SGI® OpenGL Vizserver™ User's Guide

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New Features in This Guide

- Updated the list of system requirements

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About This Guide

Welcome to OpenGL Vizserver!

With OpenGL Vizserver, you can interact with images and three-dimensional models utilizing the capabilities of any of the following remote Silicon Graphics servers:

- SGI Onyx 3000 series with InfiniteReality3 or InfiniteReality4 graphics
- SGI Onyx 3000 series with InfinitePerformance graphics
- SGI Onyx 300 with InfiniteReality3 or InfiniteReality4 graphics
- Silicon Graphics Onyx2 with InfiniteReality2, InfiniteReality3, or InfiniteReality4 graphics
- Silicon Graphics Octane or Octane2
- Silicon Graphics Fuel

OpenGL Vizserver transmits rendered images over a high-speed data pipe, running OpenGL applications with large RGB datasets at up to 20 Hz. Using your local workstation, you can take advantage of any of the above mentioned servers without leaving your desk.

There are two types of OpenGL Vizserver sessions: collaborative sessions and single-user sessions. Single-user sessions involve one client user (usually remote) using a free pipe on the server host. Collaborative sessions allow two distant users, one of them being a local client on the server host running an X server, to display and interact with the same applications in real time.

This user's guide consists of one chapter, "Running OpenGL Vizserver." This chapter provides step-by-step instructions for starting OpenGL Vizserver and interacting with images and three-dimensional models.

Multiplatform Support

OpenGL Vizserver is supported on the following platforms:

- IRIX 6.5.11 or later
- Solaris 2.6 or later
- Linux Red Hat 6.2 or later
- Windows NT 4.0, Windows 2000, Windows XP

The images that illustrate this user's guide are taken from snapshots of the IRIX version. The shape and aspect of the window might vary from one platform to another, but the windows and options are the same.

Related Publications

The following document contains additional information that may be helpful:

- *SGI OpenGL Vizserver Administrator's Guide*

Obtaining Publications

To obtain SGI documentation, go to the SGI Technical Publications Library at the following URL:

`http://docs.sgi.com`

Conventions

The following conventions are used throughout this document:

Convention	Meaning
`command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, programming language structures, and URLs.

variable	Italic typeface denotes variable entries and words or concepts being defined.
`user input`	This fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
interface	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, and menus.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

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Running OpenGL Vizserver

There are two types of OpenGL Vizserver sessions: collaborative sessions and single-user sessions. Single-user sessions involve one client user (usually remote) using a free pipe on the server host. Collaborative sessions allow two distant users, one of them being a local client on the server host running an X server, to display and interact with the same applications in real time.

This chapter provides step-by-step instructions for running OpenGL Vizserver. The following topics are covered:

- "Connecting to a Remote Server" on page 1
- "Reserving Graphics Pipes" on page 4
- "Starting a Single-User Session" on page 5
- "Starting a Collaborative Session from a Local Client" on page 9
- "Joining a Collaborative Session from a Remote Client" on page 12
- "Configuring an Active Session from a Remote Client" on page 14
- "Starting an Application from a Client" on page 19
- "Interacting with a Rendered Image" on page 21
- "Stopping an Active Session" on page 22
- "Logging Out" on page 23

Connecting to a Remote Server

The remote host server can be any of the servers mentioned on the previous page with one or more graphics subsystems. OpenGL applications installed on the server perform all image rendering. The server compresses a rendered image and transmits it to your local workstation for viewing.

To connect to the remote host server, follow these four steps:

1. Click the OpenGL Vizserver icon on your desktop, as shown in Figure 1-1.

Figure 1-1 OpenGL Vizserver Icon

Note: You can also enter the command `vizserver` in a command-line window to display the **OpenGL Vizserver** main window.

The **OpenGL Vizserver** main window appears, as shown in the example in Figure 1-2.

The **Host name** field is blank.

The **Status** field indicates that you are currently disconnected from the remote host server.

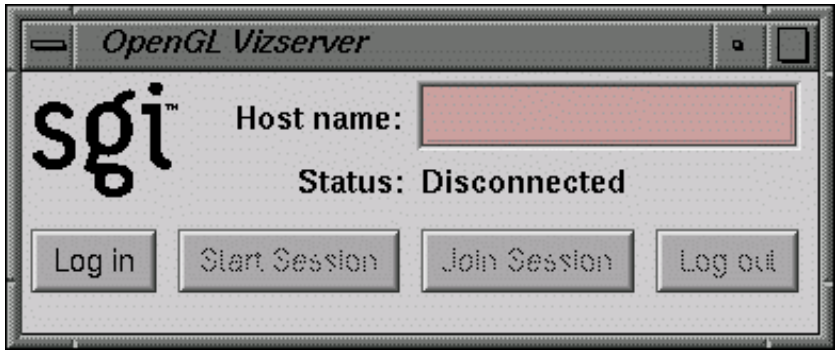

Figure 1-2 **OpenGL Vizserver** Main Window

2. Type the name of any available host server in the **Host name** field.

3. Click the **Log in** button.

   If authentication is required, the **OpenGL Vizserver Login** window appears, as shown in the example in Figure 1-3.

   In some cases, OpenGL Vizserver automatically logs you in, and you do not have to enter a user ID and password.

Figure 1-3 **OpenGL Vizserver Login** Window

4. Log in to the remote host server by entering your user name, password, and any other required information, then click the **OK** button.

   In the **OpenGL Vizserver** main window, the **Status** field now indicates that you are connecting to the remote host server. Once the **Status** field confirms that you are connected, the **Start Session**, **Join Session**, and **Log out** buttons are activated and the **Log in** button is deactivated, as shown in Figure 1-4.

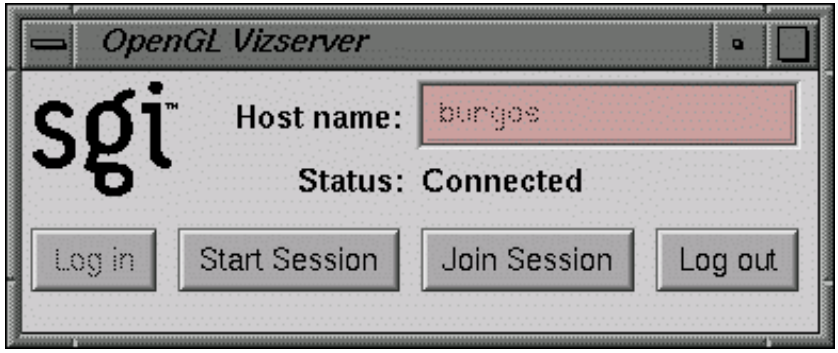

Figure 1-4 **OpenGL Vizserver** Main Window (after Logging In)

The server's hostname can also be entered through the command-line, using the following synopsis:

```
% vizserver -h serverhost
```

Providing the server host, indicated by serverhost, is valid and an OpenGL Vizserver server is running, this option will take you automatically through stages 1, 2, and 3 (that is, connect to the server's host until the login stage where the required login information is needed).

Reserving Graphics Pipes

Note: This is pertinent only for starting a single-user session.

Depending on the server's configuration, you might need to reserve one or more pipes on the remote host before you start a session. Otherwise, the start session operation will fail, with the following error message:

```
Pipe not reserved.
```

A pipe reservation is defined by a time slot (start time and end time), a user name, and the number of pipes to be reserved. In order to add a reservation, you need to use a reservation client. A sample reservation web interface can be started from the following URL:

`http://`*remotehost*`/vizserver/reservation`

The path element *remotehost* is the full name of the remote host where the server is running. For more information about this web interface, see Appendix A, "Reservation Web Interface".

Once you have started a session for which you have reserved enough pipes, this session will be available for use until the end of the time slot. A warning message will be sent to you before the end of the reservation time slot.

Starting a Single-User Session

A single-user session is a session in which a remote client can view and interact with an application that runs and renders on the local host (the server). Only one client can view and interact with the applications in a single-user session. A graphics pipe on the server is allocated for the session's exclusive use.

To start a single-user session, perform the following three steps.

1. Click the **Start Session** button in the **OpenGL Vizserver** main window.

   The **Status** field indicates that the session is starting, as shown in Figure 1-5, and the **OpenGL Vizserver Session Start** window is opened, as shown in Figure 1-6.

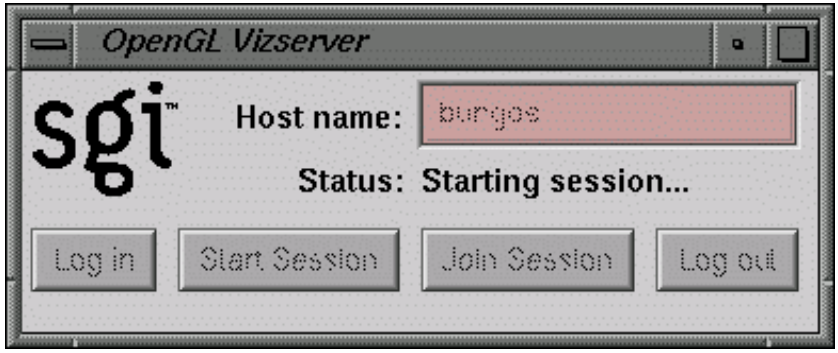

Figure 1-5 **OpenGL Vizserver** Main Window (Session Starting)

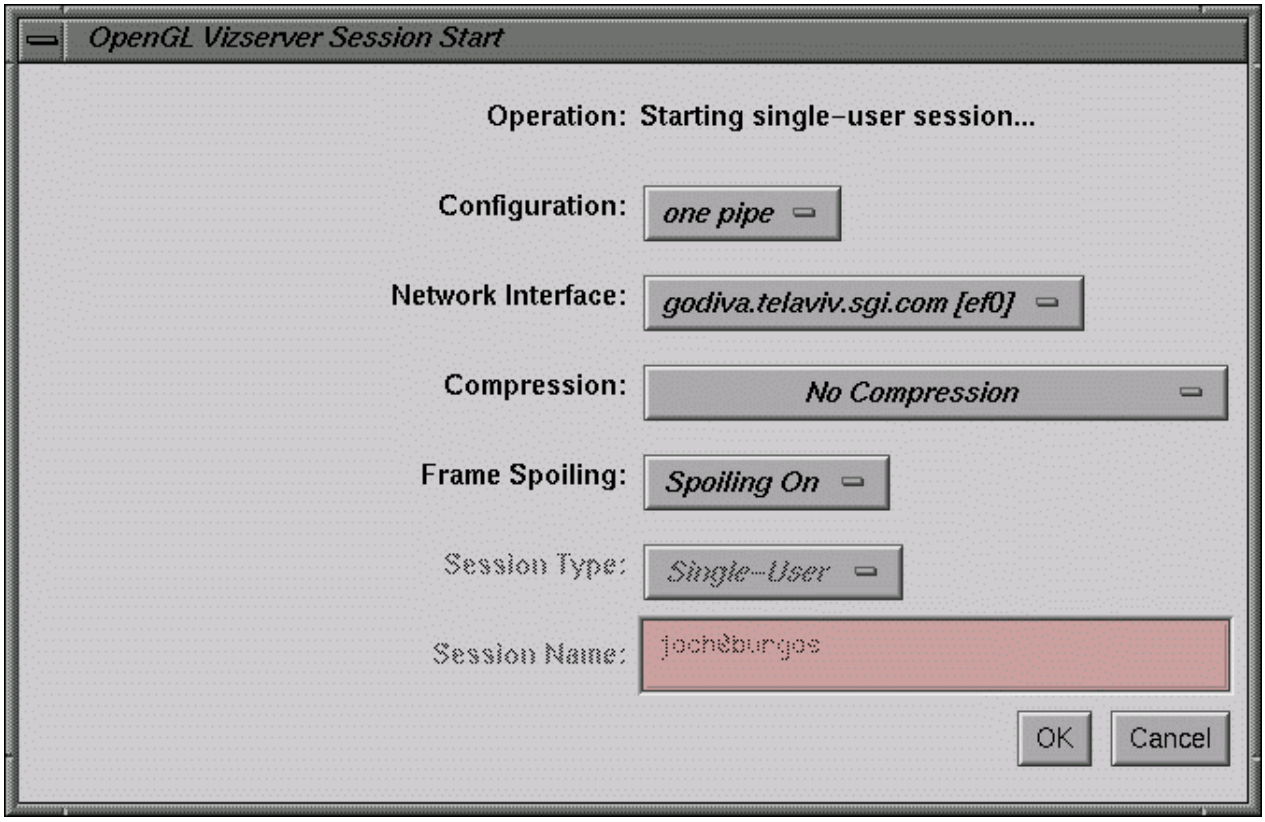

Figure 1-6 **OpenGL Vizserver Session Start** Window (Single-User Session)

2. In the **OpenGL Vizserver Session Start** window, ensure that the option menu **Session Type** is set to `Single`.
3. In the **OpenGL Vizserver Session Start** window, click the **OK** button.

   The **Status** field confirms that the session is active, as shown in Figure 1-7.

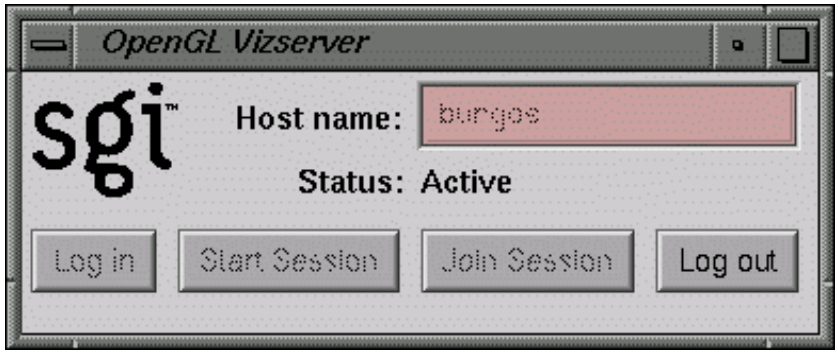

Figure 1-7 **OpenGL Vizserver** Main Window (Session Active)

For a description about configuration and use of the client during an active session, refer to "Configuring an Active Session from a Remote Client" on page 14.

Starting a Collaborative Session from a Local Client

A collaborative session is a session where the applications are displayed on both a local and a remote client and users at both clients can interact in a random fashion with the applications. The pipe being used is one that is already allocated to a running X server. The collaborated application will then be shared by both a local user (working on the server's host) and a remote user. In order for a collaborative session to be active, it must be first started by the local user's client, and then *joined* by the remote user's client.

To start a collaborative session, perform the following four steps.

1. Click the **Start Session** button in the **OpenGL Vizserver** main window.

   The **Status** field indicates that the session is starting, as shown in Figure 1-8, and the **OpenGL Vizserver Session Start** window is opened.

Figure 1-8 **OpenGL Vizserver** Main Window (Session Starting)

2. In the **OpenGL Vizserver Session Start** window, ensure that the option menu **Session Type** is set to `Collaboration`, as shown in Figure 1-9.

   This enables the **Session Name** text field.

Note: The **Session Type** option menu is enabled only in the case where the client is connected to the local server. Remote clients cannot start a collaborative session.

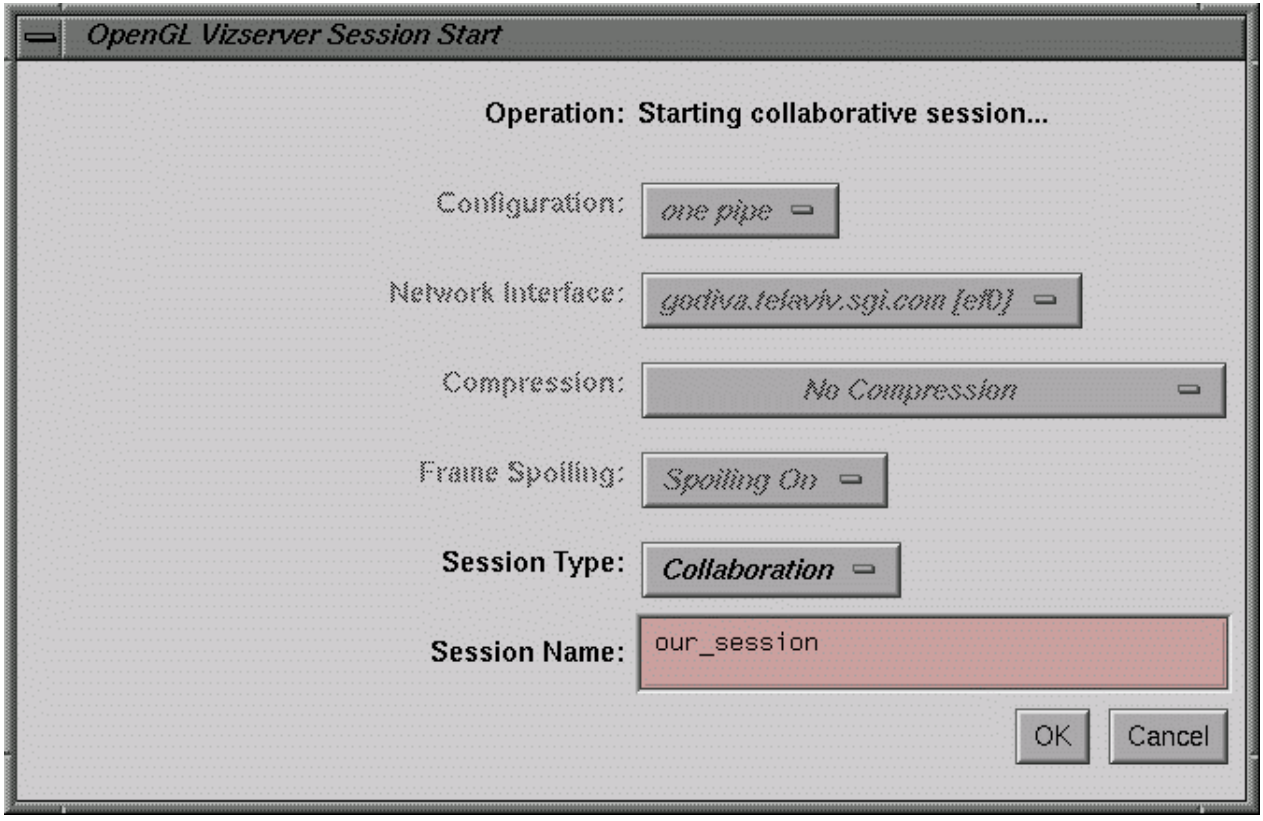

Figure 1-9 **OpenGL Vizserver Session Start** Window (Starting Collaborative Session)

3. In the **Session Name** text field, enter a non-empty name for the collaborative session.

   The remote user must use this session name to join the session.

   The client who starts a collaborative session has the session configurations fields in the **OpenGL Vizserver Session Start** window disabled, because the display will be local and no network or bandwidth setting is needed.

4. Click the **OK** button in the **OpenGL Vizserver Start Session** window.

The session will not be active until the remote user joins the session. The **Status** field in the **OpenGL Vizserver** main window confirms this state of waiting for the second user, as shown in Figure 1-10.

Figure 1-10 **OpenGL Vizserver** Main Window (Waiting for Remote User)

The **OpenGL Vizserver Session Control** window is also opened, with all options disabled except the **Stop session** button. A label in the **OpenGL Vizserver Session Control** window also indicates that the session is waiting for the remote client to join in before being active, as shown in Figure 1-11.

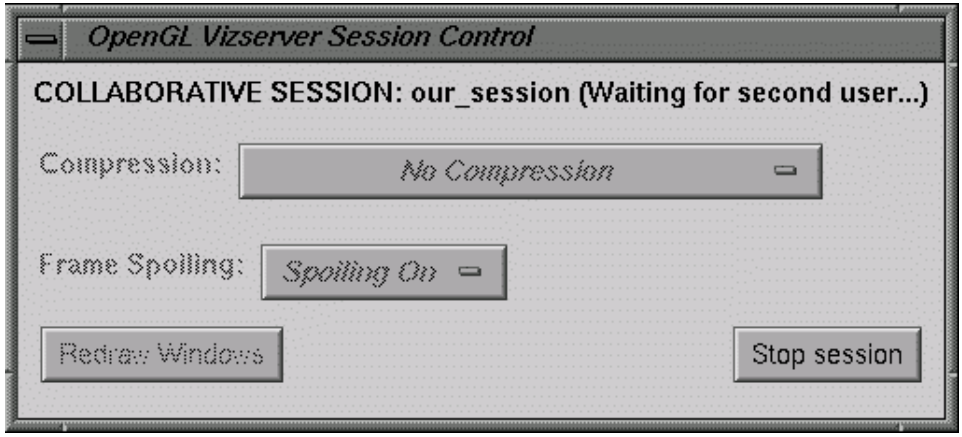

Figure 1-11 **OpenGL Vizserver Session Control** Window (Waiting for Remote User)

Joining a Collaborative Session from a Remote Client

To join a collaborative session from a remote client, perform the following three steps.

1. Click the **Join Session** button in the **OpenGL Vizserver** main window.

   The **Status** field indicates that the session is starting, as shown in Figure 1-12, and the **OpenGL Vizserver Session Start** window opens.

Figure 1-12 **OpenGL Vizserver** Main Window (Session Starting)

In the **OpenGL Vizserver Session Start** window, the option menu **Session Type** is set to `Collaboration` and disabled, as shown in Figure 1-13. The **Session Name** text field is enabled. The **Configuration** option menu is disabled since the configuration is determined by the local client's X server.

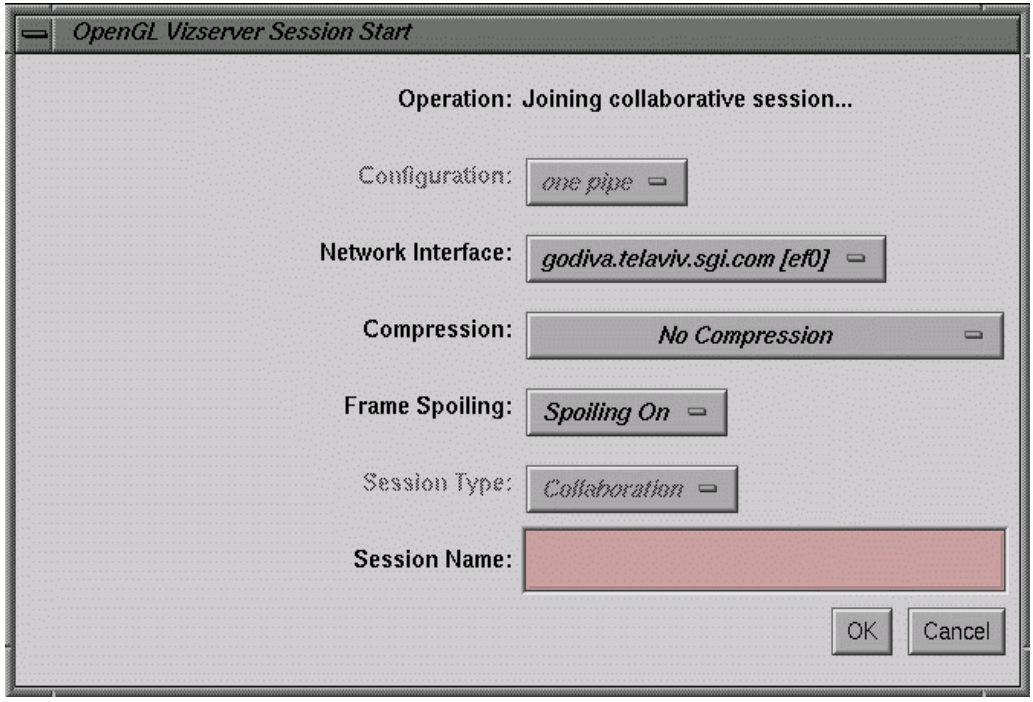

Figure 1-13 **OpenGL Vizserver Session Start** Window (Joining Collaborative Session)

2. Enter the name of the collaborative session to join in the **Session Name** text field of the **OpenGL Vizserver Session Start** Window.

   This session name must match exactly the session name chosen by the local user who started the session.

3. Click the **OK** button in the **OpenGL Vizserver Start Session** window.

   The **Status** field in the **OpenGL Vizserver** main window confirms that the session is active on both clients, as shown in Figure 1-14.

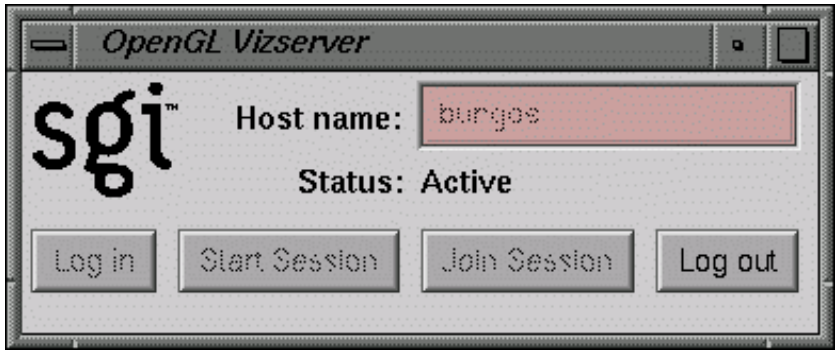

Figure 1-14 **OpenGL Vizserver** Main Window (Session Active)

For a description about configuration and use of the client during an active session, refer to "Configuring an Active Session from a Remote Client".

Configuring an Active Session from a Remote Client

After you start an active session, the **OpenGL Vizserver Session Start** window appears. In this window from a remote client (for example, when starting a single-user session or joining a collaborative session), you can choose a configuration and a network interface, set the initial compression rate, and choose a frame-spoiling option, as shown in the example in Figure 1-15. When this window appears, the displayed compression defaults to the last selection you made during your previous session.

Note: When starting a collaborative session from a local client, all fields except **Session Type** and **Session Name** are disabled in the **OpenGL Vizserver Session Start** window because they do not apply.

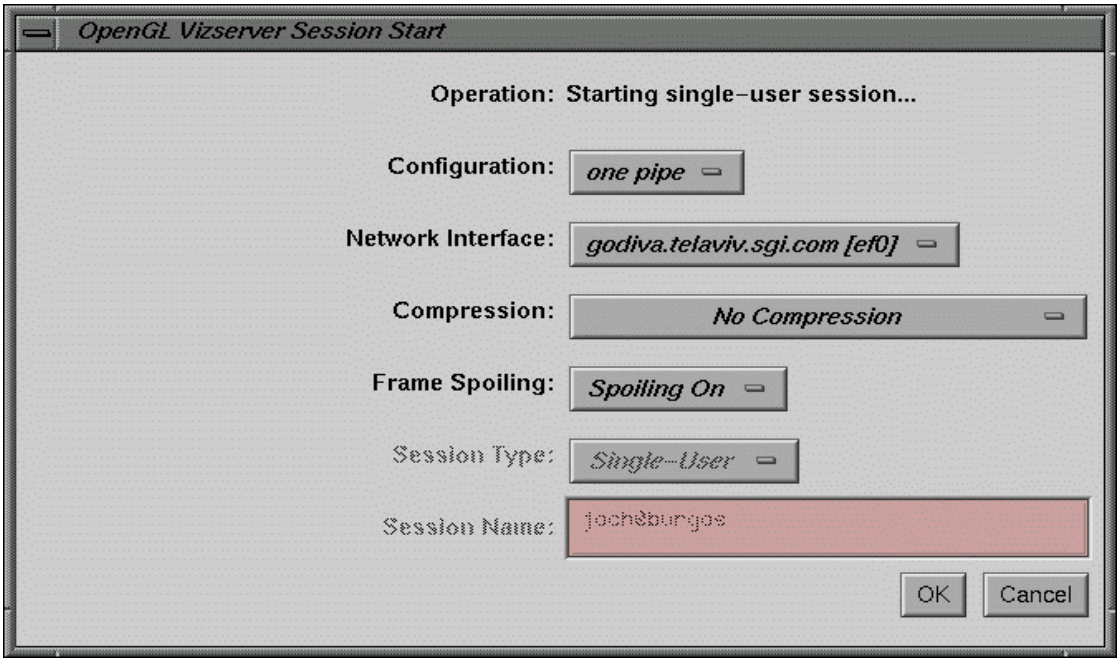

Figure 1-15 **OpenGL Vizserver Session Start** Window (Single-User Session)

The **Operation** label on the top of the **OpenGL Vizserver Session Start** window indicates the type of session that is to be started.

There is currently no multiplexing. Hence, only one user can connect to a server with a single pipe configured. Multiple users, each with an independent set of pipes, can connect to a server in a multiple-pipe configuration. In the following example, a one-pipe configuration is selected. This configuration allows a single user to access one graphics pipe on a server.

Note: Currently, OpenGL Vizserver does not support multiple active sessions for the same user.

To configure your session, perform the following steps.

1. Choose a configuration from the **Configuration** option menu.

   This specifies how many pipes will be used for the single-user session. The maximum number of available pipes for a user depends on the server's configuration. This option is disabled when joining a collaborative session. In a collaborative session, the number of pipes being used by the session is determined by the local client's X server.

2. Choose a network interface from the **Network Interface** option menu.

   This specifies which network interface the client uses to receive window updates. For example, users on multi-homed systems can specify the fast network interface.

3. Choose a compression rate from the **Compression** option menu.

   When you set the compression rate, you reduce the amount of data that is required to transmit your image, trading off some image quality for greater interaction capability. Choose a compression rate that is consistent with the frame rate you want to achieve. OpenGL Vizserver compression runs globally; hence, all applications running under OpenGL use the selected compression scheme. If you run two applications simultaneously and you change the compression setting, both applications switch to the selected compression scheme.

   You can choose one of six compression options:

Compression Option	Description
`No Compression`	Turns off compression. In this mode, the server transmits an uncompressed image.
`Lossless Delta`	For each frame, the server transmits only the difference from the previous frame. This is a non-lossy compression.
`Interpolated Color Cell Delta`	For each frame, the server transmits only the difference from the previous frame, using Interpolated Cell Compression. Compression ratio is better than 4:1.
`Color Cell Delta`	For each frame, the server transmits only the difference from the previous frame, using Color Cell Compression. Compression ratio is better than 8:1.

Compression Option	Description
`Scaled Interpolated Color Cell Delta`	For each frame, the server transmits only the difference from the previous frame, using Scaled Interpolated Cell Compression. Compression ratio is better than 16:1.
`Scaled Color Cell Delta`	For each frame, the server transmits only the difference from the previous frame, using Scaled Color Cell Compression. Compression ratio is better than 32:1.

4. Choose a frame spoiling option in the **Frame Spoiling** option menu. Choosing the **Spoiling Off** option tells the server not to generate a new frame until the current frame is displayed on the client side. Choosing the **Spoiling On** option tells the server to generate new frames at the maximum rate. This option should be used in cases where OpenGL Vizserver is used over a low-bandwidth network link, where dropped frames are acceptable.
5. Click the **OK** button in the **OpenGL Vizserver Session Start** window.

   The **OpenGL Vizserver Session Start** window disappears, and then the **OpenGL Vizserver Session Control** window appears, as shown in Figure 1-16. The main window remains on your screen.

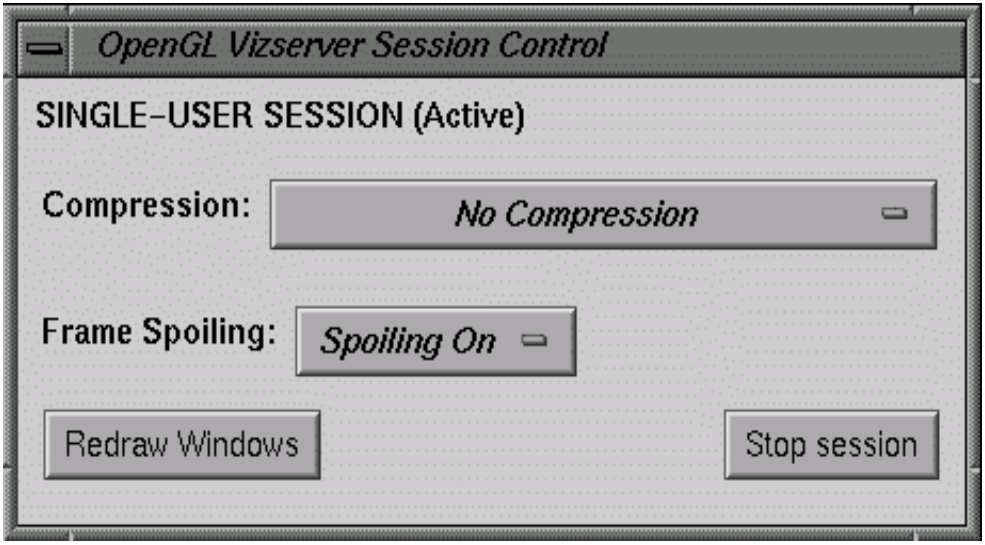

Figure 1-16 **OpenGL Vizserver Session Control** Window

In this window, you can reset the compression rate, change the spoiling option, redraw your image, or stop the active session.

After you start an application, your image appears in an application window (as described in the next section). Clicking the **Redraw Windows** button in the **OpenGL Vizserver Session Control** window redraws the image at the selected compression rate. You can reset the compression and redraw the image at any time.

Note: In a collaborative session from a local client, all fields except the Stop Session button are disabled in the **OpenGL Vizserver Session Control** window (see Figure 1-11 on page 11) because they do not apply. Indeed, the graphics output is not using OpenGL Vizserver to send to the local display, therefore, there is not an issue of compression or spoiling.

Almost simultaneously with the **OpenGL Vizserver Session Control** window, the **OpenGL Vizserver Console** window, which identifies the current host, appears at the lower left corner of your screen, as shown in the example in Figure 1-17

Figure 1-17 **OpenGL Vizserver Console** Window

Starting an Application from a Client

Start the desired application by typing commands in the console window, as shown in the example in Figure 1-18.

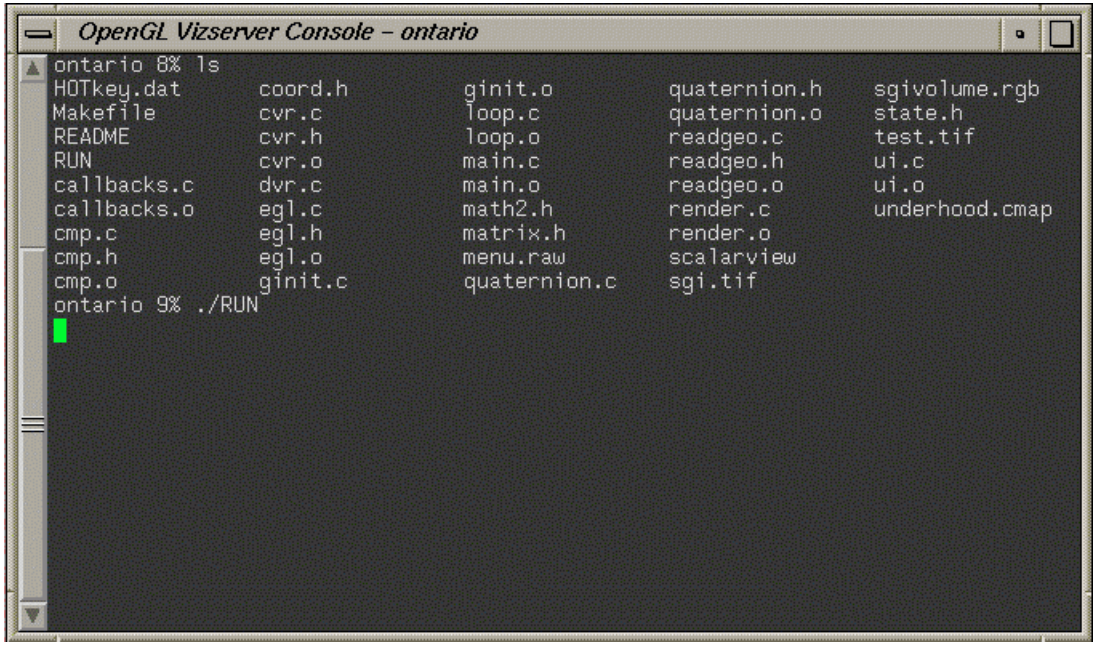

Figure 1-18 Starting an Application in the **OpenGL Vizserver Console** Window

Alternatively, you can start the desired application as follows:

1. Use the `telnet` or `rlogin` command to access the OpenGL Vizserver host machine.
2. Start the desired application using the `vsx`(1) command.

The application renders the image. Then the host server transmits it to your local workstation and displays it on your screen in the application window, as shown in the example in Figure 1-19.

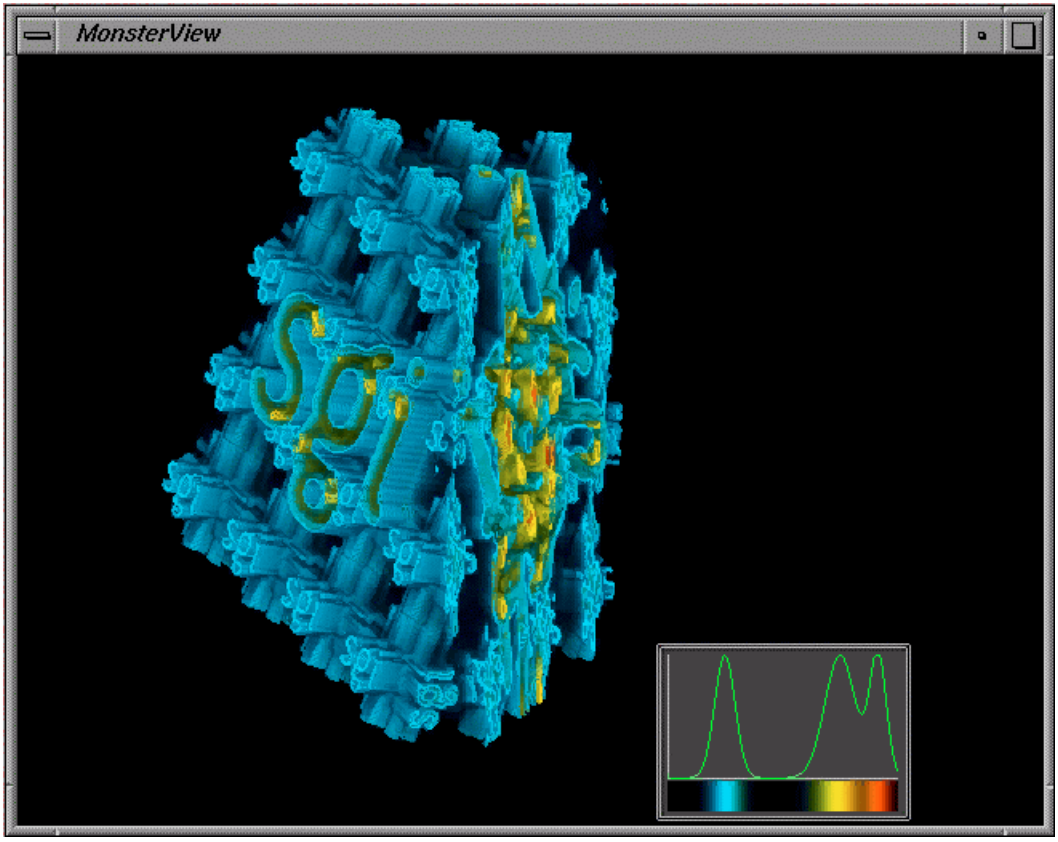

Figure 1-19 Displaying a Rendered Image in an Application Window

Interacting with a Rendered Image

Because OpenGL Vizserver provides an application-transparent service, your applications perform as if they are using the indirect rendering features of X11 and GLX. Interacting with one of your applications is the same as interacting with any other

X-based application. The application is not aware that the OpenGL Vizserver system is rendering the image.

In a collaborative session, both clients participating in the session can interact with the application. Input events streams from both the local and the remote client are handled by the application (that is, both clients have control over the local client's pointer).

Note: The local client's pointer is also displayed on the remote client.

In order to overcome incompatibilities between different window managers, a special meaning was assigned to the key combination `CTRL-F3`. Pressing this combination on application windows on the client's side will lower all OpenGL Vizserver application windows under any local windows.

Stopping an Active Session

To stop an active session, click the **Stop session** button in the **OpenGL Vizserver Session Control** window, shown in Figure 1-20.

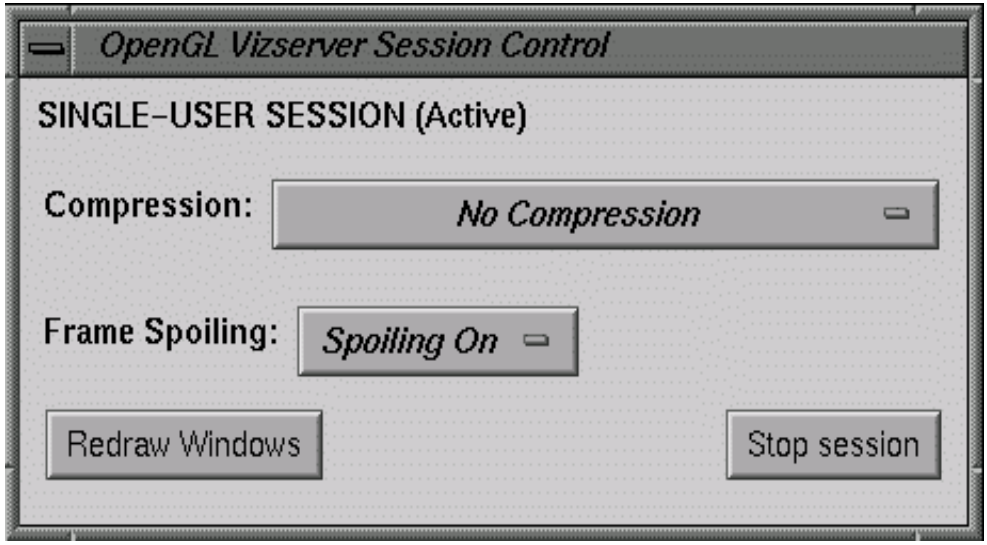

Figure 1-20 **OpenGL Vizserver Session Control** Window

You can stop a session at any time. If you close the **OpenGL Vizserver Session Control** window, it is the same as clicking the **Stop session** button.

Logging Out

If you want to log out, click the **Log out** button in the **OpenGL Vizserver** main window, shown in Figure 1-21.

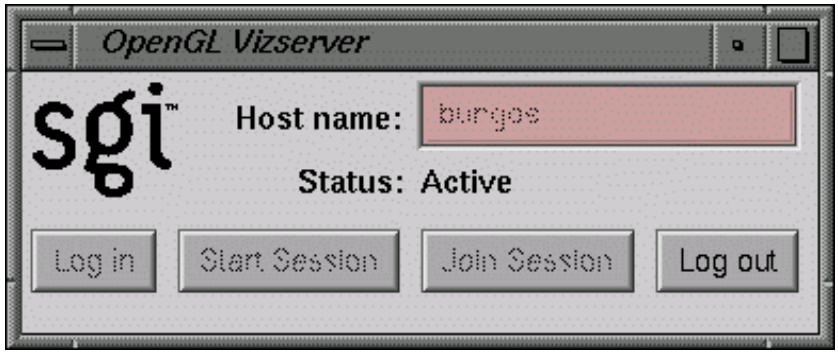

Figure 1-21 **OpenGL Vizserver** Main Window

Reservation Web Interface

The Reservation Web Interface is a client of the Reservation Database on the remote server. It can be accessed through a URL that resides on the remote host. The URL is `http://`*remotehost*`/vizserver/reservation`, where *remotehost* is the full name of the remote host where the server is running.

To log onto the reservation system, enter your authentication data (if needed) in the fields of the welcome screen, and press the **Login** button.

Common Header

All the following pages contain a header part, as shown in Figure A-1. This header shows—in addition to the SGI and OpenGL Vizserver logos—the name of the currently logged in user, the name of the remote host, and the system time on the remote host. On the left side is a **LOGOUT** link, that allows you to log out from the reservation server at any time and go back to the login page for the reservation system.

Figure A-1 Header

Login Screen

If needed by OpenGL Vizserver's authentication, fill in your authentication data in the login page. The name of the OpenGL Vizserver remote host is displayed at the top of the login page. Figure A-2 shows a typical UNIX login screen, with a user name and a password field. If login parameters are correct, you enter the daily view of the reservation database, as described in the following section.

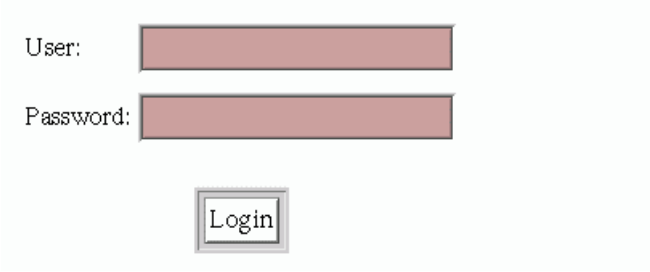

Figure A-2 Login Screen

Daily View

Once logged in, the first and main page of the reservation web interface is the daily view. The daily view shows a table of the reservations for a given day (the default is `today`), assigned to each pipe allocated for OpenGL Vizserver on the remote host. From this page you can select a reservation time slot to get its details (see, "Reservation View" on page 30); select a time on the table's vertical time scale to go to the Add Reservation page; or jump to another day through one of the day navigation links.

Day Table

The day table, as shown in Figure A-3, represents reservations as rectangles; the time scale is on the vertical axis and the associated pipe is on the horizontal axis. There are as many pipe columns as there are pipes on the remote server allocated for OpenGL Vizserver. The user name of the owner is written on the time slot. Depending on the browser's functionality, a yellow hint note is displayed when the mouse moves on the reservation time slot, showing details (start and end time) of the reservation. As color codes are used, one color is assigned to the reservations of the currently logged in user, and another color is assigned to all other users' reservations. Each user name in a time slot is a link to a more detailed view of this reservation's data (see "Reservation View" on page 30). Each hour item on the vertical time axis is a link to a form for adding a new reservation (see "Add Reservation Form" on page 29), starting by default at the selected time. All these links open a separate webpage browser window.

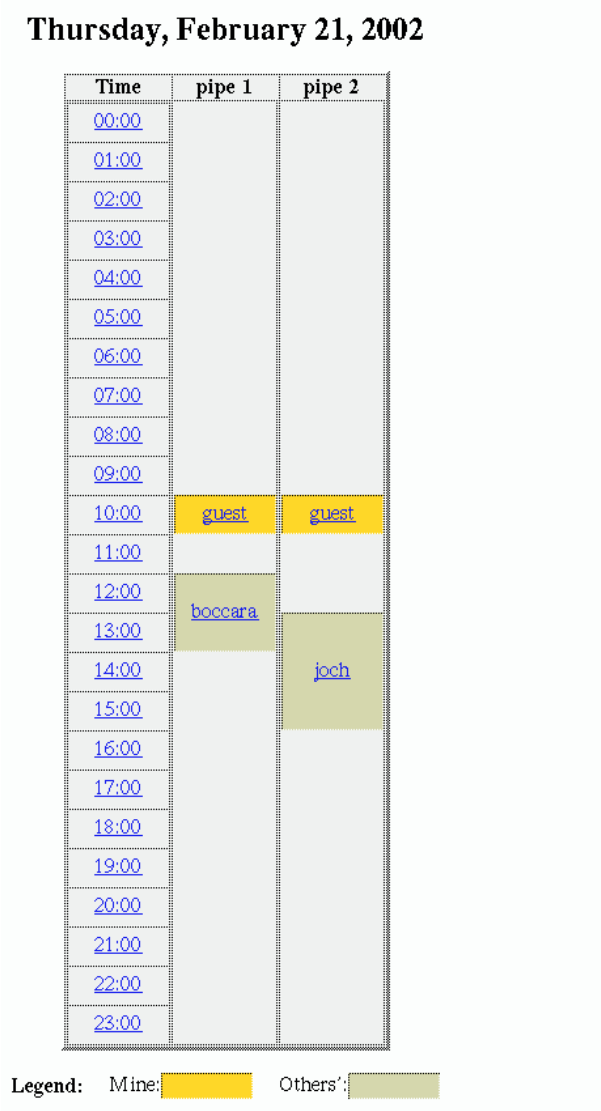

Figure A-3 Day Table

Day Navigation Links

Links are provided to jump to the previous, next, or current day, as shown in Figure A-4. Another form is provided to directly select the day you want to view, this day being defined by its year, month, and day of the month.

Figure A-4 Day Navigation

Add Reservation Form

The Add Reservation form, as shown in Figure A-5, contains fields to enter the day, start time, and duration of the reservation you want to add, as well as the number of pipes to be reserved. The owner is always the user who is logged in. A reservation will then be added after checking that this does not create a pipe overallocation for the time slot. In case of such a conflict, the operation will fail. On success, the daily view will be updated with the new reservation.

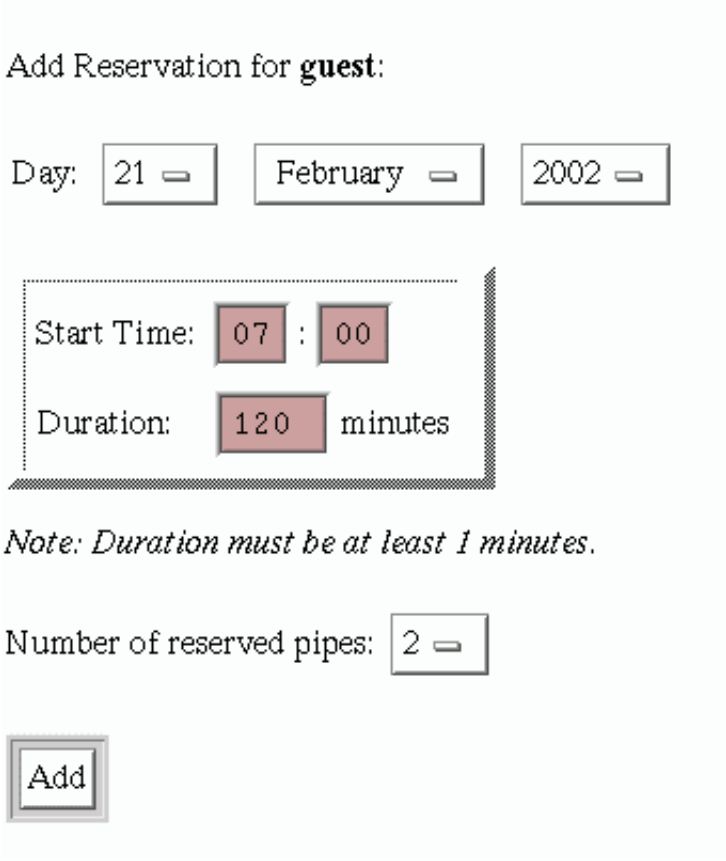

Figure A-5 Add Reservation Form

Reservation View

The reservation view, as shown in Figure A-6, provides the following details about a reservation: number of reserved pipes, start time, end time, and owner user. If you are a privileged user, or the owner of the displayed reservation, you can delete this reservation by pressing the **Delete** button. If not, the deletion operation will fail and an error message will be displayed.

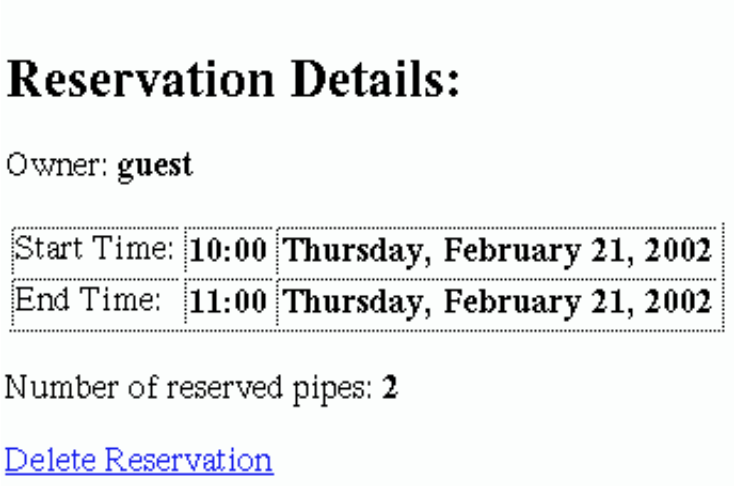

Figure A-6 Reservation View

Login Timeout

A timeout is defined in a configuration file and is reserved for an administrator's use. After a timeout has passed since your last operation on the Reservation Web Interface, the login page will be displayed and you must log in again to the reservation system.

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