Global Scientific JOURNALS

479

Cloud Based Smart Primary Education System for Deprived Children

FAHMIDA YESMIN CHOWDHURY

Department of Computer Science and Engineering, Faculty of Engineering,
University Of Development Alternative, Dhaka, Bangladesh
email:fahmida06@gmail.com

Abstract

Cloud technology is now applying in various sectors of education system. One of the main feature of cloud computing is to access many resources with minimum cost. So this feature can be used to provide effective primary education with low cost for developing countries. This research paper mainly focuses on developing countries because the primary education level of these countries is too poor or below standard compare to other developed countries. One of the major parts of the nation of developing country is deprived children who do not get proper basic education for different barriers. With limited budget, how cloud technology can be used to change the current primary education system and deliver quality education for poor children are proposed in this paper. This proposed system can be developed by implementing three main parts. One part is the public cloud where all educational resources will be stored, second part is division wise private clouds which will contain all updated data from public cloud and third part is area wise primary institutes which will connect with private cloud to deliver the quality education. With the proposed architecture, primary education system of developing country can be improved more effectually.

Key words: Primary education, Cloud based education, Effective education, Developing country, Smart education, Education for deprived children, Standard primary education system using cloud

1. Introduction

Basic or primary education works as main backbone for the developed nation and effective education can help to decrease poverty and increase the economic growth of any country. Most of the poor or deprived children of developing countries are not getting proper primary education for various reasons such as poverty, family burden, gender discrimination and lack of interest. Most of the primary level learners are going to out of school for different barriers [1]. If it possible to provide interesting, interactive and equal standard education in primary level in reliable and less time for deprived children then the percentage of the learners of this level will be increased fast. With the help of cloud technology the educational standard of primary level can be developed more better way. There are enormous numbers of benefits of developing cloud based education system. Some of them are availability, cost, on-demand basis, performance, privacy, security etc. Using these benefits, teaching and learning method of primary level can be improved and enriched for developing countries [2]. Implementing effective and standard primary education system using public and private cloud for deprived children of developing countries is proposed in this paper.

1.1. Comparative Analysis of traditional and cloud based education system

1.1.1. Limitation of Traditional Education System:

There are so many limitations in the traditional government level primary education system of developing countries. Some of them are mentioned here:

- Educational Resource
  The educational resources which are used in primary level not sufficient to deliver standard and qualitative education compared to non-government primary institutes. Most of the primary institutes don't have necessary resources to motivate the deprived children to complete their study properly.
- Teaching Method
  Teaching method which is currently running in the traditional education system is not satisfactory and less effective for the young learners of primary level. Teaching method has to change in such way that the young learners do not have to need study at home after taking the class.

- ▪ Trained Teachers

  To provide quality education educational institute must require well trained teachers who can deliver educational material in proper way. The primary institutes have much shortage of these types of teachers.

- ▪ Monitoring student performance

  In traditional system, student performances are not monitored properly for various reasons. Education system will be more effective if student performance related all information can be controlled centrally which is not possible in current system.

- ▪ Non-Reliable Time

  Most of the poor leaners do not continue their primary education for taking the family burden and becoming the earning member of the family in early age. Most of all primary institutes are running in the day time. So these working children don't get the education if they desire.

1.1.2. Cloud Based Education System:

Cloud based education system can improve the traditional education system in several ways and motivate poor children to feel interest to start and continue their study. All of the above limitations of traditional system can be easily eliminated by cloud based education. Different cloud services can be used to improve the current education system in most innovative way to develop smart education system [3]. To make the education system effective, first we have to enrich our educational content in such a way that can not only keep interest of the students but also help to increase their knowledge using modern learning methods. Content oriented modern education system can help to create learning interest for young learner which is not present in traditional education system. To create cloud-based educational content services, six main features are proposed in [4]. First is cloud platform to provide cloud-based educational media service environment, Second is a compatible file format to provide media contents in various devices, third is an authoring tool to create media contents by teachers, forth is a content viewer to display different types of media contents in multiple platform, fifth is inference engine for students for individualized learning content and sixth is security that manages user access and data encryption for educational contents. Except the fifth feature, other five features can be used to implement content oriented smart education system for primary institutes of developing countries. Providing same standard and resourceful educational material with the use of cloud can make primary education level stronger and effective. Cloud can also be used to handle large amount of data. So all students and exam related information can easily manage by cloud technology which will help to monitor student performance. Using the on-demand feature of cloud, resources can be accessed on requirement basis and can arrange night shift classes for working children. Alongside, primary institute can organize weekly or monthly knowledge based quizzes, food program and health campaign for poor children which will be controlled centrally by cloud and announces attractive prizes to motivate them.

2. Related Works

There are many research works done related to cloud based educational system. In education sector, how different services of cloud technology such as Infrastructure-as-a-Service (SaaS), Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS) can be used and learners can get better knowledge in short time are discussed in [5][6]. Private cloud can be used to implement secure education system, as it increases data security and better resource utilization and implemented by using open source software which minimizes cost. The design architecture of implementing low cost private cloud with open source software has explained in [7]. Here the author designed the private cloud using five controllers. These are cloud controller to provide web interface for users, cluster controller to communicate with cloud controller and one or more node controllers, walrus storage controller to store virtual machine images, storage controller to create the snapshot of volumes and node controller to interact with OS, hypervisor running on the node and cluster controller. First server is used to implement first four controllers and other two servers are used to implement node controller. Client node will connect with the first server using public switch and this server will connect with other server by private switch. This type of private cloud can be implemented by adding extra feature for a group of primary education institutes by division or area wise that will communicate with public cloud to access global resources to maintain same education standard for all children. Using the above technologies, it is also possible to implement secure exam system where question leakage is a big issue.

3. Proposed Architecture

Implementation of low cost cloud based smart education system is proposed in this paper. The proposed architecture will not only impact the primary education system but also make our examination system more secure. Some of the major benefits of applying the proposed architecture are mentioned here:

- All children will get same level of education.

- Keep student's interest by delivering education material in interesting way.

- Complete daily tasks within the class hours by applying interactive teaching methods.

- Monitor student's performance and attendance centrally.

- Develop secure examination system.

- Manage special class schedules for working children.

- Organize knowledge quiz, food program and health campaign.

In the proposed education system, there will be four types of users who can direct access the system are managing staffs, trainers, exam controllers and teachers. The function of the managing staffs will upload or download the latest education resources between public and private cloud and inform the trainers. The trainer will train up the primary level teachers to deliver the educational resources in proper way. The function of the exam controllers to upload the exam papers before exam securely and download the result sheets from the public cloud to publish the result. Teacher will use the cloud to download the educational resource, upload the exam marks after exam and student's performance record in regular basis. Since all the institutes deliver the same standard educational material and same exam papers, so the quality of education for each school will be same. Figure-1 shows the different users of the proposed system.
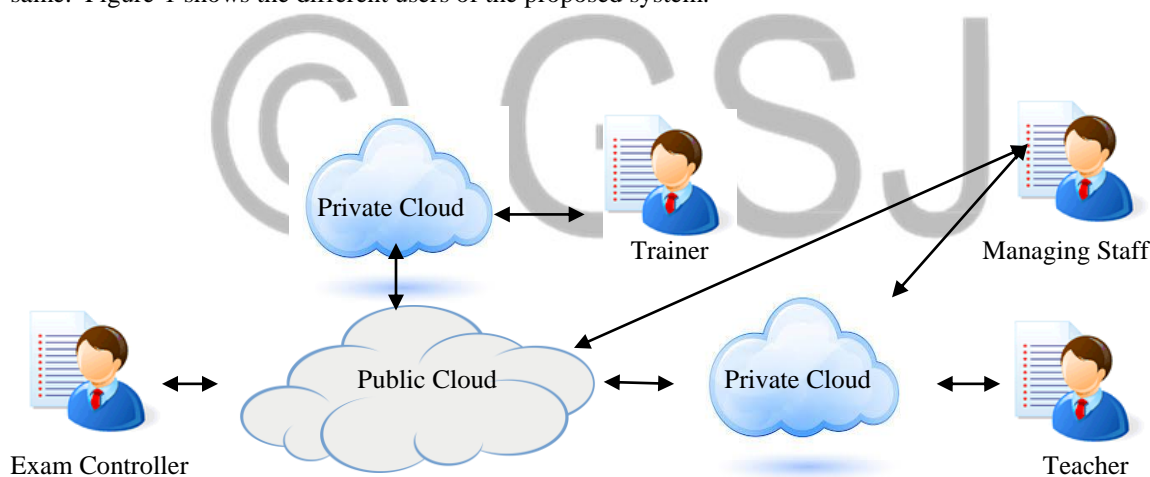

Figure-1: Primary education system using public and private cloud

Here, public cloud is used to store recent students, teachers and education related all information temporarily and after completing any task all information will be stored permanently in a private cloud assigned for fixed number of primary institutes. Only educational resources are kept permanently in the public cloud and will be delivered on demand basis. Direct users of the public cloud will be exam controllers and the managing staffs.

Fixed numbers of private clouds have to be developed by area or division wise which will be connected with powerful Internet connection to communicate with primary institute to run the overall system. Group of institutes will be the client of a particular private cloud. And all the private clouds will be the clients of a dedicated public cloud. Figure-2 shows the different levels of the proposed architecture.

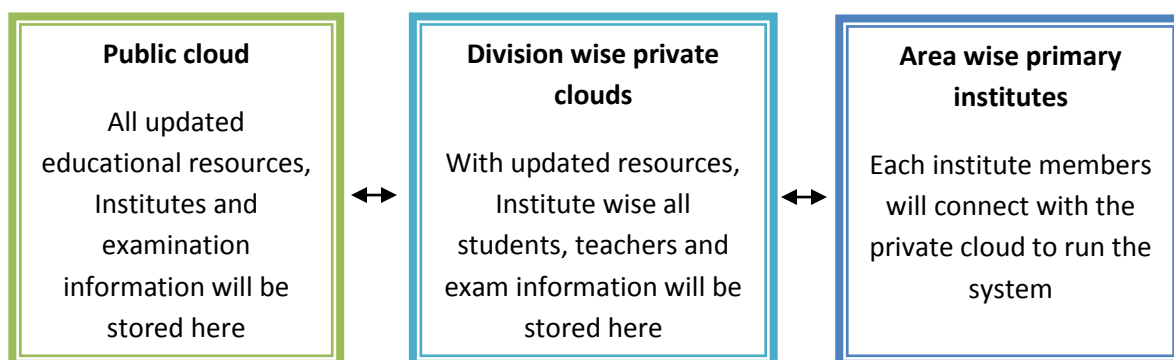| Public cloud		Division wise private clouds		Area wise primary institutes
All updated educational resources, Institutes and examination information will be stored here	↔	With updated resources, Institute wise all students, teachers and exam information will be stored here	↔	Each institute members will connect with the private cloud to run the system

Figure-2: Level of the proposed architecture

To minimize the establishment cost of the multimedia based projector class, the school authority can provide a single projector mobile or tab with high speed Internet connection for each class room. Each teacher will use this mobile or tab to communicate with the private cloud to take the regular class and upload the student and exam related all papers to the particular private cloud. Establishing the proposed multimedia based class will help to increase the interest of poor young learners and keep their concentration in the class.

Applying interactive teaching method in the class will deliver more effective knowledge to students in short time by proposed cloud based education system. In this case, students will complete their all study related works within their class hour and don't require to study at home after taking the class. This will be very helpful for working children or those children who don't get study time at home for taking family responsibilities.

Examination system of this education system will be more secure than the traditional education system. Now a day, question paper leakage is a very common issue in traditional system. In the above system, question paper will be selected by the exam controller and published just one hour or two hours before the exam. So the question leakage by third persons or any social media will not be possible.

One of the most important feature of the cloud computing is availability and on demand use. So the proposed education system will not be bound for any particular learning time. Any institute can manage different time schedule for working children to provide them standard education in their desired time.

To increase the inspiration of the deprived children and make them healthier, primary institute can organize different types of knowledge quizzes, food program and health campaign for the poor children easily with this education system. In this case, any organization can contribute in these types of programs to help the poor children where everything will be managed centrally using cloud.

4. Conclusion

Implementing standard primary education system for deprived children of developing countries using public and private clouds is proposed in this paper. This proposed system can provide smart, secure and flexible education system for deprived children where every child will get same level of education. Cloud technology is proposed in this system because it minimizes the implementation cost very effectively compared to the cost of implementing smart education system in traditional way. To store all updated educational resources centrally, public cloud is used in this system. The estimated cost according to Microsoft Azure to store and maintain all educational resources centrally can vary from $50 to $100 per month based on resource volume.

How the implementation cost of multimedia based class room can be minimized by using cloud system is discussed in this paper. In this system, teacher does not require any high configuration computers or multimedia based projector to deliver the lesson. Any Internet connected projector mobile can be used to take the class.

The major cost requires in this system is to implement division wise private clouds which will be used to communicate between public cloud and primary institutes. The managing staffs and teachers have to be trained to run the system properly.

The minimum budget require to implement this type of education system is not too less. But the benefits that can be achieved from this education system are more compared to cost. Government has to come and contribute for implementing this type of education system to reduce literacy rate very quickly and making primary education level stronger. Another disadvantage of this system is that it requires high speed Internet connection to run the system smoothly. So, government can take the support of established large IT organizations near each division or area for high speed Internet connection to implement this type of education system.

References

[1] Clarissa C. David and Jose Ramon G. Albert2,""Primary Education: Barriers to entry and Bottlenecks to Completions", Philippine Institute for Development Studies, March 2012.

[2] Maher Alghali, H. M. A. Najwa, I. Roesnita, "Challenges and Benefits of Implementing Cloud Based E-Learning in Developing Countries", Proceeding of the Social Sciences Research ICSSR 2014 (e-ISBN 978-967-11768-7-0). 9-10 June 2014, Kota Kinabalu,Sabah, MALAYSIA.

[3] S.M.Barhate and Snehal Narale,"Cloud Based Teaching and Learning Environment for Smart Education", International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 3 Issue: 2, February 2015.

[4] Ji-Seong Jeong1, Mihye Kim2 and Kwan-Hee Yoo1, "A Content Oriented Smart Education System based on Cloud Computing", International Journal of Multimedia and Ubiquitous Engineering Vol.8, No.6 (2013), pp.313-328, 2013.

[5] Dr. Hemant ,S. Mahalle , A. B. Manwar, Dr.Vinay Chavan, " Implementation of Educational Cloud in Education Sector"," International Journal of Advanced Research in Computer Science and Software Engineering", Volume 2, Issue 12, December 2012.

[6] Kiran Yadav,"Role of Cloud Computing in Education", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 2, Issue 2, February 2014.

[7] D. Sudha Devi, L.Yamuna Devi, K.Thilagavathy, P.Aruna, N.Priya, S. Vasantha, "Private Cloud in Educational Institutions: An Implementation using UEC", International Journal of Computer Applications (0975 –8887) Volume78–No.1, September 2013.