

How the FreeBSD Project Works

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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!



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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

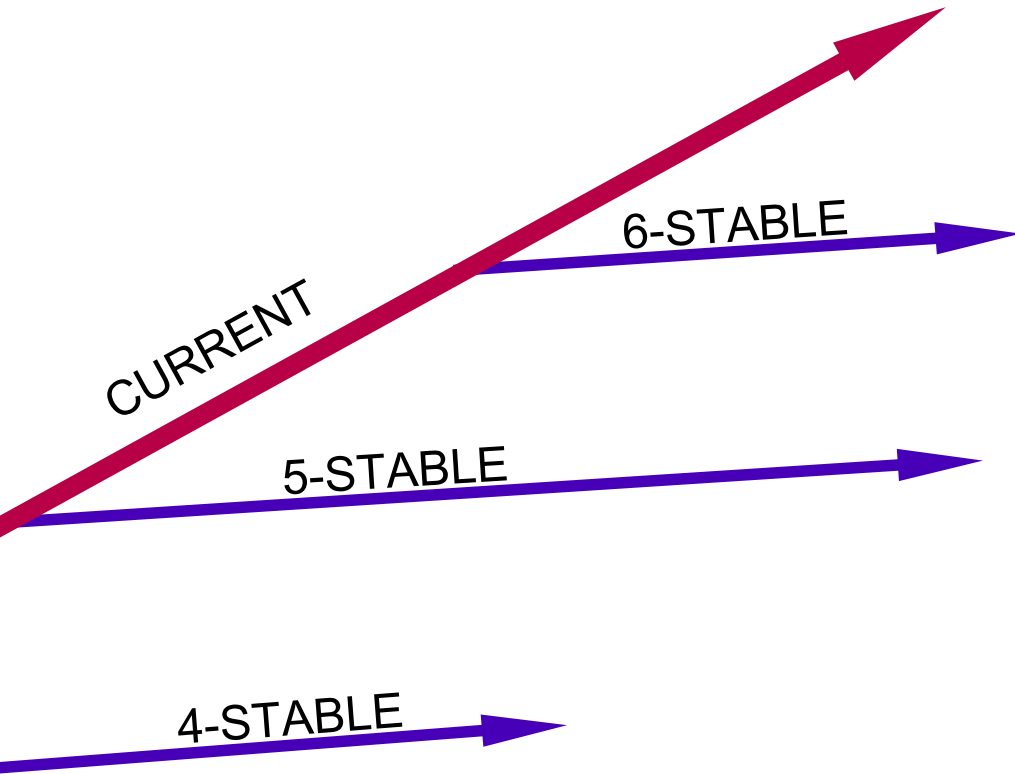
What do you get with FreeBSD?

- 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.

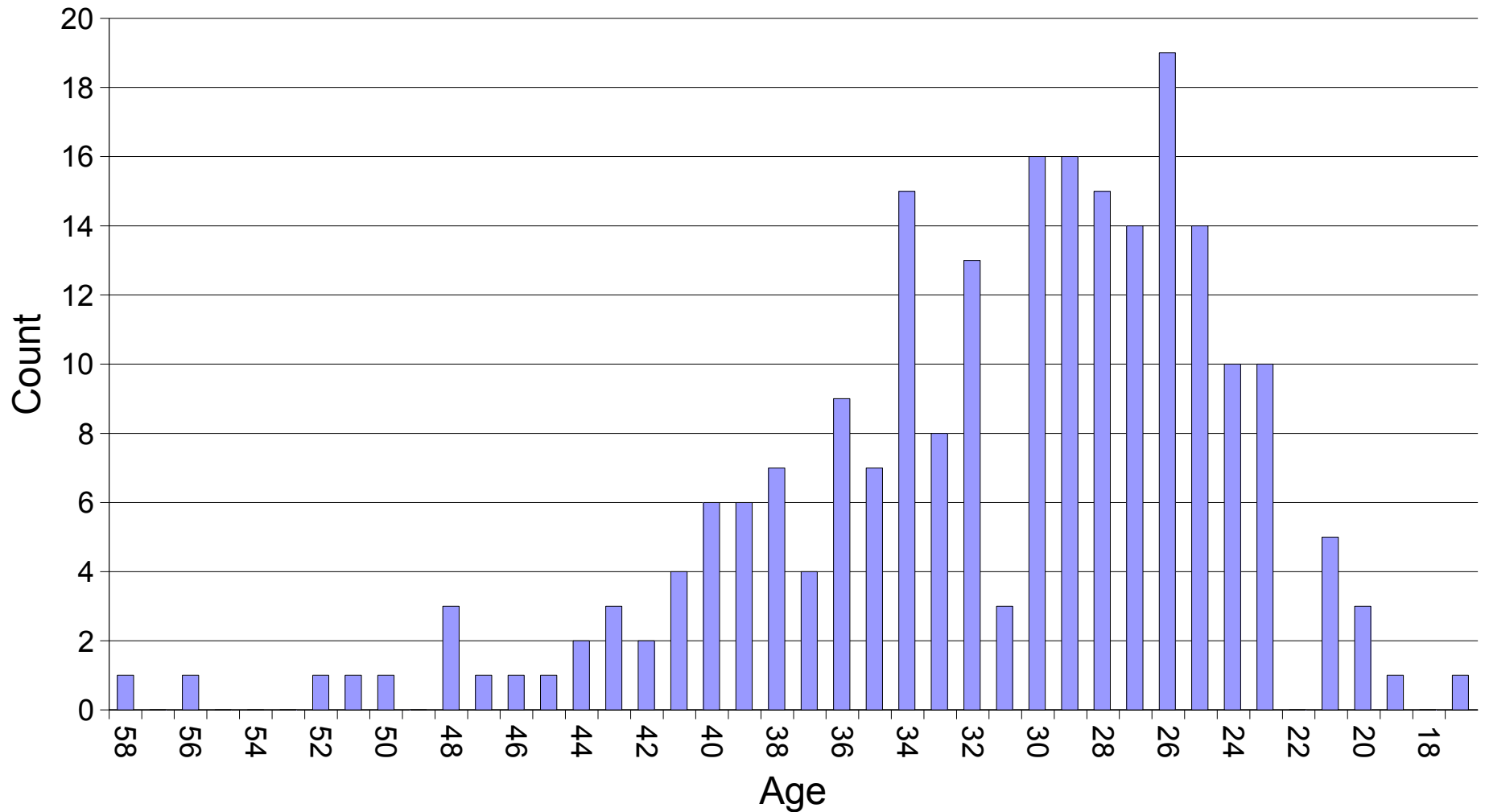
Things We Consume

- 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 Developer Age Distribution



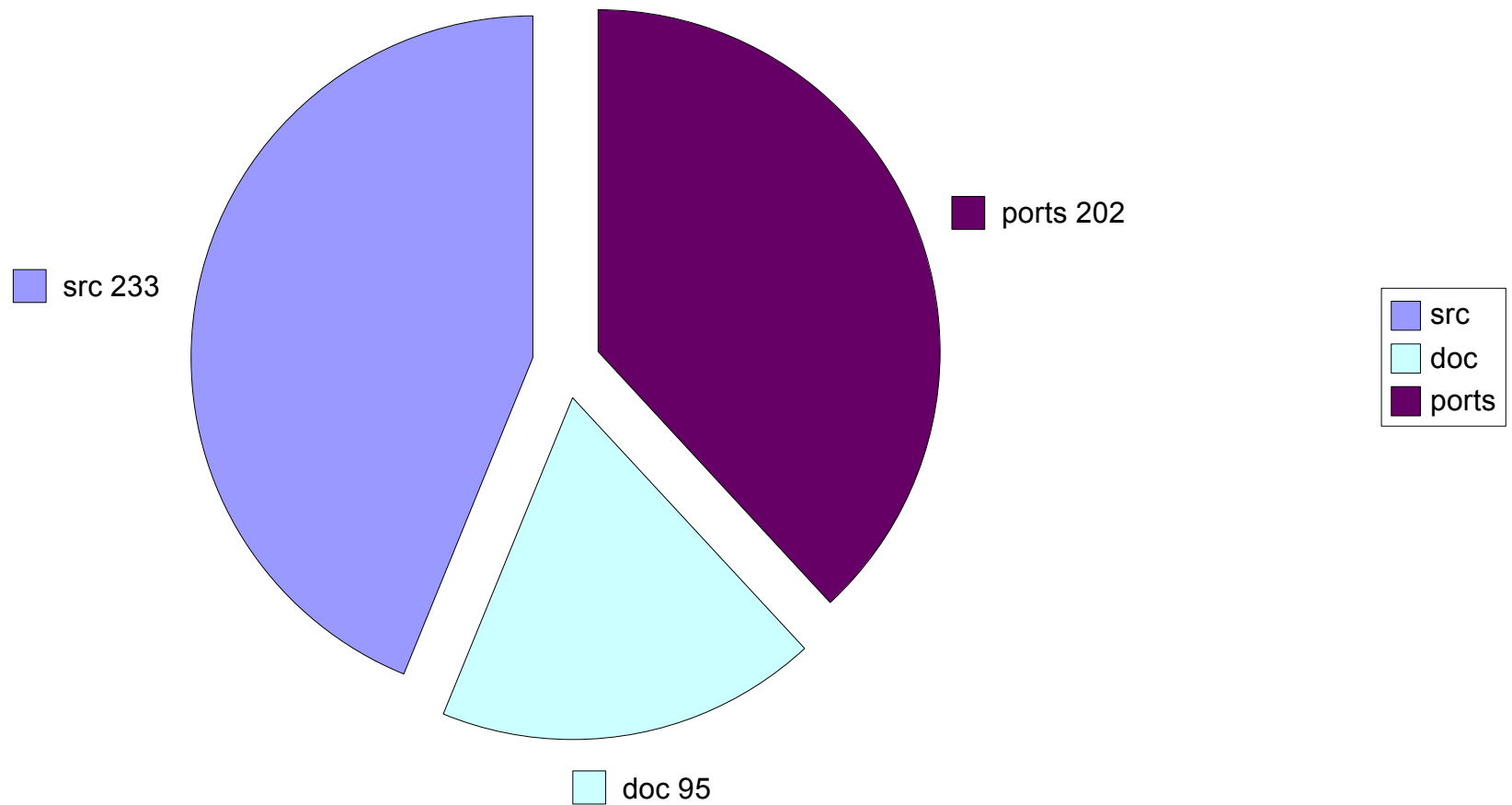
FreeBSD Processes

- 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

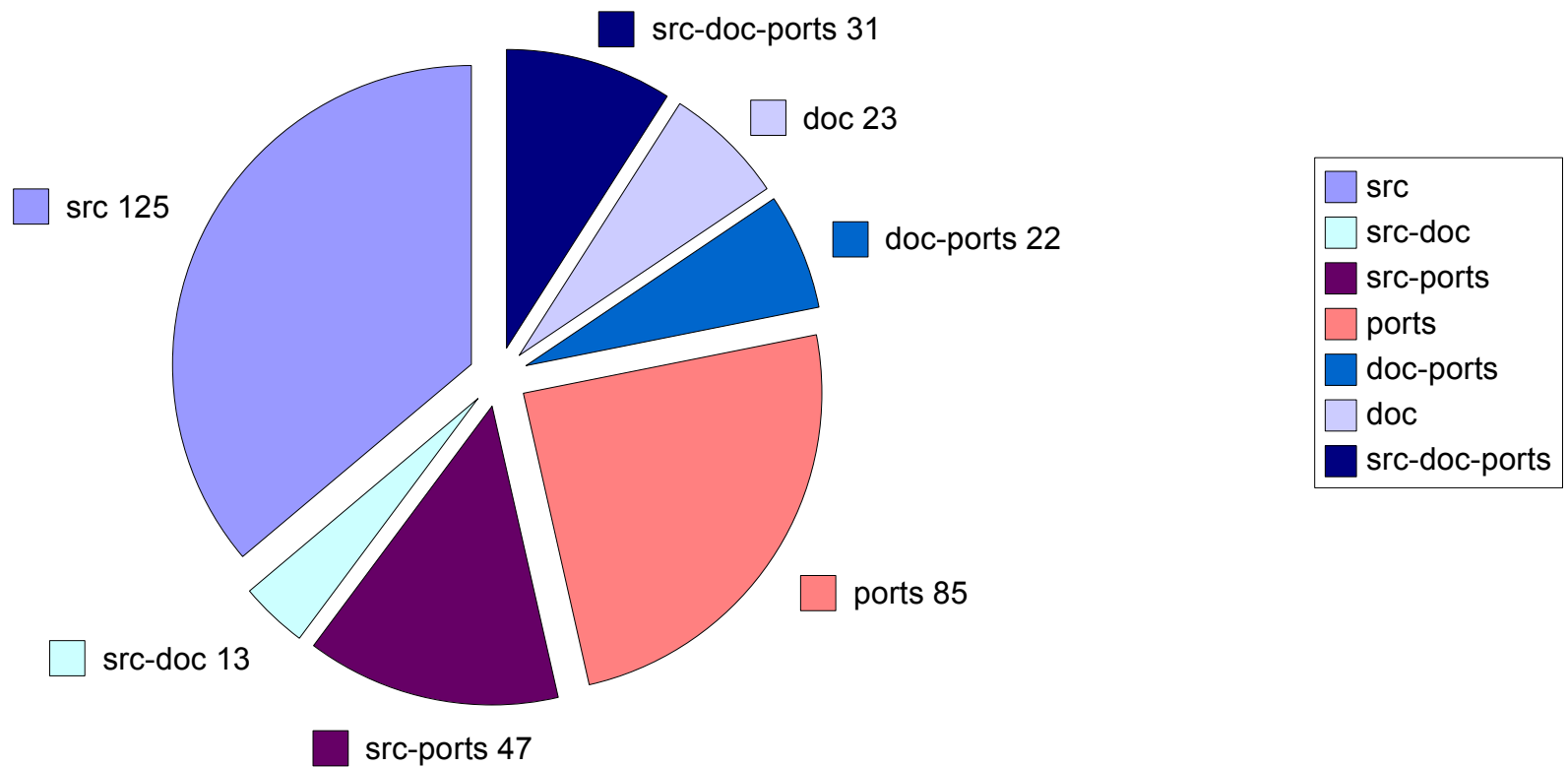
Number of Commit Bits by Type



9 May 2006

Distribution of Commit Bits

346 Total Committers



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/commmitter
 - 9 ports/maintainer
 - 8 maintainers/commmitter

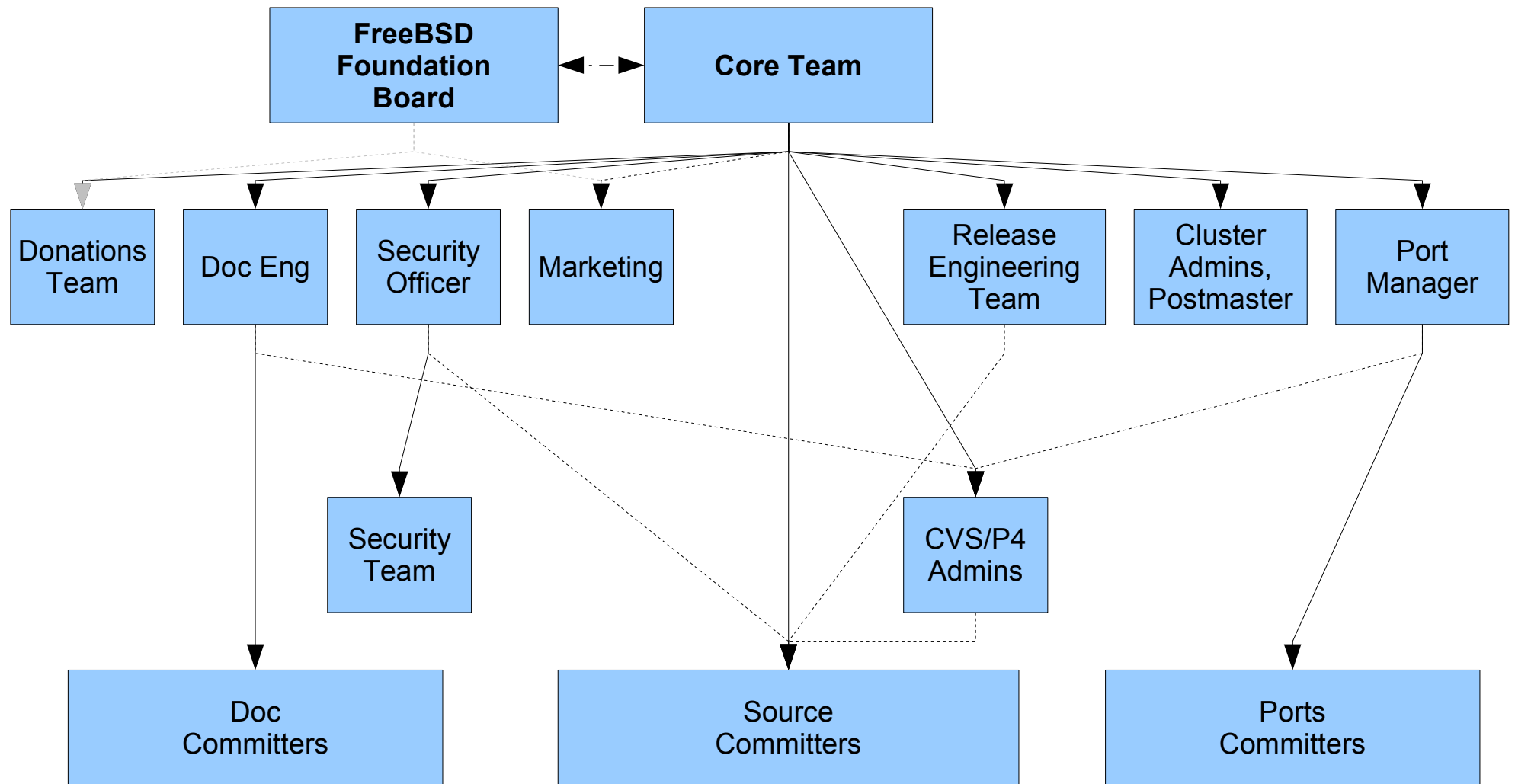
Groups and Projects

- 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

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

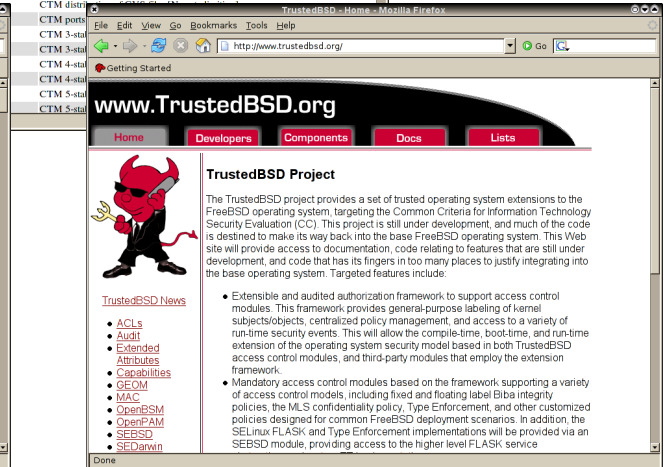
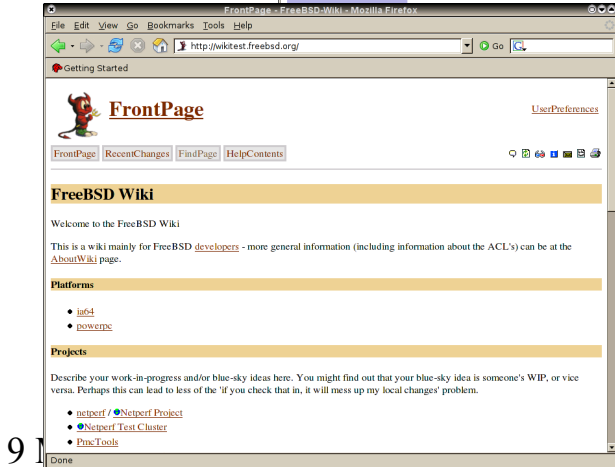
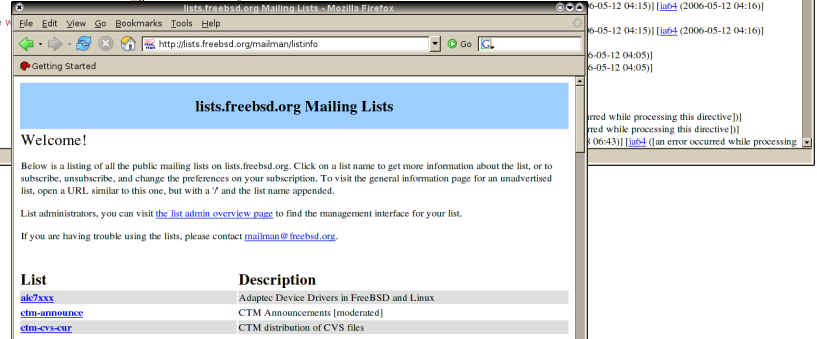
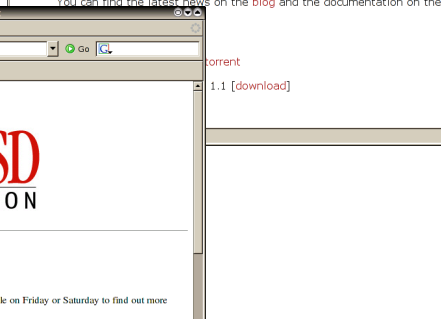
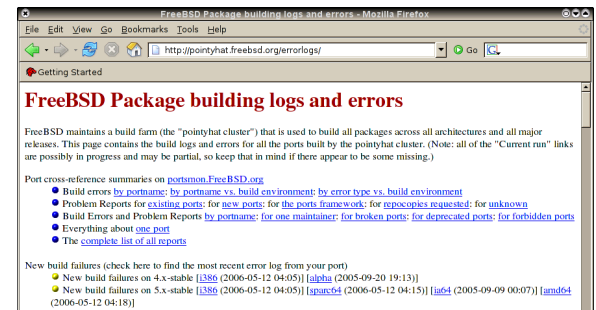
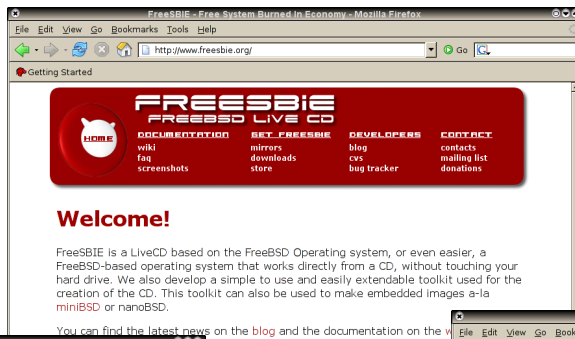
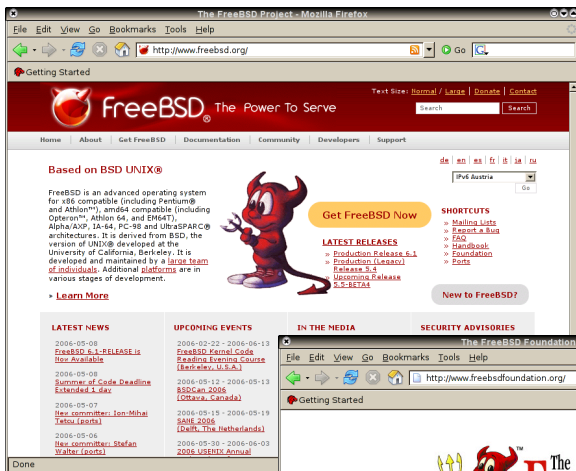
FreeBSD Project Org Chart (Sort of)



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

FreeBSD Developer Summit BSDCan 2006



9 May 2006

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
- FreeSBIE 2
- 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/projcv`s – FreeBSD project cvs
 - `/home/dcv`s – 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!