Technical Tutorial

Quantum Computing with the Low-level Strange API

Strange is a quantum computing platform for Java.

Prerequisites: JDK 21 and Java experience. Familiarity with QC concepts is preferable.

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Use the Strange Low-level API to Create a Random Bit

1. Create a variable using the QuantumExecutionEnvironment interface and assigning that variable an object from the concrete class: SimpleQuantumExecutionEnvironment (using the default, no-arg constructor).

2. Create a Program object by passing 1 (one qubit) to the constructor.
3. Create a new Step using the default, no-arg constructor.
4. Call the step's addGate method, passing a new Hadamard object created with a constructor argument of 0 (it will use qubit 0 – the only one we have; qubits are assigned a default value of zero upon creation).
5. Call the Program object's addStep method with an argument of the step you created above.

6. The object that you created at the top (Step 1.) has a runProgram method. Call it passing the Program object as the argument. It will return a Result object, so create an object to hold that result.

7. Using the Result object, call the getQubits() method, which will return an array of Qubit objects (the array size here will be one).
8. Using the first element of the array, call its measure() method which returns an integer. This is our truly random bit.
9. Display the bit's value.

Tip: If you are using eclipse, you can use Ctrl-space as you are typing to ask eclipse to find all matching class names. Alternatively, you can use "organize imports" (Ctrl-Shift O) to find the proper Strange classes to use as you are writing your code.