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Design and Implementaion of Funtionality Based Layered Architecture for Private EduCloud with Smart Phones

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Abstract: *EduCloud computing is the new technology that has various advantages and it is that technology reduces the cost effectiveness for the implementation. This is the better peak time to analyze the EduCloud and its implementation and better use it for the development of the quality and low cost education for all over the world. Mobile EduCloud Computing (MCC) which combines mobile computing and EduCloud computing, has become one of the industry buzz words and a major discussion thread in the IT world. As implementation of layered Private EduCloud computing is still at the early stage of development, it is necessary to grasp a thorough understanding of the technology in order to point out the direction of future research with smart phones.*

Keywords: *EduClud,MCC*

1. INTRODUCTION

This EduCloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. In EduCloud computing, the word EduCloud (also phrased as "the EduCloud") is used as a metaphor for "the Internet," so the phrase EduCloud computing means "a type of Internet-based computing," where different services -- such as servers, storage and applications -- are delivered to an organization's computers and devices through the Internet[7]. EduCloud computing providers offer their services according to several fundamental models: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) where IaaS is the most basic and each higher model abstracts from the details of the lower models. Other key components in XaaS are described in a comprehensive taxonomy model published in 2009 such as Strategy-as-a-Service, Collaboration-as-a-Service, Business Process as-a-Service, Database-as-a-Service, etc. In 2012, network as a service (NaaS) and communication as a service (CaaS) were officially included by ITU (International Telecommunication Union) as part of the basic EduCloud computing models, recognized service categories of a telecommunication-centric EduCloud ecosystem.

2. ARCHITECTURE OF LEARNING SYSTEM

Its main objective is to contribute an original proposal for a functional architecture and service architecture for building standard-driven distributed and interoperable learning systems. This paper analyses current standards and proposals for e-learning system architecture. Its main objective is to contribute an original proposal for a functional architecture and service architecture for building standard-driven distributed and interoperable learning systems. The functional architecture defines components that make up an e-learning system and the objects that must be moved among these components [1]. We implement the service model with Web Services technology to provide a standard means of communication among different Learning management systems and different content authoring tools. This paper focuses on how to integrate Web Services on the e-learning application domain.

2.1 Learning Portal for EduCloud Computing

Support interoperability for better collaboration of related LMSs to achieve learning task(s) of bigger scope support formal course composition methods for learning design to provide 22 better adaptive

learning activities across LMSs Provide a learner-centric single and open portal for learners that is capable of incorporating learning materials from heterogeneous LMSs

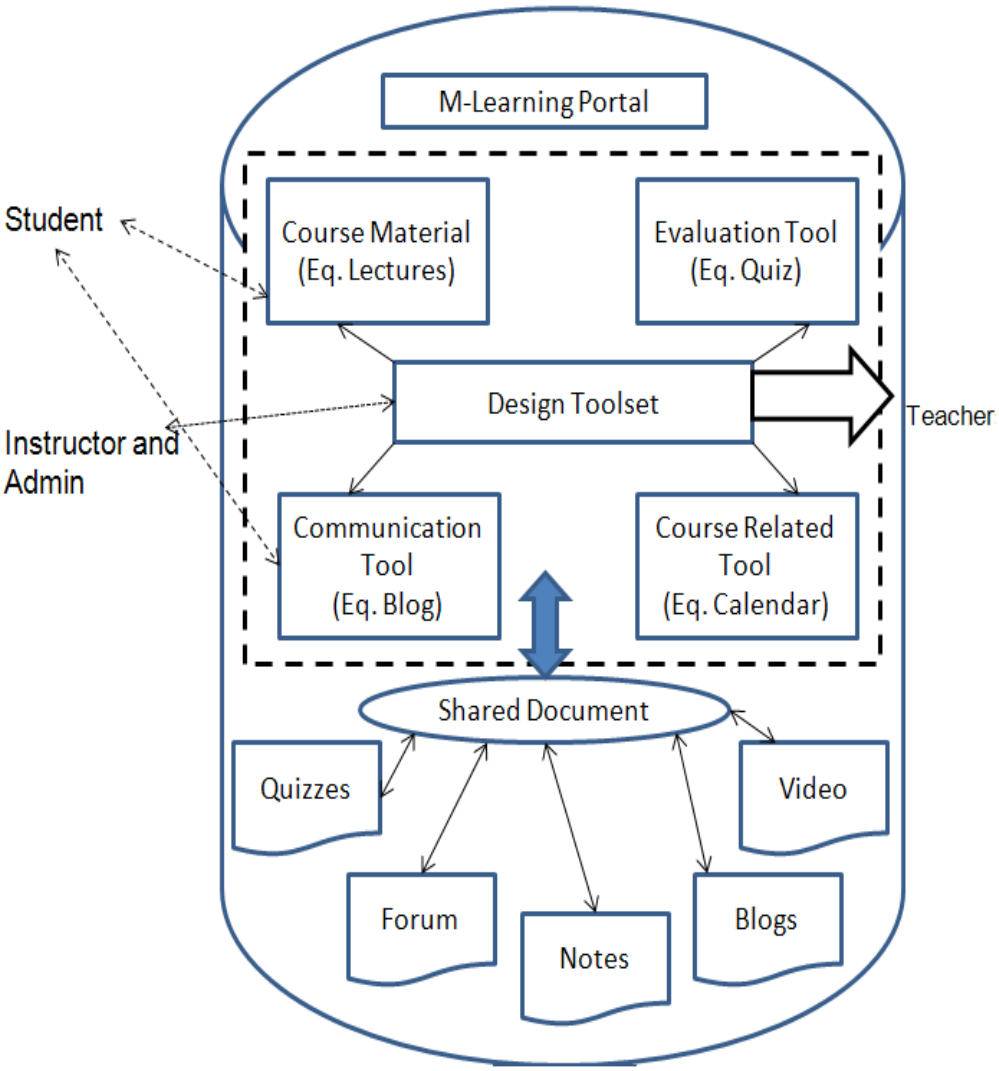

Fig1. *Architecture of Learning Portal for EduCloud Computing.*

Facilitate life-long learning in which a learner will access many LMSs during his/her learning career as well as the option of consistent scoring, tracking, accessing, and/or learning assisting methodology Several consortia contributed to the standards of reusing and sharing learning objects among LMSs, such as SCORM (sharable content object reference model), IMS (instructional management systems) and ULF (universal learning format), which defined the features of learning objects and facilitated the exchange of learning objects. Currently, many e-learning products support these specifications. However, the functionalities of learning systems hosted on decentralized platforms (such as learning assessment and complex interactive functions) still have difficulty communicating with others because each system‘s infrastructure is platform-dependent and non-interoperable[2]. The interoperability is the ability of two or more systems or components to exchange information and use the information that has been exchanged (IEEE, 1990). In this study, we highlight two interoperability problems in the e-learning systems.

Learning activity interoperability is the formal definition of learning activity such as learning path, learning strategy, and navigational sequencing, which can be shared and reused among compatible LMSs. The recent SCORM 2004 model defines several simple sequencing rules to be employed by teachers in incorporating learning strategies into the learning objects (The SCORM 2004 specification,2004). Carnegie Mellon Learning Systems Architecture Lab further developed ten templates to simplify these learning use cases to help SCORM users implement their learning strategy with ease and less cost. The IMS-LD model defines learning activities, support activities, roles,

environments, learning objects, services, and their relationships to facilitate the designing and sharing of learning strategies (IMS Learning Design Information Model V1.0, 2003). Nevertheless, these specifications focus on describing learning strategies at the metadata level without providing concrete system architecture and external interfaces for e-learning systems to connect external learning resources and services. Workflow is also a popular approach to facilitate the learning activity.

3. FUNCTIONAL MODEL OF E-LEARNING SYSTEM

To understand how different systems might work together, it is useful to have a simple functional model of an e-learning application environment. The functional model can provide a visual representation of the components that make up an e-learning environment and the objects that must be moved among these components. SCORM defines a highly generalized model of a ―Learning Management System‖ (LMS) as a suite of Services that manage the delivery and tracking of learning content to a learner. But it does not specify functionality within the LMS[3]. The functional model we propose is strongly influenced by the SCORM functional model. We supplement some functions to make it cover most of the functions an e-learning environment should have, for the reason that SCORM only focuses on the function of delivery and tracking of learning content in LMS. We also divide the LMS which SCORM defined into LCMS (Learning content management system) and LMS (Learning management system) to make each systems functionality more focused and clear. In the functional model, we also define which standards information should be interchanged among each component. The standards information focuses on the SCORM content model but is not limited to it. Figure 2 below shows the functional model.

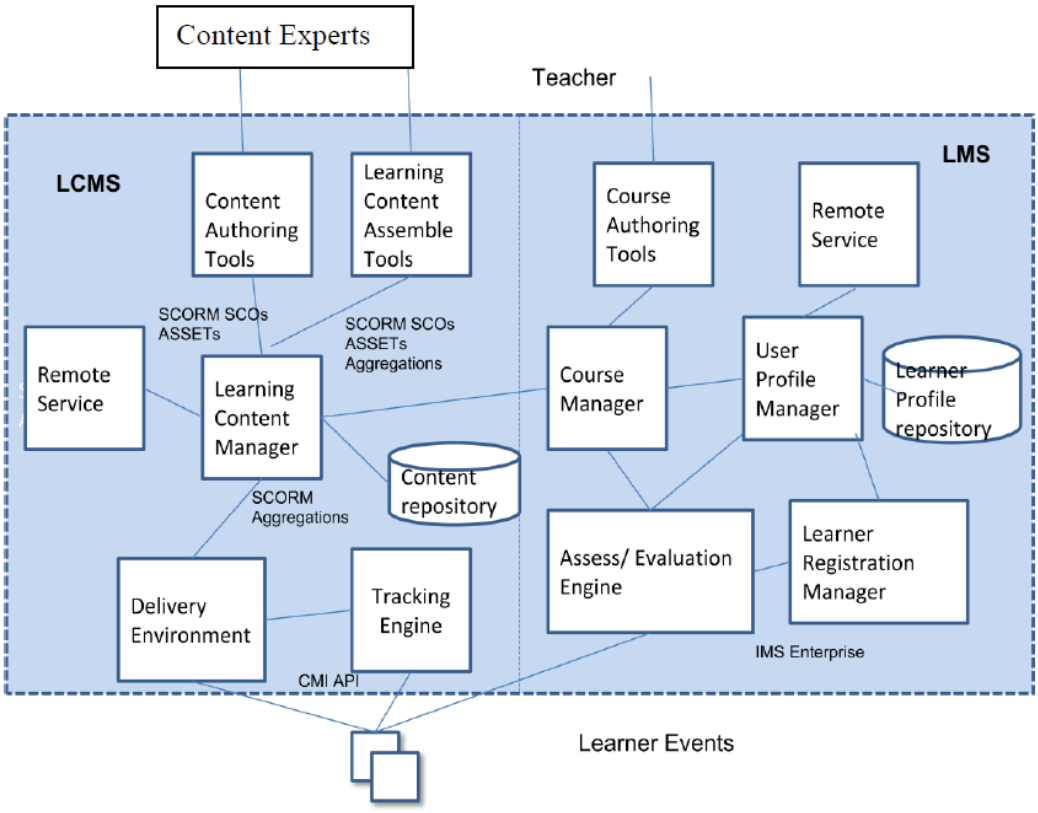

Fig2. *Functional model of learning system in EduCloud for smart phones*

4. RESULTS

Storage is a considerable part of any desktop virtualization solution. Desktop virtualization software allows deploying and managing desktop environments and applications centrally [4][5].

The cost of On-premises versus Cloud computing environment for an analysis period of 36 months (3 years) which is considered standard life of computing infrastructure.

Table1.*Testing outcome to calculating cost*

Items	3 years TCO in Rupees	Cost/month/user proposed system Rupees	Amazon Ec2/user/month Rupees
Hardware(Up-Front)	5,00,000/-	60,000/-	Nil
Cables	15,000/-	300/-	Nil
Ipaddresses	14500/-	Nil	750/-
Server	90,000/-	Nil	3000/-
Storage	10,000/-	450/-	700/-
Switch/Router	2,50,000/-	150/-	550/-
Software	65,000/-	NIL	200/-
Monitoring and Alearting	50,000/-	150	300/-
Security	60,000/-	100/-	Nil
Server Licenses	95,000/-	Nil	Nil
Support	15,000/-	200/-	Nil
Administration	1,50,000/-	50/-	Nil
Deployment	1,05,000/-	Nil	Nil
Help Desk	70,000/-	Nil	Nil
Pwer and Cooling	2,00,000	50/-	100/-
Total	**1189500**/-	**1400**/-	**5600**

4.1. Cloud vs. On-Premise Calculator

Formula for Total Cost estimation on premises = Hardware (Up-Front Cost) + Maintenance cost + Unplanned Repaire Cost - Saving on PC's[6].

First we will find out the TCO on premises

Total cost over estimated life of 36 months for Onpremise = 5,00,000/- + 11,89,500/- + 20,000/- - 0 = 17,09,500/-

Then we will find out the EduCloud on premises

Total cost over estimated life for cloud = 60000/-+ (36 x1400) + 0 - 10000/- = 1,00,400/-

Hence total saving = 17,09,500/- - 1,00,400/- = 16,09,100 /-

5. CONCLUSION

EduCloud computing can improve learning, and cloud learning can optimize human learning, to bring new ideas to the learner or changes on the behavior Help the students, staff, Trainers, Institutions using Smartphone. Mobile cloud learning – a novel unification of cloud and mobile learning. M-Learning on EduCloud is Aanywhere-Anytime on premises. Finally it improve internet from intranet.

In the future, we plan to address some additional issues for the MCC, such as: Low Bandwidth, that could be solved with 4G (5G) or strong wireless divice, Network Access Management, QoS (from technical point of view such as network delay by using cloudlets, clonecloud etc.), cost management etc.

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