Building and Running
an Open-Source Community:
The FreeBSD Project

Marshall Kirk McKusick
mckusick@mckusick.com
http://www.mckusick.com

Johns Hopkins University
Baltimore, Maryland

October 28, 2008

Introduction to FreeBSD

- Open-source operating system derived from 4.4BSD–Lite released in 1994 by The University of California at Berkeley

- One of very few open-source projects still active after more than 10 years

- Provides core Internet support:

  - Root name servers

  - Major web hosts and search engines

  - Routing infrastructure

  - Foundation for major commercial operating systems

Users of FreeBSD

- ISP server platform
  - Yahoo
  - Vario
  - Internet Software Consortium

- Appliance/embedded OS
  - Juniper Networks
  - Network Appliance
  - Nokia
  - Panasas

- Operating system core
  - Apple's Darwin, base operating system of Mac OS X
  - WindRiver's VXWorks networking stack

CSRG at Berkeley

- BSD started at University of California at Berkeley in 1977

- Coordinated by the Computer Systems Research Group (CSRG)

- Core of CSRG was four people

- In 1970's contributions came via tape or email

- In the early 1980's

  - Started using SCCS (source code control system)

  - Came up on the ARPAnet (which later became the Internet)

External Contributors to CSRG

- Give accounts on CSRG machines to 10 other trusted people who could log on and update sources

- CSRG staff used SCCS to track changes and verify them before doing distributions

- This structure formed the basis for the current BSD-based projects.

FreeBSD Project Structure

- Central source code repository (using Subversion)

- Subversion feeds to CVS which is mirrored on over 40 sites worldwide

- Anyone may anonymously download CVS tree

- Only committers can update Subversion on central site

- Core system is composed of 100 libraries and 775 utilities plus the symetric-multithreaded kernel that runs on Intel/AMD 32/64-bit, ARM, MIPS, PowerPC, Sparc, and other processors

- All other software is maintained in the ports collection which currently has over 18,000 packages

Releases

- Development on main trunk (−current)

- Stable releases on branches (−stable), currently 7.2

- Important bug fixes in −current are merged into −stable branches

current

7−stable

6−stable

5−stable

7.0 7.1 7.2

6.0 6.1 6.3 6.4 ...

5.0 5.1 5.4 5.5 ...
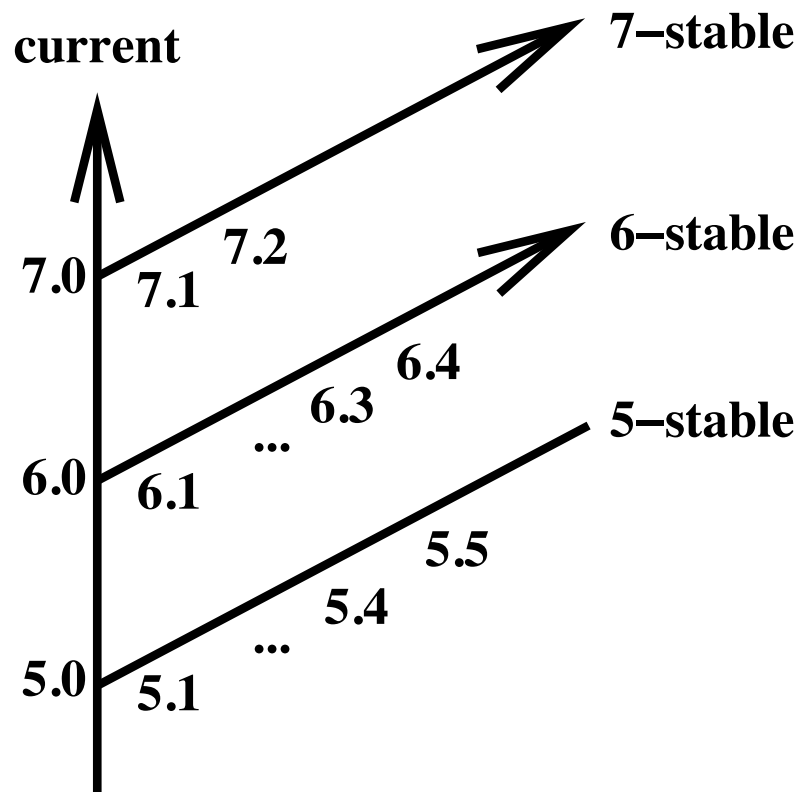
Release Engineering

- Major release approximately every two to three years

- Minor release approximately every four to six months

- Anyone can download and update to −stable at any time

- Approximately one month freeze on changes for the major release cutover

- Approximately one week freeze on changes for the minor release cutover

The FreeBSD Community

Volunteers

- Only do what they want to do

- Lowest priority (after work, family, recreation)

- No schedule

- Transient

Goals

- Self-organizing (no paid staff or managers)

- Egalitarian and merit-based advancement

- Anticipate turnover and manage it gracefully

Organization

Users (millions)

- Send and receive feedback for bugs and mailing lists

Developers (6000+)

- Read access to source code and CVS logs

- Submit changes through committers

Organization (continued)

Committers (350)

- Most are authorized to commit changes to specific ports for which they agree to assume responsibility

- All changes require review by at least one other committer

- All commit changes are mailed to all committers

- Gateway to feed in developers changes

- Nominate developers to become committers

- Mentor new committers

- Automatic suspension of commit privileges after one year of non-use

- Mean age 32, median age 30, youngest 17, oldest 58, most 25-40

Organization (continued)

Core (9)

- Nominated from and elected by committers every two years

- Maintain FreeBSD roadmap

- Resolve differences between committers

- Admit / remove committers

Types of Contributors

Coding

- Port maintainers

- Utility maintainers

- Kernel maintainers

Documentation group

Quality assurance

Release engineers

System administrators

Advocacy and marketing group

Funding

- The FreeBSD Foundation

- Created as a charitable organization (allows individuals and companies a tax deduction for cash or hardware contributions)

- Funds used to support infrastructure work that no one is willing to do for free

Licensing

- Traditional Copyright

    Often source is not available, or is only available in very restricted ways.

- GNU "Copyleft"

    With GPL 2, must make source available including any of your own work. With GPL 3, source and free use of any patents you own must be provided.

- Berkeley "Copycenter"

    Source and patent rights may or may not be provided.

Questions

FreeBSD home

http://www.freebsd.org

FreeBSD Foundation

http://www.freebsdfoundation.org/

Marshall Kirk McKusick

mckusick@mckusick.com

http://www.mckusick.com

The End

May the Source Be With You!