



CLOUD COMPUTING PILLAR-E-LEARNING

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Abstract— Investment of learning via internet especially in education sector and build multi web-based learning environment has become urgent need to manage remote education. Cloud computing recently growing rapidly with massive applications in different sectors, including education. Construction perfect e-learning system usually requires infrastructure technology (hardware and software resources). Since some universities lack or cannot afford such infrastructures technology, the best solution is cloud computing. This article includes using cloud computing as a positive impact through e-learning development, and presents the benefits of cloud computing as pillar for e-learning project management challenges when infrastructures technology is used.

Keywords: Cloud Computing; E-learning; Education; Infrastructure Technology;

I. INTRODUCTION

Cloud computing is Internet-based computing through shared multi resources include software, and information are provided to local devices to the data center, software consider as a service while applications and data stored on servers to link via internet. Universities have become based on the Information Technologies (IT) to support and increase skills students. Moreover, many universities often lack the resources or information technology [4]. Cloud computing is one of the newest technologies that has a significant impact on teaching and learning in institutions. Moreover, cloud computing offers easy ways to accessibility of education, especially in remote areas for students and staff via have the opportunity to access multi-application platform through web pages as virtual classrooms, whether in own home or in university . In addition, the e-learning systems need to mimic new direction of technology with cloud computing. In this respect, cloud computing presents multi-services that offer support for institutions such Yahoo, Microsoft, mare Amazon, Google etc. The next sections focus on advantages and concepts of cloud computing for e-learning as pillar-e-learning to development of e-learning (e.g. [2], [14], [7]).

II. APPLICATIONS AND CLOUD COMPUTING

Cloud computing is one of computing model and users can gain access to multi- applications anytime and from anywhere, via any connected device. The grid computing basic concept to build of cloud computing to service computing and multi software [9]. In this respect, an emerging model where users have access to their applications anywhere from any device they connect to. The user interface creates a touch of infrastructure that supports transparent applications to users. These applications are located in large-scale data centers where resources can be dynamically allocated and shared to achieve significant economic scale. Thanks to robust platform management services, cost management adding more IT resources to the cloud can be considerably lower than that associated with infrastructure alternatives. Vendors across the IT industry have announced a wide range of cloud computing ventures and among corporate customers there has been an increasing interest in the cloud, such as external distribution infrastructure, software as a core service for future generation and distributed computing services.

Cloud computing is a business model of delivery and methodology management infrastructure. The model provider business provides users with the optimal use of software; software and network resources to provide appropriate services through the Web, and servers provided by logical services require the use of advanced and automated tools. Moreover, Cloud then enables service creators, admin programs and others to use the service through a Web-based interface that describes the underlying infrastructure policies. Infrastructure management methodology enables IT organizations to manage a large number of highly virtualized resources as one large resource. It also enables large-scale IT organizations to grow their central data source without increasing the number of people traditionally needed to sustain that growth. For organizations that are now using traditional infrastructure, the cloud will allow users to leverage IT resources in central data in a way that was never before (e.g. [1], [13], [5]). Organizations using traditional management data centers know that making IT resources available to end persons can be time intensive. It involves many steps, such as getting the hardware; finding elevated floor space and adequate power and cooling; allocating administrators to install system operations, middleware and software; providing network; and protects the environment. Most organizations find that this process can take two to three months. IT organizations that redistribute existing equipment have found that it still takes a few weeks to reach. The cloud suddenly overcame this problem by implementing it, through automation, business workflows and many abstraction resources that allow persons to browse their IT services catalogues add them to shopping and submit orders. Once the administrator approves the command, the cloud will be over. This process reduces the time it takes to source customers from month to minute [4]. In addition, Cloud computing can increase resource utilization and thus reduce IT hardware requirements. It has the potential to reduce global emissions of (CO₂) by talking at the hardware and software level [6], making it an abstraction source for environmental applications. In this respect, Virtualization networks can offer abstraction networks for resources allocation in the cloud computing. Often, multiple virtual networks can be run simultaneously through a single physical infrastructure without interrupting each other. While, Virtual roads speed up the packet transmission process in the network as they can integrate multiple channels into the route. It can also reduce the energy used in routing. The high-level description of data centers is the support of dynamic infrastructure with the support of underlying technologies such as (virtualization, multi-provisioning automation, monitoring and capacity planning. eventually, Cloud computing provides various services and not a single product unit. These services usually, features to three models: a) software of service (SOS), b) platform of Service (POS), and infrastructure of Service (IOS) [10].

- First service (SOS): it is implementing by cloud service providers and is usually used by organizations as a university. It is also available to users over the internet.
- Second services (POS): tool such as (Windows, LINUX) that used by developers to develop and enhance Websites without installing or add any software on the system, and can be run without the administration of expertise.
- Third service (IOS): usually used, maintained or controlled also by cloud service providers that help various operations like storage, hardware, servers and different networks.

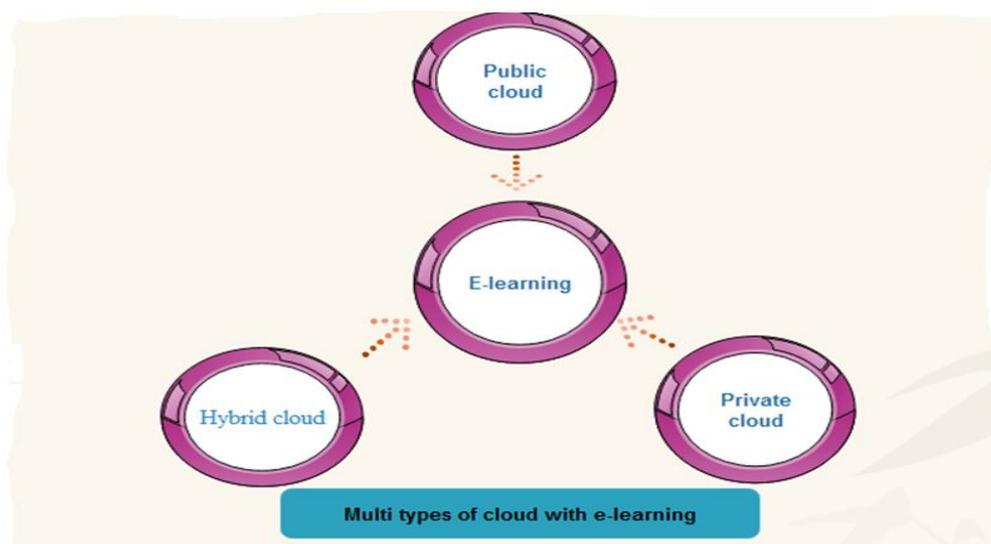


Fig.1 Multi types of cloud computing with e-learning

- In addition some types of cloud computing explained by [7]: such as (private cloud computing, public cloud computing, hybrid cloud computing and community cloud computing):

- First type (Public): it public where resources like , web applications, web services are provided via the internet for any user can get services from the cloud, moreover, public Organizations assist in providing all the infrastructure for public cloud computing deployment.
- Second type (private cloud computing): this type sued in organizations internally and anyone in the organization can get data, services and different web applications but users outside cannot get the cloud computing. Moreover, private cloud computing infrastructure it is fully managed and corporate all data and fully maintained by the organization itself [3].
- The third type of hybrid cloud computing: cloud is a combination more than two clouds like (public, private and community). It is essentially an environment where many internal or external cloud service providers are used. It is used by most organizations [8]
- Fourth type of cloud computing: Cloud is basically a combination more than of one or more public cloud, private or hybrid clouds explained in Fig. 1 shared by many organizations for one (mostly security) issue. Certain communities with shared security, the goal of compliance. Managed by a third party or managed internally. They cost less than the public cloud, but more than the private cloud computing.

III. USING E-LEARNING AND BENEFITS

Many educational institutions lack the resources and basic infrastructure to implement e-learning solutions. That's why traditional ways (Blackboard) converted into Moodle cloud, the biggest applicants in e-learning software, now have cloud-based versions of their apps. Currently E-learning is widely used in various levels of education, especially in universities in terms of: continuing education, corporate training, academic courses, and more [12]. There are many e-learning solutions from open sources to commercial sector. In this respect there are at least two entities included in the e-learning system: students and instructors to sharing different activities such as (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 and Communicate with students (forums)) [2].

IV. CLOUD-BASED E-LEARNING MODEL

A. E-learning cloud and base layer

The cloud-based e-learning class shares IT infrastructure resources and connects large system clusters to provide services. Cloud computing enables the hardware layer to work like the Internet, to make hardware resources shared and accessible as data sources in a secure and scalable way. Moreover, Virtualization technology usually, separates operating systems from physical hardware, which can make computing and storage possibilities for existing servers smaller and reconfigurable, to enhance the use and flexibility of IT resources; instead they can provide a general interface for to integrate extensive cloud computing that enables calculation of accounts(e.g. [12], [10]). The base layer can provide the primary hardware source for the platform layer, and users can use it just as the local device uses.

B. E-Learning Cloud and Platform Layer

With strong hardware support, the platform layer performs data storage, computing and software development tasks, and can even complete tasks that complete comprehensive original data storage, business intelligence processing etc. difficult to complete. Most users can choose several devices based on the complexity of the content handling. Moreover, Virtualization technology enables the platform to demonstrate and support levels of flexibility [7].

C. E-learning cloud and application layer

Application programs or services offered by organizations or universities, paid to students in the same way to meet demand, according to cost calculation and completion of production, marketing, trade and management. The cloud environment for e-learning provides resources for user-oriented customization tools, computing multi-environments, and software services. In this respect, the e-learning cloud space, allow to users' access to digital services transparently in anytime and anywhere. Persons can get the necessary networking and computing services in any situation. Information space or physical space will be fully integrated because of the power of computing everywhere. Information stations everywhere along with embedded multi-system equipment will become e-commerce stores in the future (e.g. [14], [6], [7]).

D. Cloud Computing Pillar E-Learning Application Model

With the advancement and adoption of technology, the advent of cloud computing provides a great opportunity to develop e-learning, many believes that the above problems can be solved well. Universities do not have to worry about building e-learning software environments and equipment and do not invest capital, human and material resources to build systems. All of these matters can be addressed to e-learning cloud service providers, which can be customized for users. In the e-learning cloud model, data is widely distributed, data management is central, and data services are very virtual, all of which offer safer data services.

Intelligent business or policy-making, consider E-leaning cloud environment robust provides to large data center with mass data storage and high-speed computation. This feature make architecture of cloud platform provides a variety of interface forms for users in different applications, such as Web Service interfaces includes (Java, C, Shell, etc..) interfaces [9].

In spite of Cloud computing platform equips multi-resources services to users in the form of rental. A module is designed according to consumption billing to achieve and ensure that all users only pay to resources they have used already. The main aim of cloud computing is that help to reduce the number of servers and to identify the users to meet the major demand for the infrastructure needed to offset the amount of cloud computing: the small amount of computing resources, the user's demand must wait for the resource release or reject the request until more devices run alongside the environment. Most sources of computing, hardware costs and other expenses will be forfeited to reduce costs for cloud computing. In the cloud computing platform, academic staff and administrators enter their requests for location of IT resources include (servers, multi-software, storage, etc.), and can quickly see if these resources are requested and available. If resources are on demand and available, submit your request immediately and forward it to the cloud administrator for approval. This process usually is automated and can be accomplished in a very short time. Resources utilize to planning and management is an important activity for the cloud computing. If handled correctly, the plan will achieve and provide the computing resources needed to create new robust solutions and achieve all application performance goals, moreover promote teaching and research goals (e.g. [3], [11], [5]).

The Virtual Data Centre OS or called (VDC-OS). Usually IT professionals allow to aggregate their datacenter resources via four technologies Fig.2 included (Application v Services), (Infrastructure v Services), (Cloud v Services), (Management v Services). In this respect, the (VDC-OS). Virtual infrastructure expanded along three important dimensions.

- 1) it offers an infrastructure services suite called (Infrastructure v Services) to easily serve servers, storage and networks as a set of local cloud resources and provide them with the applications you need the most.
- 2) it provides an application services suite called (Application v Services) to ensure the correct level of availability, security, and scale for all applications independent of all operating systems a s well as development framework, or architecture designed to run.
- 3) VDC-OS provides a set of cloud services called (cloud v services) Unlike traditional operating systems, optimized for a single server and only supports applications written on the interface, VDC-OS functions as an operating system for the entire data center and supports the fully diversity of all application written on any operating system, from older Windows applications to modern distributed applications running In a hybrid operating system environment. With one of the available resources is expressed in the different forms of a virtual resource to determine the multi-physical resources to meet the requirements based on set criteria. Data centers are facilities used to integrate computer systems and related components, like telecommunications and different storage systems [3].

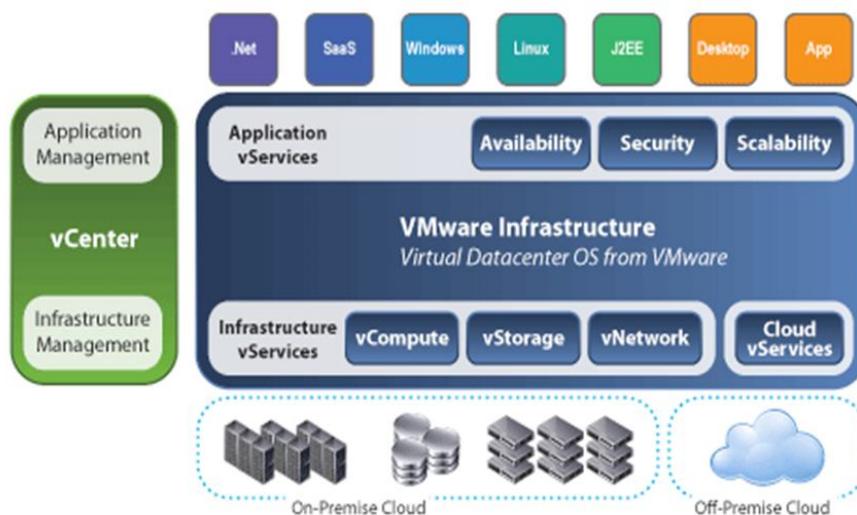


Fig 2 show (VDC-OS)

They typically include backup or power supply, excessive big data communication connections, and the growing direction in the IT world of server virtualization. This means that software allows installing virtual servers to be used in different systems. This way, help virtual servers to running or execute tasks on one physical server.

Virtualization enables different operating systems with multiple virtual machines on the one physical device to run in parallel. Usually, each virtual machine manages one set of virtual machines, and can be loaded into operating systems of devices and applications (e.g. [12], [13], [2]). Regardless of the actual physical hardware component, the multi-operating systems treat it as a consistent set of standard hardware.

V. CONCLUSIONS

Cloud computing became a powerful model for managing and delivering online services. The emergence of cloud computing is rapidly changing IT landscape and is finally a long-term promise of computing convenience becoming a reality. Cloud computing can help different institutions over the world, and can be transformed into education. The cloud computing help instructor and students via cloud services accessible easily from any device in anytime and anywhere to access new knowledge. Through helping countries around the world and reducing participation in the delivery of multi- educational services, cloud computing enables learners and teachers in worldwide to gain the 21st century skills and last information training they need to achieve and success in society especially in institutions. Through this research create model cloud-based e-learning applications by storing large amounts of data for cloud computing and high-speed computing with different capabilities, as well as optimizing the allocation and sharing of resources. Different issues like security, technical standards, regulatory services and others have not been resolved yet, pending further investigation and exploration. In both cases, the cloud-based e-learning application model will not stop moving. As cloud computing technology becomes more complex and cloud computing applications are expanding, e-learning will surely guide in a new era information of cloud computing.

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