Paragon NTFS for Linux 3 versus Captive 1.1.5

Window Writing

Writing to NTFS partitions with the NTFS driver is actually quite dangerous. But help is at hand. Paragon has an improved kernel module, and there is always Captive, a GPL-licensed program that uses a variety of Windows drivers.

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can check out the results of all this effort in the "Benefits for Linux Magazine Readers" box.

The install script also moves the new kernel module and a few other bits and bobs into the right places on your system (more or less smoothly, depending on the distribution you use). Finished! The Linux kernel should now load the module on demand, typically when you issue a command like the following:

```
mount -t ufsd -o ⮞
iocharset=utf8 ⮞
device mountpoint
```

The *iocharset* parameter helps out with character conversions in file and path names, as shown in Figure 2. Of course, you can't expect the driver to decrypt files that you have encrypted on NTFS, but it will unpack compressed files.

Our first impression was that the module is fairly quick; the long waits with the previous version are definitely a thing of the past. The last time we tested the Paragon module, *ls -l* took about 44 seconds to complete for an NTFS directory with around 50 files; the current version took about four seconds. Just to compare: the read-only driver from the

Up to now, the Linux kernel has only supported read-only mounting of NTFS partitions. Support for write access is experimental, and errors associated with the write process could completely wipe out an NTFS partition. Both Captive, a GPL licensed program, and its commercial competitor "NTFS for Linux 3" by Paragon [1] aim to change that. Linux Magazine tested the latter as one component in a larger suite of tools in [2].

Captive, a GPL-licensed program, is fairly new on the scene. Looking under the hood of Captive reveals a fairly complex structure comprised of a small kernel module and a larger userspace module. The userspace module's claim to fame is that it actually managed to convince the native NTFS driver from

Windows XP to cooperate with Linux (see Figure 1).

Paragon Module for the Linux Kernel

Some parts of the Paragon Linux driver are open source, although the driver is released under a proprietary license. In addition to these components there are two binary libraries, one for kernel 2.4, and the other for 2.6. Users need not worry about the complex infrastructure; Admins just need to ensure that the right distribution kernel header files are available and either run the install script or build the tool using *make*.

If you have not already done so, *install.sh* will create symlinks for the kernel headers in */usr/include* before going on to compile and will link an object file (the UFSD kernel module). We originally had some trouble getting this to work on our lab system, which runs Suse 9.1. A quick check showed that the kernel header had not been included properly, and that a few linker errors were occurring. Paragon had this sorted out within a few days. By the way, you

Captive 1.1.5	
Author:	Jan Kratochvil
Internet:	*http://www.jankratochvil.net/project/captive*
License:	GPL, but requires a few Windows files

NTFS for Linux 3	
Manufacturer:	Paragon Software Group
Internet:	*http://www.ntfs-linux.com*
License:	Proprietary, US$ / EUR 69.95. Discount available for Linux Magazine readers, see box "Benefits for Linux Magazine Readers", Educational licenses on request.

Linux kernel displayed the shell prompt after about three seconds.

Captive but Cheeky

The GPL licensed contender, Captive, is available as a binary RPM or tar.gz archive from the developer's project page, or you can build Captive from the source code. After completing the install, you need to have access to a few Windows XP files. The neat *captive-install-acquire* tool will help you to find the right files. It not only searches the directories where you suspect the files might reside, but can even download a Windows XP service pack from the Microsoft download server if asked to do so.

The fairly sparse documentation correctly informs users that they do need to own a valid XP license to use Captive. The remaining procedure is automated: when you mount an NTFS partition, the drivers automagically compile and mount the partition in next to no time. The mount entry is awesome:
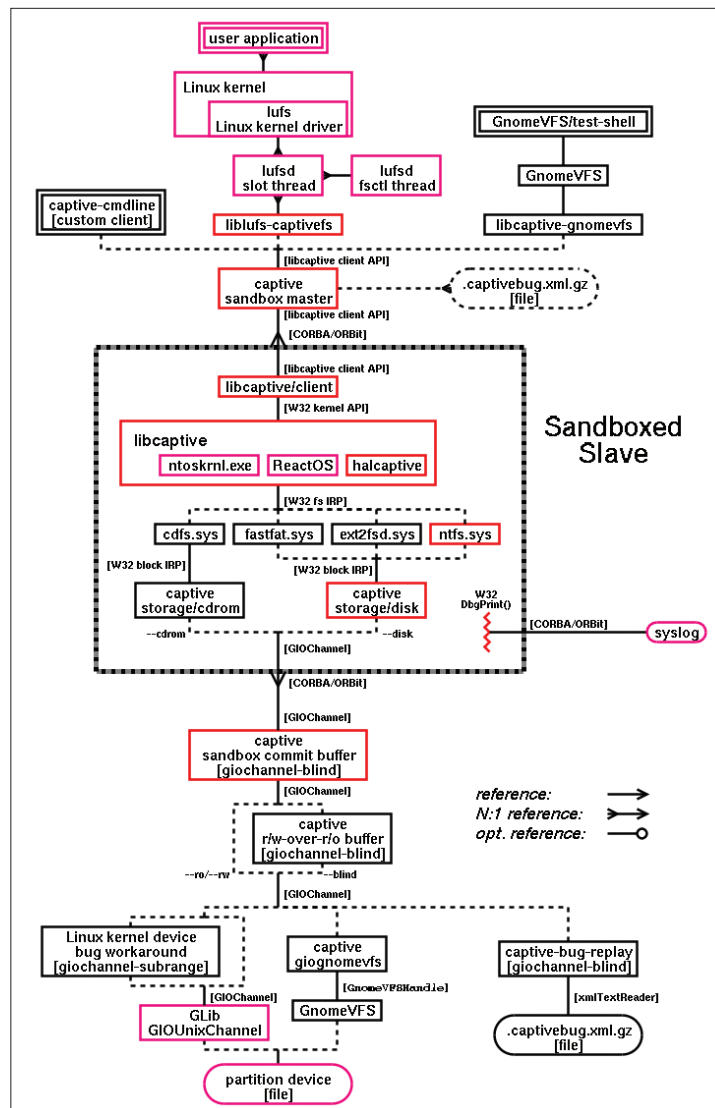

Figure 1: Captive is a free software tool, a complex structure comprised of a kernel module and a main userspace module. The latter tricks the Windows NTFS driver into running on Linux.

```
/dev/hda4 on /mnt/captive-⏎
windows2000 type captive-ntfs ⏎
(user=root,fs=captivefs,⏎
mntent.mnt_fsname=⏎
/dev/hda4,mntent.mnt_type⏎
=captive-ntfs,dir_cache_entries⏎
=0,image=/dev/hda4,noauto,⏎
captive_options=--disk;⏎
--rw;--load-module=⏎
/var/lib/captive/ntoskrnl.exe;⏎
--filesystem=/var/lib/captive⏎
/ntfs.sys;--sandbox-server=⏎
/usr/sbin/captive-sandbox⏎
-server;--bug-pathname=/var⏎
```

```
/lib/captive/bug-%FT%T.⏎
captivebug.xml.gz;⏎
--syslog;--rw,server_socket⏎
=/tmp/lufsd2057093082,⏎
server_pid=6209)
```

If you look closely, you will see that the list includes the Windows files. From a functionality point of view, the software was really convincing: it automagically detects the right character set – UTF-8 in our test – and unpacks NTFS-compressed files. Again, the tool can not decrypted NTFS-encrypted files, but that

should come as no surprise.

Measuring Write Performance

Both of these tools were designed with writing to NTFS partitions in mind. And that makes measuring the data throughput for read operations really interesting. The "Test Procedure" box goes into the gory details of the read tests. The Paragon software demonstrated better performance in this discipline, bundling the test file off to the Windows partition in a time of one minute and 10.5 seconds – this is equivalent to a throughput of 3.75 MB/s.

In contrast to this, Captive kept us waiting for 48 minutes and 19 seconds. Our pocket calculator gave us a speed of 93 KByte/s for Captive – that's around about DSL speed. It hardly seems practical to work with files of this size in real life scenarios, although the tool might be fine for the occasional text document or image file.

Read Performance

If you use one of our two test candidates to mount your NTFS partition, you will not be able to use the kernel NTFS drivers. Because of this restriction, we required both drivers to prove that they would not be affecting our machine's read performance. Paragon's kernel driver achieved speeds of around 2.1 MByte/s, reading 265 MBytes in two minutes and six seconds. As a comparison, the original NTFS kernel module copied the same file in just 35.7. The original kernel module is thus far quicker than the Paragon module.

We had already enjoyed a fairly

```
linux:/windows/D/Test # ls
.   Linux-Magazin_komprimiert.txt  Linux-Magazin_verschl?sselt.txt
..  Linux-Magazin_?m?ute.txt
linux:/windows/D/Test # cd ../..
linux:/windows # umount D
linux:/windows # mount -t ufsd -o iocharset=utf8 /dev/hda4 //windows/D
linux:/windows # cd D/Test
linux:/windows/D/Test # ls
.   Linux-Magazin_komprimiert.txt  Linux-Magazin_verschlüsselt.txt
..  Linux-Magazin_Ümäute.txt
linux:/windows/D/Test #
```

Figure 2: Paragon's NTFS module converts special characters in file names – in this case German umlauts – correctly, assuming you specify the character set in the mount command.

lengthy coffee break thanks to the Captive program, but we could have taken a trip downtown while the read test was running. After about three hours of hectic flashing, the hard disk LED finally stopped. The computer was more or less unusable the whole time. To make things worse, the test actually failed: it appears that a critical Captive component had collapsed under the load, taking the kernel driver, the mount point, the *cp* process, the shell, and finally the window manager down with it. X11 was still running. The computer freed up its resources after the act, but that was only a small consolation to us.

Conclusion

Both contenders provide stable writing facilities and support critical NTFS attributes. We did not experience any NTFS filesystem corruption during our lab sessions. And this puts them miles ahead of the kernel-based NTFS driver. Both drivers deserve our recommendation in this respect, but we had to take Captive's medal away because of its read performance with large files.

NTFS for Linux 3.0 read from and wrote to NTFS fairly quickly. The system load kernel side was quite heavy, but in some situations you may be able to live with that if you are handling small amounts of data.

Captive users can also expect heavy loads. The fact that the driver lives in userspace rather than kernel space will make very little difference in a production environment. But we very much doubt that users will be happy with the abysmal read and write performance that this NTFS emulator provides.

Captive is acceptable for occasionally exchanging small files. Moving an MPEG movie would probably exceed your hard disk's life expectancy. In contrast to this, the commercial NTFS for Linux handles the required tasks at acceptable speeds. This said, NTFS for Linux is not suitable for partitions on hard-working production machines, as the disaster that struck when we tried to run a synthetic benchmark (Boniee++) just goes to show. ■

Test Procedure

Both solutions are designed to support dual boot desktops. In this light, we decided to test both products on a normal desktop PC rather than on a high-performance server machine. In our case this was a Pentium 4 Celeron with a 2GHz CPU, 256MB RAM and an 80GB ATAPI hard disk. The machine's main operating system was Suse Linux 9.1 Professional with the original Suse kernel 2.6.3. We formatted the Linux partition with Ext 3. The NTFS partition came courtesy of Windows 2000 Professional with current service packs.

We originally wanted to use Bonnie++ for the performance tests. Bonnie++ feels perfectly at home on Ext 3 partitions. But our first attempt to run Bonnie++ with Paragon's fast software ended in a disaster. We told Bonnie++ to work with 512 Mbytes and 50x1024 files – just for comparison's sake,

this takes just a few minutes on the Ext 3 partition. Alas, the Paragon driver, and the whole system froze for about the next six hours. The mouse and keyboard showed no response at all, there was no discernible hard disk activity, and of course there were no results.

We quit Bonnie++ by pressing [Ctrl]+[C], but this was not the end of the story as Bonnie++ wanted to delete all 50000 files. To put our lab machine out of its misery, we decided to *kill* the process after about a quarter of an hour, and we manually cleaned up the wreckage on the Windows 2000 partition. This left us with a 265MByte file copy as a "benchmark." We measured the read performance by writing to device null and the write performance by copying between the partitions. The procedure took up to an hour in some cases.

Benefits for Linux Magazine Readers

Linux Magazine readers who install the Suse Linux 9.1 Pro distribution from the DVD with this issue can download the current NTFS for Linux 3.0 file system driver from the website at [3] free of charge. The driver is fully functional and not time bombed. If you have purchased Suse Linux 9.1 – no matter whether you have the Personal or Professional version – you should get along fine with the software download. The installation script is not supplied, however, all you need to do is bind the right object file into your kernel using the *insmod* filename command. The *mount* command should now work as described in this article.

Note that for compatibility reasons insmod may refuse to work with the UFSD driver after this update. This is hardly surprising as the kernel module is linked against a specific kernel version, and this is a feature that you normally only get with the US$ / EUR 69.95 commercial version of the program. On the brighter side, Paragon is offering Linux Magazine readers a fairly substantial discount. If you order via [4], and enter the right coupon code the license will cost you US$ / EUR 34.97.

INFO

[1] Paragon Software Group: *http://www.paragon.ag/*

[2] Jan Kleinert; Paragon Mount Everything 3.0 Professional test. Linux Magazine, Issue 38 / January 2004, p33

[3] NTFS for Linux 3 driver for Suse Linux 9.1 free of charge for readers of Linux Magazine: *http://www.ntfs-linux.com/linux-magazine.htm*

[4] Reader discount on NTFS for Linux 3: *https://secure.element5.com/esales/cart.html?PRODUCT[516868]=1&COUPON1=NTFSCT&currencies=USD*, Coupon Code: *NTFSCT*