User Opinion and Differentiated Attribute based Ranking in Federated Cloud

C. S. Rajarajeswari, Computer Science Department, Bharathiar University, Coimbatore, India
M. Aramudhan, Department of Information Technology, Perunthalaivar Kamarajar Institute of Engineering and Technology, Nedungadu, India

ABSTRACT

Cloud computing is an innovative technology which provides services to users on-demand and pay per use. Since there are many providers in cloud, users get confused in selecting the optimal service provider for their tasks. To overcome this limitation, federated cloud management architecture was proposed. The proposed work provides a new federated cloud mechanism, in which Broker Manager takes the responsibility of providing optimal and ranked service provider for user requirements. To rank the service providers in the federated cloud, Differentiated Priority based Ranking algorithm is implemented at the level of BM. Attributes are differentiated based on their weights assigned by a user. Service providers are discovered and ranked based on the differentiated attributes. The proposed algorithm chooses the cloud service provider for execution, not only based on the rank list generated by the BM; but also based on the suggestion given by the user. The experimental result shows that the proposed algorithm improves the performance of resource provisioning than the existing model by 13%.

KEYWORDS

Broker Manager, Differentiated Priority based Ranking, Ranking, Service Discovery, User Opinion Service Provider, Weight

1. INTRODUCTION

Federated cloud is a federation of cloud model that helps to resolve the complexities in single cloud service model. SLA (Service Level Agreement) is implemented between cloud member and cloud service provider for efficient processing of federated cloud (Buyya, Yeo, Venugopal, Broberg & Brandic, 2009; Li, Qiu, Niu & Ming, 2010; Marosi, Kecskemeti, Kertesz & Kacsuk, 2011). Functional SLA parameters includes memory related information like memory size, CPU cores, CPU size etc. and non-functional SLA parameters consists of response time, cost, execution time, security etc. (Calheiros, Vecchiola, Karunamoorthy & Buyya, 2011). User requirements include both functional and non-functional SLA parameters. Cloud service provider chosen for execution, must satisfy both the functional and non-functional requirements given by a user. Best resource provisioning (Buyya, Ranjan & Calheiros, 2009) to user’s requirement is one of the challenging tasks in federated cloud mechanism (Aljawarneh, 2011; Jrad, Tao & Streit, 2012).

In the proposed model, Broker Manager (BM) takes the responsibility of resource provisioning in federated cloud. Each provider has broker that interconnects with BM. The roles of BM in the proposed cloud architecture are (i) Sort the incoming user attributes in ascending order based on the weight (ii) Ascertain the matched cloud service providers using Stochastic Markov process model (iii) Rank the service providers using Poincare Plot method (iv) Place the user suggested cloud service provider at the top of the ranking list (v) Assign the user request to the top ranked cloud service provider.
This paper describes how the SLA management is effectively designed for users and efficient interoperability is achieved through broker architecture. This paper also discusses how the customers are linked to the best available cloud service providers through brokers.

This paper is organized into the following sections. Section 2 discusses about the related work. Section 3 describes the modified architecture of the federated cloud model. Section 4 covers the proposed ranking model in federated cloud. Section 5 deals with experimental results of the proposed model and section 6 discuss the conclusion and future work.

2. RELATED WORK

With the increasing popularity of cloud computing, many researchers studied the performance of clouds for different types of applications.

Federated cloud concepts addressed in (Buyya, Garg & Calheiros, 2011) does not include customer-driven service management, computational risk management and autonomic management of Clouds which improve the system efficiency, minimization of SLA violation and the profitability of service providers.

The proposed models and techniques in (Buyya, Ranjan & Calheiros, 2010), are critical for the design of stochastic provisioning algorithms across large federated cloud systems where resource availability is uncertain. The mapping function (Wu & Buyya, 2010), is implemented by continuous double action, sensor unit was used to predict the geographic distribution of users. Federated cloud mechanism described in (Marosi, Kecskemeti, Kertesz & Kacsuk, 2011) does not deal the plan to investigate various scenarios that arise during handling federated cloud infrastructure using the FCM architecture.

SLA based Inter cloud operations in (Jrad, Tao & Streit, 2012) does not use simulation to investigate and evaluate the performance and efficiency of different SLA-aware match making algorithms by supporting multiple SLA parameters.

SLA-oriented Dynamic Provisioning Algorithm supports integration of market based provisioning policies and virtualization technologies for flexible allocation of resources to applications. Comparison of different cloud services can be obtained through Cloud Service Measurement Index Consortium (CSMIC) and Analytic Hierarchy Process (AHP) (Ramanathan, 2001; Yazır; Matthews, Farahbod, Neville, Guitouni, Ganti & Coady, 2010) but the ranking algorithm proposed here cannot cope with variation in QoS attributes (Garget, Versteeg & Buyya, 2013).

The proposed model in (Rajarajeswari & Aramudan, 2014) finds the rank of cloud service providers by considering all the attributes having the same priority. But the proposed federated cloud model finds the rank using differentiated attributes.

3. PROPOSED FEDERATED CLOUD ARCHITECTURE

The proposed federated cloud model architecture is exemplified in Figure 1. Cloud users submit their request to the Broker Manger. Broker manager plays a vital role in the allocation process of incoming request (Rajarajeswari & Aramudan, 2013; Venugopal, Chu & Buyya, 2008). Broker manager verifies the incoming request and choose the best service provider through broker. Each broker is connected with a cloud service provider (Calheiros, NadjaranToosi, Vecchiola & Buyya, 2012; Grozev & Buyya, 2012).
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