



SGI® FusionVUE™ Installation and Configuration Guide

007-5543-001

COPYRIGHT

© 2009 SGI. All rights reserved; provided portions may be copyright in third parties, as indicated elsewhere herein. No permission is granted to copy, distribute, or create derivative works from the contents of this electronic documentation in any manner, in whole or in part, without the prior written permission of SGI.

LIMITED RIGHTS LEGEND

The software described in this document is “commercial computer software” provided with restricted rights (except as to included open/free source) as specified in the FAR 52.227-19 and/or the DFAR 227.7202, or successive sections. Use beyond license provisions is a violation of worldwide intellectual property laws, treaties and conventions. This document is provided with limited rights as defined in 52.227-14.

The electronic (software) version of this document was developed at private expense; if acquired under an agreement with the USA government or any contractor thereto, it is acquired as “commercial computer software” subject to the provisions of its applicable license agreement, as specified in (a) 48 CFR 12.212 of the FAR; or, if acquired for Department of Defense units, (b) 48 CFR 227-7202 of the DoD FAR Supplement; or sections succeeding thereto. Contractor/manufacturer is SGI, 1140 E. Arques Avenue, Sunnyvale, CA 94085.

TRADEMARKS AND ATTRIBUTIONS

Altix, SGI, and the SGI logo are registered trademarks and FusionVUE and SGI ProPack are trademarks of SGI in the United States and/or other countries worldwide.

Intel, Itanium, and Xeon are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Linux is a registered trademark of Linus Torvalds, used with permission by SGI. Novell, SUSE LINUX, and the SUSE logo are registered trademarks of Novell, Inc. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.

All other trademarks mentioned herein are the property of their respective owners.

Record of Revision

| Version | Description |
|----------------|--------------------------------|
| 001 | May 2009 Original printing. |

Contents

| | | |
|----------|---|-----------|
| 1 | Overview | 1 |
| | FusionVUE Features | 1 |
| | The FusionVUE Architecture | 3 |
| | Limitations | 5 |
| | Maximum Image Resolution | 5 |
| | VNC Servers | 5 |
| | Display Output Channels | 6 |
| | Audio Support | 6 |
| 2 | Hardware and Software Platforms | 7 |
| | Hardware | 7 |
| | Software | 8 |
| 3 | Graphics Setup | 9 |
| | NVIDIA Driver Installation | 9 |
| | Configuring Graphics | 10 |
| | Miscellaneous Configuration Constraints | 13 |
| 4 | Installation and Licensing | 15 |
| | Installing the FusionVUE Software | 15 |
| | Licensing the FusionVUE Software | 16 |
| | Obtaining the License Keys from SGI for FusionVUE | 16 |
| | Installing the License Keys | 16 |
| | Verifying the LK License Keys | 17 |
| A | The Xorg Configuration File | 19 |
| | Starting X | 20 |
| | Stopping X | 20 |

| | |
|--|-------------|
| Virtual Consoles | . 21 |
| Basics. | . 21 |
| Structure of the Configuration File | . 22 |
| Sections of the Configuration File | . 23 |
| Monitor Section. | . 24 |
| Device Section | . 25 |
| TwinView | . 25 |
| TwinView and Edge Blending | . 26 |
| Setting up Multiple X Servers on a Single Card | . 27 |
| ServerLayout section | . 28 |
| B Additional Licensing Information | . 29 |

Figures

| | | |
|------------|--|----|
| Figure 1-1 | FusionVUE Stream Sources and a Sample VUESpace | 1 |
| Figure 1-2 | FusionVUE Architecture | 3 |
| Figure 3-1 | NVIDIA X Server Settings Display | 11 |
| Figure 3-2 | Configure Display Device Screen | 12 |
| Figure A-1 | Hierarchial Structure of the Xorg Configuration File | 23 |
| Figure A-2 | Monitor Section of Xorg Configuration File. | 24 |
| Figure A-3 | Edge-Matched Display | 26 |
| Figure A-4 | Edge-Blended Display with 10% Overlap | 26 |

Tables

| | | |
|-----------|---|----|
| Table 3-1 | Software Requirements for NVIDIA Driver | 9 |
| Table 3-2 | Software Requirements for Building NVIDIA Kernel Module | 10 |
| Table A-1 | Directing Graphics to Virtual Consoles | 21 |
| Table B-1 | Licensing for Software Components | 29 |

About This Guide

SGI FusionVUE allows you to ingest heterogeneous media streams (local and remote) into a central server, render the streams into a 3D landscape you specify, and manipulate the landscape contents interactively or with scripts. This guide describes the initial setup and configuration of SGI FusionVUE. For the general operation of SGI FusionVUE, see the companion manual *SGI FusionVUE User's Guide*.

Audience

This guide is written for the person who will install and initially configure the SGI FusionVUE environment. You should have a working knowledge of Linux system administration, the X windowing system, as well as general graphics and network technology.

Chapter Descriptions

The following topics are covered in this guide:

- [Chapter 1, “Overview,”](#) describes the FusionVUE architecture.
- [Chapter 2, “Hardware and Software Platforms,”](#) describes the hardware and software platforms for FusionVUE
- [Chapter 3, “Graphics Setup,”](#) notes items that you should check to ensure that your graphics setup is appropriate for FusionVUE use.
- [Chapter 4, “Installation and Licensing,”](#) describes how you install and properly license the FusionVUE software.
- [Appendix A, “The Xorg Configuration File,”](#) describes how to make changes to the Xorg configuration file.
- [Appendix B, “Additional Licensing Information,”](#) provides some licensing information about FusionVUE components.

Related Publications

The following SGI documents might be helpful:

- *SGI FusionVUE User's Guide*, publication number 007-5542-00x
- *SGI InfiniteStorage* series documentation
- Man pages (online)

You can obtain SGI documentation, release notes, or man pages in the following ways:

- Refer to the SGI Technical Publications Library at <http://docs.sgi.com>. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.
- You can also view man pages by typing **man <title>** on a command line.

SGI systems include a set of Linux® man pages, formatted in the standard UNIX® “man page” style. Important system configuration files and commands are documented on man pages. These are found online on the internal system disk (or DVD-CD) and are displayed using the **man** command. For example, to display the man page for the **xscsidisktest** command, type the following on a command line:

```
man xscsidisktest
```

For additional information about displaying man pages using the **man** command, see **man(1)**.

In addition, the **apropos** command locates man pages based on keywords. For example, to display a list of man pages that describe disks, type the following on a command line:

```
apropos disk
```

For information about setting up and using **apropos**, see **apropos(1)**.

Conventions

The following conventions are used throughout this document:

| Convention | Meaning |
|--------------------|---|
| Command | This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures. |
| <i>variable</i> | The italic typeface denotes variable entries and words or concepts being defined. Italic typeface is also used for book titles. |
| user input | This bold fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font. |
| [] | Brackets enclose optional portions of a command or directive line. |
| ... | Ellipses indicate that a preceding element can be repeated. |
| man page(x) | Man page section identifiers appear in parentheses after man page names. |
| GUI element | This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists. |

Product Support

SGI provides a comprehensive product support and maintenance program for its products. SGI also offers services to implement and integrate Linux applications in your environment.

- Refer to <http://www.sgi.com/support/>
- If you are in North America, contact the Technical Assistance Center at +1 800 800 4SGI or contact your authorized service provider.
- If you are outside North America, contact the SGI subsidiary or authorized distributor in your country.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. 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.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address: techpubs@sgi.com
- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.
- Send mail to the following address:

SGI
Technical Publications
1140 East Arques Avenue
Sunnyvale, CA 94085-4602

SGI values your comments and will respond to them promptly.

Overview

This overview describes the features of FusionVUE, its architecture, and current limitations.

FusionVUE Features

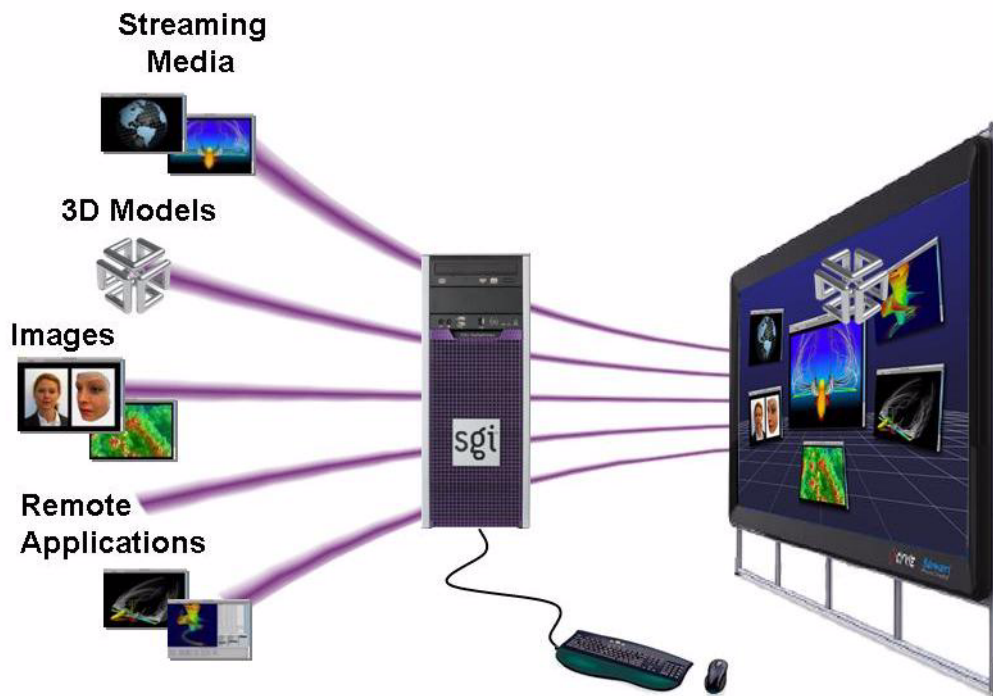


Figure 1-1 FusionVUE Stream Sources and a Sample VUESpace

As shown in [Figure 1-1](#), the FusionVUE environment provides a persistent user interface that can integrate a wide range of media streams, assets, and applications in a 3D context, termed *VUESpace*. You can control this environment interactively using the mouse and keyboard. The

FusionVUE environment provides a simple, smooth, intuitive interface to complex environments and data. FusionVUE enables you to work with multiple remote systems that are three-dimensionally arranged for optimal comprehension.

The input streams, which can be local or remote, can include assets like the following:

- 3D models
- Images
- Movies
- Applications from PC/Linux/Macintosh desktops

The FusionVUE Architecture

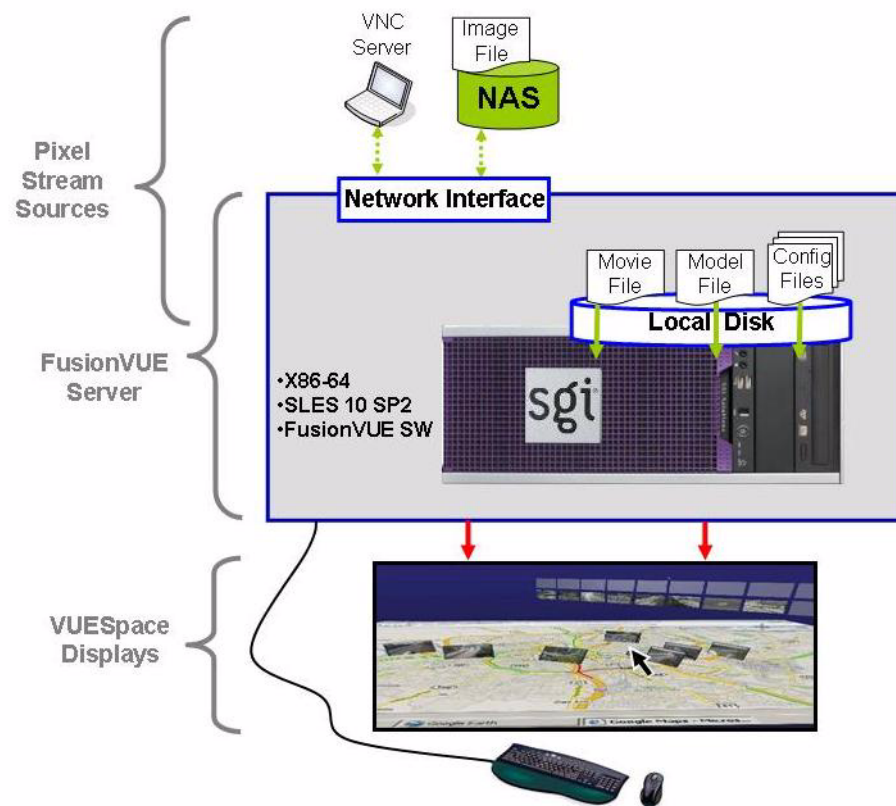


Figure 1-2 FusionVUE Architecture

Figure 1-2 illustrates a simplified FusionVUE architecture. One or more pixel streams are ingested via the network or from local storage. The pixel streams are rendered into a 3D environment by the VUESpace Graphics Engine running on the FusionVUE server. The results are shown on one or more VUESpace displays, where users interact with the streams and environment using the attached mouse and keyboard.

The major components of a FusionVUE system are the stream modules, the VUESpace Graphics Engine, and the display system. Each is described in the following list:

| Component | Description |
|--------------------------|---|
| Stream modules | There are a variety of stream modules, each capable of ingesting a particular type of media-handling, stream-specific user input. Stream types include images, movie files, 3D models, or remote desktops connected via network-attached VNC servers. |
| VUESpace Graphics Engine | The VUESpace Graphics Engine reads pixel streams into a 3D VUESpace. Users interact via the mouse and keyboard to navigate through the VUESpace and to manipulate individual streams. |
| Display system | The display system may be as simple as a single desktop monitor or a room-sized, multiple-channel-blended projection system. |

Limitations

This release of FusionVUE has noteworthy limitations in the following areas:

- Maximum image resolution
- VNC servers
- Display output channels
- Audio support

See the *FusionVUE 1.x Release Notes* in your installation media for other additional notes.

Maximum Image Resolution

The maximum area of a single pixel stream is currently limited to 5 megapixels with a maximum horizontal width of 4096 pixels and a maximum vertical height of 3072 pixels.

For example, the following image resolutions are supported:

- 2048x2560
- 3072x1706
- 4096x1280

Note: Larger images may be viewed within FusionVUE by first opening the image using an image-roaming application (such as `ImageMagick display`) rendered into a VNC server display, then ingesting the VNC display into FusionVUE.

For the list of supported image, movie, and 3D model formats, see *SGI FusionVUE User's Guide*.

VNC Servers

Two notes:

- The supported servers include TightVNC and TurboVNC.
- Multi-channel VNC servers are supported up to 2560x2048.

Display Output Channels

FusionVUE supports one or two channels from a single GPU.

Note: Multiple-GPU support is available now through SGI Professional Services and will be made standard in a future release.

Audio Support

Currently, there is no support for audio streams or audio tracks in movies.

Hardware and Software Platforms

This chapter describes the hardware and software platforms for FusionVUE.

Hardware

FusionVUE has been extensively tested on workstations with dual x86_64 CPUs and the NVIDIA Quadro FX GPU. The configuration of the workstation will have an impact of the system performance. The following shows both a minimum and a recommended configuration.

Minimum Configuration:

- Dual-core x86_64 CPU, 3.2 GHz or greater
- 1 GB memory
- NVIDIA Quadro FX1400 graphics card or greater
- GigE LAN card
- 160 GB hard disk capacity
- Three-Button mouse

Recommended Configuration:

- Dual quad-core x86_64 CPUs
- 16 GB memory
- NVIDIA Quadro FX4600 graphics card or greater
- Dual GigE LAN interconnects
- Three-Button mouse

Software

FusionVUE is supported on SUSE Linux Enterprise Server 10 Service Pack 2 (SLES 10 SP2), a 64-bit OS. In addition to the standard installation, you will need to install the NVIDIA proprietary graphics driver, described in [“NVIDIA Driver Installation” in Chapter 3](#).

Graphics Setup

To maximize FusionVUE performance, it is important that the workstation/server graphics is set up correctly before you install FusionVUE. This chapter describes the following:

- “NVIDIA Driver Installation” on page 9
- “Configuring Graphics” on page 10
- “Miscellaneous Configuration Constraints” on page 13

NVIDIA Driver Installation

FusionVUE has been extensively tested on the NVIDIA driver release 180.29.

The driver can be downloaded from the following webpage:

http://www.nvidia.com/object/linux_display_amd64_180.29.html

The minimum software requirements to install the NVIDIA are shown in [Table 3-1](#).

Table 3-1 Software Requirements for NVIDIA Driver

| Software Element | Minimum Requirement | Verification |
|------------------|---------------------|--------------------------------|
| Linux kernel | 2.4.7 | <code>cat /proc/version</code> |
| XFree86/X.Org | 4.0.1/6.7 | <code>XFree86 -version</code> |
| Kernel modutils | 2.1.121 | <code>insmod --version</code> |

If you need to build the NVIDIA kernel module, [Table 3-2](#) shows the minimum software requirements:

Table 3-2 Software Requirements for Building NVIDIA Kernel Module

| Software Element | Minimum Requirement | Verification |
|------------------|---------------------|---|
| binutils | 2.9.5 | size --version |
| GNU make | 3.77 | make --version |
| gcc | 2.91.66 | gcc --version |
| glibc | 2.0 | ls /lib/libc.so.* (greater than six) |

More information on installing the NVIDIA driver can be found in the `README.txt` file with the driver on the following webpage:

ftp://download.nvidia.com/XFree86/Linux-x86_64/180.29/README/README.txt

Configuring Graphics

SLES10 SP2 provides an `xorg.conf` file, which you will use to configure graphics. This section describes the various steps.

1. Enter the following command to customize the configuration file for the NVIDIA driver:

```
% nvidia-xconfig
```

This will generate a new configuration file based on the existing `xorg.conf` file. If no `xorg.conf` is available, a new file is generated.

2. Restart the X server.

The easiest way to restart the graphics is to log out of the system.

If the `nvidia` module installs and configures correctly, the NVIDIA splash screen appears. If the splash screen does not appear, check errors in the `/var/log/xorg.0.log` file.

3. Launch the **NVIDIA X Server Settings** display, shown in [Figure 3-1](#), by entering the following command:

```
% nvidia-settings
```

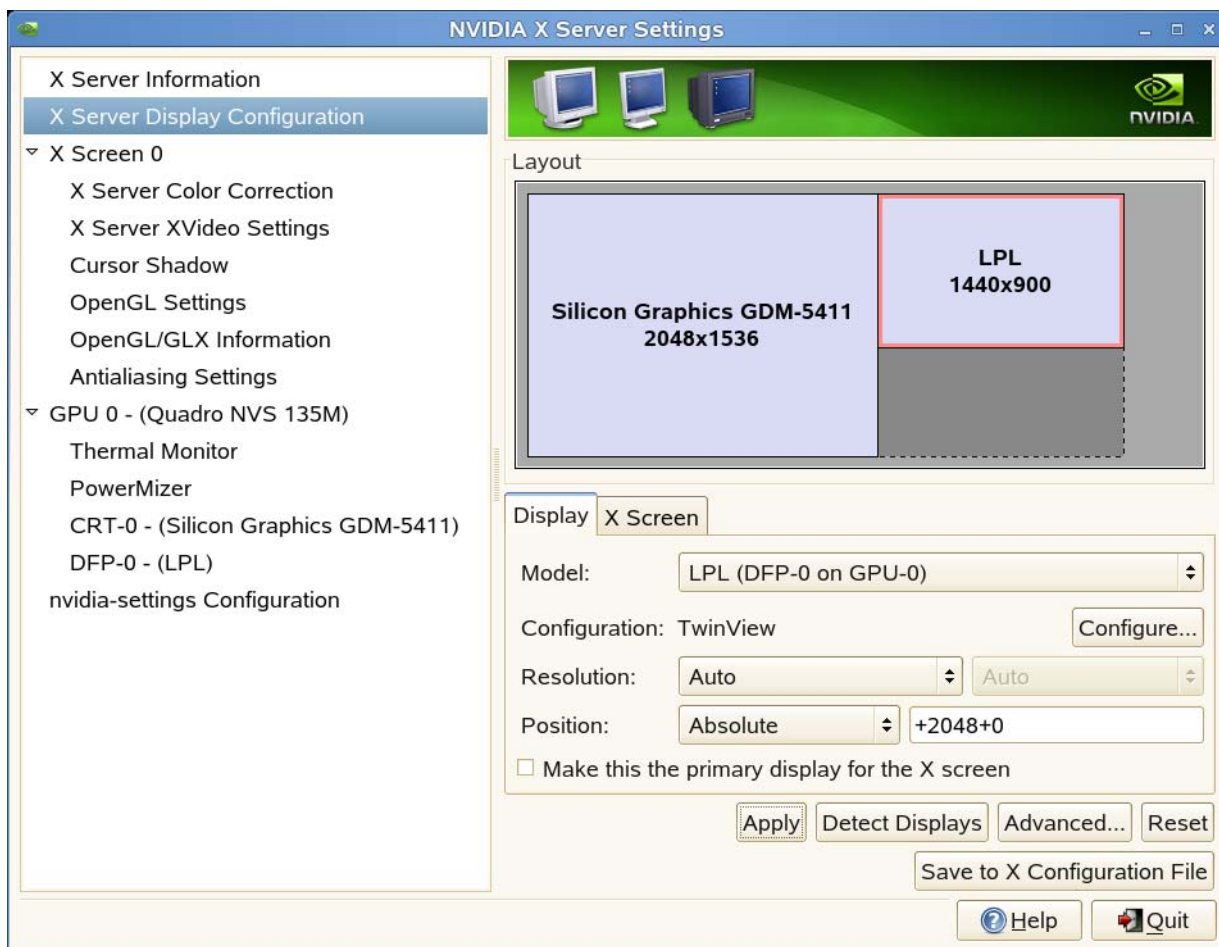



Figure 3-1 NVIDIA X Server Settings Display

4. Select the **X Server Display Configuration** option.

The **Display** tab shows what monitors or displays are currently connected to the graphics card. The driver will use EDID information read from the display to aid in the setting of the display parameters.

- Modify where needed the following parameters:

| Parameter | Description |
|----------------------|--|
| Model | Selects which display is currently active. In Layout window, the active display is shown with a red border. |
| Configuration | Configure... brings up the Configure Display Device menu shown in Figure 3-2 . This menu allows you to disable the display, to have it run on its own X Server, or to configure two displays (TwinView) to operate as a single desktop. |
| Resolution | Allows you to select a display resolution and refresh rate (derived from EDID information) for the monitor. Auto will select the default optimum setting for the system. |
| Position | Allows one display to be positioned next to the other. For an edge-blended display, an absolute setting with +xxx+yyy pixel offset may be added. Other settings are LeftOf, RightOf, etc. |

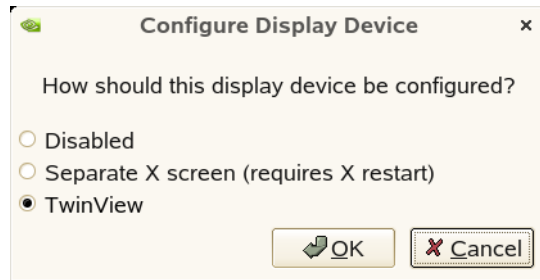


Figure 3-2 Configure Display Device Screen

- Select one or both of the following from **NVIDIA X Server Settings** display, shown in [Figure 3-1](#):

| | |
|-------------------------------------|---|
| Save to X Configuration File | Will save the setup to the active <code>xorg.conf</code> file. You may need to be root or have appropriate user permissions to do this. |
| Apply | Will apply the current configuration to the active display. Some changes may require the X Server to be reset. |

[Appendix A, “The Xorg Configuration File”](#) provides a more in-depth overview of the `xorg.conf` file and how to manually edit the file.

Miscellaneous Configuration Constraints

Note the following configuration constraints:

- Stereo is not supported.
- Only a single GPU is supported currently.
- Disable Xinerama for performance considerations.

Installation and Licensing

This chapter describes the following:

- “Installing the FusionVUE Software” on page 15
- “Licensing the FusionVUE Software” on page 16

Installing the FusionVUE Software

Install the FusionVUE Software from a directory containing the installation materials. These installation materials may be on a DVD or downloaded from the SGI website.

To install the software, do the following:

1. Log in as the root user.
2. As needed, install these dependent packages from the base OS:
 - libraw1394
 - fltk
 - python-tk
 - blt
3. Change to the installation directory.
4. Enter the following command:

```
# rpm -Uhv *.rpm
```

The software will be installed in the following directories:

- `/opt/sgi/vue/fusionvue/`
- `usr/share/doc/packages/FusionVUE1.0/`
- `usr/share/sgi/vue/fusionvue/`

Licensing the FusionVUE Software

FusionVUE requires a license key to be installed prior to running. Licenses are 1-year or 3-year subscriptions. You will need to do the following:

1. Obtain the necessary license keys from SGI.
2. Install the license keys.
3. Verify the licensing.

Obtaining the License Keys from SGI for FusionVUE

To obtain your FusionVUE license keys, see the information provided in your customer letter and the following web page:

<http://www.sgi.com/support/licensing>

If you did not receive such a letter, contact SGI.

Installing the License Keys

For FusionVUE, install the license keys in the following location:

`/etc/lk/keys.dat`

The following steps accomplish this task:

1. Create the `/etc/lk` license key directory, if necessary.

For example:

```
[root@linux root]# mkdir -p /etc/lk
```

2. Copy the keys to the `keys.dat` file.

Verifying the LK License Keys

Use the `lk_verify -A` command to verify the LK licenses. To see more output, use the `v` option.

Examples:

```
[root@linux root]# lk_verify -A
```

```
<output>
```

```
[root@linux root]# lk_verify -v
```

```
<output>
```


The Xorg Configuration File

FusionVUE requires an accelerated 3D graphics driver and X windowing system. The following provides an overview as to how the Xorg file for graphics can be configured based on the `nvidia` graphics driver.

FusionVUE is designed to run on systems that X server (Xorg) from the open source Xorg project (<http://www.x.org>).

This appendix describes the following:

- “Starting X” on page 20
- “Stopping X” on page 20
- “Virtual Consoles” on page 21
- “Basics” on page 21
- “Structure of the Configuration File” on page 22

Starting X

If X is not automatically started at run time, it can be started using one of the following methods:

- `init 5`
- `startx`

Command `init 5` will start the system in the graphical mode. When `init 5` is used, the graphics console will display a login screen.

Command `startx` will start the X server without the need for a login display.

Stopping X

X can be stopped using a variety of commands:

- `Ctrl-Alt-Backspace` (from the console/keyboard)
- `init 3` (remotely)
- `/etc/init.d/ gdm stop` (remotely)
- `killall X` (remotely)

The key sequence `Ctrl-Alt-Backspace` kills the current X server and either return to login screen or text console.

Virtual Consoles

Table A-1 describes the key sequences to direct graphics to virtual consoles.

Table A-1 Directing Graphics to Virtual Consoles

| Key Sequence | Description |
|--------------|------------------------------------|
| CTRL+ALT+F1 | graphics (X) to virtual console 1 |
| ALT+Fx | virtual console x ($x = 1..6$) |
| ALT+F7 | back to the graphics (X) |

Basics

You can modify the X server with either of the following methods:

- Manually editing file `xorg.conf`
- Using command `/usr/bin/nvidia-xconfig`

After editing the configuration file, the changes take affect after the system is rebooted. You could also just restart the X server for changes to take effect.

Detailed information on editing `xorg.conf` can be obtained by entering either of the following commands in Linux:

- `man xorg.conf`
- `man nvidia-xconfig`

You can also refer to `/usr/share/doc/NVIDIA_GLX-1.0/readme.txt`.

Structure of the Configuration File

File `xorg.conf` is the file that contains configuration information for the default X server. Its file path is `/etc/X11/xorg.conf`.

The file contains information about the following:

- Graphics
- Displays
- Video formats
- Mouse and keyboard
- Fonts
- Color names
- Extra modules, drivers, and extensions

The contents of the configuration file is hierarchial and is illustrated in [Figure A-1](#).

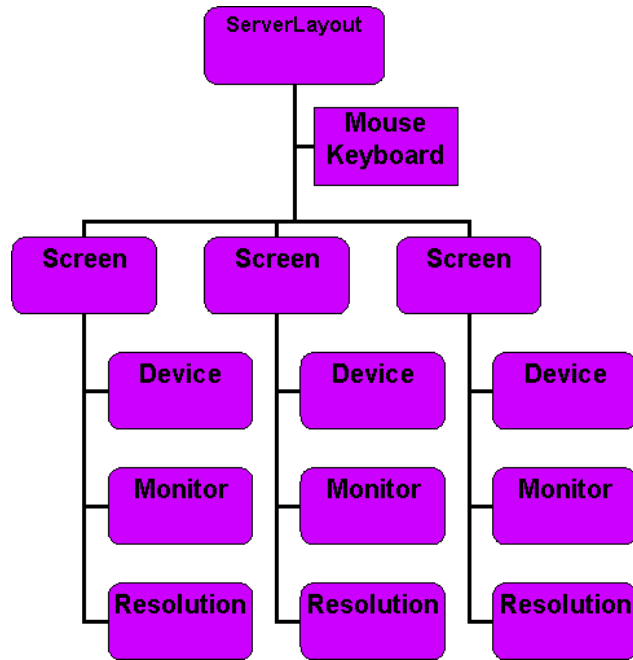


Figure A-1 Hierarchical Structure of the Xorg Configuration File

Sections of the Configuration File

The following are common sections that may be changed either by editing manually or using the `nvidia-xconfig` tool.

Monitor Section

Defines the capabilities of a display type. You can make your own by checking out the monitor's manual.

```
Section "Monitor"
    Identifier "SDM-P234"
    VendorName "SNY"
    ModelName "3d0"
    HorizSync 28-92
    VertRefresh 57-85

    ModeLine "1920x1200_60n" 154.0 1920 1968 2000 2080 1200 1203 1209
1235 -hsync -vsync
    ModeLine "1600x1200_60n" 162.0 1600 1664 1856 2160 1200 1201 1204
1250 -hsync -vsync
EndSection
```

Figure A-2 Monitor Section of Xorg Configuration File

Modelines provide video format information to be used with a display. Most displays do not require modelines as the information is returned by the display using the Extended Display Identification Data (EDID).

However, for some systems which do not provide or provides incorrect EDID information a modeline can be required. This is often true for visualization environments with video switching equipment where a EDID information is not returned to the graphics card.

It is possible to create your own modeline using tools such as the following:

<http://xtiming.sourceforge.net/cgi-bin/xtiming.pl>

The modeline is contained in the Monitor section associated with a particular display.

```
#Modeline description:  pxl  clk  Hres  Hfp  Hsnc  Htot  Vres  Vfp  Vsnc  Vtot
#-----
Modeline "1600x1200_60" 160.875 1600 1704 1808 2160 1200 1201 1205 1242
```

Device Section

The `Device` section defines the configuration parameters for a specific graphics card. Note the following:

- Typically, there is one `Device` section per graphics card.
- You can make one graphics card with two channels act like two graphics cards using the `Screen` option.
- A large number of options are available for setting the device. Refer to the NVIDIA readme for specific information. Some examples are given below.

```
Section "Device"
  Identifier "Device[0]"
  BoardName "Quadro FX 5600"
  BusID "1:0:0" # should match up with output of lspci (in decimal)
  Driver "nvidia" # use "nvidia" (proprietary driver), not "nv" (OSS)!!!
  VendorName "NVidia"
  Option "TwinView" "true" # turn on dual channel mode
  Option "MetaModes" "nvidia-auto-select,nvidia-auto-select"
  Option "TwinViewOrientation" "LeftOf"
EndSection
```

TwinView

`TwinView` is an Nvidia extension. It turns on the dual channel mode of the GPU allowing for the a single X server to be configured across the two channels. This has an advantage over other techniques such as `Xinerama`:

- A single X screen is used. The NVIDIA driver conceals all information about multiple display devices from the X server; as far as X is concerned, there is only one screen.
- Both display devices share one framebuffer. Thus, all the the functionality present on a single display (e.g., accelerated OpenGL) is available with `TwinView`.
- No additional overhead is needed to emulate having a single desktop.

To enable `TwinView`, you must specify the following options in the `Device` section of your X configuration file:

```
Option "TwinView"
Option "MetaModes" "<list of metamodes>"
```

You must also specify the following:

```
Option "SecondMonitorHorizSync" "<hsync range(s)>"  
Option "SecondMonitorVertRefresh" "<vrefresh range(s)>"
```

Alternatively:

```
Option "HorizSync" "<hsync range(s)>"  
Option "VertRefresh" "<vrefresh range(s)>"
```

You may also use any of the following options, though they are not required:

```
Option "TwinViewOrientation" "<relationship of head 1 to head 0>"  
Option "ConnectedMonitor" "<list of connected display devices>"
```

TwinView and Edge Blending



Figure A-3 Edge-Matched Display

For an edge-matched display with two channels of 1920x1200, the TwinView setup would look like the following:

```
Option "TwinView" "true" # turn on dual channel mode  
Option "MetaModes" "1920x1200"  
Option "TwinViewOrientation" "RightOf"
```

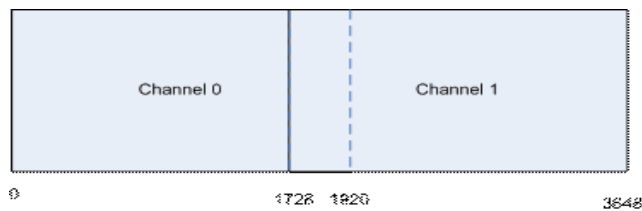


Figure A-4 Edge-Blended Display with 10% Overlap

For displays that require edge blending between the two display channels with a 10% overlap, the TwinView setup would look like the following:

```
Option "TwinView" "true" # turn on dual channel mode
Option "MetaModes" "1920x1200, 1920x1200 +1728+0"
```

The +1728 tells the graphics card to start the second channel at 1728 offset from the lower left hand corner of the first channel (the origin).

Setting up Multiple X Servers on a Single Card

The NVIDIA card can also be configured such that each connected display device is a separate X server.

First, create two separate Device sections, each listing the BusID of the graphics card to be shared and listing the driver as nvidia, and assign each a separate screen:

```
Section "Device"
    Identifier "nvidia0"
    Driver "nvidia"
    # Edit the BusID with the location of your graphics card
    BusID "PCI:1:0:0"
    Screen 0
EndSection
```

```
Section "Device"
    Identifier "nvidial"
    Driver "nvidia"
    # Edit the BusID with the location of your graphics card
    BusId "PCI:1:0:0"
    Screen 1
EndSection
```

Then, create two Screen sections, each using one of the Device sections:

```
Section "Screen"
    Identifier "Screen SG-0"
    Device "nvidia0"
    Monitor "Monitor0"
    DefaultDepth 24
    Subsection "Display"
        Depth 24
        Modes "1600x1200" "1024x768" "800x600" "640x480"
    EndSubsection
EndSection
```

```
Section "Screen"
    Identifier "Screen SG-1"
    Device "nvidia1"
    Monitor "Monitor1"
    DefaultDepth 24
    Subsection "Display"
        Depth 24
        Modes "1600x1200" "1024x768" "800x600" "640x480"
    EndSubsection
EndSection
```

ServerLayout section

ServerLayout section defines the input/output (keyboard/mouse) associated with a screen and where the multiple screens are located relative to one another.

Example 1 - Two screens:

```
Section "ServerLayout"
    Identifier "Layout[all]"
    InputDevice "Keyboard0" "CoreKeyboard"
    InputDevice "Mouse1" "CorePointer"
    Option "Xinerama" "off"
    Screen 0 "Screen SG-0"
    Screen 1 "Screen SG-1" RightOf "Screen SG-0"
EndSection
```

Example 2 - Layout with two separate keyboards/mice

```
Section "ServerLayout"
    Identifier "Seat0"
    InputDevice "Keyboard0" "CoreKeyboard"
    InputDevice "Mouse0" "CorePointer"
    Option "IsolateDevice" "True"
    Screen 0 "Screen SG-0"
EndSection
Section "ServerLayout"
    Identifier "Seat1"
    InputDevice "Keyboard1" "CoreKeyboard"
    InputDevice "Mouse1" "CorePointer"
    Option "IsolateDevice" "True"
    Screen 0 "Screen SG-1"
EndSection
```

Additional Licensing Information

The FusionVUE installer contains software packages that are released under a variety of different licenses. Table B-1 describes the licensing associated with the various software components .

Table B-1 Licensing for Software Components

| Product/Component | Licensing |
|---------------------------------------|-------------------------------------|
| FusionVUE | Proprietary |
| OpenGL Performer | Proprietary |
| SGI License Key (LK) | Proprietary |
| SLES ¹ standard components | Proprietary |
| SLES optional components | Proprietary |
| libraw1394 | |
| python-tk | |
| tightvnc | GPL ² /LGPL ³ |
| ImageMagick | GPL/LGPL |
| MPlayer | GPL/LGPL |
| libavc1394 | GPL/LGPL |
| libdc1394 | GPL/LGPL |
| libdv | GPL/LGPL |
| libwmf | GPL/LGPL |

1. SUSE Linux Enterprise Server (SLES)
2. Open source GNU General Public License (GPL)
3. Open source GNU Lesser General Public License (LGPL)

All software listed as proprietary is released under the terms of the SGI End User License Agreement, a copy of which is printed on the back of SGI CD/DVD sleeves and media boxes.