

# Cloud Service Broker Portal: Main entry point for multi-cloud service providers and consumers

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**Abstract**— Cloud-service-broker needs a virtual service portal between multiple cloud-service-providers and cloud-service-consumers. The cloud-service-broker portal enables the cloud-service-providers to specify available their services. In addition, the cloud-service-consumers may find the most suitable services by negotiating the agreements on the services. The cloud-service-broker as an emerging technology intermediates heterogeneous multiple cloud services for both the providers and consumers. In this paper, we suggest the web-based user interface design of the cloud-service-broker portal to support different providers and consumers.

**Keywords**— cloud service broker, service brokerage, broker portal

## I. INTRODUCTION

As an emerging concept, Cloud Service Broker (CSB) is a mediator service between multiple Cloud Service Providers (CSPs) and Cloud Service Consumers (CSCs) [1][2]. The purpose of a CSB is as follows: firstly, a CSB enables CSPs to register available their Infrastructure as a Service (IaaS) into the CSB's service-register-catalogue; secondly, a CSB enables CSCs to find the needed infrastructure services from the CSB's catalogue, if a CSC cannot search the service satisfying his/her utilization intent, then CSC can request to find candidate CSPs suitable to their needs by specifying service-agreement to want to use; thirdly, a CSB can deal with CSC's service agreement that requires ability of CSPs by negotiating; at last, a CSB offers and manages the most suitable IaaS product.

For facilitating all kinds of stakeholders such as CSPs, CSCs, and CSBs, Cloud Service Broker Portal (CSB-Portal) is required as a representative Graphic User Interface (GUI). The CSB-Portal makes CSPs and CSCs to log in and operate their own business through functionality of the CSB.

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In this paper, we summarize the functions and suggest the web-based user interface design of the Cloud Service Broker Portal (CSB-Portal).

From 2013, in the Compatible One project [3], ETRI is participating as a co-developing member of the first CSB platform, Accords [4]. ETRI has been established the concept of the CSB firmly and has a plan to extend the ACCORDS platform firstly originated from the several countries in EU until 2017 by allowing CSC's service specification and CSB's SLA-based re-negotiation and heterogeneous CSP integration.

This paper is consisting of as follows. In the next Chapter 2, we describe the background to understand cloud ecosystem including the concept of the CSB. In the Chapter 2, especially we summarize the role and responsibility that should be performed in the CSB.

Chapter 3 describes the design of CSB-Portal as a virtual entry point to utilize the supportive functionality of the CSB. And to make clear our research parts and show the feasibility, we developed the mock-up of which some screen shots are shown in the Chapter 4. Finally, we will conclude in the Chapter 5.

## II. BACKGROUND

To understand the CSB portal, we summarize the roles of a CSP, a CSC, and a CSB together with their requirements in this section. Furthermore, for the satisfaction of the three kinds of cloud-service-stakeholders' requirements, the user of the GUI is required to facilitate easy access and needs expression. Therefore, we consider one entry point for the cloud service stakeholders to participate in the cloud service brokering ecosystem corresponding to their purpose, which is, namely, the CSB-Portal. In this paper, we explain the CSB-

Portal and make sure the suggested portal will be helpful to all different kinds of stakeholders in the cloud service broker ecosystem [5][6].

In the Figure 1, we present the world-spread many cloud-services and one CSB-Portal of the ‘Cloud Broker’ stands in the centre of the figure. The CSB-Portal may connect CSPs and CSCs and fills the service-brokering role as another mediating service [7][8].

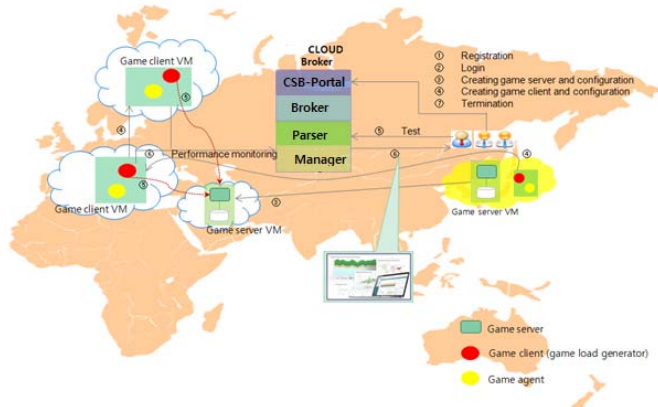


Figure 1. Use Case of CSB application

The roles of CSB-Portal can be classified from each perspective of cloud service stakeholders. We describe the roles of a CSB, a CSP, and a CSC.

#### A. The roles of a CSB

A CSB needs to perform his/her roles as follows:

- A CSB provides and manages CSB-Portal
- A CSB should provide CSPs with the CSB-Portal to assist CSPs to register their infrastructure and software services in the service-register-catalogue
- A CSB should manage authorization and authentication of CSPs and CSCs
- A CSB should know the status of available resources (i.e. server, memory, storage, and network) and services
- A CSB should assist service consumers to specify their needs and select the services from the catalogue
  - Furthermore, a CSB should negotiate with a large number of heterogeneous CSPs to find the suitable CSP for the contract which a CSC requested for his/her custom service

#### B. In the perspective of CSPs

The roles of CSPs are as follows:

- After CSPs should become a member from the CSB-Portal, they should do their own service providing business
- After CSPs log in the CSB-Portal, they register the representative Infrastructure as a Service(IaaS) and Software as a Service(SaaS) products of their companies
- For the registered service products, CSPs also should manage whether the Service Level Agreement(SLA) specified in the CSP-portal is observed or not

#### C. In the perspective of CSCs

The roles of CSCs are as follows:

- CSCs, as content providers such as the game, smartphone, and smart-TV content providers, have to search and select the most adequate cloud services
- CSCs request their own infrastructure establishment to the specific CSP
- Based on the pay-as-you-go services, CSCs should construct and manage their own services such as game, CRM, and etc.
- Through the CSB-Portal, CSCs should be aware of interesting CSPs’ service providing status.

Figure 2 shows the relationship of the CSB-Portal and stakeholders.

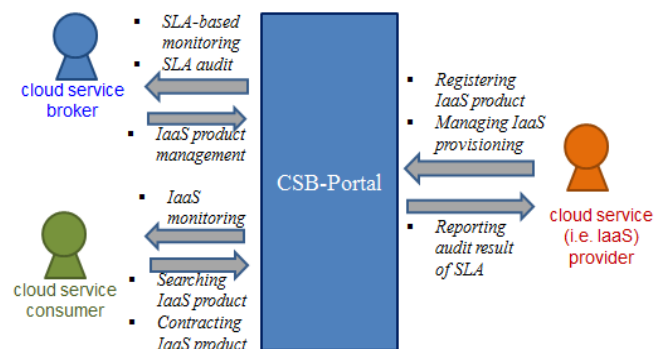


Figure 2. Relationship with the CSB Portal and the Stakeholders

### III. DESIGN OF CSB-PORTAL

A CSB-Portal is a main entry point to all kinds of multiple cloud stakeholders such as a CSB, CSPs, and CSCs. The GUIs of the CSB-Portal are classified into three kinds of GUIs such as the CSB, CSC, and CSP GUIs of the CSB-Portal.

TABLE 1. GUI HIERARCHY OF THE CSB-PORTAL

Stakeholder Type	[Stakeholder Type] GUI of CSB-Portal	Sub-GUIs
CSP	Membership	Creation, listing, update, deletion
	Provisioning	Service registration, listing, update, deletion, search
		SLA registration,
	Reporting	Reporting to CSBs and CSCs
Billing	Billing processing	
CSB	CSC management	Reference, update, deletion of CSC's membership
		Stop, start, and reference of CSC's service
	CSP management	Reference, update, deletion of CSP's membership
		Stop, start, and reference of CSP's service
	Monitoring	Services by resources
		Total amount of resources and resource status
	Reporting	Reporting by CSCs
		Reporting by CSPs
	Billing	Registration, update, reference, deletion of billing method
		Reference, update, and deletion of billing information
	Authentication	
Authorization		
Negotiation	(1-CSC:N-CSPs) one-by-one-issue negotiation	
	(1-CSC:N-CSPs) multi-issue simultaneous negotiation	
	Cost Service-quality trade-off negotiation	
CSC	Membership	Registration, retrieval, update, deletion
	Application service establishment	CSP search, listing
		Service registration, listing, update, deletion, search, stop, restart, monitoring, billing history listing
	Reporting	Reference of CSB provided report
Billing	Billing request	

Each GUI of the CSB-Portal should have the following functions to performing and facilitating the corresponding stakeholder's roles.

With CSB-Portal GUIs, a cloud-service-request from a CSC is sent to the CSB internal blocks, which negotiates service contracts with CSPs so as to find the most suitable CSP and place the services

from the CSP hence for the service requester, i.e. the CSB to use the service resources placed by the CSP. For the main function, namely the negotiation of a CSB, the CSB-Portal GUIs should support managing the membership of CSCs and CSPs, monitoring resource utilization status of services, and reporting the information such as usage amount, time with the highest resource utilization of the services, and etc.

We designed the architecture of the CSB platform including the GUIs of each stakeholder. Figure 3 shows the relationship from the negotiation perspective of the CSB platform. From the perspective of CSB-Negotiation, we can recognize the relationship with the blocks named as Cloud-Integration-Management, Cloud-Service-Operation-Information-Management, and Service-Lifecycle-Management.

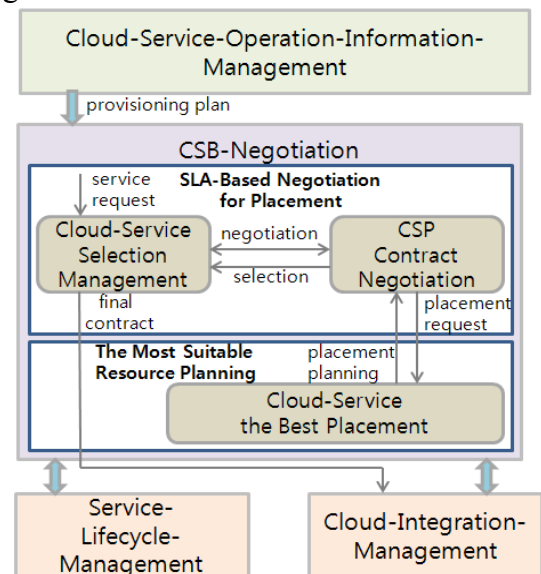


Figure 3. Relationship among CSB Internal Blocks from the CSB's Negotiation Perspective

#### IV. MOCK-UP SCREEN SHOTS

We are in the implementation of the CSB mock-up to show feasibility of CSB system and reflect real-world requirements to our CSB-Portal based on the internal blocks consisting of CSB system.

In this section, we show the screen shots of the CSB-Portal from the provider and consumer perspectives.

Figure 4 is the one screen of the CSP GUI for registering to be a member of the CSB platform with the information such as provider account and provisioning available resource's quota. After

acquiring a membership, the CSP can register his/her available resources such as virtual machines, public IPs, storages, and memories into the service catalogue. The cloud-service-register-catalogue will be managed by the CSB and referred by the CSCs to search their wanted CSPs.

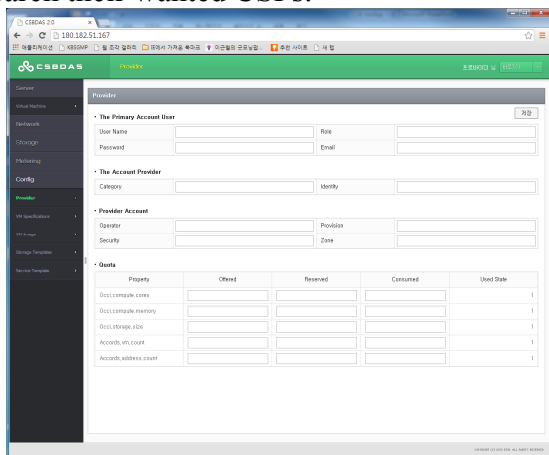


Figure 4. A Screen of Registering a CSP

Figure 5 shows the CSB-Portal CSC GUI for requesting an infrastructure service by specifying SLA.

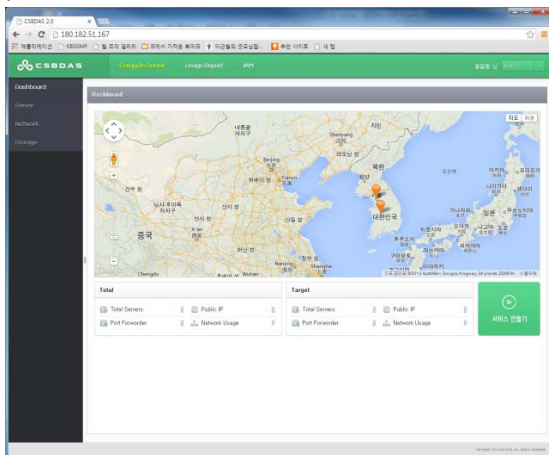


Figure 5. Operating Information about the CSCs

The CSB verifies the service request syntactically and semantically and negotiates to find the best CSP. Then, CSC can lease cloud infrastructure resources and build his/her Customer Defined Network (CDN). For example, in the world-wide map of the Figure 5, the red pin-points represent the CSCs in the place of a specific CSP's data center. Furthermore, for example, in the case of scale-out, another pin-point will be shown on the place with available resources.

The CSB negotiates to find and select the optimal CSP corresponding to the CSC's request. Figure 6 shows the SLA-based monitoring and controlling information of the CSC such as the number of running, stopped, and not being provided virtual machines, public IPs, load balancers, and etc. This information is the base for cloud-service security policy, resource provisioning, billing, and other business decisions.

Our CSB-Portal should have the brokerage APIs to integrate heterogeneous distributed CSPs into the CSB-Portal. Therefore, the existing CSPs such as Amazon EC and Windows Azure can be a member with the resource-providing role as a stakeholder in our CSB-Portal.

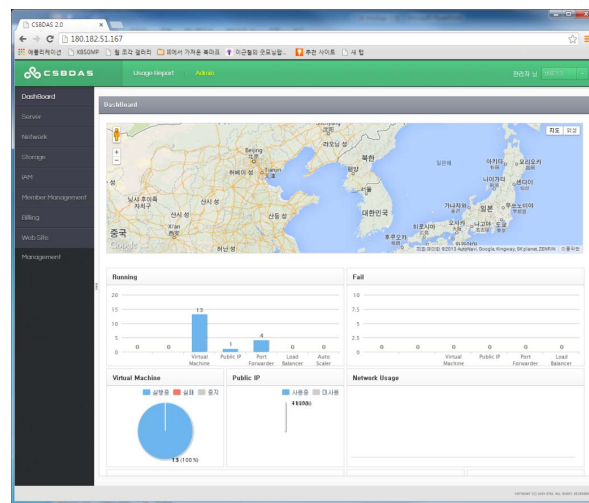


Figure 6. SLA-based Monitoring and Controlling Information

## V. CONCLUSIONS

The work progress of developing CSB-Portal is in the feasibility study. In 2013, the CSB-Portal has implemented in mock-up state as the first-year work product.

During next two years, the CSB-Portal will be beyond just portal system to integrate and manage any kind of CSPs and CSCs.

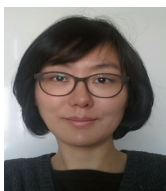
Especially we have challenges to design algorithms for the best negotiation and the smart placement of the CSB platform in the future.

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