

BSD Unix – An Introduction

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BSD – A brief history... (1)

- In the early-mid 1970s, there really was “One Unix” - from Bell Labs (later part of AT&T)
- Unix primarily a research tool
- Source code licenses available and purchased by several universities in the US
- University of California at Berkeley (UCB) purchased a Unix license in 1974, along with a PDP-11



BSD – A brief history... (2)

- By the late 1970s, UCB started making enhancements to AT&T Unix
- In late 1977, Bill Joy sent out the first tapes of enhancements to 6th Edition Unix – 1BSD, First Berkeley Software Distribution
- Later releases included 2BSD, 3BSD and 4BSD into the early 1980s
- Features added include curses, ex and vi, csh, virtual memory, the Fast File System, TCP/IP



BSD – A brief history... (3)

- In 1989, the Net/1 release was made, under the permissive 4-clause BSD license
 - AT&T source code license not required
 - Not a complete operating system, however
- Keith Bostic decided to rewrite and replace any AT&T-copyright code, leading to the Net/2 release in 1991
- Net/2 was almost a complete OS, barring several encumbered files copyrighted by AT&T



BSD – A brief history... (4)

- Net/2 led to two ports to the Intel 80386:
 - William and Lynne Jolitz's open source 386BSD (detailed in DDJ in 1991 and 1992)
 - Commercial BSD/386 (later BSD/OS) by BSDi
- AT&T's Unix System Laboratories (USL), however, were not happy with Net/2, and sued the CSRG, claiming copyright infringement



BSD – A brief history... (5)

- 386BSD development slowed, leading to various patchsets
- Patchsets grew and grew until two projects forked from 386BSD in 1993:
 - NetBSD, formed by Chris Dimetriou, Charles Hannum, Adam Glass and Theo de Raadt
 - FreeBSD



BSD – A brief history... (6)

- USL Lawsuit later settled in 1994, and 4.4BSD-lite2 in 1995 became the last release from the CSRG at Berkeley
- BSD continued, however:
 - Commercial
 - SunOS (until 4.1.4), Ultrix, OSF/1, Tru64 and NeXTStep amongst others were all BSD-based
 - SVR4 incorporated many BSD APIs
 - Open source
 - NetBSD
 - Focus on portability, clean design
 - FreeBSD
 - Focus on performance, initially i386 only



BSD Today (1)

- Five main derivatives:
 - FreeBSD
 - Focused on being a high performance (scalability, fine-grained locking, etc), general purpose operating system
 - Modular kernel
 - Available for a limited number of platforms: i386, amd64, sparc64, ppc, alpha, ia64
 - NetBSD
 - "*Of course it runs NetBSD*" - focused on portability, support for architectures that no-one else cares about (or even knows exist)
 - Available for every platform under the sun, and then some...



BSD Today (2)

- OpenBSD

- Forked from NetBSD in 1995 by Theo de Raadt
- Focus on security, correctness and being as free as possible
- Developed OpenSSH, pf, OpenBGPD, OpenNTPD, OpenCVS, etc as replacements for their non-free or GPL counterparts
- Extreme approach to binary-only drivers and NDAs

- Dragonfly BSD

- Forked from FreeBSD 4.8 in 2003 by Matt Dillon
- Different approach to SMP, compared to FreeBSD 5 and later – has adopted microkernel-like design, with message passing



BSD Today (3)

- Darwin
 - Based on a Mach microkernel, but with a mix of NeXT and FreeBSD/NetBSD userlands
 - Underlying operating system of Mac OS X
- A few other stragglers:
 - 2.11BSD (last [16-bit!] PDP-11 release) still community-supported
 - Quasijarus
 - Continued maintenance of 4.3BSD on selected VAX hardware (with Tahoe support removed)
 - Lots of other special-purpose variants (PicoBSD, PC-BSD, etc)



BSD Today (4)

- However, much sharing of code between the different operating systems
 - For example, NetBSD rc system adopted by FreeBSD
 - Similar package management tools (ports and pkgsrc)



Licensing

- BSD systems are typically licensed under the 3 cloused “modified” BSD license
- This basically allows users to do anything with the source code, enforced contribution to the community not enforced (unlike the GPL)
- Different approaches to binary-only drivers – from FreeBSD at one to OpenBSD at the other



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BSD vs Linux (1)

- *BSD is a complete operating system, Linux a kernel only
- *BSDs have a more permissive license, Linux a more contributory license
- Different versioning schemes (-STABLE, -CURRENT, etc branches for *BSD)



BSD vs Linux (2)

- Most open source software available for *BSD (all the familiar applications – X11, GNOME, KDE, OpenOffice, Firefox, Thunderbird, etc)
- Still, UNIX is UNIX...



System Demo

- Installation of NetBSD onto a Sun Ultra 5
- Installing 3rd-party software with pkgsrc



Questions?

