Xfce : A lightweight desktop environment

Olivier Fourdan, fourdan@xfce.org

1) Introduction

There are many differences between UNIX like Operating Systems and desktop workstations' OS that make UNIX and Linux so unique.

One of them is the X layer being independent from the window manager, allowing the end user to choose between more than 60 different available window managers.

Recently, two major projects have emerged on Linux, both trying to reproduce the look and feel of Microsoft Windows and Apple Macintosh environments on UNIX/Linux. KDE and GNOME, as they are known, are doing very well in this, and the developers have done a terrific good job, writing many applications to be embedded in the desktop.

Although these environments work very well on a standalone workstation, they are slow when running across a Network. Moreover, the concept of an X server, with many users connected through the Network does not apply due to network performance issues and memory consumption.

My feeling is that there is a strong need for a lightweight (but still powerful) environment that could run flawlessly when running on small servers and that could serve many X terminals (that can be real X terminals, other UNIX/Linux boxes running X or X emulator running on a Windows workstation).

2) History

Actually the need came first from the simple fact that when I was running one of these environments, there were few system resources left available to run the applications I needed. It was clear to me that the goal was not to run the desktop (as nice as it could be), but to get the job done with the application.

Xfce's primary distinction from other window managers and desktops is its speed. It's designed to run fast. Xfce being more than just a window manager, it's clear that the memory footprint of the whole environment is slightly bigger than running just a window manager. Yet, its memory footprint is much lower than other desktop environments.

The look of Xfce is inspired by CDE, the industry standard desktop on UNIX. But CDE is also very heavy and requires a lot of system resources to run.

The look being close to CDE provides a "professional" appearance for Xfce. Xfce turns Linux into a real, professional workstation according to the users' comments I received.

When I first start coding Xfce, in early 1997, I couldn't imagine how much work it could be and how far it would go. My first goal was to write a toolbar similar to the CDE panel in look (when I first saw the CDE panel, I felt instantly at ease : There were no hierarchical sub–menus to remember; all menus were logically separate and logically arranged by category, etc.). At that time, there was nothing more than the xfce toolbar. It was interfacing with fvwm, using fvwm's module standards.

I first started coding Xfce using T.C. Zhao's Xforms library mainly because Xforms provided a GUI designer and it was very simple to understand and learn. Xfce is entirely written in plain C, with the exception of a few shell scripts and a python script.

After I published the very first version on Metalab (formerly SunSITE), users started asking for some enhancements. I remember the first one was to be able to change the color palette !

Lately, I decided to include my own window manager which was based on fvwm. Actually, I think that the window manager took almost as much time coding as the toolbar itself. I made a lot of changes in fvwm to make xfwm.

The latest and probably biggest change came with the entire rewrite of xfce using GTK+ instead of Xforms last year. There are many reasons for this, one of them is Xforms not being Open Source.

3) Overview of Xfce

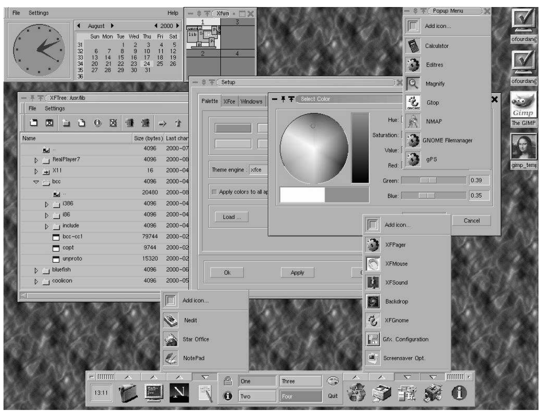
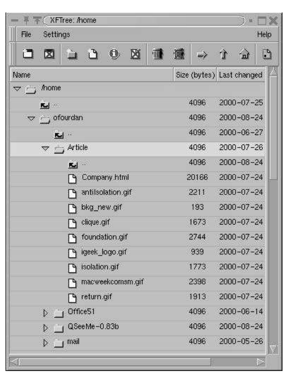


Illustration 1Xfce desktop

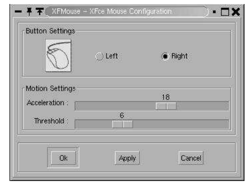
Xfce is made of a set of tools that are designed to work together.

- xfce, the toolbar that resembles the CDE panel :

- xfwm, the window manager
- xftree, the file manager :



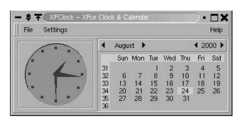
- xfmouse, the mouse settings utility :



- xfsound, the sound daemon/configuration

- xfbd, the backdrop manager

- xfclock, a clock and calendar



- xfpager, the pager
- xfgnome
- Plus as set of shell scripts for use as Drag and Drop actions for the Xfce panel (xfterm, xftrash, xfprint and xfhelp)

From the Xfce setup dialog, the user can change most of the options for the toolbar and the window manager. This is another strength of Xfce (according to Xfce's users): Xfce does not try to provide the extreme look and feel configurability as some other window managers do, but most of the configuration settings can be changed with a few mouse clicks. Xfce doesn't sacrifice functionality for its small size. The panel is very easy to configure and users can get around without having to constantly use the mouse due to the ample keyboard key bindings available.

Xfce provides the ability to built the color scheme entirely with the mouse, and automatically creates the appropriate .gtkrc configuration file so all GTK applications can share the same look. A small script, written in Python and launched at startup, will manage the color scheme for all X resources so all other standard X applications such as Xt or Motif applications also share the same colors and fonts. This strengthens the concept of a uniform desktop.

4) Usage of Xfce

The configuration and compilation of Xfce are very easy, using standard GNU tools such as GNU autoconf and automake.

Installation is also very easy, as a couple of scripts are provided to easily install/uninstall Xfce on a given user account :

- xfce_setup will replace the current $HOME/.xinitrc file with another one that starts xfce
- xfce_remove will restore user's files
- startxfce can be used as a replacement of startx if one wants to keep their configuration files untouched.

Adding entries to Xfce popup menus is as simple as dragging an executable file from xftree (the file manager) or any other xdnd aware file manager– onto the "add icon" entry.

Changing an existing entry can be done using the right mouse button. This is a general process in Xfce, whenever you want to change an existing icon or a screen label, just click using the left mouse button.

5) Integration with GNOME, KDE and Motif applications.

5.1 GNOME inter–operability

Xfce and GNOME have two things in common : They are both written in C and both based on GTK+, the widget library. It's clear that the GNOME project features tons of different applications for various purpose that Xfce, as a desktop environment, will never cover. Making Xfce and GNOME tightly compatible gives the ability to use GNOME tools transparently with Xfce.

Thanks to the separate GNOME compatibility module (xfgnome) users can turn xfwm into a GNOME–aware window manager and run the GNOME panel along with its applets, including GNOME pager or tasklist.

But Xfce compatibility with GNOME is not limited to the window manager. The xfce panel itself is able to automatically adapt its communication protocol to any other GNOME aware window manager (although when running with xfwm, it doesn't use the GNOME protocol, but rather its specific protocol described later in this document)

This allows the user to run xfce panel with Enlightenment, Icewm, Sawmill or any other GNOME–aware window manager.

Xfwm is able to connect at startup to a standard X11R6–compatible session manager, or fallback to its builtin session management if no session manager is available. As a result, if xfwm/xfce are started from gnome–session, they will automatically interface with it.

5.2 Motif applications

Interactions with Motif applications are limited to window decorations.

Like mwm, the Motif window manager, xfwm is able to read Motif specific hints and adapt window decorations accordingly. GTK+ applications also share the same hints.

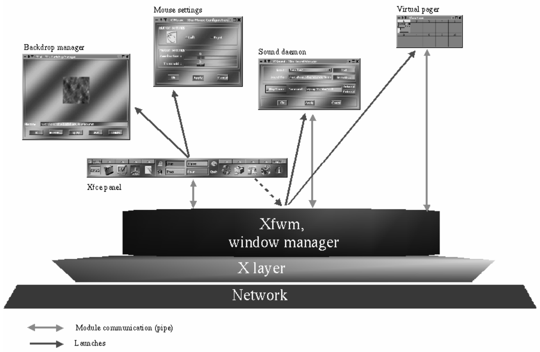
Support for SUN openlook was removed a few months ago, because it was rarely used (except with Openlook applications !). Even SUN has moved to CDE/Motif nowadays.

5.3 KDE

As with Motif, support for KDE applications is limited to window decorations. It means that there is currently no specific KDE module that would allow the use of KDE panel with xfce/xfwm.

But you can obviously use all other KDE applications without problem with Xfce.

6) Architecture



Xfce uses the same techniques as fvwm regarding the communication between modules. Every module communicates with the window manager or other modules using UNIX pipes.
In fact, even the Xfce toolbar can be concidered a module of xfwm.

This provides a high speed communication between modules, but requires the modules to be all spawned by xfwm. Actually, only xfce is really spawned by xfwm, at startup, all other modules are driven by xfce.

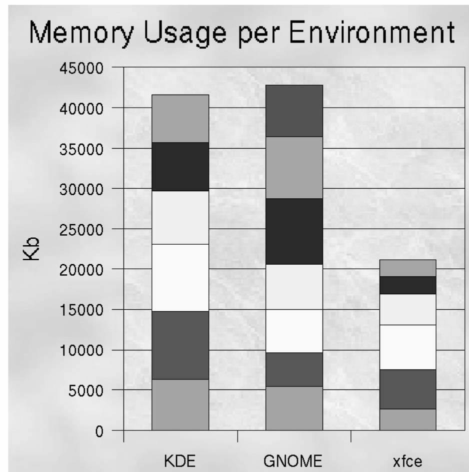
Whenever xfce needs to start a module, from either the startup process or from one of its menus, it calls the window manager asking it to run the module.

This architecture gives more flexibility to the module startup sequence. The user can select from the list of default modules, in xfce setup panel, which module should be launched at startup. This provides the user with the ability to tweak his configuration and reduce memory footprint if some modules are not needed (if you don't use GNOME, you may choose not to start xfgnome, the GNOME compatibility module, or if you don't have a sound card, you'd be better off not to start the sound daemon, etc.)

xfce is designed to save memory. The following charts shows xfce memory footprint compared to GNOME and KDE. To be fair, I've just started the programs that have similar function (window manager, file manager, pager, toolbar, sound, etc.)

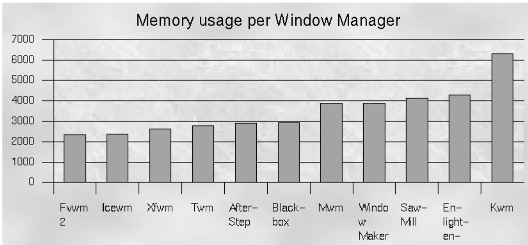
KDE version is 1.1.2 and GNOME is 1.0.55. xfce version is 3.5.0 compiled against gdk-pixbuf (ie without imlib support) :

	KDE		GNOME		xfce
Kwm	6276	gnome-smproxy	5428	xfwm	2616
Kfm	8484	sawmill	4260	xftree	4908
Kpanel	8336	gnome-name-serv	5272	xfce	5516
Kbgmdwm	6596	gnome-session	5600	xfsound	3860
Krootwm	6012	panel	8208	xfgnome	2108
Kwmsound	5932	gmc	7700	Xfpager	2132
		deskguide-applet	6328		
Total	41636	**Total**	42796	**Total**	21140



xfwm can also be compared with other window managers available on Linux (the memory usage is given in Kb, all measurement have been made on the same linux system) :

Fvwm2	2320
Icewm	2368
Xfwm	2616
Twm	2772
AfterStep	2904
Blackbox	2920
Mwm	3872
Window Maker	3884
SawMill	4120
Enlightenment	4272
Kwm	6324



7) Future and rewards

The future of Xfce has always been driven from the users' needs and my inspiration! As stated before, when I first started Xfce, I had no idea of what it could be 3 years later. In the same way, I still have no precise idea of what it will be like 3 years from now. Some enhancements that I'd like to implement, though :

- Icons on the desktop : This will be a program separate from the file manager.
- Modular window manager : By using dynamic linking, I'd like to separate the drawing routines from the core of the window manager. By doing so, xfwm could be able to have different looks without having them coded inside.
- KDE compatibility module (similar to xfgnome for GNOME compatibility)
- Improve documentation : The current documentation is a user guide in the form of an html page.

I'll probably need contributors for that. I made the biggest part of Xfce, but I would like to take this opportunity to express my thanks to the people who helped and contributed to this project over the years :

- **Chuck Mead** : Without Chuck, xfce would be missing its own web site, its own domain name and the mailing list. Needless to say that Chuck is the man who has helped xfce the most in the past two years.
- **Joe Klemmer** : Joe is the kind of user that any developper would like to have ! He has helped a lot in testing and supporting other users on the list.
- And obviously all the people who have contributed patches over the years.

8) Xfce in the press

Linux Planet : *"XFce: The Little Desktop That Could"*

http://www.linuxplanet.com/linuxplanet/reports/1931/1/

LinuxWorld : *"The desktop less travelled"*

http://www.linuxworld.com/linuxworld/lw-1999-12/lw-12-alternative_1_p.html

XFce 3 Initial press release :

http://linuxpr.com/releases/155.html

Linux Gazette :

http://www.linuxgazette.com/issue43/jacobowitz.xfce.html

32Bits Online :

http://www.32bitsonline.com/article.php3?file=issues/199908/xfce/xfce&page=1