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Objectives

Abstract: The advances in quantum hardware with functional quantum processors integrating tens of noisy qubits, together with the availability of near-term quantum algorithms have allowed the development of the so-called full-stacks that bridge quantum applications with quantum devices. In this talk, we will provide an overview of the different layers of the quantum computing full-stack, with emphasis on the software ones that include the compilation of quantum algorithms. We will then discuss the need for optimal physical-aware and algorithm-driven compilation techniques in the midst of the NISQ (Noisy Intermediate-scale quantum) era. We will also focus on key principles for architecting quantum computers such as codesign, optimization and benchmarking and illustrate how the use of structured design space exploration methodologies could help towards the development of a cross-layer codesign framework for full-stack quantum computing systems. Finally, we will talk about the scalability of quantum computing systems, which is one of the main challenges the quantum computing community is currently facing.

Short bio: Carmen G. Almudever holds a P.hD. in

Electronic Engineering from the Technical University of Catalunya (UPC BarcelonaTech), Spain. In 2012, she received a fellowship from Intel (Doctoral Student Honor Program). In February 2021, she joined the Computer Engineering department of the Technical University of Valencia (UPV, Spain) as a distinguished researcher under the Beatriz Galindo program for attracting talented researchers. Before, from 2014 to beginning 2021, she was an Assistant Professor at the Quantum and Computer Engineering Department and group leader of the Quantum Computing division of QuTech at Delft University of Technology, where she worked on the definition and implementation of a scalable quantum computer architecture. She was one of the PI's of the 10-year Intel-QuTech collaboration on quantum computing. Her research focuses on different aspects of the quantum computing full-stack including quantum programming languages and compilers, quantum error correction, fault-tolerant quantum computation, mapping of quantum algorithms and benchmarking and sclalability of quantum computers.

Speakers

Speaker: Carmen G. Almudever, Distinguished Researcher at Technical University of Valencia
Host: Alba Cervera, Quantic Senior Research Engineer, CASE, BSC

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