Academic Resources

Papers referencing EdgeX Foundry

An IoT Edge-as-a-service (Eaas) Distributed Architecture & Reference Implementation Odysseas Lamtzidis October 2019

Internet of Things (IoT) is an enabling technology for numerous domains worldwide, such as smart cities, manufacturing, logistics and critical infrastructure. On top of Internet of Things, the architectural paradigm shifts from cloud-centric to Edge-centric, offloading more and more functionality from the cloud to the Edge devices. Edge computing devices are transformed from simply aggregating data to performing data processing and decision making, accelerating the decentralization of the IoT domain. Given the considerable increase of the number of IoT devices and the size of the generated data, an increase of Edge devices with augmented functionality is expected. We propose an "Edge as a service" scheme, where Edge devices will be able to procure unused resources and run services that are requested and consumed by IoT devices that belong to different stakeholders. In this work, we outline a high-level architecture of this scheme and give a reference implementation of a narrow part of the system, boasting high modularity and the extensive use of Open Source Technologies.

Fog Computing Architectures: a Reference for Practitioners Mattia Antonini, Massimo Vecchio, and Fabio Antonelli

September 2019

Soon after realizing that Cloud Computing could indeed help several industries overcome classical product-centric approaches in favor of more affordable service-oriented business models, we are witnessing the rise of a new disruptive computing paradigm, namely Fog Computing. Essentially, Fog Computing can be considered as an evolution of Cloud Computing, in the sense that the former extends the latter to the edge of the network (that is, where the connected devices –the things– are) without discontinuity, realizing the so-called "cloud-tothing continuum". Since its infancy, Fog Computing has been considered as a necessity within several Internet of Things (IoT) domains (one for all: Industrial IoT) and, more generally, wherever embedded artificial intelligence and/or more advanced distributed capabilities were required. Fog Computing cannot be considered only a fancy buzzword: according to separate, authoritative analyses its global market will reach \$18 billion by 2022, while nearly 45% of the world's data will be moved to the network edge by 2025. In this paper, we take stock of the situation, summarizing the most modern and mature Fog Computing initiatives from standardization, commercial, and open-source communities perspectives.

A Comparative Research on Open Source Edge Computing Systems Liang, Jiayue & Liu, Fang & Li, Shen & Cai, Zhenhua July 2019

With the development of edge computing, open source communities have put forward several edge computing systems. This paper discussed about edge computing and its current situation, then presented typical open source edge computing systems such as EdgeX Foundry, Azure IoT Edge, CORD, Apache Edgent and Akraino Edge Stack, and gave a comparison about them on their characteristics. A comparison study on their characteristics were given to help users to understand these open source edge computing systems and make choices.

Open Source Software solutions implementing a reference IoT architecture from the Things and Edge to the Cloud Christos Tranoris May 2018

This report is a current snapshot of available platforms, efforts and solutions based purely on Open Source Software that can be used to deploy an end-to-end IoT solution covering the three tiers of "Things", the Edge and the Cloud. While there is a wide literature, technologies and market analysis available surveying IoT, the Edge and Cloud separately or combined, this work focuses on how OSS can be delivered to provide complete solutions and identify missing gaps and potential opportunities. To accomplish this, we define a high level architectural pattern and process, which tries to capture all the core functionalities of IoT solutions. This reference architecture is defined after analyzing several architectural IoT solutions and processes. Then we survey OSS examining features, maturity, community support, licensing models etc. by mapping OSS platforms and components that can implement all the parts and processes of this reference architecture.