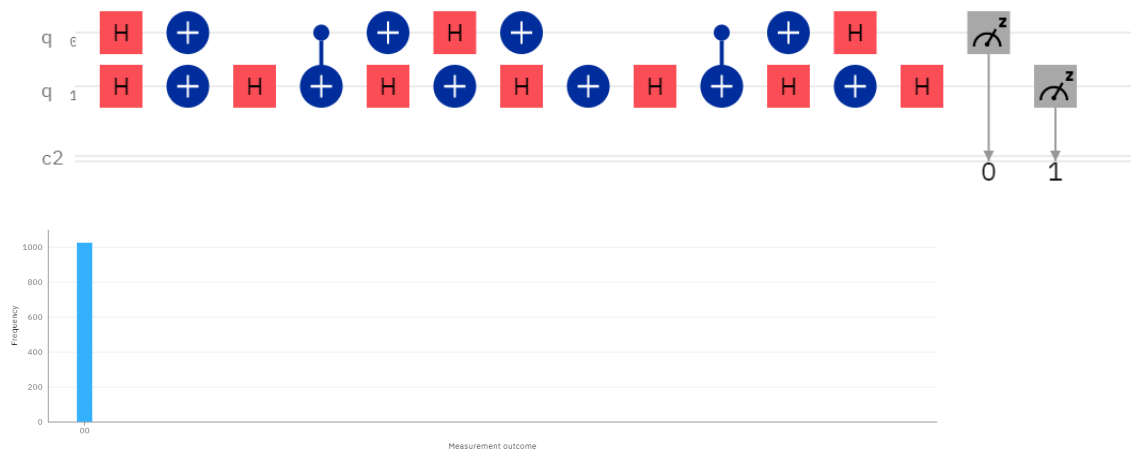Mr. Phiphat Chomchit 630631028

Grover's Search (10/11/2021)

1. Grover algorithm implementation for $N = 4$ and target $|00\rangle$.

```
1    OPENQASM 2.0;
2    include "qelib1.inc";
3    qreg q[2];
4    creg c[2];
5
6    h q;
7
8    //Oracle |00>
9    x q;
10   h q[1];
11   cx q[0], q[1];
12   h q[1];
13   x q;
14
15   //Grover's diffusion
16   h q;
17   x q;
18   h q[1];
19   cx q[0], q[1];
20   h q[1];
21   x q;
22   h q;
23
24   measure  q -> c;
25
26
```
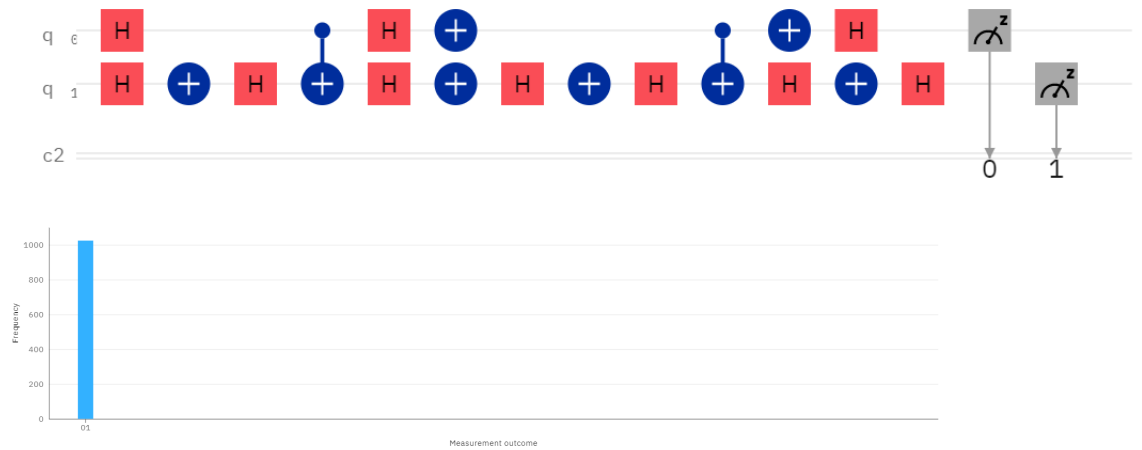
Listing 1: Oracle |00>

2. Grover algorithm implementation for $N = 4$ and target $|01\rangle$.

```
1    OPENQASM 2.0;
2    include "qelib1.inc";
3    qreg q[2];
4    creg c[2];
5
6    h q;
7
8    //Oracle |01>
9    x q[1];
10   h q[1];
11   cx q[0], q[1];
12   h q[1];
13   x q[1];
14
15   //Grover's diffusion
16   h q;
17   x q;
18   h q[1];
19   cx q[0], q[1];
20   h q[1];
21   x q;
22   h q;
23
24   measure  q -> c;
25
26
```

Listing 2: Oracle |01>

3. Grover algorithm implementation for $N = 4$ and target $|11\rangle$.

```
1      OPENQASM 2.0;
2      include "qelib1.inc";
3      qreg q[2];
4      creg c[2];
5
6      h q;
7
8      //Oracle |11>
9      h q[1];
10     cx q[0], q[1];
11     h q[1];
12
13     //Grover's diffusion
14     h q;
15     x q;
16     h q[1];
17     cx q[0], q[1];
18     h q[1];
19     x q;
20     h q;
21
22     measure  q -> c;
23
24
```

Listing 3: Oracle |11>