

## The possibility Applicability of using cloud computing technology in E-learning at University of Kassala - Sudan

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**ABSTRACT:** Became exponential growth in the volume of data and information limits the ability of university to manage this data and information and control effectively, and with continued high storage costs make the university having problems retrieving data and the preparation of backup copies, in addition to the high prevalence of information technologies evolving almost daily affect the efficiency and education. Therefore, all university seeking at the present time to achieve the highest return on technology efficiency, through the planning and implementation of virtualization technologies, and cloud computing in order to protect and manage data more effectively and efficiently.

This paper aims to discuss, analysis: concepts of cloud computing and their characteristics, and the benefits and constraints of the use of cloud computing, cloud computing services, as well the possibility of applying cloud computing in e-learning Kassala University in faculty of computer science and information technology "in Sudan", also Conclusions and Recommendations proposed.

**KEYWORDS:** Cloud Computing; E-Learning: electronic learning; Kassala University; Sudan.

### 1 INTRODUCTION

Became exponential growth in the volume of data and information limits the ability of university to manage this data and information and control effectively, and with continued high storage costs make the university having problems retrieving data and the preparation of backup copies, in addition to the high prevalence of information technologies evolving almost daily affect the efficiency and education. Therefore, all university seeking at the present time to achieve the highest return on technology efficiency, through the planning and implementation of virtualization technologies, and cloud computing in order to protect and manage data more effectively and efficiently.

At present, educational universities face many problems in keeping up with changes in information technology and Rapid communication. The development of information technology used in the education and training process requires significant costs. In addition to the cost of new hardware and software. As a result of the different locations of colleges in universities, the need to use modern information technologies, such as cloud computing, has emerged as the new solution to these problems. Can Students access applications from anywhere, anytime, from any Internet-connected devices, access to software development and development systems, and develop and implement their applications in university infrastructure, access to database and network applications Social and self-learning tools through a variety of computers and mobile devices.

The purpose of this paper is to learn the possibility of applying cloud computing of self-learning skills development among students college Computer Science and Information Technology, Kassala University, in Sudan .The procedures of this paper will include the use of the experimental method Using the Department of Computer Science to be learned through the course of

the electronic, and will use in this paper scale is a questionnaire to measure the trend towards online learning to measure the skill of self-learning in department computer students in practice. The objective of the questionnaire is to measure self-learning skills of students online and their attitudes towards. The reasons for the study of this paper are the weakness in the skill of self-learning in e-learning (in general) and learning on cloud computing technology (In particular) to the students in the Faculty of Computer Science and Information Technology At the computer department, and many of whom had already entered on this technology and use.

## 2 CLOUD COMPUTING TECHNOLOGY CONCEPTS

cloud computing is a technology that depends on the transfer of processing and storage space and data of the computer to the so-called cloud, it's a server is accessed through the Internet, That is, it has transformed information technology programs from products to services, and it is characterized by solving the problems of maintenance and development of programs from the companies used for them, and therefore focus the efforts of the beneficiaries to use these services only.

The term cloud computing can be defined as a set of services provided by the service provider to a customer or several customers or to an audience of online customers in order to exploit the capabilities and possibilities of the super service provider without having to buy expensive equipment in the company to do the same tasks. In the sense that the service provider shares its huge potential and its powerful servers to provide diverse services to the customer to provide for customers buy, equipment and maintenance of devices within his company to carry out such tasks and functions. We can say that cloud computing It is not a new technology but a new way service, but we can be using computing resources (hardware, software) But we can be using computing resources via internet. [1] [ 2]

### 2.1 CHARACTERISTICS OF CLOUD COMPUTING

Cloud computing has a set of characteristics represented in the following: -

- Self-service: the ability to use applications available in the cloud, such as Google Docs applications, spreadsheets and databases, any user can create files, modify and save files in the cloud structure using the web browser according to his needs;
- Availability: Access to applications and resources available in the cloud from anywhere and at any time;
- One place for devices, applications, and communication tools, which helps easily access data and information in a timely manner;
- Multi-tenant can share resources and costs across a large group of users;
- Centralized, infrastructure in locations with low costs Such as real estate, electricity, etc...;
- Reduce hardware and software maintenance costs;
- Improving the efficiency of the use of electric energy in the operation of information technology devices;
- Flexibility in using resource capacity and applications that require high loading and operation capabilities;
- Extend ability: Use the latest versions of software, hardware, and resources available in the clouds. [3]

## 3 THE BENEFITS AND CONSTRAINTS OF THE USE OF CLOUD COMPUTING

### 3.1 THE BENEFITS OF THE APPLICATION OF CLOUD COMPUTING IN EDUCATIONAL INSTITUTIONS

- The user can access the files and applications through the cloud without the need to provide the application in the user's device, thus reducing the security risks and hardware resources required;
- Take advantage of very large servers to perform complex operations that may require high-specification devices;
- saves a lot of money to buy the software that a user needs. All that a user needs is a computer connected to a high-speed Internet and connected to a site that provides the software it needs;
- Reduce costs through reducing the number of hardware infrastructure, and the provision of a number of employees in the maintenance of hardware and software in the enterprise;
- The current architecture of cloud computing includes the availability of data centers that are capable of providing service to customers worldwide;
- The majority of education institutions do not have remote resources and infrastructure required for the operation of e-learning and purchase modern versions of applications that evolve very quickly, so the use of cloud computing technology helps these institutions to use modern versions of hardware and software;

- E-learning services are used for a specific period of weeks, quarterly - semester, the cost saving is very important. [4]

### 3.2 OBSTACLES TO THE USE OF CLOUD COMPUTING

The obstacles to using cloud computing in the educational environment are the following:

- The problem of the availability of the Internet is one of the major problems, requiring service provides internet connect permanently while using that service;
- The problem of security and privacy of information, Represented in:

Universities lose a degree of control over their data, as data is stored in computers when another party. The responsibility to protect data from hackers and hackers is in the hands of the service providers rather than the university;

- Multiple rents, reuse of software and hardware among a large number of users leads to a high risk of deleting important data for universities;
- Sharing storage and network resources among many users is also a fundamental risk to computing. [5]

### 4 TYPES OF CLOUD COMPUTING SERVICES

The following figure shows cloud computing technology services, which are the following: -

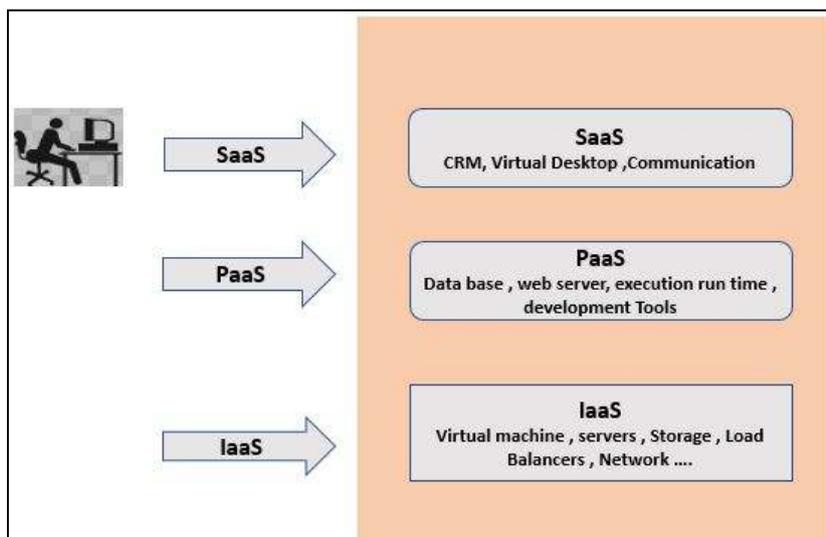


Fig. 1. shows Three Layers of Cloud Computing

- Infrastructure as a Service, it includes storage services, networks, servers, and virtual user devices that can be booted by the user, this service is used in e-learning to eliminate the need for infrastructure to operate data, network infrastructure.
- Platform as a Service, this service focuses on developers to develop web applications or applications with easy-to-use interfaces such as Google application engine. This service is used in education for the management of educational projects, research, work participation of virtual labs. also, it offers the possibility of developing distributed software team of developers Who have access and development.
- Software as a Service, the software provides a service to users. This service provides students with access to e-mail, operating systems and office software applications, including specialized programs for learners and researchers that require (virtual expertise). [6]

## 5 APPLICATION OF CLOUD COMPUTING TECHNOLOGY IN HIGHER EDUCATION UNIVERSITY OF KASSALA - SUDAN

This section aims to identify the possibility of using cloud computing technology in Kassala University, and Field study procedures include Conducting electronic learning-self for computer courses to the students of the Faculty of Computer Science and Information Technology, Department of Computer.

The field study was conducted as follows:

- Develop an introduction to the courses supported by general guidelines;
- Identify and formulate general objectives, analyze, reorganize, and display the practical content of computer department courses, and divide content into modules based on the characterization adopted by the faculty of the computer science;
- Before the students started using the Internet, was explained the nature of the web sites to be accessed, how to use the site to learn from and provide general guidance on dealing with it.
- Teach students how to take advantage of the applications available in cloud computing to learn the courses of the department computer;
- The students of the department were directed to the need to link the theoretical and practical aspects of the courses, leading to an understanding and consolidation of the subjects of the courses and thus achieving the desired educational goals;
- Encourage students to cooperate with each other to carry out the tasks of learning through cooperative education;
- Through self-learning, students can not only acquire knowledge but also achieve a spirit of competition and coordination among them, improving their interpersonal skills and etc... [7]

### 5.1 IMPLEMENTATION OF THE FIELD STUDY

After the field study at the College of Computer Science, students of the Computer Department were selected to conduct self-learning through computer applications using the Moodle learning management system. Is an (open source software) and is distributed under the GNU General Public License. and It has many features represented as follows:

Open source system - Available for free - Is a content management system - It is a learning management system - Virtual Learning Environment -An adjustable learning environment - It designed using pedagogical principles - Adopted by UNESCO and the Open University of Britain with the aim of spreading e-learning at the lowest cost.

Where we have designed an educational platform, using the cloud service provider with the Learning Management System. When students use the educational platform using cloud computing technology included many advantages Represented in the following:

Conduct tests online; Ease of sending exercises and projects to students; Ease of communication between students; Helps students and teachers use applications without uploading them to their devices and help them access files stored from any computer by connecting to the Internet; Students can access all courses at any time, from anywhere; Students communicate with teachers and admin on the platform via chat and etc....

### 5.2 FINAL CALENDAR

The overall assessment aims at measuring the extent to which the students achieved the objectives in the computer department. Evaluation is done by answering the questionnaire to determine the extent to which the cloud computing environment can be used in e-learning, all students are asked about the importance of using the learning management system and its quality in training, cooperation and participation during the semester, the results of the questionnaire were as follows:

The results of the questionnaire were: Analysis of the responses to the importance of the learning management system and its quality

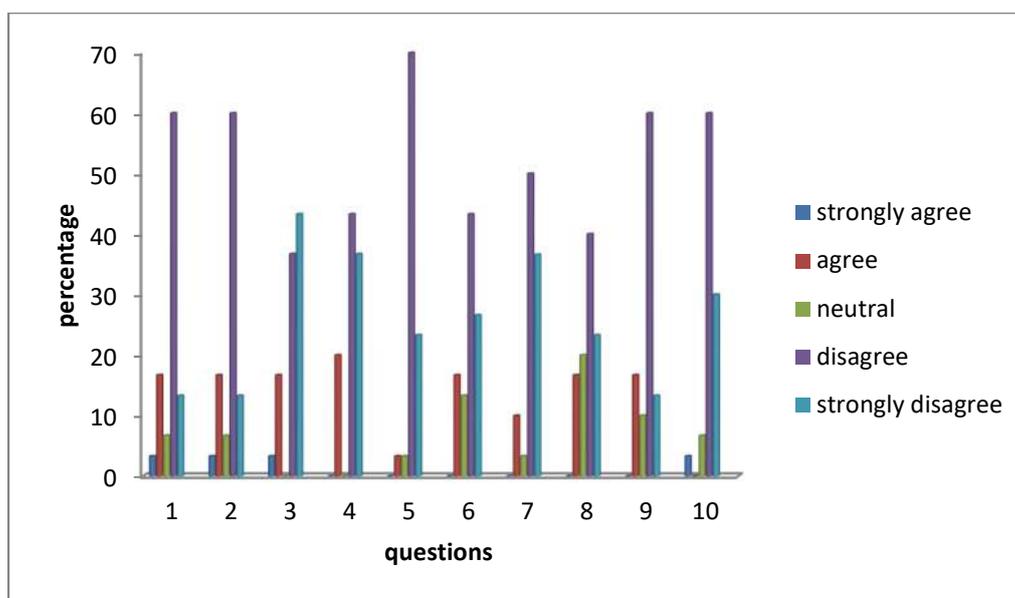
Grades have been developed to evaluate the items as follows:

Strongly disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly agree = 5

The following table shows the summary of the results of the questionnaire:

Answers					
Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Samples
26.3%	52.7%	7.7%	12.3%	1%	Students

The Answers show that the majority of students agree with the importance of the program and its quality by 52.7%. This is evident from obtaining a score of (4) in all answers to the questionnaire, and 26% strongly agree with the students' Cloud computing in e-learning for its ease and availability at any time and place. The following figure shows the rates of response to the questions of the first item according to the evaluation items (strongly agree, agree, neutral, disagree, strongly disagree).



### 5.3 RECOMMENDATIONS

Encourage students to self-education and continuous education through various e-learning environments, especially applications based on cloud computing technology ; Employing cloud computing as an education strategy that allows self-learning and collaborative learning through collective participation between students and each other ; Learning management software must be used in e-learning environments that are compatible with cloud computing ; Training the faculty members according to the principles of educational design on the developments of e-learning and methods of employment in education and scientific research ; Activating the role of electronic courses and e-learning environments in the university education stage and benefiting from the services provided by the Internet.

### 6 CONCLUSION

In light of the evolution of technology and the spread of cloud computing in the world, soon in Sudan all universities and faculties will seek to keep abreast the rapid technological development in the education field, and Cloud computing is considered as new important the alternative to the educational aspects, Through educational platform that has been applied in the Department of Computer Science, We have reached to the need to mainstreaming the use of Cloud Computing technologies in education in Sudan in the future Because in order to give the opportunity for students and teachers, to fast access to different applications, systems and resources through the internet, Share files and documents and exchange of duties and projects between the students. We can say that cloud computing technologies to improve the process of education and self-learning, if implemented in the future state of Sudan.

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