EVEREST

DESIGN ENVIRONMENT
FOR EXTREME-SCALE BIG DATA ANALYTICS
ON HETEROGENEOUS PLATFORMS

Project EVEREST is developing a design environment for FPGA-based platforms

There is a new consortium in Europe, which cooperates on the development of a design environment to simplify the implementation of Big Data applications on FPGA-based platforms. The international project EVEREST coordinated by IBM Research Europe - Switzerland and the Politecnico Di Milano is funded by the Horizon 2020 Programme for research and innovation action.

The European data market is showing a significant boost in recent years. Data processing has a profound impact on the industry, society and the environment. The EVEREST project gathers scientists and IT experts, and their common goal is to develop a holistic approach for co-designing computation and communication in a heterogeneous, distributed, scalable, and secure system for High-Performance Big Data Analytics (HPDA) applications on heterogeneous, FPGA-based platforms. While these systems can improve energy efficiency and performance, fixed-function accelerators introduce programmability and scalability issues. The resulting big data computing systems must not only efficiently manage, elaborate, and move the data under security and privacy constraints, but also demand powerful and easy-to-use design environments to express functional and non-functional requirements.

EVEREST will simplify architectures' programmability through a "data-driven" design approach, the use of hardware-accelerated AI, and efficient monitoring of the execution. *"Novel applications like Artificial Intelligence are promoting a resurgence of research in computer architecture, especially with the combination of general-purpose processors and specialized hardware. The programmability of such heterogeneous architectures is an unsolved problem. With this framework, application developers and architecture designers can sit at the same table and efficiently co-optimize systems and applications,"* explain Christoph Hagleitner from IBM Research Europe - Switzerland and Christian Pilato from Politecnico di Milano.

To validate the approach, a project team will cooperate with industrial partners who prepare three scenarios for business applications. The market for energy trading could benefit from a weather analysis-based prediction model. Thanks to this model, the production, utilization and commercialization of energy become foreseeable. Air-quality monitoring of industrial sites will help to forecast the environmental impacts of chemical pollutants and it will enable sites to delay their production or activate emission reduction treatments. Real-time traffic modelling framework for intelligent transportation in smart cities will reduce congestions in the traffic infrastructure thanks to traffic simulator, traffic prediction models and smart routing methods.

The three-year long project was launched on October 1, 2020. The initial focus of the project was to define and elaborate the requirements for the design environment posed by the three use cases, a process supported by two online technical meetings of the project partners. The project and the initial results have also been presented to the research community at conferences and workshops including DATE 2021, LATTE 2021, and MECO 2021. The project brings together a total of 10 partners from six European countries (Switzerland, Italy, Germany, France, Czech Republic and Slovakia), including research institutions and private companies, with IBM Research Europe - Switzerland acting as the project coordinator. The overall budget of the EVEREST project is EUR 5 037 372.50. For more information, see https://everest-h2020.eu

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