Release Notes for XFree86™ 4.4.0

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Abstract

This document contains information about features and their status in XFree86 4.4.0.

1. Introduction to the 4.x Release Series

XFree86 4.0 was the first official release of the new XFree86 4 series. The current release (4.4.0) is the latest in that series. XFree86 4 represents a significant redesign of the XFree86 X server, with a strong focus on modularity and clean interfaces compared with the previous XFree86 3.x series.

XFree86 4.4 introduces an automatic configuration mechanism for the XFree86 server which makes it now possible to start XFree86 without first creating a configuration file. The initial automatic configuration support is targeted towards Linux and FreeBSD and it is hoped that automatic configuration will be supported on other platforms in future releases.

If you are running either Linux or FreeBSD, try it out if you do not already have a working `XF86Config` file. If you want to customise things afterwards, you can cut and paste the automatically generated configuration from the `/var/log/XFree86.0.log` file into an `XF86Config` file and make your customisations there.

If you do not have any luck with automatic configuration, or you are using a platform that is not currently supported, try one of the older methods for getting started.

XFree86 comes with a graphical configuration tool called "`xf86cfg`", which also has a text mode interface and can be used to create an initial configuration file. It can also be used to customise existing configurations.

Next in the order of configuration preferences is to use the XFree86 server's ability to create a starting configuration file. Run as root:

```
XFree86 -configure
```

and follow the instructions.

Finally, if all else fails, the trusty old standby text-based tool "`xf86config`" can also be used for generating X server config files.

At least one, and hopefully, all of these configuration options will give you a reasonable starting point for a suitable configuration file. With the automatic mechanism you might even find that you don't need one!

If you do need to customise the configuration file, see the XF86Config manual page. You can also check the driver-specific manual pages and the related documentation (found at *tables below*

(section 3., page 6) also.

Before downloading the binary distributions for this release, please have a quick read through the Installation Document. It may save you some time and also help you figure out which of the binary releases you need.

The next section describes what is new in the latest version (4.4.0) compared with the previous full release (4.3.0). The other sections below describe some of the new features and changes between 3.3.x and 4.0. There are lot's of new features, and we definitely don't have enough space to cover them all here.

2. Summary of new features in 4.4.0.

This is a sampling of the new features in XFree86 4.4.0. A more complete list of changes can be found in the CHANGELOG that is part of the XFree86 source tree. It can also be viewed online at our CVSweb server `<URL:http://cvsweb.xfree86.org/cvsweb/xc/programs/Xserver/hw/xfree86/CHANGELOG?rev=HEAD>`.

2.1 Security Updates

The following security issues have been fixed in this release:

- Fixes for potential integer overflows in font libraries. (CAN-2003-0730)
- Better pseudo-random number generation for XDM session cookies. (CAN-2003-0692)
- Check for failure of the pam_setcred() function in xdm session initialization. (CAN-2003-0690)
- Font file buffer overlows. (CAN-2004-0083, CAN-2004-0084 and CAN-2004-0106)

2.2 Video Driver Enhancements

- Several stability issues with the support for the Intel 830M, 845G, 852GM, 855GM and 865G integrated graphics chipsets have been fixed. Some limitations related to the driver's use of the video BIOS remain, especially for some laptops.
- The nv driver for NVIDIA cards has been updated as follows:
  - Support added to the nv driver for the GeForce FX 5700, which didn't work with XFree86 4.3.
  - The driver now does a much better job of auto-detecting which connector of dual output cards the monitor is attached to, and this should reduce or eliminate the need for manual XF86Config overrides.
  - The 2D acceleration for TNT and GeForce has been completely rewritten and its performance should be substantially improved.
  - TNT and GeForce cards have a new Xv PutImage adaptor which does scaled YUV bit blits.
- The SiS driver has seen major updates, including:
  - Support for 661/741/760 and support for 330 (Xabre).
  - Merged Framebuffer mode.

  - Support for DVI, and much more.
  - DRI for 300 series (300/305, 540, 630, 730) is supported again.

- A new driver for several VIA integrated graphics chipsets has been added.
- Various updates and bug fixes have been made to most other drivers.

2.3 Input Driver Enhancements

- The mouse driver has some support on Linux and FreeBSD for auto-detecting which device node to use. This makes it unnecessary to supply this information in the XF86Config file in most cases.

2.4 IPv6 support

XFree86 4.4 supports IPv6, based on the code contributed by Sun Microsystems, Inc. to X.Org. See X.org's document `<URL:http://www.x.org/IPV6_Specific_Changes.html>` for a detailed list of what these changes are and how your system is affected by them.

2.4.1 Protocol names and aliases.

- tcp is an alias for both IPv6 and IPv4 transports.
- inet specifies IPv4 only.
- inet6 specifies IPv6 only.

You can force the X server to only listen to IPv4 connections with the `X -nolisten inet6` command or you can force a IPv6 connection by setting **DISPLAY** to `inet6/host:0`.

2.4.2 XDM

The IPv6 XDMCP code is not enabled by default on platforms that don't support binding a IPv6 socket to a IPv4 address.

The XDM-AUTHORIZATION-1 authentication scheme does not support IPv6 addresses but a new release of the protocol, XDM-AUTHORIZATION-2 has been designed; this though is yet to be implemented. By default XFree86 builds do not enable the XDM-AUTHORIZATION-1 code.

2.5 X Server and Extension Updates

- The Mesa version used for OpenGL® 1.3 and DRI driver support has been updated to 5.0.2.

2.6 Client and Library Updates

2.6.1 Xterm

The user-visible changes to xterm since XFree86 4.3 are:

Bug Fixes:

- Make signalInhibit resource work, i.e., disable the menu entries that would send signals to, or exit xterm.
- Make cursor definition in tek4014 emulation work as originally implemented.
- Modify translations for scrollbar so that one can use shifted pageup, wheel mouse, etc., while the mouse pointer is over the scrollbar.
- Correct initialization of G1 character set mapping.

New Features:

- Modify the predictable version of the generated logfile name to append the process-id rather than a random value.
- Modify scroll-back and scroll-forw actions to accept an adjustment value, e.g.,

  ```
  scroll-back(1, page-2)
  ```

  to scroll back by 2 lines less than a page.
- Add visualBellDelay resource to modify the length of time used for visual bell, for very slow displays or very fast computers.

Improved Locale Support:

- modify uxterm script to strip modifiers such as "@euro" from the locale setting before adding ".UTF-8".
- Add logic to wide-character support which attempts to load fonts specified by utf8Fonts subresources at startup. The subresources have the same names as the fonts which they replace, e.g., font, font1, etc., so that the ISO-10646-1 fonts can be specified in the XTerm app-defaults file.
- Improved performance with chinput application.

Improved Font Handling:

- Document in xterm's manual page how to use XFree86 ":unscaled" keyword to suppress scaling of bold fonts.
- Improved logic for deriving bold fontname from normal fontname.
- Make double-width characters work with -u8 option.
- Updated table of Unicode line-drawing characters.
- Several fixes for rendering using Xft (option -fa):
  - Make height of TrueType fonts match ascent+descent.
  - Translate Unicode values (from UTF-8 output to xterm) for line-drawing to xterm's internal code, etc., since TrueType fonts generally do not have either set of line-drawing glyphs. xterm can draw these directly.
  - Pass 16-bit values rather than 8-bit values to xtermXftDrawString() to allow for wide-characters.
  - Use built-in line-drawing characters for Xft fonts.
  - Implement underlining.
- Implement boldMode for wide-characters.
- Modified to work with CJK double-width (bi-width/monospace) fonts.

Workarounds for Special Applications:

- Add option -k8 and resource allowC1Printable to allow users of non-VTxxx character sets such as KOI-8 to treat the C1 control area (character codes 128-159) as printable rather than control characters.

- Add configure option --enable-broken-st and resource brokenStringTerm to allow user to revert one part of the parsing table corrections.
- Add configure option --enable-broken-osc and resource brokenLinuxOSC to accommodate scripts which do not distinguish between running in the Linux console and running in X. Linux console recognizes malformed control strings which start with an OSC, but are fixed-length, with no terminator.
- Add configure option --enable-pty-handshake to allow one to compile-in support for the pty handshaking logic, and resource ptyHandshake to enable or disable it. This feature is normally enabled.

Modified Resources:

- Change color4 to "dodger blue", since this provides better contrast.
- Remove color resources from XTerm.ad, leaving them only in XTerm-col.ad
- Modify UXTerm.ad resource file to include "XTerm-color" rather than "XTerm", in case the latter file contains no color resource definitions.
- Changed class of veryBoldColors to VeryBoldColors, since ColorMode is associated with boolean resources.
- Changed classes of colorBDMode and similar resources that override colors when a video attribute is set to ColorAttrMode, to make them distinct from ColorMode. This avoids an unexpected rendering of reverse video, for example.

Modified terminfo/termcap entries:

- Add indp and rin to terminfo entry.
- Add le to termcap xterm-basic entry. Though missing from older termcaps for xterm, some applications check for it.
- Correct AF/AB strings in termcap for xterm-256color and xterm-88color entries.

2.7 I18N and Font Updates

- FreeType2 updated to version 2.1.4.
- The "freetype" X server font backend has been updated by the After X-TT Project `<URL:http://x-tt.sourceforge.jp/>` to include the functionality previously provided by the "xtt" backend, and to fix some bugs. The "xtt" backend will be dropped in the next release in favour of the updated unified "freetype" backend.

    - The new "freetype" backend has the improved "very lazy" metric calculation method which enables super-fast loading of proportional CJKV fonts.
    - All of the servers, including xfs, Xnest, Xprt, Xvfb, the Cygwin-XFree86 server (as well as the XFree86 server) can handle the perfect TTCap options.

- The Compose file processing mechanism has been improved and made more flexible. See the *Xlib Compose file support and extensions section below* (section 5.20, page 13).
- The Bitstream Vera TrueType fonts that Bitstream, Inc donated to the GNOME Foundation have been included with this release.

2.8 OS Support Updates

- On Mac OS X, the appropriate backend drawing code is now dynamically loaded at runtime which reduces the X server's memory footprint. In rootless mode, Apple's Xplugin library is used where available. (Xplugin is included as part of Mac OS X on Panther.) With Xplugin, XDarwin provides identical performance to Apple's X11, including the following improvements over 4.3:
  - Added direct GLX rendering with thread support.
  - Faster 2-D drawing.
  - Added support for the Apple-WM extension so XDarwin interoperates with quartz-wm.
- On Darwin, IOKit mode now uses shadowfb for much faster drawing.
- Various GNU/Hurd support updates.
- Experimental support added for GNU/KFreeBSD and GNU/KNetBSD systems.
- SCO OpenServer support updates. XFree86 4.4 now works on Release 5.0.7 with Maintenance Pack 1, or on prior releases through Release 5.0.4. Please consult the README.SCO file for details.

3. Drivers

3.1 Video Drivers

XFree86 4.4.0 includes the following video drivers:

Drivers marked with (*) are present in a preliminary form in this release, but are not complete and/or stable yet.

Drivers marked with (+) are for Linux/Sparc only.

Drivers marked with (-) are for Linux/mips only.

Darwin/Mac OS X uses IOKit drivers and does not use the module loader drivers listed above. Further information can be found in README.Darwin.

XFree86 4.4.0 includes the following input drivers:

3.2 Input Drivers

Drivers marked with (*) are available for Linux only.

4. Known Problems

- Known issues with this version of the SiS driver:
  - The driver will not work with upcoming laptops/notebooks with 661/741/760 and 30xLV bridges as regards LCD output. This is due folks at SiS at the very moment writing an entirely new VBIOS for such machines whose data layout is not decided yet. (This might affect machines with 650/740 as well within the next year.)
  - Xv does not work correctly in TV NTSC 1024x768 mode, if the overlay is very large (or full screen). The effect are flickering lines on the screen. This is a hardware problem. Do not use this mode for video.
  - YPbPr 720p output is blurry (at least at 1024x768; unknown for other modes). This is a driver problem; solution currently unknown.

Driver Name	Description	Further Information
`apm`	Alliance Pro Motion	README.apm
`ark`	Ark Logic	
`ati`	ATI	README.ati, README.r128, r128(4), radeon(4)
`chips`	Chips & Technologies	README.chips, chips(4)
`cirrus`	Cirrus Logic	
`cyrix` (*)	Cyrix MediaGX	README.cyrix
`fbdev`	Linux framebuffer device	fbdev(4)
`glide`	Glide2x (3Dfx)	glide(4)
`glint`	3Dlabs, TI	glint(4)
`i128`	Number Nine	README.I128, i128(4)
`i740`	Intel i740	README.i740
`i810`	Intel i8xx	README.i810, i810(4)
`imstt`	Integrated Micro Solns	
`mga`	Matrox	mga(4)
`neomagic`	NeoMagic	neomagic(4)
`newport` (-)	SGI Newport	README.newport, newport(4)
`nsc`	National Semiconductor	nsc(4)
`nv`	NVIDIA	nv(4)
`rendition`	Rendition	README.rendition, rendition(4)
`s3`	S3 (not ViRGE or Savage)	
`s3virge`	S3 ViRGE	README.s3virge, s3virge(4)
`savage`	S3 Savage	savage(4)
`siliconmotion`	Silicon Motion	siliconmotion(4)
`sis`	SiS	README.SiS, sis(4)
`sunbw2` (+)	Sun bw2	
`suncg14` (+)	Sun cg14	
`suncg3` (+)	Sun cg3	
`suncg6` (+)	Sun GX and Turbo GX	
`sunffb` (+)	Sun Creator/3D, Elite 3D	
`sunleo` (+)	Sun Leo (ZX)	
`suntcx` (+)	Sun TCX	
`tdfx`	3Dfx	tdfx(4)
`tga`	DEC TGA	README.DECtga
`trident`	Trident	trident(4)
`tseng`	Tseng Labs	
`via`	VIA	via(4)
`vesa`	VESA	vesa(4)
`vga`	Generic VGA	vga(4)
`vmware`	VMWare guest OS	vmware(4)

- We have received a late report that enabling DPMS support with the radeon driver can damage some Viewsonic monitors. DPMS is usually disabled by default. You can verify whether or not DPMS is enabled by running 'xset q' from within your X session.

5. Overview of XFree86 4.x.

XFree86 4.x has a single X server binary called `XFree86`. This binary can either have one or more video and input drivers linked in statically, or more usually, dynamically, and in that manner load the video drivers, input drivers, and other modules that are needed.

XFree86 4.4.0 has X server support for most UNIX® and UNIX-like operating systems on Intel/x86 platforms, plus support for Linux and some BSD OSs on Alpha, PowerPC, IA-64, AMD64, Sparc, and Mips platforms, and for Darwin on PowerPC. Support for additional

Driver Name	Description	Further Information
aiptek(*)	Aiptek USB tablet	aiptek(4)
calcomp	Calcomp	
citron	Citron	citron(4)
digitaledge	DigitalEdge	
dmc	DMC	dmc(4)
dynapro	Dynapro	
elographics	EloGraphics	
fpit	Fujitsu Stylistic Tablet PCs	fpit(4)
hyperpen	Aiptek HyperPen 6000	
js_x	JamStudio pentablet	js_x(4)
kbd	generic keyboards (alternate)	kbd(4)
keyboard	generic keyboards	keyboard(4)
microtouch	MicroTouch	
mouse	most mouse devices	mouse(4)
mutouch	MicroTouch	
palmax	Palmax PD1000/PD1100	palmax(4)
penmount	PenMount	
spaceorb	SpaceOrb	
summa	SummaGraphics	
tek4957	Tektronix 4957 tablet	tek4957(4)
ur98(*)	Union Reality UR-F98 headtracker	ur98(4)
void	dummy device	void(4)
wacom	Wacom tablets	wacom(4)

architectures and operating systems is in progress and is planned for future releases.

5.1 Loader and Modules

The XFree86 X server has a built-in run-time loader, which can load normal object files and libraries in most of the commonly used formats. The loader does not rely on an operating system's native dynamic loader support and it works on platforms that do not provide this feature. This allows for the modules to be operating system independent (although not, of course, CPU architecture independent) which means that a module compiled on Linux/x86 can be loaded by an X server running on Solaris/x86, or FreeBSD, or even OS/2.

A main benefit of this, is that when modules are updated, they do not need to be recompiled for every different operating system. The loader in version 4.4.0 has support for Intel (x86), Alpha and PowerPC platforms. It also has preliminary support for Sparc platforms.

The X server makes use of modules for video drivers, X server extensions, font rasterisers, input device drivers, framebuffer layers (like mfb, cfb, etc), and internal components used by some drivers (like XAA),

The module interfaces (both API and ABI) used in this release are subject to change without notice. While we will attempt to provide backward compatibility for the module interfaces as of the 4.0 release (meaning that 4.0 modules will work with future core X server binaries), we cannot guarantee this. Compatibility in the other direction is explicitly not guaranteed because new modules may rely on interfaces added in new releases.

Note about module security

The XFree86 X server runs with root privileges, i.e. the X server loadable modules also run with these privileges. For this reason we recommend that all users be careful to only use loadable modules from reliable sources, otherwise the introduction of viruses and contaminated code can occur and wreak havoc on your system. We hope to have a mechanism for signing/verifying the modules that we provide available in a future release.

5.2 Configuration File

The XFree86 server uses a configuration file as the primary mechanism for providing configuration and run-time parameters. The configuration file format is described in detail in the XF86Config(5) manual page.

The XFree86 server has support for automatically determining an initial configuration on most platforms, as well as support or generating a basic initial configuration file.

5.3 Command Line Options

Command line options can be used to override some default parameters and parameters provided in the configuration file. These command line options are described in the XFree86(1) manual page.

5.4 XAA

The XFree86 Acceleration Architecture (XAA) was completely rewritten from scratch for XFree86 4.x. Most drivers implement acceleration by making use of the XAA module.

5.5 Multi-head

Some multi-head configurations are supported in XFree86 4.x, primarily with multiple PCI/AGP cards.

One of the main problems is with drivers not sufficiently initialising cards that were not initialised at boot time. This has been improved somewhat with the INT10 support that is used by most drivers (which allows secondary card to be "soft-booted", but in some cases there are other issues that still need to be resolved. Some combinations can be made to work better by changing which card is the primary card (either by using a different PCI slot, or by changing the system BIOS's preference for the primary card).

5.6 Xinerama

Xinerama is an X server extension that allows multiple physical screens to behave as a single screen. With traditional multi-head in X11, windows cannot span or cross physical screens. Xinerama removes this limitation. Xinerama does, however, require that the physical screens all have the same root depth, so it isn't possible, for example, to use an 8-bit screen together with a 16-bit screen in Xinerama mode.

Xinerama is not enabled by default, and can be enabled with the `+xinerama` command line option for the X server.

Xinerama was included with X11R6.4. The version included in XFree86 4.x was completely rewritten for improved performance and correctness.

Known problems:

- Most window managers are not Xinerama-aware, and so some operations like window placement and resizing might not behave in an ideal way. This is an issue that needs to be dealt with in the individual window managers, and isn't specifically an XFree86 problem.

5.7 DGA version 2

DGA 2.0 is included in 4.4.0. Documentation for the client libraries can be found in the XDGA(3) man page. A good degree of backwards compatibility with version 1.0 is provided.

5.8 DDC

The VESA® Display Data Channel (DDC™) standard allows the monitor to tell the video card (or on some cases the computer directly) about itself; particularly the supported screen resolutions and refresh rates.

Partial or complete DDC support is available in most of the video drivers. DDC is enabled by default, but can be disabled with a "Device" section entry: `Option "NoDDC"`. We have support for DDC versions 1 and 2; these can be disabled independently with `Option "NoDDC1"` and `Option "NoDDC2"`.

At startup the server prints out DDC information from the display, and can use this information to set the default monitor parameters, or to warn about monitor sync limits if those provided in the configuration file don't match those that are detected.

5.8.1 Changed behavior caused by DDC.

Several drivers uses DDC information to set the screen size and pitch. This can be overridden by explicitly resetting it to the and non-DDC default value 75 with the `-dpi 75` command line option for the X server, or by specifying appropriate screen dimensions with the "DisplaySize" keyword in the "Monitor" section of the config file.

5.9 GLX and the Direct Rendering Infrastructure (DRI)

Direct rendered OpenGL® support is provided for several hardware platforms by the Direct Rendering Infrastructure (DRI). Further information about DRI can be found at the DRI Project's web site `<URL:http://dri.sf.net/>`. The 3D core rendering component is provided by Mesa `<URL:http://www.mesa3d.org>`.

5.10 XVideo Extension (Xv)

The XVideo extension is supported in XFree86 4.x. An XvQueryPortAttributes function has been added as well as support for XvImages. XvImages are XImages in alternate color spaces such as YUV and can be passed to the server through shared memory segments. This allows clients to display YUV data with high quality hardware scaling and filtering.

5.11 X Rendering Extension (Render)

The X Rendering extension provides a 2D rendering model that more closely matches application demands and hardware capabilities. It provides a rendering model derived from Plan 9 based on Porter/Duff image composition rather than binary raster operations.

Using simple compositing operators provided by most hardware, Render can draw anti-aliased text and geometric objects as well as perform translucent image overlays and other image operations not possible with the core X rendering system.

XFree86 4.4.0 provides a partial implementation of Render sufficient for drawing anti-aliased text and image composition. Still to be implemented are geometric primitives and affine transformation of images.

Unlike the core protocol, Render provides no font support for applications, rather it allows applications to upload glyphs for display on the screen. This allows the client greater control over text rendering and complete access to the available font information while still providing hardware acceleration. The Xft library provides font access for Render applications.

5.11.1 The Xft Library

On the client side, the Xft library provides access to fonts for applications using the FreeType library, version 2. FreeType currently supports Type1 and TrueType font files, a future release is expected to support BDF and PCF files as well, so Render applications will have access to the complete range of fonts available to core applications. One important thing to note is that Xft uses the vertical size of the monitor to compute accurate pixel sizes for provided point sizes; if your monitor doesn't provide accurate information via DDC, you may want to add that information to `XF86Config`.

To allow a graceful transition for applications moving from core text rendering to the Render extension, Xft can use either core fonts or FreeType and the Render extension for text. By default, Xft is configured to support both core fonts and FreeType fonts using the supplied version of FreeType 2. See the section on FreeType support in Xft for instructions on configuring XFree86 to use an existing FreeType installation.

The Xft library uses a configuration file, `XftConfig`, which contains information about which directories contain font files and also provides a sophisticated font aliasing mechanism. Documentation for that file is included in the Xft(3) man page.

5.11.2 FreeType support in Xft

XFree86 4.4.0 includes sources for FreeType version 2.1.4, and, by default, they are built and installed automatically.

5.11.3 Application Support For Anti-Aliased Text

Only three applications have been modified in XFree86 4.4.0 to work with the Render extension and the Xft and FreeType libraries to provide anti-aliased text. Xterm, xditview and x11perf. Migration of other applications may occur in future releases.

By default, xterm uses core fonts through the standard core API. It has a command line option and associated resource to direct it to use Xft instead:

- `-fa` family / `.VT100.faceName:` family. Selects the font family to use.

Xditview will use Xft instead of the core API by default. X11perf includes tests to measure the performance of text rendered in three ways, anti-aliased, anti-aliased with sub-pixel sampling and regular chunky text, but through the Render extension, a path which is currently somewhat slower than core text.

5.12 Other extensions

The XFree86-Misc extension has not been fully ported to the new server architecture yet. This should be completed in a future release.

The XFree86-VidModeExtension extension has been updated, and mostly ported to the new server architecture. The area of mode validation needs further work, and the extension should be used with care. This extension has support for changing the gamma setting at run-time, for modes where this is possible. The `xgamma` utility makes use of this feature. Compatibility with the 3.3.x version of the extension is provided. The missing parts of this extension and some new features should be completed in a future release.

5.13 xedit

Xedit has several new features, including:

- An embedded lisp interpreter that allows easier extension of the editor.
- Several new syntax highlight modes, and indentation rules for C and Lisp.

- Flexible search/replace interface that allows regex matches.
- Please refer to `xedit(1)` for more details.

5.14 Font support

Details about the font support in XFree86 4.x can be found in the README.fonts document.

5.15 TrueType support

XFree86 4.x comes with two TrueType backends, known as "FreeType" backend (the `"freetype"` module) and 'X-TrueType' (the `"xtt"` module). Both of these backends are based on the FreeType library. The functionality of X-TrueType has been merged into the FreeType backend by the After X-TT Project for XFree86 4.4. Consequently, the old X-TrueType backend will be dropped as of XFree86 4.5.

5.16 CID font support

Support for CID-keyed fonts is included in XFree86 4.x. The CID-keyed font format was designed by Adobe Systems `<URL:http://www.adobe.com>` for fonts with large character sets. The CID-keyed font support in XFree86 was donated by SGI `<URL:http://www.sgi.com>`. See the LICENSE document for a copy of the CID Font Code Public License.

5.17 Internationalisation of the scalable font backends

XFree86 4.x has a ''fontenc'' layer to allow the scalable font backends to use a common method of font re-encoding. This re-encoding makes it possible to uses fonts in encodings other than their their native encoding. This layer is used by the Type1 and Speedo backends and the 'xfsft' version of the TrueType backend. The 'X-TrueType' version of the TrueType backend uses a different re-encoding method based on loadable encoding modules.

5.18 Large font optimisation

The glyph metrics array, which all the X clients using a particular font have access to, is placed in shared memory, so as to reduce redundant memory consumption. For non-local clients, the glyph metrics array is transmitted in a compressed format.

5.19 Unicode/ISO 10646 support

What is included in 4.x:

- All ''-misc-fixed-*'' BDF fonts are now available in the ISO10646-1 encoding and cover at least the 614 characters found in ISO 8859-{1-5,7-10,14,15}, CP1252, and MES-1. The non-bold fonts also cover all Windows Glyph List 4 (WGL4) characters, including those found in all 8-bit MS-DOS/Windows code pages. The 8-bit variants of the ''-misc-fixed-*'' BDF fonts (ISO8859-1, ISO8859-2, KOI8-R, etc.) have all been automatically generated from the new ISO10646-1 master fonts.
- Some ''-misc-fixed-*'' BDF ISO10646-1 fonts now cover a comprehensive Unicode repertoire of over 3000 characters including all Latin, Greek, Cyrillic, Armenian, Gregorian, Hebrew, IPA, and APL characters, plus numerous scientific, typographic, technical, and backwards-compatibility symbols. Some of these fonts also cover Arabic, Ethiopian, Thai, Han/Kanji, Hangul, full ISO 8859, and more. For the 6x13 font there is now a 12x13ja Kanji extension and for the 9x18 font there is a 18x18ja Kanji/Han/Hangul extension, which covers all ISO-2022-JP-2 (RFC 1554) characters. The 9x18 font can also be used to implement simple combining characters by accent overstriking. For more information, read Markus Kuhn's UTF-8 and Unicode FAQ `<URL:http://www.cl.cam.ac.uk/~mgk25/unicode.html>`.

- Mark Leisher's ClearlyU proportional font (similar to Computer Modern).
- ISO 10646/Unicode UTF-8 Level 1 support added to xterm (enabled with the `-u8` option).
- Both the xfsft (the `"freetype"` module) and the X-TrueType (the `"xtt"` module) TrueType font backends support Unicode-encoded fonts.

5.20 Xlib Compose file support and extensions

A more flexible Compose file processing system was added to Xlib in XFree86 4.4.0. The compose file is searched for in the following order:

1. If the environment variable **$XCOMPOSEFILE** is set, its value is used as the name of the Compose file.
2. If the user's home directory has a file named "`.XCompose`", it is used as the Compose file.
3. The old method is used, and the compose file is "**<***xlocaledir***>**`/`**<***localename***>**`/Compose`".

Compose files can now use an "include" instruction. This allows local modifications to be made to existing compose files without including all of the content directly. For example, the system's iso8859-1 compose file can be included with a line like this:

```
include "/usr/X11R6/lib/X11/locale/iso8859-1/Compose"
```

There are two substitutions that can be made in the file name of the include instruction. **%H** expands to the user's home directory (the **$HOME** environment variable), and **%L** expands to the name of the locale specific Compose file (i.e., "**<***xlocaledir***>**`/`**<***localename***>**`/Compose`").

For example, you can include in your compose file the default Compose file by using:

```
include "%L"
```

and then rewrite only the few rules that you need to change. New compose rules can be added, and previous ones replaced.

Finally, it is no longer necessary to specify in the right part of a rule a locale encoded string in addition to the keysym name. If the string is omitted, Xlib figures it out from the keysym according to the current locale. I.e., if a rule looks like:

```
<dead_grave> <A> : "\300" Agrave
```

the result of the composition is always the letter with the "\300" code. But if the rule is:

```
<dead_grave> <A> : Agrave
```

the result depends on how Agrave is mapped in the current locale.

5.21 Luxi fonts from Bigelow and Holmes

XFree86 now includes the "Luxi" family of Type 1 fonts and TrueType fonts. This family consists of the fonts "Luxi Serif", "Luxi Sans" and "Luxi Mono" in Roman, oblique, bold and bold oblique variants. The TrueType version have glyphs covering the basic ASCII Unicode range, the Latin 1 range, as well as the *Extended Latin* range and some additional punctuation characters. In particular, these fonts include all the glyphs needed for ISO 8859 parts 1, 2, 3, 4, 9, 13 and 15, as well as all the glyphs in the Adobe Standard encoding and the Windows 3.1 character set.

The glyph coverage of the Type 1 versions is somewhat reduced, and only covers ISO 8859 parts 1, 2 and 15 as well as the Adobe Standard encoding.

The Luxi fonts are original designs by Kris Holmes and Charles Bigelow from Bigelow and Holmes Inc., who developed the Luxi typeface designs in Ikarus digital format. URW++ Design and Development GmbH converted the Ikarus format fonts to TrueType and Type 1 font programs and implemented the grid-fitting "hints" and kerning tables in the Luxi fonts.

The license terms for the Luxi fonts are included in the file '`COPYRIGHT.BH`', as well as in the

License document. For further information, please contact <design@bigelowandholmes.com> or <info@urwpp.de>, or consult the URW++ web site <URL:http://www.urwpp.de>.

6. Credits

This section lists the credits for the XFree86 4.4.0 release. For a more detailed breakdown, refer to the CHANGELOG file in the XFree86 source tree, the cvs-commit archives <URL:http://www.mail-archive.com/cvs-commit@xfree86.org/maillist.html>, or the 'cvs log' information for individual source files.

New Features, Enhancements and Updates:

IPv6 support:
Alan Coopersmith, Fabio Massimo Di Nitto, Marc Aurele La France, Matthieu Herrb, David H. Dawes.

NVIDIA 'nv' driver rewrite:
Mark Vojkovich.

SiS driver development:
Thomas Winischhofer.

New VIA video driver:
VIA, Alan Cox, Luc Verhaegen, Thomas Hellström.

Intel 'i810' driver fixes and stability improvements:
Egbert Eich, David H. Dawes, Christian Zietz

Improved and more flexible Compose system:
Ivan Pascal.

Automatic configuration for the XFree86 server:
David H. Dawes.

Reworked FreeType font backend module:
Chisato Yamauchi and the After X-TT Project.

Xterm fixes, maintenance and enhancements:
Thomas E. Dickey.

Mac OS X enhancements:
Torrey T. Lyons, John Harper.

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SCO support updates:
Kean Johnston.

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General Integration of Submissions:
Egbert Eich, David H. Dawes, Ivan Pascal, Alan Hourihane, Matthieu Herrb.

DRI Integration:
Alan Hourihane.

Release Engineering:
David H. Dawes.

Patches and other submissions (in alphabetical order):

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7. Attributions/Acknowledgements

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