ABSTRACT

Service Oriented Architecture is an architectural paradigm and discipline that may be used to build infrastructures enabling those with needs (consumers) and those with capabilities (providers) to interact via services across disparate domains of technology and ownership. The Service Oriented Architecture facilitates the development of systems that supporting modular design, application integration, interoperation and software reuse. Using (SOA) one can build durable e-learning contents, regardless of changes or evolutions in technology. This means that new content should be added to existing content without costly redesign, reconfiguration or recoding. In this study an e-education system with Web services oriented framework was proposed. The system will be an open source application with SOAP, UDDI & WSDL standards. We will explain what this e-education system concerns & how consumers interact with producer & what services it provides. We use SCORM that is collection of standards and specifications for web-based e-learning.

Keywords: E-education System, Service Oriented Architecture, Web Services, SCORM.

1. INTRODUCTION

SOA, Service Oriented Architecture, is looked at as the way to bind loosely coupled services or software components from different legacy or open standard applications to empower business agility and facilitate the reusability of software assets [1]. Universities around the world are competing to create the ideal digital campuses to leverage a richer electronic environment for students, faculty and alumni. They are opting to deploy a single point of entry for communication, registration, class and content management, collaboration and research [4]. This will enable educational institutions to reduce cost and bring their services to market more swiftly. The e-education services system is an instrument of which assists the learners to gain more knowledge by themselves and long to support distance learning. Web service technology has emerged as a new paradigm of distributed computing. The Service-based Architectures are layered on the top of standard transfer protocols for transmitting messages. Currently, the most common ones are the XML-based specification Simple Object Access Protocol (SOAP), Universal Description, Discovery and Integration (UDDI) and Web Service Description Language (WSDL) [2]. E-Learning is a general term used to refer to a form of learning in which the instructor and student are separated by space or time where the gap between the two is bridged through the use of online technologies. [5]. E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual classroom opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM [6]. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio. A learning management system (LMS) is software used for delivering, tracking and managing training/education. LMS range from systems for managing training/educational records to software for distributing courses over the Internet and offering features for online collaboration.

2. SERVICE ORIENTED ARCHITECTURE

A service-oriented architecture (SOA) is a flexible set of design principles used during the phases of systems development and integration. A deployed SOA-based architecture will provide a loosely-integrated suite of services that can be used within multiple business domains. SOA defines how to integrate widely disparate applications for a world that is Web based and uses multiple implementation platforms. Service-orientation requires loose coupling of services with operating systems and other technologies that underlie application.

In this paper we describe the design of a distributed e-education services system that is based on service oriented architecture uses web-services. After research, Xml based web services are the best method in E-learning system. Basic parts of E-Learning system are shown in fig 1.
SOA separates functions into distinct units or services which developers make accessible over a network in order to allow users to combine and reuse them in the production of applications. These services and their corresponding consumers communicate with each other by passing data in a well-defined, shared format or by coordinating an activity between two or more services. The Service Oriented Architecture not only encompasses the services from a technology perspective but also includes the policies and practices by which the services are provided and consumed. Security and privacy are particularly important issues for education. Personal information is confidential, so access to such information must be restricted to authenticated and authorized users.

3. WEB SERVICES

Web Services are the set of protocols by which Services can be published, discovered and used in a technology neutral, standard form. Web services implements a service-oriented architecture. This is often referred to as “message-oriented” services, as it provides various types of services over web. The basic standards & protocols used in web services are SOAP (Simple Object Access Protocol), WSDL (Web Service Description Language) & UDDI (Universal Description, Discovery and Integration) & XML. SOAP is an XML-based message exchange protocol that is used to communicate between web services and their clients. The Web Services Description Language is an XML-based language that provides a model for describing Web services. UDDI is a directory service where businesses can register and search for Web services.

From the above discussions the web service architecture composed of

- SOAP (Service Invocation)
- WSDL (Service Description)
- UDDI (Service Discovery)
- TCP/IP (Network Protocol)

Web Services architecture then requires three fundamental operations: publish, find, and bind. Service providers publish services to a service broker. Service requesters find required services using a service broker and bind to them. These ideas are shown in the following figure.

3.1 Service Requestor (Consumer)

The service consumer is an application, service, or some other type of software module that requires a service. It is the entity that initiates the locating of the service in the service registry, binding to the service over a transport, and executing the service function. The service consumer executes the service by sending it a request formatted according to the contract.

3.2 Service Provider (Producer)

The service provider is the network-addressable entity that accepts and executes requests from consumers. It can be a mainframe system, a component, or some other type of software system that executes the service request. The service provider publishes its contract in the service registry for access by service consumers.

3.3 Service Registry

A service registry is a network-based directory that contains available services. It is an entity that accepts and stores contracts from service providers and provides those contracts to interested service consumers.

4. PROPOSE ARCHITECTURE

Our e-education architecture has two parts; one is for Client/devices and other is the education server. Both are connected through internet with common sets of internet protocols such as HTTP, SOAP and XML. The typical learning management system is built based on a component-based architecture. However, Web services provide a better alternative because of the following features:

- Components (services) are loosely coupled. A component accessing another component does not require knowledge of the data structures, the calls...
to other components, transaction management, and so on in that other component.

- Components are configurable. Looking at a service oriented architecture application is similar to looking at a configuration diagram. Components can be added, deleted and configured in different ways creating new applications.
- Components are interoperable. Any one component can interoperate with another component including components created by different vendors’ development environments.
- Components are location independent. Just as a component does not know or care about the implementation details of another component, it also does not know or care about its location.

4.1 Client/Consumer

Client (service requestor) uses different platform as all the services are heterogeneous in nature. The client-side contains computing devices and platforms. Some users may use desktop PCs or other may use handheld and wireless devices to access learning services. Soap is used as a communication protocol between clients & learning centre. The user can query for registration, updating profile, learning materials or content discovery. The request is send to the e-education centre which is a service broker or service directory. The role of the learning service directory is to provide details of services that are available to perform learning functions that are identified within taxonomy. The learning service directory might be an open-standard UDDI directory or service catalogue. With which can discover services as according to use request. On client side, a user interface has to be built to display data to the user or accept input from the user. It will contain controls like text boxes, drop-down lists, grid views and labels.

4.2 Education Server (Service Provider)

E-education learning system which acts as a service repository is a hub of services. But in case if no service found according to user request then a fault occurs, the system must choose another service for performing the operation. But if it finds no service with the same description, the service must be temporarily stopped and the system will be waiting until a new service with the same description is registered in the service registry. At the same time learning system makes a request to the service provider to for the service of same description. If the request is performed successfully without detecting any fault by the system, a response will be given to the client.

4.3 E-Education Learning Centre

It is a local SCORM compatible LMS and serves as a learning service broker which obtains the user requests from web client components and subsequently invokes the corresponding services to serve the user requests.

Learning Management System (LMS)

An LMS is software for planning, delivering, and managing learning events within an organization, including online, virtual classroom, and instructor-led courses. It is a complete, secure, web-based training and e-learning solution that employs a simple and intuitive user interface. This way both technical and non-technical training managers can easily create, manage, and track interactive training courses and learning programs for all levels of users. Use of Learning Management Software is to deliver personalized learning and training to your entire organization. Whether you are a global enterprise or local operation, you can leverage the power, simplicity and scalability. LMS connect your customers, partners, employees or students in a seamless self-service & on-demand e-learning system. Knowledge and learning can now be delivered instantly to everyone, anywhere in your organization.

LMS range from systems for managing training and educational records for Student self-service (e.g., self-registration on instructor-led training), training workflow (e.g., user notification, manager approval, wait-list management), the provision of on-line learning (e.g., Computer-Based Training, read & understand), on-line assessment, management of continuous professional education (CPE), collaborative learning (e.g., application sharing, discussion threads), and training resource management (e.g., instructors, facilities, equipment), are dimensions to Learning Management Systems.

SCORM (Sharable Content Object Reference Model)

SCORM is a collection of standards and specifications for web-based e-learning. It is an XML-based framework used to define and access information about learning objects so they can be easily shared among different learning management systems (LMS). SCORM 1.2 This was the first version that was widely used and is supported by most Learning Management Systems today. The SCORM standards are governed and
published by the Advanced Distributed Learning Initiative (ADL). The SCORM specifications, which are distributed through the Advanced Distributed Learning (ADL) Initiative Network, define an XML-based means of representing course structures, an application programming interface (API), a content-to-LMS data model, a content launch specification, and a specification for metadata records for all components of a system.

5. COMPONENTS OF E-EDUCATION LEARNING SYSTEM

There are five e-Learning Components that are essential for all successful online courses:

- **Audience**: the audience is a critical factor in the process of developing online courses. Everything designed and developed should be done with the audience in mind.

- **Course Structure**: Course structure refers to how a course is designed for e-learning. The structure of a course plays a critical role in how your audience learns the material. The main focus during the design phase is how the course should be organized and structured.

- **Page Design**: Like the importance of charm and charisma of the classroom instructor, the page design of an online course is critical to the learning process. How a page is designed can have a huge impact on the learning experience of your audience.

- **Content Engagement**: Because e-learning is a self-study medium, interacting with the learner becomes more important than most types of training forums. A Content engagement refers to how the learner interacts with content of the course. Because studies have shown that the learning experience is greatly enhanced when exercises or activities are incorporated into the learning process, content engagement is critical.

- **Usability**: Usability refers to the testing of e-learning content and applications.

6. CONCLUSION & FUTURE WORK

In this paper we describe the design of a distributed e-education Service system that uses an SOA as a model for Deploying, discovering, integrating, implementing, managing, and invoking e-education service system. Web Services are the set of protocols by which Services can be published, discovered and used in a technology neutral, standard form. LMS & SCROM are the major component of e-education system. You can add new educational web service and register service using UDDI or other directory service. As we worked on SOA using web service it makes the system more interoperable, configured, reliable & maintainable. Our future work is to make a more dependable system & how this education system is protected from faults. (Fault detection & fault protection).

REFERENCES