IMPLEMENTATION OF CLOUD COMPUTING FOR CENTRE DEVELOPMENT, EDUCATION AND TRAINING

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Abstract—The Implementation of Cloud Computing is an answer to the problems and challenges faced by institution of centre for training and education. Nowadays, Cloud Computing is increasing and popular but many organizations understand cloud computing in different ways. This paper briefly analyze how cloud computing can be suggested to improve teaching and learning, educational learning innovation, and have a cost effective infrastructure and also bring out its benefit. As the result, this paper consists research objectives, such as to explore the SWOT analysis for cloud computing, and to optimize the uses of cloud computing by providing of cloud computing model and architecture. In the conclusion, the author summarizes the results and provide a description for taking cloud computing implementation and development for educational institutions.
Keywords: Information technology, cloud computing, and Learning innovation

I.INTRODUCTION

The development of technology requires a variety of activities that can be easily accessible regardless of time and space. The development of information technology becomes innovative, dynamic, and economically beneficial solutions. The information technology is an answer to the problems and challenges faced by the world of education. The term of cloud computing is an important term in the world of Information and technology (IT). Cloud computing has dynamic scalability and usage of virtualized resources that can be shared by the users. Cloud computing is a computing model, where the resources such as processor or computing power, storage, network, and software become abstract and are provided as a service on a network or internet by using remote access patterns.

Generally speaking, A cloud computing implementation is becoming as critical to higher education institutions as it is to enterprises. It's especially integral considering for diversity of audiences are students, teachers, administrators and other staff .

Those are being able to access information, collaborate on projects and create and deliver content at any time from any place on any device, from other devices or gadgets, such as smartphones to laptop to tablets.

Putting a greater emphasis on cloud computing in education is equally critical to meeting the on-demand scalability needs of applications such as learning management systems or prospect management software. Cloud-based commercial applications also tend to evolve more quickly, giving education institution the ability they need to support new educational or business requirements.

IMPLEMENTATION OF CLOUD COMPUTING

Implementation of cloud computing for Centre of Development, Education and Training can serve these institutions are as follows:

- Helping IT Team for saving time and maintaining data and upgrading data. Therefore, that it can redirect its resources to innovative projects like paper coursework tracking or course participant intervention.
- Enabling participants of course and instructors to participate in cutting-edge learning management services that focus on real-time assessments and increased learning personalization.
- Driving collaboration on a global scale among increasingly geographically scattered teams, whether they are participants, instructors, researchers, administration or even other education institution entities.
- Supporting administrators with solutions that streamline and standardize finance, HR and other business processes that currently may vary across an institution's educations sites.

Those explanation above shows implementation of Information Technology (IT) by using Cloud Computing. It provides storage, computional platform and infrastructure, which are demanding by the user according to their requirement.

Due the growing need of infrastructure education and training centre institutions, organizations have to spend a large amount on their infrastructure to fulfill the needs and demands of the users. Cloud computing is one a platform that allows institutions and organizations with a dynamic pools of resource and to reduce cost through improved utilization.

Cloud computing which is an emerging technology and which relies on existing technology such as internet, visualization, grid computing, etc. can be a solutions to such problems above by providing required infrastructure, software and storage.

This paper discusses a basic research has been carried out to show how cloud computing can be reduced cost of IT infrastructure, and describes the benefits of using the cloud computing in educational systems.

II. LITERATURE SURVEY

CLOUD COMPUTING OVERVIEW

While Banerjee [1] proposed an explanation of cloud technology that a cloud-scale intelligent infrastructure provides smart environments like utility computing, smart data centers, pervasive computing, automation, virtualization and intelligent networks.

Cloud computing is an emerging application platforms and aims to share data, calculations and services among users, and also develops a cloud based infrastructure which had been optimized for wide area, performance networks and supported necessary data mining applications.

Vaishali [2] proposed Cloud computing is a model for enabling convenient, on demand network access to shared pool of configurable computing resources. It can rapidly provisioned and released with minimal management effort or service provider interaction. Thus, Cloud computing can reduce cost and maintenance equipment for configuring computing resources, such as networks, servers, storage, applications and SERVICES.

CLOUD MANAGEMENT SYSTEMS

Toma [3] proposed cloud management systems consists two types of systems. The types of systems depend on connection between nodes that we distinguish: the first type is that tightly connected/coupled systems, where multiple processors usually share in the same memory and same clock, such as HPC, supercomputers,transputers,etc.

The second type is loosely connected, where each system has its own memory and its own clock and it is identified with distributed systems, such as HTC, Grid Network, Portable batch system, etc.

However, some developers use both systems are together. Presently, the cloud computing systems are created using Open Source virtualization through a hypervisor, which is a hardware solution that allows multiple operating systems, termed guests, to run concurrently on a host computer [4] .

Obviously, what kind of hypervisor the cloud computing system is using, it is possible to offer many types of clouds such as :

Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) [9] .

Those types of clouds can deploy to the cloud computing systems, and it is possible to have private, public or hybrid cloud computing system [13].

COMPARISON OF USING CLOUD COMPUTING THROUGH OTHER SYSTEMS

Grossman, et al [5] developed a cloud-based infrastructure, which has optimized for wide area and supported necessary data mining application. The same idea proposed by Delic and Riley [6] cloud computing technology turns into more global, dependable and efficient infrastructure compare with the Grid Computing technology.

As comparison of cloud systems to the Grid systems, there are following major differences according to Frey [7] :

- Grid systems run processes Versus Cloud systems run virtual machines
- Grid systems are focused on job delegation Versus cloud systems are focused on remote resource allocation (provisioning)
- Grid systems take in to account On-the fly dynamic deployment Versus Cloud systems have Hot-Deploy issues.

Cloud computing is a new technological approach, mainly through operating system virtualization that use mature concepts inherited from Grid computing included in a larger context of HTC-High Throughput Computing, HPC-High Performance Computing and MTC-Many Task Computing.

Also the main difference between Cloud computing and grid systems is given by the length of the period of time used for massive processing, and from large amounts of computing power [8].

III. PROPOSED WORKS

SWOT ANALYSIS

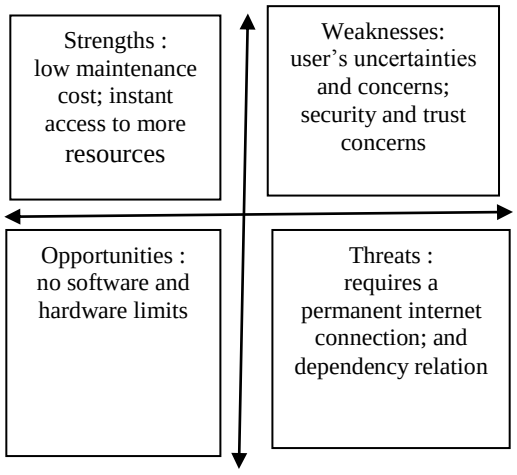
This research will explore the impact of cloud computing in educational institutions through the SWOT analysis.

The SWOT analysis of cloud computing with view of educational institutions divided into four aspects are as follows :

1) Strengths : solves the technical problems, provides best services, increases the quality of learning, and reduces costs
2) Weaknesses: training requirement, integration with local programs is difficult, lack of physical control of data and lack of commitment to service quality and availability
3) Opportunities : increase knowledge, increase provide data storage capacity, and ease access to resources
4) Threats: security concerns in term of data security, hidden cost and addiction to technology.

Those SWOT aspects have been analyzed based on the educational process and can be shown from the SWOT matrix below :

Figure 1.
SWOT Matrix for Cloud System

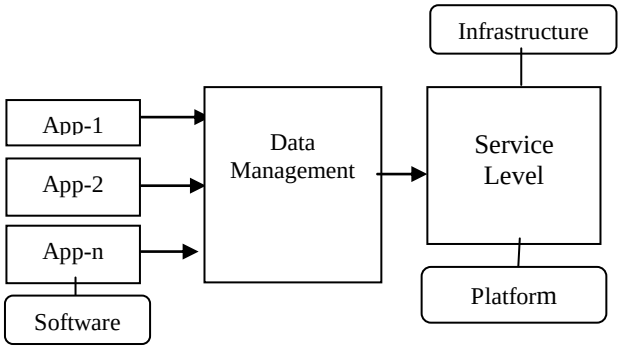


The figure 1. Shows how the SWOT matrix for cloud is an instrument used to deliver better educational services and the results will discuss on the next page.

CLOUD SERVICE MODEL

Cloud service model often refers to cloud services namely SPI model, where SPI refer to Software, Platform and Infrastructure. Depending on the model selected, the cloud provider delivers differentiated services. To optimize the uses of cloud computing, this research describes cloud service model based on cloud's availability and scalability. This model enables users to rapidly build customized the cloud's application, it is shown on the figure 2. (App-1, App-2,App-n, etc.), and available to improve data mining techniques filter and find the requested content in order to help users as shown on Figure 2. Thus, on the figure 2. Describes how the cloud service model can be combined with 3rd party commercial services to create new application and also existing content.

Figure 2.
Cloud Service Model



From the Figure 2. Shows service models of cloud computing that includes Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). IaaS provides a remote virtual hosting server for file storage, PaaS provides the entire infrastructure needed to run applications over the internet. SaaS is hosting application which runs and interacts through web browser, hosted desktop or remote client. Within the cloud service models enable to resource sharing in terms of scalable infrastructure, middleware, and application development platforms. Cloud services allow users to use a variety of devices including laptops, PCs, smartphone and PDA's to access programs; storage data and application-development platforms over the internet via services offered by cloud computing providers [9].

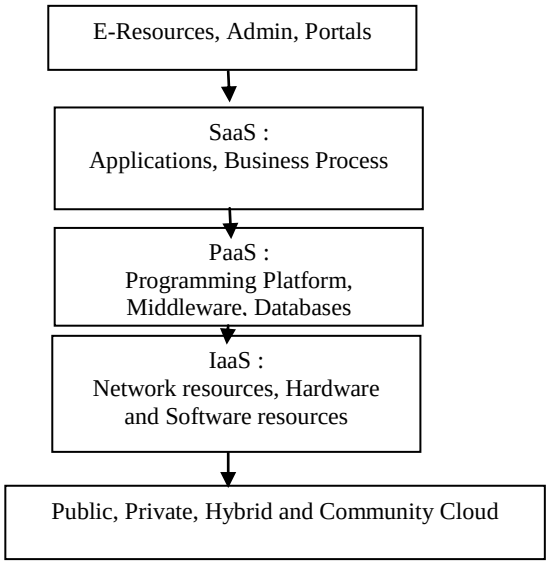
CLOUD ARCHITECTURE

Regarding of cloud service model utilized (Software as a Service, Platform as a Service and Infrastructure as a Service) there are four deployment models for cloud services and can be used for cloud architecture for educational institutions:

1) Private cloud
2) Community cloud
3) Public cloud
4) Hybrid cloud

This research proposes cloud based IT architecture for educational institution as shown in figure 3.

Figure 3.
Architecture of Cloud for
Educational Institution



From the Figure 3. shows that deployment models for cloud services (public, private, hybrid and community cloud) can be used into several cloud service models (SaaS, PaaS, or IaaS) and the service can be obtained from the cloud, such as E-Resources, Admin and Portals.

Regarding to cloud architecture has shown that Public, Private, Hybrid and Community Cloud can develop due to the maturation of market offerings and customers or users demand.

E-Resources, Admin, and Portals can be accesses via cloud service models (SaaS,PaaS and IaaS).

This cloud architecture will help educational institution to overcome the challenges associated with cloud environment such as data privacy and protection issues, organizational support and acceptance, network related issues, etc.

IV. RESULTS AND DISCUSSION

The SWOT analysis for the cloud computing has been discussed with those results are as follows:

For Strengths, the most important strengths to use cloud computing is reducing the cost and easy access to educational resources through cloud computing at any time and any place.

Weaknesses of cloud computing at educational institutions are data security, lack of physical control of the data, and training requirement for the users.

Opportunities in cloud computing for educational institutions include the expansion of the educational programs, no limitation in hardware and software, data storage capacity, provide distance learning and ease of access to resources.

Threats of cloud computing for educational institutions are security concerns relating to the security of users data and requires a permanent internet connection.

The research objectives for SWOT analysis are to explore the strength and weaknesses and challenges facing the application of cloud computing in educational institutions, and also to assess the opportunities and threats that

prevent the implementation of cloud computing in educational institutions.

V. BENEFITS OF USING CLOUD COMPUTING

In other ways we can say Adopting cloud as a solution to develop technologies and to reduce institutions expenses. Cloud computing is made up of hundreds or even thousands of computers linked together and can be accessed via the internet.

Usually in some eduation institutions, the useful of cloud in e-learning system can be divided into the following aspects are [10],:

:

- Infrastructure : to provide infrastructure hardware and software
- Platform : to provide several requirements based on the provider's development interface
- Services : to use the e-learning solution given by the provider

With the cloud computing the institution can do many things such as file sharing, service computing, collaboration systems and online education.

For secure system the benefits of cloud for individuals and companies (such as education institutution) that are developing e-learning solutions, like the following :

- Reduce risk and enhance security : cloud security helps IT Developers reduce risk, which enables them consistent security policies and enforcement, and also and improved IT security and performance.
    - Monitoring of data access : Cloud become easier to be supervised, that only one place should be supervised, not hundreds or thousands of computers, and also the security changes can be easily tested and implemented in one entry point for all the clients [11]

For others aspects, such as economic and services, cloud has several important benefits are as follows [8] :

- Virtualization : Cloud is very easy to create a clone of virtual machine, so the cloud downtime is expected to be reduced substantially.
- Delivery some services : Cloud enables instructors or tutors to quickly arrange educational and training services that enhance learning. Cloud applications can standardize processes, provide access to centralized information stores, and provide some services that enables instructors or tutors to individualized learning based on performance data and each training participant's unique learning style.

- Centralized data storage: losing a cloud client is no longer a major incident while the main part of the applications and data is stored into the cloud so a new client can be connected very fast.

VI. CONCLUSION

To conclude, this research provides an initial description regarding to the cloud computing SWOT analysis, cloud computing models and architecture, and benefit of cloud computing for the educational institutions. The research outcome will support a great number of potential cloud users who need to clearly understand the principles for cloud; cloud computing field researchers who would like to further increase their understanding of cloud computing; and instructors or lecturers who are interested in further enhancing their knowledge in term of cloud computing. However, as time limited, only a few aspects and components from cloud computing have been examined in this paper, further discussion will be carried out in the future.

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