Chapter 10

Some Aspects of Reliability Estimation of Loosely Coupled Web Services in Clustered Load Balancing Web Server

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ABSTRACT

Reliability of loosely coupled services through the paradigm of service-oriented computing and observing their fault tolerance against massive load in clustered load balancing web server plays an important role while evaluating the quality aspects of software-as-a-service (SaaS), grid, and distributed systems. This chapter shows some aspects of service execution while observing their failure records against massive execution of server-side instruction. A novel reliability estimation framework is proposed that can be deployed for evaluating the reliability of service execution over clustered load balancing web server. A load generating tool is used to generate massive load over the service execution. In this study we will discuss an experimental system and its architecture by using clustered load balancing web server, the reliability estimation framework along with the goodness of fit study through statistical analysis. The overall assessment of the work will validate the applicability of the proposed framework for the loosely coupled service in clustered load balancing web server.

INTRODUCTION

Web Service (WS) provides a framework for deploying computational task in a flexible manner. It provides a platform where one can deploy different architecture of grid and distributed system, Internet of Things (IoT) and Software as a system (SaaS) applications. It supports interoperability among heterogeneous modules of loosely coupled software models. It follows the methodology of discovering, consuming and
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publishing over public domains, which are key principles of Service Oriented Architecture (SOA). It enhances the principles of reusability and integration of remote service. The SOA is not bound to technology. Different programming languages over network based protocol can be followed for deployment. The powerful features of Extensible Markup Language (XML) can be included for sharing different services among business modules. Recently, WSs are deployed for inter machine communication. It supports different adaptability of connections over different platform independent terminals.

The WS supports modularity, interoperability and reusability. However, numbers of studies are carried out for observing the quality aspects of such deployment. From the perspective of software industry, the stakeholders such as consumers and service providers are keen interested for evaluating the quality report of such service. Basically, the service consumers are interested for evaluating the quality aspects of service, while the service providers are interested for evaluating the execution aspects of service. The validity and applicability of the service is also verified by the consumer before deploying such WS for their own business needs. The service providers publish their services over public registries where the service consumer can identify and consume it as required. Different WS may have different business parameters and decision model. Based on the requirement of the organization, the consumer usually termed as WS client establishes necessary communication with the service providers.

Many prominent consumers are utilizing the features of WS in their respective business models. They deploy to provide better and quality service to end users. The primary goal of service providers is to satisfy their consumer through flexible and in a better manner. However, over years, the end users of WS are increasing prominently. As such, delivering the service during high usage of service period is becoming an important concern. However, clustering the web server and deploying a load balancer machine can provide a better service towards the heavy usage of service. From the perspective of the exponential growth of requirement demands and organizational infrastructure, the deployment of loosely coupled WS and assessing their reliability against high usages has become a key concern among researchers. As such, this study will highlight a novel reliability evaluation framework and some important aspects of loosely coupled WS execution against high usage of service. The contribution in this chapter is an extension of the work that was discussed elsewhere (Bora et al., 2018b).

BACKGROUND

WS is the platform where one can deploy software modules as service agents. It supports configuration of loosely or tightly coupled software modules for business process. It provides a programmable interface where the integration of different functional logic can be executed (Matthew et al., 2005). The internal configuration files and data structure of WS is omitted from outside world. As such, the consumer simply utilizes the basic operation of WS. The overall service computing that comprises of service delivery, execution and publishing is defined as Service Oriented Computing (SOC). However, based on computational logic, the deployment of SOC primarily follows loosely or tightly coupled WSs. The publicity of WSs is primarily executed through Web Service Description Language (WSDL), that generates necessary executable files in server side for successful establishment of communication among platforms (WSDL, 2016). The XML is used to communicate external remote service. This is carried out along with the Simple Object Access Protocol (SOAP) features (SOAP, 2016). The Universal Description Discovery and Integration (UDDI) is a showcase of service parameters for end users (Peiris et al., 2007). The WSs can communicate in different ways and is discussed elsewhere (Bora et al., 2016).