

A Model of Information Technology as a Service (ITaaS) in Cloud Computing: A case of Collaborative Knowledge Management System

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Abstract—Collaborative Knowledge Management System (CKMS) is a system that has been used by members of Cloud Service Provider (CSP) as a place to manage and facilitate the information technology (IT) as a service (ITaaS) environment which is related to knowledge as a service (KaaS) in providing supplier and the recipient or demander for a specific application of tasks or services based on its allocating and agreement in cloud computing. In this context, there are many parties who are very concerning about it, but unfortunately there is lacking of a common of ITaaS of best practice as a guideline that can be used by CSP to make use collaboratively for the future purposes in engaging with services in the cloud computing environment. Therefore, this paper discusses the model of ITaaS in order to ensure everybody who are providing and receiving the services in the cloud satisfied and getting the best maximum return of the investment in allocating and sharing resources among the providers and recipients in cloud computing environment.

Keywords—Cloud Computing, Cloud Service Provider, Collaborative Knowledge Management System, Information Technology as a Service and Knowledge as a Service

I. INTRODUCTION

1) Cloud Computing and its Types and Models

Cloud computing describes applications that are extended to be accessible through the Internet. Anyone with a suitable Internet connection and a standard browser can access a cloud application. Cloud computing consists of multiple cloud computing service providers (CSPs). In terms of software and hardware, a cloud system is composed of many types of computers, storage devices, communications equipment, and software systems running on such devices [1]. Cloud computing is a term used to describe both a platform and type of application. A cloud computing platform dynamically provisions, configures, reconfigures, and de provisions servers as needed. Servers in the cloud can be physical machines or virtual machines [2, 3].

Currently there are five types of cloud computing namely public cloud, private cloud, hybrid cloud, community cloud and combination cloud [4]. The architecture of cloud computing are broadly divided into six categories which are Infrastructure-as-a-Service (IaaS), Platform-as-a-Service

(PaaS), Software-as-a-Service (SaaS), Communication-as-a-Service (CaaS), Data Storage-as-a-Service (DaaS) and Hardware-as-a-Service (HaaS) [5].

2) Collaborative Knowledge Management System (CKMS)

Collaborative Knowledge Management System (CKMS) is a system that has been used by members of community of practice (CoP) as a place to manage and facilitate the environment of information technology (IT) as a service (ITaaS) as well as in the context of knowledge as a service (KaaS) in providing supplier and the recipient or demander for a specific application of tasks or services based on its allocating and agreement in cloud computing. This environment as what we called as a concept of resource as a service (RaaS) is including the software (Software as a Service - SaaS), infrastructure (Infrastructure as a Service - IaaS), and platform (Platform as a Service - PaaS). In this context, there are many parties who are very concerning about it, but unfortunately there is lacking of a common of ITaaS of best practice as a guideline that can be used for CoP to make use collaboratively for the future purposes in engaging with services in the cloud environment. Therefore, in this paper will discuss the model of ITaaS in order to ensure everybody who are providing and receiving the services in the cloud satisfied and getting the best maximum return of the investment in allocating and sharing resources among the providers and recipients in cloud computing environment [6].

3) Information Technology as a Service (ITaaS)

Simply put, Information Technology as a Service in cloud environment is pay-per-usage, business needs-driven, on-demand approaches that delivers IT services according to well-defined Service Level Agreements (SLAs). IT continues to be critical to agency operation, but the entity providing it and how it is provided, does not [7]. IT becomes a tool to meet business needs, the means to an end, rather than the end itself. ITaaS does not mean that all IT functions or processes are outsourced to an IT Cloud Service Providers (CSPs) as in “lights out”. Instead, it is a shift in service delivery away from the philosophies of “do it yourself” or “outsource to a third party,” to a blend of the right sourcing options that mask the IT resources and operations from end users, focusing instead on elasticity, availability and affordability of enabling IT.

Underlying this delivery approach are the people, processes, and technologies necessary to deliver IT solutions in a standards-based, technologically sound, secure environment [7].

II. LITERATURE REVIEW

Cloud computing is a concept where the environment of computers are connected together as such a way that to allow members of CSP to work collaboratively based on SLA between service provider and demanders of services.

The role of CKMS in the world nowadays is becoming important component of the cloud environment in serving the CSP to manage, facilitate and share their knowledge to work collaboratively [6]. This one can be used by using CKMS especially related to the utilization of ITaaS in cloud computing environment.

CKMS is a system where people are making used of the Knowledge Management (KM) process such as knowledge acquisition, storage, dissemination and application of knowledge which is allowing CSP to work collaboratively [6]. In the context of cloud computing, since CKMS is allowing CSP to work collaboratively or we called as CKMS, it will provide the CSP to manage KaaS especially in related to the domain of IT environment.

In an ITaaS model, internal IT resources could instead become brokers and coordinators of services, not necessarily providers. ITaaS also differs from outsourcing in that some IT services may be provided by in-house IT staff, using resources owned by the organization, but these services are provided on-demand, with pay-per-usage, service level-oriented approach. Governance, planning, procurement and contract management remain crucial for success.

Haward [8] discussed on what makes cloud computing and ITaaS so transformative? He provides a helpfully differentiate between traditional IT and ITaaS in cloud environment as shown in table 1.

TABLE 1: TRADITIONAL IT VS ITAAS

Traditional IT	IT as a Service
Support the business	Engage the business
Constrain supply	Stimulate demand
Deliver applications	Aggregate services
Protect the perimeter	Protect intellectual property
Infrastructure for stability	Platform for innovation
Technological depth	Technological and business breadth
Cost center	Business investment option
Business specifies	Business self-serves
CIO shapes technology supply	CIO embraces business demand and delivers business value

III. METHODOLOGY

In order to develop the model of ITaaS with KaaS in storing, managing and facilitating of knowledge in cloud computing environment, the methodology shall be carried out in four main steps as shown:

1) Step 1: Literature review of ITaaS, KaaS and RaaS in a collaborative environment of cloud computing

This step involves evaluation of existing ITaaS with KaaS models, cloud knowledge literature reviews and how the ITaaS with KaaS as system can be used to manage, store and facilitate the personal knowledge facilitating by CSP in order to achieve their mission statement.

2) Step 2: Conduct a pre-survey

Questionnaire survey shall be used to evaluate the different ITaaS with KaaS models used by selected cloud environments such as junior and senior cloud developers as well as cloud administrators, so that they can verify the proposed ITaaS with KaaS such as system functionality and non-functionality requirement such as reliability and availability that supported from the literature as well as may have additional requirement of any missing variability or functions of ITaaS with KaaS as a model in providing the knowledge facilitating by CSP. The pre-survey shall cover collaborative activities and ITaaS with KaaS improvement required. Also, usage of collaborative tools and ITaaS with KaaS improvement sharing tools shall be identified.

3) Step 3: Formulation of the proposed model

In this step the formulation of our proposed ITaaS with KaaS model of facilitating of knowledge in a collaborative environment of cloud computing is discussed as follow:

Based on earlier literature reviews and pre-survey results, areas of concerns and different ITaaS with KaaS improvement requirement areas are noted. Build a ITaaS with KaaS model based on the knowledge management and facilitating techniques.

4) Step 4: Evaluation

In this step, another round of questionnaire called post-survey in order not only to verify and validate the model but also a part to enhancing of a comprehensive system model specification is discussed.

IV. A MODEL OF ITAAS IN CLOUD COMPUTING

This section described the model to manage and facilitate the ITaaS environment which is related to KaaS in cloud environment. Figure 1 shows a schematic representation the model of ITaaS in cloud computing. The framework has been built by using three layers.

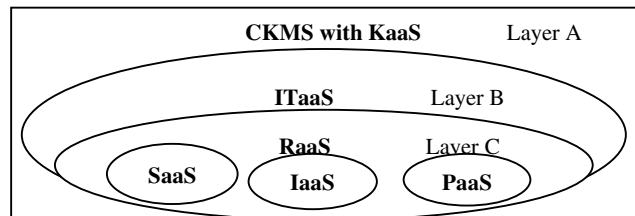


Figure 1: The Conceptual model of ITaaS in relating to CKMS with KaaS environment

The summarized of these layers as follows:

- **Layer A:** In this layer the cloud knowledge is driven based on KaaS techniques and manages, stores and facilitates based on CKMS techniques.

- **Layer B:** In this layer the IT services is been served by CSPs.
- **Layer C:** In this layer the knowledge of SaaS, IaaS and PaaS is managed based on RaaS capabilities.

The relationship of ITaaS and CKMS with KaaS in cloud computing Environment is tabulated in Table 2

TABLE 2: THE RELATIONSHIP OF ITaaS AND CKMS WITH KAAS IN CLOUD COMPUTING ENVIRONMENT

Cloud Computing Environment	ITaaS		
	RaaS & SLA		
CKMS with KaaS	SaaS	IaaS	PaaS

V. RESULTS AND DISCUSSION

The CKMS model development in the context of cloud computing has been gone rapidly. Based on this, there is a significant result shown that the CKMS should accommodated the following features or components, in order to become relevant to serve the CSP in cloud computing environment.

a) CKMS Capabilities with RaaS of its Environment

CKMS capabilities with KaaS of its environment that can be implemented based on the following aspects such as conceptual modeling, CKMS functionality and its architecture, CKMS capabilities, KaaS features and CKMS operational that having the similarity agreement. Figure 2 show the level of agreement on particular knowledge of CSP about the knowledge that need to be included in the CKMS for future purposes. While, Figure 3 show the level of importance of Knowledge Type that the explicit knowledge is more concern than tacit knowledge a KMS in cloud environment.

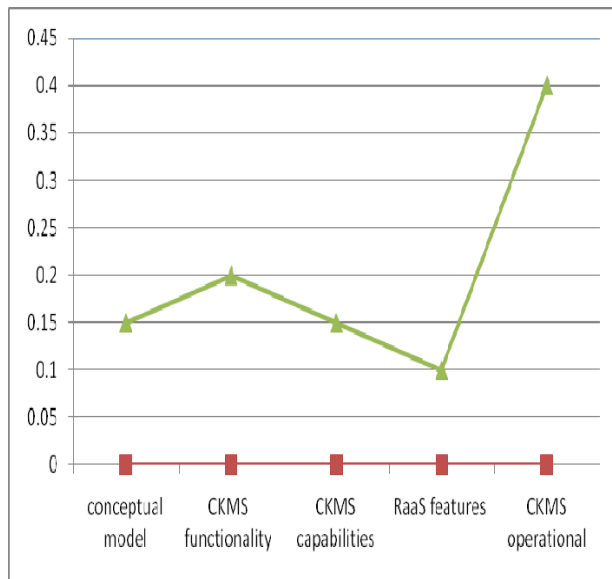


Figure 2: CKMS Capabilities with RaaS of its Environment

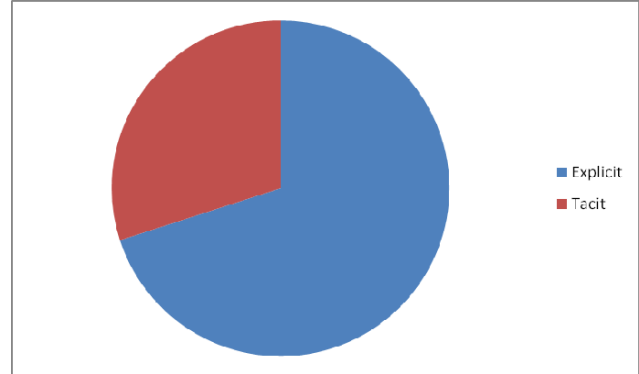


Figure 3: The Importance of Knowledge Type in CKMS in Cloud Environment

b) Knowledge structure in cloud environment

Based on the knowledge structure in cloud environment in terms of importance for reliability and availability, respondents are agreed that the average of knowledge structure in cloud environment in managing the knowledge as shown in Figure 4, the CSP has agreed that Reliability – 100%, and availability – 70%. This is shown that reliability is more concern in cloud computing environment.

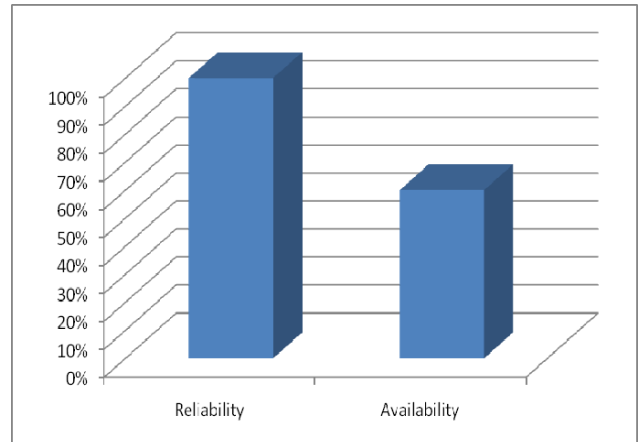


Figure 4: The Agreement of Importance for Knowledge Structure

VI. CONCLUSION

As a conclusion, the paper has shown that the the model of ITaaS together with RaaS and SLA in order to ensure everybody who are providing and receiving the services in the cloud satisfied and getting the best maximum return of the investment in allocating and sharing resources among the providers and recipients in cloud computing environment. The finding is also shown that the CSP can getting the collection of processes in cloud environment that has contribute a significant effect to them in acquiring, storing, disseminating and applying the knowledge for the future purposes. Besides that, in order to ensure CKMS with RaaS in cloud environment that can be done smoothly, the cloud administrator should be considered the most related issues like

performance, reliability and availability in a good manners so, that CSP can access and use of the particular knowledge at anywhere and at anytime.

For future work, it is good to be considered on how CKMS can be accessed and used by CSP in cloud environment that may be using any devices especially through mobile computing since this project is only considered for accessing in CKMS as common devices (client server based environment through desktop technology) only.

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