

Amateur Radio and the Linux Operating System 8/18/97

John B. Bandy, WOUT, ex-WNOTSK; Wichita, Ks U.S.A

Abstract.

This paper is about moving from MS Windows 3.1 & MS-DOS to MIT X Window & Linux 1.2.13. These operating systems run on the author's PC Intel chips supporting amateur radio applications.

Key Words.

MIT X Window, MS Windows 3.1, MS-DOS, Linux 1.2.13, PC, TAPR/AMSAT DSP-93 amateur radio packet, digital communications, AX25, TCP/IP.

Introduction.

This will be a **comparision** based on experience of the two above mentioned operating systems. The author tried to be as objective as possible by pointing out the plusses and minuses of both systems. Also are lists of ham radio application software, journals, books, and Internet Sites available for Linux.

Pronouncing Linux.

The "i" in Linux is short as it is in Linus.

Comparisons.

\*\*\*\*\* Operating System(OS) \*\*\*\*\*

Characteristic	X Window	& Linux	Windows3.1	& DOS
plug and play.....	no	no	yes	yes
non-programmer friendly.....	yes	no	yes	no
C programmer friendly [5].....	yes	yes	no	no
OS Source code available.....	yes	yes	no	no
runs on the PC.....	yes	yes	yes	yes
reliable [4].....	yes	yes	somewhat	yes
network operating system [4].....	yes	yes	no	no
build-in amateur radio AX25 [1][2].....	yes	yes	no	no
ham applications software [ 6].....	some	some	much	much
application freeware [6].....	much	much	some	some
application shareware.....	some	some	much	much
application commercialware.....	much	much	much	much
operating system freeware.....	yes	yes	no	no

hardware vendor provides drivers .....	no	no	yes	yes
hardware driver specs available[ 9].....	some	some	some	some
scripting .....	yes	yes	no	no
pipng .....	yes	yes	no	no
development toolkits freeware [ 7].....	yes	yes	no	no
runs Unix application software.....	yes	yes	no	no
build-in TCP/IP [I] .....	yes	yes	no	no
multi-user .....	yes	yes	no	no
multi-tasking .....	yes	yes	no	no
case sensitive.....	yes	yes	no	no
implements a superset of the POSIX public standard [ 8].....	yes	yes	no	no
public design specifications.....	yes	yes	no	no

Note: The Windows NT and X Window & Linux systems probably compare closer because both are network operating systems, but the author has not experienced the Windows NT system. Linux runs on the PowerPC [3] and other platforms [9], but again the author has not experienced it.

Notes.

Notes made while moving software and data from MS Windows 3.1 & MS-DOS to MIT X Window & Linux 1.2.13 for those hams wanting to avoid the struggle. Other notes also included.

### 1. Stable Kernel Making

```

/usr/src/linuxelf-1.2.13 # make config      makes 'c' files list
                        make dep          establishes dependent files
                        make clean        removes old kernel files
                        make zImage       compiles 'c' code
                        make zdisk        creates boot disk
                        rdev -R /dev/fd0 1
                        make zlilo
/usr/lib/lilo# lilo          updates lilo

```

drivers in /usr/src/linuxelf-1.2.13/drivers/

Once the 'c' files list has been established changes can be made to the 'c' code such as a driver and the kernel process started at 'makezImage'.

Soundblaster Pro 2 IRQ is 5.

### 2. To move something from the MS-DOS machine to the Linux machine do

```

in MS DOS
gzip something. c
rename something.cz something.gz
rawrite something.gz writes over any dos format stuff - Linux format
in LINUX
cd /usr/src/
cp /dev/fd0 something.c.gz copies entire disk
gunzip something.c.gz decompress file and skips garbage
vi something. c

```

3. To I/O a 3.5 diskette written on in a MS-DOS format do the following:

- a. Put diskette in drive
- b. mcopy a: \*/home/jbbandy/ msdos to linux - no mounting
- c. go to linux directory and gzip -d sep\_96.z or gunzip sep\_96.z
- d. cannot copy a directory to a directory. Can mcd down to the file level and mcopy a: \*/directory/directory .

4. To review logon messages enter “dmesg | more” less quotes.

5. Name colors denote different permission combinations:

```

white      data
dark blue  directory
green*     executable shell script
red        compressed
light blue@ link

```

6. Arguments for commands can be enclosed in apostrophes or quotes, or both.

If an apostrophe(s) is part of a literal use quotes.

example: sed -e "s,^\${1-}.},," -e '/^\$/d'

7. To add a directory to the search PATH, vi /etc/profile.

Save the old profile before modifying it.

8. chmod 777 \* will change permission of all files in the directory.

9. Mouse is connected to connector marked com1/com3 on i/o board.

10. Serial port is connected to connector marked com2/com4 on i/o board.

11. When the fsck command upon startup issues the “duplicate/bad blocks”

message, run “fsck -r /dev/hda1” and answer “y” to all questions at

the (none): prompt (root/logout).

Look in the lost+found file.

Note the hda1 is mounted “read only”.

12. Run `/etc/rc.d/rc.serial` to get settings of internal & external serial ports.
13. Tried `irq 5` on `cua3`, but it slowed down bps to about 300. Slow! !  
Put `rc.serial` into `rc.local`.
14. Installed an IBM modem/sound dsp combo board, but the `minicom` program would not initialize it. Also the serial port line did not display when starting the computer.
15. `gunzip` & `tar -vxf` filename compressed files suffixed with `.z`, `.gz`, or `.tgz` in root.  
example: `gunzip gw4pts_m.z`  
          `tar -vxf gw4pts_m`  
          `gunzip sccw_tar.gz`  
          `tar -vxf sccw.tar`  
  
When using 'gunzip', if the message `. . . more` than one entry.. is received, use the '`unzip -aL`' command instead of '`gunzip`'.
16. To change date/time enter `mmddhhmmyy`. Ex. Jan 2, 1997 03:04 UTC  
Seconds will show, but do NOT enter them   `mmddhhmmyy`  
  `0102030497`
17. To remove the MS-DOS end-of-line symbol (`^M`) from a text file do this in root.  
1. `zip tncinit tncinit.txt`  
2. `unzip -aL tncinit.zip`
18. For `syslog`, etc. messages do these in "root":  
a. `dmesg | more`  
b. `vi /usr/adm/syslog`  
c. `vi /usr/adm/messages`  
d. `vi /usr/adm/debug`
19. '`chown -R jbandy.users *`' will change owner for all sub-directories and related files. Note: '`-R`' stands for recursive.
20. If math routines such as `sqrt`, `sin`, `tan`, etc. are involved in a compile `-lm` must be used as a parameter in `gcc`. `-l` means library.  
example: `gcc -O color colort.c -lX 11 -lm`

## 2 1. Cross Reference

GNU	SYSTEM V
gawk	awk
yacc	yacc
flex	lex
terminfo	terminfo
	lint
gdb	sdb
make	make
Makefiles	Makefiles
RCS	SCCS
ncurses	curses

22. “man” page names for curses/ncurses functions must be prefixed with curs .  
Sometimes this may not work when one “man” page covers 2 or more functions.  
Use the cross reference table in “man ncurses” if the “man” page appears  
to be missing.
23. If “call waiting” is removed "\*"70," number prefix must be removed or  
minicom gets a busy signal.

Books/Journals.

Linux Journal, SSC, Seattle, WA, phone 206-782-7733.

Eric F. Johnson & Kevin Reichard, X Window Applications Programming, MIS:Press,  
N.Y., N.Y., 1992.

Eric F. Johnson & Kevin Reichard, Advanced X Window Applications Programming,  
M&T Books, N.Y., N.Y., 1994.

Eric F. Johnson & Kevin Reichard, Professional Graphics Programming in the  
X Window System, MIS:Press, N.Y., N.Y., 1993.

Rebecca Thomas & Rik Farrow, UNIX Administration Guide for System V,  
Prentice Hall, Englewood Cliffs, New Jersey, 1989.

Mitchell Waite, Stephen Prata, & Donald Martin, The Waite Group’s UNIX System V  
Primer, SAMS, Carmel, Indiana, 2nd Edition, 1992.

Stephen Prata, Donald Martin, & The Waite Group, UNIX System V Bible-Commands  
and Utilities, SAMS Publishing, Indianapolis, Indiana, 1987.

J. Purcell & A. Robinson, compilers, Dr. Linux - The Complete Linux reference  
documentation, Red Hat Software, Inc. and LSL, Westport, Ct, 4th Edition, 1996.

Ian Wade, G3NRW, NOSintro - TCP/IP over Packet Radio, Dowermain Ltd, Luton, Bedfordshire, U. K., I 992.

Kamran Husain, Timothy Parker, Ph.D; et al, Linux Unleashed, Sams Publishing, Indianapolis, IN, 2nd edition, 1996.

Note: Some Linux books are nothing more than bound doc prints from Internet Site <http://sunsite.unc.edu/pub/Linux/docs> and its mirrors.

Note: Most of the information in UNIX books/journals/courses/seminars also applies to Linux.

Linux Internet Address.

<http://sunsite.unc.edu/pub/Linux>  
<ftp://sunsite.unc.edu/pub/Linux>  
<ftp://ftp.ucsd.edu/hamradio/packet/tcpip/linux>  
<http://www.rahul.net/perens/HamRadio/LinuxAndAmateurRadio/html>  
<http://www.arrl.org>  
<http://www.amsat.org>  
<ftp://ftp.amsat.org>  
<http://www.tapr.org>  
<ftp://ftp.tapr.org>

Some Linux Ham Software.[6]

See reference for details.

Microsoft Ground Station Software - X Window xpb, xpg, xtlm.  
**SatTrack** - X Window Satellite tracking program.  
Predict - Satellite orbital prediction program.  
UO1 1 - Decodes OSCAR 11 telemetry.  
Dove - Decodes OSCAR 17 telemetry.  
Kepgen - Keplerian elements keyboard entry program.  
FT-890 - Remote Control program for Yaesu FT-890 transceiver.  
**F6FBB** Packet BBS - X Window Bulletin Board System (BBS).  
DX Cluster Watcher.  
**Digiinfo** - Reads a database of packet radio networks information.  
**BayBox** BBS - Packet bulletin board system.  
JNET - KA9Q Network Operating System (NOS) derivative.  
**XNET** - X Window Traffic analyzer for AX.25 networks. [ 1 1 ]  
**monax25** - Utilities for collecting statistics on AX.25 channel usage.  
split screen - splits screen for user to user chats.

talk-ax25 - 'talk' program to support AX.25 operation.  
7Plus for Linux - encodes binary files for AX.25 messaging.  
TNOS - NOS derivative.  
NOARY Packet BBS for UN\*X - Command set similar to RLI bbs and extended.  
    Ham network to INTERNET message gateway.  
LBBS - BBS message gateway. SMTP/NNTP<>BBS gatewaying.  
MBL/RLI message to NNTP and email converter - Converts MBL/RLI messages to  
    either the NNTP format or  
    RFC-822 format.  
CLX Packet DX Cluster Program - Network node software that clones PacketCluster  
    nodes.  
DPTNT Terminal and DPBOX BBS package - full-featured terminal and BBS system.  
IPIP Encapsulation daemon - IPIP encapsulating gateway to the Internet.  
AXIP Encapsulation daemon - AXIP encapsulating gateway to the Internet.  
Ping-Pong Convers Server - Roundtable chat server.  
RSPF Daemon - Radio Shortest Path First (RSPF) router.  
Michael Westfall's TTYLINK Daemon - Listens on the TTYLINK port and accepts  
    connect requests.  
Craig Small's TTYLINK Daemon - Answers TTYLINK requests.  
Pileup - sends Morse code pileups from a sound card for copy practice.  
bip - X Window sends Morse code for copy practice. Also works without X Windows  
    and soundcard.  
cw2hex - Creates an Intel hex file from keyed input for use in burning an eprom.  
SoundCard CW - sends Morse code for copy practice.  
GW4PTS Morse trainer - sends Morse code for copy practice from internal PC spkr.  
morse (aka superiormorse) - X Window sends Morse code for copy practice.  
oscope - Makes the platform function as an audio oscilloscope using the 8.8khz-  
    44khz sound card, SVGA monitor, X Window, etc..  
Software Oscilloscope - Makes the platform function as an audio oscilloscope  
    using the sound card, SVGA monitor, etc..  
Printed Circuit Board Design Tool - Layout circuit with popular component  
    symbols using X Window.  
Chipmunk Circuit Design and Simulation Tool - X Window application.  
irsim - X Window MOS circuit simulator.  
Spice - Analog circuit emulator. [ 13][ 14]  
svgaafft - Turns the X Window platform into a audio spectrum analyzer using  
    the sound card, monitor, etc..  
Audio Spectrum Analyzer - X Window application.  
ObjectProDSP - X Window Digital Signal Processing network design tool and  
    simulator.  
bpf - two pole bandpass filter calculator.  
twelock - X Window displays time of day in various parts of the world.  
Chirp - ncurses contest logging program.  
Contest - contest logging program.  
SunClock - X Window displays date, local time, UTC, and the sunny parts

of the globe.

Xearth - X Window displays the earth as view from space and the mercator projection view.

Additional Linux Ham Software.

QRZ! Ham Radio CDROM-Callsign Database - searches a call sign database.  
<http://www.cdrom.com>

dspload - Loads assembled dsp programs in the TAPR-AMSAT DSP-93 modem.  
<http://www.tapr.org>

TASM - A Table Driven Cross Assembler for the Linux Environment supporting 6502, 6800/6801/68HC11/6805/TMS32010/TMS320C25/TMS7000/8048/8051/8080/8085/Z80 Microprocessor families, (alpha version as of 2/6/97 j).  
Tom@main.fs1.InControl.com  
Speech Technology, 837 Front St. S., Issaquah, WA 98027

nasawash - extracts and files NASA format 2-line Kep elements from email/BBS messages. <http://www.amsat.org>

Magic - X Window IC layout editor. [14]  
<http://www.research.digital.com/wrl/projects/magic/magic.html>

Sigview - X Window graphical signal viewer. [14]  
<ftp://ftp.sunsite.edu/pub/Linux/apps/circuits/sigview31.tgz>

Acrobat Reader - X Window displays and/or prints a file in the .pdf format.  
<http://www.adobe.com>

Netscape - X Window web browser.  
<http://www.netscape.com>

Mosaic - X Window web browser.  
<ftp://ftp.ncsa.edu/Mosaic/Unix/binaries/>  
<http://www.ncsa.uinc.edu/SDG/Software/xmosaic>

Conclusion.

X Window & Linux is for those hams who have a background in network operating systems. Windows 3.1 & MS-DOS is for the others, since installing them and their associated software is easier. The author has spent no money on software



(excluding the Slackware freeware distribution cd-rom [10]) since he started using Linux, but has spent many joyful hours configuring for the cd-rom drive, sound card, modem, etc., and installing application freeware. This is not to say he will not buy application shareware and commercialware in the future for his Linux machine.

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<ftp://sunsite.unc.edu/pub/Linux/docs/HOWTO/AX25-HOWTO>, vl.4, 2 March 1997.
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<http://sunsite.unc.edu/pub/Linux/docs/HOWTO/HAM-HOWTO>, v2.3, I April 1997.
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- [8] Linux Journal, SSC, Seattle, WA, Issue # 38, pp. 4 & 17, June 1997, phone 206-782-7733.
- [9] Patrick Reijnen, "Linux Hardware Compatibility HOWTO",  
<http://sunsite.unc.edu/pub/Linux/docs/HOWTO/Hardware-HOWTO>, v97.2, 14 June 1997.

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