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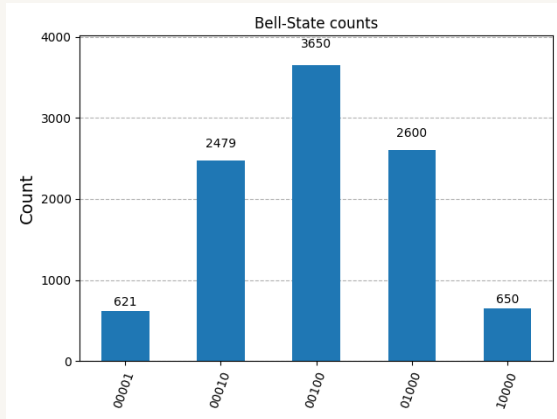
Project 1

Quantum Walks and Monte Carlo

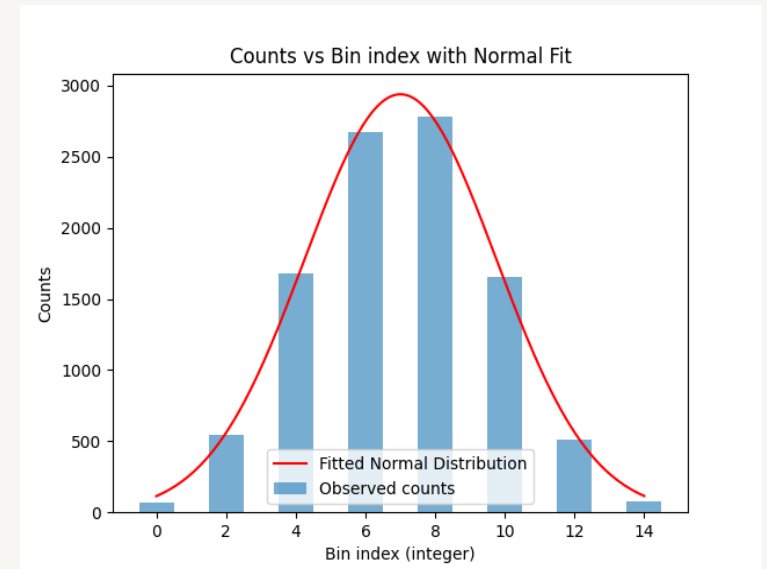
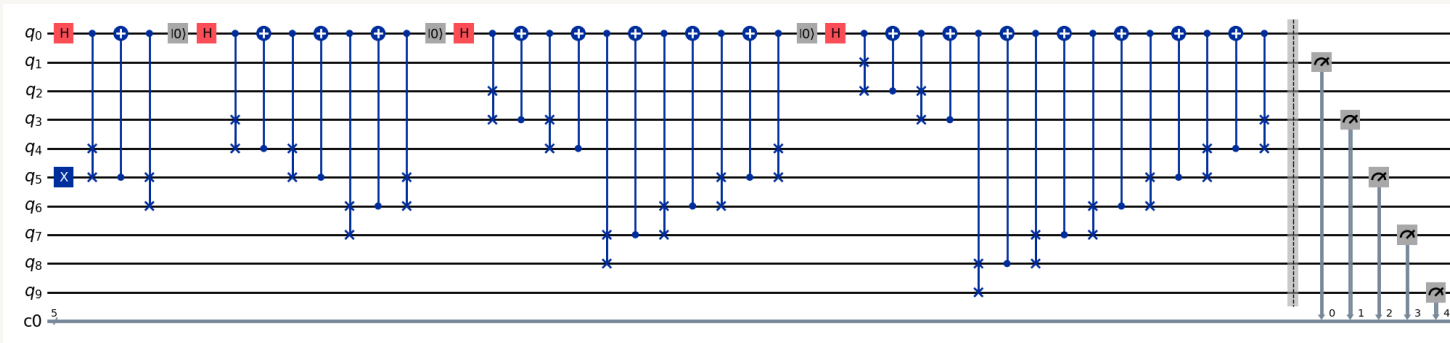
Problem Statement

- Generalise quantum Galton board for n -layers.
- Verify output of a gaussian using chi-squared test.
- Modify the circuit to implement different target distributions.

Solution – Gaussian circuit



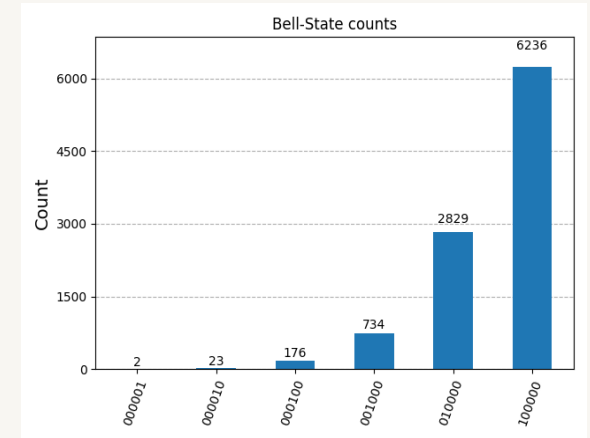
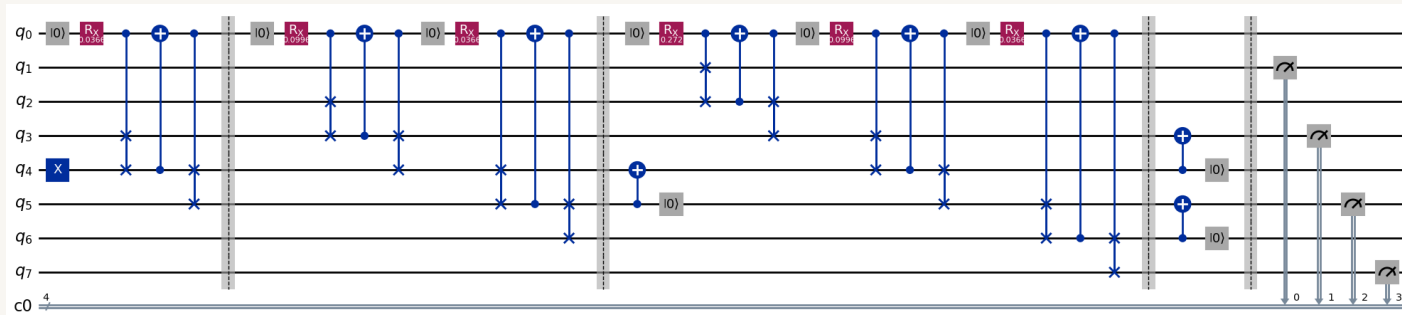
Circuit and histogram for Gaussian Galton box with 4 layers.



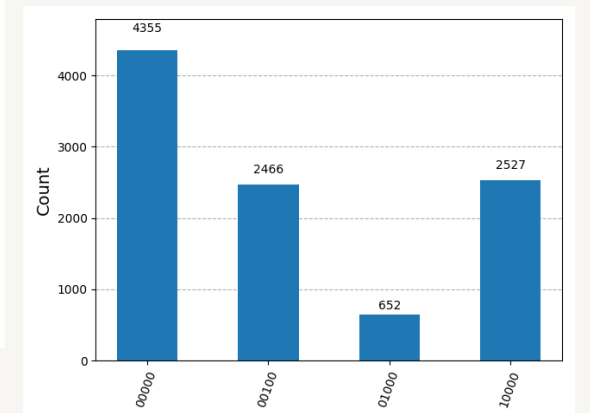
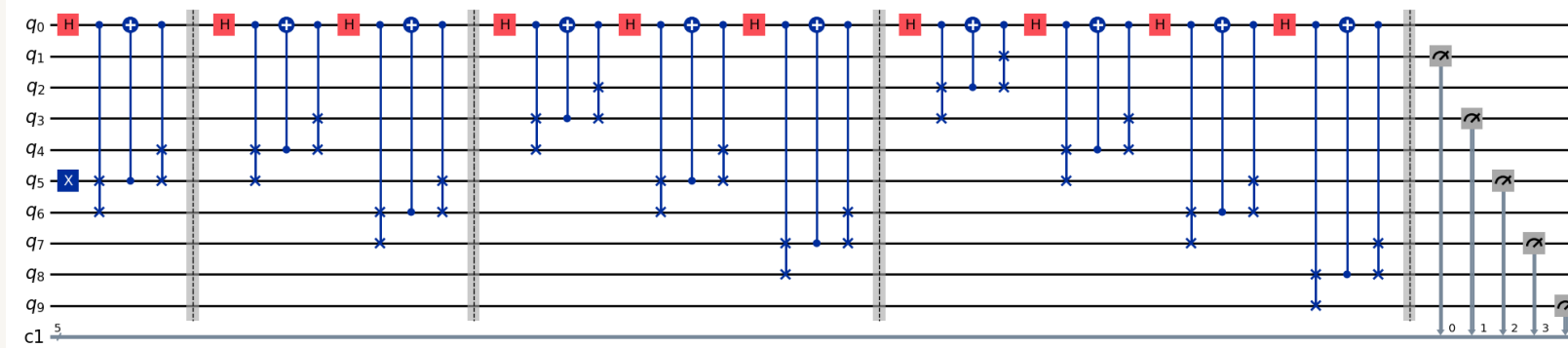
Chi squared test was done on the normal fit, even though the test statistic was low it is clear to see the general gaussian trend.

Solution – Exponential and Hadamard

Circuit and histogram for exponential Galton box with 4 layers.



Circuit and histogram for Hadamard quantum walk with 4 layers.



Future Scope

- Add noise models to get a more realistic model of the real-world applications.
- Hadamard quantum walk slight asymmetrical feature most likely due to circuit implementation.