

HPC Tutorial 4

As the number of qubits increases, the time required to run the simulation also grows. This is because a larger number of qubits creates a more complex quantum system, demanding more operations and measurements. However, as the number of qubits increases, the system may encounter hardware limitations, such as memory and processing power, which can lead to slower performance or even simulation failure if the system cannot handle the larger state space.

Similarly, varying the number of shots, which refers to the number of repetitions of each circuit, also impacts the results. Increasing the number of shots improves the accuracy of the measurements because it provides a better sampling of the quantum state. However, more shots also mean higher computational demand, as the circuit is executed multiple times, consuming more time and resources.

While a larger number of shots leads to better accuracy, it also makes the simulation slower. Thus, there is a trade-off between having enough shots to ensure accurate results and maintaining an efficient simulation process. It's important to find a balance that allows for reliable results without excessive delays.

In conclusion, increasing the number of qubits or shots results in higher accuracy but requires more computational resources. The time for the experiment grows exponentially as the number of qubits increases, reflecting the increased complexity. By varying the number of qubits and shots, we can better understand the balance between computational resources, accuracy, and efficiency in quantum simulations.