
Release Notes for X11R7.5

The X.Org Foundation

October 2009

Abstract

These release notes contain information about features and their status in the X.Org Foundation X11R7.5 release.

Table of Contents

Dedication	3
Introduction to the X11R7.5 Release	4
Summary of new features in X11R7.5	5
Overview of X11R7.5	6
Details of X11R7.5 components	7
Video Drivers	7
Input Drivers	8
Xorg server	8
Font support	11
Build changes and issues	13
Silent build rules	13
New configure options for font modules	13
New configure options for documentation in modules	13
Miscellaneous	14
Socket directory ownership and permissions	14
Deprecated components and removal plans	15
Future Removals	15
Removed in this Release	15
Attributions/Acknowledgements/Credits	16

Dedication

Two of the early leaders of the X Window System community were lost to cancer this year — Smokey Wallace, who led the DEC WSL team which created the initial implementation of X11, and Hideki Hiura from Sun Microsystems who helped design the X11R6 internationalization framework. This release is dedicated to their memory.

Introduction to the X11R7.5 Release

This release is the sixth modular release of the X Window System™. The next full release will be X11R7.6 and is expected in 2010.

Unlike X11R1 through X11R6.9, X11R7.x releases are not built from one monolithic source tree, but many individual modules. These modules are distributed as individual source code releases, and each one is released when it is ready, instead of only when the overall window system is ready for release. The X11R7.x releases are made by “rolling up” the individual module releases into a collection that is often affectionately called the “*katamari*” by the developers.

The X11R7.5 release does not include all of the software formerly included in the previous X Window System releases. It is designed to be a reasonable baseline from which to start when building the window system for the first time for a new installation, distribution, or package set. It does not provide a full desktop environment, expecting a more feature rich set of applications to be installed from one of the several excellent desktop environments available for the X Window System. The X.Org developers continue to maintain and produce new releases of much of the software that was formerly in the main window system releases but is no longer included in the *katamari* releases, including many of the Athena Widgets desktop applications that were provided as samples in previous window system versions.

Once their window system build is established, most builders watch for announcements of individual module updates on the `xorg-announce` mailing list and update to those as needed. The X.Org Foundation currently releases the X Window System *katamari* releases approximately once a year, but many modules, especially the X servers and drivers, are updated more frequently between those releases.

For help with how to build and develop in the modular tree see the Modular Developer's Guide in the X.Org wiki.

We encourage you to report bugs using `freedesktop.org`'s bug tracking system using the `xorg` product, and to submit bug fixes and enhancements to `<xorg-devel@lists.x.org>`. More details on patch submission and review process are available on the `SubmittingPatches` page of the X.Org wiki.

The release numbering is based on the original MIT X numbering system. X11 refers to the version of the network protocol that the X Window system is based on: Version 11 was first released in 1988 and has been stable for 22 years, with only upward compatible additions to the core X protocol, a record of stability envied in computing. Formal releases of X started with X version 9 from MIT; the first commercial X products were based on X version 10. The MIT X Consortium and its successors, the X Consortium, the Open Group X Project Team, and the X.Org Group released versions X11R3 through X11R6.6. Since the founding of the X.Org Foundation in early 2004, many further releases have been issued, from X11R6.7 to the current 7.5.

The next section describes what is new in the latest full release (7.5) compared with the previous full release (7.4).

Summary of new features in X11R7.5

This is a sampling of the new features in X11R7.5. A more complete list of changes can be found in the ChangeLog files that are part of the source of each X module.

- *InputClass* sections in Xorg configuration files are used to apply configuration options to any input device matching specified rules, such as device path, type of device, device manufacturer, or other data provided by the input hotplug backend. Details can be found in the `INPUTCLASS` section of the `xorg.conf(5)` manual page.
- *Xorg configuration directories* are used to allow fragments of the X server configuration to be delivered in individual files. For instance, the input device driver matching rules previously provided in HAL `.fdi` files are now provided as `InputClass` sections in `.conf` files in a `xorg.conf.d` directory.
- *udev* is now used by the X server on Linux systems for input device discovery and hot-plug notification. Other platforms continue to use the HAL framework for these tasks for now.
- *X protocol C-language Binding (XCB)* is now included in the `katamari`, and is required by several client-side modules, including `libx11`, **`xlsatoms`**, **`xlsclients`** and **`xwininfo`**. XCB is a replacement for Xlib featuring a small footprint, latency hiding, direct access to the protocol, improved threading support, and extensibility. More information can be found on the XCB website at <http://xcb.freedesktop.org/>.
- Major progress has been made on the X.Org Documentation modernization - most of the library and protocol specifications are now included in the modules for those libraries and protocols so they can be updated in sync with new versions, and many have been converted to DocBook XML from the variety of formats they were previously in. On most systems these documents will be installed under `/usr/share/doc/`. They are also posted on the X.Org website at <http://www.x.org/releases/X11R7.6/>.
- *Video and input driver enhancements*. Please see the ChangeLog files for individual drivers; there are far too many updates to list here.
- ... and the usual assortment of correctness and crash fixes.

Overview of X11R7.5

On most platforms, X11R7.5 has a single hardware-driving X server binary called **Xorg**. This binary can dynamically load the video drivers, input drivers, and other modules that are needed. **Xorg** has currently has support for Linux, Solaris, and some BSD OSs on Alpha, PowerPC, IA-64, AMD64, Intel x86, Sparc, and MIPS platforms.

Additional specialized X server binaries may be found depending on the platform and build configuration, including:

Xdmx is a proxy X server that uses one or more other X servers as its display devices. It provides multi-head X functionality for displays that might be located on different machines.

Xnest is a nested X server, that operates as both an X client and X server. **Xnest** is a client of the real server which manages windows and graphics requests on its behalf. **Xnest** is a server to its own clients, and manages windows and graphics requests on their behalf. To these clients, it appears to be a conventional server.

Xephyr is a X server that outputs to a window on a pre-existing “host” X display. Unlike **Xnest** which is an X proxy, and thus limited to the capabilities of the host X server, **Xephyr** is a full X server which uses the host X server window as a “framebuffer” via fast SHM XImages.

Xvfb is a virtual framebuffer X server that can run on machines with no display hardware and no physical input devices. It emulates a dumb framebuffer using virtual memory.

Xquartz is an X server that interacts with the MacOS X native Aqua window system, displaying windows on the Mac desktop and accepting input from the Mac system devices, allowing X11 applications to be used in a native Mac desktop session.

Xwin is an X server that runs under the Cygwin environment, interacting with the Microsoft Windows native window system, displaying windows on the Windows desktop and accepting input from the Windows system devices, allowing X11 applications to be used in a native Windows desktop session.

Details of X11R7.5 components

Video Drivers

X11R7.5 includes the following video drivers:

Driver Name	Description	Further Information
apm	Alliance Pro Motion	README.apm
ark	Ark Logic	
ast	ASPEED Technology	
chips	Chips & Technologies	README.chips, chips(4)
cirrus	Cirrus Logic	
fbdev	Linux framebuffer device	fbdev(4)
geode (*)	AMD Geode GX and LX	
glint	3Dlabs, TI	glint(4)
i128	Number Nine	README.I128, i128(4)
i740	Intel i740	README.i740
imstt	Integrated Micro Solns	
intel	Intel i8xx/i9xx	README.intel, intel(4)
mach64	ATI Mach64	README.ati
mga	Matrox	mga(4)
neomagic	NeoMagic	neomagic(4)
newport (-)	SGI Newport	README.newport, new- port(4)
nsc	National Semiconductor	nsc(4)
nv	NVIDIA	nv(4)
r128	ATI Rage128	README.r128, r128(4)
radeon	ATI Radeon	radeon(4)
rendition	Rendition	README.rendition, rendi- tion(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)
sisusb	SiS USB	sisusb(4)
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 Voodoo Banshee, 3, 4 tdfx(4) & 5	
tga	DEC TGA	README.DECtga
trident	Trident	trident(4)
tseng	Tseng Labs	
v4l	Video4Linux	v4l(4)
vesa	VESA	vesa(4)
vmware	VMware guest OS	vmware(4)
voodoo	3Dfx Voodoo 1 & 2	voodoo(4)
wsfb	Workstation Framebuffer	wsfb(4)
xgi	XGI	xgi(4)
xgixp	XGI XP	xgixp(4)

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.

Input Drivers

X11R7.5 includes the following input drivers:

Driver Name	Description	Further Information
acecad	Acecad Flair	acecad(4)
aiptek(*)	Aiptek USB tablet	aiptek(4)
evdev(*)	Linux kernel EvDev	evdev(4)
joystick	Joystick	joystick(4)
kbd	generic keyboards (non-kbd(4) evdev systems)	
mouse	most mouse devices (non-mousedrv(4) evdev systems)	
synaptics	Synaptics & ALP touchpads	synaptics(4)
vmmouse	VMWare virtual mouse	vmmouse(4)
void	dummy device	void(4)

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

Xorg server

Loader and Modules

The Xorg server relies on the operating system's native module loader support for handling program modules. The X server makes use of modules for video drivers,

X server extensions, input device drivers, framebuffer layers, and internal components used by some drivers (like XAA & EXA).

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, 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 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.

Configuration File

The Xorg 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 `xorg.conf(5)` manual page.

Note that this release features significant improvements for running the server without a configuration file, so many users may find that they don't need a configuration file.

If you do need to customize the configuration file, see the `xorg.conf` manual page . You can also check the driver-specific manual pages and the related documentation (found at [driver tables](#)) also.

The recommended method for generating a configuration file is to use the Xorg server itself. Run as root:

```
Xorg -configure
```

and follow the instructions.

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 `Xorg(1)` manual page.

Multi-head

Some multi-head configurations are supported in X11R7.5. Support for multiple PCI/AGP cards may require a kernel with changes to support VGA arbitration.

One of the main problems is with drivers not sufficiently initializing cards that were not initialized at boot time. This has been improved somewhat with the INT10 sup-

port 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).

Xinerama

Xinerama is an X server extension that allows multiple physical screens connected to multiple video devices 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. Note that enabling Xinerama may disable certain other extensions which are not compatible with Xinerama.

DDC

The VESA® Display Data Channel (DDC™) standard allows the monitor to tell the video card (or in 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.

Changed behavior caused by DDC.

Several drivers use 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.

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. The 3D core rendering component is provided by Mesa.

Of note is that this release supports building the X server using the system-wide `libdrm`. Previously, `drm` was kept in the server's tree and loaded as a module, rather than using the standard OS mechanisms for managing shared libraries of code. This requires that the server be built using a version of `libdrm` of 2.3.0 or newer if it is to use DRM.

Terminate Server keystroke

The Xorg server has previously allowed users to exit the server by pressing the keys **Control + Alt + Backspace**. While this function is still enabled by default in this release, the keymap data usually used with Xorg, from the `xkeyboard-config` project, has been modified to not map that sequence by default, in order to reduce the chance that inexperienced users will accidentally destroy their work.

Users who wish to have this functionality available by default may enable it via the XKB configuration option `"terminate:ctrl_alt_bksp"`. For instance, the **setxkbmap** command can be used to enable this by running:

```
setxkbmap -option "terminate:ctrl_alt_bksp"
```

The XKB Configuration Guide also includes an example `xorg.conf.d` file that sets the `"terminate:ctrl_alt_bksp"` option by default on all keyboards. Many desktop environments include XKB configuration options in their preferences to enable this as well.

X Server startup state

The X servers in the X11R7.5 release now start by default with an empty black screen and do not draw the mouse cursor until a client sets the cursor image. To restore the classic behavior of starting with the grey weave pattern and `x` cursor, start the X server with the `-retro` option.

Font support

Details about the font support in X11R7.5 can be found in the “Fonts in X11R7.5” document.

Default font installation directory

Previous versions of X installed font files under the `lib/X11/fonts` subdirectory of the X installation directory (for instance, in X11R6 releases, `/usr/X11R6/lib/X11/fonts` was commonly used). This release uses the default installation path of the `fonts` subdirectory of the `datadir` setting from the GNU `autoconf` configuration. For instance, if the fonts are configured with `./configure --prefix=/usr`, they will be installed under subdirectories of `/usr/share/fonts/X11`. The font module `configure` scripts all take an option of `--with-fontrootdir=PATH` to override the default. If `--with-fontrootdir` is not specified, the `fontutil pkg-config` file will be consulted to find the `fontrootdir` specified when the `fontutil` module was installed.

Bitmap font compression methods

The X11R7.5 release supports PCF format bitmap fonts stored uncompressed or compressed via the **compress**, **gzip**, or **bzip2** programs. To utilize `bzip2` compression, the `libXfont` and **mkfontscale** modules must be built with the `--with-bzip2` — all other methods are enabled by default.

To specify which compression method to use when installing a font module from X11R7.5 the configure scripts accept an option of `--with-compression=TYPE`, where *TYPE* may be `none`, `compress`, `gzip`, or `bzip2`.

Type1 Font support

Previous versions of X came with two Postscript Type1 font backends. The functionality from the “Type1” backend has been replaced by the Type1 support in the “FreeType” backend.

CID Font support

The CID-keyed font format was designed by Adobe Systems for fonts with large character sets. The CID-keyed format is obsolete, as it has been superseded by other formats such as OpenType/CFF and support for CID-keyed fonts has been removed from X11.

Build changes and issues

Silent build rules

Most of the modules in this release use the `AM_SILENT_RULES` option of GNU automake 1.11. When building the software, most output will show an abbreviated format for the commands being run, such as:

```
CC xmen.o
```

To enable verbose output, showing all the arguments to the commands being run, add the flag `v=1` to the **make** command line or add the flag `--disable-silent-rules` to the configure command.

New configure options for font modules

The bitmap font modules now accept a configure option of `--disable-all-encodings` to set the default for all encodings to off, requiring builders to then pass `--enable-<encoding>` flags for each encoding to be built.

New configure options for documentation in modules

As many more modules now contain documentation to be converted from DocBook XML to text, HTML, PostScript, and/or PDF formats, new standard options have been added to the configure macros to control the build of these in the modules.

<code>--with-xmlto=yes/no</code>	Enables or disables use of the xmlto command to translate DocBook XML to other formats. All DocBook XML conversions require use of this command.
<code>--with-fop=yes/no</code>	Enables or disables use of the Apache fop command to translate DocBook XML to PostScript and PDF formats.
<code>--enable-docs=yes/no</code>	Enables or disables the build and installation of all documentation except traditional man pages or those covered by the <code>--enable-devel-docs</code> and <code>--enable-specs</code> options.
<code>--enable-devel-docs=yes/no</code>	Enables or disables the build and installation of documentation for developers of the X.Org software modules.
<code>--enable-specs=yes/no</code>	Enables or disables the build and installation of the formal specification documents for protocols and APIs.

Miscellaneous

This section describes other items of note for the X11R7.5 release.

Socket directory ownership and permissions

The socket directories created in `/tmp` are now required to be owned by root and have their sticky-bit set. If the permissions are not set correctly, the component using this directory will print an error message and fail to start. Common socket directories that are known to be affected include:

```
/tmp/.font-unix  
/tmp/.ICE-unix  
/tmp/.X11-unix
```

These directories are used by the font server (**xfs**), applications using the Inter-Client Exchange protocol (ICE) and the X server, respectively.

There are several solutions to the problem of when to create these directories. They could be created at install time by the system's installer if the `/tmp` dir is persistent. They could be created at boot time by the system's boot scripts (e.g., the `init.d` scripts). Or, they could be created by PAM modules at service startup or user login time.

The solution chosen is platform dependent, and the system administrator should be able to handle creating those directories on any systems that do not have the correct ownership or permissions.

Deprecated components and removal plans

This section lists current plans for removal of obsolete or deprecated components in the X.Org releases. As our releases are open source, users who continue to require these can find the source in previous releases and continue to use these, but the X.Org Foundation and its volunteers have decided the burden of continued maintenance and distribution in the core X11 releases outweighs the benefits of doing so. In some cases, this is simply because no one has volunteered to do continued maintenance, so if software is listed here that you need, you can contact [<xorg@lists.freedesktop.org>](mailto:xorg@lists.freedesktop.org) to volunteer to take over maintainership, either inside or outside of the Xorg release process.

Future Removals

DGA version 2	DGA 2.0 is included in 7.5. Documentation for the client libraries can be found in the XDGA(3) man page. DGA should be considered deprecated; if you are relying on it, please let us know what you need it for so we can find better solutions. In this release, support has been removed for all DGA rendering and mapping code, leaving just mode setting and raw input device access.
Input device discovery via HAL	The Xorg server currently uses the HAL framework to discover connected input devices, receive notification of hotplug events for them, and to retrieve configuration parameters for them. The HAL maintainers have deprecated HAL, so the X.Org developers have begun replacement with alternatives. As a result, configuration of input devices via HAL *.fdi files is no longer supported on Linux platforms using udev, and may not be supported on other platforms in future Xorg server releases.

Removed in this Release

Xprint	The Xprint server and extension were previously removed from X11R7.5. This release removes Xprint support from a number of client programs that still had it.
Xsdl server	The experimental Xsdl server has never been finished or maintained, and was removed in this release.
Unmaintained extensions	Support has been removed from the X servers for the following extensions, which were obsolete, not widely used, or not working: <ul style="list-style-type: none">• Multi-Buffering

Attributions/Acknowledgements/Credits

This section lists the credits for the X11R7.5 release. For a more detailed breakdown, refer to the ChangeLog file in the source tree for each module, the history in the xorg product in freedesktop.org's git repositories or the 'git log' information for individual source files.

The X Window System has been a collaborative effort from its inception. Our apologies for anyone or organization inadvertently overlooked. Many individuals (including major contributors) who worked on X are represented by their employers in this list. If you feel we have left anyone out, please let us know.

These people contributed in some way to X11R7.5 since the release of X11R7.4:

邓逸昕	Kim Woelders
Aaron Plattner	Kok, Auke
Aaron Zang	Kristian Høgsberg
Adam Jackson	Kusanagi Kouichi
Adam Tkac	Lee Leahu
Adrian 'Dagurashibanipal' von Bidder	Leif Middelschulte
Adrian Bunk	Leonardo Chiquitto
Alan Coopersmith	Lubos Lunak
Alberto Milone	Luc Verhaegen
Alex Deucher	Luca Tettamanti
Alex Warg	Ma Ling
Alexander Kabaev	Maarten Maathuis
Alp Toker	Macpaul Lin
Andrej Gelenberg	Magnus Kessler
Andres Salomon	Marc Majka
Andrew Chant	Marcin Baczyński
Andrew Randrianasulu	Marcin Kościelnicki
Andrzej Hajda	Marcin Slusarz
Andy Furniss	Marek Olšák
Andy Ritger	Mario Kleiner
Antoine Latter	Mark Kettenis
Arkadiusz Miśkiewicz	Marko Myllynen
Arnaud Fontaine	Markus Duft
Auke Kok	Markus Gapp
Bart Massey	Markus Strobl
Bartek Iwaniec	Mart Raudsepp
Bartosz Brachaczek	Martin Ettl
Ben Byer	Martin Otte
Ben Hutchings	Martin Pärtel
Ben Skeggs	Martin-Éric Racine
Benjamin Close	Márton Németh
Benjamin Tissoires	Matt Dew
Bernhard R. Link	Matt Turner
Bob Ham	Matteo Delfino
Brian Paul	Matthias Hopf
Brice Goglin	Matthieu Herrb
Bryce Harrington	Matthijs Kooijman
Carl Worth	Michael Cree
Carlos Garnacho	Michael Jansen

Carsten Meier	Michael Olbrich
Cedric Cellier	Michael Ost
Chase Douglas	Michael Stapelberg
Chris Bagwell	Michael Vogt
Chris Ball	Michał Górny
Chris Dekter	Michel Dänzer
Chris Humbert	Mikhail Gusarov
Chris Wilson	Nicolai Hähnle
Christian Bühler	Nicolas Boullis
Christian Hartmann	Nicolas George
Christian Zander	Nicolas Reinecke
Christoph Pfister	Nigel Tamplin
Christopher James Halse Rogers	Nirbheek Chauhan
Cody Maloney	Oldřich Jedlička
Colin Harrison	Oliver McFadden
Colin Watson	Olivier Samyn
Cooper Yuan	Osamu Sayama
Corbin Simpson	Oswald Buddenhagen
Csillag Kristof	Otavio Salvador
Cyril Brulebois	Owain G. Ainsworth
Dan Nicholson	Owen W. Taylor
Daniel Drake	Patrick Caulfield
Daniel Kahn Gillmor	Patrick Curran
Daniel Stone	Patrick E. Kane
Dave Airlie	Patrick Guimond
David Ge	Paul Bender
David James	Paul Loewenstein
David Ronis	Paul "TBBle" Hampson
David Woodhouse	Pauli Nieminen
Diego 'Flameeyes' Pettenò	Paulo César Pereira de Andrade
Dima Kogan	Paulo Ricardo Zanoni
Dirk Wallenstein	Peter Harris
Dmitry Torokhov	Peter Hutterer
Dominik Jasiok	Peter Korsgaard
Donnie Berkholz	Petr Salinger
Eamon Walsh	Philippe Ribet
Ed Schouten	Pierre-Loup A. Griffais
Edward Moy	Rami Ylimäki
Edward O'Callaghan	Rémi Cardona
Egbert Eich	Rémi Denis-Courmont
Eric Anholt	Richard Barnette
Éric Piel	Richard Purdie
Eric Sesterhenn	Rob Taylor
Fabio Pedretti	Robert Bragg
Fernando Carrijo	Robert Hooker
Francisco Jerez	Robert Morell
Frank Huang	Roel Kluin
Fredrik Höglund	Roland Scheidegger
Gabor Z. Papp	Ruediger Oertel
Gaetan Nadon	Ryan Hajdaj
Geoffrey Li	Sam Lau
Guillem Jover	Sami Farin
Hans Nieser	Samuel Thibault
Heikki Lindholm	Sascha Hlusiak

Henning Sten
Henry Zhao
Hiroyuki Ikezoe
Horst Wente
Hunk Cui
Ian Osgood
Ian Romanick
Ingmar Vanhassel
Jakob Bornecrantz
James Cloos
James Jones
James Le Cuirot
Jamey Sharp
Jan Hauffa
Jens Petersen
Jeremy Huddleston
Jeremy Kolb
Jeroen Hoek
Jerome Glisse
Jesse Adkins
Jesse Barnes
Jim Ingram
Jim Ramsay
Joachim Breitner
Jon TURNEY
Josh Triplett
Julien Cristau
Julien Danjou
Juliusz Chroboczek
Justin Mattock
Kalle Olavi Niemitalo
Karl Tomlinson
Kees Cook
Keith Packard
Kenneth Graunke
Kevin E Martin
Kevin Van Vechten

Sedat Dilek
Shunichi Fuji
Simon Farnsworth
Simon Thum
Søren Sandmann Pedersen
Thien-Thi Nguyen
Thomas Coppi
Thomas Hellstrom
Thomas Hunger
Thomas Jaeger
Tiago Vignatti
Tilman Sauerbeck
Tim Yamin
Timo Aaltonen
Timo Myyra
Tobias Droste
Tobias Koch
Tollef Fog Heen
Tomas Carnecky
Tomáš Chvátal
Tormod Volden
Trevor Woerner
Ville Syrjälä
Vincent Torri
Walter Harms
Will Thompson
Wolfram
Xavier Chantry
Xiaoyang Yu (Max)
Y.C. Chen
Yaakov Selkowitz
Yang Zhao
Yann Droneaud
Yannick Heneault
Zephaniah E. Hull
Zhao Yakui

This product includes software developed by:

2d3d Inc.
3Dlabs Inc. Ltd.
Aaron Plattner
Adam de Boor
Adam Jackson
Adobe Systems Inc.
Advanced Micro Devices, Inc.
After X-TT Project
AGE Logic Inc.
Alan Coopersmith
Alan Cox
Alan Hourihane
Alexander Gottwald
Alex Deucher

Kensuke Matsuzaki
Kevin E. Martin
Kim woelders
Kristian Høgsberg
Larry Wall
Lars Knoll
Lawrence Berkeley Laboratory
Leif Delgass
Lennart Augustsson
Leon Shiman
Lexmark International Inc.
Linus Torvalds
Linuxcare Inc.
Lorens Younes

Alex Williamson	Luc Verhaegen
Alexei Gilchrist	Machine Vision Holdings Inc.
Anders Carlsson	Mandriva Linux
Andreas Luik	Manfred Brands
Andreas Monitzer	Manish Singh
Andreas Robinson	Marc Aurele La France
Andrei Barbu	Mark Adler
Andrew C Aitchison	Mark J. Kilgard
Andrey A. Chernov	Mark Kettenis
Andy Ritger	Mark Leisher
Angus Lees	Mark Smulders
Ani Joshi	Mark Vojkovich
Anton Zioviev	Martin Husemann
Apollo Computer Inc.	Marvin Solomon
Apple Computer Inc.	Massachusetts Inst. Of Technology
Apple Inc.	Matrox Graphics
Ares Software Corp.	Matthew Grossman
Arnaud LE HORS	Matthias Hopf
Arne Schwabe	Matthias Ihmig
ASPEED Technology Inc.	Matthieu Herrb
AT&T Inc.	Metro Link Inc.
ATI Technologies Inc.	Michal Rehacek
Bart Massey	Michael Bax
Bart Trojanowski, Symbio Technologies, LLC	Michael H. Schimek
BEAM Ltd.	Michael P. Marking
Benjamin Herrenschmidt	Michael Schimek
Benjamin Riefenstahl	Michael Smith
Ben Skeggs	Michel Dänzer
Beth Mardutho: The Syriac Institute	Mike A. Harris
Bigelow and Holmes	Mike Harris
Bill Reynolds	Ming Yu
Bitstream Inc.	MIPS Computer Systems Inc.
Bogdan Diaconescu	MontaVista Software Inc.
Branden Robinson	National Semiconductor
Brian Fundakowski Feldman	NCR Corporation Inc.
Brian Goines	Neil Brown
Bogdan D.	NetBSD Foundation
Brian Paul	Netscape Communications Corp.
Bruce Kalk	Network Computing Devices Inc.
Bruno Haible	New Mexico State University
Bryan Stine	Nicholas Joly
Bryan W. Headley.	Nicholas Miell
C. Scott Ananian	Nicholas Wourms
Carl Switzky	Nicolai Haehnle
Catharon Productions Inc.	Noah Levitt
Charles Murcko	Nolan Leake
Chen Xiangyang	Nokia Corporation
Chisato Yamauchi	Nokia Home Communications
Chris Constello	Novell Inc.
Chris Salch	Nozomi YTOW
Christian Thaeter	NTT Software Corporation
Christian Zietz	Number Nine Computer Corp.
Cognition Corp.	Number Nine Visual Technologies

Compaq Computer Corporation	NVIDIA Corporation
Concurrent Computer Corporation	Oivier Danet
Conectiva S.A.	Oki Technosystems Laboratory Inc.
Corin Anderson	Olivetti Research Limited
Corvin Zahn.	OMRON Corporation
Cronyx Ltd.	Open Software Foundation
Craig Struble	Open Text Corporation
Daewoo Electronics Co. Ltd.	OpenedHand Ltd.
Dag-Erling Smørgrav	Oracle Corp.
Dale Schumacher	Orest Zborowski
Damien Miller	Owen Taylor
Daniel Berrange	Pablo Saratxaga
Daniel Borca	Panacea Inc.
Daniel Stone	Panagiotis Tsirigotis
Daniver Limited	Paolo Severini
Daryll Strauss	Pascal Haible
Data General Corporation	Patrick Lecoanet
Dave Airlie	Patrick Lerda
David Bateman	Paul Anderson
David Dawes	Paul Elliott
David E. Wexelblat	Paul Mackerras
David Holland	Peter Breitenlohner
David J. McKay	Peter Hutterer
David McCullough	Peter Kunzmann
David Mosberger-Tang	Peter Osterlund
David Reveman	Peter Trattler
David S. Miller	Philip Blundell
David Woodhouse	Philip Homburg
Davor Matic	Philip Langdale
Deron Johnson	Precision Insight Inc.
Digeo Inc.	Prentice Hall
Dennis De Winter	Quarterdeck Office Systems
Digital Equipment Corporation	Radek Doulik
Dirk Hohndel	Ralf Habacker
Dmitry Golubev	Randy Hendry
Donnie Berkholz	Ranier Keller
DOS-EMU-Development-Team	Red Hat Inc.
Doug Anson	Regis Cridlig
Drew Parsons	Rene Cougnenc
Earle F. Philhower III	Richard A. Hecker
Edouard TISSERANT	Richard Burdick
Eduard Fuchs	Rich Murphey
Eduardo Horvath	Rickard E. Faith
Egbert Eich	Rik Faith
Egmont Koblinger	Robert Chesler
Elliot Lee	Robert Millan
Eric Anholt	Robert V. Baron
Eric Fortune	Robin Cutshaw
Eric Sunshine	Roland Mainz
Erik Fortune	Roland Scheidegger
Erik Nygren	Ronny Vindenes
Evans & Sutherland Computer Corp.	Russ Blaine
Fabio Massimo Di Nitto	Ryan Breen
Fabrizio Gennari	Ryan Lortie

Fedor P. Goncharov	Ryan Underwood
Felix Kühling	S. Lehner
Finn Thoegersen	S3 Graphics Inc.
Francesco Zappa Nardelli	Sam Leffler
Frank C. Earl	Santa Cruz Operation Inc.
Florian Loitsch	Sascha Hlusiak.
Francisco Jerez	SciTech Software
Fred Hucht	Scott Laird
Frederic Lepied	Sebastien Marineau
Fredrik Höglund	Serge Winitzki
Free Software Foundation	Sergey Vovk
Fujitsu Limited	Shigehiro Nomura
Fujitsu Open Systems Solutions Inc.	ShoGraphics Inc.
Fuji Xerox Co. Ltd.	Shunsuke Akiyama
Gareth Hughes	Silicon Graphics Computer Systems
Geert Uytterhoeven	Silicon Graphics, Inc.
George Fufutos	Silicon Integrated Systems Corp
George Sapountzis	Silicon Motion Inc.
Gerrit Jan Akkerman	Simon P. Cooper
Gerry Toll	Simon Thum
Ghozlane Toumi	Snitily Graphics Consulting Services
Glenn G. Lai	Sony Corporation
GNOME Foundation	Søren Sandmann
Go Watanabe	SRI
Google Summer of Code participants	Stanislav Brabec
Greg Kroah-Hartman	Stefan Bethge
Gregory Mokhin	Stefan Dirsch
Greg Parker	Stefan Gmeiner
GROUPE BULL	Stephane Marchesin
Guillem Jover	Stephan Lang
Guy Martin	Steven Lang
Hans Oey	Stuart Kreitman
Harald Koenig	Sun Microsystems Inc.
Harm Hanemaayer	SunSoft Inc.
Harold L Hunt II	SuSE Inc
Harry Langenbacher	Sven Luther
Hartwig Felger	Takis Psarogiannakopoulos
Henry A. Worth	Takuma Murakami
Henry Davies	Takuya SHIOZAKI
Hewlett-Packard Company	T. A. Phelps
Hitachi Ltd.	Tektronix Inc.
Holger Veit	Theo de Raadt
Hong Bo Peng	Theodore Ts'o
Howard Greenwell	The Open Group
Hummingbird Communications Ltd.	The Unichrome Project
Ian Romanick	The Weather Channel Inc.
IBM Corporation	Thomas E. Dickey
Inst. of Software Academia Sinica	Thomas G. Lane
Intel Corporation	Thomas Hellström
INTERACTIVE Systems Corporation	Thomas Mueller
Itai Nahshon	Thomas Roell
Itronix Inc.	Thomas Thanner
Ivan Kokshaysky	Thomas Winischhofer
Ivan Pascal	Thomas Wolfram

Jakub Jelinek	Thorsten.Ohl
James Tsillas	Tiago Gons
Jamey Sharp	Tilman Sauerbeck
Jason Bacon	Todd C. Miller
Jaymz Julian	Tomohiro KUBOTA
Jean-loup Gailly	Torrey Lyons
Jeff Hartmann	Torrey T. Lyons
Jeff Kirk	TOSHIBA Corp.
Jeffrey Hsu	Toshimitsu Tanaka
Jehan Bing	Travis Tilley
Jeremy C. Reed	Trolltech AS
Jeremy Katz	Troy D. Hanson
Jeremy Huddleston	Tungsten Graphics Inc.
Jérôme Glisse	Tuomas J. Lukka
Jesse Barnes	Ty Sarna
Jim Gettys	UCHIYAMA Yasushi
Jim Tsillas	Unicode Inc.
Joerg Sonnenberger	UniSoft Group Limited
John Dennis	University of California
John Harper	University of South Australia
John Heasley	University of Utah
Jonathan Adamczewski	University of Wisconsin
Jon Block	UNIX System Laboratories Inc.
Jon Smirl	URW++ GmbH
Jon Tombs	Valery Inozemtsev
Jörg Bösner	VA Linux Systems
Jorge Delgado	VIA Technologies Inc.
José Fonseca	Video Electronics Standard Assoc.
Josh Triplett	VMware Inc.
Joseph Friedman	Vrije Universiteit
Joseph P. Skudlarek	Wittawat Yamwong
Joseph V. Moss	Wyse Technology Inc.
Julio M. Merino Vidal	X Consortium
Juan Romero Pardines	XFree86 Project Inc.
Juliusz Chroboczek	Xi Graphics Inc.
Jyunji Takagi	X-Oz Technologies
Kaleb Keithley	X-TrueType Server Project
Kazushi (Jam) Marukawa	X.Org Foundation
Kazuyuki (ikko-) Okamoto	XGI Technology
Kazutaka YOKOTA	Yu Shao
Kean Johnston	Zack Rusin
Keith Packard	Zephaniah E. Hull
Keith Whitwell	Zhenyu Wang

This product includes software developed by The XFree86 Project, Inc (<http://www.xfree86.org/>) and its contributors.

This product includes software that is based in part on the work of the FreeType Team (<http://www.freetype.org/>).

This product includes software developed by the University of California, Berkeley and its contributors.

This product includes software developed by Christopher G. Demetriou.

This product includes software developed by the NetBSD Foundation, Inc. (<http://www.netbsd.org/>) and its contributors.

This product includes software developed by X-Oz Technologies (<http://www.x-oz.com/>).