Learning Software Component Model for Online Tutoring

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Abstract

Web services are interface elements which allow applications to render functional services to requested clients using open standard protocols. Interactive Learning is a tutorial scheme that integrates social networking and urban computing into course design and delivery. Many interactive learning services are presented through online. To make an online tutoring scheme more effective, the previous work used web services and application programs like instant messaging based on environments in which students reside. But the downside is that it is difficult to maintain the service request queues online. The services and data storage processes are inefficient. To overcome all the above issues, a learning software component model (LSCM) framework is formed in the present work to build a component model based on communication services. In addition to this, the proposed software component modeled with learning object (LO) aspects to integrate related sub hierarchical components. Based on LSCM, training schedulers are identified efficiently. The proposed LSCM framework is experimented to show the performance improvement with the previous online tutoring scheme based on web services in terms of delivery report, maintenance of tutoring sessions and reliability.

Keywords: Web services, Interactive learning, LSCM, Learning Object

1. Introduction

With quick advances in dispersed multimedia technology, the concept of real-time interactive distance learning has established more consideration than ever before. While conventional classroom activities are distinguished by their intrinsic geographical limitation, the initiation of distant E-learning applications has facilitated students to listen classes anywhere with an online computer. With existing commercial products of media applications, two chief categories are gladly valid for remote E-learning. In order to sustain the achievement of a specific educational objective, a learning service provider is provided. This is attained by producing a learning environment consisting of communication infrastructure, educational material, meeting places, educators, etc.

An emerging topic in software engineering is referred to as the Component-based development (CBD). The advantage of CBD technology discussed in [6] is its underlying software component model, which defines components and their composition mechanisms. In this work, the author survey and analyze current component models and classify them into a taxonomy based on commonly accepted desiderata for CBD.
In spite of the materialization of the new creation of Web based learning systems, customary learning mode, where teachers and students are face to face with each other in an unchanged classroom persists to have its unequaled advantages. Not like many Web-based learning systems embracing an asynchronized way, the teacher brings out learning content statically on the Internet and students acquire static learning materials at diverse times, genuine classroom learning tracks a synchronized learning process, where students in and out of classroom pay attention to the reside instruction while the teacher gives the lectures. In the majority cases, synchronized learning capture participants' thought and attention much more efficiently than asynchronized one. As a result, real-time interactive effective classroom with tele-education experience is of requisite consequence in distance learning. The architecture of E-learning system is described in fig 1.

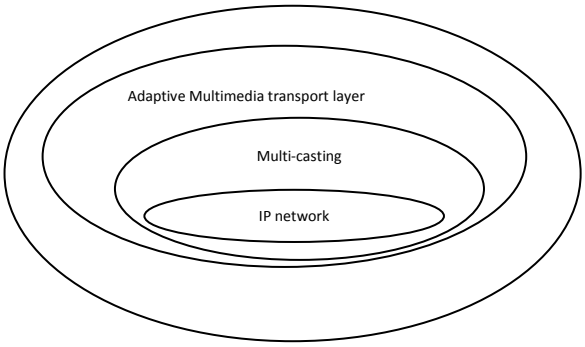

Fig 1 Architecture Diagram of E-learning system

There are numerous issues arise in the design of a remote E-learning system. The bandwidth conditions are low, in efficient real time interactive data. But, classroom-based e-

learning systems help both the teacher and students in the learning process and have achieved successful results. Even all web based learning services are provided interactive learning services more efficient, the main drawback is that if more number of service requests queued up, then is difficult to sustain and respond all those services for the students. To make an online tutoring scheme more efficient, middleware interactive components are built. Middleware is a software layer that locates between the network and the application to provide reusable solutions to regularly met problems like interoperability, security, heterogeneity. The main contribution of the present work is to build a component software framework which is described in section 3 briefly based on web services and learning object chosen by the students in an appropriate environment.

2. Literature Review

The progression of human-computing interface is integrated to enhance the work efficiency [1]. In the education area, human-computing interface can assist the teacher to lecture the class and assist the students learn and converse with others. A number of projects, such as [9] and [14], realize particular human-computing interfaces in their knowledge environment. At the similar time, mobile devices such as mobile phone, smart phone, PDA, and laptop have been straightforwardly available for common people. Researchers in [10] and [8] lay emphasis on that mobile devices cooperate a significant role in learning. For instance, the teacher used his Smart Phone to fetch the management file and to organize the slideshow, whereas the students can utilize a laptop to converse with others. Some of these features have been incorporated in several projects.

A prior Smart Platform facilitates mobile devices wandering with users to join into Smart Space by eADK-based agent of Smart Platform. Nevertheless, it is easy for the users, particularly for Smart Space to utilize their mobile devices. Open Smart Platform are used for Web-based mobile edges in Smart Space. OSPG rendered the mobile interfaces, such as PPT upload or Turn-to-Next-Page, as a Web page [15], [12].Processing of web services using B2B and B2C are essential for reliable transactional processing. Traditional web services relax the property and completely depend on mechanism to ensure the transactions validity in the presence of failures. In this work [4] the author proposes architecture for concurrency control.

Since nearly all the mobile devices such as laptop, PDA, smart phone, or even ordinary cell phones have an incorporated Web browser, it is very suitable for the users to enhance the services and interfaces inside Smart Space [2], [13]. In addition to this, rendering extensibility, load scalability for the mobile devices to interrelate with Smart Space is also enhanced by this mechanism. Serving as a centralized server between the mobile devices and modules inside Smart Space, when the similar mobile device access increases, OSPG could occupy load balancing [7], [11] and cache method to improve the whole load for Smart Space and also could manage the total number of the concurrent mobile devices in order to evade the burden of the whole system.

Event monitoring is essential to Web service requirements. The work [5] introduces an online monitoring approach for Web service requirements. It includes a specification of service constraints that links to service requirements and additionally includes a monitoring model that covers five kinds of system events relevant to client request, service response, application, resource, and management, and a monitoring framework in which different probes and agents collect events and data that are sensitive to requirements.

In machine learning and retrieval of information the use of positive an unlabeled data is very essential. Several methodologies for solving this problem have been proposed but they do not work properly when only a small amount of data are available. In [3] the author proposes a novel algorithm called Topic Sensitive PLSA to solve this problem. This algorithm uses a small amount of information from the user. The supervision is stored as a set of constraints. The author developed an iterative algorithm that can obtain the local optimum of the objective function. To improve the online tutoring scheme more effective, we implements learning software component model for communication services like messaging, chatting, etc.,. The learning software component is modeled with learning object aspects to build a component model.

3. LSCM for Online Tutoring Scheme through Web Services

The proposed Learning Software Component Model is designed to build a framework for online tutoring scheme which run under web services. It renders the communication services to applications like messaging, chatting etc,. The proposed LSCM architecture consists of two main strategies. The first strategy is to build a component model framework based on web related communication services. The second strategy is to provide the communication services through the LSC framework to the students participated in online tutoring schemes.

In the learning software component building strategy, the learning communication services are analyzed based on students' environment. The learning software component framework is built with learning services and each component is built with the learning objects chosen by the students. Each component contains an appropriate service based on respective students' level functionality. The second strategy is to process of communication services through the component invocation based on LO at the student required levels. Before delivering the service of the component to the student, the

authorization of student are interpreted based on their skills. So, only the authorized and demanded communication services are delivered to respective environmental application student.

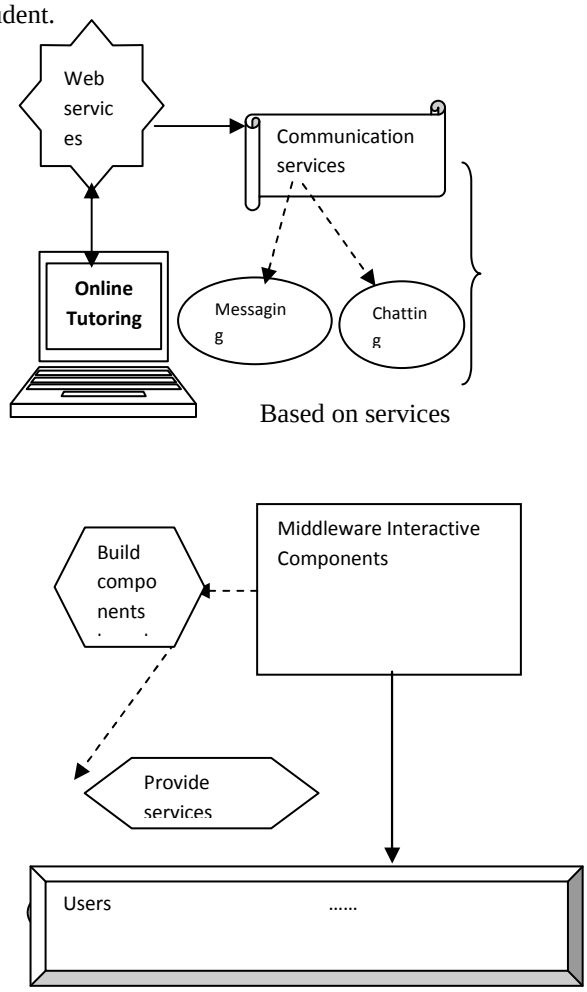

Fig. 2 Architecture Diagram for LSCM for online tutoring scheme through web services

Using learning software components of services, the framework is built which has several types of communication services like messaging, chatting etc. Based on interactive component based middleware service architecture, the components are built with the services and it efficiently achieved the interoperability service on providing a learning service to the students. The proposed component based middleware service architecture consumes less time for building the components and less storage services.

3.1 Learning Software Component Building phase

The LSCM is built based on the learning services provided by the online tutoring scheme. Based on communication services like messaging, chatting, and the component is built with an appropriate service and LSC model. The process of LSCM is shown in fig 3. The procedure describes the LSCM process is:

Step 1: Input: Different types of web services
Step 2: Analyze the type of services
Step 2.1: Communication services: Messaging, chatting
Step 3: Based on students' request to service,
Step 3.1: Invoke the services
Step 4: Based on services
Step 4.1: Build structural components
Step 4.2: Construct the set of components
Step 4.3: Invoke the services for different set of components
Step 4.4: Each components may have different set of services
Step 5: Output: Build the components efficiently.

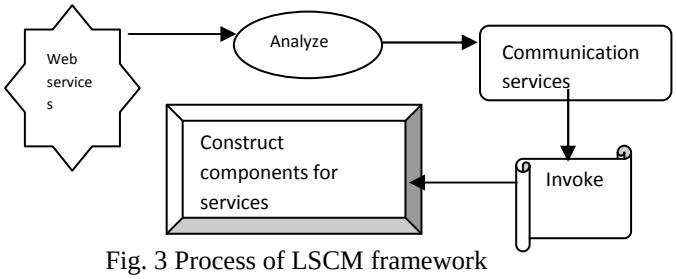

Fig. 3 Process of LSCM framework

The process of building the component framework based on communication services is described in fig 3. The applications may have several services to interact with the other services. Based upon the communication services, the component is built using learning software Component Based Middleware service architecture with corresponding components based communication services.

3.2 Steps to provide communication service through LSCM framework

The procedures below described the process of providing communication service through LSCM framework.

Step 1 : Based on learning object (LO),
Step 1.1 : Invoke the software component architecture from LSCM
Step 2 : Before delivering the service,
Step 2.1: Identify the authorization of the student, based on their skills
Step3 : Deliver the demanded service component to the student.

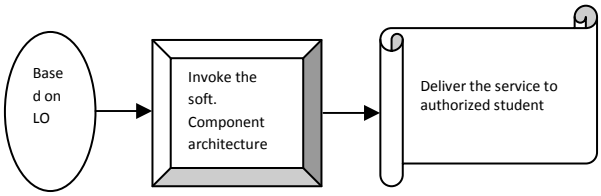

Fig 4 Steps for communication services

Based on communication service component, the component function is evaluated to show the coordinate value of the message event. Render the services to students' applications need. After rendering the services, only the authorized students can demand the services are applicable to the student environment.

4. Experimental Evaluation

The Learning Software Component Model (LSCM) is implemented by using the Java platform. The experiments were run on an Intel P-IV machine with 2 GB memory and 3 GHz dual processor CPU. The performance evaluation tests aimed at comparing the online tutoring scheme with challenging interactions through web services. LSCM framework is depended on interception (Figure 2). At set up it build the components based on communication services rendered. The service used with component building architecture to raise the online tutoring scheme more efficient. A LSCM framework carries two types of operations generic (building components based on LO, service rendering…). Operations can be assigned to different services and components in the infrastructure.

The performance of LSCM is evaluated by the following metrics

i. Delivery report rate
ii. Maintenance of tutoring sessions
iii. Reliability

5. Results and Discussion

In this work, we have seen how a component can be designed for communication service composition to capture the common design patterns for online tutoring scheme written in mainstream languages such as Java. We run independent tests with growing number of applications, and number of students' service requests responded by each trainers is 30-35% requests per client.

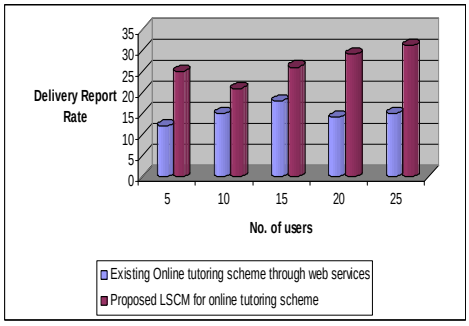

Fig. 5 Users vs. Delivery Report Rate

Fig 5 describes the delivery report rate for students who are in need of online tutoring. Many users are participated in the experimentation to validate LSCM. Comparison result of LSCM with an existing online tutoring through web services based on delivery report rate, measured in terms of milliseconds (m/s). When number of students' service requests applications increases, the delivery report rate based on communication services is high in the proposed LSCM contrast to an existing online tutoring scheme through web services. The performance graph of the proposed LSCM in component building phase is shown in the fig 5. The variance in the delivery report rate would be 12-20% high in the proposed LSCM.

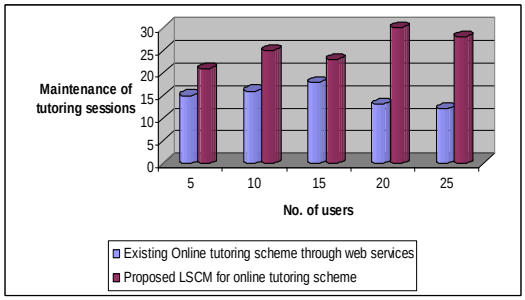

Fig. 6 Users vs. Maintenance of tutoring sessions

Fig 6 describes the maintenance of tutoring sessions even when number of user increases. Since the services are built as components framework, the maintenance of tutoring sessions was easy. When number of students' service requests applications increases, the maintenance of tutoring sessions is also being high in the proposed LSCM contrast to an existing online tutoring scheme through web services. The performance graph of the proposed LSCM in component building phase is shown in the fig 6. The variance in the maintenance would be 15-20% high in the proposed LSCM.

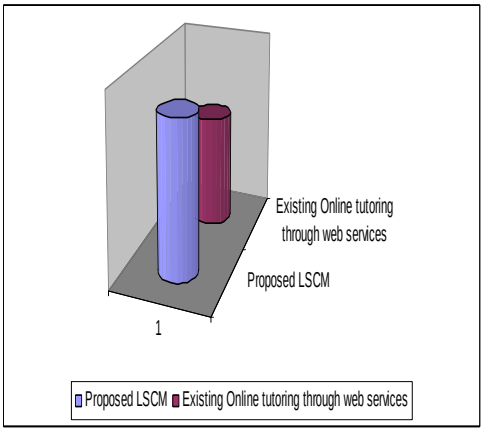

Fig. 7 Reliability model for both SCM & Online tutoring through web services

Fig. 7 describes the reliability of the proposed LSCM with an existing online tutoring scheme through web services. Various numbers of applications are used in the experimentation to improve the reliability of LSCM. Comparison result of LSCM with an existing online tutoring

scheme through web services shows that the proposed LSCM perform better the reliability of the proposed LSCM also be improved.

Finally, it is observed that the proposed LSCM framework is efficiently built based on learning object and the web communication services are also rendered to users' based on their environment. The reliability and performance rate also be improved in the proposed LSCM framework.

7. Conclusion

The progression of proposed LSCM for online tutoring has showed us that the growth of a suitable culture for online tutoring is rapidly high. According to the users' need, the learning services are offered to the students by building the component for communication services efficiently. The middleware interactive service components are developed from building the service components efficiently. A desirable feature of the proposed LSCM framework is high maintenance of tutoring session based on communication services. LSCM with service rendering approach allows trainers to interact with the students based on learning object aspects and communication services. The experimental results showed that the improved performance of delivery time, maintenance rate and reliability.

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