# **An Enhanced Framework for Web Service**

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Abstract - A service-oriented architecture is actively used by many companies for the implementation of web-services both in the extranet and intranet environments. Web-services of SOA provides many facilities to the consumer over traditional methods or software. SOA based web service provides many facilities like reusability, reliability, compatibility and flexible deployment, which attracts the consumer's concentration. However, Many incidents have been reported in past decades. Security of SOA based web services is a concern. Also, the open use of SOA web service has an adverse impact on performance. Most of the web services use XML over HTTP protocol in any transaction so the use of traditional network firewalls is not sufficient to secure web services. Security, performance and reliability of SOA web service still needs an enhancement. The author(s) collected the incident information from several SOA web services consumers and tried to provide their solution in the proposed framework. This framework will be helpful in reducing many incidents and will improve security and reliability of the SOA web services.

Index Terms - Service-oriented architecture; web service; wsdl; xml; security; Framework.

### I. INTRODUCTION

Most of Web service uses XML as a language, but it can be written in any language. The web service is described in a document known as web service description language (WSDL). This file is used for validating incoming consumer request which helps in enforcing correct web service. All other requests whose descriptions are not present in WSDL will be discarded. Web service based on SOA is more reusable and trusted attract the attention of consumers. The SOA infrastructure allows the consumer to invoke the web service exposed by different providers. The basic service oriented architectural service are loosely coupled service which do not have a co-ordinating service to provide security features. The resources of the SOA service providers could require authentication and authorization. The loose coupling functionality of the service causes a problem of security, messaging, confidentiality and integrity. Since SOA relies on standard (mostly web service standard such as XML, SOAP, UDDI) do not emphasize security. Some protocol enables security within these standard such as SSL for HTTP and encryption for XML. An example is the firewall which is used as standard in most of the companies that controls the traffic from external organization to internal organization. In case of SOA based web service, HTTP and SSL are widely used which uses TCP port 80 and 443 that usually can pass through the firewall. Hence, additional security features are required for SOA based web service implementation to prevent possible threats. Web services are the preferred way to

realize SOA. Most of the SOA based web services are XML web services which communicate via internet protocol (HTTP) and send/receive data as an XML document. Each service requires a description language to describe the service offering and service requirements such type of descriptions used in SOA are called as a web service description language (WSDL). These files should be an open standard to have full compatibility with service consumers. SOA web service cannot be secured by using standard only, but it is needed to have SOA basic principles, confidentiality, integrity and availability.

security principle. such as authentication. Α authorization, auditibility and non-repudiation should be implemented to ensure end to end security for SOA based web service [2, 4]. Message level security should be provided to enhance better security which can be achieved using SOAP messages. SOAP based messages help in securing interaction in case of WSOA (web based SOA). Some techniques to secure messages which is being consumed from different SOA services.SOA based Web services are reusable, loosely coupled and follows distributed environments helps consumers to integrate different services of heterogeneous applications over the internet [3, 7]. As per industry standard, most of the web services rely on XML [1, 14]. All messages are validated as per defined set instructions :

- A data format (XML specification).
- A document that is used to validate the content (XML Schema).
- A language that describes a web service (WSDL)
- An envelope which is used to send the request and response (SOAP).
- A framework used for describing, publishing, and finding web services. (UDDI).

In this paper, The author(s) focus on enhancing existing web service framework using the latest technologies at different layers of web service protocol. The authors propose a model for enhancing security implementation which will helpful for SOA based web service. Also, the author(s) suggested to implement enhanced SSL model and implementation of global cache for SOA based web services. In section2, problem statement and related work have been described. Section 3 describes existing SOA based web services. Section 4 contains proposed model. It also includes comparison of existing Vs proposed models. At the last conclusion of the paper has been written in section 5.

#### II. PROBLEMS OF EXISTING SOA BASED WEBSERVICES

Service oriented architectural based web services are widely preferred by companies because of its functionalities buts it comes along with many concerns like security and performance issue [8]. SOA based web service has functionality like reusability, composibility, reliability. These functionalities cause more security attack on web service. To ensure end to end security, Message level security is also required [15,18]. To enhance the security for web service the author(s) proposes a combination of different techniques in a model using IBM data power as tool [12]. The proposed framework will be helpful in reducing security risk and increase the reliability and trust of the service.

#### III. SOA BASED WEB SERVICES

Web services using SOA can be implemented using different technologies like Service Component Architecture (SCA), CORBA, Enterprise JavaBeans (EJB) etc [16]. Different interface can be designed with the use of different technology [9,10]. Web service implementation using SOA makes the Web Service reusabale, robust, composable which attracts the concentration of consumer [11,17]. It is comparisonally better than other architecture to meet the business requirements.

SOA based web service simplifies the web integration. It acts as a universal connector between existing systems and data. SOA based web service can be defined as:

Web Services = transport protocol (such as HTTP)+ XML.

3. 1 Introduction to web service

A web service is a program which communicates over a network using the internet protocol like XML, WSDL, SOAP and UDDI [13]. XML (Extensible Markup Language) is used as the data format. WSDL (Web Services Description Language) is used to describe service and helps in validating the incoming message. SOAP (Simple Object Access Protocol) is used as messaging protocol, UDDI (Universal Description, Discovery, and Integration) provides a list of all available web services.

Layers of web service protocol

The Layers or the components of web services are as below in figure 1:

- Transport Protocol
- XML Layer
- WSDL Layer
- UDDI Layer

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	UDDI Layer
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	XML Layer
	Transport Layer
	Figure 1: Layers of web service protocol

The build of Web Service using SOA started in 2000. The first version web service composed of SOAP, messaging, WSDL 1.1 and UDDI a service registry [20]. It is divided into three components: Service Broker, Service Requester and Service Provider as shown in figure 2:



Figure 2: Web Service Architecture

Different software is used by different organizations to exchange the data over the network using internet protocol. The Web service is a method to establish the communication to exchange the data [5]. The software that request the data is called service requester whereas a system that would provide the data and process the request and is called service provider. The service broker provides service interface and implementation access information to the service requester. It is also known a service registry [6]. Service requester, Service provider and UDDI are the components of Web Service Architecture. The service provider sends a WSDL file to UDDI. Service providers use to share the information about the service in a file called WSDL to UDDI. Service requester has to contact UDDI for service information. The request is validated by a service provider, and shares the information as requested by a service requester using SOAP protocol.

### Characteristics of the SOA Based Web service

The service-oriented architectural based web service has many properties that attract the attention of consumers.

Web services are self-describing, self-contained and can be located, published and invoked across the Internet. It is language-independent, dynamic, composable, loosely coupled and interoperable [8]. Web services inherently open and standard-based. Also provide the ability to wrap existing applications.

#### Overview of Web Service Security

SOA based web service provides flexibility, reusability, loose coupling, open access and interoperability, which are the prime factors for customer to choose SOA web services. But these facility come along with security concerns[19]. Most of the SOA based web service is implemented using below security majors:

- Authentication It is a process to verify the identity of the user. It validates the credentials provided by users.
- Authorization It is processed for proving access to the valid user who has been authenticated successfully.
- Confidentiality restriction on certain information implemented through a set of rules.
- Integrity and non-repudiation It is a process to ensure the message is unaltered during transit.

The Web services have security concerns. SOA based web service is mostly attacked due to its functionality which reduces the trust and reliability of the service. The author(s) analyzed the issue might be sorted by enhancing the security for SOA based web services.

Security must be included as part of requirement of web service development. The web service should include transport level security to protect communication channel. Also, Message level security should be enhanced to ensure end to end security for web services. We should also include various security implementations like integrity using digital signatures, authentication by requiring username, X.509, or SAML tokens as part of security required to enhance web service security [21].

IV. ENHANCED FRAMEWORK FOR SOA BASED WEBSERVICES

Existing Web service Architecture

The Web Service has many issues since it was introduced. The Existing Web Service has interoperability issue which can be resolved if we use SOA for the creation of web service. Many IT organizations like IBM, Microsoft, and other significant IT companies provided their solution to implement the web service [5]. SOA and Web Service are one of the best combination which provides a better solution of existing issues to the customer. Existing Web services has many layers like transport, messaging, Description, QoS and UDDI, which helps in the Web service implementation. However, the author(s) identified some of the area like security and performance where enhancement is required in existing web service architecture which will improve the reliability of developed web service using service oriented architecture [15]. Existing Web Service architecture has been shown in figure 3 as below:



Figure 3 : Web Service Architecture

## Enhanced Web Service Architecture

The author(s) proposes a model which includes implementation of enhanced SSL model and Global Cache as shown in figure 4:



Figure 4: Enhanced Web Service Architecture

Implementation of Enhanced SSL

The proposed SSL model has the same functionality as an existing SSL model, but it authenticate the user before the processing of transactions which helps in reducing the security attacks.

Implementation of Global Cache

Global cache will be helpful in saving required the credentials which can be used in next transactions. This implementation will improve the performance of the existing wen services.

Comparison of Existing Model Vs Proposed Model

The author(s) implemented the proposed model in some of the selected projects and found increase in service performance and reduction in security incidents as shown in table 1 and figure 5:

Properties	Existing Model	Proposed Model
Security enhancement in percentage	60	75
Reliability enhancement in percentage	62	79
Performance enhancement in percentage	78	88

Table1 : Comparison of Existing Model Vs Proposed Model



Figure 5: Comparison of Existing Model Vs Proposed Model

## IV. CONCLUSIONS

SOA based web service has many concerns. The decision of choosing an appropriate architecture and tool will be helpful in reducing attacks on web service. The author(s) propses an enhanced SSL and their implementation along with implementation of global cache. This enhancement in web service architecture will help in reducing security indents and will also helpful in improving service performance. This architecture will increase service reliability and trust.

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