

LOOK Systems and Open Source

A white paper by Jim McKinnell, Technical Partner, LOOK Systems

Executive Summary

Nearly all businesses use IT. A common set of services including email, intranet and office automation are routinely provided. In addition there may be applications specific to the business without which the business could not function effectively.

Do businesses spend a disproportionate fraction of the IT budget on the basic software infrastructure and office tools, leaving too little for maintaining and enhancing the crucial applications which may define competitive advantage?

This paper is about the availability and dependability of free "Open Source" software which can deliver a stable and reliable network infrastructure with no software licence costs and reduced support costs. Moreover many Open Source software packages implement published industry standards, thus ensuring interoperability and significantly reducing the redundancy and incompatibility which are commonly associated with software upgrades. These software systems are scalable and are relevant to an individual accountant or a multi-national bank, a corner shop keeper or a supermarket chain.

Although, strictly speaking, Linux is simply an operating system kernel providing a platform for software applications, Linux distributions encompass a range of applications including both open source and commercial software. Linux runs on hand held computers and IBM mainframes as well as Intel-based systems and other processors, such as Compaq AlphaServers.

LOOK Systems has developed expertise in Linux and a range of Open Source packages providing many of the common requirements of businesses' IT networks. Server services include firewall, routing, web caching, email management, web server, ecommerce server, network logon, file server, print server and database server. Linux can also be used on the desktop providing a graphical desktop, email client, web browser and office automation suite as well as providing an environment supported by a growing number of commercial applications.

Linux and Unix systems are not frequently targeted by virus attacks. Nevertheless security management and the application of patches for key software components is critically important. LOOK monitors such requirements and has implemented simple but effective anti-virus measures for email.

Through the introduction of Open Source packages on Linux-based servers an organisation can take more direct control over the management of and access to its own information, while cutting costs and reducing the need for continual hardware upgrades.

LOOK has experience of supporting networks of well over 100 PCs with key services provided by Linux servers. Larger servers could support networks with thousands of desktops. We have successfully migrated services from NetWare, Windows NT and Unix servers.

LOOK operates the <http://www.linuxexamples.com> website which provides examples of configuring specific applications on Linux. See LOOK Systems' website at <http://www.looksystems.co.uk> for further details about the company. Jim McKinnell can be contacted by email to <mailto:jim.mckinnell@looksystems.co.uk>.

Introduction

The purpose of this white paper is to encourage the reader to review their organisation's current and prospective use of Open Source software. Many Open Source packages are included in the various distributions of Linux, such as those from Red Hat (<http://www.redhat.com>) and Mandrake (<http://www.linux-mandrake.com>).

The paper is written by Jim McKinnell, Technical Partner for LOOK Systems. LOOK provides expertise in implementing Linux-based systems, whether using existing applications or developing bespoke systems.

LOOK was formed in 1989 to promote and support the use of Open Systems, in particular Unix. Since that time LOOK has provided consultancy, software development, network implementation, support and training services to a variety of organisations including a race horse trainer, an NHS trust and an international accountancy firm.

A fundamental philosophy of Open Systems is a commitment to published standards. One such standard is POSIX the Portable Operating System Interface published by the IEEE (<http://standards.ieee.org>). This standard developed from the Unix System V Interface Definition and the Linux kernel “aims for POSIX compliance”.

Linux (<http://www.kernel.org>) is the operating system kernel which offers Unix-like facilities to higher level software. Linux distributions offer a wealth of software applications derived from a variety of prestigious organisations and projects. Much of this software, including the Linux kernel, is provided as Open Source. Linux is not owned or managed by any one company but many companies sponsor Linux International (<http://www.li.org>) to promote Linux and support further development.

Open Source software is free to use and may be free to embed and resell in proprietary applications – see details of the GNU General Public License and the GNU Lesser General Public License at <http://www.gnu.org/licenses>, various other licence models are also used. Widely used Open Source packages are reliable - any problems with new releases are rapidly diagnosed and fixed.

The next section provides a rationale for the use of Open Source software with subsequent sections describing effective configurations for LOOK clients and LOOK itself. Finally an interpretation of IT trends leads to a recommendation to review the role of Linux in your IT strategy now.

Why Open Source?

A key role of computers is the storage and interchange of information. An organisation needs an IT network to underpin internal communications and enable data collection and information sharing. Increasingly IT systems present an organisation's interface to other businesses and customers.

For this role to be fulfilled standards are needed defining interfaces within systems and between systems. Ethernet and TCP/IP are crucial standards at the network infrastructure level. SQL is a common standard for database access, although vendors tend to include their own extensions to the agreed standard.

Proprietary software may conform to published standards but often significantly diverges from those standards, alternatively it may define poorly documented standards not shared by software from other suppliers. This cavalier approach to standards inhibits information interchange.

Open Source software seeks to be standards compliant, in specific cases this may be compliance to a de facto proprietary standard to ensure interoperability. The development of the Linux kernel has provided a focus and label for promoting open source. However it owes its success to initiatives, such as the GNU project (<http://www.gnu.org>), which had been publishing open source or free software long before Linus Torvalds started work. The Open Source Initiative (<http://www.opensource.org>) was formed in 1998 to offer a definition of, and promote the benefits of, open source software.

Open Source challenges key software producers which are among the world's top companies by value, thus potentially damaging a section of the economy. However the history of the stock market is marked by the explosive rise and slower fall back of values in new technology. In Victorian times new railways were completed in remarkably short times and could show significant returns for shareholders. This wealth generation was short-lived but railways continue to be necessary and effective. In some ways the film industry defined the 20th century with periodic innovation and cultural adaptation. It has certainly been one of the big money businesses, nevertheless low budget movies can become classics.

IT has been the industry in ascendancy since the microprocessor burst onto the scene in the 1970's. Advances in computer hardware continually enable software to deliver more. In some ways software is like rail tracks while in others it is more like films. Reliability and dependability are crucially important but there will always be room for innovation and specialisation. The World needs dependable common software providing the basis for the IT industry just as rail operators need well-engineered and maintained tracks. Open Source, in particular Linux, can provide that foundation.

Many IT companies embrace standardisation and contribute to the refinement of existing standards and the development of new ones. They may also directly contribute to open source developments: IBM is backing Linux with significant investments, while Sun Microsystems has initiated the OpenOffice project (<http://www.openoffice.org>) which provides an Open Source office automation suite with conformance to the XML standard (<http://www.XML.org>).

Common standards are necessary. Where open source is available and meets particular needs in line with published standards it makes sense for organisations to use it.

Clients' Networks

LOOK has provided consultancy, network support, software development and training services for over 10 years. Each year most customers have renewed their annual contracts.

Over this time LOOK has helped clients migrate from Windows 3.1 to Windows 95 or Windows NT desktops while a range of server services have been set up. Unix and NetWare have largely given way to Windows NT, with specific applications remaining on Unix.

LOOK has been working with Linux since 1994 and has installed Linux servers (often old PCs) as Internet gateways since that time. Over the last 3 years LOOK has promoted Linux as a general purpose server operating system, supporting the main Windows-based office applications.

A Linux server can be introduced at very low cost – equipment previously considered redundant may prove effective, for example a 486 or Pentium based PC with 32Mb RAM can be more than adequate as an Internet gateway / firewall.

Installations of Linux done by LOOK are based on the Red Hat distribution. A number of packages are installed and configured to provide a range of network server services.

Samba (<http://www.samba.org>) provides file and print services and can also act as NetBIOS nameserver and logon server.

The dhcpd DHCP demon is used to administer network IP addresses while the BIND DNS server provides domain name administration and resolution. Both of these packages are maintained by the Internet Software Consortium (<http://www.isc.org>).

Sendmail (<http://www.sendmail.org>) is a mail transport agent. It provides mail forwarding and filtering services for Internet email. An IMAP4/POP3 post-office server such as that from the University of Washington (<http://www.washington.edu/imap>) manages users' mailboxes, providing access to messages.

Squid (<http://www.squid-cache.org>) is a web proxy cache for connection to and filtering of Internet web sites.

The Apache HTTP server (<http://httpd.apache.org>) is used to support internal and external web sites.

These packages together provide the core facilities required of a network server. All of these services can maintain usage logs enabling monitoring of activities such as web browsing and email. Configuration details are maintained in text files which can readily be put under revision control. In this way a history of configuration changes is maintained. Also the Red Hat Package Manager (<http://rpm.redhat.com/RPM-HOWTO>) enables easy and foolproof application of software upgrades and version management.

These packages are reliable and operate independently. Problems with one service can be addressed or the service reconfigured without any interruption to the other services. Also upgrades and patches can be applied without the need to reboot the server. Furthermore the software is relatively efficient and can be deployed effectively with a relatively low hardware budget.

LOOK has been supporting Linux servers providing the above services to networks of over 100 PCs for over 3 years.

LOOK's Internal Network

At LOOK Systems' offices in Gargrave, North Yorkshire, our internal network has several Linux servers plus Compaq AlphaServers running Tru64 and a server running Windows NT.

NT is used largely in connection with SQL Server which is used by some clients for applications supported by LOOK. Oracle is used for the same reason.

AlphaServers are used to run the Ingres RDBMS from Computer Associates supporting applications developed and maintained by LOOK for a number of clients. Some of the Open Source services mentioned above, such as Samba, are operated on Compaq Tru64 as well as on Linux.

Our main server is an Intel-based server with dual 433MHz Celeron processors, 448Mb RAM and a 20Gb IDE disk drive. One of the AlphaServers provides user file space on an 18Gb SCSI drive. A DDS-3 DAT tape drive is used to back up from multiple servers to a single tape drive under the control of AMANDA (<http://www.amanda.org>).

In addition to running Samba, sendmail, squid and httpd as above the server also supports up to 8 thin-clients operating under the Linux kernel and X terminal server. Each user runs the KDE desktop plus an email client and web browser as well as other applications such as Star Office or software development tools.

Email is managed using the Cyrus imapd (<http://asg.web.cmu.edu/cyrus>) server from Carnegie Mellon. The imap (<http://www.imap.org>) protocol allows mail to be stored on a central server and accessed from various different clients using a variety of interfaces. Shared folders are supported as well as individuals' private folders.

The server also runs the Zope (<http://www.zope.org>) web application server which is used to maintain our internal home page – a bulletin board of news and internal announcements plus a menu of intranet services.

The intranet provides access to our support system or Help Desk log, the ECO (engineering change order) system for development management, CVS (<http://www.cvs.org>) for source code and document management, as well as a calendar of individual activities, and our client database. The support and ECO systems are maintained via web-based interfaces with data stored in a PostgreSQL (<http://www.postgresql.org>) database. These applications are implemented using Perl and PerlDBI (<http://www.perl.org>), also “liblookdb”.

liblookdb is a C++ library that provides an interface to several common Database Management Systems (DBMS). It enables the programmer to write application code that can be built and run unchanged on a variety of platforms and against several DBMS. LOOK Systems published the source of liblookdb at SourceForge (<http://sourceforge.net>), the world's largest Open Source development website with over 28,000 hosted projects, on 6th July 2001.

LOOK also operates two Linux communication servers. One acts as gateway to the Internet via an ISDN connection. ISDN is also used for dial-up access to some of our client sites while modems are used to connect to others. In many cases access is seamless from any desktop or thin-client on our network to the server at a client network. We also use VPN connections thus optimising use of communication links.

LOOK Systems runs on Open Source. Proprietary environments and applications are needed to maintain clients' applications and provide support for proprietary software. Specific functions, such as payroll, are also handled using proprietary packages.

The Way Ahead

Throughout the 1990's the development of software applications has focused on the point and click GUI and the client-server model offered by PCs and Local Area Networks. More recently applications have begun to progress from the fat client, thin server model to a more flexible layered model and there is a trend for use of browser software to support the user interface. At the same time more projects are using Object Oriented Programming techniques and languages such as C++, Java and now XML are changing the developer's toolkit.

For these developments to be successful and widespread good open standards will be essential. As applications are re-implemented or superseded using these open standards a wider range of platforms will be supported. Linux supports the tools and will increasingly support the applications too.

Currently the deployment of Linux on desktops is held back by the need to run specific applications which are not currently supported in this environment. However for some organisations or application areas this will not be a hurdle. The potential savings in costs of hardware, software and support resulting from using Linux where appropriate should not be ignored. These savings are not always easy to quantify but specific implementations of Open Source, such as the decision by the Central Scotland Police to implement StarOffice saving £250,000, have been justified on cost alone (<http://crn.vnunet.com/News/1124456>).

In the high end server market IBM has taken up the Linux standard in direct competition with Sun's Solaris servers. Low cost server vendors, such as Dell, offer Linux as an alternative to Microsoft's Windows 2000. Also some home PC users may shy away from Windows XP and turn to Linux.

Linux already makes sense as a mainstream server operating system for businesses. It will not be long before it is a serious option for the desktop too.

Contact LOOK Systems today to find out what Linux and LOOK can do for your organisation.

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