# Silicon Graphics Visual Workstation Environment (VWE) Start Here

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# Record of Revision

| Version | Description |
|---------|-------------|
| 002 | December 2000 |
|  | Support Visual Workstation Environment 3.0. |

# Contents

# About This Document

This document provides information about the Visual Workstation Environment (VWE) 3.0 release. It is divided into three chapters:

- Chapter 1, "Release Features," describes the major features of this release.

- Chapter 2, "Software Features," describes the major features of earlier releases that are included in this release.

- Chapter 3, "Configuration and Installation," discusses installing and configuring the VWE software.

VWE is an overlay product that adds or enhances features in Linux base distributions from Red Hat (version 6.2) or TurboLinux (version 6.0). If you have a critical need to run SuSE, please contact your SGI customer support representative. Guides for installing and getting started with a base Linux distribution are included with the base Linux distribution release kit.

## 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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# Release Features

This chapter provides a short introduction to the Visual Workstation Environment (VWE) and describes the features provided with this release. describes features supported in previous releases that enhance the features of your base Linux distribution.

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**Caution:** Before installing or reinstalling software, including your base Linux distribution, you must read the file `README.VWE`, located in the top-level directory of the software CD. This file contains information which arose too late in the release cycle to be documented in this manual. After the software installation, this file is located at `/usr/share/doc/VWE-3.0/README.VWE`.

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**Caution:** VWE has been tested only on Silicon Graphics Visual Workstations, and it does not support other systems. Please do not attempt to install this software on any system other than a Silicon Graphics Visual Workstation.

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The errata that describes issues and bugfixes or workarounds not included in this document is available at the following URL:

`http://support.sgi.com/linux`

Manuals for installing your base Linux distribution and getting started in using it are included with your base Linux distribution release kit. Use these manuals as a reference for information not included in this guide. If you need to reinstall your base distribution, you must read "Configuring the X Window System" on page 16.

Documentation for the VWE software and for Linux in general, including man pages, HOWTO guides, and other relevant documentation from the Linux Documentation Project, is available from the following URL:

`http://techpubs.sgi.com`

SGI maintains the following Web site for open source information that describes projects related to its open source efforts:

```
http://oss.sgi.com
```

**Note:** Packaged with the VWE software is a separate sheet that contains the Software License Agreement. This software is provided to you solely under the terms and conditions of the Software License Agreement. Please take a few moments to review the Agreement.

# Feature Overview

The VWE is an overlay product that adds to or enhances features in base Linux distributions from Red Hat (version 6.2) or TurboLinux (version 6.0). If you have a critical need to run SuSE, please contact your SGI customer support representative.

The VWE software will most likely come preinstalled on your SGI platform. If you should need to install it, be aware that you must install one of the supported base Linux distributions using the base distributor's installation tools and then install the VWE software using the VWE installer. Installation and configuration is described in Chapter 3, "Configuration and Installation."

## New Features

New features provided in VWE are as follows:

- Open Inventor is an object-oriented 3D toolkit that offers a comprehensive solution to traditional 3D programming problems. Its programming model, based on a 3D scene database, includes a rich set of objects such as cubes, polygons, materials, cameras, lights, trackballs, engines, 3D viewers, and editors that speed up programming time and extend 3D programming capabilities.

- Digital Media Software Development Kit (dmSDK) provides a cross-platform library for controlling digital media hardware. It supports audio and video I/O devices and transcoders.

- Process Aggregates (PAGGs) consists of modifications to the Linux kernel that let developers create loadable kernel modules to group processes into aggregates.

PAGGs provides functions that allow loadable kernel modules to register as providers of a specific type of process aggregate implementation. Additionally, this feature ensures that membership in a process aggregate, or group, is inherited across process forks.

PAGGs can be used to support a formal job container on Linux. Comprehensive System Accounting, which provides enhanced job accounting, is being ported to Linux. Comprehensive System Accounting will make use of the future job container kernel module.

To learn more about Process Aggregates and the job container module for Linux, please consult `http://oss.sgi.com/projects/pagg`. For more information about Comprehensive System Accounting, please consult `http://oss.sgi.com/projects/csa`.

- The latest journalling file system from Hans Reiser, *reiserfs* version 3.5.23, provides better compatibility with SuSE installations. If you have a critical need to run SuSE, please contact your SGI customer support representative.

- The patch `udf-0.9.2.1.patch` provides the Universal Disk Format (UDF), which is the new DVD and CD-ROM file system format that is expected to replace the ISO9660 standard.

- Support for a pre-release version of the 2.4 Linux kernel. This is experimental software; therefore, it is unsupported and should be run at your own risk. This software includes a pre-release of XFS. For more information, visit `http://linuxtoday.com/stories/15936.html`.

  Install this software by executing `./INSTALL -k 2.4.0` rather than `./INSTALL`.

## Enhancements to Existing Features

Updates to features previously supported in VWE are as follows:

- Enhancements to NFS to allow server support for NFS over TCP. This support allows any file system exported by the server to be mounted by a client using TCP as the transport mechanism. TCP as a transport mechanism provides better congestion control and no limit on transfer sizes as well as other benefits. For more information, see "NFS Enhancements" on page 9.

- Enhancements to PCP support, including the following:

  - An update to PCP version 2.1.9-9, with a large number of minor bugfixes (see the file `/usr/doc/pcp-2.1.9/CHANGELOG` for details).

- A rework for the `rc` scripts for `pcp`, `pmie`, and `pmlogger` so they work correctly on all supported base distributions.

- The `pmsocks` utility allows PCP to monitor TCP applications through *socks4* firewalls. With this utility, you can monitor systems on the Internet at large from within a firewall.

- XFS and `pagebuf` metrics (these are only available if you run the 2.4 kernel with XFS, as described later in this list).

- Support for NFS (version 3) PCP metrics.

- An extension of the `weblogs` PCP agent lets PCP report proxy HTTP servers and adds assorted HTTP cache statistics.

- A fix for the Cisco router PCP agent.

- The device file system (DEVFS) was updated to v99.17, which provides a better device management infrastructure as well as an IRIX-like hardware graph (`/hw`). This version is the latest 2.2.*x* version with most 2.4 kernel DEVFS features backported to 2.2.

- The kernel was updated to use *sard* patch version 0.6 and enhanced to correctly update the disk read I/O and write I/O accounting for Mylex RAID. The read I/O and write I/O counters exported in `/proc/partitions` are correctly updated each time the kernel reads or writes to a disk. This in turns allows PCP to be used to monitor disk I/O operations on systems that have Mylex RAID controllers. The Mylex RAID driver was also updated to version 2.2.8 and the device naming convention was changed to conform to the DEVFS standard.

- An accounting patch to the kernel (`syscall` accounting) counts per-CPU system calls, and corresponding new metrics were added to PCP (`kernel.all.syscall` and `kernel.perCPU.syscall`). This feature will be used by PCP in layered products that integrate with SGI's Embedded Support Partner (ESP) using VWE as a base.

- The `lcrash` utility was updated to version 2.2, which supports *lcrash* on IDE drives as well as SCSI drives.

## Qualified Drivers

The Advanced Linux Sound Architecture (ALSA) drivers included in VWE make up the newest sound subsystem for Linux and provide advanced multimedia capabilities not

previously available. For more information, see "Advanced Linux Sound Architecture (ALSA) Drivers" on page 10.

VWE has an OpenGL driver implementation from NVIDIA Corporation with performance can prove to be better than other available Linux OpenGL implementations.

The QLogic 1080/1280 and 2100 drivers have been supplied by QLogic Corporation, and include updated firmware and improved error handling.

The QLogic drivers were updated to the following new versions:

- The `qla2x00` driver version 4.0 for 2100 and 2200 cards. This version works on the 2.2 and 2.4 kernels as well as IA64.

- The `qla1280` driver version 3.12.

- The `qla1040` driver version 1.20.

The Alteon Gigabit Ethernet driver has been modified to recognize and drive the SGI Gigabit Ethernet card. VWE supports version 0.45.

Other drivers have new versions as follows:

- DAC960 (Mylex) driver version 2.2.8.

- Adaptec driver version 5.1.31.

- USB driver version `usb2.4.0-test2-pre2`, which provides the USB support from the version 2.4 Linux kernel backported to work with the 2.2.*x* kernel.

## Patches and Changes to Base Linux Distributions

This section provides an overview of changes that the VWE software makes in your base Linux distribution.

The following packages were added by SGI:

- `libdba.so` 1.0 (APIs to enhance database performance)

- `lockstat` 1.0 (spinlock metering analysis)

- `sard` 0.6 (disk activity statistics/analysis)

- `sgi-logos` 1.0.1 (SGI logos)
- `sgi-fonts` 1.0 (SGI fonts)
- `sgi-extra-RedHat` 1.7 (manipulate system files for SGI value-added features)
- `sgi-extra-SuSE` 1.7 (manipulate system files for SGI value-added features -- if you have a critical need to run SuSE, please contact your SGI customer support representative.)
- `sgi-extra-TurboLinux` 1.7 (manipulate system files for SGI value-added features)
- `sgi-initscripts-RedHat` 1.4 (manipulate init scripts for SGI value-added features)
- `sgi-initscripts-SuSE` 1.4 (manipulate init scripts for SGI value-added features -- if you have a critical need to run SuSE, please contact your SGI customer support representative)
- `sgi-initscripts-TurboLinux` 1.4 (manipulate init scripts for SGI value-added features)
- `sgi-release` (SGI release identification)
- `devfsd` 1.3.10 (daemon that allows backward compatibility with old device file systems)
- `mkinitrd` 2.3 (creates an initial ramdisk image for preloading modules)
- `mount-2.9u-4_nfsv3` 0.3 (provides mount support for NFS version 3)
- `hinv` 1.4pre2 (provides support for *hinv*)
- `alsa-lib` 0.5.9 (provides support for ALSA driver libraries)
- `alsa-utils` 0.5.9 (provides support for ALSA driver utilities)
- `xfs-cmds` 1.0.4 (provides XFS support)
- `sgi-vwedocs` 1.4 (HTML-formatted documentation for VWE)
- `sgi-vwedocs-print` 1.4 (PDF-formatted documentation for VWE)

# Software Features

This chapter describes features supported in previous releases that enhance the features of your base Linux distribution. For a description of new features, please read Chapter 1, "Release Features."

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**Note:** For information about the software components that enable the graphical features of Silicon Graphics Visual Workstations, see the file README.VWE, which is located on the software CD before you install the software. After the software installation, this file is located at /usr/share/doc/VWE-3.0/README.VWE. This chapter describes only the non-workstation software components of VWE.

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The Visual Workstation Environment (VWE) software provides the Linux kernel version 2.2.16. The VWE software adds functionality to base Linux distributions that is specific to SGI hardware platforms.

Some of the most significant features that Linux provides are listed below:

- An extensible UNIX-like kernel, supporting symmetric multiprocessing

- Typical commands you would expect to see on a UNIX-like system

- Typical configuration files you would expect to see on a UNIX-like system, along with an optional graphical frontend

- Development tools such as compilers, debuggers, and libraries

- Internet applications such as web servers and browsers, news servers, network utilities, e-mail servers, and clients

- Everything needed for network file sharing with a wide variety of clients

- Desktop environments and graphical applications

The VWE software provides optimization that enhances performance on kernel-intensive workloads. SGI has added a number of features to the Linux kernel and certain packages to provide increased performance and manageability.

The performance enhancements include a kernel-level implementation of POSIX 1003.1-1996 asynchronous I/O, a low-overhead interprocess synchronization mechanism, low overhead and high-volume raw disk I/O, and support for large amounts of physical memory.

The manageability and supportability improvements include kernel memory dump capability with analysis tools. VWE also includes version 0.6 of the kernel debugger `kdb`. The features of `kdb` releases are documented at the following URL:

```
http://oss.sgi.com/projects/kdb
```

The manageability of the release has been improved by integrating a number of publicly available kernel patches, such as the following:

- Stephen Tweedie's Raw I/O patch, which forms the basis for the SGI raw disk I/O enhancements. This patch is described in "Raw I/O Path Changes" on page 11.

- The Device File System (`CONFIG_DEVFS_FS`) patch from Richard Gooch. This patch provides a more consistent naming scheme for hardware and software devices. Sites that expect to connect a large number of devices may find DEVFS very useful in helping to manage them. DEVFS can also provide the traditional Linux names for devices, for backward compatibility, and is otherwise very compatible with the rest of the Linux system.

- The `sard` utility and associated kernel metrics patch for disk traffic analysis. This patch provides additional disk I/O statistics, useful for tuning database layouts and queries.

The kernel in VWE contains both traditional and simplified Chinese by default.

# IRIS Performer

VWE supports IRIS Performer, a high-performance 3D rendering toolkit for developers of real-time, interactive graphics applications. IRIS Performer simplifies development of complex applications such as those for visual simulation, simulation-based design, virtual reality, interactive entertainment, broadcast video, CAD, and architectural walk-through, while providing a high-performance portability path across the entire SGI product line.

IRIS Performer 2.3 for Linux is fully API-compatible with existing IRIS Performer applications and is a full distribution, including the core run-time libraries and file loaders, development header files, sample source code, and man pages.

## NFS Enhancements

VWE includes server support for NFS over TCP.

The Linux kernel has had client-side support for NFS over TCP, which means that a user can mount a file system from a server using TCP as the underlying transport. However, because the Linux server did not support NFS over TCP, the transport mechanism required you to use servers running non-Linux kernels.

With the addition of server support, any file system that the server exports can be mounted by a client using TCP as the transport mechanism. The client will need to explicitly specify the protocol as TCP, because UDP is used by default. For example, to mount /server over /mnt using TCP from the server sgi-server, the client needs to execute a command something like the following:

```
client> mount -o proto=tcp sgi-server:/server /mnt
```

The advantages of using TCP as a transport (as opposed to UDP) include better congestion control, no limit on transfer sizes, better performance over WANs, and error recovery and retransmit handling at the transport layer rather than the application layer.

The following additional NFS functionality has been added to VWE:

- NFS version 3 client and server support

- Network Lock Manager (NLM) version 4 client and server support

- Kernel level NFS and NLM implementation

- A number of bugfixes for the NFS server and client

NFS and NFSD are configured as modules by default, but they can be configured to compile as part of the kernel by setting the CONFIG_NFS_FS and CONFIG_NFSD configuration parameters. The CONFIG_NFS_V3 and CONFIG_NFSD_V3 parameters are set by default and can be turned off if the user wants to use NFS version 2 only. The CONFIG_NFSD parameter needs to be configured for LOCKD to work, so if CONFIG_LOCKD is set, CONFIG_NFSD should be set also.

# Advanced Linux Sound Architecture (ALSA) Drivers

VWE contains support for the Advanced Linux Sound Architecture (ALSA) drivers. These drivers make up the newest sound subsystem for Linux and provide advanced multimedia capabilities not previously available. The presence of these drivers will not be noticed by anyone except people who want to use the digital media SDK or who use Silicon Graphics Visual Workstations for serious audio purposes.

ALSA's mixer model is more sophisticated than that of the standard Linux audio driver, providing fine control over muting and volumes of audio channels. The standard Linux audio drivers (Open Sound System or OSS) does not offer a mute separate from volume, nor does OSS distinguish between input gains for recording and output feedback volumes for input sources. ALSA does, and these features are essential for the digital media SDK and for serious audio use.

The main advantages of the ALSA drivers are as follows:

- Full support for digital media SDK

- Advanced multimedia capabilities

- Audio capabilities essential to professional audio use

- Advanced synchronization and timing features not available in the standard sound drivers

# Performance Co-Pilot

Performance Co-Pilot (PCP) provides a framework and set of services to support system-level performance monitoring and performance management. The PCP open source release provides a unifying abstraction for all of the interesting performance data in a system, and allows client applications to easily retrieve and process any subset of that data using a single API.

A client-server architecture allows multiple clients to monitor the same host and a single client to monitor multiple hosts (for example, in a Beowulf cluster). This enables centralized monitoring of distributed processing.

Integrated archive logging and replay allow client applications to use the same API to process real-time data from a host or historical data from an archive.

The framework supports APIs and configuration file formats that enable the scope of performance monitoring to be extended at all levels.

The open source release of PCP provides a subset of the features of SGI's Performance Co-Pilot products for IRIX (see `http//www.sgi.com/software/co-pilot/`).

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**Note:** Enhancements for PCP in the VWE release are detailed in "Enhancements to Existing Features" on page 3.

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# Raw I/O Path Changes

Current file-system-based disk I/O requires fixed size I/O operations (typically 1024 bytes) into kernel buffers, then the data is moved from the kernel buffer to the user program address space. While this allows the file system to cache frequently accessed data, it also consumes excess system bus bandwidth when copying the data from the kernel buffer(s) into the user address space. Both the small size of the I/O (2 sectors) and the copy operation greatly reduce the I/O subsystem throughput for database operations, where transactions and full-table scan operations operate more quickly with no operating system data intervention.

To help alleviate this problem, Stephen Tweedie of Red Hat developed a mechanism that allows disk I/O directly to a buffer in the application address space (historically known as raw (or unprocessed) I/O). This mechanism will lock the required pages of memory to prevent them from being paged out or swapped during the I/O operation. Applications required to perform this type of disk I/O would open the character special device `/dev/raw` and bind the disk device to a special raw device using an `ioctl`(2) system call.

This mechanism, however, is cumbersome to use and suffers from some deficiencies. The primary deficiency with the mechanism comes from its continued use of the file-system buffer-header data structures and associated device queueing routines. While use of the buffer headers is a straightforward mechanism, it implies that I/O operations will still need to be fragmented into 1024-bytes per operation, increasing the kernel overhead significantly. The binding mechanism used to bind an existing block device to a new raw device is also somewhat cumbersome and counterintuitive to UNIX system administrators, who expect to find a relationship in the device namespace between a block device and its corresponding raw device.

To address these concerns, SGI has added additional capabilities to Stephen Tweedie's raw I/O patch that allow large I/O operations directly to the user address space and bypasses the bulk of the kernel I/O queueing code for SCSI and FiberChannel devices.

You can download a `dd` command that is capable of using the raw device features from the following FTP location:

```
ftp://oss.sgi.com/projects/rawio/download/dd.raw
```

This feature is off by default, but you can turn it on by setting the `CONFIG_RAW` kernel configuration parameter.

More information about raw I/O is available from the following URL:

```
http://oss.sgi.com/projects/rawio/faq.html
```

## Fast Synchronization Mechanism

While the UNIX System V IPC semaphore facility does provide exceptional capability, its performance leaves much to be desired. Many UNIX vendors have released a low-overhead interapplication synchronization primitive known as "post /wait."

SGI has included in this release a kernel level implementation of post/wait along with the library containing application APIs. The post allows for a process to "wait" for an event. This event can either be a timeout or a "post" from another process. A group of cooperating processes can use these "post" and "wait" facilities to synchronize among themselves.

In order to use post/wait, the kernel must be compiled with the `CONFIG_PW` configuration variable, and you may optionally set an additional configuration variable, `CONFIG_PW_VMAX`. These variables are described in the configuration help. For a user program to use the post/wait facilities, it must link against `libdba.so`.

For more information on post/wait, please refer to the `postwait`(3) man page.

# POSIX Asynchronous I/O

The ability to overlap I/O and processing activities has always been important to high-performance applications. To allow this type of overlap in single-threaded applications, SGI has included a kernel-level implementation of POSIX asynchronous I/O and the associated API library.

VWE works with raw devices as well as with file systems including pipes and sockets.

This facility is turned on by setting the `CONFIG_AIO` kernel option. User code can get access to the facility by linking with libdba.so. Further information can be found in the `/lib/libdba/README` file.

# Crash Functionality

The following changes have been made to the Linux crash utility, which are explained briefly below. General information about `lcrash` can be found in the `/cmd/lcrash/README` file.

- Linux kernel crash dump enhancements. VWE provides a configuration option to allow kernel crash dumps to be available. This option is configured to be on by default, and the default dump space is the first swap partition found when booting. If you are building a new kernel, you can specify **Support kernel crash dump capabilities** in the **Kernel Hacking** section of `make xconfig`.

  The crash dump capabilities in the kernel allow the system to create a crash dump when a failure occurs due to a `panic()` call or an exception. For more details on the dump method, compression used, and so on, please read the LKCD FAQ at the following URL:

  `http://oss.sgi.com/projects/lkcd/faq.html`

  Information about LKCD is also available in the file `/cmd/lcrash/README.lkcd`.

- Boot up process changes. As the system boots up, the `/sbin/vmdump` script will be run out of `/etc/rc.d/rc.sysinit`. This script saves crash dumps and reads sysconfig variables to open the dump device and configure the system for crash dumps.

- Crash dump configuration options. There are a number of configurable options to save system crash dumps. Please read `/etc/sysconfig/vmdump` for more details

on the options available. The following list describes what the options allow you to do:

– Determine if you want to implement crash dumps in the kernel

– Choose whether to save crash dumps to disk or not

– Change the location to which the crash dumps are saved

– Specify any block dump device you want

– Compress (or not compress) the crash dumps

– Configure the system to reset (or not reset) after a failure

• The `lcrash` utility now uses the new `librl` library for command line input.

## Patches, Configuration Options, Commands, and Libraries

The following list describes patches implemented and enhancements to configuration options, commands, and libraries:

• `librl` library. This new library supplies command line editing and command history functionality. See the `/cmd/lcrash/lib/librl/README` file for information on how to use this library. The `lcrash` command uses this library.

• `rlimits` patch. In the Linux 2.2.15 kernel, faulty rlimit checking will not allow a process to have more than 2 GB total address space, stack size, or locked memory. This release has fixed the rlimit checking, so (subject to other accounting limitations) the kernel honors **RLIM_INFINITY** settings on these resources.

• SMP PTE patch. In stock Linux, the page stealing code that is used under high memory load has a bug that might cause it to steal a page from a process without writing out the contents to swap if the page has been modified by the process. This bug is only present in a multiprocessor machine. VWE provides a fix for this bug.

# Configuration and Installation

This chapter describes how to install the Visual Workstation Environment (VWE) software from CD. You will need to do this only if you have purchased a Silicon Graphics Visual Workstation configuration that did not have Linux preloaded onto the hard disk drive at the factory, or if you should need to reinstall the base Linux distribution for some reason.

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**Note:** Silicon Graphics Visual Workstation configurations with preloaded Linux software are shipped from the factory with a null root password. In some cases, a reseller may have configured the system with a root password before it reached you. In any case, you should ensure that your system has a non-null root password before connecting it to a network.

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If you need to install software, you should do it in the following order:

1. Read the file README.VWE before you install software, including the base Linux distribution. This file is located in the top-level directory of the CD and in /usr/share/doc/VWE-3.0/README.VWE after the software is installed.

2. Install a base Linux distribution using the base distributor's installation tools.

3. Install the VWE software using its installer, as described in this chapter.

4. Configure the base Linux distribution as described in the installation manual for the base distribution.

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**Note:** The VWE software only works with Red Hat 6.2 or TurboLinux 6.0. Earlier versions of these distributions, or any other distributions, are not compatible with VWE. If you have a critical need to run SuSE, please contact your SGI customer support representative.

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# Configuring the X Window System

VWE includes a default XFree86 4.0 configuration file that is specific to the Silicon Graphics VPro accelerated Linux OpenGL implementation. The file is installed in two places:

- `/etc/X11/XF86Config`
- `/etc/X11/XF86Config_sgivpro`

Please see this file for information about X Window System configuration, including pointers to information about changes to this file that are necessary in order to use a non-English keyboard.

There are many interactive configuration utility programs available to generate XF86Config files. We strongly recommend that you **not** attempt to use any of these programs, because they will not generate a XF86Config file that is appropriate for a Silicon Graphics Visual Workstation.

If your `/etc/X11/XF86Config` file becomes corrupted (for example, as a result of attempting to run a configuration utility program), simply execute the following command as root:

```
# cp /etc/X11/XF86Config_sgivpro /etc/X11/XF86Config
```

# VWE Configuration Notes

The following information will help you get VWE up and running properly.

### Silicon Graphics VPro Accelerated OpenGL Implementation

The Silicon Graphics VPro accelerated OpenGL implementation is the product of a partnership among SGI, NVidia Corporation, and VALinux. The VPro V3 and VR3 graphics accelerators are based on accelerator chips from NVidia.

The "workstation" convention is for `glXSwapBuffers()` to be synchronized to vertical retrace. The "PC" convention is for `glXSwapBuffers()` **not** to be synchronized to vertical retrace. The VPro OpenGL implementation follows the "PC" convention by default.

To synchronize glXSwapBuffers() to vertical retrace, set the environment variable GL_SYNC_TO_VBLANK as follows before starting the application program.

For csh-based shells, use the following command:

**setenv GL_SYNC_TO_VBLANK 1**

For sh-based shells, use the following command:

**export GL_SYNC_TO_VBLANK=1**

## Application Notes

If you encounter a problem with a packaged Linux application program on your Silicon Graphics Visual Workstation, contact the packager to find out if a patch or update is available to fix the problem.

### Performer

The URL for Performer information is http://www.sgi.com/performer.

Performer for Linux is included in VWE. To run the Performer Town demonstration program, use the following command:

**% perfly town.perfly**

You should see a full-screen animated 3D simulation of a vehicle driving through a town.

### Blender

The URL for Blender information is http://www.blender.nl.

After installing Blender, type the following command:

**% blender -f -H**

### Heretic II

The URL for Heretic II information is
http://www.lokigames.com/products/heretic2.

After installing Heretic II, change directories to the Heretic II application directory and remove the following symbolic link:

```
libGL.so -> libMesaGL.so
```

After starting the application, use the video menu to set the render mode to **OpenGL**.

Patches are available at the following URL:

```
http://www.lokigames.com/products/heretic2/updates.php3
```

**Quake II**

After installing Quake II, change directories to the Quake II application directory and remove the following symbolic link:

```
libGL.so -> libMesaGL.so
```

To run Quake II in OpenGL mode, type the following command:

```
% quake2 +set vid_ref glx +set gl_driver libGL.so
```

## Installing VWE from a CD

Should you need to install VWE from a CD, first ensure that either Red Hat 6.2 or TurboLinux 6.0 is installed, and then use the procedure in this section. If you have a critical need to run SuSE, please contact your SGI customer support representative.

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**Caution:** Ensure that you read the file README.VWE before you install software, including the base Linux distribution. This file is located in the top-level directory of the CD and in /usr/share/doc/VWE-3.0/README.VWE after the software is installed.

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The installation procedure has buttons that will allow you to go back to the previous screen or to quit the installation. To use these buttons, press the Tab key to highlight the one you want to use and press Enter.

1. Log in as root.

2. Mount the VWE CD by executing the mount command as you have configured it. A common example is *mount /dev/cdrom /mnt/cdrom*.

3. Change directories to the root directory for the mounted CD. A common root directory is */mnt/cdrom*.

4. Execute *./INSTALL*

   **Note:** VWE provides support for a pre-release version of the 2.4 Linux kernel. This is experimental software; therefore, it is unsupported and should be run at your own risk. This software includes a pre-release of XFS. Install this software by executing *./INSTALL -k 2.4.0* rather than *./INSTALL*.

5. Select the language you want to use for the installation procedure. The default is English. Use the up and down arrow keys to select your language of choice. Press the Tab key to highlight *OK* and press Enter.

6. The Welcome screen appears. Highlight *OK* and press Enter.

7. The Package Group Selection screen appears. This screen allows you to select the type of package you want to install. You select a package by using the up and down arrow keys and pressing the Space bar to select the one you want. When you select a package, RPMs for that package will be installed after you press the Tab key to highlight *OK* and press Enter.

   You may also choose "Select individual packages," which lets you choose the specific RPMs that you want to install.

8. You may see the Package Dependencies screen, which tells you if there are additional packages required beyond those you selected. Review the packages. If you want to install them (you should install them unless there is some important reason not to do so), press the Tab key to highlight *OK* and press Enter.

9. The Installation to Begin screen appears. It tells you that a log of the installation will be placed in */tmp/sgi-install.log*. Press the Tab key to highlight *OK* and press Enter.

10. The installation begins. You will see the Package Installation screen, which tells you which packages are being installed and logs the time it takes to install them.

11. After the installation is complete, the Complete screen appears. Press Enter. You are returned to the root prompt.

12. After the VWE installation is complete, you should reboot your system in order to begin using the newly installed VWE kernel. You can reboot by typing *reboot* and pressing `Enter`.

## Recreating or Upgrading Your Preinstalled Software

Should you need to recreate your system (returning it to its original state), simply install your base distribution as described in the distributor's installation instructions and then install the VWE from the CD as described in "Installing VWE from a CD" on page 18.

To upgrade your software from earlier SGI Linux releases, you should follow the instructions for upgrading the base distribution. VWE will only run on Red Hat 6.2 or TurboLinux 6.0. If you have a critical need to run SuSE, please contact your SGI customer support representative.

After you have upgraded your base distribution, install the VWE as described in "Installing VWE from a CD" on page 18.

**Note:** It is not possible to change base distributions when upgrading your VWE release. You must install the new base distribution and then install VWE.