FRAMEWORK FOR SERVICE ORIENTED DEVELOPMENT OF MONOLITHIC LEGACY SOFTWARE

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ABSTRACT

In continuation of research work based on service orientation of monolithic legacy software, the work presented in this paper is for the development of framework for service orientation of monolithic legacy software after completion of phases of software analysis, service understanding and extraction from monolithic code. The work presents the framework with steps of further development of platform for web services, developing web services and application of service oriented reengineering techniques for development intended target system.

Keywords: MLS, Reverse Engineering, SOA, Web service, Wrapping, WSDL.

I. INTRODUCTION

The proposed framework for design and development of loosely coupled service oriented system with integration of some specific service component developed from legacy is facilitated by the methodologies of service oriented reengineering. The heritage monolithic legacy software need to be redeveloped into a target system which is made up of a set of loosely coupled web services, as the project is for the service orientation task, service oriented software reengineering is applied here with other redevelopment methodologies for service oriented development of monolithic legacy software. As a result this framework can support the developer, designer and analyst to reengineer the tightly coupled monolithic system to loosely coupled service oriented system.
II. LITERATURE SURVEY

Chung et al. [1] undertaken a project in which they applied a legacy theorem for proof checking and derivation tool called Bertie3 which supports the development of system reengineered to SOA, and developed a Service-Oriented Bertie (SoBertie) tool which provides the key competence of Bertie3 as web services.

Chung et al. [2] presented service oriented software reengineering methodology designed for applying SOA to legacy systems. It is concluded from three participant service models as, (1) 4+1 view model [3], and (2) RACI charts [4], (3) Service oriented reengineering.

Distante et al. [5] presented Ubiquitous Web Applications Design Framework (UWA) for designing of legacy applications for web oriented application and further presented its extended version as Transaction Design Model (UWAT+).

Chen et al. [6] presented an approach for identifying the features of legacy program for service oriented design and further construction of service oriented features with their implementation.

Cuadrado et al. [7] proposed a very useful methodology for the development and recovering of legacy architecture in service oriented perspective. It uses three step approach containing architecture recovery, developing orientation plan, and its execution.

III. FRAMEWORK DEVELOPMENT CRITERIA

The proposed framework is supposed to satisfy following identified criteria:

1. The framework is to developed for reengineering, development, wrapping and integration of services from monolithic legacy;
2. Monolithic legacy is main application domain of framework;
3. Cost effective and worthwhile application of framework;
4. Applicability for checking and composition of services;
5. Evaluation for required changes in existing system target system acceptance;
6. Minimizes tools support;
7. Maximum coverage on development task;
8. Implementation and validation: The framework must have to satisfy the evaluation and validation parameters with its implication.

IV. FRAMEWORK DEVELOPMENT

Proposed framework consisting of four steps is depicted in following Fig. 1, details of these steps are given in following sections.
4.1 Design of Web Service Platforms

The platform for design of services and implementation is Microsoft .NET. WSPs must be implemented through HTTP that provides platform for web service message exchange system as SOAP, it can also use some other message passing system such as MIME over SMTP[8], which also support for security, availability, standardization and routing of web messages. Fig. 2 depicts the web service platform consisting of SOAP processing, message handler, registry and related components.

Fig. 1: Framework for service oriented development

4.2 Web Service development:

Web service development process consisting of four major set of activities as depicted in Fig. 3 are following:

4.2.1 Service recovery;
4.2.2 Service wrapping;
4.2.3 Service availability;
4.2.4 Service oriented reengineering.
These set of activities are briefly described and discussed in the following sections:

4.2.1 **Service recovery**

To recover the services from existing legacy code base it is useful to check the worthwhile for development process. The recovery process will undertake the investigation upon the monolithic program to search the reusable functional code and convert them as service. As it is observed in the PL/I, C, and COBOL code that the service providing functions are scattered in many blocks within the functional routine [9]. Once the code block statements containing service definition are identified then extract the code block which may be an enumerated data type, abstract data type, procedure or a COBOL paragraph then it has to be reassembled as a separate module with its own services.

![Diagram](image1)

**Fig. 3:** Web service development process

4.2.2 **Service wrapping**

The tool SoftWrap is applied to automate service wrapping developed from monolithic code, the process include WSDL interface description. The extracted services are assigned to object wrapping component. It will help the automated manipulation of monolithic code to be effective wrapping. The procedure applied at this stage is depicted in fig. 4.

![Diagram](image2)

**Fig. 4:** Wrapping of services
4.2.3 Service availability

The third step of the development framework is to make available the web service for further reengineering task. The availability of service includes for example on the server there is a scheduler responsible for the message exchange and identify which service has to process and forward to WSDL content from the wrapped services modules, once the wrapped services are available for execution then it can perform the desired function and then are ready to take the part in the further reengineering based development of target service oriented system.

4.2.4 Service oriented reengineering

![Fig. 5: SOR methodology](image)

Service oriented reengineering consist of two main processes: reverse software reengineering and forward software reengineering as shown in the fig. 5. The reverse software reengineering process undertake the monolithic code generated services to develop target system the process begin with stakeholders input under the SOC perspectives and then forward software reengineering process conceptualize the target system after collecting all services, wrap services, necessary documentation.

V. CONCLUSION

The service oriented development of monolithic legacy program is a procedural activity containing several useful phases and application of conceptual and automated tools support. The work presented in this paper describes one of the activities of all those development phases, which mainly describe through a framework the service oriented development of monolithic legacy software. The work concludes that SOD can be performed successfully by implementing the activities suggested and applied in this paper.

REFERENCES


AUTHOR’S BIOGRAPHY

Asfa Praveen has six years of experience with good practical, academic and research projects exposures after completion of three years degree program Master of Computer Applications (M.C.A.) in year 2007 from Punjab Technical University, Jalandhar, India with excellent grade; Advanced ‘A’ level (P.G.) Diploma in Computer Science in year 2003 from Department of Electronics, Ministry of I.T., Govt. of India; Oracle Certified Professional (O.C.P.) Examination in year 2003 from Oracle Corporation, U.S.A.; she is currently pursuing Ph.D. in Computer Science in Faculty of Science & Technology of Shri Venkateshwara University, Gajraula, (U.P.), her area of research includes Service Oriented Migration & Development of Monolithic Legacy Software.

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