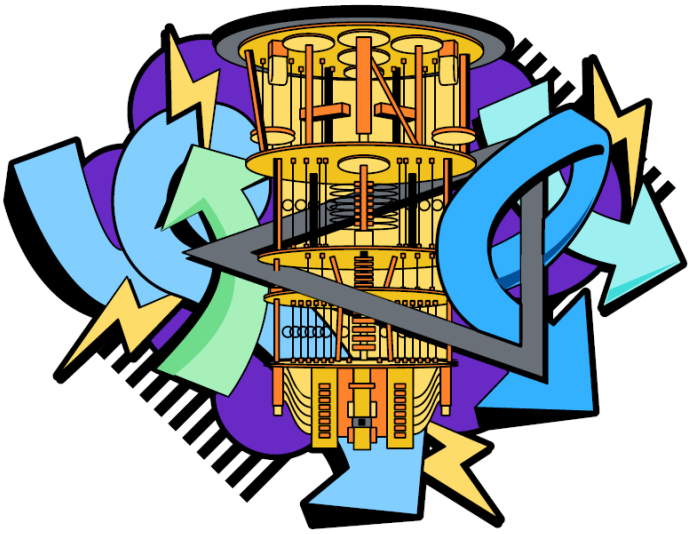
qBITS

# Quest
# qHackathon

Qiskit | Fall Fest

Hello and welcome to Quest, the BITS Goa chapter of Qiskit Fall Fest! This is the hackathon problem statement, so read the document carefully. Best of luck, and have fun!



## Problem Statement

**Make a Quantum Simulator!**

If you have ever coded in Qiskit before, you know how useful quantum circuit simulators can be to test out your code as a proof of concept, or debugging before you run it on an actual quantum computer. For qHackathon, Quest '22, we want you to make a basic implementation of a quantum simulator.

More specifically, your quantum simulator should be able to perform the following tasks -

1. Initialize: Initialize a quantum system in a specific state. This initialization can be as simple as just storing the initial probability amplitudes of the quantum state.
2. Evolve: Apply an operator to the circuit (Hint: Find the corresponding matrix representation of the operator)
3. Measure: On measurement of any given quantum state, your quantum simulator should reproduce the results of the corresponding ideal quantum measurement. For this, you should look into implementing weighted random functions (Reference: weighted random choice in Python) in your code to simulate probability amplitudes of a quantum state.

Note -

1. You can use any language to implement the simulator.
2. You may use libraries to assist in mathematical functions - but within reason (eg. don't import Qiskit in your simulator)!

## Instructions

1. The deadline for the qHackathon is 11:59 P.M. IST on Saturday, 26 November 2022.
2. Teams can comprise 1-2 members.
3. You may use the WhatsApp group for team formation and to clear doubts.
4. To make a submission, upload all your code and material to a **public** GitHub repository, and share the link on this Google form. Only one submission per team is needed.
5. Make sure your GitHub repository has a README file with instructions on how to use your code. Your submission will only be evaluated if the instructions are clear.
6. Plagiarism will not be tolerated, and any similarity between codes of two or more teams will result in disqualification of all teams involved. If you are using any resources/papers, make sure to give due credit by including a references section.
7. Any tie-breaks will be resolved based on the discretion of the organizers.

## Winners

1. Every team that makes a submission will receive a certificate from qBITS and Qiskit.
2. The top team will receive a swag pack with goodies from Qiskit and IBM Quantum.
3. The top three teams will get a special advantage during qBITS inductions.

## Code of Conduct

All participants of Quest must abide by the Qiskit code of conduct, failing which any submission will be removed from consideration, and further participation in the fest will be banned.