Study & Analysis of SOA based E-Learning Academic System

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Abstract — SOA is software architecture. It is real solution to integrate system resource utilities in academic system supporting modular design, ware application integration and interpolation software reuse, otherwise it will be difficult to manage the large scale distributed system. SOA web services works with open standards, such as SOAP, WSDL AND UDDI. This Paper firstly analyses and compares the current academic system and proposed system with SOA. How SOA is helpful to improve the performance of system via comparison of parameter such as efficiency, reuse, and shortens, life-cycle, reduce cost.

Keywords- XML = eXtended Mark-up Language, SOAP = Simple Object Access Protocol, WSDL = Web Services Description Language, UDDI = Universal Description Discovery and Integration.

I. INTRODUCTION

The Service-Oriented architecture appears to be an ideal paradigm for educational and government services. However, it is currently focused only on enterprise and business services. One of the goals of this paper is to verify the feasibility of using Service Oriented in the design and implementation of educational services. The prevalence of E-Learning has caused government agencies, schools and private enterprises to set up E-Learning websites one after another. However, these E-Learning websites were constructed with different programming languages, data storage formats and system architectures, hence causing an issue with interoperability. Therefore, this study uses SOA and web services as open standards to effectively resolve these issues. [1]

II. ACADEMIC SYSTEM

Academic system based on SOA architecture connects through standard service interface in order to making data change. It shield difference of varies platform, program language, operation system and hardware architecture. On this way, an application or part application is a type of service, and can be re-used and share.
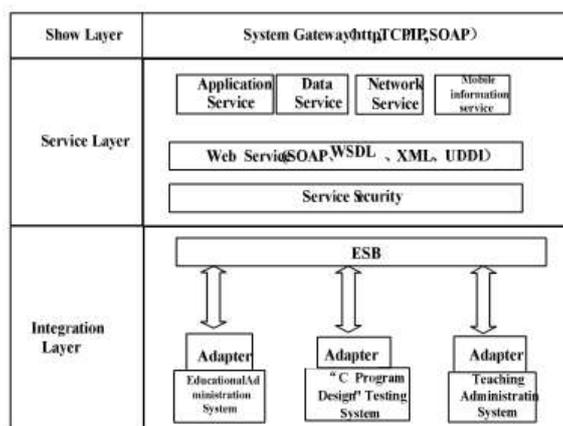
III. E-LEARNING SYSTEM

E-Learning The popular definition is, "The delivery of a learning, training or education program by electronic means". E-Learning system includes Knowledge Management and Knowledge acquision subsystems. Web-based Training that delivers on the Inter- or Intra-net, takes the much desired E-Learning incarnation of Online Learning. [2]

IV. ARCHITECTURE OF E-LEARNING SYSTEM

The E-Learning Architecture contains following layers which makes the system simple to understand:
1. Show Layer
2. Service Layer
3. Integration Layer

(Figure 1. Architecture of E-Learning System)

4.1 Show Layer

The module which in charge of implementing interface between enterprises and outside clients and relative of clients mutual. E-learning system information gateway provides a uniform and individual interface to users. Users can access varies content service of e-learning system through it.

4.2 Service Layer

In fact is a container of web service, it is in the core position. E-learning system provides application and data organized by the manner of service, so that provide service to show layer. In our e-learning system, including four types of service:
4.2.1   Application Service.
4.2.2   Data Service.
4.2.3   Network Service.
4.2.4   Mobile Information Service.

4.3 Integration Layer

Implement uniform of interface data format, database and file system data between existing e-learning system and developing system.
Need to administration and unifying remaining isomerism system, application system developed by J2EE and system based on web developed on J2EE platform.

V.   ADVANTAGE OF E-LEARNING SYSTEM

Compared with traditional software systems, SOA emphasis on "user" as the center. For users, service is a black box, which shields the technology details used to implement the function. The users do not have to know how it implements, but they can just call. [2]

In nowadays, user's demand for software becomes more and more personalized. As a framework, SOA has very obvious advantages in solving problems in education resource.

First, it is standardized architecture. As long as in conformity with the relevant standards, all components can be integrated into the SOA system no matter what kind of tools it used to develop and when it develops.

Second, it is easy to integrate the existing systems.

Third, it can accelerate development, reduce costs and risks. There are several factors: reuse the existing services and components; decompose the application development because of the standardized architecture.

VI.   FUTURE OF E-LEARNING SYSTEM

The future of the academic system will restructure through information communication technology (ICT), which is a comprehensive approach to innovate academic systems, methods, and management. The new paradigm of ICT in educations is smart services, which enhances the education efficiency, effectiveness, and productivity.

The future of the academic system is the new paradigm to restructure learning methodology through information communication technology (ICT), which is a comprehensive approach to innovate education systems, methods, and management. ICT diversifies teaching-learning methods and practices.

It engages all stakeholders of education to adapt in rapid changes of society and the environment. The new paradigm of ICT in educations is smart services, which enhances the education efficiency, effectiveness, and productivity. [2]

VII.   SOA – ENTERPRISE VIEW IN ACADEMIC SYSTEM

7.1 Business participants from both inside and outside the organization.
7.2 Delivery Channels.
7.3 Business services represent services the enterprise wants to expose to customers, partners and internal users (identified by SOMA).
7.4 EIS bulk of data and logic.
7.5 ESB routing, protocol mediation, and transformation. [4]
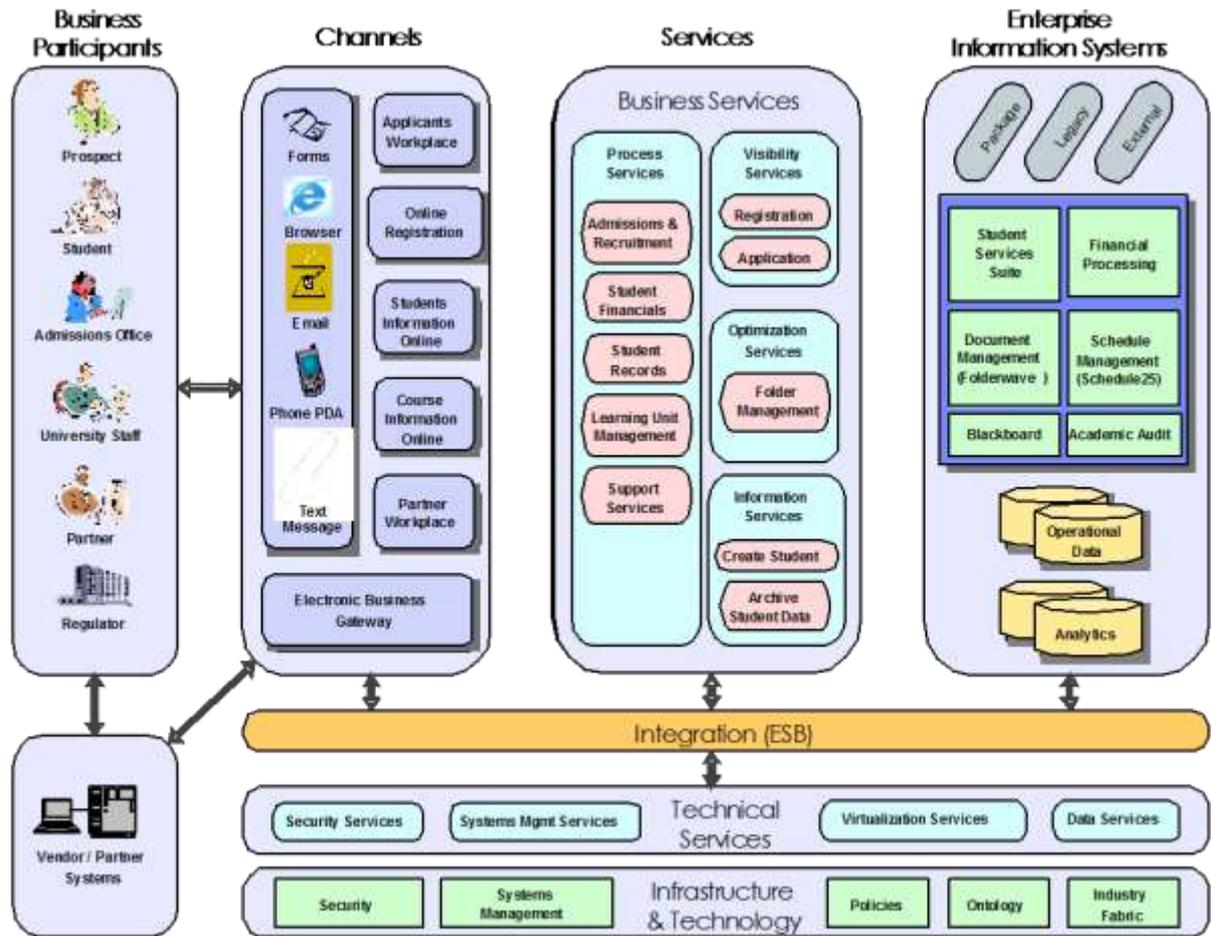
(Figure 2. Enterprise View Architecture of SOA Academic System)

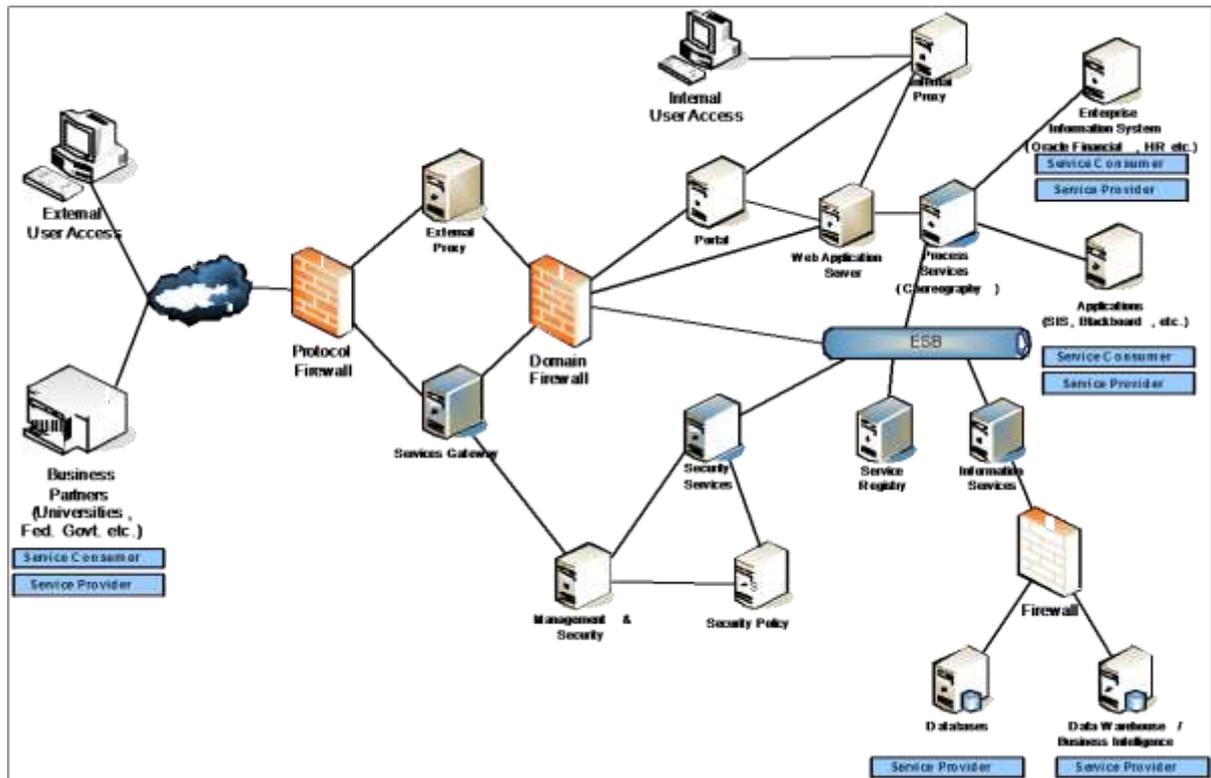## VIII.   SOA – IT VIEW IN ACADEMIC SYSTEM

Business as usual elements plus SOA related elements.

Gateways (security & manageability), ESB (adapters, queues, brokers), Registries (several types), Service registry for service metadata, LDAP registry for identities, access policies, certificates and configuration information.

Information services to provide information to consumers in a standard format despite how or where it might be stored.

Process Services provide the ability to compose services together and choreograph, their behavior to carry out business processes.

Security Services are enhanced to meet SOA requirements. [3]

(Figure 3. IT View Architecture of SOA Academic System)

IX.   SOA – MIDDLEWARE VIEW IN ACADEMIC SYSTEM

9.1 Business Application Service
Business Application Services are at the core (fundamental & repeatable business tasks & identified by SOMA)
Tool support for this layer:
-    WebSphere app server JBOSS and Glassfish.

9.2 Access Service Layer
Access Services Layer dedicated to integrating existing applications and functions into an SOA.
Tool Support of this layer:
-    WebSphere Adapters, BEA adapters, Sun SeeBeyond Adapters implemented with J2EE Connector and JCA.

9.3 Partner Service Layer
It can be viewed as a special case of interaction services - representing the integration of external entities like Government services and other higher education services, etc. [4]

9.4 Integration Service Layer
Captures the logic of presentation to the entities external to CMU.
Web Frameworks, e.g., struts, JSF, Ruby on Rails, provide a configurable sequence flow. [4]
Tool Support for this layer:
-    IBM WebSphere Portal Server, JBOSS Portal Vignette (industry leading implementation of JSR-168 Web Services for Remote Portlet WSRP) Apache JetSpeed, JSF, Spring Framework, etc.

9.5 Process Service Layer
Captures process flows and business rules.
Tool Support:
-    IBM WebSphere Process Server (SCA and BPEL), Apache Tuscany (SCA, SDO and BPEL), Active BPEL, Glassfish, Oracle Business Rules using RETE rules engine, IBM bought ILOG and now has a rules engine, RedHat DROOLS.

9.6 Information Service Layer

Provide access to the persistent data of the business and provide access to business intelligence. [4]
Tool support:
- Oracle RDBMS, IBM DB2, Apache Derby, MySQL, Ingres DBMS (open source).

9.7 ESB

Many vendors have an ESB product, JBoss has an open source ESB.
CMU has recently chosen Oracle's ESB, An ESB usually includes Content
Transformations (often via XSLT), Queuing and waiting   until services are available, Routing (often using WS-Addressing), Event driven publish/subscribe, Protocol mediation Monitoring and logging.
ESB delivers all interconnectivity capabilities Transport services, Event services and Mediation services (routing and transformation, logging, auditing). The ESB is a silent partner, transparent to services. [4]
Tool Support includes:
- IBM WebSphere ESB, TIBCO ActiveMatrix, JBOSS ESB Apache ServiceMix, etc…

9.8 Registry

Registries are included in this layer.
Tools include:
- IBM WebSphere Service Registry and Repository, BEA AquaLogic Registry and Repository UDDI) etc…

9.9 Development Service Layer

Business analysts need modeling tools. Software architects need to model data, flows, and system interactions. Software developers need to build business logic. [4]
Tools include:
- IBM Rational Software Architect, IBM Rational Application Developer, Eclipse Web Tools Platform, Netbeans IDE (J2EE, Ruby,..) BEA workshop for WebLogic, Jboss developer suite, BPEL Source Editors, IBM WebSphere Integration Developer, Eclipse BPEL designer plug-in Netbeans, etc.

9.10 IT Service Management Layer

IT Services Management Layer monitors and manages deployed services.
Tools include:
- IBM WebSphere Business Monitor, BEA AquaLogic BPM, Sun SeeBeyond.

9.11 Infrastructure Service Layer

Infrastructure Services Layer (Security, efficiency, integrity, balanced workload, etc..)
Tools include:
- IBM Tivoli Composite Application Manager (ITCAM), IBM Tivoli Identity Manager (TIM), IBM Tivoli Access, Manager (TAM) - security policies and authorization, BEA AquaLogic Enterprise Security, Sun Java System Access Manager.

User Registries tools includes:
- IBM Tivoli Directory Server (LDAP-compliant), Microsoft Active Directory (LDAP-compliant), Novel eDirectory (LDAP-compliant), OpenLDAP, etc…

9.12 Business Innovation & Optimization Service Layer

Business Tools include:
- IBM WebSphere Business Modeler, Model to UML or BPEL, Microsoft Visio, MagicDraw and Sun SeeBeyond eInsight Process manager.

Business rules management Tools include:
- IBM Websphere process server, Drools, Jboss Rules, etc..

X.   CONCLUSION

In this article, I started with the fundamentals of a service-oriented architecture, its layers, and the associated types of architectural decisions. Then, I described the e-Learning system with its architecture and also mention the advantage and scope of it. Elaborate the template you can use for your architectural decisions in each of the layers of the SOA.

By a combination of web services, it can obtain a lot of new business functions, so it improved services reuse of the system, it reach the goal of business rapid update and greatly reducing the system's management work.

XI.   REFERENCES

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