WebWisdom.com
Tango Interactive Group

Tango Interactive Server Administrator Guide

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Tango Interactive Server Administrator Guide
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1 Introduction

1.1 Understanding Functionality of Tango Interactive Server

The first thing to understand about Tango Interactive (TI) server is that it is **not** an HTTP server. Tango Interactive server is a collaboration engine. We call it a server for lack of a better, commonly accepted term. In reality, collaborative server is more like an IP router. It makes sure the messages get to the intended receivers. Unlike a router, though, a collaboratory server accepts permanent connections and it holds a considerable amount of state. The server works together with all active instances of Tango Interactive Session Managers to keep and manage the state of the collaboration.

In user terms, the server is a meeting point in the cyberspace. Each server can support one or more communities, and multiple servers can support branches of the same community.

On the communication level, each Tango Interactive server accepts connections from an arbitrary number of Session Managers. All events created by application modules connected to active Session Managers are sent to the server and are properly distributed. Collaboratory server is like a spider in the center of the net.

Are all data the application uses going through the server? Well, no. This would be a non-scaleable, low-performance design with a system bottleneck. Tango Interactive applications get data either from various Internet servers, or use separate communication channels to exchange high bit rate data streams (such as audio and video). The collaboratory server just tells the applications how to set up these channels. Once the static bulk of the data is received by an application module, the "changes" to the application state (called “events") are distributed by the server.

This architecture is extremely robust, and it has been designed to make full use of the available Internet infrastructure. Tango Interactive is the first, and, so far, the only CSCW system that is fully "Web-aware".

In order to transform the “virtual crowd" into “electronic community", the users must possess electronic identity. This is obviously needed for any business applications, but is also helpful in recreational use of the Web-based communities. Tango Interactive servers can access user data from repositories such as flat files and, in the next release, database back ends. The servers provide services to Session Managers to retrieve user information if necessary.

Another aspect of the community support is security and access control. This is also handled by the collaboratory servers if the community administrator decides that privacy and security is important. Tango Interactive clients can connect to the server across firewall using SOCKS4 proxies.

Finally, if multiple servers support different branches of one community, it is important for the servers to exchange active user information, so that people can find themselves in the cyberspace. This functionality will be supported by Tango Interactive servers in the next release.

In short, think about collaboratory server as a house with rooms in the virtual space, which provides you with various services to find, meet, and communicate with other electronic users. Behind the walls, there is a maze of pipes and wires, but we don't want you to even think about this. Enjoy the company and the view from the windows!

1.2 Basics of Tango Interactive Server Administration

Tango Interactive Server is one of the key components of the Tango Interactive system. The server, sometimes also referred to as Conference Engine, communicates directly with the Tango Interactive Session Managers. The server handles several tasks critical for system operation. It maintains the dynamic state of the collaboration system i.e., the information about active users, established sessions and running applications. Whenever the state changes, appropriate updates are sent to all TI Session Managers, which are currently connected to the server.

The server also provides communication channels for message flow in the system. Using these channels, the collaborative applications started by the active users can exchange data. In addition, the server controls access to the system using information retrieved from the user database. All system events, such as a user login or start of a new application sessions, are recorded in the server log.

The server may be easily configured to reflect specific needs of the deployment environment. It is implemented as a multithreaded Java application and, therefore, it can run on a variety of platforms.

This document describes how to install and configure Tango Interactive Server so that it can operate on different platforms and in various environments.

To establish your own institutional infrastructure for collaboratory services, you need to install one or more instances of the TI Server. You can designate an installed server as a group server for one project or community, or you can support several communities on one server. Operation of a TI Server requires a license (see below). Alternatively, you can purchase a package of collaboration services from WebWisdom.com and use TI servers installed and maintained for you on our site.

Unless you have received a server with an evaluation license, you have to apply for a license by sending e-mail to license@webwisdom.com. You will receive a small executable file that will automatically install license files for your server.

TI server can operate in two modes: an "open" server, in which case access to the server is unrestricted (i.e., everybody who knows server location can access it and join the community, and a "restricted" server. Secure server communicates with user database and permits server access only to a group of registered users. Server access is protected by encrypted passwords.

2 System Requirements

2.1 Software Requirements:

Tango Interactive Server is a Java application. As every Java application, the server requires that Java interpreter is installed and accessible. Current version of TI Server requires at least JDK 1.1. The server will not run if used with JDK 1.0.

Installation of the Java runtime (JRE) is not a subject of this manual. Consult Sun documentation for JDK installation issues. As a general guideline, note that recommended Java runtime installation is very different on Unix and Windows platforms. On Unix, Java interpreter comes as a part of JDK (Java Development Kit). On Windows, JRE is available as a separate package. We include JRE in the server installation package for Windows NT.

On Unix platforms, JDK 1.1 is the only requirement for the server to run. On Windows, server has been designed as an NT service. The server requires Windows NT Workstation[1] with Service Pack 3 or higher.

2.2 Hardware Requirements:

TI server imposes minimal burden on the system. The minimal configuration for the Windows NT version is a 266 MHz CPU with 128 MB RAM. However, if you decide to run a large cluster of TI servers on NT, you may need a high-end PC with at least 256 MB of RAM.

There are no specific hardware requirements for UNIX machines running TI Server. A single instance of the TI Server will run on about any UNIX workstation.

The machine running TI server must be connected to an IP network. There are no special requirements for network performance or configuration.

[1] It is technically possible to install and run TI server on Windows 95 or 98. We don't support and don't recommend this setup due to Windows 95/98 limitations on number of active sockets, and due to general system stability issues.

3 Server Installation

The server is available for several operating systems. We provide installation packages for Unix and Windows NT. Installation procedures for each of these platforms are described below:

3.1 Unix

On Unix platforms, Tango Interactive Server runs as a background process. The server can be installed in two different ways:

- **Installation by an unprivileged user**: there is no requirement for the TI server process to be owned by root. To run the server in this mode, the user will have to start it manually using the script we provide. The server will survive user's logout, but it will not be restarted if the system is re-booted.
- **Installation by a system administrator**: In this mode, it is possible to add server boot-time startup scripts. The server will be automatically restarted after system reboot. We provide boot-time startup scripts for Irix, Linux, and Solaris. See Sections 3.1.2 and 5 for description of these procedures.

3.1.1 Installing the server

1. Select a directory to install the server. Copy the compressed file to selected location.
2. Uncompress and unpack the distribution file. Use GNU unzip utility `gunzip` to unzip distribution file. Use `tar` utility to unpack it.

   Example:

   ```
   gunzip Tango-server-2.0.0.9[2]-unix.tar.gz
   tar -xvpf Tango-server-2.0.0.9-unix.tar
   ```

   The two commands above will create a subdirectory `WebWisdom` with the following (or similar) contents:

   ```
   WebWisdom/Tango-server-2.0.0.9-unix/COPYRIGHT
   WebWisdom/Tango-server-2.0.0.9-unix/EULA
   WebWisdom/Tango-server-2.0.0.9-unix/README
   WebWisdom/Tango-server-2.0.0.9-unix/admin/README
   WebWisdom/Tango-server-2.0.0.9-unix/admin/list_tis
   WebWisdom/Tango-server-2.0.0.9-unix/admin/start_tis
   WebWisdom/Tango-server-2.0.0.9-unix/admin/stat_tis
   WebWisdom/Tango-server-2.0.0.9-unix/admin/stop_tis
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/README
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/README.password
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/add.passwd_tmpl
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/run_as_root
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/run_as_root_for_extra_instance
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/Tango.config
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/Tango.init.d
   WebWisdom/Tango-server-2.0.0.9-unix/etc/IRIX/Tango.init.d_ei
   WebWisdom/Tango-server-2.0.0.9-unix/exec/IRIX-Tango_start
   WebWisdom/Tango-server-2.0.0.9-unix/manager.jar
   WebWisdom/Tango-server-2.0.0.9-unix/Tango.jar
   WebWisdom/Tango-server-2.0.0.9-unix/users.tui
   WebWisdom/Tango-server-2.0.0.9-unix/users_12000.tui
   ```

3. Email license@webwisdom.com to obtain the server license (Section 4.1.3) file. You will receive a response with attached script file. Place the script in the `WebWisdom` directory and execute it. The script will install your license file.

[2] The version number, currently 2.0.0.9, will change with each server release.

NOTA BENE: it is critical that you place the license installation script in the `WebWisdom/Tango-server-2.0.0.9-unix` directory before you execute it!

4. Items 1-3 above install server software, but they do not start the server. Before a server instance can be started, you must receive and install license file (Section 4.1). Further, if the server is supposed to run in secure mode, you have to create user database file (Section 4.2). After these two steps are completed, you can start the server manually, or you can proceed to Section 5 to install server administration scripts.

   To start the server manually, proceed as follows:

   - Go to the `WebWisdom/Tango-server-2.0.0.9-unix/exec/yourOS` directory
   - Run `yourOS-Tango_start port_number [user_db]` script

   where `yourOS` is one of `{Solaris, IRIX, and Linux}`. This script will start TI Server instance on the `port_number`, and it will designate `user_db` file as user database. Recommended name of the user database file is `user_portnumber.tui`.

   The server installed this way will run under the UID of the user who installed it. This is permissible: the user has created his/her personal collaboration server. The server runs in the background and it will remain active even if the user logs out. However, if the system is rebooted, the user will have to repeat step 4 above to restart the server. Further, there are no administration scripts provided for manually started server instances.

3.1.2 Installing the server boot-time startup procedures

To ensure that the server is started automatically after each reboot, do the following:

1. Login as root
2. Go to the `WebWisdom/Tango-server-2.0.0.9-unix/etc/yourOS` directory and run the `run_as_root` script.

   This script does several things, including creation of the new `"tango"` user and its home directory[3]. If `tango` user already exists, this step is skipped, so it is safe to run the script many times. The script also copies the entire server distribution to the server home directory (if it is not already there). Further, the script installs all boot-time scripts for a particular flavor of Unix.

   The first instance of the TI Server starts on the default port number 12000.

3. If you wish to run more than one instance of the server, run the script:

   ```
   run_as_root_for_extra_instance port_number
   ```

   This script takes port number as a parameter. It does not matter if you run the script from the existing or newly created directory (see item 2 above). This script will install boot-time scripts for additional TI server instance running on the given port number. TI server instances are recognized by the port numbers on which they are listening for connections

4. For each server instance you wish to start, run `start_tis port_number` command. The script is located in the `WebWisdom/Tango-server-2.0.0.9-unix/admin` directory:

[3] The home directory is `/usr/people/tango` on Irix and `/opt/tango` on Linux and Solaris.

5. If the server instances started correctly, they are also expected to start automatically during system boot time. If you wish to verify that this is indeed the case, reboot your system. Check if the server is running using `list_tis` command or by inspecting the `logs` directory.

Installation procedures for Irix, Linux and Solaris slightly differ. Consult the startup scripts provided in the server distribution for more details.

3.2 Windows NT

Tango Interactive Server is installed as a Windows NT service. The installation procedure is completely automatic. The server is distributed as a self-extracting executable archive. Download the distribution or copy it from your CD-ROM to a temporary disk file, execute the file, and follow installer's directions. In addition to the TI Server files, the procedure installs Sun's Java Runtime Environment. (JRE).

Since the server runs as NT service, boot-time restart is provided automatically by the operating system, and no further action is needed during server installation.

In addition, bear in mind that an NT services **is not** started from an icon or from command line. After installation, TI server should be up and running without user intervention. To start and stop the service you have to use Control Panel “Services” applet:

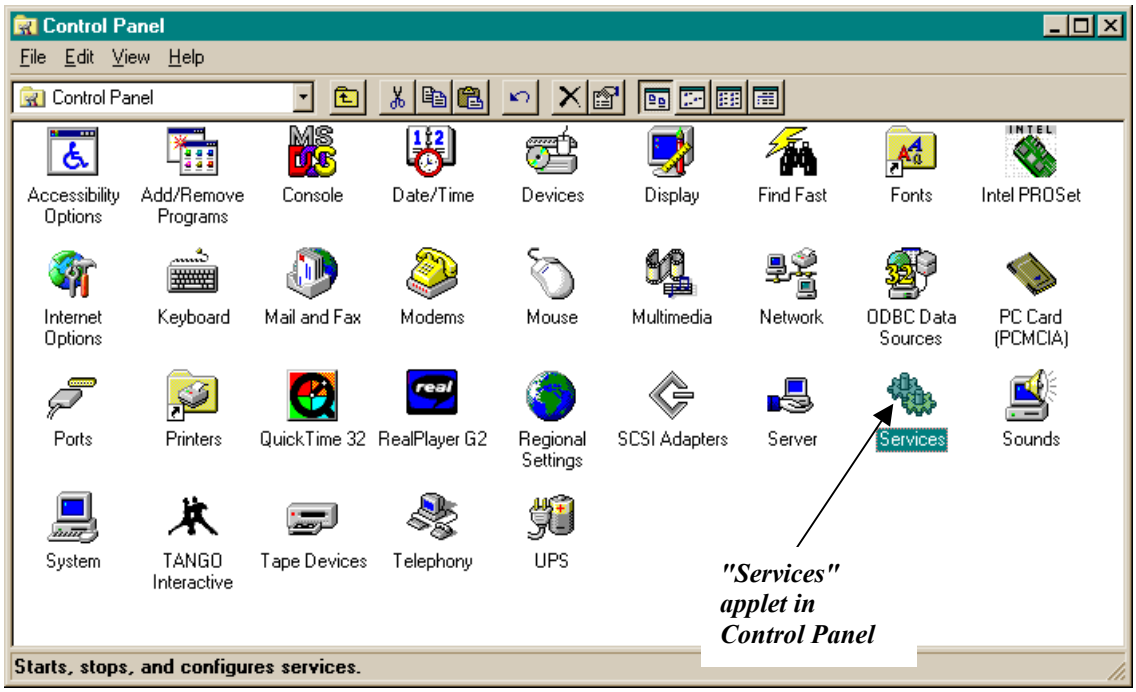

Figure 1: “Services” applet in Control Panel

To verify if Tango Interactive services have properly started, double click the “Services” applet in Control Panel. You should see the window as shown in Figure 2 below.

Tango Interactive *service* can control multiple *server* instances (see Section 5.1 below). The service itself runs as a separate process; every server instance, including the TI Mail Server, spawns an independent process. Figure 3 below shows Task Manager window with four highlighted processes: `TMservice.exe`,

`TangoService.exe`, and two `jrew.exe`[4]. `TMservice and TangoService` processes are Windows NT services, which can be started/stopped using "Services" applet. If the server was started properly, there should be at least two `jrew.exe` processes: one TI Server, and one TI Mail server. There may be many TIServer `jrew.exe` processes; they are managed by the Tango Interactive Control Panel applet (see Section 5.3)

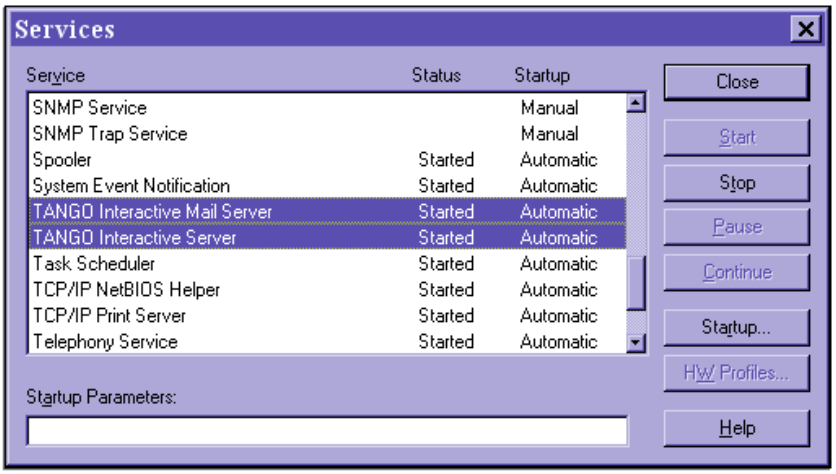

Figure 2: "Services" applet with two started Tango Interactive Server services

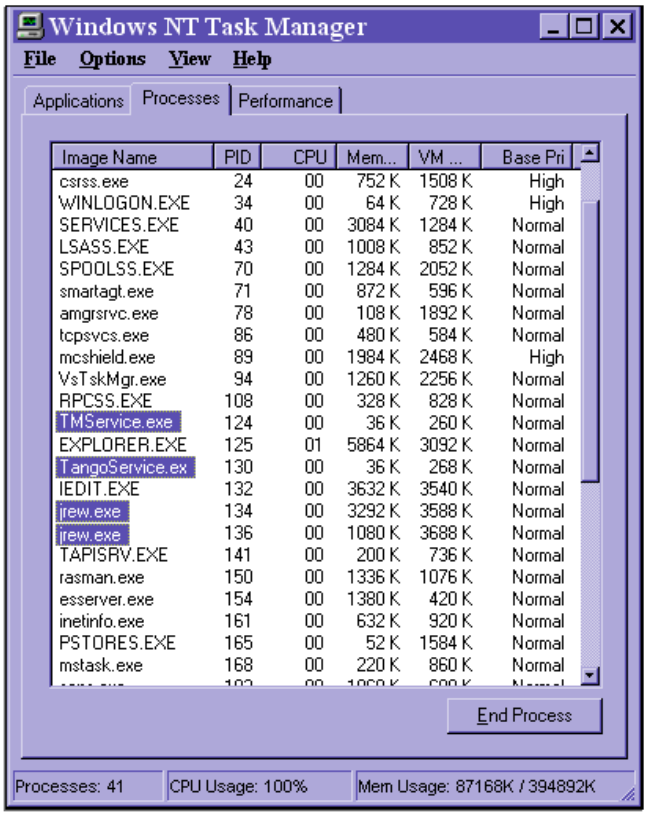

Figure 3: Task Manager with marked Tango Interactive Server processes.

[4] Each `jrew.exe` process is a Java runtime running actual server code: TI Server or TI Mail Server.

4 Server Configuration Files

Tango Interactive Server uses two configuration files: the license file and user database configuration file. These files must be installed before server can start.

4.1 License

A valid license is required for running TI Server. The server will not start without valid license file. The license file must be installed in the directory from which the server is started. If the TI Server cannot find the license file, it will terminate with appropriate message in the log file (see `SERVER_INIT1` tag description in Section 6). The TI Server license may impose limitations on the period during which the server can be used *(expiration date)* and/or on the number of active, concurrent users *(user number limit*). The license limitations are listed in the server log file (see `SERVER_INIT1` and `SERVER_INIT2` tags descriptions in Section 6.3).

The license file is always called `license` and it must be placed in the directory from which the server is started. Location of this file *cannot be configured*.

The license file is coded in ASCII. You cannot edit it, however. Any attempt to modify server license file will incapacitate the server.

It is possible to run a cluster (multiple instances) of server on a single machine (see Section 5.1), as long as each server uses unique port number. The number of concurrent instances is also limited by the license file. All servers in the cluster share the same license file, but they may have different user databases. Hence, multiple server instances can support different communities, projects, or classes.

4.1.1 License expiration

After the license expiration date, Tango Interactive Server will not start. The information about invalid license will be displayed during the startup attempt and stored in the log file. If the license expires while server is running, the server will continue operation but new users will not be accepted and appropriate message about expired license will be displayed by the Session Manager). Information about login failure will also be stored in the log file (see USER_LOGIN tag description in Section 6.3).

4.1.2 Concurrent users number limit

Tango Interactive Server will not accept more concurrent users than the limit defined in the license. When a new user tries to enter the system and if accepting this user would exceed the license limit, the access will be denied and the Session Manager will display appropriate information. Information about login failure will also be stored in the log file (see `USER_LOGIN` tag description in Section 6.3).

4.1.3 Obtaining TI Server license

The license is issued for a specific computer identified by the **IP address of the machine's primary network interface**. Three types of licenses are available:

- **Permanent license**: Such licenses are only available to WebWisdom.com partners
- **Production license**: if you have purchased the system, you will receive, via e-mail, a production server license. Production licenses have no expiration date, but they may set limits on the number of concurrent users and number of server instances.
- **Evaluation license**: the server package may come with an evaluation license. Standard server packaging contains with a one instance, 2-users license, provided solely for the purpose of

verification of the correct server installation. To obtain evaluation license you need to e-mail license@webwisdom.com using the form available on our web site, http://www.webwisdom.com/license_application.html. You must fill all the data fields in the form. We will e-mail the server license installer to the address provided in your application[5]. Evaluation licenses are always time-limited, and they usually impose limit on the number of concurrent users.

If you wish to move your server to another machine, or if the IP address of your machine has changed, you will have to apply for a new license file. *License modifications are not available for evaluation licenses.*

During startup procedure, Tango Interactive Server compares IP address of the machine with information encoded in the license file. If the addresses differ, Tango Interactive Server will not run and the information about invalid license is recorded in the log file (see `SERVER_INIT1` tag description in Section 6.3).

4.2 User Data Base

The user database contains information about the users of the specific system. It contains name, password, status, full name, and e-mail address of each user. Tango Interactive Server uses part of this information (name and password) to grant or deny the access to the system. User name and the remainder of the data is sent to the Session Manager and made available to other Tango Interactive users. In order to activate system access control, the Tango Interactive Server must be provided with the location and name of the user database file upon startup and the user database file must exist.

Current server administration procedures assume that the user database is stored in the server startup directory under the name `users_portnumber.tui`

If the name of the user database file is not provided, *or if the file does not exist*, the TI server will start in the "open" mode, i.e., there will be no admission control and all users trying to connect will be admitted with arbitrary user IDs. Missing user database file *will not generate error message*! To create a secure server, you must have user database file in place before your start the server.

The user data file may contain more user entries than the user limit encoded in the license. However, the number of active (logged in) concurrent users may not exceed license limits.

Tango Interactive Server reads the information stored in the user database file during startup procedure. Therefore, any modifications of the user data file made while the server is running will have no effect until the server is restarted. Note that server restart causes all existing collaborative sessions to be terminated.

4.2.1 Security considerations

The passwords in the user data file are encoded using SHA message digest algorithm, which applies secure one-way hash function to the strings. It means that user passwords cannot be retrieved directly from the string present in the user database file. However, a potential intruder can discover a password by running the digest algorithm on a large number of words and comparing results with the user password. In order to avoid such situation, the access (reading and writing) to the directory with user data files should be granted only to the server administrators. To minimize possibility of breaking in, the passwords used for TI server should conform to general security policy defined for the system accounts.

Current release of the TI server can only access user database stored in a local file. The upcoming release will support data sources such as relational database, an XML-compliant database stored on an HTTP server, and an LDAP server.

[5] We will NOT e-mail licenses to "free e-mail addresses" such as hotlink.com, yahoo.com, etc. To obtain the license you must provide us with a "real" e-mail address provided by your company, college, or other non-virtual organization. If you don't have such an address, you must provide us with your name and phone number. We will e-mail the evaluation license only after we have verified your identity.

4.2.2 User database file data format

The user data file has the following format:

- Information about each user is stored in the user database file as one line
- The line has the following structure:

```
name:password:role:fullname:e-mail
```

- All lines that start with # character are treated as comments and are not interpreted.

As one can see, this format is very similar to the format of the Unix `/etc/passwd` file.

The fields in the line have the following semantics:

Field	Presence	Information
`Name`	required	User identifier representing user in the system
`password`	optional	User password used during login procedure. If the field is empty, the user is assigned empty password
`role`	Educational server: required General server : optional	Describes user role in the system, e.g. professor, student etc.
`fullname`	optional	Full name of the user
`e-mail`	optional	E-mail address (or other contact information)

Example of the user data file is presented below:

```
#User data file for class CIS345
#professor:
john:1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1:prof:John
Smith:jsmith@aaa.bbb.edu
#students:
steve:2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2:student:Steve Morgan:ddd@aaa.hhh.edu
mary:3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3:student:Mary Johnson:ppp@iii.kkk.com
#end of file
```

4.2.3 Adding user entries to the database

User database file can be edited using the User Management tool (Figure 4). Manual editing of the file is discouraged.

User Management tools is a Java utility, and, as such, it is identical on both Unix and Windows platform. On Unix, the tool is started using the `Manager.csh` script placed in the server `admin` directory. On Windows NT, `Manager.bat` batch file is provided in the server installation directory.

In the current release, the tool only enters data into a flat file user database. User database files should be stored in the server startup directory under the name `users_portnumber.tui` (see Section 5.2.2) where `portnumber` is the port on which the server instance using this particular user database file is running. (Strictly speaking, the above naming convention is *required* on Unix and only *recommended* on Windows NT)

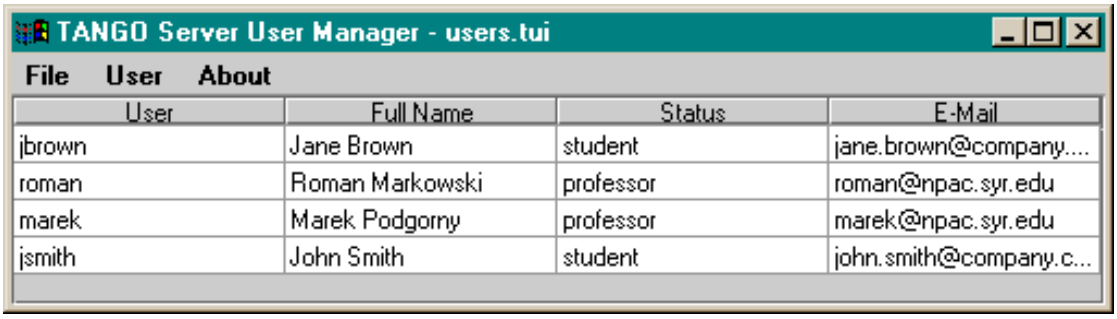

Figure 4: User Manager tool for Tango Interactive Server

The tool displays all users registered in the database, and all the attribute fields with exception of user passwords. To open another user database file, use `File/Open` menu

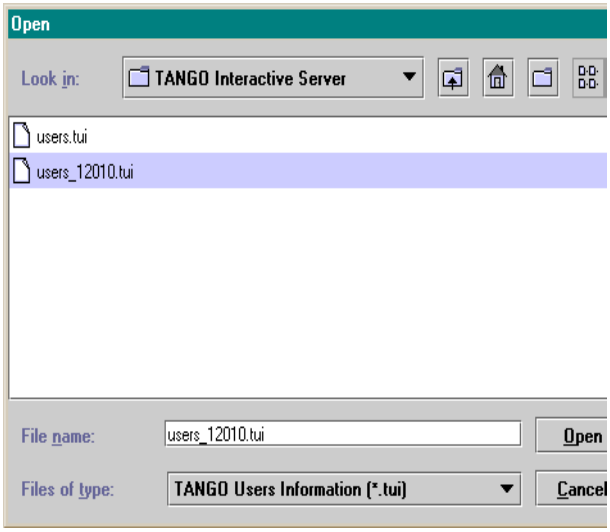

Figure 5: Open File dialog of the User Manager

In the Figure 5 above, we select the file `users_12010.tui`, `which` will be used to store user database information for the server instance running on port 12010.

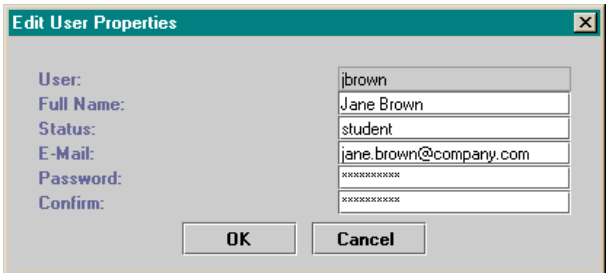

Figure 6: Edit User Properties box of the User Manager

`Edit User` menu item allows system administrator to modify user data entries. Other functionality, such as `Delete User` etc. is self-explanatory.

Remember that for the user database changes to take effect, the server instance must be restarted.

5 Server Administration

In addition to proper setup of the configuration files discussed in Section 4 above, TI server administration may involve a number of tasks, such as:

- Stopping and restarting the server
- Changing server startup parameters such as listener port number, log file location, and user database location
- Starting and managing multiple instances of the server
- Removing TI Server software from the system

5.1 Server Clustering

It is possible to run several instances of the TI server on one workstation. This feature is useful if the TI system is used to support several classes in a virtual university, or several project communities within an Intranet. The number of server instances a user can run depends on the purchased license. All evaluation licenses limit number of concurrent server instances to one.

If multiple server instances are used, they use different listener port numbers, and different log files (Section 6). They might or might not use different user database files.

All server instances share the same `license` file. Hence, all the servers have the same expiration date (if any), and the same number of concurrent users. The maximal number of concurrent server instances is encoded independently by the license installation utility. In addition, all server instances share the same software installation directory. On Windows NT, a Control Panel applet is provided to manage TI Server instances. On Unix, we provide a set of server management shell scripts.

5.2 TI Server Administration on Unix

This section describes TI Server administration on Unix platforms.

5.2.1 Starting, stopping, and restarting the server

5.2.1.1 Manually started server instances

A shell script is provided to simplify the task. Refer to Section 3.1.1, item 4 (page 10), for information about manually starting TI Server.

Manually started server can only be stopped using Unix `kill` or `killall` commands. You must find process ID (PID) of the server using `ps [-fu][wax][-wax] yourUID` command on Irix, Linux, and Solaris, respectively. There are no server administration scripts for manually started server instances.

5.2.1.2 Server instances started at the boot time

If your Unix-based server has been installed by a system administrator, you can use boot-time scripts to start and stop the server. The scripts are located in the `WebWisdom/Tango-server-2.0.0.9-unix/admin` directory. Following commands are available:

- `list_tis` takes no arguments and it simply lists all running TI Servers in the familiar "`ps`" format.
- `start_tis` takes server port number as argument. The command starts server instance associated with the specified port number
- `stop_tis` takes server port number as argument. This command stops server instance associated with the specified port number.

- `stat_tis` takes server port number as argument. This command checks and prints status of the server instance associated with the specified port number.

With exception of `list_tis`, all other commands require that boot-time startup scripts for each instance of the server have been installed using either `run_as_root` or `run_as_root_for_extra_instance` scripts.

All scripts provide self-explanatory diagnostics.

5.2.2 Naming of the TI Server configuration files

Server license is always provided in the `license` file located in the `WebWisdom/Tango-server-2.0.0.9-unix` directory. This file *cannot be renamed or moved*, and it ***should not be edited by the user*** under any circumstances. In addition, the server-licensing scheme requires another file, `Leveler`, collocated with the `license` file.

User database files are always named `users_port_number.tui`. The initial server distribution comes with the `users_12000.tui` file. This file contains two example user accounts, and it is associated with the TI Server v. 2.0 default port number (12000)

Every time a server instance is started, a new log file is instantiated. The log files are written into `WebWisdom/Tango-server-2.0.0.9-unix/logs` directory. The names of the log files follow the following syntax: `mm.dd.yy_hh:mm_portnumber.log`, where the time stamp refers to the server startup time.

5.2.3 Removing TI Server software from the system

To remove TI Server software form the system, proceed as follows:

1. Remove the `WebWisdom` directory and all its contents
2. Remove `/etc/ini.d/Tango20*` files
3. Remove `/etc/rc0.d/*Tango20*` files
4. Remove `/etc/rc2.d/*Tango20*` files (`/etc/rc3.d` on Solaris)
5. On Irix, remove `/etc/config/Tango20*` files

You will need root access to perform operations 2-5.

5.3 TI Server Administration on Windows NT

On Windows NT, Tango Interactive Server administration is supported by a Control Panel applet. The applet installs automatically what the server is installed. The applet allows system administrator to start and stop TI Server instances from a simple graphical user interface. It also sets up server parameters such as server executable location, server ports, log file location, user database locations and SMTP server used by Tango Interactive mail.

Figure 7: TI Server control applet in the Windows NT Control Panel

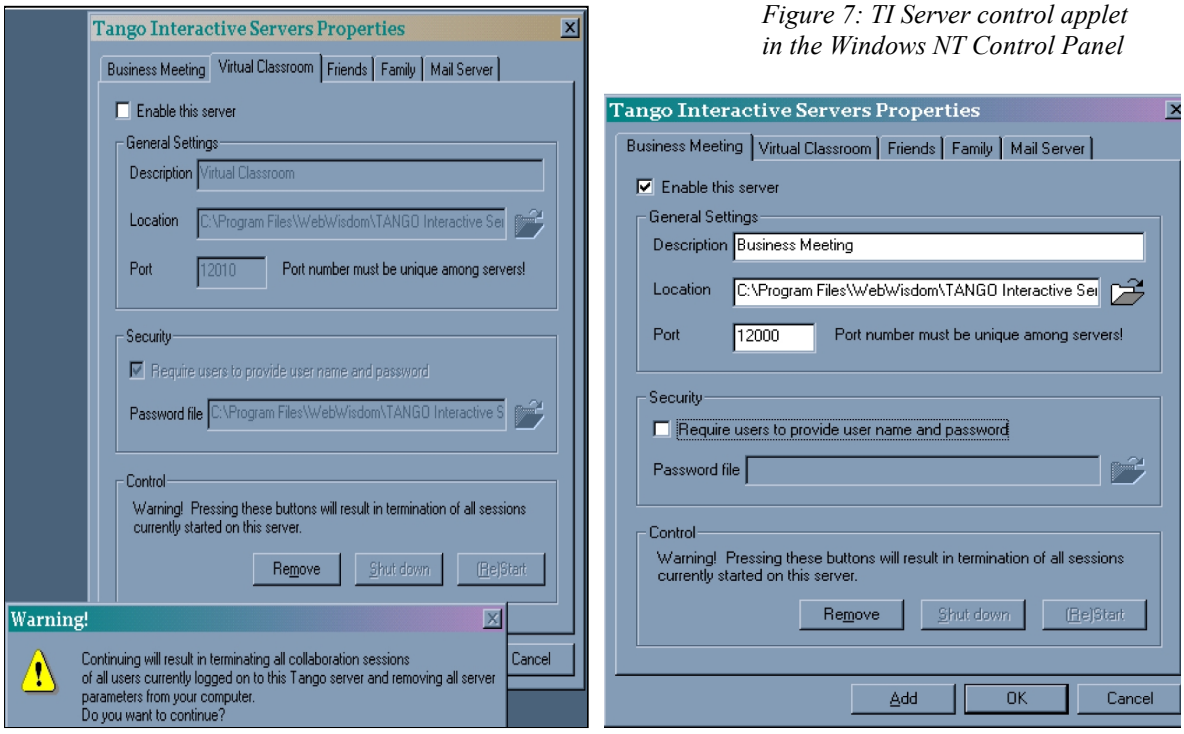

Figure 8: Tango Interactive Service administration applet running under Windows2000

Figure 9: Cluster control - only licensed number of servers can run concurrently

Figure 8 above shows TI Server control applet. Two server instances have been defined. The "Business Meeting" instance (right panel) is an open server running on port 12000. The "Virtual Classroom" instance (left panel) is a secure TI server running on port 12010. The "Security" subsection defines the location of the instance user database. The available controls have the following functions:

- `Shutdown` button stops the instance. `(Re)Start` button is used to re-initialize the server after the user database was modified, or to start a non-active (previously stopped) instance.
- `Remove` button will remove server instance from the list of server instance handled by the service (action shown in Figure 8, left panel)
- `Add` button creates new server instance and allows specification of instance parameters.

Caveats:

- Stopping (removing) the last active instance of the server will stop the entire service. To restart the service, use Control Panel "Services" applet (Section 3.2).
- If the Tango Interactive service is not running, `Shutdown` and `(Re)Start` actions have no effect
- One can define any number of servers, but only the licensed number of server instances can be concurrently active (Figure 9). If you have license for N instances, the applet will not let you check more than N `"Enable the server"` checkboxes.
- Each server instance must run on a different, unique port number. We recommend port numbers >12000. In the current version, the applet does not check if the port numbers are unique and it won't report an error, but server instances with duplicate port numbers will not start.

5.3.1 Tango Interactive Mail Server

Each Tango Interactive service includes an instance of a Mail Server. This is a dedicated process, providing a gateway to mail services for all Tango Interactive applications. For instance, if a user decides to mail the contents of a chat session to all members of the community, Tango Interactive client will connect to the Mail server to obtain services necessary to send the message. TI Mail Server provides a number of services, including MIME support. It also allows all users of the community to send mail using the mail server of the organization running Tango Interactive service, which otherwise might be inaccessible to them due to the frequently imposed anti-spamming measures.

TI Mail server use is entirely transparent to the users. To function properly, the TI Mail server requires location of an SMTP server that will accept messages from TI user community. This is illustrated in Figure 10 below:

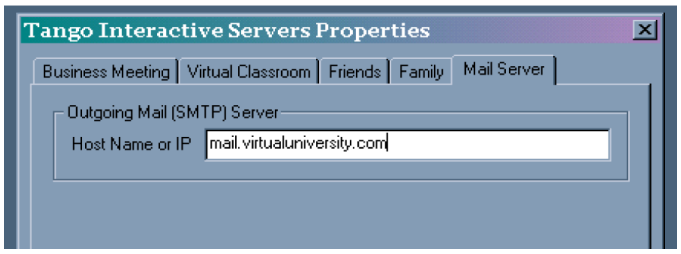

Figure 10: Configuration of the TI Mail Server

5.3.2 Troubleshooting

Two tools are available to help troubleshooting Tango Interactive service and servers.

- If you have problems with the service itself (not starting, hanging, throwing error messages), start `Event Viewer` form the NT Administrative Tools menu, and, from the `Log` menu of the tool, select `Application`. You should be able to find messages related to Tango Interactive service.
- If the service starts but any of the instances fails to start, consult TI server log files. The logs are stored in the server installation directory (typically, `c:\Program Files\WebWisdom\Tango Interactive Server\*_portnumber.log`)

5.3.3 Removing TI Server from the system

To permanently remove TI Server software from your system, proceed as follows:

- Stop the service using "Services" applet. This is important, since otherwise certain files being in active use will not be removed!
- Use "Add/Remove Software" applet in Control Panel to remove Tango Interactive Server. Find "Tango Interactive Server" entry and press "Remove" button. Never remove server files manually!

5.4 TI Server auto-registration procedure

Tango Interactive server registers itself upon startup with a registration server (sometimes also referred to as *meta-server*). In the current release, TI server passes to the registration server the following information: host name or IP address of the machine running the server and the port number. Registration procedure creates an entry in the local server log file (see `SERVER REGISTRATION` message in Section 6)

If the meta-server cannot be reached for whatever reason, TI will start and operate normally, but it will write appropriate message to the server log.

The registration service is provided for several reasons:

- Providing one central service for tracking all running TI servers for server administration and system security purposes
- Architectural support for future server-hoping and directory services, support for distributed communities, and automatic collaborators discovery.

At present, the meta-server is only available at WebWisdom.com. Registration information is protected and treated as confidential.

6 Event Logging

6.1 Essential Tango Interactive Concepts

This section presents several basic Tango Interactive concepts. Understanding of these concepts is essential for proper interpretation of the data stored in the server log file.

Application is a collaborative tool used by the user to communicate with other users. Chat or Whiteboard are examples of Tango Interactive application. The Tango Interactive system can communicate with applets, Java script applications and with applications that run outside Netscape browser. Each instance of application started by the Tango Interactive user has its unique identifier – AID (Application Identifier).

Session is a set of Tango Interactive application instances of the compatible type that exchange information between each other. Each application instance belongs to a different user. Exchange of information is achieved by sending and receiving messages e.g. chat session enables exchange of text information between chat applications that are started in the same session. The communication between applications in the same session is transparently provided by the Tango Interactive system. Each session has its unique identifier – SID (Session Identifier).

Participant is a user that takes part in the session. Participant exchanges information with other participants using the application. Each participant can have only one application instance running in a given session. However, the user can concurrently participate in many application sessions. This includes multiple concurrent application sessions of the same type.

Master is a participant that has special privileges in the session. Master controls the state of the session, approves new session participants or starts applications for other participants. The user that started session becomes the master of the session automatically. The master status can be transferred to other users.

6.2 Messages generated by Tango Interactive Server[6]

Tango Interactive Server generates various types of messages. The error messages inform about errors in the server configuration. The system event messages reflect activities of Tango Interactive users. All messages are written to log files. The files can be post-processed for various reasons, e.g., to gather usage statistics or for billing purposes.

6.2.1 Error messages

If provided startup parameters are not valid or the server is unable to open the log file, the appropriate error messages will be displayed on the standard output and server will terminate. Consult log file if your server does not appear to work properly.

6.2.2 System events

If the Tango Interactive Server is configured and started correctly, all messages about the Tango Interactive system events will be stored in the server log file. All messages are time-stamped. The event messages can be divided into several categories:

1. Server event:
    - Server start and initialization
    - Server registration

[6] Please, note that the description provided in this section is not equivalent to the TI system protocol definition. The information herein should not be used to develop applications communicating with the system. In general, TI system application modules never communicate directly with the TI server.

2. User events:
    - User enters the system
    - User leaves the system
3. Session events:
    - Session starts
    - Session terminates
4. Application events:
    - User joins session
    - User leaves session

A more detailed description of logged events is presented below:

Server start and initialization
Tags: `SERVER_INIT1, SERVER_INIT2, SERVER_INIT3`
The event is recorded when the server starts. Entry in the log contains information about server version, host on which the server is running, IP address, initialization status, used configuration file, expiration date and user limit for server license. In addition, it provides contact information for accessing Tango Interactive support. The event entry contains timestamp.

Server registration
Tags: `SERVER_REGISTER`
The event is recorded the server performs registration procedure. Entry in the log contains the information about the hostname and the port of the registration server and status of the operation. The event entry contains timestamp.

User enters the system
Tag: `USER_LOGIN`
The event is recorded when a new user enters the system. Entry in the log contains information about user name used in login procedure, unique user ID used by the system, and user status. It also informs about machine from which the user connected to the server (hostname and IP address) and general status of the operation. The event entry contains timestamp.

User leaves the system
Tag: `USER_LOGOUT`
The event is recorded when a user leaves the session. Entry in the log contains information about user name, user unique ID used by the system, and user status. General status of the operation is also provided. The event entry contains timestamp.

User starts a session
Tag: `SESSION_START`
The event is recorded when a user starts a session. Entry in the log contains information about the name of the user that started the session, user ID, application type of the applications started in the session, session ID, and status of the operation. The user that started the session becomes automatically a master of the session. For description of master status, see section 5. The event entry contains timestamp.

User terminates a session
Tag: `SESSION_TERM`
The event is recorded when a session is terminated. The session is terminated when the session master leaves the session. If other users were present in the session, they automatically leave the session. This event is preceded by the set of ‘session leave’ events (described below), which are also recorded in the log file. The entry in the log specifies the name of the user that terminated the session (master), user ID, session application type, session ID, and operation status. The event entry contains timestamp.

User joins a session
Tag: `SESSION_JOIN`
The event is recorded when a user joins a session. The entry in the log specifies the name of user that joins the session, user ID, the name of the session master and master's user ID, application type, session ID, and application ID. Status of the operation is also included. Session join operation can fail for two reasons. The session master may deny access to the session. Second case is more complex and deals with the situation when the session master tries to remotely start application for the user. If the target user does not agree for opening applications remotely, the remote session join initiated by the session master will fail. The event entry contains timestamp.

User leaves a session
Tag: `SESSION_LEAVE`
The event is recorded when a use leaves the session. The entry in the log specifies the name of user that leaves the session, user ID, the name of the session master and master's user ID, application type, session ID, and application ID. Status of the operation is also included which is always OK – each user can leave the session. The event entry contains timestamp.

6.3 Log File Format

The purpose of the Tango Interactive Server log file is to provide system manager with the information about events that take place in Tango Interactive system. Using this information, it is possible to determine who uses the system, what applications are used, how much time users spent in the system, etc. The Tango Interactive Server log file messages follow strictly defined format. This enables system administrators to implement customized scripts to analyze the data, for instance for billing purposes.

Each event is described by one line in the log file. The line starts with the event tag, which is followed by the list of event specific data entries of the form `FIELD_KEY=VALUE`. The log file always starts with startup and initialization information.

As we mentioned above, each type of the system event has specific entry in the server log file:

Message tag	Information
`SERVER_INIT1`	Server initialization: version, hostname, IP address, port and initialization status
`SERVER_INIT2`	Server initialization: passwords and license
`SERVER_INIT3`	Server initialization: contact
`SERVER_REGISTER`	Server registration
`USER_LOGIN`	User entered the system
`USER_LOGOUT`	User left the system
`SESSION_START`	New session was started by the user
`SESSION_TERM`	Session was terminated by the user
`SESSION_JOIN`	User joined the session
`SESSION_LEAVE`	User left the session

Following sections describe entries format for each event message:

SERVER_INIT1

Field	Value	Meaning
VERSION	String	Version of the server
HOST	String	Hostname of the machine on which the server is running
IP	String	IP address of the machine
PORT	Integer	Port number on which server waits for new connections
STATUS	FAILED_NO_LICENSE	License file not present, server terminates
	FAILED_INVALID_LICENSE	License not valid, server terminates
	FAILED_PORT_BUSY	Port is busy, server terminates
	FAILED_NO_PASSWDFILE	User data file cannot be found even though it was specified in server command line, server terminates
	OK	Server started successfully

SERVER_INIT2

Field	Value	Meaning
PASSWORDS	String	Filename of the user data file
	NONE	Server started without user data file
	UNDEFINED	Parameter could not be determined, server execution was terminated before value of this parameter was evaluated
EXPDATE	WW MM DD HH:MM:SS TZ YY	Expiration date of the server license. Format: day of week, month, day of month, hours, minutes, seconds, time zone, year
	UNLIMITED	License does not define expiration date
	UNDEFINED	Parameter could not be determined, server execution was terminated before value of this parameter was evaluated
LIMIT	Integer	Limit on number of active users connected to the server determined by the license
	UNLIMITED	License does not define any limits on the number of active users
	UNDEFINED	Parameter could not be determined, server execution was terminated before value of this parameter was evaluated
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

SERVER_INIT3

Field	Value	Meaning
COMPANY	String	Name of the company that released the server – WebWisdom.com
CONTACT	String	E-mail address that should be used for contacting technical support

SERVER_REGISTER

Field	Value	Meaning
HOST	String	Hostname of the machine running the meta-server
PORT	Integer	Port number used by the meta-server
STATUS	FAILED_CANNOT_CONNECT	Tango Interactive server was not able to connect to the registration server
	OK	Tango server successfully connected to the registration server and performed registration procedure
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

USER_LOGIN

Field	Value	Meaning
NAME	String	User name as provided by the user during login procedure
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
USRSTAT	String	User status as defined in server configuration file
	Null	Server does not access user data file, the information is not available
HOST	String	Name of the host from which the user connected to the server
IP	String	IP address on the host from which the user connected to the server
STATUS	FAILED_LICENSE_EXPIRED	Server license expired, user could not log in
	FAILED_LIMIT_EXCEEDED	Server license limit for number of active users exceeded, user could not log in
	FAILED_PRESENT	User with the same name already entered the system
	FAILED_PASSWORD	User did not provide correct password
	OK	User entered system successfully
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

USER_LOGOUT

Field	Value	Meaning
NAME	String	User name as provided by the user during login procedure
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
USRSTAT	String	User status as defined in user data file
	Null	Server does not access user data file, the information is not available
STATUS	CONNECTION_BROKEN	User removed from the system because of broken connection between the server and client machine
	TIMEOUT	User removed from the system because server did not receive any response from the client for more than 5 minutes
	OK	User logged out successfully as a result of user action
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

SESSION_START

Field	Value	Meaning
NAME	String	Name of the user that starts new session
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
AT	Integer	Application type identifier
SID	Integer	Unique session identifier, assigned dynamically by the server to the session when it is created
STATUS	OK	Session was created successfully. Any user can always create new session
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

SESSION_TERM

Field	Value	Meaning
NAME	String	Name of the user that terminates the session
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
AT	Integer	Application type identifier for the session
SID	Integer	Unique session identifier assigned dynamically by the server to the session when it is created
STATUS	OK	Session was terminated successfully
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

SESSION_JOIN

Field	Value	Meaning
NAME	String	Name of the user that joins the session
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
MASTER	String	Name of the session master
MUID	Integer	UID of the session master
AT	Integer	Application type identifier for the session
SID	Integer	Unique session identifier assigned dynamically by the server to the session when it is created
AID	Integer	Unique application identifier, assigned dynamically by the server to the new application in the session
STATUS	FAILED_DENIED	Session master denied access to the session, user could not join the session
	FAILED_REMOTEDENIED	User did not agree to join the session, user did not join the session
	OK	User joined the session successfully
TIME	WW MM DD HH:MM:SS TZ YY	Timestamp of the message in the format: day of week, month, day of month, hours, minutes, seconds, time zone, year

SESSION_LEAVE

Field	Value	Meaning
NAME	String	Name of the user that leaves the session
UID	Integer	Unique user identification number, assigned dynamically by the server to the user during login procedure
MASTER	String	Name of the session master
MUID	Integer	UID of the session master
AT	Integer	Application type identifier for the session
SID	Integer	Unique session identifier, assigned dynamically by the server to the session when it is created
AID	Integer	Unique application identifier assigned dynamically by the server to the new application in the session
STATUS	OK	User always can leave the session

7 Support

For support please contact: support@webwisdom.com. In case of trouble, provide as much detail as possible, including OS version, service pack version (if any), Java VM version, and attach your license, user database, and server log files.

For evaluation licenses, we only provide very limited support. We will respond to one e-mail message per user.