Service Architecture Leveraging Tuxedo (SALT)

Administration Guide

12*c* Release 2 (12.1.3)

April 2014

ORACLE

Oracle Service Architecture Leveraging Tuxedo (SALT) Administration Guide, 12*c* Release 2 (12.1.3)

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CHAPTER 1

SALT Administration Overview

This chapter contains the following topics:

Administering SALT

This section explains the following basic concepts for administering SALT:

Oracle Tuxedo Service Metadata Repository

The Oracle Tuxedo Service Metadata Repository was developed to facilitate saving and retrieving Oracle Tuxedo service metadata. Oracle Tuxedo service metadata is a collection of Oracle Tuxedo service attributes that are especially useful in describing the request/response details of an Oracle Tuxedo service. The SALT gateway server (`GWWS`), relies on the Oracle Tuxedo Service Metadata Repository for conversions between the Oracle Tuxedo request/response format (buffer types) and standard SOAP message format.

When exposing Oracle Tuxedo services as Web services using SALT, you must define and load your Oracle Tuxedo service metadata in the Oracle Tuxedo Service Metadata Repository. SALT can then define the corresponding SOAP message format from the Oracle Tuxedo service metadata.

When invoking external Web services from an Oracle Tuxedo application, SALT provides a WSDL file converter, `wsdlcvt`. This command utility helps you to define Oracle Tuxedo service metadata from each Web service operation. The converted services are called SALT proxy services and can be invoked as normal Oracle Tuxedo services. SALT proxy services also need to be loaded in the Oracle Tuxedo Service Metadata Repository.

To retrieve the Oracle Tuxedo service metadata information, you must configure the Oracle Tuxedo Service Metadata Repository system server (`TMMETADATA`), to be booted in the Oracle Tuxedo application.

Note: `TMMETADATA` must be booted prior to using any SALT gateway `GWWS` server.

For more information, see "Oracle Tuxedo Service Metadata Repository" and Using Oracle Tuxedo Service Metadata Repository for SALT in the SALT Configuration Guide.

SALT Web Service Deployment Model

Deploying SALT requires two configuration file types:

- SALT Web Service Definition File (`WSDF`)
- SALT Deployment File (`SALTDEPLOY`)

SALT Web Service Definition File

The SALT Web Service Definition File (`WSDF`) is an XML-based file used to define SALT Web service components (Web Service Bindings, Web Service Operations, Web Service Policies, and so on). The `WSDF` is an SALT specific representation of the Web Service Definition Language data model. There are two `WSDF` types: native and non-native.

- Native `WSDF`

  A native `WSDF` is created manually. You must define a set of Oracle Tuxedo services and how they are exposed as Web services in the `WSDF`. It looks similar to the SALT 1.1 configuration file. The native `WSDF` is the input file for the SALT WSDL generator (`tmwsdlgen`). For more information, see the SALT Configuration Guide.

- Non-native `WSDF`

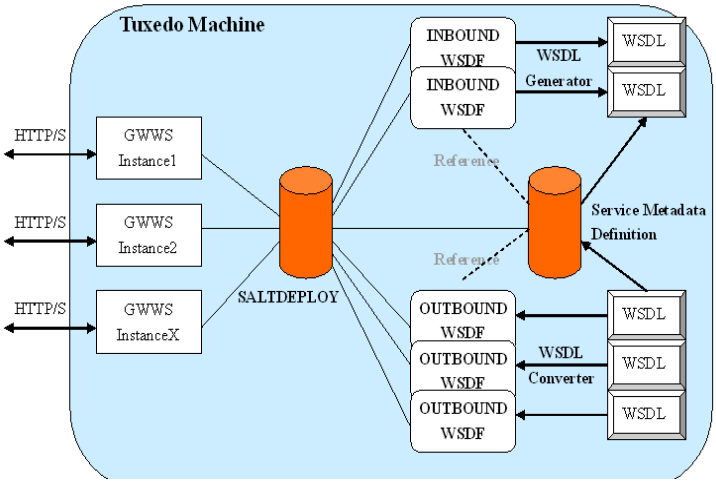
A non-native WSDF is generated from an external WSDL file that has been converted using the SALT WSDL converter (wsdlcvt). Basically, you do not need to change the generated WSDF (except to configure advanced features). For more information, see Configuring Web Services.

SALT Deployment File

The SALT Deployment File (SALTDEPLOY) is an XML-based file used to define SALT GWWS server deployment information on a *per* Oracle Tuxedo machine basis. The SALTDEPLOY file lists all necessary WSDF files. It also specifies how many GWWS servers are deployed on an Oracle Tuxedo machine and associates inbound and outbound Web service endpoints for each GWWS server. The SALTDEPLOY file contains a system section where global resources are configured (including certificates and plug-in load libraries). For more information, see Creating the SALT Deployment File in the SALT Configuration Guide.

Figure 1-1 illustrates the SALT deployment model.

Figure 1-1 SALT Deployment Model



SALT Web Services Administrative Tasks and Tools

SALT provides a set of command utilities for managing different parts of an SALT application built on the Oracle Tuxedo system. These utilities can be used for the following tasks:

- Configuring SALT Applications Using Command-Line Utilities

- Administering SALT Applications Using Command-Line Utilities

Configuring SALT Applications Using Command-Line Utilities

You can configure your SALT application by using command-line utilities. Specifically, you can use an XML editor to create and edit the configuration file (`WSDF` files and `SALTDEPLOY` file) for your application, and then use the command-line utility, `wsloadcf`, to translate the XML files (`SALTDEPLOY` file and referenced WSDF files) to a binary file (`SALTCONFIG`). You are then ready to boot the SALT gateway (GWWS) servers.

The following list identifies SALT command-line utilities that you can use to configure your application:

- `wsloadcf(1)`

  A command that is initiated on each Oracle Tuxedo machine. It allows you to compile your application `SALTDEPLOY` file and referenced WSDF files into the binary `SALTCONFIG` file. The `wsloadcf` command loads the binary file to the location defined by the `SALTCONFIG` environment variable.

- `wsdlcvt(1)`

  A command that converts an external Web Service Description Language (`WSDL`) file into Oracle Tuxedo definition files (`WSDF` file, Oracle Tuxedo Service Metadata definition file, FML32 field table file and XML Schema file). The generated `WSDF` file is a non-native `WSDF` file used for SALT outbound calls specifically.

Since SALT is built on the Oracle Tuxedo framework, you should also use the following Oracle Tuxedo provided command-line utilities to configure SALT specific items in an Oracle Tuxedo application:

- `tmloadcf(1)`

  A command that runs on the master Oracle Tuxedo machine. It is used to compile the Oracle Tuxedo application UBBCONFIG file into the binary `TUXCONFIG` file. To boot SALT gateway servers, you must define GWWS servers in the `UBBCONFIG` file.

- `tmloadrepos(1)`

  A command that runs on the machine where the Oracle Tuxedo Service Metadata Repository System Server (`TMMETADATA`) is booted. It loads the Oracle Tuxedo service metadata definition text files into the binary Oracle Tuxedo Service Metadata Repository file. You must load all existing Oracle Tuxedo services that are to be exposed as Web

service operations in the Oracle Tuxedo Service Metadata Repository. You must also load all `wsdlcvt` generated SALT proxy services in the Oracle Tuxedo Service Metadata Repository.

- `saml`

  The `wsadmin` sub-command `saml` can be used to manage SAML related metadata for use with the SAML Single Sign-On capability. For more information, see wsadmin in the SALT Command Reference.

Administering SALT Applications Using Command-Line Utilities

You can use the `wsadmin(1)`command-line utility to perform administrative functions for SALT gateway servers in your Oracle Tuxedo applications. Similar to the `tmadmin`, `dmadmin` and `qmadmin` commands, `wsadmin` is an interactive meta-command that enables you to run sub-commands.

In an Oracle Tuxedo application, you can run `wsadmin(1)` on any machine to monitor and manage the SALT gateway servers defined in the Oracle Tuxedo application.

SALT Web Application Server Administrative Tasks and Tools

SALT provides the following Web application server administration tools:

- Web module `mod_tuxedo` (for Apache or OHS), and `tux_nsapi` (for iPlanet). The configuration elements are located in the respective configuration files (`httpd.conf` or `magnus.conf`).
- The `WEBHNDLR` system server which serves HTTP requests proxied from `mod_tuxedo` or `tux_nsapi`. This system server is configured in the `UBBCONFIG` file and administered using regular Oracle Tuxedo commands.

For more information, see SALT Installation Guide, Administering SALT at Runtime and Configuring an Oracle SALT Application.

SALT WS-TX Administrative Tasks and Tools

SALT provides a set of command utilities for managing and supporting WS-TX transactions.The names and usages of these utilities are the same as in the SALT Reference Guide.

For more information, see WX-TX Support in Oracle Tuxedo Interoperability and Configuring SALT WX-TX Support in the SALT Configuration Guide.

See Also

- SALT Installation Guide
- SALT Configuration Guide
- SALT Programming Guide
- SALT Reference Guide
- SALT Interoperability Guide

CHAPTER 2

Administering SALT at Runtime

This chapter contains the following topics:

Administering Oracle Tuxedo Web Services

This section contains the following topics:

Browsing to the WSDL Document from the GWWS Server

Each `GWWS` server automatically generates a WSDL document for each deployed inbound native WSDF. The WSDL document can be downloaded from any of the HTTP/S listening endpoints via HTTP GET.

Use the following URL to browse the WSDL document:

```
“http(s)://<host>:<port>/wsdl[? [id=<wsdf_name>]
[&mappolicy=<pack|raw|mtom>] [&toolkit=<wls|axis>]]”
```

Table 2-1 lists all WSDL document download options.

Table 2-1 WSDL Download Options

Option	Value Description
`id`	Specifies the native WSDF name for the WSDL document. The specified native WSDF must be imported via inbound direction by the `GWWS` server. If the option is not specified, the first inbound native WSDF is used.
`mappolicy`	`{pack | raw | mtom}` Specifies the data mapping policies for certain Oracle Tuxedo Typed buffers for the generated WSDL document. Currently, this option impacts CARRAY typed buffers only. If the option is not specified, `pack` is used as the default value.
`toolkit`	`{wls | axis}` Use this option only if you have previously defined `mappolicy=raw`. Specify the client toolkit used so that the proper WSDL document description for a CARRAY typed buffer MIME attachment is generated. SALT supports WebLogic Server and Axis for SOAP with Attachments. The default value is `wls`.

Note: The WSDL download URL supported by SALT 2.0 and later is different from the SALT1.1 release. In SALT 1.1, one GWWS server adaptively supports both RPC/encoded and document/literal message style, both SOAP 1.1 and SOAP 1.2 version, from a given configuration file.

In SALT 2.0 and later, each WSDF file associated with the GWWS server must be pre-combined with a certain SOAP version and a certain SOAP message style. So the following WSDL download options for SALT 1.1 GWWS server are deprecated in this release.

Table 2-2 Deprecated WSDL Download Options

Option	Value Description

Table 2-2 Deprecated WSDL Download Options

`SOAPversion`	This deprecated option is used to specify the expected SOAP version defined in the generated WSDL document. This option is now set in the WSDF file.
`encstyle`	This deprecated option is used to specify the expected SOAP message style defined in the generated WSDL document. This option is now set in the WSDF file.

Tuning the GWWS Server

The GWWS server is a high performance gateway used between external Web Service application and the Oracle Tuxedo application. It uses a thread-pool working model to improve performance in a multi-processor server environment.

The GWWS server also provides options to control runtime behavior by setting the `<WSGateway>` element property values in the SALT configuration file. The following topics list deployment considerations based on different scenarios.

- Thread Pool Size Tuning
- Network Timeout Control
- Backlog Control
- Oracle Tuxedo BLOCKTIME
- Boost Performance Using Multiple GWWS instances

For more information, see Configuring the GWWS Servers in the SALT Configuration Guide.

Thread Pool Size Tuning

Property: `thread_pool_size`

The default thread pool size is 16, but in some cases this may not be enough to handle high volume loads. It is recommended to conduct a typical usage analysis in order to better estimate the proper size requirement. Usually, if the concurrent client number is large (for example, more than 500), it is suggested that you deploy the GWWS gateway on a server with at least a 4-way processor and set the thread pool size to 64.

Network Timeout Control

Property: `timeout`

SALT provides a network timeout tuning parameter in the configuration file. The default timeout value is 300 seconds. The value can be adjusted to reduce timeout errors.

Max Content Length Control

Property: `max_content_length`

SALT administrators may want to limit the buffer size sent from a client. SALT supports this by using a property value that can be set for particular GWWS instances. By default there is no limit.

Backlog Control

Property: `max_backlog`

The default backlog socket listen value is 20. On some systems, such as Windows, 20 may not meet heavy load requirements. The client connection is rejected during TCP handshake.

The recommended value for Windows is based on the max concurrent TCP connections you may encounter. For example, if 80 is the peak point, you may configure the `max_backlog` property value to 60 in the SALT configuration file.

Note: The default backlog value is adequate for most systems. You do not need to tune it unless you experience client connection problems during heavy loads.

WARNING: A large backlog value may increase *syn-blood* attack risk.

Oracle Tuxedo BLOCKTIME

A network receive timeout property is provided in the SALT configuration file. Web service applications are also impacted by the Oracle Tuxedo `BLOCKTIME` parameter. Blocktime accounting begins when a message is transformed from XML to a typed buffer and delivered to the Oracle Tuxedo framework.

If no reply is received for a particular Web service client within the `BLOCKTIME` time frame, the GWWS server sends a SOAP fault message to the client and terminates the connection. If the GWWS server receives a delayed reply, it drops this message because the client has been disconnected.

`BLOCKTIME` is defined in the `UBBCONFIG` file `*RESOURCE` section.

Boost Performance Using Multiple GWWS instances

If one GWWS instance is bottlenecks due to network congestion, low CPU resources and so on, multiple GWWS instances can be deployed with the same Web Service binding on distributed Oracle Tuxedo nodes.

Note: Even though multiple `GWWS` instances can provide the same logic functionality, from a client perspective, they are different Web service endpoints with different HTTP/S listen ports and addresses.

Tracing the GWWS Server

The GWWS server process utilizes the `TMTRACE` trace functionality that is supported by the Tuxedo. The trace feature in the GWWS is used in conjunction with the `TMTRACE`.

The trace messages are logged in the ULOG file accessible within the user set-up directory. The user could check the ULOG file to determine the cause of a problem. Also, looking at the ULOG helps the user to determine at what stage of the message processing the problem occurred within the SALT gateway

The trace can be enabled using the environment variables `TMTRACE` and `GWWS_TRACE_LEVEL`. The `TMTRACE` variable enables the trace. And the environment variable `GWWS_TRACE_LEVEL` controls the amount of trace that will be logged by the SALT gateway.

The trace category ws is used to trace Oracle SALT messages. It can be used together with other general trace categories. For example, if trace category "`atmi+ws`" is specified, both Oracle SALT and Oracle Tuxedo ATMI trace messages are logged.

Note: Message tracing is recommended for diagnostic treatment only. The following trigger specifications are not recommended for GWWS servers:

`abort`, `system`, `sleep`

If any of these trigger specifications are used, GWWS servers may terminate unexpectedly.

For more information, see tmtrace(5) in the *File Formats, Data Descriptions, MIBs, and System Processes Reference*.

`GWWS_TRACE_LEVEL` can be set to `100` or `200`. The value '`100`' provides the least amount of trace information in the ULOG file. The value '`200`' provides the most amount of trace information.

`TMTRACE` and `GWWS_TRACE_LEVEL` environment variables can be set as follows:

```
export TMTRACE=atmi+ws:ulog
```

```
export GWWS_TRACE_LEVEL=100
```

Trace is enabled for both ATMI and SALT messages (for least amount of tracing).

To enable tracing for only SALT messages, set as follows:

```
export TMTRACE=ws:ulog
export GWWS_TRACE_LEVEL=200
```

This sets the trace level to maximum tracing amount.

Note: Be aware of the amount disk space available when the `GWWS_TRACE_LEVEL` is set to 200 especially for large data buffers since trace will fill the ULOG file.

Listing 2-1 shows a ULOG file example containing SALT tracing messages.

Note: GWWS tracing verb "`ms`" has been deprecated and is replaced by "`ws.`"

Listing 2-1 TMTRACE Messages Logged By GWWS Server

```
105106.slc04jtu!GWWS.27653.1379895040.0: TRACE:ws:Begin data
transformation of request message, buffer type = FML32, SCO index=4095

105106.slc04jtu!GWWS.27653.1379895040.0:
TRACE:ws:trace_level<100>:sco_index<4095>:WS<TFML32>:tuxedo_service<TFML32
>:direction<inbound>:message_kind<request>:Parsing of the Data message
begins before sending to tuxedo
…
105106.slc04jtu!GWWS.27653.1379895040.0: TRACE:ws:Entering<TRACE_FSM>

105106.slc04jtu!GWWS.27653.1379895040.0: TRACE:ws:SCO[4095] FSM State
Transition: --OK-->FindService

105106.slc04jtu!GWWS.27653.1379895040.0: TRACE:ws:Exiting<TRACE_FSM>

105106.slc04jtu!GWWS.27653.1379895040.0:
TRACE:ws:<200>:<4095>:<TFML32>:<TFML32>:<inbound>:<request>:<Message:Style
/Encoding><DOC/LITERAL>
…
105106.slc04jtu!GWWS.27653.1379895040.0: TRACE:ws:<runSoap2BufConversion>
<200>:<4095>:<TFML32>:<TFML32>:<inbound>:<request>:Message config
parameters info:input
buffer<inbuf>:type<FML32>:schema-name<fml32_TFML32_In>:style<DOC>:encoding
```

```
<LITERAL>:type<request-response>
…
105106.slc04jtu!GWWS.27653.1379895040.0:
TRACE:ws:<100>:<4095>:<TFML32>:<TFML32>:<inbound>:<request>:<XML2Tux> data
conversion SOAP to tuxedo completed
…
105106.slc04jtu!GWWS.27653.1388463872.0: TRACE:ws:<buffer2soap>
trace_level<200>:sco_index<4095>:WS<TFML32>:tuxedo_service<TFML32>:directi
on<inbound>:message_kind<response>:Data will be converted to SOAP
message:mode<Internal>:style/encoded<DOC>/<LITERAL>:endpoint<http://slc04j
tu:12438/TuxAll>:buffertype<outbuf>

105106.slc04jtu!GWWS.27653.1388463872.0: TRACE:ws:<runBuf2SoapConversion>
<200>:<4095>:<TFML32>:<TFML32>:<inbound>:<response>:Message config
parameters info:output
buffer<outbuf>:type<FML32>:schema-name<fml32_TFML32_Out>:style<DOC>:encodi
ng<LITERAL>:type<request-response>

105106.slc04jtu!GWWS.27653.1388463872.0: TRACE:ws:<runBuf2SoapConversion>
<200>:<4095>:<TFML32>:<TFML32>:<inbound>:<response>:type<FML32>:name<outbu
f>

105106.slc04jtu!GWWS.27653.1388463872.0: TRACE:ws:<nestBuf2Soap>
<200>:<4095>:<TFML32>:<TFML32>:<inbound>:<response>:type<BYTE>:schema-type
<byte>:minOccur<1>:maxOccur<1>:name<tf32char>:value<0xFFFFFF80>
…
FML32>:<TFML32>:<inbound>:<response>:type<MBSTRING>:schema-type<string>:mi
nOccur<1>:maxOccur<1>:name<tf32mbstr>:value<abcdefg>
```

Monitoring the GWWS Server

The GWWS server can be monitored using the `wsadmin` utility, which is a command-line tool. This tool displays GWWS running status.

An example is shown in Listing 2-2.

Listing 2-2 Use wsadmin to Monitor GWWS

```
$wsadmin
wsadmin - Copyright (c) 2005-2010 Oracle.
Portions * Copyright 1986-1997 RSA Data Security, Inc.
All Rights Reserved.
Distributed under license by Oracle.
SALT is a registered trademark.

> gwstats -i abcd
GWWS Instance : abcd

Inbound Statistics :
---------------------------------
      Request Response Succ :     74
      Request Response Fail :     32
                Oneway Succ :      0
                Oneway Fail :      0

                 Total Succ :     74
                 Total Fail :     32

       Avg. Processing Time : 210.726 (ms)
Outbound Statistics :
---------------------------------
      Request Response Succ :      0
      Request Response Fail :      0
                Oneway Succ :      0
                Oneway Fail :      0

                 Total Succ :      0
                 Total Fail :      0

       Avg. Processing Time :  0.000 (ms)
---------------------------------
      Total request Pending :      0
   Outbound request Pending :      0
       Active Thread Number :      2
```

```
> gws -i out -s getTemp
GWWS Instance : out

Service : getTemp

Outboud Statistics :
---------------------------------
      Request Response Succ :    333
      Request Response Fail :    139
       Avg. Processing Time : 143.064 (ms)


>
```

The `gwstats` command (`gws`), displays the `WWS` server statistics data with a specific instance ID or of a certain `GWWS` server service of the. The data includes the amount of successful and failed request, etc.

Before `wsadmin` is executed, both the `TUXCONFIG` and `SALTCONFIG` environment variables must be set. `wsadmin` supports both active mode and in-active mode, which means `wsadmin` is able to launch with/without booting the Oracle Tuxedo domain.

Table 2-3 lists wsadmin sub-commands.

Table 2-3 wsadmin Sub-Commands

Sub-Command	Description
`gwstats(gws)`	Displays statistics information of GWWS server.
`configstats(cstat)`	Displays configuration information.
`default(d)`	Specifies the default `-i` option.
`reload -i`	Used to reload `SALTCONFIG` file. `-i` specifies the gateway instance id of the GWWS to reload.
`echo(e)`	Switches echo input on/off.

Table 2-3 wsadmin Sub-Commands

`forgettrans`	Forgets one or all heuristic log records for the named GWWS instance.
`printtrans`	Prints transaction information for the named GWWS instance.
`paginate(page)`	Switches paging output on/off.
`verbose(v)`	Switches verbose output on/off.
`saml (s) {create|add|modify|delete}`	SAML key metadata operations.
`quit(q)`	Terminates the program.

Troubleshooting SALT

This section contains the following topics:

- GWWS Start Up Failure
- GWWS Rejects SOAP Request
- WSDL Document Generated Incorrectly or Rejected by SOAP Client Toolkit

GWWS Start Up Failure

If the GWWS server fails to start, check the following:

- Oracle Tuxedo service contract configuration
  - Check if the Oracle Tuxedo service contract definition is correct in the Oracle Tuxedo Service Metadata Repository.
  - Check if the Oracle Tuxedo Service Metadata Repository Server - `TMMETADATA` - is booted successfully.
- GWWS server license

  The GWWS server requires an extra license from Oracle to enable functionality. Check to make sure it has been installed properly.
- GWWS server HTTP listen port configuration.

Check the GWWS server listen /WS-Addressing endpoints defined in the SALT configuration files. Avoid port conflicts with other applications.

- GWWS instance ID.

  Check the GWWS instance ID to make sure the two names defined in `UBBCONFIG` and `SALTDEPLOY` file are consistent.

- UBBCONFIG file `MAXWSCLIENTS` definition.

  Make sure that `MAXWSCLIENTS` is defined in the `UBBCONFIG` file `*MACHINE` section on the computer where the GWWS server is deployed.

- `RESTART=Y` and `REPLYQ=Y parameters`.

  If the GWWS server is set to `RESTART=Y` in the `UBBCONFIG` file, `REPLYQ=Y` must also be defined.

- `SALTCONFIG` file.

  Make sure the binary version `SALTCONFIG` file is compiled successfully and the environment variable `SALTCONFIG` is set correctly for the `GWWS` server.

GWWS Rejects SOAP Request

In some cases, the GWWS server may reject SOAP requests. The most common causes are:

- The WSDL document is outdated.

  The WSDL document used by SOAP clients is out of date and some services may not be available.

- The GWWS server environment variables are not set correctly.

  When exporting an Oracle Tuxedo service with FML/VIEW buffers to a Web service, make sure the related GWWS environment variables are set with valid values. The GWWS server needs this information for data mapping conversion.

- Violated Oracle Tuxedo Service Metadata Repository restrictions.

  Check the SOAP client data and make sure Oracle Tuxedo Service Metadata Repository restrictions are not violated.

- Unavailable Oracle Tuxedo service.

  Make sure the Oracle Tuxedo service you want exported as a Web service is available.

WSDL Document Generated Incorrectly or Rejected by SOAP Client Toolkit

If the WSDL document is rejected by the Web Service client toolkit, do the following:

- Try to use the `document/literal` message style and SOAP 1.1 to define native Oracle Tuxedo `WSDF` file. This is also the default behavior.
- Use `tmwsdlgen` to generate the WSDL document manually and compare it with the one downloaded by the `GWWS` server. If the `TMMETADATA` server is not started when the `GWWS` server booted, the `GWWS` server cannot obtain the correct service contract information. Therefore, the downloaded WSDL document does not contain the correct type definitions.

See Also

- `tmadmin`
- `tmtrace`
- Configuring a SALT Application
- SALT Programming
- SALT Command Reference