How the FreeBSD Project Works

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FreeBSD Project
FreeBSD Foundation

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Introduction

- What is FreeBSD?
- What is the FreeBSD Project?
- How does the FreeBSD Project work?
- And does it all depend on who you ask?
  - Caveat: kernel developer!
Introduction to FreeBSD

- Open source BSD UNIX-derived OS
- ISP server network server platform
  - Yahoo!, Verio, NY Internet, ISC, ...
- Appliance/product/embedded OS foundation
  - Juniper JunOS, Nokia, Panasas, Timing Solutions,...
  - VXWorks, Mac OS X, ...
- One of most successful open source projects
- Focus on storage, networking, security
Introduction to FreeBSD (cont)

• Active development community
  – Central source repository and revision control
  – Extensive online community
  – Over 300 active developers

• Liberal Berkeley Open Source License
  – Designed to maximize commercial reuse
  – No requirement that derived works be open source
  – Extensive use in commercial, research systems
What do you get with FreeBSD?

- Complete, integrated UNIX system
  - Multi-processing, multi-threaded kernel
    - Intel/AMD 32/64-bit, Itanium, alpha, sparc64, ARM, PPC
  - UNIX, POSIX, BSD APIs
  - Multi-protocol network stack
    - IPv4, IPv6, IPX/SPX, AppleTalk, IPSEC, ATM, BlueTooth, 802.11, ...
  - Standard and embedded build/integration targets
  - Extensive documentation
- Over 13,000 third party software packages
FreeBSD Releases

• Three active development branches in CVS
  – 4.x – Legacy release series
  – 5.x – Large scale feature expansion
  – 6.x – Refinement of 5.x feature platform

• Most recent release FreeBSD 6.1, 7 May 2006

• FreeBSD 5.5 due out RSN

• http://www.FreeBSD.org/
  – Or buy CDs/DVDs from a number of vendors
Development Branches

- Simultaneous parallel development
- Related but non-identical source bases
- Branching creates a new working branch
- Merging brings changes from one branch to another
The FreeBSD Project

• One of the most successful open source projects in the world

• Can't throw a stone without hitting FreeBSD
  – Root name servers
  – Major web hosts, search engines
  – Routing infrastructure
  – Foundation for major commercial operating systems
  – And much more...

• But the FreeBSD Project is more than software
What the Project Is Depends on Who You Ask

- FreeBSD Core Team Member
- FreeBSD src Developer
- FreeBSD portmgr Member
- FreeBSD Documentation Team Member
- FreeBSD User
- My wife
FreeBSD Project

• Global community of developers and users
  – FreeBSD.org web site, mailing lists
  – How many people?

• Developer community
  – Core team
  – Committers
  – Ports maintainers
  – Contributors

• User communities
FreeBSD Foundation

• Non-profit organization based in Boulder, CO
• Sponsored development
  – Intellectual property, contracts, licensing, legal
  – Fund-raising
  – Event sponsorship (BSDCan!)
  – Hardware purchase
  – Collaborative R&D agreements
• Learn more at our booth
  – Consider a donation today!
What the Project Produces

- FreeBSD kernel
- FreeBSD user space
- FreeBSD ports collection, package builds
- FreeBSD releases
- FreeBSD handbook
- FreeBSD web pages
- FreeBSD marketing material
- Technical support, debugging, etc.
Things We Consume

- Beer, Soda, Chocolate, and other vices
- Donated and sponsored hardware
  - Especially in racks
- Bandwidth in vast quantities
- Travel grants
- Salaries, contracts, grants
- Thanks and other appreciations
- More bandwidth
Who are the Developers?

- **Locations**
  - 34 countries
  - 6 continents

- **Ages**
  - Oldest (documented) committer born 1948
  - Youngest (documented) committer born 1989
  - Mean age 32, median age 30, stddev 7.2

- **Students, hobbyists, systems programmers, consultants, contractors, professors, ...**
FreeBSD Processes

- Committer life cycle and commit bits
- Core Team
- Mailing Lists
- Web pages
- Groups/Projects
- Events
- Development Cycle

- Release Cycle
- CVS and Perforce
- Clusters
- Conflict resolution
How People Become Committers

- Committer is someone with CVS commit rights
- Generally a property of having made themselves excessively obvious
  - Significant source code contribution
  - Long term commitment to the project
  - Vendor relationships
- Key concept: mentor
  - Mentor proposes to core@ (portmgr@, doceng@)
  - Will guide through first few months of committing
Number of Commit Bits by Type

- src: 233
- doc: 95
- ports: 202
Distribution of Commit Bits

346 Total Committers

- src (125)
- src-doc (13)
- src-ports (47)
- ports (85)
- doc-ports (22)
- src-doc-ports (31)

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FreeBSD Core Team

• 9-member elected management body
  – Votes and candidates from the full set of active FreeBSD committers
  – Core secretary

• Responsibilities
  – Approving/delegating approval for new commit bits
  – “Project direction”, making decisions where needed
  – Rules, conflict resolution, enforcement
  – Other stuff
Ports Committers, Maintainers

- Slightly stale data, of course...
  - 185 ports committers
  - 1,510 ports maintainers
  - 13,483 ports

- Averages
  - 73 ports/committer
  - 9 ports/maintainer
  - 8 maintainers/committer
Groups and Projects

- Source Developers
- Core Team
- Core Team Secretary
- Release Engineering Team
- Release Engineering Build Teams
- Security Officer
- Security Team
- Donations Team
- Marketing Team
- Perforce Admins
- CVS Admins
- Postmaster
- Foundation Board of Directors
- Foundation Operations Manager
- Doceng Team
- Documentation Team
- Ports Team
- Port Managers
- FreeBSD.org admins@
- FreeBSD.org webmaster
- Sentex cluster admins
- ISC cluster admins
- Vendor Relations Team
- Mirrors Team

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Wait, I'm Not Done Yet!

- CVSUP Team
- Perforce Contributors
- Questions Subscribers
- FreeBSD GNOME Project
- FreeBSD KDE Project
- Mono on FreeBSD
- OpenOffice.org on FreeBSD
- BSDCan
- EuroBSDCon
- AsiaBSDCon
- KAME Project
- Netperf Project
- TrustedBSD Project
- Stress Testing
- FreeBSD Tinderbox
- FreeBSD Standards
- Java Team
- SoC Mentors
- Monthly Status Reports
- Coverity Team

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Mailing Lists

- Over 40 active mailing lists
- Mostly public
  - Some exceptions (core, re, so, portmgr, ...)
- Organized loosely by topic
  - -announce, -current, -arch, cvs-all, -security, ...
  - -chat, -hackers, -questions...
- Place where vast majority of FreeBSD discussion and planning takes place
  - Both developer and user
FreeBSD Project Web Pages
(Just a few)
Events

• Conferences
  – USENIX ATC
  – BSDCan
  – BSDCon (sometimes)
  – EuroBSDCon
  – AsiaBSDCon

• Developer Summits
  – Two day events associated with conferences
A Few Highlights
Developer Summit, May 2006

- Network stack virtualization
- Xen, Sun4v
- SCTP
- FreeBSD on 32-processor systems
- Multi-threaded, multi-processor network stack performance

- FreeBSD/embedded
- FreeBSD 802.11
- Ports
- TrustedBSD
FreeBSD Development Cycle

• Branched development model
  – 7-CURRENT – Cutting edge development
  – 6-STABLE – Active development with releases
  – 5-STABLE – Legacy branch with releases
  – 4-STABLE – Legacy branch

• Goal
  – 18 month major “dot zero” releases (6.0, 7.0, …)
  – 4-6 month minor “dot” releases (6.1, 6.2, …)
FreeBSD Release cycle

- Open development
- Release cycle
  - Code slush
  - Code freeze
    - Beta series, and branching
    - Release candidate series
    - Releases
  - Errata/Security advisories
- Repeat
CVS

• Primary revision control system
  – Almost all project activity is in CVS
  – 10+ year revision history
  – Technical limitations becoming more apparent

• repoman.FreeBSD.org
  – /home/ncvs – FreeBSD src cvs
  – /home/pcvs – FreeBSD ports cvs
  – /home/projlcvs – FreeBSD project cvs
  – /home/dcvs – FreeBSD documentation cvs
Perforce

• Secondary revision control system
  – Supports heavily branched development
  – FreeBSD developers
  – Guest accounts and project accounts

• Active project include
  – SMPng, TrustedBSD Audit, TrustedBSD MAC
  – TrustedBSD SEBSD, Alan Cox Superpages, uart
  – ARM, Summer of Code, dtrace, Xen, Sun4v
  – GEOM (gjournal, etc), CAM locking, netperf, ...
FreeBSD.org Cluster

- Hosted at Yahoo!
  - Mail servers (hub, mx1, mx2)
  - Distribution (ftp-master, www)
  - Shell access (freefall, builder)
  - Revision control (repoman, spit, ncvsup)
  - Ports cluster (pointyhat, gohans)
  - Test systems (sledge, ref4, pluto2, pluto1, panther, beast)
  - Name server (ns0)
Other Clusters

- Korean Ports Cluster
- RTP Cluster
  - Security officer, release engineering
- Sentex Cluster
  - Network and SMP performance work
- ISC Cluster
  - ftp.freebsd.org, Coverity, test systems
Conflict Resolution

• Developers generally characterized by:
  – Independence
  – Cooperation
  – Common sense

• Facilitated by intentional avoidance of overlap

• Strong technical disagreements, personality conflicts, etc, do occur

• When they get out of hand, generally mediated by a member of core
What Is a Bikeshed, Anyway?

- A very special kind of conflict
- Not specific to FreeBSD, but one of our favorites
- Strong opinions easier to have on unimportant details
Conclusion

• FreeBSD Project one of the largest, oldest, and most successful open source projects
  – Hundreds of committers, thousands of contributors
  – Millions of lines of code
  – Tens of millions of deployed systems
• Highly successful community model makes this possible
• Join this community!