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Comparison of Cloud Service Quality Information Publication Based on Cloud Service Quality Model

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Abstract. Major stakeholders of cloud services are service providers and service consumers. To support communication related to cloud services between them, it is necessary to provide sufficient and clear information about the quality of cloud services. Using content analysis and CSQM (Cloud Service Quality Model), this paper aims to compare the differences of quality information depending on cloud services types; Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

Keywords: cloud services, quality model, quality factors

1. Introduction

Cloud computing services as services based on pay-per-use model of computing resources is not limited to use and purchase anytime and anywhere [1]. To support consumers' service selection decision making, it is necessary to provide sufficient and clear information on service quality and payment methods of alternative cloud services. In this paper, using web content analysis and CSQM (Cloud Service Quality Model), we try to analyze public-opened quality information of different types of cloud services; Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). In the purpose, public-opened quality information of cloud services of major global companies including Amazon.com, Google, and Salesforce.com, and Korean service providers including KT, SKT, and LG CNS are compared. Based on five quality factors of CSQM, the quality description of each service on web pages is analyzed and classified into the five quality factors. The classified information is used to compare the focus and sufficiency of quality information of cloud services of different cloud service types. Also, we try to analyze the differences of quality information publication of global service providers and Korean service providers.

2. Cloud Service Quality Model

CSQM (Cloud Service Quality Model) is a cloud service quality model to support communication between service providers and service consumers [3]. CSQM was based on WSQF (Web Service Quality Factors) as service quality model of SOA (Service-Oriented Architecture) [2]. CSQM has extensibility and flexibility in order to describe quality information of various cloud services comprehensively. CSQM consists of five quality factors, Service Level Quality, Integration Quality, Security Quality, Usage Manageability, and Metering Quality, which are grouped into two quality groups; Service Quality Group and Manageability Group, as shown in Fig.1 [3].

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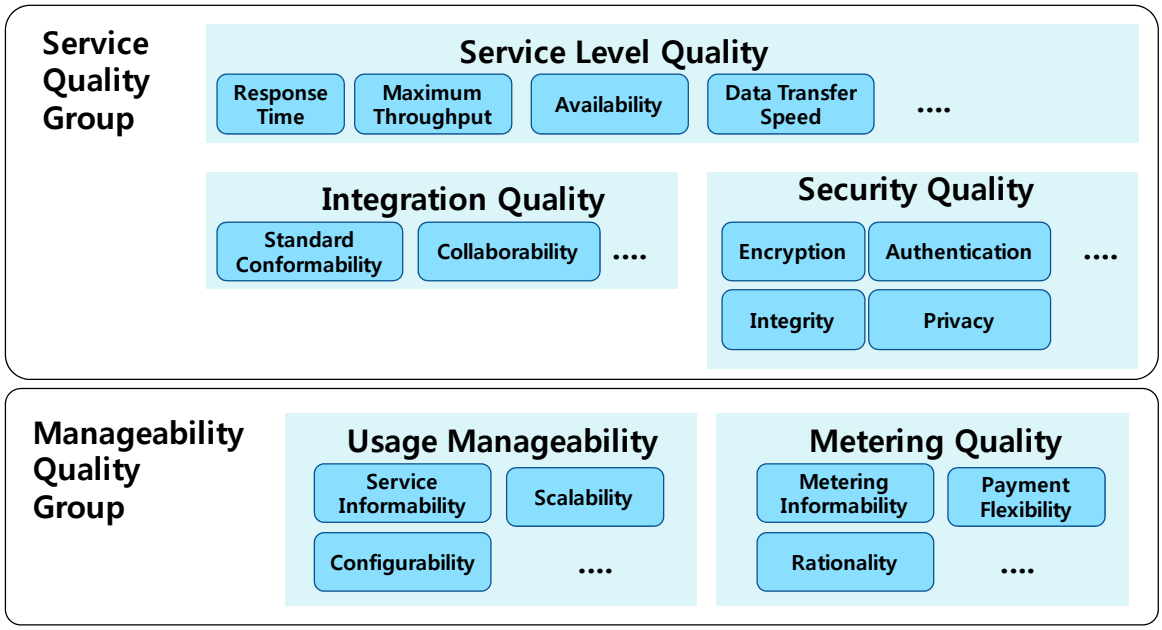

Fig. 1: Cloud service quality factors in CSQM [3]

3. Purpose of This Study

Even though quality information of cloud services is important to support selection decision making of cloud service consumers, the amount and detail level of quality information are different depending on cloud service types and service providers. In this study, to support the understanding of current status of public-opened quality information of cloud services, quality information of cloud services on web pages are analyzed based on CSQM. Specific research questions are as follows:

(1) Are there differences of public-opened quality information level depending on the type of cloud services (IaaS, PaaS, and SaaS)?

(2) Are there differences of public-opened quality information level between cloud service providers in global and Korean service providers?

4. Experimental Design

Quality information of 6 service provides; three global companies including Amazon.com, Google, and Salesforce.com and three Korean companies including LG-CNS, SKT and KT are gathered through web pages. The contents of quality information are analyzed based on CSQM. The analysis of quality information of cloud services are performed in terms of (1) measures and keywords. For example, the analysis result of Amazon's EC2 service in terms of measures is shown Tab.1. Also, Tab.2 shows another analysis result of cloud service Amazon S3 (Simple Storage Service) in terms of keywords. The number of measures and the number of keywords are used to represent the focus and details of quality information of cloud services.

Tab.1 Quality information analysis of Amazon EC2 using measures [3]

Quality Factor	***Sub-factor***	***Measures***
Service Level Quality	Availability	Time-to-service/Time-to-operation
Integration Quality	Collaborability	List of supporting OSs List of management tools that can work together
Security	Authorization	Prevention of access by unauthorized users (binary)
	Privacy	Support data privacy (binary)
Usage Manageability	Service Controllability	Support of access to instances (binary)

Quality Factor	*Sub-factor*	*Measures*
	Configurability	Time to setup Time to configuration change Security configurability (binary) Network access configurability (binary)
	Scalability	Supporting dynamic instantiations
Metering Quality	Rationality	Pay per use rate
	Payment Flexibility	Payment options

Tab.2 Quality information analysis of Amazon S3 using keywords

Quality Factor	*Keywords*
Service Level Quality	objects containing from 1 byte to 5 terabytes , 99.999999999% durability(400 times the durability), 99.99% availability, operations synchronously, expected loss of 0.01% of objects, accelerates, high-speed, no single points of failure
Integration Quality	work with, multiple devices , Import, Export, migrating, between the services
Security Quality	Secure, unauthorized, granted, encryption, protection, flexibility to control, policies, identity, permissions, deny permissions, restorez
Usage Quality	configure
	choose a region, regulatory requirements, additional, flexible, easily be added, transfer "in" and "out", scalable
	any time, anywhere, easy, accessing, managing , backups, disaster recovery
Metering Quality	inexpensive, lower costs , pricing, pay, fee, monthly, bill, free, standard , one year, region, transfer charge

5. Results

5.1. Comparison based on service types

Fig.2 shows the aggregated results of cloud services of global companies in terms of measures of quality factors. We can find the quality information of IaaS is more balanced and rich than those of PaaS and SaaS.

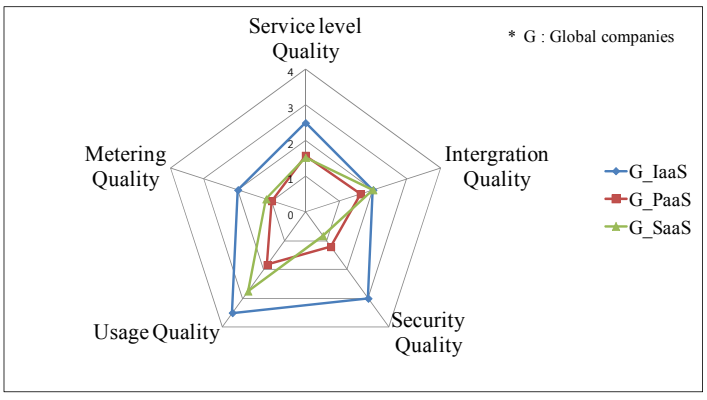

Fig. 2: Comparison of quality information of global companies in terms of service types using quality measures

5.2. Comparison between global companies and Korean companies

The following Fig.3 shows the aggregated results of global companies and Korean companies in terms of measures. Korean companies are more biased quality information about usage and metering quality. On the other hand, global companies are more balanced for five quality factors.

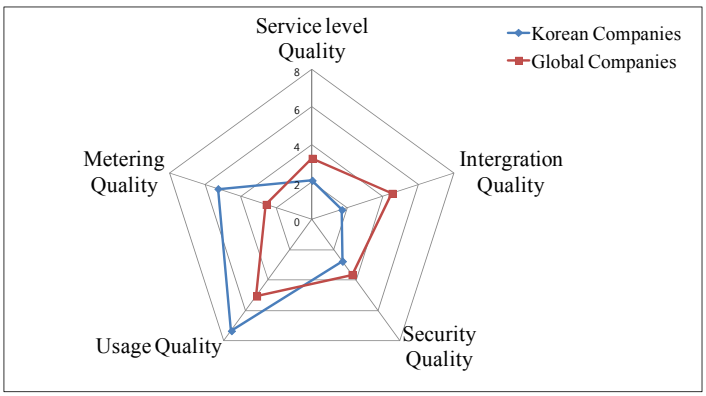

Fig.3 Comparison of public quality information between global and Korean companies in terms of measures on quality factors [4]

Fig.4 shows the aggregated results of global and Korean companies in terms of keywords of quality factors. Similar to Fig.3, the number of keywords on metering quality of Korean companies are the highest as shwon in Fig.4. Also, the number of useage quality of Korean companies is the second highest. In the case of global companies, for all service quality factors except metering quality, the numbers of keywords of quality factors are higher than those of Korean companies and are more balanced and rich among five quality factors.

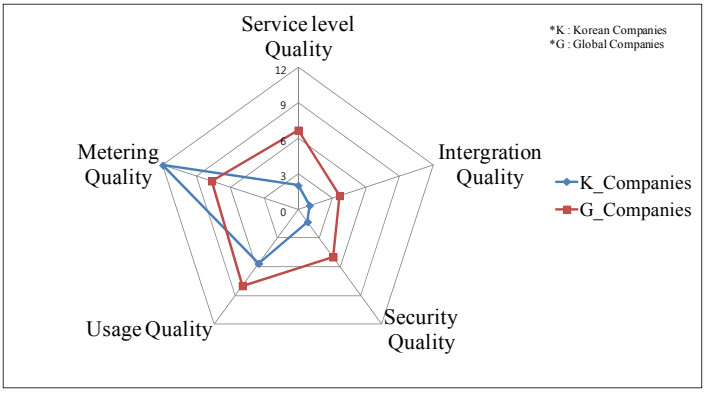

Fig. 4 Comparison of public quality information between global and Korean companies in terms of keywords on quality factors

6. Conclusion

In this study, we try to analyze public quality information of cloud services in terms of service types. The results show that in public quality information, there are differences depending on cloud services types such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). That is, the quality information of IaaS is more details and more balanced than those of PaaS and SaaS. Also, there exist differences between services from global and Korean service providers. That is, quality information of cloud services of global companies more focused on Service Level Quality, Integration Quality, and Security Quality. On the other hand, quality information of cloud services of Korean service providers are more focused on Metering Quality, and Usage Quality.

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