THE
PERSONAL
COMPUTING
MAGAZINE

PC
QUEST

A CYBER MEDIA PUBLICATION

POWER UTILITIES
PC Tools * NU * Shareware

VIRUS KILLERS
The War Goes On

LINUX
A Public Domain UNIX

CorelMOVE! - SAMPLE.CMV

Help

Results

Quarter

View   Arrange   Display

CorelPHOTO-PAINT!

File   Edit   Image   Effects   Mask   Display   Special   Window

D7-4A.BMP 100%

CorelDRAW! 4.0
The world's best illustrator gets better

LINUX 0.99
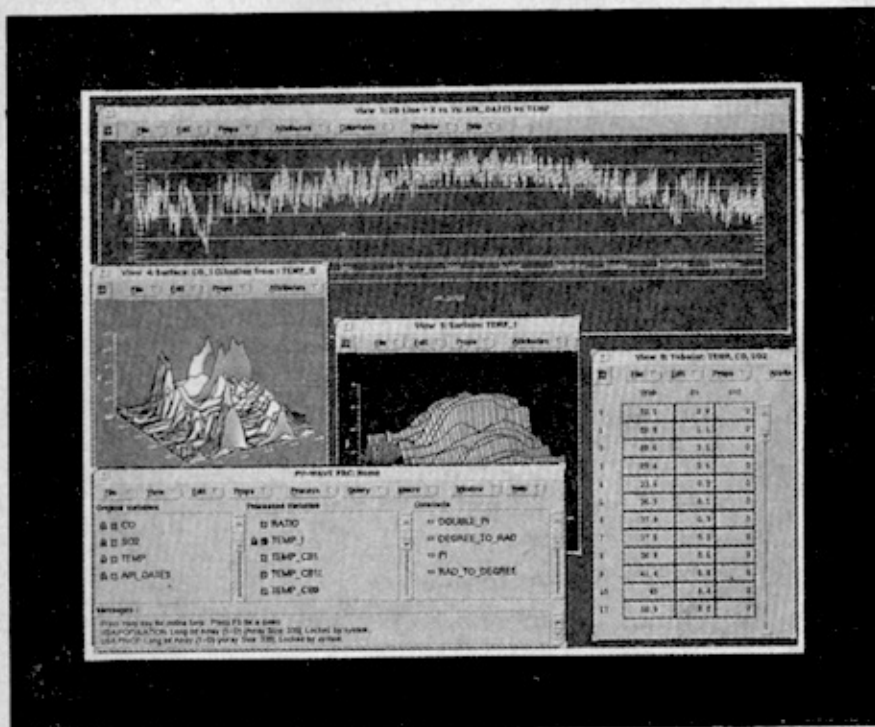
A full featured public domain UNIX for your PC.

This time we take a look at the most popular free UNIX clones for x86 machines. LINUX is a freely distributable UNIX clone that combines the best of the SVRx UNIX series and the BSD distributions. It even implements a subset of POSIX compliance. LINUX, written and copylefted by Linus Torvalds, is yet another example of high-quality, freely distributable, open software.

LINUX needs very little to run: zero cost (if you download electronically), 80 MB hard disk space for a full installation (10 MB for minimal installation), 4 MB RAM, and a 386 machine. It supports *everything*: virtual consoles, shells (bash, rc, zsh, tcsh, pdksh), complete manpages, EMACS, UUCP, mail, USENET news, shared libraries, SCSI support, a threaded file system, paged virtual memory, demand loading of executables, TeX, the GNU C++ compiler and GNU development tools, TCP/IP, SLIP, an alpha version of a DOS emulator, and yes, even X-Windows (X11R5).

Installing LINUX

The major LINUX distributions or releases are SLS, Boot/Root, TAMU, and MCC. The SLS (SoftLanding LINUX System) is a very complete set of precompiled programs, an automated installation script, much of the source code, and a boot disk. This is the preferred release for installing LINUX. In a set of 30 disks, you get the base system, all the extended utilities, the GNU C++ compiler and development environment, documentation, source, the TeX text formatting system, EMACS, and the X Window System 11 Release 5 (X11R5).

▲
The OpenLook interface runs plenty of nice graphical applications.

The Boot/Root is just a single bootable root disk with the kernel image. The TAMU (Texas A&M University) release is like the SLS release but is less flexible in its installation options. The MCC (Manchester Computing Centre) release is similar to SLS, but does not have either EMACS or X11R5. Finally, the full source code for

LINUX is available, but before you can run that on a machine you need to compile it (*that is,* you need a machine capable of running GNU C++). Since the SLS release is the most popular and easily available, this review will focus on SLS.

SLS Release

The SLS comprises one boot/install disk and 29 DOS formatted disks which contain the software in a compressed format. There are number of ways to get the SLS disks. You can order them direct from the SLS distributors in US (around $150). Those who have Internet access can get the disk images from nic.funet.fi in the /pub/OS/LINUX/ directory or from sunsite.unc.edu in the /pub/LINUX directory. You can also download the disk images from the Skynet Gold BBS in Delhi (tel: 7528036) in the LINUX forum, or get them from the distributors listed in box.

The disk image of floppy a1 needs to be written to hard disk as-is, which you can do by using DISKEDIT. This writes the file to physical sectors on a DOS formatted hard disk. You could also use the program 'rawrite' that is available on the Linux forum for this purpose. There are two versions of the disk image for a1 depending on whether you use the 5.25" (1.2 MB) floppy or a 3.5" (1.44 MB) disk. The other 29 disks contain DOS files which you can copy onto the hard disk in the normal fashion. Once you have the floppy disks, boot from disk a1, partition your drive, and follow the prompts. It would be an excellent idea to go through the LINUX Frequently Asked Questions (FAQ) list, available from the LINUX internet sites or from any of the three BBSes in Delhi, before beginning.

Stability And Compatibility

There is a general tendency to believe that any beta product must be full of bugs. I was surprised to find how far from the truth this is. I have been running LINUX for a few months on a 486 box, and it hasn't crashed even once, handled summertime power cuts gracefully, efficiently communicated with other computers using SLIP and UUCP, routinely accessed my stacked MS-DOS partition, and compiled and run loads of public domain programs.

LINUX has been in beta longer than Windows NT and the present LINUX version is Release 0.99 Patchlevel 10. However, LINUX patchlevels change very fast because LINUX is distributed primarily on the Internet. The authors may release a new patchlevel in the morning, users discover bugs in it and report them during the day, and bug fixes might well be available by evening!

The MIT Tab Window manager in Linux is a fast, no-frills interface

The lightning-fast communications on the Internet facilitate the quick development of LINUX.

The only weak link in LINUX's array of facilities is its DOS emulator, which is in alpha stage, and can be expected to contain numerous bugs. However, here again, the quality of the LINUX **dosemu** package (alpha) is higher than that of most commercial beta releases. And most of the bugs are known and documented in the FAQ list and a buglist.

An interesting fact about the alpha DOS emulator: there is no way to exit it gracefully. The FAQ list recommends that till this problem is fixed, users should use the kill command from another terminal to stop the DOS-emulator, or run a DOS command that is known to crash it!

LINUX was written on clone-386s and 486s, with IDE drives and VGA monitors. It will work on most 386 machines with an ISA bus and an AT type drive controller. LINUX will probably not work on an EISA based machine, and will not take advantage of the EISA bus structure anyway. A high density floppy drive (3.5" or 5.25") is required for installation, although newer versions of SLS can be installed off a network or a CD-ROM. LINUX supports most common SCSI controllers. The OS needs 2 MB RAM to run but 4MB is recommended, though it can make use of 16MB and more if you have that much memory installed. LINUX does not yet run on MCA bus machines like the IBM PS/2s.

LINUX will not run on 286s and there is no likelihood that it will ever be ported to chips that are incompatible with the 386 since it uses a lot of 386 optimized code and 386 memory management and protection capabilities. This makes LINUX fast but non-portable. LINUX will co-exist on your hard-drive with any other operating system, and using the dosemu package can even access stacked DOS disks or partitions.

The X-Window System

X11R5 which is distributed with the SLS LINUX release is a port of the Xfree386 freely distributable X Window system. It includes the MIT Tab Window Manager and the Open Look Windows Manager but there is no free implementation of the Motif Window Manager or the Motif libraries. Applications written using Motif style interfaces will still run and look like Motif, of course. The OpenLook window manager is configured as default but the MIT Tab Manager is a lot simpler and significantly faster. But, setting up X to run properly on your machine is far from easy. You must, at the very least, know what chipset your VGA card uses, and how much memory it has on board, though most setups will require that you also know the clocking of your card and monitor.

History of Linux

LINUX's history is a fascinating insight into the movement towards freely distributable software. The story of LINUX is deeply intertwined with that of GNU, which stands for Gnu's Not Unix. GNU is a project started by the Free Software Foundation to develop a UNIX-like microkernel and a set of utilities for UNIX. A lot of the utilities have been ready for years, like the very popular GNU C++ compiler, the GNU version of awk, the GNU chess program, and of course GNU EMACS, among others. The microkernel, named HURD, is still in development. Other free UNIX clones like LINUX and 386BSD make heavy use of the GNU project's utilities and contributions.

The Free Software Foundation invented the General Public License for their software, which grants many rights to users and derivative users of their products, including the right to source code. However, it provides for copyrighting of the software by the owner or author. For its extreme liberalism in granting users rights, and in enforcing that such rights are passed on to users of code derived from GNU code, the General Public License is also known as the Copyleft. LINUX is copylefted.

The story of LINUX is also related to that of MINIX, a UNIX clone with source code that is commercially available from Prentice-Hall and was first described by Andrew Tannenbaum in his book Operating Systems: Design and Implementation. The book included full source code for MINIX, and since then hundreds of UNIX hackers who wished to learn the internals of UNIX intimately have used MINIX as a learning environment. It is these hackers who have made major contributions to development of code and utilities for MINIX.

Linus Torvalds was one such MINIX hacker who started the Linux project in July '91. About two months later, something had been patched together, and sources for Version 0.01 were uploaded by Linus to the internet site nic.funet.fi. (I forgot to mention—Linus Torvalds is from Finland). Linus says: "0.01 sources weren't actually runnable: they were just a token gesture to arl who had probably started to despair about ever getting anything." There followed a number of releases, and more and more hackers got interested in LINUX.

By release 0.11, the name LINUX. used informally on USENET, had stuck, and LINUX appeared on FTP sites like tsx-11.mit.edu and Tupac-Amaru.Informatik. RWTH-Aachen.DE. Linus realised that development was going way faster than expected, and LINUX soon began to look more like the mature OS it is now than as a construction to hack on. Linus was soon ready for the jump from v0.11 to 0.95. Says Linus, "then it was 0.95 in March, bugfixes in April, and soon 0.96. It's certainly been fun (and I trust will continue to be so) - reactions have been mostly very positive, and you do learn a lot doing this type of thing (on the other hand, your studies suffer in other respects)."

Linus Torvalds, the originator and prime-author of LINUX.

Fortunately, the task of configuring X is made much easier by the documentation files included with LINUX or available from FTP sites and BBSes. X on LINUX, when set-up correctly starts and runs much faster than X on USL's SVR4.2

MGR

MGR is yet another GUI for UNIXs, still unknown to many UNIX users. MGR provides facilities like multiple overlapping windows, multiple fonts, text and graphics in each window, a simple popup menu package, a client/server model like X and independence from any particular networking technology. MGR, like X, has a server process, and a number of client processes. Each client has its own window, and can create subwindows. Clients can communicate with the server over a bi-directional channel. LINUX implements MGR and also provides a C library for MGR clients. MGR is also being ported to Coherent, and a beta release for Coherent is already available.

Performance

According to the LINUX FAQ list, 'LINUX running X Window is faster on a 486/33 than many SUN workstations with the same amount of RAM, run-

ning SunOS.' I can attest to its blazing speed which outstrips all other x86 based UNIX systems, including SCO SVRx, AT&T SVRx, XENIX, and Consensys but with the possible exception of COHERENT, especially in compilations.

X is also very fast on LINUX, partly because of LINUX's inherent speed, and to some extent because the window manager commonly used with X on LINUX, TWM, is simple and very efficient compared to the ornate Motif Window Manager popular on SVRx. The OpenLook Window Manager on LINUX is a an excellent combination of power and speed while providing a pleasing interface. Both window managers support virtual desktops that can be much larger than the actual screen area. When you try to move the mouse beyond the screen boundaries the display will scroll to show you the other parts of your virtual desktop. Unlike most MS-Windows virtual desktop programs which expect you to select one screen-sized desktop out of a number of

discrete desktops, LINUX's virtual desktops feel very comfortable because they just follow the mouse. LINUX accomplishes this trick by using extra memory on the display board itself, and just remapping the display memory area when it needs to scroll the screen—making scrolling fast and smooth.

The performance benefits of LINUX are not perceptible from the start since LINUX needs to be setup correctly. This involves editing scripts and configuration files, and issuing various commands. Specifically, unless you set up LINUX's LILO boot manager package (not a very difficult task, but not trivial either) LINUX will expect to boot off floppy, which is slow. Unless you set SWAPON, LINUX will not use paged virtual memory, and till you fiddle with the X startup scripts, you might have a less than optimal X system. And if you want great X performance on your modest 386 or 486, you would need to setup the TAB Window Manager. Also, X386, the X

system for LINUX, does not support video accelerator boards yet, so you can't use those to make X performance snappier.

Summary

LINUX is not only an outstanding example of free software, it is also a viable alternative to commercial Unices. If you need to do X development but cannot afford a legal copy of OpenDesktop, say, or you need a TCP/IP or NFS solution for your LAN, or a small learning environment for UNIX, and even for more demanding applications, you should investigate LINUX. LINUX is a strong performer in terms of speed and features. And, perhaps most importantly, it is one of the vast array of software that has the capability to painlessly put an end to the vice of software piracy so rampant in India.

ASHISH GULHATI
is a technology consultant in New Delhi.