Chapter 11
Software as a Service, Semantic Web, and Big Data:
Theories and Applications

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ABSTRACT

This chapter explains the overview of software as a service (SaaS); SaaS and application service provision (ASP); the security concern of SaaS; the perspectives on SaaS adoption; the challenges of SaaS in the digital age; the overview of the Semantic Web; the current trends in the Semantic Web services; the overview of Big Data; the concept of Big Data analytics; and the prospects of Big Data in the digital age. SaaS offers a wide range of business applications through the cloud computing service providers toward enhancing organizational performance. The Semantic Web extends beyond the capabilities of the current Web 2.0, thus enabling more effective collaborations and smarter decision making in modern operations. Big Data from the cloud computing platforms provides the significant advantage, if the essential data sources are hosted by the same SaaS and enhanced by the Semantic Web technologies.

INTRODUCTION

Software as a service (SaaS) represents a radical shift in how software is created, delivered, and purchased (Savelyev, 2014). SaaS refers to an on-demand software delivery service model (Marston, Li, Bandyopadhyay, Zhang & Ghalsasi, 2011), which is part of the cloud computing phenomenon. Cloud computing is the specialized pattern of grid and utility computing, and that takes grid computing style when the dynamic connection service and the virtual resources service are available through the Internet (Jasim, Abbas, El-Horbaty & Salem, 2016). With the rapid development in the availability of computer services and the widespread application of the Internet technology, SaaS has become an important approach for new product development within various information technology (IT), the Internet, and software companies (Du, Lu, Wu, Li, & Li, 2013). The distributed SaaS environments significantly sup-

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port the provision of scalable and virtualized resources as a service over the Internet (Aisopos, Tserpes & Varvarigou, 2013).

The Semantic Web (also known as Web 3.0) is an extension of the current Web 2.0 in which information has a well-defined meaning (Çelik & Elçi, 2013). Khan et al. (2013) indicated that the Semantic Web technologies (e.g., the Semantic Web services) can effectively cater the requirements for achieving interoperability. The main goal of the Semantic Web is to enrich Web 2.0 with semantics and make Web 2.0 be understood by computers, in order to communicate between people and computers (Zhongzhi, Mingkai, Yuncheng & Haijun, 2005). The Semantic Web can be considered as an example of a semantic network (Guns, 2013). The Semantic Web consists of the distributed environment of shared and interoperable ontologies, which have emerged as the common formalisms for knowledge representation (Wei, Guosun & Lulai, 2006).

Big Data is a collection of enormous data that it becomes difficult to process using current database management tools or traditional data processing applications (Xu, Zhao, Chiang, Huang, & Huang, 2015). Regarding Big Data applications, the increases in the volume of data, the velocity with which they are generated and captured, and the variety of formats in which they are delivered all must be taken into account (Kimble & Milolidakis, 2015). Big Data computing demands a huge storage and computing for data processing that can be delivered from on-premise or cloud computing infrastructures (Kune, Konugurthi, Agarwal, Chillarige & Buyya, 2016). Hashem et al. (2015) stated that Big Data utilizes the distributed storage technology based on cloud computing rather than the local storage attached to a computer or electronic device.

In modern operations, the deployment, the integration, and the operation of a Big Data infrastructure are complex and require human resources and special skills. More and more organizations are no longer interested in keeping complex infrastructures in their own data center. Loading large data sets is often a challenge. Another shift of this Big Data processing is the move toward cloud computing (Vaidya, 2016). Big Data from cloud computing-related SaaS and the Semantic Web can be an attractive alternative, relieving the organizations from pre-investments and all operational tasks. The efforts regarding installation, configuration, and maintenance of the systems are completely omitted. Capacity planning is no longer necessary regarding SaaS and the Semantic Web.

Major Internet services (e.g., the Semantic Web) are required to execute the tremendous amount of data at real time (Yıldırım & Watson, 2016). Big Data storage and processing are essential for cloud computing services (Pokorny & Stantic, 2016). The required capacities can be flexibly adjusted to the changing demands, in particular during peak loads in modern operations. Big Data services from SaaS and the Semantic Web provide the great potential for cost reduction toward obtaining various Big Data benefits. Big Data from the cloud computing platforms provides the significant advantage, if the essential data sources are hosted by the same SaaS and enhanced by the Semantic Web technologies.

This chapter aims to bridge the gap in the literature on the thorough literature consolidation of SaaS, the Semantic Web, and Big Data. The extensive literature of SaaS, the Semantic Web, and Big Data provides a contribution to practitioners and researchers by describing the current issues and trends with SaaS, the Semantic Web, and Big Data in order to maximize the technological impact of SaaS, the Semantic Web, and Big Data in modern operations.