



# Quantum Coding Course

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[www.quantumatlas.ir](http://www.quantumatlas.ir)




QuantumSTEM

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# About us

**Quantum Atlas** is an educational group which aims to educate people in various fields of quantum, from hardware to software and quantum machine learning.

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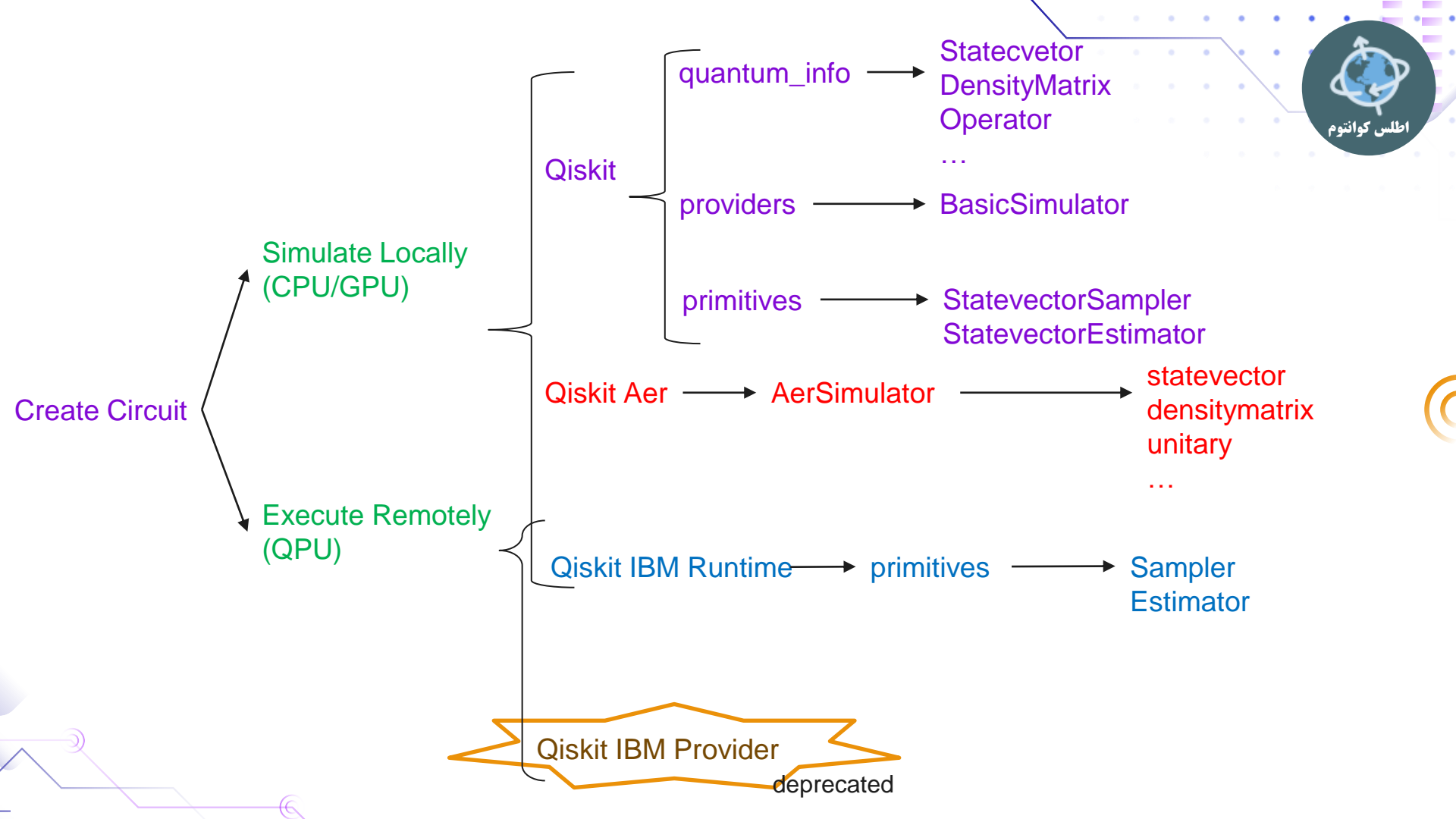




# Syllabus

Section 1	Lecture 1	Quantum Computation and Information (Theoretical lecture) – By Y. Mafi
	Lecture 2	Quantum Circuits (Coding lecture) – By A. Kookani
Section 2	Lecture 3	Quantum Simulation (Coding lecture) – By A. Kookani
	Lecture 4	IBMQ and Error Correction (Implementation and Theoretical lecture) – By Y. Mafi
Section 3	Lecture 5	Quantum Algorithm (Theoretical lecture) – By Y. Mafi
	Lecture 6	Quantum Algorithm Simulation (Coding lecture) – By A. Kookani





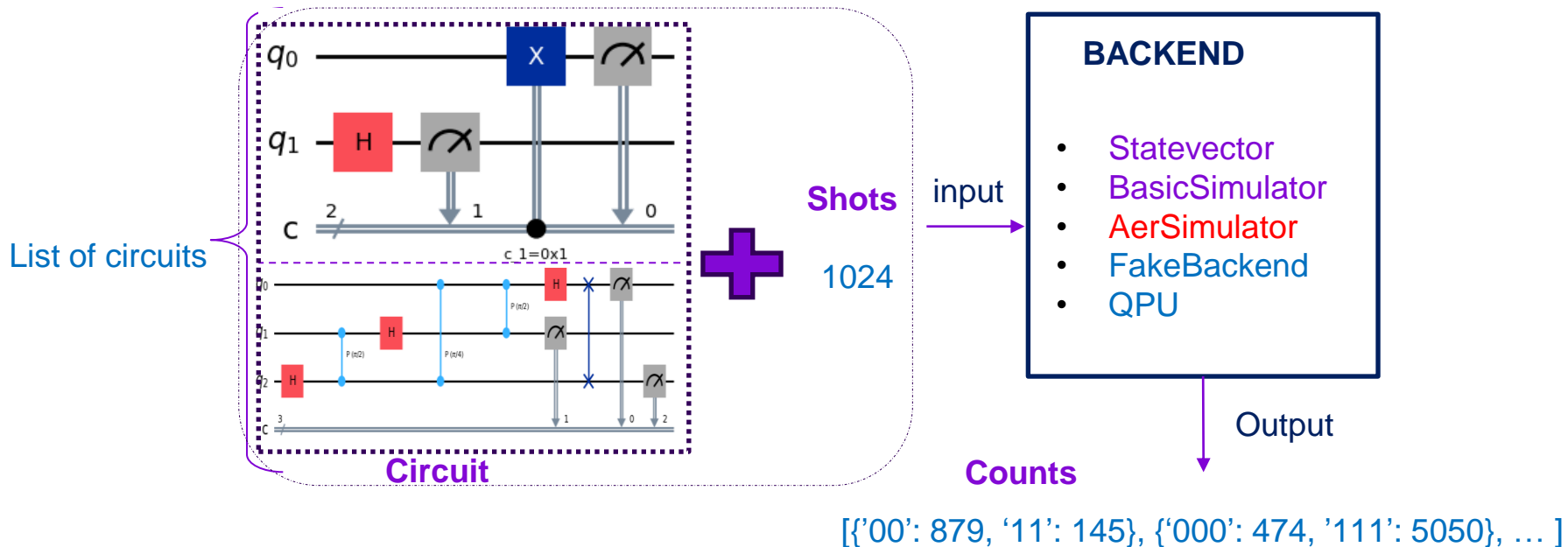


# Primitives

The smallest processing instruction for a given abstraction level.

# Running on Backends

- Provide circuit(s) + number of shots
- Run specified backend
- Get counts for each circuit



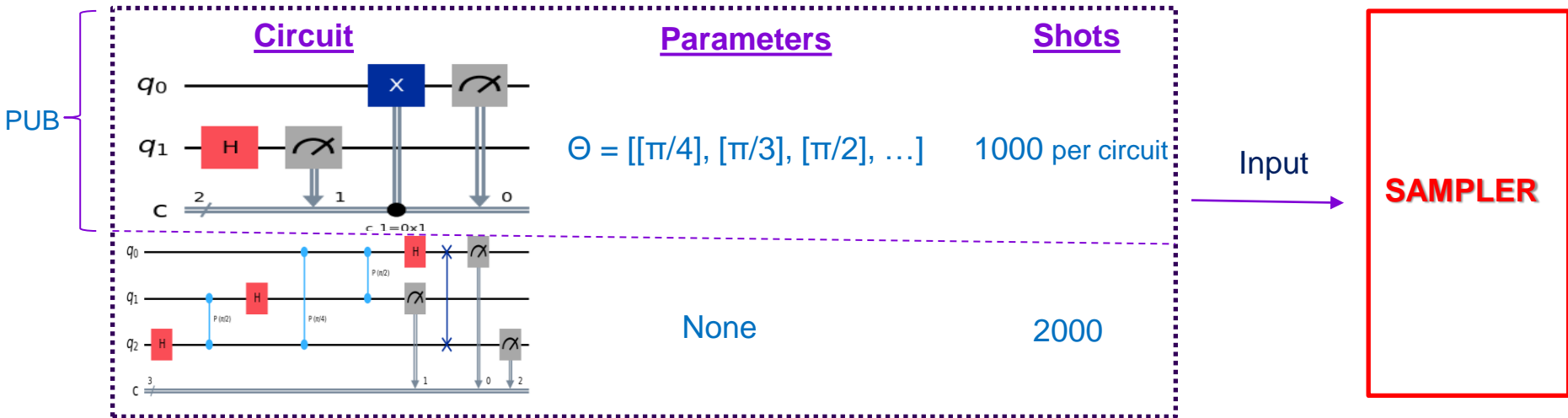


# Sampler

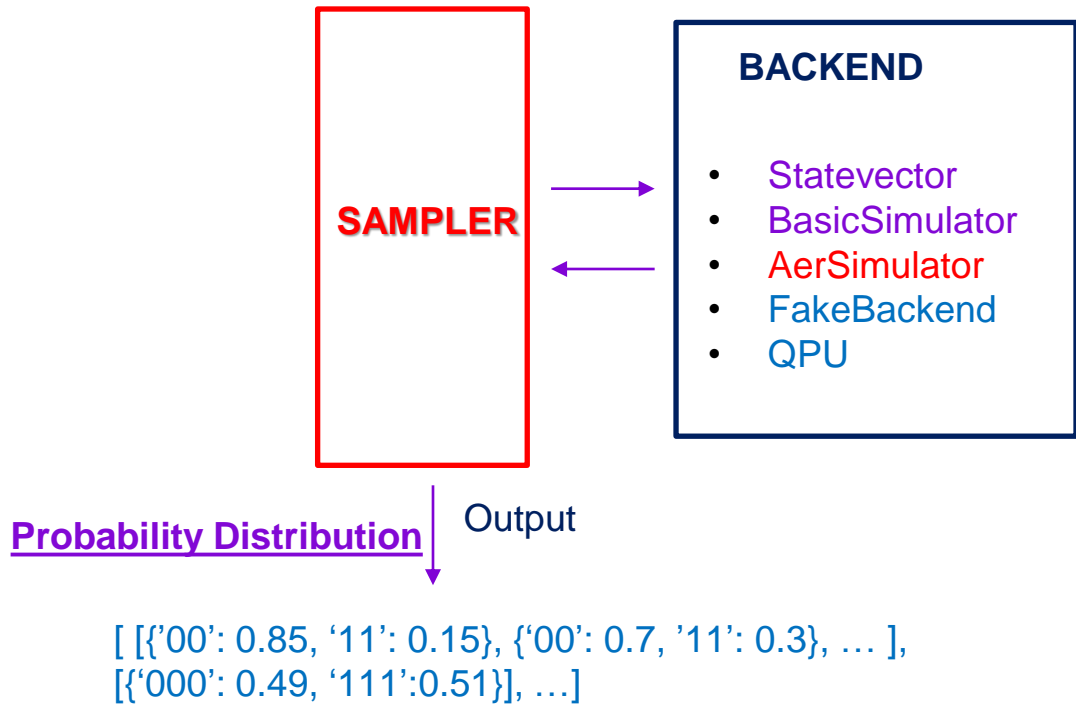
Returns shot by shot bit strings sampled from the probability distribution of the quantum state prepared on the device.

# Primitives

- Basic functional block to run slightly higher-level quantum programs
- Return more than just “counts” at the output
  - Sampler:** Samples output state of a circuit (e.g. a probability distribution)









# Estimators

Computes expectation values of observables with the respective states prepared by quantum circuits.

# Primitives

- Basic functional block to run slightly higher-level quantum programs
- Return more than just “counts” at the output
  - Estimator:** Estimates expectation value of state with respect to observables

