



Under construction

This column replaces "32-Bit" and is our eye on Unix. Chris Bidmead is still in the chair, and keeping him company are ppp diagnostics, Dick Pick, and Dylan the Hippy Wabbit.

All web pages sporting roadworks signs saying they're "Under Construction" make me laugh. They're a testimony to the many people out there who still don't get it. Do these people think that at some point their web-making is going to be "finished" and they can knock off? The web is, by its nature, always "Under Construction". If it isn't being re-thought and re-built on at least a monthly basis, what you've got isn't a web page, it's a tombstone. Likewise, columns like this. This has been called "32-bit Computing" for nearly three years, but under that loose umbrella has been ducking and weaving, looking for themes, developing them, chucking them and moving on.

OS/2 used to fall under this banner until we spun it off into a separate column. Now it's the turn of Windows NT. I'm delighted that Microsoft's operating system is going to have its own column from this month. When I started, Windows NT was a niche operating system of dubious reliability. Since then it has grown up into a serious contender, not just as a server, but also as a workstation operating system (arguably — well, I would argue — the only proper desktop operating system Microsoft has on offer). Yes, it's still pretty memory-hungry for a general desktop system, but look what's happened to the price of memory over those three years.

If Windows NT has been getting short shrift from me over recent months, it's because the main theme, guided by feedback from your letters and emails, has been Unix and its variants. The new Windows NT column gives readers the chance to keep up in-depth with an

operating system that I'm sure is going to make an important contribution to the computing mainstream. And to give us a better focus on the alternatives. The change doesn't mean that I'll be ripping Windows NT out of my own network forthwith. Like OS/2, it will continue to form part of the heterogeneous computing environment I'm nurturing here, and no doubt you'll hear from me about it in that context from time to time.

Hacking pppd

The netstat utility makes a useful PPP diagnostic. You can evoke it with a number of parameters to look at different aspects of how your network is functioning. Netstat-i gives you something like Fig 1.

This lists the various network

connections and how the packets are moving through them. We're interested in the ppp0 connection and the input and output errors columns (Ierrs and Oerrs). But don't make the mistake (as I did, before being corrected by wiser heads) of ignoring the total input and output traffic (Ipkts and Opkts) because the errors are only interesting in proportion to the total traffic. Netstat lists the whole network activity, including internal network connections on the same machine, so you might want to filter the output along the lines of Fig 2.

Grep is one of the great Unix workhorses, a filter that we use here to say "Just give me every line with the string 'ppp0' in it". While we're filtering, and just for fun, let's look at a way of tightening the filter even further. We

Fig 1 netstat-i

```
nextmachine:1# netstat -i
Name Mtu Network Address Ipkts Ierrs Opkts Oerrs Coll
lo0 1536 loopback localhost 9638 0 9638 0 0
en0 1500 192.168.1 nextmachine 643394 0 458918 0 0
en0* 1500 none none 16571 0 1919 0 0
ppp0 576 158.152 cbidmead.myisp.29005 14 31342 0 0
ppp1* 1500 none none 0 0 0 0 0
en0* 1500 none none 676037 0 460834 2 1692
```

Fig 2 Filtering output

```
nextmachine:2# netstat -i | grep
ppp0ppp0 576 158.152 cbidmead.myisp. 29110 14 31461 0 0
```

Fig 3 awk equivalent of grep filter

```
nextmachine:4# netstat -i | awk '/ppp0/
{print}' ppp0 576 158.152 cbidmead.demon. 29368 14 31742 0 0
```

do this with a more flexible filter language called awk, which, as long-standing readers will know, is a particular favourite of mine. The equivalent in awk of the grep filter looks more complicated (Fig 3).

The benefits of awk emerge when we want to cut the netstat table column-wise and row-wise. In awk, each word (by default a string surrounded by spaces) is represented by the variable \$n, where n is the number of the word reading left to right across the row. We're interested in the packet traffic and the errors — the fifth, sixth, seventh and eighth words across the row. We can revise our awk inline program (Fig 4).

This gives us just four numbers, but we might have forgotten what they stand for.

Fig 4 awk inline program, revised

```
nextmachine:11# netstat -i | awk '/ppp0/
{print $5 "\t" $6 "\t" $7 "\t" $8}' 29740 14 32114 0
```

So, let's include the headers. If you were doing this in BASIC, you'd probably want to write an extra line to PRINT out the titles as string constants, but awk is all about being quick and dirty. So let's use the title strings that are already in the netstat table and tell awk to print any line that either contains "ppp0" OR the string 'Name'. That OR is represented by the vertical bar character "|", which happens to be the same symbol we use outside awk to mean "pipe" (as in "send the output from utility a into the input of utility b"). Fig 5 shows what we get.

These alternative uses of "|" can be confusing, and this kind of complexity is one

Fig 5 Including headers

```
nextmachine:13# netstat -i | awk '/ppp0|Name/
{print $5 "\t" $6 "\t" $7 "\t" $8}'
Ipkts Ierrs Opkts Oerrs
31443 14 33908 0
```

of the many perceived barriers to entry for would-be UNIX users. Let me turn this around and call it one of the life lessons that UNIX can teach you. The vertical bar character is a symbol, and symbols by definition are only given meaning by their context. Smile at a stranger in Newcastle and the chances are you'll get a smile back. You're saying, "Hello, isn't it a nice day?" Do the same thing in London and you'll almost certainly get a sour look, if you get anything at all. Part of the versatility and depth of Unix comes from the fact that nobody has tried to cram all the things an operating system can

do into a single context.

This brings me to an argument from one of my readers. Dylan the Hippy Wabbit <spacey@icrf.icnet.uk> (sigh...!) seems to be a Macintosh fan, and writes: "Sometimes I get the impression that you've been using command line systems so long that you've forgotten that it ever hurt. Rather like a guy I used to work with. He was so badly damaged by MS-DROS that he couldn't see what was unintuitive about edlin."

I told the Hippy Wabbit that the problem with not having a command line is that you then leave it to the designer of the GUI to second guess everything you're going to want or need to do with the system. My current experience with Linux and NeXTStep

has convinced me that the last thing I want to yield up to some interface designer is my command line.

NeXT and, indeed, any Unix + X gives me the benefit of both worlds without compromise.

And the Mac is a historic example, IMHO, of why it's a bad idea to deprive users of choices. Remember that Steve Jobs didn't just steal the command line from Mac users. He took away cursor keys, a mouse button and expansion slots. And he took the object-orientatedness out of the Xerox GUI too. History has shown him wrong about all this, and thank heavens he acknowledged it with the design of NeXT. The world, and, if I may humbly suggest, Dylan the Hippy Wabbit, would do well to learn from this.

Multiple booting

I've had a number of mailings from readers complaining about operating systems messing with the master boot record so that multiple boot

installations (which Linux's lilo is supposed to enable) don't work any more. The chief offender is Windows 95, which writes its own master boot record as though there is no other operating system in the world. In the past, my advice has been to install Windows 95 first (then perhaps run a utility like Norton to save the master boot record just in case) and then install Linux, putting lilo on the MBR.

An alternative I've been using with some success is the Boot Manager that comes with IBM's OS/2. Obviously this is proprietary code, and you'll need a copy of

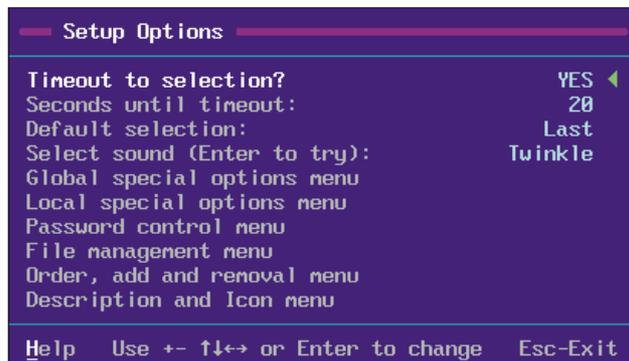
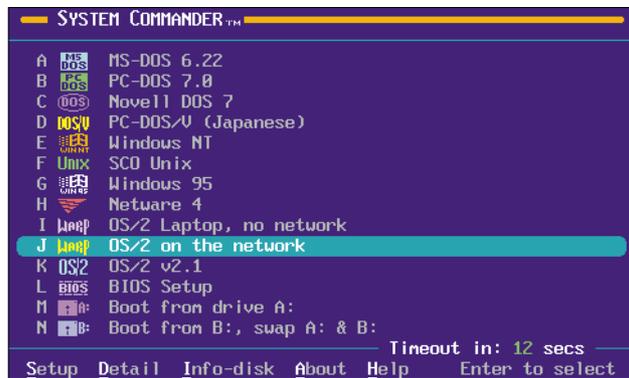
OS/2. You don't, however, need to install OS/2 onto your hard disk; it's enough to have an OS/2 boot disk to install and set up the Boot Manager.

Another approach turned up in my postbag the other day. "System Commander" is a very flexible commercial boot manager that claims to be able to deal with a huge list of operating systems – as far as I can make out, pretty well every operating system that has ever run on an Intel box, including defunct ones like Coherent, exotic ones like QNX (a fascinating microkernel-based real-time network operating system I keep promising myself to install some day) and even Pick.

A Pick diversion

I'd love to hear from any readers who are using Pick. It might encourage me to take another look at what I remember as being a clever and flexible operating system that was built on a special kind of database that the inventor called "co-relational". He was the legendary Richard A Pick. Everyone called him Dick Pick, of course, a punchy name that suited him to a tee. He died in 1994, and... well, I remember him so vividly from a night some time in the mid-eighties we spent in a Japanese restaurant.

He was very — I was going to write "witty", but a better word is "funny". He loved to laugh, he was erudite, and he hated IBM with a passion. In fact, the whole "co-relational" database thing was inspired by his hatred of what he saw as the orthogonal, regimented ethos of Big Blue. He believed (wrongly, I think) that IBM's concept of the relational database was shaped by the experience of punched cards, which was why it stored all its data in inflexible flat tables. His own astonishing database system was designed to accommodate real business data in



System Commander automatically detects your installed operating systems and comes up with a menu like this, which you can subsequently edit

System Commander's setup menu. As well as useful features like being able to password protect individual operating systems, you can also characterise different operating system boots with different sounds

whatever shape it arrives. It's based on the flat file, but the various records in that file can be different shapes and sizes, with whatever fields are appropriate for that particular record. And individual fields in those records can have as many separate pieces of data in them as you need.

I think Dick Pick misunderstood Codd's concept of the relational database, but there's no denying that a real pearl grew around the irritant that IBM produced in his soul. Pick, the operating system, was delivering solutions for businesses at a time when other operating systems on mainframes and minis were choking on their own promises. In the mid-eighties I ran Pick on an IBM AT, and was persuaded that all operating systems would one day discover that the database ought to be underneath

the file system, which is where Pick put it. My copy of the manual is signed by Dick Pick himself, and I treasure it. There are some touching tributes to him on <http://www.picksys.com/links/pub/info/pickworld/95jan07.html>

Back to System Commander

But I was telling you about System Commander. The only limitation I can see is that it requires a DOS-style FAT partition somewhere on the hard drive, but if you're running DOS, Windows 95, OS/2 or Windows NT, you will or may well have this anyway. Like Windows 95, System Commander writes its own MBR, but not before it has analysed your existing MBR to find out what operating systems you are using. It installs using this information, but not before it has backed up your own MBR. It keeps a copy of its own MBR on the FAT partition so you can reinstall it if necessary.

The manual deals with partitioning and booting, and is full of good advice and hard-to-find information.

Get System Commander from POW! 01202 716726, or email dpower@powdist.co.uk <dpower@powdist.co.uk>. There's a web page at <http://www.powdist.co.uk/>.



There's a new operating system using a tightly integrated database and file system. "Be" comes with its own dual-processor hardware from a company set up by Jean-Louis Gasse, an Apple refugee. I'll cover this more in the future. Here's a screenshot from the company's web page at <http://www.be.com>

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