Test 2 Entanglement

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1. Suppose you have 5 qubits in the state $|\Psi\rangle = \frac{1}{\sqrt{2}}|01010\rangle + |10101\rangle$. Is state $|\Psi\rangle$ entangled? Why?

   Ans:

2. Write a program to generate $|\Psi\rangle$, run it 1024 times, and come up with an example how to use it in quantum communication.

```
1    OPENQASM 2.0;
2    include "qelib1.inc";
3
4    qreg q[5];
5    creg c[5];
6
7    h q[0];
8    x q[1];
9    x q[3];
10   cx q[0],q[1];
11   cx q[0],q[2];
12   cx q[0],q[3];
13   cx q[0],q[4];
14   measure q[0] -> c[0];
15   measure q[1] -> c[1];
16   measure q[2] -> c[2];
17   measure q[3] -> c[3];
18   measure q[4] -> c[4];
19
```
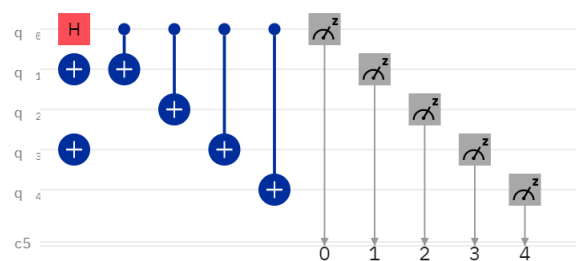
Listing 1: IBM Q code
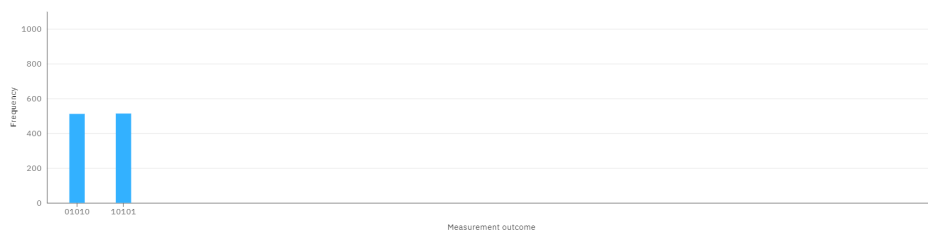
Figure 1: quantum circuit

Figure 2: result