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Updated 05/07/2024

Sign up

Introduction to Quantum Programming

2 days (14 hours)

Presentation

Quantum computer performance could well surpass that of conventional computers. Quantum programming could revolutionize computing in terms of speed and efficiency. This computing power will enable advances in biology, healthcare and energy.

By embracing quantum programming, you can stay ahead of your competitors and gain a clear competitive edge. The best-known use cases for quantum development are :

- Cyber security
- Drug manufacturing
- Financial modeling
- Artificial intelligence
- Meteorology

There are already a dozen suppliers of quantum computers. The best-known are Micosoft Quantum Computing, IBM Quantum Computing and Google Research.

Our quantum programming course will introduce you to the fundamental concepts of quantum computing, introduce you to emerging quantum languages and help you develop your own algorithms using Qiskit.

Objectives

- Understand the basic principles of quantum computing
- Learn about the various applications of quantum programming
- Understanding the different quantum languages
- Developing quantum algorithms with Qiskit languages

Target audience

- Developers
- Researchers
- Engineers

Prerequisites

- Knowledge of mathematics (probability, statistics and linear algebra)
- Knowledge of Python

Further information

If you want to master a quantum programming language, we recommend our Q# training course.

Quantum programming training program

INTRODUCTION

- A simple explanation of how a quantum computer works
- A reminder of linear algebra and complex numbers
- The mathematical concepts of quantum computing
- Installing Qiskit

Practical applications of quantum programming

- Prediction thanks to artificial intelligence
- Cryptography
- Data search
- Financial and technical optimization algorithms

Quantum architecture overview

- The Quantum Gates
- Quantum circuits
- D-Wave architecture overview

MATHEMATICAL MODELS FOR QUANTUM COMPUTING

- Bits, Pbits, Qubit
- The Qubit measurement.
- Multiqubit systems

- Qubit life cycle

Overview and COMPARISON OF QUANTIC LANGUAGES

- Q Language - an extension of the C++ language
- QFC (graphical syntax) and QPL (textual syntax)
- QML, interface description language
- qGCL from Newcastle University
- Scaffold from Princeton University
- Silq - the first high-level intuitive language, created by ETH Zurich

QUANTUM ALGORITHMS AND QISKIT MODULES

- Quantum simulators
- Sub-systems and properties
- Basics of quantum computing
- Quantum parallelism
- How do you create and apply quantum computing algorithms?
- Creating a neural network algorithm
- Create a classification algorithm
- Quantum data processing

Companies concerned

This training course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as registration is finalized, the learner receives a self-assessment questionnaire which enables us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and personal objectives for the training to come, within the limits imposed by the selected format. This questionnaire also enables us to anticipate any connection or security difficulties within the company (intra-company or virtual classroom) which could be problematic for the follow-up and smooth running of the training session.

Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

Sanction

A certificate will be issued to each trainee who completes the course.