Chapter 14
Model of Interoperable E-Business in Traffic Sector based on Cloud Computing Concepts

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ABSTRACT

This chapter analyzes the possibilities of applying the cloud concepts in the realization of the interoperable electronic business of traffic and transport subjects. Special attention is paid to defining the Business-to-Business (B2B) model of integrating the traffic business subjects in cloud computing technological environment. It describes the design, implementation, and application of the cloud concepts on the examples of B2B integration in the field of traffic. The examples demonstrate the usage of Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) by traffic business subjects in the Republic of Serbia. The examples of PaaS are the databases created and hosted on Microsoft SQL Azure platform. The examples of SaaS are Web services hosted on Microsoft Windows Azure platform. The defined model of B2B integration allows interoperability of the traffic business subjects on the syntactic, conceptual, and semantic level.

INTRODUCTION

The notion of interoperability, in general, refers to the possibility of two systems to exchange information, as well as to make use of the exchanged information. The interoperability is not a product; it is a property of a system (Janković, 2010). In the context of business systems and applications the interoperability has been defined as the capability of a system or a product to work seamlessly with other system or product not requiring any special efforts by the customer or user (Naudet, Latour,

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Guedria, & Chen, 2010). The applications that have been developed independently (at a different time, by different teams, using different technologies) even within the same enterprise experience problems in exchanging data (Janković et al., 2011). The problem is of the same nature, but significantly magnified, when interoperability of e-business of several different organizations needs to be realized (Mladenović & Janković, 2011; Sehgal, Erdelyi, Merzky, & Jha, 2011).

Traffic and transport systems are heterogeneous systems which share information in their operation. Therefore, it is necessary to achieve the interoperability of their information systems (Janković, Mladenović, Radonjić, Kostić-Ljubisavljević, & Uzelac, 2011). The subject of research in this chapter is the definition of the model of interoperable electronic business of traffic business systems. The model has been based on the combination of the known methods of Business-to-Business (B2B) integration: integration of information, integration on the basis of services and portal integration (Radonjic, Jankovic, Mladenovic, Veskovic, & Kostic-Ljubisavljevic, 2011). The methods of B2B integration have been implemented within the cloud computing technological environment. A case study has been done as part of this chapter using as example organizations from the domain of traffic safety in the Republic of Serbia. A solution has been developed as the result of the case study, on Microsoft Windows Azure platform (Jennings, 2009; Li, 2010), which allows B2B integration of three traffic business subjects.

The following sections present the structure of the model of interoperable electronic business and the scenarios of B2B integration based on the proposed model. The implementation of the B2B integration methods based on the use of the cloud computing concepts has been described. The chapter is concluded with the analysis of the proposed model.

BACKGROUND

Traffic and transport systems are the very complex systems, so they are organizationally divided into a great number of units, such as directorates, sectors, services, etc. (Lee, Tseng, & Shieh, 2010). Each organizational unit uses applications and databases designed to meet their specific needs. It is not uncommon that one particular entity from the real system is modelled in multiple databases that are used in different organizational units (Radonjic, Jankovic, Mladenovic, Veskovic, & Kostic-Ljubisavljevic, 2011). An organizational unit of one transport systems often use the data generated and updated by another organizational unit. On the railways, for example, work of the Sector for transportation of goods and passengers is based on the data given by the Directorate of Infrastructure (data on construction, electrotechnical, telecommunication and transport infrastructure and its maintenance), the Department for maintenance of rolling stock and the Department for towing trains (Janković & Mladenović, 2012). In addition, each unit uses its own databases and applications. This creates redundancy and inconsistency of data. This means that cooperation between organizations and/or organizational units are often based on reports that have different syntax and semantics. To avoid redundancy and inconsistency of data and to avoid incompatible reports, it is necessary to enable the B2B integration of organizations and different organizational units of one traffic and transport system.

In defining the legal and institutional frames of integration, two basic types of B2B integrations are distinguished:

- **Horizontal B2B Integrations:**
  Integrations of entities which consider the common domain with approximately equal level of abstraction.