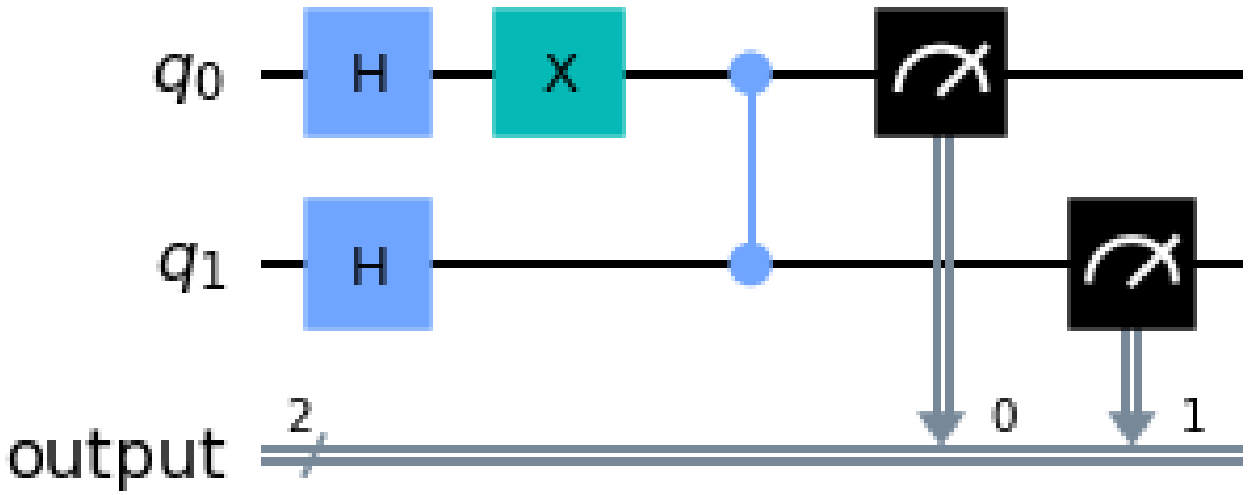
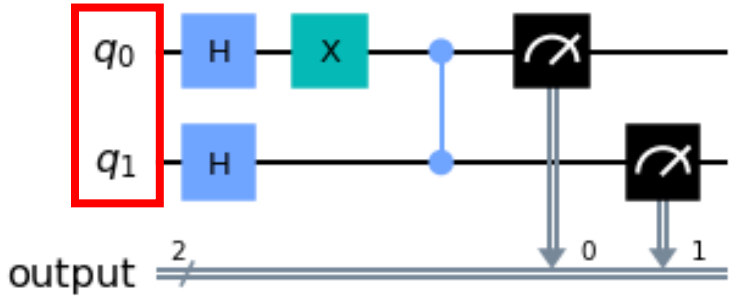
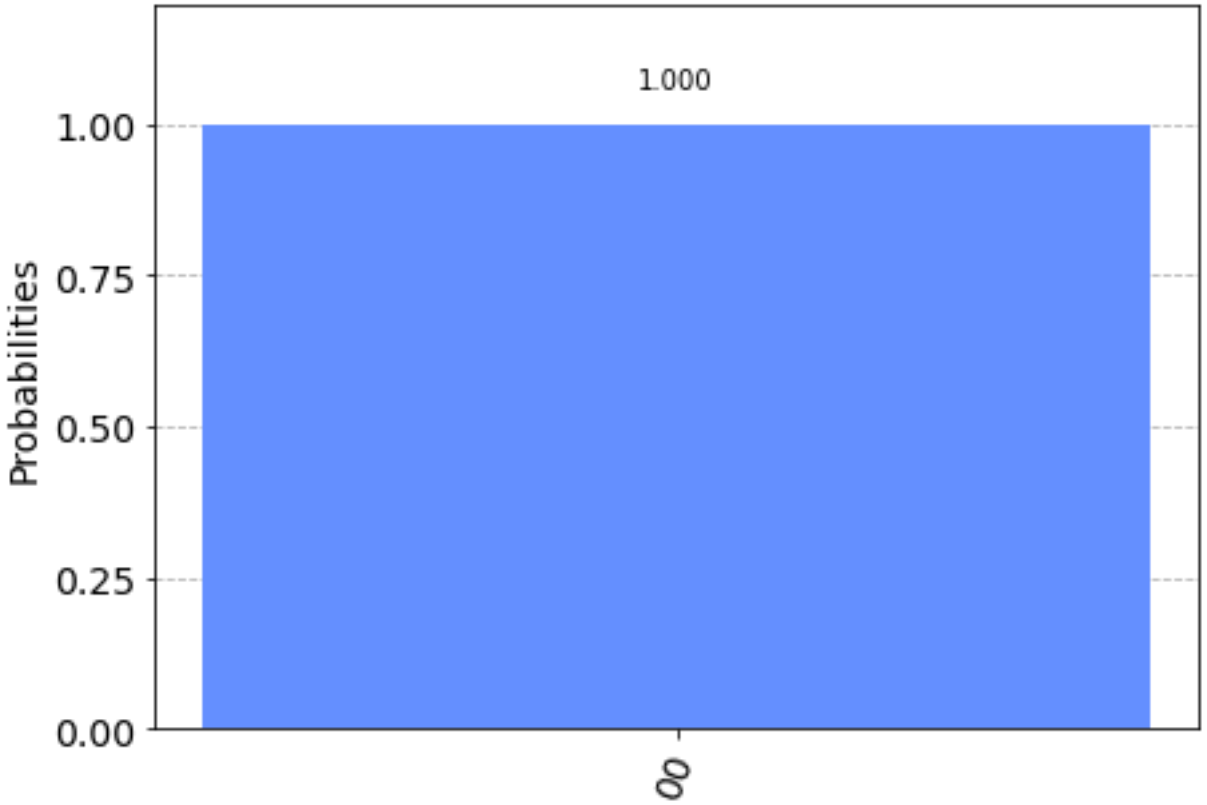
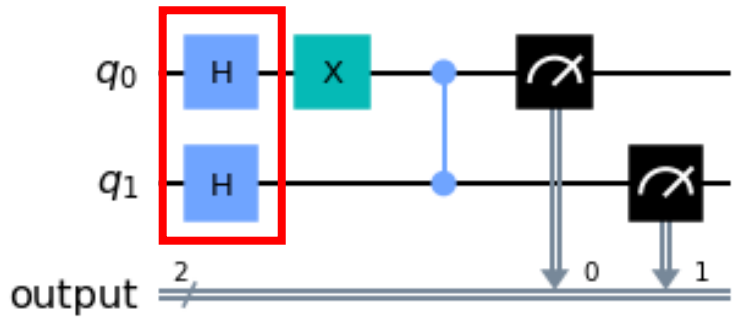


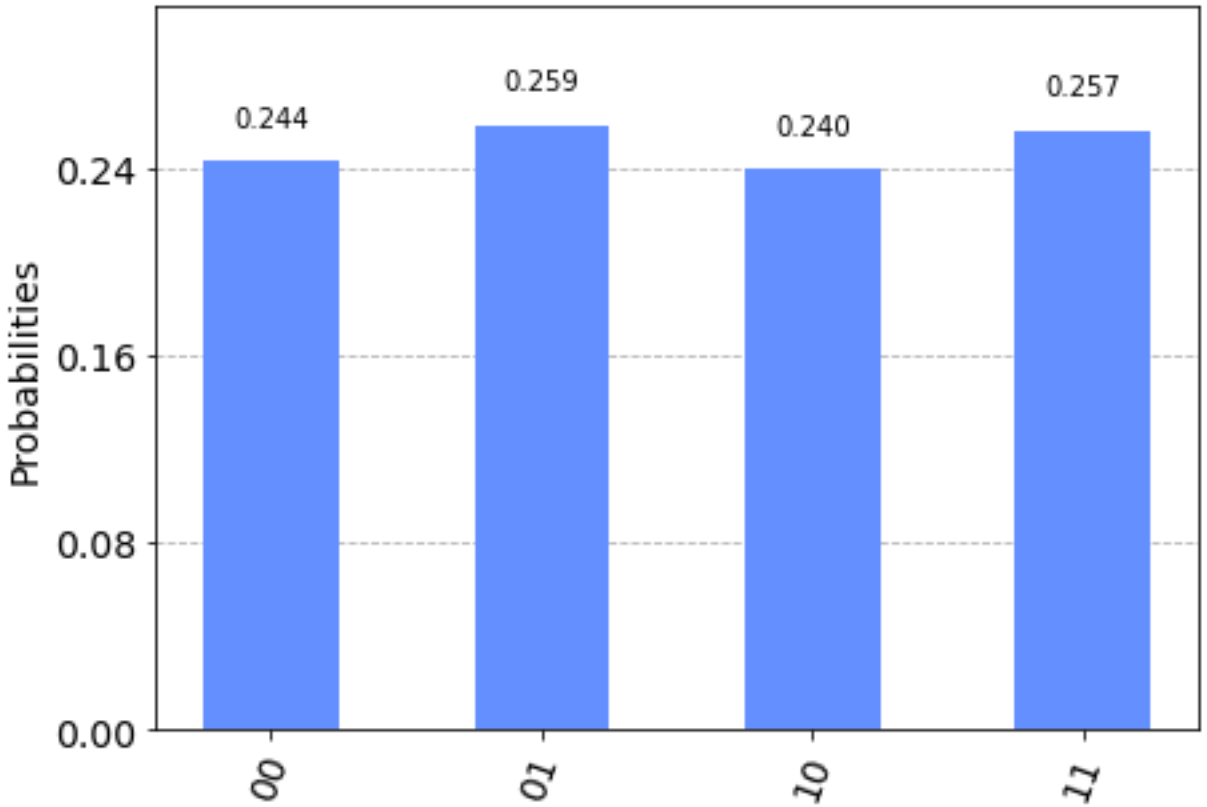
Let us implement this circuit step by step and observe what happens to the state of the two qubits…





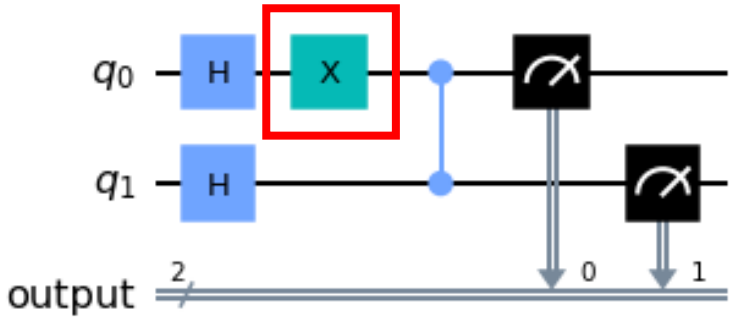
We start in the state $|0\rangle|0\rangle$. This means, if we measure the qubits the outcome would be 00 with 100% probability.

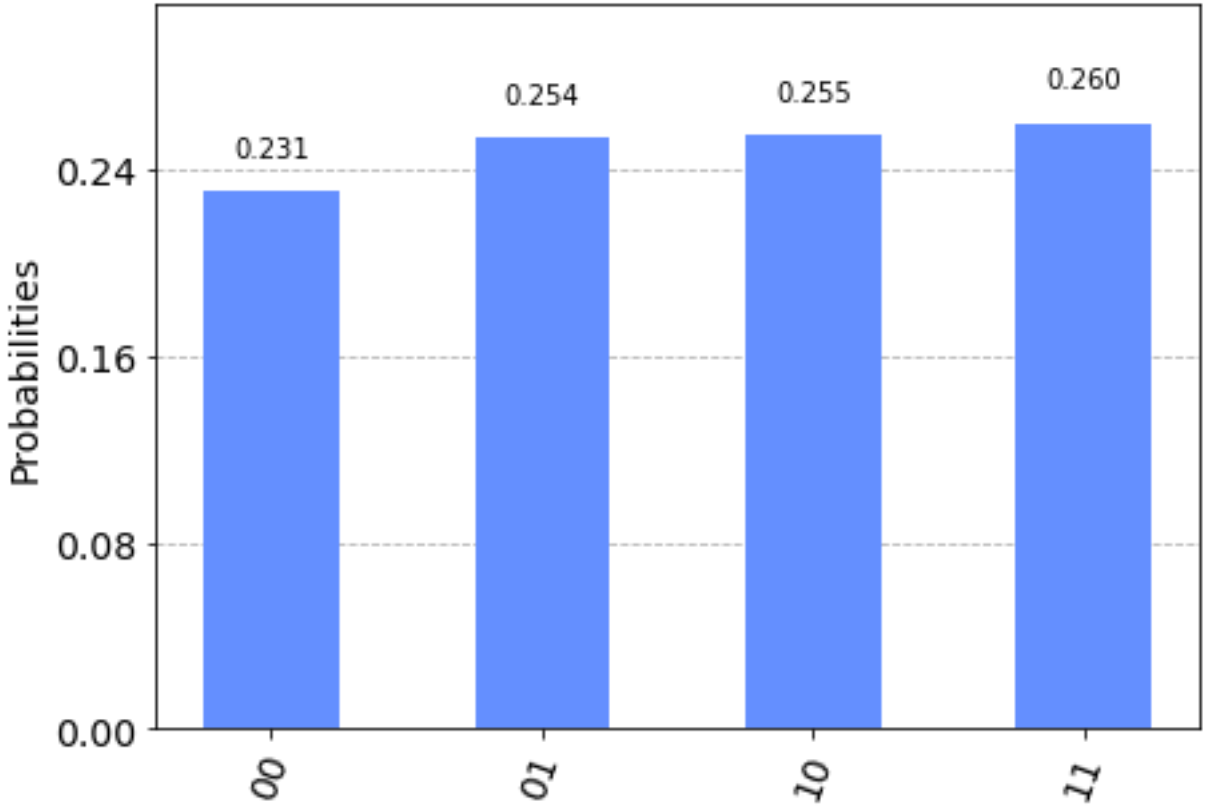




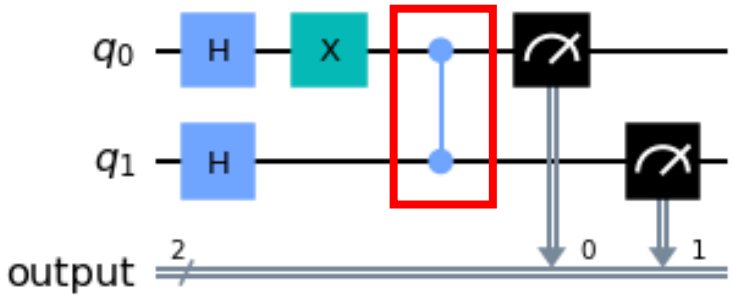
Then we apply a Hadamard gate to each qubit. This leads to an equal superposition

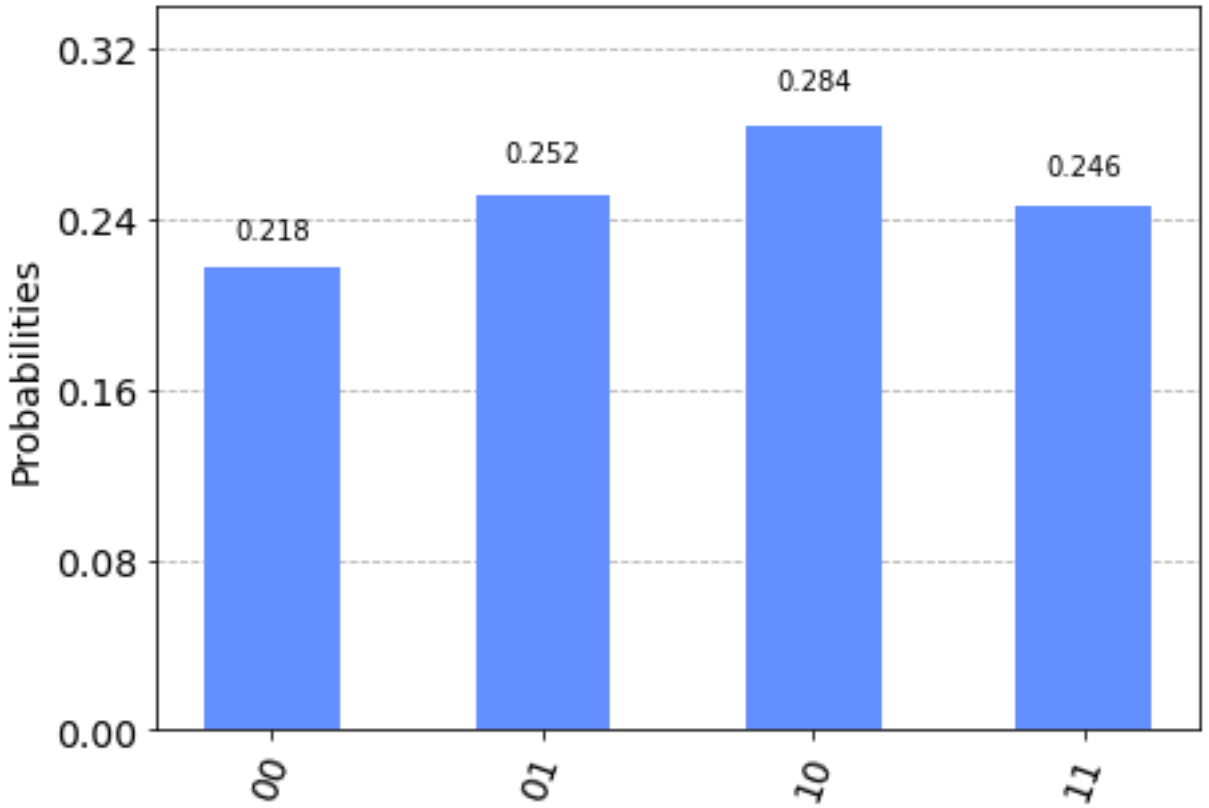
$$|0\rangle|0\rangle + |0\rangle|1\rangle + |1\rangle|0\rangle + |1\rangle|1\rangle$$



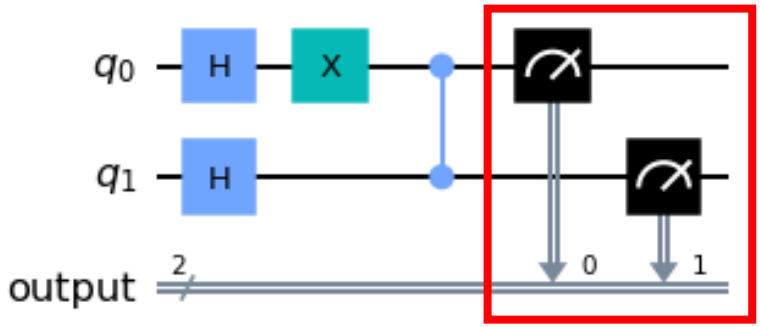


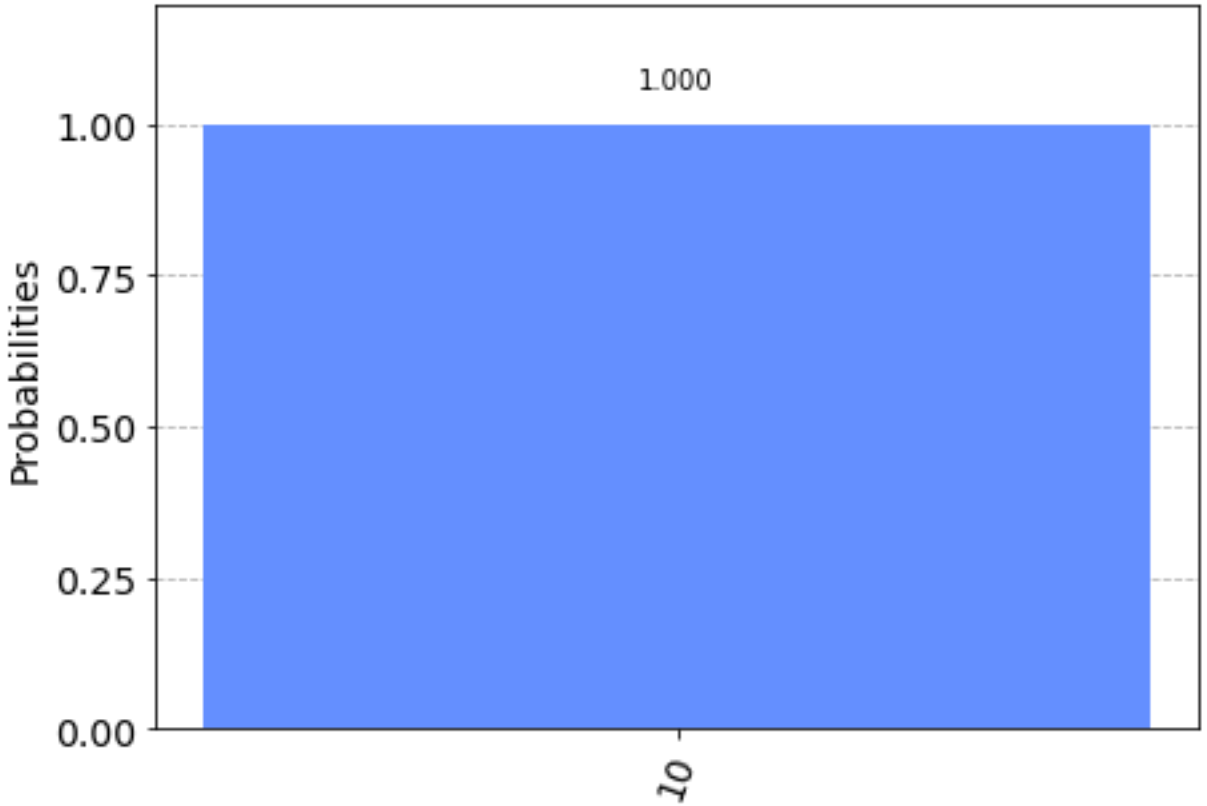
Next, we apply an X-gate to the first qubit. Note that this changes the superposition, i.e. if we measure the qubits we get different probabilities of obtaining 00, 01, 10, or 11 than before.





We now implement the controlled Z-gate with control-qubit q_0 and target-qubit q_1. This again changes the state and the most probable measurement outcome would be 10.





Finally, we measure the qubits. Thus the state **collapses** and in this case we measured the most probable outcome 10.