The Linux DOSEMU HOWTO

edited by Mike Deisher, deisher@dspsun.eas.asu.edu v0.50.1, 30 April 1994 for dosemu 0.50pl1

This is the 'Frequently Asked Questions' (FAQ) / HOWTO document for dosemu, The most up-to-date version of the dosemu-HOWTO may be found in dspsun.eas.asu.edu:/pub/dosemu.

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1 The preliminaries

1.1 What is dosemu, anyway?

To quote the manual, "dosemu is a user-level program which uses certain special features of the Linux kernel and the 80386 processor to run MS-DOS in what we in the biz call a 'DOS box.' The DOS box, a combination of hardware and software trickery, has these capabilities:

- the ability to virtualize all input/output and processor control instructions
- the ability to support the word size and addressing modes of the iAPX86 processor family's "real mode," while still running within the full protected mode environment"
- the ability to trap all DOS and BIOS system calls and emulate such calls as are necessary for proper operation and good performance
- the ability to simulate a hardware environment over which DOS programs are accustomed to having control.

- the ability to provide MS-DOS services through native Linux services; for example, dosemu can provide a virtual hard disk drive which is actually a Linux directory hierarchy.

1.2 What's the newest version of dosemu and where can I get it?

The newest version of dosemu is `dosemu0.50pl1` and can be ftp'ed from the following sites:

```
dspsun.eas.asu.edu:/pub/dosemu/
tsx-11.mit.edu:/pub/linux/ALPHA/dosemu/
```

1.3 Where can I follow the development?

If you want to follow the development of dosemu, you should consider subscribing to the MSDOS channel on Linux-activists. To subscribe, send mail to `linux-activists-request@niksula.hut.fi`. Your mail HEADER or FIRST LINE must contain the line:

```
X-Mn-Admin: join MSDOS
```

To post to the list, send mail to linux-activists@niksula.hut.fi. Your mail HEADER or FIRST LINE must contain the line:

```
X-Mn-Key: MSDOS
```

1.4 What documentation is available for dosemu?

The dosemu manual (`dosemu.texinfo`) written by Robert Sanders has not been updated in some time but is still a good source of information. It is distributed with dosemu.

The "dosemu Novice's Altering Guide" or DANG is a road map to the inner workings of dosemu. It is designed for the adventurous, those who wish to modify the source code themselves. The DANG is maintained by Alistair MacDonald (`am20@unix.york.ac.uk`) and is posted once in a while to the MSDOS channel of Linux Activists.

The EMU success list (EMUsuccess.txt) is a list of all programs that have been reported to work with dosemu. It is posted once in a while to the MSDOS channel of Linux Activists. The most recent version can be found on dspsun.eas.asu.edu:/pub/dosemu.

And then, of course, there is the dosemu FAQ/HOWTO. But you already know about that, don't you. It is also posted once in a while to the MSDOS channel of Linux Activists. The most recent version can be found on `dspsun.eas.asu.edu:/pub/dosemu`.

2 Compiling and installing dosemu

2.1 What does `emu.c:349: parse error before 'outfuntype'` mean?

James B. MacLean (`jmaclean@fox.nstn.ns.ca`) reported (12/1/93) that

A fix that works is: Change the '`outfuntype c`' parm in line 349 to '`int (*c())(int)`', and try again.

[Note: `outfuntype` is defined in `termcap.h`. You may have a bad or incomplete `termcap.h` (`termcap.h` is not part of dosemu).]

2.2 What does `scan.o: Undefined symbol _yywrap` mean?

Alan David Modra (`alan@spri.levels.unisa.edu.au`) reported (2/16/94) that

Flex-2.4.6 generates code that requires linking in libfl.a You need to add `-lfl` to the linker command line:

```
gcc -o par scan.o parse.o -lfl
```

[Note: edit `parse/Makefile` to incorporate this change]

2.3 What does `sh: -c: line 2: syntax error` mean?

(3/18/94)

If the error message is

```
install -m 04755 dos /usr/bin
sh: -c: line 2: syntax error: unexpected end of file
make: *** [install] Error 2
```

then you are probably using Slackware. Some people have had success by simply commenting out line 183

```
@if [ -f /lib/libemu ]; then rm -f /lib/libemu
```

of the makefile. (I don't know why this works!) If this does not work for you, you can always just install the "dos" binary by hand

```
cp dos /usr/bin/
chmod 04755 /usr/bin/dos
```

2.4 Can I use dosemu on a multi-user system?

Corey Sweeney (`corey@amiganet.xnet.com`) reported (12/8/93) that

If you running dosemu on a system in which more then one person may want to run dosemu, then you may want to change the directory of your hard drive image. Currently in the `/etc/dosemu/config` file there

exists the line saying that the hard drive image is "hdimage". If you change this to `/etc/dosemu/hdimage` then people do not have to worry about what directory they are in when they run dosemu, and hdimage does not have to be moved each time you upgrade to the next patch level.

If you do do this for multi-user dosemu, then you will want to make the hdimage in `/etc/dosemu` read-only for everyone but the dosemu administrator.

Note that you can use the new emufs.sys thing to mount a "public" directory and/or a "private" directory (a sub-directory in each person's home directory).

3 Hard disk setup

3.1 How do I use my hard disk with dosemu?

First, mount your dos hard disk partition as a Linux subdirectory. For example, you could create a directory in Linux such as /dos (mkdir -m 755 /dos) and add a line like

```
/dev/hda1       /dos     msdos   umask=022
```

to your /etc/fstab. (In this example, the hard disk is mounted read-only. You may want to mount it read/write by replacing "022" with "000" and using the -m 777 option with mkdir). Now `mount /dos`. Now you can add a line like

```
lredir d: linux\fs/dos
```

to the AUTOEXEC.BAT file in your hdimage (see the comments on LREDIR below). On a multi-user system you may want to use

```
lredir d: linux\fs\${home}
```

where "home" is the name of an environmental variable that contains the location of the dos directory (/dos in this example).

Tim Bird (Tim_R_Bird@Novell.COM) states that LREDIR users should

be careful when they use LREDIR in the autoexec, because COMMAND.COM will continue parsing the autoexec.bat from the redirected drive as the same file offset where it left off in the autoexec.bat on the physical drive. For this reason, it is safest to have the autoexec.bat on the redirected drive and the physical drive (diskimage) be the same.

Robert D. Warren (`rw11258@xx.acs.appstate.edu`) reported (4/28/94) that

I boot off a small hdimage file (less than 1 MB - and twice as large as needs be at that), and the next to last line in my config.sys file on the hdimage boot image is:

```
install=c:\lredir.exe LINUX\FS\home/dos
```

This will execute lredir just before the command interpreter runs. And I have successfully run it with both command.com and 4DOS. This eliminates the offset problem using lredir in autoexec.bat.

3.2 Can I use my stacked/double-spaced/super-stored disk?

At this time, compressed drives cannot be accessed via the redirector (lredir or emufs). However, many people have had success by simply uncommenting the

```
disk { wholedisk "/dev/hda" }        # 1st partition on 1st disk
```

line in their dosemu config file. A few others have had success using

```
disk { partition "/dev/hda1" 1 }
```

Holger Schemel (q99492@pbhrzx.uni-paderborn.de) reported (2/10/94) that

Works even fine under DOSEMU with MS-DOS 6.0. If you have problems, then you have to edit the file 'DBLSPACE.INI' manually and change the disk letter to the letter your drive gets under DOSEMU.

Darren J Moffat (moffatd@dcs.gla.ac.uk) also reported (3/27/94)

"...use 6.2 if you can get it!! Just make sure you have a lilo boot disk on hand since dos 6{.2} will change the MBR of the boot HD."

3.3 I get an error message about my config.sys file but it looks fine.

Corey Sweeney (corey@amiganet.xnet.com) reported (12/8/93) that

Sometimes when loading config.sys you will get a error message saying something like "error in line 6 of config.sys". The problem will go away if you add several carriage returns at the end of your config.sys.

4 Serial ports and mice

4.1 Where are the (microsoft compatible) mouse drivers?

Tom Kimball (tk@pssparc2.oc.com) reported (11/24/93) that

Several people said to use a different mouse driver and suggested some. I found a couple that seem to work fine.

```
oak.oakland.edu:/pub/msdos/mouse/mouse701.zip   (mscmouse)
oak.oakland.edu:/pub/msdos/mouse/gmous102.zip   (gmouse)
```

4.2 Why doesn't the mouse driver work?

Scott D. Heavner (sdh@fishmonger.nouucp) reported (11/27/93) that

If you start the mouse driver and it just hangs (it might actually take 30-60s), but if you are waiting longer than a minute for the mouse driver to start, remove any "timer" lines in your config file.

4.3 How do I use dosemu over the serial ports?

Corey Sweeney (corey@amiganet.xnet.com) reported (12/8/93) that

If you plan to be using dosemu over a serial line, telnet session, or just don't want to use raw console mode, then you will probably want to get to know the termcap file. For those who don't know, the termcap file is usually located in the /etc directory. It contains the information on what sequences of characters to send to your terminal, and what sequences of characters from your terminal represent what keystrokes. If when you hit F5, and it does not work, it will usually be the fault of a incorrect termcap entry. (To learn more about termcaps look up the termcap man page.)

Now the information in the termcap relates to entries in the dosemu code. So after you put k5=\E[[E in your termcap, whenever your terminal sends \E[[E, dosemu translates that and says "he hit the k5 key!" Then it is up to dosemu to figure out what the proper scancode for the k5 key is, and push that into the buffer in some magical way. To determine the scancode, it looks up in a little table in termio.c. In termio.c under the line which (currently) says

```
#define FUNKEYS 20
```

There exist several lines following the form

```
{NULL, "termcap code", scancode} /* name of key */
```

so when it says

```
{NULL, "k5", 0x3f00} /* F5 */
```

it's saying that 0x3f00 is the scancode for F5, and that when the person activates the k5 sequence (defined in the termcap) to stuff the F5 scancode into the buffer.

Now that's all fine and dandy for analyzing how dosemu does this, but you probably want to be able to do something with this new information. Well you can add functionality for the F11 and F12 keys (and any other keys that you can find the scancode for).

All you have to do is add a line to the termio.c table that says:

```
{NULL, "ka", 0x8500} /* F11 */
```

Then to actually get it to read the line you just put in, add one to the FUNKEYS number.

```
#define FUNKEYS = 21
```

Then add a "ka" entry to your termcap. After that, every time you hit the sequence stored in your termcap for ka, your dos program recognizes an "F11."

Warning: Make sure that ka is not in use in your termcap. If it is you are headed for trouble.

Note: The scancode for F12 is `0x8600`.

4.4 Why does dosemu clobber COM4?

Rob Janssen (`rob@pe1chl.ampr.org`) reported (3/24/94) that

According to `jmorriso@bogomips.ee.ubc.ca`, "dosemu still clobbers COM4 (0x2e8, IRQ 5). 0x2e8 isn't in ports{} in config. I have to run setserial /dev/cua3 irq 5 on it after dosemu exits."

This is caused by your VGA BIOS. I have found that by enabling the IO port trace and seeing where it was clobbered.

Disable the "`allowvideoportaccess on`" line in config and it will work fine. When you then have problems with the video, try to enable more selective ranges of IO addresses (e.g., 40-43).

5 dosemu and X-windows

5.1 Can I run dosemu in console mode while running X?

Ronald Schalk (`R.Schalk@uci.kun.nl`) reported (1/17/94) that

Yes, no problem. Just remember to use ctrl-alt-<Fn> to go to a Virtual Console (VC), and you can run any Linux application (dosemu is a linux-application). I've got almost always WP5.1 in a dos session.

[Note: Use alt-F7 to switch back to X from dosemu.]

[Note: Some people have reported problems when dosemu is started before X]

5.2 Is it possible to run dosemu in an xterm?

Evmorfopoulos Dimitris (`devmorfo@mtu.edu`) reported (12/10/93) that

It is possible to run dosemu under an xterm, but without any graphics, and with no more than 128 characters.

H. Peter Anvin (`hpa@hook.eecs.nwu.edu`) adds (2/6/94)

no more than 128 characters... unless you use a special font. Someone has an IBM PC (CP 437) X font for use with ANSI-graphics on BBS's, as well as a patch for Xterm that *might* include character translation (for letters like `\305`, `\304`, `\326` for example.

6 Video and sound

6.1 Exiting from dosemu gives me a screen full of garbage.

Keith A Grider (kgrider@magnus.acs.ohio-state.edu) reported (12/5/93) that

I have seen many postings concerning this with exit from X as well as exiting from a graphic dos screen. it seems to be prevalent among ATI graphic card users as well as a few others. The problem is that the font information for the vga text screen is not being saved. The only way I have been able to fix it is to download the vgalib-090.tar.gz file from sunsite.unc.edu. It is (I believe) in the pub/Linux/GCC directory. You get a lot of stuff that is not directly used to solve this problem, but in the fonts directory that is created when you untar the file, there are 2 files of interest, runx and restorefont. Read the README file in this directory. Copy runx and restorefont to a directory in your path. when runx is used, for example, it saves the font information in tmp/fontdata. I use a file called fix which consists of the line:

```
restorefont -r /tmp/fontdata
```

so that it is easy to 'fix' a vt when I go there from X (i.e. ctrl-alt-f2). This should also work for dosemu. I think the XFree86 people know about the problem and are working on a solution as this is a bit of a kluge.

6.2 How do I get dosemu to work with my Trident/Actix/other video card?

[The screen flickers violently, displays the video BIOS startup message, and hangs.]

Andrew Tridgell (tridge@nimbus.anu.edu.au) reported (1/29/94) that

I found with early versions it would work if I used:

```
ports { 0x42 }
```

but that sometimes my machine would crash when it was cycling the video bios in dosemu. This is because you're allowing the VGA bios to re-program your clock, which severely stuffs with Linux.

This prompted me to write the readonly and masking patches for dosemu, which I believe are still in the latest version. I now use:

```
ports { readonly 0x42 }
```

and it boots dosemu more slowly, but more reliably.

Tim Shnaider (tims@kcbbs.gen.nz) also reported (1/18/94) that

One way of fixing this is to use the GETROM program to dump your video bios to a file and edit the config file in the /etc/dosemu directory There will be a few video lines. Here is my video line

```
video { vga console graphics chipset trident memsize 1024 vbios_file
/etc/dosemu/vbios }
```

where vbios is the file generated by typing

```
getrom > vbios
```

6.3 Why doesn't my soundcard software work with dosemu?

Hannu Savolainen (hsavolai@cs.Helsinki.FI) reported (3/21/94) that

The DOSEMU and any DOS program with it run under control of a protected mode operating system. This means that the memory is not mapped as the program expects. If it somehow manages to start DMA based recording with SB, the recorded sound doesn't find it's way to the application. It just destroys some data in the memory.

7 Problems and fixes

7.1 Why does dosemu lock up after one keystroke?

(12/17/93)

You need to turn on the keyboard interrupt in the dosemu config file. Add a line to the config file:

```
keybint on
```

7.2 Why does my ethernet driver lock-up dosemu?

James B. MacLean (jmaclean@fox.nstn.ns.ca) reported (1/16/94) that

If you have Linux networking turned on for your card, it is not accessible to DOSEMU at this time. It is also true that the default dosemu will not get interrupts from the kernel. That said, if you'd like to give your NIC to dosemu for it to control, maybe for access to Netware on the network through a NETX client, I do have a driver (Silly Interrupt Generator) to put in the kernel that any program, like dosemu can use to get at the interrupt for your NIC. I use it in DOSEMU to access a Novell Lite network. Speed is not it's high point, but it does seem to work :-).

Any interested parties should E-mail me (jmaclean@fox.nstn.ns.ca) and I'll pass along some directions.

7.3 Why are my keystrokes echoed ttwwiiccee??

Nick Holloway (alfie@dcs.warwick.ac.uk) reported (2/22/94) that

After running dos after playing with some stty settings, I was getting doubled key presses. I can now reveal what the reason is!

It only happens when dos is run on the console with 'istrip' set. This is (I think) because the raw scancodes are mutilated by the 'istrip', so that key release events look like key press events.

So, the input processing needs to be turned off when using the scan codes on a console (it wouldn't be a good idea to do it for tty lines).

7.4 Why does dosemu give "divide overflow" errors after running for more than 24-hours?

(1/17/94)

This is a known bug. It will (hopefully) be fixed in an upcoming release. For now, you can simply exit dosemu and start it again.

7.5 Where did the debugging output go?

As of dosemu0.49pl4, stderr is automatically redirected to /dev/null. Try "dos -D+a 2¿debug" to turn on debugging information and redirect it to the file "debug".

7.6 Why do I get a segmentation fault error when I start dosemu?

James MacLean (`jmaclean@fox.nstn.ns.ca`) reported (3/10/94) that

For everyone suffering from seg faults, please try these 2 things:

1) In emu.c, function `video_config_init()`, add `*(u_char *)0x462=0;` after the switch statement ends.

2) In emu.c, function `emulate()`, move `video_config_init()` to just after `memory_setup()` in the same function `emulate()`.

[Note: this applies only to dosemu0.50]

7.7 Why are characters < 128 highlighted and blinking?

Chris Kuehnke (`Christian.Kuehnke@Informatik.Uni-Oldenburg.DE`) reported (3/21/94) that

I think I've found a bug in dosemu0.50pl1; with a MDA card displayed characters > 128 automagically appeared as highlighted and blinking.

This patch fixed the problem for me [but on the other hand, maybe I'm totally wrong ;-)]:

```
--- video.c~    Sat Mar 19 00:50:25 1994
+++ video.c     Sat Mar 19 20:36:10 1994
@@ -721,7 +721,7 @@
   int x, y, i, tmp;
   unsigned int s;
   static int gfx_flag = 0;
-  char c;
+  u_char c;
   us *sm;
```

```
if (d.video >= 3)
```

7.8 Why will dosemu run in a term but not in the console?

JyiJiin Luo (jjluo@casbah.acns.nwu.edu) reported (4/19/94) that

I experienced exactly the same problem before. I figured out all the video shadow in my AMI BIOS must be disabled. Now dosemu runs fine on my system.

7.9 How can I speed up dosemu?

Mark Rejhon (mdrejhon@undergrad.math.uwaterloo.ca) reported (4/7/94) that

TIP: Speed up your DOS "dir" listings by about 25%-50% or so by typing `break off` at the DOS prompt or including it in autoexec.bat.

TIP: Use the nnansi.com ANSI driver to speed up the "dir" output even more at roughly 50%-100% more. It works properly in non-graphics mode, unlike turbo.com.

Joel M. Hoffman (joel@rac1.wam.umd.edu) reported (4/23/94) that

Ironically, I've found that it's sometimes faster to run dosemu in an Emacs terminal emulator rather than directly to the console. Emacs's output optimization is what makes the difference here.

Put the following in your .emacs:

```
(defun do-dos ()
  (interactive)
  (terminal-emulator "dos" "/usr/local/bin/dos" ()))
```

and then "emacs -f do-dos" will run the dosemu inside the buffer. Make sure you emacs window is 25x80, of course.

7.10 My CDROM drive has problems reading some files under dosemu.

Vinod G Kulkarni (vinod@cse.iitb.ernet.in) reported (4/7/94) that

When a CDROM is mounted from linux and used from within DOSEMU (mapped drive), there could be some problems. The cdrom driver (iso9660) in the kernel tries to find out the type of the file (i.e. binary or text). If it can't find, it tries to guess the type of the file using a heuristic. This heuristic fails under some circumstances when a (almost) text file is to be treated as binary. (I do not know if it is a bug or feature.)

The result of this is that if you copy such a file from cdrom (from linux itself, and not necessarily dosemu), the resulting file will be usually bigger than original file. (Blanks get added before `^J`,`^M`.) So a program running in dosemu gives error or hangs, which you may mistaken as problem of dosemu.

I could verify that this kind of heuristic is not used when the cdrom is used from DEC ALPHA system. (I nfs mounted the exported cdrom drive and used under dosemu as a drive.)

To correct the behaviour, you can force the iso9660 file system not to use heuristic at all. Make the following change and then recompile your kernel.

```
File: /usr/src/linux/fs/isofs/file.c
In Function: static int isofs_file_read ()
  ...
          if (inode->u.isofs_i.i_file_format == ISOFS_FILE_UNKNOWN) {
               inode->u.isofs_i.i_file_format = ISOFS_FILE_BINARY ;
               /* ORIGINAL: isofs_determine_filetype(inode);  */
          }
  ...
```

8 Contributing to the dosemu project

8.1 Who is responsible for dosemu?

(3/18/94)

Dosemu is built upon the work of Matthias Lautner and Robert Sanders. James B. MacLean (`jmaclean@fox.nstn.ns.ca`) is responsible for organizing the latest releases of dosemu.

History of dosemu

Version	Date	Person
0.1	September 3, 1992	Matthias Lautner
0.2	September 13, 1992	Matthias Lautner
0.3	???	Matthias Lautner
0.4	November 26, 1992	Matthias Lautner
0.47	January 27, 1993	Robert Sanders
0.47.7	February 5, 1993	Robert Sanders
0.48	February 16, 1993	Robert Sanders
0.48pl1	February 18, 1993	Robert Sanders
0.49	May 20, 1993	Robert Sanders
0.49pl2	November 18, 1993	James MacLean
0.49pl3	November 30, 1993	James MacLean
0.49pl3.3	December 3, 1993	James MacLean
0.50	March 4, 1994	James MacLean
0.50pl1	March 18, 1994	James MacLean

8.2 I want to help. Who should I contact?

The dosemu project is a team effort. If you wish to contribute, see the DPR (DOSEMU Project Registry). A current copy may be found in `dspsun.eas.asu.edu:/pub/dosemu`.