25 Years of FreeBSD

DEB GOODKIN – EXECUTIVE DIRECTOR
Who Am I?

- Joined FreeBSD Foundation in August, 2005

- Technical background – 20 years in storage development as firmware engineer, logic designer, applications engineer, technical marketing and technical sales

- Growing my FreeBSD skills so I can teach others how to use FreeBSD
Goals

- Share FreeBSD’s long history

- Why people use FreeBSD

- Why you should use and/or contribute to FreeBSD!
The FreeBSD World

FreeBSD is an open source Unix-like operating system descended from the Unix developed at the University of California, Berkeley in the 1970s.

The FreeBSD Project is an active open source community since 1993 with hundreds of committers and thousands of contributors around the world.

The FreeBSD Foundation is a non-profit organization registered in Colorado, USA in 2000 dedicated to supporting the FreeBSD Project, its development and its community.
What is FreeBSD?

It’s not a Linux Distribution!

One of the oldest (1993), largest, and most successful open source projects in the world

Complete operating system including kernel, userland, documentation, and tools

Over 30,000 3rd Party Open Source Packages
What is FreeBSD?

Created and distributed by a community of highly technical and committed contributors (Over 400 active developers and thousands of contributors)

Works on Intel / AMD x86 32 and 64bit, 32 and 64 bit ARM, RISC-V, PowerPC, Sparc64, MIPS, AWS, Azure, GCP, …

10s of millions of deployed systems
History of FreeBSD

1969
Unics for Uniplexed Information and Computing Service Created

1972
Unix Code Migrates to C programming language

1974
Unix Brought to the UC Berkeley

1977
Berkeley Software Distribution (1BSD) created based off of UNIX

1979
Second Berkeley Software Distribution (2BSD) released

1986
4.3BSD released

1988
4.3BSD-Tahoe port released

1992
386/BSD released

1976
Unix Research Systems continue development

1976
Unix Time Sharing System V6 Released
1992
386/BSD released

1992
Lawsuit brought against BSDI by USL

1993
FreeBSD branches off from 386/BSD

1993
First version of FreeBSD released

1993
NetBSD Branches off from 386/BSD

1994
Both sides of the lawsuit settle

1995
OpenBSD splits from NetBSD

1995
FreeBSD 2.1.5 released
1994
FreeBSD ports begin appearing

1995
FreeBSD 2.1.5 released

1999
FreeBSD jails are introduced

2005
jemalloc came into use as the FreeBSD libc allocator

2008
Z File System (ZFS) introduced

2008
Substantial port of Dtrace added to FreeBSD

2009
Clang/LLVM introduced

2010
Capiscum capability-based security added

2012
Capability Hardware Enhanced RISC Instructions (CHERI) implemented

World-leading networking performance
1969

UNIX

Before Bell Labs left the Multics project, Dennis Ritchie and Ken Thompson got a taste of what Multics could be capable of. They secured funding from the Bell Labs Legal department to purchase a more powerful PDP-11/20 machine. In 1969 Ken Thompson, Dennis Ritchie and others started working on a new program that utilized the full capabilities of the more powerful computer. This program was called Unics (Uniplexed Information and Computing Service).
1974

**UNIX BROUGHT TO UC BERKELEY**

In 1974, Professor Bob Fabry of the University of California, Berkeley, acquired a UNIX source license from AT&T. Bob Fabry had previously seen UNIX 4 at the ACM Symposium (Association for Computing Machinery) on Operating System Principles in 1973 and was interested in bringing it to the University. The Computer Systems Research Group started to modify and improve AT&T Research Unix. They called this modified version “Berkeley Unix” or “BSD.”
1991 – 1992

386BSD AND NET/2

Keith Bostic started a project to reimplement most of the standard Unix utilities without using the AT&T code. The result was the release of Networking Release 2 (Net/2), a nearly complete operating system that was freely distributable. Net/2 was the basis for two separate ports of BSD to the Intel 80386 architecture: the free 386BSD by William Jolitz and the proprietary BSD/386 (later renamed BSD/OS) by Berkeley Software Design (BSDi). 386BSD itself was short-lived, but became the initial code base of the NetBSD and FreeBSD projects that were started shortly thereafter.
JUNE 1993
FREEBSD CREATED

The development flow of 386BSD was slow and after a period of neglect, a group of 386BSD users decided to branch out on their own and create FreeBSD so that they could keep the operating system up to date. On 19 June 1993, the name FreeBSD was chosen for the project. The first version of FreeBSD was released on November 1993.
AUGUST 1994

FREEBSD PORTS

The FreeBSD Ports and Packages Collection offers a simple way for users and administrators to install applications. The ports collection now offers over 34,000 ports, they started appearing in 1994 after Jordan Hubbard committed 'port make macros' to the FreeBSD CVS repository to compliment his package install suite "Makefile".
FREEBSD JAILS

FreeBSD Jails were released with FreeBSD 4.X in early 2000. The jail mechanism is an implementation of operating system-level virtualization which allows system administrators to partition a FreeBSD system into several independent minijails or "jails". This gave sys admins much more power to secure and optimize their FreeBSD systems.
2012

**CHERI**

In 2012, the University of Cambridge started developing Capability Hardware Enhanced RISC Instructions (CHERI), an outgrowth based off of the earlier Capsicum project. CHERI transposes the Capsicum hybrid capability model into the CPU architecture space, allowing fine-grained compartmentalisation within process address spaces – while continuing to support current software designs.
Who Uses FreeBSD
Most Likely You Use FreeBSD!

- iPhone or Apple computer
- Streaming Netflix
- Messaging someone over Facebook’s WhatsApp application
- Sony PlayStation 4
- FlightAware
Why Use FreeBSD?

• Friendly and Approachable Community

• Excellent Documentation

• Good Tooling and Modern Compilers

• Consistent Development and Release Processes

• Wide Variety of Architectures Supported

• Secure

• It’s the cool operating system to use! (Heard from many students)
Why Companies Use FreeBSD?

- History of innovation
- Great tools
- ABI stability within major releases
- Mature release model
- Excellent documentation
- Business Friendly License
- ZFS
- Open Community
How the Project Works

Independent of the FreeBSD Foundation

Developer Elected Core Team

Mentorship for Commit Bit

Functional Teams (core, release engineering, security, ports, documentation, …)

Collaborative Development Environment
FreeBSD core team

Historically “key” developers but now…

…9-member elected management body
• Votes and candidates from the full set of active committers
• Co-opted non-voting core team secretary

Responsibilities
• Administrative (commit bits, hats, team charters)
• Strategic (project direction, coordination, cajoling)
• Rules, conflict resolution, enforcement

We have no “benevolent” dictators for life!
Who are the FreeBSD committers

Locations
- 34 countries
- 6 continents

Ages
- Oldest (documented) committer born in 1948
- Youngest (documented) committer born in 1997
- Average age 39.5
- Data from circa Nov 2017
Applications

Netflix – High performance content delivery

Sony Playstation 4 - Embedded

NetApp ONTAP – FreeBSD based enterprise storage

Groupon and WhatsApp - Datacenter applications

Apple - Uses large portions of FreeBSD in their Mac OS and iOS

Citrix Netscaler

Microsoft – Supports FreeBSD in the cloud environment
Where FreeBSD Stands Out

Embedded Systems
Video CDN/Streaming
Security
Research
Cloud and Virtualization
Storage
Networking
High Performance
Data Centers
Servers
Co-Location Facilities
The FreeBSD Foundation

Founded in March 2000

501(c)3 (non-profit public charity)

Based in Boulder, Colorado

100% Funded by donations
Why Get Involved in FreeBSD?

Gain marketable skills like:
Communication – How to ask questions – Distributed team
Collaboration
Tools – Repositories, bug reporting, IRC, …
Best Practices
Technologies – Operating Systems, File Systems, Networking, Storage
Why Get Involved in FreeBSD?

• Be part of an inclusive and welcoming community
• Learning opportunities from experts
• Opportunities to work in areas you’re interested in
• Resume building - highlight skills in public forum
• Have fun working with like minded individuals
• Learn from reading real operating system code!
How You Can Contribute To FreeBSD

Get Involved Today!

Report or fix a bug

Documentation - improve, translate, fix documentation

Write about FreeBSD in a blog post, article, on social media

Educate people about FreeBSD – run a meetup!

Get Involved Today!
Resources

Getting Started with FreeBSD:
As part of the FreeBSD Foundation’s education initiative, we’ve worked with community members and new recruits to develop guides that make getting started with FreeBSD a straightforward process. For an overview, see our FreeBSD Quickstart Guide. Stay tuned for more how-tos as they become available.

FreeBSD Installation Guides:
- Installing FreeBSD with VirtualBox (Mac/Windows)
- Installing a Desktop Environment on FreeBSD
- Installing FreeBSD for Raspberry Pi
- Installing PC-BSD as a Primary Operating System

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