Chapter 20
Rapid Development of Service-Based Cloud Applications: The Case of the Cloud Application Platforms

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ABSTRACT

Cloud application platforms gain popularity and have the potential to alter the way service-based cloud applications are developed involving utilisation of platform basic services. A platform basic service provides certain functionality and is usually offered via a web API. However, the diversification of the services and the available providers increase the challenge for the application developers to integrate them and deal with the heterogeneous providers' web APIs. Therefore, a new approach of developing applications should be adopted in which developers leverage multiple platform basic services independently from the target application platforms. To this end, the authors present a development framework assisting the design of service-based cloud applications. The objective of the framework is to enable the consistent integration of the services, and to allow the seamless use of the concrete providers. The optimal service provider each time can vary depending on criteria such as pricing, quality of service and can be determined based upon Big Data analysis approaches.

INTRODUCTION

In recent years two major technological trends have emerged and are able to drive the evolution of service oriented computing, namely cloud computing and Big Data. The rise and proliferation of cloud computing (Armbrust et al., 2010) and cloud platforms in specific (Cusumano, 2010), has the potential

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to change the way cloud based software applications are developed, distributed and consumed. Cloud platforms popularity stems from their potential to speed up and simplify the development, deployment and maintenance of cloud based software applications. Nevertheless, there is a large heterogeneity in the platforms offerings (Gonidis, Paraskakis, Simons, & Kourtesis, 2013) which can be classified into three clusters. On one cluster application development time is drastically decreased with the use of bespoke visual tools and graphical environments at the expense of a restricted application scope which is usually limited to customer relationship management (CRM) and office solutions. At the other end of the spectrum platforms offer basic development and deployment capabilities such as application servers and databases. The intermediate cluster consists of cloud platforms, which offer additional functionality via the provisioning of, what the authors call, platform basic services (e.g. mail service, billing service, messaging service etc.). A platform basic service can be considered as a piece of software, which provides certain functionality and can be reused by multiple users. It is typically provisioned via a web API. The platforms offering such services are also referred to as cloud application platforms (Kourtesis, Bratanis, Bibikas, & Paraskakis, 2012). The rise of the cloud application platforms has the potential to lead to a paradigm shift of software development where the platform basic services act as the building blocks for the creation of service-based cloud applications.

Almost in parallel with the emergence of cloud computing, data volumes started skyrocketing leading to what is commonly referred nowadays as Big Data (Jacobs, 2009). The term Big Data has been initially attributed with certain features (McAfee, & Brynjolfsson, 2012) such as: *a) Volume, b) Velocity and c) Variety*. Volume refers to the large amount of data which are generated each day. Velocity dictates the need for analysis of the rapidly collected data as those are becoming outdated quickly. Variety denotes the diverse forms and formats in which data are collected and stored. In addition to these features, Demchenko et al. (2013) propose a wider definition of Big Data by adding two extra characteristics: *d) Veracity* and *e) Value*. Veracity refers to the amount of uncertainty that the collected data contain and to the extend they can be considered trustworthy. Value denotes the added-value that data can bring to the predictive analysis. Therefore, what once used to be a technical problem due to limited storage and processing capacity now it is being transformed into a business opportunity (The Data Warehouse Institute, 2011). The collection and analysis of Big Data can lead to the extraction of meaningful information and can subsequently drive important decisions (McAfee, & Brynjolfsson, 2012).

In the field of service oriented computing the combination of the cloud computing and Big Data analysis has the potential to lead to the design of flexible and adaptable service-based cloud applications where their functionality and the concrete service providers are determined based on the stimuli from the environment. The criteria based upon the selection of the appropriate services are made, can be based upon several factors such as pricing, quality of service, current availability of the provider, geospatial data etc. In certain cases the selection of the concrete service providers is a time critical operation and is subject to the analysis of big volume of data. Therefore Big Data approaches can be employed to process and analyse the large volume of data, acting this way as decision supporters in the selection of the concrete service providers. As discussed later in this article the world of E-commerce and electronic (mobile) payments can be used as motivating scenario in this research work. Gartner, the leading information technology research company, reports a 42% average increase in the mobile transaction volume and value in the period 2011-2016 (Gartner Inc., 2012). Therefore, cloud payment services, enabling an application to handle electronic payments, is becoming an indispensable part of a service-based cloud applications. There is a plethora of available payment service providers offering a variety of features regarding the price, the quality of service, the geographical region etc. Different payment providers may