

# A Quick Tour of FreeBSD 9

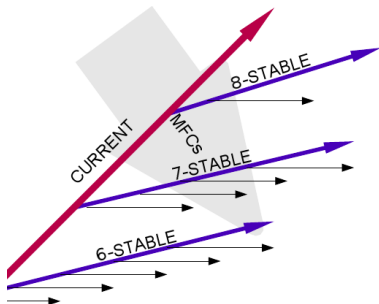
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# Introduction - FreeBSD Development model

First, a little bit of theory...



- ▶ concurrent development
- ▶ divergence based on feature maturity
- ▶ MFCs (“merge from current”)
- ▶ time-based releases
- ▶ every 5-7 month “X.Y” - minor release
- ▶ every 18-24 month “X.0” - major release



# Introduction - 9.0-RELEASE

- ▶ 9.0 comes ca. 24 months after 8.0
  - ▶ 8.0-RELEASE announced on 11/27/2009
- ▶ new major version 9.0 / stable branch 9.0-STABLE
  - ▶ FreeBSD 10-CURRENT
- ▶ currently RC1 available (two more to come)
- ▶ will probably get released by the end of the year
- ▶ considered production quality despite .0 name
- ▶ many new features, enhancements and bug fixes
- ▶ let's have a look...



# Highlights & Overview

- ▶ New system installer - bsdinstall
- ▶ Userland DTrace
- ▶ CLANG / LLVM compiler
- ▶ Large-scale SMP support
- ▶ USB 3.0 support
- ▶ Modern event timer infrastructure
- ▶ More SMP-scalable TCP/IP
- ▶ New NFS client and server
- ▶ PF 4.5 port
- ▶ ZFS updated to version 28
- ▶ HAST
- ▶ UFS SoftUpdates+Journal (SU+J)
- ▶ New driver for AHCI SATA drives
- ▶ ATA CAM implementation
- ▶ Capsicum
- ▶ NFSv4 ACLs for UFS
- ▶ Resource Containers
- ▶ ...



# New system installer - bsdinstall

- ▶ sysinstall has some problems ...
  - ▶ cannot handle new features
  - ▶ has no maintainer
- ▶ bsdinstall tries to solve these problems
  - ▶ several developers involved
  - ▶ set of shell scripts called in sequence
  - ▶ easily extensible, readable, comprehensible
  - ▶ (re)uses modern tools already in base (gpt, ...)
  - ▶ wireless setup
  - ▶ capable of installing PowerPC
  - ▶ installation from live system
  - ▶ text-based
  - ▶ to be merged with pc-sysinstall in the future
  - ▶ still missing some key features (zfs on root, ...)



# Userland DTrace

- ▶ integral part of the kernel DTrace which we had since 8.0
- ▶ ported by Rui Paulo under the FreeBSD Foundation sponsorship
- ▶ allows admins/developers to analyze system failure or performance bottlenecks
- ▶ userland DTrace is already used in some large well known software packages such as PostgreSQL and X.Org
- ▶ could be used to speed up the FreeBSD itself too



# CLANG / LLVM compiler

- ▶ GCC is GPLv3 licenced after 4.2 release
- ▶ (Free)BSD project has issues with GPLv3 and thus leaving us with ancient compiler
- ▶ clang/LLVM is a C/C++/ObjC compiler (framework) which aims to possibly replace GCC
- ▶ clang/LLVM is being shipped with 9.0 by default
- ▶ recent version imported every now and then
- ▶ capable to build a fully bootable and usable FreeBSD system
- ▶ work in progress
  
- ▶ more on this will be covered in rdivacky@'s talk at 17:30



# New NFS client and server

- ▶ completely rewritten NFS client and server code
- ▶ supports NFSv4.0 and NFSv4.1 is ongoing
- ▶ adds many new features like a stateful protocol, performance improvements and stronger security (ACLs, strong authentication).
- ▶ heavily tested and considered stable
- ▶ NFSv4 ACLs for UFS
  - ▶ NFSv4 ACLs are already directly implemented in ZFS



## PF 4.5 port

- ▶ pf matched OpenBSD 4.1 until recently
- ▶ it is now at the level of OpenBSD 4.5
- ▶ brings in many bug fixes
- ▶ supposed to improve performance as well
- ▶ naturally, pfsync updated too
- ▶ check out the OpenBSD release announcements
- ▶ further updates are questionable due to syntax changes
- ▶ there's ongoing work on carp



# ZFS updated to version 28

- ▶ ZFS gets updated to version 15
- ▶ ...and later to v28 - the latest publicly available code base from Sun
  - ▶ Data deduplication
  - ▶ Triple parity RAIDZ
  - ▶ zfs diff
- ▶ lots of bug fixes and performance improvements
- ▶ backporting code from IllumnOS
- ▶ now considered really production ready
- ▶ Wait for Martins's presentation for more information (next one)



# HAST

- ▶ developed by Pawel Jakub Dawidek (pjd@) under FreeBSD Foundation sponsorship
- ▶ a framework which allows transparent storage of the same data across several physically separated machines connected by a TCP/IP network
  - ▶ think network-based RAID1 (mirror)
  - ▶ similar to the DRBD storage system known from Linux
- ▶ possible to build highly-available storage cluster together with carp and pfsync
- ▶ it's available in FreeBSD 8, but 9.0 comes with many bugfixes and some enhancements
  - ▶ compression of the data
  - ▶ checksuming
  - ▶ security enhancements
  - ▶ additional synchronization modes



# UFS SU+J

- ▶ soft-updates are fine, but
  - ▶ not so much with big file-systems
  - ▶ memory hungry
- ▶ Jeff Roberson added a small journal to collaborate with softupdates
- ▶ the recovery process is very quick
- ▶ effectively gets you rid of background fsck after unclean shutdown
- ▶ can be enabled on existing file-systems too
- ▶ enabled by default in 9.0 installed by bsdinstall



# ATA CAM and AHCI, geom\_raid

- ▶ ATA CAM implementation
  - ▶ ATA disk drivers have all been moved to the CAM (common access method for storage) system
  - ▶ ataraid now obsoleted
- ▶ New driver for AHCI SATA drives
  - ▶ supports native AHCI via CAM
  - ▶ AHCI drives are manipulated by camcontrol
  - ▶ new features like NCQ
  - ▶ port multipliers and hot-plugging are greatly improved
- ▶ GEOM-based ataraid replacement `geom_raid`
  - ▶ supports various BIOS-based software RAIDs
  - ▶ RAID0, RAID1, RAID1E, RAID10, SINGLE, CONCAT are supported, more to come
  - ▶ project is sponsored by Cisco and iXsystems



# Capsicum

- ▶ lightweight OS capability and sandbox framework
- ▶ framework for security isolation of sensitive processes
- ▶ developed at the University of Cambridge Computer Laboratory, supported by a grant from Google
- ▶ intended to supplement existing system-centric mandatory access control protections
- ▶ several applications (tcpdump, hast, Chromium browser) have been modified to use sandboxing to confine risky activities



# Resource Containers

- ▶ FreeBSD Foundation sponsored project
- ▶ adds support for per-jail resource limits
- ▶ allows system administrators to partition resources like memory or CPU between jails and prevent users from DoS-ing the whole system
  - ▶ effectively enables FreeBSD jails to act as lightweight VMs
- ▶ not part of GENERIC kernel though



# Other

- ▶ Large-scale SMP support
  - ▶ brings in support for large SMP systems, with more than 32 CPUs.
- ▶ Modern event timer infrastructure
  - ▶ a new unifying timer infrastructure
  - ▶ foundation for tickless kernel
- ▶ USB 3.0 support
  - ▶ added new XHCI driver which supports USB 3.0
  - ▶ compatible with USB 2.0 and 1.0 thus aims to replace older UHCI/OHCI/EHCI drivers
- ▶ FreeBSD runs on Amazon EC2
- ▶ More SMP-scalable TCP/IP
- ▶ FreeBSD IPv6-only Support
- ▶ TRIM support for UFS



# Many more & References

If you would like to learn about all of this and further developments in more detail, please visit:

- ▶ <http://www.FreeBSD.org/news/status/>
- ▶ <http://ivoras.net/freebsd/freebsd9.html>



*Wake Up, I'm finishing already - Q/A*



Thank you for your attention!

