

A Framework of Cloud Service Broker System for Managing and Integrating Multiple Cloud Services

Hangoo Jeon¹, Jinmee Kim², Young-Gi Min³, Kwang-Kyu Seo^{4*}

¹ Department of Management Engineering, Graduate School, Sangmyung University, 20, Honggimun 2-Gil, Jongno-Gu, Seoul 110-743, Rep. of Korea, {enter1919}@gmail.com

² Electronics and Telecommunications Research Institute, 218, Gajeong-ro, Yuseong-gu, Daejeon-si, 305-700, Republic of Korea, {jinmee}@etri.re.kr

³ Korea Association of Cloud Industry, 8F, Younghun B/D, 2075, Nambusunhwan-ro, Dongjak-gu, Seoul, 156-827, Republic of Korea, {min}@kcsa.or.kr

⁴ Department of Management Engineering, Sangmyung University, 31, Sangmyungde-gil, Dongnam-gu, Cheonam-si, Chungnam 330-720, Republic of Korea, {kwangkyu}@smu.ac.kr

Abstract. The recent increase in the use of cloud service has led to the need for cloud service broker(CSB) for supporting the use of various cloud computing platforms. CSB plays the role of not only providing overall services needed for individuals and companies to use cloud computing but also managing and inspecting them. As cloud computing became commonplace, it is expected that the demand for more useful cloud-based service at more affordable prices will increase exponentially. Accordingly, the current situation calls for CSB that connects cloud service provider & customer and provides the service of managing and inspecting cloud service. This paper presents a framework of the components and role of cloud service broker system that supports the allocation, control and management of virtual system based on brokering function between cloud service provider(CSP) and cloud service customer (CSC) by integrating and managing cloud resources in multiple heterogeneous cloud environment. Based on this, it is expected that this paper will contribute to the revitalization of cloud service industry.

Keywords: Cloud Service broker, IaaS, Multiple Cloud Services, System, Integration, Auditor, brokerage

1 Introduction

Since cloud market is being expanded in various forms from rapid increase of cloud service and related products, there are various difficulties for final customers in using the services of various products by numerous providers. In the midst of such circumstance, cloud service broker (CSB) is becoming one of its solutions and the area of CSB is garnering much attention in the market thanks to its technological innovation and various advantages. It is expected that CSB will bring about a significant change in cloud service market as final customers will be able to choose

* Corresponding author: kwangkyu@smu.ac.kr

and change cloud service according to their requirements without being dependent upon service provider [2][3][6].

The purpose of this paper is to deduce various user requirements to develop technology for CSB infrastructure environment to support CSB and CSP, as well as provide assistance in establishing CSB system environment by describing a framework of CSB system that supports cloud interoperability.

2 Cloud Service Broker System User Requirements

2.1 Overview of Cloud Service Broker System

CSB system plays a brokering role between CSP and CSC. Upon receiving requirements of CSC, CSB validates service requirements to establish service selection plan and selects optimum service through service assignment negotiation & selection process. The selected service is assigned to cloud through service assignment process to manage the assigned service [4].

2.2 Cloud Service Broker System User Requirements

The users of CSB system can be classified into user that requires cloud service, provider that provides cloud service and manager that manages CSB system and according requirements for system features and structure that must be reflected while establishing CSB system environment are as shown in Table 1 [1].

Table 1. Feature Requirements of Cloud Service Broker System [1]

Classification	Requirements
CSC Management	<ul style="list-style-type: none"> ● CSC members create, query, modify, delete ● Service query, create, modify, delete ● Service start, stop, and restart
CSP Management	<ul style="list-style-type: none"> ● CSP members create, query, modify, delete ● Service lookup, catalog registration ● Service start, stop, and restart
Monitoring	<ul style="list-style-type: none"> ● CSC service monitoring ● CSP monitoring
Metering	<ul style="list-style-type: none"> ● CSC report / written statements ● CSP report / written statements
Billing	<ul style="list-style-type: none"> ● Pricing registration, query, modify, delete ● Service Charge view, edit, delete

4 A Framework of Cloud Service Broker System

CSB system, as shown in Fig. 1, consists of cloud service operating information management block, CSB brokering block, service life cycle management block, cloud connection control block and commercialization support block [5].

- Cloud service operating information management block: alleviate the complexity of using multiple clouds in the integrated cloud environment and broker portal for providing integrated environment and operating data integrated storage, registration and management of service supportable by CSP, integrated operational information management feature for verifying the validity of service requirement entered by user
- CSB brokering block: provides optimal cloud service selection and assignment plan for assigning service upon receiving service requirement from user and implement contract by brokering service agreement through mediation between SLA presented by CSP and user requirements
- Service life cycle management block: service status control and composition management in the case of violating restriction such as performance condition and SLA presented by resource monitoring and assigned service
- Cloud connection control block: perform connection and provide common interface through interface abstraction of heterogeneous cloud for usability via single broker system for various cloud services provided in multiple cloud environment
- Commercialization support block: as a part for supporting additional feature required for cloud service commercialization, it supports user account & rights control, accounting, usage information collection & estimation, report feature and test feature

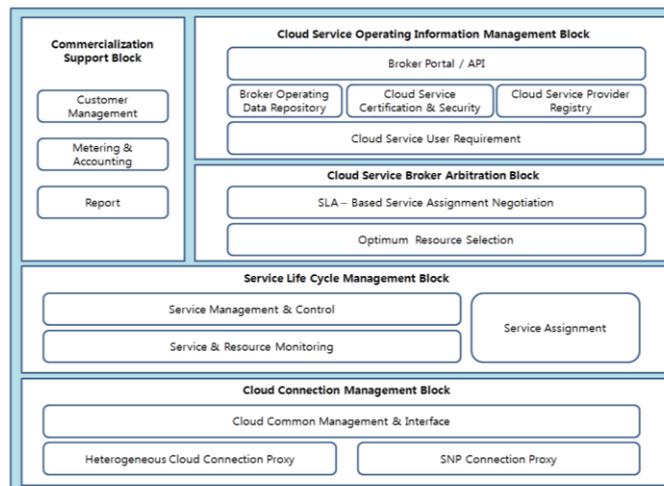


Fig. 1. Framework of Cloud Service Broker System

5 Conclusion

This paper proposed a framework of CSB system for using various cloud computing platforms at a point in time where the use of cloud service is increasing. In addition, it described respective role and main features of each block composing framework and it is expected to be used in the future for establishing CSB system environment.

As for the limitations of this study, it was conducted focusing on IaaS among various cloud service areas and the scope of study should be expanded in the future to PaaS and SaaS to review the applicability of the proposed framework. In addition, a clearer CSB system framework can be proposed upon conducting a study for preparing a system for flexibly responding to cloud computing technology that is changing quickly through actual CSB system implementation and operation.

Acknowledgments. This research was supported by the ICT R&D program of MSIP/IITP, Republic of Korea [14-000-055-001, Smart Networking Core Technology Development]. This Research was also supported by the MSIP (Ministry of Science, ICT and Future Planning), Korea, under the CPRC(Communications Policy Research Center) support program supervised by the KCA (Korea Communications Agency) (KCA-1194100004).

References

1. Srijiith K.Nair, Pramod Pawar, Ali Sajjad, Mariam Kiran, Ming Jiang: Requirements and Architecture of a Cloud Broker, OPTIMIS Consortium, pp. 12-15 (2009)
2. S.J Jang: Case Research of Domestic & International Cloud Service Broker (CSB) Business Model, pp. 14--22, Korea Association of Cloud Industry Market Reports (2013)
3. Cloud Service Brokerage (CSB) Market Worldwide Forecasts and Analysis (2013-2018), Markets and Markets (2013)
4. J.M Kim, D.J Kang, S.I Jeong, J.H Lee: Cloud Service Broker System Design Version 1.0, Electronics and Telecommunications Research Institute Technical Reports, pp. 13-17, ETRI (2014)
5. Framework of inter-cloud computing, International Telecommunication Union, pp. 8-11 (2014)
6. DBGuide.net, www.dbguide.net