



What Good is a Linux Client?

A Linux White Paper

Preface

Anyone who has followed the progress of Linux the past few years has noted the surprising gains that Linux has made in server operating system market share and “mindshare” against the entrenched opposition, notably Microsoft® Windows NT®, Novell Netware and various varieties of UNIX®. A complete Linux network, of course, would require Linux clients (networked PCs or terminals) as well. Therefore, an important question is, “Is Linux a viable desktop operating system for general business use?” or must we continue to be confined to the Windows world for our non-server needs? And what about laptop support, or a Small Office/Home Office (SOHO) user or home user, who does not need a network server? Is there a place for Linux in a stand-alone environment?

These are some of the questions this paper addresses. I must confess that until recently I was merely a bystander watching with curiosity from the sidelines—without any real involvement—the progress Linux has made. So writing this paper not only gave me the excuse to join in on the action, but it also provides you with the perspective of a Linux “newbie” who is attempting to find the applications and utilities needed to create a working system.

The conventional wisdom so far is that Linux is not “ready for prime time” as anything but a network operating system. We shall test this notion to see if I can find commercial, shareware and/or freeware programs for Linux to replace the existing applications I currently use with Windows. If they exist, where can a user find them, how easy are they to install and use, and how well do they work together? Ideally, when I am done I should have a system that would allow me to stop using Windows for anything. (Obviously your mileage may vary, depending on what uses you have for your computer.) So, let us start.

(Note: There probably are many terms used in this paper that are unfamiliar if you are new to Linux. You may find it useful to reference the white paper called *A Brief Linux Glossary for Windows Users*, available from the same sources as this paper.)

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In the Beginning

I began my quest with two PCs: An IBM® ThinkPad® 600E notebook with nothing installed on it but Red Hat Linux 6.2, and an IBM ThinkPad i Series 1420, with Windows 2000 and a variety of applications installed. The 600E was my test system to build into a working Linux client. The 1420 is my production system. It contains Microsoft Office 2000, Lotus® Notes™ (for e-mail/calendar/database access), a Web browser (Netscape Navigator), Adobe Acrobat (to produce a .PDF file from this document), and other tools essential to my job as a technical writer/editor. My task was to try to duplicate the functionality and compatibility of these programs as closely as possible on the 600E, my Linux computer.

It appeared that my first step was to get a Web browser installed and running on my Linux system in order to allow me to download and install other applications and browser plug-ins. So, what is available, and where would I find them?

The Search Begins

It occurred to me that if I had only one PC, running Linux, I might have a chicken-and-egg problem regarding a Web browser. How do I find and download the browser from a Web site if I do not already have a browser with which to download? Theoretically, I could order a browser on CD from somewhere if I knew what to order and from whom, but that would take days or weeks to get, and I wanted to get started NOW. Could there be a browser already included on the CD from which I installed Red Hat 6.2?

Indeed there is. Red Hat automatically installed the Linux version of Netscape Communicator 4.72 on my system. So far, so good. But there were still a lot of applications and utilities to go to reach my goal.

Hunter/Gatherer

It was time to start exploring the world of Linux applications, utilities and device drivers. First, I had to figure out where to start. So, I asked some friends and co-workers to recommend some good Web sites with Linux content. From there, I followed a number of links to other sites. It didn't take long to come up with:

- DLR Fresh Archive (www.go.dlr.de/fresh/linux/src)
- Freshmeat (freshmeat.net). (Love the name)
- Linux Apps (www.linuxapps.com)
- Linux Archives (home.linuxarchives.com/software.html)
- Linux Game Tome (www.happypenguin.org)
- Linux Games (www.linuxgames.com)
- Linux Software Encyclopedia (stommel.tamu.edu/~baum/linuxlist/linuxlist/linuxlist.html)
- Linuxberg/Tucows Linux (linux.tucows.com)
- Slashdot (slashdot.org)

See *Appendix A* for a list of some of the apps, utilities and games I found. (This mission reminded me greatly of the early years of OS/2: constantly scouring the online software sites looking for the latest tools to round out my home or office system.) Most of these sites have search engines to help you find the applications by name or description.

What I was *not* looking for was programming tools or server-specific programs. Those are whole other worlds entirely and perhaps grist for future papers. Right now, I was looking for solutions for office workers, small business and home users, primarily.

Knowing Linux's reputation as a server operating system I was not surprised to find plenty of "industrial strength" applications, such as relational databases and communication programs. What I was curious to see was how many useful office applications and entertainment/leisure programs I could locate. In terms of entertainment and leisure, I was thinking of games, of course, but also other "off hours" pastimes, including music and video players, personal finance/investing, and the like. Would a home (or home office) user be happy with an all-Linux system?

Linux Resources

In the process of browsing through the extensive lists of programs and utilities available, I also came across some useful Linux-related Web sites.

For current news about Linux, and article archives, visit:

- CNET Linux Center (linux.cnet.com/?tag=st.ne.ni.refer.1491268) — A Linux-specific news site. It not only has news, but also links to popular Linux downloads, product reviews, Linux events, Linux company stock quotes and other resources.
- ICE News (www.nikos.com/icenews/linux.html).
- Linux Planet (www.linuxplanet.com/linuxplanet).
- Linux Today (linxtoday.com).
- Linux Weekly News (www.lwn.net).
- Linux World (www.linuxworld.com).
- ZDNet Linux Homepage (www.zdnet.com/enterprise/filters/resources/0,10227,2186824,00.html) — News, links to popular Linux downloads, product reviews, online documentation, Linux-related jobs and other resources.

For informational publications about Linux, try:

- Linux Documentation Project (www.linuxdoc.org) — A collection of Frequently Asked Questions (FAQs), "how to" documents, manuals and online magazines.
- Linux Gazette (www.linuxgazette.com) — Includes articles, columns and even comic strips.
- Linux Journal (www.linuxjournal.com) — Contains links to newsgroups, chat rooms, online manuals, FAQs, vendor support sites, local Linux user groups and more.
- Linux Man Pages (linux.ctyme.com) — A collection of the "man" (manual) instructions for various Linux commands and utilities.
- Linux Newbies (www.linuxnewbies.org) — Help files for "newbies" (those new to Linux).
- SecurityFocus (securityfocus.com) — Security alerts to new viruses, Trojan horses and other security problems; also offers fixes for these problems.
- Slick Penguin (www.slickpenguin.com) — White papers, case studies and other Linux business-related implementation success stories.

- ZDNet Linux Homepage (www.zdnet.com/enterprise/filters/resources/0,10227,2186824,00.html) — How-tos, tips, white papers and books.

Notebook computers often have unique problems that do not typically afflict desktop computers (related to LCD screens, built-in “winmodems”, PCMCIA cards, external CD-ROM drives and so on). There is a Web page specifically devoted to *Linux on the IBM ThinkPad* at pejpa.essex.ac.uk/tp-linux. For issues involving Linux on other brands of notebook systems (as well as specific IBM models), try the *Linux on Laptops* site at www.cs.utexas.edu/users/kharker/linux-laptop.

Linux developers (and even some non-programmers) might be interested in the IBM *developerWorks™* Web site at www.ibm.com/developer/linux. There you will find a number of free downloadable tools, including the Application Developer’s Kit (which includes the Lotus Domino™ server, IBM DB2®, IBM WebSphere™ Application Server, etc.), the Developer Kit for Java (including runtime modules), IBM Journaled File System (JFS) source code, IBM VisualAge® for Java and various device drivers, patches, ports and other Linux aids.

If you are looking for Linux application source code to play with, try the *SourceForge* (sourceforge.net/softwaremap). It is a repository of several thousand open source programs written in a wide variety of languages and scripts (C, C++, LISP, Perl, Java, etc.) that can be downloaded free of charge and used or modified. Go to the Web page for an explanation of open source, copyrights, licensing and other information about the SourceForge.

If you see some commercial software that you would like to buy, where can you go to purchase it? Odds are that your local computer store carries few, if any, Linux titles. Fortunately, there are several Web sites in the United States with extensive Linux inventories:

- Indelible Blue (www.indelibleblue.com)
- Linux Mall (www.linuxmall.com)
- The Linux Store (www.thelinuxstore.com)

In Australia, Linux users can go to:

- Everything Linux (www.everythinglinux.com.au)

Beyond merely software, these sites also carry Linux books and hardware devices known to be Linux-friendly, should you need to add to, or upgrade, your system. Some of them even offer such things as caps, mugs, neckties and other Linux paraphernalia. If you are looking for an extensive list of Linux books, try O’Reilly & Associates (linux.oreilly.com).

Finally, for some jumping off places to many other Linux Web sites, visit Linux Links (www.linuxlinks.com), FirstLinux (www.firstlinux.com) and Andover.net (andover.net).

Release the Hounds!

Wow! There are a lot more Linux programs “out there” than I expected. The more I looked, the more I found.

Now that I had located quite a few programs in almost every category imaginable, the question was, “Will any of them adequately take the place of my current Windows applications?”

The next step was to try downloading and installing some. I did not have a software budget to work with, so for the purposes of this test I had to limit myself exclusively to programs that I

could download at no cost, or where I could find someone else with an installed copy I could try out.

Note: This is not intended to be an exhaustive list of everything available—merely what I found and tried, in order to give you a starting point. Nor did I attempt to do any in-depth evaluations of the products. I merely provide a brief description of what the products do and perhaps some unique characteristics of one versus another. For a somewhat larger list (complete with disclaimers), see *Appendix A*.

If you do not know what to do with downloaded files with extensions like **.tar**, **.gtz** or **.rpm**, refer to the white paper called *Installing Linux Applications for the First Time*, available from the same sources as this paper.

Before I describe the results of each product search, I will explain what I am using the Windows product for and what I expect from the Linux equivalent:

Web Browser/E-mail System

At work, I am required to use Lotus Notes, both for e-mail/calendaring and to access various online Notes databases, so my first question was “Is there a Linux version of Notes available or something compatible?” (For the answer to this, see the table on page 17.) I also needed to find out what Linux browsers and e-mail readers are available. At home, I can get by with Netscape Navigator for both my e-mail and Web browser needs. I also use Netscape at work as my browser.

If you cannot live without Microsoft Internet Explorer, you are out of luck, of course, finding a native Linux version. However, if you are happy with Netscape Navigator then you are all set. Not only was a Linux version of **Netscape Communicator 4.72** included with Red Hat 6.2, but newer versions of Netscape Navigator and Communicator (including 6.0) are available for Linux as well, released simultaneously with the Windows version. Anything you can do with the Windows version of Netscape you can do with the Linux version. (To find and download the latest version, go to: home.netscape.com/download/index.html.)

If you would like to try something other than Netscape, there is **Opera**, a small, fast browser without a lot of the other “overhead” (non-browser features) of Netscape. If you prefer (or need, for some reason), a non-graphical—text mode—browser, try **Lynx**.

Important Note: When I began to use Netscape on my Linux system, I first wanted to copy the bookmark file from my Windows PC so that I would have all the software download links I had found. The first thing I had to figure out was where to put the file, as the directory structure is completely different on the Linux system. Using the Linux **kfind** utility I was able to determine that the default bookmark file is kept in the **/home/username/netscape** directory (substitute your account name for “username”). So I copied the bookmark file from my Windows PC to a floppy, and then to the appropriate Linux directory. Yet, when I restarted Netscape and clicked on the Bookmarks menu option I saw the default bookmarks, not my customized list. After some head scratching, I determined that the problem was in the file name. On the Windows system, the file is called **bookmark.htm**, but the Linux version is **bookmarks.html** (note the two extra letters). I corrected the file name and restarted Netscape, and everything worked as expected. This also demonstrates that the bookmark file formats are compatible between the Windows and Linux versions of Netscape Communicator 4.72.

This paper assumes that you already have Internet access working on your system (otherwise you will not be able to download any of the software mentioned here). If you need help setting up your Linux system for dial-up Internet access, refer to the white paper called *Linux Questions and Answers*, available from the same sources as this paper. If you need help to

connect to the Internet via your office network, contact your help desk. If you are trying to set up Linux for DSL or cable modem (non-dial-up) access at home, contact your DSL or cable modem provider for assistance (and hope someone there has ever heard of Linux).

Word Processors/Office Suites

The single most important capability for me in my job is to be able to write Microsoft Word-compatible documents and read Word files written by others (for editing purposes). This is followed closely by the need to be able to turn those documents into Adobe PDF files for electronic distribution. (Of course, I also need to be able to read those PDF files with a viewer, so that I can verify prior to distribution that they turned out the way they should have.)

My research (see *Appendix A*) found four word processors that advertise the ability to convert documents from and (in some cases) to MS Word (.doc) format. Two of these are contained in the StarOffice and ThinkFree Office suites. The remaining two are stand-alone programs called AbiWord and HancomWord, respectively. So this was where I would start. However, based on experience with other word processors in the past I was not optimistic about the results. Other attempts at seamless conversion between Word and such products as Lotus WordPro and DeScribe, Inc.'s DeScribe Word Publisher were less than satisfactory. Inevitably, formatting and highlighting attributes were lost or substituted during conversion, resulting in a significant amount of work to duplicate the appearance of the original. For me to be able to replace a Windows system with a Linux system, I would need perfect results every time.

Fortunately, because all of these Linux products are no-cost downloads, users are able to try them out before deciding which best fits their needs.

To test MS Word compatibility, I copied this white paper (with nearly 30 pages of text, a table of contents and several other tables, bulleted lists, numbered lists, several different fonts, header and footer text, and so on), as well as a simpler six-page document that lacked many of these features.

StarOffice 5.2

The word processing module is called StarOffice Writer. It looks much like MS Word and has a similar menu structure. Writer can open and edit Word (.doc), Rich Text Format (.rtf), ASCII text (.txt) and HTML (.htm/.html) documents. My main criterion for choosing a Linux word processor was that it be able to open, edit and export documents seamlessly (i.e., with no corrections necessary) with MS Word 2000. Star Office 5.2 comes close but just misses. When I opened my large test document in Writer, for example, the table of contents dropped out, the "long dash" special characters (—) were replaced by hyphens (-), list bullets were surrounded by light blue boxes, and the second page of trademarks was blank. Perhaps future versions will correct these problems.

For someone needing functionality similar to that of Word 2000 but without the requirement for interoperability, StarOffice Writer might fit the bill. The only significant feature that I looked for but did not find was for a table of contents; something that is not necessary for short documents, anyway. Overall, StarOffice Writer was the most MS Word document-compatible of the Linux word processors I tested.

The other StarOffice modules include Adabas (database), Calc (spreadsheet), Chart (graphing), Draw (drawing), Image (scan and edit photos), Impress (presentation), Math (formula editor) and Schedule (organizer). StarOffice is available for Windows 95/98 and Sun Solaris in addition to Linux. You can find StarOffice at: www.sun.com/products/staroffice. (Note that installing the entire StarOffice suite will take up several hundred megabytes of disk space and that installation may require more than 500B of space, including temporary files, if all modules are installed.)

ThinkFree Office 1.5

The word processor, called **ThinkFree Write**, looks much like MS Word but is much smaller (less than 2MB), with the entire office suite taking up only 8MB of disk space. The intriguing thing about **ThinkFree Office** is that it runs in a Web browser via the Internet. Besides **ThinkFree Write** native format (**.wrf**) documents, **ThinkFree** can open and edit Word (**.doc**), Rich Text Format (**.rtf**), ASCII text (**.txt**) and HTML (**.htm/.html**) documents. Files can be saved in Word, Rich Text, HTML, ASCII text or **ThinkFree** formats; however, the current version of **Write** has some limitations when working with Word documents, notably in the area of tables. Future versions of **Write** may resolve these problems. Of course, because you are working with your documents online, slow modem connections, poor quality phone lines and busy signals to your Internet Service Provider (ISP) can inhibit your ability to work.

Still, if you do not need two-way interchangeability of **.doc** files, this product has a lot to offer. Unlike MS Word (or StarOffice Writer), **Write** is quite easy on disk space and allows you to store documents on your local hard drive, or online in a free personal 20MB storage area at the **ThinkFree** Web site, password-protected and encrypted. (More space is available online, if needed.) Files stored on the Web site can be accessed at home, in the office or anywhere else the user has Internet access, making it very convenient for the mobile worker: no more worrying about having to back up the latest version to take with you. *In addition, **ThinkFree Office** is available for Windows, the Macintosh and other UNIX platforms, if you are not wedded to MS Word but need interchangeability between platforms.*

The spreadsheet module, **ThinkFree Calc**, looks and feels much like Microsoft Excel and can open, edit, and save Excel 5.0/95/97 files. The presentation program is called **ThinkFree Show**. There is also a file manager (**ThinkFree Folders**) to use as a substitute for Windows Explorer, and as a starting point for running the **ThinkFree** applications. Currently in development are an address book (**ThinkFree Contacts**) and an e-mail client (**ThinkFree Mail**). Best of all, **ThinkFree Office** can be downloaded for free (hence the name) from www.thinkfree.com.

AbiWord 0.7.10

As you can tell from the version number, **AbiWord** is still incomplete. However, even in its unfinished state it shows potential. It allows the ability to *open* files that have been saved in the **AbiWord** native format (**.abw**), naturally, but also gzipped (compressed) **AbiWord** files (**.zabw**), UTF8 (**.utf8**), LaTeX (**.latex**), HTML, Rich Text Format, plain text and most important to me, MS Word-format files. However, it does not offer the ability to *save* a document in the MS Word format. Like **ThinkFree Office**, **AbiWord** is relatively small, requiring only about 20MB of disk space.

As of the current version, however, there are compatibility problems with opening Word documents. When I opened my large test document, the 28 pages had somehow shrunk to four: the cover page, the trademarks pages at the end, and then some sort of modified (meaning that most of the formatting was missing) table of contents page overlaying the end of the trademarks. Everything between the table of contents and the trademarks page was missing, as were the header and footer text—hardly what I was seeking in a word processor. Apparently, the table of contents is what threw the program, because the shorter document displayed all eight pages, although it lost all heading/subheading formatting, plus all the text on first two pages was italicized.

Still, if I were converting my documents one time from Word to **AbiWord** (and did not have any tables to worry about), it would have taken me only a few minutes to correct these minor defects. Moreover, let us not forget that this is still an unfinished product. Some of these defects may be corrected in the final version. On the plus side, **AbiWord Personal** is small, fast and easy to use. As a simple word processor for generating new documents, it appears to work well. The user interface is simple and easy to use, and it has a built-in spell-checker; but it lacks a grammar checker and the ability to create tables. (Download **AbiWord** from www.abisource.com/free.phtml.)

HancomWord 5.0

The latest entry in the Linux word processing arena is **HancomWord**, which is still in beta testing as I write this. Its strongest feature may be its multilingual support, a real asset for those exchanging documents between countries whose native language is not English. (Given that the English version is a port from the original Korean word processor, it is not surprising that some of the options and documentation have spelling and grammatical errors, but these may be worked out in later versions.) HancomWord supports the importing of files in MS Word, WPS, RTF, HTML and text formats (as well as some other file formats, apparently Korean). (HancomWord is commercial software, but there is a limited-time trial version that you can download and use for 60 days before deciding whether to buy. Download it from www.hancom.com/english.)

Unfortunately, for my purposes, it lost the “—“ character entirely in my test documents, as well as the formatting for the Table of Contents and lists (bulleted and numbered), and even the *entire* two pages of trademark information. It also distorted the trademark symbol (™) and did not recognize the Arial font I used, instead substituting a Times New Roman font.

It looks like a capable word processor (it even includes table support), as long as you do not need two-way exchange of MS Word documents. Perhaps improved compatibility will come in later versions. If you are looking for one Linux word processor to support a combination of users who write in English, Korean, Chinese and Japanese, this is really your only choice at this time.

Note: HancomLinux is preparing to release, in October 2000, its own Office package, which includes (in addition to HancomWord), **HancomSheet** (spreadsheet), **HancomPainter** (Graphic Editor) and **HancomPresenter** (Presentation Tool). It will support the importing of MS Office file formats. Furthermore, **HancomMail** and **HancomSecurity**, for Unix and Linux servers, are scheduled to be released in late 2000 with other related products.

Commercial Word Processors

In addition to the preceding, there are a couple of commercial products that might suit your needs: **WordPerfect** and **Applixware Words**.

WordPerfect 9 for Linux — This is a commercial product (sold both separately and as part of the **WordPerfect Office 2000** suite), and as I had no software budget to work with, I was unable to test document compatibility with MS Word. However, according to Corel (the software vendor), WordPerfect 9 includes “Enhanced Microsoft file conversion capabilities [to] let you retain most document data, from open to save.” You will have to determine for yourself what “most document data” means. On the other hand, if you already use WordPerfect for Windows as your office standard and do not require MS Word compatibility, this product should fit right in. The rest of the **CorelOffice** suite consists of **Quattro Pro** (spreadsheet), **Presentations** (presentation/slideshow), **CorelCentral** (Personal Information Manager) and **Corel Linux 1.1**. To read a lengthy review of WordPerfect 8 for Linux (not the latest version), go to: www.zdnet.com/enterprise/stories/main/0,10228,2396369,00.html.

Applixware Words — This too is part of a commercial suite (**Applixware Office**), which includes a database module, as well as e-mail, graphics, spreadsheet and presentation components. Although it will import MS Word, Rich Text (**.rtf**) and other file formats, it does not export to Word (**.doc**) format—only RTF and others—so it would not be suitable for a two-way interchange of documents with MS Word users (unless both parties were willing to convert to and from **.rtf** files all the time and clean up any formatting problems that might occur).

Note: As a last resort, if none of these programs fits your needs, you may be able to run the Windows version of Microsoft Word itself under Linux using one of the products described in the *DOS/Windows Software Compatibility* section, below. This would ensure complete

document interchangeability; however, depending on the tool you use, how fast your processor is and how much memory you have in your system, Word may run significantly slower under Linux than under native Windows. Only you can decide if this trade-off is worth the effort.

Utilities

There are several types of programs that are essential for the adequate functioning of any Windows system: an antivirus application to keep your data safe, a disk defragmenter to keep disk performance up to par, and a *backup/restore utility* for external data storage. In addition, there are a number of utilities that may be necessary, or simply desirable, depending on one's needs. For example: one or more music players for listening to audio from various sources (CD, MP3, RealAudio, WAV, etc.), a video player (DVD, MPEG, AVI and other movie types), a graphic image viewer/editor (for JPEG, GIF, BMP and other picture files), speech recognition and/or synthesis, a multi-operating system boot manager, a disk partitioning utility, file compression/decompression (zip/unzip), drivers/utilities for managing Iomega Zip drives, and so on. I thought it best to look into similar utilities for my Linux system.

Here are some of the utilities I took a look at, by category. There are other utilities listed in *Appendix A* that I did not try out, but they may be of use to others.

Antivirus

It is reportedly impossible (although in this industry I hesitate to use the "i" word about anything) for UNIX-based operating systems to suffer system-level damage from a virus (because it cannot get access to low-level system functions). However, it *is* possible for a Linux user to pass on an infected file or e-mail attachment to a Windows user. For this reason it is still a good idea to check downloaded files for viruses. Currently H+BEDV AntiVir (which searches e-mail attachments/ftp directories, etc., from a command line interface) is only available for servers (a client version is in the works). TkAntivir is a graphical front-end for H+BEDV AntiVir. There are a number of other e-mail virus scanners available (BSscanmail, MIME Defanger, Qscan, Scan4Virus, VBS, WMailScanner, etc.), but I did not have e-mail running on my test system, so I did not try out any of those.

Backup/Restore

Among the large number of backup programs, Arkeia offers automated backups on a set schedule. BackupEDGE provides high-speed tape backup, and backs up all files, including device nodes, empty directories, named pipes and symbolic links. Ftape supports QIC-40/80/3010/3021, Travan, Ditto and other diskette drive controller-attached tape drives. Other tools include BRU, CTU, PerfectBACKUP+, Recovery Is Possible (RIP), Sitback and Star.

Boot Manager

A boot manager is a tool that allows you to create one or more partitions with bootable operating systems and to choose between them during system startup. The Lilo tool included with every Linux distribution serves as a text mode boot manager for Linux partitions. If you are looking for a graphical boot manager, try one of the following: Klilo is a simple graphical KDE front-end for Lilo. KbootSelector is a graphical front-end for Lilo as well, but it adds the ability to boot from a Windows partition as well as Linux partitions. System Commander Deluxe, a tool similar to its Windows sibling, not only allows you to create and manage partitions, but also to set the system up to boot from multiple partitions and install new operating systems to these partitions. If you will be installing Linux to share a disk with Windows NT specifically, a useful tool is BootPart (members.aol.com/qvollant/bootpart.htm).

CD-ROM

Autorun allows CD-ROMs to load programs automatically when inserted or starts the default CD player when audio CDs are inserted. Red Hat Linux 6.2, for example, installs this useful tool as standard equipment. Once installed, it lurks in the background until a CD-ROM or

audio CD is inserted. No user interaction is required. Kscd (a CD audio player), also installed by Red Hat as the default CD player, works much like a typical Windows CD player.

Command Line Assistance

If you are not used to using commands to execute programs, and especially if you have never used UNIX commands before, it can be confusing. Fortunately, there are some tools to help you learn and use Linux commands: EZTerm is an electronic “cheat sheet” that makes it easy to learn and use the Linux command line interface. Within the EZTerm interface, the user has access to a full-function Linux terminal with step-by-step help for the Linux command structure and syntax. TkChmod provides a graphical interface to the Chmod command. tkWorld offers a graphical command line environment and command assistance.

Defragmenter

Although there are disk defragmentation programs available for Linux, such as defrag and e2defrag, in the normal course of events they should not be needed. The design of the Linux filesystem minimizes file fragmentation under normal circumstances, eliminating the performance problems that result from fragmentation on a Windows system. However, if your disk drives are chronically nearly full, defragging your drives may improve performance.

Desktop/Window Manager

DDT is a graphical desktop that allows a user to view files and start applications like any other desktop. What sets it apart from the other user interfaces is its multilingual support. As a bonus, DDT can also be used as a file manager from other desktops, taking advantage of the iconic interface. DFM makes a Linux desktop work somewhat like the OS/2 Workplace Shell—a plus for former OS/2 users. A similar tool is icewm, which can emulate the look of OS/2, Windows or Motif. If you are coming to Linux from a NeXTSTEP environment, you might prefer AfterStep. A few other desktop managers include: Enlightenment, Gxdesktop and Sawmill.

Disk Partitioning

The basic partitioning tools included with Linux, such as Fdisk and Fips, are capable of performing simple disk partitioning and file system-specific formatting for Linux. If you are looking for something with more features, or a friendlier user interface, there are a number of other tools available: DiskDrake allows you to create, delete, resize, change type or format partitions. GNU Parted lets you create, delete, resize, move or copy partitions, and even create disk images for installation replication. For those who have used the Windows version of PartitionMagic, the Linux version is very similar. Like other tools it can create Linux and DOS/Windows partitions, but where it excels is in its ability to not only create any of a number of different partition types, but to seamlessly convert from one file system type to another *without losing data* (although for safety reasons it is still a good idea to backup your data files first). It supports conversion from: FAT (DOS, Windows, or OS/2) to FAT32 (Windows), or NTFS (Windows NT/2000), or HPFS (OS/2); from FAT32 to FAT; and from NTFS to FAT or FAT32. It can also change a primary partition to a logical partition and vice versa. (PartitionMagic is sold commercially but may be included on some Linux distribution CDs.)

DOS, Windows, OS/2 Disk Access

Mtools is a collection of public domain tools that allows UNIX/Linux systems to read, write and manipulate files on a non-UNIX (DOS/Windows or OS/2) formatted floppy without first mounting it. (It even supports Windows long filenames and OS/2 XDF-format diskettes.) It also permits Linux applications to emulate the DOS equivalent command without some of the unnecessary restrictions and oddities of DOS. (Mfm provides a graphical interface for the command-line Mtools.) NTFS Drivers allows Linux to read disk and network partitions formatted using the Windows NT NTFS file system).

Graphical File Manager

Both KDE and Gnome come with a graphical tool for managing files (see the *Linux Questions and Answers* white paper, available from the same source as this paper for information on

how to use the default file managers), but there are other tools available with different features and styles, if you would like to try them: **Gentoo** allows you to specify how to display different file types (with unique colors and icons) and what to do when you double-click on them (such as load image viewers, music players, etc.). It includes more than 120 original icons that you can assign as desired. If you are looking for a multilingual file manager, check out **Lanzadera**. **X Northern Captain (XNC)** is a graphic file manager with the usual file manager capabilities (including opening/copying/moving/deleting/renaming files, and so on), but it also allows the user to edit files stored in ASCII text or Hexadecimal (Hex) format. Other features include Recursive Directory Copying, Moving and Deleting, and Quick Scan directories, as well as calculating the size and number of files. Some other graphical file managers I did not have time to investigate include **Akkord**, **Endeavour** and **Fred's Own Filemanager (FOF)**.

Installation Disk

If you ever need to create a Linux installation disk and all you have available is a Windows system, **Rawrite** is the tool for you.

PCMCIA

To help you manage hot-swapping of PCMCIA cards (PC Cards), there are a couple of packages you can download and try: **PCMCIA Card Services for Linux** and **gLaptop**.

PDF File Reader

In order to be able to read the many online documents that have been stored in the Adobe Acrobat file .pdf format (such as the online tax forms the IRS provides at www.irs.ustreas.gov/forms_pubs/index.html) you will need a compatible program. Just as Adobe offers a PDF file reader for Windows users, it offers **Adobe Acrobat Reader** for Linux. Another PDF reader is **xpdf**, which also includes programs to convert PDF files to PostScript or plain text.

PIM/Organizer

One Personal Information Manager (PIM), calendar and scheduler for KDE and X Windows is **KOrganizer**. It is conceptually similar to Microsoft Outlook in that it organizes your appointments, projects and schedule, but it differs in that it natively reads and writes the vCalendar file format (the industry standard personal data interchange format). It also can import from the Lotus and Microsoft PIM/organizer products. Motif users might prefer **Plan**, a calendar/day planner.

Plug-and-Play Configuration

Configuring Plug-and-Play hardware on a Windows system is pretty simple, because the operating system generally does a good job of handling the setup automatically. Configuring older ISA (Industry Standard Architecture, also called AT Bus) hardware, if you have any, is not as simple under Windows, nor is it under Linux. **ISAPNPTOOLS** is a utility that helps in the task of configuring ISA plug-and-play hardware.

Rescue Disk

If you ever find yourself in a situation where your system has somehow been rendered non-bootable, you generally have two options to get your system back up and running: Reinstall the operating system from the original CD, or boot to a "rescue" diskette and make whatever corrections are needed to your system. When you install Linux you are asked if you want to make a rescue disk. Hopefully you did. But if not, or you have misplaced it, you may need to make one sometime after installation. **Zdisk** is a tool that lets you create a bootable floppy disk containing the operating system kernel (core) as well as various useful utilities needed to get your system back up and running.

Scanner

If you have a scanner you will need Linux software to run it. **SANE** is a universal scanner interface, which supports many different scanners. (**Xsane** is an X-Window front-end for

SANE.) If you need optical character recognition, **OCR Shop** will convert your paper documents and images into editable formats for use with many applications. (The current Linux version outputs only in ASCII text format, though.) It also recognizes 14 languages. **ScanShop**, for SCSI scanners, offers the ability to modify a scanned image type, as well as cropping, zooming, vertical and horizontal mirroring and rotation.

Speech Recognition

If you are looking for software to allow you to operate your computer by voice, there are at least a couple of options available: **IBM ViaVoice™ SDK** is a software developer's toolkit that allows programmers to add voice command support to applications as well as provide the ability to use continuous dictation as input to applications. It also includes a runtime module that can be used stand-alone. Another option is **KvoiceControl**, which allows UNIX commands to be issued by voice (but continuous voice dictation is not provided).

Speech Synthesis

If you are in need of software that can read text and convert it to speech, again you have a couple of choices: **Festival**, which performs text-to-speech in English, Spanish and Welsh (and includes application development tools) and the **IBM ViaVoice SDK** (see above).

Swap File Manager

One of the issues that every Linux user has to face when setting up their system is how much swap space to reserve in a special partition. This space is then unavailable to Linux for any other use. If the swap partition is too small, performance suffers; too large and there is unused wasted space. **Swupd** does not require a fixed swap file size. It dynamically adjusts the size of the partition, as needed, to conform to the current needs of the user.

ThinkPad Tools

IBM ThinkPad notebook users who upgrade their computers from Windows to Linux need a replacement for the ThinkPad Utilities program (PS2.EXE) provided with their systems. This program is used for controlling BIOS functions, including power management. A tool that provides similar capabilities is **tpctl**.

Zip/Unzip

There are any number of tools to compress/decompress program and data files, and anyone who downloads files from the Internet will eventually need one. Because I was already familiar with the DOS and Windows versions of **PKZIP**, and also the DOS, Windows and OS/2 versions of the **Zip/Unzip** combo, I decided to start with those—in addition to the **tar** and **gzip** utilities shipped with Linux.

Games/Entertainment

This category, of course is more for the home user than for the office worker. Unlike with some of the office products, I was not worried about data compatibility issues—simply what was available. Are there professional-quality games “out there,” or is it simply a case of home programmers taking a stab at something, as it was in the early OS/2 days? It was years before commercial games for OS/2 emerged in any quantity. How would Linux fare in this area?

Clearly, Linux is off to a good start with respect to commercial games, judging by the release in native Linux form of such popular DOS/Windows games as **Civilization: Call to Power**, **Heavy Gear II**, **Heretic II**, **Heroes of Might and Magic III**, **Myth II: Soulblighter**, **Quake I/II/III**, **SimCity 3000**, **Ultima Online** and **Unreal Tournament**. In addition to commercially packaged software, there are hundreds of high-quality free, or shareware, games available on CD or by download.

Of course, the true test of Linux's appeal as a gaming platform will be when commercial games begin appearing for Linux *before* they arrive for Windows. In the meantime, there are plenty of games from which to choose—especially free ones, as you can see in *Appendix A*.

Besides games, there are other leisure time programs to be found, including screen savers, anagram and other puzzle generators, and so on.

Personal Finance

This category, too, is primarily for a home user—not an office worker. But here I was concerned with data compatibility issues, on the theory that many people who are using Quicken today would want to migrate their existing data to Linux, rather than have to start over. My two big questions were, “Are there tools with functionality equivalent to Quicken or Microsoft Money?” and if so, “Can I convert my old data files for use with the new program?” Here is what I found:

- **GnuCash** — Very similar in concept to Quicken. It even allows the importing of Quicken **.QIF** files. It can track and update investment portfolios by accessing various Web sites. Small Office/Home Office users might find it effective for business accounting as well. (www.gnucash.org)
- **MoneyDance** — Uses a checkbook register-like interface. Write checks, generate graphs and reports, schedule transactions, generate reminders and work in multiple languages and currencies. Imports/exports Quicken QIF files. (seanreilly.com/java/moneydance)
- **QHacc (Q Home Accountant)** — Emphasizes ease of use; designed for the home user. It is meant to be a basic accounting package not a Quicken replacement. QHacc is still in beta testing, so some features may not yet be bug free, or even present. (www.ostrich-emulators.cx/~ryan/qhacc)

A couple of other possibilities for the future might be **Linux-Kontor** (at present in German-only, but being migrated to other languages) and **WebAccountant** (currently in a pre-beta development stage, so it is still too early for a features list). (For the latest status, visit www.linux-kontor.de/de and www.webaccountant.org, respectively.)

DOS/Windows Software Compatibility

This could be a big category for some people. What do you do in situations where there simply is no Linux solution that meets your needs? As it turns out, there are several possible solutions for those who absolutely need a particular application and who cannot accept (or perhaps find) a Linux equivalent. In many cases, using these product could save you from having to use both a Windows PC and a Linux PC, or as one joker put it, a “Table Area Network,” to get your work done.

- **DOSemu** is a DOS emulator that comes with many Linux distributions. It allows most DOS programs to run in a windowed session but does not require the actual DOS operating system to be installed. Interestingly, many DOS programs run faster under DOSemu than under native DOS or Windows. This is because DOS function calls launch 32-bit Linux system services, rather than the original 16-bit DOS services. If you are used to using the Geoworks graphical interface for DOS, it reportedly works inside DOSemu (although I have not tried it myself).

Note: I do not know if anyone actually supports Geoworks-under-DOSemu-inside-Linux, but here is a document I found that explains how to fix some problems when using Geoworks on a fast computer and/or with recent operating systems. Perhaps it will help if you have trouble using Geoworks with Linux. (www.newdealinc.com/supportn/ts/276.htm)

- **Plex86**, like VMware “virtualizes” the PC processor, allowing it to run multiple operating systems at once. Like Wine, it too is open source software, meaning that it is non-commercial and many different people are collaborating on its development. Eventually it may be able to run various Windows operating systems (and others), but at this early (pre-

release) stage in its development it is limited to running a licensed copy of MS DOS 6.22 in a virtual session. You can download it from: www.freemware.org/download.phtml.

- VMware allows the installation and running of an actual copy of a Windows 3.1/9x/NT/2000 operating system (as well as FreeBSD and DOS) inside Linux without requiring a separate disk partition. It requires that you have an installable copy of the full Windows package handy. (An “upgrade” package, which requires that an earlier version of Windows already be installed, will not work.) VMware works by using the Virtual Machine mode of Intel-compatible processor chips to isolate an area of memory from the rest of the system. Once a version of Windows is installed, you can run practically any program compatible with that Windows product in the Virtual Machine session. Because Windows applications run in a protected mode environment, if a Windows program freezes it should not affect the operation of Linux.

Keep in mind that if you run a Windows operating system under the Linux operating system, and run a Windows application under all that, it will require a large amount of memory to run effectively—much more than if you were simply running the program under either Windows or Linux—because you are running both operating systems in memory simultaneously. The more RAM you have, the better. Even so, do not be surprised if a Windows application runs much slower under Windows-inside-of-Linux than under native Windows, given that the processor is juggling two different operating systems at once. Whether it runs too slowly will depend a lot on how fast your system processor is, how much memory it has and the type of applications you are using.

In addition, the disk space requirement for two entire operating systems will be much larger than for only one. VMware recommends allowing at least 500MB per “virtual PC,” so plan accordingly when sizing your partitions.

Note: Reviews of the product and a detailed listing of hardware and software requirements can be found at: www.linuxplanet.com/linuxplanet/reviews/1704/1 as well as www.zdnet.com/enterprise/stories/main/0,10228,2461923,00.html. VMware is available at www.vmware.com. It is a commercial product, however, there is a free 30-day trial version that you can download and try before buying.

- Win4Lin is similar to VMware in that it allows you to install and run an actual copy of Windows 95/98 (but not Windows 3.1/NT/2000) inside of Linux. Once Win4Lin installed, you should be able to run many Windows programs. Windows and Linux share the same files directly, so Samba is not required. Win4Lin can be set up on a Linux server, and it can export Windows applications directly to a user's desktop. Like VMware, your memory and disk requirements will be much higher running both operating systems than just one.

Note: For product reviews, go to: www.linuxworld.com.au/article.php3?tid=8&aid=5 and www.nwfusion.com/research/2000/1016featside.html. Win4Lin is available for purchase from store.yahoo.com/netraverse; however, before buying you can download a free 15-day trial version at: www.netraverse.com/products/win4lin/downloads/eval/index.php.

- Wine (Wine Is Not an Emulator) is a “Windows application environment,” which allows many Win32[®] (Windows 95/98/Me/NT/2000) programs to run unmodified under Linux, including those that use Winsock TCP/IP networking. Wine acts as a substitute for Windows to execute Windows software. Whether a particular Windows program will run under Wine may depend not only on which Linux distribution you are using, but also the version of the Windows application and the version of Wine being used.

Macintosh Software Compatibility

If you have almost weaned yourself away from your old Apple Macintosh system but still have a few Mac programs that you cannot live without, it may be possible to run them on your Linux system. Try out the following Macintosh emulator programs:

- Basilisk II is a free program that emulates either a Motorola 68000-based Macintosh Classic (which runs Mac OS 0.x thru 7.5) or a Macintosh II (which runs MacOS 7.x, 8.0 and 8.1), depending on the ROM being used. It requires a 512K or 1MB Macintosh ROM image and the Macintosh System 7.x or 8.x operating system.
- Executor duplicates in software the functions and command sets of the Motorola hardware chips used in many Macs. Because both the Motorola hardware and the Apple OS are only emulated, Executor allows you to run many (but not all) Mac programs on your Linux system. Like the Windows environments, above, it will increase your memory requirement (especially if you *also* have a Windows environment installed), and because the program is only emulating the Motorola hardware, the performance of your Mac applications may be less than you are used to. (On the other hand, if you are upgrading from a low-end Mac to a high-end PC with lots of memory, performance may be quite acceptable.) Still, if it is a program you run only occasionally and performance is not critical, Executor may do the job well enough to let you get that second computer off your desk. (It requires no Mac ROM images or system files.) Executor is commercial software, obtainable from www.ardi.com, or you can download a functional 30-day demo version from www.ardi.com/executor/products/lin86_demo.html. For a list of Macintosh software identified by ARDI as compatible, go to: www.ardi.com/compat/search.phtml.
- vMac emulates the Motorola 68000 series chips used in the Macintosh Plus. It allows you to install a copy of Macintosh System 7.5.5 (or earlier) and run Macintosh applications inside of Linux. (A ROM image from a Mac Plus *is* required.)

For a more in-depth look at these DOS and Windows environments in action, refer to the white paper entitled, *How to Run DOS and Windows Applications Under Linux*, available from the same sources as this paper.

Others

There were many programs that I did not try out, because they were not products that I really need or want at this time; but if you are in the market for a relational database, desktop publisher, terminal emulator, high-end graphics suite, etc., be sure to look at *Appendix A*, following. There are quite a few programs listed there that I did not test for this paper.

In Conclusion

I was pleasantly surprised by how many categories of applications and utilities were represented with Linux tools. Many people would be able to perform their daily jobs, even run a business, using some of the software available for Linux. On the other hand, those needing Linux versions of popular Windows applications may be disappointed. Moreover, because Linux software is still in a hyper-growth phase, many of the available applications are still fairly new and lack some functionality and polish. However, these flaws will diminish over time, and more “cross-over” applications from the Windows universe (in addition to WordPerfect, CorelDRAW, IBM DB2 Universal Database, Oracle, Adobe FrameMaker, Quake III, SimCity 3000, and other existing Linux applications migrated from Windows) will become available as Linux becomes more popular.

From an operating system standpoint alone (i.e., ignoring applications), I would say that technically savvy computer users (those who like to “get under the covers” and tweak configuration settings, download and install the latest and greatest tools, modify and recompile programs, etc.) will likely enjoy using Linux and tailoring it just the way they want it. And even those who don’t know a window from a door, but who have IT departments at the office to do all the setup and tuning for them and provide training classes, will probably find it nearly as easy to use as Windows. *Nevertheless, at its present state of development, I feel that many home and home office users (those who are comfortable using Windows but not editing*

configuration files, running occasional commands from the command line or compiling software before use), might be best served avoiding Linux for now, at least until such time as the level of “polish” allows users to do everything from the graphical interface, as Windows 98 does.

If you are already convinced that Linux is for you, then this document should help you find many of the programs you will need to use your system productively.

My Scorecard

I began this quest to see if I could cobble together a working Linux system that could replace my Windows systems in their entirety. I needed the same functionality, and in some cases, complete file interchange with the equivalent Windows applications. Here is how I fared:

Needed to replace my Windows-based office system:

Adobe Acrobat PDF file creator	Found (<i>Ghostscript</i> or <i>text2pdf</i>)
Adobe Acrobat PDF file reader	Found (<i>Adobe Acrobat Reader 4.0</i> , or <i>xpdf</i>)
Antivirus	Found (Quite a few e-mail virus scanners)
Fax utility	Found (<i>Mgetty+Sendfax</i> , or <i>FaxMail</i>)
Lotus Notes for Linux	Not Found (however, see: spacelab.lotus.com for possible plans)
MS Word-compatible word processor	Found (<i>StarOffice Writer</i>)
Visio® compatible equivalent	Not Found (Perhaps <i>Dia</i> , for similar results, but not for file-compatibility—not tested; or Visio itself, via <i>Wine</i> , <i>VMware</i> , or <i>Win4Lin</i> —not tested)
Web browser	Found (<i>Netscape 4.72</i>)

Needed to replace my Windows-based home system:

Adobe Acrobat PDF file reader	Found (<i>Adobe Acrobat Reader 4.0</i> or <i>xpdf</i>)
Antivirus	Found (Quite a few e-mail virus scanners)
CD/MP3 music player	Found (<i>RealPlayer</i>)
Decent word processor (import from MS Word):	Found (<i>ThinkFree Write</i> , <i>StarOffice Writer</i> , <i>HancomWord</i> or <i>AbiWord</i>)
Decent games	Found (Quite a few ¹ —see Games/Entertainment/Education)
Disk utilities	Found (Quite a few—see Utilities)
DVD video player	Found , but not tested (<i>Creative DXR2</i>)
Image viewing/editing	Found (Quite a few—see Graphics/Image Processing/Diagram Creation)
E-mail	Found (Quite a few—see Communications/Telephony/E-Mail)
Fax software	Found (Several—see Communications/Telephony/E-Mail)
Multimedia audio/video player	Found (Quite a few—see Audio/Video)
Personal finances (Quicken equivalent)	Found (<i>GnuCash</i> ; perhaps <i>Quicken</i> , via <i>Wine</i> or <i>VMware</i> —not tested)
Personal investment manager	Found (<i>Xinvest</i>)

¹ I did not buy any of the commercial games (such as *Quake III* and *Civilization: Call to Power*), but I have no doubt that they are every bit as good as the Windows versions of those games, as they are produced by the same vendors. I did manage to waste a fair amount of time playing (er, testing—yeah, that’s it, testing!) free versions of backgammon, Yahtzee, solitaire, minesweeper and various arcade-type games. (Only on personal time, boss—honest!)

Preparing Today for Linux® Tomorrow

Spreadsheet (import from MS Excel):	Found (<i>ThinkFree Calc</i> or <i>StarOffice Calc</i>)
Tax preparation software	Not Found (perhaps <i>TaxCut</i> or <i>TurboTax</i> via <i>Wine</i> , <i>VMware</i> or <i>Win4Lin</i> —not tested)
Web browser	Found (<i>Netscape 4.72</i>)

I was not able to find everything I needed for either home or office, but I was not far from creating a complete home system. As for the office system, it was the lack of a Lotus Notes client for Linux that did me in. Nevertheless, for those who can use Netscape or one of the other Linux mail programs for their e-mail, this would not be an impediment.

In some cases, the *Wine* utility (which allows a Linux user to run many off-the-shelf Windows applications), or *VMware* and *Win4Lin* (which enable the installation and operation of Windows itself inside a Linux virtual machine session) may make up for the lack of specific native Linux applications by allowing you to use your Windows versions of those applications on a Linux system. Similarly, if there are any DOS programs you cannot live without, the *DOSemu* utility included with Linux may allow you to run those programs as well.

Appendix A

There were so many potential applications to try out that there just was not time to get to them all, so I decided to make a list of many of those that I found, primarily those that were written or updated within the last year. Some are free under the GNU General Program License (GPL), and some are sold commercially. A number have been around quite a while and are feature-rich and polished; others are beta (or even pre-beta) code or in the very early release-levels (1.0x) and therefore still somewhat lacking—but perhaps useful nonetheless. Depending on the Linux distribution you use, and whether you downloaded it or obtained it on a CD-ROM loaded with other software, you may already have some of the software listed here, or equivalents. The lists are provided in case you do not have something you need or would rather try an alternative to what you have.

There was no attempt to make the following lists comprehensive. Such a task would require an extensive database and a large expenditure of time for researching and updating. Instead, presented here are just a few representative examples in each category to illustrate what is available and perhaps serve as a starting point for those new to Linux. (The descriptions were excerpted from the Web sites where I found the software.) Although I was concentrating on non-server based applications and tools, I did include some server products that I thought were interesting and perhaps not well-known.

Also, keep in mind that not all of these Linux programs will work with all distributions “as is.” Some may work with SuSE Linux, for example, but not TurboLinux, without recompiling the program or adding or upgrading software libraries. Similarly, one application may require the KDE graphical user interface, while another will only work with Gnome. A few may only supply source code, requiring the user to compile the program before using it. For more information about specific programs, or to download, go to the Web sites referenced earlier.

DISCLAIMER: *By listing software below I make no representation of quality or suitability for purpose. These are not recommendations. I have made no attempt to perform an in-depth analysis and review of these products, and in some cases I have not even tested them. They are merely included as examples of what is available. It is up to you to try them out and determine whether they are appropriate for your needs.*

Audio/Video

This category includes software for downloading, viewing, editing and listening to various types of audio, video and images, as well as some device drivers.

- **Audio driver** — OSS (device drivers for most audio chips); ALSA driver/utilities (modular driver, compatible with most OSS drivers).
- **Audio/video recording/editing/playing** — Broadcast 2000 (also screen capture, video capture and QuickTime output).
- **CD audio player** — cccd; cdplayer.app; demcd; GCD; Sing-along Disc Player.
- **CD organizer** — CD-Keeper (search for CDs different ways).
- **CD recorder** — Kcdmaker (front-end for, and requires, *cdrecord* and *cdparanoia*); cdda2wav (save to WAV and Sun® formats); X-CD-Roast.
- **Digital camera** — gPhoto (thumbnail previews, upload/download/delete images, camera configuration, etc.); kdcpi (download pictures from a Kodak DC200/DC210 camera); PhotoPC (camera controls).
- **DVD capture** — dvgrab (save video data from a Mini-DV video camcorder).

- **DVD driver/player** — Creative DXR2 (driver and movie player for the DXR2 (CT7120) DVD decoder board); **Hollywood Plus/DXR3** (drivers for the Hollywood Plus and DXR3 DVD decoder boards); **Tk-DVD** (graphical front-end for Creative DXR2 software).
- **MIDI player** — **Midnight** (plays MIDI and Karaoke-enhanced MIDI).
- **MIDI sequencer** — **Jazz++** (for Linux and Windows).
- **MP3 audio player** — **eAusic** (MP3/WAV/CD/MOD); **Kmp3** (MP3 audio player for the KDE user interface); **MP3VoiceControl** (uses IBM ViaVoice speech recognition to let the user choose a song by speaking into a microphone); **RealPlayer** (the UNIX version of the popular Windows utility); **xmms** (an MP3/WAV/CD/MOD/IceCast audio player).
- **MPEG video player** — **MpegOrion**; **mtv** (MPEG-1/Video CD format video players).
- **Napster** — **gnapster** (a Linux client for online Napster mp3 servers).
- **QT/AVI video player** — **aKtion** (QuickTime/AVI/FLI/FLC/SGI format video player).

Business-Specific

The following are application suites for the running of specific types of businesses or departments:

- **AMS Realtime** — An integration application suite for project/program management, resource management, cost management and timesheets. Includes APIs to allow integration with ERP and other enterprise software.
- **FreeVet** — Complete system for managing an *animal clinic*.
- **Keystone** — For small to medium IT departments. Provides problem tickets/tracking, contact and resource management. Web-based.
- **Pizza Delivery System** — Track customer delivery information by phone number; includes CallerID support. It prints a ticket for the kitchen, the customer's bill and various financial and inventory reports.
- **Silk Software** — Accounts payable, accounts receivable, general ledger, inventory management, purchase order, point-of-sale, payroll, sales analysis and work order processing.
- **ViewTouch** — Turnkey point-of-sale solution for *restaurants and food and beverage organizations*. Supports X terminal touch screens. Supports all popular POS equipment. Includes time clock and real-time reporting.
- **XLN** — Complete ERP/MRP II system with manufacturing, accounting, data collection, service and distribution components. Also Windows NT, UNIX, OS/2 and DOS versions. Seamless integration with spreadsheet packages such as Microsoft Excel and graphics viewers, including PaintShop Pro.

CAD/3D/Drafting

This category includes high-end applications for creating animations, designing circuit boards and other modeling and drafting uses.

- **Blender** — Create TV commercials, animation, technical visualization and business graphics.
- **CYCAS** — Complete 2D/3D CAD package for presentations and technical illustrations.
- **Eagle PCB** — CAD software for designing printed circuit boards.
- **ME10 Professional** — 2D design and drafting tool.

- **Moonlight 3D Atelier** — 3D modeling and rendering.
- **POV-Ray** — Ray-tracing 3D graphics package. Also available for DOS, Windows, Mac OS and Amiga.
- **povfront** — Graphical front-end for POV-Ray.
- **RenderPark** — Photo-realistic rendering tool; several new state-of-the-art rendering algorithms.
- **VariCAD** — 2D/3D modeling; supports .DXF and .IGES file formats.
- **xfpovray** — Graphical front-end for POV-Ray.

Communications/Telephony/E-mail

Although I was primarily looking for desktop/notebook solutions, rather than server products, some of the following are rather interesting server applications that might not be well-known:

- **E-mail clients** — aargh (customizable e-mail auto-responder); Arrow; Balsa; Elm; MMP; Netscape Navigator (see Web Browser/Tools, below); OpenMail (compatible with Exchange and Notes servers); Pine; Spruce; TkMail; Xcmail; Zmail (for Motif).
- **E-mail conversion** — MStoNS (converts Microsoft Outlook Express mail folders to Netscape mail folders).
- **Fax** — efax (basic fax program); FaxMail (send faxes via e-mail); HotWire EasyFAX; HylaFAX (also supports paging); KFax (view/print incoming faxes); Mgetty+Sendfax (sends and receives faxes; includes answering machine with call discrimination between voice/modem/fax).
- **Internet Relay Chat (IRC)** — cIRCus; sirc (for X Window System); xirc (for X Window System); Zircon (for X Window System).
- **Instant messaging** — Banter (multilingual); Everybuddy (Linux replacement for AOL Instant Messenger (AIM), Yahoo! and ICQ); GAIM (a clone of AIM); Jabber; Kicq (KDE ICQ clone); Licq (X Windows ICQ clone).
- **Internet telephone** — Speak Freely; Whisper.
- **IP-based teleconferencing** — MeetingPoint.
- **Multiline telephony server** — ACS.
- **Paging** — HylaFAX (also supports faxing); QuickPage (client/server paging); Spatch (alphanumeric paging);
- **Spam poisoner** — Sugarplum (defends mail servers against automated “spambots”).
- **WAP/SMS Gateway** — WAP/SMS Gateway (Web server gateway to support mobile WAP terminals and SMS-capable handsets).

Database Manager

This is one of the strongest application areas for Linux, with native versions of many popular database managers from other operating system platforms. The following list contains a mix of established database managers from other platforms and those unique to Linux. (Also, see the Office Suites category, below, for other products.)

- **DB2 UDB** — IBM’s relational SQL database. Databases can be accessed from any Java™ enabled Web browser. Supports JDBC and SQLJ. Versions are also available for Windows, OS/400®, AIX/6000® and OS/390®.

- **Informix-SE** — Easy-to-manage database for small-to-medium-range applications. Also available for other platforms.
- **ivSQL** — Java-based graphical front-end to SQL data.
- **Max** — An xBase database, compatible with dBASE or FoxPro; Windows version also available.
- **Mimer** — Relational SQL database, compliant with Microsoft's ODBC interface. Versions also available for many UNIX varieties, Windows NT, Windows 95/98 and OpenVMS.
- **OpenLink Virtuoso** — Transparent access to existing data sources. Supports Oracle, DB2, SQL Server, Informix, Progress, CA-Ingres and other databases via ODBC, JDBC, UDBC, OLE-DB compliant client apps.
- **Oracle** — Linux version of the popular relational database. Also available on other platforms.
- **Paradox** — Linux version of the popular DOS/Windows database.
- **Pervasive.SQL 2000** — Scalable database management system, supporting both relational and transaction data access methods.

Games/Entertainment/Education

These are some off-duty “fun” items to relax the mind, de-stress the body and soothe the soul (or, perhaps, get the adrenaline pumping):

- **Action games** — LDescent (a port of the popular game Descent; requires a registered version); Heavy Gear II (armored robot combat); glTron (lightcycle racing game); KInsectizid (for KDE; blast the insects before they get you); Nighthawk (fight radioactive droids); Obsidian (similar to Quake); Orbit (space combat); Space Racer (3D car racing game); Tux Racer (Tux the racing Linux penguin); XShip Wars (multiplayer, graphical, space-oriented action game, designed for network play).
- **Arcade games** — Gnome Breakout (for GNOME); Kalax (for KDE); kPacman (for KDE); kSpaceDuel (for KDE); Maelstrom; Penguin Command; Scavenger; Xblast; Xgalaga; XInvaders 3D; Xpilot (some are similar to, or based on, classic arcade games); XRally; Xscorch.
- **Board games** — Gnerudite (GNOME-based word game); Gnome Chess; Gnu Chess; Gyahtzee (for GNOME); KGo (for KDE; Go/Othello); Kmahjongg (for KDE); KnightCap Chess (for KDE; 3D); Squaroid (multi-player); xMahjongg.
- **Card games** — Ace of Penguins (solitaire); Blackjack; Cardwords; Eric's Ultimate Solitaire (23 different games); KDE Games (for KDE; solitaire, Mahjongg, poker, etc.); Linux Memory Game (like the card game Concentration); PySol (includes Mahjongg); Seahaven (based on Solitaire and other classic card games); XPatience (14 solitaire games).
- **Educational software** — Dr. Genius (general math/geometry); Dr. Geo (geometry); Letters and Numbers (basic counting and letter recognition); Typist (typing tutor); Xpuzzles (rotational 3D and sliding block puzzles).
- **Fantasy/Adventure/Role-playing games** — Heretic II (save the world via sorcery); Hopkins FBI; Myth II: Soulblighter (with your army of soldiers and sorcerers, do battle with the Soulblighter); The Guild; Ultima Online (multi-player version of the popular Ultima role-playing series for DOS/Windows).
- **First-person shooter (FPS) games** — GLHeretic (a port of the DOS game Heretic); Golgotha Forever; Quake, Quake II, Quake III (Id Software's Quake series); Unreal Tournament (sequel to Unreal; single-player or multi-player modes); xsoldier.

- **Puzzle games** — Blockade; Chain; gdstar; gTans (Tangrams); Intelligent Tetris; Krilo; Quadra; Rubik's Kube; Seb's 3D Tetris; XblockOut; xtris.
- **Simulator Games** — Flight Gear (flight simulator); Sabre Fighter (Korean War flight simulator).
- **Strategy Games** — AirTraffic (you are the air traffic controller); Civilization: Call to Power (the classic series continues); Craft (a vaguely SimCity-like game; build a new nation from scratch); Emperor (conquer all the cities in the world); Europa; Freeciv (similar to Civilization II); FreeCraft (a clone of WarCraft II; requires the actual WarCraft II product to supply the graphic and sound files and documentation); GNUlactic Konquest (for KDE; multiplayer); Heroes of Might and Magic III (do battle with sorcerers, knights and beasts); KBattleship (for KDE); LinCity (SimCity-like game); Railroad Tycoon II Gold Edition (Real-time strategy simulation game set in the late-1800s through 2030. Build your railroad empire); SimCity 3000 (continuation of the classic series); Spellcast (multiplayer strategy game); Stock (multiplayer stock market simulation); Unfair (attack or defend a planet); Xbattle (concurrent, multiplayer battle strategy game).
- **Table Games** — Flying (pool, air hockey and other table games); gtkpool (a billiards game with customizable physics and sound).
- **Miscellaneous** — agm (an anagram generator); seti_applet (GNOME applet for SETI@Home); XScreenSaver (screen saver/locker for X Windows).

I also came across an anthology of more than 400 Linux games, graphics applications, audio players and development tools crammed onto one CD, available from Indelible Blue (www.indelibleblue.com) under the name Turbo Games++ for Linux. For about the price of one game you get Doom, Quake, chess, blackjack, solitaire and hundreds of others.

Graphics/Image Processing/Diagram Creation

Here are some applications intended primarily for diagram and artwork creation and editing or viewing.

- **Artstream** — Illustration and page layout for graphic design and desktop publishing.
- **Blender** — 3D suite for creating TV commercials, technical visualization, business graphics, image morphing and user interface design.
- **CorelDRAW Graphics Suite** — A Linux version of the popular Windows software. Part of CorelOffice (see Office Suites, below).
- **Dia** — Intended to be similar to Visio (a Windows product). Allows the creation of flowcharts, circuit diagrams, network diagrams and UML diagrams. New shapes can be added via XML. Can save to custom XML format and export to EPS or SVG formats.
- **Image Magick** — Display/edit images on an X Windows system.
- **iManager for ImLib** — Organize and display a large collection of images.
- **ImPress** — Graphical layout program; create presentations and PostScript documents.
- **KIllustrator** — Vector drawing program for the KDE user interface; intended to be similar to Corel Draw or Adobe Illustrator. Part of KOffice (see Office Suites, below).
- **kImageShop** — Bitmap image editor for KOffice (see Office Suites, below).
- **MagicPoint** — Slide show presentation tool.
- **Photogenics** — Linux version of the popular Amiga painting/editing program.
- **Photopc** — Manipulate some digital cameras (Agfa, Epson, Olympus and Sanyo).

- **The Gimp** — Photo retouching/painting/image conversion tool.
- **Xpaint** — Image editing tool with common paint program features.
- **xv** — Image manipulation program for X Windows; supports many file types.

Office Suites

These are collections of interconnected applications that perform various general business functions:

- **ApplixWare** — Word processor, spreadsheet, presentation graphics and others.
- **CorelOffice** — Contains WordPerfect, CorelDRAW and other tools.
- **IBM Small Business Suite** — Includes IBM DB2 Universal Database (multimedia-ready SQL relational database), IBM WebSphere Application Server (Web application runtime environment for Web pages), IBM WebSphere Homepage Builder (templates, tools and multimedia tutorials for creating and publishing Web sites), IBM WebSphere Studio (tools to support all Web development levels; groupware for content authors, graphic artists, page scripters, Web programmers and Webmasters), Lotus Domino (desktop and mobile e-mail, Web access, calendaring, group scheduling, bulletin boards/newsgroups, workflow and database access) and Lotus Domino Designer (rapid design and development tool for enhancing or building Lotus Notes and Domino Web applications). It can be ordered directly from IBM at: www.ibm.com/shopibm.
- **IOffice2000** — Web-based groupware suite. Includes a scheduler, ToDo list, e-mail, workflow, discussion, bulletin board, document organizer, address book, etc.
- **KOffice** — Office suite for the KDE user interface. Provides a word processor (KWord), spreadsheet (KSpread), database (Katabase), presentation program (KPresenter), drawing module (KIllustrator), image viewer/editor (KImageShop) and a formula editor.
- **Siag Office** — Includes a word processor (Pathetic Writer), spreadsheet (Siag), animation program (Egon), text editor, file manager and PostScript/ghostscript viewer.
- **SmartWare 2000** — Provides a word processor, spreadsheet, relational database manager, asynchronous communications module and a script-like programming language.
- **StarOffice** — Includes StarWriter, StarCalc, StarBase, StarDraw, StarChart, StarSchedule, StarImpress and other tools. Provides conversion filters for import/export with other file formats (including Microsoft Office). Also available in Windows, OS/2 and Sun Solaris versions.
- **ThinkFree Office** — Web-based suite (with downloaded Java components) includes ThinkFree Filer (file management), Write, Calc, Show and e-mail support. User interface resembles MS Office; provides conversion filters for import/export with Microsoft Office (.doc) and HTML.
- **Uniplex UBS** — Office automation suite; includes a word processor, spreadsheet, e-mail, scheduler, presentation graphics and the Informix relational database.
- **WordPerfect Office 2000** — *Standard Edition* contains WordPerfect, Quattro Pro (spreadsheet), Corel Presentations, CorelCENTRAL, fonts, clipart and photos. *Deluxe Edition* adds the Paradox database, Railroad Tycoon II Gold, and fonts, clipart and photos.

Personal Finance/Investing

This category includes software for keeping track of investments, checkbooks, auctions and other forms of personal finances.

- **Bidwatcher** — A tool for eBay users to track current bids and listings.

- **GnuCash** — Similar in concept to Quicken.
- **MoneyDance** — Personal finance manager.
- **Qhacc (Q Home Accountant)** — Personal finance manager.
- **QuoteGrabber** — Java application that provides live, continuously updated, quotes, charts and news from the Internet. Includes a portfolio manager.
- **tsinvest** — Quantitative statistical analysis of equities.
- **Xinvest** — Personal finance tracking and performance tool for the X Window GUI.

Spreadsheet

There were so many stand-alone spreadsheet programs that I did not see the need (or have the space) to describe each one. Here are a few of them:

- Abacus; GNU Oleo; GNUmeric; moods; NexS; Quattro Pro; Xess and xxl (also see Office Suites, above).

Terminal Emulators

This category is not of much use to most home or home office users, but there are still many office users who need to connect to a mainframe or midrange (“minicomputer”) system using the host terminal mode. Here are some terminal emulators for Linux:

- **DEC VTxxx terminal** — BTERM (VT320); Eterm (VT102); screen (VT100).
- **IBM 3270 terminal** (IBM mainframe terminal) — Emulus; tn3270.
- **IBM 5250 terminal** (AS/400 terminal) — tn5250.

Utilities

There were too many types of utilities to describe each one. Some provide similar functionality to Windows features or utilities, while others enhance or simplify the Linux interface. Here are some selected tools, organized by category:

- **Antivirus** — AntiVir (searches e-mail attachments/ftp directories, etc.); BSScanmail; H+BEDV AntiVir (command line interface); NetShield Security Suite (server-based virus protection); TkAntivir (graphical front-end for H+BEDV AntiVir); MIME Defanger, Qscan, Scan4Virus, VBS and WmailScanner (all e-mail virus scanner/filters).
- **Backup/restore** — Arkeia; BackupEDGE; BRU; Catchup (synchronizes directory contents between two different computers or drives); CTU; Drive Image; Ftape (supports QIC-40/80/3010/3021, Travan, Ditto and other diskette drive controller-attached tape drives); Kbackup; PerfectBACKUP+; Sitback; Star; Taper.
- **Boot manager** — BootPart (eases Windows NT coexistence); KbootSelector (graphical KDE front-end for LILO to allow it to boot from a Windows partition as well as Linux partitions); KLilo (graphical KDE front-end for LILO); Smart Boot Manager (OS-independent boot manager interface similar to System Commander, OS/2® Boot Manager or Bootstar; still requires an OS loader, such as LILO); System Commander Deluxe (install multiple OSes in multiple partitions).
- **CD-ROM** — Autorun (allows CD-ROMs to load automatically when inserted; starts the default CD player when audio CDs are inserted).
- **Command line assistance** — EZTerm (simplifies the command line interface); TkChmod (GUI interface to Chmod command); tkWorld (GUI environment, command assistance).

- **Defragmenter** — defrag (disk defragger); e2defrag (modified version of defrag that works on ext2 filesystems).
- **Desktop/window manager** — AfterStep (makes Linux look and feel much like NeXTSTEP, with enhancements); DDT; DFM (makes Linux work somewhat like the OS/2 Workplace Shell); Enlightenment (highly user-configurable); Gxdesktop (works on top of GNOME or KDE); icewm (can emulate the look of OS/2, Windows or Motif); Sawmill.
- **Disk partitioning** — DiskDrake (create, delete, resize, change-type, or format partitions); GNU Parted (create, delete, resize, move, or copy partitions; create disk images for installation replication); PartitionMagic (similar to the Windows version); System Commander Plus.
- **DOS application environment** — DOSemu (allows many DOS programs to run unmodified under Linux; may allow the use of the Geoworks graphical user interface (sold separately) for DOS; VMware (install and run an actual copy of DOS—and DOS applications—inside a Linux Virtual Machine session).
- **DOS, Windows, OS/2 disk access** — HPFS (reads/writes OS/2 HPFS-formatted partitions); Mtools (access DOS/Windows and OS/2-formatted disks without mounting them; supports long filenames, OS/2 XDF format diskettes); Mfm (graphical interface for Mtools); NTFS (drivers to allow access to Windows NT NTFS-formatted partitions).
- **Graphical file manager** — Akkord; Endeavour; Fred's Own Filemanager (FOF); gentoo; lanzadera (multilingual); X Northern Captain (XNC).
- **Installation disk** — Rawrite (creates a Linux installation disk on a Windows system).
- **Joystick/Gamepad support** — Joystick (supports a wide variety of game devices).
- **Macintosh Emulator** — Executor (emulates the Mac OS and Motorola 68000 chip); vMac (install/run Macintosh System 7.5.5—or earlier—and Macintosh applications inside Linux).
- **Notebook computer tools** — gLaptop (for GNOME; provides power management, PCMCIA (PC Card) swapping and two generic "script on/off" buttons); tpctl (a console utility for IBM ThinkPad computers, similar to the PS2.EXE utility for DOS, Windows and OS/2, for controlling BIOS functions, including power management).
- **PCMCIA** — PCMCIA Card Services for Linux; gLaptop (for GNOME).
- **PDF file reader** — Adobe Acrobat Reader (PDF file reader); xpdf (also includes programs to convert PDF to PostScript or plain text).
- **PIM/Organizer** — Gaby (address book/contact manager); KOrganizer (Personal Information Manager, calendar and scheduler for KDE and X Windows; can import from Lotus and Microsoft PIM/organizer products); plan (calendar/day planner for X/Motif).
- **Plug-and-Play** — ISAPNPTOOLS (configure ISA plug-and-play hardware).
- **Rescue disk** — Yard; Zdisk (creates a bootable floppy disk).
- **Scanner** — KScan (for KDE); OCR Shop (optical character recognition; can read 14 languages); SANE (universal scanner interface; programming API); ScanShop (for SCSI scanners); Xsane (X Windows front-end for SANE).
- **Speech recognition** — IBM ViaVoice™ SDK (developer's toolkit for adding voice commands and continuous dictation to applications; includes a runtime module); KvoiceControl (issue UNIX commands by voice).
- **Speech synthesis** — Festival (text-to-speech in English, Spanish and Welsh); IBM ViaVoice SDK (see above); Screader (text-to-speech program that reads graphical or text screen content).

- **Swap file manager** — `swamd` (dynamic swap file manager; doesn't require fixed swap file size).
- **UPS power management** — `APC PowerChute plus` (software control for uninterruptible power source devices); `LANSafe III`; `SmartUPStools` (monitors a large assortment of UPS hardware).
- **Windows application environment** — `Win4Lin` (install/run Windows 95/98 and Windows applications inside a Linux Virtual Machine session); `Wine` (allows many DOS, Windows 3.1/95/98/NT—Win16 and Win32—programs to run unmodified under Linux; supports native Windows printer drivers); `VMware` (install and run actual copies of DOS, Windows 3.1, Windows 9x/NT/2000 and their applications inside a Linux Virtual Machine session).
- **X10** — `GX10`; `HAL-X10` (home automation utilities for controlling X10-compatible appliances via the CM11a computer interface).
- **Zip disks** — `Gtkzip` (mount/unmount/use Iomega Zip disks); `jaZip` (maintain and use Zip and Jaz disks); `Ziptool` (tools for Zip and Jaz disk drives).
- **Zip/Unzip** — Tools to compress/decompress program and data files: `bzip2`; `gxTar`; `gzip`; `Karchiver` (supports tar, gzip, bzip2, zip, lha and rar formats); `lha`; `PKZIP` (compatible with the DOS/Windows versions, and tar, gzip, uuencode, xxencode, BinHex and MIME files), `Zip` and `Unzip` (compatible with the DOS, Windows and OS/2 versions, as well as PKZIP); in addition to the `tar` utility shipped with Linux.

Web Browser/Tools

Everyone needs a Web browser. In addition, for those with personal Web sites, or with other needs for Web creation tools:

- **ChangingPages** — Web content management suite; requires no HTML knowledge.
- **IBM WebSphere Homepage Builder** — Includes templates, tools and multimedia tutorials for creating and publishing Internet and intranet Web sites.
- **Leelou** — Author small animated files for online technical support.
- **Lynx** — Text mode browser.
- **Netscape Navigator** — Version 4.7x. Also, V6.0 (beta code) can be downloaded from: home.netscape.com/download/previewrelease.html?cp=hom04t5.
- **Opera** — Small, fast, customizable browser.
- **Tango 2000** — Web application development environment; supports HTML and XML; includes native Oracle support, ODBC drivers and support for COM objects and JavaBeans.
- **TopPage** — Graphical HTML editor; requires no HTML knowledge.

Word Processor/Desktop Publisher/Text Editor

These are products sold separately. *For word processors shipped as part of a suite, see the Office Suites list, above.*

- **AbiWord** — Full-featured, small, fast word processor for MS Windows and X Windows-based Unix. Looks much like MS Word; can read Word (`.doc`), Rich Text Format (`.rft`) and text (`.txt`) files, and write RTF, Hypertext Markup Language (`.htm/.html`) and text.
- **Adobe FrameMaker** — Word processing, page layout and document distribution, with professional color capabilities. Can output directly to Adobe Acrobat PDF format, or produce Web-ready documents. Supports Asian languages.

- **Cooledit** — Full-featured text editor for X Windows.
- **Corel WordPerfect Personal Edition** — The popular DOS/Windows word processor, with Linux enhancements.
- **Document converter** — **catdoc** (converts Microsoft Word documents to ASCII); **Ghostscript** (converts PostScript files to Adobe Acrobat PDF); **HTML2LaTeX** (converts HTML files to LaTeX); **LA2MML** (converts LaTeX documents to FrameMaker MML); **LaTeX2HTML** (converts LaTeX documents to HTML); **MSWordView** (converts Microsoft Word documents to HTML); **TeXPerfect** (converts WordPerfect documents to LaTeX); **tex2pdf** (converts TeX documents to PDF); **text2pdf** (converts text files directly to PDF without an intermediate PostScript conversion step); **Word2X** (converts Word documents to HTML or LaTeX).
- **Edith Professional** — Multi-window text editor; user-friendly interface.
- **HancomWord** — Strong multilingual support; can read/edit/write HTML, MS Word (**.doc**), (**.wds**) and Rich Text Format (**.rft**) files.
- **LaTeX** — High-quality typesetting system, designed for the production of technical and scientific publications. (There are several graphical front-ends available to simplify the command-line LaTeX.)
- **SciTeXt** — A scientific word processor.
- **Ted** — Simple text editor intended to serve the same purpose as Windows' WordPad; uses WordPad's RTF native file format.
- **TheDic** — Multilingual dictionary (currently English↔Russian only, but more to come).
- **VIM** — Enhanced version of the standard UNIX vi text editor.
- **Xdict** — Graphical English↔German dictionary.

Enterprise-class Solutions

No, this is not a Star Trek reference! Although this paper is primarily about desktop software, some people have the notion that perhaps Linux is not appropriate for Fortune 500 type companies. Just to dispel that idea, here are some enterprise-class Linux products:

- **Linux for mainframes** — Linux for S/390® (for more information, go to oss.software.ibm.com/developerworks/opensource/linux390; for an interesting article about the advantages of combining Linux with the industrial strength architecture of a S/390, see www.linuxplanet.com/linuxplanet/reports/1532/1).
- **Low-cost supercomputers** — It is possible to create a “Beowulf-class” supercomputer using a massively-parallel network of low-cost PCs and other computers tied together by Linux and using special software, such as TurboLinux enFuzion, SuSE Extreme Linux or custom-written software. For more on this technology, read the following articles: www.linuxworld.com/linuxworld/lw-2000-04/lw-04-parallel.html and www.ibm.com/press/prnews.nsf/Searchvw/3f4e88b102477aa5852568460067a52a.
- **Middleware** — IBM MQSeries (equivalent to, and compatible with, MQSeries on other IBM platforms); IBM DB2 Connect (lets Linux applications share data from the mainframe DB2 Universal Database software, running under OS/390).

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