

Tru64 UNIX

Configuring Multiple Monitors on a Single System

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This Best Practice describes how to configure multiple monitors on a single system running the Common Desktop Environment (CDE) on Version 5.0 or higher of the Tru64™ UNIX operating system.

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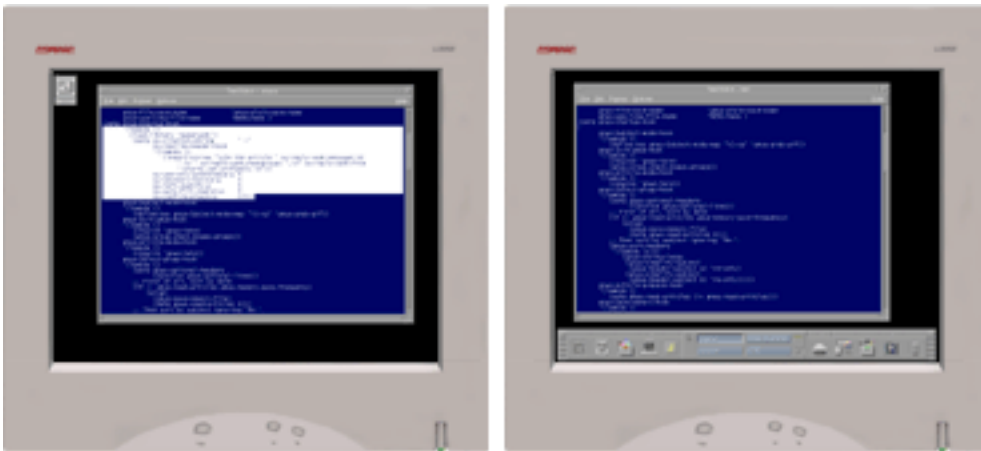
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Configuring Multiple Monitors on a Single System

This Best Practice describes how to configure multiple monitors on a single system running the Common Desktop Environment (CDE) on Version 5.0 or higher of the Tru64™ UNIX operating system.

The best way to accomplish this is to use the Xinerama (formerly panoramiX) extension to the X Server, which was added to the operating system in Version 5.0. This feature makes it possible to configure your system to operate multiple video monitors (a multi-headed system) as one contiguous virtual screen, as opposed to two or more separate screens. With Xinerama enabled, you can physically arrange your monitors in a variety of layouts to customize your desktop space. Furthermore, your windows can span multiple monitors, and you can move the windows from one monitor to another.

You might find this setup useful if you use your Tru64 UNIX system as a workstation. If you often need to view multiple applications or windows at the same time (for instance, to cut and paste text between documents), multiple monitors can save you a lot of time and effort. In the following figure, a user cuts text from an editor window on one monitor and drags it into an editor window on another monitor:



Even if your system is a server, you might find multiple monitors useful for certain tasks. For instance, you might want to configure your system to display several screens of server statistics at once. The following figure shows two monitors that contain windows from the SysMan Station, System Information, Process Tuner, and Event Viewer utilities, which you can invoke from the CDE Application Manager:



If you want to configure a multi-headed system, start by verifying that you meet the criteria specified in *Is This Best Practice Right for You?*

To see other Best Practices documentation, visit the [Tru64 UNIX Best Practices Web page](#).

Is This Best Practice Right for You?

Not all Best Practices apply to all configurations, so you must be sure that they are appropriate for your system and circumstances. To use this Best Practice, you must meet the requirements described in the following table:

Requirement	Description
Operating System	Tru64 UNIX Version 5.0 or higher
Windowing System	Common Desktop Environment
Impact on Availability	You must reboot the system to install new hardware.
Hardware	The Xinerama extension is supported only in homogeneous graphics environments. That is, your environment must consist of common video cards, bit depths, visual classes, resolutions, and so on. It is also strongly recommended that you use Xinerama on monitors of the same size. See <i>Before You Begin</i> for additional information about hardware restrictions.
Software	The Xnest and Xvfb servers and Open 3D layered products do not work with the Xinerama extension.
Skill Level	You must have basic UNIX administration skills. Also, you must be familiar with the procedure for physically adding new option cards to your system. This procedure is often covered in the documentation for your system or the option card itself.

If you do not meet the previous requirements, see *Alternative Practices* for more information.

Before You Begin

Before you apply the Best Practice for Configuring Multiple Monitors on a Single System, you must understand some background information and perform some preliminary tasks.

Related Documentation

You will find it helpful to have the following documentation available during the procedure:

- The hardware documentation for your system
- The hardware documentation for your video option cards
- The online or hardcopy reference pages, particularly `Xdec(1)`
- The *X Window System Environment* guide

Hardware Prerequisites

As stated previously, the Xinerama extension is supported only in homogeneous graphics environments. In other words, your environment must consist of common video cards, bit depths, visual classes, and resolutions. The following table explains these criteria in further detail:

Criterion	Explanation
Video Cards	<p>You must select a video card that provides support for multiheaded configurations, and you must buy two or more of the same video card. (Note that the S3Trio line of video cards does not provide this support.)</p> <p>Check the video card that came with your system. You might be able to buy additional cards to match this card.</p>
Bit Depths	<p>Bit depths (or color depths) indicate the number of colors (or shades of gray) that your video card can display. The higher the bit depth, the more colors will be displayed on your monitor. Video cards have a bit depth from 1 to 24. The number of colors a card can display is equal to 2 to the power of the bit depth. For example, an 8-bit card can display 256 colors (2^8).</p> <p>To enable Xinerama, your video cards need to be of equal bit depths; for example, two or more 16-bit video cards.</p>

Criterion	Explanation
Visual Classes	<p>Visual classes (or visuals) are another way to indicate the number of colors that your video card can display.</p> <p>Tru64 UNIX allows you to set the visual class for a screen by specifying the <code>-vclass</code> option to the <code>Xdec</code> command. By default, the system runs in <code>PseudoColor</code> mode, which is equivalent to 8-bit color, or 256 colors. With selected video cards, you can increase the number of colors to as many as 16,777,215 (24-bit color) by running in <code>TrueColor</code> mode.</p> <p>The X Server also allows you to set a different visual class for each screen, if necessary; however, when you enable Xinerama, the visuals must be identical. (Note that if you have not changed this setting in the past, you do not need to take any action.) See <code>Xdec(1X)</code> for more information about the <code>-vclass</code> option.</p>
Resolutions	<p>Resolution indicates the number and configuration of the pixels your video card can display on a monitor. It is usually a function of the size and shape of your monitor and the amount of memory on your video card. The lowest common denominator for bit depths is usually 640 x 480 pixels, but you can adjust the resolution so you are comfortable with the size, sharpness, and clarity of the image.</p> <p>To enable Xinerama, your video cards need to be set to the same resolution. It is also best to use monitors of the same size; otherwise, images will appear radically different from one monitor to another.</p>

Check your video card documentation for further information about meeting these criteria.

Disabling the VGA Services on Video Cards

If you install multiple video cards on a system without disabling VGA services on all but one of the cards, all of the cards will compete for control of the video subsystem at boot time and possibly damage your system. This can happen on any multiheaded system, whether you use the Xinerama extension or not.

Most video cards are capable of dynamically enabling or disabling VGA services as necessary, but others (including ELSA Gloria Synergy cards) require you to make this change yourself via a jumper setting on the video card. Check your video card documentation to see if this change is required. If so, make the change before you install the video cards in your system.

Applying the Best Practice

Before you configure multiple monitors on a single system, be sure to follow the recommendations in *Before You Begin*.

1. If necessary, disable the VGA capability on all but one of your video cards before you install the cards in your system. Some cards require this step and some do not. See *Disabling the VGA Services on Video Cards* for more information.
2. Shut down the operating system and enter the following command at the console prompt:

```
>>> show config
```

For future reference, note the output that pertains to the video cards you have installed on your system. The following output indicates the presence of one ELSA Gloria video card, which is installed in slot 12 on PCI bus 0:

```
Slot      Option          Hose 0, Bus 0, PCI
.
.
.
12      ELSA GLoria Synergy
```

3. Switch the computer off, unplug the computer's power cord from the electrical outlet, and install your video cards. See the documentation for your computer and your video cards for this procedure.
4. Plug the power cord back into the electrical outlet, switch the computer on, and enter the following command at the console prompt:

```
>>> show config
```

The output should indicate that the newly installed video cards are available to the system. For example, the following output indicates the presence of two ELSA Gloria video cards, which are installed in slots 12 and 13 on PCI bus 0:

```
Slot      Option          Hose 0, Bus 0, PCI
.
.
.
12      ELSA GLoria Synergy
13      ELSA GLoria Synergy
```

5. Once you verify that you have correctly installed your new video cards, boot the operating system. The operating system should automatically configure your new video cards into the kernel during the boot sequence.

Log in to CDE as root and verify the configuration of the video cards as specified in *Verifying Kernel Configuration*.

6. Open the `/usr/var/X11/Xserver.conf` file with a text editor and find the `args < >` statement at the end of the file. It looks similar to this:

```
args <
  -pn
>
```

Add the `+panoramiX` argument to the `args < >` statement, as follows:

```
args <
  -pn
  +panoramiX
>
```

The arguments in this statement are passed to the `Xdec` command (the X Server) at system startup. (Note that `+xinerama` is also a valid argument on Tru64 UNIX Version 5.0A and higher, and it does the same thing as `+panoramiX`.)

If you would like to configure your monitors for any physical arrangement other than side-by-side, see *Physically Arranging the Monitors* for information about additional arguments.

7. Log out of CDE. On the CDE login screen, click on the Options button and select Reset Login Screen from the pull-down menu.

This option restarts the X Server. When the process is complete, the CDE login screen is displayed. Xinerama is now enabled.

Physically Arranging the Monitors

By default, the system uses the physical location of the video cards on the system bus to number the screens. This order depends on the computer that you have. Assuming that you have connected the cables to the video cards in the proper order, the number of the screens from left to right will be either 0, 1, 2, *n*... or *n*...2, 1, 0. For example, when the monitors are placed side-by-side, the screen order can be as follows:



If you want to change the screen order without physically moving the monitors, you can specify the X Server `-screenOrder` option in the `Xserver.conf` file. Or, if you want to create a virtual screen in which the monitors are not side-by-side, but stacked in some manner, you can specify the `-edge` option. (However, note that when you use the `-edge` option, you can arrange the monitors only in a rectangular configuration, and you must set hard boundaries to indicate where the edges of the screen are located; otherwise, you will see inconsistent results.)

The following examples show uses for the `-screenOrder` and `-edge` options. For more information on these and other options, see `Xdec(1)`.

Note

The X Server supports up to 16 monitors configured in this manner; however, the actual number of monitors you can have is limited by the number of option card slots available in your computer and the number of cards your video card supports in multiheaded configurations. See your hardware documentation for more information.

Example 1

You have three monitors, screens numbered 0 through 2, as in the following diagram:

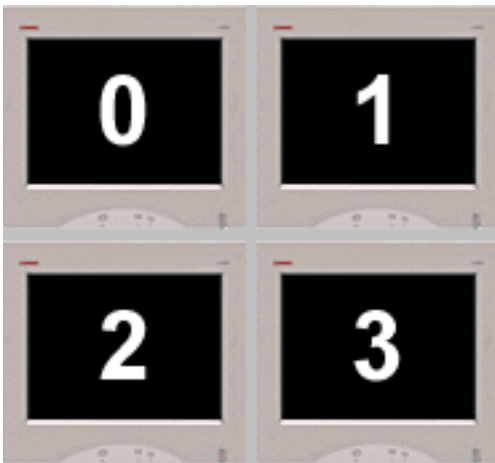


If you have already physically arranged the monitors and you do not want to move them again, you can add the following `-screenOrder` option to the `Xserver.conf` file below the `+panoramiX` option to correct the screen layout:

```
args <
  -pn
  +panoramiX
  -screenOrder 1,0,2
>
```

Example 2

You have four monitors, screens numbered 0 through 3, and you want to arrange them in a square as in the following diagram:



You can configure the Xinerama virtual screen in this manner by adding the following `-edge` statements to the `Xserver.conf` file below the `+panoramiX` option:

```
args <
  -pn
  +panoramiX
  -edge_bottom0 2 -edge_top0 -1 -edge_right0 1 -edge_left0 -1 1
  -edge_bottom1 3 -edge_top1 -1 -edge_right1 -1 -edge_left1 0 2
  -edge_bottom2 -1 -edge_top2 0 -edge_right2 3 -edge_left2 -1 3
  -edge_bottom3 -1 -edge_top3 1 -edge_right3 -1 -edge_left3 2 4
>
```

The lines in this example have the following meaning:

- ① The bottom edge of screen 0 is connected to screen 2.
The top edge of screen 0 is at the top edge of the virtual screen.
The right edge of screen 0 is connected to screen 1.
The left edge of screen 0 is at the left edge of the virtual screen.
 - ② The bottom edge of screen 1 is connected to screen 3.
The top edge of screen 1 is at the top edge of the virtual screen.
The right edge of screen 1 is at the right edge of the virtual screen.
The left edge of screen 1 is connected to screen 0.
 - ③ The bottom edge of screen 2 is at the bottom edge of the virtual screen.
The top edge of screen 2 is connected to screen 0.
The right edge of screen 2 is connected to screen 3.
The left edge of screen 2 is at the left edge of the virtual screen.
 - ④ The bottom edge of screen 3 is at the bottom edge of the virtual screen.
The top edge of screen 3 is connected to screen 1.
The right edge of screen 3 is at the right edge of the virtual screen.
The left edge of screen 3 is connected to screen 2.
-

Verifying Success

When you complete the procedure, all of your monitors should be active and organized in the proper arrangement. You should be able to open windows and drag them from screen to screen.

If the Best Practice was not successful, see *Troubleshooting* for information about identifying and solving problems.

Troubleshooting

If you determine that the Best Practice was not successful, as described in *Verifying Success*, use the following table to identify and solve problems:

Problem	Possible Solutions
System behaves inconsistently or does not display the boot prompt after card installation.	<p>Verify that you have disabled the VGA capability on all but one of your video cards. If this is not the problem, you might be using an incompatible system, incompatible video cards, or a heterogeneous graphics environment. See <i>Is This Best Practice Right for You?</i> and <i>Before You Begin</i> for more information.</p> <p>Note that incompatible hardware might cause damage to the system, particularly the video monitors, if they are not syncing correctly.</p>
X Server does not restart after adding <code>+panoramiX</code> or <code>+xinerama</code> option.	<p>If the X Server fails to start, it likely indicates the improper usage of an Xdec command option.</p> <p>If the screen is blank, press the Enter key to display a login: prompt. Log in and view the contents of the <code>/var/dt/Xerrors</code> file for error messages. Edit the <code>/usr/var/X11/Xserver.conf</code> file to fix any problems and execute the following command to start the X Server again:</p> <pre data-bbox="695 1402 1084 1430"># /sbin/init.d/xlogin start</pre>
One or more of the monitors is not active.	<p>Check the video cards to see if they were properly installed and properly configured into the kernel. See <i>Verifying Kernel Configuration</i> for information about checking the kernel configuration.</p> <p>Also, check to see if your monitors are capable of working at the resolution and frequency for which the card is set. See your video card and monitor documentation for more information.</p>

Problem	Possible Solutions
Netscape Navigator windows are sometimes displayed improperly.	This problem is a limitation of Xinerama. One workaround is to open Netscape Navigator's Preferences dialog box, select Appearance→Colors, and select the check box for Always use my colors, overriding document. Another workaround is to set Navigator to run with 64 colors by invoking it with the following command: # <code>netscape -ncols 64</code>
Adobe Acrobat displays documents with garbled text.	This is a bug for which there is currently no fix. As a workaround, if you previously set the <code>-vclass</code> option to TrueColor mode, try reverting to PseudoColor mode.
When opening an application, half of the window appears on one screen and half appears on another screen.	This is normal behavior. Because Xinerama treats the monitors as one contiguous screen, and most applications open in the center of the screen, there is a possibility that windows will appear between screens, particularly on two monitor systems. Once the application starts, you can move the window to a more appropriate location.

Verifying Kernel Configuration

The operating system should automatically configure your new video cards into the kernel when you boot the system. You should see output similar to the following during the boot sequence:

```
Aug 29 16:43:30 tigger vmunix: comet1: Card type 'Elsa GLoria' with 8MB frameb
uffer memory.
Aug 29 16:43:30 tigger vmunix: comet1 at pci2 slot 12
Aug 29 16:43:30 tigger vmunix: comet2: Card type 'Elsa GLoria' with 8MB frameb
uffer memory.
Aug 29 16:43:30 tigger vmunix: comet2 at pci2 slot 13
Aug 29 16:43:30 tigger vmunix: kernel console: comet1
```

If you miss the boot sequence, log in as root and view the output from the boot sequence in the `/var/adm/syslog.dated/current/kern.log` file.

If you cannot find output to indicate that the cards are configured, verify that the running kernel recognizes the cards by executing the following command as the super user:

```
# sizer -gt
```

The output should indicate the same number of option cards that are installed in your system. For example, if you have two ELSA Gloria Synergy cards, the output should appear as follows:

```
COMET  
COMET
```

If you do not see the appropriate number of option cards, you need to manually add the options to your kernel configuration file. See the *System Administration* guide for more information.

Alternative Practices

Although this Best Practice is the recommended method for configuring multiple monitors on a single system, if your system does not meet the requirements described in *Is This Best Practice Right for You?*, you can use an alternative method:

- Use multiple monitors under CDE without the Xinerama extension
To use CDE without the Xinerama extension, follow only steps 1–5 of the procedure from this Best Practice. However, you will have less control over the arrangement of your desktop under this configuration. Also, the monitors will be treated as separate screens, and you will not be able to drag windows and text from screen to screen.
- Use multiple monitors under the X Display Manager (xdm) without the Xinerama extension
On systems running Tru64 UNIX Version 5.0 or higher, you can add video cards by completing only steps 1–5 of the procedure from this Best Practice. On systems running versions of Tru64 UNIX prior to Version 5.0, you also need to manually configure your video card into the kernel configuration file. See the *System Administration* guide for more information.
If configured properly into the kernel, your additional video cards and monitors are available upon reboot. However, this configuration has the same limitations as using multiple monitors under CDE without the Xinerama extension.
- Use multiple monitors under the X Display Manager (xdm) with the Xinerama extension
On systems running Tru64 UNIX Version 5.0 or higher, you can add video cards by completing the procedure from this Best Practice. On

systems running versions of Tru64 UNIX prior to Version 5.0, you also need to manually configure your video card into the kernel configuration file. See the *System Administration* guide for more information.

The Xinerama extension will work under the X Display Manager; however, this support is not as finely tuned as the Xinerama support under CDE.

Note that you can choose to use the `xdm` program, the standard X11 login manager, to display your window environment by executing the `xsetup` command. See `xdm(1X)` for more information about the `xdm` program.

In addition, if you cannot configure Xinerama or one of the alternatives, you can use CDE to manage multiple workspaces on one screen. By default, CDE includes four workspaces, numbered `One` through `Four`. You can click on a workspace button on the CDE Front Panel to switch between these workspaces. You can also assign applications to be executed in these workspaces and create additional workspaces. See the *Common Desktop Environment: User's Guide* and *Common Desktop Environment: Advanced User's and System Administrator's Guide* for more information.

Comments and Questions

We value your comments and questions on the information in this document. Please mail your comments to us at this address:

`best_practices@zk3.dec.com`

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