E-Educatıon Based On Cloud Computıng
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Abstract

Modern technological learning paradigms enable educators to support the development of highly skilled human resources. For this reason, teachers of higher education institutions consider the use of advanced technologies more and more useful. The rapid application of cloud computing to pedagogical practice creates a professional need to study the technological possibilities of cloud-based training services in order to choose the best educational solutions among the available options. With this in mind, the present thesis contains a theoretical overview of the layers of the e-learning cloud architecture and the study of its deployment models in the educational system. In order to test the compatibility of Learning Management Systems with the distance education model, a study was conducted among teachers of the First Moscow State Medical University named after I.M. Sechenov (Russia), Prydniprovska State Academy of Construction and Architecture (Ukraine) and Wuxi Institute of Technology (China). . This study was conducted using the Blackboard Learn learning management system as an example. This study included 100 people who tested Blackboard Learn's teaching capabilities. The conducted research allowed us to note the main advantages of using computer-based electronic educational programs in the process of organizing and supporting the educational process. Among them, there are convenient tools for processing educational content, effective organization of the educational process, effective tools for monitoring knowledge, and an effective security and privacy system. The present work also sheds light on the benefits of implementing cloud-based e-learning in higher education institutions as producers of an integrated educational product. The study confirmed that the application of cloud computing in education results in the improvement of learning content and can significantly improve the academic results of students due to updated learning technologies, concepts and tools.

Key words: Learning Management Systems, monitoring knowledge, technological learning paradigms.

In today's society, proper education is vital for business and socio-economic development. The widespread adoption of various internet services, especially social networks, has increased the digital literacy of the world's population. Therefore, modern technological learning paradigms such as mobile learning are becoming more popular. World trends in the development of the digital economy have resulted in more technological complexity and the disappearance of many traditional professions due to the automation of human actions and the emergence of new personnel requirements. Now the virtual environment covers a large part of labor relations and even segments of employment. As a result, it becomes necessary to form new powers and rebuild the entire education system.

With the rapid rise in popularity of the Internet in educational practices, curriculum delivery has shifted from local desktops to online applications. Recent technological advances have led universities to adopt innovative educational methods. New technologies provide higher education institutions with many interesting tools that can be used to improve the teaching process. The widespread use of technology, constantly updated information, the need for students to access information anywhere, and the personalization of education have led to the emergence of distance education, electronic education, and mobile education. Wireless technologies and mobile devices play an important role in popularizing these concepts.

A significant trend in universities has been the implementation of Learning Management Systems, which are used as a common platform where students and teachers can interact digitally. LMS not only provides academic institutions with effective learning tools, but also enables efficient organization and sharing of academic knowledge.

Cloud computing is among the emerging technological innovations that can effectively impact education by implementing dynamic scalability and resource efficiency. The cloud-based e-learning model has an

efficiency-of-scale mechanism that transfers the role of building the e-learning system to cloud computing providers. This allows providers and users to build a beneficial relationship. Such a model for education becomes a cost-saving tool for providing an innovative educational process. Partnerships and cost-effectiveness remain the privilege of cloud-based e-learning, as educational institutions are solely responsible for the learning process, content management and knowledge delivery, while the supplier deals with the construction, maintenance, development and management of the educational system. The cloud-based environment can run on a wide range of hardware devices and support the creation of next-generation e-learning systems. Modern users do not need any special knowledge about cloud computing to connect their PC or laptop to the server.

Cloud computing provides a unique opportunity to expand the accessibility of education. Along with the emergence and application of advanced technologies, cloud computing provides an excellent opportunity for the development of e-learning. Today, students and teachers have instant access to numerous application platforms and web-based educational resources through the Internet. An educational institution does not need to worry about creating a software and hardware environment for online learning or spending a lot of money, human and material resources on designing an e-learning system. All these functions can be outsourced to e-learning cloud service providers. The cloud-based e-learning model provides a high level of data security through data storage distribution, centralized management, and data service visualization. Various educational organizations are expanding the presence of e-learning in their educational practices. As an e-learning system usually requires the targeted use of network technologies in educational processes, cloud computing is an excellent alternative for academic institutions with less resources to deploy and manage online learning systems. The advantages of cloud computing in education, especially in e-learning, attract the attention of many developers and software providers.

Recently, many colleges, universities and even schools are implementing cloud-based e-learning programs in their educational process. However, many of them implement them as support to their main learning management systems. The application of cloud computing to the pedagogical practice of higher education institutions creates a professional need to study the technological possibilities of cloud services in order to choose the optimal educational solutions among analogues. In this regard, the presented research aims to verify the suitability of cloud computing applications for e-learning and to determine the advantages of using the systems in providing a quality educational process.

Today, cloud computing has become a high technology that can offer unlimited computing for various social or business applications. At the current stage of development of the education segment, cloud computing technologies are cost-effective services that enable the creation of learning quality. The e-learning cloud represents the transition of innovative cloud computing technology to the field of e-learning, thereby forming the educational infrastructure with all necessary hardware and software computing resources.

E-learning cloud architecture can be conventionally divided into several layers. The infrastructure layer of e-learning is located at the lowest level of the cloud service and consists of information infrastructure and teaching resources. Information infrastructure includes system software, information management system and universal software and hardware. Educational resources are formed from learning materials developed in the traditional teaching model and distributed throughout the educational structure. Using a cloud-based e-learning model, a physical server, storage and network virtualization group forms a pool of physical hosts. The software resource layer is formed by the operating system and middleware. Here, various software resources are integrated to provide a single interface for e-learning software developers. Specialized applications are developed based on software resources and hosted in the cloud, which makes them available to users. The resource management layer is the key to achieving interoperability between software and hardware resources. Service level There are three levels of cloud computing services defined as Software as a service, Platform as a service and Infrastructure as a service.

Software as a service. Software-as-a-Service is a software licensing and delivery model that provides on-demand software products to customers. Its services are hosted by a cloud computing provider and consist of software. The software provides services such as e-mail as a service, conferencing software, and various business applications such as Enterprise Resource Planning, Customer Relationship Management, and Supply Chain Management. Some of the most well-known Software as a Service examples are salesforce.com, Google Apps, Dropbox, mailchimp, zendesk, docusign, Slack, Hubspot. Software as a service is also considered the primary service model used to access software through the cloud. Software-as-a-service AI is delivered in the form of machine learning involved in Machine-to-Human workflows. Software-as-a-service and artificial intelligence take the form of hyper-personalization. It represents personalized educational content generated after the user interacts with machine learning.

Platform as a service. Cloud computing users are not affected by the quality, integrity and availability of data. They must rely on the security measures adopted by the cloud providers. Thus, the reputation of cloud service providers largely depends on the fulfillment of their Service Level Agreement during their operational activities. To provide the best services, large organizations tend to use multiple cloud application services, which is called Fog Cloud process. As a result of these moves, cloud service providers are sometimes forced to lock down their services, and users must switch from one service to another at the same time. In any case, access to services is always complemented by the creation of a seller-user relationship, and both should strive to improve mutual security. Software-as-a-service platforms provide a limited approach on the client side, making the server side very capable. Thus, it provides minimal integrated control for service-based functionality to the client's end users.

Infrastructure as a service. Infrastructure-as-a-service A cloud service vendor shares a "pay-as-you-go" facility over the Internet to access a range of network servers, computing applications, and storage. Infrastructure as a service is an architecture that balances the number of resources allocated to a service with the needs of actual users. For this reason, the infrastructure uses a load balancer, PHP and mysql servers as a service. In the early stages of building cloud architecture, cloud services were offered in only three main modes, namely Software as a Service, Platform as a Service and Infrastructure as a Service. But later, domain-specific services emerged as Business Process as a Service. The role of artificial intelligence in business process as a service is related to the connection between Education 4.0 and Cloud-based e-learning.

The last, the application layer, operates on the basis of applications that integrate educational resources into the cloud computing model and facilitate the development of interactive lessons and the distribution of learning resources. This process consists of the development and delivery of content, the formulation of educational objectives, and the assessment and management of knowledge.

The last, the application layer, operates on the basis of applications that integrate educational resources into the cloud computing model and facilitate the development of interactive lessons and the distribution of learning resources. This process consists of the development and delivery of content, the formulation of educational objectives, and the assessment and management of knowledge. Distribution of educational resources includes teaching material and information resources in digital libraries and information centers. Cloud-based e-learning provides user-centered adaptive hardware resources, computing environment, and software services. In the cloud, users can transparently access digital services anytime and anywhere. Often, e-learning cloud systems address the requirements of educational institutions for virtualization of learning resources, centralized data storage, low operational costs, scalability, flexibility and availability of e-learning systems. Therefore, a cloud-based e-learning architecture includes a cloud management system, hardware and software computing resources, and services offered by the cloud.

Despite the rapid adoption of cloud technologies in university educational practices, there are concerns about whether these technologies are used as effective teaching tools or simply as storage of electronic documents. Findings from various researchers show that while many university staff around the world use

Learning Management Systems to varying degrees, the vast majority fail to take advantage of the potential pedagogical benefits offered by the software's full functionality.

The decision to include cloud computing in university practice is not only related to technological preparation, but also to cultural aspects. Studies comparing the Middle East and Europe in terms of the application of cloud computing to the educational process have shown that European countries are more inclined towards advanced technologies, while the Middle East still prefers traditional learning methods. In addition, cloud-based education in the Middle East is only in its infancy, while many European universities are actively implementing advanced educational technologies. Several important factors influence the decision to implement cloud-based e-learning in a particular country. These include perceived usefulness, ease of use, trust, security, need, and intention to study in such a mode.

The implementation of cloud-based e-learning provides the following advantages for a higher education institution as a producer of an integrated educational product:

Users can run applications with minimum internet connection configuration

Absence of performance-related problems in the operation of users' computers (or mobile devices) since the majority of applications and processes are stored in the cloud

Automatic software update

Compatibility with various file and font formats

Conclusion

Benefits for students – the entire learning process is online, including taking courses, taking exams, getting feedback from teachers, and assigning and receiving projects and assignments. Advantages for educators – methodological support of the educational process is carried out online (test preparation; course material design; training content management; evaluation of completed tests, homework and projects; sending feedback to students; and communication with students).

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