Chapter 6

Internet of Things Resources Interaction for Service Construction and Delivery

ABSTRACT

Semantic interaction support for internet of things (IoT) resources is a key point of the service construction and delivery for the users. Semantic interoperability between interacted resources provides possibilities for them to understand each other. One of the possible approaches to enrich the semantic interoperability is the ontology modeling. Every resource is described by an ontology. The ontology formally represents knowledge as a set of concepts within a domain, using a shared vocabulary to denote the types, properties, and interrelationships of those concepts. Based on the ontology matching techniques, resource ontologies are matched, and resources operate in accordance with this matching. Context is any information that can be used to characterize the situation of an entity. An entity in the considered case is the resource of IoT environment. It is proposed to use the ontologies to describe the context of resource and take this information for task performing. For the service construction, the coalitions of IoT resources that can jointly provide the needed service for a task performing need to be created.
INTRODUCTION

Interaction of IoT resources is the important task for the joint service construction and delivery. Different resources should “understand” each other to perform task together that requires the interoperability support between them. The chapter considers different levels of interoperability, discuss the context model creation for the resource, and presents an approach to coalition creation of IoT resources for joint service construction.

There are following levels of interoperability between software resources are distinguished (see Kubicek, Cimander, & Scholl, 2011; Kubicek & Cimander, 2009): technical level, syntactic level, level of semantic interoperability, and level of organizational interoperability (or interoperability of business processes). The technical layer provides connection information transfer between software components (interfaces, communication protocols and the infrastructure necessary for the operation of these protocols). The syntactic layer includes data transfer formats from one program component to another. The semantic level provides an understanding of the meaning of the information exchanged between software components. The organizational level provides an understanding of the business processes arising from the interaction of software components. The first two levels are related to the technical equipment and the basic software of the interacting components, while the third level is the basic one when they interact to harmonize the behavior of the components. The fourth level allows the software components to reconcile business processes between them when performing joint tasks. The third level is the base for support “understanding” of each other by IoT resources. In this regard, this chapter focuses on ensuring the semantic interoperability of IoT resources, which will allow the formation of coalitions for the joint task performing by different IoT resources. The second aspect for coalition creation is the context modelling. The task that should be performed has to be modelled as soon as current situation that is related to this task. Therefore, authors propose to use the context management technology for the context modelling and utilization. In scope of the chapter it is proposed to use ontologies to ensure the semantic interoperability between Internet of Things resources. The ontology formally represents knowledge as a set of concepts within a domain, using a shared vocabulary to denote the types, properties, and interrelationships of those concepts. Ontology management
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