

CLOUD COMPUTING IN EDUCATION

VIJAYALAXMI S SUVARNA

Asst. Professor, Department of Mathematics & Statistics, H. R. College of Commerce & Economics,
Churchgate, Mumbai, India

ABSTRACT

Education plays an important role in the development of millions of people in the country. Flexible systems, futuristic curricula, and a twenty-first-century career orientation have become necessary for young people today. Conventional definitions of livelihood options are too limited to cater to such a large number of people. It is necessary that we think about the latest technologies to incorporate in the teaching, learning process. Cloud computing is an excellent alternative to educational institutions that have a shortage of funds to use latest technology effectively. Cloud computing takes the technology, services and applications that are similar to those on the Internet and turns them into self-service utility. This paper presents a study of how cloud computing can be used for research and teaching activities, its benefits and challenges in Higher education.

KEYWORDS: Cloud Computing, Higher Education, Models of Cloud Computing, Virtualization

INTRODUCTION

The development of Science and Technology has made the world a global village; this represents unprecedented challenges in global economy, culture and thus in education. Earlier, the knowledge base of humanity used to double every ten to twelve years; now it doubles every two to three years. But the course curriculum in most institutes is not updated regularly in line with global developments. Additionally, there is dearth of qualified teachers in the country. Teachers and educational institutions have not been technology savvy traditionally; hence the adoption of new technologies has been slow. The challenges facing students in rural area and low-income communities in India are daunting. Reach of quality education in remote villages in India has traditionally been low. More often in rural areas institutions do not have a proper infrastructure, proper faculty, in the face of these challenges; various education technology innovations are presented as solutions. Even though Akash tablets have helped to stimulate the e-learning market, the costs of Internet access and lack of bandwidth in rural areas restricts its usage.

India holds an important place in the global education industry. As per the report mentioned in India in business [11] our country has more than 1.4 million schools and more than 36,000 higher education institutes. India has become the second largest market for e-learning after the US. This sector is currently pegged at US\$ 2-3 billion, and is expected to touch US\$ 40 billion by 2017. The distance education market in India is expected to grow at a Compound Annual Growth Rate (CAGR) of around 34% from 2013-14 to 2017-18. Higher education system in India has undergone rapid expansion. Currently, India's higher education system is the largest in the world enrolling over 70 million students.. At present, higher education sector witnesses spending of over Rs 46,200 crore (US\$ 6.78 billion), and it is expected to grow at an average annual rate of over 18 % to reach Rs 232,500 crore (US\$ 34.12 billion) in next 10 years.

One of the biggest challenges that the government faces in providing education is the lack of infrastructure and if available then maintenance of that infrastructure and other issue is procuring and maintaining a wide range of hardware and software. Cloud computing can provide solutions for these problems. It's a network of computing resources—located just about anywhere— that can be shared. Thus by implementing cloud computing technology we can overcome all these short comes and maintain a centralized system where all the authorities can monitor and guide the education system.

CLOUD COMPUTING

With the rapid development of processing and storage technologies and the success of the Internet, computing resources have become cheaper, more powerful and more ubiquitously available than ever before. This technological trend has enabled the realization of a new computing model called cloud computing, in which resources are provided as general utilities that can be leased and released by users through the Internet in an on-demand fashion. In a cloud computing environment, the traditional role of service provider is divided into two: the infrastructure providers who manage cloud platforms and lease resources according to a usage-based pricing model, and service providers, who rent resources from one or many infrastructure providers to serve the end users. The emergence of cloud computing has made a tremendous impact on the Information Technology industry over the past few years.

Cloud computing refers to applications and services that run on a distributed network using virtualized resources and accessed by common Internet protocols and networking standards. It is distinguished by the notion that resources are virtual and limitless and that details of the physical systems on which the software runs are abstracted from the user. Data and programs are being swept up from the desktop PCs and corporate server rooms and installed in the computer cloud.

The National Institute of Standards and Technology (NIST) defines cloud computing as “a model that helps enable 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 main reason for the existence of different perceptions of cloud computing is that cloud computing, unlike other technical terms, is not a new technology, but rather a new operation model that brings together a set of existing technologies to run business in a different way. Indeed, most of the technologies used by cloud computing, such as virtualization and utility-based pricing, are not new. Instead, cloud computing leverages these existing technologies to meet the technological and economic requirements of today's demand for information technology.

CLOUD TYPES

The two major cloud types are deployment model and service model. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models. Basically deployment model tells where the cloud is located and for what purpose. Public, private, community and hybrid clouds are deployment models. Service model describe the type of service the service provider is offering, classic example is Google. The best known service models are: software as a service, platform as a service and infrastructure as a service. These three different service models taken together have come to be known as the SPI model of cloud computing.

Deployment Model: The NIST definition of four deployment models is as follows:

Public Cloud: The public cloud infrastructure is available for public use alternatively for a large industry group and is owned by an organization selling cloud services.

Private Cloud: The private cloud infrastructure is operated for the exclusive use of an organization. The cloud may be managed by the organization or a third party. The private clouds may be either on-or off premises.

Hybrid Cloud: A hybrid cloud combines multiple clouds (private, community or public) where those clouds retain their unique identities, but are bound together as a unit.

Community Cloud: A community cloud is the one where the cloud has been organized to serve a common function or purpose.

Service Models: The three major service models are IaaS, PaaS, SaaS.

Infrastructure as a Service: IaaS provides virtual machines, virtual infrastructure and other hardware assets as resources that clients can provision. Examples of IaaS providers include Amazon Elastic Compute Cloud (EC2), Eucalyptus, GoGrid, FlexiScale, Linode, RackSpaceCloud, Terremark.

Platform as a Service: PaaS refers to providing platform layer resources such as Virtual machines, operating systems, application services, development frameworks, transactions and control structures. Examples of PaaS providers include Force.com, GoGrid Cloud Centre, Google AppEngine, and Windows Azure Platform.

The Client can deploy its application on the cloud infrastructure or use application that were programmed using languages and tools that are supported by the PaaS service provider, The service provider manages the clouds infrastructure, the operating system and the enabling software. The client is responsible for installing and managing the application that it is deploying.

Software as a Service: SaaS is a complete operating environment with application, management and user interface. SaaS refers to providing on demand applications over the internet. In the SaaS model, the application is provided to the client through a thin client interface and the customer's responsibility begins and ends with entering and managing its data and user interaction. Everything from the application down to the infrastructure is the vendor's responsibility. Other good examples SaaS cloud services provider are Google Apps., Oracle on Demand, Salesforce.com, SQL Azure.

CLOUD COMPUTING IN EDUCATION:

Many technologies that were previously expensive or unavailable are now becoming free to anyone with a web browser. This is true for all web sites, blogs, video sharing, music sharing, social sharing, collaboration software, editing/presentation and publishing, and computing platforms in the "cloud". Students are already using many of these technologies in their personal lives. In the professional world, the trend of discovering and using technologies in our personal life is called consumerization this means we should demand and consume the required services. Our education system should take advantage of this trend, which will both enrich our student's technology enabled education and importantly, reduce the budget impact in academic institutions. University management should identify and leverage emerging technologies that are cost-effective and strive for feasible and equitable access to technology for students and staff. The need for hardware and software isn't being eliminated, but it is shifting from being on-premises to being in the cloud. All that is needed is a cheap access device and a web browser in the institutions, perhaps wireless hotspots.

Remote classrooms enabled by cloud will help in running multiple classrooms through a small group of teachers and will help overcome the problem of lack of skilled teachers. In addition, it will also lead to standardization of course content and education delivery methods. Indeed, cloud computing will enable certain educational institutions to actually make use of the global internet resources for data analysis and data storage. The cloud is a valuable tool that can be used to improve accessibility to quality education and to boost achievement. The problem of overcrowded classrooms can be addressed by virtualizing the classroom environment. Students can actually log onto a space online and attend classes. Cloud allows students to share their ideas, which results in drastic reduction in educational institution's overhead expenditures on quality learning materials like books, software and allows equal access to these scarce resources which helps the student's academic performance along with the quality of education.

BENEFITS OF CLOUD COMPUTING IN EDUCATION

- **Standardization of Content:** Courses delivered over cloud through a central location will lead to a standard content delivery to multiple remote virtual classrooms and can be delivered anytime, anywhere.
- **Collaboration:** Students and teachers can collaborate on studies, projects.
- **Shared Resource Pooling:** The infrastructure provider offers a pool of computing resources that can be dynamically assigned to multiple resource consumers. Such dynamic resource assignment capability provides flexibility to infrastructure providers for managing their own resource usage and operating costs.
- **Improved Administrative Efficiency of Schools and Universities:** Teachers and the administrative staff can focus on the core functions of the institution instead of futile efforts on IT infrastructure and the applications set-up.
- **Higher Quality of Education Delivered Anytime, Anywhere:** Courses with updated content can be delivered consistently across all locations.
- **Lower Cost of Education:** Leveraging on limited staff or teachers, a university can reach out to numerous students all across the globe, hence limiting the costs of education delivery. Clouds built using voluntary resources, or a mixture of voluntary and dedicated resources are much cheaper to operate and more suitable for non-profit applications such as scientific computing.
- **Scalability:** Scalable systems on cloud to provision big data platform for research and analysis.
- **Lesser Carbon Imprint:** Cloud computing enabled educational institutions to reduce power consumed by them. This in turn leads to lesser carbon emissions. Moreover, cloud providers are making sincere efforts to create eco-friendly data centers which will further reduce carbon emissions.
- Cloud computing allows for both large and small organizations to have the opportunity to use Internet-based services so that they can reduce start-up costs, lower capital expenditures, use services on a pay-as-you-use basis, access applications only as needed, and quickly reduce or increase capacities.

CHALLENGES OF CLOUD COMPUTING

- Policy and control issues will slow cloud adoption in higher education. Among a great many issues related to adopting a cloud computing approach to delivering services, policy and control issues seem paramount.

- Various question arise in the minds of the user while allowing a third party service to take custody of personal documents such as, will they be allowed to take their data if they move to a competing service provider?, will they lose access to their documents if they fail to pay their bill?

CONCLUSIONS

The emergence of cloud computing has made a tremendous impact on the Information Technology (IT) industry over the past few years, where large companies such as Google, Amazon and Microsoft strive to provide more powerful, reliable and cost-efficient cloud platforms. Indeed, cloud computing provides several compelling features that make it useful for educational institutions. Students, teachers, researchers and administrative personnel have the opportunity to quickly and economically access various application platforms and resources through the web pages on-demand. This automatically reduces the cost of organizational expenses and offers more powerful functional capabilities. The gradual removal of software license costs, hardware costs and maintenance costs respectively provides great flexibility to university.

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