Oracle Service Architecture Leveraging Tuxedo

Product Overview

12*c* Release 1 (12.1.1)

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Oracle Service Architecture Leveraging Tuxedo (SALT) Product Overview, 12*c* Release 1 (12.1.1)

Oracle Service Architecture Leveraging Tuxedo Overview

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The following sections provide an overview to the Oracle Service Architecture Leveraging Tuxedo (SALT) product:

- Understanding Oracle Service Architecture Leveraging Tuxedo
- Oracle SALT Release History
- Oracle Service Architecture Leveraging Tuxedo Components
- Oracle SALT Use Cases
- Configuring Web Services with Oracle Service Architecture Leveraging Tuxedo
- Oracle Service Architecture Leveraging Tuxedo Supported Standards
- What’s Next?

Understanding Oracle Service Architecture Leveraging Tuxedo

Service Architecture Leveraging Tuxedo (SALT) is an add-on product option for Oracle Tuxedo, enabling Oracle Tuxedo applications to participate in SOA environments.

SALT allows external Web services applications to invoke Oracle Tuxedo services as Web services, and Oracle Tuxedo applications to invoke external Web services. SALT does not require any coding to achieve this.

Understanding Oracle Service Architecture Leveraging Tuxedo Web Services

SALT complies with standard Web service specifications (SOAP 1.1, SOAP 1.2, and WSDL 1.1), allowing SALT to interoperate with other Web service products and SALT Overview development toolkits. Oracle Tuxedo applications can easily integrate with Web services applications using SALT.

What Are Web Services?

Web services are a set of functions packaged into a single entity made available to other systems on a network. They can be shared and used as a component of distributed Web-based applications. The network can be a corporate intranet or the Internet. Other systems, such as customer relationship management (CRM) systems, order-processing systems, and other existing back-end applications, can call these functions to request data or perform an operation. Because Web services rely on standard technologies which most systems provide, they are an excellent means for connecting distributed systems together.

The software industry has evolved toward loosely coupled service-oriented applications that interact dynamically over the Web. The applications break down the larger software system into smaller modular components, or shared services. These services can reside on different computers and can be implemented by vastly different technologies. They are packaged and made accessible using standard Web protocols, such as XML and HTTP.

Web services share the following properties that make them easily accessible from heterogeneous environments:

- Web services are accessed using widely supported Web protocols such as HTTP.
- Web services describe themselves using an XML-based description language.

Web services communicate with clients (both end-user applications or other Web services) through simple XML messages that can be produced or parsed by virtually any programming environment or manually, if necessary.

Why Use Oracle Service Architecture Leveraging Tuxedo?

SALT is a native Oracle Tuxedo Web service integration solution. It reduces Oracle Tuxedo/Web service integration costs and decreases conversion processes that may exist with other solutions for accessing Oracle Tuxedo services. It enables seamless connectivity between Oracle Tuxedo applications and external Web service applications.

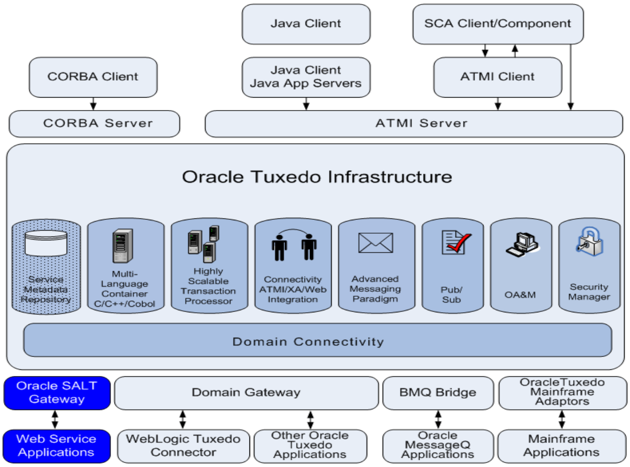
SALT allows existing Oracle Tuxedo services (inbound) to be easily exposed as Web services without additional programming tasks. It also allows you to create native Oracle Tuxedo applications that access external Web services (outbound) transparently.

Major Web services benefits include:

- Interoperability among distributed applications that span diverse hardware and software platforms
- Easy, widespread access to applications using Web protocols
- A cross-platform, cross-language data model (XML) that facilitates developing heterogeneous distributed applications

Figure 1 illustrates how the SALT gateway is used in the Oracle Tuxedo framework.

Figure 1 SALT Gateway/Oracle Tuxedo Infrastructure


Java Client
SCA Client/Component
CORBA Client
Java Client
Java App Servers
ATMI Client
CORBA Server
ATMI Server
Oracle Tuxedo Infrastructure
Service Metadata Repository
Multi-Language Container C/C++/Cobol
Highly Scalable Transaction Processor
Connectivity ATMI/XA/Web Integration
Advanced Messaging Paradigm
Pub/ Sub
OA&M
Security Manager
Domain Connectivity
Oracle SALT Gateway
Domain Gateway
BMQ Bridge
OracleTuxedo Mainframe Adaptors
Web Service Applications
WebLogic Tuxedo Connector
Other Oracle Tuxedo Applications
Oracle MessageQ Applications
Mainframe Applications

Oracle Service Architecture Leveraging Tuxedo Release History

SALT is the latest add-on to the Oracle Tuxedo product family. Developed in 2006, SALT is designed to provide a seamless Oracle Tuxedo solution of integrating Oracle Tuxedo applications and standard Web services application.

- Release 1.1

- Release 2.0
- Release 10g R3 (10.3)
- Release 11g R1 (11.1.1.1.0)
- Release 11g R1 (11.1.1.2.0)
- Release 11g R1 (11.1.1.2.2)
- Release 12c R1 (12.1.1)

Release 1.1

Release 1.1 is the initial SALT release. Made available in 2006, SALT 1.1 introduced the following major features:

- Inbound Service Support
  Permits Web service applications to invoke native Oracle Tuxedo services
- HTTP and HTTP over SSL Transport Support
- Asynchronous and Reliable Messaging Support

Release 2.0

The SALT 2.0 release incorporates significant enhancements based on the SALT 1.1 release. SALT 2.0 introduced the following features:

- Outbound Service Support
- Extended WS-* Standards Support
- SOAP Message Transmission Optimization Mechanism Support (MTOM)
- Oracle Tuxedo TPFAIL Support for Web Services
- Extensible Data Type Mapping and Message Conversion
- Multiple Encoding Support
- Configuration-Driven Deployment
- Leveraging the Oracle Tuxedo Service Metadata Repository
- Data Type Mapping and Message Conversion

- Asynchronous and Reliable Messaging
- Web Service Security Support

Release 10*g* R3 (10.3)

SALT 10*g* Release 3 (10.3) introduced the following features:

- Service Component Architecture (SCA) Programming

  SCA provides a new programming model that aims at simplifying component re-use and seamless communications between components. The SALT 10*g* Release 3 (10.3) SCA container enables new programming model and leverages the most valued Oracle Tuxedo features (such as reliability, availability, scalability, and performance). SALT 10*g* Release 3 (10.3) introduces the following SCA features:

  - Client-side binding for SCA invocations over ATMI and SOAP
  - Server-side binding for serving SCA requests made over ATMI and SOAP
  - Client-side binding for SCA invocations from Java environments
  - Development and runtime tools: Commands to build and deploy SCA clients and servers as well as commands for runtime administration. For more information, see the Oracle Service Architecture Leveraging Tuxedo 10*g* Release 3 (10.3) Command Reference Guide.
  - Authentication and authorization for SCA services
  - Global transactions
  - Thread-safe SCA/SDO clients and servers
  - SCDL schema validation
  - Support for simple data types
  - Support for complex data types using SDO
  - Automatic data transformation to/from Oracle Tuxedo buffer types
  - Support for multi-byte characters using multiple encoding

- Service Contract Discovery

  Automatically discover service contract information at run time. The generated information can be put into metadata repository automatically or to a file which can then be loaded manually into the metadata repository using the `tmloadrepos` utility. For more information, see Configuring an Oracle Service Architecture Leveraging Tuxedo Application in the *Oracle Service Architecture Leveraging Tuxedo Administration Guide*.

- Access Log for All Incoming Requests

  Assists Oracle Tuxedo client administrators to monitor application validity at runtime. You can record application high water client count, current client count, and named users.

Release 11*g* R1 (11.1.1.1.0)

SALT Release 11g R1 (11.1.1.1.0) introduced the following features:

- Python and Ruby Support

  Python and Ruby support in SALT SCA provides a simple SCA client API for each language to perform SCA calls from Python or Ruby client programs, and an SCAHOST system server to allow access to Python or Ruby components. Python, Ruby or C++ components can now call or be called to/from other Python, Ruby or C++ components.

  For more information, see *Oracle Service Architecture Leveraging Tuxedo SCA Programming* in the Oracle Service Architecture Leveraging Tuxedo Programming guide.

- SCA Structure support

  Provides additional C++ structure functionality for improved performance.

  For more information, see *Oracle Service Architecture Leveraging Tuxedo SCA Programming* in the Oracle Service Architecture Leveraging Tuxedo Programming guide.

- Scatuxgen Metadata Generation Tool

  The Scatuxgen Metadata Generation Tool parses C++ interfaces as used to develop SCA components for the SCA runtime functionality introduced in SALT 10gR3. It generates Oracle Tuxedo metadata repository interface data, and optionally a Web Services Definition File (WSDF) document.

  For more information, see the Oracle Service Architecture Leveraging Tuxedo Command Reference Guide.

- WS-TX Support

  Provides bi-directional transactional interoperability between Web Services and Oracle Tuxedo applications. Applications transparently make use of the GWWS system server transactional capabilities.

Outbound XA transactions are transparently propagated outside of an Oracle Tuxedo domain and mapped one-to-one to WS-TX transactions. Inbound WS-TX transactions are propagated into an Oracle Tuxedo domain and mapped to XA transactions.

For more information see, *WS_TX Support* in Oracle Service Architecture Leveraging Tuxedo Interoperability.

Release 11*g* R1 (11.1.1.2.0)

SALT 11*g* Release 11g R1 (11.1.1.2.0) introduced the following features:

- SOCKS Proxy Support

  SOCKS proxy support provides a configurable element associated to outbound endpoints and allows configuring a SOCKS server address that will proxy outbound connections according to the SOCKS V4 and V5 protocol.

  Inbound support is not be necessary as SOCKS proxies incoming connections without listening endpoints being aware of it. For more information, see the Oracle Service Architecture Leveraging Tuxedo Deployment File Reference in the Oracle Service Architecture Leveraging Tuxedo Reference Guide.

  The `wsdlcvt` command is enhanced to connect to a SOCKS proxy server. For more information, see the Oracle Service Architecture Leveraging Tuxedo Command Reference in the Oracle Service Architecture Leveraging Tuxedo Reference Guide.

Release 11*g* R1 (11.1.1.2.2)

SALT 11*g* Release 11g R1 (11.1.1.2.2) introduces the following features:

- Apache 2 Web Server Plug-in Support

  Web Server plug-ins in Apache 2 format, for interfacing Apache HTTP server 2, Oracle HTTP Server or iPlanet Server and Oracle Tuxedo-based web applications.

- Web Gateway Interface Support

  Support of a Web Gateway Interface in order to develop Oracle Tuxedo services that generate dynamic HTML pages.

- PHP, Python and Ruby Web Scripts Support
  - PHP scripts supported directly
  - Python scripts supported via WSGI
  - Ruby scripts supported via Rack

  - PHP, Python and Ruby applications using most web frameworks such as Zend framework, Symfony, Django or Rails run as-is in an Oracle Tuxedo environment.

- PHP SCA Script Support

  Support for PHP scripts as SCA client and SCA components, for SOA integration.

For more information, see the Oracle Service Architecture Leveraging Tuxedo Administration Guide.

Release 12*c* R1 (12.1.1)

SALT 12*c* Release 12c R1 (12.1.1) introduces the following features:

- Web Services Configuration Tool

  SALT 12c provides an HTTP-based configuration tool to expose existing Oracle Tuxedo services as Web services without manually editing configuration files. It allows you to learn service definitions for existing Oracle Tuxedo services, edit service definitions in metadata repository, and create Web services definitions and SALTDEPLOY files through an easy to use graphical user interface.

  For more information, see Enabling the SALT Configuration Tool in the Oracle Service Architecture Leveraging Tuxedo Configuration Guide.

- Security Assertion Markup Language (SAML) Single Sign-On (SSO) Support

  Provides the ability to recognize an SAML token inside a SOAP message request received by the SALT Web Services Gateway (GWWS). Based on the token contents, GWWS makes the decision to grant or deny access to Oracle Tuxedo resources.

  For more information, see Configuring Oracle Tuxedo Web Services/Configuring Security Features in the Oracle Service Architecture Leveraging Tuxedo Configuration Guide.

- New Data Type Support

  Supports nested View32 data types. It also supports mapping of additional View and View32 primitive types to and from XML.

  For more information, see Data Type Mapping and Message Conversion in the Oracle Service Architecture Leveraging Tuxedo Programming Guide.

Note: SALT Python, Ruby, and SCA features are now part of Oracle Tuxedo 12c Release 1 (12.1.1). For more information, see Oracle Tuxedo 12c Release (12.1.1) documentation.

Oracle Service Architecture Leveraging Tuxedo Components

SALT consists of the following major components:

- Oracle SALT Gateway (GWWS)
- WSDL Assistant Utilities

Oracle Service Architecture Leveraging Tuxedo Gateway (GWWS)

The SALT provided Oracle Tuxedo system server (GWWS), connects with other Web service applications via SOAP over HTTP/S protocol. The GWWS server acts as an Oracle Tuxedo gateway process and is managed in the same manner as general Oracle Tuxedo system servers. Each GWWS server has bi-directional (inbound/outbound) capability. The GWWS server:

- accepts SOAP requests from Web service applications and issue Oracle Tuxedo native calls to Oracle Tuxedo services.
- accepts Oracle Tuxedo ATMI requests and issues SOAP calls to Web Service applications.

You can have multiple GWWS instances in one Oracle Tuxedo domain. The same functionality for multiple GWWS instances is provided by specifying the same SALT configuration to improve throughput and failover protection. You can also group multiple GWWS instances in different configuration files for different purposes.

When the GWWS server boots, it loads the specified SALT configuration file and Oracle Tuxedo service contract information from the Oracle Tuxedo Service Metadata Repository.

The GWWS server also acts as a simple HTTP Web server for WSDL document and XML Schema file download.

WSDL Assistant Utilities

The Web Services Description Language (WSDL) is an XML-based specification that describes a Web service. A WSDL document describes Web service operations, input and output parameters, and how a client application connects to the Web service. SALT provides two utilities (`tmwsdlgen` and `wsdlcvt`) to map Oracle Tuxedo applications and Web Service WSDL descriptions.

WSDL Generator from Oracle Tuxedo Definitions

When using SALT to publish Oracle Tuxedo services as Web services, you do not need to compose a WSDL document manually; it is automatically generated as part of the SALT Web service development process. The generated WSDL document can be integrated using Web service development tools, or can be published to a UDDI server.

There are two ways to obtain a WSDL document:

- Use `tmwsdlgen` (the WSDL document file generating utility).
- Download the GWWS server generated WSDL document via HTTP(S).

WSDL Convertor to Oracle Tuxedo Definitions

To support external Web Service applications, external WSDL documents need to be converted. The SALT conversion utility, `wsdlcvt`, converts external WSDL documents to Oracle Tuxedo specific definition files (SALT Web Service Definition file, Oracle Tuxedo Service Metadata Repository Definition file and FML32 Field Table Definition file).

The SALT Web Service Definition file can be imported into a SALT Deployment file and utilized by a particular GWWS server. The Oracle Tuxedo Service Metadata Repository Definition file and FML32 Field Table Definition file provide service interface descriptions for Oracle Tuxedo client programming.

Oracle Service Architecture Leveraging Tuxedo Use Cases

The following sections describe the most common SALT Web services use cases:

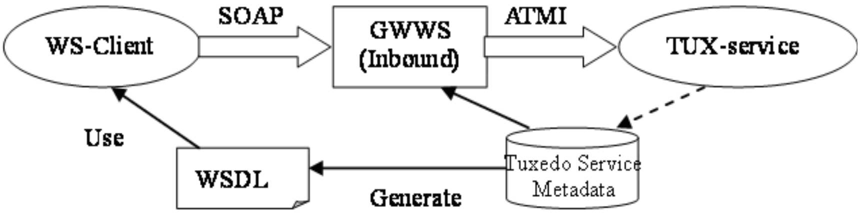
- Use Case 1: Exposing Native Oracle Tuxedo Services as Web Services
- Use Case 2: Invoking Web Services from Oracle Tuxedo Applications
- Use Case 3: Connecting Oracle Tuxedo Domains Using SOAP Protocol
- Use Case 4: SAML Single Sign-On

Use Case 1: Exposing Native Oracle Tuxedo Services as Web Services

Native Oracle Tuxedo services can be exposed as Web services using standard Web service SOAP protocol. The GWWS server accepts SOAP requests through HTTP/S and then converts them into Oracle Tuxedo ATMI calls. SALT generates a WSDL document that describes the open standard Web service interfaces for Oracle Tuxedo services.The Oracle Tuxedo Service Metadata Repository is used to define Oracle Tuxedo service contract information. This is an “inbound” use case.

Figure 2 illustrates a generic inbound Web service call.

Figure 2 Exposing Oracle Tuxedo Services as Web Services (Inbound)



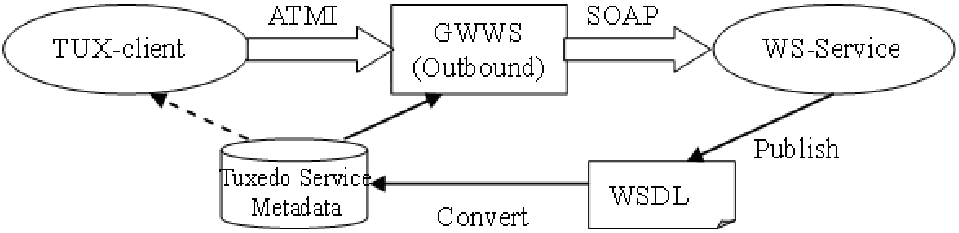
Use Case 2: Invoking Web Services from Oracle Tuxedo Applications

Web service applications can be imported into an Oracle Tuxedo domain, advertised as Oracle Tuxedo services through the GWWS server, and invoked from Oracle Tuxedo applications. SALT converts and maps each `wsdl:operation` as a particular Oracle Tuxedo service. The GWWS server advertises the mapped services (called SALT proxy services), and accepts Oracle Tuxedo ATMI requests from Oracle Tuxedo applications.

The Oracle Tuxedo Service Metadata Repository is used to store converted Oracle Tuxedo service contract information and helps Oracle Tuxedo programmers understand what type of Oracle Tuxedo buffers are expected for the imported SALT proxy services. This is an “outbound” use case.

Figure 3 illustrates a generic outbound Web service call.

Figure 3 Invoking Web Services from Oracle Tuxedo Applications (Outbound)



Use Case 3: Connecting Oracle Tuxedo Domains Using SOAP Protocol

SALT also allows you to connect two *different* Oracle Tuxedo domains using GWWS servers as an alternative to using /T domain. The GWWS server in the calling domain works in an outbound direction, the GWWS server in the receiving domain works in an inbound direction.

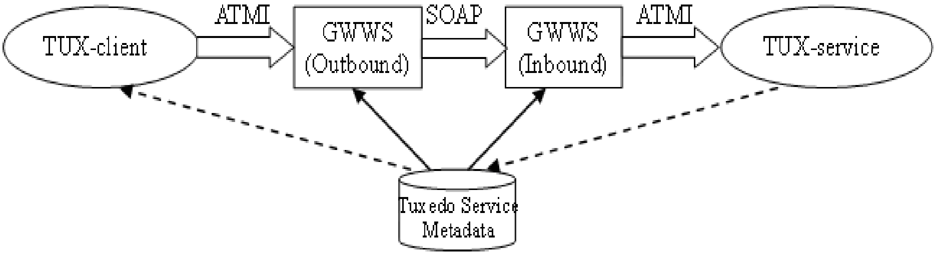
The receiving Oracle Tuxedo domain must propagate the Oracle Tuxedo service definition to the calling Oracle Tuxedo domain. This means that the calling domain Oracle Tuxedo Service Metadata Repository must contain the Oracle Tuxedo service definition file that runs in the receiving domain.

Note: This should be set up *manually*. The Oracle Tuxedo Service Metadata Repository infrastructure does not currently provide automatic propagation between Oracle Tuxedo domains.

The WSDL document is not required. SALT provides simple configurations to allow two GWWS servers to work together for domain connectivity using SOAP protocol without needing to exchange WSDL documents.

Figure 4 illustrates how to use SALT to connect two domains.

Figure 4 Connecting Two Oracle Tuxedo Domains with SOAP protocol



Two GWWS servers should not be used to create connections within the *same* Oracle Tuxedo domain, see Figure 5. Also, a single GWWS server cannot connect to itself, see Figure 6.

In either scenario, the GWWS server advertises the same Oracle Tuxedo services which are already advertised by other application servers. This might result in *dead-loop* service dispatching.

WARNING: It is strongly advised that you carefully plan and configure your SALT application to avoid these scenarios.

Figure 5 Two GWWS Servers Making a Connection Within the Same Oracle Tuxedo Domain

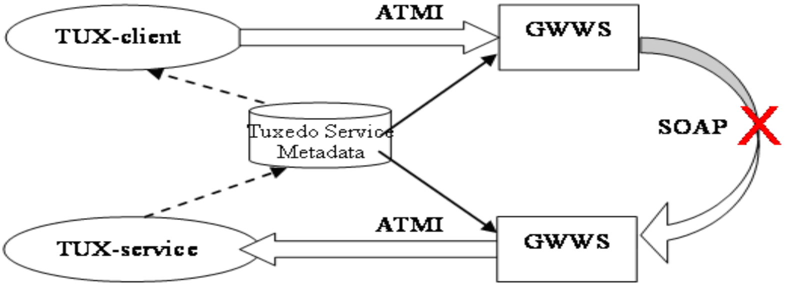
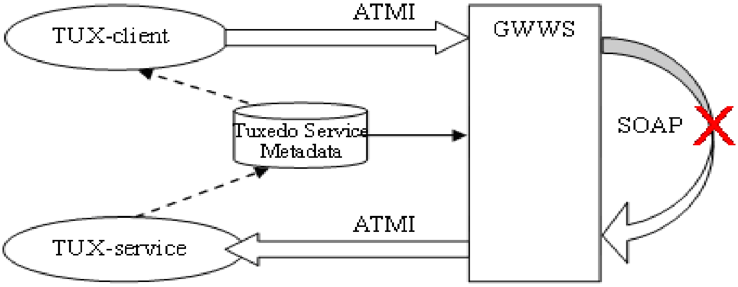


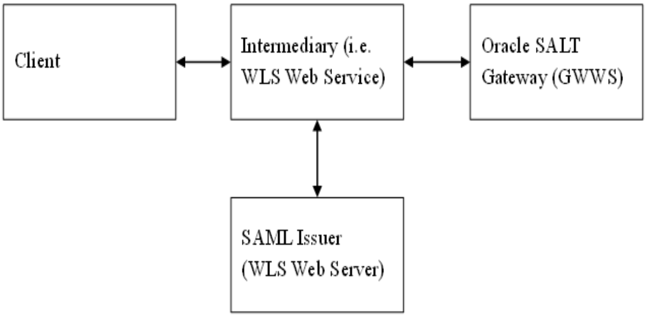
Figure 6 Single GWWS Server Making a Connection to Itself



Use Case 4: SAML Single Sign-On

The Web Service client user agent, usually a web browser, attaches a Security token with valid SAML assertions to a SOAP message using WSS: SOAP Message Security by placing assertion elements inside a `<wsse:Security>` header and sending the request to GWWSas shown in Figure 7

Figure 7 SAML Single Sign-On



SALT will not accept these assertions unless it has successfully validated the integrity of the assertions. The only supported subject confirmation method is currently sender-vouches, in this case SALT must also have TRUST relationship with the attesting entity. When all these requirements are satisfied, the user is granted access to Oracle Tuxedo resources.

An Oracle WebLogic Server instance security can be a SAML issuer. In a WLS environment the typical intermediary is Web Service, but a web browser can also be an intermediary. To establish a TRUST relationship with an attesting entity, GWWS must have access to either a shared secret with attesting entity or its public key.

The SAML issuer is the party creating the SAML assertion, and "intermediary" is the party that attaches the SAML security token to the SOAP message before it is forwarded to GWWS.

The general flow is as follows:

1. Client sends request to WLS.
2. WLS authenticates the client.
3. WLS forwards all necessary login information to the issuer (WLS Web Server).
4. WLS Web Server issuer creates the SAML assertions and returns to WLS.
5. WLS attaches the SAML security token with SAML assertion to the SOAP message and forwards it to GWWS.
6. GWWS returns the reply/fault to WLS.
7. WLS returns the reply/fault to client.

There is a trust relationship between GWWS and WLS/issuer.

Configuring Web Services with Oracle Service Architecture Leveraging Tuxedo

The following steps are used typically when you configure Web services using SALT:

1. Configure Inbound Oracle Tuxedo Services
   a. Define Oracle Tuxedo application services using the Oracle Tuxedo Service Metadata Repository.
   b. Compose one or more SALT Web Service Definition Files (WSDF).
2. Configure Outbound Web Services
   a. Convert an external WSDL document into Oracle Tuxedo the following components: SALT Web Service Definition file, Oracle Tuxedo Service Metadata Repository Definition file, and FML32 Field Table Definition file.

   b. Resolve potential naming conflicts for the auto-generated service names and FML32 field names.

3. Load all Oracle Tuxedo Service Definitions into the Oracle Tuxedo Service Metadata Repository using `tmloadrepos`.
4. Compose the SALT Deployment File for both inbound and outbound services.
5. Add the `TMMETADATA` and `GWWS` servers to your Oracle Tuxedo `UBBCONFIG` file.
6. Boot the Oracle Tuxedo application.

Invoking Oracle Tuxedo Services Using Web Service Client Toolkits

1. Client end user downloads the WSDL document file from the GWWS server.
2. Client end user generates client-side stubcode from the WSDL document file with a SOAP development kit.
3. Generate client-side program.
4. Run the client to invoke the Web service with SOAP messages.

Invoking Web Services Using Oracle Tuxedo Programming Interfaces

1. Create an Oracle Tuxedo client/server program according to the generated Oracle Tuxedo Service Metadata Definition file. The client program can be written in any Oracle Tuxedo supported client-side programming language (C/C++, Java, COBOL, .NET, and so on).
2. Compile and deploy the Oracle Tuxedo client/server program.
3. Run the Oracle Tuxedo application to invoke the external Web service applications.

Oracle Service Architecture Leveraging Tuxedo Supported Standards

SALT support the following standards:

- SOAP Standards
- Single Sign-On Standards

SOAP Standards

- Standards for transmitting data and Web service invocation calls between the Web service and the user of the Web service.
  - SOAP 1.1

    For more information, see:
    http://www.w3.org/TR/2000/NOTE-SOAP-20000508/
  - SOAP 1.2

    For more information, see:
    http://www.w3.org/TR/soap12-part0/
  - SOAP with Attachment

    For more information, see:
    http://www.w3.org/TR/SOAP-attachments
  - MTOM

    For more information, see:
    http://www.w3.org/TR/soap12-mtom/
- A standard for client applications to find a registered Web service and to register a Web service.
  - UDDI 2.0

    For more information, see:
    http://uddi.org/pubs/ProgrammersAPI-V2.04-Published-20020719.htm
- Standards for describing the Web service to clients so they can invoke it.
  - WSDL 1.1

    For more information, see:
    http://www.w3.org/TR/2001/NOTE-wsdl-20010315
  - WS-Policy

    For more information, see:
    http://specs.xmlsoap.org/ws/2004/09/policy/ws-policy.pdf

    http://specs.xmlsoap.org/ws/2004/09/policy/ws-policyattachment.pdf
- Standards for Web Service infrastructure.
  - WS-Addressing

    For more information, see:
    http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810/

  - WS-ReliableMessaging

    For more information, see:
    http://specs.xmlsoap.org/ws/2005/02/rm/ws-reliablemessaging.pdf

    http://specs.xmlsoap.org/ws/2005/02/rm/WS-RMPolicy.pdf

- Standards for Web Service Security.
  - WS-Security 1.0

    For more information, see:

    http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf
    http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0.pdf
    http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-x509-token-profile-1.0.pdf

  - WS-Security 1.1

    For more information, see:

    http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf
    http://www.oasis-open.org/committees/download.php/16782/wss-v1.1-spec-os-UsernameTokenProfile.pdf
    http://www.oasis-open.org/committees/download.php/16785/wss-v1.1-spec-os-x509TokenProfile.pdf

- Standards for Web Service Transactions.
  - WS-Coordination 1.0

    For more information, see:

    http://schemas.xmlsoap.org/ws/2004/10/wscoor/

  - WS-AtomicTransaction 1.0

    For more information, see:

    http://schemas.xmlsoap.org/ws/2004/10/wsat/

Single Sign-On Standards

- Single Sign-On Standards
  - SAML 1.1

    For more information, see: http://www.oasis-open.org/standards#samlv1.1.
  - SAML 2.0

    For more information, see: http://www.oasis-open.org/standards#samlv2.0.

What's Next?

After becoming familiar with the SALT Product Overview, refer to the following topics for installing, configuring, and running Web services using the SALT product:

- Install the SALT product.

  For an explanation of how to install the product, refer to the *Oracle Service Architecture Leveraging Tuxedo Installation Guide*.

- Configure and administer the SALT product.

  For an explanation of how to configure and administer the product, refer to the *Oracle Service Architecture Leveraging Tuxedo Administration Guide*.

- Program Web Services using the SALT.

  For an explanation of how to program with SALT, refer to the *Oracle Service Architecture Leveraging Tuxedo Programming Guide*.

- SALT Web service samples

  For SALT Web service application samples, refer to the *Oracle Service Architecture Leveraging Tuxedo Sample Guide.*