Electronic Distance Education – A Proposed Model And Benefits By Using Cloud Base E Learning, Cloud Virtualization And Web Mining

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Abstract - Distance Education is one of the contributions of the education which provide many benefits such as flexibility, convince, availability and cost reduce. The rapid growth of information technology more institutions concern to implement DE system. Hence still continue some drawback in the implementation, maintenance, cost, updates, inefficient resource utilization, standardization and lack of real interaction, in technically network speed, cross platform and data storage. So we plan to propose the Electronically Distance Education model in theoretically with the support of cloud computing technology and it has combines the advantages and strength of current DE, E-learning and education related resources. This model delivers the interactive learning environment, online communication, virtual learning environment and structured learning opportunities. More over with purpose of enhance the propose model we suggest to implement techniques such as Cloud base E-Learning, Cloud virtualization and Web mining. Through this we expect to improve the access speed, enhance the dynamic flexibility, efficient resource sharing and isolation in anywhere, anytime.

Key Words – Cloud virtualization; E-Learning; Electronic Distance Education; Web mining

1. INTRODUCTION
The Distance Education (DE) is a mode of delivering education. Unlike the traditional degrees, it does not require the physical presence of the students in an overly crowded classroom. Correspondence education was one of the oldest forms of Distance Education. Although it worked well over distance, it limited the students from receiving sufficient amount of resources and practical experiences. However this issue was mitigated by the growing IT world, where the students were eager to use new technology such as electronic devices and internet as new tools to enhance their learning. Initial introduction of DE systems began with just course works, which helped to build a bridge between the student and the academic staff. Future more students retrieve the significant classroom interface without attending an on-university. Electronic Medias played a vital role of exchanging course materials and assignments between the students and the academic staff. However, as time progressed this method was considered to be inefficient and non interactive. Future more it occurred the separation between the student and lectures. This significant drawback in DE system resulted in students shifting to Electronic Distance Education (EDE) which consist of current DE system, cloud base e-learning, cloud virtualization and web mining.

E-learning, web base learning, online learning and DE are often used interchangeably. Since the development of technologies, E Learning becomes a more popular due to include the large resources such as course materials, publications, presentations and audio/visual resources. Flexibility, measurement and diversity are the benefits of e-learning [7]. In order to increase the effectiveness of education, learning contents and better learning environment are vital for e-learning. Institutions must upgrade their E-Learning systems to provide high quality education due to increase the number of users and E Learning content.

Uneven sharing of resources, lack of standardization, low quality resources, duplicate contents, inefficiency of innovative application and lack of real interaction are the barriers of the current DE system. The main obstructions in the technical aspect are network speed, data storage format, cross platform access, webpage reflection and access to the capacity of data. Costs of basic implementation,
maintenance and upgrade, inefficient utilization of resources and management are the major drawbacks in the current system. Future more E learning has some limitation, because of it’s operates in client server architecture, due to that raise difficulties to use full potential way in some occasion.

Current DE is a combination of cloud computing and cloud based e-learning. Face book, twitter, flicker, and other social networks are the new wave of the web service which is known as web2.0. Content publishing is the main service of web 2.0 and it has some collaboration with cloud base e-learning [2]. Cloud computing is the new innovation of the present IT world and it allows sharing of resources, software’s, application and storage according to the user demand. Network equipment, firewall, storage area network and other security devices are part of the cloud computing. Web application and web services hosted in the powerful servers and data centers are managed by cloud computing and cloud application. Therefore any user can access the cloud application using standard browser [10].

This paper we recommend the model of Electronic Distance Education (EDS), which uses the following technology such as cloud computing, cloud base e-learning, cloud virtualization and web mining into the current DE System, to enhance the interactive teaching learning method and overcome the stated drawbacks. This model has the capacity to offer flexible teaching learning methods in various ways to support valuable tools like audio/video material. These can later be used to develop and manage course works. It has the ability to create a virtual modern classroom that highly interactive and at the same time make it a two way learning experience. Furthermore, The EDE will increase access to education, reduce the cost of resource material, assist to effective learning at distance and closely integrate formal education [6]. Main aim of this study is to find the model of EDE with the collaborate of current DE system, cloud base E-learning, cloud virtualization and web mining, which will challenges the current DE system and E-Learning, ultimately give the good educational platform to the world in the way EDE.

II. RELATED WORK
Introducing the new technology is the optimal ways to maximize the education outcome. Due to knowledge is one of the factors of development country, all the countries making more concern about the education. Distance Education is the part of the education and it will provide the interactive learning environment and student participate their education in actively. Cloud computing is the amazing technology in this 21st century and this is the correct gateway to enhance the current distance education system. So we are proposing the Electronic Distance Education model using the cloud technology.

Still there are many researchers doing research on this hot topic. Faten karim [17] explorer that the cloud base platform is the good technology for access the E Learning platform in potential way and its benefits as reduce the cost, easy to maintain and update. He define E learning is the good mediator to spread the knowledge in fast and efficient way and for archive the new way of learning, E Learning provide the good communication skills and create the innovative learning environment. He also said that cloud computing define as a new styling of computing, On-demand consumer access, Pooling of resources, Broad access to network, Flexible provision of services, Cloud Storage, Cloud Services and Measurement of services are the key characteristics of cloud computing and Improved performance of PCs, Lower hardware requirements for users, IT Infrastructure costs are lower, Lower maintenance issues, Lower software cost, Unlimited storage capacity, Increased computing power, Improved compatibility between operating systems, Instant software updates, Accessibility from a range of devices, Increased data security, Easier group collaboration and Portability of documents are the benefits of cloud computing.

Venkata Subrahmanyam C. V [18] said that Distance Education provide the learning environment when learners and source of contents are separated by distance and time or both. Online Education,
Online Learning and E-Learning are interchangeable, transfer the knowledge by the form of electronically using computer, this platform include computer-based learning, virtual education opportunities and Web-based learning and internet, intranet, satellite TV, audio/Video tape and CD-ROM are content delivered method. He divided Distance Education in three paths as Synchronous Learning, Asynchronous Learning and Hybrid / Blended Learning base on learning. Synchronous learning means all the learners present at the same time by remotely, classes conducted by using video conference, web conference and instructional television technologies and telephone, VoIP, live streaming and internet radio are help to facilitate meeting in Distance learning courses. Asynchronous learning means learners not present at the same time and access the course material in their own time. Email, audio/video recording, voice mail, fax and printed materials are the delivery method of Asynchronous learning. Hybrid / Blended Learning means complain two methods as Synchronous Learning, Asynchronous Learning and offered the courses.

Dawei Sun [5] explore, cloud computing introduced the model as new pay-as-you-go business and attackers more concern to attack that model due to contain the huge resources. It create a new security issue in cloud computing. And he argued some of the current researchers think that the cloud computing security and existing security are the same and existing security technique such as encryption, digital signature and firewalls helped to overcome the above cloud issue. Moreover he argued many companies still wondering to use the cloud environment due to security warning. He strongly believe confidence, reliability and lack of knowledge about the cloud security are the factors of cloud issue and reliability, availability, safety, confidentiality and integrity are the services provided by Dependability which was the important property of cloud computing. Through the enhancement of Dependability, security also enhance due to security services are considered as sub dimension of Dependability of service. Early researches conducted regarding on dependability using qualitative approach. So he proposed the novel model named CDSV (Cloud Dependability by using System-level Virtualization) and prove the dependability and security of the proposed CDSV model by using the Definition or quantities method. According to analysis of definition CDSV model improve the dependability.

III. CHALLENGES OF CURRENT DE SYSTEM AND E-LEARNING

In the 21st century DE and E-learning is the most welcomed and accepted technology. Most students adopted and following their higher education through DE. Universities offer number of courses as DE for students. In past decades this learning model was used well. Even though Currently DE is facing new issues everyday in theoretical and systematical due to increase in users, technology and education standards.

1. Current DE leads the “Island Information”, which has disadvantages such as, weak system expansion capacity, waste of manpower, more money and inconvenience with teaching resource distribution and sharing[1, 3]. During semester and exam periods resource usage rate is high, in comparison to end of semester and holidays. This is another issue of inefficient use of resources.

2. Network speed and bandwidth is not enough to transfer high capacity resources [3]. DE contains audio/video resources and the present status of it does not satisfy the real time communication. Generally video resources work in centralized mode as they have a huge utilization rate in comparison to the others. Concurrent access of video transfer, storage and transport causes a huge network data flow.

3. Lack of real interaction between student and academic staff [3] is a result of current DE system as it only provides teacher centric learning, study material and assignment via emails. Staffs and student are not interested in this type of digital library resources method.

4. Duplicate content, low quality resources, group management, lacks of standardized and non
standard data’s are the barrier to sharing the resources [1]. Due to the increase in the DE users and mentioned restrictions it is very difficult to access the library resources.

5. Initial cost to implement DE is really high. Human resources, Infrastructure, maintenance are the main cost factors in the E-learning [7]. Educational institutes provide the program with the unaffordable costs, because of that institutes do not show much interest in implement DE on their system. In addition, expensive of integrate the proprietary software, the education institute not able to collaborate and scalable with the existing e-learning platform [8].

6. The current E-learning system has some limitations. Since it operates as a client server architecture or web base technology, it cannot share the resources in other platforms as it doesn’t have the interconnection and limitation [10]. It also lacks scalability, flexibility and interoperability among others. Due to the above issues, different platform, screen sizes, power and memory are not supported to implement PDA devices with E-Learning.

7. Resource storage formats are not uniform. For example the video resources are stored in different formats such as .dat, .avi and etc and the search times for these resources tend to be longer when done by the user. However the future video resources are managed by centralize mode. The way it works is by receiving the request from the user via server and sending a response directly back to the user [1]. This direct process of video storing, transferring, processing requires a huge capacity and the unavailability of capacity causes the network data flow. This action result in server overload or server crash.

8. Security and virus attack is another overhead of current DE system. Hackers may concern the DE system due to increase the users, valuable resources and modified the personal information include their grades. For that they use lot of technique such as Network Sniffers, IP Spoofing, Connection Hijacking and Data Spoofing for attack the network or server. Future more chances to spread virus when we use the web base learning through the learning resources and attachment. It leads to process unwanted task in the server, reduce the efficiency of the server, due to that DE system might be slow down.

Above obstacles are create more challenges to the ongoing DE. In current status, DE users and technology growth their path very well. More countries and institution acknowledge DE learning with the expectation of reduce the cost, facilitate experiential learning, and increase the educated people and access more in the DE system. Due to that make full attention to develop current DE, upgrade and manage the existing infrastructure and create the wonderful platform.

IV. PROPOSED ARCHITECTURE AND IMPLEMENT TECHNIQUES TO EDE MODEL
This chapter will introduce the proposed EDE model with the support of cloud computing which was reference in the previous DE architectures. Implementation of Cloud base E-Learning, Cloud base virtualization and web mining have given strong benefits to the proposed EDE model. This proposed EDE model and implemented technique will not only enhance the current DE system but also reduce the early mention issue.
The proposed EDE architecture described in Figure 1 consists of 5 layers. First layer is the Physical resources layer which contains memory, CPU, servers and network devices. According to the demand of cloud computing, physical resources layer shares its resources with virtual machines. The second layer is VMM/Hypervisor layer, where the virtual machine monitor (VMM) is the primary software behind virtualization. VMM help to create Virtual Machines (VMs) with separate guest OS, Application and control that assists the operation of virtual environment by providing the physical resources such as hardware, memory, CPU and etc.

Third layer is Virtual machine layers. It contain guest OS, Application and supporting files. According to the number of user, Cloud enables the virtual machines and physical resources to be shared by the Physical resource layers. Cloud providers must care about the security of VM as it can limit the access of physical resources to authorized personnel [14]. Fourth layer is cloud DE gateway layer. This layer act as a mediator between user and VMs. User gives the request as per their demand through this layer and this layer manages the access to cloud DE services. User layer is the last layer which can access the VMs using any PDA device. If any disabilities were to occur in your PDA device, Cloud DE gateway layer can enable available services and fulfill the necessary needs. Hence, this will implement the following techniques in the proposed EDE model.

A. Cloud base E- Learning
EDE is fully collaborative with current DE and Cloud base E-learning. Basically E-learning defines as internet enables learning. It includes learning resources, online community of learners, content developers and experts [11]. Flexibility, easy accessibility, diversity, convenience, measurement and etc are the benefits of E- learning [15]. Even though implementation of E-learning still have some issue such as economy factor, human factor, unutilized resource and etc. Cloud computing is the new innovation of IT world and it fulfills the needs of the use by the way of services. Cloud base E-learning technology collaborate with Education as a Service (EaaS) and it contribute more benefits to the DE [11]. No client software needed and it reduces the burden of the maintenance, by paying as per usage and provides the necessary resources which you want are the benefits of cloud base e-learning. In future SaaS server will give the support to EaaS for the need of high level security [11]. So this proposed implementation technique in our proposed EDE model.

B. Cloud base virtualization
Virtualization, a technology introduced by IBM is a key factor that can be used in cloud computing. It is a simulating hardware and software that can run on another virtual machine [13].Cloud downtime is reduced by creating a clone of the virtual machine, which is an easy task to cloud that performs
automatic configuration, deployment and software update by itself [11]. Cloud provides build various software’s for conducting online courses. Effective resource utilization can be achieved using cloud based virtualization due to the introduction of many virtual machines. Cloud based virtualization is the appropriate technique to access the DE system using PDA. Through the implementation of these techniques to the proposed EDE model, we can achieve these benefits.

C. Web mining
Web mining is the application of data mining which automatically discovers and extract the information from the web site [9]. The use of available resources and finding of valuable content from effective resource are some of the main factor of analysis among the contents of document [4]. Basically Web mining research task used three methodologies such as web content mining, web structure mining and web usage mining. The detail structure is illustrated in the figure 2.

Web content mining extract information such as text, images, audio, video and structured records from the content of web document and list them in a form of a table. Search is done by search engine. Search Engine Optimization (SEO) is a technique that increases the delivery of web page to the search engine queries. [16]. Web structure mining discovers the information in the form of web graph which consists of web pages as nodes and hyperlinks. Web usage mining discovers the usage of web data and log information in order to know the service of web application. It also captures the identity or origin of the web users. Google, msn and yahoo are the world’s largest gateway and web content mining technology help in such ways to find the behaviors of their user’s websites.

Data mining can process nearly 1 million data’s from database and often they require the access rights due to the private data’s, but Ten million data processing is a simple task for web mining and it mostly deals with public data, as a result there is no need to get the access rights. Future more the traditional data mining works based on the database information, whereas the web mining works based on web pages. Collect, parse, analyze and produce are the four step for extracting the web page content using web mining.

Future web mining also concerns the data security. EDE contains lot of E- learning materials in the form of website, which includes publications, audio/visual resources, assignments of online exams and
etc. These resources are stored in the servers. When the user request to search information, it is necessary to choose and comprehensively analyses the resources in all server [4]. This consume a lot of time to complete the task. If web mining technology were to be implemented for the above task, then the time taken for the process will reduce as it would extracts the information from web pages and their description, web content mining based on texts data’s. Web mining can combine analyses, conclude, categorize and cluster the content from the large number of document on the web and produce the web document [4]. For this process the time taken will be minimize. Hence it is recommend to implement web mining technique to the propose EDE mode

V. EXPECTED BENEFITS FROM EDE
Portable network devices (PDA) such as smart phones, ipad, surface and iPod have grown in various ways in order to keep up with the technology development. All the users have these kinds of devices which are very convenient when it comes to developing their education. But due to lack of scalability, flexibility and interoperability, the main overhead is not compatible for DE with PDA device [10]. Future mobile platform and E-learning platform will differ in comparison to the previous E-Learning System. PDA devices have more limitation due to constraints such as screen size, processing power and memory capability. Cloud base E-learning and web services have the ability to overcome the drawbacks by the way of provide the servers to process all type of task, issues that require resources and increase the memory capacity. These techniques are quite helpful to upgrade the EDE and will allow the users to access the system more frequently. Future Cloud base E-learning will also give the support to collaborate learning and solving the hardware disability of the PDA devices

High cost is another major drawback of the current DE system. Cloud computing provide high scalability and sharing of resources as per requirement [7]. Maintenance of DE system, human resources, imbalance in the utilization of hardware resources, license, and upgrade and implementation are the major contributors to cost. However, implementation of Cloud based E-learning to the DE system reduces the above obstacles. Cloud providers supply maintenance and upgrade. The imbalance in utilization is solved by on demand service and SaaS, a service provided by cloud solves the problem of purchasing the software as its online service includes Google Apps and Zoho office [12]. Large storage space is required when DE is collaborated with cloud based E-learning due to high capacity learning resources, audio/video resources, digital library and etc. Therefore, cloud provides much more capacity than required and future cloud provides storage facilities for minimum cost. Metered billing is also provided which gives the opportunity to pay for only what is used. Therefore implementation of Cloud based E-learning in EDE is the best alternative solution to minimize the cost of the current DE System effectively.

Backup and security are the key concept of the DE system as the current system running with client server technology, and this may lead to server overload or server crash and complete crashing of DE system. Moreover security attack on the server can result in direct restart of the servers, data corruption and server overload, which cause to decrease in server efficiency. Virus and worm infections on the server can also slow down the process of the DE system. If any infection occurs in the server, it may lead to delete the system files, unwanted process and capture storage without request. But Cloud based E-learning technology is the superb solution for the above issues. The collaboration between Cloud base E-learning and DE will help to overcome the issues by providing file backup, flexibility, hardware resources, elasticity, update/maintenance and solution for server overload and server crash. The backed up files will be stored in the Cloud store. If any data were to be lost or crash the server (overload the server) then the data can be recovered from Cloud Store.

For the learning purpose most of the education institutions adopted DE system widely due to increased users. However, the institutions face difficulty to provide powerful resources which includes high speed, large memory, the necessary hardware devices to each user for DE access and the need for building space due to increased number of users. Virtualization technique trims the building space,
reduce the need of air conditioning and power consumption. Unused resources can be utilized effectively, providing high availability application deployment and migrations are other benefits of cloud based virtualization. Moreover cloud have the ability to create any number of VMs and share the resources within a short period of time, reduce the hardware maintenance cost by using lower number of physical server.

Web mining is creating, enhancing, mining, and acting on web data to retrieve information fast. EDE contains a lot of valid and secure information. Every day a large number of users login to the EDE system and access a large amount of E-learning materials. Different types of servers are co-operated with the EDE server. So it must maintain some important records such as login information, time of access, keywords and search engine used by visitors, server log files, how a visitor arrived at a website, what keywords they used to locate it and etc. With the use of web mining technique we can retrieve the above information accurately and efficiently.

All of the above benefits through the implementation of cloud based E-Learning, cloud base virtualization and web mining are expected from the proposed EDE model.

VI. CONCLUSION
In this paper we have proposed the EDE model and discussed some implementation techniques using cloud computing technology. EDE is another distribution of the education. Traditionally DE conducts in different ways which consist of E-Learning resources, Learning Audio/Video resources, Educational software’s and online exams. Current DE facilitates experiential learning environment, expand the access of education, video conference and E learning. Due to the increase in users and growth of technology, most institutions are willing to implement the DE system with their education curriculum. High Cost is the main issue with implementing the DE system. Other facts include, inefficient resource distribution, slow network speed, duplicate content, low interaction between student and teachers and limited or insufficient security.

We have proposed a new architecture called the EDE model which combines the current DE, E-learning, online exam and available resources related to education based on cloud computing, which will help overcome the above barriers. Moreover we implemented some techniques which include, Cloud based E-Learning, Cloud virtualization and Web mining to upgrade the EOE model. Cloud based E-Learning provide more services from cloud and collaborate with EDE, Cloud based virtualization to create the VMs and reduce the cost factor by sharing the hardware resources and web mining to discover useful information from web pages using keywords in the search engine.

The proposed EDE and above mentioned techniques will help to reduce the investment of initial cost, maintenance cost and capable of collaborating with other educational platforms as per the student requirement and able to scale dynamically based on demand. In future we may offer tools and educational software through the proposed EDE model. It is beneficial in increasing the communication and appearance among the student and academic staff. User can access EDE model using any PDA device without time and place restrictions, cloud provides the needed resources according to the demand. In future we will perform the implementation and evaluation of this EDE model with the support of cloud computing and mentioned techniques.

REFERENCE


