How the FreeBSD Project Works: Self-Description as Advocacy

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FreeBSD Developer Summit
BSDCan 2007
17 May, 2007

"How the FreeBSD Project Works"

- First presented BSDCan 2006
  - Also at EuroBSDCon 2006, LinuxForum.dk 2007, UKUUG 2007, AsiaBSDCon 2007
- Advocates FreeBSD by describing project
  - Not just good software
  - Real value is in the organization that writes it
- Lots of people ask for the slides
- This talk is on how to give the talk

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Structure of the Talk

- Introduce FreeBSD
  - Software, project, foundation
- People
  - Produces, consumes
  - People and processes
- Projects
- Ecosystem

- Mailing lists, web sites
- Events
- Development cycle
- Clusters
- Conflict resolution

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Introduction

How the FreeBSD Project Works

21 March 2007

Robert Watson

FreeBSD Project

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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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Introduce FreeBSD

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, Nokia, NetApp, Panasas, Timing Solutions, Secure Computing, nCircle, The Weather Channel
  - VXWorks, Mac OS X, ...
- Focuses on storage, networking, security
- One of most successful open source projects

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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
- 16,600 third party software packages

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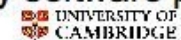
Project and Foundation

The FreeBSD Project

- Online development community
  - Central source repository and revision control
  - Extensive online community
  - 340 CVS committers, thousands of contributors
  - Extensive user community
- Liberal Berkeley open source license
  - Designed to maximize commercial reuse
  - No requirement that derived works be open source
  - Extensive use in commercial, research systems

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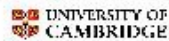
FreeBSD Foundation

- Non-profit organization based in Boulder, CO
  - Intentionally independent from FreeBSD Project
  - Sponsored development
  - Intellectual property, contracts, licensing, legal
  - Developer travel grants, vent sponsorship
  - Hardware purchase
  - Collaborative R&D agreements
- Support the FreeBSD Project – consider a donation today!

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Producing and Consuming

What the Project Produces

- FreeBSD kernel, user space
- Security officer, release engineering
- Ports collection, binary packages
- FreeBSD releases
- Manuals, handbook, web pages, marketing
- Technical support, debugging, etc.
- A variety of user/community events

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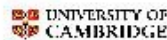
Things We Consume

- 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, good press
- Yet more bandwidth

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- We do a lot more than just "write software"
- Second slide is for laughs, but has real value

FreeBSD People and Processes

FreeBSD People and Processes

- FreeBSD committers
- Core Team
- Ports committers and maintainers
- Groups/projects
- Derived projects
- Mailing lists
- Web sites

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

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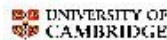
FreeBSD Committers

- 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

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- A key differentiating point: we have processes
- Committer is a concept that requires explaining

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Who are the Committers?

Who are the Committers?
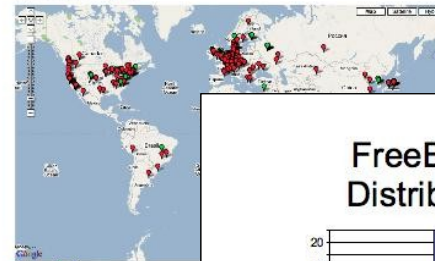(2006-2007)
- Locations
  - 34 countries
  - 6 continents
- Ages
  - Oldest (documented) committer born 1948
  - Youngest (documented) committer born 1989
  - Mean age 32.5, median age 31, stddev 7.3
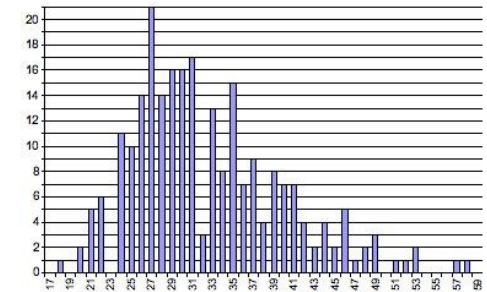- Professional programmers, hobbyists, consultants, university professors, students ...
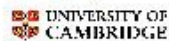
Locations of FreeBSD Committers (March 2007)
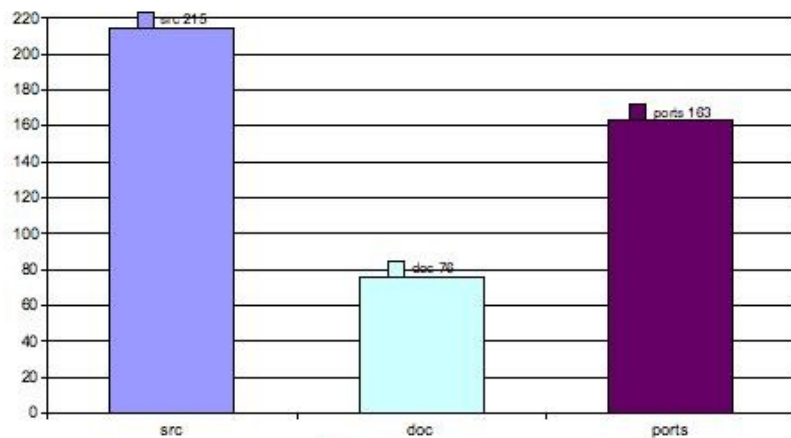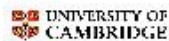
FreeBSD Developer Age Distribution (March 2007)

- Try to make committers seem human
- Emphasize diversity, professionalism

Commit Bit Types
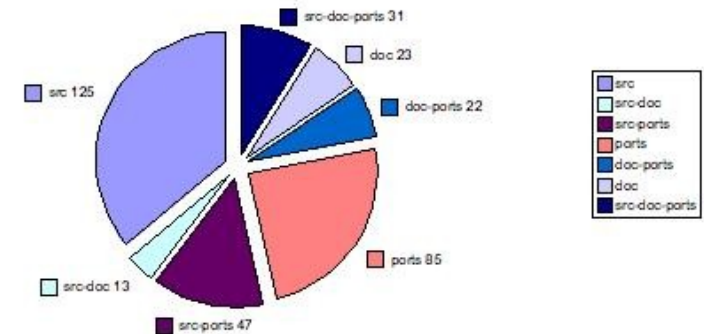

Number of Commit Bits by Type (March 2007)

src 215, doc 76, ports 163

Distribution of Commit Bits (March 2007) — 348 Total Committers

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

- Scale of project

- But the compartments are not in isolation

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Project Structure

FreeBSD Core Team

- Historically "key" developers but now ...
- ... 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

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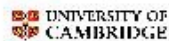
FreeBSD Project Org Chart (Sort of)

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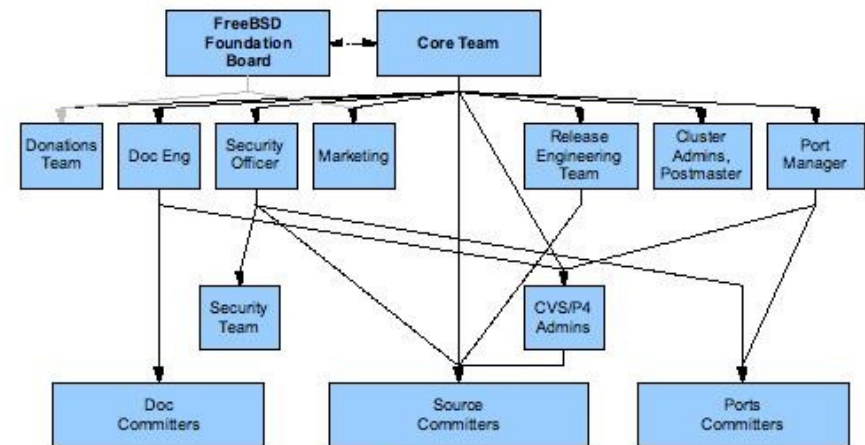
- Evolution from self-selected to elected board
- What does an org chart mean for volunteers?

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Groups

Groups and Projects

- Developers
  - Source Developers
  - Core Team
  - Core Team Secretary
  - Release Engineering Team
  - Release Engineering Build Teams
  - Security Officer
  - Security Team
  - Ports Team
  - Port Managers
  - Doceng Team
  - Documentation Team
  - Vendor Relations Team

- Administrative
  - Foundation Board of Directors
  - Foundation Operations Manager
  - FreeBSD.org admins@
  - FreeBSD.org webmaster
  - Sentex cluster admins
  - ISC cluster admins
  - Mirrors Team
  - Donations Team
  - Marketing Team
  - Perforce Admins
  - CVS Admins
  - Postmaster

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Wait, I'm Not Done Yet!

- Administrative (cont)
  - CVSUP Mirrors Team
- Other Contributors
  - Perforce Contributors
  - Questions Subscribers
- Software Adaptation Projects
  - FreeBSD GNOME Project
  - FreeBSD KDE Project
  - Mono on FreeBSD
  - OpenOffice.org on FreeBSD
  - Java on FreeBSD

- Special Projects
  - Stress Testing
  - FreeBSD Tinderbox
  - FreeBSD Standards
  - SoC Mentors
  - Monthly Status Reports
  - Coverity Team
- External Projects
  - KAME Project
 - TrustedBSD Project
  - PC-BSD
  - DesktopBSD

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- We do a lot of stuff, wave hands at some of it
  - Don't just read out the list, that would be boring

Ecosystem

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

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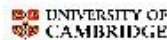
Mailing Lists

- Over 60 active central mailing lists
- Mostly public
  - Some exceptions (core, re, so, portmgr, ...)
- Organized loosely b
  - -announce, -current
  - -chat, -hackers, -qu
- Place where vast m discussion and plan
  - Both developer and

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FreeBSD Project Web Pages (Just a few)

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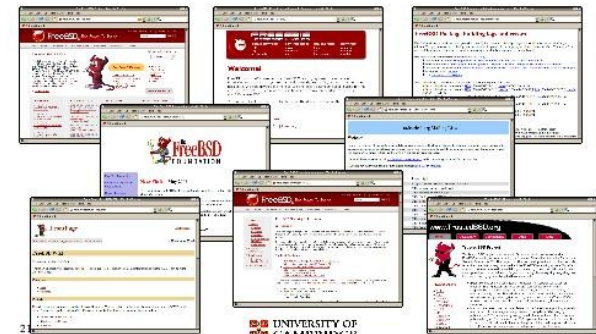
- Scalable community model with derivatives
- Wave hands at mailing lists and web pages

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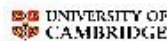
Conferences + Developer Summits

Events

- Conferences
  - USENIX ATC
  - BSDCan
  - BSDCon
  - EuroBSDCon
  - AsiaBSDCon
  - NYCBSDCon
  - MeetBSD
  - BSDConTR

- Developer Summits
  - Two day events
  - March 2007: AsiaBSDCon, Tokyo
  - May: BSDCan 2007, Ottawa
  - September 2007, EuroBSDCon, Copenhagen

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FreeBSD Developer Summit BSDCan May 2006

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A Few Highlights Developer Summits, 2006

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

- FreeBSD/embedded
- FreeSBIE 2
- FreeBSD 802.11
- Ports
- TrustedBSD Audit
- ZFS, GJournal
- Revision control
- gcc4

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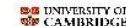
- Social and technical importance of events
- Use opportunity to wave technical flags

FreeBSD Development Process

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
  - 18-24 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

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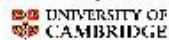
Development Branches
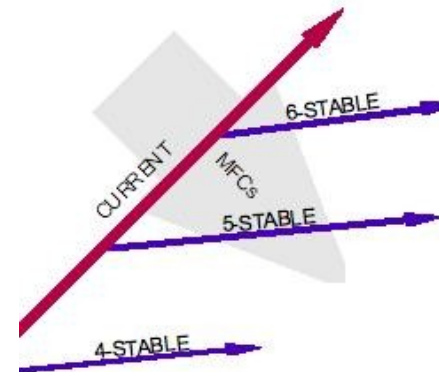
- Simultaneous parallel development
- Divergence based on feature maturity
- "MFC" merges changes from CURRENT to STABLE branches

CURRENT
MFCS
6-STABLE
5-STABLE
4-STABLE

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- Branched development
- Release schedule

FreeBSD Releases and Cycle

FreeBSD Release...

- Three active development branch...
  - 5.x – Major development branch, in...
  - 6.x – Refinement and optimization o...
  - 7.x – Active feature development
- Most recent releases FreeBSD 5.5...
  - Project releases at http://www.FreeB...
  - CDs/DVDs from several vendors
  - Derived systems (PC-BSD, Desktop...

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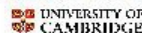### FreeBSD Release Cyc...

- 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 frequent...

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FreeBSD 7-CURRENT
7.0 due 2007Q3/Q4

- MP Scalability
  - 16+ core scalability
  - ULE2 scheduler
  - New threading library
  - Scalable jemalloc
- File systems
  - Sun's ZFS file system
  - GJournal for UFS
- Sun4v

- Security
  - New privilege arch
- Networking
  - Direct dispatch
  - Zero-copy BPF
  - 10gbps optimizations
  - SCTP
- Superpages
- And much more ...

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- We do a lot of stuff, wave hands at some of it
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FreeBSD and Revision Control

- **FreeBSD Project lives and breaths CVS/P4**

- **Importance of heavily branched development**

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Clusters

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)

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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

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- Centralized development, centralized resources
- Critical contributions made by our supporters

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Conflict Resolution

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

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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

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- Conflicts happen, model addresses them
- Play Warner slide for laughs, but issue real

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Conclusion

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 it happen
  - Join this community!
- http://www.FreeBSD.org/

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- Success not just in numbers
- Self-perpetuating community model key

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