NetBSD in 2001 - A Report

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* Intro

2001 was an eventful year in many ways. In addition to the many political and economic changes that happened which influence all our lives, there were also many changes in the technical sector showing interesting trends. One of them is the increasing popularity and awareness of Open Source software. While Linux has become a serious alternative to both established server and desktop systems, BSD based systems are getting increasing attention due to their clearer internal structure, maturity and stability. This article intends to talk a bit about the highlights of the NetBSD project in the year 2001, with the hope that this trend will continue in 2002.

* Ports

Of course NetBSD added another slew of supported platforms in 2001 again, following it's goal to run on any hardware platform in the universe. Among the ones added last year are:

- SH3/4-based WinCE PDAs
- StrongARM-based WinCE PDAs
- Motorola Sandpoint reference platform
- The ARM-based Netwinder
- The 68010-based Sun 2
- Algorithmics MIPS evaluation boards
- IBM's 405GP Reference Board
- FIC8234 VME processor board
- NetBSD/x86_64: a port for AMD's upcoming line of 64-bit CPUs

With these ports, the overall number of supported platforms rose above forty, with 16 different CPU architectures supported. See the ports page for all the details.

The most notable omission in the platforms supported by NetBSD is the HP Precision Architecture (HP-PA) family. If anyone wants to do work on this, don't hesitate to start discussion on the port-hp700 mailing list.

* People

Of course, all the achievements of the NetBSD project as the world's most portable operating system wouldn't be possible without the people devoting their time to it. A great MANY THANKS goes out to all NetBSD developers and supporters!

In 2001, the NetBSD Project got many new developers doing work in various areas:

- 16 developers joined kernel development with various points of focus, including device drivers, console drivers, compat systems for Linux, Irix and MS Windows as well as to port NetBSD to new platforms.
- 11 developers joined the pkgsrc crew, doing work on the NetBSD Packages Collection and the NetBSD Packages System.
- 6 developers joined our team to work in the documentation area, writing and maintaining the NetBSD web site, working on translations as well as answering user questions coming in from various mailing lists and to www@netbsd.org.
- 2 developers joined in to help with administrative tasks, managing the NetBSD projects machines as well as doing user management.
- 2 developers came aboard to do various bugfixing tasks all over the source tree, including userlevel and kernel areas.

At the end of 2001, the NetBSD project had about 250 active developers that work on various parts of the source tree and related areas.

One fact that should be mentioned here is something that should need no mentioning, but I still feel like telling about it. With all of the emancipation going on in the world, women are still a scarce species in technical areas, and we are very proud to welcome our first two female developers. Tracy Di Marco White will help us out with user account management and general system administration tasks on all the NetBSD machines, while Maria Zevenhoven will take special care of the NetBSD project's CVS server. Welcome on board, ladies!

And if you want to know where all the NetBSD developers are located, in case you want to drop off some pizza, there is now an official map of all developers available from the NetBSD project's web server!

* Products

Creating an Open Source operating system is a lot of fun, but that's not all there is to it! There are a number of very serious applications, especially as NetBSD fills some niches that make it really unique throughout the world, thanks to its wide platform support, clean design and maturity. In 2001, quite a number of manufacturers have shown their confidence by choosing NetBSD as an operating system for which they either offered a software product, used it to drive their hardware, or just offer some devotionalia to increase the publicity of the NetBSD project's operating system.

Here's an attempt to compile a list of various such products!

- Modules to run the Linux version of VMware on NetBSD, by Wasabi Systems
- RTLinux support for NetBSD
- Plat'Home Co., LTD. 's OpenBlockS
- IPSiO - 250-MHz 64bit RISC RM7000 based "network color copier/printer/fax"
- NetBSD-based wireless router/gateway by ROOT Inc.

- NetBSD based routers by Dynarc
- SEIL-T1 - a lightweight router for T1 connection
- BCM1250 Integrated 64-bit MIPS Multi-Processor Evaluation Board
- Perforce - Fast Software Configuration Management (SCM) system
- Vestris Inc.'s Alkaline Internet / Intranet search engine software
- Turbocat Development's TCWebMail web based email application
- BSD Mall - NetBSD "Why Not" T-Shirt
- The NetBSD Mission - "Iwo Daemons" T-Shirt
- NetBSD 1.5 available through Compat Test Drive Program

For more details see the following entries in the NetBSD gallery:

- Commercial Software for NetBSD
- Hardware designed for and with NetBSD
- Products based on NetBSD
- NetBSD Devotionalia

* Phunny tech stuff

After NetBSD 1.5 was released in December 2000, there was no new major release in 2001. Besides the maintenance releases that happened in 2001 and that we will talk about later, there were many things that happened on the NetBSD-current development branch and that will be major new features in the next major release of NetBSD. Here are a few highlights!

- A number of the m68k based ports were switched to using ELF as the native execution format. This will mean some interesting upgrade procedures for the next major release, but previous experiences from the i386 and sparc port have shown that this isn't all that difficult to do correctly. With ELF in place, using the FSF based toolchain is possible without the need to maintain local patches to compiler, linker etc., resulting in more time for our developers to concentrate on other areas.
- The I4B ISDN subsystem was integrated into NetBSD
- UVM and the unified buffer cache system (UBC, not part of any NetBSD release yet) got quite some tuning for optimized memory usage-balance. See the news entries on UVM, balancing memory usage of UBC as well as some UVM related sysctls.
- The alpha and vax port support SMP now. The code is included in NetBSD-current and will be part of the next major release.
- The SCSI/ATAPI mid-layer (SCSIPI) that manages communication between high-level drivers for SCSI disks etc. and host bus adapter drivers was completely rewritten and replaced with the "SCSIPI" system that allows better reporting of errors and also supports SCSI emulation for ATAPI devices, which allows using the same userland programs to talk to a ATAPI/IDE CDROM as a SCSI CDROM (cdrecord, ...).
- Emmanuel Dreyfus wrote an excellent series of article about implementation of Linux binary compatibility for NetBSD/powerpc. The articles can be read at O'Reilly's OnLAMP site.
- In the networking area, news include support for various Gigabit Ethernet drivers, in-kernel support for PPPoE as well as hardware checksumming of TCP/IP packets.
- A new pipe implementation was committed, replacing the old code for better performance
- File system changes include the so-called "dirpref" code that speeds up creating/deleting of files

and many other changes
- USB v2.0 support was added
- Initial IrDA support was committed
- Massive work on a new build system for crosscompiling of the whole system added, also for non-NetBSD host systems; still under development!
- During the last few weeks of the year, lots of activity was happening on Nathan William's branch for Scheduler Activations. This code will implement userland threads as well as a sophisticated system mapping between kernel and userland threads.

The above list is by no means exhaustive! For a list of major changes, see the "NetBSD Changes" web page, more details about changes can be found in the doc/CHANGES file as well as in the source-changes mailing list archive.

* Packages

One of the working areas in the NetBSD project is the collection of 3rd party programs, AKA the NetBSD Packages Collection AKA pkgsrc. Currently it consists of 2638 applications, ranging from small tools over web browsers to full-blown desktop systems like KDE and GNOME. There are currently about 22 developers working on maintaining the NetBSD Packages Collection as well as the NetBSD Packages System that allows installing these programs either from source or from precompiled binary packages.

Besides the continous growth of the Packages Collection, some of the hilights that were implemented last year include:

- buildlink: with the help of buildlink.mk files, packages that depend on other packages can now make easier use of these. Paths for includes, libraries, etc. are merged in automatically. See pkgsrc/Packages.txt #8 for more details.
- The pkgsrc per-packet directory layout was changed to remove the "pkg" subdirectory, allowing a faster updating of the tree with CVS, and also faster extraction of pkgsrc.tar.gz.
- Binary packages can now have digital signatures
- pkgsrc now works on Apple's Darwin (MacOS X) too. Adding to Linux, Solaris and HP/UX, this allows NetBSD's Packages Collection to be used on five different operating systems now.

Again, this list is by no means exhaustive! See Al's monthly "Changes to the NetBSD Packages Collection" status reports in the netbsd-announce list archive, as well as the doc/pkg-CHANGES file.

* Project events

After the many technical changes and details, there were a few other events that were interesting for the NetBSD project in 2001 too.

After NetBSD 1.5 was released in December 2000, a 2-CD-set of precompiled binaries for 1.5/i386 was released on ftp.netbsd.org in February. Even before the set was announced (to give our mirrors some time to catch up!) it got ftp.netbsd.org some 40 concurrent downloads of the images only. After the announcement it went as high as 150 concurrent downloads; again, of the two images only - there were

50-100 other downloads taking place at the same time. One week after the images were uploaded, we had a total of more than 330 downloads.

In July, NetBSD 1.5.1 was released as the first maintenance update to NetBSD 1.5, including many bugfixes and minor improvements over the previous release.

Almost identical with NetBSD 1.5.1, an updated 1.5.1/i386 set of precompiled binary packages was released. As this was taken from the latest pkgsrc, there were three CD images available now. The images are sold by a number of companies such as Wasabi Systems. Thanks to some disk-shuffling and hardware-upgrade of ftp.netbsd.org, the machine did take the release of these CDs a bit better. No numbers, though. ;)

After the success of NetBSD 1.5.1, another maintenance release was done with NetBSD 1.5.2 in September 2001. Again, it consisted mostly of bugfixes to the previous release, and is the latest release of NetBSD so far.

It is likely that there will be a NetBSD 1.5.3 in early 2002. Everyone who wants to have a look at what it will be like can check out the work-in-progress that has all the changes beyond NetBSD 1.5.2 from the "netbsd-1-5" branch.

Speaking about branches, since April 2001 we now have some documentation about the various branches that exist in the NetBSD source tree. Check it out if you're confused or want to know about development not even available on the main (development) branch, NetBSD-current.

Another change that helps in navigating the NetBSD source tree consists of a change that was made in June to the source-changes mails that document every change to the NetBSD CVS repository. As of then, the Subject: lines of the commit log mails now contain more information. Not only do they tell which branch a commit went to, but it now also contains the path of the file(s) that were modified, making it easier to identify changes to various parts of the source tree by a single look at the mailfolder's Subject: list.

Last but not least, there were not only user-visible changes affecting the NetBSD documentation and mailing lists, but the NetBSD project itself was also present on a list of roadshows and exhibitions. Among them:

- Comdex Spring
- USENIX Annual Technical Conference 2001
- LinuxWorld Expo 2001
- BSDcon Europe 2001
- RISC OS 2001 Show
- NetWorld+Interop Tokyo

For a full list of all past, present and future events regarding NetBSD, see our events page!

* Outro

That's enough about 2001. It was a year with many ups and downs, and we can now look forward to another exciting year in Open Source operating systems' history, of course with NetBSD. :-)

Things to look out for include a new major release soon, which will include many of the goodies described above. Furthermore, a native Java implementation may finally show up, there will be some updates on the status of the NetBSD Foundation, and there are many many other features that can still be added to NetBSD. Let's see what time will bring.

Happy New Year!
