



# Sun Fire™ Visual Grid System Installation and User's Guide

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# Preface

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This document describes the installation of the Sun Fire™ Visual Grid system consisting of the networking interconnect of Sun Fire 4800/6800 Visual Grid computers and Sun Fire V880z Visual Grid computers through Sun XVR-4000 graphics accelerators.

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**Note** – The procedures in this manual should *only* be performed by experienced system administrators.

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## How This Book Is Organized

[Chapter 1](#) provides an overview of the Sun Fire Visual Grid system and an overview of the installation process.

[Chapter 2](#) describes the Sun Fire Visual Grid system software requirements.

[Chapter 3](#) describes the Sun Fire Visual Grid hardware requirements and supported system configurations.

[Chapter 4](#) describes installing the Sun Fire Visual Grid interconnect and Sun Fire Visual Grid software.

[Chapter 5](#) describes the `dzadmin` configuration tool, which administrators use to configure a Sun Fire Visual Grid system.

[Chapter 6](#) provides security information through the Sun Fire Visual Grid software daemon program (`dzdaemon`).

[Appendix A](#) provides troubleshooting information.

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# Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See the following for this information:

- Software documentation that you received with your system
- Solaris™ operating environment documentation, which is at:

<http://docs.sun.com>

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## Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

\* The settings on your browser might differ from these settings.

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## Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

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*Sun Fire Visual Grid System Installation and User's Guide*, part number 817-2365-10.

# Sun Fire Visual Grid System Overview

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This chapter provides an overview of the Sun Fire Visual Grid system.

- [“Overview” on page 1](#)
- [“Installation Kit” on page 2](#)
- [“Installation Process Overview” on page 3](#)
- [“Technical Support” on page 3](#)

The Sun Fire Visual Grid system consists of the Sun Fire 4800/6800, the Sun Fire V880z, and the Sun Fire Visual Grid software and networking interconnect.

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## Overview

The Sun Fire Visual Grid system enables a host (*master*) computer to use remote (*slave*) computers for rendering to displays using Sun XVR-4000 graphics accelerators. The system runs over a high-speed, networked Sun Fire Visual Grid interconnect. The Sun Fire Visual Grid software makes this connection transparent to the master running the application; the application functions as if the Sun XVR-4000 graphics accelerators are located local to the master. Thus, the software enables large numbers of displays to be addressable from a single computer in this system without modifying application software, and often with little or no performance degradation or change in user experience. Local Sun XVR-4000 graphics accelerators installed in the master can also be used in conjunction with Sun XVR-4000 graphics accelerators installed in the slaves.

The Sun Fire Visual Grid software implements a pseudo-frame-buffer device on a master host that acts as a proxy for a physical frame buffer device on a remote Sun Fire V880z slave host. One or more remote slave hosts are connected to the master host in such a way that the remote frame buffers on the slave hosts appear to existing APIs (Application Program Interfaces, such as X Windows, Sun OpenGL<sup>®</sup> 1.3 for Solaris, and Java 3D<sup>™</sup>) and application software as if they were local frame buffer devices on the master host.

In complex display environments, up to 16 slave computers can be connected to the master computer, each with one or two remote Sun XVR-4000 graphics accelerators, each of which could drive two monitors or projectors, for a total of 64. For configurations beyond the limits listed in “Supported Configurations” on page 14, see Support Services at: <http://www.sun.com/service/online>

The Sun Fire Visual Grid interconnect for 3D graphics is a Myrinet PCI network card. The Gigabit Ethernet is also supported for the X Windows portion of the network.

Refer to the following documentation for detailed server hardware service information (select “Servers” at <http://www.sun.com/documentation>):

- *Sun Fire 6800/4810/4800/3800 Systems Service Manual* (805-7363)
- *Sun Fire V880 Server Service Manual* (806-6597)
- *Sun Fire V880 Server Owner’s Manual* (806-6592)
- *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User’s Guide* (817-2400)

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## Installation Kit

The Sun Fire Visual Grid system installation kit includes:

- Sun Fire Visual Grid software CD
- Myrinet network cards (six for each networked slave system)
- Myrinet networking cables (three for each slave)
- USB card (included if the installation includes a Sun Fire 4800/6800)
- *Sun Fire Visual Grid System Installation and User’s Guide*, this document

The Sun Fire Visual Grid system uses the Sun XVR-4000 graphics accelerator to render the system graphics. If necessary, for the latest Sun XVR-4000 graphics accelerator CD and software patches, go to:

<http://sunsolve.sun.com>



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# Installation Process Overview

1. Verify the Sun Fire Visual Grid system software requirements ([Chapter 2](#)).
2. Verify the hardware and network requirements ([Chapter 3](#)).
3. Verify that the site is properly prepared for the hardware installation and establish an administration workstation ([Chapter 4, “Site Hardware Preparation” on page 18](#) and [“Administration Workstation” on page 19](#)).
4. Set up an Ethernet network for the Sun Fire Visual Grid system ([Chapter 4, “Setting Up an Ethernet Network” on page 19](#)).
5. Install the Myrinet cards ([Chapter 4, “Installing a Myrinet Card” on page 21](#)).
6. Install a USB card, where applicable ([Chapter 4, “Installing a USB Card” on page 25](#)).
7. Install the Sun Fire Visual Grid software ([Chapter 4, “Installing the Software” on page 27](#)).
8. Use the `dzadmin` configuration tool to configure a Sun Fire Visual Grid system ([Chapter 5](#)).

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# Technical Support

For assistance and other information not found in this document concerning the Sun Fire Visual Grid system, see Support Services at:

<http://www.sun.com/service/online>

For the most up-to-date version of the installation and user’s guide, select “Servers” at:

<http://www.sun.com/documentation>

For the latest software patches, go to:

<http://sunsolve.sun.com>



# Sun Fire Visual Grid System Software Requirements

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This chapter describes the Sun Fire Visual Grid system software requirements.

- [“Operating Environment Requirements” on page 5](#)
- [“Sun Fire Visual Grid Software Packages” on page 6](#)
- [“Sun OpenGL for Solaris Software” on page 9](#)
- [“Other Software Requirements” on page 10](#)

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## Operating Environment Requirements

- Master (Sun Fire V880z): Solaris 8 2/02 operating environment, or a subsequent compatible version of the Solaris 8 operating environment
- Master (Sun Fire 4800/6800): Solaris 8 2/02 operating environment, or a subsequent compatible version of the Solaris 8 operating environment
- Slave (Sun Fire V880z): Solaris 8 2/02 operating environment, or a subsequent compatible version of the Solaris 8 operating environment

# Sun Fire Visual Grid Software Packages

TABLE 2-1 lists the Sun Fire Visual Grid software CD files and directories. The packages are located in the `cdrom/cdrom0/` directory:

TABLE 2-1 Sun Fire Visual Grid Software CD Directories

Directory (or file) name	Description
License	Binary Code License
Sun_Visual_Grid_Software/1.0/Solaris_8/Packages/	Sun Fire Visual Grid software for Solaris 8 operating environment
Sun_Visual_Grid_Software/1.0/Solaris_8/Patches/	Sun Fire Visual Grid software patches
Java/1.4/Packages/	Sun J2SE runtime
Myrinet/1.6.4/Packages/	Myrinet drivers and software
OpenGL/1.3/Packages/	Sun OpenGL 1.3 for Solaris
Docs/	Sun Fire Visual Grid system documentation
Copyright	U.S. version of copyright
FR_Copyright	French version of copyright
install	Product installation script
uninstall	Product removal script
README	Product information
README.first	Important product release information

# Software Packages

[TABLE 2-2](#) lists the Sun Fire Visual Grid software packages.

**TABLE 2-2** Sun Fire Visual Grid Software Packages

Package Name	Description
SUNWdz-admin	Sun Fire Visual Grid Administration Tools
SUNWdz-driver-64	Sun Fire Visual Grid Device Driver (64-bit)
SUNWdz-network	Sun Fire Visual Grid OpenGL connectivity libraries
SUNWdz-xwindow	Sun Fire Visual Grid Window System Support
SUNWdz-runtime	Sun Fire Visual Grid System Software
SUNWmyril	Myrinet Network Libraries, Utilities, and Documentation
SUNWmyrir	Myrinet Network System Software
SUNWmyrix	Myrinet Network System Software/Device Driver (64-bit)
SUNWj3rt	J2SDK 1.4 runtime environment
SUNWdz-man	Sun Fire Visual Grid man pages

## Software Package Locations

The Sun Fire Visual Grid software packages are located in the directories listed in [TABLE 2-3](#). The packages are located in the `cdrom/cdrom0/` directory:

**TABLE 2-3** Location of Sun Fire Visual Grid Software Packages

Software Packages	Directory Location
Solaris 8 software	<code>Sun_Visual_Grid_Software/1.0/Solaris_8/Packages/</code>
Sun J2SE runtime	<code>Java/1.4/Packages/</code>
Myrinet drivers and software	<code>Myrinet/1.6.4/Packages/</code>
Sun OpenGL 1.3 for Solaris	<code>OpenGL/1.3/Packages/</code>

# Software Patches

TABLE 2-4 lists the Sun Fire Visual Grid software patches required; these are all installed automatically by the Sun Fire Visual Grid software install script. The Solaris 8 operating environment patch bundle found on the Sun patch web site (<http://sunsolve.sun.com>) may have newer versions of these patches, which are preferable.

The patches are located in the following directory:

cdrom/cdrom0/Sun\_Visual\_Grid\_Software/1.0/Solaris\_8/Patches/

**TABLE 2-4** Patches for the Solaris 8 Operating Environments

Patches	Installation
110380-04	Automatically installed by the Sun Fire Visual Grid <code>install</code> script.
110934-10	Automatically installed by the Sun Fire Visual Grid <code>install</code> script.
110842-08	Automatically installed by the Sun Fire Visual Grid <code>install</code> script.
109896-21	Automatically installed by the Sun Fire Visual Grid <code>install</code> script if the computer is a Sun Fire 4800 or Sun Fire 6800. A kernel patch update is also installed since it is a prerequisite to this patch. The Sun Fire V880z does not require this patch.
108652-74	Automatically installed by the Sun Fire Visual Grid <code>install</code> script.

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# Sun OpenGL for Solaris Software

The Sun Fire Visual Grid software is supported in Sun OpenGL Version 1.3, and subsequent compatible Sun OpenGL versions, for Solaris operating environments. Each computer in the Sun Fire Visual Grid system requires this version of Sun OpenGL for Solaris. These software packages are bundled and automatically installed as part of the Sun Fire Visual Grid software. Two OpenGL 1.3 patches are also required; these are also bundled and automatically installed as part of the Sun Fire Visual Grid software.

## Sun OpenGL for Solaris Software Packages

TABLE 2-5 lists the Sun OpenGL 1.3 for Solaris software package names and descriptions. The packages are located in the following directory:  
`cdrom/cdrom0/OpenGL/1.3/Packages/`

**TABLE 2-5** Package Names for Sun OpenGL Version 1.3

Package Name	Description
SUNWgldoc	Sun OpenGL for Solaris Documentation and Man Pages
SUNWgldp	Sun OpenGL for Solaris Device Pipeline Support
SUNWgldpx	Sun OpenGL for Solaris 64-bit Device Pipeline Support
SUNWglh	Sun OpenGL for Solaris Header Files
SUNWglrt	Sun OpenGL for Solaris Runtime Libraries
SUNWglrtu	Sun OpenGL for Solaris Platform Specific Runtime Libraries
SUNWglrtx	Sun OpenGL for Solaris 64-bit Runtime Libraries
SUNWglsr	Sun OpenGL for Solaris Runtime Generic Software
SUNWglsrx	Sun OpenGL for Solaris 64-bit Optimized SW Rasterizer
SUNWglsrz	Sun OpenGL for Solaris Optimized SW Rasterizer

# Sun OpenGL for Solaris Patches

TABLE 2-6 lists the directory locations of the Sun OpenGL for Solaris software packages. The packages are located in the `cdrom/cdrom0/` directory

TABLE 2-6 Location of Sun OpenGL for Solaris Software Patches

Software Patches	Directory Location
Sun OpenGL 1.3 patch (32-bit)	<code>OpenGL/1.3/Packages/113886-15</code>
Sun OpenGL 1.3 patch (64-bit)	<code>OpenGL/1.3/Packages/113887-15</code>

Updated versions of Sun OpenGL for Solaris are available at:  
<http://www.sun.com/software/graphics/OpenGL/>

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## Other Software Requirements

Each Sun Fire Visual Grid computer containing a Sun XVR-4000 graphics accelerator requires all of the Sun XVR-4000 graphics accelerator software installed. See the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User's Guide*.

Each computer also requires a Java™ Runtime Environment (JRE) version 1.4 or 1.4.x, where *x* is any version number. The JRE version 1.4 is bundled with the Sun Fire Visual Grid software; if a JRE version 1.4.X is not found on the target system, it is automatically installed during the software installation process. If a correct version of the JRE is found already installed on the target system, the bundled JRE will not be installed; the Sun Fire Visual Grid software will automatically use the already installed JRE.

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**Note** – Each computer must have the same version of the Sun Fire Visual Grid software packages running on it. If not, the `dzadmin` tool generates an error. Upgrade the Sun Fire Visual Grid software on *each* computer.

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# Sun Fire Visual Grid System Hardware Requirements

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This chapter describes the Sun Fire Visual Grid system hardware requirements and supported system configurations.

- [“Graphics Accelerator Hardware” on page 11](#)
- [“Network Hardware” on page 12](#)
- [“Supported Configurations” on page 14](#)

See the diagrams in [“System Configuration Examples” on page 16](#) for examples on hardware networking configurations.

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## Graphics Accelerator Hardware

Only the Sun XVR-4000 graphics accelerator is supported by the Sun Fire Visual Grid system. A system can have other frame buffers installed; they *cannot*, however, be used in conjunction with the Sun Fire Visual Grid software.

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# Network Hardware

Each slave must be connected to the master by at least two separate networks—a Gigabit Ethernet network connection for X protocol data and a Myrinet network for OpenGL data. The Ethernet connection can pass through a switch, but the Myrinet connections must be point-to-point. For security and performance reasons, consider isolating the Sun Fire Visual Grid system Gigabit Ethernet network from the main corporate network (see [Chapter 6](#)).

Sun Fire Visual Grid software includes software that aggregates bandwidth across three point-to-point Myrinet links between the master host and each slave host. This makes it possible to increase bandwidth beyond what is possible for a single Myrinet card. A total of six Myrinet cards are required for each slave—three are installed in the slave computer and three in the master computer. A Myrinet fiber cable is used to attach each pair of Myrinet cards in point-to-point fashion, without a network switch; therefore, three Myrinet cables are required between each master and slave. The Myrinet cards and cables are part of the installation kit (“[Installation Kit](#)” on page 2).

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**Note** – The Gigabit Ethernet gear (if required) or cables are *not* included as a standard part of the Sun Fire Visual Grid installation kit.

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## Myrinet Networking Cards

- Every slave must have exactly three Myrinet PCI network cards, and they should be plugged into the same distribution of 66/33 Mhz PCI bus slots.
- For a Sun Fire 4800/6800 master, each slave must be connected to a separate I/O assembly on the master.
- Myrinet connections must be point-to-point; a Myrinet switch is not supported at this time.
- Myrinet driver packages for Solaris that are delivered as part of the Sun Fire Visual Grid software distribution must be installed. The installation script performs this installation automatically.

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**Note** – Do *not* download the Myrinet driver packages directly from the Myricom web site.

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- Do not install other non-Sun Myrinet cards in any of the master or slaves. The only exception would be installation in a separate system domain in a Sun Fire 4800/6800 master.

## Myricom Myrinet Card Requirements

- Six Myrinet-2000-Fiber/PCI interface PCI short cards (Myricom part no. M3F-PCI64C-2) for each slave computer. Three are for the slave and three are for the master.
- Myrinet-2000-Fiber cables (50/125 multimode fiber pairs with LC connectors) 25 meters in length (Myricom part no. M3F-CB-25M) for each slave computer. If necessary for a particular installation configuration, longer cable lengths should function without problems.

## Ethernet Networking Cards

- A Gigabit Ethernet network for the master-slave connection is required. Any Sun-supported Gigabit Ethernet network card is acceptable.
- Sun standard Gigabit Ethernet network cards are supported.
- Each slave has a built-in fiber Gigabit Ethernet adapter.

## USB Card

For a Sun Fire 4800/6800 master, you must install a USB card into one of the PCI slots so that the keyboard and mouse can be attached. This keyboard and mouse is used when running X Windows. The Sun Fire V880z already has USB ports for a keyboard and mouse.

A USB card that fits into a Sun Fire 4800/6800 PCI slot is included in the Sun Fire Visual Grid system installation kit. The USB card is only supported for a keyboard and mouse, and other USB 1.0 and USB 1.1 functionality. USB 2.0 is not officially supported with this card, although it should function properly.

## Serial Port

For a master Sun Fire 4800/6800, you can obtain serial port capability by using an Edgeport Standard Serial Converter (Edgeport model number 301-1000-04), which is a USB-to-RS232 serial converter.

# Keyboard, Video, and Mouse Extenders

A keyboard and mouse extender device is required for a Sun Fire 4800/6800. Otherwise, the keyboard and mouse cables will not reach far enough to connect to that computer. Some installations might also need video extenders, which provide remote access to the video some distance away from a Sun Fire V880z, typically over fiber links. This equipment must be purchased separately and is not included in the Sun Fire Visual Grid system installation kit. For help obtaining the equipment, contact your Sun service representative.

---

## Supported Configurations

TABLE 3-1 lists the supported system configurations. For networking diagram examples, see “System Configuration Examples” on page 16.

TABLE 3-1 Supported Configuration Summary

Master Computer	Slave Computer
Sun Fire V880z with one Sun XVR-4000 graphics accelerator (4-6 CPUs)	One Sun Fire V880z with two Sun XVR-4000 graphics accelerators (2 CPUs)
Sun Fire V880z with two Sun XVR-4000 graphics accelerators (4 CPUs)	One Sun Fire V880z with two Sun XVR-4000 graphics accelerators (2 CPUs)
Sun Fire 4800	Up to two Sun Fire V880z computers with one or two Sun XVR-4000 graphics accelerators (2 CPUs)
Sun Fire 6800	Up to four Sun Fire V880z computers with one or two Sun XVR-4000 graphics accelerators (2 CPUs)

For configurations beyond the limits in TABLE 3-1, see Support Services at:

<http://www.sun.com/service/online>

## Sun Fire 4800 and Sun Fire 6800 Configurations

For Sun Fire 4800 and Sun Fire 6800 Visual Grid configurations only, the single Sun XVR-4000 graphics accelerator option enables configurations with an odd number of frame buffers. In this configuration, however, you can only have *one* Sun Fire V880z slave with one Sun XVR-4000 graphics accelerator.

# Installing the Sun Fire Visual Grid System

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This chapter describes how to install the Sun Fire Visual Grid system.

- [“System Configuration Examples” on page 16](#)
- [“Site Hardware Preparation” on page 18](#)
- [“Installing a Myrinet Card” on page 21](#)
- [“Installing a USB Card” on page 25](#)
- [“Installing the Software” on page 27](#)
- [“Upgrading the Sun Fire Visual Grid Software” on page 32](#)
- [“Interchanging a Master and Slave” on page 34](#)
- [“Configuring the Frame Buffer Attributes” on page 36](#)

# System Configuration Examples

FIGURE 4-1 shows an example of a Sun Fire Visual Grid system networked configuration for one Sun Fire 6800 master and two slaves.

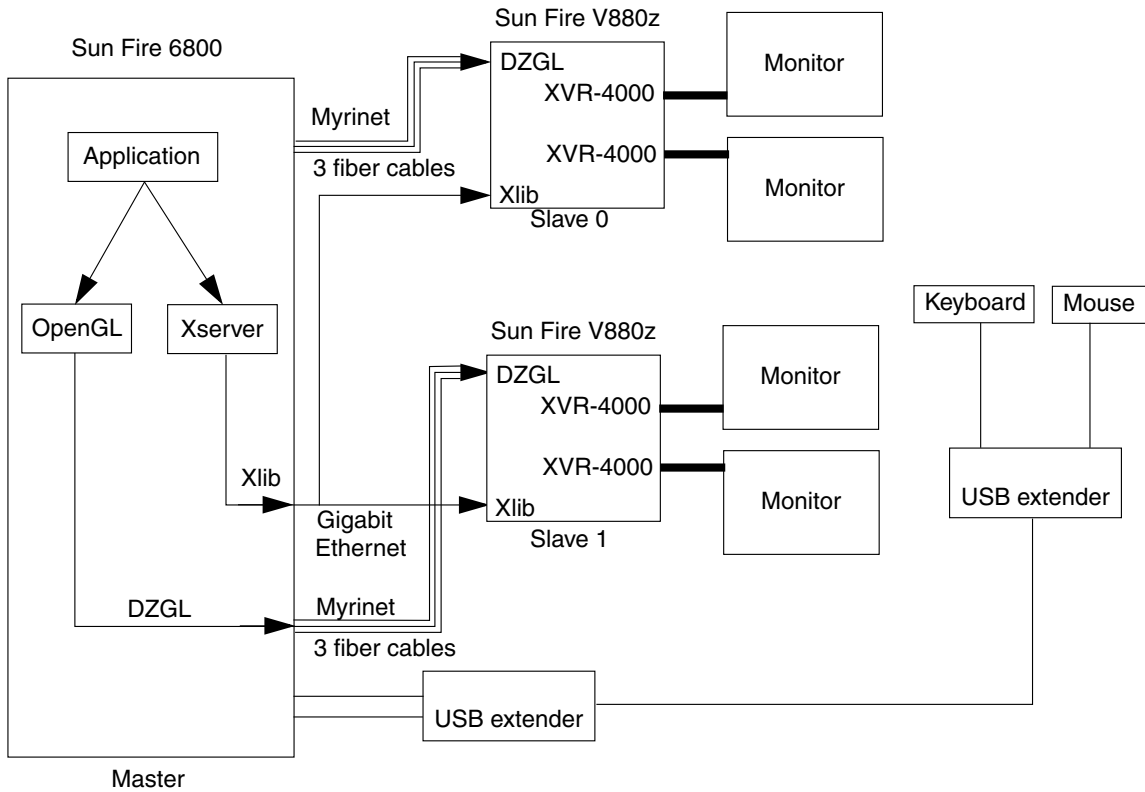


FIGURE 4-1 Configuration of One Sun Fire 6800 Master and Two Slaves

FIGURE 4-1 shows an example of a Sun Fire Visual Grid system networked configuration for one Sun Fire V880z master and one slave.

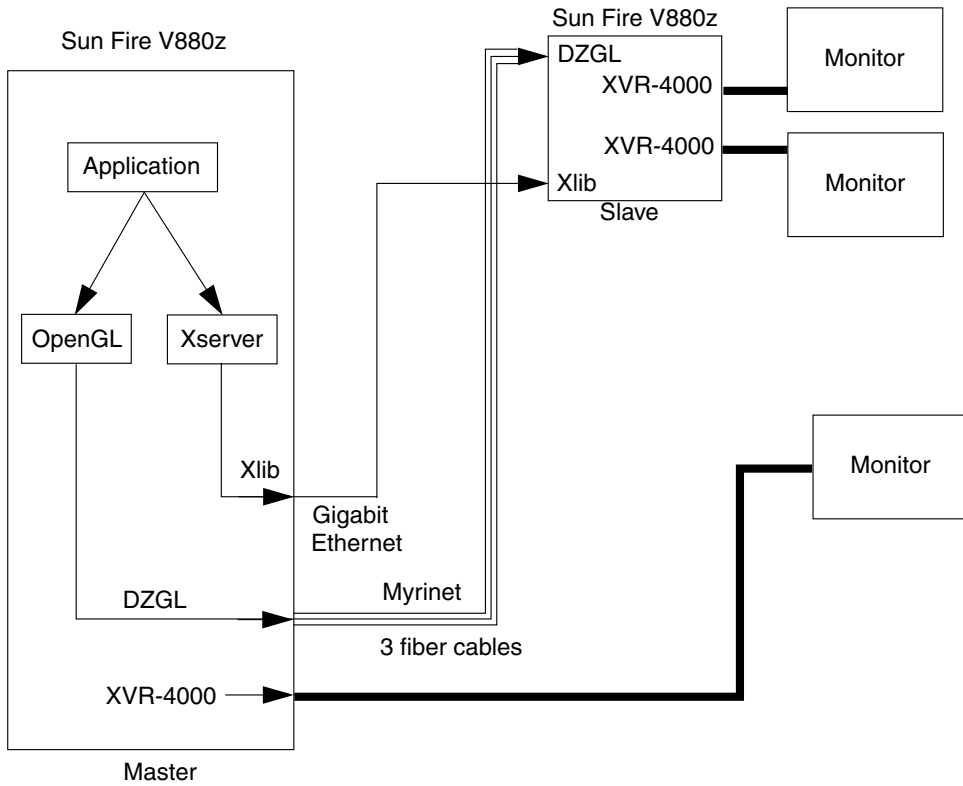


FIGURE 4-2 Configuration of One Sun Fire V880z Master and One Slave

---

# Site Hardware Preparation

You need to complete specific hardware prerequisites for a Sun Fire Visual Grid system installation before attempting to go through the software installation procedure. These requirements are described below:

---

**Note** – All of the following necessary items *must* be in place before proceeding with the Sun Fire Visual Grid software installation procedure.

---

- Make sure that there is an administration workstation available during the installation process which has network access to the master computer.

The administration workstation should be a separate computer from the master and slaves. It should be capable of running X Windows and have remote access (`rsh` or `rlogin`) to the master. The master should have remote access (`rsh` or `rlogin`) to each slave. The administration workstation should be able to log into both master and slaves. See [“Administration Workstation” on page 19](#).

- Configure the Gigabit Ethernet network on the master and slave computers, ensuring that each slave can be reached through a `ping` from the master over the gigabit link, and vice versa.

See [“Setting Up an Ethernet Network” on page 19](#).

- Install the Myrinet cards into the master and each slave. Properly cable the Myrinet cards from the master to each of the cards in the slaves.

See [“Installing a Myrinet Card” on page 21](#). Until the Myrinet drivers are installed during the software installation process, the Myrinet boards are “invisible” to the systems. See [“Verifying the Myrinet Software” on page 55](#).

- If the master does not have USB ports, as in the case of a Sun Fire 4800 or Sun Fire 6800, you must install a USB card in the master for the keyboard and mouse.

Installing a USB card is not necessary with a Sun Fire V880z, because it already provides USB ports for the keyboard and mouse. See [“Installing a USB Card” on page 25](#).

- Install the appropriate hardware to co-locate the master (host) keyboard and mouse remotely with the displays, if this is going to be a part of the final installation.

This is required for a Sun Fire 4800 or Sun Fire 6800 installation because without extender hardware the keyboard and mouse do not reach the displays. See [“Keyboard, Video, and Mouse Extenders” on page 14](#).



---

# Administration Workstation

A separate workstation is required to administer the Sun Fire Visual Grid software during system installation. This administration workstation must be on the same network as the master in the Sun Fire Visual Grid system configuration (see [“System Configuration Examples” on page 16](#)). The administration workstation is used to run the software administration tool, `dzadmin`, to configure the grid (see [Chapter 5](#)).

---

## Setting Up an Ethernet Network

Using a Gigabit Ethernet network is required for better X Window performance. The Sun Fire Visual Grid system has built-in fiber Gigabit Ethernet hardware.

---

**Note** – These instructions provide a simple method to configure a Gigabit Ethernet network local to the Sun Fire Visual Grid system. If you prefer that your network administrator configure the network instead of using these instructions, contact your Sun service representative.

---

For each master and slave on the network, take the following steps:

**1. Determine which IP network addresses to use for the Gigabit Ethernet.**

If the systems are already on a corporate network, then the Gigabit Ethernet network should be on a different subnet. For simplicity, you may want to use a different class B address. For example, if the system is on the corporate network as 195.131.45.155, you might choose the Gigabit Ethernet address somewhere in 195.132.\*.\*. Each associated master/slave Gigabit Ethernet connection should have the same class B address (for example, 195.132.\*.\*). If there is a switch handling the Gigabit Ethernet network between the master and slave systems, then each system in the Sun Fire Visual Grid system installation can share the same class B address space on the Gigabit Ethernet network. When there are multiple master/slave point-to-point Gigabit Ethernet connections (for example, a switch is not being used between the master and slave machines and there is more than one slave machine), you must assign a different class B address space to each master/slave pair.

**2. Add the Gigabit Ethernet name and IP address of all master and slaves on this subnetwork to the `/etc/hosts` file of each system.**

**3. Create a file `/etc/hostname.xxx`, where `xxx` is the name of the Gigabit Ethernet port.**

On a Sun Fire V880z, the built-in Gigabit Ethernet port is `ge0`, therefore, the file is `/etc/hostname.ge0`. On a Sun Fire Enterprise class server, the port may be `gen` or `cen` depending on the adapter type.

The `/etc/hostname.xxx` file should contain a single line with the name of this server on the Gigabit Ethernet network. This name should be unique from the nodename or any other network name of this server. So the master machine might be called “master” and each slave “slaven”, where *n* is the slave number.

**4. Create the file `/etc/notrouter`. Type:**

```
# touch /etc/notrouter
```

The file has no contents.

**5. Edit the `/etc/nsswitch.conf` file to check the local hosts file first.**

For example, if `/etc/nsswitch.conf` is configured for `nis`, find the line:

```
hosts: nis [NOTFOUND=return] files
```

Edit the line to read:

```
hosts: files nis [NOTFOUND=return] files
```

**6. Enable the Gigabit Ethernet port.**

To do this, reboot the server.

**7. Verify the installation.**

Using the example nodenames above, it should be possible to use the `ping master` command from each slave, and the command `ping slaven` for each slave from the master. Use the `ifconfig -a` command on each master/slave computer to display the Gigabit Ethernet adapter.

---

# Installing a Myrinet Card

This section provides information for installing the Myrinet hardware and software.

The following describes how to install the Myrinet PCI cards into a Sun Fire 4800/6800 and a Sun Fire V880z.

## Installing the Myrinet PCI Cards in a Sun Fire 4800/6800

On a Sun Fire 4800/6800, the Myrinet cards attached to a particular slave must be completely contained within one I/O assembly. The PCI slots are numbered on the side of the I/O assembly boat, and the PCI busses are marked as well. There are two PCI busses that feed into the PCI slots. Install the three cards so that at least one of them is attached to each of the two PCI buses.

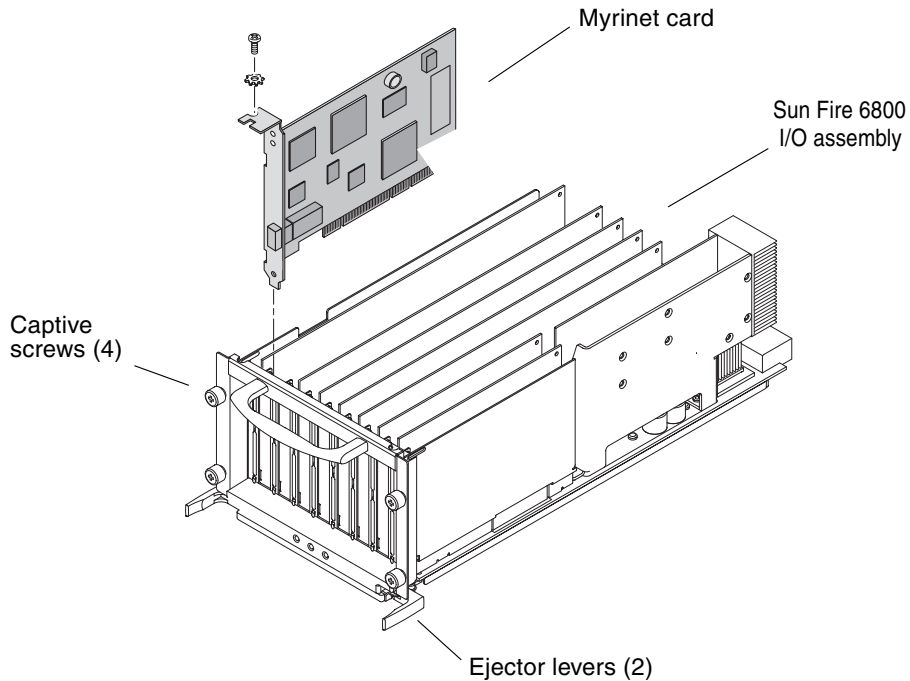
The power requirement of a Myrinet card is approximately 11 Watts.

See the *Sun Fire 6800/4810/4800/3800 Systems Service Manual* for procedures on how to shut down these systems safely before installing or removing any internal boards, and how to reboot the system after installation.

- 1. Shut down your system and remove the Sun Fire 4800/6800 PCI I/O assembly.**
  - a. Loosen the four I/O assembly captive Phillips screws and pull the ejector levers outward (FIGURE 4-3).**
  - b. Slide out the I/O assembly and place it on an ESD mat close to the system.**
- 2. Attach the antistatic wrist strap to your wrist and connect the strap to the I/O assembly.**
- 3. Lay the I/O assembly on its side.**

Locate the PCI slot numbers where the Myrinet cards are to be installed.
- 4. Position the Myrinet card in the I/O assembly (FIGURE 4-3).**
- 5. Guide the Myrinet card into the I/O assembly PCI slot (slot 7 in this example) (FIGURE 4-3).**
  - a. Insert the faceplate end of the Myrinet card into the appropriate opening in the I/O assembly back panel.**
  - b. Guide the opposite end of the Myrinet card into the card slot.**

- c. Secure the faceplate to the I/O assembly with the two Phillips screws.



**FIGURE 4-3** Installing a Myrinet PCI Card in the Sun Fire 6800 I/O Assembly

6. Insert and secure filler boards into any other open slots.
7. Replace the I/O assembly into the Sun Fire 4800/6800 chassis.
  - a. Line up the I/O assembly with the chassis I/O assembly opening and slide the assembly into the chassis.
  - b. Simultaneously press the two ejector levers inward. Then tighten the four captive Phillips screws snugly by hand.
8. Install the Myrinet cards in the Sun Fire V880z.  
[See "Installing the Myrinet PCI Cards in a Sun Fire V880z" on page 23.](#)

---

**Note** – When the Sun Fire Visual Grid software is installed, the Myrinet cards are recognized by the Myrinet software bundled with Sun Fire Visual Grid software.

---

# Installing the Myrinet PCI Cards in a Sun Fire V880z

On a Sun Fire V880z that is powered down, install each Myrinet card in a separate PCI bus. The Sun Fire V880z has nine PCI slots and three PCI buses. The PCI slots are numbered from the bottom up, starting at 0 and ending at 8. The numbering scheme can be found on the inside of the left door that closes over the PCI slots.

Refer to the following hardware documentation for detailed installation and service information:

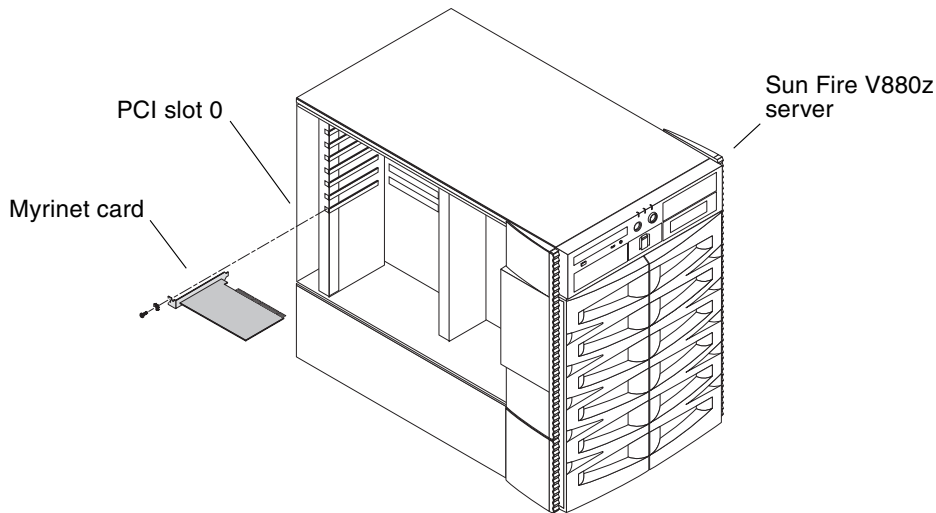
- *Sun Fire V880 Server Service Manual* (806-6597)
- *Sun Fire V880 Server Owner's Manual* (806-6592)

## 1. Identify the slots where you want to install the Myrinet cards.

One card should be installed in one of the PCI slots numbers 0-3 (33 MHz bus), one installed into one of the PCI slots numbered 4-6 (33 MHz bus), and one installed into one the PCI slots numbered 7-8 (66 MHz bus). The 66 MHz slots are physically the highest two PCI slots.

## 2. Remove the PCI filler panel from the back of the system.

- a. Pinch the PCI card retaining clip until it releases from the top of the filler panel and rotate the clip outward.
- b. Slide the filler panel out from the rear panel.



**FIGURE 4-4** Installing Myrinet Cards in the Sun Fire V880z

3. Insert the Myrinet cards into the appropriate slots on the I/O board ([FIGURE 4-4](#)).
  - a. Insert the faceplate side of the Myrinet card into the appropriate opening on the rear panel. At the same time, insert the other end of the card into the corresponding groove on the PCI card bracket.
  - b. Push the card into the slot on the I/O board until the card is fully seated.

## Cabling the Master and Slaves

- **Connect one end of each Myrinet networking fiber cable (three cables per slave) from each Myrinet card in the master to a Myrinet card in the slave.**

There are six Myrinet cards for each networked slave—three in the master, three in the slave.

Ensure that the fiber cables connecting the master with each Myrinet card in each slave are properly attached. All connections are point-to-point and there is no network switch involved. See [“System Configuration Examples” on page 16](#).

When cabling the Myrinet cards, the green LED on the cards illuminates once a connection is established over the fiber cabling. If the LED does not light and both master and slave computers are powered on, then there is a problem with the fiber cables, the connection, or device seating.

---

**Note** – You must only use the Myrinet drivers bundled with the Sun Fire Visual Grid software. Do *not* use other Myrinet drivers, such as Myrinet drivers available on Myricom’s web site. See [“Verifying the Myrinet Software” on page 55](#).

---

---

# Installing a USB Card

This procedure only applies to the Sun Fire 4800/6800. Installing a USB card is *not* necessary with a Sun Fire V880z, since it already provides USB ports for the keyboard and mouse. The USB card can be installed into any PCI slot.

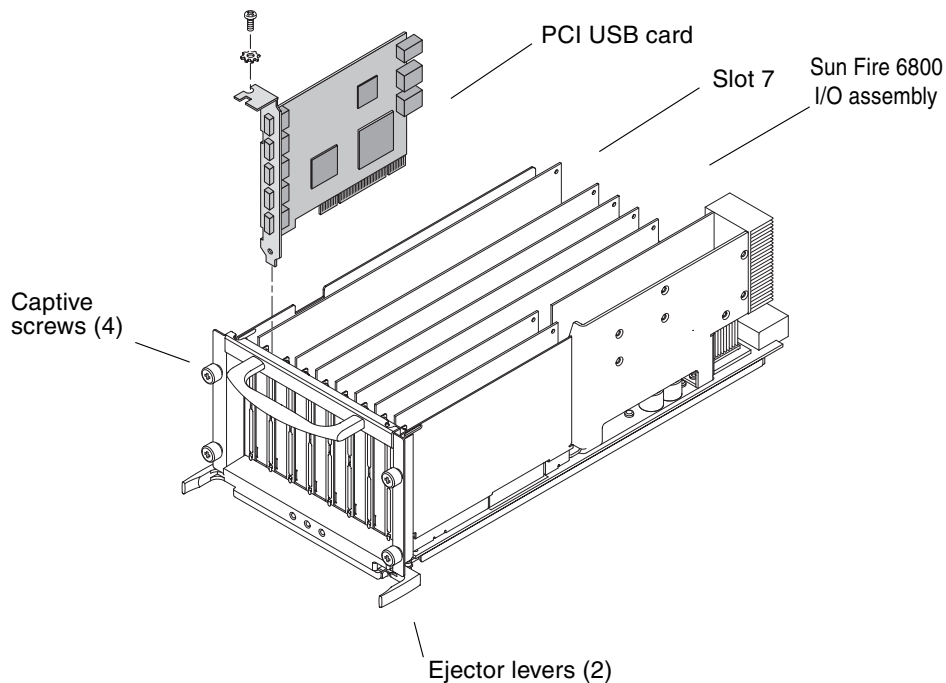
Refer to the *Sun Fire 6800/4810/4800/3800 Systems Service Manual* (805-7363) for proper procedures on how to shut down the computer safely before installing or removing any internal boards and how to reboot after installation. For a complete set of documentation, select "Servers" at: <http://www.sun.com/documentation>

## Installing a USB Card in a Sun Fire 4800/6800

1. **Shut down your system and remove the Sun Fire 4800/6800 PCI I/O assembly.**

Refer to the *Sun Fire 6800/4810/4800/3800 Systems Service Manual* for details on removing and replacing PCI I/O assemblies.

  - a. **Loosen the four I/O assembly captive Phillips screws and pull the ejector levers outward (FIGURE 4-5).**
  - b. **Slide out the I/O assembly and place it on an ESD mat close to the system.**
2. **Attach the antistatic wrist strap and connect it to the I/O assembly.**
3. **Place the I/O assembly on its side.**
4. **Position the USB card in the I/O assembly (FIGURE 4-5).**
5. **Guide the USB card into the I/O assembly slot 7 (FIGURE 4-5). Choose any available slot for the card.**
  - a. **Insert the faceplate end of the USB card into the appropriate opening in the I/O assembly back panel.**
  - b. **Guide the opposite end of the USB card into the card slot.**
  - c. **Secure the faceplate to the I/O assembly with the two Phillips screws.**



**FIGURE 4-5** Installing a PCI USB Card in the Sun Fire 6800 I/O Assembly

6. Insert and secure filler boards into any other open slots.
7. Replace the I/O assembly into the Sun Fire 4800/6800 chassis.
  - a. Line up the I/O assembly with the chassis I/O assembly opening and slide the assembly into the chassis.
  - b. Simultaneously press the two ejector levers inward and tighten the four captive Phillips screws snugly by hand.

---

**Note** – In order for the USB PCI card to be recognized by Solaris 8 update 7, you must always reboot the Sun Fire 4800/6800 with the `-r` flag.

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# Installing the Software

This section is for first time setup only. Please make sure that you have completed the site preparation requirements (“[Site Hardware Preparation](#)” on page 18) before proceeding further.

---

**Note** – Once the Sun Fire Visual Grid system hardware and software are installed and configured for the first time, upgrading the software is simple. The process is detailed in “[Upgrading the Sun Fire Visual Grid Software](#)” on page 32.

---

1. **If necessary, install the correct version of the Solaris operating environment on each system and upgrade to the proper Solaris operating environment patch level.** See “[Operating Environment Requirements](#)” on page 5 and “[Software Patches](#)” on page 8 in [Chapter 2](#).

---

**Note** – The patches required for Sun Fire Visual Grid system are automatically installed when you run the `install` script (this is a later step). Refer to the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User’s Guide* for Sun XVR-4000 graphics accelerator software installation procedures.

---

2. **Before starting the software installation, verify that each slave can bring up the X Window system.**

For example, log in and start an X Window session (for example, CDE or GNOME) on each Sun XVR-4000 graphics accelerator. A keyboard and mouse be plugged into the USB ports of each slave system, even after the Sun Fire Visual Grid software installation is complete. If not, the X server on the slaves will not be able to start.

If necessary, upgrade to the latest Sun XVR-4000 graphics accelerator drivers. See the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User’s Guide* for instructions. Sun OpenGL for Solaris software is bundled with the Sun Fire Visual Grid software.

3. **Become superuser and set the frame buffer attributes to the same values for each Sun XVR-4000 graphics accelerator in each system.**

---

**Note** – This step is required only if you plan to run your system in Xinerama mode. If not, this step is optional.

---

If you run your system in Xinerama mode, the frame buffer attributes *must* be set to the same values for each Sun XVR-4000 graphics accelerator in each system. To do this, type the following on each master and slave that has a Sun XVR-4000 graphics

accelerator installed:

```
# fbconfig -dev /dev/fbs/zulun -defaults
```

Where *zulu*n** refers to *zulu0*, *zulu1*, and so on, as the devices appear in the */dev/fbs* directory on each computer.

This step is to ensure that the frame buffers are all set with the same properties. Later, after the installation is complete, these settings can be customized for the particular installation.

4. **On each slave, make the master the `loghost` for the slave by modifying the slave system `/etc/hosts` file. Also, modify the `/etc/syslog.conf` file on each slave so that the console output is redirected to the master console output.**

If you do not modify these two files, the slave console output is written on the screen, obscuring the window system when this slave is run as a Sun Fire Visual Grid slave computer. See [“Redirecting the Slave Console Output” on page 31](#).

5. **Remotely log in to each slave and run the following:**

```
# /usr/dt/bin/dtconfig -d  
# /usr/dt/bin/dtconfig -kill
```

These commands bring down the login screen if it is currently running. These commands cause the `login` screen for the X Window system *not* to come up automatically whenever the X Window system is exited or when the Sun Fire Visual Grid system comes up after a reboot. The login screen is not necessary on the slave since the master initiates the X Window system on the slave.

6. **Install the software packages on the master and on each slave.**

For Sun Fire 4800/6800 computers:

- a. **Insert the Sun Fire Visual Grid software CD into the CD-ROM drive, become superuser, go to the following directory and install the required patches. Type:**

```
# cd /cdrom/cdrom0/  
# ./install_patches
```

- b. **Reboot.**

- c. **Install the Sun Fire Visual Grid software. Type:**

```
# ./install
```

**d. Respond to the installation prompts.**

You need to know whether you are installing the software on a master or slave.  
For Sun Fire V880z computers:

**a. Insert the Sun Fire Visual Grid software CD into the CD-ROM drive, become superuser, go to the following directory and install:**

```
# cd /cdrom/cdrom0/  
# ./install
```

**b. Respond to the installation prompts.**

You need to know whether you are installing the software on a master or slave.

**7. Reboot the master and each slave.**

No special boot flags are required on a Sun Fire V880z. The Sun Fire 4800/6800, however, requires the `-r` flag for the boot command to recognize the PCI USB board.

**8. With the `dzadmin` software administration tool, create your system configuration and install it on the master.**

You should remotely log in (`rlogin`) to the master computer from the administration workstation and then run `dzadmin`. When you are finished with this step, exit the `dzadmin` tool. Carefully follow the directions the first time using this tool.

See [“dzadmin Administration Tool” on page 37](#).

**9. Modify `/etc/dt/config/Xservers` on the master to match the multi-display installation created in the administration tool (`dzadmin`).**

The `Xservers` file controls on what frame buffers X Windows appears. The `dzadmin` tool appends a string to the end of the `/etc/dt/config/Xservers` file when the `dzadmin` install button is pushed. Uncomment that line by removing the pound sign (`#`) in front of it; comment out the old entry by adding a `#` in front of it. Every installation with the `dzadmin` tool appends a new commented-out X servers string to the end of the `Xservers` file.

---

**Note** – The `Xservers` file on the slave system is always ignored by the software.

---

See the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User's Guide* for more details on how to modify the `Xservers` file.

**10. Bring up the window system login screen in Sun Fire Visual Grid mode.**

If the window system is running on the master, log out of the session.

On the master, from a remote shell, run the following as superuser:

```
# /usr/sbin/dzstartup start
# /usr/dt/bin/dtconfig -reset
```

The window system is reset to the new settings. The X window login screen should now appear. (The command-line output from `dzstartup` might list an error condition; ignore this message.)

**11. On the master, log in through the X Window login screen.**

After the window system appears across the frame buffers, run an OpenGL program on each display to verify the installation.

For example, type the following:

```
% setenv DISPLAY :0.0
% /usr/openwin/demo/GL/ogl_install_check
```

If the window system is running in Xinerama mode, there is only one logical display, which enables you to move the program window across the different displays. In a non-Xinerama installation, separately test each display.

Installation is now complete.

See [Appendix A](#), Troubleshooting, or contact your Sun service representative if installation problems occur:

<http://www.sun.com/service/online>

# Redirecting the Slave Console Output

On each slave, modify the `/etc/syslog.conf` file so that the output from the console goes to the master console output. If this is not done, console messages appear on the slave screen, obscuring rendering. Modify the `/etc/syslog.conf` file on each slave as follows.

**1. Comment (#) the following line in the file:**

```
# *.err;kern.notice;auth.notice    /dev/sysmsg
```

**2. Add the following line to the file right after the commented out line:**

```
*.err;kern.notice;auth.notice    @loghost
```

**3. Comment (#) the following line in the file:**

```
# user.err                          /dev/sysmsg
```

**4. Add the following line to the file right after the commented out line:**

```
user.err                            @loghost
```

Ensure that the line being replaced is a comment. Add the additional line after the replaced line as shown in this sample `/etc/syslog.conf` file:

```
# *.err;kern.notice;auth.notice    /dev/sysmsg
*.err;kern.notice;auth.notice    @loghost
# user.err                          /dev/sysmsg
user.err                            @loghost
```

On each slave, designate the master as the `loghost`. Modify the `/etc/hosts` file by removing the `loghost` notation from the slave line to the master line, and by making the master the `loghost`. Ensure that there is a line in the `/etc/hosts` file that contains the master IP address. This line should have been added during the Gigabit Ethernet network installation process.

Example original `/etc/hosts` file:

```
127.0.0.1 localhost
10.5.28.254 slavehost loghost
11.5.28.254 dzslave0 ## slave gigabit ethernet
11.5.28.28 dzmaster ## master gigabit ethernet
```

Example modified `/etc/hosts` file:

```
127.0.0.1 localhost
10.5.28.254 slavehost
11.5.28.254 dzslave0 ## slave gigabit ethernet
11.5.28.28 dzmaster loghost ## master gigabit ethernet
```

These changes, combined with the `/etc/syslog.conf` change described earlier in this section, redirects each slave console output to the master in the `/var/adm/messages` file.

For these changes to take effect, reboot the slave, or more preferably, run the `syslog` script as superuser in `/etc/init.d`:

```
# /etc/init.d/syslog stop
# /etc/init.d/syslog start
```

See [Appendix A](#) for troubleshooting information.

---

## Upgrading the Sun Fire Visual Grid Software

If the Sun Fire Visual Grid software is being installed for the first time, follow the procedures in [“Site Hardware Preparation” on page 18](#) and [“Installing the Software” on page 27](#). If you are upgrading the software in an existing Sun Fire Visual Grid software installation, follow the directions in this section.

The Sun Fire Visual Grid software packages are specific to the Solaris 8 operating environment. The installation script automatically detects the operating environment and installs the correct packages and patches. In addition to Sun Fire Visual Grid software, these packages automatically install the correct version of OpenGL 1.3, a recent OpenGL 1.3 patch, a Java 1.4 runtime environment, and the drivers for the Myrinet cards, as necessary. The entire release is bundled into a single executable that is run from the command line and is menu driven.

---

**Note** – Install the software upgrade from the command line and *not* while the Sun Fire Visual Grid software window system is running.

---

1. Insert the Sun Fire Visual Grid software CD into the CD-ROM drive, become superuser, go to the following directory, and type:

```
# cd /cdrom/cdrom0
# ./install
```

Respond to the installation prompts. You need to know whether you are installing the software on a master or slave.

If a `trustedhosts` file already exists on the systems for security reasons (see [Chapter 6](#)), the script acknowledges this and retains the `trustedhosts` settings.

---

**Note** – All master and slave computers must be upgraded. If only a subset of the machines are upgraded, and an attempt is made to run the Sun Fire Visual Grid software, the software issues an error message at run time and exit.

---

To remove previously installed Sun Fire Visual Grid software packages, use the `./uninstall` command, and respond to the removal prompts. An `uninstall` completely removes the previous installation. However, the `install` script only installs components that have been updated since the last release, and does not reinstall the other components on the computer.

2. After completing the installation, reboot each master and slave.

Previous state settings, such as an installed system configuration file, remain in effect from release to release. The system should just appear with the previous settings after the software upgrade.

---

# Interchanging a Master and Slave

In some complex configurations, it might be desirable to use the same computer interchangeably as a master and a slave.

Select the master option when installing software on any computer that may be a master computer, even if it will initially serve as a slave computer. You select master or slave when responding to the software installation script. See [Step 6](#) in “[Installing the Software](#)” on page 27.

Modify the `trustedhosts` file (`/etc/openwin/dz/trustedhosts`) on each computer to contain all the hosts that may be required. Or, alternatively, remove the `trustedhosts` file on a computer to enable any computer to administer/control it.

On a slave computer, the `trustedhosts` file, at a minimum, contains “localhost” and the Gigabit Ethernet hostname of the master computer. On a master, it contains, at a minimum, “localhost” and the output of `uname -n` on the master. The union of these names is required for a computer’s `trustedhosts` file to be either a master or a slave.

Run the following command sequences from the administration workstation.

## Changing a Master to a Slave Computer

To stop a computer from being a master (if you are changing master computers), do the following steps.

1. On the master computer, type:

```
# /etc/init.d/dtlogin stop (stops the X server)
# /usr/sbin/dzstartup stop (stops the Sun Fire Visual Grid service)
# mv /etc/openwin/dz/system.dzcfg backup file
```

Where *backup file* is the filename you selected as the backup file.

2. Perform any necessary Myrinet recabling after you have executed the above commands.
3. Once a computer is no longer a master, you can add it as a slave to another master computer by running `dzadmin` on the new master.



4. **Once the new configuration is complete in dzadmin, select Actions -> Configure Myrinet Hardware from the administration tool Actions menu.**

This automatically reconfigures the Sun Fire Visual Grid system to the new Myrinet hardware setup. See [“The System Administration Tool Menus”](#) on page 41 for a description of the menus.

5. **Select Install to install the configuration.**

Manually update the `/etc/dt/config/Xservers` file on the new master computer. Occasionally, you may need to reboot any computer that was part of the Myrinet recabling before dzadmin successfully installs a new installation on the new master computer.

6. **Verify that the old master computer is no longer designated as a master.**

To do this, run `/usr/sbin/dzstatus` on the old master computer.

## Removing a Slave Computer

To stop a computer from being a slave, do the following steps. Perform this if you are keeping the same master computer but removing or changing slave computers:

1. **On the master computer, type:**

```
# /etc/init.d/dtlogin stop
# dzstartup stop
```

2. **Perform any necessary Myrinet recabling after you have executed the above commands.**
3. **Run dzadmin on the master computer and remove this slave computer from the configuration.**

4. **Select Install to install the configuration.**

Manually update the `/etc/dt/config/Xservers` file on the master.

5. **Run dzstartup start.**

6. **Restart X window by running /etc/init.d/dtlogin start.**

Occasionally, you may need to reboot any computer that was part of the Myrinet recabling before dzadmin successfully installs a new installation on the new master computer.

7. **Verify that the slave computer is no longer designated as a slave.**

To do this, run `/usr/sbin/dzstatus` on the slave computer.

---

# Configuring the Frame Buffer Attributes

Once a Sun Fire Visual Grid system installation has been successfully completed, you can configure all of the remote frame buffers from the master machine. To see a list of frame buffers recognized by the system, type the following on the master machine:

```
# fbconfig -list
```

All the frame buffers with `dzfb` in the name are Sun Fire Visual Grid frame buffers. The following command lists the properties of the first Sun Fire Visual Grid frame buffer:

```
# fbconfig -dev /dev/fbs/dzfb0 -propt
```

The following command lists the possible commands:

```
# fbconfig -dev /dev/fbs/dzfb0 -help
```

Using `fbconfig` to administer a Sun Fire Visual Grid frame buffer is no different than using `fbconfig` to administer a local Sun XVR-4000 graphics accelerator. Most `fbconfig` changes require restarting the X server. Log out of the X Window system on the master and log back in. The Sun Fire Visual Grid software automatically restarts the X server on the slaves during this process.

When a slave is running in Xinerama mode, the entire slave system is addressed as a single device from the master system (for example, `dzfb0`). So using `fbconfig` on a single device affects both of the slave frame buffers. The `fbconfig -list` lists only a single device for the slave when it is running in Xinerama mode.

Refer to the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User's Guide* for details on the effect of various `fbconfig` commands on the Sun XVR-4000 graphics accelerator.

# System Administration

---

This chapter describes the `dzadmin` configuration tool that system administrators use to configure a Sun Fire Visual Grid system.

- “`dzadmin` Administration Tool” on page 37
- “The System Administration Tool Menus” on page 41
- “Starting the `dzadmin` System Administration Tool” on page 43
- “Using the `dzadmin` System Administration Tool” on page 45
- “`dzstatus` Status Tool” on page 48
- “Sun Fire Visual Grid Limitations” on page 49
- “Framelock and Genlock” on page 49

---

## `dzadmin` Administration Tool

The `dzadmin` program is the system administration configuration tool that system administrators use to configure a Sun Fire Visual Grid system. The `dzadmin` tool is a Graphical User Interface (GUI) (FIGURE 5-1).

You must run `dzadmin` on a Sun Fire Visual Grid system master with a slave present. The `dzadmin` tool dynamically queries the master and slaves for the available hardware; these details appear in the tool GUI. The Sun Fire Visual Grid system achieves communication between master and slave machines by running a network aware daemon, called `dzdaemon`, on each machine. `dzdaemon` always comes up automatically when a system is rebooted.

# Administration Tool Overview

The Sun Fire Visual Grid system master is configured using the Master Machine Configuration panel of the Sun Fire Visual Grid System Administration window (FIGURE 5-1). From the `dzadmin` System Administration window menu system (Actions -> Add Slave), you can add slaves to the configuration. The addition of each slave adds a new slave panel to the Slave Machine Configurations panel. From this panel, you can set the characteristics of each slave (FIGURE 5-1). As each slave is added, the tool automatically queries the frame buffer information from that slave. The information appears in the Slave Machine Configurations panel. The Messages panel provides feedback about the tool's progress and reports any problems.

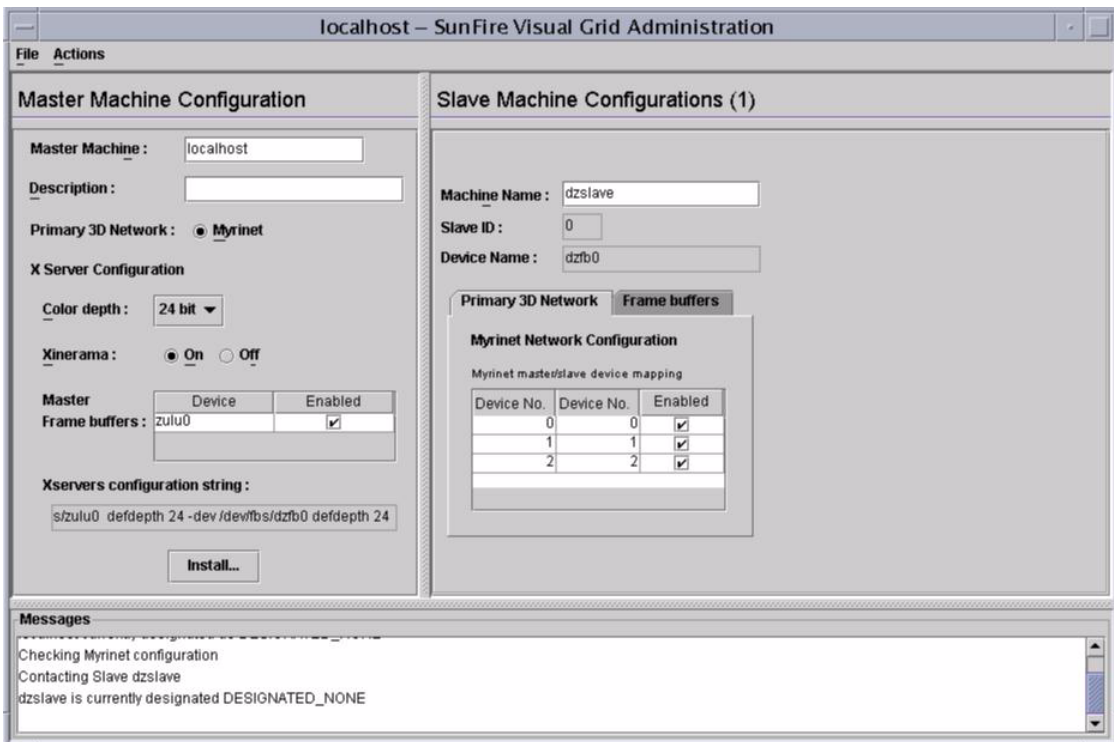


FIGURE 5-1 Sun Fire Visual Grid Software Administration Tool

Once a configuration has been generated, you can save it as a file for later use or you can install it onto the master for immediate operation (from either Actions menu or pressing the Install button). Save a configuration by saving it as a user-named file. To load a file into the GUI, select Load from the File menu (File -> Load). A newly installed configuration becomes the default system configuration. The `dzadmin` tool

overwrites the previous configuration file in `/etc/dz/openwin/system.dzcfg`. To be safe, save an existing installation to a file before installing another configuration.

The newly installed configuration takes effect after you modify the `/etc/dt/config/Xservers` file and restart the existing X session. The `Xservers` file determines which screens and what command line arguments the X server will use. Once the configuration in `dzadmin` has changed, it is important to modify the `Xservers` file before restarting the X server, or the system will not come up properly. When the Install button was pressed on the `dzadmin` administration tool, it appended a commented-out sample line to the bottom of the `Xservers` file that corresponds to the particular configuration in the tool. Comment out the existing line in the file (adding a pound sign “#” to the front of the line) and then uncomment the newly appended line (removing # in front of the line) before restarting the X server.

Alternatively, the following command, as superuser, causes the new configuration to come up immediately, and causes the X server to restart if the configuration has changed:

```
master# /usr/sbin/dzstartup start
```

If the X session is being started from the command line, you must run `/usr/sbin/dzstartup start` in between invocations of X sessions. That is, you must run the `start` command again if the device configuration changes (for example, if slave machines were added or deleted, or a frame buffer was added to a slave). You also must run `start` if the user changes from Xinerama mode to non-Xinerama mode or vice versa.

When you select the Install option in the Actions menu, it automatically prompts the user to save the configuration to a user-named file. A new installation automatically overwrites the previously installed `system.dzcfg` file. To recover it, refer back to the backup file you created while installing it. To be safe, save an existing installation to a file by saving it before installing another configuration.

## Using Xinerama and dzadmin

In an ordinary multiscreen system without Sun Fire Visual Grid software, it is possible to switch to or from Xinerama mode by modifying the `Xservers` file and restarting the windowing system. The `Xservers` file is located at `/etc/dt/config/Xservers`. The `Xservers` file, if it does not already exist, is automatically created by the Sun Fire Visual Grid software package installation.

In a Sun Fire Visual Grid system, when switching back and forth between Xinerama and non-Xinerama mode, you must modify the `Xservers` file in the same way. And you must check or uncheck the Xinerama box in the Frame Buffers panel located within the slave panel in the `dzadmin` tool. This is extra step is necessary because in Xinerama mode, Sun Fire Visual Grid software sees a pair of frame buffers in a slave as a single device on the master. The single device displays twice the resolution of the individual devices.

You must set the frame buffer attributes of a system running in Xinerama mode to the same values. See [“Upgrading the Sun Fire Visual Grid Software” on page 32](#) for more details.

---

# The System Administration Tool Menus

There are two menus on the Sun Fire Visual Grid software administration tool (dzaadmin) menu bar: File and Actions.

## File Menu

FIGURE 5-2 shows the File menu.

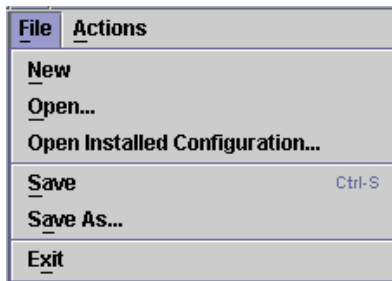


FIGURE 5-2 Sun Fire Visual Grid Software Administration Tool File Menu

TABLE 5-1 describes the File menu items.

TABLE 5-1 File Menu

Menu Item	Description
New	Creates a new, blank configuration file.
Open...	Opens the file menu to select a particular configuration file to load.
Open Installed Configuration	Loads and displays the currently installed master configuration.
Save	Saves the configuration file to disk. This does <i>not</i> install the configuration file.
Save As.	Saves the configuration file to disk by a selected filename. This does <i>not</i> install the configuration file.
Exit	Exits the system administration tool.

# Actions Menu

FIGURE 5-3 shows the Actions menu.

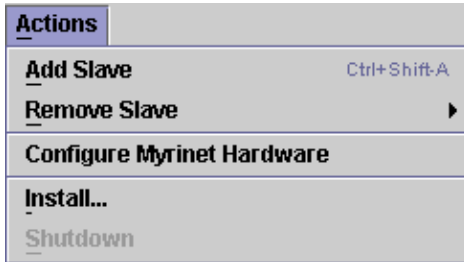


FIGURE 5-3 Sun Fire Visual Grid Software Administration Tool Actions Menu

TABLE 5-2 describes the Actions menu items.

TABLE 5-2 Actions Menu

Menu Item	Description
Add Slave	Adds a slave to the configuration.
Remove Slave	Removes a slave from a configuration.
Configure Myrinet Hardware	Automatically reconfigures the Sun Fire Visual Grid system to a new Myrinet hardware setup.
Install	Installs the configuration file.
Shutdown	Stops the daemon on both master and slave computers.



---

# Starting the dzadmin System Administration Tool

The dzadmin tool does not make any dynamic changes to the system configuration until the user installs the system configuration. Therefore, you can use the tool to create new configuration profiles while the Sun Fire Visual Grid system is in use by other users.

Run dzadmin on the master by setting the DISPLAY environment variable so that you can become host (xhost) to the administration workstation. The application displays on the screen of the administration workstation.

To start the dzadmin tool:

1. **Become superuser and set the administration workstation DISPLAY environment variable. Type:**

```
admin# rlogin master
master# setenv DISPLAY admin:0.0
```

Where *master* is the master host and *admin* is the name of the administration workstation.

2. **Start dzadmin. Type:**

```
master# /usr/sbin/dzadmin&
```

The Sun Fire Visual Grid software administration tool then appears on the administration workstation screen (FIGURE 5-4).

The administration tool consists of three panels: Master Machine Configuration, Slave Machine Configuration, and Messages.

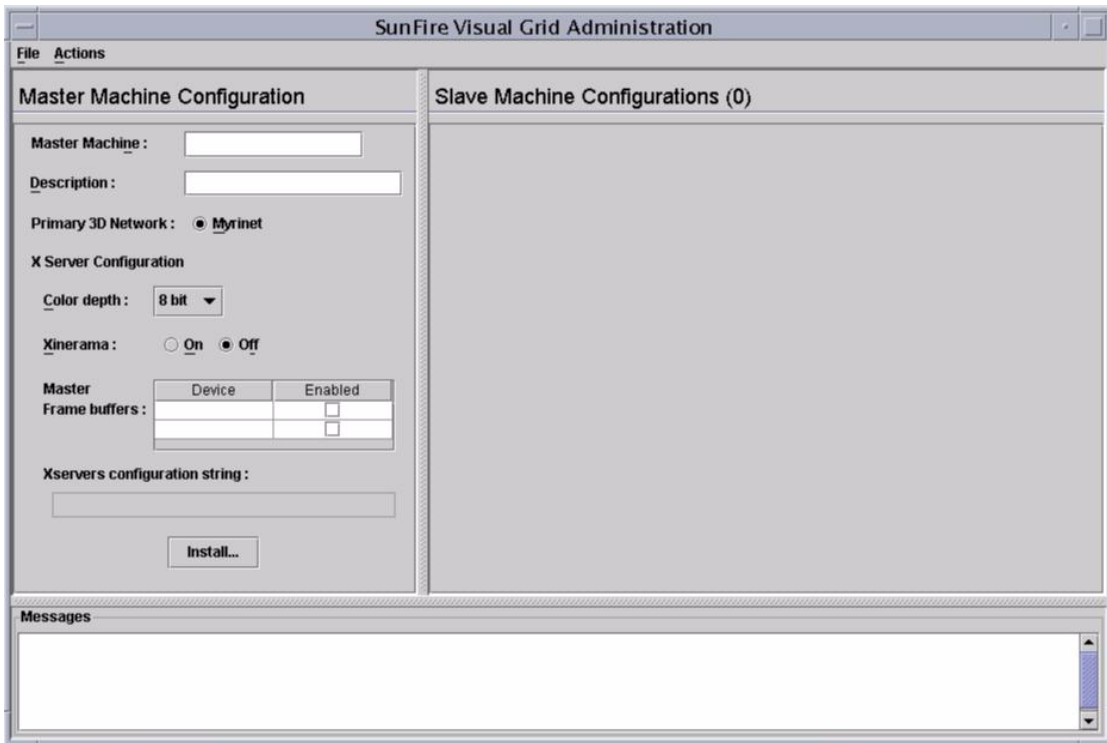


FIGURE 5-4 Sun Fire Visual Grid Software Administration Tool

3. Go to [“Using the dzadmin System Administration Tool”](#) on page 45.

---

# Using the dzadmin System Administration Tool

## 1. Start the dzadmin administration tool

See “Starting the dzadmin System Administration Tool” on page 43.

## 2. Enter the master nodename in the Master Machine field.

### a. Enter the master nodename, or enter localhost.

To find the master machine nodename, type:

```
host% uname -n
```

### b. Press Enter or Tab to move to the next field.



---

**Caution** – Do *not* enter the master Gigabit Ethernet nodename in the master field. This can cause a security problem for secure setups.

---

After you fill in the Master Machine field (FIGURE 5-5), dzadmin queries the hardware on the master computer. If a current Sun Fire Visual Grid `system.dzcfg` installation file exists on this master, a dialog box appears prompting you to load it into the tool. If the file is not installed, you will enter the information in the steps of this procedure.

### Master Machine Configuration

**Master Machine :**

**Description :**

**Primary 3D Network :**  Myrinet

**X Server Configuration**

**Color depth :**  ▼

**Xinerama :**  On  Off

Master Framebuffers :	Device	Enabled
	zulu0	<input checked="" type="checkbox"/>

**Xservers configuration string :**

**FIGURE 5-5** Master Machine Configuration Panel

---

**Note** – The X server options in the `/etc/dt/config/Xservers` file must be manually edited to match the options in the `dzadmin` tool after the Install button has been pressed. See [Step 7](#).

---

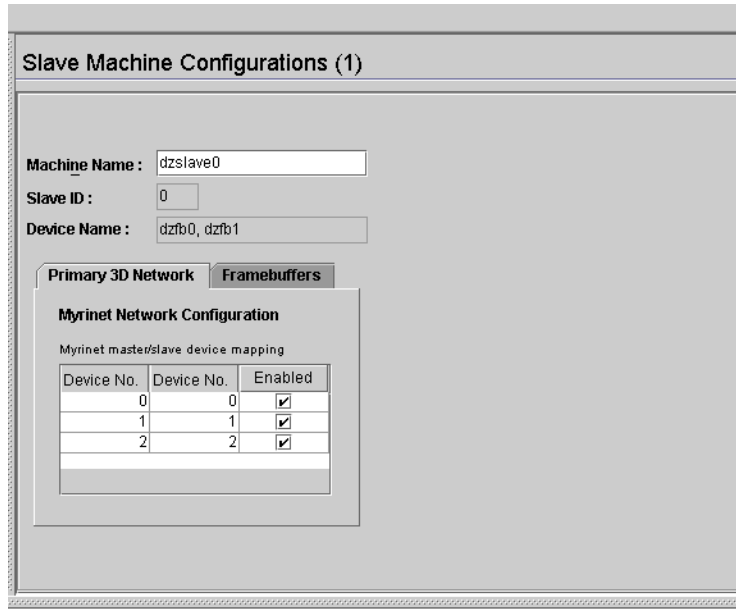
### 3. Configure the X server options for the master machine.

Choose the required color depth and select Xinerama, if required. If you select Xinerama here, all the displays are combined into one large flat X screen.

4. Add the required number of slave machines one at a time.

a. From the administration tool menu bar, choose Actions -> AddSlaves.

A Slave Machine Configurations panel displays for each computer (FIGURE 5-6). A (1) indicates the first slave, a (2) indicates the second slave, and so on.



Slave Machine Configurations (1)

Machine Name : dzslave0

Slave ID : 0

Device Name : dzfb0, dzfb1

Primary 3D Network    Framebuffers

**Myrinet Network Configuration**

Myrinet master/slave device mapping

Device No.	Device No.	Enabled
0	0	<input checked="" type="checkbox"/>
1	1	<input checked="" type="checkbox"/>
2	2	<input checked="" type="checkbox"/>

FIGURE 5-6 Slave Machine Configuration Panel

b. In each slave panel, enter the name of the slave using its Gigabit Ethernet nodename in the Machine Name field, and press Enter or Tab.

The hardware on the slaves is dynamically queried, and appears as configurable options in the dzadmin tool.

c. Adjust the Slaves Machine Configuration panel as required.

For example, you may want to select color depth, Xinerama, or particular frame buffers on the slave.

5. After you add all the slaves to the configuration, install the configuration.

Press the Install button on the Master Machine Configuration Panel (FIGURE 5-5).

---

**Note** – You are prompted to save the configuration in a user-named file as a backup before installation. Install the new configuration, in addition to saving it to a file, or the configuration does not take effect.

---

6. Exit dzadmin. Choose File -> Exit from the administration tool menu bar.

7. Make necessary changes to the `/etc/dt/config/Xservers` file.

The `Xservers` file controls which frame buffers the window system and X Windows appear on. The dzadmin tool appends a string to the end of the `/etc/dt/config/Xservers` file when the dzadmin Install button is pushed. Uncomment the appended line string at the end of the file by removing the pound sign (#) in front of it, and comment out the old entry above it by adding a “#” in front of the line.

See Chapter 5 of the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User's Guide* for more details on how to modify the `Xservers` file.

8. If a window session is currently running, log out and log back in.

The window system restarts with the configuration changes you have made.

Or, if you are not already logged in, select Reset from the Options menu from the desktop login screen, this causes the session to use the new settings.

---

## dzstatus Status Tool

The `dzstatus` program, found in `/usr/sbin`, queries `dzdaemon` on the local host and prints its status. `dzdaemon` is a daemon that runs in the background as part of the Sun Fire Visual Grid system. It exchanges set up and connection initiation information among computers in the system. `dzstatus` reports whether the local `dzdaemon` is designated as a master or slave in the Sun Fire Visual Grid system, and what network transport layer is being used for passing 3D graphics protocol.

This information can be useful in diagnosing configuration problems. See [Appendix A](#) for troubleshooting information.

---

**Note** – The format of the `dzstatus` output is subject to change without notice. Care should be taken in writing scripts that parse the output.

---

---

## Sun Fire Visual Grid Limitations

GLX (indirect) rendering on the master is supported (for example, `master:0.2`), but the network connection used is TCP and not Myrinet. It is *never* correct to set the display for indirect rendering to the slave display (for example, `slave:0.0`).

Only six concurrent OpenGL applications can simultaneously use the high-speed Myrinet connection. The seventh and subsequent concurrent OpenGL applications fall back to using the slower Gigabit Ethernet connection. Applications using the slower link do not automatically migrate to the Myrinet connection if space becomes available when one of the first six applications terminates. The application must be restarted to use the faster network. This is only a performance limitation, functionality is not affected.

---

## Framelock and Genlock

For the Sun Fire Visual Grid system, framelock and genlock are configured as if all the frame buffers were installed in the same host; therefore, the software setup and cabling requirements do not change. All of the `fbconfig` commands are issued on the master machine. The only difference is the device names, `dzfbn` is the device name for the Sun Fire Visual Grid frame buffers (instead of `zulun`).

See the *Sun Fire V880z Server and Sun XVR-4000 Graphics Accelerator Installation and User's Guide* for details on how to framelock and/or genlock multiple Sun XVR-4000 graphics accelerators.





# Security

---

This chapter describes the Sun Fire Visual Grid software security measures used by the `dzdaemon` program.

- [“dzdaemon Daemon” on page 51](#)
  - [“Role-Based Access” on page 52](#)
- 

## dzdaemon Daemon

The Sun Fire Visual Grid software uses a daemon (`dzdaemon`) running on each computer in the installation to set up and control the Sun Fire Visual Grid system. This `dzdaemon` is responsible for the following:

- Installing and modifying configuration files on the master computer
- Running `dtlogin -kill` on the slave computers
- Starting X window on the slave computers
- Starting `oglserver` on the slave computers
- Configuring and installing the `dzfb` devices on the master computer
- Configuring the Myrinet network

The `dzdaemon` daemon architecture has access to the system resources required by the Sun Fire Visual Grid system. The architecture includes an optional trusted hosts system to restrict which computers on a network can communicate with `dzdaemon`.

The Sun Fire Visual Grid software installation script prompts the user to create trusted hosts files, although this option can be declined. On the slave computers the trusted hosts file (`/etc/openwin/dz/trustedhosts`) is a text file that should contain the names (or IP addresses) of the Gigabit Ethernet connection to the master computer (or set of masters if the configuration is changed regularly) and `localhost`. The name or IP address referring to the master in the slave

trustedhosts file should be the same connection over which the master sends X protocol to the slave. On the master, the trustedhosts file should simply contain the name (uname -n output) or IP address of that master and localhost.

The Sun Fire Visual Grid system uses the following port numbers for master-slave communication over TCP and UDP protocols:

**TABLE 6-1** TCP and UDP Protocols

Program	Protocol	Port
dzdaemon	3866/tcp	DZDAEMON Port
dzdaemon	3866/udp	DZDAEMON Port
dzoglserver	3867/tcp	DZOGLSERVER Port
dzoglserver	3867/udp	DZOGLSERVER Port

These ports have been registered with the Internet Assigned Numbers Authority (IANA) and can be referenced at:

<http://www.iana.org/assignments/port-numbers>

---

## Role-Based Access

The Sun Fire Visual Grid system can provide role-based access to users of dzadmin. This enables users other than root to modify the system setup using dzadmin.

To give a user the ability to run dzadmin:

- **Add the following line (all on one line) to the /etc/user\_attr file:**

```
username:::auths=solaris.dz.admin;profiles=Visual Grid Administration
```

Where *username* is the name of the user to whom you are granting access.

# Troubleshooting

---

This appendix provides troubleshooting information.

- “Log Files” on page 53
- “General Troubleshooting Information” on page 54
- “Verifying the Myrinet Software” on page 55

For additional technical support, see Support Services at:  
<http://www.sun.com/service/online>

---

## Log Files

For information about installation problems, view the log files. The following log files can be helpful in debugging installation problems:

```
/var/dt/Xerrors  
/var/dt/dzlog  
/tmp/dz_daemon_out  
/var/dt/dz/master.*  
/var/adm/messages
```

The file `/tmp/dzdaemon_out` on each computer might contain the output and errors from the local `dzdaemon`.

---

# General Troubleshooting Information

- If `dzstartup` reports problems, review the log file `/var/dt/dzlog`. Try running `/usr/sbin/dzstartup start` on the master.
- X startup errors are logged in `/var/dt/Xerrors`. If X fails to start, try starting from the command line using `Xsun -dev /dev/fbs/dzfb0`. Since X takes control of the local keyboard run this test from a shell that you log on to remotely from the administration workstation. Test out each `dzfb` device independently in this manner.
- If the slave needs to be rebooted, the system administrator might have to start and `-reset` the Sun Fire Visual Grid system from the master as shown below (preferably from a shell window on the administration workstation using `rlogin` to communicate to the master computer).

```
# /usr/sbin/dzstartup start
# /usr/dt/bin/dtconfig -reset
```

- When installing a system from scratch, start without using Xinerama mode. When the installation is complete, you can switch to Xinerama mode using the `dzadmin` tool.
- Running `/usr/sbin/dzstatus` returns the current status of `dzdaemon`. This should return `DESIGNATED_MASTER` on the master machine, and `DESIGNATED_SLAVE` on the slave machine. If not, either reboot the machine with the improper designation, or preferably, run `dzstartup start` from the master.
- A keyboard and mouse must always be plugged into the USB ports on the Sun Fire V880z slave, otherwise the X server fails to come up properly.
- If you are using a `trustedhosts` file on the slave, make sure that the file contains at least a “localhost” entry and the hostname of the master system Gigabit Ethernet connection (not the master system 100 Mbit/sec connection). See [Chapter 6](#) for more details.
- A Sun Fire 4800 or Sun Fire 6800 often requires a `-r` flag to the boot command (`boot -r`) in order to recognize the USB card, and to recognize the keyboard and mouse. This flag, however, causes the X server to fail to start. You can discover if this is the problem by:
  - Looking for an error message in the `/var/dt/Xerrors` file that contains the string `VUIDGFORMAT`.
  - Confirming that there is no keyboard or mouse entry in the `/dev/usb` directory, as there should be with properly functioning USB card software.

---

## Verifying the Myrinet Software

The Myrinet software is installed in three packages (`SUNWmyril`, `SUNWmyrir`, and `SUNWmyrix`) as part of the overall Sun Fire Visual Grid software installation. The Myrinet cards should appear in the “Primary 3D Network” panel the first time that the `dzadmin` tool is run. To manually verify the installation after the Sun Fire Visual Grid software has been installed, type:

```
# cd /opt/SUNWmyri/bin
# ./gm_board_info
```

The output should list each of the boards installed in the local server.



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