

A Good Web Server Platform at the Right Price

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A key decision in setting up and maintaining a Web site is the choice of operating system and hardware platform. Now, before you say, "I'll just use Windows NT" or "I'll just use Solaris," think about this: The operating system needs to be affordable, reliable, secure, fast, scalable, have Web server software available for it and have a list of satisfied users.



OpenBSD, the newest variant of 4.4BSD or "Berkeley UNIX," meets the criteria, plus, it runs on nine hardware platforms. Of course, every operating system vendor wants you to believe that its OS is best (for all purposes). Let's leave discussion of commercial UNIX systems' and NT's (in)security to the Bugtraq list (<http://www.geek-girl.com/bugtraq/index.html>), and here concentrate on how OpenBSD fits the above criteria.

OpenBSD Installation

The OpenBSD installation has some very nice features. First, on four architectures (Sun Microsystems Inc. SPARCs, Intel Corp. i386s, Digital Equipment Corp. Alphas and Advanced RISC Computing, or ARC, machines), there's the ability to boot directly from one of the two CD-ROMs in the kit. For example, on my SPARCstation IPX, I just said `boot cdrom`. My PC did not support this option, so I had to boot from a floppy. The floppy image is provided and can be copied to floppy either using `dd` or using a DOS program `rawrite`, also provided. When you boot from the floppy, you first see a UNIX-style boot listing. After the kernel is initialized, the version of `init(8)` on the floppy asks which shell you want; hitting return gives the Bourne shell (which is really PDKSH). At this point, you type `install` and you're off to the races.

The `install` script asks the usual questions about which boot disk to install on and lets you run its `fdisk` and `disklabel` programs to set them up. You probably know that on a PC, `fdisk` breaks the disk into larger

chunks; on UNIX, a second program assigns individual partitions within the UNIX `fdisk` partition. At least one is required for swapping, because UNIX gains some efficiency by swapping directly to a disk partition instead of into a file as, say, Windows 95 does. UNIX reserves swapping to a file for when you don't allocate a big enough swap partition.

The one trick to this step is getting the sizes and offsets of the partitions exactly right. It may be easier (and safer, if you are sharing your boot disk with another PC-based OS) to use DOS `fdisk` to create the partition, then change it to an OpenBSD partition using `disklabel`. Please read the accompanying installation documentation for the gory details on disk partitioning.

The `install` script also lets you set up the network, which is necessary only if you are using it to install. Yes, in fact, you can install with just a boot floppy and a network card. The main install files, of which there are five, plus a copy of the generic kernel, can be installed from CD-ROM from a local disk in any of several formats—including DOS/Windows FAT, or from a network via NFS, FTP or even HTTP.

Indeed, if you are patient, you can do your entire installation over the Internet, given a copy of the boot floppy and a direct connection. (Don't try this at home, kiddies, if your Internet link is 56 Kb/s or under. It might work, but you'll probably die of old age first.)

I didn't get to try the network install, but on one machine I did have to copy the install files to a Windows partition and run them from there. It worked like a charm!

Apache – No Muss, No Fuss

First, let's look at software, because without it you won't be able to use OpenBSD as a Web server platform. The most popular Web server on the Internet is the free-software Apache server (<http://www.apache.org>). After you've installed OpenBSD, copied its "ports" tree from the CD to disk and have a connection to the Internet, it's just a matter of typing

```
cd /usr/ports/www/apache
make install
```

and you've got a recent version of Apache compiled and installed, ready to configure. No muss, no fuss.

I didn't test either Netscape Communications Corp. or Microsoft Corp. Web servers because neither is readily available in a form usable on OpenBSD.

There is other software readily available for Linux, and OpenBSD has a good "compatibility" mode for Linux, SVR4 and other systems. This compatibility mode is not system-call mapping (with the overhead that that implies) but a method of loading a different set of shared libraries and system-call entries.

For example, Figure 1 shows a 43-KB GIF image of two Netscape Navigator 4.0.x screens. Both are displayed on a Solaris workstation. One is Netscape running locally (Solaris version), the

other is the Linux Navigator in OpenBSD's Linux emulation. View them side by side and see if you can tell which is which.

What about Perl, the language used by many Webmasters for CGI scripting? No problem! OpenBSD is one of the few systems that ships with Perl preinstalled, ready to use. And what about Java? Of course you don't need Java support just to install applets on pages that you serve; they are just data files to the server. But you might want to develop your own applets.

Or you might want to run "servlets," which are Java fragments that blend into your Web server, avoiding the overhead of starting a new process each time a user posts a form. But Java is a new language: Some love it, some leave it. If you're in the former camp, you'll be happy to know that there's a FreeBSD port of Sun's Java Developer's Kit 1.1, which works reasonably well (that compatibility mode, again). There should soon be an OpenBSD native support. Of course if you're in the latter camp, you won't care beans about Java. In either case, OpenBSD delivers the goods in terms of server software support.

Cost and Support

Windows NT Server costs more than \$500 per server (depending on where you shop and how many client

licenses you buy). Solaris Server Edition also costs more than \$500 per CPU. OpenBSD costs \$30—yes, that's thirty bucks—if you want the full distribution on CD-ROM. If that's too much (and if it is, how did you ever afford a PC to run it on :-)), you can download OpenBSD over the Internet. In either case, there's no per-CPU licensing. So if you add a second or third server, or decide to run it on your notebook PC (having given up on Windows 95 after having to reinstall it for the 95th time), there's no cost.

However, the OpenBSD Project's main source of funding is from sales of the CD-ROM, which pays for development, timely patches from its Web site and the like. So if you're using OpenBSD on dozens, hundreds or thousands of machines, you really should make a contribution to the project—cash, machinery or software (your faithful scribe ported a kernel-level device driver for the Connectix QuickCam from another UNIX platform and donated it to the project. Why? I like [some!] WebCams, I like QuickCam and I had the hardware handy).

As you will have gathered, OpenBSD is free software, and there is no guarantee of support. However, the source is in the hands of many developers. Peter Honeyman of the Center for Information Technology Integration, an applied research and development center at the University of Michigan, chose OpenBSD as the platform for a large research project. He says, "we run OpenBSD because it runs AFS [the Andrew File System, an alternative to NFS], has had a lot of attention paid to security vulnerabilities, is really UNIX and has a friendly and open developer community."

As an example, while my Cyrix Systems Pentium 166 system works fine off the CD-ROM distribution of OpenBSD 2.2, my Dell Computer Corp. notebook's ATAPI CD-ROM wasn't recognized. An email to the mailing list brought a reply from a developer in Europe, including a patch, within about 10 minutes. How many commercial OS vendors even read their email, let alone respond the same hour or the same day?

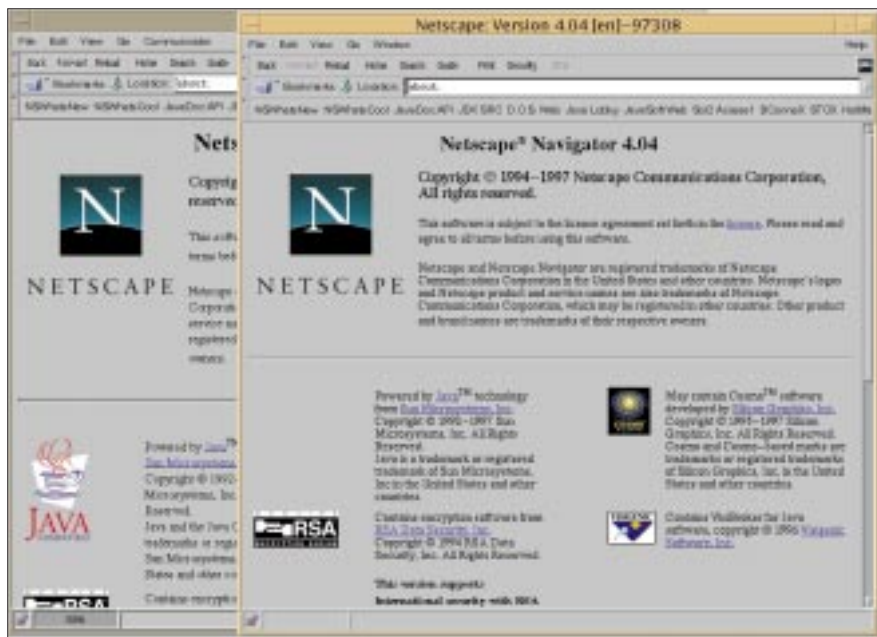


Figure 1. Can you tell the Solaris from the Linux version?

For the Security Wary?

Today's Internet has its full share of vandals and crackers. To stay alive, you need a secure OS and a secure Web server. The Apache server team keeps a close eye on the Bugtraq list and publishes patches. The OpenBSD people are very security conscious. And because their base code is derived from 4BSD, it has been worked over by many of the best developers in the UNIX and inter-networking communities for years. Then, in 1997, OpenBSD itself was given a thorough going over for security, from head to toe. Oliver Friedrichs, vice president of engineering at Secure Networks Inc., Calgary, Canada, wrote to me in January 1998:

"We have been using OpenBSD in our development of security software for the past one-and-a-half years. We develop a network security assessment tool which identifies weaknesses in computer networks. Our main interest in using OpenBSD was its security benefits. We have assisted the OpenBSD development team in a fairly large capacity to find and solve many security problems which were present in OpenBSD and other BSD operating systems. That being said, it's quite some time later now, and in my opinion, OpenBSD has been 'victim' to one of the most stringent software source code reviews (that is, looking for and discovering security flaws), that I know of, occurring in any operating system. Many individuals worldwide have spent much of the last year piling through source code, identifying and fixing security problems.

"... if you want a stable and secure environment, there are definitely many benefits to using it. Most of the security problems found in other free operating systems were fixed first in OpenBSD. For reference, many of these vulnerabilities apply to other operating systems as well, and have been documented as security advisories at SecNet.com/advisories [see <http://www.secnet.com/advisories>]."

The result is that, according to OpenBSD Project Leader Theo Deraadt, not a single remote root security problem was detected between the release of 2.1 and 2.2 (2.3 is scheduled for release this month). For more information on

Benchmark	X86 Running Solaris 2.6	X86 Running OpenBSD
Arithmetic	6.6	7.6
Drhystone 2 (nonregister)	9.0	10.5
Execl throughput	5.4	32.9
File copy (30 seconds)	3.4	5.0
Pipe-based context switch	7.1	13.9
Shell scripts (8 concurrent)	2.2	9.2
Average	5.6	13.2

Figure 2. Benchmark results (comparable to other runs of Byte Benchmark 3.0).

OpenBSD's security policies, see the OpenBSD security page at <http://www.openbsd.org/advisories>. Friedrichs' company produces some exciting security software that is based on OpenBSD. This, and many others, are listed in the OpenBSD software users list at the OpenBSD Web site, which includes companies using OpenBSD internally, many OpenBSD-based ISPs, companies developing or offering software for OpenBSD and so on.



OpenBSD also features a range of cryptographic software, including Kerberos and IPSec, compiled and installed as part of the base system. One could even say the main focus of OpenBSD development is on operating system security. It is, according to the OpenBSD Project, "the only significant OS shipping with full crypto support included." Because OpenBSD ships from Canada, it is only indirectly subject to the U.S. Commerce Department's vagaries and can ship with features that you may never see from SunSoft Inc., The Santa Cruz Operation Inc. or Microsoft.

Even password security is expanded beyond most conventional UNIX varieties. Not only is the shadow password format mandatory, but there are four algorithms for encoding login passwords, one of which is compatible with standard UNIX and the rest of which are more secure. Normally this is not much of an issue because a machine dedicated to Web serving won't have many interactive users. But being on

the Internet, you want your machine as secure as possible. In addition, Kerberos IV authentication is there to allow secure network logins, as for updating files on the Web server.

And network security has not been overlooked. The IPSec protocols ESP and AH are preinstalled on the system, and a pair of tools (a manual configuration process and a daemon for providing standard mappings) lets you control what type of security is used and on which connections. This is a very powerful feature for use on extranets. Overall, OpenBSD security is arguably the best available.

As for reliability, it generally just keeps running. Unlike Windows 3.1, which needs rebooting every hour or so, or Windows 95, which needs rebooting daily, Berkeley UNIX systems tend to stay up for months at a time.

In the early days of 4.2BSD, a bug in the "uptime" code was detected when a system had been up for six months without a reboot and a small integer variable wrapped around. We have not kept our test system up for six months (otherwise, you wouldn't see this review until the end of the year) but, apart from flaky or unsupported hardware, we have never had a system crash or lock up in normal operation.

And in case you do have problems, you can build a kernel with a debugger built in; instead of crashing, system failures will drop it into a debugger. In short, OpenBSD is reliable and secure enough for use as a Web server platform.

Testing Its Speed

We ran the "Byte UNIX Benchmark, Version 3.1" against the same machine running Solaris and OpenBSD. The machine is a Pentium (Cyrix) 166 with 32 MB of RAM (see Figure 2).

The Byte UNIX Benchmark measures CPU time (where the two systems did about equal), the throughput of executing another program (where OpenBSD won hands-down) and other features. The numbers are the ratio of the machine under test to some original, so higher numbers are better.

While benchmarking Web server performance is a trickier proposition, we think these results indicate that OpenBSD is faster than Solaris at many of the things that a Web server does. This should extrapolate to peppy Web server response from OpenBSD, a measure confirmed by the number of ISPs running OpenBSD systems.

Hardware Support

Because OpenBSD is mostly a volunteer effort, the latest hardware may not be supported until somebody gets around to writing support for it. For example, my Dell notebook has a PCI-based PCMCIA bridge, but as of Version 2.2 (and for several months

thereafter), this adapter was not supported (the reason I had to try out the "install from local disk" option when installing on the notebook). As of this writing, we are still using a work-around—telling the system that the PCI-PCMCIA bridge is on the ISA bus—on my notebook. It works just fine but it's a "bit of a hack."

In addition, there is less likely to be support for proprietary hardware. To mention my Dell notebook one last time, it uses some contemptible proprietary "NeoMagic" video adapter, which works just fine under Windows 95 and Solaris 2.6, because the big companies involved play together. But NeoMagic will not give any of its undocumented programming information to organizations like XFree86, so it doesn't support it. And it doesn't appear to emulate anything other than 640-by-480-by-16 VGA mode unless you have the secret documentation, so that's what I use on my notebook. On the desk-side PC, I have an ATI video board—ATI Technologies Inc.

seems always to have played fairly with developers large and small, and the ATI boards are well supported at 1,024 by 768 and higher.

On the SPARC, the normal video configurations (CG2, CG3, CG6, BW2 and P4) are supported, as are all of the other standard hardware. There is something to be said for a platform that doesn't have 1,200 different and incompatible video boards available, though cost isn't it. For the latest word on hardware support, check the OpenBSD Web site. There is no MP support at present. This might be an issue of scalability on larger servers.

OpenBSD is a free UNIX-like system that runs on many platforms. It has Perl 5, gcc and many other tools bundled, and much freeware, including the Apache Web server, can be added easily. OpenBSD's meticulous and proactive approach to security means that your system is more likely to survive attacks via the Internet. And the price is very right, too. ✍

OpenBSD

Company

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WWW

<http://www.openbsd.org>

Best Features

A good server OS. Runs on many platforms. Runs many popular Web servers, and Perl for CGI is preinstalled. Freely available in source code, reasonably priced on CD-ROM. Cryptographic and security software included.

Worst Features

Limited support for the wide range of peripherals available on the PC, compared with some commercial operating systems.

Price

\$30

Circle 159