

## The BSD-family and their focus

**FreeBSD** - <http://www.FreeBSD.org/>

The BSD most widespread on personal computers is FreeBSD. It has the best hardware support and is the most optimised for the i386 (x32) and amd64 (or Intel EM64T) architecture. It has the most features and focuses most on ease-of-use. It also has the largest Ports Collection, with more than 14.000 applications available. FreeBSD does not consider itself a pure server operating system anymore. It now has much better desktop support, with significant improvements in sound and graphics capability, USB, Firewire and WLAN support, helping users from Windows and Linux with graphical user interfaces.

FreeBSD supports a lot of platforms, including amd64, EM64T, Alpha, Itanium (ia64), PowerPC (Apple), SPARC64 etc. FreeBSD is the most widespread BSD with the largest user base and most committers and has very good SMP support. Today projects have emerged especially for desktop users like DesktopBSD and PC-BSD, giving users an easy way to install, configure and update their systems. In addition there is an advanced Live-CD called FreeSBIE, which serves as an installation medium and rescue system too. FreeBSD is used for a lot of servers in companies and enjoys much support from well-known companies like Dell, Yahoo! and others.

**NetBSD** – <http://www.NetBSD.org/>

NetBSD was started 1993 to continue the multi-platform capability of the old Berkeley Unix (BSD). From this stems it's almost striking feature of being able to run on so many hardware platforms -more than 50!. NetBSD supports more architectures from a single source code than any other operating system. Hence the project's slogan: Of course it runs NetBSD!

This expresses the attitude of the NetBSD developers: Write correct code on the basis of abstracted system interfaces which is secure, stable, portable and fast. In many cases the choice for NetBSD is easy since there's simply no alternative on some hardware platforms. These range from embedded devices and handhelds over to Desktop PCs and 64 bit SMP-Opteron systems with multiple CPU cores. Lately there's been strong initiative supporting virtualization platforms like Xen. Applications for NetBSD are available with the NetBSD package collection "pkgsrc", now used by DragonFly BSD too. Today there are a few thousand applications available, from databases to web servers, from Desktop environments to firewall apps. LiveCDs for NetBSD are also available like NewBIE and Xenopix.

**OpenBSD** – <http://www.OpenBSD.org/>

OpenBSD emerged from NetBSD in 1996 and emphasizes maximum possible security. This aspect is not underestimated by any other BSD, but it is top priority for OpenBSD. Security in OpenBSD is achieved by high source code quality, a small set of services available by default and concentration on just the necessary services in the base installation.

The team around Theo de Raadt rigorously audits the source code for vulnerabilities. OpenBSD is dominated by it's commitment to strong cryptography, IPsec and IPv6 are available in the base installation, Kerberos, Hash functions, ProPolice, W^X and AFS are other keywords. Other sub-projects connected to OpenBSD are: OpenSSH, OpenSSL, OpenBGPD, OpenNTPD and OpenCVS. OpenBSD's innovations, such as PF, pfsync and CARP have been integrated into the other BSDs.

But just as important is the adherence to standards and the belief in free software. This includes the rejection of software patents, proprietary techniques and protocols. Around 3'300 programs are available as binary packages or as ports. OpenBSD places less emphasis on features or a multitude of programs, you may call it puristic.

**DragonFly BSD** – <http://www.DragonFlyBSD/>

DragonFly BSD evolved from FreeBSD and aims at realizing Single System Image clustering (SSI). Instead of having to take care of multiple systems this makes networking them easy, and with DragonFly BSD they would all act as a single system.

The code quality is of very high significance for DragonFly BSD. Security and stability are also not neglected. The system supports OpenBSD's PF as well as FreeBSD's IPFW. In addition to that the TCP protocol extension SACK, for enhanced performance despite packet loss, and SCTP, a SYN-flood resistant transport protocol, were implemented. As protection from buffer overflows the GNU C compiler was extended with the Stack-Smashing Protector.

DragonFly BSD currently only supports x86-based hardware and amd64/am64t in 32bit mode. Just like FreeBSD, DragonFly BSD also has very good SMP support. A native amd64-port is currently being worked on. The LiveCD is also the install CD. DragonFly BSD uses NetBSD's pkgsrc package system to supply you with applications.

# \*BSD

## The \*BSD-family

**Important websites:**

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

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

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

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

Other BSD-projects:

MirOS BSD #8: <http://MirBSD.de/>

FreeSBIE 1.1: <http://www.FreeSBIE.org/>

DesktopBSD 1.0: <http://DesktopBSD.net/>

PC-BSD 1.0: <http://www.PCBSD.org/>

Current BSD-versions, [valid as of 04/2006](#)

FreeBSD 6.0-RELEASE

NetBSD: 3.0-RELEASE

OpenBSD: 3.8-RELEASE

DragonFly BSD: 1.4.4-RELEASE



One of the most frequently asked questions is the one how these BSDs are different from each other. (To keep this brief, we're not discussing other BSD projects like DragonFly BSD. This however doesn't mean that they are of less value.

## Commonalities

Traditionally Unix operating systems come in two flavors, SystemV (SysV) and BSD. Today's systems are direct descendants of 4.4BSD Lite2, the last official BSD version of the University of Berkeley, ancestor of all BSD systems.

Some facts: BSD systems are the product of 30 years of hard work, they are stable and mature Unices.

In the course of time multiple BSDs emerged, each with it's own focus, but in core they are still quite similar and they complement each other with shared ideas, code and documentation..

BSD systems are not "Linux distributions". You will find similar tools like gcc, but the kernel, license and the development model and some other things differ vastly from Linux. There's no distribution chaos with BSD.

All BSDs are united in their love for Unix, standards like POSIX, ANSI, X/Open etc. and stable, secure, clean and efficient code.

## BSD License

All BSDs use the same license which grants the user far more freedom than the GPL. The user may do whatever he or she wishes as long the origin is mentioned, there are no other requirements. This expresses the liberal and free spirit of the BSD community.

## Unified System Design

Each BSD consists not only of the kernel, but also of the necessary libraries, utilities and build-tools to call itself operating system, developed as a unified whole. Upgrades always apply to the whole system, not just the kernel as with Linux, kernel and userland must be in sync. The kernel and the complete operating system can easily be rebuilt from source with a few commands. There is a strict division between operating system and applications ( e.g. Firefox, Thunderbird and OpenOffice) by means of an appropriate file system hierarchy. The operating system and applications are updated separately which adds a lot to the longevity and stability of a system.

## Professional Development Model

All BSDs maintain their source in publicly accessible CVS repositories. All changes are verified and can be retracted if necessary. Only a few people, called committers, who have the necessary experience and skill, may commit changes to the code base. But anyone may look at the code base and make suggestions for improvement, thereby getting involved in the development process. The constant peer review by many people as well as strict style guidelines and tests serve to maintain a high code quality and security. This is considered more important than the number of features.

## Tight Organization

The BSD projects are not a bunch of hobbyists, they are as professionally organized as any commercial project. The FreeBSD and NetBSD projects have a board, called „Core“, which is responsible for strategic planning. There are teams beneath core for each aspect of software development, documentation, internationalization and especially security!

## Software in Abundance

All BSDs can compile and run more than 99% of all source code available in places like <http://freshmeat.net>. But mostly there's already a package ready for easy installation. By means of a Linux-compatible Application Binary Interface (ABI) Linux applications can also be used on BSDs without changing anything, even if there are only binary packages for Linux available, like Acrobat Reader and Oracle, they run just as well on BSD. The speed and stability are the same as on Linux. The quality and completeness of the Linux ABI however differs between the BSDs, FreeBSD and DragonFly BSD have the most advanced ABI.

## Stable File System

The Unix File System (UFS), also known as Fast File System (FFS), has a decade-long track-record of proven reliability and stability and performance. UFS2 (FreeBSD, NetBSD) with Softupdates ensures the integrity of the meta data even in a crash. A journaling file system is being developed and should be available any time soon now in 2006. Alternative file systems like NFS, XFS, ext2, FAT32, NTFS, ReiserFS 3.6 etc. can be used too, but may lack some of their features.

## Ports and Packages System

A lot of freely available software comes only as source code or cannot be distributed as a binary package (compiled package, the BSD analogy to RPMs) due to legal or other constraints. To provide a solution the Ports framework was developed for FreeBSD and OpenBSD. It consists of a file hierarchy of make files and patches. They describe how to unpack, configure, compile and install a specific source code collection without much user-interaction. The Ports system automatically downloads the source or binary software from the Internet, CD or any other source and automatically resolves any dependencies. The Ports system is easy to use both on the console and with graphical user interfaces. It's one of the big strong-points of BSD and most users are very pleased to have the decade-long matured and stable Ports system. NetBSD and recently Dragonfly BSD both use pkgsrc as an alternative to the classic Ports system. Pkgsrc can be used on many platforms and even different operating systems. By the way, pkgsrc is also available for FreeBSD and OpenBSD. MirBSD uses the MirPorts Framework, derived from OpenBSD Ports Tree, usable as well on OpenBSD and Mac OS X.

## Excellent Documentation

The BSDs are renowned for being the best documented operating systems present. Handbooks, manual pages, FAQ and project websites are well structured, written to be easily understood and up to date. The help provided is regarded as best-practice and free to be used by anybody.

