# Superposition and Entanglement in Qiskit

This notebook demonstrates:

1. **Superposition** using a single qubit.
2. **Entanglement** using two qubits. We will use Qiskit to create circuits, visualize the states, and measure outcomes.

In [ ]:
```
!pip install qiskit --quiet
!pip install qiskit-aer --quiet
```

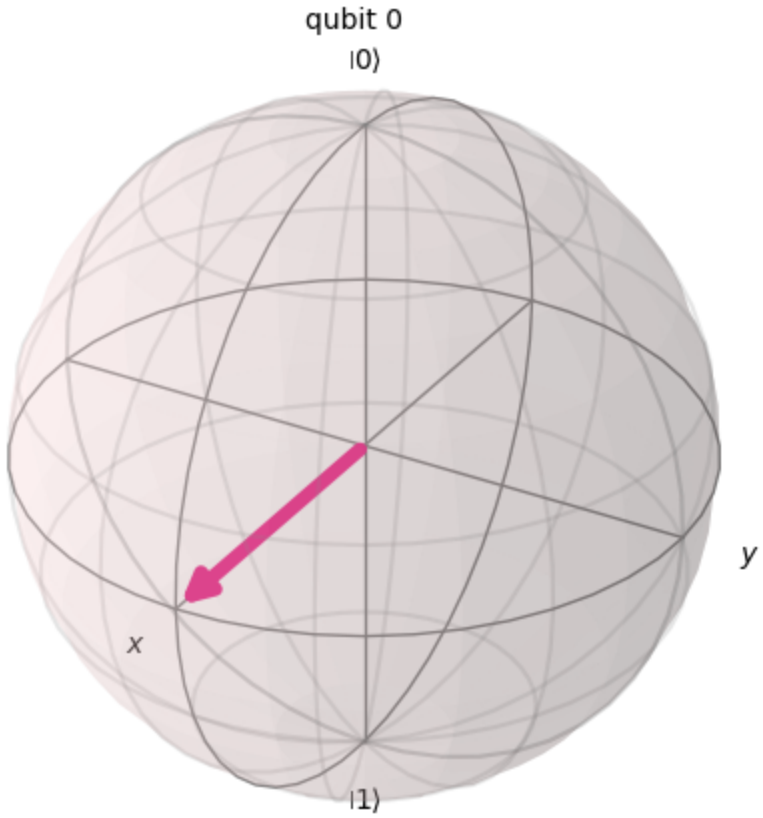
In [ ]:
```
from qiskit import QuantumCircuit
from qiskit_aer import AerSimulator
from qiskit.visualization import plot_histogram, plot_bloch_multivector
from qiskit.quantum_info import Statevector
import matplotlib.pyplot as plt
```

In [ ]:
```
#Task_1
```

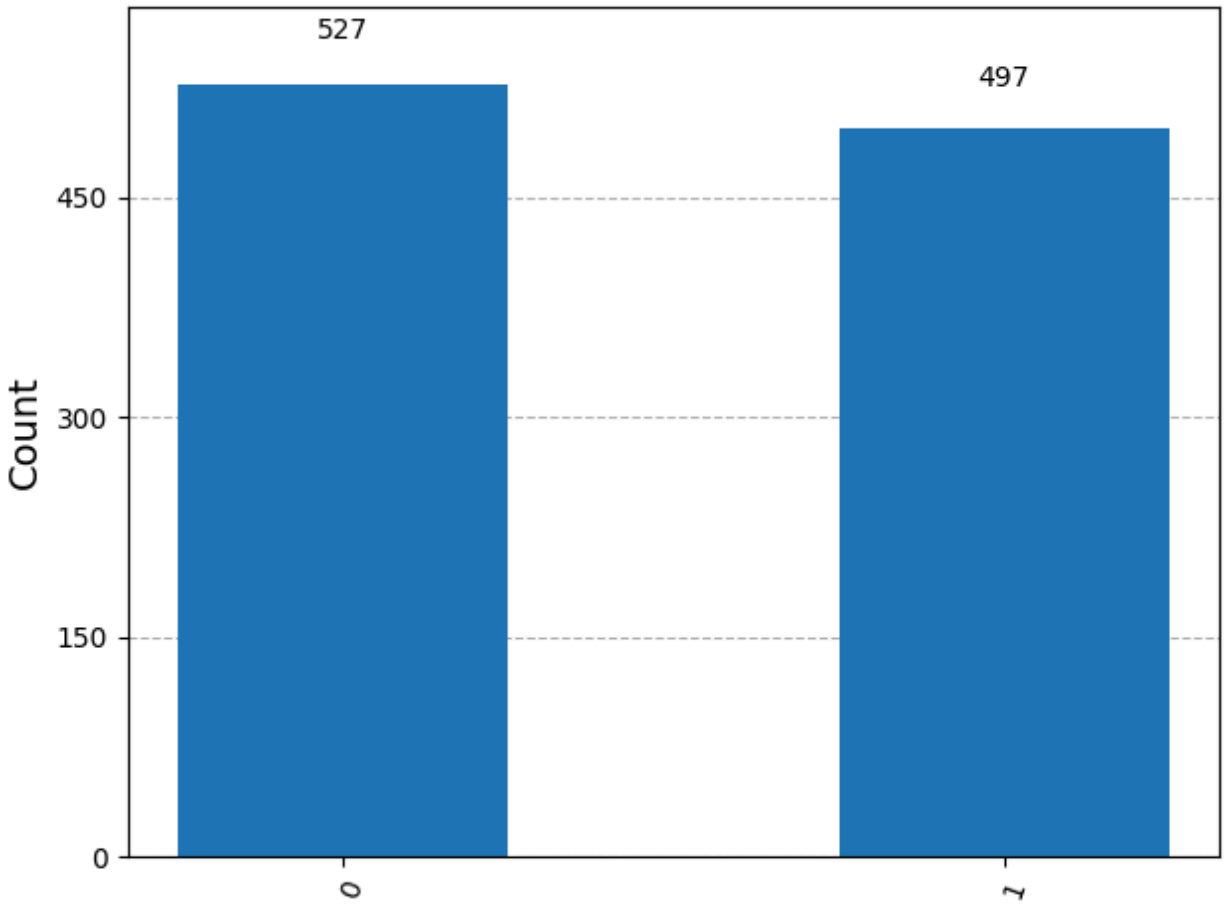
In [4]:
```
qc_super = QuantumCircuit(1)
qc_super.h(0)
qc_super.draw('text')

state_super = Statevector.from_instruction(qc_super)
plot_bloch_multivector(state_super)
plt.show()

qc_super.measure_all()
simulator = AerSimulator()
job_super = simulator.run(qc_super, shots=1024)
result_super = job_super.result()
counts_super = result_super.get_counts()
print("Superposition Measurement Counts:", counts_super)
plot_histogram(counts_super)
plt.show()
```




```
Superposition Measurement Counts: {'1': 497, '0': 527}
```

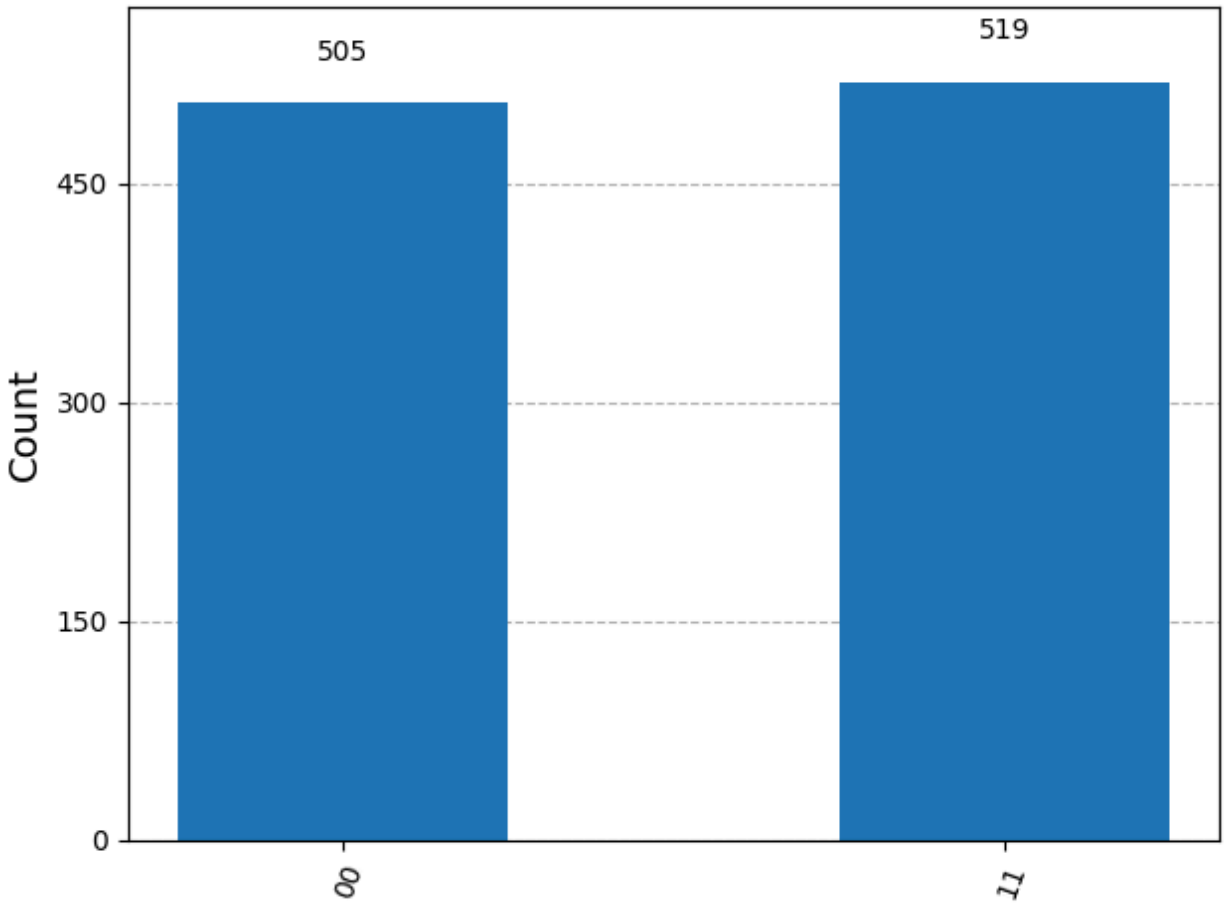



In [ ]:
```
#Task_2
```

In [6]:
```
qc_entangle = QuantumCircuit(2)
qc_entangle.h(0)
qc_entangle.cx(0, 1)
qc_entangle.measure_all()

simulator = AerSimulator()
job = simulator.run(qc_entangle, shots=1024)
result = job.result()
counts = result.get_counts()
print("Entanglement Measurement Counts:", counts)
plot_histogram(counts)
plt.show()
```

```
Entanglement Measurement Counts: {'00': 505, '11': 519}
```


505
519
450
300
150
0
Count
00
11