graphics administration guide

for HP-UX 11.x

Manufacturing Part Number: B2355-IE003

Edition E0206

Contents

1 preface

The purpose of this document is to collect, in one place, all the information necessary to configure and administer graphics cards supported in HP-UX workstations and servers running the 11.00 and 11i version 1 (11.11) Operating Systems.

NOTE

Previous versions of this document contained information for 3D graphics Application Programming Interfaces (APIs) that are now obsolete. The following APIs were discontinued, then obsoleted, on the indicated dates:

Table 1-1

Product Name	**Product Number**	**Discontinued On**	**Obsoleted On**
Starbase	B2374A	October 1, 1997	October 1, 2002
PEXlib	B3176B	May 1, 1998	August 31, 2003
PHIGS	B1685L	October 1, 1997	October 1, 2002

For detailed information on HP's supported 3D graphics API, OpenGL, please refer to the "OpenGL Implementation Guide", which can be found on the World Wide Web at:
http://www.hp.com/support/OpenGL_Imp_Guide_PA

document conventions

Below is a list of the typographical conventions used in this document:

`ls /usr/include`

Verbatim computer literals are in computer font. Text in this style is letter-for-letter verbatim and, depending on the context, should be typed in exactly as specified, or is named exactly as specified.

In every case...

Emphasized words are in italic type.

. . .to configure a **Single Logical Screen**. . .

New terms being introduced are in bold-faced type.

. . .the <*device_id. . .*>

Conceptual values are in italic type, enclosed in angle brackets. These items are not verbatim values, but are descriptors of the type of item it is, and the user should replace the conceptual item with whatever value is appropriate for the context.

2 configuring X Windows on HP-UX (HP Visualize graphics cards)

This chapter documents information specific to the HP X Server. It describes features that are unique to HP's X Server, provides information on how to configure the X Server and includes a list of supported configurations. For each supported graphics device, device-dependent configuration information is provided.

Information specific to a new release of the X Server, beyond the scope of the general information in this document, can be found in the HP-UX Release Notes located in `/usr/share/doc`.

NOTE

This chapter deals with configuration information for HP Visualize graphics cards (fxe, fx5, fx10, etc.) ONLY. For configuration information for other graphics cards, see Chapter 3 in this document.

X Server configuration

Configuration of the X Server is supported through SAM via an icon titled “X Server Configuration.” This icon resides either at SAM’s top level or under the top-level “Display” icon. This location is determined by the version of the HP-UX operating system (later HP-UX releases will place “X Server Configuration” under the “Display” folder).

There are several X*screens files used to configure the operation of the X Server. The SAM graphical user interface for X Server configuration is provided to simplify complexity and facilitate ease of use. While it is still possible to modify these files manually (see below), using the SAM interface greatly simplifies the process for creating Multi-Display and Single Logical Screen configurations.

Our SAM component has the following actions:

- **Configure Print Server**
- **Modify Multi-Screen Layout**
- **Modify Server Options**
- **Single Logical Screen (SLS)**

- **Describe Screen**
- **Identify Screen**
- **Modify Default Visual**
- **Modify Screen Options**
- **Add Screen to Configuration**
- **Remove Screen from Configuration**

The first group of actions can be thought of as “global” actions. They will typically be active regardless of what has been selected. If any of these menu items is not visible, it is because it is not supported under the current configuration. For example, on systems containing only one graphics screen, the last three menu items will not be visible.

The second group of actions can be thought of as “screen” actions. They will be activated depending on which screens have been chosen. It is also possible that the last two actions (`Add` and `Remove`) will be absent. When only one graphics screen is present, SAM will treat this screen as though it is always configured. Preselecting both configured and unconfigured screens will result in only the first two screen menu options being active.

X*screens file

For manual changes, please refer to the sample files in the `/etc/X11/` directory. Three files of particular interest are the X0screens, X0devices, and X0pointerkeys files.

description of the X*screens configuration file

This file belongs in `/etc/X11/X*screens`, where “*” is the display number of the server. For example, the “X0screens” file is used when the `$DISPLAY` environment variable is set to `hostname:0.screen` and the server is invoked using the “:0” option.

The X*screens file is used to specify:

- Device-independent server options, and
- For each screen:
  - what device file to use (required),
  - the default visual,
  - monitor size, and
  - device-dependent screen options.

Note that all of the items above, except for device-independent server options, are specified on a per-screen basis.

The X Server supports up to four screens at a time. Specifying more than four screens will cause a server error message.

syntax guidelines

- Blank lines and comments (text following “#”) are ignored.
  Entries can occupy more than a single line.
- All symbols in the file are recognized case-insensitive.

the X*screens file format

Items must appear in the X*screens file in the order that they are specified below.

```
 [ServerOptions
   <server_option>
   .
   .
   .
   <server_option>]
{Screen <device_name>} ||
{SingleLogicalScreen <nRows> <nCols>
   <device_name1> . . .< device_nameN>}
      [DefaultVisual
         [Class <visual_class>]
         [Depth <depth>]
         [Layer <layer>]
         [Transparent]]
       [MonitorSize <diagonal_length>< units>]
       [MinimumMonitorPowerSaveLevel <level>]
       [ScreenOptions
              <screen_option>
                .
                .
                .
                 <screen_option>]
```

Brackets (“[“and “]”) denote optional items. Italicized items in angle brackets (“<” and “>”) denote values to be specified. The double vertical line (“||”) denotes that one of the ored values (items surrounded by braces, “{“and “}”) must be included.

The block from the “Screen <*device_name*>” line to the final “<*screen_option*>” line is referred to as a either a “Screen Entry” or as a “Single Logical Screen entry”. As shown above, the X*screens format is composed of an optional block specifying device-independent server options followed by one or more either Screen or Single Logical Screen entries (maximum of four graphics devices).

The minimum X*screens file is a line with the keyword “Screen” followed by a screen device file. For example:

```
Screen /dev/crt
```

server options

For more information about server options, or about additional server options, look in an information file (for example, `/usr/lib/X11/Xserver/info/screens/hp`).

`GraphicsSharedMemorySize <`*`memory_size`*`>`

Specify the size of the graphics shared memory region. The size must be specified in bytes and must be in hexadecimal.

Default value: 0x580000

`ImmediateLoadDles`

The X Server delays loading of some X extensions until the first protocol request to the given extension is received. Specifying this server option forces all extensions to be loaded at X Server startup. The 11.00 X Server patches shipped after July, 1997 perform delayed loading of X extensions.

screen entries

The minimum screen entry is a line with the keyword "Screen" followed by a screen device file.

Optional specifications for default visual, monitor size, and device-dependent screen options may follow this minimal screen description line.

DefaultVisual

This optional part of the format specifies the default visual that the screen uses. Valid keywords following the "DefaultVisual" keyword are "Class", "Depth", "Layer", and "Transparent".

If no default visual is specified, then the standard default visual class, depth, layer, and transparency for the graphics device is used.

Not all default visual specifications will work on all devices.

If there is an error in a specification, look in an information file for more details (for example, `/usr/lib/X11/Xserver/info/screens/hp`), in case it is newer than the document you're now reading.

Class <*StaticGray*> |<*GrayScale*> | <*StaticColor*> |<*PseudoColor*> | <*TrueColor*>| <*DirectColor*>

Specify the class of the default visual.

Depth <*depth_value*>

Specify the depth of the default visual (for example 8, 12, or 24).

Layer <*Image*> | <*Overlay*>

Specify the layer of the default visual.

Transparent

Specify that a visual with an application-accessible transparent entry in the default colormap be used.

`MonitorSize <`*`diagonal_length`*`> Inches | MM`

Specify the diagonal size of the monitor. After the "MonitorSize" keyword, you must specify the diagonal length of the monitor and then the units. Use this entry only if you are using a non-standard monitor.

MinimumMonitorPowerSaveLevel <*value*>

Specify the minimum power save level to be used by the monitor during screen blanking. You must specify a level of 0 -3 If the option is not used, the default is level 0. On devices that do not support DPMS, this option will be ignored.

ScreenOptions

Screen options are device-dependent options that are documented in a file in the X Server information directory (for example, `/usr/lib/X11/Xserver/info/screens/hp`).

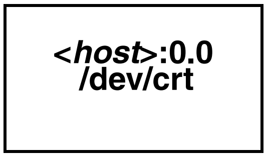
sample X*screens files

Below are several sample X*screens files that illustrate the new format.

- This is the minimum legal X*screens file, the "Screen" keyword followed by the screen device. Since no other information is given, the X Server will assume default values for other options and settings.

```
Screen /dev/crt
```

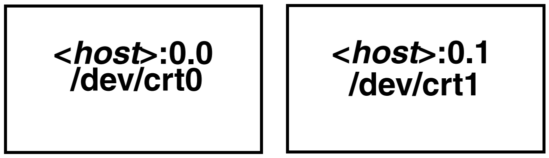
Figure 2-1 Results of minimal legal X*screens file



- This is the minimum specification for a two-screen configuration. The maximum number of screens supported on the X Server is four. Here, the displays associated with `/dev/crt0` and `/dev/crt1` are referred to as "<*host*>:0.0" and "<*host*>:0.1", respectively.

```
Screen /dev/crt0
Screen /dev/crt1
```

Figure 2-2 **Two physical displays, two separate screens**



- This sample X*screens file could be used on a system using HP VISUALIZE-FXE with a 17-inch monitor. In this example, the GraphicsSharedMemorySize is decreased to 1 Mbyte in order to reduce the swap space requirements of the system. Decreasing GraphicsSharedMemorySize is appropriate when you do not intend to run any 3D graphics applications.

```
ServerOptions
  GraphicsSharedMemorySize 0x100000
Screen /dev/crt
  MonitorSize 17 inches
```

  The display diagram would be the same as that of the “Results of Minimal Legal X*screens File” configuration, above.

- This sample X*screens file could be used on a system with a HP VISUALIZE-FX5 graphics device. The overlay visual is selected as the default. There are 255 overlay colormap entries available on the HP VISUALIZE-FX5. The 256th entry is hard-wired to transparent. Having less than 256 colormap entries should not cause a problem for most applications, but for those applications that require 256 colormap entries, the CountTransparentInOverlayVisual screen option should be used as shown below. Note that any attempts to modify the 256th entry will have no effect on the colormap.

```
Screen /dev/crt
  ScreenOptions
   CountTransparentInOverlayVisual
```

  The display diagram would be the same as that of the “Results of Minimal Legal X*screens File” configuration, above.

- This sample X*screens file could be used on a system with a HP VISUALIZE-FX10 graphics device. The default visual on the HP VISUALIZE-FX10 is the opaque overlay visual. All 256 colormap entries are opaque and allocable. If an application requires transparency in the default visual, the “Transparent” keyword can be used to select the transparent overlay visual as shown below.

```
Screen /dev/crt
DefaultVisual
Transparent
```

The display diagram would be the same as that of the "Results of Minimal Legal X*screens File" configuration, above.

- This sample X*screens file could be used on a system with a HP VISUALIZE-FXE graphics device. By default on the HP VISUALIZE-FXE, the overlay visual does not have a transparent entry available to applications for rendering transparency. If an application requires overlay transparency, an optional X Server mode is available, but it is restrictive. In this optional mode, only one hardware colormap is available in the overlays (instead of two) and only one hardware colormap is available in the image planes (instead of two). The optional X Server mode can be set via the EnableOverlayTransparency screen option as shown below.

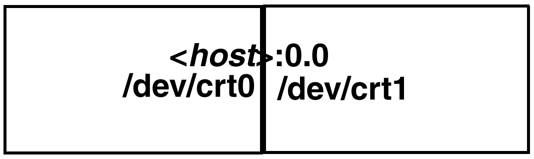
```
Screen /dev/crt
   ScreenOptions
    EnableOverlayTransparency
```

The display diagram would be the same as that of the "Results of Minimal Legal X*screens File" configuration, above.

- These sample X*screens file entries could be used on a system with two homogeneous graphics devices. Assuming the first device is associated with the device file "`/dev/crt0`" and the second device is associated with the device file "`/dev/crt1`", both examples specify a horizontal Single Logical Screen configuration.

```
SingleLogicalScreen 1 2
  /dev/crt0 /dev/crt1
or
SingleLogicalScreen 1 2
  /dev/crt0
   /dev/crt1
```

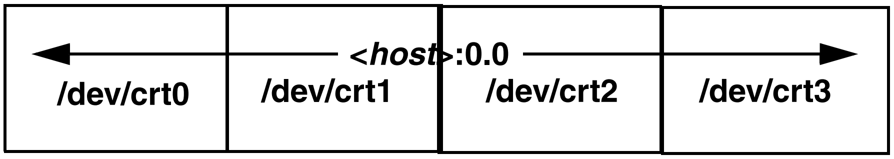
Figure 2-3 **Two physical displays, single logical screen (1x2)**



- These sample X*screens entries could be used on a system with four homogeneous graphics devices. Assuming the first device is associated with the device file "/dev/crt0", the second device is associated with the device file "/dev/crt1", etc. The following examples specify valid Single Logical Screen configurations.

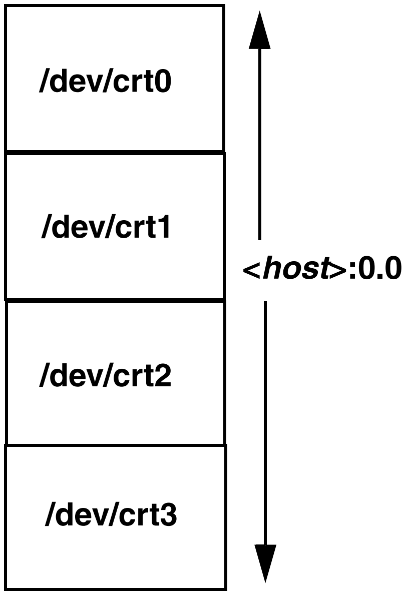
```
SingleLogicalScreen 1 4
/dev/crt0 /dev/crt1 /dev/crt2 /dev/crt3
```

Figure 2-4 **Four physical displays, single logical screen (1x4)**



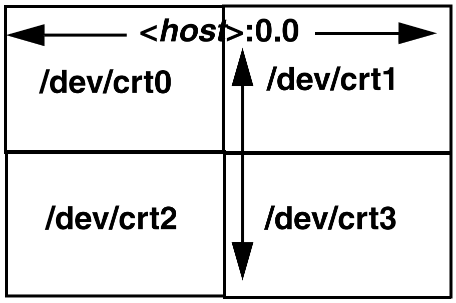
```
SingleLogicalScreen 4 1
/dev/crt0
/dev/crt1
/dev/crt2
/dev/crt3
```

Figure 2-5 Four physical displays, single logical screen (4x1)



```
SingleLogicalScreen 2 2
   /dev/crt0 /dev/crt1
    /dev/crt2 /dev/crt3
```

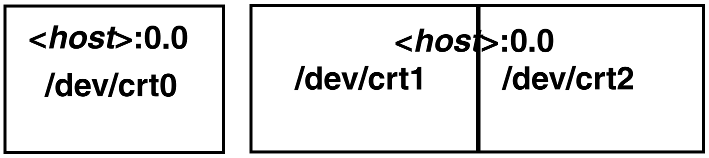
Figure 2-6 Four physical displays, single logical screen (2x2)



- It is possible to include a Screen Entry and an SLS Screen Entry in the same X*screens File. This creates a situation where there are two X Screens (e.g.< *host*>:0.0 and <*host*>:1.0), one of which happens to be a Single Logical Screen. Below is an example of this:

```
Screen /dev/crt0
SingleLogicalScreen 1 2
/dev/crt1 /dev/crt2
```

Figure 2-7 Three physical displays, screen plus single logical screen(1x2)



miscellaneous topics

double buffer extensions

DBE is an extension to the X Server that provides a double-buffering Application Programming Interface (API). For more information about DBE and the API, consult the DBE man pages:

DBE
XdbeQueryExtension
XdbeGetVisualInfo
XdbeFreeVisualInfo
XdbeAllocateBackBufferName
XdbeDeallocateBackBufferName
XdbeSwapBuffers
XdbeBeginIdiom
XdbeEndIdiom
XdbeGetBackBufferAttributes

performing buffer swaps on vertical blank

For performance reasons, the default DBE behavior is to not synchronize buffer swaps with the monitor’s vertical retrace period. In some instances, therefore, image tearing (seeing part of the old image and part of the new image on the display at the same time) could be visible while swapping large DBE windows. For those instances where tearing would occur and is undesirable, an optional X Server mode is available to allow for synchronization of buffer swaps with vertical retrace. To activate this optional X Server mode, set the following screen option in the X*screens File before the X Server is started:

```
SwapBuffersOnVBlank
```

determining swap performance

The DBE API does not allow users to determine if double-buffering in a visual is through software or hardware. However, the API does provide a way to determine relative swapping performance on a per-visual basis. The `XdbeScreenVisualInfo()` function returns information about the swapping performance levels for the double-buffering visuals on a display. A visual with a higher performance level is likely to have better double-buffer graphics performance than a visual with a lower performance level. Nothing can be deduced from any of the following: the magnitude of the difference of two performance levels, a performance level in isolation, or comparing performance levels from different servers.

For more information, refer to the DBE man page on `XdbeScreenVisualInfo()`.

supported devices

The X Server supports DBE on the following devices:

- HP VISUALIZE-FX5 and FX10
- HP VISUALIZE-FXE

display power management signaling (DPMS)

Monitors constitute a large percentage of the power used by a workstation even when not actively in use (i.e., during screen blanking). In order to reduce the power consumption, the Video Electronic Standards Association (VESA) has defined a Display Power Management Signaling (DPMS) standard which can be used to greatly reduce the amount of power being used by a monitor during screen blanking.

The X Server features the ability to make use of DPMS on the following graphics devices:

- HP VISUALIZE-FX5 and FX10
- HP VISUALIZE-FXE

The following table is a description of the states that are defined by VESA. The Power Savings column indicates (roughly) the level of power savings achieved in the given state. The Recovery Time is the amount of time that the screen takes to return to a usable state when the screen saver is turned off (by pressing a key or the moving the mouse).

Table 2-1 Power saving states defined by VESA

Level	State	DPMS Compliance Requirements	Power Savings	Recovery Time
0	Screen Saver	Not Applicable	None	Very Short (<1sec.)
1	Stand-by	Optional	Minimal	Short
2	Suspend	Mandatory	Substantial	Longer
3	Off	Mandatory	Maximum	System Dependent

The actual amount of power saved and the recovery time for each of the states is monitor-dependent and may vary widely. The customer can compensate for this by choosing an appropriate level for the monitor that is currently in use.

By default, the DPMS level used is the Screen Saver (i.e. no power savings). If you wish to use power saving during screen blanking, set the following X*screens file entry before starting the server:

```
MinimumMonitorPowerSaveLevel <level>
```

where level is replaced with the single digit 0, 1, 2, or 3 as specified in the Level column in the above table.

shared memory extension (MIT_SHM)

The MIT shared memory extension provides both shared-memory XImages and shared-memory pixmaps based on the SYSV shared memory primitives.

Shared memory XImages are essentially a version of the XImage interface where the actual image data is stored in a shared memory segment, and thus need not be moved through the Xlib interprocess communication channel. For large images, use of this facility can result in increased performance.

Shared memory pixmaps are a similar concept implemented for the pixmap interface. Shared memory pixmaps are two-dimensional arrays of pixels in a format specified by the X Server, where the pixmap data is stored in the shared memory segment. In all other respects, shared memory pixmaps behave the same as ordinary pixmaps and can be modified by the usual Xlib routines. In addition, it is possible to change the contents of these pixmaps directly without the use of Xlib routines merely by modifying the pixmap data.

supported devices

The X Server supports the MIT shared memory extension on the following devices:

- HP VISUALIZE-FX5 and FX10
- HP VISUALIZE-FXE

supported X configurations

multi-display support

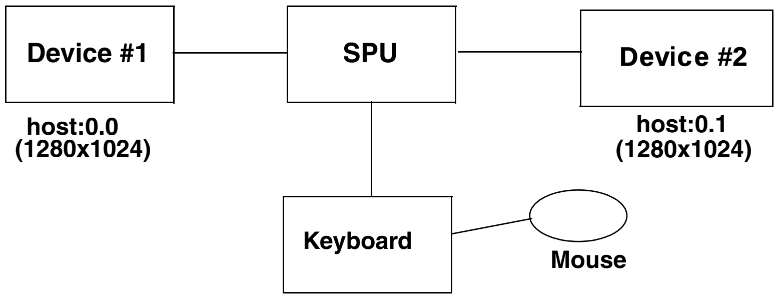
The following definitions are included to reduce confusion between the terms “multi-display,” “multi-screen,” and “single logical screen.”

Multi-Display

A configuration with multiple graphics devices used concurrently. Any multi-screen or single logical screen configuration is referred to as a multi-display configuration.

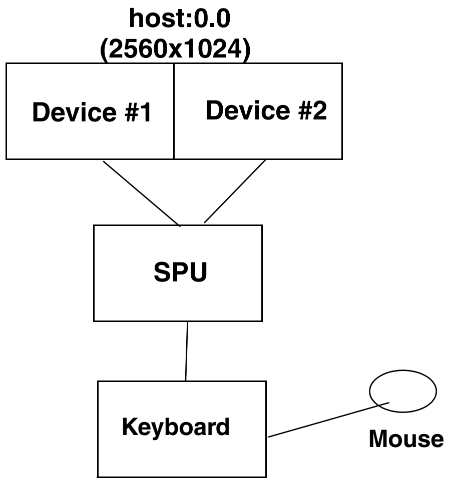
Multi-Screen

A configuration in which a single X Server with a mouse and keyboard drives multiple graphics devices (where each display is a different X Screen) concurrently while only allowing the cursor, not windows, to be moved between displays.



Single logical screen

A configuration in which a single X Server with a single mouse and keyboard drives multiple homogeneous graphics devices concurrently while allowing the displays to emulate a large single screen. This differs from a multi-screen environment by allowing windows to be moved and displayed across displays. See the section in this document on Single Logical Screen.



Note that different monitor resolutions are not supported with the multi-display configurations unless stated otherwise in the table below.

multi-screen support

The list of supported multi-display configurations is rather large, and it changes whenever a new graphics device is introduced. Thus, if you are considering a Single Logical Screen or any other multi-display configuration, we recommend consulting your HP Sales Representative and inquiring whether the configuration you have in mind is indeed supported.

There are general guidelines, however. For example:

- Multi-display configurations may be limited by available power. Depending on the capacity of your computer's power supply, and the power demands of the combination of graphics cards you are considering, there may or may not be enough power to operate them all.
- Single Logical Screen configurations must use identical graphics devices (see the next section).

single logical screen (SLS)

SLS is a mechanism for treating homogeneous multi-display configurations as a single "logical" screen. This allows the moving/spanning of windows across multiple physical monitors. The word "homogeneous" is included because SLS only works if the graphics devices included in the SLS Configuration are of the same type.

SLS is enabled by using SAM (the System Administration Manager tool, `/usr/sbin/sam`). To enable an SLS configuration, start SAM, and follow the instructions below:

1. Double-click on the "X Server Configuration" button. A window entitled "Graphics" appears, containing an icon for every graphics device on your system.

2. Select the devices you want to combine into an SLS (click the mouse on the first device, and [Ctrl]-click on the others). At this point, all the devices you want to combine into an SLS configuration should be highlighted.

3.From the "Actions" menu, choose the menu item "Modify Multi-Screen Layout". A dialog box appears, allowing you to specify exactly how you want your SLS configuration to be.

Note that if your machine has only one graphics device, the “Modify Multi-Screen Layout” menu option does not even appear, since multiple devices cannot occur in a single-device context.

Note also that DHA (Direct Hardware Access) is supported in a window that spans multiple screens.

“Spanning,” in this context, includes a window that is two or more screens in size, as well as a window that is partially on one screen and partially on another (even though it would fit on a single screen if it were moved).

SLS can also be enabled via the /etc/X11/X*screens file via the syntax:

```
SingleLogicalScreen n m
   /dev/crt0 ... /dev/crtk
```

where:

n = the number of “rows” in the physical configuration,
m = the number of “columns” in the physical configuration,
and the product of n x m is less than or equal to four.

For example, to create a logical screen that is one monitor tall by two monitors wide, the following syntax would be used:

```
SingleLogicalScreen 1 2
     /dev/crt0 /dev/crt1
```

Whereas for a logical screen that is two monitors tall by one monitor wide, the syntax is:

```
SingleLogicalScreen 2 1
     /dev/crt0 /dev/crt1
```

3D acceleration and single logical screen

Currently, SLS does not take advantage of 3D acceleration (e.g. Visualize FX5). 3D applications (from any supported HP 3D API) will continue to run with SLS; However, 3D performance with SLS will be much slower than it is without SLS.

hp CDE and single logical screen

Please note that HP CDE has not been modified to take advantage of the Single Logical Screen capability. When presenting information on your display, HP CDE may split a window across physical screens. Examples include:

- The login screen.
- The Front Panel.
- Window move and resize boxes.
- The screen lock dialog.

This behavior is the result of HP CDE's naive assumption that it is running against one large screen; it centers these windows accordingly.

If you are using the default HP CDE key bindings, you can easily reposition the Front Panel so that it is completely contained within one physical screen:

1. With the input focus on the Front Panel, press **Alt and Space**.
2. With the Front Panel menu posted and the "Move" menu item selected, press **Enter** (on older keyboards ,**Return**) to start the move.
3. Use the mouse or the arrow keys to reposition the Front Panel to the desired location.
4. Press **Enter** (or **Return**) to complete the move. You may instead press **Esc** to cancel the move.

Afterwards, this setting will be remembered and restored at your next login. If you have previously set a Home session, you will need to re-set the Home session in the Style Manager to register the new Front Panel position.

Note that there is no mechanism in HP CDE for repositioning the login screen, window move/resize boxes, or the screen lock dialog.

hp Visualize- FXE, FX5 and FX10 device-dependent information

This section includes information on the HP VISUALIZE-FXE/5/10 graphics devices.

The HP VISUALIZE-FXE/5/10 has 8 overlay planes, 48 image planes a 24-bit z buffer and 4 hardware colormaps.

HP VISUALIZE-FXE/5/10 graphics devices contain 2D hardware acceleration similar to that in other HP VISUALIZE devices, as well as 3D acceleration for lighting, shading and texture mapping.

supported visuals

HP VISUALIZE-FXE/5/10 graphics devices support all of the following visuals:

- Class PseudoColor Depth 8 Layer Image
- Class PseudoColor Depth 8 Layer Overlay
- Class PseudoColor Depth8 Layer Overlay Transparent
- Class DirectColor Depth 24 Layer Image
- Class TrueColor Depth 24 Layer Image

The following visuals are enabled by default on the HP VISUALIZE-FXE/5/10:

- Class PseudoColor Depth 8 Layer Image
  supports DBE hardware double-buffering
- Class PseudoColor Depth 8 Layer Overlay
  supports DBE software double-buffering
- Class PseudoColor Depth 8 Layer Overlay Transparent
  supports DBE software double-buffering
- Class DirectColor Depth 24 Layer Image
  does not support DBE hardware or software double-buffering
- Class TrueColor Depth 24 Layer Image
  does not support DBE hardware or software double-buffering

NOTE When running xdpyinfo or calling the XGetVisualInfo() Xlib function, some extra duplicate visuals may appear in the visual list. These extra visuals are created on behalf of the OpenGL extension to

X (GLX). If necessary, the extra visuals can be disabled using the DisableGLxVisuals screen option. See the "Disabling the GLX Visuals" section for more information.

supported screen options

The following screen options are supported:

- CountTransparentInOverlayVisual
- ImageTextViaBitMap
- EnableIncludeInferiorsFix
- DisableGlxVisuals

hp VISUALIZE-FXE/5/10 configuration hints

overlay visuals and overlay transparency

HP VISUALIZE-FXE/5/10 devices have two visuals in the overlay planes, both depth-8 PseudoColor. The first (default) overlay visual has 256 entries per colormap and no transparency. The second overlay visual has 255 entries per colormap and supports transparency.

To allow applications to determine which visuals are in the overlay planes, both overlay visuals are listed in the SERVER_OVERLAY_VISUALS property attached to the root window. The default overlay visual has a transparent type of "0" (None), while the transparent overlay visual has a transparent type of "1" (TransparentPixel).

If you need an overlay colormap that supports transparency, create the colormap using the visual that has transparency in its SERVER_OVERLAY_VISUALS property.

disabling the GLX visuals

The HP VISUALIZE-FXE/5/10 products support the OpenGL extension to X (GLX). If HP OpenGL is installed on an HP VISUALIZE-FXE/5/10 system, then the GLX extension offers new entry points for obtaining more information about X visuals. As part of offering extended visual information, some extra X visuals appear in the X visual list. The extra visuals are simply duplicates of visuals that would normally appear in the X visual list. In case that the extra visuals cause problems with applications, a screen option can be used to disable them.

To disable the GLX visuals, add the DisableGlxVisualsScreen Option to the X*screens file.For example:

```
Screen /dev/crt/
    ScreenOption
       DisableGlxVisuals
```

hp VISUALIZE-FXE/5/10 colormaps

HP VISUALIZE-FXE/5/10 devices have a total of 4 hardware colormaps. 2 of the colormaps are dedicated to the overlay planes. The remaining 2 colormaps are dedicated to the image planes.

Of the two overlay colormaps, one is permanently reserved for the default colormap. The other overlay colormap is available to applications.

changing the monitor type

A configuration tool is available to change the monitor type on HP VISUALIZE-FXE/5/10 devices. This tool permits users to change the monitor's refresh rate, frame buffer resolution, and frame buffer memory configuration (e.g., Stereo, Double Buffer), when the device supports multiple options. To change the monitor type, the setmon command can be executed directly or done through the SAM system administration tool.

The setmon executable is located at /opt/graphics/common/bin/setmon. Under SAM this component is located under the top-level "Display" folder, next to the "X Server Configuration" icon.

NOTE Changing the monitor type while the X Server is running will necessitate killing and restarting the X Server.

3 configuring X Windows on HP-UX (other graphics cards)

This chapter documents information specific to the HP Xf86 X Server. The Xf86 X Server is based on the XFree86 version 4.2.0 X Server. This section describes features unique to HP's implementation of the X Server, provides information on how to configure the X Server and includes a list of supported X configurations. For each supported graphics device, device-dependent configuration information is provided.

NOTE

This chapter deals with configuration requirements for graphics cards OTHER THAN HP Visualize cards (fxe, fx5, fx10, etc.). For configuration information for all HP Visualize cards, refer to Chapter 2 in this document.

using SAM to configure X Windows

Configuration of the X Server is supported through SAM via an icon titled “X Server Configuration.” This icon resides either at SAM’s top-level or under the top-level “Display” icon.

The SAM graphical user interface for X Server configuration is provided to simplify complexity and facilitate ease of use in modifying or creating the X Server configuration file, XF86Config. The Xf86 server uses the XF86Config file for its configurations. While it is still possible to modify this file manually (see below), using the SAM interface can greatly simplify the process.

The SAM component has the following actions:

- **Configure Print Server...**
- **Configure How X Starts...**
- **Modify Multi-Screen Layout...**
- **Single Logical Screen (SLS) ->**

--

- **Describe Screen...**
- **Identify Screen**
- **Modify Default Visual...**
- **Modify Screen Options...**
- **Modify Server Options...**
- **Add Screen to Configuration**
- **Remove Screen from Configuration**

The first group of Actions menus can be thought of as global actions. They will typically be active regardless of what has been selected. If any of these menu items are not visible it is because they are not supported under the current configuration.

The **Configure Print Server** item allows you to manage print servers. From this menu item you can create, stop or remove print servers.

On systems that contain a mix of HP Visualize and other HP graphics cards, the **Configure How X Starts** item allows you to choose on which graphics devices the X Server should start. From this action, you can assign which of your configuration files to use as a display connection - the X* screens file for HP graphics cards or the XF86Config file with other graphics cards. Running independent X Servers on an HP Visualize graphics device and any other device simultaneously is not supported.

SLS is a mechanism for treating homogeneous multi-display configurations as a single logical screen. This allows the moving/spanning of windows across multiple physical monitors. The word homogeneous is included because SLS only works if the graphics devices included in the SLS Configuration are of the same type.

To enable an SLS configuration, start SAM, select the "Display" icon, and follow the instructions below:

1. Double-click on the "X Server Configuration" button. A window entitled "X Server Configuration" appears, containing an icon for every graphics device on your system.

2. Select the devices you want to combine into an SLS configuration. To select the devices, click the mouse on the first device, and **[Ctrl]**-click on the others. At this point, all the devices you want to combine into an SLS configuration should be highlighted.

3. From the "Actions" menu, choose the it "Single Logical Screen (SLS)" -> "Create SLS..."

4. In the "Create SLS" screen, select the desired layout (horizontal or vertical) and screen mapping, and click "OK".

5. The "X Server Configuration" window should now show a single icon denoting an SLS confguration.

6. Select "File -> Exit". This will save the new SLS configuration and give you the option to restart the Xserver. The Xserver will need to be restarted for the new SLS configuration settings to take effect.

Specific Xf86 server options can be set with the **Modify Server Options** menu item. See the item for information on specific options.

The second group of “Actions” menus can be thought of as screen actions. They will be activated depending on which screens have been chosen. The windows that result from choosing on of these actions differ depending upon whether the selected screen is an HP Visualize graphics card or other HP graphics cards.

The **Describe Screen** and **Identify Screen** menu selections provide information about the device. I**dentify Screen** flashes the monitor that is connected to the graphics device.

The **Modify Default Visual** menu item lets you set the default visuals, depth and resolution on a graphics device. It lets you identify which of these should be the default settings.

The **Modify Screens Options** item contains options that are specific to each graphics device. This list might be different for cards depending on the capabilities of each card.

Grayed out screen icons represent screens that have not been configured for use by the X Server. You can select these grayed out icons and choose the **Add Screen to Configuration** menu item to add screens to the configuration file. HP Visualize graphics devices are added to the X*screens file and other HP graphics devices are added to the XF86Config file.

More information on configuration of the X Server and each of the above actions can be obtained from SAMs on-line Help.

using setmon to configure the monitor

setmon is a configuration tool used to change the monitor settings for a monitor attached to a graphics device. This tool permits you to change the monitor's refresh rate, frame buffer resolution, and frame buffer memory configuration (e.g., Stereo, Double Buffer), when the device supports multiple options. To change the monitor type, the **setmon** command can be executed directly or done through SAM.

The **setmon** executable is located at `/opt/graphics/common/bin/setmon`. Under SAM this component is located under the top-level “Display” folder, next to the “X Server Configuration” icon.

NOTE

Changing the monitor type while the X Server is running will necessitate killing and restarting the X Server. In order to change the monitor settings, the X Server needs to be running on the device specified. For these graphics cards, it may not be possible to test some of the monitor settings before making the change permanent.

the XF86Config file

The XF86Config file is located in `/etc/X11/XF86Config`. It can be generated automatically or modified using SAM. A working configuration file is also delivered on the system. You must be root to create or edit this file. The XF86Config man page provides additional information regarding the configuration file. It is necessary to re-start the X Server for changes made to the XF86Config file to take effect.

the XF86Config file format

Most of the content in this section has been copied from the XF86Config(5) man page listed on “The XFree86 Project, Inc.” web site (**http://www.xfree86.org**). The man pages are available from **http://www.xfree86.org/4.2.0**

Config file keywords are case-insensitive, and underscore “_” characters are ignored. Most strings (including **Option** names) are also case-insensitive, and insensitive to white space and underscore “_” characters.

Each config file entry usually takes up a single line in the file. They consist of a keyword, which is possibly followed by one or more arguments, with the number and types of the arguments depending on the keyword. The argument types are:

- **Integer** - an integer number in decimal, hex or octal
- **Real -** a floating point number
- **String -** a string enclosed in double quote marks (“)

NOTE Hex integer values must be prefixed with “0x”, and octal values with “0”.

A special keyword called **Option** may be used to provide free-form data to various components of the server. The **Option** keyword takes either one or two string arguments. The first is the option name, and the optional second argument is the option value. Some commonly used option value types include:

- **Intege**r - an integer number in decimal, hex or octal
- **Real** - a floating point number

- **String** - a sequence of characters
- **Boolean** - a boolean value (see below)
- **Frequency** - a frequency value (see below)

NOTE All **Option** values, not just strings, must be enclosed in quotes.

Boolean options may optionally have a value specified. When no value is specified, the option's value is **TRUE**. The following boolean option values are recognized as **TRUE**:

```
1, on, true, yes
```

and the following boolean option values are recognized as **FALSE**:

```
0, off, false, no
```

If an option name is prefixed with “No”, then the option value is negated.

Frequency option values consist of a real number that is optionally followed by one of the following frequency units:

```
Hz, k, kHz, M, MHz
```

When the unit name is omitted, the correct units will be determined from the value and the expectations of the appropriate range of the value. It is recommended that the units always be specified when using frequency option values to avoid any errors in determining the value.

“ServerLayout” section

The **ServerLayout** section is used to identify which **Screen** sections are to be used in a multi-headed configuration, the relative layout of those screens, and which **InputDevice** sections are to be used. Each **ServerLayout** section has an **Identifier**, a list of **Screen** section identifiers, and a list of **InputDevice** section identifiers. **Options** may also be included in the **ServerLayout** section. A **ServerLayout** section may be made active by referencing (via its **Identifier**) on the command line that starts X. In the absence of this, the first one found in the file will be chosen by default, as there may be multiple **ServerLayout** sections in the config file. The format of the **ServerLayout** section is as follows:

```
Section ìServerLayoutî

   Identifier ìServerLayoutNameî
   Screen [ScreenNumber] ìScreenIDî [Position] [Xcoor] [Ycoor]
   . . .
   InputDevice  ìInputDeviceIDî ìInputDeviceOptionî
   . . .
   [Option Ö]
   . . .
EndSection
```

Keywords, options and values enclosed in [ ] are optional.

A number specifying the preferred screen number for that screen may optionally follow each **Screen**. When no screen number is specified, it is numbered according to the order in which it is listed. Next comes the **ScreenID**, a required field that must be enclosed in double quotes. The **ScreenID** must match an **Identifier** in a **Screen** section. The remaining information on the line is optional. Next comes the physical position of the screen, either in absolute terms or relative to another screen (or screens). Finally the XY coordinates of the screen may be specified.

The position keywords are:

Absolute
RightOf
LeftOf
Above
Below
Relative

The preferred method of specifying the layout is to explicitly specify the screen's location in absolute terms or relative to another screen.

The examples are based on the examples listed in the DESIGN document from XFree86.

In the absolute case, the upper left corner's coordinates are given after the **Absolute** keyword. If the coordinates are omitted, a value of (0,0) is assumed. An example of absolute positioning follows:

```
Section ìServerLayoutî
      Identifier ìMainLayoutî
      Screen 0         ìScreen 1" Absolute
      Screen 1         ìScreen 2" Absolute 1024  0
      Screen           ìScreen 3" Absolute 2048  0
      . . .
EndSection
```

When the **Relative** keyword is used, the coordinates of the new screen's origin relative to reference screen follow the reference screen name. The following example shows how to use some of the relative positioning options:

```
Section ìServerLayoutî
         Identifier      ìMain Layoutî
         Screen 0        ìScreen 1"
         Screen 1        ìScreen 2ì  RightOf   ìScreen 1"
        Screen         ìScreen 3" Relative ìScreen 1" 2048 0
         . . .
EndSection
```

Each **InputDevice** is followed by an InputDeviceID, a required field that must be enclosed in double quotes. The InputDeviceID must match an **Identifier** in an **InputDevice** section. Last, an option may be provided. The option can also be specified in the **InputDevice** section. Typical options specified here are: **CorePointer**, **CoreKeyboard**, and **SendCoreEvents**. The option must be enclosed in double quotes. See the **InputDevice** section for more information regarding the options. Normally, at least two InputDevices are present: a keyboard and a mouse.

Options that apply to the X Server may also be specified in this section. The following table lists all options that may be set in the **ServerLayout** section.

Table 3-1

Option	Value	Default	Description
DontZap	Boolean	Off	This disallows the use of the *Ctrl+Shift+Break* sequence. That sequence is normally used to terminate the X Server. When this option is enabled, that key sequence has no special meaning and is passed to clients. Source: XF86Config man page.
DontZoom	Boolean	Off	This disallows the use of the *Ctrl+Alt+Keypad-Plus* and *Ctrl+Alt+Keypad-Minus* sequences. These sequences allow you to switch between video modes. When this option is enabled, those key sequences have no special meaning and are passed to clients. Source: XF86Config man page.
AllowMouseOpenFail	Boolean	false	This allows the server to start up even if the mouse device can't be opened/initialized.Source: XF86Config man page.
Pixmap	Bpp	32	This sets the pixmap format to use for depth 24. Allowed values for *bpp* are 24 and 32. Default: 32 unless driver constraints don't allow this (which is rare). **Note:** some clients don't behave well when this value is set to 24. Source: XF86Config man page.
Verbose	Integer	-1	See the section on “Features: Logging and Verbosity” for more details regarding these options.
NoLogging	NA	NA	See the section on “Features: Logging and Verbosity” for more details regarding these options.
LogVerbose	Integer	-1	See the section on “Features: Logging and Verbosity” for more details regarding these options.

Table 3-1 (Continued)

CursorScaleFactor	Integer	1	See the section in “Features: ” for more details regarding these options.
MaxCursorSize	Integer	64	See the section in “Features: Cursor Scaling” for more details regarding these options.
AcelerateIndirectRendering	Boolean	True	This option is used to specify whether or not OpenGL is to do software rendering. A value of False forces software rendering. The default is for OpenGL to use accelerated rendering.

“Files” section

The **Files** section is used to specify paths to where fonts and modules are located and the location of the rgb database and the user specified logfile. The **Files** section format is:

```
    ìFilesî Section
            [FontPath     ìPathNameî]
             .
             .
            [ModulePath ìPathNameî]
             .
             .
            [RgbPath        ìPathNameî]
            [LogPath        ìPathNameî]
   Endsection
```

Multiple **Font Paths** and **Module Paths** may be specified in two ways, either by multiple lines or by using a “,” delimiter between paths on the same line.

Font Path elements may be either absolute directory paths, or a font server identifier. Font server identifiers have the form:

```
<trans>/<hostname>:<port-number>
```

where <*trans*> is the transport type to use to connect to the font server (e.g., **Unix** for UNIX-domain sockets or **tcp** for a TCP/IP connection), <*hostname*> is the hostname of the machine running the font server, and <*port-number*> is the port number that the font server is listening on (usually 7000). The default Font Path is:

```
tcp:/7000,
/usr/lib/X11/fonts/hp_roman8/75dpi/,
/usr/lib/X11/fonts/iso_8859.1/100dpi/,
/usr/lib/X11/fonts/iso_8859.1/75dpi/,
/usr/lib/X11/fonts/hp_kana8/,
/usr/lib/X11/fonts/hp_japanese/100dpi/,
/usr/lib/X11/fonts/hp_japanese/75dpi/,
/usr/lib/X11/fonts/hp_korean/75dpi/,
/usr/lib/X11/fonts/hp_chinese_s/75dpi/,
/usr/lib/X11/fonts/hp_chinese_t/75dpi/,
/usr/lib/X11/fonts/iso_8859.2/75dpi/,
/usr/lib/X11/fonts/iso_8859.5/75dpi/,
/usr/lib/X11/fonts/iso_8859.6/75dpi/,
/usr/lib/X11/fonts/iso_8859.7/75dpi/
/usr/lib/X11/fonts/iso_8859.8/75dpi/,
/usr/lib/X11/fonts/iso_8859.9/75dpi/,
/usr/lib/X11/fonts/misc/
```

Xf86 uses **ModulePaths** as locations to look for loadable modules. The default **ModulePath** is:

```
/usr/lib/X11/Xserver/modules/xf86/,
/opt/graphics/common/lib/
```

RgbPath can be used to specify the RGB database path. Normally it is never changed. If it is not specified the built-in path `/etc/X11/rgb` is used.

In addition, the **LogPath** can be specified, if server logging information is to be sent somewhere other than the default log file. The default logfile is located at `/var/X11/Xserver/logs/Xf86.n.log`, where *n* is the display number.

All names must be enclosed within double quotes. There may be only one **Files** section in the config file. This section does not recognize **Option** as a keyword.

“Module” section

The **Module** section is used to specify which X Server modules should be loaded. The types of modules normally loaded in this section are X Server extension modules, and font rasterizer modules. Most other module types are loaded automatically when they are needed via other mechanisms. There may only be one **Module** section in the config file. The format of the **Module** section is as follows:

```
        Section ìModuleî
                Load ìModuleNameî
                 . . .
                [SubSection ìModuleNameî
                    Option . . .
                     . . .
                EndSubSection]
                 . . .
       EndSection.
```

Load instructs the server to load the module called **ModuleName**. The module name given should be the module's extension name, not the module file name. The extension name is case-sensitive, and does not include the “lib” prefix, or the “.1” suffix.

Example: the Double Buffered Extension (DBE) can be loaded with the following entry:

```
Load ìdbeî
```

SubSection also instructs the server to load the module called **ModuleName**. The module name given should be the module's extension name, not the module file name. The extension name is case-sensitive, and does not include the “lib” prefix, or the “.1” suffix. The difference is that the listed **Options** are passed to the module when it is loaded.

Modules are searched for in each directory specified in the **ModulePath** search path (or the default **ModulePath** if one is not specified in the **Files** section) and in the drivers, input, extensions, fonts, and HP-UX subdirectories of each directory in the **ModulePath**.

“InputDevice” section

An **InputDevice** section is considered active if there is a reference to it in the active **ServerLayout** section. There may be multiple **InputDevice** sections. There will normally be at least two: one for the core (primary) keyboard, and one for the core pointer. **InputDevice** sections have the following format:

```
Section ìInputDeviceî

        Identifier     ìInputDeviceIDî
         Driver          ìDriverNameî

        [Option Ö]

     . . .
EndSection
```

The **Identifier** entry specifies the unique name for this input device and must match an **InputDeviceID** in the active **ServerLayout** section in order to be active.

The **Driver** entry specifies the name of the driver to use for this input device.

InputDevice sections recognize some driver-independent **Options**, which are described here. See the individual input driver manual pages for a description of the device-specific options that can be entered here.

Table 3-2

Option	**Value**	**Description**
CorePointer	NA	When this is set, the input device is installed as the core (primary) pointer device. There must be no more than one core pointer. If this option is not set here, or in the **ServerLayout** section, or from the -pointer command line option, then the first input device that is capable of being used as a core pointer will be selected as the core pointer. Source: XF86Config man page.

Table 3-2 (Continued)

CoreKeyboard	NA	When this is set, the input device is to be installed as the core (primary) keyboard device. There must be no more than one core keyboard. If this option is not set here, or in the **ServerLayout** section, then the first input device that is capable of being used as a core keyboard will be selected as the core keyboard. Source: XF86Config man page.
AlwaysCore SendCoreEvents	boolean	Both of these options are equivalent, and when enabled cause the input device to always report core events. This can be used, for example, to allow additional pointer devices to generate core pointer events (such as moving the cursor, etc). Source: XF86Config man page.
HistorySize	number	Sets the motion history size. Default: 0. Source: XF86Config man page.

The following two examples show an **InputDevice** section for a keyboard and mouse:

```
Section ìInputDeviceî

         Identifier     ìKeyboard0î
          Driver          ìkeyboardî

EndSection

Section ìInputDeviceî

         Identifier     ìMouse0î
         Driver         ìmouseî
         Option         ìProtocolî    ìPS/2î
EndSection
```

“Screen” section

The configuration file may have multiple **Screen** sections. There must be at least one, for the “screen” being used. A “screen” binds a graphics device (**Device** section) and a monitor (**Monitor** section) together. A **Screen** section is considered “active” if it is referenced by an active

ServerLayout section. If neither of these is present, the first **Screen** section found in the configuration file is considered the active one. **Screen** sections have the following format:

```
Section ìScreenî
       Identifier ìScreenIDî
       Device     ìDeviceIDî
       Monitor    ìMonitorIDî
       DefaultDepth   <Depth>
       Option ...
       .
       .
       SubSection ìDisplayî
               .
               .
       EndSubSection
       .
EndSection
```

The **Identifier** entry specifies the unique name for this screen. The **Identifier** generally must match a ScreenID listed in the active **ServerLayout** section. The **Screen** section provides information specific to the whole screen, including screen-specific **Options**. In multi-screen configurations, there will be multiple active **Screen** sections, one for each head.

The **Device** keyword specifies which **Device** section to be used for this screen. This is what binds a specific graphics card to a screen. The **DeviceID** must match the **Identifier** of a **Device** section in the configuration file.

The **Monitor** keyword specifies which **Monitor** section is to be used for this screen. This is what binds a specific monitor to the screen. The **MonitorID** must match the **Identifier** of a **Monitor** section in the configuration file.

The **DefaultDepth** keyword specifies which color depth the server should use by default. The `-depth` command line option can be used to override this. If neither is specified, the default depth is driver-specific, but in most cases is 8.

Various **Option** flags may be specified in the **Screen** section. Some are driver-specific and are described in the driver documentation. Driver-independent options are described here.

Table 3-3

Entry	**Entry Position**	**Description**
Accel	NA	Enables XAA (X Acceleration Architecture), a mechanism that makes video cards' 2D hardware acceleration available to the Xserver. This option is on by default, but it may be necessary to turn it off if there are bugs in the driver. There are many options to disable specific accelerated operations, listed below. Note that disabling an operation will have no effect if the operation is not accelerated (whether due to lack of support in the hardware or in the driver). Source: XF86Config man page.
SuppressVisuals	string	See the section in “Features: Glx Visual Suppression” for more details. Source: XF86Config man page.
SuppressGlxVisuals	string	See the section in “Features: Visual Suppression” for more details. Source: XF86Config man page.

Each **Screen** section must contain one or more **Display** subsections. Those subsections provide depth configuration information, and the one chosen depends on the depth that is being used for the screen. The **Display** subsection format is described in the section below.

“Display” subsection

The **Screen** sections include one or more **Display** subsections. One **Display** subsection may be provided for each depth that the server supports. The size of the virtual screen the server may also be specified.

The virtual screen allows you to have a “root window” larger than what can be displayed on the monitor. (e.g. the monitor may be 800x600 display, but have a 1280x1024 virtual size). The **Virtual** keyword is used to specify this size. Note that many of the new accelerated graphics drivers use non-displayed memory for caching. It is not desirable to use all available memory for the virtual display, as this leaves none for caching, and this can decrease server performance. **Display** subsections have the following format:

```
SubSection ìDisplayî

     Depth      depth

     Visual     visual

     Modes     ìModeNameî

     ViewPort   x0   y0

     Option Ö

     ...

EndSubSection
```

The **Depth** entry specifies what color depth the **Display** subsection is to be used for. Only Depths of 8 and 24 are supported.

The **Modes** entry specifies the list of video modes to use. Each **ModeName** specified must be in double quotes. They must correspond to those specified or referenced in the appropriate **Monitor** section. The server will delete modes from this list which don't satisfy various requirements. The first valid mode in this list will be the default display mode for startup. The list of valid modes is converted internally into a circular list. It is possible to switch to the next mode with **Ctrl+Alt+Keypad-Plus** and to the previous mode with **Ctrl+Alt+Keypad-Minus**. When this entry is omitted, the largest valid mode referenced by the appropriate **Monitor** section will be used.

The **Visual** entry is optional and sets the default root visual type.

The visual type available for the depth 8 is: PseudoColor

The visual type available for depth 24 is: TrueColor

The **ViewPort** optional entry sets the upper left corner of the initial display. This is only relevant when the virtual screen resolution is different from the resolution of the initial video mode. If this entry is not given, then the initial display will be centered in the virtual display area. Source: XF86Config man page.

Option flags may be specified in the **Display** subsections. These may include driver-specific options or driver-independent options. The former are described in the driver-specific documentation. Some of the latter are described above in the section about the **Screen** section, and they may also be included here. However, options set in the **Display** subsection may be "overridden" in the **Screen** section.

"Monitor" section

The configuration file may have multiple **Monitor** sections. The **Monitor** section provides information about the specifications of the monitor, monitor-specific **Options**, and information about the video modes to use with the monitor. There must be at least one **Monitor** section, for the monitor being used. A **Monitor** section is considered "active" if it is referenced by an active **Screen** section. **Monitor** sections have the following format:

```
Section ìMonitorî
     Identifier   ìMonitorIDî
     VendorName  ìVnameî
     ModelName    ìMnameî
     HorizSync     horizsync-range
     VertRefresh   vertrefresh-range
     DisplaySize   width  height
     Gamma    [gamma-value|{red-gamma green-gamma blue-gamma}]
     GammaAllLayers [on | true | 1]
EndSection
```

The **Identifier** entry specifies the unique name for this monitor.

The **VendorName** is an optional entry and is used to specify the monitor's manufacturer.

This **ModelName** is an optional entry that is used to specify the monitor model.

HorizSync gives the range(s) of horizontal sync frequencies supported by the monitor. *horizsync-range* may be a comma separated list of either discrete values or ranges of values. A range of values is two values separated by a dash. By default the values are in units of kHz. They may be specified in MHz or Hz if **MHz** or **Hz** is added to the end of the line.

The data given here is used by the X Server to determine if video modes are within the specifications of the monitor. This information should be available in the monitor's handbook. If this entry is omitted, a default range of 28-33 kHz is used. Source: XF86Config man page.

VertRefresh gives the range(s) of vertical refresh frequencies supported by the monitor. *vertrefresh-range* may be a comma separated list of either discrete values or ranges of values. A range of values is two values separated by a dash. By default the values are in units of Hz. They may be specified in MHz or kHz if **MHz** or **kHz** is added to the end of the line. The data given here is used by the X Server to determine if video modes are within the specifications of the monitor. This information should be available in the monitor's handbook. If this entry is omitted, a default range of 43-72Hz is used. Source: XF86Config man page.

DisplaySize is an optional entry gives the width and height, in millimeters, of the picture area of the monitor. If given this is used to calculate the horizontal and vertical pitch (DPI) of the screen. Source: XF86Config man page.

Gamma is an optional entry that can be used to specify the gamma correction for the monitor. It may be specified as either a single value or as three separate RGB values. The values should be in the range 0.1 to 10.0, and the default is 1.0. Not all drivers are capable of using this information. Source: XF86Config man page.

GammaAllLayers is an optional entry that causes the X Server to apply gamma correction to all hardware layers. The default behavior is to apply gamma correction only to the image layer of the device. The overlay planes are not affected by gamma. This option is not supported on all devices.

“Device” section

The config file may have multiple **Device** sections. There must be at least one, for the video card being used. **Device** sections have the following format:

```
Section ìDeviceî

     Identifier     ìDeviceIDî
     Driver         ìdriverî
     VendorName     ìVnameî
    Option Ö

     . . .

EndSection
```

The **Identifier** entry specifies the unique name for this graphics device. It must match a **DriverID** in the active **Screen** section.

sample XF86Config file

```
# This is a sample XF86Config file. It can be cut from this document
# and placed in the /etc/X11/XF86Config file.
#
# The config file has a hierarchical ìSectionî structure along
# with some standalone ìSections.î
#
# The standalone sections are the Files, Module, and DRI Sections.
# There may only be one of each of these sections in the config file.
#
# The hierarchical section consists of the ServerLayout, InputDevice,
# Screen, Monitor, and Device sections. There may be multiple sections
# of each.
#
# Each screen section in turn specifies a Monitor and a Device
# section.
#
# Check the document ìGraphics Administration Guideî for complete
# documentation of the config file organization and description of all
# options. An online version of the Graphics Administration Guide is
# located online at:
# http://www.hp.com/support/Graphics_Admin_Guide_PA
# Comment/uncomment/modify as needed.
#
# The ServerLayout section specifies the input and output devices that are
# connected to the server. Multiple ServerLayout sections may be contained in
# the XF86Config file. However, the first one in the file is the active
# layout, unless otherwise specified by the -layout option from the command
# line. Check the "Graphics Administration Guide" (GAG) for other options that
# may be set here, or elsewhere, in the XF86Config file.  An online
# version of the "Graphics Administration Guide" is available at:
#
# http://www.hp.com/support/Graphics_Admin_Guide_PA
#
# after selecting the link appropriate for a given workstation model.
#
Section "ServerLayout"

#
# The ServerLayout ID. A required line.
#
Identifier     "Main Layout"

#
# The first field on the Screen line specifies the screen number. It is
# optional. The second field is the Screen ID. It must match an entry in
# a Screen section. Only Screens specified here will be active. The
# remaining fields specify relative or absolute positions of the screen
# relative to other screens. Check the GAG for full details on
# specifying the Screen.
#

Screen      0  "Screen 0" 0 0

#
# Each InputDevice line specifies an InputDevice section ID name and
# optionally some options that specify the way the device is to be used.
# Typically there is a pointer device (mouse) and a keyboard. They
# usually are specified with a CorePointer and CoreKeyboard option
# respectively. Additional pointers and keyboards are specified with
# the SendCoreEvents option. The options may also be specified in the
# InputDevice section. It is not necessary to specify an InputDevice.
#
```

```
InputDevice    "Mouse0" "CorePointer"
InputDevice    "Keyboard0" "CoreKeyboard"

#
# Uncomment this to force OGL indirect contexts to be rendered in
# software.  Indirect rendering is done with the hardware driver by
# default.  However, some features such as rendering to a glXPixmap
# may not be available in all hardware drivers.
#

#Option       "AccelerateIndirectRendering" "false"

# Uncomment the following line and update the time to turn on Xserver
# screen blanking. The time is in minutes.

#Option "blank time"   "10"

# Uncomment the following lines to set the DPMS time periods. The
# time is in minutes. The DPMS Monitor Option must be on for these
# to have an effect (see the "Monitor" section).

#Option "standby time" "20"
#Option "suspend time" "30"
#Option "off time"     "40"
EndSection

#
# The Files section is used to specify the location of various files
# to the X server. There may only be one Files section in the XF86Config
# file.
#
Section "Files"

#
# FontPaths. Specifies the font paths. You may want to
# specify a different font path for the following reasons.
# 1) An application delivers its own fonts.
# 2) A font server is to be used instead of the default path.
#
EndSection

#
# The Module section is used to inform the server which loadable libraries are
# to be loaded at run time. There may only be one Module section in the
# XF86Config file.
# See the GAG for more details.
#
Section "Module"
EndSection

#
# There may be multiple InputDevice sections. An InputDevice section is active
# only if it is specified by the active ServerLayout section. The Identifief
# is a required line and must be identical to an InputDevice line in the
# active ServerLayout in order for the device to be active. Normally there
# are two InputDevice sections in the XF86Config file. One for the pointer
# (mouse) and the other for the keyboard. The Driver line is required. It
# specifies which driver is to be loaded at run time. See the GAG for more
# details on what input devices are supported and which options may be selected.
#
Section "InputDevice"
Identifier "Keyboard0"
Driver     "keyboard"
EndSection

Section "InputDevice"
Identifier "Mouse0"
Driver     "mouse"
```

```
Option     "Protocol" "PS/2"
EndSection

#
# There may be multiple Monitor sections. The purpose of this section is
# is to specify the range of operation of a monitor. For a Monitor to be
# in use the Identifier must match the Monitor line in an active Screen.
# HorizSync and VertRefresh are required fields. See the GAG for more
# options that may be set.
#
Section "Monitor"
Identifier    "Monitor 0"
HorizSync     30.0 - 110.0
VertRefresh   50.0 - 75.0

 # DPMS is not enabled by default. Uncomment the following line to
 # enable it.

 #Option      "DPMS"  "on"
EndSection

#
# There may be multiple Device sections. This section is used to specify
# parameters for the graphics device. The Identifier string must match
# the Device string in the active Screen section for this device to be
# in use. See GAG for more options that may be set for this particular device.
#
Section "Device"
Identifier       "Console"
Devicefile       "/dev/gvid"
EndSection

#
# There may be multiple Screen sections. The Identifier string must match
# the Device string in the active ServerLayout section for the Screen to
# be active.
#
Section "Screen"
Identifier "Screen 0"
Device     "Console"
Monitor    "Monitor 0"

#
# Set the default depth.
#
DefaultDepth     24

#
# The subsection associates a buffer depth with a screen size.
#
SubSection "Display"
Depth      24
Modes    "1280x1024"
EndSubSection
EndSection
```

extensions

double buffer extension (DBE)

DBE is an extension to the X Server that provides a double-buffering API. For more information about DBE and the API, consult the DBE man pages:

DBE

XdbeQueryExtension

XdbeGetVisualInfo

XdbeFreeVisualInfo

XdbeScreenVisualInfo

XdbeAllocateBackBufferName

XdbeDeallocateBackBufferName

XdbeSwapBuffers

XdbeBeginIdiom

XdbeEndIdiom

XdbeGetBackBufferAttributes

determining swap performance

The DBE API does not allow users to determine if double-buffering in a visual is through software or hardware. However, the API does provide a way to determine relative swapping performance on a per-visual basis. The `XdbeScreenVisualInfo()` function returns information about the swapping performance levels for the double-buffering visuals on a display. A visual with a higher performance level is likely to have better double-buffer graphics performance than a visual with a lower performance level. Nothing can be deduced from any of the following: the magnitude of the difference of two performance levels, a performance level in isolation, or comparing performance levels from different servers.

display power management signaling (DPMS)

Monitors constitute a large percentage of the power used by a workstation even when not actively in use (i.e. during screen blanking). In order to reduce the power consumption, the Video Electronic Standards Association (VESA) has defined a Display Power Management Signaling (DPMS) standard which can be used to greatly reduce the amount of power being used by a monitor during screen blanking.

The following table is a description of the states that are defined by VESA. The Power Savings column indicates (roughly) the level of power savings achieved in the given state. The Recovery Time is the amount of time that the screen takes to return to a usable state when the screen saver is turned off (by pressing a key or the moving the mouse).

Table 3-4

Level	State	DPMS Compliance Requirements	Power Savings	Recovery Time
0	Screen Saver	Not Applicable	None	Very Short (<1 sec)
1	Standby	Optional	Minimal	Short
2	Suspend	Mandatory	Substantial	Longer
3	Off	Mandatory	Maximum	System Dependent

The actual amount of power saved and the recovery time for each of the states is monitor dependent and may vary widely. The customer can compensate for this by choosing an appropriate level for the monitor that is currently in use.

By default, the DPMS level used is the Screen Saver (i.e. no power savings). If you wish to use power saving during screen blanking, set the following XF86Config file entries before starting the server: blank time, standby time, suspend time, and off time.

The DPMS Extension lets individual users customize their personal DPMS settings to meet their work styles and any restrictions imposed by their employers. For example, an employer may decide that all monitors must save power after 30 minutes of idle time. The individual user may decide that 30 minutes is too long, and adjust the time downward to meet their work preference.

More information (including sample code) on the DPMS Extension entry points can be found online, via the man pages. The extension entry points are:

```
DPMS
DPMSQueryExtension
DPMSGetVersion
DPMSCapable
DPMSSetTimeouts
DPMSGetTimeouts
DPMSEnable
DPMSDisable
DPMSForceLevel
DPMSInfo
```

XFree86 provides four options that may be set in the **ServerLayout** section that may be used to support this functionality. The options are: blank time, standby time, suspend time, and off time. The following example sets these to 10, 20, 30, and 60 minutes respectively.

```
Section ìServerLayoutî
    . . .
     Option     ìblank timeî      ì10î
     Option     ìstandby timeî    ì20î
     Option     ìsuspend timeî    ì30î
      Option     ìoff timeî         ì60î
    . . .
EndSection
```

Option	**Value**	**Default**	**Description**
BlankTime	time	10	Blank Time sets the inactivity timeout for the blanking phase of the screensaver. *Time* is in minutes. This is equivalent to the Xserver's `-s' flag, and the value can be changed at run-time with `xset(1)`.
StandbyTime	time	20	Standby Time sets the inactivity timeout for the “standby” phase of DPMS mode. *Time* is in minutes, and the value can be changed at run-time with `xset(1)`.

Option	**Value**	**Default**	**Description**
SuspendTime	time	30	Suspend Time sets the inactivity timeout for the “suspend” phase of DPMS mode. *Time* is in minutes, and the value can be changed at run-time with `xset(1)`.
OffTime	time	40	Off Time sets the inactivity timeout for the “off” phase of DPMS mode. *Time* is in minutes, and the value can be changed at run-time with *xset(1)*.

dynamic library loading

The path for each dynamically loaded module must be specified in the **ModulePath** in order for them to load. See the section “The XF86Config File: Module Section” for more details regarding the **ModulePath**.

Dynamically loaded modules are recorded by the X Server in the `/var/X11/Xserver/logs` directory. The log file reflects the display identifier for a given run. Only the last invocation against a given display identifier is retained. The log file contains the parsed contents of the XF86Config file and the full path name for all dynamically loaded modules for the given X Server invocation. Deferred loaded modules are recorded as they are referenced.

NOTE Altering or removing files under `/usr/lib/X11/Xserver` may prevent the X Server from running.

features

cursor scaling

There are times when the standard X11 cursors are difficult to see on the screen. The effect is compounded on large displays. Two options are available in the X Server that instruct the X Server to scale all X11 cursors (both user-defined and built-in cursors) by a user-defined value.

Cursor Scaling is indicated with the following syntax in the XF86Config file:

```
Section ìServerLayoutî

     . . .

     Option      ìCursorScaleFactorî    ìnî

     Option      ìMaxCursorSizeî       ìSizeî

     . . .

EndSection
```

Where n = 1, 2, 3, …

Where Size = 2, 4, 8, 16, 32, 64, …

For example, n=2 instructs the X Server to scale all cursors by “2x” so that a 16x16 cursor becomes a 32x32 cursor and a 9x9 cursor becomes an 18x18 cursor, etc.

If the scaled width or height of any cursor is greater than Size, the scale factor is reduced so that the net size of the cursor fits into a SizexSize rectangle.

The default value for “n” is 1, or no scaling. The default value for “Size” is 64, or 64x64 maximum size.

Glx visual suppression

This option can be used to “hide” visuals. It reduces the number of visuals made available to clients. The example that follows demonstrates how to suppress all visuals except for the most capable of all the visuals.

```
Section ìScreenî
    . . .
```

```
Option  ìSuppressGlxVisualsî  ìHideDuplicateGlxVisualsî
   . . .
EndSection
```

The user can also selectively “hide” classes of visuals. For example to suppress all visuals that don’t have an Alpha buffer and don’t have Stencil planes do:

```
        Option  ìSuppressGlxVisualsî  ìNoAlpha & NoStencilî
```

The options can be white space, ampersand (&), or comma (,) delimited, and must be enclosed with a single pair of double quotes.

The following is a complete list of Glx visuals that may be suppressed

IsRgba – Suppress all visuals that are RGB (True Color).
IsCi – Suppress all visuals that are Color Indexed (Pseudo Color).
Alpha – Suppress all visuals that have Alpha planes.
NoAlpha – Suppress all visuals that don’t have Alpha planes.
Back – Suppress all visuals that have a double buffer.
NoBack – Suppress all visuals that don’t have a double buffer.
Accum - Suppress all visuals that have an accumulator.
NoAccum - Suppress all visuals that don’t have an accumulator.
Depth - Suppress all visuals that have a Z (depth) buffer.
NoDepth - Suppress all visuals that don’t have a Z (depth) buffer.
Stencil - Suppress all visuals that have Stencil planes.
NoStencil - Suppress all visuals that don’t have Stencil planes.
Stereo - Suppress all visuals that have Stereo buffers.
NoStereo - Suppress all visuals that don’t have Stereo buffers.

If an opposing pair of options is selected (for example, Stereo and NoStereo) the suppress options will be ignored since selecting an opposing pair would suppress all the visuals.

visuals suppression

This option can be used to hide whole classes of visuals. These can be selected via the **SuppressVisuals** option in **Screen** section of the XF86Config file. The visuals that can be suppressed are: PseudoColor and TrueColor. If all visuals are suppressed and no default visual has been selected, the X Server will exit with a fatal error. Also if a default visual is defined, it overrides the suppression request. The example below suppresses the PseudoColor visual. The options can be delimited by white space, |, or “,”.

```
Section ìScreenî
```

```
    Option  ìSuppressVisualsî ìPseudoColorî
EndSection
```

technical print service (TPS)

The Technical Print Service, `tps(5)`, is a network transparent printing system that allows X applications to render to non screen devices in the same manner they render to displays. It may also be referenced as the X Print Service. Please refer to the `tps(5)` man page for details on configuring and using TPS.

virtual frame buffer (Xvfb)

`Xvfb(1)` is an X Server that does not require display hardware or input devices. It emulates a video frame buffer by using the system's virtual memory.

Xvfb may be used for: rendering with non-standard depths and screen configurations, software rendering, providing a way to run applications that don't need an X Server but for some reason insist on having one, etc.

Generally the user application must use functions such as `XGetImage(3)` in order to see what was actually rendered.

security

See Xf86(1) for information on configuring the Xf86 security policies, files and settings.

connecting to the network

The X Server supports client connections via a platform-dependent sub-set of the following transport types: TCP/IP and Unix Domain sockets.

granting access

Information on X Server authorization may be found in the Xf86(1) man pages.

signals

See Xf86(1) for information on how the X Server handles signals.

starting the X Server from the command line

Command line options for the X Server are described in Xf86(1).

mapping options from the previous hp X Server to the current hp X Server

The purpose of this section is to provide the user, who is familiar with the X* screens files or the HP X Server, a method of setting the equivalent options in the XF86Config file, in the current release of the HP X Server. Only those options that are currently implemented in the release are documented here.

defaultVisual option

Class

The default class visual can be set in a **Display** subsection of the **Screen** section of the XF86Config file using the **Visual** option. The following example demonstrates how this would be done in the X*screens file and how it would be done in the XF86Config file. The example sets the default visual class to TrueColor.

X*screens File Example:

```
Screen /dev/crt
     DefaultVisual
         Class TrueColor
```

XF86Config File Example:

```
Section “Screen”
   . . .
  SubSection “Display”
   . . .
    Visual “TrueColor”
    . . .
  EndSubSection
   . . .
EndSection
```

The following visual classes may be set as the default visual: StaticGray, GrayScale, StaticColor, PseudoColor, TrueColor and DirectColor. However, many hardware devices do not support all visual classes.

Depth

The default depth of the visual can be set in the **Screen** section of the XF86Config file using the **DefaultDepth** option. The following example sets the default depth to 24.

X*screens File Example:

```
Screen /dev/crt
     DefaultVisual
          Depth 24
```

XF86Config File Example:

```
Section ìScreenî
     . . .
     DefaultDepth 24
     . . .
EndSection
```

The following depth may be selected as the default depth: 24.

minimum monitor power save level option

See the section on “Extensions: Display Power Management Signaling” for more details on this option.

HPCursorScaleFactor <n>

See the section “Features: Cursor Scaling” for more details regarding this option.

NoServerLogging

See the section “Features: Logging and Verbosity” for more details.

DisableGlxVisuals

This can be accomplished by not loading the GLX driver in the **Modules** section. See the example below.

```
Section ìModuleî

     #Noload   ìglxî

EndSection
```

DPMSStandbyTime <Time (Seconds)>
DPMSSuspendTime <Time (Seconds)>
DPMSOffTime <Time (Seconds)>

See section “Features MinimumMonitorPowerSaveLevel Option” of this document.

HideDuplicateGlxVisuals

See the section on “Extensions: SignalingGlx Visual Suppression” for more details on this option.

input devices

keyboards

supported keyboard drivers

The following is a list of supported keyboard drivers:

```
keyboard
```

supported keyboard options

The following is a list of keyboard options that are supported by HP.

Table 3-5

Options	Value	Description
AutoRepeat	Integer	Set the keyboard auto repeat parameters. Not all platforms implement this.
Xleds	Integer ...	Specify which keyboard LEDs can be user-controlled (for example, with `xset(1)`).

pointers

supported pointer drivers

The following is a list of supported pointer drivers:

```
mouse
```

supported pointer options

The following is a list of pointer options that are supported by HP.

Table 3-6

Options	Value	Description
Protocol	String	Values may only be “PS/2”
Device	String	The value may only be “`/dev/hid/mouse_000`”

output devices

hp Fire™ GL-UX device-dependent information

HP Fire GL-UX provides 8 overlay planes, 48 image planes, a 24-bit Z buffer, 4 8-bit per channel hardware colormaps and 1 10-bit per channel hardware colormap for use in gamma correction. This device provides 2D hardware acceleration for most operations as well as 3D acceleration for lighting, shading and texture mapping.

supported visuals

HP Fire GL-UX supports the following visuals:

Table 3-7

Class	Depth	Layer
PseudoColor	8	Overlay
TrueColor	24	Image

Both the PseudoColor and TrueColor visuals are enabled by default. See the section “Supported Device Options” below for instructions on changing the default visual and/or disabling overlay visuals.

supported device options

Table 3-8

Options	Value	Default	Description
enableDVI	Boolean	False	Enable DVI connector.
Qbs	Boolean	False	Enable quad-buffered stereo mode.
CountTransInOvlyVis	Boolean	True	When set to false, causes the X Server to reserve the transparent pixel index in all PseudoColor overlay colormaps, thus reporting only 255 available entries.

Table 3-8 (Continued)

PHOOGLVisuals	Boolean	False	Modify the GLX visual list so that legacy 3-D applications are more likely to choose an appropriate OpenGL visual.
TransparentIndex0	Boolean	False	Make the overlay transparent pixel index 0 instead of 255.
DefaultVisualTrueColor	Boolean	False	Use TrueColor as the default visual instead of PseudoColor.

These options are enabled by adding a line to the `/etc/X11/XF86Config` file in the **Device** section. For example:

```
Option "Overlay" "True"
```

Note that both the option name and option value must be enclosed in quotation marks. Options that do not take parameters require only one value, the option name. For example:

```
Option "TransparentIndex0"
```

supported monitor configurations

The following table documents supported display resolution and refresh rate for the HP Fire GL-UX. Check your monitor specification to determine if the monitor supports any or all of these resolutions.

Table 3-9

Resolution (HxV)	Frequency (Hz)	Description
1024x768	75	VESA Standard
1024x768	85	VESA Standard
1280x1024	60	VESA Standard
1280x1024	75	VESA Standard
1280x1024	85	VESA Standard
1600x1024	75	24" monitor
1600x1024	85	24” monitor
1600x1200	75	VESA Standard
1600x1200	85	VESA Standard
1920x1080	75	24" monitor
1920x1080	85	24" monitor
1920x1200	75	24" monitor
1920x1200	85	24" monitor

ATI FireGL™ X1/T2/X3 device-dependent information

The ATI FireGL family graphics cards provides 8 or 24 overlay planes, 48 image planes, a 24-bit Z buffer, an 8 bit stencil buffer, and 16 bits per channel (RGBA) of accumulation buffer. There is one hardware colormap for the overlay planes and one hardware colormap in the image planes for gamma correction. These devices provide 2D hardware acceleration for most operations as well as 3D acceleration for lighting, shading and texture mapping.

supported visuals

ATI FireGL cards support the following visuals:

Class	Depth	Layer
PseudoColor	8	Overlay

Class	**Depth**	**Layer**
TrueColor (optional)	24	Overlay
TrueColor	24	Image

The depth 8 PseudoColor and TrueColor visuals are enabled by default. See the section “Supported Device Options” that follows for instructions on changing the default visual and/or disabling overlay visuals.

supported device options

The following screen options can be set with SAM from the Modify Screen Options action in the X server Configuration Menu..

Table 3-10

Screen Option	Type	Default	Description
AccelerateIndirectRendering	Boolean	True	Controls whether indirect OpenGL contexts utilize hardware acceleration or use the HP VMD software driver. Applications that require large or numerous GLX pixmaps may require that this option be set to false.
BackingStore	Boolean	False	Enables support for backing store and save unders as requested by applications.
DefaultVisualTrueColor	Boolean	False	Use a TrueColor visual as the default visual. If TrueColorOverlay is also enabled, the default visual will be TrueColor visual in the Overlay planes.
EnableOpaqueOverlayVisual	Boolean	False	Enable a depth 8 PseudoColor visual in the overlay planes that does not reserve index 255 for transparency..
FSAAScale	Integer	Not Set	Specifies the maximum number of samples per pixel for OpenGL Multisample rendering. (Full Scene AntiAliasing) Permissible values are 2, 4, or 6. The FSAA buffers are reserved at X server startup. All buffers (front, back, depth, FSAA) are allocated from the first 128MB of framebuffer memory. If there is insufficient memory for the requested FSAAScale at a given screen resolution, the server will attempt to allocate a lower scale factor.
Overlay	Boolean	True	Disable overlay visuals completely.
Stereo	Boolean	False	Enable visuals for OpenGL Stereo rendering. Allocates separate left and right sets of color buffers.
TrueColorOverlay	Boolean	False	Enable a TrueColor visual in the overlay planes.

supported monitor configurations

All FireGL cards support multiple monitors. The FireGL X1 and X3 have dual DVI-I connectors, which will drive either digital or analog monitors. The FireGL T2 has one DVI-I and one VGA connector. When using a single monitor, the monitor can be attached to either connector. Monitors should be connected and powered up prior to system boot to ensure the system can read available DDC information and select optimum video timings.

Multiple monitors are supported in a Single Logical Screen (SLS) configuration. The maximum SLS screen width is 2560 for the X1 and T2 and 3840 for the X3. See the “using SAM to configure X Windows” section for details on configuring SLS with SAM.

hp Fire GL-UX configuration hints

overlay visuals and overlay transparency

HP Fire GL-UX devices have one visual in the overlay planes, depth-8 PseudoColor. To allow applications to determine which visuals are in the overlay planes, overlay visuals are listed in the "SERVER_OVERLAY_VISUALS" property attached to the root window. The default overlay visual has a transparent type of "1" (Transparent-Pixel).

If you need an overlay colormap that supports transparency, create the colormap using the visual that has transparency in its SERVER_OVERLAY_VISUALS property. To look at the contents of this property, you would use code similar to the following:

```
{
    typedef struct {
            VisualID    overlayVisualID;
            Card32      transparentType;
             /* None, TransparentPixel, TransparentMask */
            Card32      value;
            /* Either pixel value or pixel mask */
            Card32      layer;
    } OverlayVisualPropertyRec;
    OverlayVisualPropertyRec  *pOverlayVisuals, *pOVis;
    XVisualInfo               getVis;
    XVisualInfo               *pVisuals;
    Atom                      overlayVisualsAtom, actualType;
    ...
    /* Get the visuals for this screen and allocate. */
    getVis.screen   = screen;
    pVisuals       = XGetVisualInfo(display, VisualScreenMask,
                                   &getVis, &nVisuals);
    pOverlayVisuals = (OverlayVisualPropertyRec *)
                     malloc ( (size_t)nVisuals *
                               sizeof(OverlayVisualPropertyRec) );

    /*
    ** Get the overlay visual information for this screen.  Obtain
    ** this information from the SERVER_OVERLAY_VISUALS property.
    */
    overlayVisualsAtom = XInternAtom(display,"SERVER_OVERLAY_VISUALS",
                                   True);
    if (overlayVisualsAtom != None)
    {
    /* Since the Atom exists, request the property's contents. */
        bytesAfter = 0;
        numLongs   = (nVisuals * sizeof(OverlayVisualPropertyRec) + 3 )
                     / 4;
        XGetWindowProperty(display, RootWindow(display, screen),
                           overlayVisualsAtom, 0, numLongs, False,
                           AnyPropertyType, &actualType, &actualFormat,
                           &numLongs, &bytesAfter, &pOverlayVisuals);
        if (bytesAfter != 0 ) {/* Serious Failure Here */} ;

        /* Loop through the pOverlayVisuals array. */
                ...
        nOVisuals = numLongs/sizeof(OverlayVisualPropertyRec);
        pOVis     = pOverlayVisuals;

        while (--nOVisuals >= 0)
                     {if ( pOVis->transparentType == TransparentPixel )
                          {/*
                          **Found a transparent overlay visual,
                          **set ident. aside.
                          */
                     };
                     pOVis++;
        }
        XFree(pOverlayVisuals);
        /*
        **There might be some additional checking of the found
        **transparent overlay visuals wanted; e.g., for depth.
        */
        }
        XFree(pVisuals);
}
```

This program segment is not complete; however, its main purpose is to give an idea of how to find an overlay visual having transparency.

When the overlay planes are enabled, one colormap entry in PseudoColor colormaps is not available for use by clients. The server handles this entry in one of two ways depending upon the setting of the "Count-TransInOvlyVis" device option. If the option is not set, the server will report that 256 colormap entries are available for allocation in the PseudoColor visual. However, the transparent pixel will always remain transparent. The image layer will be visible wherever this pixel value is rendered in the overlay planes. Hence, applications should not render using this pixel unless transparency is desired.

This may cause problems with some applications. Setting "CountTransInOvlyVis" causes the server to reserve the transparent pixel index. In this case, the server reports that 255 colormap entries are available for allocation in the PseudoColor visual. This option may be useful to applications that depend on having 256 colormap entries available in depth 8 PseudoColor visuals. The transparent index value is configurable through the "TransparentIndex0" device option. Setting this option will change the transparent pixel value to 0 from the default of 255. This option may be useful to applications that depend on the transparent pixel value being 0.

HP Fire GL-UX Colormaps Hints

HP Fire GL-UX devices have a total of 5 hardware colormaps. One colormap is reserved for gamma correction and is not directly available to X clients. The remaining colormaps are available for clients to use. When the default visual is in the overlay planes, one of the four available hardware colormaps is reserved for the default colormap. This ensures that clients using the default colormap never encounter technicolor.

The HP Fire GL-UX driver reports on the installation status of a total of 5 colormaps via the XListInstalledColormaps() API. Four of these correspond to the actual state of the hardware color tables used with PseudoColor visuals. Colormaps are installed in these hardware LUTs in first-in, first-out order. The driver also keeps track of the last TrueColor colormap installed via XInstallColormap() and includes this information whenever queried. By definition, all TrueColor colormaps are always installed.

system requirements

hardware compatibility table

This table lists graphics cards that are support on a system and which OS is required:

Graphics Device	**Supported Systems**	**Required Operating System**
HP Fire GL-UX	C3650, C3700, J6700	HP-UX 11.0 and 11.11

monitor compatibility Most multi-sync monitors are compatible with the graphics cards in this release of the X Server. All current monitors from HP are compatible.

compatibility matrix with previous releases The following table illustrates differences between the graphics devices of previous HP releases and the graphics device of this release.

Feature	**Visualize fxe**	**Visualize fx5/fx10**	**HP Fire GL-UX**	**ATI FireGL X1/X3/T2-128**
Overlay Planes	8	8	8/8	8/8 or 24
Overlay LUTs	2	2	4 (shared)	Infinite
Image Planes	32	32	32	32
Image LUTs	2	2	4 (shared) 1 Gamma	1
Per-pixel Attributes	Yes	Yes	Yes	No
Default Visual	8I-O	8I-O	8I-O	8I-O
Overlay Transparency	Yes	Yes	Yes	Yes
Gamma Correction	Yes	Yes	Yes	Yes
Buffer swap method	Register write	Register write	Register write	Copy Swap
Stereo support	No	Yes (external sync and glasses)	Yes (glasses)	Yes: X1, X3 No: T2

Feature	Visualize fxe	Visualize fx5/fx10	HP Fire GL-UX	ATI FireGL X1/X3/T2-128
Clip rectangles	4	4	1	1
Clip plane	Yes	Yes	Yes	Yes
Hardware byte swapping	Yes	Yes	Yes	Yes
Video conversion	No	Yes	Yes	Yes
1920x1200 @ 76 Hz	No	Yes	Yes	Yes
1600x1200 @ 85 Hz	No	Yes	Yes	Yes
1280x1024 @ 85 Hz	No	Yes	Yes	Yes
1024x768 @ 85 Hz	No	Yes	Yes	Yes
Hardware multi display	No	No	No	Yes (Max of 2)
PCI	2X	4X	4X	No
AGP	No	No	No	3.0 (8X)

miscellaneous

fonts

The X Server can obtain fonts from directories or font servers. Setting up a font server or making a directory a font directory is beyond the scope of this document. The font path can be loaded via the –fp option from the command line or from the XF86Config file. The latter is the preferred method. The default font path is: `/usr/lib/X11/fonts/misc`. See section “The XF86Config File: Files Section” regarding the **FontPath**. The following font directories are delivered with the system and may be added to the font path. Applications may install their own fonts. The application font path can be added to the FontPath as necessary.

```
/usr/lib/X11/fonts/misc/
/usr/lib/X11/fonts/hp_kana8/
/usr/lib/X11/fonts/hp_roman8/75dpi/
/usr/lib/X11/fonts/iso_8859.1/100dpi/
```

```
/usr/lib/X11/fonts/iso_8859.1/75dpi/
/usr/lib/X11/fonts/hp_chinese_s/75dpi/
/usr/lib/X11/fonts/hp_chinese_t/75dpi/
/usr/lib/X11/fonts/hp_korean/75dpi/
/usr/lib/X11/fonts/hp_japanese/100dpi/
/usr/lib/X11/fonts/iso_8859.2/75dpi/
/usr/lib/X11/fonts/iso_8859.5/75dpi/
/usr/lib/X11/fonts/iso_8859.6/75dpi/
/usr/lib/X11/fonts/iso_8859.7/75dpi/
/usr/lib/X11/fonts/iso_8859.8/75dpi/
/usr/lib/X11/fonts/iso_8859.9/75dpi/
/usr/lib/X11/fonts/iso_8859.15/75dpi/
```

files

The X Server makes use of various files on the system during normal operation. The section lists the default location of the files and gives a brief description of what they do.

File	**Description**
/etc/X11/XF86Config	The configuration file. Xf86 uses this file to configure itself during initialization.
/etc/X11/rgb	The color database.
/etc/Xn.hosts	Initial access control list for display n.
/var/X11/Xserver/logs/Xf86.n.log	The log file, where n is the display number.

ATI FireGL X1/T2/X3 configuration hints

overlay visuals and overlay transparency

FireGL devices support both depth 8 PseudoColor and depth 24 TrueColor overlay visuals. The depth 8 PseudoColor visuals with transparency are enabled by default for compatibility with previous devices. An opaque depth 8 PseudoColor visual can be enabled by setting the EnableOpaqueOverlayVisual screen option described in the previous section. This option is useful for applications that require allocation of all 256 entries in the colormap with no index mapping to transparency.

The SERVER_OVERLAY_VISUALS property is attached to the root window. The default overlay visual has a transparent type of "1" (TransparentPixel). If you need an overlay colormap that supports transparency, create the colormap using the visual that has transparency in its SERVER_OVERLAY_VISUALS property. See the Fire GL-UX configuration hints section for a code fragment .

The depth 24 TrueColor overlay visual is enabled by setting the TrueColorOverlay screen option described in the previous section. To make the TrueColor overlay visual the default, also set the DefaultVisualTrueColor screen option. The SERVER_OVERLAY_VISUALS property will not report this visual.

Overlay visuals are disabled completely when a Single Logical Screen configuration is enabled, or when using a display with at width of greater than 1920 pixels.

colormaps

FireGL devices have a colormap per window for windows created in the overlay visuals. There is a single colormap in the image planes. The image colormap is reserved for gamma correction and is not directly available to X clients.

gamma correction

Gamma correction can be applied to windows in the image planes explicitly with the gamma tool (/opt/graphics/common/bin/gamma) or implicitly by running a direct rendering OpenGL application. If no default gamma has been set with the gamma tool, the OpenGL libraries will apply a gamma of 1.7 when starting an OpenGL application.

ATI FireGL X1, T2, and X3 devices behave differently than HP Visualize or HP Fire GL-UX devices because ATI FireGL devices have one gamma colormap. Previous devices allowed at least one OpenGL window to have gamma applied without affecting other windows in the image planes. FireGL devices will apply the OpenGL gamma value to all windows in the image planes. This is most noticeable when the default visual resides in the image planes. In this case, the entire desktop can become overly bright when an OpenGL application starts.

There are two ways to avoid this behavior.

- Set a screen default gamma to a value other than 1.0 using the gamma tool. This solution will completely eliminate the brightening of all windows when an OpenGL application starts because the screen default gamma value takes precedence over the default OpenGL gamma value. OpenGL applications may appear dimmer than expected using this solution.
- Enable the TrueColorOverlay screen option in addition to DefaultVisualTrueColor. With the default TrueColor visual in the overlay planes, the desktop and most Xlib applications will not be affected by direct rendering OpenGL windows, as OpenGL windows always reside in the image planes. Gamma correction can only be applied to TrueColor windows in the image planes. In addition, this solution is not available with Single Logical Screen configurations or when using displays with at width greater than 1920 because overlay planes are not available in these configurations.

4 X Windows configuration details

This chapter discusses several details concerning the configuration of X hosts, colormaps, mouse and keyboard.

making an x*.hosts file

The /etc/X0.hosts file is an ASCII text file containing the hostnames of each remote host permitted to access your local server.

- If you are running as a stand-alone system, you must have your system's name in this file.
- If you are part of a network, the other system names must be included.

The syntax is as follows:

<*host*>
<*host*>
<*host*>

For example, if you are hpaaaaa, and regularly ran clients on hpccccc, and hpddddd, you would want the following lines.

```
hpaaaaa
hpccccc
hpddddd
```

Note that aliases work as well as hostnames, provided they are valid, that is, commonly known across the network.

using an /etc/hosts file

This file need not be present if your system is configured to query a nameserver.

The `/etc/hosts` file is an ASCII text file containing a list of all the host names and internet addresses known to your system, including your own system.

If your system is not connected to a network, use the loopback address (127.0.0.1) and the hostname unknown:

127.0.0.1 unknown

For a local system to access a remote host:

- The address and hostname of the remote host must be listed in the local system's `/etc/hosts` file.

- The user must have a valid login (username and password) and home directory on the remote host.

stopping the X Window system

After stopping all application programs, stop the window system by holding down the Ctrl and Shift keys, and then pressing the Pause/Break key. This stops the display server, and with it the window system.

customizing the mouse and keyboard

This section describes various customizations that can modify the default keyboard and mouse behavior.

changing mouse button actions

The xmodmap utility can be used to change mouse button mappings. The syntax for changing mouse button mappings with xmodmap is:

```
xmodmap {-e ìpointer = {default | number [number...]}î | -pp}
```

where:

-e
Specifies a remapping expression. Valid expressions are covered in “Customizing Keyboard Input”.

default
Set mouse keys back to default bindings.

number
Specifies a list of button numbers to map the mouse keys to. The order of the numbers refers to the original button mapping.

pp
Print the current pointer mapping.

For example, to reverse the positions of buttons 1 and 3 for left-handed mapping:

xmodmap -e “pointer = 3 2 1" (2-button mouse)

xmodmap -e “pointer = 3 2 1 5 4" (3-button mouse)

To establish OSF/Motif-standard button mapping:

xmodmap -e “pointer = 1 3 2" 2-button mouse xmodmap -e “pointer = 1 3 2 4 5" 3-button mouse

modifying modifier key bindings with xmodmap

To change the meaning of a particular key for a particular X11 session, or to initialize the X Server with a completely different set of key mappings, use the xmodmap client.

The syntax for xmodmap is as follows: `xmodmap` *<options> [<filename>] where <options>* are:

`-display` *`<host>:<display>`*
Specifies the host, display number, and screen to use.

`-help`
Displays a brief description of xmodmap options.

`-grammar`
Displays a brief description of the syntax for modification expressions.

`-verbose`
Prints log information as xmodmap executes.

`-quiet`
Turns off verbose logging. This is the default.

`-n`
Lists changes to key mappings without actually making those changes.

`-e` *`<expression>`*
Specifies a remapping expression to be executed.

`-pm, -p`
Prints the current modifier map to the standard output. This is the default.

`-pk`
Prints the current keymap table to the standard output.

`-pp`
Print the current pointer map to the standard output.

`-` (dash)
Specifies that the standard input should be used for the input file.

`<filename>`
Specifies a particular key mapping file to be used.

specifying key remapping expressions

Whether you remap a single key “on the fly” with a command-line entry or install an entire new keyboard map file, you must use valid expressions in your specification, one expression for each remapping.

A valid expression is any one of the following:

Table 4-1

To do this . . .	**Use this expression . . .**
Assign a key symbol to a keycode	keycode <keycode> = <keysym>
Replace a key symbol expression with another	keysym <keysym> = <keysym>
Clear all keys associated with a modifier key	clear<modifier>
Add a key symbol to a modifier	add <modifier>= <keysym>
Remove a key symbol from a modifier	remove <modifier> = <keysym>

keycode
Refers to the numerical value that uniquely identifies each key on a keyboard. Values may be in decimal, octal, or hexadecimal.

keysym
Refers to the character symbol name associated with a keycode; for example, KP_Add.

<*modifier* >
Specifies one of the eight modifier names: Shift, Control, Lock, Mod1, Mod2, Mod3, Mod4, and Mod5.

On Hewlett-Packard keyboards, the lock modifier is set to the **Caps** key. However, any of the modifiers can be associated with any valid key symbol. Additionally, you can associate more than one key symbol with a modifier (such as `Lock = Shift_R` and `Lock = Shift_L`), and you can associate more than one modifier with a key symbol (for example, `Control = Caps_Lock` and `Lock = Caps_Lock`).

For example, on a PC-style keyboard, you can press **D** to print a lower case "d", **Shift D** to print a capital "D", **Alt D** to print something else, and **Shift Alt D** to print still something else.

The xmodmap client gives you the power to change the meaning of any key at any time or to install a whole new key map for your keyboard.

examples

Suppose you frequently press the **Caps** key at the most inopportune moments. You could remove the **Caps** lock key from the lock modifier, swap it for the **f1** key, then map the **f1** key to the lock modifier. Do this by creating a little swapper file that contains the following lines:

!This file swaps the [Caps] key with the [F1] key.

```
remove Lock = Caps_Lock
keysym Caps_Lock = F1
keysym F1 = Caps_Lock
add Lock = Caps_Lock
```

Note the use of the ! in the file to start a comment line. To put your "swapper" file into effect, enter the following on the command line:

```
xmodmap swapper
```

If you use such a swapper file, you should probably have an unswapper file. The following file enables you to swap back to the original keyboard mapping without having to exit X11:

!This file unswaps the [F1] key with the [Caps] key.

```
remove Lock = Caps_Lock
keycode 88 = F1
keycode 55 = Caps_Lock
add Lock = Caps_Lock
```

Note the use of the hexadecimal values to reinitialize the keycodes to the proper key symbols. You put your “unswapper” file into effect by entering the following command line:

```
xmodmap unswapper
```

On a larger scale, you can change your current keyboard to a Dvorak keyboard by creating a file with the appropriate keyboard mappings.

```
xmodmap .keymap
```

printing a key map

The -pk option prints a list of the key mappings for the current keyboard.

```
xmodmap -pk
```

The list contains the keycode and up to four 2-part columns. The first column contains unmodified key values, the second column contains shifted key values, the third column contains meta (**Extend Char/Alt**) key values, and the fourth column contains shifted meta key values. Each column is in two parts: hexadecimal key symbol value, and key symbol name.