

A STUDY OF CLOUD COMPUTING-BASED E-LEARNING SYSTEM ARCHITECTURE IN EDUCATION 4.0 AND ITS FUTURE

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Accepted: 12.04.2023

Published: 01.05.2023

Keywords: Cloud Computing, e-learning, e- Cloud Learning, Remote Access.

Abstract

Cloud computing is a computing model of providing IT resources such as application, infrastructure and platform as a service using the Internet. Cloud Computing provides the infrastructure for calculations and processing of all types of data sources and is adapted to work with large amounts of data. This internet present technology has brought flexibility, capacity and processing power. This technology recognized the service-oriented idea and created a new system in the world of computing with its influence and advantages. The possibilities of cloud computing have been able to move the IT industry one step forward. Currently, large and important enterprises have migrated to cloud computing and moved their processing and storage to it. Proximity to refined code computers has made it possible to bring back a number of exasperated issues into the call at the present time and in a lower regard. This article shows the characteristics of this e-learning, that is, examines the distinction of disseminated negative pages and displays the structure of the distributed phase method after the process of the e-learning alternative. The creators sought to introduce the disseminated method to e-learning, to collect the e-learning cloud, the build degree of associated eager research and research for it from other edges: structure, improvement rationale, and external interface with the model. E-learning architecture based on Cloud Computing is the implementation of an e-learning system using the advantages of Cloud Computing. In addition, the e-learning system will undergo a change with the onset of the Education 4.0 era, which is an adaptation of the development of Industry 4.0.

These articles that evaluate the architecture of cloud-based e-learning systems, as well as articles on Education 4.0.

Paper Identification



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1.Introduction :-

The class is changing. From the moment the school bell rings to studying late into the night, students demand more technology services from their schools. It is important not only to keep up with their evolving needs, but also to prepare them for the demands of the future workplace. At the same time, educational institutions are under increasing pressure to deliver more for less and must find ways to offer rich and accessible services and tools. Those educators who can provide these sophisticated communication environments, including the desktop applications that employers use today, will help their students find better jobs and greater opportunities in the future. Cloud computing can help provide these solutions. It's a network of computing resources—located almost anywhere—that can be shared. They bring a number of possibilities to education that cannot be found in traditional IT models. Integrating the software and assets you own with cloud software and services actually gives you new options to balance system management, cost and security while helping to improve services. What's in the cloud? A lot of what's on your desktop or in your data center right now. For example, cloud email is often free for schools and universities that need to upgrade legacy systems and expand services. The cloud helps ensure that students, teachers, faculty, parents and staff can access important information on demand using any device from anywhere. Both public and private institutions can use the cloud to provide better services even when working with fewer resources. By sharing IT services in the cloud, your educational institution can outsource non-core services and better focus on providing students, teachers, faculty and staff with the essential tools to help them succeed.

2.Journey from Traditional e-LEARNING network to Cloud e- LEARNING:-

E-learning is an associated technique of electronic learning, web development abuse to fashion, perform, select, supervise, promote and expand recognition, which may not succeed in recent preparation of ways that will in any case significantly improve management intensity.

Since e-learning contains a huge life of favorable circumstances such as flexibility, organized assortment, development, gap, and short time at a time, it is reworked to basic suggestions that for learning in the new century as arrangements that are outdated electronic classroom regime, structure improvement and support are part of consultative institutions or efforts that direct the direction of a lot of problems, as a basic hypothesis, but necessary, while there are no capital additions for them, which leads to the absence of the potential for progression. The cloud e-learning model in its capabilities represents a framework for scaling forces, i.e. progress

The e-learning structure is invested in circulating computer suppliers who can create suppliers and customers to achieve a win-win situation. The cloud setting supports the arrangement of the latest amount of e-learning structures that are ready to continue running on traditional different hardware gadgets while securing the information in the cloud. It offers a resourceful e-learning setup enhanced with advanced computing and a website several improvements. The article examines the tremendous key cloud organizations given the circumstances of the open dissemination of computing, such as Google App Engine, Amazon Elastic Compute Cloud (EC2) or Windows Azure, and highlights the benefits of causing E-Taking in a large number of 0 applications for such a structure. Manufacturers have implemented the well-known advantages of cloud e-learning in a large number of 2.0 applications (flexibility, wisdom or openness) and emphasized the redesign regarding the organization of considerateness and danger. Focused on the current style of e-learning and issues in current e-learning applications. The article shows the academic model of the jug as a result of the combination of quality space and online preparation and its adaptation for e-learning applications running on circulation computing structure. Manufacturers highlight the challenges of e-learning, particularly openness, measurability and cost of enhancement/customization. E-learning systems, they are not continuously scalable and cannot be expanded – the combination with optional e-learning structures is extremely expensive. Article music organizations that intersect with cloud transport demonstrate what will allow to sink the relevance issues that have arisen. Inside this text, an associated unblemished perspective is concluded in the educational area by way of presenting sent calculations for expanding the measurability, flexibility, and openness of e-learning systems. Manufacturers have researched the quality of the e-learning organization of suspension frameworks with its advancements and problems and thus the danger for maneuver an e-learning system out of assets

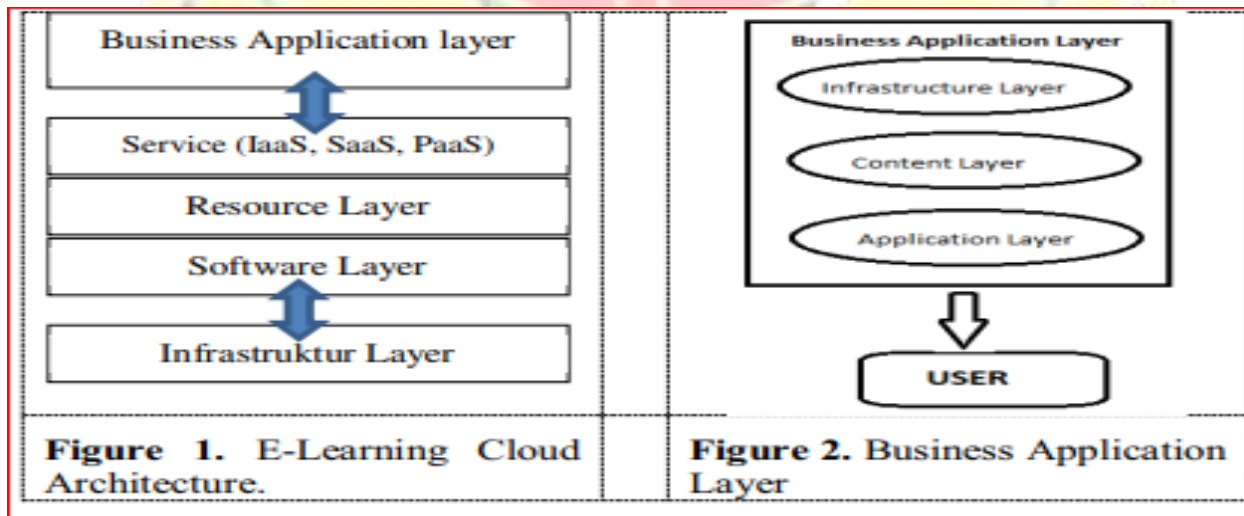
or adventures within a extended computing institution. Also could be the distribution of jobs elements and the sufficiency of consideration researched very important favors. Institutions are responsible for guidance equipment, content organization, and transportation, and along those lines, the merchant manages structure improvement, support, advancement, and organization. The structure of e-learning could also be scaled, each on the level plane and vertically, and so the educational affiliation is preserved for the life of the servers used, which depends on the life of the specialists, as shown that in the previous web-based sorting regime, the approach to construction and preserving the discipline of the unit established within the tutorial companies or companies that the intersection rectifier for tons of problems, such as needing large funds, but at the same time capital is not useful properties for them, which leads to the associated absence of advanced skills. In contrast, the cloud-centered e-study model introduces a scaling efficiency mechanism, that is, the construction of the e-study approach is entrusted to cloud computing vendors who can create vendors and users to recognize a win-win situation. A cloud-focused setup supports the creation of ultra-modern new ways of e-learning that are capable of running on a variety of hardware gadgets while keeping understanding in the cloud.

3. Cloud Based e-Learning Architecture :-

Cloud-based learning platforms are just one of many types of e-learning software. The e-learning architecture automatically responds to each individual user's demand and is able to anticipate user preferences or interests. E-learning cannot completely replace academic staff; it is exclusively an associate degree substitute for technological power, recommendations and tools, providing new content, recommendations and approaches for education that do not seem ready to replace the roles of lecturers. The lecturers will still play a leading role and participate in the development and growing use of the E-finding out cloud. The combined inquiry technique created a stronger teaching act. In addition, interactive content and virtual collaboration ensure an excessive data retention problem. On the other hand, the cloud of e-learning can even be a migration of the technological power of cloud computing between the topic of e-study, which will be the future infrastructure of e-learning, almost as good as all the required hardware and computing packages. assets cooperating in e-discovery. After these computing assets are virtualized, they will be made available to educational institutions, students, and businesses for computing asset rentals in a variety of offerings.

Cloud e-learning systems are divided into five layers: Infrastructure Layer, Software Layer, Resource Management Layer, Service layer and Application Business Layer[4]. In the article

Cloud Computing-Based E-learning System: A Review, he explains that the part that, in addition to the other four layers, differentiates between cloud-based e-learning systems and other systems in the enterprise application layer [1] . Of these five layers, the application layer is often referred to as the Business Application layer, which is the layer that distinguishes it from other systems when implementing cloud computing[1]. This layer contains three other layers, namely Infrastructure Layer, Content Layer and Application Layer. The infrastructure layer is a pool of cloud-based e-learning resources, while the Content Layer contains e-learning content such as web file systems, web services, database systems, and so on. And in the application layer, it contains services from the E-Learning system. While another article titled Cloud Computing: The New Business Paradigm for E-Learning also divides the architecture into five layers with the Business Application layer as the layer that opens up to other cloud implementations. In it, however, it is divided into five parts, namely content creation, content delivery, educational platform, teaching evaluation and educational management[5]. In another post on Cloud computing system based on e-learning architecture, also with five layers with Business Application Layer and important layers which are divided into six parts, content production, content delivery, collaboration, virtualization, evaluation and management[4] .



Education 4.0

The e-learning system is the third revolution in education, which in delivery and distribution includes all forms of education using electronic media and digital media. In the implementation of Massive Open Online Course (MOOC) developing e-learning system, which is a means of teaching and online learning offered by various universities in the world, whether graphic or licensed. While the paper on Education 4.0 for a senior thin engineer in a data-driven society explains the development in the world of education which is currently known as Education 4.0.

This article explains that Education 4.0 is an adaptation of Industry 4.0, which is loaded with automation and sensors and leads to the Internet of Things (IoT) [2]. Another is the role of artificial intelligence (AI), which plays an important role in the fourth education revolution called Education 4.0. which features blended learning and seven AI features, namely [2]; Adaptability to the level of individual knowledge, Chabot's for defining topics, Machine Learning, Game based learning, Communities of practice, Learning analytics, Mobile connectivity, E-Assessments. In addition, there are seven aspects in Education 4.0 namely: Personalization, Gamification, Mobile Connectivity, Adaptability, Learning Analysis Method, Intelligent Teletutors and E-Assessment. In addition, there is another definition of Education 4.0 by Dematrini [6], who stated that Education 4.0 is a property of Education 3.0 that is complemented by an emphasis on AI, which is an increase in the properties of 6 attributes in education, namely: Teacher, content delivery, learning process , learning organization, student and average and others.

4.BENEFITS OF CLOUD BASED e- Learning:-

4.1.Create an interactive learning experience:- Cloud-based learning environments enable an interactive learning experience. Using an authoring tool, you can leverage a variety of features and elements to help bring static content to life. Easygenerator, for example, allows you to add quizzes, fill-in-the-blank exercises, interactive images, and more. These are just some cloud-based learning examples that invite your learners to participate in the course, keeping them engaged.

4.2. Makes remote learning easy:-

Students can access learning materials remotely from anywhere. This facilitates independent learning and makes it easier for distance learners to participate fully in the course. As a result of the Covid-19 pandemic, it is increasingly important for organizations to enable distance learning. Cloud-based learning platforms make this much easier. Trainers can create their content in an authoring tool and then host it in a cloud-based LMS. Not only can students easily access content remotely, but coaches can also track their progress in real time. A cloud-based authoring tool like Easygenerator allows you to host your content and track your students' activity right on the platform, offering an all-in-one solution for distance learning.

4.3. Automatic software updates

Moreover, not having your cloud-based learning platform stored locally on your desktop means you're not responsible for keeping your software up-to-date. With cloud tools, software updates happen automatically. This means that every time you log in – whether as a student or content creator – you can sit back knowing you're always using the latest, user-optimized version.

4.4. Accessible across devices

As we mentioned earlier, cloud-based e-learning content is available on any internet-connected device. This is beneficial for both students and instructors. First, online learning traditionally takes place on a computer. But with so many people owning smartphones and tablets, cloud learning allows students to access content from their preferred device.

4.5. Data backed up:-

When e-learning content is stored in the cloud instead of on the desktop, your content is backed up continuously. This means that if your computer were to fail and compromise all of your locally hosted files, you can be sure that your cloud-based e-learning content is safely stored online. You will only need another device connected to the Internet to access it.

4.6. Cost effectiveness:- Educators can typically adopt a flexible, pay-as-you-go payment system for using a cloud-based LMS. Many basic cloud-based e-learning platforms are actually completely free. Compared to the cost of traditional LMS and non-digital learning methods, cloud-based e-learning provides great value for money.

5. Security in the cloud Education

Institutions are entrusted with confidential information and private data. Cloud computing can seem risky because you can't secure its perimeter - where are the boundaries of the cloud? In addition, these institutions must comply with regulatory regulations such as FERPA and HIPAA and should support educational standards such as SIF. NIST likens the adoption of cloud computing to wireless technology. Institutions have gradually learned how to protect their wireless data – and will do the same with cloud computing.

6. Future of cloud based e learning:-

∴, the future of eLearning is bright and there are many exciting developments on the horizon. From artificial intelligence and VR/AR to microlearning and gamification to social learning and

collaboration, the eLearning environment is set to become more engaging, interactive and personalized than ever before. A fair share of educators face knowledge barriers when implementing technology in the classroom. While many technology-hesitant teachers have gained expertise during the pandemic, challenges remain. Cloud services enable students and educators to develop the 21st century skills required in and out of the classroom. Your technology partnerships provide more than just ensuring a reliable and secure connection. Managed service providers also work with your organization to develop deployment strategies and address skills gaps. Live training and e-learning programs help staff update skills, identify opportunities in the classroom and utilize hybrid learning methods.

Similarly, incorporating digital activities into events on campus and in school prepares students for the future of work—which, data shows, includes remote work and online onboarding and training. Cloud-based digital tools are improving future outcomes, with more than half of GLG survey respondents saying, "EdTech has helped them develop the skills of their students."

Conclusion:-

E-learning is not just a change in technology. It is part of redefining how we as a species pass on knowledge, skills and values to younger generations of workers and students. This book contains several predictions of how e-learning and the functions it serves will continue to evolve. Cloud computing has effortlessly later emerged as a persuasive management paradigm and offers a choice over the web. The rise of cloud computing is rapidly a dynamic landscape of technological powerhouse competencies and will eventually turn into reality the lengthy promise of the right utility computing system. Cloud computing will facilitate communities and countries, it can build on education. Currently, a whole world of knowledge will be created to be marketed within the marketplace for tutors and students through the offering of cloud-based often targeted offerings from any gismo. By serving international nations, reducing value and simplifying educational offerings, cloud computing enables international pupils to accumulate the 21st century potential and coaching they need to be forced to compete and reap the world's knowledge society.

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