The Development of E-Learning Systems Application Based On Cloud Computing For Higher Education

M. Budi Hartanto, S.Kom

Abstract

An E-Learning systems used internet technology to provide data base used for the activity of studying for higher education institution. In order to achieve the way of communication through information technology, cloud computing is a new science in the field of informatics that make the activity more fluent and easy to use. Managing students through e-learning will give positive impact to the development of e-learning systems.

This paper discusses about the development of E-Learning Systems Application Based On Cloud Computing as an immerge of information technology for higher education. There are some models of E-Learning that can be applied to help students and lectures in the activity of education with terms of collaborating, coordinating and inspecting.

The results expected with this paper is that there is more preparation for higher education in providing and building their own systems by installing some important aspects such as security, viability and quick response to make internet as a smart media in achieving the goal of higher eduaction by using internet.

Key words: cloud computing, e-learning systems, implementation, strategies

1. INTRODUCTION

Cloud computing is a way to pool a large amount of IT resources in a way that allows the provider to leverage scale and efficiencies to drive down prices and provide quicker access to those pooled resources to all users of that cloud service. Although that implies that cloud computing is all about cost savings and ability to use already deployed IT resources quicker, that is not a complete picture. Indeed if customers of cloud services view these services as an improved co-location service, it is likely that many of the more important benefits of cloud computing will go unused and likely the cost will be higher than an efficiently run self-hosted infrastructure.

Enterprise class cloud service providers spend a large amount of resources providing a highly redundant, reliable, scalable and geographically distributed infrastructure to their customers. Users of cloud services can take advantage of these properties without having to spend the resources or obtain the expertise to build and design their own infrastructures in their own datacenters. For Penn, it would be impractical to provide the same level of geographic redundancy that vendors in our preferred portfolio are able to provide. Some vendors describe this as 'Stop spending money on Undifferentiated Heavy Lifting'. So more resources and effort can be spent working on IT problems that do make a difference to our customers and allows us to further the mission of the University.

Because cloud vendors have large, distributed environments that run some of the largest internet based businesses, they deliver a number of solutions that allow for applications to scale quickly on increased demand. Many cloud vendors serve customers that target an international, internet sized audience that can increase the usage of a solution exponentially. The scalability that these applications require and the problems that need to be solved for these sorts of architectures are now part of the standard solutions the cloud vendor provides and allnew solutions will have that scalability built in from the start. This also means that you do not have to scale your infrastructure for your highest expected demand, instead you can design your solution to scale on demand and only pay for those resources you actually need, rather than planning and paying

for resources you may need in 3-5 years, which is the typical depreciation period for capital expenses.

Since the cloud vendors are providing the infrastructure, they are the ones that are providing the capital expenses. By using cloud solutions, you will trade your capital expenses for operational expenses for the resources you consume. Of course, it is vitally important that the solutions that target cloud infrastructure are built in such a way that they use the elasticity the cloud services provide. If your solution is built using traditional architectures that do not scale according to demand and use the cloud solution simply as a co-location provider, you will not realize the savings you might expect. Although, cloud providers use their buying power and scale to design and build IT systems tailored specifically to their services and do not use system resellers to build and deploy their systems, which give them savings beyond what smaller IT organizations can attain. Market surveys have shown that their cost will be higher than self provisioned infrastructures if used for traditionally designed application infrastructures. Cloud providers use virtualization technology and automation to deliver IT solutions in minutes rather than weeks or months for traditional IT infrastructures that may use a capital approval process and organization specific systems and installations. This allows for solutions to be deployed as soon as they are ready and the planning process for infrastructure deployment is no longer a barrier or significant aspect of IT solution delivery

Because one can deploy IT solutions without capital expense (or even significant operational expense for small efforts), it allows organizations to try out solutions quickly and without incurring ongoing costs that traditional solutions would. Since scalability can be built in from the start, you also do not need to worry about a solution being successful, since the cloud vendor provides 'unlimited' scalability. This means new, innovative ideas can be tried quickly and often without significant up front expenses and failed idea can be thrown away without having committed ongoing expense.

Infrastructure Security vs. Application Security

Cloud vendors have designed infrastructures with security designed in from the ground up. The market leaders in the space have a large and dedicated IT security staff that are dedicated to the security of the infrastructures they provide. Many provide automatic updates and patching of the OS and application infrastructures they provide. This means that users of the solutions get a lot of security 'baked in'.

Network considerations

Cloud services, by their very nature are provisioned using the internet, therefore solutions that are network latency and bandwidth sensitive may not be appropriate for cloud based deployments. Additionally, some cloud vendors charge for the usage of bandwidth either for the ingress or egress of data, or both. It is important to consider the impact of the network and the location and connectivity of cloud vendors when considering a cloud based solution. It is also important to review encryption requirements when transitioning data to and from the cloud provider, since generally, the data will be traversing a public network and therefore may be inspected by external parties.

Compliance, Privacy, Confidentiality and Legal Considerations

The Penn privacy web site and the Information Security web site have a lot of information on privacy and protecting Penn data. It is important to understand that as a steward of Penn's data, Penn users of cloud based solutions will need to assess the provider's adherence to Penn policies and procedures, including e.g. FERPA, HIPAA, etc. There also may be legal and governmental requirements depending on the class of data that is used. Preferably these controls need to be codified in a contract with the vendor. It is also important to understand whether any data used by the solution is under export controls, which would require the cloud vendor to provide US based location restrictions. If the solution is part of Penn's portfolio of trusted cloud based solutions, the contract will reflect these considerations. Please check with your local LSP or with ISC if you need more information or guidance.

2. Concepts and Theory

The National Institute of Standards and Technology (NIST) defines cloud computing as follows: Cloud computing is a model for enabling 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.

There are two basic types of cloud infrastructures: internal and external. In an internal cloud, servers, software resources, and IT expertise are used inside the school system to buil d a scalabl e i nfrastructure that meets cl oud computi ng requi rements. In an external cloud, service providers sell on-demand, shared services to a school. IT support, services, and expertise are included in the package; the school needs to run only the provided applications and services.

What does this mean for your school or district?

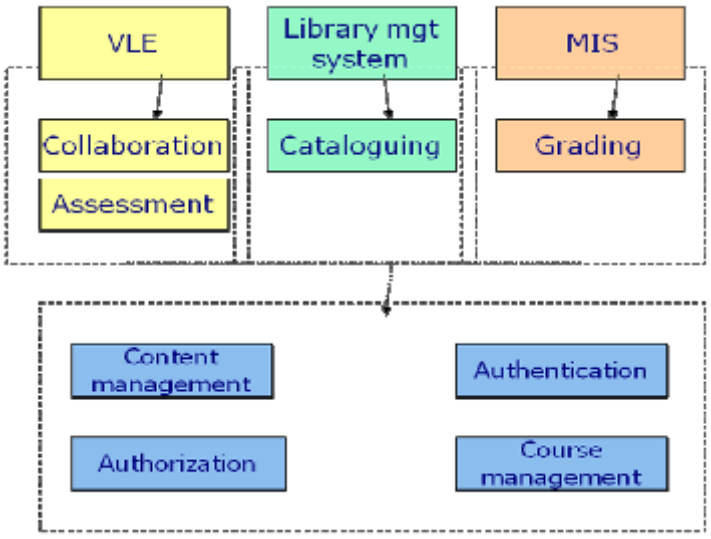
1. Teaching and learning platforms: Servers car provide some or all software applications operating systems, and Internet access, rather thar having these installed and maintained on eacl platform separately. Servers deliver on demand, a needed by the school population, to the ful spectrum of learning platforms and devices. Fo example, a single application might be shared b hundreds of students and teachers on notebooks tablets, and desktops.

2. School IT: Cloud computing allows for cost and energy-efficient centralization of schoo infrastructures. It takes advantage of server capabilities to adjust allocation based on demand—all invisible to teachers and students. Remote management and mai ntenance can save ti me and i ncrease securi ty. For i nstance, an appli cati on or operating system served by the cloud can be upgraded once at the server level, rather than on each individual platform. Platform access can be restricted or denied in the event of a loss or theft.

3. Access: Along with the greater control for IT comes increased flexibility for teachers. They can sel ect from the enti re pool of availabl e appli cati ons those which best compl ement thei r curri cul um and students at any given ti me. The wi de range of Internet-based software and tools can also be quickly and easily served by the cloud.

3. E-Learning Systems

E-learning is an Internet-based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional education methods, but will greatly improve the efficiency of education. As e-learning has a lot of advantages like flexibility, diversity, measurement, opening and so on, it will become a primary way for learning in the new century as in Fig. 1.



Mendez [19] illustrates that in traditional web-based learning mode, system construction and maintenance are located inside the educational institutions or enterprises, which led to a lot of problems, such as significant investment needed but without capital gains for them, which leads to a lack of development potential. In contrast, cloud-based e-learning model introduces scale

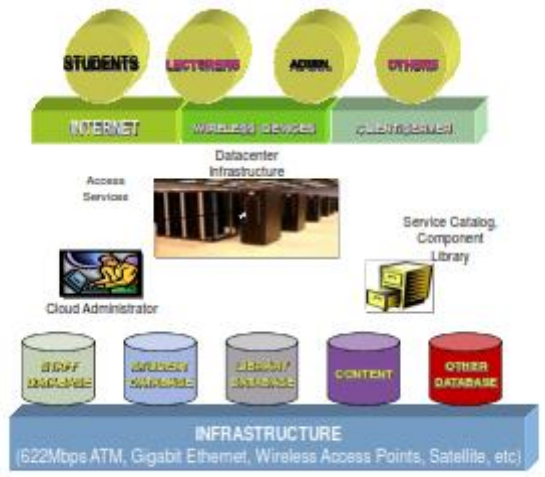
efficiency mechanism, i.e. construction of e-learning system is entrusted to cloud computing suppliers, which can make providers and users to achieve a win-win situation. The cloud-based environment supports the creation of new generation of e-learning systems, able to run on a wide range of hardware devices, while storing data inside the cloud.

Ouf [20] has presented an innovative e-learning ecosystem based on cloud computing and Web 2.0 technologies. The article analyses the most important cloud-based services provided by public cloud computing environments such as Google App Engine, Amazon Elastic Compute Cloud (EC2) or Windows Azure, and highlights the advantages of deploying E-Learning 2.0 applications for such an infrastructure. The authors also identified the benefits of cloud-based E-Learning 2.0 applications (scalability, feasibility, or availability) and underlined the enhancements regarding the cost and risk management.

4. Architecture Review

The E-learning cannot completely replace teachers; it is only an updating for technology, concepts and tools, giving new content, concepts and methods for education, so the roles of teachers cannot be replaced. The teachers will still play leading roles and participate in developing and making use of e-learning cloud. The blended learning strategy should improve the educational act. Moreover, the interactive content and virtual collaboration guarantee a high retention factor. On the other hand, E-learning cloud is a migration of cloud computing technology in the field of e-learning, which is a future e-learning infrastructure, including all the necessary hardware and software computing resources engaging in elearning.

After these computing resources are virtualized, they can be afforded in the form of services for educational institutions, students and businesses to rent computing resources. E-learning cloud architecture is shown in Fig. 3



5. Conclusion

Currently, cloud computing is considered the next best thing when in comes to optimize IT budgets in the current economic environment. It's believed that it will become a key technology oriented at sharing in-frastructure, software or business processes. Cloud Computing is a way to serve the needs of computation through the virtualization of some resources through the Internet.

It’s made of shared services under a virtualized management, accessible to users and other services through the Internet under a “pay per use” payment system. Nowadays the Cloud Computing market includes more and more companies, each and every one of them developing the business more and more. The main reason is the acceptance and adoption of these revolutionary technologies. When speaking about Cloud Computing, risk management activities must take place throughout the life cycle of information, and risks should be re-assessed periodically or in case of a change.

Therefore, companies and organizations that have decided to use the services supplied within the Cloud must consider not only the implied savings

and cost reductions but also the additional risks. Once risks are identified, a clearer picture will take shape at the level of management, of how cloud services will influence the structure and operations of economic processes.

Referensi

http://gibraltarsolutions.com/wp-content/uploads/2013/08/cloud-computing-education-21st-century-e-learning-study.pdf

http://www.pearsonschoolsystems.com/blog/?p=1507#sthash.BtQiJbQh.dpbs

http://www.upenn.edu/computing/isc/cloud/benefits.html