In [ ]:
```
!pip install qiskit
```

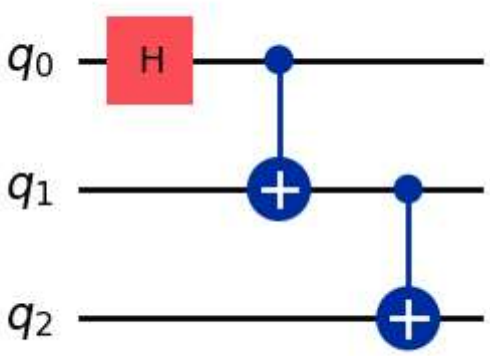
```
Collecting qiskit
  Downloading qiskit-1.2.2-cp38-abi3-manylinux_2_17_x86_64.manylinux2014_x86_6
4.whl.metadata (12 kB)
Collecting rustworkx>=0.15.0 (from qiskit)
  Downloading rustworkx-0.15.1-cp38-abi3-manylinux_2_17_x86_64.manylinux2014_x8
6_64.whl.metadata (9.9 kB)
Requirement already satisfied: numpy<3,>=1.17 in /usr/local/lib/python3.10/dist
-packages (from qiskit) (1.26.4)
Requirement already satisfied: scipy>=1.5 in /usr/local/lib/python3.10/dist-pac
kages (from qiskit) (1.13.1)
Requirement already satisfied: sympy>=1.3 in /usr/local/lib/python3.10/dist-pac
kages (from qiskit) (1.13.3)
Collecting dill>=0.3 (from qiskit)
  Downloading dill-0.3.9-py3-none-any.whl.metadata (10 kB)
Requirement already satisfied: python-dateutil>=2.8.0 in /usr/local/lib/python
3.10/dist-packages (from qiskit) (2.8.2)
Collecting stevedore>=3.0.0 (from qiskit)
  Downloading stevedore-5.3.0-py3-none-any.whl.metadata (2.3 kB)
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.10/d
ist-packages (from qiskit) (4.12.2)
Collecting symengine>=0.11 (from qiskit)
  Downloading symengine-0.13.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_
x86_64.whl.metadata (1.2 kB)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packa
ges (from python-dateutil>=2.8.0->qiskit) (1.16.0)
Collecting pbr>=2.0.0 (from stevedore>=3.0.0->qiskit)
  Downloading pbr-6.1.0-py2.py3-none-any.whl.metadata (3.4 kB)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.10/
dist-packages (from sympy>=1.3->qiskit) (1.3.0)
Downloading qiskit-1.2.2-cp38-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.w
hl (4.7 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 4.7/4.7 MB 34.2 MB/s eta 0:00:00
Downloading dill-0.3.9-py3-none-any.whl (119 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 119.4/119.4 kB 9.9 MB/s eta 0:00:00
Downloading rustworkx-0.15.1-cp38-abi3-manylinux_2_17_x86_64.manylinux2014_x86_
64.whl (2.0 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 2.0/2.0 MB 73.1 MB/s eta 0:00:00
Downloading stevedore-5.3.0-py3-none-any.whl (49 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 49.7/49.7 kB 4.5 MB/s eta 0:00:00
Downloading symengine-0.13.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x8
6_64.whl (49.7 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 49.7/49.7 MB 17.8 MB/s eta 0:00:00
Downloading pbr-6.1.0-py2.py3-none-any.whl (108 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 108.5/108.5 kB 10.1 MB/s eta 0:00:0
0
Installing collected packages: symengine, rustworkx, pbr, dill, stevedore, qisk
it
Successfully installed dill-0.3.9 pbr-6.1.0 qiskit-1.2.2 rustworkx-0.15.1 steve
dore-5.3.0 symengine-0.13.0
```

In [ ]:
```
!pip install pylatexenc
```

```
Collecting pylatexenc
  Downloading pylatexenc-2.10.tar.gz (162 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 162.6/162.6 kB 3.0 MB/s eta 0:00:
00
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: pylatexenc
  Building wheel for pylatexenc (setup.py) ... done
  Created wheel for pylatexenc: filename=pylatexenc-2.10-py3-none-any.whl size=
136817 sha256=87cb1a539d5d13b81339193d00f2146b442c15e5c55c46d1a0230c35d9d67038
  Stored in directory: /root/.cache/pip/wheels/d3/31/8b/e09b0386afd80cfc556c004
08c9aeea5c35c4d484a9c762fd5
Successfully built pylatexenc
Installing collected packages: pylatexenc
Successfully installed pylatexenc-2.10
```

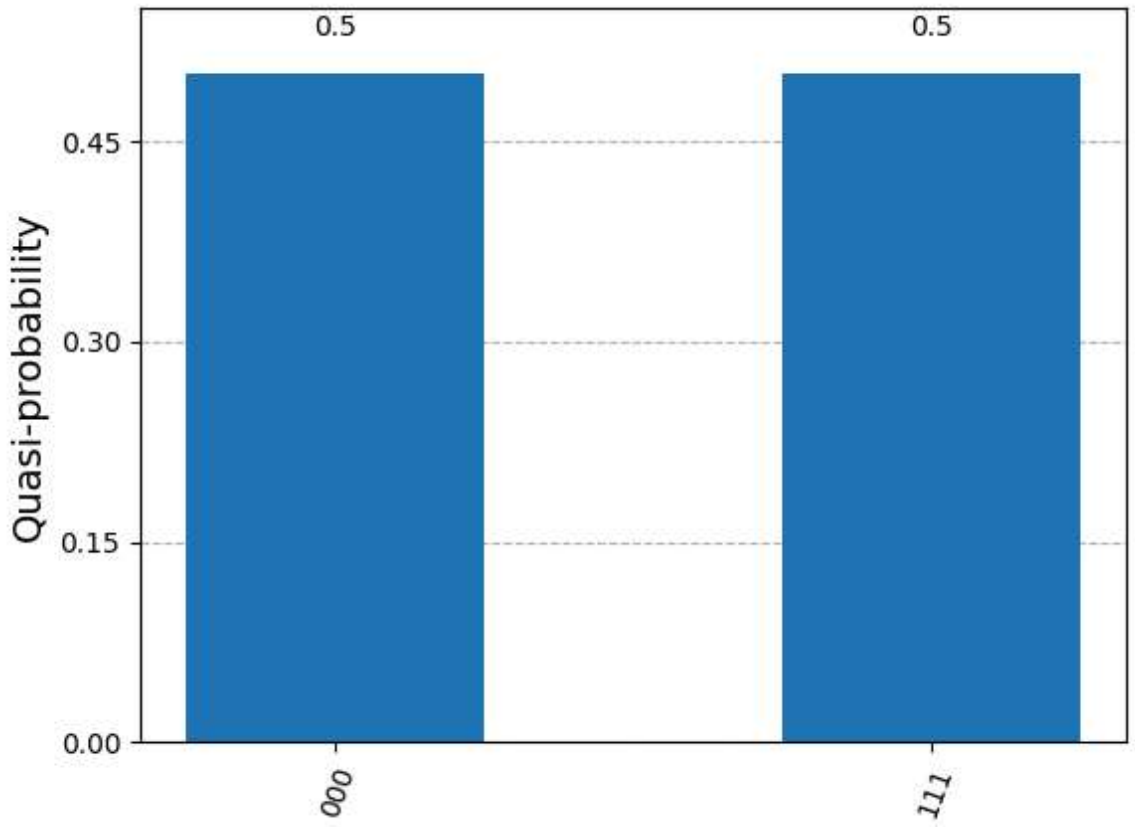
In [ ]:
```
from qiskit import QuantumCircuit
qc = QuantumCircuit(3)
qc.h(0)
qc.cx(0,1)
qc.cx(1,2)
qc.draw("mpl")
```

Out[ ]:



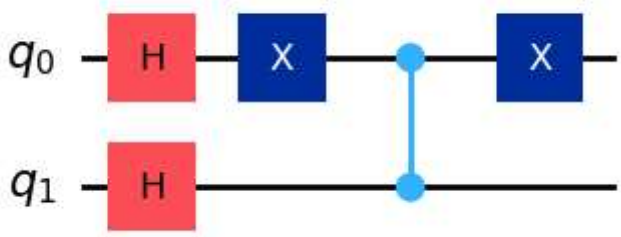
In [23]:
```
from qiskit.quantum_info import Statevector
from qiskit.visualization import plot_state_city
from qiskit.visualization import plot_histogram

state = Statevector(qc)
# plot_state_city(state,alpha=0.6)
prob = state.probabilities_dict()
plot_histogram(prob)
```

Out[23]:



In [ ]:
```
qc1 = QuantumCircuit(2)
qc1.h(0)
qc1.h(1)
qc1.x(0)
qc1.cz(0,1)
qc1.x(0)
qc1.draw("mpl")
```

Out[ ]:



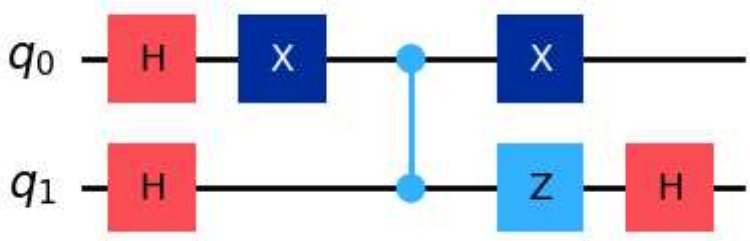
In [27]:
```
state1 = Statevector.from_instruction(qc1)
state1.draw('latex')
# plot_state_city(state1,alpha=0.6)
```

Out[27]:

$$\frac{1}{2}|00\rangle + \frac{1}{2}|01\rangle - \frac{1}{2}|10\rangle + \frac{1}{2}|11\rangle$$

In [29]:
```
qc2= QuantumCircuit(2)
qc_ghz = qc2.compose(qc1)
qc_ghz.z(1)
qc_ghz.h(1)
qc_ghz.draw("mpl")
```

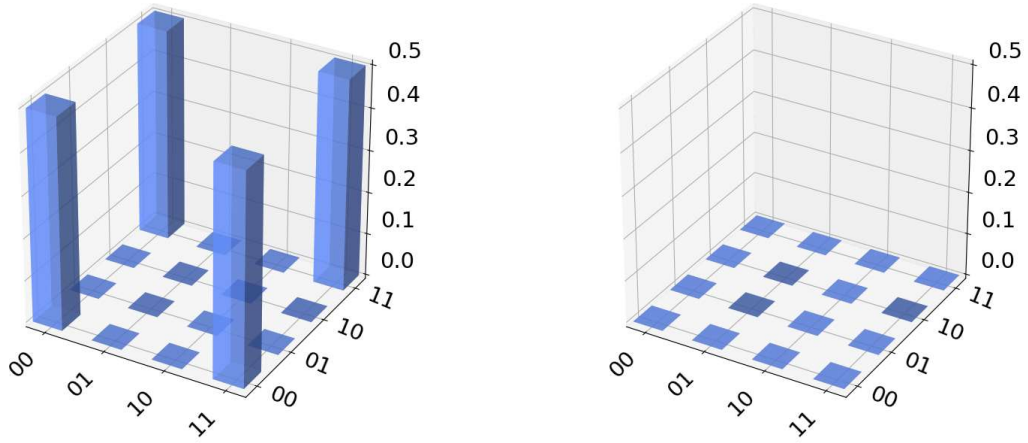
Out[29]:



In [30]:
```
state_ghz = Statevector(qc_ghz)
plot_state_city(state_ghz,alpha=0.6)
```

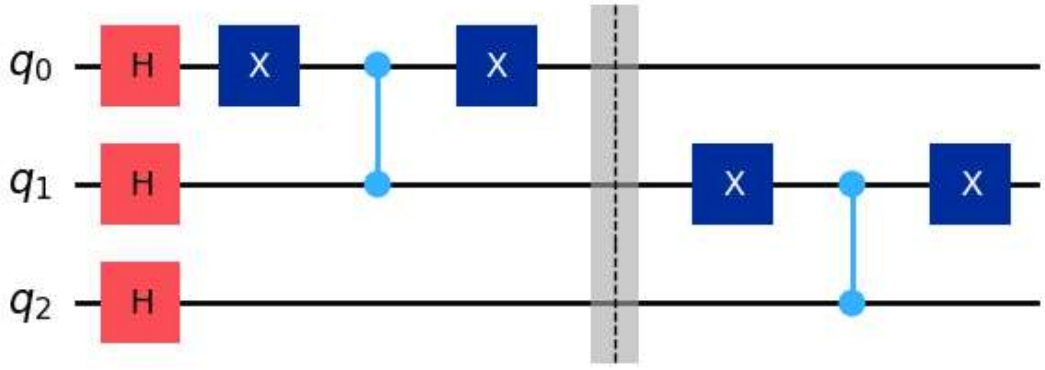
Out[30]:

Real Amplitude (ρ) Imaginary Amplitude (ρ)



In [22]:
```
qc3 = QuantumCircuit(3)
qc3.h(0)
qc3.h(1)
qc3.h(2)
qc3.x(0)
qc3.cz(0,1)
qc3.x(0)
qc3.barrier()
qc3.x(1)
qc3.cz(1,2)
qc3.x(1)
qc3.draw("mpl")
```

Out[22]:



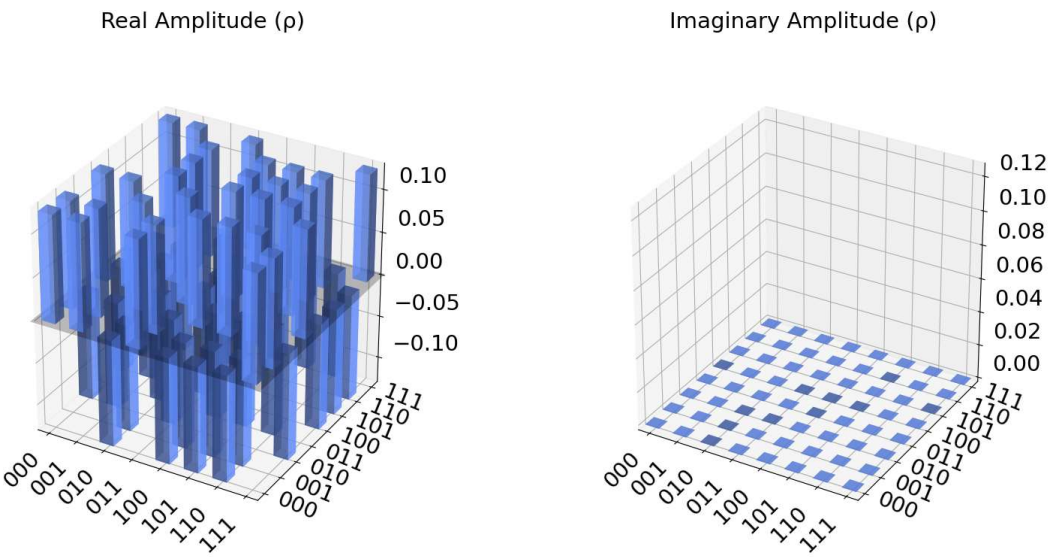
In [26]:
```
state3 = Statevector.from_instruction(qc3)
state3.draw('latex')
```

Out[26]:

$$\frac{\sqrt{2}}{4}|000\rangle + \frac{\sqrt{2}}{4}|001\rangle - \frac{\sqrt{2}}{4}|010\rangle + \frac{\sqrt{2}}{4}|011\rangle - \frac{\sqrt{2}}{4}|100\rangle - \frac{\sqrt{2}}{4}|101\rangle - \frac{\sqrt{2}}{4}|110\rangle +$$

In [28]:
```
plot_state_city(state3,alpha=0.6)
```

Out[28]:



In [ ]: