



# FreeBSD News

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**Y**ahoo! began life at Stanford University on a DEC Alpha box running OSF and a Sparc 20 running SunOS. They served us well for the first year, but we learned that neither system was really designed for handling a large number of HTTP requests. In fact we were unable to find any commercial system that addressed the problems we were facing with scalability. This was one of the unfortunate realities of being at the forefront of Web technology.

After leaving Stanford we used a few platforms including SGI IRIX, Linux, and BSDI. Not

being impressed with anything we'd used (in terms of performance and stability), we were still looking for alternatives. As Yahoo! grew more popular, both scalability and stability were becoming critical to our success. At the time none of us knew anything about FreeBSD, but after seeing references to it I thought I'd give it a try.

Having spent many frustrating hours trying to install other PC OS's, I was a bit skeptical. I had no intention of spending three days trying to install yet another one. To my surprise I went to the FreeBSD Web site, downloaded the floppy boot image, booted a PC with the created floppy, answered a few install questions, and a few minutes later FreeBSD was installing over the Net. The real surprise was when I came back later to a fully configured system that actually worked. If anything had gone wrong with that install it would have likely been the end of that trial. Luckily for us that it was the easiest and most painless OS installs I had ever experienced.

A couple of days later we added a FreeBSD box to our cluster of Web servers. Not only did it out-perform the rest of our machines, but it was more stable. A few weeks into this experiment and we were sold. Although the

price was certainly attractive, it was the stability, performance, and access to the source code that sold us. Ever since then we've used FreeBSD almost exclusively for production as well as our development environment.

Early on the two big unknowns were support issues and the future direction of FreeBSD. The support we've received from the core team as well as other users has been excellent. This support along with the source code has allowed us to solve any issues

the lack of third party software. Fortunately this is changing, but there's still a long way to go. The only way for this to change is for Yahoo! along with other organizations to convince the software vendors that there is a big enough market for their products.

One of our big technical challenges is scaling our services in the face of rapid growth. Looking forward we are very interested in using SMP to achieve even better price/performance. FreeBSD on other platforms

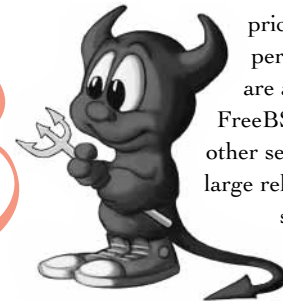
(e.g. Alpha) is also interesting from the price/performance perspective. We are also looking at

FreeBSD to provide other services such as large reliable RAID file servers. Overall we've found FreeBSD to excel in

performance, stability, technical support, and of course price. Two years after discovering FreeBSD, we have yet to find a reason why we should switch to anything else.

## YAHOO!

by David Filo, Co-founder of Yahoo!



we've had almost immediately. Likewise we were pleasantly surprised with the organization and direction of the FreeBSD project as we learned more about it and the people involved over the last two years.

We started with a single Pentium100 box running FreeBSD 2.0.5. We eventually migrated the rest of our production servers to FreeBSD and today we have over 50 servers running various versions of 2.1 STABLE. We are in the process of testing 2.2 STABLE and hope to convert during the next 6 months. The machines we use range from a Pentium100 with 64MB of memory to a PPro200 with 256MB of memory. When additional I/O performance is needed we use ccd with striping over multiple disks. 100Mbps fast ethernet is used for networking. Overall an extremely cost effective solution.

FreeBSD has been extremely stable for us. We've seen over 180 days of uptime on a machine serving over 4 million HTTP requests per day. Performance has been impressive too. With disk striping using ccd we've been able to serve over 12 million HTTP requests per day on a PPro200 with 128MB of memory. One of the only negative things we've found with FreeBSD has been

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## Java Developer's Kit for FreeBSD

by Jeff Hsu

The Java Development Kit 1.0.2 from Sun has been ported to FreeBSD and is available from [ftp://freelfall.cdrom.com/pub/FreeBSD/LOCAL\\_PORTS/jdk102.11-26.tar.gz](ftp://freelfall.cdrom.com/pub/FreeBSD/LOCAL_PORTS/jdk102.11-26.tar.gz). It includes a Java interpreter, a Java compiler, the applet viewer, and the Java class libraries, basically, everything you need to get started with Java. For good programming books, I recommend the following books: Laura Lemay, *Teach Yourself Java in 21 Days*, Sams.net, 1996; Arnold and Gosling, *The Java Programming Language*, Addison-Wesley, 1996; Geary and McClellan, *Graphic Java*, SunSoft Press, 1997.

One common problem which people have is the infamous 'class not found' error. This is almost always the result of incorrectly setting the CLASSPATH environment variable. The Java interpreter looks for a class in a ".class" file with the same name as the class. So the Object class would be in a file named "Object.class". The directory which the interpreter looks for this file in is the package of the class with the dots replaced by slashes. Thus the java.lang.Object class would be in the directory "java/lang" in the file "Object.class". The directory is relative to the components in your CLASSPATH. The interpreter tries each component of your CLASSPATH in order. For example, in the CSH shell, `setenv CLASSPATH ./usr/local/java/classes.zip:usr/lib/classes` defines a CLASSPATH with 3 components, the second of which is a zip file. A zip file internally preserves a directory structure so for this purpose, it's the same as a directory bundled into a file.

consistent project focus. Most of the developers come from commercial software development and BSD UNIX backgrounds, providing a unique perspective on what can and should be done with this technology in the marketplace. Our long history of software development experience has also paid dividends in the way that the project is organized, with multi-track development (commercial and experimental), strong use of source code control (CVS) and a highly centralized development model (not just the kernel, but the entire system) being just some of the benefits of our experience.

### Where do I get more information?

The project runs a web server at <http://www.freebsd.org> which contains a lot of useful information (also mirrored in over 25 countries—please see <http://www.<countrycode>.freebsd.org> for the nearest local server) and you're highly encouraged to visit it.

To reach the FreeBSD development team, please send email to [hackers@freebsd.org](mailto:hackers@freebsd.org). If you have a matter which requires the specific attentions of the core team (a commercial request or some other proposed cooperative venture), please send email to [core@freebsd.org](mailto:core@freebsd.org).

# What is FreeBSD?

by Jordan K. Hubbard, Editor

FreeBSD is a UNIX®-compatible operating system based on 4.4 BSD Lite2 from the University of California, Berkeley and its contributors. BSD has been in more or less constant development for over 15 years, and the same technologies used in FreeBSD have also been the basis for many commercial operating systems, from Digital's Ultrix to Sun's SunOS, still remaining a staple of commercial OS development today.

Like its commercial counterparts, FreeBSD also seeks to make the task of using and installing the system as simple as possible, going on the basic principle that no advanced technology is worth much if those who wish to use it are presented with significant difficulties in doing so. Since cost is also a barrier to some, we've made sure that the system is available free of charge on the Internet (<ftp://ftp.freebsd.org/pub/FreeBSD>) and we welcome both free and commercial redistribution of the technology.

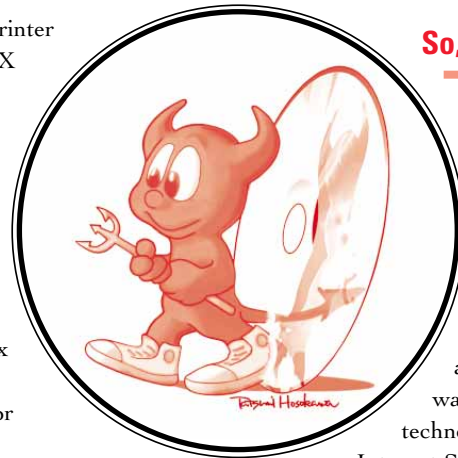
FreeBSD can be used for everything from creating web servers, providing enterprise

mail services, file and printer sharing (for other UNIX systems as well as the Windows and Macintosh platforms) to serious software development. FreeBSD also provides binary emulation for other systems such as BSD/OS, Linux and SCO, allowing applications available for those systems to run on FreeBSD and providing the widest possible selection of applications to the user.

If you're looking for a stable, easy-to-install operating system with a long and proven track record, FreeBSD is the OS for you!

### Who are the FreeBSD Project?

The FreeBSD Project is a group of some 90 developers led by a 17 member "core team" which sets overall direction and ensures a



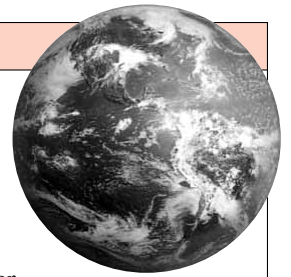
### So, in short...

The marketing hype may tell you that NT can do everything a well-configured UNIX machine can do, but we know differently from practical experience and if we didn't feel this was the best possible technology for the needs of

Internet Service Providers and

other commercial/private interests, we'd be using something else ourselves! As it is, thousands of commercial users, including such notables as Yahoo! and Walnut Creek CDROM (who run the biggest general FTP server in the world on FreeBSD), are happily running FreeBSD and we hope that you will choose to do so too!





# The Busiest Public FTP Server in the World

by David Greeman, FreeBSD core-team

Most people on the Net know that Walnut Creek CDROM's popular FTP server, **wcarchive.cdrom.com**, runs FreeBSD and supports more than the average number of users. What may be less well known, however, is that it's also the busiest public access FTP server in the world. Last month alone, wcarchive sent out more than 4 tera-bytes of files to over a million people!!

Wcarchive started life in 1993 as an Intel 486/66 with 64MB RAM, a 3GB disk drive, and connected by a 1.5Mbps T1 line. During these early days, even the comparatively low 150 user limit was enough to completely overload the T1, forcing an eventual move to another location where it could be co-located



closer to the Internet backbone. Demand for wcarchive's services has also continued to double every year, making it quite a challenge to keep up on the hardware end of things. After a dozen or more upgrades and a switch to a different ISP, wcarchive is now a 200MHz Pentium Pro (actually overclocked to 233MHz, but don't tell anyone), 512MB RAM, 139GB disk space, and connected via 100Mbps fast ethernet. With the current hardware, we can handle more than 2,000 simultaneous users—a tenfold increase over what we first started with and the highest user limit of any public FTP server.

On April 13th, wcarchive was upgraded to FreeBSD 2.2.1+. There were several reasons why wcarchive was upgraded—the main one being all the performance improvements that we've made over the past 2 years. The upgrade was performed "online", while the machine was running by unpacking a copy of a previously installed 2.2.1 system onto a spare partition, customizing it, and then rebooting into this alternate root partition—all of this done remotely from 500 miles away in Portland. With only a minimal amount of kernel tuning, the new system is performing impressively well. Where do we go from here? Well, if we assume that the demand will continue to grow at 100% per year as it has been, then by the year 2000 wcarchive will need to have 1 terabyte of disk space and handle more than 12,000 users! We will obviously have to continue to upgrade the hardware on a regular basis, but even with the hardware upgrades, there is a 4GB limit on the amount of physical memory that the 32-bit PC architecture can handle. We've considered various alternatives to meeting the increasing demand, one being to have multiple geographically distributed servers. Unfortunately, for an archive that is as large as wcarchive (and growing every day), it isn't possible to keep multiple independent machines synchronized with all of the changes each day. Another alternative is to employ some form of clustering technology (not involving NFS) and this may indeed be a usable solution some day, but until the support is written for FreeBSD, it's just a dream.

## FreeBSD & Other Products



### FreeBSD 2.2.2 is here!

What's new? • Bugs fixes for the Adaptec 294x/394x (AHC) driver • NFSv3 as default • ftpd supports virtual FTP hosting • Numerous security fixes • Enhancements for C++ libraries, user-mode ppp, textinfo doc. mechanism • Support for man global • /etc/sysconfig replaced by /etc/rc.conf for more concise customization • much more!!



#### FreeBSD 3.0 Snapshot!

A two disc, early release of FreeBSD 3.0. 4.4BSD-Lite2 merge complete for kernel sources & SMP branch. Speedups, security fixes, new bundled util. & more.



#### The Complete FreeBSD

This 817 page book contains complete information on installing and running FreeBSD. Comes with the complete operating system on two CDROMs!



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Contains over 75 software packages: including the latest version of Emacs, GNU C/C++ compiler, GNU debugger (GDB), source, docs., & much more.



#### Perl

Own the latest sources to Perl5 (5.001m, 5.002, and 5.005). You get 653 scripts for Perl4/5 and 448 modules for Perl5. The choice for sys. admin. & web devel.



#### Developer Tools for JAVA

Contains essential tools for the Java prog. language and Javascript. You get over 60 development tools: compilers, utilities, class libraries, tutorials, & docs.



#### X11R6.3

Contains complete source code for X11R6.3 (Broadway) and binaries for most Unix sys. Pre-built XFree86 3.2 for FreeBSD. Full documentation.



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Finally, there is the very good possibility that warchive may one day be moved to the 64-bit DEC Alpha platform, running a future version of "FreeBSD/ Alpha". Whichever of these solutions we choose, the next three years should be very interesting times for warchive and our favorite operating system which runs on it!

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## Leading-edge Solution for Networking Graphical Software



(Denver, CO)—Xi Graphics, a Denver-based, leading developer of high-performance graphical software, recently announced the release of CDE Business Desktop, the first and only integrated desktop for FreeBSD. It has also upgraded its popular AcceleratedX Server, a fully supported, commercial grade X display server.

CDE Business Desktop is an easy-to-use operating environment that provides users with a consistent graphical user interface across workstations, X terminals, and PCs, enabling them to quickly and seamlessly access data and applications from anywhere in the network. This system has the most comprehensive internationalization package available—including all major European languages and Japanese.

AcceleratedX Server v3.1 is the fastest, most stable, and feature-rich server available, supporting more than 450 graphics hardware cards. Major enhancements include technology for TrueColor Visuals (with capable boards), gamma correction, and a unique overlay technology for optimum resolution while conserving resources. For more information, please call Xi Graphics at (303) 298-7478, or visit their web site at [www.xig.com/](http://www.xig.com/).

For more information, visit the FreeBSD web site @

<http://www.freebsd.org/>



### Walnut Creek CDROM

4041 Pike Lane, Suite F-932  
Concord, CA 94520

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U.S. POSTAGE  
**PAID**  
CONCORD, CA  
PERMIT NO. 677

