TSP Problem Report

Report generated on: 2025-08-14 10:34:44

Graph Details

Number of Nodes: 3
Edges of Nodes: [(0,1), (0,2), (1,2)]
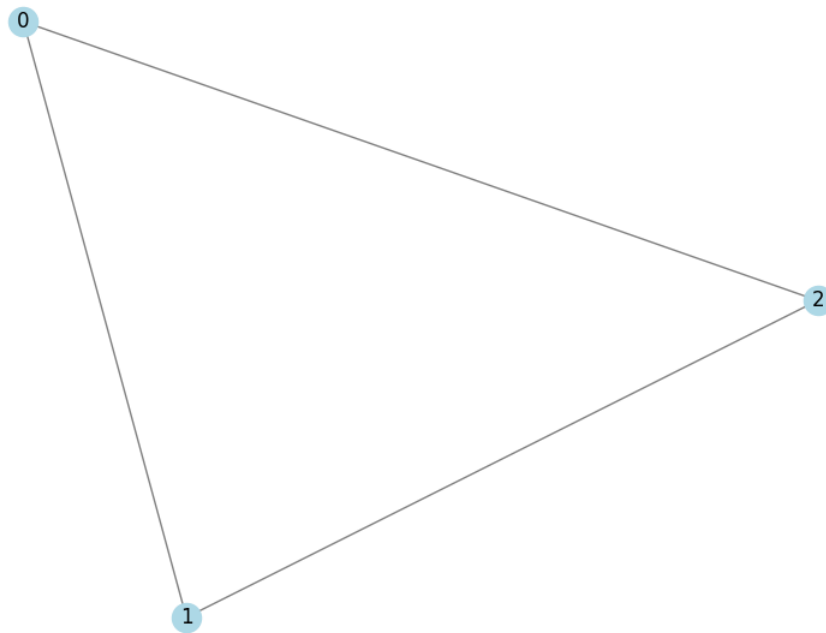

Figure 1: Graph Visualization

0.1 QUBO Matrix Visualization

Converted QUBO matrix visualization:

$$
\begin{array}{rrrrrrrrr}
-90.0 & 90.0 & 90.0 & 90.0 & 11.0 & 0.0 & 90.0 & 30.0 & 0.0 \\
0.0 & -90.0 & 90.0 & 0.0 & 90.0 & 11.0 & 0.0 & 90.0 & 30.0 \\
0.0 & 0.0 & -90.0 & 0.0 & 0.0 & 90.0 & 0.0 & 0.0 & 90.0 \\
0.0 & 11.0 & 0.0 & -90.0 & 90.0 & 90.0 & 90.0 & 35.0 & 0.0 \\
0.0 & 0.0 & 11.0 & 0.0 & -90.0 & 90.0 & 0.0 & 90.0 & 35.0 \\
0.0 & 0.0 & 0.0 & 0.0 & 0.0 & -90.0 & 0.0 & 0.0 & 90.0 \\
0.0 & 30.0 & 0.0 & 0.0 & 35.0 & 0.0 & -90.0 & 90.0 & 90.0 \\
0.0 & 0.0 & 30.0 & 0.0 & 0.0 & 35.0 & 0.0 & -90.0 & 90.0 \\
0.0 & 0.0 & 0.0 & 0.0 & 0.0 & 0.0 & 0.0 & 0.0 & -90.0 \\
\end{array}
$$

0.2 Oracle Visualization

The corresponding oracle for the TSP is shown below:
not implemented yet

QAOA Optimization Results

Most Probable Solution for QAOA:

- Variable x_1 is set to false

- Variable x_2 is set to false

- Variable x_3 is set to true

- Variable x_4 is set to true

- Variable x_5 is set to false

- Variable x_6 is set to false

- Variable x_7 is set to false

- Variable x_8 is set to true

- Variable x_9 is set to false

VQE Optimization Results

Most Probable Solution for VQE:
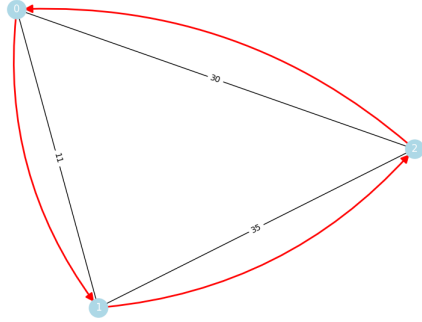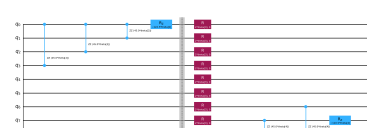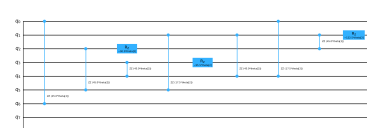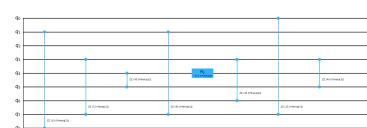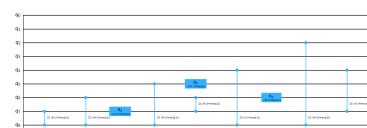
- Variable x_1 is set to true

Figure 2: QAOA Result

- Variable x_2 is set to false

- Variable x_3 is set to false

- Variable x_4 is set to false

- Variable x_5 is set to false

- Variable x_6 is set to true

- Variable x_7 is set to false

- Variable x_8 is set to true
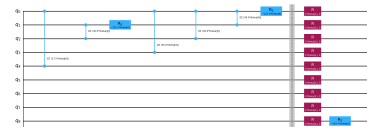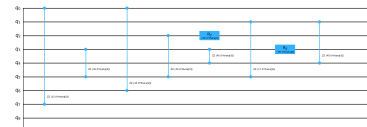
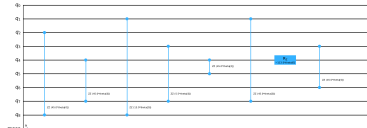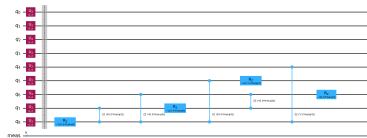- Variable x_9 is set to false

Grover's Algorithm Results

not implemented yet

Device Recommendation Summary

\textbf{Here is the device recommendation summary based on error, time, and price:}\
- Lowest error: Quantinuum H1 from Azure Quantum with a calculated error of 17.14%, time to execute: 6253.2 seconds and a price of \$288625.0.
- Lowest time: IQM Garnet from Amazon Braket with a calculated error of 100.0%, time to execute: 0.731 seconds and a price of \$87.5.
- Lowest price: Rigetti Ankaa-9Q-3 from Azure Quantum with a calculated error of 96.89%, time to execute: 1.336 seconds and a price of \$1.74.
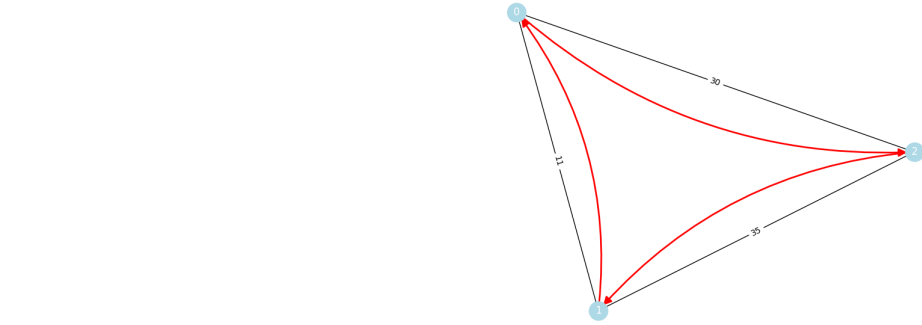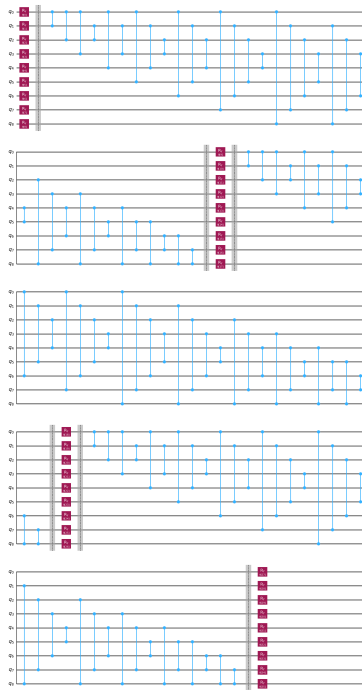
4

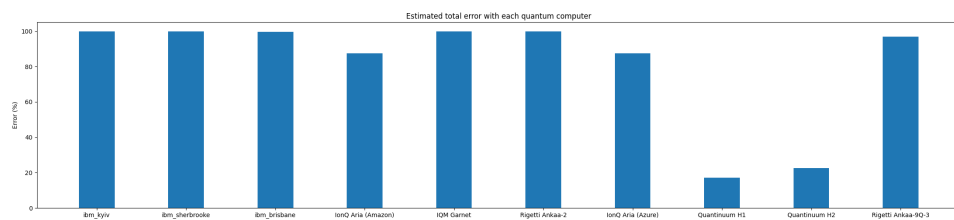Figure 4: VQE Result

Figure 5: VQE Quantum Circuit

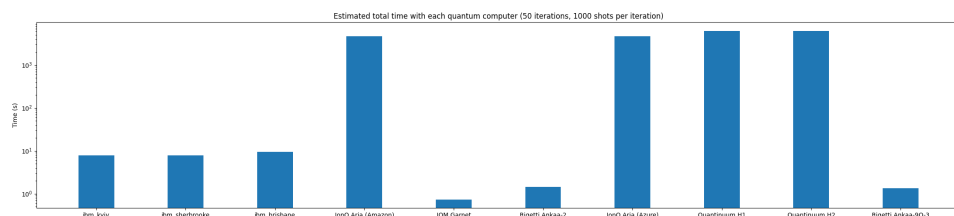Figure 6: Estimated total error with each quantum computer
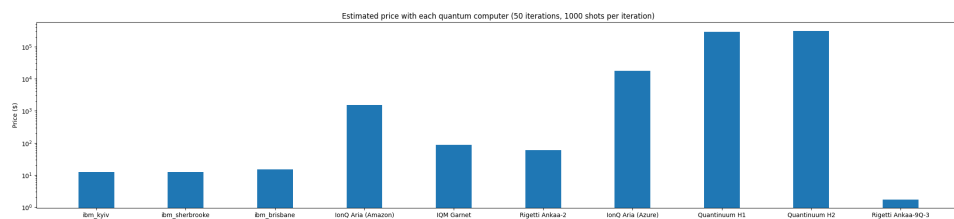

Figure 7: Estimated total time with each quantum computer

Figure 8: Estimated price with each quantum computer