INTEGRATED WEB SERVICE COMPONENT INTERFACE FOR EFFICIENT E-LEARNING SERVICES

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ABSTRACT
Online tutoring is all about using web services or the Internet for tutorials or tutoring activities. Students interact with their tutors with the application of Internet. To make an online tutoring scheme more effective, a framework for Learning Software Component Model (LSCM) is designed. The objective of LSCM is to construct a component model based on the communication services using the network. The framework of LSCM transforms the functions as components to provide better students’ service requests with the help of repositories for the E-learning system. In addition to that, the aspects of Learning Object (LO) in LSCM combine the related sub hierarchical components. Based on the combination of components, training schedulers are recognized efficiently in LSCM. The proposed online tutoring system, OTFWS, for E-learning system using web service technology is experimented to evaluate the performance improvement compared to the previous Semantic Oriented Web Services (SOWS) in terms of communication efficiency, speed of message transfer, delivery report, maintenance of tutoring sessions, reliability, application throughput, interaction of more number of people, and scalability. Proposed OTFWS achieves 25% - 28% lesser in the delivery report rate time, 15% - 19% high in communication efficiency, 23% - 28% high in people interaction rate, 17% high in application throughput.

KEY WORDS: Web services, Interactive learning, LSCM, Learning object.

1 INTRODUCTION
With the massive growth of computers and increasing use and application of the Internet in educational streams, several web-based educational applications have been designed and deployed for commercial purpose. In people’s daily life, with the development of interaction between the human and computer, vast amount of human-computing interfaces have been combined for increasing the efficiency of work in day to day environment. In the environment concerned with learning the interface between the human and computer can make the tutor to educate in the classroom environment and assist the students to get educated and tweet with each other. Several projects are implemented for special human-computing interfaces in the learning environment.

Figure 1.1 Architecture for private online tutoring
Some of the other major concerns for the parents or teachers while the use of online tutoring services the perceived attitude of an online tutor with respect to a learner's developmental issues that reach beyond a single session. Certain types of cultural communication issues rise between the tutors present in the remote are and a learner placed locally. The purpose of the research work is to investigate a new online tutoring system using web service, and how to use web service to help online tutoring system. The courseware discovery, delivery, access and service are the main issues. The proposed research work will greatly resolve the problems in tutoring system using online. The objectives behind the research work include the following: To develop a structural framework of integrated web services for online interactive training/education environment. To provide resource allocation to multiple platforms using object-oriented interface with the online tutorial system. To provide the E-learning web service to all environments i.e., both open and closed environments utilizing E-Learning System (ELS) smart tools. To provide reliability and scalability of service with the aid of smart class room. To construct a component model based on the communication services using the network using Learning Software Component Model (LSCM). To provide better students’ service requests with the help of repositories for the purpose of E-learning system using LSCM. To provide efficient interface between web services and components, Online Tutoring Framework for E-learning system using Web Service technology (OTFWS) is introduced to present an E-learning system in a well-organized way.

2 MATERIALS AND METHODS
In the past, online tutoring was performed using Email where a student sends a question to the tutor, with the anticipation that the Email returned will consists of the answer. As an alternative, what happened was a disconnection. Even though the student can expect and provide answers using face-to-face tutoring conference, the Email format recommended the student to answer the question with a straight answer.

This section discusses in detail about the middleware component framework for building Online Tutoring Framework for E-learning systems using Web Service technology (OTFWS) software components. The OTFWS is a distributed model made out of loosely-coupled interoperable web services. The communication between the client (tutor/student) and the web services is bi-directional and it is performed in a remote manner with the help of the middleware. The proposed work is designed for providing an interface between the back end web services and the interactive learning software component model. Using the proposed online tutoring framework model, a common interface is maintained for all the learning software components, which are developed for the trainers to teach the course in an online to the students in an efficient manner. The proposed work describes the process of implementing a web service technology with the learning software component...
framework using an interface which acts as a mediator for the development of E-learning systems. The architecture diagram of the proposed online tutoring framework for E-learning system using web service technology is shown in the Figure 2.1.

Using the above Figure 2.1, an interface is built based on the back end web service and middleware interactive components. The interface online tutoring environment is a collective method which is highly essential and significant to the society in which every student and tutor is embodied by a unique code. The online tutoring environment uses multi-user resources and thus produces knowledge based on the existence of others. Every user or the student as a part of engineering institute dominates the position of their occurrence accordingly to their requirements. Additionally, each existence whether the student or tutor is prepared with gestures such as taking notes, listening class, clearing doubt can be used to visually communicate with others.

The overall process of the online tutoring framework for E-learning system using web service technology is described below using an algorithm

Let Users be Ui, i = 1, 2 … n
Let Web services be WS
While Ui do
   Ui requests WS
   Analyze type of WS
   Based on Ui requested WS
   Invoke WSi
   For each WSi
      Build structural component SC
      Construct set of components, C
   End for
   For each C
      Create different set of services
      End for
      Invoke services for C
      Build Components efficiently
      Create Learning Object LO
      Based on LO
      Invoke Software Component for Ui
      Before delivering the service,
      Identify Ui authorizations
      Deliver demanded service component
End while

Figure 2.2 Algorithm for online tutoring framework for E-learning system using web service technology

As illustrated in the algorithm, users request the web service and the type of web service is analyzed and based on the web service requested by the user, the specific web service is invoked. Followed by this for each web services, structural components and components are built. For each component, different set of services are created. Next, the services are invoked, components are built and the specific software component is invoked for the specific user. Finally before delivering the service, authorizations are performed and finally they are delivered to the authorized user.

3 RESULTS

Scalability refers to the ability of the proposed OTFWS system to process the E-learning concepts using an interface that provides web services in terms of middleware components. The outcome of the proposed online tutoring framework for E-learning system using web service technology is compared with an existing Semantic Oriented Web Services (SOWS) as proposed by Brut et al (2011).

Figure 3.1 Number of web services vs. Scalability

Figure 3.1 describes the scalability of web services accessed by the tutors and trainers with respect to the number of web services present in the E-learning system. From the Figure it is illustrative that the scalability level of the proposed OTFWS model increases with the increase in the number of web services compared to the existing SOWS. This is because the proposed OTFWS model uses an interface, for each middleware component framework. As a result using the proposed OTFWS model, the students obtain the E-learning concepts in a reliable manner with an increased rate of response from the side of tutor. The saturation point of scalability is attained when the number of web service is 16 because by acquiring an access code, though students communicate with tutor in real time and obtain the response of the tutor immediately, but in the absence of the tutor the response are obtained at a later time.

As a result, the scalability drops from 61.25 % to 60.56 %. The scalability of proposed OTFWS model is improved by 4 – 31 % compared to SOWS because of the introduction of interface between the backend web service component and middleware interactive components that minimize the computerized combination of educational services into a smart learning space.

Response time between the tutor and the learner is the amount of time taken to respond to each other when request and response is made between the tutor and the learner.

Figure 3.2 demonstrates the comparison graph of the proposed OTFWS for online tutoring scheme and SOWS for online tutoring using web services. It shows the response time between tutor and student interaction. When number of users increases, response time between tutor and students gets decreased in both online tutoring systems. Proposed OTFWS consumes less response time to respond to the request using the server environment (contribution of faster e-learning services being rendered to the clients/users) with help of runtime phase when compared to existing SOWS using web services.

Figure 2.1 Architecture diagram of the proposed OTFWS

Figure 3.2 Comparison graph of proposed OTFWS vs. existing SOWS
Also the proposed OTFWS used Software component model for interaction between the tutor and students, hence it achieved less response time.

Figure 3.2 Response time between tutor and student interaction

Also, web services are composed by delegation of method calls through messages. This result in minimized response time and the average variance in the response time rate is 0.90% - 0.93% less in the proposed OTFWS when compared to existing SOWS.

Message transfer refers to the rate at which the message is transferred and delivered to the students. The outcome of the online tutoring framework for E-learning system using web service technology is compared with an existing semantic oriented web services.

Figure 3.3 Number of users vs. Speed of message transfer

Figure 3.3 describes the message transferring speed when more number of users involved in the E-learning system. Since the proposed work used web service component interface for middleware common component framework, the E-learning concepts outperforms well for both the students’ and the tutors. Compared to the semantic oriented web services, the online tutoring framework for E-learning system using web service technology provides 7.75% high speed of message transfer because of the fact that services (contribution of faster E-learning services) are deployed in the design phase and there is not separate deployment phase which result in the increased speed of message transfer than the existing SOWS model.

4 CONCLUSION

In this research work, a new E-learning system is presented, namely online tutoring framework for E-learning system using web service technology. OTFWS framework has been developed as an encapsulated education environment which effectively integrated web services. It used the significant aspect of resource sharing for relevant online tutoring domain that can be applied effectively to multicultural students. It is created on software infrastructure based on multi-agent system architecture using web service technology. The experimental results show that the proposed OTFWS outperforms well in online tutoring scheme by providing better learning services. The performance is evaluated and the experimental results show an improved performance of communication rate, delivery time and scalability which proved the efficiency of interactive web service tutoring scheme for E-learning. Proposed OTFWS achieved 25% - 28% lesser in the delivery report rate time, communication efficiency was increased to 15% - 19%, the interaction of people increased to 23% - 28% with the application throughput increased to 17% with the increase in message transfer speed to 7.75%, maintenance time of tutoring sessions is 14.88% – 16 % less, scalability increased to 4% - 31 % and higher reliability rate of 25% – 30 % compared with existing semantic oriented web services.

REFERENCES