

The future of Linux and the desktop

WHICH WAY FORWARD?

JONO BACON



Choice is, in general, a good thing. But choice also brings with it the headaches of decision-making. Linux/UNIX already offers more than 30 window managers in combination with several desktop systems. What will the future hold?



Over the past couple of years I have been involved with the KDE project in contributing to a leading desktop for Linux/UNIX systems. Although my time has been spent with other open source projects, KDE has remained my desktop of choice.

One of the most positive elements of Linux is the power of choice, and this is particularly evident in the world of desktops. Alongside KDE is GNOME, Afterstep, Windowmaker, FVWM and hundreds more. Some of these projects vary in their target, but they are all related in providing an easy to use GUI experience for the Linux user.

Although my interest in KDE is clear, I am going to focus this article on the future of Linux and the desktop, and this covers far more than KDE alone. Of course, I will exercise absolute objectivity in my appraisal of the desktops. My focus is not which desktop to use, but what to expect from each of them. I will leave the decision of personal choice with whom it should be left – you.

The current state of the desktop

Before we can look into the future we need to first look at the current state of the desktop. Using this information we can then examine what we can expect from the desktop in the future.

At the moment the bulk of Linux users appear to be employing either the KDE or GNOME systems. Both of these systems run off the X Window system

(with most Linux users using XFree86). Both systems offer a good graphical interface and provide user and developer with a range of services that can ease the use and development of software running on the respective systems. Both have the following abilities:

- Common styles and interfaces across applications
- Reusable compants
- Object embedding systems
- Graphical system configuration software

The above are a few of the main features of both systems – features that users not only expect, but need building on with innovative features that set the systems apart.

Other than KDE and GNOME, there is currently a well-built and supported X Windows implementation – XFree86. XFree86 currently supports lots of hardware configurations, and is by far the most popular windowing software.

The limitations

Although the current state of the desktop is quite good, it is by no means perfect. Each system (as well as the general architecture) has its flaws. An example to begin with is X itself. X is a bit of a beast as it stands, and although development of X improves daily, it still has some performance issues. This no doubt due to the general structure of the desktop in which the OS is loaded first, and then X,

and then the desktop environment such as KDE or GNOME. In the current system, each layer is required, and the X layer is provided so the desktop system can access the graphics hardware and other services. This extra layer ensures a performance hit compared with other systems, which access the graphics hardware and other services directly. Another problem of X is that it is an established part of an old institution of technologies. X has been around for a number of years, and therefore has a requirement to continually support older software that runs on it (and which could possibly be omitted for a higher performance system).

Another major stumbling block for the current desktop model is that of interoperability. This is the issue of the various desktops sharing information and services with each other so that changing desktops appears seamless. At the moment some things are compatible – such as drag and drop using the XDND protocol. KDE support GTK themes and applications can run under varying desktops if the correct software is installed (Kmail, for instance, will run fine in GNOME). A more serious problem is that of sharing data between applications. An example is if I would like to embed a Spread spreadsheet in

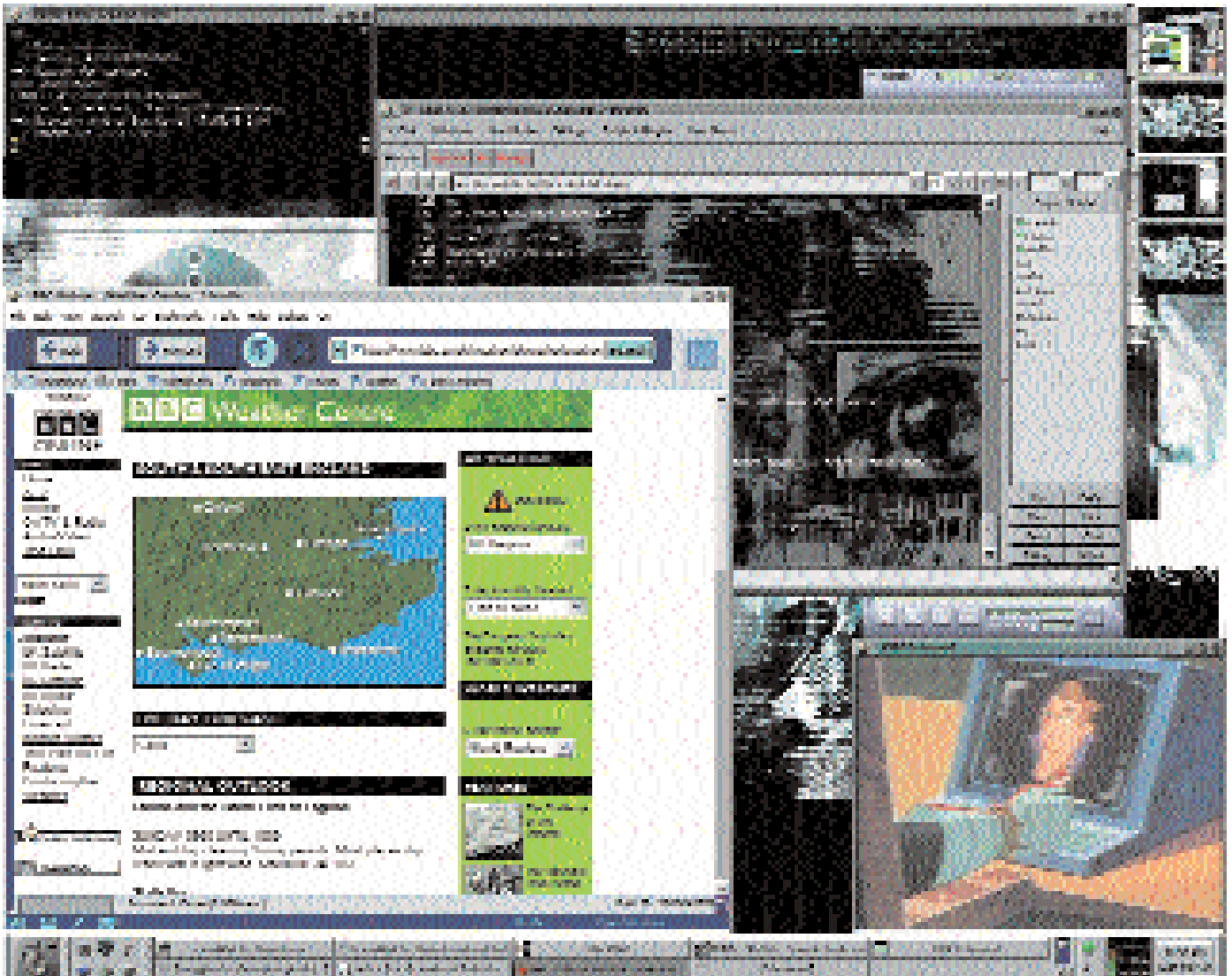
AbiWord. In each environment it is easy to do within that desktop's applications. However, cross desktop embedding is still problematic.

Another uncertainty surrounding the current state of the desktop is the lack of a standardized desktop model. An example is that there are a great many desktop environments available, with a great many varying tools to build applications that run on these environments. Take for example KDE and Qt, GNOME and GTK, Motif, Afterstep, Window Maker, ICEWM, FVWM etc. While I am not saying choice is a bad thing, quite the opposite – it is a very good thing. A lack of standards however is a very bad thing.

The future

The future of the desktop is one which seeks to fix current limitations, and one which works on extending the desktop model to areas and standards. Like any other Open Source project, there are enthusiastic developers from all sides, and just like the 200,00+ CD players we seem to have, there are certainly a variety of different options available.

A typical GNOME Desktop



To best describe the varying projects and where they are going, I will look at each separately and then assess how they fit together.

XFree86

When XFree86 4.0 was released it marked a change in the architecture of X, and added some new features. As XFree86 continues to develop, it gets faster and adds more and more features that make the desktop experience better. Newer features such as alpha blending (the ability to use transparency in graphical objects) and anti aliasing (making graphical objects look less pixilated) are slowly working their way into XFree86. At the moment these technologies are available to varying degrees. They are implemented by the toolkit which sits on top of X (Alpha Blending, for instance, is now supported in KDE2). After made technologies such as Alpha Blending it into XFree86, it can enhance performance. There are also some interesting developments with X in the implementation of XRender; a technology that will make X perform better and more flexibly.

KDE

As I have most experience with KDE, I can fairly faithfully predict its future, and comment on current developments that will come to eventual fruition. At the time of writing, KDE 2.0.1 has just been released, and Alpha Blending has made it into KDE. KDE has been technically superior to many other desktops. The release of KDE2 consolidates its position, as a result of the sheer number of new features and capabilities. The range of technologies that were released in KDE2 makes both development and use of KDE applications easier. Technologies that were released as part of KDE include KParts (a component system for embedding software components in applications), DCOP (an inter-application message mechanism) and numerous other technologies. Although these technologies were new at the time of release, and many heralded a new wave of Linux development, an even more important role can be ascribed to a significant portion of them. Many of these technologies have formed the basis for even more impressive technologies of the future.

Other interesting developments are taking shape in KDE. These consist of the implementation of a better printing system (possibly using CUPS or APS) and a more themeable desktop that will be implemented as time goes on. I have been told by some developers that transparent menus, alpha blended windows and other eye candy may be in store and the KParts model will no doubt be extended and perfected so data sharing can exist. A little while before KDE2 was released, Qt was also GPLed – which has enabled development for some parties who were previously restricted.

GNOME

Like XFree86 and KDE, GNOME is developing at an impressive rate, and is getting better and better all the time. The GNOME team have been working hard perfecting ORBit (the GNOME CORBA implementation), GConf (configuration system), Pango (internationalisation), Bonobo (component model) etc. The GNOME team have been developing their new technologies steadily. They have also made good progress on user interface development. This development is continuing to provide a solid development framework for GNOME developers using the new technologies.

GNOME is based upon the GTK toolkit – an area of development which is also progressing smoothly. GTK continues to add new and improved features, and an impressive amount of language bindings.

X vs Framebuffer

When the 2.2.x Linux Kernel was released, interest found its focus around a feature known as the framebuffer. The framebuffer is a technology that enables direct access to graphics hardware (a feature only recently being implemented in X). The benefit of the framebuffer is that the extra layer of X is not required and therefore there is a large increase in performance. Direct graphics access is a requirement in many cases for high-powered applications that require correspondingly high-powered graphics. A perfect example of this is in the use of games. The framebuffer support in the kernel opened up many possibilities for this new kind of support – which obviously bodes well for the desktop. The problem with the framebuffer at the moment is that it does not support accelerated graphics, which is important for many users. As the Linux kernel develops, and the framebuffer support improves, it makes the possibility of bringing the desktops (such as KDE and GNOME) closer to the kernel and running these directly off the framebuffer increasingly likely.

The realisation of the desktop is already being developed and tested in some ways, and the tools for such development are already in the pipeline. An example is Qt from Troll Tech (Qt is the software which is used to build KDE). Qt is already available for X, Win32 and a port was made to the framebuffer. The Qt API has remained the same, and Troll Tech also decided to release Qt for the framebuffer under the GPL. This makes the development of a framebuffer KDE possible as the Qt API (the programmers interface) remains the same. Most of the KDE code uses the Qt API, and therefore little work would theoretically be necessary to port it to the framebuffer.

Although a framebuffer desktop could be theoretically possible, and could have many benefits in terms of performance, there are of course some disadvantages in taking X out of the

picture. The main two problems are simply that you would not be able to run your X software on the framebuffer, and that you would lose the network transparency that X provides. For many users these disadvantages do not matter, but for some they do. The problem is reaching a good balance that is agreeable to most users.

KDE and GNOME collaboration

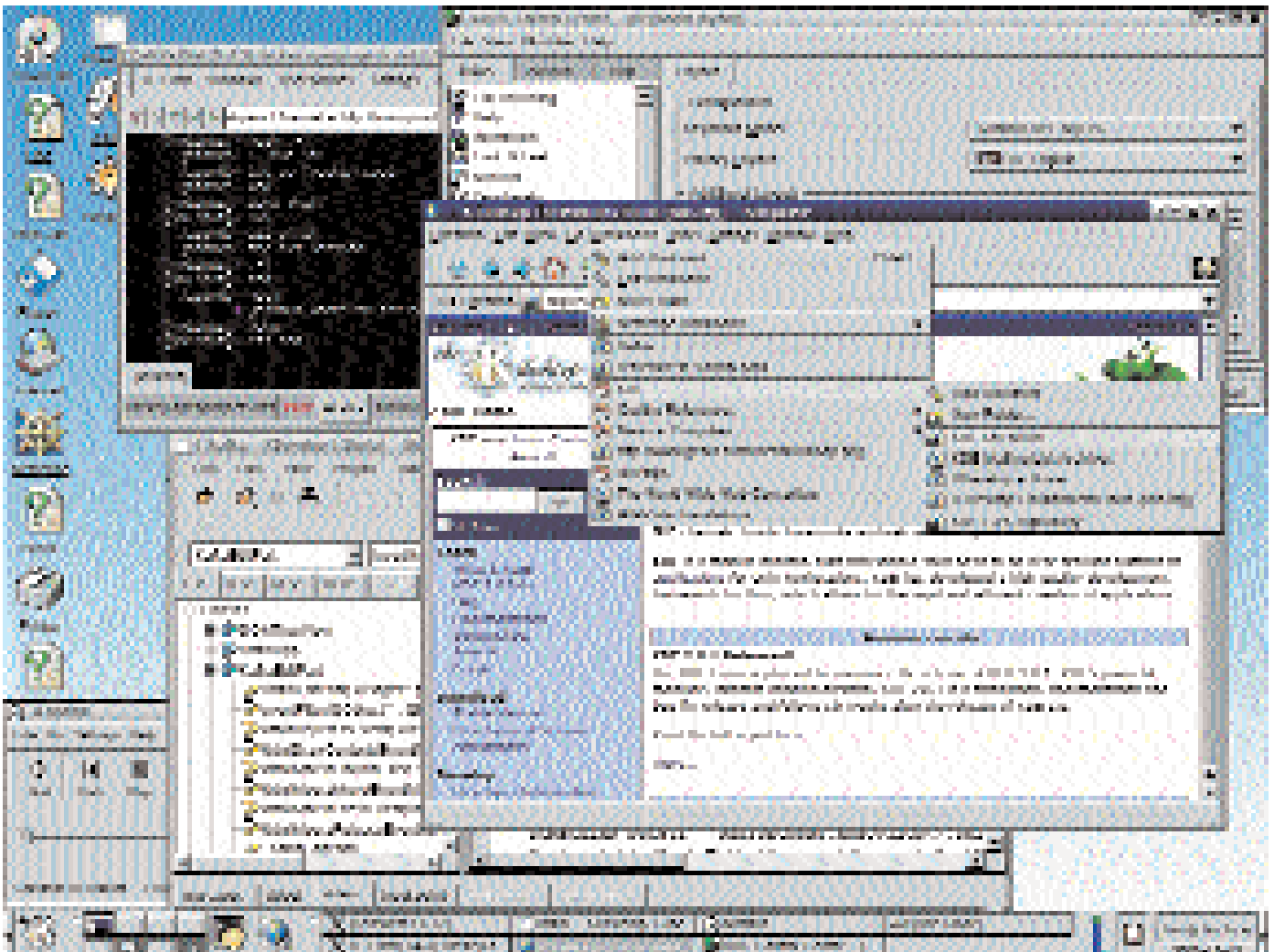
If you take a look at the various technologies that KDE and GNOME have to offer, you can see that these technologies are performing the same functions in many ways. An example is KParts and Bonobo; both are component technologies. KDE and GNOME also use the same kind of human-computer interfacing characteristics and common GUI elements (such as scroll bars, buttons etc). Surely there must be a way for KDE and GNOME to talk to each other?

The answer to that is the same as the answer to many questions of this type – yes and no. Technically virtually anything is possible. However, there are some considerations that may make this feasible and some reasons it may not be so practical. The first is that many KDE and GNOME users are simply not interested in any collaboration

as they only use one desktop and that *one* desktop's applications. There are however, many users who want to share data between applications. There is certainly some support for this.

I believe that there will, at some point, be collaboration. It is not likely that this collaborative effort will be written by someone who codes for the love of it, but by a company. Regardless of its origin, at some juncture the gap is sure to be filled. Many of the Linux distributors hire coders to write software that is needed for an enterprise desktop, but has not been previously conceived of. We need to always remember that Linux is built by many people in their spare time. Most of the software that we use is built by people who hack away when they arrive home from work, school or university. If nobody finds a particular area interesting, it simply won't get written, no matter how desperately it is needed. That is why we seem to have 200,00 CD players, yet we lack some of the essential software that distributors end up writing. There does seem to be a will amongst developers to write the code, but I sense that technical control is difficult to coordinate between the two projects. By the time you read this it may have already been written, and I think that KDE/GNOME collaboration is a likely occurrence in the future.

A fully featured KDE Desktop



Multimedia and the desktop

One area in which Linux and the desktop is making good progress is that of multimedia. The future looks good. Because Linux has a strong UNIX-based server background, multimedia was neglected in some respects until the desktop revolution in Linux came along. As the desktop gets more and more multimedia laden, and the Web provides better bandwidth and more multimedia content, Linux and the desktop needs to be able to support and execute these emergent multimedia effectively.

The development of multimedia in Linux has taken a number of routes, but one route that is looking most promising is the development of aRts. The aim of the aRts project is to provide a multimedia framework that can be used by applications. The aRts team has phased in key technologies and while playback of multimedia content was primarily the focus, a strong codebase is also being developed in the creation of synthesizers and digital effects.

The aRts project does not rely on any particular desktop to function correctly, although it is being used officially in KDE for multimedia content. I have not heard anything from the GNOME team about using aRts, but they may be using it officially for multimedia in GNOME.

As a student of multimedia communication at university, I needed to rely upon a variety of multimedia technologies for the successful implementation and execution of multimedia products. As Linux currently stands it is a good platform for playback and execution, but is not wholly suitable for multimedia authoring. I predominantly use Macromedia Director for multimedia authoring, and although I am not aware of plans to port Director to Linux, I am surprised there are no Open Source multimedia authoring packages available. If you know differently and have seen some projects to develop a multimedia development package, please get in touch with me and let me know.

Applications, applications, applications

It is well known that a computer cannot function without usable software. This is particularly true in the world of the desktop. A Linux desktop is nothing but an interface to a computer, and a way of working in a controlled environment. Once the

environment is in place, applications are required to exploit its features and get the user's work done.

When examining applications for the desktop, we note that there are predominantly three types:

- Productivity
- Custom
- Browsing

Productivity applications are applications which a user can use to create something and get his/her work done. Examples include office suites, graphics manipulation programs, personal information management systems etc. It's applications like this that users really want so they can get their work done using Linux. In terms of office suites, the future looks good. Currently the contenders are KOffice, GNOME Office, OpenOffice amongst others. All of these office suites work quite well on a basic level at the moment, but the road ahead looks bright. With the basic functionality there, special features are being added such as automatic formatting, HTML generation etc. Also these office suites are using the new technologies that both KDE and GNOME are developing, thus making sharing data between each component in an office suite a simple proposition.

The second category is custom applications. This includes applications specifically written for a particular purpose and not for general usage. Examples include scientific applications, custom business applications for particular business practices and research applications for conducting research in institutions. As this category does not really deal with the general usage of the desktop it is not strictly relevant. Custom built software will always be written to specification and is not always necessarily available to use publicly. What is relevant however is that as the varying desktops make application development easier and more scalable, the benefits of exploiting these technologies are real and accessible.

The third and final category is browsing software. This includes software that enables you look at various types of content, such as Web sites, FTP sites, images, textual documents, sounds, video etc. Browsing software is crucial to the success of the desktop, and some serious progress has been made recently in the ability to browse content across the desktops. Examples of applications that can browse content include Konqueror for KDE and Nautilus for GNOME. The essential thing about browsing software is that people who use a desktop frequently use it to look at already available content rather than publishing content. A typical example of this type of user is someone who browses the Web. The only tool they really require is a capable Web browser. They do not need an HTML editor, image editor and FTP client to browse. The actual proportion of people who spend most of their time browsing is high. Even the people who use productivity software still browse too. The future certainly looks good for the browsing software fans, with progress being made in virtually all areas of browsing, and projects maturing steadily. Web browsers such as Konqueror and Mozilla are

Some useful Web sites:

KDE	http://www.kde.org/
GNOME	http://www.gnome.org/
XFree86	http://www.xfree86.org/
Troll Tech	http://www.troll.no/
KDE League	http://www.kdeleague.org/
GNOME Foundation	http://www.gnomefoundation.org/

becoming more capable at displaying content, image viewers such as Electric Eyes continue to develop strongly and support more and more file types, and document-centric viewers such as Adobe Acrobat viewers are displaying the latest PDF specification files. Probably the most difficult of all browsers to develop is the Web browser, as so many new technologies are added to the Web experience. However, most technologies are implemented extremely quickly.

Commercial backing of the desktop

When Linux was in its earlier stages of development, many companies shunned it as a geeks' system which only programmers could have any shred of interest in. As time went on, and development got stronger and stronger, companies started putting a firm foot on the bandwagon and began supporting Linux both verbally and substantively. As the desktop revolution of Linux then gathered steam, some companies began to realise the potential of Linux, or simply to accept that it was not going to go away.

Although there had been some backing for the various desktops, on August 15th 2000 the first major support agreement for the GNOME desktop was announced with the unveiling of the GNOME foundation. The official announcement stated the following about the aim of the GNOME Foundation:

"The GNOME project today announced the creation of the GNOME Foundation, which will be governed by a board of directors elected by the hundreds of volunteer developers who contribute to GNOME. In addition, industry leaders and organisations including Compaq, Eazel, Free Software Foundation, Gnumatic, Helix Code, Henzai, Hewlett-Packard, IBM, Object Management Group, Red Hat, Sun Microsystems, TurboLinux and VA Linux have announced their support for the foundation, with the goal of advancing the availability of this easy-to-use, open source, desktop environment."

This move was a turning point in the development of GNOME and is a sign that the future of the GNOME desktop will be supported by a range of companies, who might possibly wish to use GNOME in an enterprise environment. This could pass some major benefits onto users. The KDE team had been preparing a similar system, although they initially put the idea on hold in order to get KDE 2.0 finished. Once KDE 2.0 was released however, it was time to explore the idea further, and the KDE League was born. The official announcement of the KDE League stated:

"The KDE League is a group of industry leaders and KDE developers focused on facilitating the promotion, distribution, and development of KDE. The League will focus on promoting the use of the advanced Open Source desktop alternative by enterprises and individuals and on promoting the development of KDE software by third-party

developers. The League will not be directly involved in developing the core KDE libraries and applications, although League members are encouraged to contribute to the KDE codebase in the spirit of KDE's wildly successful 'Bazaar-style' development."

The importance of the GNOME Foundation and the KDE League factors cannot be over-estimated when it comes to predicting the future of the desktop. Although the GNOME Foundation and KDE League do differ – many think they don't but they definitely do – both organisations are there to help promote each desktop and what it has to offer. This will mean more developers will get involved and that means more software. Also, the companies behind each organisation will no doubt be using their power to put the desktops on more computers, and get more software ported to each desktop.

The marriage of Linux and the desktop is developing at an incredible rate, and the usability of software for the Linux desktop becomes easier and easier all the time. Although many hardcore Linux addicts frown upon the commercialisation of Linux, it is happening. It *needs* to happen to help Linux into enterprise and thence into the domain of the common or garden home user. With the rapid advancement of development and the enthusiastic twenty-four hour global coding frenzy, it is difficult to predict the future for a system that moves so quickly and holds the potential for such dynamic growth. There is no doubt that the desktop environments such as KDE and GNOME are going to develop smoothly and efficiently on their own merits, but the future should bode well for both systems integrating together more tightly. We will no doubt see embeddable components within both desktops' compliant applications, and more sharing of themes and inter-application communication. We can also expect to see the desktops integrating better with palmtop computers and devices, and maybe even seeing both KDE and GNOME available for pocket computers! The future for the X Window system looks both bright and gloomy as we get a better implementation of X, with more features and performance improvements, but with the rapid development of the framebuffer, X may be taken out of the picture altogether. Application support for the desktop is getting better and better all the time. The work of the KDE League and the GNOME Foundation should bring more commercial software natively to the desktop, as well as protecting the valuable community of developers who contribute their time and skills for free.

The future of the Linux desktop is bright. As I conclude this article just remember this – it took years and years to make other commercial desktop environments usable enough to appeal to the average consumer. The Linux desktops have virtually caught up with these other desktops in an impressively short time. With this pace of development, and the enthusiasm of millions of developers and users, who knows where the future will take us? ■