

Stack4Things as a fog computing platform for Smart City applications

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Abstract

© 2016 IEEE. Fog computing envisions computation logic to be moved at the edge of the Internet where data needs to be quickly elaborated, decisions made, and actions performed. Delegating to the Cloud the whole burden of applications could not be efficient indeed, for example in case of workload bursts. This is especially true in the context of IoT and Smart City where thousands of smart objects, vehicles, mobiles, people interact to provide innovative services. We thus designed Stack4Things as an OpenStack-based framework spanning the Infrastructure-as-a-Service and Platform-as-a-Service layers. It enables developers and users to manage an IoT infrastructure, remotely controlling nodes as well as virtualizing their functions and creating network overlays among them, implementing a provisioning model for Cyber-Physical Systems. Moreover, it provides mechanisms to scatter the application logic on top of the involved smart objects and to choose with fine granularity which specific tasks to delegate to centralized Cloud infrastructure. In this paper, we show the core Stack4Things mechanisms implementing a Fog computing approach towards a run-time 'rewireable' Smart City paradigm. We demonstrate its effectiveness in a smart mobility scenario where vehicles interact with City-level smart objects to provide end users with highly responsive geolocalised services.

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Keywords

AllJoyn, code injection, fog computing, function virtualization, OpenStack, plugin-based development, Stack4Things