Development a Teaching Methods using a Cloud Computing Technology in Iraqi Schools

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Abstract

The current state of education is mostly electronic. Factors such as servers, storage space, and software are more prominent than ever before. Cloud Computing is defined as an Internet-based computing space that allows its users to share resources, software and information. In the context of Iraq, increased educational spending has not translated into improved learning environments. This work intends to increase the efficiency of education in Iraq through reviewing the characteristics associated with cloud computing providers, such as Microsoft, Google and Amazon, in the context of enhancing the advantages to students, teachers, and other stakeholders. The work will also try to determine approaches that offered rich and affordable services and tools through posing a suitable Cloud Computing Model for Iraqi Schools (CCIS). This particular model is made up of three major parts; preparation, implementation and monitoring, and evaluating and reviewing. The CCIS model combines public and private clouds in the provision of multiple services to the students and enables the formation of links outside of schools. Problems associated with security and data privacy are quite low and under control in this model, as they are defended beyond firewalls alongside remote services, scalability, low costs, efficiency, and functional plug and play options. This study will also decrease the challenges faced by the model internally and externally via constant appraisals and review.

Keywords – school education; cloud computing; integrating IT into teaching and learning; country-specific developments; improving classroom teaching.

الخلاصة

الوضع الحالي للتعليم في معظمه الكترونياً. العوامل مثل الخوادم، ومساحة التخزين، والبرمجيات هي أكثر وضوحا من أي وقت مضى. الحوسبة السحابية هي الحوسبة المستندة الى الإنترنت والتي تسمح للمستخدمين بتبادل الموارد والبرامج والمعلومات. في سياق العراق، لم تترجم زيادة الإنفاق على التعليم إلى تحسين بيئات التعلم. هذا العمل يهدف إلى زيادة كفاءة التعليم في العراق من خلال استعراض الخصائص المرتبطة مع مزودي الحوسبة السحابية مثل مايكروسوفت وجوجل وأمازون لزيادة الفائدة للطلبة والمدرسين والعاملين في قطاع التربية. وهذا العمل أيضاً هو محاولة لتحديد الاساليب التي تقدم الخدمات والأدوات الغنية وبأسعار معقولة من خلال بناء نموذج مناسب للحوسبة السحابية للمدارس العراقية. يتكون هذا النموذج العملي من ثلاثة أجزاء رئيسية: التهيئة، التنفيذ والمراقبة، والتقييم والمراجعة. هذا النموذج يجمع بين الحوسبة العامة والخاصة لتقديم خدمات متعددة ويُمكن الطلبة والجهات المستفيدة من الوصول الى المعلومات خارج المدارس. المشاكل المرتبطة بأمن وخصوصية البيانات منخفضة جدا وتحت السيطرة في هذا النموذج، كون البيانات محمية وراء الجدران النارية مع الاحتفاظ بالوصول عن بعد الى الخدمات العامة، قابلية التوسع، التكاليف المنخفضة، الكفاءة، خيارات التوصيل والتشغيل. هذه الدراسة أيضا تقلل من التحديات الداخلية والخارجية التي يواجهها تنفيذ هذا النموذج من خلال استمرار التقييم والمراجعة.

الكلمات المفتاحية: التعليم المدرسي، الحوسبة السحابية، دمج تكنولوجيا المعلومات في التعليم والتعلم، تحسين التدريس في الفصول الدراسية.

I. Introduction

Cloud computing is a modern technology that has been activated and exploited by technology giants such as Microsoft, Google, and Amazon. However, it has been only recently that nations, such as Malaysia's and Britain's, are making use of the feature offered by this technology in the form of rationalization and saving costs (Intel, 2010; Microsoft, 2015). The National Institute of Standards and Technology (NIST) define cloud computing as *"a model that enables convenient and 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 interactions"* (Nikam & Patil 2014). Simply, cloud computing is the utilization, passing on, and storage of information through the applications and services offered over the Internet and hosted by third-class corporations. In cloud computing, Internet-based computer resources are participated rather than using local servers or devices. Some examples of cloud services include Dropbox, Yahoo, Google Docs, Google Apps Education (Gorrow 2013).

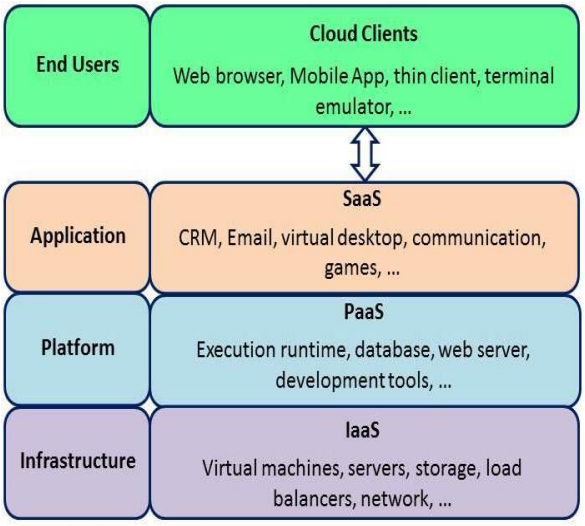

Figure 1: Cloud computing services layers [Source: Jang, 2014]

The University of California (UC) discovered that the implementation of cloud computing as useful for one of their subjects, which was mostly about the development and implementation of SaaS applications (Mathew, 2012; Sultan, 2010). It is also a fact that cloud computing results in increased advantages to students, such as testing directly (online), easy sending of exercises and projects for learners, easy access to the tests, exercises, projects submitted by students, feedback between students and teachers, ease of communication between students, helping students and teachers to use applications without loaded on their computers and helping them to access stored files from any computer by using the Internet, and access to all programs at any time, from anywhere. This makes the implementation of cloud computing in education viable in the context of some areas, such as the provision of lectures or seminars quota from a distance, which allows them to be present on the virtual cloud (as a mobile app) and are accessible beyond time and space (Adrees *et al*., 2015).

Cloud service models illustrate how it is made in hand to users The most essential service models embraces a composite of IaaS (infrastructure as a service), PaaS (platform as a service), and SaaS (software as a service). These service models are interactive and interdependent; for example, PaaS is dependent on IaaS, because the application platforms need physical infrastructures (see Figure 1). The major contrast between SaaS and PaaS is that PaaS normally represents a platform for application advancement while SaaS supplies online applications that are already advanced perception the association and dependency between these models are crucial IaaS is the establishment of all cloud services, with PaaS building upon IaaS, and SaaS in turn building upon PaaS. The architecture of the cloud layer model is presented in Figure 2. Moreover, The spread models clarified by the cloud community are Public Cloud, Private Cloud, Hybrid Cloud, and Community Cloud (see Figure 3) (Lakshminarayanan *et al*. 2013; Microsoft, 2015).

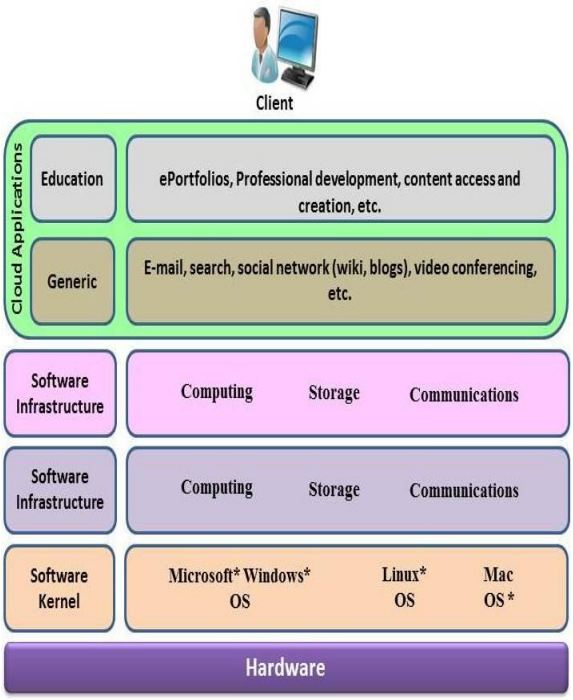

Figure 2: architecture of the layer model of cloud computing
[Source: Sen, 2013; Intel, 2010]

Microsoft Live@edu was designed to cater to educational requirements. The program provides a collection of hosted collaboration services for educational institutions, such as collaboration services, communication tools, mobile, desktop, and web-based applications (Microsoft, 2015). Google Apps is a library of web-based programs and file storage that runs on web browser, sans software, requiring only a login and password to be utilized. The communication tools associated with Google Apps are Gmail, Google Talk, and Google Calendar, while productivity tools are Google Docs: text files, spreadsheets, and presentations, iGoogle, and Google Sites, all of which could be utilized to construct web pages (Lakshminarayanan *et al*. 2013). The provisions of cloud services by Amazon Web Services include Compute, Software, Content Delivery, Database, Storage, Deployment & Management, Application Services and Workforce (Amazon 2015). Compute service includes Amazon Elastic Computer Cloud (EC2), Amazon Elastic Map Reduce, Auto Scaling and Elastic Load Balancing.

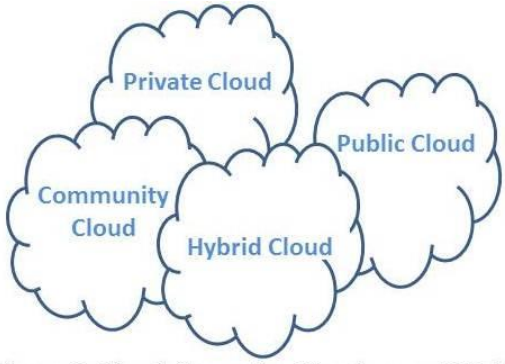

Figure 3: Cloud Computing Development Model
[Source: Lakshminarayanan *et al*., 2013]

Learners can access cloud services via mobile devices connected to the internet. The creation and implementation of new services allow schools to react to requirements needing new and innovative services. In the case of teachers, the advantage of using cloud technology in various schools is the fact that they minimize the level of solitudes

for teachers working in special educational domains, enabling them to connect electronically with partners supported reflection on professional usage via online communication, enhancing skills for staffs, producing a greater understanding of access technology used by students (Nikam & Patil 2014). The obstacles and risks that will force the adoption of educational cloud are related to trusting, trust and assurance. Security represents the main concern vis-à-vis in the implementation of cloud computing in academia and industries. Cloud computing, the latest in current technology, will subsequently replace the traditional approaches to learning (Xiao & Wang 2011; Mokhtar *et al*. 2013).

II. Methodology

Currently, traditional educations (especially schools in Iraq) are minimal in opportunities for collaboration, and thus knowledge building is quite low rather than the standard. This research will examine the viability of cloud computing for schools' education and its potential benefits via literature reviews on recent research papers, books, and reports. The study investigates how the implementation of the cloud computing technology at schools of Iraq and how the introduction of the cloud enables students and teachers to create, share documents, and access, view, or edit, as well as invest on the limitless opportunities of cloud computing, which offer collaboration within and beyond the school. Figure 4 shows the sequence of activities involved in the adopted methodology of this study. The approach is divided in two major stages, the stages of this method are considered as sources in the design of the CCIS Model. The approach of this study is to obtain the CCIS conceptual model through reviewing findings from the literature concerning existing models, challenges, and good practices. Furthermore, this study investigates the current status of education sector in Iraq concerning IT infrastructure, stakeholders and readiness, and challenges to obtain specific plan for Iraqi schools. The two stages form the basis of the actual proposed model.

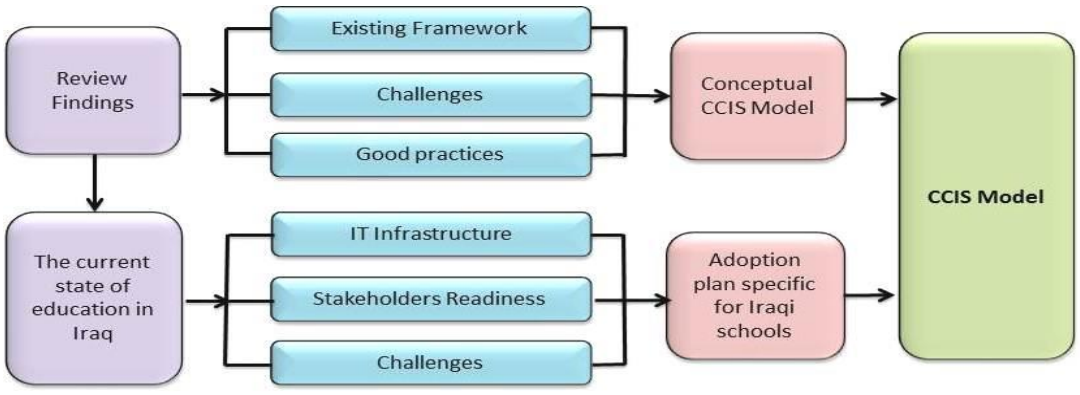

Figure 4: Method used to develop the CCIS Model

III. Overview of the Ccis Proposed Model

A successful transition model to cloud computing for Iraqi schools (CCIS) depends on well-defined transition strategies. Basically, the CCIS model is divided into three major phases, which are preparation, implementation and monitoring, and evaluation and reviewing, as it is shown in Figure 5.

A. Preparation stage

The preparation stage in the CCIS model was formed in three steps. The first step is the raise of knowledge on the Proposed Model; this concept is entirely new, making it necessary that both teachers and students understand it. When the teachers understand it, then they can easily explain it to the students and parents. The second step is the provision of technical support and experts; we can hardly find any computer expert, thus, we have to arrange for a well-versed engineer to be on site. Currently available facilities need to be improved to cater to current needs. The third step represents a major step, which will include running our proposed model to check the results and address all the errors produced by the model.

B. Implementation and Monitoring Stage

This stage discusses the services provided to the students, teachers, and educational stakeholders. This work put forth an intermediate model involving cloud computing technology, merging public and private clouds that are tailored for certain requirements. Clouds that are publically accessible propel world class technologies at reasonable costs. However, security concerns remain an issue. The advent of private clouds addressed this problem, but it also results in increased costs. Merging both clouds will result in a split process where tasks are compartmentalized and sent to the right counterparts that deals with tasks of their respective nature. A hybrid cloud helps schools optimize the benefits inherent in public and private clouds vis-a-vis costs and scaling needs. Some applications need increased controls towards data management, while others require less protection. Hybrid clouds also allow flexibility towards the education services to quarantine confidential data while utilizing the rest of the data to enhance the learning experience and delivery.

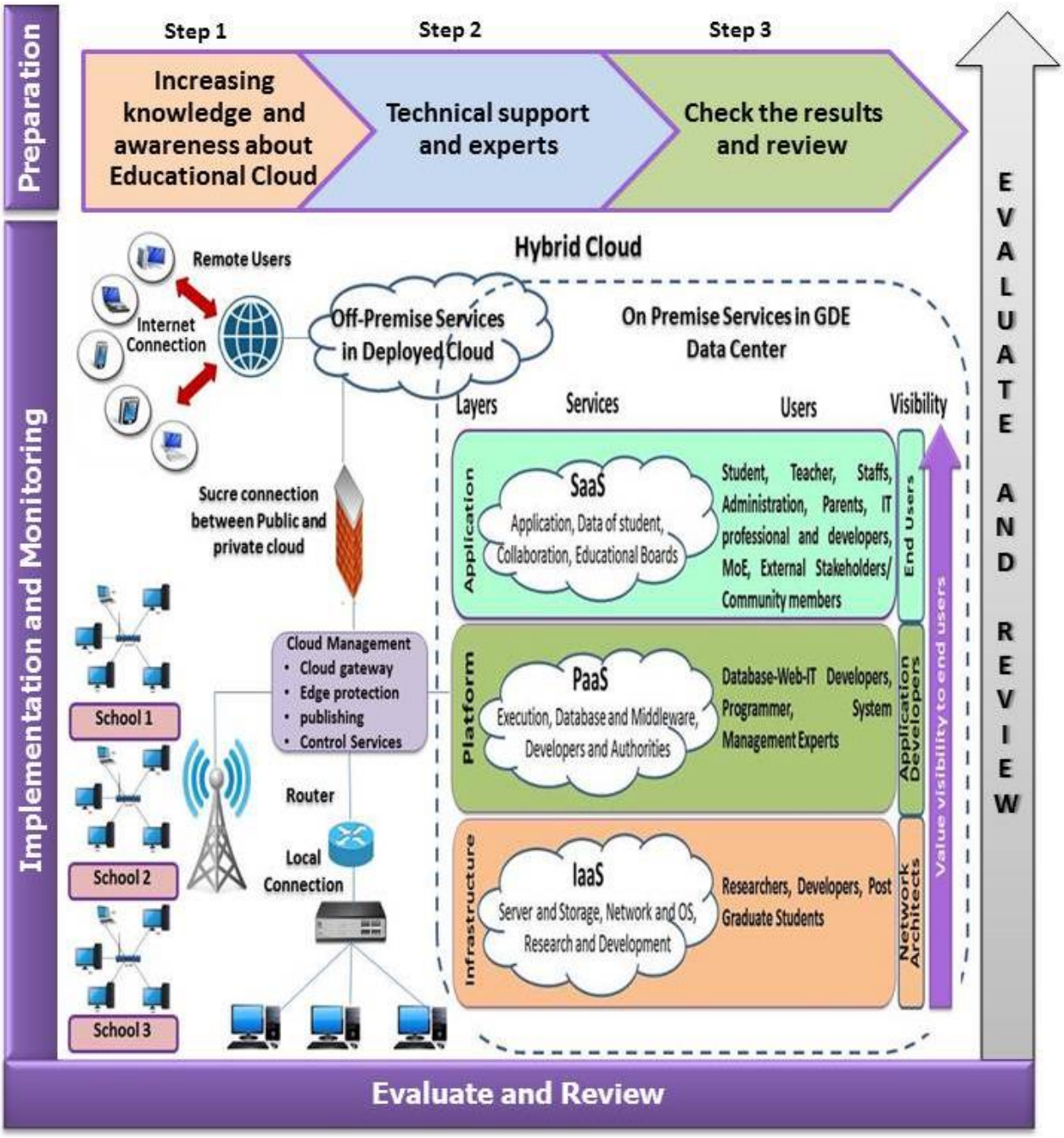

Figure 5: Overview of the CCIS Proposed Model

The proposed model is capable of applying the solution within iterative stages via a continuous transition of data, services and processes towards cloud, allowing for a two-way traffic where data from internally hosted operations are capable of returning to their point of origin. At this point, certain factors are accounted for, such as the flexibility of the program of risk management that helps eschew risks in the event of transitions and security technology architectures. The proposed model also adapts the inherent benefits of cloud computing, examples being of lower operating and capital expenses, increased agility and responsiveness, and scalability.

There are many internal and external factors challenges faced when trying to implement the CCIS model like data security, cost uncertainty, loss of control, regulatory compliance, data portability/ integration, software compatibility, and performance. Furthermore, educational management of cloud computing differ from their more traditional counterparts. This means that CCIS model should be implemented within a carefully constructed framework to avoid any managerial problems. The minimization of the influence of these factors is reliant upon the development of an intricately designed plan that is on par with the status and potential of Iraqi schools and infrastructure, especially in the context of computing and utilizing of technological tools alongside the continuous assessment.

This study proposes a hybrid connection via districts. Special arrangements are made with the proposed Data Center at the General Directorate of Education (GDE) and other educational distant buildings in the provision of Internet connectivity via fiber. Linking GDE with multiple schools' buildings within a few miles of each other uses high bandwidth connectivity via wireless connections. Other factors that should be taken into account are terrain and visual obstructions. Wireless works best when the terrain is relatively flat; however, hills and valleys obstruct clear lines of sights between the buildings. Connecting all the schools is difficult to realize, unless school districts devise ways to efficiently bring all students and staff the electronic resources available on the district-wide network and the Internet.

C. Evaluate and Review Stage

Based on the previous stage, and in line with (Mircea *et al.*, 2011) organizers of education should be aware of the problems and should determine the optimal cloud computing solutions that are capable of solving these problems. This can be done via internal experiments through reviewing the external success practices of cloud computing. This model was built to evaluate data, services, and processes. Time, effort, and the cost of migrating to cloud computing depend on the status and position of the current IT systems. The cost of reengineering existing systems depends on the current status. This stage is preferred by experts who have extensive experience in multiple technology areas, such as systems management, Internet technologies, hardware technologies, and distributed computing. This can be done in parallel with the previous stage. Furthermore, the end users are able to choose their needs or services based on their respective functions. This kind of service provides the end user with almost unlimited computing infrastructure. Therefore, the end user can utilize cloud resources automatically without the need for any human interaction.

IV. Conclusion

Despite the ever increasing effort being made to modernize education in Iraq, there are still many hurdles that need to be surpassed, such as decreased budgets for IT and constantly increasing demands from the education department, and the emergence of more and more schools. This work confirmed the fact that migrating to cloud computing is not a day's affair; it is preceded by promoting culture of cloud computing, such as workshops, seminars, participating in conferences, training courses, and contact with experts. These factors are imperative: the former is influential upon decision makers in the educational sector, as they need to be convinced that it is indeed beneficial that cloud

computing be implemented. Some problems include the fact that people need to be assigned to deal with implementation and execution. This work also analyzed the advantages of implementing cloud computing in Iraqi schools via a hybrid model provided by Microsoft, Google and Amazon Web Service, resulting in advantages such as lower operating and capital expenses, increased agility and responsiveness, and scalability. The proposed model (CCIS) links solutions to tasks; public cloud, private cloud and dedicated servers are merged and they function as a single system, and eliminate trade-offs and technical obstacles in order to maximize the advantages from every component, which will allow the user to focus on improving the educational sector. It will also let decision makers in education internalize storage for confidential work, which is a major concern of cloud computing. The advent of assessment would hopefully assist in locating missteps in the implementation stage.

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