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RECENT DEVELOPMENTS IN CLOUD COMPUTING



VRINDA PUBLISHING HOUSE

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Editors

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Hyderabad • Chennai

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Recent Developments in Cloud Computing

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IMPLEMENTATION OF CLOUD COMPUTING IN EDUCATIONAL INSTITUTIONS

– Dr.N.Hemalatha *

Abstract

Cloud computing is becoming an adoptable technology for many of the organizations with its dynamic scalability and usage of virtualized resources as a service through the Internet. Cloud computing is an excellent alternative for educational institutions which are especially under budget shortage in order to operate their information systems effectively without spending any more capital for the computers and network devices. By sharing IT services in the cloud, educational institution can outsource noncore services and better concentrate on offering students, faculty and staff the essential tools to help them succeed. In this paper, we will review what the cloud computing infrastructure will provide in the educational arena, where the use of computers are more intensive and what can be done to increase the benefits of common applications for students and teachers and how we can provide the quality education by using the above technology.

Keywords: Cloud computing; virtualization; SaaS.

Introduction

Educational institutions throughout the World have become highly dependent on information technology to service their business requirements. Procuring and maintaining a wide range of hardware and software require substantial, ongoing investment and the skills to support them.

The economies of scale and other features of cloud computing are likely to mean an increasing shift away from institutionally-hosted services. These services are increasingly provided using Internet technologies to staff and students and accessed from web browsers. The services are offered cheaply or freely to education, often with much higher availability than can be provided by the educational institution.

According to Cloud computing it presents a significant advancement in the delivery of information technology and services as it is capable of enhancing collaboration, agility, scaling, and availability. It also provides potential for cost reduction through optimized and efficient computing. Thus, Cloud Computing offers compelling advantages in cost, speed and efficiency by providing on-demand access to a shared pool of computing resources in a self-service, dynamically scaled and metered manner. The cloud is a valuable tool that can be used to improve ICT service delivery for institutions of higher learning and also accessibility to quality education.

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Are we therefore facing a future where the majority of educational services will be hosted in the cloud and institutions no longer host their own data centers with expensive hardware, power bills, staff salaries and computing resources which are rarely fully utilized?

This policy brief has analyzed some of the emerging benefits and challenges of cloud computing for the educational sector.

Characteristics of Cloud Computing

Remote data centre's: Cloud services are delivered via the Internet from high-specification data centre's in locations remote from the end user and their institution. The server farms have features such as the latest cooling systems and service optimization on techniques which individual educational institutions are unlikely to be able to afford. The data centre's are often located near cheap sources of electricity. Their locations are not necessarily known to the user, though in some cases users require services to be located in specified countries due to data protection legislation.

Pooling of Resources: Resources such as data storage, processing, memory and bandwidth are shared between multiple customers and can be allocated dynamically depending on demand. Individual hardware components can be replaced without impacting on performance or availability. Resources may even be spread across multiple data centres to provide better security and resilience.

Pay per Use: Customers simply pay for the services they use while providers bear the costs of hardware and software provision. Pricing may vary depending on the time of day due to peaks in demand or varying electricity costs and institutions may therefore carry out certain activities when costs are cheaper. However distributed cloud networks may enable providers to smooth out demand globally and offer uniform pricing strategies not dependent on timing.

Advantages of Cloud Computing

A lot many advantages storing the information in the cloud and a recent conversation about cloud computing with several colleagues in the education field revealed significant advantages:

Reducing Costs: Colleges have constraints such as oversubscribed classrooms, lack of adequate teaching and learning resources to a lack of funding which limits the quality of provision. Cloud computing enables students to log on to a virtual classroom from anywhere offering access to the internet. As such, teaching doesn't have to be delivered face-to-face, it doesn't even have to be in real time. Lessons can be delivered remotely in the form of webinars, webcasts or audibly via podcasts. So that they can reduce the infrastructure and maintenance costs.

Easy access: Lesson plans, labs, grades, notes, PowerPoint slides - just about anything digital that you use in teaching is easily uploaded and accessed anytime.

Stable and Secure: Your data, content, information, images - anything you store in the cloud usually requires authentication (ID and password, for example) - so it is not easily accessible by anyone. No more of carrying devices, such as thumb drives or CDs. You don't need to worry about losing them, damages, or your information not being loaded properly.

Share ability: While working with other teachers you can share your files that you have stored in the cloud. No need of an extra thumb drive or burning another CD or DVD. You just need to share the link containing your file(s).

Track ability: Make changes to a lesson and want to change it back? No problem. Cloud computing will save multiple revisions and versions of a document so that you can chronologically trace back the evolution of an item.

No photocopies: You can just share the document, pass on the link to other teachers and even students so that the access is pretty simply and avoids paper work.

Round the clock access: You can access your files, presentations and calendars whenever you need, as they are just a click away.

Cloud Computing Framework

According to the Service Models of Cloud Computing are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). It has been observed that the three models are foundations upon which universities can implement cloud computing, and are described as follows:

Software as a Service (SaaS): The applications are hosted by a cloud service provider and made available to customers over a network, typically the Internet. The applications are accessible from various client devices through either a thin client interface, such as a web browser, or a program interface.

Platform as a Service (PaaS): Is the capability provided to the consumer to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

Infrastructure as a Service (IaaS): Is the capability provided to the consumer to process, store and network so that the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components such as host firewalls.

Ddeployment of Cloud Services

Cloud services are typically made available via a private cloud, community cloud, public cloud or hybrid cloud. 1) Public cloud: Is available via the Internet for public use, and can be free or subscription pricing for individuals or organizations 2) Private cloud: Is a dedicated cloud for exclusive use by a specific organization or enterprise. It is sometimes called an enterprise cloud and can be on-premise or off-premise hosted by a third-party provider 3) Community cloud: Is shared by various organizations in support of a specific community and it can be either off-premise or on-premise 4) Hybrid cloud: Is a mix of the specified cloud models cited above, or the use of technologies selected for their cloud capabilities integrated into traditional data centres.

The inter-relationships and the necessary connections of the NIST cloud computing characteristics and models were specified by Jerry Bishop, the Chief Information Officer at Chippewa Valley Technical College in Wisconsin. These clearly show the five characteristics, the service models, and the deployment models and how they interrelate and work together in a model of cloud computing. These interrelationships with the characteristics, service and deployment models are shown in figure 1 below.

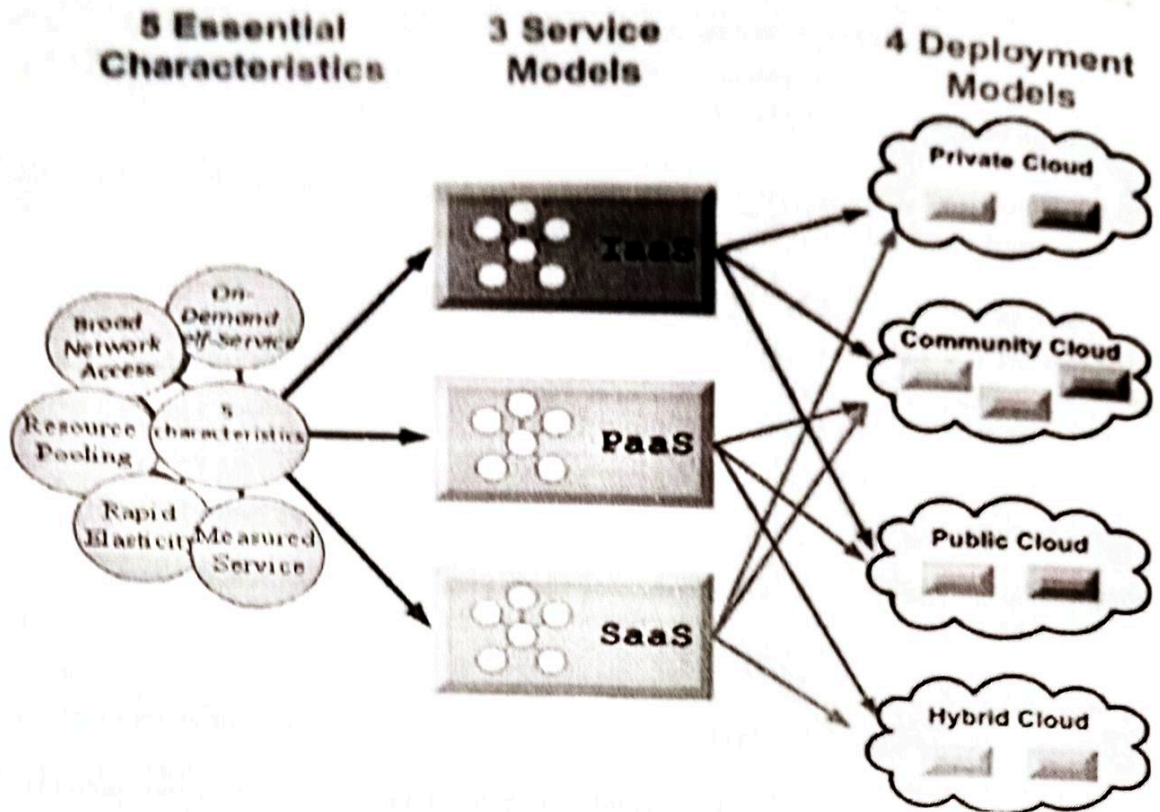


Figure 1: The interrelationships - characteristics, Service and Deployment Models

Risks of Cloud Computing in Education

There are clearly some major potential benefits to institutions deploying cloud services however; it challenges computing service personnel who may fear the consequences of their roles being outsourced. The universities and schools should consider the challenges and risks prior to transferring to the cloud . Examples of these risks are:

Cloud Service Failure: Insufficiency of financing and immature markets could guide some cloud providers out of business and any loss or deterioration of service delivery performance, as well as a loss of investment, make the universities and schools to the risk of having to perform their own duties and obligations, thus being exposed to contractual or legal liability to their employees, third parties, the students or even the public .

Data security: A major concern is around the security of data. Institutions may consider that their data is more secure if it is hosted within the institution. Transferring data to a third party for hosting in a remote data centre, not under the control of the institution and the location of which may not be known presents a risk. Strict data protection laws restrict the storage of personal data to certain countries with which agreements have been signed. Some cloud providers now provide guarantees in their contracts that personal data will only be stored in particular countries. The primary risk here is that there will be a breach of confidentiality which involves a student (or member of staff) suing the institution, leading to high costs and adverse publicity.

Privacy: The multi-tenancy, reuse of hardware and software profiles, and resiliency due to the

redundant nature of cloud means a greater risk of incomplete or unlock deletion or denial of service attacks on institutions' confidential data.

Assurance to Service Provider: This proposes a dependency on a particular cloud service provider for service preparation, especially when data portability is not supported.

Conclusion

The Present problem of our country reaching technology to remote schools and educational Institutes in imparting "equal and quality education to all" can be solved with mere small gadgets like ipad's, iphones, tabs thereby saving on purchase of computing infrastructure, licensing and purchase of software's and support personnel. In the era of "Big data" cloud computing has immense role in improving quality and enormous educational content available for students and research scholars. The success and high return on investment (ROI) of cloud infrastructure vests in the hands of bigger organizations and the public sector in particular. The success of cloud computing in education can be attributed to the acceptance of cloud computing by everyone in the field of education with good chunk of support by government. This paper presents educational cloud computing and how the universities and institutions are already taking advantage of it, not only in terms of cost but also efficiency security, reliability and portability. Several general examples of cloud computing in education such as Microsoft, Google App, IBM and others help to digitalize the education system and storing the data in cloud. As bandwidth increases globally and increasing numbers of students have adequate access to the Internet, many through mobile devices, they will become more comfortable with using rapidly evolving web-based applications and storing their data online rather than on their own storage devices which are more likely to be lost or corrupted. Demand for cloud applications may therefore be driven by users rather than by institutions.

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