ICOS: Towards a functional continuum operating system

Description

The unstoppable proliferation of novel computing and sensing device technologies, and the ever-growing demand for data-intensive applications in the edge and cloud, are driving a paradigm shift in computing around the dynamic, intelligent and yet seamless interconnection of IoT, edge and cloud resources in one single computing system to form a continuum. Many research initiatives have focused on deploying a management plane intended to manage the continuum properly. Simultaneously, several solutions exist aimed at managing edge and cloud systems by not suitably addressing the whole continuum challenges.

The next step is, without a doubt, the design of an extended, open, secure, trustable, adaptable, technology agnostic and much more complete management strategy, covering the entire continuum, i.e. IoT-to-edge-to-cloud, with a clear focus on the network connecting the whole stack, leveraging off-the-shell technologies (e.g., AI, data, etc.), but also open to accommodate novel services as technology progress goes on.

The ICOS project aims to cover the challenges coming up when addressing this continuum paradigm, proposing an approach embedding a well-defined set of functionalities, ending up in the definition of an IoT2cloud Operating System (ICOS). Indeed, the main objective of the project ICOS is to design, develop and validate a meta operating system for a continuum by addressing the challenges of

i) devices volatility and heterogeneity, continuum infrastructure virtualization and diverse network connectivity;

ii) optimized and scalable service execution and performance, as well as resources consumptions, including power consumption;

iii) guaranteed trust, security and privacy, and;

iv) reduction of integration costs and effective mitigation of cloud provider lock-in effects in a data-driven system built upon openness, adaptability, data sharing and a future edge market scenario for services and data.

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