



Designing Firmware Upgrades Around FreeBSD's pkgng

An Annotated Version History

Overview

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- (2) FreeBSD
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- (9) Questions



Author: Franco

"I like nifty things. I read a lot. Sometimes I write stuff."



- o UNIX networking engineer
- o Firewalls, Operating Systems
- o DragonFly BSD, OPNsense, mdocml, zeromq, FreeBSD ports



@fitchitis



fichtner

OPNsense

- o Firewall distribution on top of FreeBSD, forked from pfSense
- o pkg(ng) adoption, bootstrap interface, MVC, API, redesigned build tools, traffic shaper replacement, etc.
- o two major releases: 15.1 (January 2015), 15.7 (July 2015), with almost 40 minor releases in total in said 9 months
- o Security enhancements: weekly updates, LibreSSL as an option, ASLR soon (via HardenedBSD), privilege separation as a long-term goal
- o Open community platform, multiple translations (German, Japanese, Chinese, more on the way)



FreeBSD

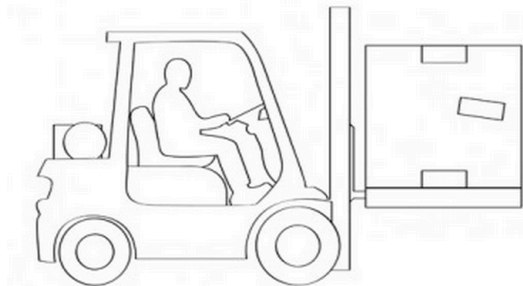
- o Since 1993, forked directly from the original BSD
- o about three quarters of all BSD deployments
- o strong networking and storage (zfs)
- o large third party software collection (25000 ports)
- o viable desktop (manually or out of the box with PCBSD)
- o pkg(ng) as the default manager since FreeBSD 10 (2014)



FreeBSD®

pkg(ng)

- o older FreeBSD tools were written over 20 years ago
- o binary package manager rework started around 2012
- o better dependency tracking (shared libraries)
- o eventually gains FreeBSD base and kernel support
- o easy command structure, countless maintenance tools



pkg(ng)

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```
# pkg install foobar  
# pkg delete foobar  
# pkg upgrade
```

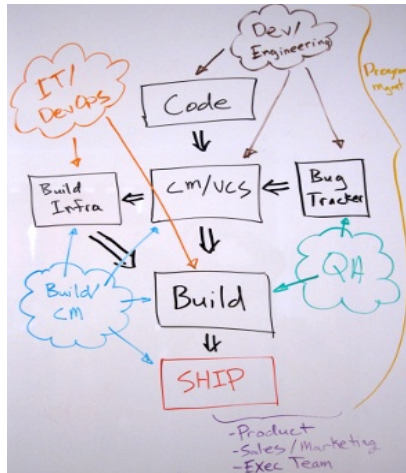
Motivation

timely updates



Motivation

timely updates

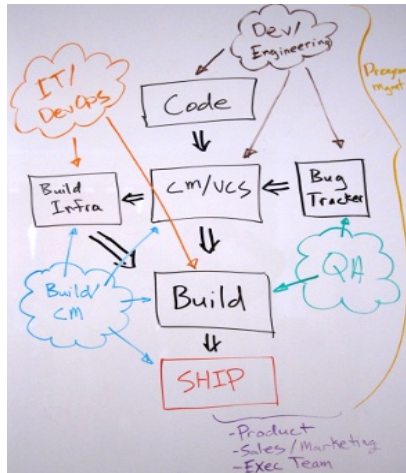


sustainable
release
engineering



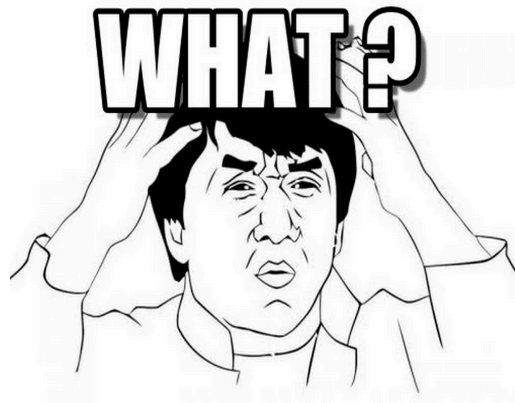
Motivation

timely updates



sustainable
release
engineering

smallest
possible
impact
for users



Requirements

- ➔ reliable
- ➔ fast
- ➔ secure
- ➔ modular
- ➔ fancy

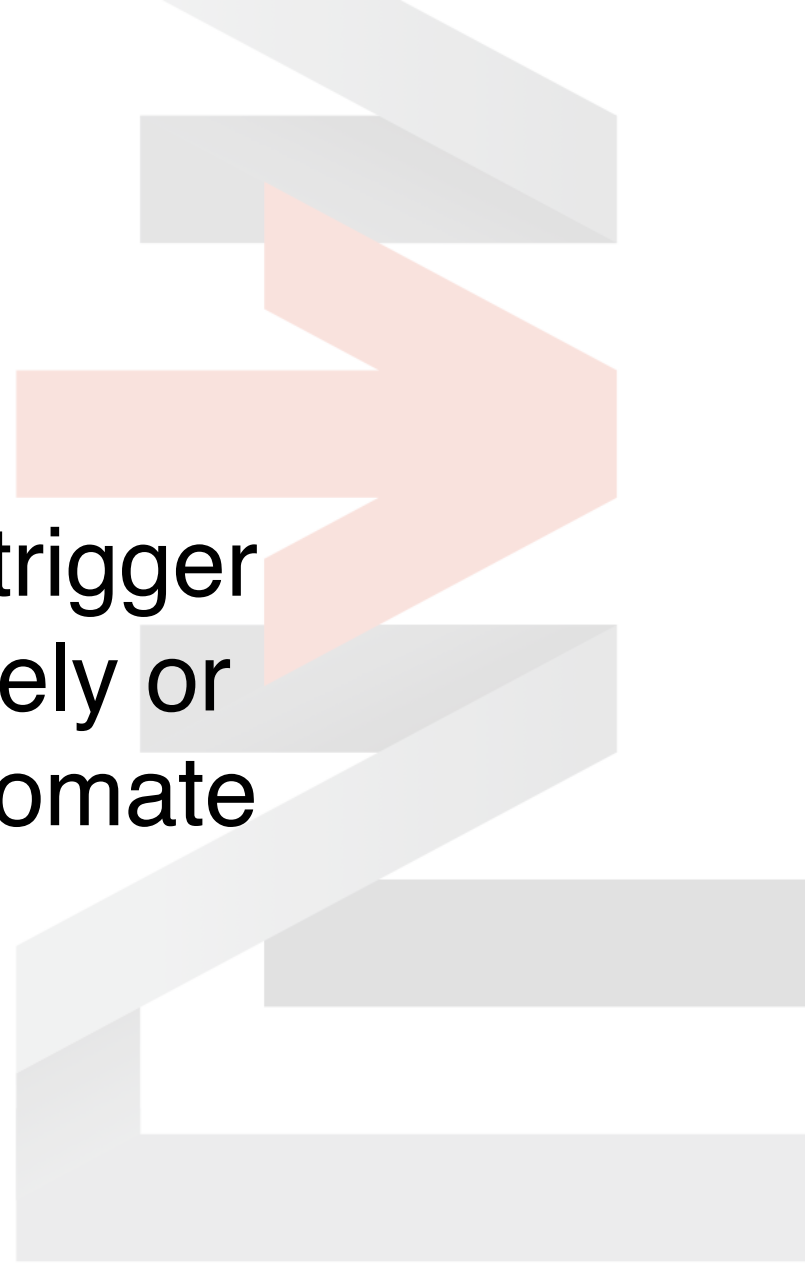


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ok to trigger
remotely or
to automate



Timeline: 15.1 (Jan 2)



- o first release version
- o architecture amd64 only
- o package updates only
- o preliminary GUI and backend scripting



Timeline: 15.1.1 (Jan 12)



o added i386 architecture

Timeline: 15.1.6.1 (Feb 21)



- o kernel and base upgrades support, direly needed for the upcoming FreeBSD 10.1 upgrade
- o opnsense-update utility as an unified tool for updates

Timeline: 15.1.7.1 (Feb 28)



- o console (ssh) firmware update scripting done
- o base/kernel upgrades now only apply if needed ;)
- o LibreSSL test version



Timeline: 15.1.8.4 (Apr 7)



- o detached upgrade from the frontend code (aka upgrades terminated themselves via a loop)
- o version number madness ;)



Timeline: 15.1.10 (May 4)



o switched on package signature verification



Timeline: 15.1.11 (May 22)



- o MVC rewrite of firmware GUI including API

Timeline: 15.1.11.4 (Jun 12)



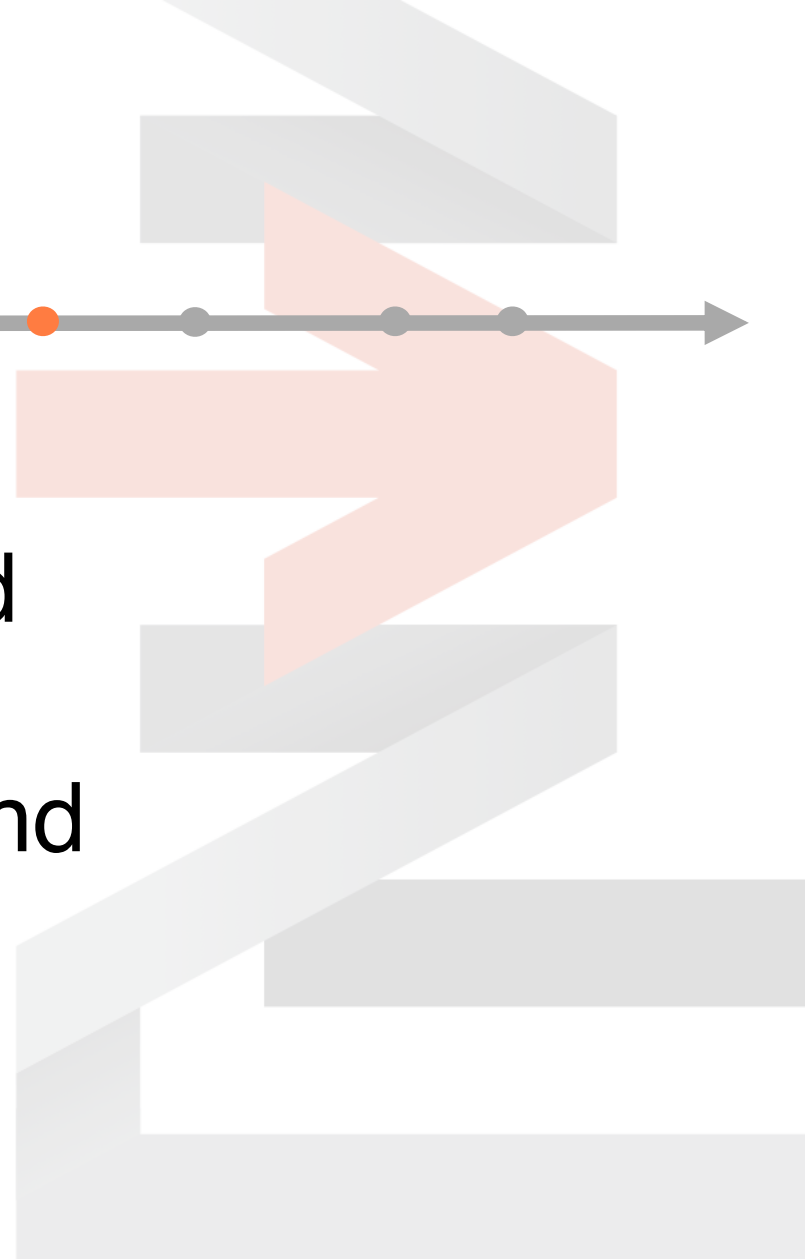
- o lots of GUI UX tweaks
- o opnsense-update now also deals with package updates in one go



Timeline: 15.7.2 (Jul 10)



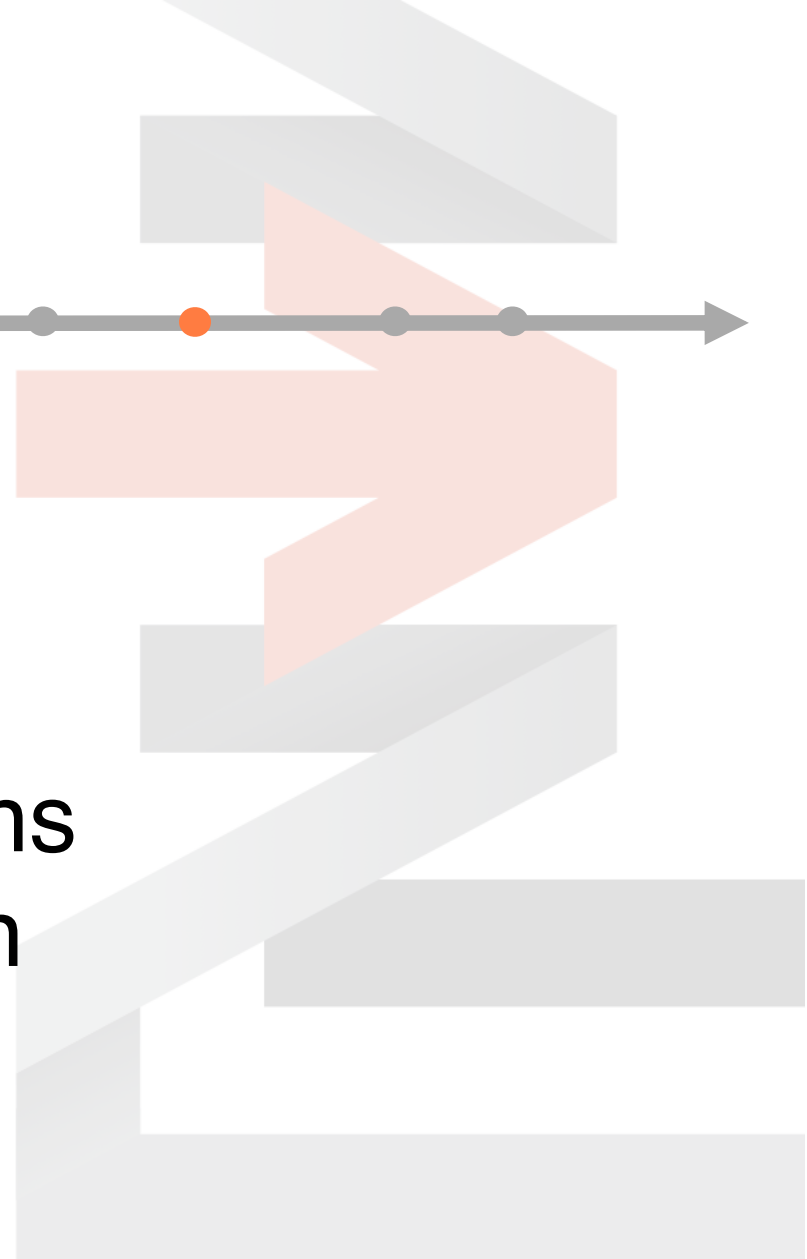
- o opnsense-update gained the ability to move from OpenSSL to LibreSSL and back seamlessly (command line only)



Timeline: 15.7.3 (Jul 17)



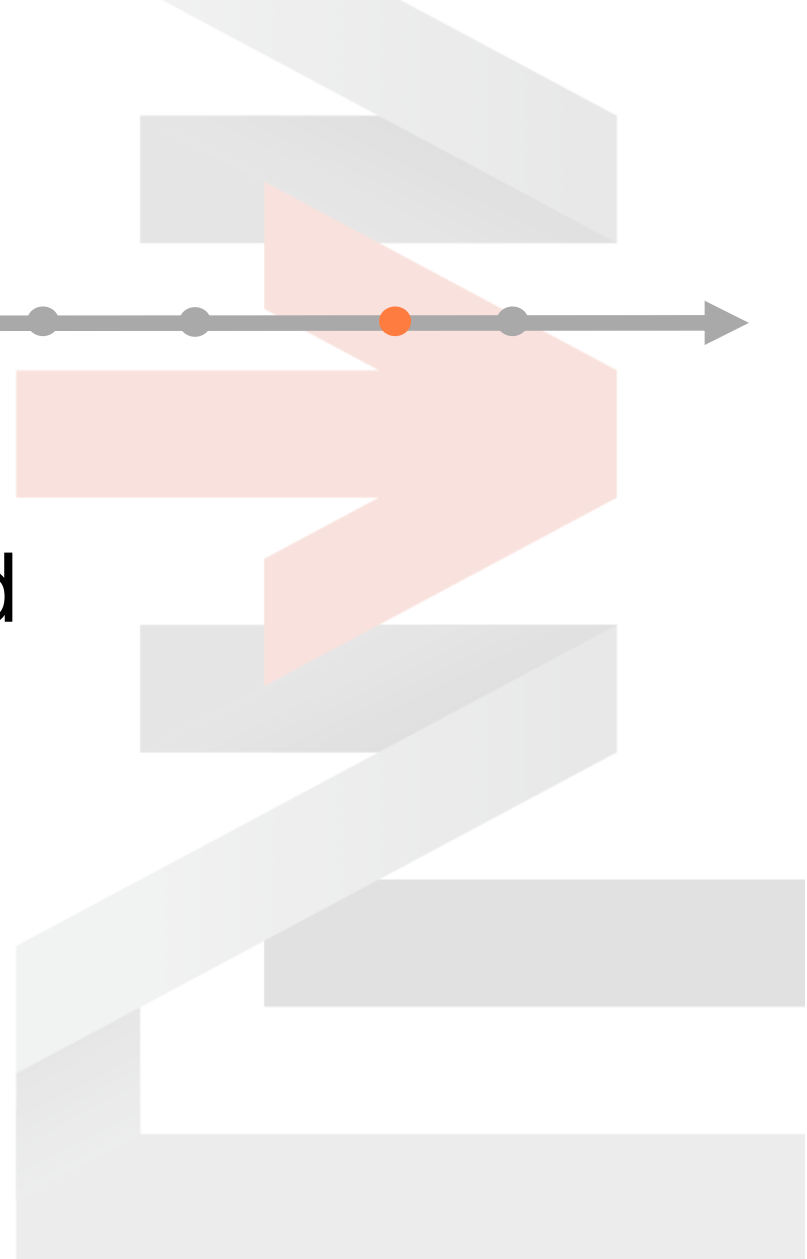
- o GUI reboot probing
- o GUI package overview
- o first development versions that could be installed on the system manually



Timeline: 15.7.6 (Jul 31)



o opnsense-update gained the ability to move to a different firmware mirror (command line only)



Timeline: 15.7.7 (Aug 8)



- o GUI mirror and crypto selection was integrated

Demo

Upgrading 15.7.11 to 15.7.12, plus OpenSSL to LibreSSL



Matthias Rampke

@matthiasr

Much love for [@opnsense](#) just because the web interface works on mobile & I can upgrade the FW without even getting out of bed

09:18 AM - 26 Aug 15



Future Work

- o daily snapshots of development and stable branches plus GUI support
- o scheduled updates (automatic mode)
- o plugin infrastructure and GUI support
- o upgrade to the next FreeBSD 11
- o and probably more :)

Thank you!

Time for your questions,
comments and ideas.

<https://www.freebsd.org/>

<https://opnsense.org/>

