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The Role Of Cloud Computing In Sharing Of Information Resources Among Digital Libraries In New Digital Era

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Abstract:

The evolution of traditional library collections to digital or virtual collections has given new dimension. The Internet, Web environment and associated sophisticated tools have given a new dynamic role to play and serve the new information based society in better ways than previously. Because of the powerful features of Web i.e. distributed, heterogeneous, collaborative, multimedia, multi-protocol, hypermedia-oriented architecture, World Wide Web has revolutionized the way people access information, and has opened up new possibilities in areas such as digital libraries, virtual libraries, scientific information retrieval and dissemination. For above list there is a new addition called "cloud computing", it is a new technology which uses Internet and central remote servers to keep up data and applications. The article gives an overview of limitless scope of cloud computing using internet and web, the role of cloud computing in sharing of information resources through internet and web environment especially as intermediary, facilitator, knowledge manager and shifter of information resources is also described.

Keywords: *Internet, World Wide Web, Cloud Computing, digital Library, Search Intermediary Facilitator, Interface Designer, Shifter of Information Resource, Resource Sharing*

1.Introduction

The internet is a global network of networks that connect computers all over the world, so that any one from any point in the network can communicate with others on the network through a service provider. The transmission control protocol/ Internet protocol (TCP/IP) and the World Wide Web (WWW) technology have become the universal standard for networking and deliver of information. The Personal Digital Assistant (PDA), also known as handhelds, pocket computers or palm-tops, are rapidly covering on a single pocket device that is leveraging on the wireless TCP/IP networks and WWW protocol so that information can be delivered anywhere and anytime. There are many ways of networking with PDA and currently the popular standards include Infrared Data Association (IrDA), Wireless Fidelity or Wi-fi, Blue Tooth Radio and the General Pocket Radio Service (GPRS). Similarly Cloud Computing is a new technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows users to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth.

2.Defining Digital Libraries

Digital libraries are defined in many ways, encompassing both analog materials made available digitally and newly created digital content. Already there is misconception about digital libraries in the minds of some people, particularly traditional library professionals. Because of lack of understanding of the fundamental concepts, different things mean to different people. Some still feel that on-line catalogues or bibliographies are 'digital' resources. It should be noted that these electronic resources are only 'pointers' to documents and do not constitute the 'content' or full-text of documents. With so much of ongoing research in the area of digital libraries, problems of terminology, standards, and quality are bound to crop up[1].

Below these situations, it is necessary to enclose a noticeable design of the concepts, technologies, standards, formats, protocols, policies and legal/ethical issues, before venturing into digital libraries. "The future of digital library history will be determined not by the technology involved, but by the ideology. If the prevailing definition of a digital library is an organized searchable collection in digital format, then the future of digital libraries will reflect a move toward integrated service functions and collection

development and management similar to the traditional library organization". Some of the definitions given by the computer 'gurus' are given below.

"Digital library is a library that maintains all, or a substantial part, of its collection in computer-processible form as an alternative, supplements, or complement to the conventional printed and microfilm materials that currently dominate library collections" (William Saffady)[2]

"A managed collection of information with associated services, where the information is stored in digital formats and is accessible over a network". (Arms) [3]

"Digital libraries are organized collections of digital information. They combine the structuring and gathering of information, which libraries and archives have always done, with the digital representation that computers have made possible." (Lesk) [4]

"…a library / information space, located in either a physical or virtual space, or a combination of both, in which a significant proportion of the resources available to users of that service exist only in digital form". (Bawden and Rowlands) [5]

3.Resource Sharing

Characterization of resource sharing in the Libraries are defined as "Resources are making available to other libraries, from the library resources owned by a board, the information contained in those resources will be made available from the expertise staff they help in locating and makes available the information or the library resources"(Murthy)[6].

In its broadest sense, resource sharing is the most frequent use by many libraries of each other's resources, whether they are, equipment, staff knowledge and expertise, materials, facilities, and/or information resources. Although the majority of resource sharing has been the sharing of bibliographic information and document exchange through interlibrary loan, it also includes the staff, expertise, technology, and services that enable this to happen. The library network, whatever its configuration is an organized system of sharing resources based on a set of shared values and formalized operational agreements.

4.Cloud Computing

Cloud computing illustrate a innovative extension, utilization, and discharge model for IT services support on the Internet, and it naturally engage over the-Internet-provision of dynamically scalable and often virtualized resources. It is a derivative and end result of the ease-of-access to remote computing sites afford by the Internet. Distinctive cloud

computing donor carries common business applications online that are accessed from an alternative Web service or software like a Web browser, at the same time the software and data are stored on servers. The majority cloud computing communications consists of services distribute through universal hub and built on servers (Galen, 2008)[7]. In general, Cloud computing customers do not own the physical infrastructure, instead avoiding capital expenditure by renting usage from a third-party provider. They consume resources as a service and pay only for resources that they use.

5.Architecture

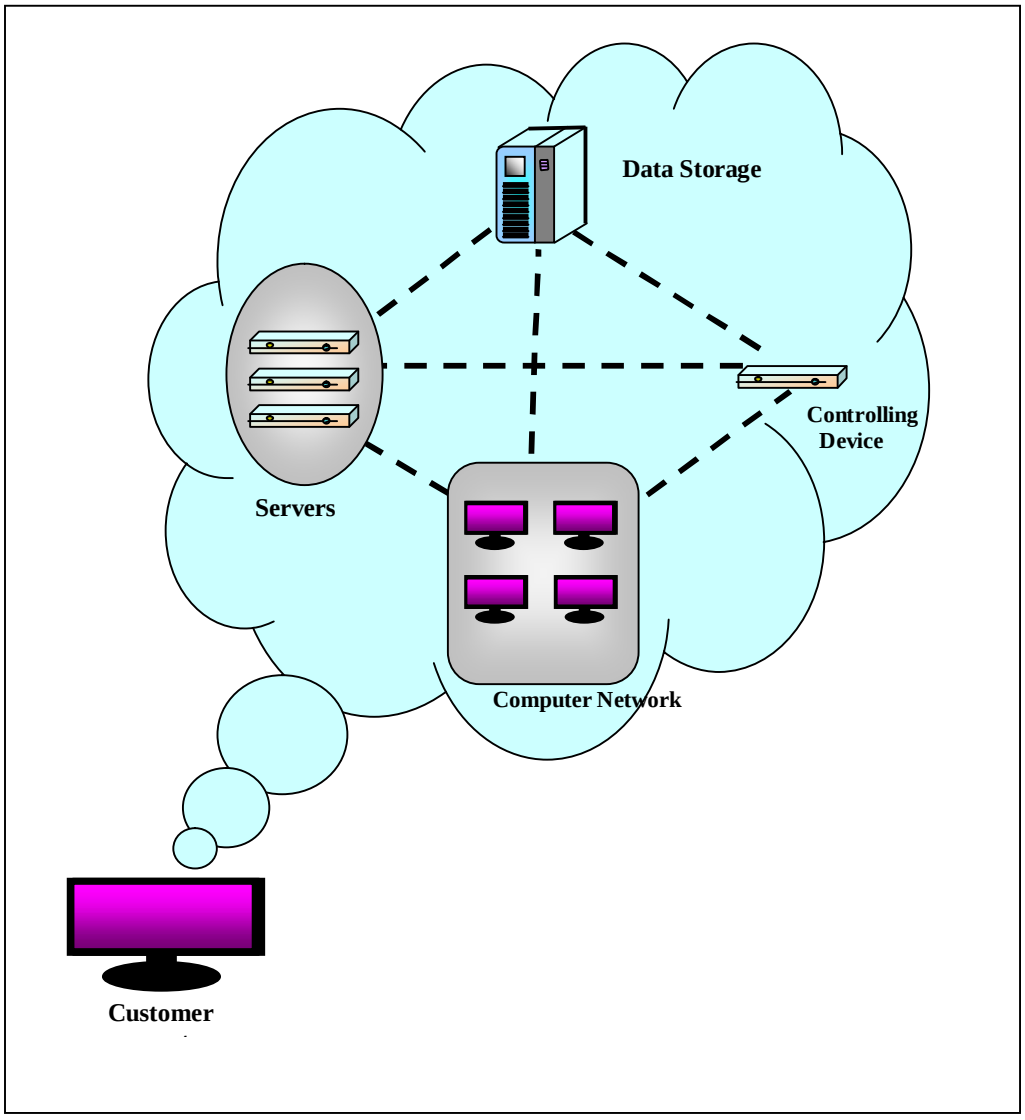

Figure 1: Cloud computing illustration architecture

- Key features: Fallowing are identified as the main features of cloud computing (Economist, 2009)8
- Agility improves with users' ability to rapidly and inexpensively re-provision technological infrastructure resources.
- Cost is claimed to be greatly reduced and capital expenditure is converted to operational expenditure. This ostensibly lowers barriers to entry, as infrastructure is typically provided by a third-party and does not need to be purchased for one-time or infrequent intensive computing tasks.
- Device and location independence enable users to access systems using a web browser regardless of their location or what device they are using (e.g, PC, mobile). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.
- Multi-tenancy enables sharing of resources and costs across a large pool of users thus allowing for:
    - Centralization of infrastructure in locations with lower costs
    - Peak-load capacity increases (users need not engineer for highest possible load-levels)
- Reliability is improved if multiple redundant sites are used, which makes well designed cloud computing suitable for business continuity and disaster recovery.
- Scalability via dynamic ("on-demand") provisioning of resources on a fine-grained, self-service basis near real-time, consistent and loosely coupled architectures are constructed using web services as the system interface. One of the most important new methods for overcoming performance bottlenecks for a large class of applications is data parallel programming on a distributed data grid.
- Security could improve due to centralization of data, increased security-focused resources, etc., but concerns can persist about loss of control over certain sensitive data, and the lack of security for stored kernels. Security is often as good as or better than under traditional systems, Furthermore, the complexity of security is greatly increased when data is distributed over a wider area and / or number of devices.
- Maintenance cloud computing applications are easier to maintain, since they don't have to be installed on each user's computer. They are easier to support and to improve since the changes reach the clients instantly.

- Metering cloud computing resources usage should be measurable and should be metered per client and application on daily, weekly, monthly, and annual basis. This will enable clients on choosing the vendor cloud on cost and reliability.

6.Layers

There are three main layers are identified as important layers (Yeo) [9]

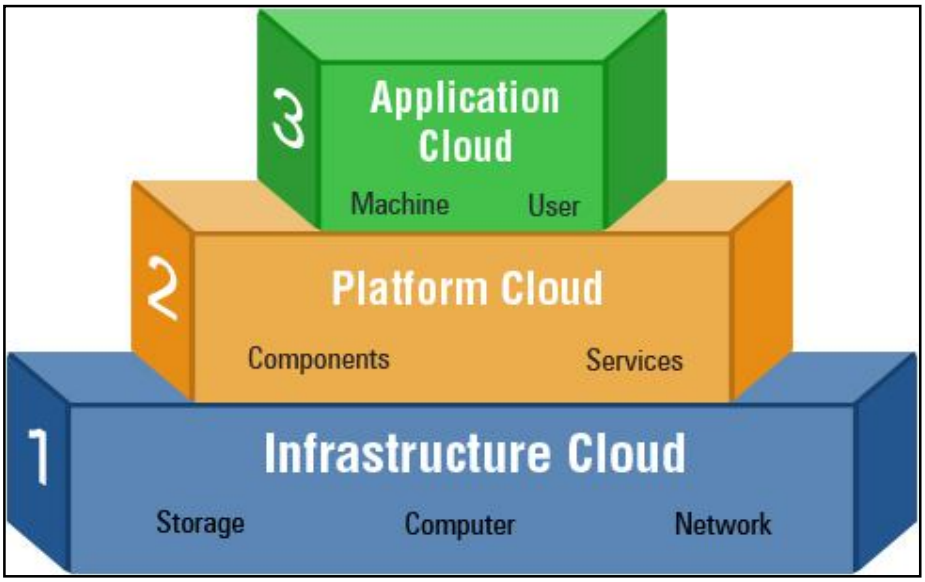

Figure 2: Different layers of Cloud Computing

6.1.Application

Application Cloud which carry software as a service over the Internet, eradicate the necessary installation and run the application on the customer's own computers and make simpler maintenance and support. The Key characteristics also includes

- Network- pedestal access and management of commercially available software
- Activities that are administer from central locations rather than at each customer's site, enabling customers to access applications remotely via the Web
- Application delivery that typically is closer to a one-to-many model (single instance, multi-tenant architecture) than to a one-to-one model, including architecture, pricing, partnering, and management characteristics
- Centralized feature updating, which prevent the need for downloadable patches and upgrades.

On demand software services approach in a small amount of diverse varieties which differ in their value scheme and how the software is distribute to the end users. In the past, the end-user would generally purchase servers and is accessed by the end user over the internet. While this is the most common platform for on demand software services, there are also some slightly different offerings which can be described as a hybrid of these two platforms. For instance, a program through which the end user pays a license fee, but then accesses the software over the internet from centralized servers is considered as a hybrid service. (Otey, 2010) [10]

Who is Offering On Demand Software? - The companies underneath are already reputable in the On-Demand software or SaaS business. These companies charge their customers a subscription fee and in return host software on central servers that are accessed by the end user via the internet.

- Salesforce.com (CRM)
- Google (GOOG)
- NetSuite (N)
- Taleo (TLEO)
- Concur Technologies (CNQR)
- Info Technologies (IT)
- canadasoftware.net (nexgen)

Who is Offering Traditional Software? - The following companies have established themselves as traditional software providers. These companies sell licenses to their users, who then run the software from on premise servers.
SAP AG (SAP)

- Oracle (ORCL)
- Blackbaud (BLKB)
- Lawson Software (LWSN)
- Blackboard (BBBB)

6.2.Machine And User

A cloud user consists of computer hardware and computer software that relies on cloud computing for application delivery, or that is specifically designed for delivery of cloud services include some devices like computers, phones and other devices, operating systems and browsers.

7.Platform

Cloud platform services or "Platform as a Service (PaaS)" deliver a computing platform and/or solution stack as a service, often consuming cloud infrastructure and sustaining cloud applications. It facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software layers. (Wikipaedia) [11].

Active platforms - The following companies have developed platforms that allow end users to access applications from centralized servers using the internet.

- Google (GOOG) - Apps Engine
- Amazon.com (AMZN) - EC2
- Microsoft (MSFT) - Windows Live
- Terremark Worldwide (TMRK) - The Enterprise Cloud
- Salesforce.com (CRM) - Force.com
- NetSuite (N) - Suiteflex
- Rackspace Cloud - cloudservers, cloudsites, cloudfiles
- Metrisoft - Metrisoft SaaS Platform

8.Infrastructure

The ultimate fragment in cloud computing is recognized as the infrastructure, and is incredible spinal column of the whole concept. Infrastructure vendor's environments (such as Google gears) that permit users to construct applications, Cloud storage, such as Amazon's S3, is also considered to be part of the infrastructure segment(Sun Microsystem)[12].

Major Infrastructure Vendors - Below companies that are providing infrastructure services

- Google (GOOG) - Managed hosting, development environment
- International Business Machines (IBM) - Managed hosting
- SAVVIS (SVVS) - Managed hosting
- Terremark Worldwide (TMRK) - Managed hosting
- Amazon.com (AMZN) - Cloud storage
- Rackspace Hosting (RAX) - Managed hosting & cloud computing

9.Server

The server's layer consists of computer hardware and/or computer software products that are specifically designed for the delivery of cloud services, including multi-core processors, cloud-specific operating systems and combined offerings.

9.1.Cloud Computing Storage

Cloud Computing Storage is a model of networked Computer data storage, where data is stored on multiple virtual servers, generally hosted by third parties, rather than being hosted on dedicated servers. Hosting companies operate large data centers; and people who require their data to be hosted buy or lease storage capacity from them and use it for their storage needs. The data center operators, in the background, virtualize the resources according to the requirements of the customer and expose them as virtual servers, which the customers can themselves manage. Physically, the resource may span across multiple servers (TechPluto) [13].

10.Role Of Clod Computing And World Wide Web In Resource Sharing

With the intensification of the Internet and the accumulation of extra various electronic resources, the capacity for searching in the Internet also increased. Since Beginning, the Internet has experienced unprecedented growth in terms of networks, host computers and users. Prior to the Internet dissemination of information was limited to the delivery of formal print publications. In contrast, nowadays with the use of cloud computing a person is able to create a Web page or send information sources for disseminating information. Furthermore, people are able to use e-mail or teleconferencing to exchange information with others in real-time collaborative sessions.

Cloud computing or Web is the practical and existing real world application of the age-old dreams of a universal information database. information that would not only be accessible to people around the world, but information that would link to other pieces of information so that only the most useful information would be quickly found by a user.

The most fundamental and powerful features of the cloud computing are its:

- Support to distribute information in a number of different sites all over the Internet
- Capacity to incorporate all types of media objects (video, sound, images, text, etc.) into a single document

- Utilization of hypertext or hypermedia-oriented architecture in which a document has embedded links to other documents, which can exist locally or anywhere in the world
- Ability to span the depths of heterogeneous client/server platforms. One can view from any client platform (DOS, UNIX, etc.) a data object stored on virtually any server platform that supports almost all protocol types i.e. Email (Simple Mail Transfer Protocol), Telnet (Telnet Protocol), FTP (File Transfer Protocol), USENET (Network News Transfer Protocol), Gopher (Gopher Protocol) and Web pages (HyperText Transfer Protocol)
- Ability to support construction of information resources all over the Internet

11.Cloud Computing As Intermediary

An Intermediary is distinct by Peter Ingwersen (Ingwersen) [14] as "A human being or machine located physically between IR (Information Retrieval) systems and genuine user with the idea to alter interactively requests for information to query formulations that suit the retrieval components of one or several IR systems, to model and support the actual user as to his information need and underlying goals, and to provide information of potential value to that user from IR systems".

An IR system comprises text-presentations, classification and indexing systems, and IR techniques in catalogues and databases or additional information sources. However, research in this field is directed towards implementing non-human intermediary technique like cloud computing into online IR systems through user interfaces and system setting. The availability of infrastructure for exploiting the cloud computing fully like high speed Internet connectivity, access to CDROM databases are in the process of catching up with the advanced users.

The existing of e-documents on Internet and the support extended by World Wide Web to access these documents have newly amplified enormously. A number of print Journals have swing their platform to Web, which consist of free and paid publications. In this scenario cloud computing technique plays an intermediary role to locate and retrieve the widely dispersed information in the cyberspace.

12.Cloud Computing As A Sifter Of Information Resources

In general, sifter is illustrated as "software programs to remove identified, suitable, and actionable patterns from bulky databases". This method is also known as "Data Mining" (Saffo) [15]. The Internet and Web offer access to vast information resources, the term "sifter" may be used for the cloud computing which helps users make sense and order of the resources. The future belongs neither to the channel or content players but to those who control the filtering, searching, and sense-making tools to navigate through the expanses of cyberspace. In another words, cloud computing can be a key player in the emerging scenario.

13.Conclusion

Cloud computing is a universal supportive network of university, corporate, government and private computers, all converse with each other, modern progress in communication technology have afford authoritative innovative tools for global communications. With the advent of this new technology like cloud computing, we can share information resources any where across the globe round the clock. Majority of user community has an optimistic perception on the impact of the cloud computing, enabled by Internet intermediaries. The role of the cloud computing in resource sharing is no longer thing of the future, it is today's reality. As we move into the next century, and a new millennium, the cloud computing, as we know it today, should help us to define the world of tomorrow.

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