

Contract First Design: The Best Approach to Design of Web Services

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Abstract— The web service design comes in two approaches **Code First Services and Contract First Services**. In the **Code-First service design method the service is coded first and then service contract is created for written code**. In the **Contract-First service design method, the service contract is created first and then the code is written for the created contract**. The technology used in both the methods is same but they differ in their methodology and implementations. This paper discusses both the approaches of service design and discusses advantages and disadvantages of both the approaches.

Keywords— Web Service Contract, Design of Service Contract, Contract First Design.

I. INTRODUCTION

Web services are software components that communicate through the service contract. In the service oriented environment, the interaction between the service consumer and producer is explicitly through the service contract. The service contract is act as glue between the service provider and consumer. The only available document to the service provider is service contract. The service contract is the document that describes the purpose and functionalities of the service, how the input and output of the operations are passed as messages between the client and provider, data structures of the messages, conditions under which the operations are carried out and the information about how the service can be accessed [1]. From this service contract the consumer can understand the functionalities and the way how to access the service. Therefore the designing of service contract takes much important than writing the code for functionalities of the service. According to the functionalities of the service, the service contract ranges from simple to complex. The contract of the web services also should follow the principle characteristics of services. Among the characteristics of services, loose coupling, reusability, granularity are important design considerations. An effective service contract should be modular, flexible and usable. The service contract is described with XML schema and XML based Web Service Description Language (WSDL). The WSDL represents a contract between the consumer and provider. The service contract describes what operations the service provides, where these operations reside and how it can be accessed. The service interface is defined with the following standards [2]:

- (i) WSDL – Web Service Description Language defines name, location and operations of the service and inputs and outputs of the service.
- (ii) XSD – XML Schemas Definition Language which is used to defines the input and output data.
- (iii) XML – Extensible Markup Language defines the structure of input and output data type.
- (iv) SOAP – Simple Object Access Protocol is communication protocol to communicate between the services.

The consumer of the service before consuming the service, they need to evaluate the service. The evaluation of the service is possible only through the evaluation of service contract. The only document available to the consumer is service contract. The service capability and its performance are evaluated. Therefore the design of service contract is much important than the coding of service. The service contract may be either designed first before the web service is developed or after developing the web service the service contract may be created last. This paper is organized as follows: In section 2 Code First Web Services are discussed. In section 3 the Contract First Web Services and its advantages are discussed. Section 4 concludes the paper.

II. CODE FIRST WEB SERVICES

The code first – contract last web service is the common method of developing web service. In the code first - contract last web service, the application logic is implemented as web service and then at the end the service contract is developed. This type of development of services is easier to the people who are not familiar with the standards of web services [3]. Tools are available to create service contract for the developed web service.

A. Advantages of Code First Web Services

- Code First web services are simple and easy to use.
- Developing such web services are less time consumption.
- No need of depth knowledge of WSDL.
- This type of web services can be used to make web services out of legacy systems.

B. Disadvantages of Code First Web Services

- Changes in the service will affect the service contract.
- Implementation changes will change the contract which in will affect the clients.
- The performance of web service is affected by this method.
- Extension may be difficult.
- Since lacking of flexibility and extensibility, reusability is less.
- Service is for specific application. Therefore it does not cover wide range of consumers.

III. CONTRACT FIRST WEB SERVICES

In the contract first web services, the full attention is on designing of service contract. With Contract-First design approach, the service contract document is design and developed with WSDL and then the code is generated for the service. The contract-first approach is the right model to follow when building clients. On the client side usually all frameworks start by generating code from WSDL. Therefore the service contract should be clearly defined. It is easier to change a service contract than to change the clients that consume the service. At the same time we can easily impart the new technology in the implementation part without changing the service contract. Versioning is a common problem in the software development. What happens if there is any change in the service contract? When a web service contract changes, users of the contract will have to be instructed to obtain the new contract and potentially change their code to accommodate the changes

in the contract [4]. Therefore versioning is easier in this approach. With this approach already implemented service contracts can be revised without breaking backwards compatibility. In this approach it is easy to create reusable and extensible schemas [5]. The important of service orientation is standardization and decoupling of service contract of each service. The service oriented design should be the contract first design approach.

In the contract first design approach, first the data which are to exchanged should be defined with XSD. After defining the data the messages which are to used to exchange the data should be designed. In the third step the contract is defined with WSDL. Once the service interface is created the code for the service contract can be written (Figure – 1).

A. Advantages of Contract First Web Services

- Loose coupling between contract and implementation is possible in this approach.
- Possible to create reusable schema definition.
- Handling of versioning easily.
- Higher performance.
- Maintenance is easier.

The disadvantage of this method is it is complex than the code-first method. But many tools are available to generate source code from the WSDL. These tools, in the first step it aids in the design of data, messages and service interface contract description in an interoperable fashion. In the second step it generates code from the service interface description.

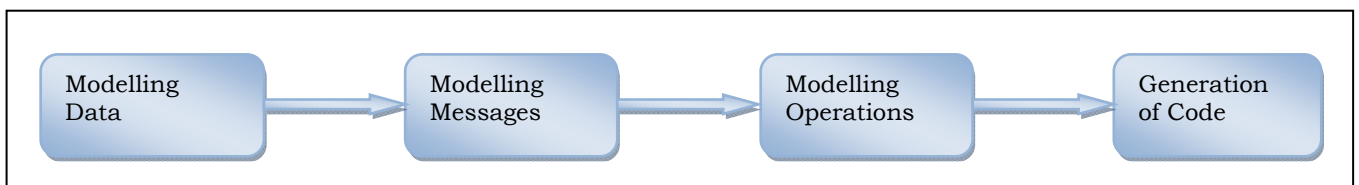


Fig. – 1 Steps in Implementation of Contract First Web Services

IV. CONCLUSIONS

In this paper we discussed about the two methods of service design namely Code-First and Contract-First methods. In both the approaches the service contract is designed using the same technology like SOAP and WSDL. But they differ in the way they have developed and implemented. With the advantages of high performance, easy maintenance and version handling the Contract-First design takes more advantages over the Code-First design approach.

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