A CONCEPTUAL FRAMEWORK OF CLOUD-BASED KNOWLEDGE MANAGEMENT SYSTEM FOR HIGHER EDUCATION INSTITUTION

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Abstract: - *Higher education institutions create and apply the knowledge while perform their academic activities and process. Knowledge management system provides connections between all academic stakeholder to improved academic and administrative services. Higher education organizations realized the importance of Knowledge Management (KM) and some higher education institute has started practice. This paper developed a conceptual framework of cloud based knowledge management system and discusses the benefit of the framework.*

Keywords: *Knowledge Management, Cloud-based, Knowledge Management system, Higher education,*

I. Introduction

Today's world of higher learning academic education is becoming popular and create competitive in terms of quality to benchmark and international curriculum. No doubt the higher learning institution is an organization that has fertile and natural scope for knowledge management. The term "Knowledge Management" (KM) is used to describe everything from the application of new technologies in the campus of the institutions. Cloud computing is a new technology with regard to applications platforms which can be used for sharing and transferring data through information technology [4]. Maglitta [2] suggests that data is raw numbers and facts, information is processed data, and knowledge is information in actionable". Knowledge is information processed in the mind of an individual: it is personalized or subjective information related to facts, procedures, concepts, interpretations, ideas, observations and judgments (which may or may not be unique, useful, accurate, or structural). Information becomes knowledge once it is

processed in the mind of an individual ("tacit knowledge in the words of Polanyi [3] and Nonaka [4]. Cloud based knowledge management systems become an obvious solution to share and effectively use organizational knowledge. Link between KMS and cloud computing is claimed that it is a key factor to improve organizational performance. Cloud-based KMS implementation will save the organization a great deal of budgets because the organization does not need to buy, run, maintain, and upgrade their own hardware and software infrastructures [5, 6]. Using KM as a service in higher education could save time and effort to get knowledge.

II. Knowledge Management System and Cloud Computing Technology

This section provides the details intersection between KMS and Cloud Computing technology and discusses in detail the main features of Cloud Computing and its

benefits which can be used for improving KMS. Cloud computing is the paradigm that can benefit KM from two aspects: keeping it aligned to the new technological progresses, and providing a great means that can highly benefit knowledge sharing and acquisition in a highly distributed and dynamic environment. According to the National Institute of Standards and Technology (NIST) definition [7], "Cloud Computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The technology system concern in this proposed framework is with the cloud computing which has 4 types of development module and broadly classified three service categories as Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

A. Infrastructure as a Service (IaaS): it enables organizations to utilize servers, devices, network, and storage disks whenever they require. It provides a truly dynamic cloud computing infrastructure. Such an infrastructure comprises a pool of physical computing resources – i.e. processors, memory, network bandwidth and storage, potentially distributed physically across server and geographical boundaries. A virtualization technology allows IaaS providers to present clients with affordable and practically unlimited instances of servers which consist of physical resources as servers. Knowledge management in the cloud requires using the infrastructure for storing knowledge in great sizes and for learning and inference requirements for computational capacity. Activities like publishing a problem to a potential group of problem-solvers is an example that shows the need to interconnection and processing power in the infrastructure layer.

B. Platform as a Service: Service provider only provides platform or a stack of solutions for users. It helps users saving investment on hardware and software. This layer is placed on the infrastructure layer's virtual machines. PaaS solutions have enabled more and more people to develop and maintain web based applications without possessing specific expertise. Knowledge management in the cloud may use the PaaS services to allow knowledge workers (with technological expertise) to design their own applications on the basis of the provided platforms. These applications can become very widespread among a variety of users, making it possible to solve problems online, getting valuable knowledge from different sources based on knowledge workers' creativity in expressing their needs and sharing the problem via the desired cloud applications online.

C. Software as a Service: Services at this layer are typically applications that do not need to be developed e.g. email, customer relationship management etc. These applications are cloud based and are accessible to web users or organizations on a pay-as-you-go, anytime-anywhere basis. Knowledge gathering can be of the great interest in gathering knowledge from different sources. This way, SaaS may provide a free of charge to a potentially very large number of people and organizations, and in return gather lots of knowledge. In this layer, focus is on sharing, processing, and classifying knowledge along with stakeholder assessment based on cloud technology. KMaaS is a SaaS, in which, knowledge management services are provided by KMaaS service providers and are consumed by KMaaS service consumers.

III. Propose Framework of Cloud based Knowledge Management System for higher education

The proposed framework is particularly designed for higher education institute to provide

a Cloud-based KM service. This common KM service simplifies capturing and retrieving of knowledge anytime through the hosting system locally by all academic stakeholders. It also will help to improve the efficiency of higher education system. This raising cloud computing technologies are a form of outsource IT solution on demand pay-per-used basis. Cloud computing is a general term for anything that involves delivering hosted services over the internet. Cloud computing can be classified into 4 types on the basis of location where the cloud is hosted, these are Public, Private, Hybrid and Community cloud. The author have proposed and developed a conceptual framework model of cloud based knowledge management for higher education depending mostly on a through investigation of various model presented in various authors in their respective paper and articles. The framework is adapted from [8] cloud based knowledge management System to a major aims of facilitating and supporting of knowledge management system as a service in teaching and learning for higher education. The framework is organized into four layers as Knowledge management users and managers, Internet (KM domain registration i.e. user interface), Knowledge Management System and Communities of practice as shown in figure 1.
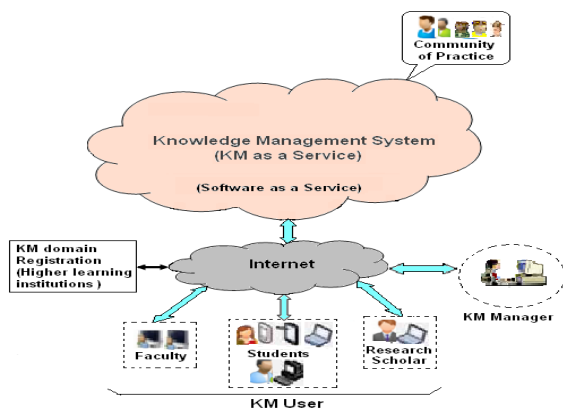

Fig.1: Cloud Based Knowledge Management System (KM as a Service) for Higher Education Institution.

The KM user and KM manager are the two entities involved knowledge management system in higher education. The faculty, students and research scholar are the knowledge users considered in this framework as it is focused on the academic process i.e. teaching and learning. By nature HEI is a knowledge creation and service centre. Everyone can learn, earn knowledge and manage the knowledge through cloud based knowledge Management System.

The faculty- faculty can create subject knowledge and use the knowledge by collaborating with other teacher and communities practice. They create knowledge structure and use knowledge system for collaboration with other teachers and other stakeholders. Teaching becomes profession of KM. A teacher can pass easily the writing skill of computer programming to the students. It advocates the knowledge clearly fall within the realm of knowledge management. Teachers become professionals by playing a main role in creation of so called knowledge worker. In this situation, teacher is always approach in search of new teaching idea, methodology that usually already published in journal and book.

Student- they are the main users as they keep track of their learning activities by developing portfolios of their work. Students are thirst to find people who share to their learning thought and identify new resources related to their subject knowledge and acquire new knowledge and skills. The function of learning process of the student is already started right from they have enrolled in an academic institution. KM is the foundation of learning that indicated that KM can help the competitive advantages and an alternative practice of problems solving technique.

Research Scholar- Research scholar used knowledge management for research innovation-based learning. They design the project and communicate with other scholar for effective activities and better outcome. Research communities' commonly use the facilities of KM for tracking many areas like research results,

outcomes, project under taken problems and success and failure stories. At the same time, they are looking for available expertise and resources of different areas handling projects and project funding and funding procedure. Utilising the facilities of KM is improved research activities and develops depth research of experience and valuable strategy to have research quality.

Knowledge management manager is another entity use in this framework. KM manager is the responsible for overall strategy, planning, and implementation. This executive position is also tacking initiatives for formulating KM strategy, handling KM operations and managing staff and change management of the educational organization.

Internet- it is second level of framework. Internet becomes a great tool that global source of information resources can access at anytime by anyone from any corner of the world. It acts as a powerful tool to communicate and exchange of ideas towards the stakeholder all over the world. However, there is need of reservation of KM domain name for authorizing to access the user required knowledge from knowledge management system. A unique KM domain name is required to identify the user.

The another level is knowledge Management System, it is a cloud base knowledge management service which has a initiatives of creating databases of experts and expertise profiling to aid access to resources of non-collocated individuals. It has process or method that can be captured available knowledge and retain in a database. Then it made available to all the users in any time when needed in order to life long learning and long term competitiveness of an organization. The development of KMS is on private cloud interface through internet and offered different knowledge management service (KMaaS) to the user. This KMS development for teaching and learning interface through internet is a self-directed learning in HEI. It served as a supporting mechanism for development of

teaching delivery to facilities KM networks for teachers and students.

A community of practice is the last level entity in this framework. It is a virtual professional groups brought together by shared goals and common concerns regarding participation, exchanges, trading, organizing and management of their tacit and explicit knowledge in order to improve their professional performance, as well as the performance of their organizations as a whole. Communities practice plays a major role in capturing tacit knowledge, facilitating innovation, as well as knowledge sharing and collaboration. It gives new idea of appropriate knowledge base creation among faculty members and possibility of knowledge codification for sharing and capturing explicit and tacit knowledge in the higher educational institution. It is an effective resource sharing platform of knowledge among the faculty members, students and research scholar.

IV. Benefit of proposed framework

Due to continuous development and upgrades in IT technologies infrastructure, software and hardware has put a great deal of pressure on budgets and expenses of educational institutions. In such situation a relatively new concept and constantly evolving cloud computing is started introduced across the world in academic institutions. It provides a next generation IT infrastructure platform which offers service developers and end-users unprecedented control and dynamism in real-time to help for service latency, availability, performance, security and knowledge management. Cloud computing also offers significant computing capability and economy of scale that might not otherwise be affordable without the IT infrastructure investment. Cloud based knowledge management systems become an obvious solution to share and effectively use organizational knowledge. And some other benefits are listed below:

A. Reduced costs and increased efficiency: Reduced licensing charges by using a single content management system. Reduced ownership charges due to transition to cloud and enhanced efficiency and cooperation throughout enterprises via a unified system.

B. Flexibility and Scalability of service: The service core scales flexible and supports multi-tenancy. Reduced risks due to improve flexible and scable service. Using KM as a service in higher education could save time and effort to get knowledge, so all the stakeholder able to use knowledge wherever and whenever it is needed. Technologies allow filtering knowledge according to the user interest and profile.

C. Reduced maintenance cost and resource cost: Cloud based knowledge management will help to reduce the operation and maintenance cost. In particular maintenance cost is important in IT infrastructure. With cloud computing, academic staff can focus on their own research, instead of dealing with the complexity of high performance computing systems. HEI can reduce or eliminate IT capital expenditures and decrease ongoing operating expenses by paying only for the services they used and potentially by reducing IT staff.

D. Better scope of access location and device: Any network-enabled device can lead to access at any choice of location. A client or user can connect through his/her PC at work, or laptop at home, or on smartphone anywhere in world can access instantly to knowledge stored in the cloud. This is really beneficial for knowledge organizations in which many individuals are not tied down to a single location.

E. Availability **and quality of service -** Availability of the services is one of the most important that desired by the user using the cloud based KM. 24X7 is the availability that is needed by system user without failure with quality of service.

V. Discussion

The present framework consists of four modules which illustrate the trends in uses of KMS in higher education with Cloud Computing features. The modules are i) a knowledge retrieval module ii) a knowledge storage module iii) a knowledge sharing module iv) a knowledge publishing module.

Knowledge retrieval seeks to return information in a structured form, consistent with human cognitive processes as opposed to simple lists of data items. Knowledge retrieval focuses on the knowledge level which we need to examine how to extract, represent, and use the knowledge in data and information [9]. Knowledge retrieval is provides knowledge to knowledge seekers or users in a structured way. It is also based on partial match and best match. Considering user interfacing perspective knowledge retrieval is focus on semantics and knowledge organization by connecting among knowledge units and knowledge structures.

Knowledge storage is an approach to database systems where the data and information resides, Maglitta [2] suggests that data is raw numbers and facts, information is processed data, and knowledge is information in actionable". Knowledge is retaining into a database for the purpose of everyone use. The success of organization would be to build a strong knowledge database in the organization – knowledge can be shared by new people as the oldies leave the organization [10]. Viewing knowledge as a crucial resource, organizations recognize the value of knowledge storage for present and future use. The preservation of knowledge seems to be a major building block in implementing knowledge management so as to re-use and create knowledge. [11] Point out that the term organizational memory and knowledge storage will be used synonymously. Probst et. al. [12] describes memory as "a system of knowledge and skills that preserves and stores perceptions and experiences beyond the moment when they occur, so that they can be retrieved at

a later time". Knowledge of the organization relevant and correct should be updated. It should be stored into and should also be retrievable from the storage. Consequently the storage of such knowledge could yield more benefit to the organization.

A successful knowledge management system is a shared system where people can retrieve and contribute to the knowledge pool as well. In fact, knowledge sharing is the core process of the KM, since the main goal and objectives of the KM research and practice is to foster the flow of knowledge among individuals [13]. Knowledge sharing is concerns with transferring and sharing knowledge among the individuals in the organization. During sharing of knowledge, a new knowledge is created by combining the shared knowledge and existing knowledge [14]. Knowledge sharing module has sub-process, according to [15] knowledge sharing contains the sub-processes: knowledge representation, knowledge distribution and knowledge utilization. Knowledge representation is to represent knowledge in a more clear and storable way. Knowledge distribution supports the spread of knowledge throughout the organization. Finally, knowledge utilization supports knowledge application.

Knowledge publishing has been rapidly spreading on the World Wide Web over the last three years. It is a new form of communication that many expect will change the way people work and collaborate, especially in areas where knowledge and innovation play an important role. Knowledge publishing has its roots in a practice known as "weblogging". Weblogs are the altering communication patterns on the Web. A weblog is a continuously-running publication and updates that incites readers to visit the site on a regular basis. A relationship is established between author and reader and strengthened with each visit, just as happens with other regular publications. Then latter often being seen once and seldom revisited.

This framework corresponds to Alavi and Leidnar [16] suggestion that a knowledge management system offer for its processes through the knowledge management cycle which should be alienated into: Knowledge Creation, Storage and Retrieval, Transfer, and Applications. The knowledge creation phase deals with combining new sources of knowledge. Knowledge storage and retrieval used to support organization memory and individuals to access knowledge. Knowledge storage provides coding and indexing of knowledge for later recovery. Knowledge transfer provides communication channels and faster access to knowledge sources. The last step of the process is knowledge application which assists in applying knowledge in different sites through workflow automation. Knowledge management system can be accessed through mobile computing [17].

VI. Conclusion

Building a cloud-based KMS is about transferring an existing KMS to cloud-based environment to achieve the purpose of facilitating knowledge management. In the manner of facilitating knowledge management or use it as a KMS offered a client or user can connect through his/her PC at work, or laptop at home, or on smartphone anywhere in world. It can access instantly to knowledge stored in the cloud. This is really beneficial for knowledge organizations in which many individuals are not tied down to a single location. Cloud-based KM can be easily accessed knowledge at any choice of user location. All the stakeholders are able to use knowledge wherever and whenever it is needed. Furthermore, by using private cloud sensitive information should be shielded from most users, while allowing easy access to those with the proper credentials. Cloud computing paradigm base KM, i.e. KM as a Service will make a vast decrease in time, cost and effort for access of knowledge. It also provides a great means for gathering and redistributing knowledge through Internet and Web browser.

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