DECICE

Device-Edge-Cloud Intelligent Collaboration Framework

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in **DECICE Project**

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RELEVANCE **& IMPACT**

The cloud computing industry has grown massively over the last decade and with that new areas of application have arisen. User requirements such as ultra-low latency, security and location awareness (e.g., *Smart Cities*) are becoming more common. Modern cloud applications have also become more complex and need to be placed in locations close to the user. Unifying diverse systems into centrally controlled compute clusters and providing sophisticated scheduling decisions across them are two major challenges in this field.

DECICE aims to develop an **open and portable cloud management framework** for automatic and adaptive optimization of applications by mapping jobs to the most suitable resources in a heterogeneous system landscape, including computing from the very large (e.g., HPC) systems to the very small (e.g., IoT sensors connected on the edge). By utilizing holistic monitoring, the project constructs a *Digital Twin* of the system that reflects on the original system. An *AI-Scheduler* makes decisions on placement of job and data as well as conducting job rescheduling to adjust to system changes. A virtual training environment is provided that generates test data for training of ML-models and the exploration of what-if scenarios. The portable framework is integrated into the *Kubernetes* ecosystem and validated using relevant use-cases (smart traffic control, digital healthcare, and intelligent emergency response) on real-world heterogeneous systems.

PROJECT **OBJECTIVES**

LEVERAGE A COMPUTE CONTINUUM ranging from Cloud and HPC to Edge and IoT.

AI-SCHEDULER supporting dynamic load balancing for energy efficient compute orchestration, improved use of Green Energy, and automated deployment.

API that increases control over network, computing and data resources.

DYNAMIC DIGITAL TWIN of the system with AI-based prediction capabilities.

REAL-LIFE USE CASES of DECICE framework (usability and benefits).

SERVICE DEPLOYMENT with a high level of trustworthiness and compliance with relevant security frameworks.

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PROJECT FACTS

Duration
11/2022 to 10/2025

Programme
Horizon Europe

Reference
101092582

Coordinator
Georg-August-Universität Göttingen

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GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

GWDG Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen

E4 COMPUTER ENGINEERING

KTH VETENSKAP OCH KONST

HLRS High-Performance Computing Center Stuttgart

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