HBSD:
A Hadoop Based Service Discovery Model for Enterprise Cloud Bus

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ABSTRACT

Enterprise cloud bus (ECBS) is a multi-agent-based abstraction layer framework, responsible for publishing and discovery of services in an Inter-cloud environment. Our work focuses on the service discovery model (HBSD) using Hadoop that leads to the challenges of automatic web service discovery patterns. It has been observed that the RDBMS can handle only data sizes up to a few Terabytes but fails to scale beyond that, so Apache Hadoop can be used for parallel processing of massive datasets. This article provides a novel Hadoop based Service Discovery (HBSD) approach that can handle vast amount of datasets generated from heterogeneous cloud services. The novelty of the proposed architecture coordinates cloud participants, automate service registration pattern, reconfigure discover services and focus on aggregating heterogeneous services from Inter-cloud environments. Moreover, this particle states a novel and efficient algorithm (HBSDMCA) for finding the appropriate service as per user’s requirements that can provide higher QoS to the user request for web services.

KEYWORDS

Enterprise Cloud Bus System, Hadoop, HBSD, Hive, HQL, HUDDI, Service Discovery, XML Schema

INTRODUCTION

Cloud computing has evolved as key areas of software engineering research and practices which identifies functional requirements from users along with its benefits of cost effectiveness and global access. By providing on demand access of services to a distributed environment of computing resources in a dynamically scaled and virtualized manner, agent-based cloud computing offers compelling advantages in cost, speed and efficiency. In this context, analysis of such dynamics is a major challenge. For this purpose, proper mechanism is required to conceptualize and study the behavioral properties of multi-cloud-based architecture. Agent-oriented systems are the most acceptable paradigm to handle the dynamicity of Inter-cloud architecture.

In recent days, due to increase in number of clouds and its services and the growing interest of enterprise towards cloud computing technology, the capacity of service storage, registration and discovery has emerged as one of the most challenging issues. Thus, enterprise service applications lead to the problem of flexible and scalable access to computing resources of SOA architecture. Traditional service registration process encounters many problems on cloud service registration and discovery which are discuss in the next related work section. To overcome such issues, many of the research work focuses on the domain of service registration and discovery of large number of datasets to be

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processed and stored in distributed computing environment. The objective of using Hadoop based service discovery framework is to support large volume of non-relational data storage model in an efficient manner that facilitates several features of cloud computing model like flexibility, scalability, fault tolerance, portability, adaptability, coexistence and integrity etc.

This article provides a modeling and analysis of service discovery approach using Hadoop to address the problems of organizing and processing vast amounts of heterogeneous cloud services and support for fast, accurate service discovery. Based on Hadoop Based Service Discovery (HBSD) model, we illustrate the workflow of service registration and discovery process of the Multi-cloud architecture. We carried out an experiment based on the proposed model and further the same datasets is used for other relevant traditional service discovery model to validate web service registration and discovery performance improvement. Further, an elaborate comparison between HBSDMCA and (SSAC and RSSA) is made based on the simulation results derived from the experiment conducted. The preliminary results indicated that, HBSDMCA performs better on service registration and discovery than SSAC and RSSA.

RELATED WORK

Nowadays, due to phenomenal increase of cloud and its services, the Service Oriented Computing (SOC) has become a predominant computing domain that are facing many web service issues in Multi- cloud architecture like performance, complexity, dynamic provisioning, virtualization etc. Many of the research work focus on the Service Oriented Computing paradigm that utilizes Software as a service (SaaS) (Huhns et al., 2005; Arsanjani et al., 2004; Zheng et al., 2010) as the basic constructs to support the development of rapid and low-cost composition of software applications. Several researchers discuss over the architectural design of cloud computing and its applications. Among them (Alexandros et al., 2014; Cavalcante et al., 2013; Buuya et al., 2010; Mandal et al., 2013) focus on the architectural driven environment for cloud applications that facilitates monitoring cloud services, composing, and adapting cloud applications. In recent days, several researches in last decade, have devised conceptual model for Multi-cloud architecture that aim at addressing the issues. The authors in (Brandtzæg et al., 2013; Ferry et al., 2013) focus on the Model-driven approach for dynamic provisioning and deployment of Inter-cloud architecture. The authors in (Divyakant et al., 2013) focus on the database scalability and elasticity of such cloud architecture. However, all these approaches have certain limitations to exhibit the dynamism of internal behavior of the system, which comprises of heterogeneous set of components.

Agent based technology is one of the key factor that helps to resolve the dynamism issues the cloud architecture. Formalization and analysis of Agent-based system has been explained in paper (Zambonelli et al., 2004; Baur et al., 2001). There are few research works (Klugl et al., 2008; Dhavachelvan et al., 2008) based on measurement of complexity and its validity for Multi-agent system. Further the authors in (Sarkar et al., 2012; Sarkar et al., 2013) model the dynamic behavior of Multi-agent system using graph-based approach. Moreover, modeling and design of Agent-based Multi-cloud architecture (Djamel et al., 2013) have emerged as one of the most challenging domains in cloud computing domain. As our previous work are based on such MAS based Inter-cloud architecture (Khan et al., 2014), called Enterprise Cloud Bus (ECB). Further, the structural components of the proposed architecture are modeled using UML 2.0 (Khan et al., 2014), to make the cloud-based system more reliable and robust. Few of our earlier work are based on service registration and discovery mechanism in ECB (Khan et al., 2014; Khan et al., 2015; Khan et al., 2015; Khan et al., 2016) which helps to identify services during run time. Further, in (Khan et al., 2014) scheduling of services and its performance analysis in ECB have been proposed. Few of the research works based on ECB model is done using petri-net model (Khan et al., 2017) and further the proposed model is formalized using high level petri-net tool called CPN (Khan et al., 2017).
A Pattern Language for Knowledge Discovery in a Semantic Web Context
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