

Worksheet 3: Create a random number generator

The goal is to create a random number generator using quantum superposition.

1. Connect to the IBM Quantum Platform or to IQM.
2. Begin with programming a quantum circuit that is then sent to and run by a quantum computer. Choose one of the listed quantum computers.
3. Use the following OpenQASM 2.0 code¹:

```
OPENQASM 2.0;
include "qelib1.inc";

qreg q[3];
creg c[3];

h q[0];
h q[1];
h q[2];

measure q[0] -> c[0];
measure q[1] -> c[1];
measure q[2] -> c[2];
```

4. Depict the quantum circuit and describe its elements.

¹ Source: <https://gist.github.com/rish-16/6f34b7481abbe4257216cdd032cbe78b>

5. Describe and comment the result.

Conclusion

You have just taken your first step in working with a real quantum computer! Now you are ready to research what quantum computers are good for, like:²

- simulating molecular interactions, predicting material properties, and accelerating drug discovery processes;
- designing new materials with specific properties;
- modelling complex systems such as climate and weather patterns;
- modelling environmental systems more accurately, aiding in climate prediction and the development of sustainable solutions;
- optimising traffic flow in cities and reduce travel time for commuters;
- cybersecurity;
- modelling financial systems and analysing the behaviour of financial markets, which can help risk assessment and portfolio optimisation;
- Improving machine learning.

² Source: <https://thesmartinnovator.com/top-10-quantum-computing-applications-you-need-to-know-about/>