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, sparc64, ARM, PPC
  – UNIX, POSIX, BSD programming interfaces
  – Multi-protocol network stack
    • IPv4, IPv6, IPX/SPX, AppleTalk, IPSEC, ATM, Bluetooth, 802.11, SCTP, ...
  – Standard and embedded build/integration targets
  – Extensive documentation

• Over 16,000 third party software packages
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 Users
FreeBSD Project

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

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

• User communities
  – Some more or less involved in global community
FreeBSD Foundation

- Non-profit organization based in Boulder, CO
- Sponsored development
  - Intellectual property, contracts, licensing, legal
  - Developer travel grants
  - Event sponsorship (EuroBSDCon!)
  - Hardware purchase
  - Collaborative R&D agreements
- Support the FreeBSD Project – consider a donation today!
What the Project Produces

- FreeBSD kernel, user space
- Security officer, release engineering
- FreeBSD ports collection, binary packages
- FreeBSD releases
- FreeBSD manual, handbook, web pages, marketing material
- Technical support, debugging, etc.
- A variety of user/community events
Things We Consume

- Beer, soda, chocolate, and other vices
- Donated and sponsored hardware
  - Especially in racks, with hands
- Bandwidth in vast and untold quantities
- Travel grants, salaries, contracts, grants
- Thanks, user testimonials, appreciation, good press
- Yet more bandwidth
Who are the Developers? (May 2006)

• 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

• Professional programmers, hobbyists, consultants, university professors, students ...
FreeBSD Processes

- Committer life cycle and commit bits
- Core Team
- Mailing Lists
- Web pages, documentation
- Groups/projects
- Derived projects

- Events
- Development cycle
- Release Cycle
- CVS and Perforce
- Clusters
- Conflict resolution
FreeBSD Committers

- Committer is someone with CVS commit rights
- Selected based on key characteristics
  - Technical expertise
  - History of contribution to the FreeBSD Project
  - Ability to work well in the community
  - Having made these properties obvious!
- Key concept: mentor
  - Mentor proposes to core@ (portmgr@, doceng@)
  - Guide through first few months of committing
Distribution of Commit Bits (May 2006)

346 Total Committers

- src: 125
- src-doc: 13
- src-ports: 47
- ports: 85
- doc-ports: 22
- doc: 23
- src-doc-ports: 31

11 November 2006
Number of Commit Bits by Type (May 2006)

- src 233
- doc 95
- ports 202

11 November 2006
FreeBSD Core Team

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

- Responsibilities
  - Administrative (commit bits, hats, team charters)
  - Strategic (project direction, coordination, cajoling)
  - Rules, conflict resolution, enforcement
Ports Committers, Maintainers

• Slightly stale data, of course (May-Nov 2006)
  – 158 ports committers
  – Over 1,500 ports maintainers
  – Over 16,000 ports

• Averages
  – 85 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

11 November 2006
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
Derived Projects and Organizations

- Interesting and important growth in ecosystem
- Projects that consume FreeBSD but produce something new and different
  - FreeSBIE, pfSense, PC-BSD, Darwin, DesktopBSD, DragonflyBSD, FreeNAS, ...
  - Features to flow up- and down-stream
  - Avoid stepping on toes of derived projects, while fostering their growth
- Shows scalability of community model
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
  - EuroBSDCon
  - AsiaBSDCon
  - NYCBSDCon
  - MeetBSD

- Developer Summits
  - Two day events, often associated with conferences
A Few Highlights
Developer Summits, 2006

- Virtualization
- Xen, Sun4v
- SCTP
- 32-processor systems
- Multi-threaded, multi-processor network stack performance
- Interrupt filters
- GCC4

- FreeBSD/embedded
- FreeBSD 802.11
- Ports
- TrustedBSD
- ZFS, GJournal
- Atomic operations
- Revision control
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 (5.5, 6.1, 6.2, …)

• Balance is tricky but important
Development Branches

- Simultaneous parallel development
- Divergence based on feature maturity
- “MFC” merges changes from CURRENT to STABLE branches
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 releases FreeBSD 5.5, 6.2
  – CDs/DVDs from several vendors
FreeBSD Release cycle

- Most of the time open development
- Release cycle on STABLE branches
  - Code slush
  - Code freeze
  - Beta series, branching
  - Release candidate series
  - Release
  - Errata/Security advisories
- Big “dot zero” releases less frequently
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/projcvcs – FreeBSD project cvs
  – /home/dcvvs – 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, ZFS, CAM locking, netperf, ...
Revision Control: the Future

• Heavy use of Perforce a symptom of CVS weaknesses
  – Need lightweight branching, history-aware merging
  – Need access control

• Every few years, consider options
  – Cost of migration very high – interrupt development, retrain developers, high risk

• Currently evaluating several of revision control systems to see if any meet requirements
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, blades)
  – Test systems (sledge, pluto, panther, beast)
  – Name server (ns0)
  – NetApp filer (dumpster)
Other Clusters

- Korean Ports Cluster
- allbsd.org
  - Multiprocessor Sun hardware for testing
- Sentex Cluster
  - Security officer
  - Network, SMP performance, storage work
- ISC Cluster
  - ftp.freebsd.org, Coverity, test systems, ports
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!