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Subset WSDL to access Subset Service for Analysis

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1. Introduction

→ Service analyzer requires automated approach to access *Subset Service*, so that cost can be reduced by organizing the test scenarios. Emphasis of analyzer is to access and handle subset of code.

→ This paper proposed a conceptual model that access *Subset Service* in two steps. First, slicing the Web service based on *Subset WSDL (SWSDL)* to access *Subset Service*.

→ Second, the *Subset Service* is categorized into five layers. This improves and optimizes cost of Web service analysis by slicing and layering the Service.

→ We conducted case studies for few Service projects. *SWSDLs* are used for *Operationalized* and *Parameterized* Web service analysis.

2. Subset WSDL (SWSDL) to access Subset Service

→ *SWSDL* constructed with 'requiredOperations' in following three-steps in fig.1 (a).
A. Gather operations ('requiredOperations') that are present in '*wsdl*' required for analysis of WS.

B. Extract and construct the various parts of WSDL (Definition, XSD, Message, Port, Binding and Service).

C. Combine all the parts semantically according to the WSDL standards and input WSDL, such that a client can properly communicate with the WS code via *SWSDL*.

→ All WSDL changes are captured in DifferenceWSDL (DWSDL). WS code changes are captured in UnitWSDL (UWSDL) and ParameterWSDL (PWSDL).

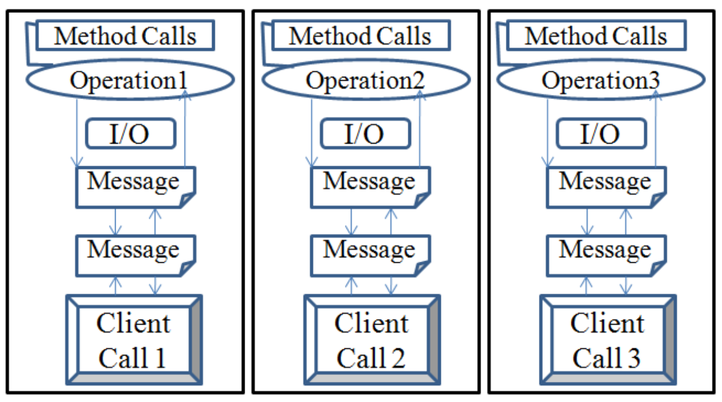

Fig 1 (a) Slicing of WS code to construct Subset Service.

4. Subset Service for Categorized Analysis

→ Web Service Analysis require to analyze its WSDL, XSD, message passing, method call graph, WS code and WS composition.

→ Subset service is analyzed for different layers shown in figure 1 (b). Following are categorizes of WSA based on WS layers to identify all affected portions.

1) WS functional and non-functional requirement analysis:
2) Message part WSA:
3) Parameterized (XSD input-output) WSA:
4) Operationalized WSA:
5) WS call testing:

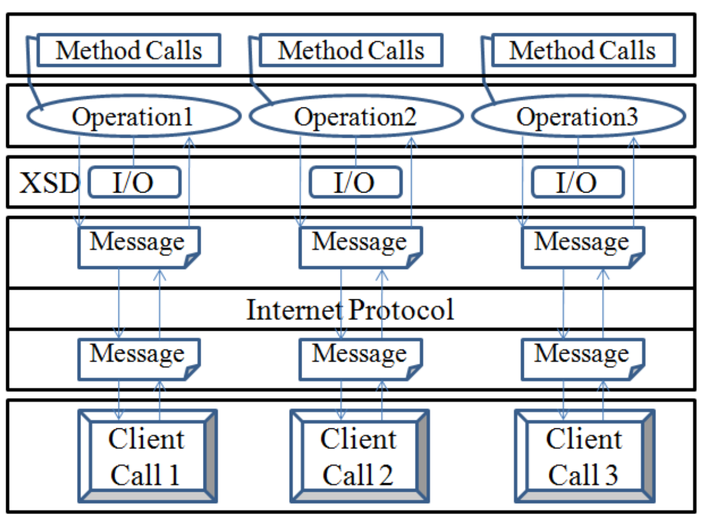

Fig 1 (b) Layers of WS to perform analysis for Subset Service.

4. Optimize Service Analysis using Subset service

→ *Subset SWSDL* is used for the *Subset Service* analysis by accessing only subset code. For example in figure 1 (c) two service are used to access *Subset Service* in three ways.

1) Reduced service: accessed with the selected operation.

2) *Combined service*: accessed with the unique merge, addition or combination of operations from two or more services.

3) *Difference service*: accessed with the difference between set of operation in two services.

→ *Operationalized analysis* can be applied to any type of operation.

→ *Parameterized analysis* is applied to special cases of operation where some of the parameters are interdependent on each other. We can identify the special primary parameters in WS operation. The fixed value of primary parameters were exercised with combinations of various values for non-primary parameters.

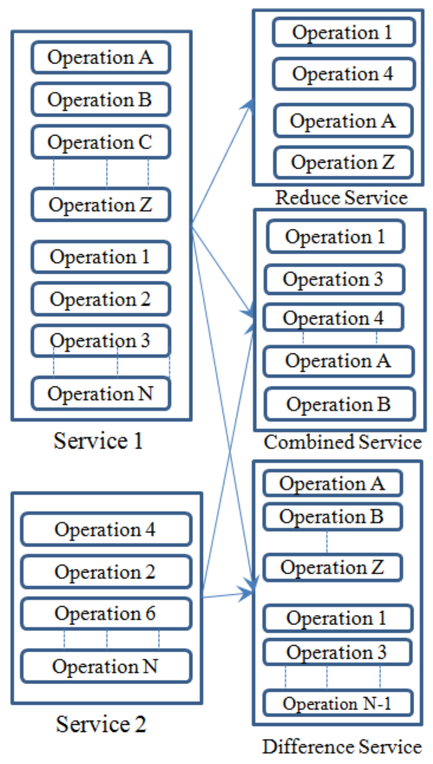

Fig 1 (c) Three types of Subset Service

5. Case Study

→ *Experiments for usefulness of SWDLs in WS analysis:* SWSDLs are used for Operationalized and Parameterized analysis. SWSDLs are accepted by SoapUI, JMeter, Eclipse and NetBeans. This validates SWSDL's semantics and structure.

→ *Experiments conducted for Subset Service analysis:* Study for two layers, namely, operation and parameter (XSD). Figure 1 (b), layer one and layer two require Operationalized and Parameterized analysis.

→ *Operationalized analysis:* Two versions of the WS are used to generate the SWSDLs. The SWSDLs are used to select reduced test cases from old test suite for modified operations and test templates were generated for inserted operations.

→ *Parameterized analysis:* Study was conducted over WSs in table 1. Test case for a value of primary parameter and combination values of non-primary parameters makes test suite more formal, systematic and analytic. Hence, we can properly map test data to the flow of the code.

Table I. Parameter in an operation in BookService

Project	Primary parameter	Non – Primary Parameter
Currency Convertor WS	FromCurrency	ToCurrency
Global weather WS	CountryName	CityName
Bible WS	BookTitle	ChapterName and Verse
Sunset Sunrise WS	Latitude and Longitude	SunsetTime and SunRiseTime
Addition of 3 digit	a, b and c	----------

6. Conclusion to Subset WSDL and Subset Service

→ How to layer and slice a WS for its analysis?

→ Slicing of WS is done using different *Subsets WSDL* to access *Subset Service* with the selected operations. Test cases are selected for *Subset WSDL* and *Subset Service*.

→ Five different layers described for WS analysis. Categorized analysis reduces efforts in regression testing and top down development.

→*In future*, modules or tools can be developed with different approaches to access *Subset Service*. Few more SWSDLs can be created for improvement in WS development and maintenance process.

Other Published Articles on AWSCM

1. Chaturvedi Animesh. "Change Impact Analysis Based Regression Testing of Web Services." *arXiv preprint arXiv:1408.1600* (2014).
2. C. Animesh and G. Atul, "A Tool Supported Approach to Perform Efficient Regression Testing of Web Service," 7th IEEE MESOCA 2013.
3. Chaturvedi Animesh, "Subset WSDL to access Subset Service for Analysis", 6th IEEE CloudCom 2014.
4. Chaturvedi Animesh, "Automated Web Service Change Management AWSCM - A Tool" 6th IEEE CloudCom 2014.
5. Chaturvedi Animesh, "Reducing Cost in Regression Testing of Web Service," CSI 6th CONSEG, 2012 on IEEE.

AWSCM Website: https://sites.google.com/site/animeshchaturvedi07/research/awscm