APPLYING SERVICE-ORIENTED ARCHITECTURE FROM DESIGN TO IMPLEMENTATION OF E-SERVICES IN HIGHER EDUCATION

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ABSTRACT

This paper proposes the apply service-oriented architecture from design to implementation of e-services in higher education which emphasize the design and the software development to be the open system that automatic support with the different integrated services. The system design can interoperate between higher education and related departments. The development of system uses business process to control the workflow of SOA. In additions, SOA can support complex working processes and services rapidly for students, teachers, officers, academics, executives, department in university, and all of institutes. Also the paper shows services preparation and transformation of services to e-services which connected by web service. Requestors can make the application for using services via web service which process by the standard XML language.

Index Terms— Service-Oriented Architecture, Higher Education Services, Web Services, Interoperation

1. INTRODUCTION

Nowadays, Management Innovation in Higher Education [1] of Thailand uses the modern technologies to support the internal and external activities of university in order to be in line with government and support complex working process [2]. Higher educations improve their process of working for responding the user requirement rapidly [3][15]. In addition, lack of data interoperation between higher education and other institutes can make problems: store the same data, disunity of document, and expensive data management fee. These problems are the difference of technological base structures, criterion of the name list and interoperability of communication rule [2]. From problems aforementioned, service oriented architecture (SOA) is the one of choices in the process of software development that changes to the particular software service [15]. The SOA support loosely coupling and reuse legacy [15] so it is easy to enter the program. Moreover, this efficiency of software development can reduce overlaps, save money and time.

2. LITERATURE REVIEWS

According to related theory and research follow as:

Management Innovation in Higher Education [1] by office of the education council is the model for setting the process of working and model of higher education service group. The method and the step of public transformation service development [2] by information and communication technology ministry (ICT). It is a framework for designing and developing service in higher education that data can interoperate in e-service. The strategic plan of information technology service in university supports service for student, teacher, academics, executives, and university departments [8], [9]. It is a concept for IT service provision. The framework and strategy for transforming and managing modern organizations in order to reduce software development outlay follow as SOA [10],[11],[12]. It is uses for setting technology which support SOA in design and service development for searching or invoke service rapidly and save cost. The web service that reuse software development in case of service unit which is business process [3],[15]. Using BPEL [3] to set workflow of the request via standard web service [4]. In order that study in components of web service such as SOAP [5], WSDL [6], and UDDI [7].The LMS working integration is the prototype of the web service model which transform between higher education altogether [13].

3. THE PROVISION AND SERVICE DESIGN VIA SOA

3.1 Services based on higher education

This part is about services based on higher education which use for the service-oriented design of e-services. For example:

3.1.1 University Admission Service (UAS): the system that select a person to be student in higher education. This system is consisting of select criterions: GPAX, GPA O-NET, A -NET.

3.1.2 E-Learning Services (ELS): the system of learning through electronics equipments such as computer aids instructor (CAI), and online learning and teaching.

3.1.3 Academic Administration Services (AAS): academics management systems on higher education such as courses, researches, evaluations and guarantee quality of education.

3.1.4 Library Management Services (LMS): library management system such as substance arrangement, data seeking, and borrow- return books, category arrangement.

3.1.5 Student Record Services (SRS): the system of record data student alteration for example name and address change, check the school-record, check the scholarship, and check paying fee or value registers [15].

3.2 Service base change to e-service

This part presents in requirement of a services in order to define processes tool and framework for construction of services.

3.2.4 Definition of Enterprise Business Process: Defines tools, processes and technology for combining services. Such as Graphical flow modeling tools, BPEL4WS generators, Corresponding runtime support.

3.2.5 Definition of Enterprise Service Bus: Defines Communication technology for application integration such as web services.

4. SOA SERVICE STRUCTURE

Figure 1 presents in a designing and developing framework of e-Services in Higher Education. This Figure deploys the example demonstrates for definition of services model, access application, business process, IT infrastructure, services interoperation between providers and requesters. This divided into five parts in Figures 2 and 3.

4.1 Business Services

Business Services are scope of business process and

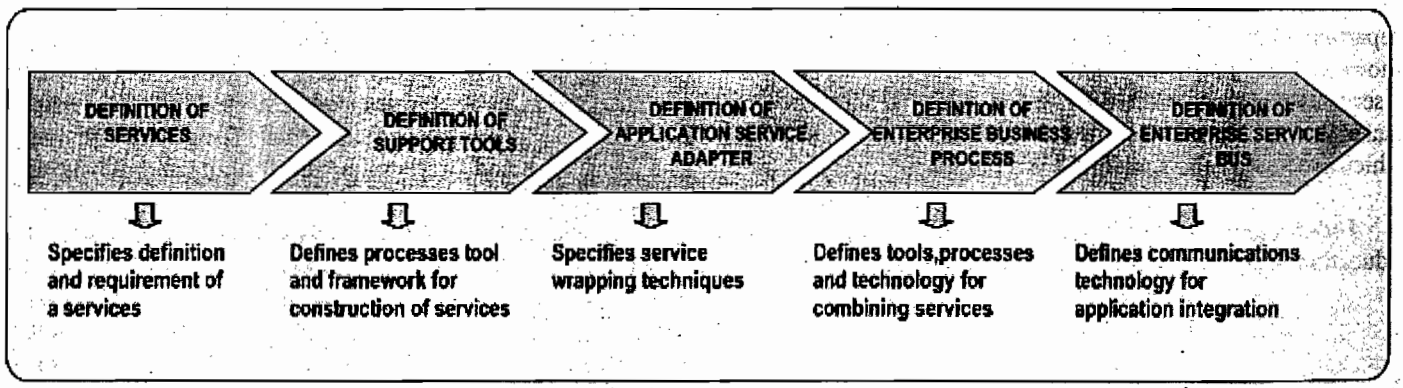

Figure 1. A designing and developing framework of e-Services in Higher Education

Figure 1. A explain framework design and development of e-Services in Higher Education as follows:

3.2.1 Definition of Services: Specifies definition and requirement of a service. Such as Platform, Location, Metadata, Data format, Invocation pattern, Protocols and Programming language

3.2.2 Definition of Supporting Tools: Defines processes tool and framework for construction of services such as UML editors, WSDL editors, Java-to-WSDL generators.

3.2.3 Definition of Application Services: Specifies services wrapping techniques such as User Access Services, User Interface Services, Common Services and Information Management Services.

business logic that supports the access services of higher education. Inside organization requestors can access to services via intranet while outside requestors can access via extranet or internet.

4.2 Application Services

Application Services are scope of necessary components to build an application. This scope of includes component to support:

y4.2.1 User Access Services: component support access sequence, and presentation about the access of business function services via specific channels that requestors of services are going to use.

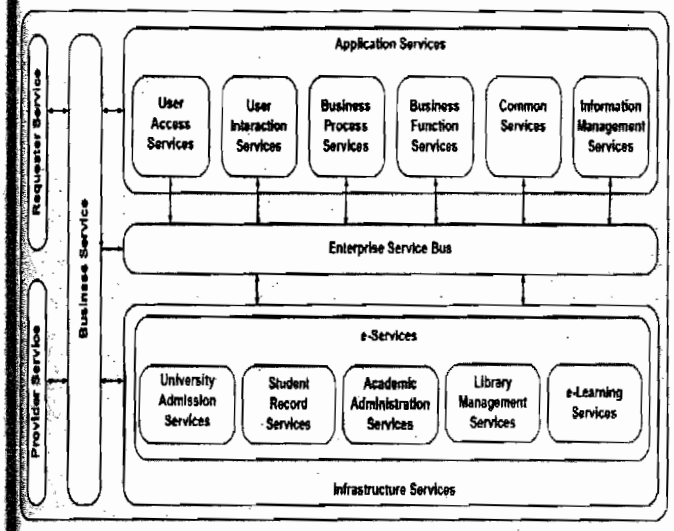

Figure 2. e-Services System in Higher Education

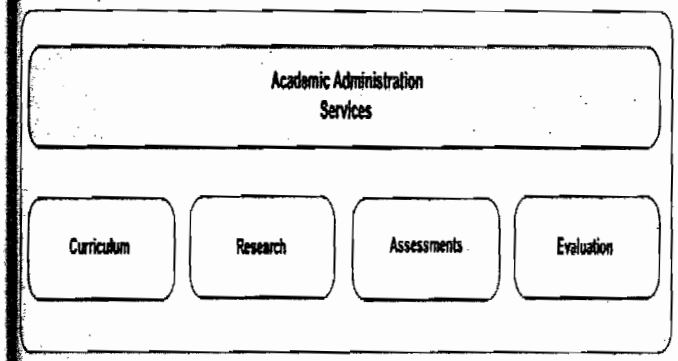

Figure 3. Lower-level in Academic Administration Services Component

4.2.2 User Interaction Services: component prepare the additional interaction commonly needed to serve a group of requestors such as handle direct interactions with requestors involved in the business process or collaborative process.

4.2.3 Business Process Services: component support the execution of other services that user process flow or rule technology to describe their behavior for example choreography and business rule.

4.2.4 Business Function Services: components which using software package that adapt enterprise data to help atomic integration of business functions into business function services.

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4.2.5 Common Services: helper function designed to be used by many business services such as include services implementing personalization of user access and user interaction services and reporting status and progress of business services.

4.2.6 Information Management Services: integration of accessing, managing, analyzing, and integrating data and content across heterogeneous information sources.

4.3 Enterprise Service Bus

The Enterprise Service Bus is an intermediation layer that interconnects all of the services or facilitates mediated interactions between service end points.

4.4 e-Services

e-Services set of services in higher education that provided to support requestors who use services such as University Admission Services (UAS), e-Learning Services (ELS), Academic Administration Services (AAS), Library Management Services (LMS) and Student Record Services (SRS).

4.5 Infrastructure Services

Infrastructure Services is a set of platform-independent services that enables all of the other services domain components to be installed, executed, and controlled on a concrete infrastructure combination of software and hardware systems.

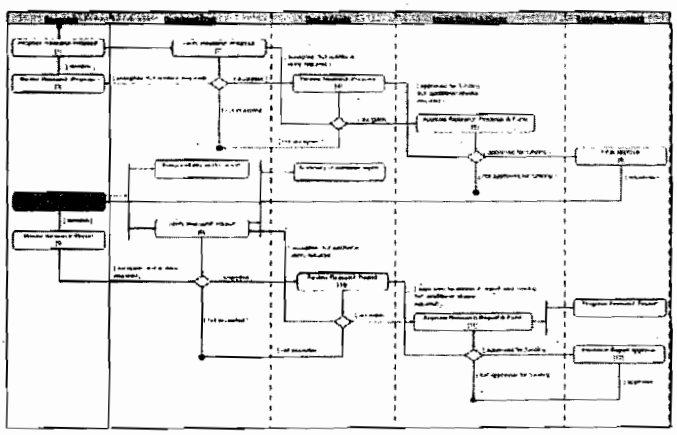

Figure 4. The example of approved for funding and research operation

5. THE WEB SERVICE DESIGN

A components of "Research" in Figure 3 used to be the example for designing web service, called Research Web Service (RWS). The design divided into two parts.

5.1 Process Research Model to e-Services

This example demonstrates how to the model services in 3.1.3 (AAS) according to the applying service-oriented architecture from design to implementation of e-services in higher education in Figure 1. The example of approved for funding and research operation that use to define workflow which is transform to design the method of RWS.

5.2 The designing method of Research Process

In Figure 4, the process in "Submit Research Report" the researcher transfers to the example in design method which serve RWS. The process defines relation between researcher and "Submit Research Report" which consists of create, revise, submit, re-submit, and show status research proposal in Figure 5.

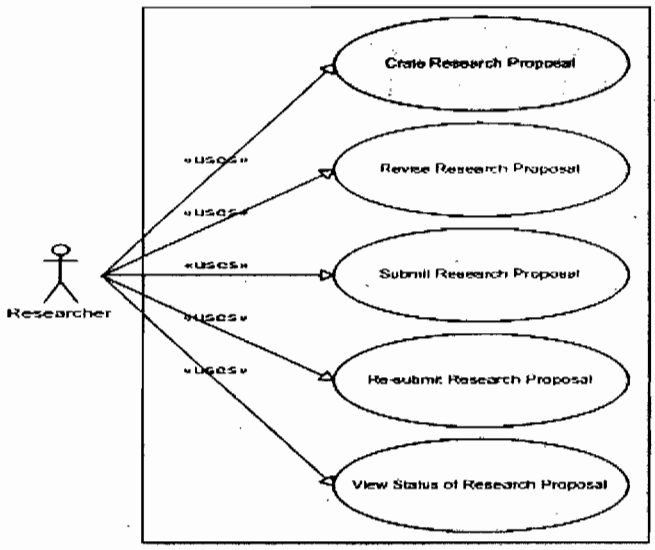

Figure 5. Use case relation of researcher between submit research report

In the highlight "Create Research Proposal" in Figure 5 is an example of attributes and operations which the defines login and the research administration in Figure 6

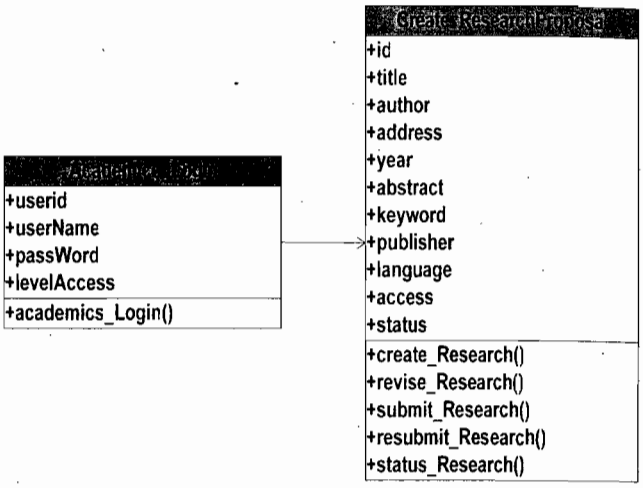

Figure 6. The example of attributes and operations of Web service

6. CONCLUSION

This paper is applying service-oriented architecture from design to implementation of e-services in higher education. Example of as this paper be shown in creating the interoperation framework between higher education and relevant organization such as other collages, university, and the Ministry of Education. This paper demonstrate uses SOA as framework below :

- To bring up University Admission Services (UAS), e-Learning Services (ELS), Academic Administration Services (AAS), Library Management Services (LMS), and Student Record Services (SRS). Then transfer these system to the example in the apply service-oriented architecture from design to implementation of e-Services in higher education.
- The detail of defines e-Services design presented framework in Figure 1.
- Moreover, it can share resource and support service rapidly for teachers, academics, executives, officers, students, and support units of higher education.

7. SUGGUESTION

This paper is the one of any number in services which show point of view and transform process in the apply service oriented architecture from design to implementation of e-services in higher education. However, we can design and develop follow as this framework in the future in order to cover all of services.

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