Achieving Knowledge Management Through Cloud Computing

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Abstract

In era of knowledge based economy and globalization of world economy, a new opportunity has been emerged as a management issue within the spectrum of information management, information technology, artificial intelligence, expert system, semantic web, neural network, cognitive sciences, mathematics and management theory, economics and recently Cloud Computing.

This study tries to give a different perspective of the cloud application through a knowledge management perspective and its structure in the cloud computing environment. In recent years, there has been a great hype about cloud computing and different books and literature reviews have classified different types of cloud with various definitions and criteria focusing on mainly three different layers of services being infrastructure, platform and software. The benefit of cloud computing is supply of services anytime, anywhere device-agnostic access. This paper provides a meta-observation over an integrated cloud ecosystem through the knowledge window.

Achieving Knowledge Management through Cloud Computing has expanded new insights, vision and practices. This article critically evaluates ways to achieve knowledge management though cloud computing.

Keywords: Cloud Computing, Knowledge, Knowledge Management

1. Introduction to Knowledge Management

Knowledge management encapsulates several discipline like Information Science, Information Technology, Informatics, Artificial Intelligence, Management theory, economics, organizational behavior, social science, epistemology, cognitive science, expert system, semantic web, neural networks etc. Knowledge management touches human behavior, attitudes, capacities, philosophies, models, operations tool and technology. It is required that research in area of human resources, information resource centers and knowledge resource centers that creates, process, store, transfer the knowledge and how one can handle with these process with knowledge management model and tools.

Knowledge management has become a central management point throughout the world. Information Technology and Globalization of economy provide opportunities to increase emphasis on personnel and societal intellectual resources in knowledge economy. Knowledge management is still in its infancy stage. Knowledge management is a strategy whereby the knowledge within an organization is treated as a key asset to be managed in the most effective way possible.[1]

Very fast growth in technology, increased quantity and complexity and the wide and easy access to

information creates a new demand for the present information Technology. The technologies of the "knowledge Age" are transitioning from individual, isolated information systems and repositories to an expanded exchange and sharing of information in order to broaden the size and depth of knowledge available in individual and activities. According the leading researchers around the world by the year 2010, more than one trillion intelligent computing devices will be utilized in all aspects of the commercial environment. The concept of intelligence is built upon four fundamental principles, which include: Data, Information, Knowledge and Wisdom. Wisdom is also known as intelligence. Intelligence is an entity that is the measures, map and symbols of the world, and is also information that produced by attaching meaning to data, data becomes information when it becomes to our decision-making process. Knowledge is the subjective interpretation of information in effort to recognize the application and approach to act upon in the mind of receiver. [2] It attaches purpose and competence to information, resulting in the potential to generate action. Wisdom embodies awareness, insight, moral judgments, and principles to construct new knowledge and improve upon existing knowledge. Knowledge modeling packages are combinations of data or information into a reusable format for the purpose of preserving, improving, sharing, aggregating and processing knowledge to simulate intelligence. Innovation, progress and prosperity all depends heavily on making right decisions. Knowledge model can have a data, information or outputs from other models as input. Knowledge model has the ability to be constantly and continuous monitored and improved. Knowledge models help us to learn from past decisions to assess

present activities and just as important to preserve all domain expertise.[3]
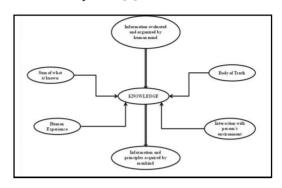

Figure 1: Knowledge Management

According A.C. Foskett," Knowledge is what I know, Information is what we know".[4]

Merriam-Webster Online Dictionary, knowledge is "the sum of what is known: the body of truth, information and principles acquired by mankind".[5]

According Sunasee and Sewery, 2002," knowledge is human expertise stored in a person's mind, gained through experience and interaction with the person's environment".[6]

According Rousa, 2002," knowledge is information evaluated and organized by the human mind so that it can be used purposefully".[7]

According to T. Davenport et al. 1998 "knowledge is information combined with experience, context, interpretation and reflection. It is a high- value form of information that is ready to decisions and actions."[8]
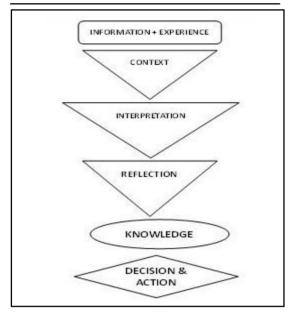
Figure 2: Knowledge Management

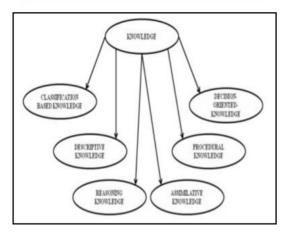**Knowledge may be Classified as Follows**

Figure 3:   Classification of Knowledge

2.   Cloud Computing

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams.

The three distinct characteristics of Cloud Computing involves selling on demand, in terms of minute or the hour; it is flexible in terms of a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the service supplier/provider (the user or client needs only a personal computer and Internet access). With the growing innovations in virtualization, distributed computing as well as improved access to high-speed Internet, have accelerated awareness and usage of cloud computing.

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.

❖ **Public Cloud:** Computing infrastructure is hosted at the Vendor/Provider location. The Client/ user has no visibility over the location of the cloud computing infrastructure. The computing infrastructure is shared between organizations.

❖ **Private Cloud:** Computing architecture is dedicated to the Client/customer and is not shared with other organisations/clients. They are expensive but are more secure than Public Clouds. Private clouds may be externally hosted ones as well as in premise hosted clouds.

❖ **Hybrid Cloud**: Organisations host some critical, secure applications in private clouds and other not so critical applications are hosted in the public cloud. The combination is known as Hybrid Cloud. Another hybrid cloud is Cloud bursting. It is used to define a system where the organisation uses its own infrastructure for normal usage, but cloud is used for peak loads.

❖ **Community Cloud**: The Cloud infrastructure is shared between the organizations of the same community. For example, all the government

agencies in a city can share the same cloud but not the non government agencies. All libraries in a city or country sharing the same cloud.[9]

3. Types of Cloud Computing

Cloud Computing services are broadly divided into three categories:

A. Infrastructure as a Service (IaaS)- Service provider bears all the cost of servers, networking equipment, storage, and back-ups. You just have to pay to take the computing service. And the users build their own application softwares. 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 which can be organized on demand into a dynamic logical entity i.e. "cloud computer", that can grow or shrink in real-time in order to assure the desired levels of latency sensitivity, performance, scalability, reliability and security to any application that runs in it. Amazon EC2 is a great example of this type of service.

B. Platform as a Service (PaaS) - Service provider only provide platform or a stack of solutions for your users. It helps users saving investment on hardware and software. PaaS offerings facilitate deployment of applications without the cost and complexity of buying and managing the underlying hardware and software and provisioning hosting capabilities, providing all of the facilities required to support the complete life cycle of building and delivering web applications and services entirely available from the Internet.PaaS offerings may include facilities for application design, application development,

testing, deployment and hosting as well as application services such as team collaboration, web service integration and marshalling, database integration, security, scalability, storage, persistence, state management, application versioning, application instrumentation and developer community facilitation. These services may be provisioned as an integrated solution over the web. Google Gc engine and Force.com provide this type of service.

C. Software as a Service (SaaS) - Service provider will give your users the service of using their software, especially any type of applications software. They will be able to develop cloud based services using the management services API to configure, monitor and manage service resource allocation, availability, utilization, performance and security of their applications in real-time. Service management and service delivery will be integrated into application development to allow application developers to be able to specify run time SLAs. Example-Google (GOOG), Salesforce.com (CRM), NetSuite (N).

4. How Cloud-based Knowledge Management, can be Beneficial

The benefit of cloud-based computing is that your key information and softwares can be easily accessed virtually. Any network-enabled device can lead to access at any location of your choice. A client or user can connect through his 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.

With ongoing scenario the predicated near future will have no central offices/organizational hubs at

all but instead will consist of individuals scattered around the world all plugged into the cloud.

Built in redundancy is another benefit of cloud-based knowledge management systems. As the information is typically stored across many servers, computers, data storage devices in cloud computing instead of in one place, one server outage does not hamper the access and functioning of whole network.

Another major benefit of cloud-based knowledge management in cost economies/ Instead of installing hardware and software on every computer by the organization they can simply store it all in the cloud and have user/cleints access it through a browser or lightweight interface.

An appropriate example of Knowledge management through Cloud Computing is of OCLC and Google are exchanging data to facilitate the discovery of library collections through Google search services. OCLC member libraries participating in the Google Book Search program may share their WorldCat-derived MARC (machine-readable cataloging) records with Google to better facilitate discovery of library collections through Google, with links from Google Book Search to WorldCat.org that will drive trafûc to library OPACs and other library services. Google shares data and links to digitized books with OCLC, which makes it possible for OCLC to represent the digitized collections of OCLC member libraries in WorldCat. [10]

5. Cloud-based knowledge Management and Potential Concerns

There are also some drawbacks inherent to cloud-based knowledge management systems. Cloud based Knowledge management also creates security risks that can be quite serious for organizations and

its users which is paramount. In the past many cases of hacking, dotting, damaging, cracking and defacing of Information stored in the cloud has been reported though they were well protected through firewalls and authentication measures. Similarly privacy, security, data integrity, intellectual property management, audit trails, and other issues have raised the sanctity of Knowledge Management through Cloud Computing. This menace can only be lessened, by taking advanced measures to hide and protect the most security-sensitive information stored.

Another concern is of additional trained staff for setting up a cloud-based management system is often expensive for some organisations. Cloud networking is usually quite simple from the user's perspective, but infrastructural base of it is complicated. Similarly cloud-computing consultancy services that can help organisations to have smooth functioning are still somewhat expensive as well.[11]
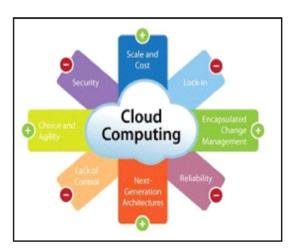

Figure 4: Cloud Computing

The above image explains the advantages and disadvantages of Cloud Computing in plus and minus respectively.[12]

6. KM Aspects Aligned to Cloud Computing

❖ **Knowledge Cloud Storage**: Vast knowledge is stored in Blogger zone, Micro-blogging page, Team collaboration space, Individual web space, Podcasts, Webcasts, and Wikis. These all can be utilized through low-priced Cloud storage.

❖ **Multi-tenant Environment and Elasticity** Cloud computing provides on-demand IT services and scalability in a multi-tenant environment. Flexibility can be achieved by allocating IT resources as they are needed. Search model is supported with elastic nature of cloud computing in case of sudden spikes; Ideal for projects such as bulk e-mails, Web conferencing and resource management.

❖ **Scalable Services**: Cloud Computing provides integrated scalable services with strong SLAs

❖ **Reliable and Easy Access**: Cloud model provides Information access from anytime, anywhere 24*7. With the ease of access and support for multiple clients/users, approval process in workflows becomes more efficient.

❖ **High Performance Computing**: BI/analytic tool(s) which enable corporate executives and end-users to quickly and easily manipulate knowledge assets to generate the right insights to make better decisions and improve their operational effectiveness and to drive innovations and research.

❖ **Fault to Lerance**: Provide the base for secured fault tolerance.

❖ **Security**: Cloud computing secures data, ideas, governance and allows inter operatibility of services.[13]

This movement toward a knowledge management constitutes a significant paradigm shift. Future knowledge management will require tools to integrate and access information across devices, formats, and locations, to facilitate their increasingly mobile and remote work styles. Technology has to become smarter and more tailored to specific users to help knowledge organisers filter and integrate disparate information bits into usable knowledge. As technology becomes more aware of, and adapted to specific users, they will need visibility and control of the documented personal information that becomes a by-product of evolving context-aware systems. Technology is a facilitator and a key enabler. Cloud Computing is one of the prominent example of it! [14]

7. Conclusion

Knowledge management provides a whole new momentum and direction of knowledge disseminating centre and corporate leadership and practices. Knowledge management comprises a range of strategies and practices used within an organization to identify, create, represent, distribute, and enable adoption of insights and experiences. While cloud computing refers to services, applications, and data storage delivered online through powerful file servers. Cloud computing provides us virtually unlimited and on – demand computing resources. The infrastructure of cloud computing is such, that it encourages the development of innovation in every field. The proposed goal of achieving knowledge management described in this paper dramatically changes the current landscape of enabling cloud computing service. Cloud Computing provides a next generation infrastructure platform which offers service developers and end-users unprecedented

control and dynamism in real-time to help assure SLAs for service latency, availability, performance, security and knowledge management.

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