

A Web Service Platform for Support Multiple Programming Language to Access Biomedical Image Databases

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Abstract—Images are important in disease research, education, and clinical medicine. This paper presents a Web Service Platform (WSP) for support multiple programming languages to access image from biomedical databases. The main function WSP is to allow web users access image from biomedical databases. The WSP will receive web user's queries. After that, it will send to Querying Server (QS) and the QS will search and retrieve data from biomedical databases. Finally, the information will display to the web users. Simple application is developed and tested for experiment purpose. Result from experiment indicated WSP can be used in biomedical environment.

Keywords—Biomedical, Image, Web Service Platform.

I. INTRODUCTION

IMAGES are important in medical area for specified purpose such as documenting patient presentation. Many web sites provide information about medical. These sites are allowing users to access image from database. However, web users only can access biomedical image if web users using same technology. The problem in web application is web users cannot access image from others biomedical databases if the web users using different programming language.

A Web Service Platform (WSP) is proposed to solve this problem. The main function WSP is to allow web users from different technology to access images from different databases. The WSP is act as server between web users and biomedical databases. The biomedical databases are provided collection of biomedical images. The implementation for Web Service Platform will describe in implementation phase.

Through WSP, this problem in Web Application can be solved and web users have no problem to access image from biomedical image. Simple application is develop to test the capability of WSP in biomedical domain.

II. PREVIOUS WORK

A Web Service Platform has been applied in archaeological domain [1]. A framework (MIDAS) [2] was developing for storing vast amount of information. The function this framework is to query archaeological data and to reconstruct the objects and archaeological sites. A decentralized platform also was developed. Main function the decentralized platform is to facilitate the querying of multiple heterogeneous archaeological databases through Web.

Usually, archaeological databases are required to store wide range of complex archaeological data. A computer is mainly helping the excavation process. However, data in archeological databases provide a medium for reconstruction, management, and realistic visualization.

3D Murale [3] is used for recording, reconstructing, database,

and visualization components. The recording tools were developed for measuring, terrain, stratigraphy, buildings, building blocks, pottery, shreds, and statues on the archaeological site.

One of archaeological projects is Tay [4]. This project was developing for archaeological inventory on the Web. A database is created to store and archive the archaeological sites and the findings. This project also provides function is for browsing and searching archaeological data. Web users can search and get information about archaeological easily through this system. Figure 1 shows interface for Tay Project.

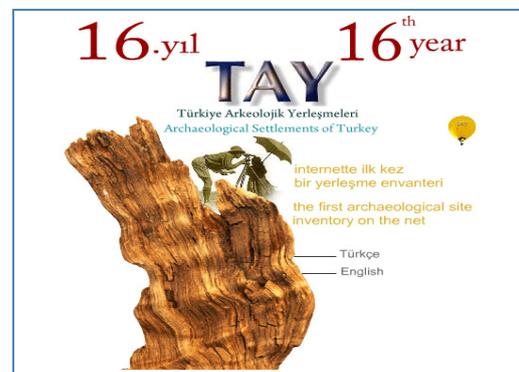


Fig. 1. Tay Project

Another projects in archaeological is Theban Mapping [5]. In this project, national database of pre-Islamic sites was developed. They have built very useful dataset and resource for Egyptologist and Archaeologist. Web users can search information by entered data such as text, date, subject, country, source, period, and language. The web users also can enter keyword or logical operators for searching purpose. About 5000 objects were selected for the wide collection of the British Museum's collection and stored in database is called "Compass" [6].

Database of Irish Excavation Reports [7] contains summary accounts of all the excavations carried out in Ireland from 1985 to 2000. Through this database, searching and browsing process can used multiple fields of the reports such as name, title, etc. The most popular web service is called "Mediolanum" [8]. This web service is created facilitate international cooperation in the planning and execution of archaeological field work all over Europe.

Through this literature, a Web Service Platform has a potential to implement in other domain. In this paper, the WSP is implemented in biomedical. The WSP is needed in biomedical area. Through this platform, web users can search and get biomedical data especially biomedical image.

This section presents a design for Web Service Platform (WSP) for biomedical image databases. Figure 2 shows the designing WSP.

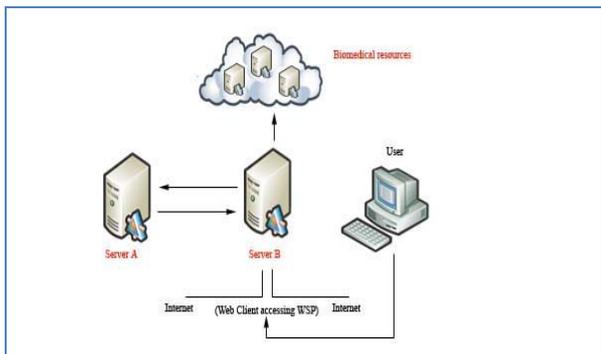


Fig. 2. Web Service Platform

Server A represents as a register server. The register server keeps all biomedical websites. Server B represents as a querying server. This server will serve query from web user through Web Service Platform. The processes involve once web user request information as follow:-

- i. Web user sends a query
- ii. Server B receive a query
- iii. Server B checks website address from server A.
- iv. Server A will reply list of registered website related with biomedical image.
- v. After server B get feedback from server A, server B will search and retrieve data from biomedical resources.
- vi. Finally, server B will send data through WSP to web user.

Suppose $M = \{x_1, x_2, x_3, x_n\}$, where x represent registered website under register server, A. M is a member of A, this is denoted $M \in A$. Equivalently, this formula also can write $A \supseteq M$, read as A is a superset of M.

Here, WSP is important. The importance of WSP is to make sure, web user got the right or related information after searching and retrieving processes. Beside that, WSP also support different multiple language. Figure 3 shows how WSP support multiple languages.

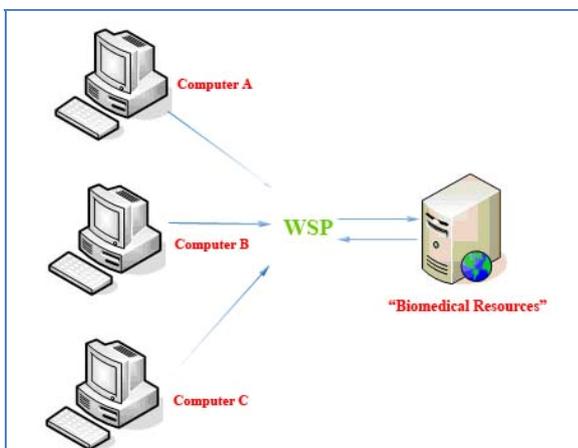


Fig. 3. WSP Support Multiple Languages

Fig. 3 represents three computers using different language. Computer A use Java language, computer B use PHP language and computer C use ASP language. WSP become as a client by defining a Web Description Language (WSDL) document [9]. A WSDL is description is an XML document that gives the information about a Web service such as its name, operations, and parameters for those operations, and the location of where to send requests. XML is a markup language that makes data portable, by proving a standard way of data-exchange. Suppose a computer A sends a query about "bone". WSP will receive a query form computer A. Then, the WSP will search and retrieve data from biomedical resources. After that, the WSP will send information to computer A. These processes are same for computer B and computer C. WSP will create XML document in order computer A, computer B, and computer C get right or related information although different languages.

IV. EXPERIMENTAL RESULT

Simple application has been develop to test capability of Web Service Platform for accessing biomedical image databases. Beside that, this application is tested using different language to access biomedical image databases.

Experiment 1

This experiment use WSP to access biomedical image databases for same web user language.



Fig. 4. Interface for Web Service Querying Server

Fig. 4 shows interface for web service querying server. Web user will send a query to Query Server through WSP.

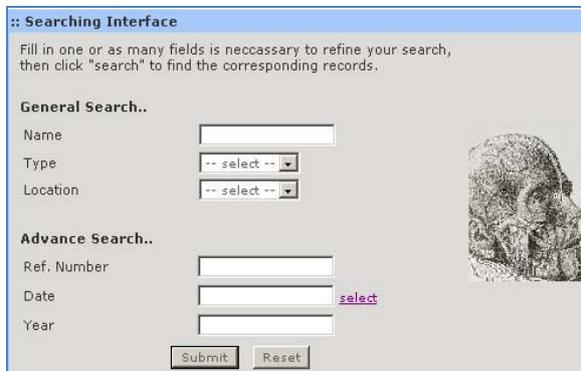


Fig. 5. Searching Interface

Fig. 5 shows interface for searching. Web user is needed to enter information to text field, etc. After that, user is needed to press button "submit". Query server will receive a query from web user. Then, the query server will communicate with query server. The purpose of this communication is to know list of registered biomedical databases before searching and retrieving process. After that, query server will search and retrieve data from the registered biomedical databases. Finally, query server will send the results to web user through WSP.



Fig. 6. Interface after searching and retrieving process

Fig. 6 shows interface after searching and retrieving process. The results will show to web user.

Experiment 2

This experiment use WSP to access biomedical image databases for different web user language. Three web user using different language. Web user 1 using java language, web user 2 using php language, and web user using asp language.

Fig. 7. Searching Interface for Web User 1

Fig. 7 shows interface for web user 1 which uses java programming language.

Fig. 8. Searching Interface for Web User 2

Fig. 8 shows interface for web user 2 which uses php programming language.

Fig. 9. Searching Interface for Web User 3

Fig. 9 shows interface for web user 3 which uses asp programming language. Suppose all three web users entered reference number equal to "M3204". Query server will receive a query from three web users through WSP. Steps for search and retrieve are same with experiment 1. The query server will communicate with register server. After get feedback from register server, the query server will search and retrieve data from biomedical databases. Finally, the three web users with different programming language will get the result through WSP.

Based on experiment 1 and experiment 2, the result indicates Web Service Platform is suitable from single programming language and also for multiple programming languages. This Web Service Platform also suitable and can be used for biomedical image domain.

V. CONCLUSIONS AND FUTURE WORK

Web Service Platform is active research topic in web application. Web application is important for some business organization. That way, this platform is developed and tested to measure capability WSP in specific domain. Based on several experiments have been done, the results indicates WSP is suitable for biomedical image domain.

Future work will approach the WSP for another specific domain. Beside that, enhancement is needed to improve capability of WSP for web application.

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