

IMPLEMENT A VIRTUAL UNIVERSITY IN EDUCATION BASED ON A CLOUD COMPUTING

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Abstract: This Cloud computing can be a welcomed optioned in the universities and educational institutes for higher studies. It gives a better choice and flexibility to the IT departments by building multipurpose computational infrastructure once and then uses it for several purposes for several times.

In the proposed approach, Infrastructure as a Service (IaaS) provides virtual machines (VMs) on demand for students of the. These machines are customized for courses and university exercises and provisioned to build virtual universities. Platform as a Service (PaaS) goes a step further and offers the students a framework to deploy their developed programming exercises on a well-defined environment. Finally, Software as a Service (SaaS) makes software services, like lecturing assist tools, or development tools, available for multiple users. In summary, cloud computing allows a flexible and adaptive use of computing resources on demand and thus supports powerful learning environments in terms of a constructivist conception of learning in an effective way.

Our cloud management system provides different services that are categorized into the well-known cloud service model SaaS, PaaS and IaaS. Obviously, the more specialized (e.g. SaaS) the less customizable by the student.

Keywords: Cloud computing; a virtual university.

Introduction

In the recent years, where educational institutes, universities, industries are giving their full contribution in transforming the society and entire world economy. Various researches are carried out to update the present IT infrastructure especially in the area of education.

Cloud computing can be a welcomed optioned in the universities and educational institutes for higher studies. It gives a better choice and flexibility to the IT departments by building multipurpose computational infrastructure once and then uses it for several purposes for several times.

Generally cloud computing may be defined as , “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” [1,2].

Many groups have started implementing these new technologies to further decrease costs through improved machine utilization, reduced administration time and infrastructure costs [3]. Cloud computing is the environment that enables customers to use applications on the Internet such as storing and protecting data while providing a service [4].

Recent studies in the Learning Future of Education in Computer Sector in Sudan highlights two main challenges in ICT Education in Faculties of Computers and Information Sciences in Sudan: (I) Rarity of ICT Faculty members; (II) Lacking to the high performance infrastructure. So, utilizing Cloud Computing in Sudanese Universities can facilitate different scenarios for overcoming this challenge. Being able to provide university setups for students outside universities, and after university times is really an interesting point. Students might access their university scenarios from home, during breaks, and from everywhere.

At present, as many universities are trying to update their IT infrastructure and data, but they are facing few challenges which can be solved by cloud computing. The challenges are [5]

- 1) Cost.
- 2) Flexibility: cloud computing allows to dynamically scale the investment in infrastructures as demand fluctuate.
- 3) Accessibility: making the data and services available publicly without losing the sensitive information.

The main objective of this paper propose to implement a virtual university in education based on a cloud computing to improve teaching, agility and have a cost-effective infrastructure which can bring a revolution in the field of education. It also tries to bring out its benefits and limitations.

The remainder of this paper is organized as follows: section 2 introduces the related work. In section 3, we describe the relevance of using clouds in virtual organizations. In section 4, we propose The Proposed Architecture. To consolidate the proposed models, we implement, in section5, a cloud computing solution based on IaaS (Infrastructure as a Service), constituting the core of our virtual organization. This solution is based on the centralized model. Finally, we conclude the whole paper in section 6.

2. Related work

With an aim of reducing the expenditure of the universities for IT infrastructure and the complexity faced by universities and institutions, the traditional installed software on the campus computers are now replaced by cloud computing.

With the power of cloud, today higher education can gain significant flexibility and agility and can migrate the sensitive data into remote and world wide data center ‘ the cloud’ itself. To use the cloud services the universities and the institutions has to first define their requirements and has to take a special attention for the privacy and critical issues. There are several cloud services as follows; [6]

- 1) Infrastructure as a Service (IaaS): can be used to satisfy the infrastructure needs of the students, faculties or researcher globally or locally with some specific hardware configuration for a specific task.
- 2) Platform as a Service (PaaS): certain providers are opening up application platforms to permit customers to build their own application without the cost and complexity of buying and managing the underlying hardware and software layers.
- 3) Software as a Service (SaaS): the application service provider is hosting the application which runs and interacts through web browser, hosted desktop or remote client. It eliminates the need to install and run the application on customer own computer and simplifying maintenance and support.

Cloud computing provides students and teachers with the tools to employ on-demand computing resources for the development of classes and laboratories according to their needs. For example, teachers can create virtual computers on demand with pre-installed software to deploy labs quickly [7].

Some educational institutions are already using cloud computing to outsource email services, collaboration tools, data storage, or hosting Virtual Learning Environments (VLE) [8, 9].

Educational institutions, such as colleges and universities, recognize the need for the adoption of new technologies as an academic mainstay. Criteria for the selection of new technologies should include factors such as adaptability, performance, flexibility, and efficiency in the platforms [10].

Despite the flexibility, scalability, and lack of resource demand that cloud computing offers, there is a low adoption rate in pedagogical institutions according to Gartner, which reports only a 4% current use. Another study reveals that 12% of participants are not familiar with cloud computing services, while 88% think cloud computing services for education should be exploited [11].

From the review of the literature, several universities have attempted to implement technological infrastructures for the teaching of practical IT skills. Research work [12] is noteworthy because it describes a remote laboratory, or V-lab, in which teachers can configure virtual machines for students to access remotely for networking practices. In [13], the authors present an elastic net model in R, a virtual machine configured with mathematical tools and statistics that can be shared by other educators

3. Benefits of the cloud in virtual university

The authors in [14] show the need to make several clouds collaborate around a virtual university. The resource provided by one cloud is usually limited and some applications need the services of several clouds in order to provide a collective service. They proposed a secured collaboration platform entitled “Cloud VO” which takes into account safety policies of the Clouds partners. Our paper deals with the same collaboration spirit involving several clouds while allowing an organization partner to the virtual organization to freely find configurable computer science resources. The cloud infrastructure we are proposing allows each partner organization to create its own resources and users while keeping control of its own assets. In [15], the authors deal with the evolution of online labs toward Cloud Computing. The cloud computing SaaS (Software as Service) proposed in [16] provides participants with an environment that allows for network conferencing through the BigBlueButton platform.

The platform allows each guest participant to connect and start a collaborative or individual session in the lab. The paper is also concerned with distance lab resources available in the cloud by identifying the web resources through a centralized model, physical resources through the decentralized model. In [17], the authors show the relevance of combining, through a private cloud, real and distance labs for an efficient sharing of lab platforms. The resources provided in [16] are of the SaaS type, which does not offer the opportunity to cloud users to shop freely.

Owing to multiple resources to manage and share, within the collaborative area, the paper proposes two models for sharing resources based on cloud which are the corner stones of the virtual organization: the decentralized and the centralized models.

4. The Proposed Architecture

The proposed architecture is intended for designing and configuring a cloud computing system that; serve the educational of the university in a very economical and cost efficient manner. It delivers a range of functionalities and services that map well onto

the cloud computing requirements and expectations. There are few principal components in proposed architecture as shown in Figure1:

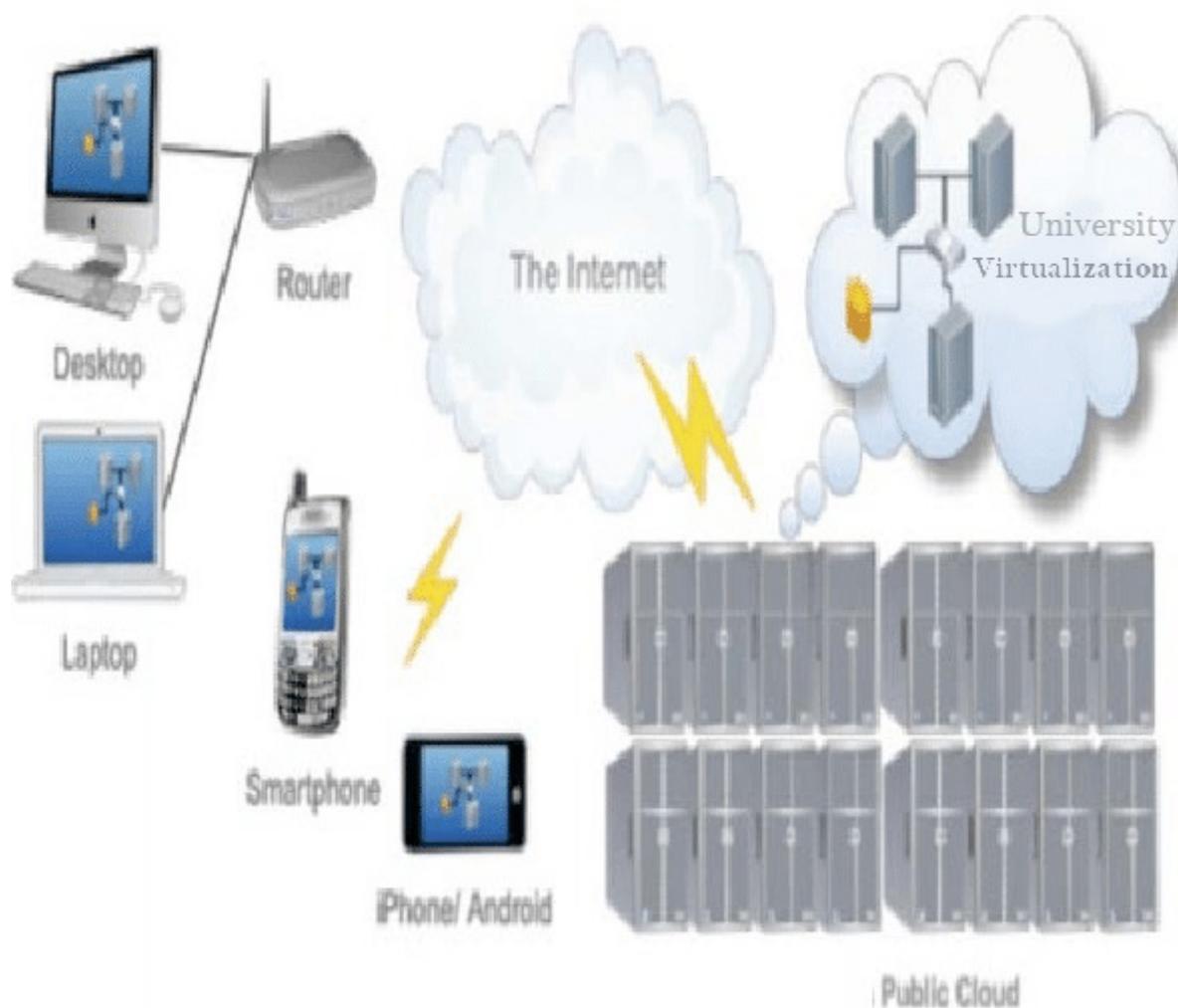


Figure1: proposed architecture as shown [17]

5. Discussion and Conclusions

The first part of the solution is virtual university concept, a virtual university takes programs running on college hardware and beams the images to any computer desktop across the internet, giving students the ability to create and save work as though the programs were running on their own hard drives. The software's performance depends on the strength of the student's Internet connection as opposed to the processing power of their computer, so even students with older computers can use advanced software without difficulty. Such concepts also, need a high performance infrastructure.

The second part of the solution is the cloud computing; A cloud is a powerful combination from networking, storage, management solutions, and business applications that facilitate a new generation of IT and consumer services. These services are available on demand and are delivered economically without Compromising security or functionality. To take full advantage of cloud computing, enterprises need to evolve their IT strategy to achieve greater business value through the improved cost-savings and productivity that cloud services offer Service providers need to offer and monitor cloud – computing services to serve their customers even more effectively while improving profitability . Cloud computing trend is the key behind an innovative solution to the current problems illustrated earlier and a proper design and implementation might be a life-changing solution to technology education around the world.

Cloud computing model incorporates technologies like “Virtualization”, “Software-as-a-Service”, that is a brilliant solution to the current problems we are facing in the traditional technology training methodology and the sub-optimal eLearning solutions in common use today, Utilizing cloud-computing model for e-Learning provides several advantages. First and foremost, an Internet scale solution that can easily scale to thousands or millions of online concurrent system users. Enabling wide scale revolutionary deployment to large masses of students.

The proposed solution is to provide an eLearning solution that leverages current IT infrastructure and presents enhanced pedagogical aspects of the e-Courses E-Learning is far deeper than e-Courses. Our solution includes Pedagogical Objectives and Technical Objectives

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