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An Adaptive Framework for Applying Cloud Computing In Virtual Learning Environment at Education a Case Study of "AASTMT"

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Abstract

This study aims to provide a Cloud Computing (CC) proposed framework using Application programming interface (API's) to deliver connectivity and interaction of Software as a Service (SaaS) in Virtual Learning Environment (VLE) system at higher education institute. The framework is adopted and implemented to enhance the existing VLE to meet the incremental increasing of users' needs and expectations. Different research's methodologies and techniques are used to measure the students and instructors satisfaction, and to measure the impact of the adoption of CC on business value for VLE as well. In addition, the study identifies and explores the idea of covering the gap between the advance of adopting CC as a new technology and the benefits of implementing cloud techniques in education. The findings of implementing the adopted framework equate the study expectations, where the user's satisfaction significantly increased compared with the existing system. The users found that the system performance and response to their tasks are improved. Meanwhile, the users found that the new adopted system make it easier for them to achieve their academic activities and goals.

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Keywords: Cloud Computing; Virtual Learning Environments; Software as a Service; Application Programming Interface.

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1. Introduction

Cloud Computing (CC) began to be deeply involved in educational sector globally, educational institutions adopt CC models in their virtual learning systems not only to take advantage of CC cost effective, CC make it easy for adopters to enhance their educational experience through the deployment of a lot of services that can be accessed anytime, anywhere with no worries about how the cloud and its services works, or where they are located. As well it helps the user to get rid of periodic maintenance operations to be handled by the service provider[7].

In general, CC have three main deployment models public cloud, private cloud, and hybrid cloud, each model has its characteristics, as public cloud is available for open use by the general public[1]. One of public cloud benefits is that, it can be larger than a private cloud, and all the risks removed from customer shoulder to providers. One of cons of the public cloud is the security and privacy issues, which is resolved in private cloud; the main purpose of the private cloud is giving the institution more control over resources, their data and security[1], in this model the cloud infrastructure can be owned and managed by the institution, a third party or combination of them. The hybrid model simply is a combination of different private and public clouds, some resources provided in-house and others provided throw third parties.

As well, CC has three main services models Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS). IAAS provide on-demand, pay-as-you-use access to infrastructure resources, including servers, storage or network devices[2]. PaaS besides infrastructure it provides operating system for developers (e.g., windows Azure). SaaS provides a software's that is provided from a vendor and made it available for public use (e.g., Gmail, and Hotmail), is usually provided through a public cloud provider.

The study survey of the current system found that there are some problems facing the existing VLE such, difficulty to respond to user needs, lack of timely, adequate information about user needs, lack of user involvement, lack of continuous communication among users.

The aim of this study is to present a CC based APIs to provide SaaS integration with the current virtual learning environment system to combine a range of services that helps improve the VLE experience to meet users' needs. The rest of this paper organized as follows: Section 2 gives an overview of API and briefly describes virtual learning environment. Section 3 presents some related work. Section 4 presents the proposed cloud-based framework and the methodology. Section 5 presents the experimental study and work results Finally, Section 6 ends this paper with conclusion and future work.

2. Background and fundamentals

This section will briefly illustrate the application programming interface and virtual learning environment.

2.1. Application Programing Interface

API is stands for, a mechanism for code reuse[6]. Code reuse allows extend functionality of software and mashup services together that build on top of the work, rather than starting from scratch with every software[6]. API generally work as a software to software interface that can allow communication and interoperate in a secure way, with the same or other applications on different platforms or written in different languages, without the need to understand, modify the provider code. The main purpose of integrating APIs is to enhance the functionality of the intended system.

Web services API's development is usually done using Representational State Transfer (REST) and Simple Object Access protocol (SOAP) [8].

2.2. Virtual Learning Environment

Virtual Learning Environment (VLE) it can also called "learning platforms" It is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process[3], including web based access to class content, grades, assessments, and other class tools.