

Policy Based Contract Generation and Cost-Based Optimization of Service Composition

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ABSTRACT: The web service framework provides an integrated platform by describing the interface by means of WSDL (Web Service Description Language), UDDI (Universal Discovery Description and Integration) for storing in the repository, SOAP (Simple Object Access Protocol) for communication. The web service contract presents a succinct description of service provision to the customer. The web service contract therefore protects the proper elements are in place to provide coherent support and delivery to the customer by service provider. The web policy is attached to the contract in such a way that quality of service requirements is met. The web service contract can be implemented by the technologies such as Web Service Level Agreement (WSLA) or WS-Agreement. In this project, the Agreement Based on the web service is the technique going to be used for creating Service Level Agreement (SLA).

General Terms: Web service, composition, SLA

I. INTRODUCTION:

The reality in IT enterprises is that infrastructure is heterogeneous across operating systems, system software and application infrastructure. An application business logic or individual functions are modularized and presented as services for consumer/client applications. Web services are used to achieve a platform neutral approach to access services in better interoperability.

The Service Oriented Architecture is highly distributed and has choices where the services can be positioned and deployed. Application developers can build applications by composing one or more services without knowing the services underlying implementations. The technology used in SOA is more diverse as it is comprised of the expanding web services platform. In SOA, the service provider, service broker or a service requester are the roles involved in the application. In SOA, services communicate with messages formally defined in XML Schema. SOA supports loose coupling and there by promotes reuse. For example a service can be implemented either in .Net or J2EE and the application consuming the service can be on a different platform or language.

Composition of Web services is generally done using Business Process Execution Language (BPEL). Business Process Execution Language (BPEL) is an OASIS standard executable language for specifying actions within business processes in web services. Process in BPEL export and import information by using web service exclusively. BPEL is an orchestration language that specifies an executable process that involves message exchanges with others systems.

The Web Service Level Agreement (WSLA) [1] is the technique used for creating the Service Level Agreement or also known as contracts. The Web Service Level Agreement defines assertions of service provider to perform a service according to agreed guarantees of IT level and business service such as response time and throughput. The Web Service Level Agreement is based on XML Schema. The WS-Policy represents a set of specifications that describe the capabilities and constraints of the security (and other business) policies on intermediaries and end points and how to associate policies with services and end points. The web service policy helps to specify the quality of service (QOS) requirements.

II. PROBLEM STATEMENT:

This report focuses on creation of Service Level Agreement (SLA) using Web Service Level Agreement (WSLA) technique for service oriented application. The web service contract is to be created between the service provider and the service consumer such that the consumer while accessing to the service has to undergo certain conditions. The policy is to be attached to the contract for specifying QOS requirements.

III. SCOPE AND LIMITATION:

The proposed system aims to generate an e-Contract for SOA application in which the web services are created and composed using Business Process Execution Language (BPEL).

Considering an e-Shopping application that the service provider provides. It consists of all the list of services

that the consumer can view. The service provider specifies a contract to the customer specifying conditions such as validity of the service, availability of the service etc. The customer can get access to the product if and only if he/she accepts to the terms and conditions of the service provided. The calendar period is specified in the contract in such a way that the offer is specified to the customer. The web service policy is used to specify the QOS requirements for the execution.

IV.WEB SERVICES:

The process of communications between two electronic devices over world. The consequence, thus resulting system suffer from agility issues. When you implement an SOA using Web services technologies, you can create a new way of build in applications.

The purpose of web service is to provide some functionality on behalf of its owner such as business or individual. The provider entity is the person or organization that provides an appropriate agent to implement a web service. The success of web service is to implement us a true SOA. A requestor entity is a person or organization that wishes to make use of provider entity's web service. It will use a requestor agent to exchange messages with provider entity's provider agent.

The web services are preferred because of the following reasons

1. Interoperability.
2. Take web applications to the next level.

V.SERVICE ORIENTED ARCHITECTURE:

Service-Oriented Architecture (SOA) stands for a standards-based and technology independent distributed computing paradigm and architectural style which is especially suited to meet the demands of today's dynamic business applications.

A deployed SOA-based architecture will provide a loosely-integrated suite of services that can be used within multiple business domains. The SOA community concentrates mainly on developing services.

The purpose of SOA is to allow easy cooperation of a large number of computers that are connected over a network. In Figure 2.1, the service provider publishes the service in the UDDI[2] registry by which it provides needs for finding the business process using the WSDL language. The requestor finds the service and communicates using SOAP [3] messaging service.

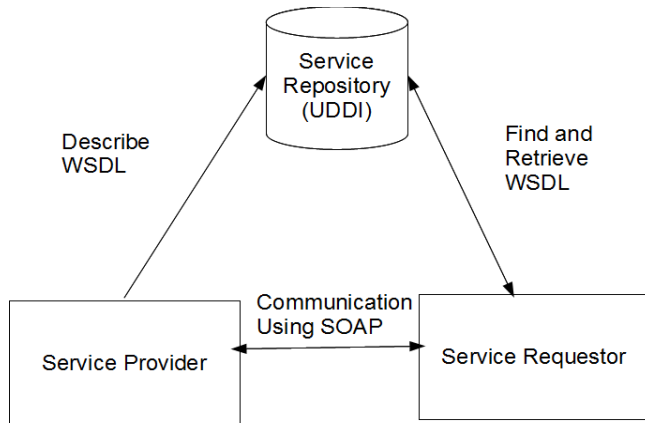


Figure 2.1: SOA Interaction Diagram.

VI.SERVICE LEVEL AGREEMENT (SLA):

The SLA[1] is a contract negotiated and agreed between a customer and a service provider. The SLA format should clearly describe a service. They present the level of performance of service. It defines ways by which the service parameters can be monitored. Penalties are to be paid by service provider when service requirements are not met.

VII.WEB SERVICE-POLICY(WSPOLICY):

Enable web services applications to specify the policies for their required application. The WS Policy specifies the set of information that allows the web services to advertise their policies based on the consumer requirements. The WS Policy assertion specifies the individual capability, preference and requirement. The WS Policy[3] attachment is specified in such a way that the policy expression associates with one or more objects. The policy expression is represented by means of an XML structure.

VIII.WEB SERVICE CONTRACT:

A web service contract[6] is a collection of metadata describing the operations regarding the information about what the service does, how and where the service has been accessed.

The aspects involved in the web service contract are:

1. The purpose and function of operations
2. The messages that needed to be exchanged
3. Data models used to define the structure of messages
4. Set of conditions under which the operations take place

IX. WEB SERVICE DESCRIPTION LANGUAGE (WSDL):

WSDL is used to describe about the functionalities offered by the web services. It is also used to locate the web services and it is written in XML. It specifies the location of the service and the operations the services expose. WSDL document can be thought of as a contract between a client and server. It describes what a web service can do, where it can be found and how to invoke it. WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document oriented or procedural information. The WSDL endpoint should not be confused with the general term endpoint used to reference the point of contact for a Web service. The Figure 2.2 describes the WSDL Structure

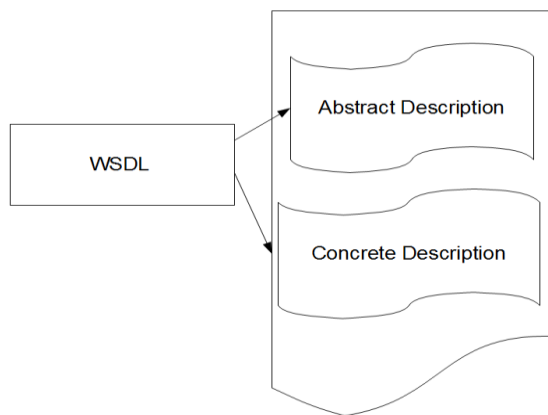


Figure 2.2: WSDL Structure.

WSDL is often used in combination with SOAP and XML Schemata to provide web services over the Internet. Each of these three service description documents can read the WSDL to determine what functions are available on the memory. A particular special data types used are merged in the WSDL file in the form of an XML Schema. SOAP can call the functions listed in the WSDL.

```
<!-- WSDL definition structure -->
<definitions
  name="MathService"
  targetNamespace="http://example.company.com/temp
  Service/">
```

```
<!-- abstract "interface" definitions -->
<types> ...
<message> ...
<portType> ...
```

```
<!-- concrete "implementation" definitions -->
<binding> ...
<service> ...
</definition>
```

Abstract Description:

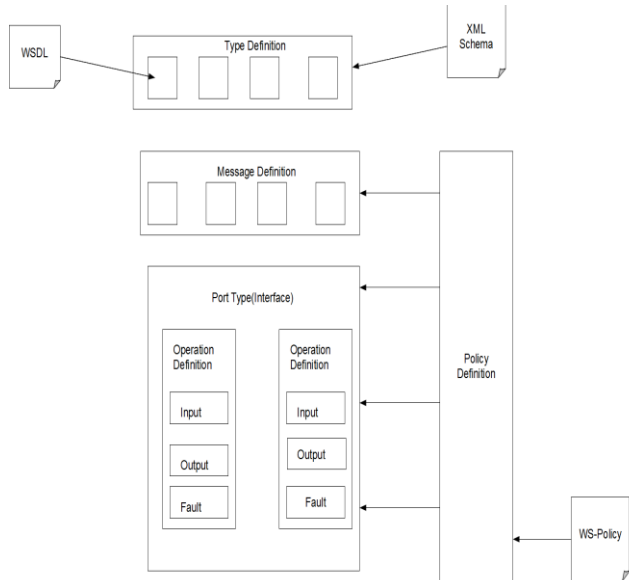


Figure 2.3: Abstract Description.

An abstract description establishes technical interface independent of implementation. It specifies what the service does. The Figure 2.3 explains the physical view of abstract description

The parts of abstract description are:

1. Port Type (Interface) Definition: It essentially represents the technical interface or access point.
2. Operation Definition: It defines the capabilities or the functions involved in the web service.
3. Message Definition: It defines how the data has to be transmitted.

The types of messages are:

1. Input Message: Message sent to web service by consumer.
2. Output Message: Message sent by web service to consumer.
3. Fault Message: Error notification sent by web service to consumer program.
4. Type Definition: The data needs to have a specified structure.
5. Policy Definition: It represents further behavioral characteristics and requirements of the service.

```

<types>
<schematargetNamespace="http://tempuri.org/
xsd"
xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:SOAPENC="http://schemas.xmlsoap.org/soap
/encoding/"
xmlns:wSDL="http://schemas.xmlsoap.org/wSDL/"
elementFormDefault="qualified">
</schema>
</types>
<message name="Simple.foo">
<part name="arg" type="xsd:int"/></message>
<portType name="SimplePortType">
<operation name="foo" parameterOrder="arg">
<input message="wSDLns:Simple.foo"/>
<output message="wSDLns:Simple.fooResponse"/>
</operation>
</portType>

```

Listing 2.1: Example of an abstract description

The listing 2.1 shows the abstract description where the type of a part element can be an XSD based type, a SOAP defined type, a WSDL defined type, or a types section defined type. The message elements comprise the messages part. If we carefully consider the process as functions, then a message element set the parameters to that function. There can be one or more portType elements in the portType section.

Because abstract portType definitions can be placed in a joined file, it can be done to have zero portType element in a WSDL file. A portType element defines one or more operations in operation element. This also allows for the design of highly adaptive business activities.

Concrete Description:

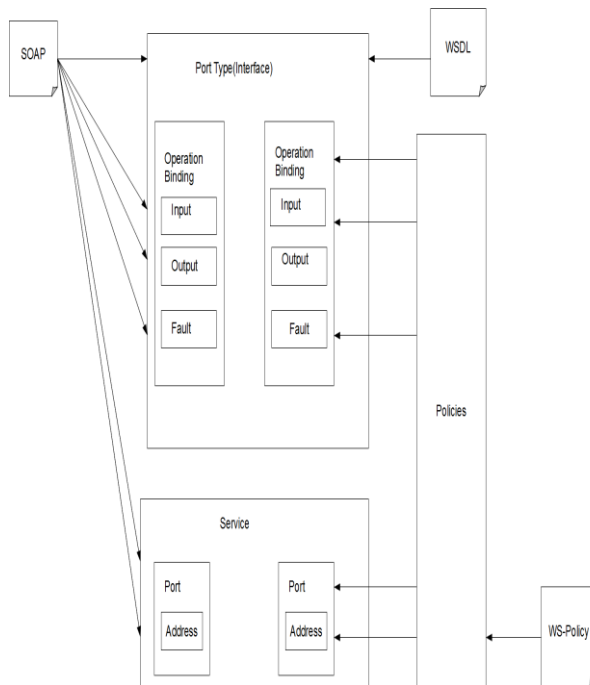


Figure 2.4: Concrete Description.

A concrete description specifies how and where the service has been accessed. It provides the implementation details. The Figure 2.4 explains the physical view of concrete description.

The parts of concrete description are:

1. Port Type(Interface) Binding: It details the communication technology that can be used by consumer programs to invoke and interact with web service.
2. Operation Binding: It specifies the operation involved in the webservice.
3. Message Binding: It specifies the input or output message.

The types of messages are :

1. Input Message: Message sent to web service by consumer.
2. Output Message: Message sent by web service to consumer.
3. Fault Message: Error notification sent by web service to consumer program.
4. Policy Definition: It represents configuration and runtime requirements of particular messaging or transport protocol.
5. Address Definition: It establishes the physical network address.

The Binding section can have one or more binding elements. Its aim is to state how each operation call and response is sent. A service that has received a context and has completed registration is considered. Each of which port elements refers to a binding element in the Binding section. Both the Bindings

and Services sections comprise the concrete descriptions of a WSDL document.

CONCLUSION:

A service can represent any range of logic from any types of services. It will minimize the cases of SLA against an agreement. Particular part of service scope should have the level of service defined. The contract may involve financial penalties and the right to terminate if SLAs metrics are consistently missed this is the way to prevent against an agreement, and they are utilized as one of the primary tools of outsourcing governance. In this paper, we have designed this difficult thing as a one-dimensional discrete optimization solution. Furthermore, we have used both, control and own algorithms. We have established these algorithms based on a manufacturing case study and have shown which types of algorithms are better suited for which scenarios.

The availability of repositories of Web service descriptions enables interesting forms of dynamic structured according to business motivations exposing a specified contract, i.e., contracts which are done for all future instances. We agree that the PREVENT adaptation model can be extended to this kind of SLOs and actions, we have to secure damage through new approaches and impact models are needed to this end.

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