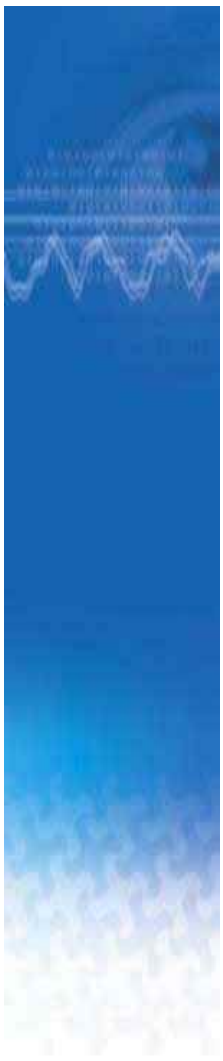

LINUX

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1. Introduction

For enthusiasts and sceptics alike, there can be no doubt that Linux is now an established part of the computing landscape. From its beginnings in the early 90s, Linux has been rapidly gaining popularity. For many years though, it was merely seen as a hobby for PC-owning Unix enthusiasts, with no real business applications and showing no real use to the average home computer user.

No longer is this the case. Linux is now one of the most widely-used operating systems in a number of important sectors; web servers, corporate servers and high-end supercomputing clusters to name a few. There is also a small but enthusiastic base of home desktop Linux users.

What is more, in recent years a number of the corporate IT giants, such as IBM and Novell, have thrown their weight behind Linux, promoting its adoption in the business world. The Open Source Development Lab (OSDL), founded in 2000, is dedicated to accelerating the growth and adoption of Linux in the enterprise. Its list of member organizations reads a bit like a who's who of many of the major global IT companies.

So Linux is no longer an irrelevant past time, but an operating system worthy of serious consideration. But what are the reasons for and against taking up, or switching to Linux, both for business and home use? Before considering this, it is worth looking at what Linux is and what it provides.

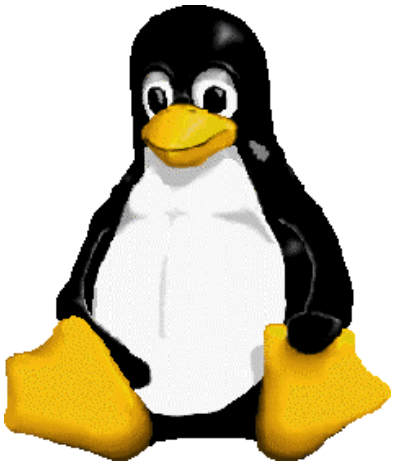
2. What is Linux?

Linux is a Unix-like operating system (OS). However, unlike most other common operating systems, Linux is 'open source'. This means that the Linux source code is freely available to everyone, and anyone is able to customize the code for personal use (Linux is developed under the GNU general public licence). While you can download Linux for free, some companies do charge for providing easier-to-use installations of Linux and accompanying software; they are allowed to as long as the source code is also made available. Usually though, these Linux installations are made available at a low price (often enough to only cover the media expense), and companies rely on making most of their money via related areas, such as technical support and automated upgrades.

The open source model does not mean that there are a myriad of different versions of Linux in existence. To have changes accepted into the official Linux kernel (the core part of the operating system), they must be peer reviewed and approved. This Linux standard serves to prevent the fragmentation of the OS that

was observed in Unix, while ensuring a level of quality and consistency in the core source. Although many companies distribute different Linux packages, they all have in essence the same Linux 'core'; a strong advantage of Linux over the multitude of Unix-based operating systems. Instead, the effect of having an open source code is that a large number of programmers can simultaneously improve the OS, and this results in rapid solutions to most problems that are encountered with the system. It also gives it a very broad base of testers and scrutinizers.

Unlike a number of Unix operating systems, Linux is well suited to running on standard PCs, and as such has become a popular alternative to other commercial operating systems, such as Microsoft's Windows series. As will be discussed later, Linux retains a lot of the advantages of the Unix OS whilst having significant improvements in other areas. Oh, and it also has Tux - the cutest logo of all operating systems.



Tux - the Linux logo

3. A Brief History

Linux began life as a hobby of a young student named Linus Torvalds. Whilst studying at the University of Helsinki he acquired a new Intel 386 PC and found both the DOS and Unix operating systems too expensive. A free, reduced version of Unix called Minix was available and often used in academic circles, though Torvalds found this inadequate and decided to attempt to develop a system to improve upon this. The public release of version 0.0.2 of Linux in 1991 was made in order to enlist help from other programmers with different areas of expertise. In 1992 there were about one hundred users, by the next year, around one thousand. The system has rapidly evolved, with new releases still occurring

at regular intervals. Tens of millions of users are now thought to use the OS worldwide. Linux is especially popular in the academic world and in multi-user environments.

To become widely used, Linux had to shed the Unix image of being a powerful, yet complicated system to use. Associated with this came the need to provide a wide range of software to run on the system. The major conversion of Linux from a hobby of the open source community to a truly viable commercial OS has gone hand in hand with the acceptance of some major hardware and software companies to support the system. Along with this has come the development and subsequent improvement of front end GUIs to allow point-and-click operation instead of the more powerful, yet less intuitive, command line control.

4. Advantages and Features

So why has Linux become so popular? One of the most obvious advantages of Linux is that it is free, or at least very cheap, thus running Linux instead of another commercial OS has the potential to produce major savings. While it's true that switching to Linux is not always the cheapest option in the long run, for some systems – particularly running multiple servers or a high-performance computing cluster – the savings from Linux can be very significant indeed.

What other advantages does it have over other operating systems? Firstly Linux can be run on a whole host of machines. It is happy running on lower spec, older PCs, as well as the latest high-speed AMD or Intel processors. It is supported on processors as varied as the Motorola 68k series (Amiga/Atari), DEC Alpha, Sun Sparc or Motorola PowerPC. The modular nature of the operating system means that slimmed down versions can be run on palmtops or as dedicated mail servers, for example.

Linux has retained the Unix true multi-tasking, multi-user functionality. This means that several users can simultaneously run programs on a single machine without those programs interfering with each other. Linux has the concept of unique users, with each user having their own workspace, which they can control access to. This allows each user to protect sensitive information from other users and is one of the reasons that Linux is often the OS of choice for Internet service providers. The multi-tasking nature of Linux means that it can, for example, run multiple PPP connections, a firewall and FTP servers, as well as acting as a file, name and print server all at the same time.

Linux is a very reliable and stable operating system, able to run continuously for months at a time without failure. The only time a reboot of the computer is likely to be required would be during a hardware installation or kernel change. New software, for instance, can be added without the need to shut down the machine. This stability, along with Linux's multi-tasking capabilities and a large collection of software allowing it to communicate with other operating systems, make it ideal as a network or web server. Software such as SAMBA, a Windows file server for Linux, and VMware, which allows other operating system programs to be run on Linux, add to the versatility of the OS.

Linux uses the X-Windows graphical interface, which is decoupled from the underlying operating system. This allows a user on one machine to run a CPU-intensive program on another, more powerful machine, and view the results on their own. Linux now supports a number of excellent graphical desktops (e.g. GNOME or KDE), which can be configured to match the style and functionality of, for instance, Windows.

The amount of software available for Linux is rapidly growing. Much of this software is free. Some of the packages available include Sun's StarOffice or the open source OpenOffice, which give most of the functionality of (and are compatible with files produced by) Microsoft Office. The arts and graphics package GIMP is one of the best available, while the myriad of other software supported by companies such as Sun, IBM (DB2, Lotus Notes), Corel, HP, WordPerfect, Oracle and Netscape and all the GNU-based software packages mean that Linux can no longer be described as lacking in software. In general, a free or low-cost application to perform most common tasks is likely to be available for Linux, as well as many high-quality commercial products. In addition, the availability of C/C++ and Java compilers (all free, and often packaged with the installation), makes Linux an excellent platform for the programmer. The availability of more specialized applications is, however, more patchy – some vendors provide a Linux version, but others do not.

Another advantage Linux has over some of its rivals is excellent memory management. Each process runs in its own private memory space, preventing it from affecting others programs, or the kernel itself. Applications trying to access memory they don't own are halted, without affecting the rest of the system.

Security is an area of importance within the IT community, especially with regard to hacking and viruses. Linux is not immune to either of these, however there are a number of reasons why it is often safer than other commercial

operating systems. Firstly, it must be admitted that Linux is much less frequently targeted by hackers when compared, for example, to Windows. When Linux is targeted, however, the open source nature of the development can be of benefit. This is seen both in posting kernel patches to security holes, normally within hours of them being discovered, and providing extra scrutiny of the source before it is released. The memory management system of Linux also helps to provide added security, as it is not possible for a virus to affect another application running in memory. Additionally, the file permission structure on Linux limits the damage any virus can do.

5. Disadvantages and Drawbacks

Given the array of advantages listed above, why doesn't everybody use Linux? In part the answer is that it takes time for something 'new' to gain in popularity. Commercial operating systems, such as Windows, Mac OS and other Unix variants have a strong, established user-base on their respective hardware. Existing users are not likely to all change to an alternative immediately when it becomes available. But Linux has its drawbacks too.

While Linux is normally cheap or free to obtain, additional costs can slip in afterwards. For both users and system administrators, a switch from another OS to Linux can mean a change from something familiar to something new. It takes time to become as productive as before and training is often required. Technical support for Linux is also an issue. While Linux comes with plenty of documentation, either with a distribution or on the web, it is not always the most user-friendly. Technical support is available from some Linux distributors or other consultants, but has to be paid for.

These factors are most significant for the average desktop PC user. For corporate servers, run by system administrators, the time required for training and familiarization should to be set against reduced license costs and the ability Linux often provides to use cheaper, more generic hardware. Also, when moving from other Unix systems to Linux, the learning curve is much lower. This all helps to explain the greater uptake of Linux for servers compared to desktop PCs, and the larger percentage of systems that have moved from commercial Unix operating systems in favour of Linux.

Installing Linux can require a certain amount of expertise. Most Linux distributions come pre-packaged with software designed for quick installation, but these can be more difficult to configure than Microsoft Windows, for example. While this is continually being worked on and improved in the open

source community, Linux is still less beginner-friendly than some other platforms. Then, as security patches and upgrades are developed, a Linux administrator will need to spend time tracking and installing the updates from the internet. Alternatively they can pay someone else to do most of this for them.

A final problem is that not all hardware is supported for Linux. While this is less of an issue than it was, say, 5 years ago, it's still worth checking that the hardware you have will all run under Linux. While many hardware vendors provide Linux drivers, others do not, and they do not always release the communication and configuration protocols to allow the open source community to develop their own. If your existing hardware is not supported, then it may not be financially worth the switch over.

6. Switching to Linux

If you want to switch to Linux, you should first consider the hardware that is to be used. A minimalist command-line only version of Linux will run on as low a specification as a 386/486 with 4 MB of RAM and 10 MB of hard disk capacity. Installing a standard Linux distribution, with a graphical desktop and common applications will require much more in terms of processor, memory and disk space.

Many different organizations and companies provide or sell a range of 'distributions' of Linux. These all provide a version of the core Linux operating system, along with different applications and libraries, installation packages and documentation. Distributions can usually be downloaded from the internet, or bought on CD (often for merely the cost of media and postage). Some vendors sell pre-packaged distributions including printed manuals and some level of support. Each distribution provides different options in terms of the applications provided, ease of installation, and quality of documentation. Which is 'best' depends on the intended end use, and is often a matter of personal preference. Popular suppliers include RedHat, Debian, Mandriva, Slackware and SuSE/ Novell.

If you wish to use Linux in addition to another OS, then a dual-boot solution can be used, installing Linux alongside the other OS with options to boot to both. Alternatively you can buy a distribution like Knoppix, which can boot and run purely from CD.

7. Linux – the Future

So where is Linux heading and how popular will it become? Linux seems set to grow in use for corporate and web servers, and remain the OS of choice for large computational clusters. It is also growing in popularity in developing countries, where licence costs are generally harder to afford.

Whether it can obtain a greater uptake in the desktop PC market is another question. To do so it may need to become more user-friendly and easier to administrate. A more widespread support for hardware, and further software applications won't harm its cause either.

Linux has already made quite an impact and everything suggests that it will continue to do so. But only the years to come will reveal just how great that influence is to be.

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