GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

CLOUD COMPUTING AND ITS ROLE IN EDUCATION IN MOROCCO

Omer Abdel Rahim M. Fadil[*1], KHALDI Mohamed[2], Yassine Tabaa[3], Dr. Mohamed A. El Hindi[4]
Laboratory of the Computer System and Communication Abdelmalek Essaadi University, Tetouan, Morocco[*1]
Department of Computer Science and Management Laboratory of the Computer System and Communication Ecole Normale Superieure Abdelmalek Essaadi University, Tetouan, Morocco[2]
Laboratory Information and Communication Systems Abdelmalek Essaadi University,Tetouan, Morocco[3]
Assistant Vice Chancellor & Chief Information Officer University of Wisconsin-La Crosse[4]

ABSTRACT

Become the nature of the Internet continually changing from what it was to an environment that allows end-users to run software applications. The need for education in this time he became a constantly growing and developing and improving e-learning solutions become important, so we need to the e-learning systems to keep the pace with the technology, so the new direction is to use cloud computing, Cloud computing is highly scalable and creates virtualized resources that can be made available to users will have a significant impact on the educational environment in the future. 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. Academic institutions take advantage of available cloud-based applications offered by service providers and enable their own students to perform academic tasks, Aim of this paper explore the educational potential of "cloud computing", and how it could be exploited in enhancing engagement among educational researchers and educators to better understand and improve their practice, in increasing the quality of their students' learning outcomes. Morocco, using wireless Internet Wi-Fi ,In order to take advantage of the products based on the low cost of cloud computing enables students to access electronic paintings and mobile devices to the Internet 24 hours a day, the owners of 7 days a week.

Keywords: E-learning: electronic learning; Iaas: Infrastructure-as-a-Service; PaaS: Platform-as-a-service; SaaS: Software-as-a-service; Morocco.

1. **INTRODUCTION**

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.
Most of the conventional education forms are becoming not being suitable for requirements of social progress and educational development and not being able to catch up with the changes of learning demand in time, thus computer networks have brought opportunities for it.
In traditional web-based e-learning mode, system construction and maintenance are located in interior of educational institutions or enterprises, which results in a lot of problems like more investment.
The nature of the Internet was constantly changing from a place used to read web pages to an environment that allows end-users to run software applications.
The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary. Also, the e- learning systems need to keep the pace with the technology, so the new direction is to use cloud computing.
Cloud computing is becoming an attractive technology because of its dynamic scalability and effective usage of the resources; it can be utilized under circumstances where the availability of resources is limited. The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary.
Also Cloud computing is a model for enabling 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.[1]
According to National Institute of Standards and Technology USA (NIST) Cloud Computing is encompasses a whole range of services can be hosted in a variety of manners, depending on the nature of the service involved and the data/security needs of the contracting organization [2].
Cloud computing caters for desirable properties to provide e-learning services, especially in scenarios where these

services are computer-intensive (virtual worlds, simulations, video streaming, etc.), or are offered in a high-scale way, as in Massive Open Online Courses (MOOCs). The cloud can provide students and teachers with tools to deploy computing resources on-demand for lectures and labs according to their learning needs.

Some educational institutions are already using cloud computing to outsource email services, to offer collaboration tools and data storage for students and to host institutional Virtual Learning Environments (VLEs) (Sclater, 2010a) [3].

Figure (1): shows the general concept of cloud computing [4].

He said the Director of SAP Africa company (Giles lebreter) is a branch of the German origin company, One of the largest European companies, The African continent has a great opportunity to use technologies such as "cloud computing" to allow cities the possibility of working together and create a new style of entrepreneurship and gives millions of people the opportunity to work, and to improve the cost rationalization in the retail and manufacturing services for the expansion of consumer markets.
Add to that The cloud computing, enables intelligent transportation systems to solve the problem of severe traffic congestion, so that the growth in the automotive sector provides more jobs in the supply chain, the intelligent transportation systems may already provide new people and newcomers to the cities [5].
The development and spread of information technology at this time helped in the presence of cloud computing rapidly
Became all public and private companies and educational institutions in Europe are using cloud computing in all the fields of process.
Although the beginning of the spread of cloud computing in Morocco and Particularly in the field of education, However, there are some problems faced by educational institutions in the application and implementation of the concept of cloud systems in general in Morocco, Among these problems, not availability of infrastructure and rising costs in the application of cloud computing.
Despite this with the beginning of 2013 launched the University of Marrakech, Morocco, using wireless Internet Wi-Fi, In order to take advantage of the products based on the low cost of cloud computing enables students to access electronic paintings and mobile devices to the Internet 24 hours a day, the owners of 7 days a week.
The move came in order to promote teamwork among students and staff, which will make it easier for them to send e-mail, and use Google Talk (instant messaging) to discuss the lectures and collaboration in Google Docs (Google Docs) for collective action, in addition to the use of Google, sessions to host study groups, and access to information easily from their mobile device [6].

This paper is organized as follows: Section 1 general concept of cloud computing. In Section 2 this paper describes works cloud computing.
Section 3 the benefits of cloud computing. In Section 4 describes the difference between cloud computing and web 2.0. In Section 5 describes works cloud computing. In Section 6 Benefits and affordances of cloud computing for education. In Section 7 Risks of cloud computing for education. This paper is concluded in section 7.

1.1 Types of cloud

We can classify the clouds, according to the various services offered by into three categories As following

a) Infrastructure-as-a-Service (IaaS), buying access to computing capacity over the internet, such as servers or storage. Also known as utility computing, as it is like buying in a utility service such as gas or electricity. IaaS often employs virtualization so users can create their own "virtual computer". This means they can specify the applications, software and operating system they want to deploy in the cloud. Advantages are that users don't need to worry about purchasing and running their own hardware but disadvantages include that it can be difficult to package up and run a computer remotely.

b) Platform-as-a-service (PaaS), developing applications that use web-based tools, so they run in a software environment (i.e. a platform) provided by another company.

c) Software-as-a-service (SaaS), using a complete application running on someone else's system. Web-based email and customer service management systems are examples of SaaS [7].

1.2 Components layers cloud computing

Cloud computing consists of three layers, Infrastructure as a service (IaaS), Platform as a service (PaaS), and Software as a service (SaaS).
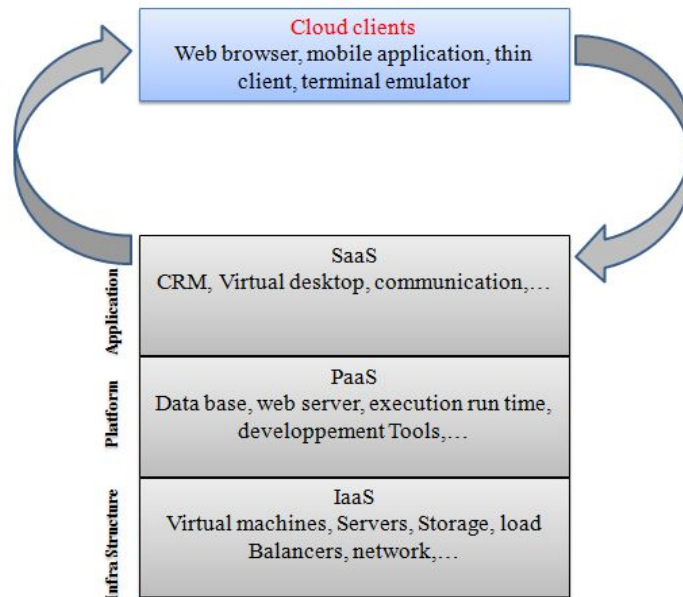

Figure (2): shows Three Layers of Cloud Computing

Depending on the requirements, the customers can choose one or more services provided, for that the quality of service Become a factor Critical To the success of cloud computing.
Cloud computing is highly scalable and creates virtualized resources that can be made available to users.
Users do not require any special knowledge about the concept of Cloud computing to connect their computers to the server where applications have been installed and use them, where users can communicate through Internet with remote servers these servers can exchange their computing slots themselves.
In Cloud computing resources can be either externally owned (public Cloud – as provided by Google and Amazon) or internally owned (private Cloud).
Public Clouds offer access to external users who are typically billed on a pay as you use basis, while private Cloud is built to reach within the enterprise where the users can utilize the facility without any charge [8].

1.3 Cloud computing infrastructure

Is a promising infrastructure which provides computation and storage resources as services.
Cloud computing infrastructure and related mechanisms allow for the stability, equilibrium, efficient resource use, and sustainability of an e-learning ecosystem [9].

2. HOW IT WORKS CLOUD COMPUTING

Unlike shared grids, which are based on open source technologies, clouds are a proprietary technology, only the resource provider knows exactly how the cloud manages data job queues and security requirements.
Cloud computing consists of layers -mainly the back end layers and the front end layers. The front layers are the parts you see and interact with. When you access profile on Facebook account for example, the back end consists of the hardware and the software architecture that delivers the data you see on the front end.
Clouds use a network layer to connect users end point devices, like computers or smart phones, to resources that are centralised in a data center. Users can access the data center via a company network or the internet or both. Clouds can also be accessed from any location, allowing mobile workers to access their business systems on demand.
Where the The computers are set up to work together so that it appears as if the applications were running on one particular machine, allowing the user to use as much or as little of the cloud resources as they want at short notice, without any assigning any specific hardware for the job in advance [10].

Cloud computing has been changing how most people use the web and how they store their files.
Most websites and server-based applications run on particular computers or servers.
Cloud utilizes the resources from the computers as a collective virtual computer, where the applications can run independently from particular computer or server configurations. They are basically floating around in a "cloud of resources", making the hardware less important to how the applications work [11].

2.1 .Why cloud computing and why we use the clouds
The main idea behind the cloud to help us complete access to all the information on the Internet without the need for any detailed knowledge of the infrastructure used to enable [12].
There are many large and small companies at the present time are used cloud computing either directly Such as Google or Amazon, or indirectly Such Twitter, instead of traditional on site alternatives.
Most companies today are using cloud computing is so widely and for the following reasons:
Reduction of costs, hosting the price of deploying applications in the cloud can be less due to lower hardware costs from more effective use of physical resources.
Universal access, Allow employees of the dimension of access to applications and work via the Internet.

Up to date software, cloud provider will also be able to upgrade software keeping in mind feedback from previous software releases.

Choice of applications, that allows flexibility for cloud users to experiment and choose the best option for their needs.

Potential to be greener and more economical Flexibility, cloud computing allows users to switch applications easily and rapidly, using the one that suits their needs best [13].

3. THE BENEFITS OF CLOUD COMPUTING

Cloud computing allows Small and Medium Business to gain access to technologies (infrastructure, platforms, and software) that they might otherwise need sophisticated IT support to obtain. For example, few small businesses have the knowledge and expertise to perform ongoing management of dedicated servers, and storage in order to run commercially available (ERP) packages.

by making use of the cloud, Small and Medium Business can gain access to service levels (especially with respect to reliability and performance) that are much higher than they would be able to provide with a typical on premise

installation, In short, leveraging cloud solutions in a service oriented manner allows Small and Medium Business to focus their efforts on the most important aspects of running their businesses, and it allows technology to be simply one of many actors that support the company, and also is especially true for startups When resources are scarce, paying for expensive hardware without knowing the product or service to market fit is a risk, The explosion in services like Facebook, Drop Box, and Twitter etc.., have been made possible by cloud services from IaaS providers [14].

3.1   Advantages and Disadvantages Of Cloud Computing

The cloud computing if used properly and to the extent necessary, working with data in the cloud can vastly benefit all types of businesses.
We will address some of the advantages and positives of cloud computing Are as follows, Cost Efficient, Almost Unlimited Storage, Backup and Recovery, Automatic Software Integration, Quick Deployment.
Despite the many their benefits that we have addressed, That cloud computing Has disadvantages, such as technical issues
Most companies and institutions need to be aware of these cons before going in for this clouds, While cloud computing is not without its risks, the truth remains that these risks are definitely manageable with some effort taken on the part of the company involved [15].

4.   THE DIFFERENCE BETWEEN CLOUD COMPUTING AND WEB 2.0

Cloud computing they allow users to alter the content of web pages and interact with others. Such software can be hosted by an institution or accessed over the Interne, Web 2.0 can be regarded as a particular type of application while cloud computing is a method by which applications and data are hosted and delivered.

5.   CLOUD COMPUTING IN EDUCATION

Educational institutions throughout the World have become heavily dependent on information technology to service their business requirements.
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 you need substantial, ongoing investment and the skills to support them.
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, or often with much higher availability than can be provided by the educational institution.
After the spread of technology in various fields have become many educational institutions using cloud computing and worked on the their application in education
Educational institutions in this aspect began to use the lowest level of cloud services for purposes such as data storage, this may be attractive when data security is of minimal concern, such as the provision of video, audio, and open educational resources.
Cloud computing in the field of education worked on the host the institutional learning management systems in the cloud , Outsourcing the provision of learning management systems such as Blackboard or Moodle to a third party makes sense for institutions who cannot justify the costs of purchasing, maintaining and supporting hardware and software themselves.

6.   BENEFITS OF CLOUD COMPUTING FOR INSTITUTIONS AND STUDENTS

There are some major potential benefits to institutions deploying cloud services.

Economies, the primary advantage for many institutions is economic. This is particularly clear where services such as email are offered for free by external providers.
Elasticity, this allows institutions to begin with small-scale services. It also allows for rapid escalations in demand at peak times such as at the start of the academic year or during exam periods. There is therefore no need to plan usage levels in advance.

Enhanced availability, A further benefit is that availability may be higher with less down time due to the superior resources and skills available to cloud providers, Students depends increasingly on online services for learning and assessment should be given the best possible availability.
There are also many of the benefits of cloud computing for institutions and students, such as Lower Environmental impact, Concentration on core business, End user satisfaction [16].

Cloud computing can help in provide plenty of the solutions in the fields of education, Offering a range of options that are not found in traditional information technology models.
in actually the integration of software and assets you ownership with software and services in the cloud provides new choices for balancing system management, cost, and security with helping to improve services.

Cloud computing helps students, teachers and teaching staff and parents, and employees have access to critical information using any device from any anywhere Connected to the Internet.

Through the exchange of information technology services in cloud computing, Education institutions can outsource and focus on providing the best students, teachers and faculty members, staff and the basic tools to help them succeed [17].

In the health field Cloud computing is used in Brain Segmentation and Medicine in general at this time, are extremely useful for the healthcare scientists to provide pioneering research , this improves the efficiency for teaching, as trainees doctors can fully understand their expectations and medical lessons.
Cloud Computing is useful for medical education and research, and describes the methodology, results and lesson learned.
Working Bioinformatics Cloud platform can demonstrate computation and visualisation of brain imaging, Cloud Computing offers cost-effective and innovative way to deliver education and research while maintaining a high level of quality of work for education, research and technology [18].

Cloud computing is considered beneficial for the various institutions as follows, Low cost and free technology
There has been a huge growth in low cost and free technology for social interaction, publishing, collaborative, editing, content creation, computing, etc.
Content growth, the amount of content (art, expression, opinion, true development and false information of all forms) is growing at an exponential rate, available to the board audience, and anyone can contribute. Collaboration, Technology is rapidly improving the ability to communicate collaborate with others [19].

6.1   Using Cloud Computing for E-learning Systems

After the development and spread of information technology at this time, have become cloud computing is evolving rapidly with all the applications and are used in all domains, including the fields of education.
There are many educational institutions that can not afford the e-learning systems requirements because of many of the hardware and software and resources and other investments, from our perspective we consider the cloud computing is the best solution where they helps to develop e-learning solutions.
The development of education is constantly growing at this time therefore has to be the development and improvement of e-learning solutions through cloud computing, Where there are several cloud computing services providers that offer support for educational systems. Among them are Amazon, Google, Yahoo, Microsoft etc.

6.2   Cloud Computing Benefits for E-learning Solutions

At present, e-learning is used widely today at various levels of education, such as, continuing education program,training courses in Enterprises, academic courses, etc.
There are at least two entities involved in an e-learning system: the students and the trainers.
The students, Take online course, Take exams, Send feedback, Send homework, projects.
The trainers, Deal with content management, Prepare tests, Assess tests, homework, projects taken by students, Send feedback, Communicate with students (forums).
E-learning systems can benefit from cloud computing using, Infrastructure use an e-learning solution on the provider's infrastructure, Platform, use and develop an e-learning solution based on the provider's development

interface, Services, use the e-learning solution given by the provider.
We can say that the process of the development of e-learning solutions cannot be ignored by the trends of cloud computing.
Despite the the benefits of using cloud computing in the field of e-learning systems, But there are some disadvantages that should be taken into account.
utilization cloud computing to find solutions e-learning influences the way the e-learning software projects are managed, also, the cost and risk management influences the way the e- learning solutions based on cloud computing are managed, There are specific tasks that deal with finding providers for cloud computing, depending on the requirements (infrastructure, platform or services) [20].

7. BENEFITS AND AFFORDANCES OF CLOUD COMPUTING FOR EDUCATION

The main stakeholders in education (learners, educational practitioners, educational institutions, and the IT personnel) can benefit from using cloud computing.
Where there are many Benefits and affordances of cloud computing for the main educational stakeholders For instance but not limited to Such as
Availability of online applications, Flexibility to create learning environments, Support for mobile learning, Computing intensive support, Scalability, Cost savings in hardware, Cost savings in software. Also Where the provides of educational practitioners are many benefits Such as New learning scenarios are now feasible, As well as for students provides many benefits such as Possibilities to extend learning out of the institution, Easier communication and resource sharing, Creation of Personal Learning Environments tailored to students needs without technical skills, Focus on assignments instead of configuration tasks, Easy sharing or synchronization with other devices and institutional learning platforms.
As well Where the Availability of Staff Information Technology are many benefits Such as Reduced installation and maintenance efforts, Offering services with highly variable demand without investing and managing over provisioned infrastructures, Development of applications without scale concerns, Better utilization and simpler management of consolidated resources.
also Where the provides of Educational institutions are many benefits Such as Promote the reuse of pre-configured environments among teachers, courses or other institutions, Usage of free or pay-per-use applications instead of buying many licenses (often not really used) and etc.

8. RISKS OF CLOUD COMPUTING FOR EDUCATION

Although there are clear advantages in the use of the cloud in education, but has risks and affect differently to the educational stakeholders, among these risks are Security and privacy, Vendor lock-in, Performance and reliability, Licensing and price models [21].

9. CONCLUSION

Has newly been recognition of the importance and efficiency of employing cloud computing in educational activities And research and management of educational institutions on the face especially associated with higher education at the national level , It provides for educational institutions the possibility to focus more on teaching activities And scientific research Instead of information technology components and complex software systems
With the possibility of reducing the complexity associated with information technology, by using cloud computing, Achieves the success of e-learning educational institutions use measurement system Developed to measure the effectiveness of e-learning solutions based on the cloud.
Despite this trend, but we note in the Sudanese and Arabic our environment in general, these educational institutions do you still exist in the initial phase in the use of the clouds, and there are many colleges not have enough hardware or software to provide full of students learning experience, and in the paper next we will resolve the problems facing colleges in the use of cloud computing, through the development of the system consists of a platform, where the platform can be divided into three categories, application, platform and infrastructure. However, with SaaS and IAAS, limited budget allows students access to the latest technology on display, and students can work on the cloud, and collaborate with team members and the exchange of knowledge, since they are on the cloud, it can be accessed anywhere, whether home or college, ... etc.

REFERENCES

[1] Prof ,sawit viktar ,   CLOUD BASED MODEL FOR E-LEARNING IN HIGHER EDUCATION ,International Journal of advanced engineering technology, (E-ISSN 0976-3945)Vol.III/ Issue IV/Oct.-Dec., 2012/38-42

[2] Dr A shish Rastogi, a Model based Approach to Implement Cloud Computing in E-Governance, International Journal of Computer Applications (0975 –8887) Volume 9– No.7, November 2010

[3] José A. González-Martinez, Miguel L. Bote-Lorenzo, Eduardo Gómez-Sánchez, Rafael Cano-Parra, << Computers & Education >> Cloud computing and education: A state-of-the-art survey , Available online 15 September 2014.

[4] General concept of cloud computing, (2014), Available;http://manorgeek.com/computing/what-is-cloud-computing/#!prettyphoto/0/

[5] Shoaib lvrich <<Cloud computing software play a pivotal role in the growth of the African continent>>, 03/12/2014

[6]. Hiam Hayek <<Cloud computing are invading Higher Education Institutions>>, 02/03/2013

[7] E-science city, cloud-lounge<<cloud computing in 30, type of cloud>>,Available,http://cloud-lounge.org/EN/types-of cloud.html

[8] Prof. Swati Vitkar,CLOUD BASED MODEL FOR E-LEARNING IN HIGHER EDUCATION, International Journal of Advanced Engineering Technology (E-ISSN 0976-3945)Oct.-Dec., 2012/38-42

[9] Jie Yang, Haifei Li; Mu Qiao «An E-learning Ecosystem Based on Cloud Computing Infrastructure» Advanced Learning Technologies, 2009. ICALT 2009. Ninth IEEE International Conference on, 15-17 July2009.

[10] E-science city, cloud-lounge<<How do clouds work>>, Available, http://cloud-lounge.org/EN/how-do-clouds-work.html

[11] Taty «Technology Explained, the Internet»,Available,http://makeuseof.com/tag/cloud-computing-work-technology-explained/,OnthMarch, 2010

[12] Cloud for Good << why cloud everyone is talking about the "cloud". But what does it mean for your organization? >>, Headquarters: 2157 Madison Ave. Ste. 203, Memphis, TN 38104 - See more at: http://cloud4good.com/why-cloud/#sthash.rGe1suWe.dpuf

[13] e-science city, cloud-lounge<<cloud computing in 30, why use of clouds>>, Available, http://cloud-lounge.org/EN/types-of-cloud.html

[14] Bala Kamalakharan «The benefits of Cloud computing », January 30th, 2014

[15]   IITE Policy Brief «CLOUD COMPUTING IN EDUCATION», Septembre 2010

[16] <<Cloud computing in education, Savings, flexibility, and choice for IT>>,A Microsoft U.S. Education white paper April 2010.

[17] Victor Chang << Brain Segmentation – A Case study of Biomedical Cloud Computing for Education and Research>>, THE Higher Education Academy.

[18] Victor Chang << Brain Segmentation – A Case study of Biomedical Cloud Computing for Education and Research>> ,THE Higher Education Academy.

[19] Mrs. Mili Patel & Proff. Anupam R. Chaube, Literature review of recent research on Cloud Computing in Education, International Journal of Research Vol-1, Issue-6, July 2014 ISSN 2348-6848

[20] PAUL POCATILU, FELICIAN ALECU, MARIUS VETRICI<<Using Cloud Computing for E-learning Systems>>, RECENT ADVANCES on DATA NETWORKS, COMMUNICATIONS, COMPUTERS, ISSN: 1790-5109.

[21] Bhruthari G. Pund Sanil S. Nair and Prajakta P Deshmukh, <<USING CLOUD COMPUTING ON E-LEARNING>> International Journal of Emerging Trends & Technology in Computer Science (IJETTCS) Volume 1, Issue 2, July –August 2012, ISSN 2278-6856

[22] José A. González-Martínez, Miguel L. Bote-Lorenzo, Eduardo Gómez-Sánchez, Rafael Cano-Parra, << Computers & Education >> Cloud computing and education: A state-of-the-art survey , Available online 15 September 2014.