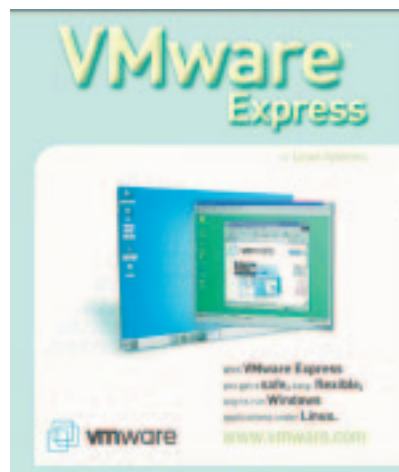
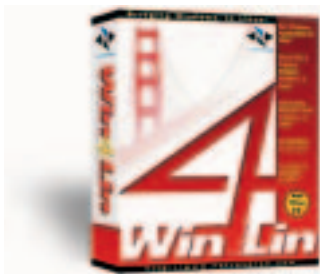


Win4Lin versus VMware Express

TOURIST

GUIDE

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Emulators allow programs from guest operating systems to run under Linux. The two commercial solutions Win4Linux 2.0 Desktop and VMware Express are direct competitors – we compare and contrast them here.

Win4Lin from Netraverse is available in Version 2.0. The Express economy version of the popular hardware emulator VMware is aimed at the same market segment. Unlike the Workstation version, this only allows the use of Windows 9x as guest operating system.

To run native Windows32 programs under Linux, there are currently three solutions: Wine, VMware and Win4Lin. While Wine copies Windows system commands, so is a sort of pure API emulator, VMware emulates a complete virtual PC with BIOS, peripherals and so on in an X-window, so is a true hardware emulator.

Win4Lin hybrid

Win4Lin is halfway between the two extremes. With Win4Lin, Windows 9x can be installed in an X-window. Windows programs will then run at close to their original speed. Also, the Window-Windows boots faster than a real one. Unlike VMware, Win4Lin reproduces Windows file systems direct into the Linux file system relating to the home directory of the user.

Win4Lin is especially suitable for the efficient execution of native Windows applications, so that Win4Lin, in comparison with VMware, manages with considerably more modest hardware. Unlike

version 1.0, version 2.0 now also supports SMP, sound and European versions of Windows 9x.

For networkers, this may be of interest: Win4Lin registers the original Windows CAB files on a Win4Lin shared directory of the Linux host. For additional user-specific Windows installations, no CD is required, just the Windows licence key. But the Windows licence is not included in the price.

The latest Win4Lin version 2.0 can be obtained from Netraverse for \$90 at https://www.netraverse.com/frame_index.php?screen=shop. Netraverse also offers (as does VMware) a 30-day test version at <http://www.netraverse.com> for downloading. The demo version can be released later with a licence key for 60 US dollars, which saves a bit compared with the CD version.

Win4Lin runs at least with SuSE-Linux 6.x, Red Hat 6.x and 7.0, Caldera 2.2 and 2.3, Caldera eDesktop 2.4 and Mandrake 6.1 to 7.1.

Installing Win4Lin

The complicated and time-consuming installation of Win4Lin was the main fault in version 1.0.

Unfortunately, this has not really improved much. The installation scripts only work for the CD version. The download version displayed a few snags in a test installation.

In principle, the Win4Lin installation (regardless of whether it's the CD or download version) is carried out according to the following pattern: First a kernel specially adapted for Win4Lin must be installed, and a few other preparations may also be necessary, such as a *Glibc* Update.

Netraverse provides the appropriately adapted kernel for the most common distributions and updates and patches (Red Hat Erratas) on its FTP server.

Next, boot up with the Win4Lin kernel, where the kernel installation script of Win4Lin automatically adjusts the Lilo configuration. Other boot configurations (such as Bootdisk or Grub) are not taken into account at present. Next, install the Win4Lin binaries and put in the licence file.

Hooks and eyes: Installation in practice

To register the evaluation licence, to download the demo-version itself, and for the installation of the Win4Lin kernel, Netraverse provides the script *quickdownload.sh* online. After that, reconnect to the Netraverse server on the host on which the Win4Lin is to be installed and start the script *quickdownload.sh* locally.

It analyses the existing system environment and creates from it the necessary download files. Sadly, this won't work if you do not intend to install Win4Lin on the same computer as the one with Internet access.

In the next step the Win4Lin Linux kernel adapted for the version of Linux in use should be installed, though in one or two distributions this only works if a few patches, also found on the Netraverse server, and/or system expansions, have been installed first.

For the kernel installation the manufacturer provides an installation script on the FTP server, which can be found at *\$HOME/downloads/Win4Lin/Linux_Kernels/install_kernel*. The script analyses the actual system to find out whether kernel adaptation patches or updates are necessary, installs the modified Win4Lin kernel and adapts the Lilo configuration.

So much for theory. The script is only intended for the CD version and does not run through with the download version. But it is certainly useful for determining the system requirements. On a RedHat test computer for example it complained about the lack of the RedHat Errata updates due to the faulty *Glibc* version in Red Hat 7.0.

The requisite updates were obtained from the Netraverse server and it was also possible to install them. Of course, this also works with a regular RedHat Errata.

Lilo manual labour

The kernel installation script also writes an adapted *lilo.conf* file under */etc* for booting the Win4Lin

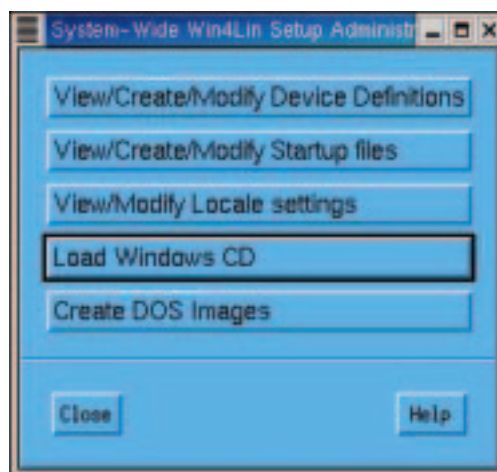
kernel via Lilo on the hard drive. So anyone who installs Lilo on a boot disk or uses a different bootloader is going to feel pretty lonely.

The adapted Lilo configuration should then be written manually on the boot disk (Lilo option *boot=/dev/fd0*). Using the parameters *install=/boot/boot.b* and *map=/boot/map* the Lilo boot sectors can also respond directly to the diskette, provide these have previously been copied thereto with *dd*.

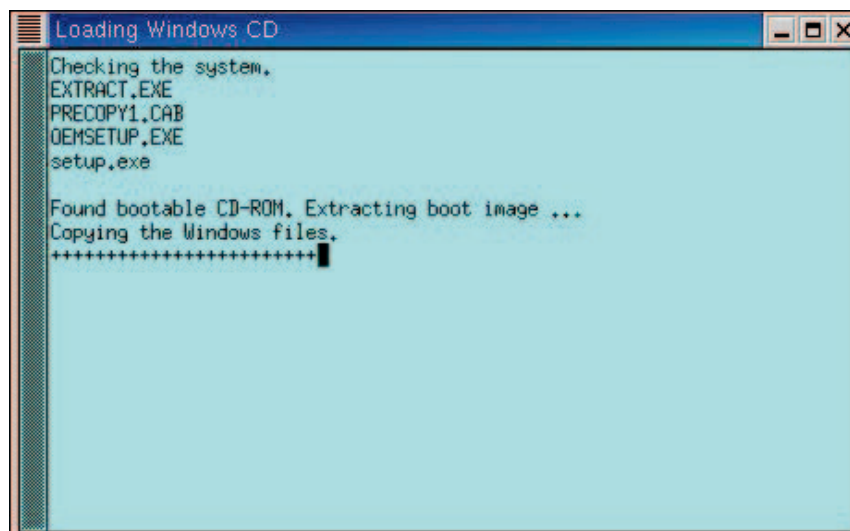
Win4Lin binaries

After rebooting, you can execute the actual Win4Lin installation script under *\$HOME/downloads/Win4Lin/Win4Lin2.0-eval/Win4Lin/install-Win4Lin.sh*. Since it is searching for the Win4Lin CD, the testers tried out their RPM command line know-how. While the installation of RPM is in progress, the end user licence, EULA, is displayed and has to be confirmed before being unpacked any further.

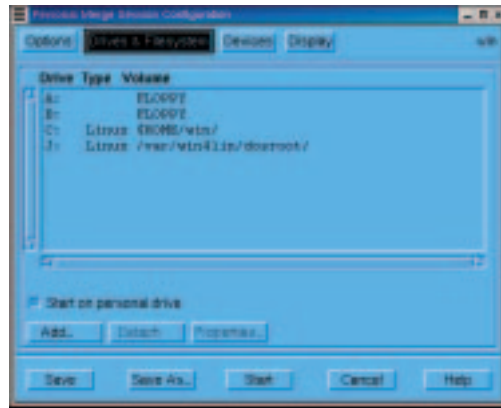
In the final step of Win4Lin installation, an existing Windows CD should be read in. To register the Windows CD the Win4Lin configuration module *winsetup* can be used (as root). To do this, you go to the main menu item *System-Wide*



The CAB files from the Windows original CD are loaded only once onto the Win4Lin shared drive J: and are available for additional installations.



With Winsetup, Win4Lin can be configured fairly easily.



VMware emulates the whole PC exactly in an X-window, on which Windows 98 then installs itself as on a real PC.



Win4Lin Administration and there select submenu Load Windows CD.

To complete the installation of the Win4Lin download version, all that is now needed is the licence file. This is sent via email, if you have registered online and is to be put in under

/var/Win4Lin/install. A Windows session is started with *win*, the configuration module with *winsetup*.

Win4Lin configuration

After installation, Win4Lin is ready to use, as long as you are willing to live with the default configuration. All users apart from root can start a windows session by entering *win*. With the first *win* the Windows installation in the Win-Box is commenced.

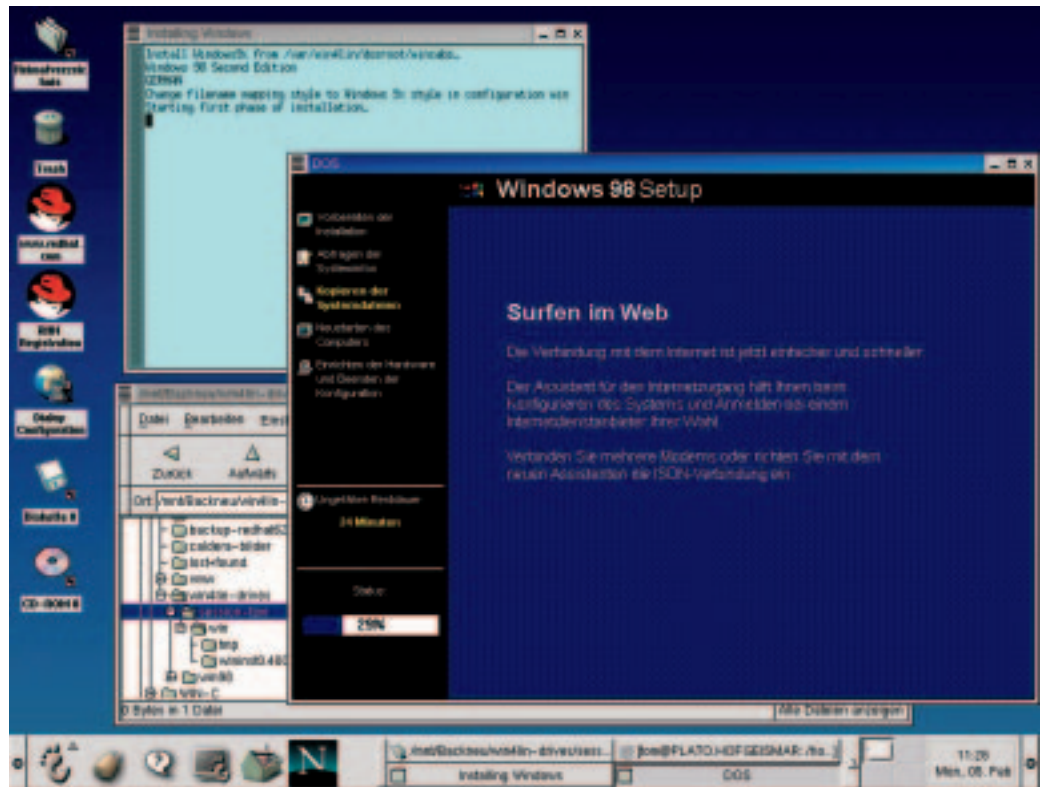
The graphical Win4Lin configuration tool *winsetup* serves to adapt the multi-faceted drive and path allocations for Windows sessions as well as the waiting hardware devices, such as ports or printer. This is also the point when the behaviour of the VGA mode is adjusted.

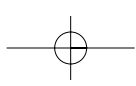
Winsetup is divided into a system-wide part (as root) and a user-specific part, in which each user configures his own sessions. The personal Windows drive, C: is reflected under *\$HOME/win* under Linux. In the system wide part the Windows CD can be read in, among other things.

The graphical user interface of Winsetup is certainly fairly clear but is also knitted to a very simple pattern – it doesn't compare with the modern and pleasant wizards in the VMware-Express configuration.

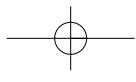
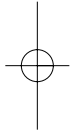
The actual Windows installation runs similarly to that on a native Windows system. The simplest thing is to call up *Personal Win4Lin-Session....* in Winsetup. Your personal drive starts with the *Start* button. The same thing is achieved from the menu item *Personal Windows setup* or *win* on the Linux command line.

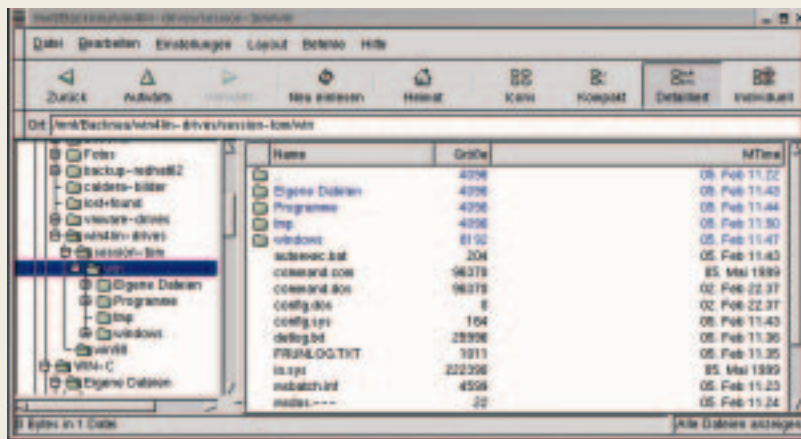
Windows installation in a Win4Lin session goes perfectly.





Linux IT



Alphabet soup

The Personal Drive of Win4Lin is also emulated in the Linux file system.

Win4Lin confronts the user after installation in the first instance with a bewildering maze of different drive letters. After studying the excellent English documentation it all quickly becomes clear: As the basis for the Windows-9x installation, one C: drive serves as the so-called Personal Drive per user. In the Linux file system this drive is emulated under \$HOME/win. If there are space problems – though a standard Windows must fit in each case – it might help to have symbolic links to other partitions. There is also a J: drive each, which as the shared drive, provides DOS and Win4Lin system files for all users. It also records the Windows-CAB files from the installation CD, so that any Win4Linux user without a Windows CD can create his own Windows sessions on his Personal Drive. The location of J: in the Linux file system is /var/Win4Lin.

Apart from the obligatory floppy drives A: and B: it is also possible to configure access to a Linux CD-ROM drive in the system-wide Win4Lin configuration with the drive letter N:.

Also, Win4Lin can set up any DOS sessions you like on the basis of a virtual drive or a native DOS partition. As a template, Win4Lin provides the virtual DOS device D: with a rudimentary DOS 7.0 system.

VMware Express

VMware Express is not really a new product, but a variant of VMware, which is restricted to the use of Windows9x as guest operating system. But on the other hand the price, at about £85 (for example from Linux Emporium) is considerably lower compared with the Workstation version at £275.

VMware is a hardware emulator, which means the software virtually emulates a complete standard PC environment in an X-window. Then you can install Windows 95, 98 or 98SE as guest operating system. VMware also controls file sharing via drag

and drop between guest and host, diverse network modes (VPN, LAN, Dial-UP, Samba), sound, Highcolor-VGA and lots more.

The hardware requirements, apart from that for memory, are moderate in view of the functional principle, but considerably higher than in Win4Lin. A standard PC at 266 MHz and at least 500MB disk space to accommodate the emulated EIDE-hard disk is sufficient.

The speed of VMware profits in a particular way from the size of the main memory on the host, since host and guest share the physical memory hardware. An absolute minimum would be 128MB, but otherwise remember: the bigger, the better.

VMware was tested with SuSE and Red Hat 6.x to 7.0, Caldera 2.x and TurboLinux.

Installation and configuration of VMware Express

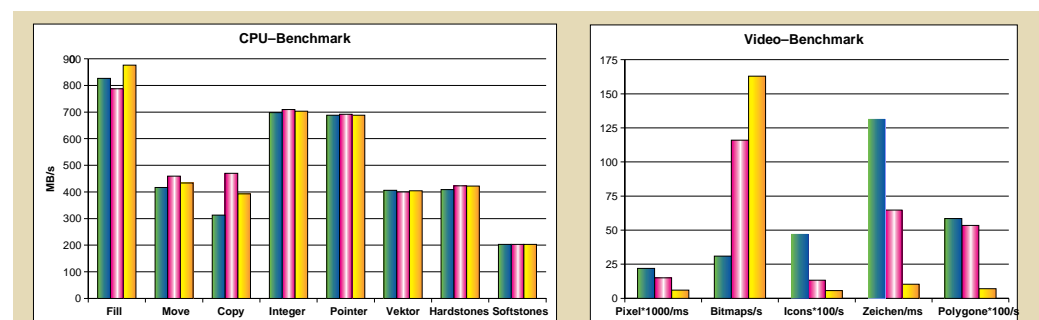
The installation and start of operation of VMware Express are child's play, compared with the contortions in Win4Lin. Both the installation of the host with the aid of the Perl script *VMware-config.pl*, and that of the Windows guest systems with the aid of graphical assistants, went without a hitch. In principle, the installation of VMware is done according to the following steps:

1. Installation of the RPM binaries of the host software.
2. Configuration of the hosts/guest with the script *VMware-config.pl*.
3. Configuration of the virtual PC with the aid of the VMware configuration wizard or of the VMware configuration editor and adjustments in the Phoenix BIOS of the virtual PC
4. Installation of the guest operating system Windows.

After that, the virtual PC can be started with *Power On*. But no operating system has been installed yet, which means the virtual PC acts like an ordinary PC with no operating system. For Windows installation from CD you switch the boot sequence in the BIOS of the virtual PC to CD.

Measurement technique and conclusion

In the 2D graphics domain, both emulators offer adequate reserves for practical working with Word





VMware provides a handy assistant for the client installation, the "VMware Configuration Wizard".

& Co. Nevertheless, on the subject of VGA performance, the following facts are worth mentioning: Win4Lin is currently having massive problems in practical use with its image-refresh. Often image areas overwritten by Linux-window are simply not restored. It may be possible to alleviate this situation somewhat by means of VGA optimisation.

The image output in VMware is certainly tortuously slow after the basic installation, but error-free. For this, VMware delivers its well-known graphics tools as part of the package, and these are now an integral part of the product and no longer have to be loaded separately from the VMware server. It is easy to put them into operation, thanks to wizards. After that, VMware ran on our test computer at 1600 resolution in high colour with impressive graphics performance.

Win4Lin plays its speed trump at file level

A physical hard disk benchmark by means of blockwise disk-I/O can only be executed with the emulators on the basis of the virtual devices. But one of these is not necessary in the default configuration of Win4Lin. Equally telling is the logical disk-I/O at file system level (C-drive benchmark).

This is where Win4Lin plays its trump and impressively confirms the subjective impression of the testers. On the basis of the emulation of the logical Windows file system in the Linux file system, it is precisely in connection with its write buffer that a greater access speed is achieved than with native Windows.

The disk-I/O on the virtual devices of VMware is certainly considerably behind in comparison with Win4Lin and also native Windows, but viewed subjectively is still tolerable. Nevertheless in the virtual image files of VMware, again, the read-cache of the Ext2 host system gives an extremely positive impression.

Last of all, it has to be said for Win4Lin 2.0 that a Windows session is booted up sensationally quickly. VMware comes in last when booting, too. Nevertheless, on balance the conclusion remains: VMware is the only Windows emulator with which truly practical work can be done, because it works plainly and simply.

Win4Lin certainly does offer some rather fascinating technology, but will never be taken seriously by users until Word & Co. can be used on a daily basis. ■

Conceptual differences

While VMware foresaw, from the original development concept, access to DOS/Windows file systems solely via virtual devices, which for their part mirror the complete FAT file system of the guest operating system in an image file based on the Linux file system (similar to the Cooked Files of a DBMS), raw disk support, which means direct access to native DOS partitions in VMware, was only implemented later on.

One advantage of the image file method is that the image file can be seen in the Linux file system and can thus be handled. Win4Lin can in fact also cope with virtual devices, but pursues a different concept: It models the Windows file system on the Linux file system, which is linked with some technical expense (see Samba). In the case of Win4Lin the user finds all Windows directories in the Linux directory tree.

Win4Lin has three types of drive: Windows directories mapped to drive letters, native DOS devices (physical DOS partitions) and so-called virtual DOS devices, similar to the VMware method.