

FreeBSD Foundation June 2016 Update



Dedicated to supporting the
FreeBSD Project and community

Upcoming Events

[Texas Linux Fest](#)

July 8-9, 2016
Austin, TX

[HOPE XI](#)

July 22-24, 2016
New York, NY

[BSDCam 2016](#)

August 15-17, 2016
Cambridge, UK

FreeBSD Journal



The [May/June](#) issue of the *FreeBSD Journal* is now available!

Don't miss articles on ARMv8 Architecture, Cavium ThunderX Chip, bhyveATA Emulation, and more.

New Feature! Browser-Based subscribers now have the ability to download and share PDFs of the articles!

Sample Issue! If you've ever wanted to

Message from the Executive Director

Dear FreeBSD Community Member,

The Foundation team headed into summer with full steam ahead. June was one of our busiest months to date, and included attending multiple events to promote FreeBSD, launching both the new Getting Started with FreeBSD initiative and the FreeBSD community survey, publishing a new issue of the Journal and more! We're energized by what we've been able to accomplish for the Project this month, but, we can't do it alone. As you'll see below, your support has helped us make a positive impact on the Project. Please consider [making a donation](#) today to help us continue this momentum through the coming months and beyond!

Deb

Development Projects Update

The FreeBSD Foundation supports FreeBSD project development through individual project grants, and through engagements with long-term technical staff. One of



the key benefits of having paid technical staff working for the Foundation is that we have a vehicle to investigate, fix, improve and maintain critical FreeBSD components over a long time horizon. This month I'd like to focus on Konstantin (Kostik) Belousov's work on the FreeBSD Virtual Memory (VM) system.

A virtual memory system is a critical, key component underpinning any UNIX-like operating system. FreeBSD's is a mature design, based on concepts from Carnegie Mellon University's Mach kernel 2.0. It has received significant updates over time, including improvements for high performance multiprocessor support, fine grained locking, and the use of superpages (large pages). As it is a relatively large and complex code base, bugs are inevitable, and especially given the need to handle unusual conditions and subtle timing issues between threads.

FreeBSD developer Peter Holm has been working for over ten years on stress testing the FreeBSD kernel and is the author of the extensive

read through an entire issue of the FreeBSD Journal, now's your chance. [Download](#) the sample issue and be sure to share with your friends and colleagues.

Not a subscriber? [Sign up](#) today!

See what others are saying about the Journal:

"Awesome! This is the best way to popularize FreeBSD!!" San Jose, California

"I've found it really practical, and great reading...it caters to all levels of users." Brooklyn, NY

Why Choose FreeBSD?



"[NYI](#) is a data center provider that uses FreeBSD for all of its internal and customer-facing solutions for colocation and dedicated servers, cloud computing and managed services. Our initial choice of technology included commercial Unix systems tied to proprietary hardware. However, the cost and portability of FreeBSD were determining factors in our changing platforms early in our company's existence.

Since then, we have enjoyed the functionality and reliability of FreeBSD. We rely on it for networking duties like routers, VPNs, firewalls and traffic shapers, as well as web applications like shared hosting, backend interfaces, load balancers and proxies. We particularly appreciate the community support and centralized documentation, which means that we do not have to hunt down bits and pieces of information, like we would with other projects."

– Phillip Koblence, VP Operations, [NYI](#)

'stress2' test suite. Peter has collected details on over 1400 issues detected by the stress suite, and has worked with a number of FreeBSD developers on taking issues to root cause and testing a resulting fix. Kostik has been involved for as long as this investigation has been ongoing, initially as a volunteer with limited time. As a result of Foundation employment, he has been able to spend significantly more time investigating and fixing issues. Over the last ten years, Kostik has investigated 910 issues discovered by Peter, or an average of 93 per year.

Kostik writes:

There were several issues which lately became quite visible in the VM subsystems. These issues were present for a long time, but for some reason they started occurring more frequently around the 10.2 release.

For background, The Mach/FreeBSD VM has a concept of a shadow chain, where VM objects implement copy-on-write (COW) by shadowing the lower object's content. For example, on fork we insert new anonymous objects on top of shadow chains for each copied map entry, to implement the copy semantic. An obvious issue is that such chains would become uncontrollably long, without specific measures to address this. To do so, the VM system implements 'collapse', where fully shadowed objects are claimed to be unused and removed from system. This keeps the chain lengths relatively short.

The collapse is done by backing scan, that is, inspection of all of the pages of the shadowed object. Pages are either moved to shadow or discarded if already copied. The scan might need to sleep if an encountered page is busy, and sleeping drops the vm object lock.

Three recent commits highlight bugs fixed in this area:

- r300758: it was possible that simultaneous collapses were started on the same object by two threads, each thread confusing another.
- PR 204764, r302063: The sysctl vm.vmtotal scan for active objects collided with the the lock-less object initialization, corrupting object flags.
- PR 204426, r302236: vm_fault raced with collapse scan and caused spurious SIGSEGVs.

Issues like these need to be found and fixed to have a stable and reliable operating system, and your continued support of Kostik's work through FreeBSD Foundation donations will ensure we continue this critical effort.

-- contributed by Ed Maste and Konstantin Belousov

Conference Report: 2016 USENIX Annual Technical Conference

We attended the [USENIX Annual Technical Conference](#) in Denver on June 22 and 23. It was a small conference attended mostly by people doing research from universities around the world. Our purpose for being there was to promote FreeBSD as a great research platform and

highlight the research being done on and with FreeBSD. We talked to a variety of people including local systems administrators to researchers from South Korea. Over the two-day period, we had many people stop by our table to talk about FreeBSD. One university systems administrator told us about how she picked FreeBSD back in the early '90s for their datacenter. They are still using FreeBSD because of the stability and security it provides. She added that other universities have approached her to help give them guidance on setting up their data centers with FreeBSD.



We also met with students from George Washington University, University of Connecticut, and other universities that were interested in finding out how to get involved in FreeBSD.

The advantage of this being a smaller conference, was that we didn't have other open source projects to compete with, while still having many attendees interested in talking to us. It also gave the attendees more time to spend at our table, asking questions, and learning more about FreeBSD.

To raise awareness of all the research being done on and with FreeBSD, we created a webpage to highlight these efforts. It's still a work in progress, but check out what we have so far [here](#).

-- contributed by Deb Goodkin

Conference Report: FreeBSD Dev Summit and BSDCan 2016

We were pleased to be a Gold Sponsor at [BSDCan 2016](#) earlier this month and the primary sponsor for the [FreeBSD Developer Summit](#) that preceded it. This conference gets better and better each year, organized and run by Dan Langille. Videos from the sessions can be found [here](#).

The Foundation team arrived a few days before the conference to hold our annual board meeting. This full-day meeting is spent electing the board of directors and officers for the upcoming year, and working on our near and long term strategic plans. Having this opportunity to meet face-to-face when our team is spread around the world, helps us get a lot accomplished, including determining our top priorities for supporting the FreeBSD Project and community.

Our newly elected board of directors are: Justin Gibbs, Dru Lavigne, George Neville-Neil, Hiroki Sato, Robert Watson, Benedict Reuschling, and Kirk McKusick. Newly elected officers are: Justin Gibbs, President; Benedict Reuschling, Vice President; Kirk McKusick, Treasurer; and George Neville-Neil, Secretary.

We would also like to send out a big thank you to outgoing board

members. First to Erwin Lansing, for his many contributions as a Foundation board member, serving since 2010. Second to Cheryl Blain, who shared her passion for FreeBSD while serving as a board member since 2014.

Many of us followed up the all-day board meeting with a FreeBSD Journal editorial board meeting. There were around 10-12 people in that meeting, to discuss the themes and articles for future issues. Now, here's a group of passionate volunteers who are driven to get articles written about all the interesting features in FreeBSD and what's going on in the community.

The next two days were filled with FreeBSD Developer Summit sessions. The Microsoft Open Source team gave a presentation on supporting FreeBSD in their Azure Marketplace. You can find out more about the partnership between the FreeBSD Project, FreeBSD Foundation, and Microsoft [here](#).



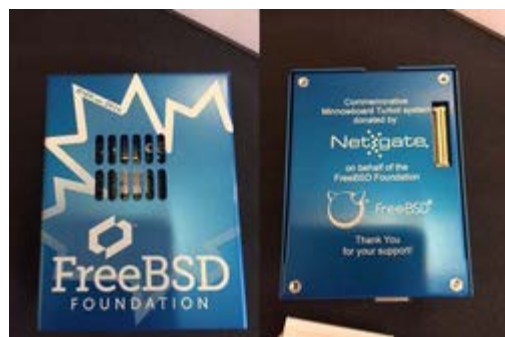
We again staffed a table during the conference, and we had an enormous number of attendees come by! People stopped by to talk about their work, possible collaborative work with their

companies, and, of course, to give us donations for our Spring Fundraising Campaign. We received \$2,275.59 USD in donations. In addition, Gordon Tetlow generously agreed to match this amount! That means we raised \$4,551.18 at BSDCan!!

(Above photo courtesy of Ollivier Robert)

[NetGate](#) generously donated four MinnowBoard Turbot's in very cool customized laser etched cases for us to raffle off at the end of the conference. The

winner was Stephen Kiernan, Ray Percival, Niclas Zeising, and Marie Heartwood, who all made donations to the Foundation which automatically entered them into the drawing.



We also recognized four people for their contributions to FreeBSD. Those people were Rod Grimes (yes, one of the founders of FreeBSD!), Gleb Smirnoff, Bryan Drewery, and Warren Block.

Your donations also helped us fund travel grants for the following attendees: Mathieu Arnold, Ruslan Bukin, Thomas Abthorpe, Trent Thompson, and Li-Wen Hsu. Trip reports from the grant recipients can be found on the [Foundation blog](#), and are posted as we receive them.

All in all, the week was extremely productive for us, and like the rest of the attendees, we left there exhausted, but with renewed energy to work on new and existing opportunities.

-- contributed by Deb Goodkin

FreeBSD Community Survey: Send Us Your Feedback!

The Foundation needs your input. Please help us by filling out the 2016 FreeBSD Community Survey. The survey should only take about 10 minutes and will help us determine the direction of our efforts in supporting the Project and community.

<https://www.surveymonkey.com/r/freebsd2016>

If you've already filled out the survey, thank you for your feedback! If not, please submit soon. All responses are due on **July, 7, 2016**.

-- contributed by Anne Dickison

New! Getting Started with FreeBSD

We're excited to announce the Getting Started with FreeBSD Project. The new initiative has been created to develop How To Get Started with FreeBSD guides and videos for new people interested in trying out FreeBSD for



the first time on their desktops. When we promote FreeBSD at events, we find many people interested in trying out FreeBSD, so we decided as part of our education initiative that we should provide some easy to follow tutorials to get these people on board quickly!

A few weeks ago, we decided to hire a summer intern, who has never worked with FreeBSD or any Unix-like OS, but who is computer literate, to work on this project for us. The plan was to have him go through the process of a new person trying out FreeBSD for the first time. Working with people inside and outside the Foundation, we created a list of tasks for our intern to figure out how to do on his own, with FreeBSD. By the end of the summer, our goal is to have 5-8 how-to guides in our Getting Started with FreeBSD series. Some of the first tasks included installing FreeBSD on a Mac and PC, installing a GUI, and accessing the internet.

Our intern, Drew, is also writing a blog about his experiences accomplishing each task, including problems he's run into, and the processes he had to go through to complete each task. This may include finding the appropriate documentation, or figuring out how to get

around a problem. He is also submitting PRs through the proper channels, and submitting issues to the appropriate mailing lists, to help improve the onboarding process for new people in the future.

We look forward to making these how-to guides available for individuals wanting simple to follow instructions on getting started with FreeBSD!

Check out the first how-to on Installing FreeBSD on VirtualBox [here](#).

Bringing on staff to help simplify the on-boarding process is just one of the many things we are doing to support FreeBSD. But, we can't do it without your help. Please consider making a [donation](#) today!

-- contributed by Deb Goodkin

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