Tamino

Communication with Tamino's X-Machine

Version 10.1

April 2018

WEBMETHODS

This document applies to Tamino Version 10.1 and all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

Document ID: INS-COMMUNICATIONS-101-20180413

Table of Contents

Communication with Tamino's X-Machine

This document describes the methods available to clients for communicating with Tamino's X-Machine.

This document is intended for use by application programmers who wish to develop client applications that communicate with the X-Machine.

This information is structured into the following sections:

1 Introduction

Clients that access the X-Machine can be tools (e.g. Tamino Interactive Interface or Tamino Data Loader), applications that use the Tamino APIs, or applications that use HTTP directly without a Tamino API.

Communication issues of other components (e.g. Tamino Manager) are not discussed here. Traditionally, the X-Machine is accessed via a web server; from Tamino 4.1, direct (*webserverless*) access is also possible. It makes no difference to the X-Machine whether requests are shipped with or without a web server.

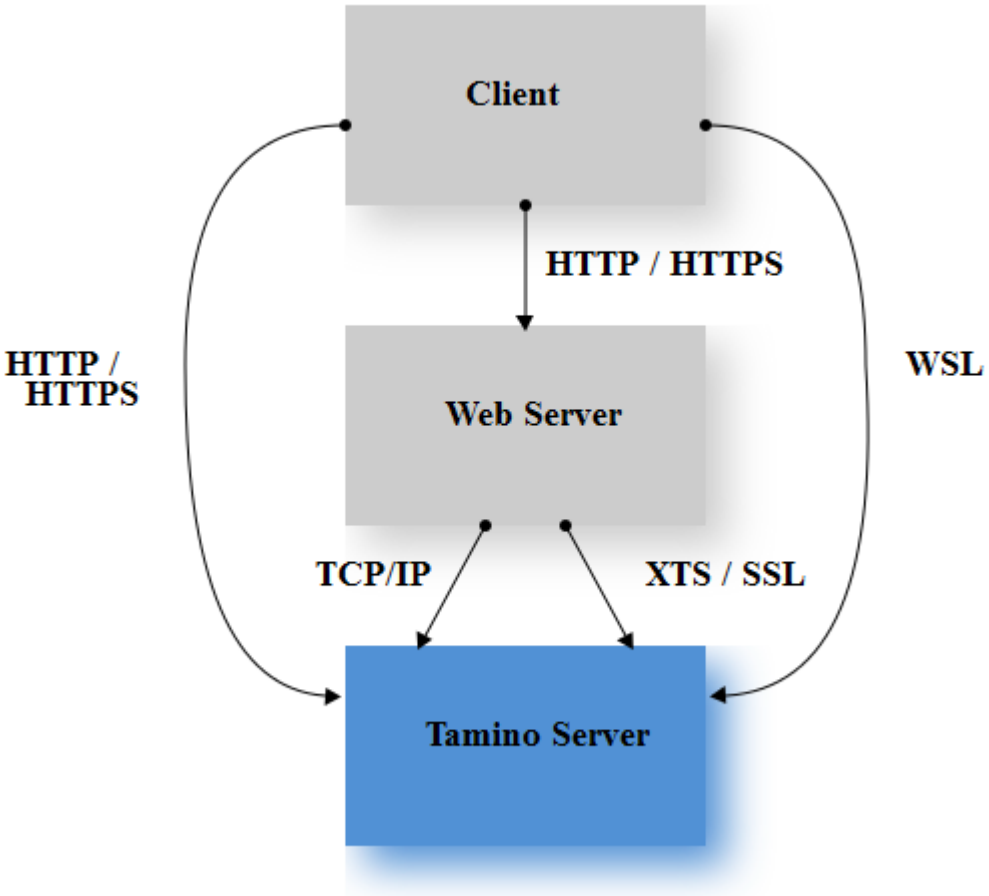
The user's session state in the database is not related to any communication machinery. Requests relating to a single database session can be issued from various machines via various transport layers, as long as they contain the appropriate session ID and session key.

2 Communication Methods

Introduction

Tamino offers three communication methods:

- via a web server,
- via direct HTTP rsp. HTTPS, or
- WSL (*webserverless*)

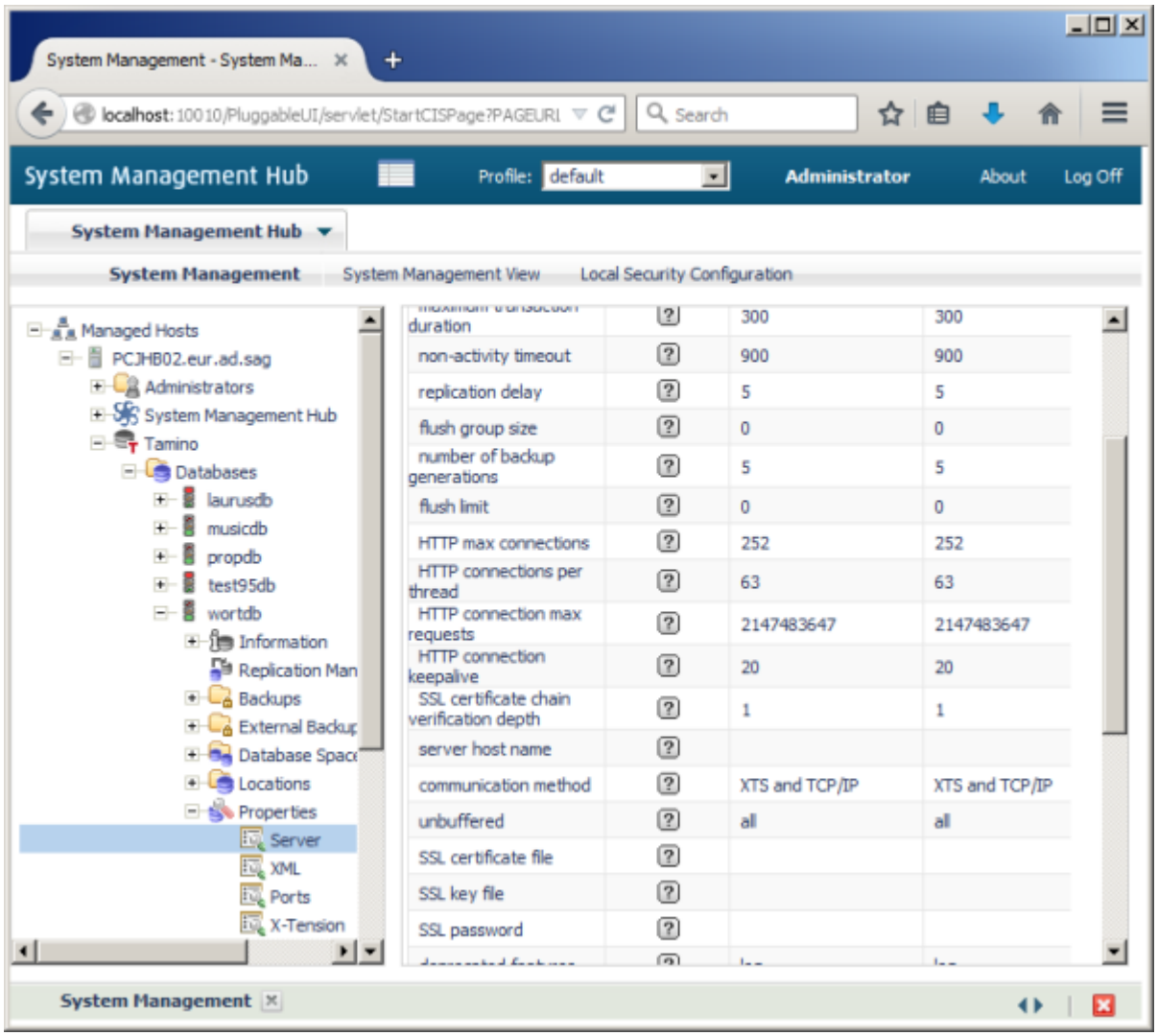


The desired communication methods are specified via the database property `communication method` (see the table "Server properties" in the Tamino Manager documentation, section *Database Handling*).

Communication is stateless: a client issues a request and receives a reply. A *physical* connection between client and X-Machine lasts only for the duration of a request.

Communication via a Web Server

The communication via web server is the default in that a newly created database specifies 'XTS and TCP/IP' as the `communication method` database property (see the table “Server properties” in the Tamino Manager documentation, section *Database Handling*).



To communicate with Tamino as such a web server must be configured to redirect the user's HTTP (or HTTPS) calls towards Tamino as described in the section “Configuring the Web Server” in the chapter, section *Before You Start Using Tamino*. Whether the communication between the user and the web server is HTTP or HTTPS depends solely on the configuration of the server and has nothing to do with Tamino communication. Communication from the server towards Tamino is either via TCP/IP or via XTS. XTS-based communication can further be secured using SSL for encryption. The default communication here is XTS. XTS uses TCP/IP also.

In case of TCP/IP communication Tamino listens for incoming requests on the port that is specified via the database property `XML port` (see table “Port properties” in the Tamino Manager documentation, section *Database Handling*). The port number is assigned when the database is created.

In case of XTS communication Tamino listens for incoming requests on the port that is specified via the database property `XML XTS port` (see table “Port properties” in the Tamino Manager documentation, section *Database Handling*). If the property is not specified, the server picks a port when it is started. A typical use case where a port needs to be specified is when client and database are on opposite sides of a firewall, so that a port must be opened there.

A database name is resolved to an IP address and port number via a directory server. The database registers itself with the directory server at startup and deregisters at shutdown. A web server an and a database have to use the same directory server to be able to communicate.

Related Properties

The following database server properties are also relevant for working with XTS (see the table “Server properties” in the Tamino Manager documentation, section *Database Handling*):

Property Name	Meaning
`overwrite XTS registration`	If a database with the given name is already registered in the directory server, its registry entry is overwritten.
`server host name`	The hostname that can be optionally entered into the directory server at server startup.

The SSL communication method is identical to XTS, but the communication between the web server and the Tamino database is encrypted. For SSL the following properties are relevant.

Property Name	Meaning
`SSL certificate file registration`	The absolute path to a file containing an SSL certificate.
`SSL key file`	The absolute path to a file containing an SSL key.
`SSL password`	Optionally, an SSL password.

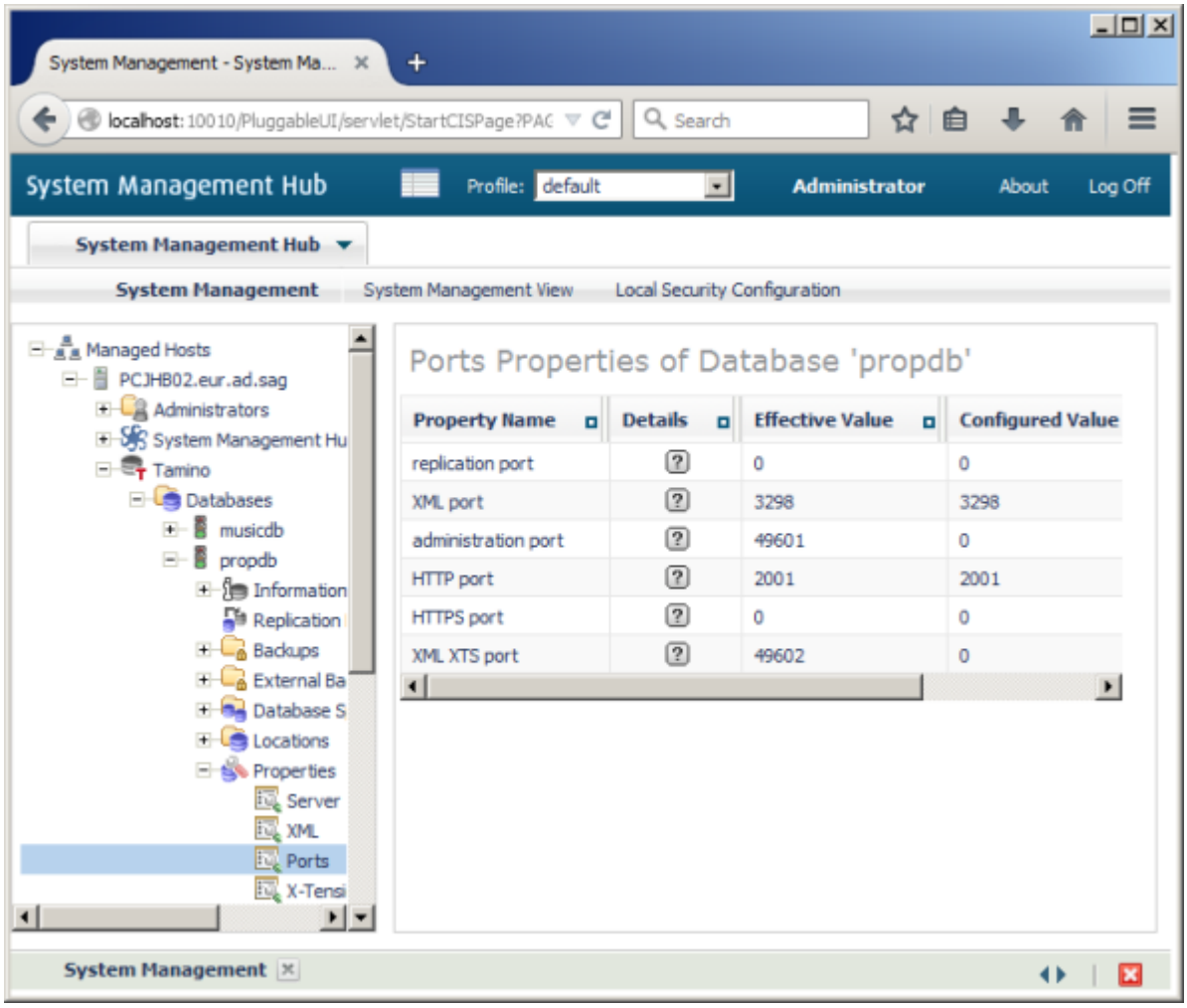
HTTP/HTTPS based communication

Tamino XML Server is able to act as an HTTP server of its own rights. Clients can communicate with Tamino using a native HTTP and/or HTTPS protocol.

This is achieved by configuring a server property communication method (e.g. "HTTP and HTTPS"). A valid port number has to be assigned to the server property HTTP port. Via this port, messages based on either HTTP or HTTPS protocol are communicated.

The contents of the HTTP requests and responses in respect to Tamino server request protocol is not affected by this method of communication.

The Tamino Mass Loader (inoload) communicates via XTS or alternatively via TCP/IP. Thus when the communication method does not involve either of the two, the loader can't operate.



For HTTPS the following properties are relevant.

Property Name	Meaning
`SSL certificate file registration`	The absolute path to a file containing an SSL certificate.
`SSL key file`	The absolute path to a file containing an SSL key.
`SSL password`	Optionally, an SSL password.
`SSL certificate chain verification depth`	Optionally, the maximum depth for the certificate chain verification.
`SSL CA file`	Optionally, the absolute path to a CA (Certificate Authority) file.

Property Name	Meaning
`SSL cipher list`	Optionally, a user defined cipher list for OpenSSL communication. Per default the server uses the cipher list "ALL:!ADH:RC4+RSA:!SSLv2:!LOW:!EXPORT:@STRENGTH".
`SSL verify client`	Optionally, yes or no.

The Tamino installation provides a self-signed certificate in the directory *$INODIR/$INOVERS/files/certs* that can be used to test HTTPS communication.

The "webserverless" option of the Java or C API

The Tamino APIs for Java and for C offer a webserverless option. Clients can communicate with Tamino without using HTTP. The communication method XTS must be configured in this case. Client and database have to use the same directory server to be able to communicate.

3 Web Servers

A client can talk to the X-Machine via HTTP. In the default case, the X-Machine itself does not implement the HTTP protocol. Since high-quality third-party HTTP servers are available, Tamino uses them. Tamino contains a component named X-Port, which is a collection of programs that are installed as interfaces inside web servers. They get control when a request with a URL that is mapped to a Tamino database arrives at the web server. These interface programs forward the request to the target database's X-Machine and send the X-Machine reply back to the client.

The protocol between the client and the web server is HTTP.

Tamino APIs use HTTP to send requests to Tamino via a web server, except of course when using the webserverless API. Using a web server offers the following advantages:

- No XTS installation/configuration is needed on the client.
- Transparent use of Tamino databases: the client does not need to know whether a requested resource is inside a Tamino database or somewhere else.
- The web server's security infrastructure can be used.
- The web server's logging infrastructure can be used.
- Common firewall setups can be used.
- Browsers can be used as clients

A Tamino database does not have a dedicated web server. A web server can talk to any number of databases. Each database can be accessed by any number of web servers.

Tamino's web server interfaces are compatible with all Tamino versions. It is recommended to use the current version of Tamino's web server interface for communication with all Tamino databases.

The web server does not have to be on the same machine as the Tamino database. It may be desirable for performance or availability reasons to use separate machines for the web server and the database server.

The web server does not have to run on the same platform as the Tamino database. The Tamino distribution only includes web server interfaces for the target platform. Interfaces for other platforms are available; please contact your software supplier for details.

Installing Tamino's web server interfaces is straightforward; all you have to do is to ask the web server to load the interface at startup. Configuration is also straightforward: define a mapping from URLs to Tamino databases, so that the web server knows which requests should be handled by the Tamino interface and the Tamino interface knows to which database it should forward the request. Installation and configuration are usually done automatically by the Tamino installation procedure.

4 Webserverless APIs

The APIs for Java and C can talk to the X-Machine without HTTP, so no web server is used in this case. The protocol used is the same one that is used between web servers and the X-Machine. From the X-Machine's point of view, such a client is just another web server.

5 Security

Introduction

This section deals with security issues of network traffic. Authentication of users and authorization (permissions for parts of documents) are described in the documentation of the Tamino Manager (see the section *Tamino Security*). The X-Machine provides two mechanisms to safeguard communications: it is possible to specify that a given database may only talk to particular web servers, and the communication can be encrypted. The two mechanisms can be combined.

Web Server Assignment

By default, the X-Machine accepts requests from clients without checking their IP addresses. This behavior can be changed by specifying the clients that are allowed to communicate with the database. If at least one client is specified, *all* unspecified clients are rejected. Clients are specified and assigned via the Tamino Manager.

The Tamino Manager uses the term *web server*, but the logic also works for the Tamino Data Loader. Clients are specified in the Tamino Manager with their IP addresses (host/port). The Tamino Data Loader is treated like a web server that runs on port 80.

If a list of web servers is specified for a database, only these clients can access the database.

Note: Clients that use the webserverless feature of the APIs cannot access databases that have web servers assigned.

Encryption

The communication between client and Tamino can be encrypted if the XTS communication method is used. The Native TCP/IP communication method currently does not offer encryption. If all communication is to be encrypted, Native TCP/IP must be switched off. A combination of encrypted and unencrypted communication makes sense for those use cases where trusted clients (e.g. web servers that talk to the X-Machine over a secure wire) and untrusted clients should be able to talk to the database. Encryption uses SSL. Please note that the X-Machine currently does not support SSL's authentication capabilities. Clients currently do not use the server certificate to authenticate the server. Encryption is activated via the database property `communication method`. If this property is set to "SSL" (or "SSL and TCP/IP"), then XTS communication is encrypted using the certificate that is specified in the database properties `SSL certificate file` and `SSL key file`. If the used key is password protected, then the password must be specified via the server parameter `SSL password`. A sample certificate is contained in the Tamino distribution (see the directory *files/certs* under the Tamino installation directory).

Note: Under Solaris 8, Solaris patch 112438 is required for SSL.

Using SSL with Native HTTP access (HTTPS)

Native HTTP communication with a Tamino server supports the usage of the SSL protocol (TLS 1.0).

The SSL encrypted traffic is handled through the Tamino HTTP port (link to server properties).

In order to configure the usage of the SSL protocol when talking to a terminal server the following server properties need to be set appropriately:

- `SSL certificate file` contains the full path to the SSL certificate file to be used. Only pem format is supported.
- `SSL key file` contains the full path to the server's private key file
- `SSL password` contains the password in case the various SSL certificate files are password protected
- `SSL CA file` contains the full path to the file containing the CA certificate required
- SSL verify depth contains an integer value to indicate the maximum depth of chained certificate verification, the default value is 1.
- `SSL verify client` indicates whether the client is to be authenticated by the server based on its certificate, default value is "no".

6 Request Handling in the Server

The X-Machine operates in multi-threaded mode. It executes requests in "worker threads". Incoming requests are queued in front of the worker threads.

A worker thread picks up a request from the queue, reads the input message, executes the contained commands, sends the output message, and then picks up the next request (or waits for one to arrive). The execution of a single request is not multi-threaded: a request stays in its worker thread until it is finished. The number of worker threads determines the number of requests that can be executed in parallel.

A worker thread may have to wait for an event, e.g. I/O completion. If the X-Machine recognizes that all worker threads are waiting, it starts another one. If this happens, a message is written to the job log.

The following database properties are related to request handling:

Property Name	Meaning
`XML max simultaneous requests`	This specifies the size of the X-Machine's input queue.
`XML work threads`	This is the initial number of worker threads used by the X-Machine.

Please note that the property `XML maximum sessions` is not related to TCP/IP sessions and has nothing to do with communication resources.

Index