

Bernstein-Vazirani

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[154]: from qiskit import *
from qiskit.providers.aer import QasmSimulator
# also import a visualization tool from qiskit
from qiskit.tools.visualization import plot_histogram
%matplotlib inline
```

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[164]: class BVn():

    def __init__(self, A:str, Id = False):

        self.a = A
        self.s = int(A, 2)
        self.qcirc = QuantumCircuit(len(self.a)+1, len(self.a))
        self.qcirc.h(range(len(self.a)))
        self.qcirc.x(len(self.a))
        self.qcirc.h(len(self.a))
        self.qcirc.barrier()

        if Id: #If Id is true, gate identities are used to build the black box
        ↪circuit circuit
            for i in range(len(self.a)):
                if (self.s & (1 << i)):
                    self.qcirc.z(i)
                else:
                    self.qcirc.iden(i)
            else:
                for ii, yesno in enumerate(reversed(self.a)):
                    if yesno == "1":
                        self.qcirc.cx(ii, len(self.a))

        self.qcirc.barrier()
        self.qcirc.h(range(len(self.a)))
        self.qcirc.barrier()
        self.qcirc.measure(range(len(self.a)),range(len(self.a)))

    def sim(self):
        self.simulator = Aer.get_backend('qasm_simulator')
```

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self.job = execute(self.qcirc,self.simulator,shots=1)
self.result = self.job.result()
self.counts = self.result.get_counts()
print("The secret number in decimal is ", self.s, "=", self.counts)

```

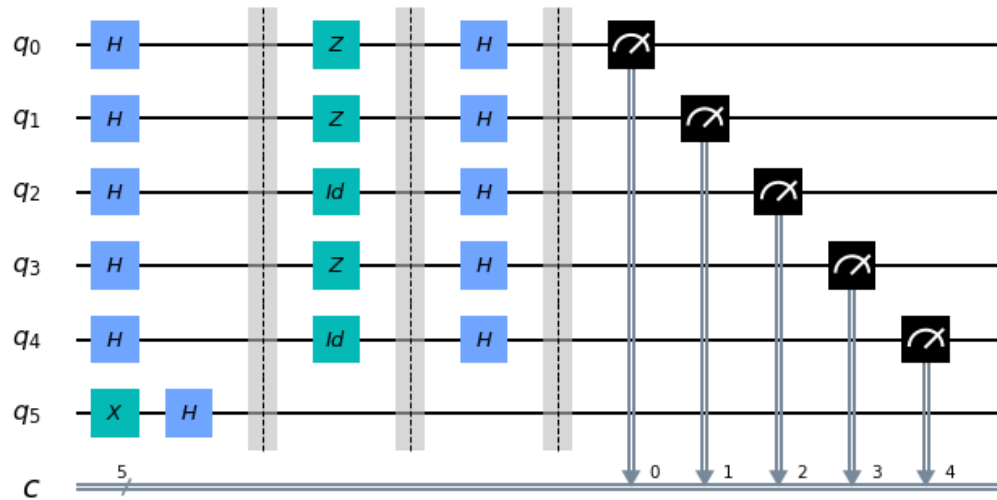
```

[165]: bv_1 = BVn("01011", True)
        bv_1.sim()
        bv_1.qcirc.draw(output = 'mpl')

```

The secret number in decimal is 11 = {'01011': 1}

[165]:



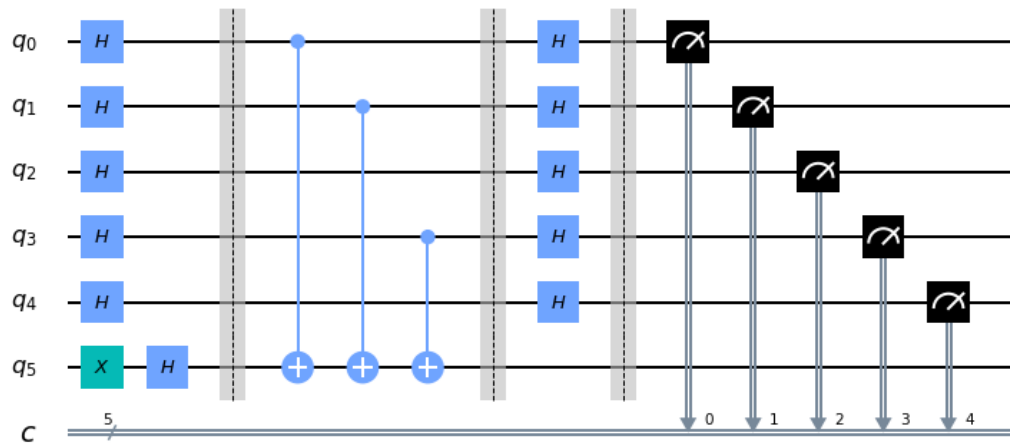
```

[167]: bv_1 = BVn("01011")
        bv_1.sim()
        bv_1.qcirc.draw(output= 'mpl')

```

The secret number in decimal is 11 = {'01011': 1}

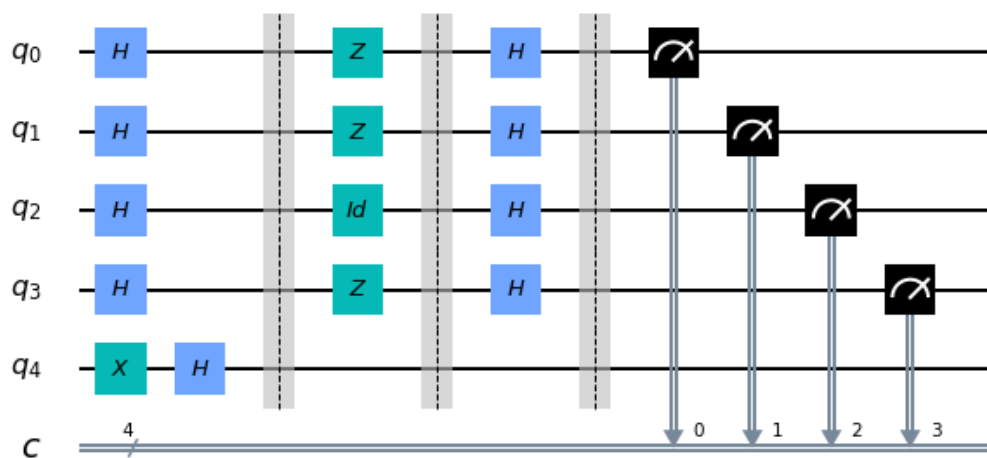
[167]:



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[168]: bv_2 = BVn("1011", True)
        bv_2.sim()
        bv_2.qcirc.draw(output = 'mpl')
```

The secret number in decimal is 11 = {'1011': 1}

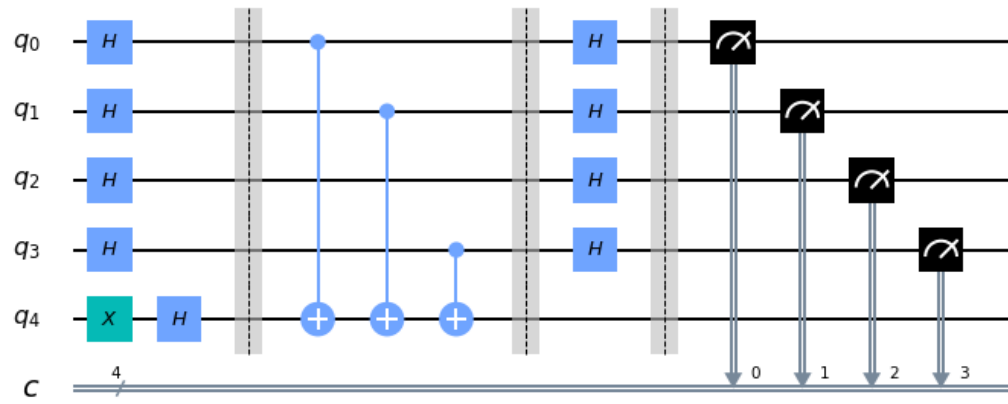
[168]:



```
[170]: bv_2 = BVn("1011")
        bv_2.sim()
        bv_2.qcirc.draw(output = 'mpl')
```

The secret number in decimal is 11 = {'1011': 1}

[170]:



[]: