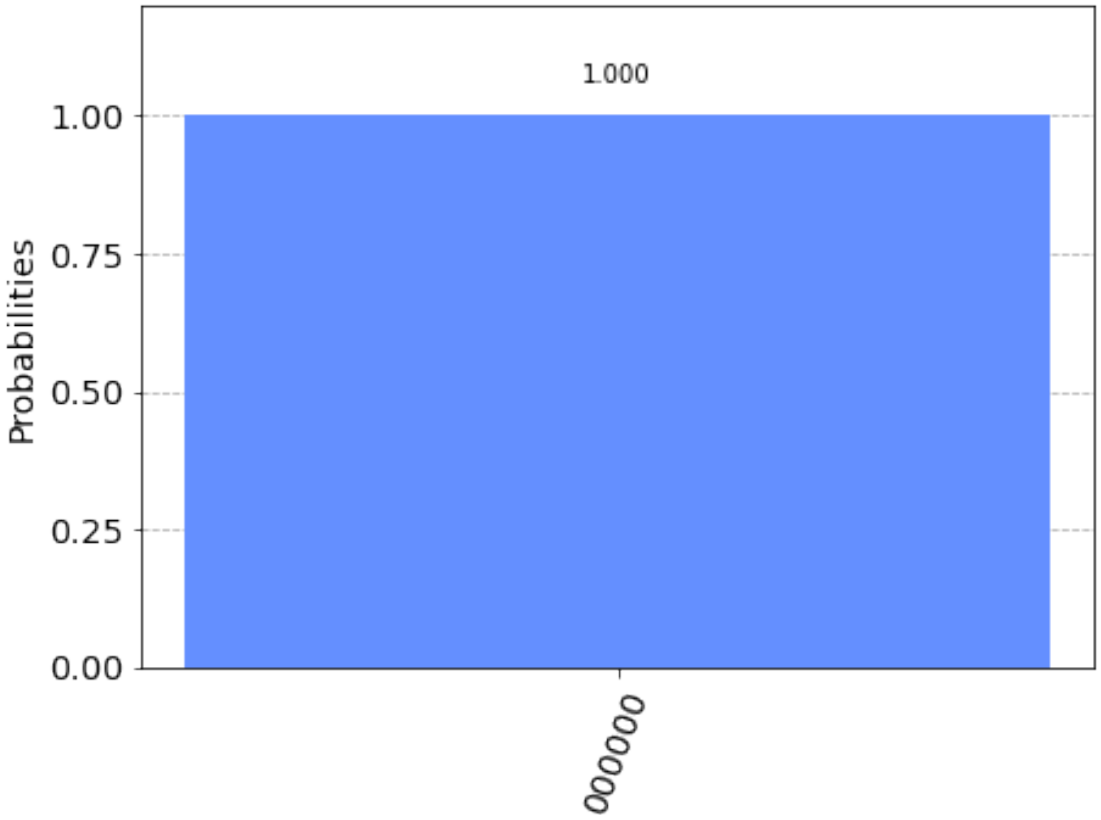
```
    dj_circuit4.measure(i, i)


dj_circuit4.draw(output="mpl")
```

[27]:



[28]:
```
#caso constante
backend = BasicAer.get_backend('qasm_simulator')
results = execute(dj_circuit4, backend=backend, shots=1000).result()
answer = results.get_counts()
plot_histogram(answer)
```

[28]:


1.000
1.00
0.75
0.50
0.25
0.00
Probabilities
000000

[ ]: