

QSim Quantum Computer Simulator Toolki

By IASToppers | 2021-08-28 17:40:00



QSim – Quantum Computer Simulator Toolkit

Ministry of Electronics & Information Technology has **launched QSim** – Quantum Computer Simulator Toolkit.

IT IAS Toppers



[Ref- Pib]

<u> Aim:</u>

• To enable Researchers and Students to carryout research in Quantum Computing.

<u>All about Qsim:</u>

- It allows researchers and students to write and **debug Quantum Code** that is essential for developing Quantum Algorithms.
- It allows researchers to **explore Quantum Algorithms** under idealized conditions and help prepare experiments to run on actual Quantum Hardware.

Features:

- Intuitive UI: QSim offers a robust QC Simulator integrated with a GUI based workbench allowing students / researchers to create Quantum programs, visualize the instant circuit generation and simulated outputs.
- Simulate noisy Quantum logic circuits: Helps simulate Quantum circuits with and without noise



and test how well various algorithms work with imperfect quantum components.

- **Pre-loaded Quantum algorithms and Examples**: QSim comes loaded with Quantum programs and algorithms providing a head start to the users.
- **Integrated with HPC:** The quantum simulations are performed on powerful HPC resources allowing multiple users to submit jobs simultaneously with different QuBit configurations.

<u>QSim - Offering Models:</u>

- PARAM SHAVAK QSim Standalone system with Quantum Simulator in a box.
- PARAM QSim Cloud Available on cloud using HPC infrastructure PARAM SIDDHI AI.

Importance:

- Can serve as an important educational / research tool providing an excellent way to attract students / researchers to the field of Quantum Technology.
- Provides a platform to acquire the skills of '**programming**' as well as '**designing**' real Quantum Hardware.

Quantum computing:

- Quantum computing is an area of computing focused on developing computer technology based on the principles of quantum theory (which explains the behavior of energy and material on the atomic and subatomic levels).
- The devices that perform quantum computations are known as quantum computers.

Applications:

- Cybersecurity
- Drug Development
- Financial Modelling
- Better Batteries
- Cleaner Fertilization
- Traffic Optimization
- Weather Forecasting and Climate Change
- Artificial Intelligence
- Solar Capture

Obstacles:

There are several technical challenges in building a large-scale quantum computer.

- · Physically scalable to increase the number of qubits
- Qubits that can be initialized to arbitrary values
- Quantum gates that are faster than decoherence time
- Universal gate set
- · Qubits that can be read easily

