FreeBSDOURNAL Editorial Board

John Baldwin • FreeBSD Developer, Member of the FreeBSD Core Team and Chair of FreeBSD Journal Editorial Board.

Bryan Drewery • Senior Software Engineer at Dell EMC Isilon, member of FreeBSD Portmgr Team, and FreeBSD Committer.

Justin Gibbs • Founder of the FreeBSD Foundation, President of the FreeBSD Foundation, and a Software Engineer at Facebook.

Director at BSD Consulting Inc. Daichi Goto • (Tokyo).

Joseph Kong • Software Development Engineer at Amazon Web Services, author of FreeBSD Device Drivers and Designing BSD Rootkits.

Dru Lavigne • Author of BSD Hacks and The Best of FreeBSD Basics.

Author of Absolute FreeBSD. Michael W Lucas •

> Director of Project Development, Ed Maste • FreeBSD Foundation.

Kirk McKusick • Treasurer of the FreeBSD Foundation Board, and lead author of *The Design* and Implementation book series.

George V. Neville-Neil • Director of the FreeBSD Foundation Board, and co-author of The Design and Implementation of the FreeBSD Operating System.

> Philip Paeps • Secretary of the FreeBSD Foundation Board, FreeBSD Committer, and Independent Consultant.

Kristof Provost • Treasurer of the EuroBSDCon Foundation, FreeBSD Committer, and Independent Consultant.

Hiroki Sato • Director of the FreeBSD Foundation Board, Chair of Asia BSDCon, member of the FreeBSD Core Team, and Assistant Professor at Tokyo Institute of Technology.

Benedict Reuschling • Vice President of the FreeBSD Foundation Board, a FreeBSD Documentation Committer, and member of the FreeBSD Core Team.

Director of the FreeBSD Foundation Robert N. M. Watson • Board, Founder of the TrustedBSD Project, and University Senior Lecturer at the University of Cambridge.

S&W Publishing LLC PO BOX 408, BELFAST, MAINE 04915

Publisher • Walter Andrzejewski walter@freebsdjournal.com

Editor-at-Large • James Maurer jmaurer@freebsdjournal.com

Copy Editor • Annaliese Jakimides

Design & Production • Reuter & Associates

Advertising Sales • Walter Andrzejewski walter@freebsdjournal.com Call 888/290-9469

FreeBSD Journal (ISBN: 978-0-615-88479-0) is published 6 times a year (January/February, March/April, May/June, July/August, September/October, November/December). Published by the FreeBSD Foundation, 3980 Broadway St. STE #103-107, Boulder, CO 80304 ph: 720/207-5142 • fax: 720/222-2350 email: info@freebsdfoundation.org Copyright © 2020 by FreeBSD Foundation. All rights reserved. This magazine may not be reproduced in whole or in part without written permission from the publisher.



Thank You to the Community

Welcome to the March/April issue of the FreeBSD Journal. On behalf of the Foundation, I wanted to take a minute to thank everyone for continuing to support FreeBSD during this challenging time. When recruiting folks to join the Project, we always talk about the community and how kind, generous, and welcoming it can be. This crisis has shown me that truer words were never spoken. From supporting other developers in need, to creating new methods of engagement to fill the void left by the end of in-person events, the FreeBSD community has gone above and beyond to help its fellow community members.

The Foundation is also committed to continuing to support the FreeBSD Project and community. In addition to publishing the Journal, we are increasing funding for development projects, working on new methods for online advocacy and continuing our company outreach. To find out more about these projects, please take a look at the Foundation's Q1 2020 Status Report and our March/April Newsletter.

We also want to thank the Journal authors, editorial board, and publishers for their hard work in getting this issue out during an unpredictable time.

Finally, I want to wish everyone good health for you and your loved ones. Thank you again for your ongoing support. We'll be here continuing to make big strides to improving FreeBSD and supporting the growing community.

We hope you enjoy the issue!

Deb Goodkin

Executive Director FreeBSD Foundation