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INFORMATION SECURITY FOR CLOUD COMPUTING IN LIBRARIES

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ABSTRACT :

Cloud storage is suggested and adopted in many of the libraries and information centers today. But, it is noted that the data stored in clouds is not free from problems and concerns. Hence, there are concerns of privacy of the data stored, data security, etc. The present paper analyzed the universal data storage, which to a greater extent reduces the problems and weaknesses of the cloud storages generally adopted by many of the organizations.

Keywords: Cloud computing, Information security and Libraries

INTRODUCTION :

Libraries are using computers for running services such as Integrated Library Management Software (ILMS), website or portal, digital library or institutional repository, etc. These are either maintained by parent organization's computer staff or library staff. It involves investment on hardware, software and staff to maintain these services and undertake backup and upgrade as and when new version of the software gets released. Library professionals in most cases not being trained in maintaining servers find it difficult to undertake some of these activities without the support of IT staff from within or outside the organization. Now cloud computing has become a new buzzword in the field of libraries, which is blessing in disguise to run different ICT services without much of a problem as third-party services will manage servers and undertake upgrades and take backup of data. (Bansode and Pujar, 2012)

Cloud Computing

The term cloud means "Universal Data Storage". The term "cloud computing" has been used in recent years to denote a particular way of

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providing computer services, made possible by developments in communications technology. Other terms including "grids" and "clusters" have been used to indicate collaborative operation of computers, but cloud computing has the special feature that access is provided as a service, similarly in some respects to the supply of electrical power or piped water. Variations are referred to as: Infrastructure-as-a-Service (IaaS), Platform-as a- Service (PaaS) and application(s) or Software-as-a-Service (SaaS). In each case the client organisation receives service from a powerful combination of processing and storage facilities without needing to know details. Means of communication between client and cloud have been termed "middleware" and depend very much on formation of images of virtual machines. An important aspect is load balancing among the actual machines (Andrew, 2012).

Cloud Computing is a new large scale distributed computing paradigm in which dynamically scalable virtualized computing resources and services are provided over the Internet. Users do not need any knowledge of the infrastructure that run their applications somewhere "in the cloud", whether they run on an internal private network or on the Internet. Cloud Computing is service oriented paradigm which includes both infrastructure and software as services. This allows user applications to be constructed out of various services, represented by individual independent software components (service providers) which maximize services/software reusability. It is Service Level Agreement driven, where the infrastructure is dynamically managed by service-level agreements that define usage policies at pre-set cost and defined time scale for the delivery of a service (Khaddaj, 2012).

Cloud Computing a new model of computing that is widely being utilized in today's industry and society (Hartig, 2008).

Cloud Computing concept is derived from the imagery of the "Internet cloud", in which the imagery of a cloud is traditionally "used to

represent the Internet or some large networked environment". The idea depicted in the imagery is that client data and applications are stored and accessed "somewhere out there" (Hosch, 2009).

Hartig defined it as "virtualization of resources that maintains and manages itself In simple words, cloud computing can be defined as simply the sharing and use of applications and resources of a network environment to get work done without concern about ownership and management of the network's resources and applications. With cloud computing, computer resources for getting work done and their data are no longer stored on one's personal computer, but are hosted elsewhere to be made accessible in any location and at any time. (Hartig, 2008).

Cloud Computing, also known as "The Cloud", is a highly scalable platform promising quick access to hardware and software over the internet, in addition to easy management and access by non-expert users. There are various types of "clouds".

• Cloud Computing may be public, in the event that the owner is a provider maintaining the cloud for the entities that own the data: In this case, entities pay for the use and enjoyment of the resource on the internet.

• It may also be private in the event that the platform is maintained by the institution itself, within its facilities. However, the term Cloud Computing is most commonly associated with the public cloud.

• Cloud Computing relies on technologies such as virtualization, programming techniques such as multi-tenancy and/or scalability, load balancing and optimal performance, to ensure that resources are offered quickly and easily. Furthermore, in the case of public clouds, these techniques generate economies of scale arising from the efficient use of hardware and human resources. These economies of scale, in turn, have an effect on the price the customer pays, which is of great interest to any institution in current times (Romero, 2012).

Problems and Challenges in Cloud Computing

There are many problems and challenges in cloud computing applications. There are problems and concerns in using cloud services such as privacy, security, etc., some of the libraries have already embraced this new technology to run some of their services. Following are the problems and concerns in cloud computing:

Security and Privacy:

The major concern about cloud computing is security and privacy, especially the organizations are dealing with private information related to the customers or users. The data stored in clouds is vulnerable to viruses, hacking, theft, etc. Hence, there is always fear of loss of data stored in clouds.

Network Connectivity and Bandwidth:

Since the cloud computing is offered over the internet, if the connection goes down due to any reason then the organizations suffer from loss of data connectivity till the time it is set. Also the service requires more bandwidth, as it may not work on low-speed internet connections (Miller, 2009).

Dependence on Outside Agencies:

The cloud services being offered by third party services over the Internet, it is virtually difficult to have any control on the maintenance levels and the frequency. Also it is tough to assess the contingency procedures of the service provider in regard to backup, updates, restore and disaster recovery. Migration to other service provider is also an issue, if the uniform standards are not followed by the host (Bansode and Pujar, 2012).

Integration of Knowledge:

It is also difficult to integrate the knowledge and data that is stored in clouds.

Cost:

Depending on the number of users, the cost may high or low. If there are more users and less data, the cost may down, but on the other hand, if there are lesser users and large amount of data, then the cost may be higher. To cope with these concerns related to cloud computing, many of the organizations and individuals are developing secured models for cloud computing. It is essential for the libraries to go for their own clouds. For this purpose, there is need to design and develop an independent and secured model of cloud computing.

• **Semantic data:** The data provided by the user semantically organised in such way that only the trusted parties can access and expose the data, it is often done upon request by the owner of the data.

• **Internet resources:** Internet resources can be defined as anything which is available on the internet.

• **Service users:** An entity which uses the service of this technology, who is able to store data on the cloud, this could be individual users or public users such as enterprises.

• **Semantic link:** This is the link formed between the end-user, service provider and the semantic data. This is nothing but semantic data. In universal data storage, (provided by various service providers) a user stores his/her data. The owner of the data is also the owner of the information wanted his/her information to be stored and protected from external threats. The universal data storage also contains data from various other users. The stored data is accessed by each owner through search. In cloud computing as users no longer stores the data in his/her server or data storage, it is of very important that user's data are intelligently stored, maintained and protected. In many cases the users appoint third party to monitor their data, because the users have very little or no resources to do so. Sometimes to appoint such a third party is not that secure because of the fear of information manipulation and

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leakage. In this proposed approach that the semantic link between the service providers, users and semantic data can overcome these above mentioned problems and it is reliable and semantic. Gradually the universal data storage is able to learn, infer and forms searchable semantic links and index.

The aims of new system should be data protection, semantic information indexing, semantic check for interlopers, etc. These features should be adopted so as to authenticate only genuine users to gain information from knowledge database. The indexing and query method should be based on hash tree access using per node or per document identifiers, descendent/ ancestor search element search by suing keyword, incremental update and looking after the size of indexing such as entry number and entry size. The hash tree is suitable since cross searching as well as parent to children based search is needed. In this approach every path and entity and its relationships are selected for indexing, so that the data guide has to be done with same sequence of labels. Every path in the data base should have only one corresponding path in the data guide.

For example, Biju John and Khaddaj (2012) had given a model as under. The key words are related to its owner or contributor "Fanta" such as "supplier" and "Location". Here supplier and location are also the attributes of "Fanta". The number of Fanta, supplier or location can be presented as integers 0-n. Supplier and location are names, and all these attributes are nested in each element. The hash function noted here.

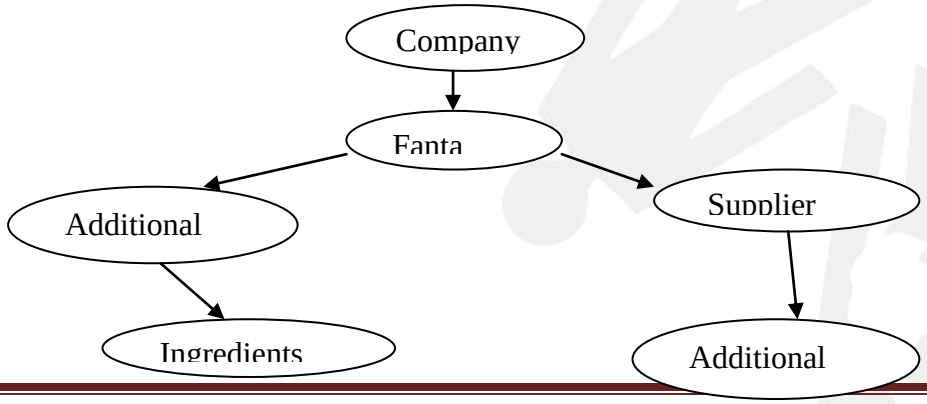

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Fig.1. Graphic of Indexing and Search

It is revealed from the above figure that the indexing and search using hash tree access, also shows that each node is identified by an identifying number and it goes from ancestor to descendant and also allows cross search descendant to ancestor (graphical search). Keyword is also the attribute value and each time the node looks for updates and the insertion is incremental. In cloud computing the local data becomes universal data by storing the data in the universal data storage (service provider) and therefore each owner's data has three parts. One is the searchable data with keywords, second is the data stored in universal database (probably encrypted) and the third is the semantic data formed by semantic links (connections). Each owner's searchable data eventually becomes semantic data and it forms semantic connections within itself.

In order to integrate and establish semantic relationships between entities of an owner or a universal database environment, the first step will be to identify entities and relationships of products services of a particular owner etc. Then, the identified entities and their relationships are classified and labeled. The itemized entities and their relationships can be then stored on a universal database. In order to facilitate the correspondence between entities, tags can be used. The tagging system can notify of the available products and their relationships. Therefore, the nonrelated products or services of an owner can be easily identified or updated.

CONCLUSION :

It is noted that the data stored in universal data storage is valuable and secured. Hence, the data stored in each library and information centre stored in universal data storage and their records are protected along with keyword index to allow semantic searches by users. In order to make the search more efficient and avoid the gatecrashers the present paper proposed a Semantic check for interlopers where users obtain their

search capabilities from universal data storage based on their attributes. It is proposed for novel solution for efficient search and discovery, in order to enhance the search efficiency using semantic search and semantic connections for cloud computing.

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