Q-Team

BY YOUR SIDE IN A QUANTUM WORLD

Simulating quantum algorithms with Q-Team

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Keywords: Quantum Computing, Quantum Computing, Quantum information theory, Quantum Team, Q-Team

General objective:

A brief description of what is quantum computing, why is necessary and which kind of problems can solve, how to make a transition from classic computing to the quantum computing using the Q-team simulator.

Identify the Q-team elements that aims to develop quantum algorithms across the graphic and programing environment, how to document the algorithms and results export.

The results can be sent to be reviewed to the next mail David.banuelos@q-team.mx.

You will Learn These Core Skills:

- Identifies the basic aspects that led to seeking a transition from classical computing to quantum computing.
- Acquire the basic knowledge to operate with the mathematical principles of the quantum gates.
- Develop of quantum algorithms using quantum gates.
- Identify tools to simulate quantum algorithms.
- Operate the quantum algorithms simulator Q-Team.

Who can take this course:

- Mechatronics, Electronics, IT, and related careers students.
- Mechatronics, Electronics, IT, and related master's degree students.

Technical requirements: a laptop with the next resources

- Processor: Core i3 (similar or higher).
- RAM: 8GB (or higher).
- Hard disk: at least 50 GB free.
- Web browser: Firefox or Chromium based (Chrome, Edge, Brave, etc.).

Prior knowledge:

- Linear algebra.
- Combinational logic.

Previous editions:

- Global opportunities consulting.
- CADS (Centro de Análisis de Datos y Supercómputo).

Number of attendees: 10-20

Duration: 4 hours.

About our instructor:

José David Bañuelos Aquino is a mechatronic engineer with a master's degree in IT who has worked in the industry as an Applications engineer Sr., analyst of new technological trends, SAM solutions architect and currently as a software asset manager, likewise, academically work in the research line of quantum computing with focus on the development of quantum logical reasoning algorithms.

Module	Topics	Learning objetives	Teach method	Duration
1. What a hell is quantum computing?	1.1 High performance computing, cloud, and data centers. 1.2 The computer. 1.3 The microprocessor. 1.4 The Arithmetic logic unit (ALU). 1.5 Logic gates. 1.6 Transistors and miniaturization. 1.7 Quantum physics 1.8 Quantum information theory. 1.9 Qubit. 1.10 Qubit from superconductors. 1.11 Quantum gates. 1.12 Quantum processors. 1.13 Quantum simulators. 1.14 Q-Team.	Understand the classic computing limits. Understand the quantum computing parading and the physics principles that use. Understand how is composed a quantum computer and how it works. Understand what a qubit is and how to modify its basis state using quantum gates. Understand What a quantum simulator is and the Q-Team differentiators.	The instructor will develop the topics contained in the presentation, seeking at certain moments the Socratic method, to achieve the learning objectives.	2 Hours
2. Simulating quantum algorithms with Q-Team	2.1 Qubit 2.2 Quantum Gates. 2.3 Pauli X. 2.4 Pauli Y. 2.5 Pauli Z. 2.6 Hadamard. 2.7 Phase shift. 2.8 Controlled gates. 2.9 Quantum circuits. 2.10 Quantum computing from classical computing. 2.11 Most Common Algorithms.	Show to the students how to operate the quantum algorithms simulator algorithms using the graphic and programing environments. Show to the students how to operate the fundamentals quantum gates. Show to the students some of the most common quantum algorithms. Show to the students how to develop quantum algorithms and its implementation from combinational logic circuits and mathematical definitions.	The instructor will develop the topics and the activities together with the students, The students will develop some algorithms by its self's and present results.	2 Hours