



freeBSD®



Open Source: Why You Should Get Involved!

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Goals

- Introduce you to open source and what it is
- Explain why open source is used and the benefits of contributing to an open source project
- Highlight the FreeBSD Project and hopefully generate some interest here in contributing!

Who Am I?

- Joined the FreeBSD Foundation in August, 2005
- Technical background – 20 years in storage development as firmware engineer, logic designer, applications engineer, technical marketing and technical sales
- Avid runner, hiker, and dog lover



What Is Open Source?

```
207     p = (struct proc *)mem;
208     EVENTHANDLER_DIRECT_INVOKE(process_fini, p);
209     pstats_free(p->p_stats);
210     thread_free(FIRST_THREAD_IN_PROC(p));
211     wtx_destroy(&p->p_wtx);
212     if (p->p_ksi != NULL)
213         ksiinfo_free(p->p_ksi);
214 #else
215     panic("proc reclaimed");
216 #endif
217 }
218
219 /*
220  * Is p an inferior of the current process?
221  */
222 int
223 inferior(struct proc *p)
224 {
225
226     sx_assert(&proctree_lock, SX_LOCKED);
227     PROC_LOCK_ASSERT(p, MA_OWNED);
228     for (; p != curproc; p = proc_realparent(p)) {
229         if (p->p_pid == 0)
230             return (0);
231     }
232     return (1);
233 }
```

Computer software for which the original source code is made freely available and may be redistributed and modified.

Open Source term coined in 1998 after Netscape open sourced their software



Open Source Software

Mozilla Firefox - Internet Browser

LibreOffice - Complete office suite (like Word, Excel,...)

GIMP - Photo editing software

Python - Programming and scripting language

WordPress/Drupal - Content management system for blogs and websites

R - Popular for modelling/statistical work. Students in math/stats, physics, economics, ecology, or any other field that involves data analysis will most likely be using this.

Linux - Unix-like operating system kernel

FreeBSD - Unix-like operating system

Darwin - forms the Unix-based core set of components upon which [macOS](#) (previously OS X and Mac OS X), [iOS](#), [watchOS](#), [tvOS](#), [iPadOS](#) and [bridgeOS](#) are based



Drupal™



FreeBSD.



It's Been Around For a Long Time!

1953 - A-2 system for the UNIVAC, followed by all software for IBM mainframe computers

Licenses

Open source projects have to abide by an open source license. A license allows free use, modification, and distribution of the software with certain requirements.

There are two broad license categories: copyleft licenses (like the GPL), which require derivatives of the software to be released back as open source; and permissive licenses (like the BSD license), which allow the software to be reused in any project, even closed-source projects, and doesn't have to be released back as open source.

There are 110 OSI approved licenses. Here are the most popular:

- **MIT license (MIT):** This is a permissive license, requiring the original copyright notice and copy of the license itself in your modification of code. Used by Ruby on Rails and Node.js projects.
- **Apache License 2.0 (Apache-2.0):** This is a permissive license whose main conditions require preservation of copyright and license notices. Used by Free Software Foundation, OSI, Debian and Fedora.
- **2-clause BSD license (BSD-2-Clause):** The BSD licensing model allows the free modification and distribution of the software's code in the source or binary format, given that a copy of the copyright notice, list of conditions, and the disclaimer are retained. Used by FreeBSD, NetBSD, OpenBSD, and Darwin projects.
- **GNU General Public License (GPL):** Those who write software code under GPL, must release it as open source. In other words, all the users are obliged to release the full source code and all the rights to change and share the entire code. Used by Linux, Ansible, Git, and WordPress.



Go to [Opensource.org](https://opensource.org) to learn more about the open source definition and licenses



Why Do Companies Use Open Source?

- Faster time to market - They don't have to reinvent the wheel!
- Transparency
- Security
- Freedom from vendor lock-in
- Cost effective
- Collaborate w/ other companies and individuals - more diversity, ideas, and faster development

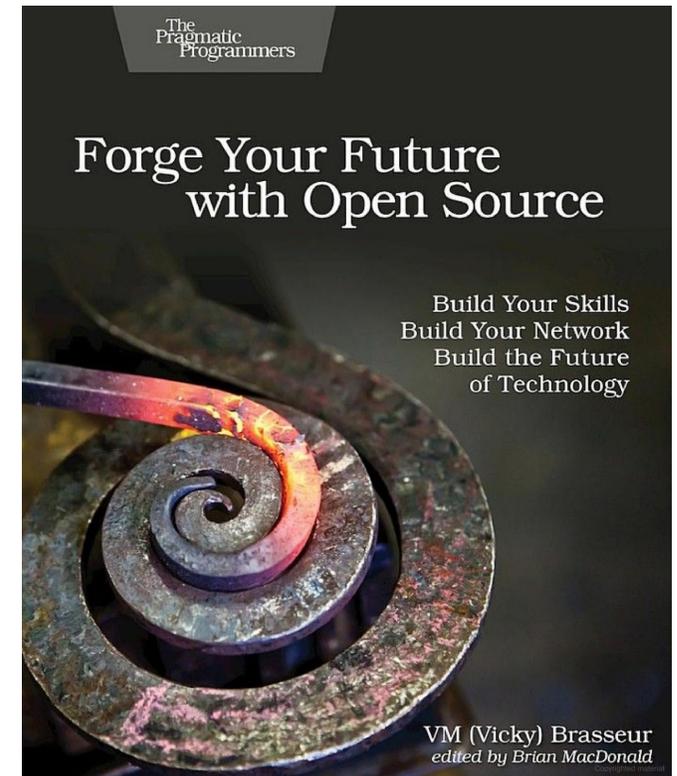
Why Do Individuals Use Open Source?

- Free
- Control
- Security
- Learning opportunities
- Community



Why Get Involved in Open Source?

- Resume building - highlight skills in a public forum
- Gain Communication and Collaboration Skills
- Have fun working with like minded individuals
- Learning opportunities from experts
- Opportunities to work in areas you are interested in
- Learn how to use various tools



How to Pick a Project!

There are over 40,000 Million repositories in Github!

Think about:

- What are your goals (remember they have to be specific and actionable)?
 - Become more proficient in C or Python or Assembly...
- What skills do you want to gain or offer?
- What are your interests?
- What type of community do you want?
- How much time do you have to dedicate to a project?

Find a project that fits your goals, skills, interests, and other requirements

How?

Look at projects/software you already use

- Find a project based on your interests
 - Do a search on your interest with the words open source. For example, “running app open source.”



FreeBSD

How to Contribute?

- Write code
- Submit bug reports
- Creating, writing, and editing documentation.
- Creating quickstarts, blogposts, videos, and tutorials.
- Organizing, hosting, and managing community events and meetups.
- Signing up for beta testing, reporting bugs, and submitting feature requests.
- Answering questions on forums like StackOverflow, technical subreddits, and so forth.
- Improving the user experience and interface design.
- Becoming an Advocate or Evangelist.
- Participating in mentorship and code review sessions.
- Volunteering opportunities and sponsorship, and many more!



What is FreeBSD?

- One of the oldest, most successful, and largest open source projects in the world
- Complete operating system including kernel, userland, documentation, and tools
- Descended from Berkeley Unix a descendent of the original Unix
- Used by universities, corporations, and individuals for over 29 years!

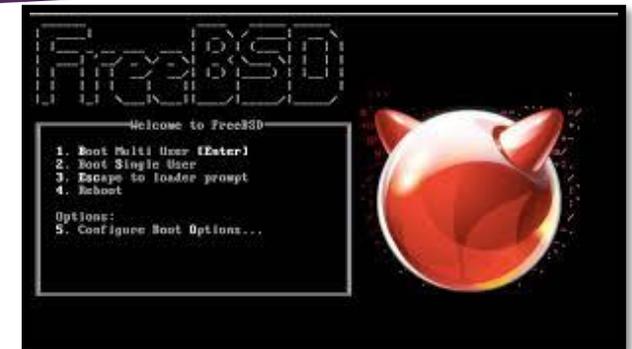


The FreeBSD World

FreeBSD is an open source Unix-like **operating system** descended from the Unix developed at the University of California, Berkeley in the 1970s.



The FreeBSD Project is an active open source community since 1993 with hundreds of committers and thousands of contributors around the world.



The FreeBSD Foundation is a 501(c)3 **non-profit organization** registered in Colorado, USA in 2000 dedicated to supporting the FreeBSD Project, its development and its community.

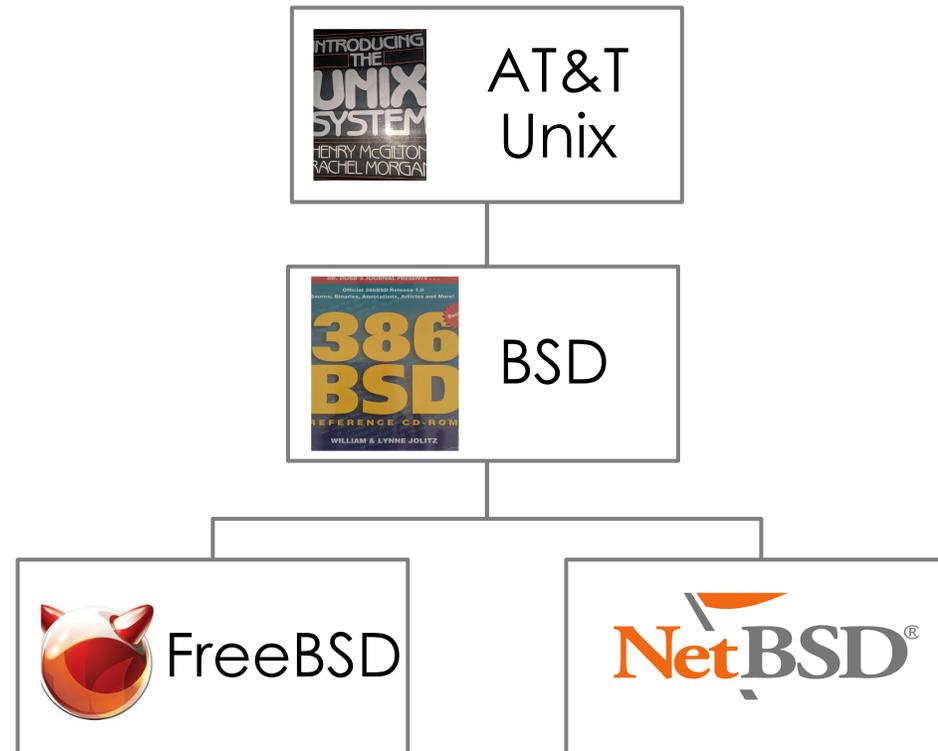


FreeBSD Foundation

- US-based 501(c)3
- 100% funded by donations
- Based in Boulder, CO, USA
- Founded in March 2000
- Our purpose is to support the FreeBSD Project and community worldwide



Abridged BSD Family Tree



BSD
In 1974 The Computer Systems Research Group at UC Berkeley started to modify and improve AT&T Research Unix. They called this modified version "Berkeley Unix" or "BSD".

BSDi Lawsuit
BSDi found itself in legal trouble with AT&T's Unix System Laboratories, then the owners of the System V copyright, and the Unix trademark. The USL v. BSDi lawsuit was filed in 1992.

1974

1992

1969

1992

1993

2022

29 YEARS OF
INNOVATION AND
GROWTH

UNIX

In 1969 Ken Thompson, Dennis Ritchie and others started working on a program that utilized the full capabilities of new powerful computer systems. This program was called Unix.

386/BSD

386/BSD was released in 1992. This was the first freely redistributable full BSD operating system with 100% unencumbered files.

FreeBSD

The development flow of 386BSD was slow and after a period of neglect, a group of 386BSD users decided to branch out on their own and create FreeBSD so that they could keep the operating system up to date. On 19 June 1993, the name FreeBSD was chosen for the project.



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

Who Uses FreeBSD



NETFLIX



BECKHO

JUNIPER
NETWORKS

vmware®

arm



SONY
NGINX



trivago®

GROUPON®



Most Likely You Use FreeBSD!



- iPhone or Apple computer

- Streaming Netflix **NETFLIX**



- Planning your next vacation

- Sony PlayStation 4&5



- Getting an awesome deal!



FreeBSD

Why Use FreeBSD?

- Friendly and Approachable Community
- Excellent Documentation
- Good Tooling and Modern Compilers
- Consistent Development and Release Processes
- Wide Variety of Architectures Supported
- 2-clause BSD license - Does not restrict what you can do with your own code!
- Secure, Stable, and Reliable



FreeBSD Project Goal

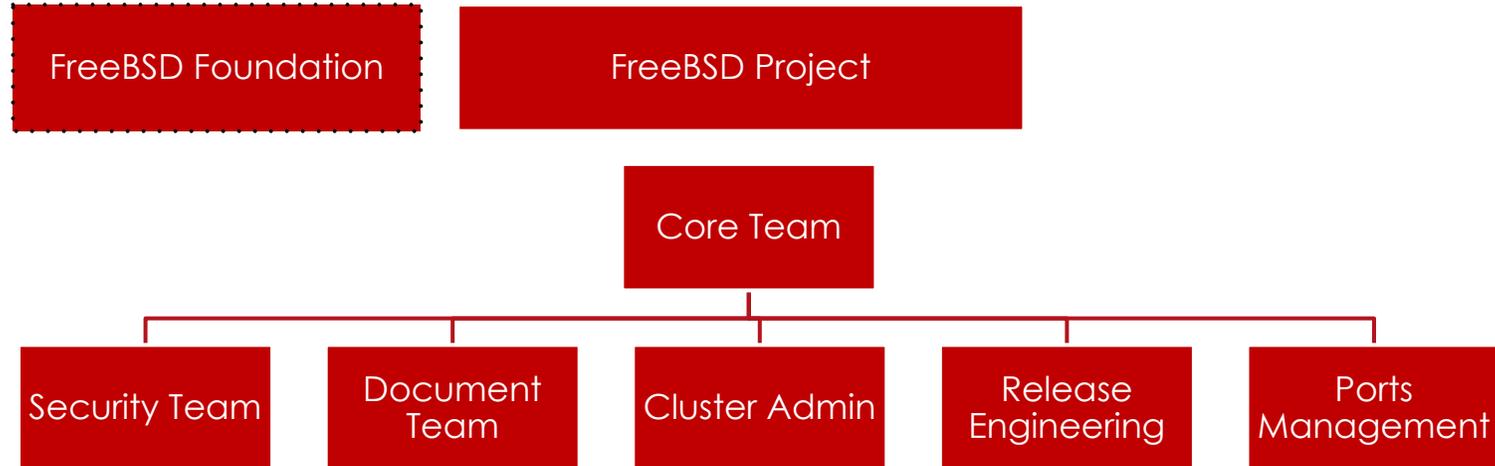
Provide software that may be used for any purpose and
without strings attached

FreeBSD Project Model

- FreeBSD followed the model set up at Berkeley, improving over the years.
- Thousands of contributors/developers who maintain, write documentation, and make improvements who can submit changes and improvements as PRs or through committers.
- Hundreds of committers who can submit changes and improvements to the source tree.
- Nine member elected core team who governs and leads the Project.
- Strong mentorship culture, where a committer will mentor a new contributor.
- No “benevolent” dictators for life, meaning anyone can make a huge impact.
- High coding standards



FreeBSD Project Org Chart



Other Teams include:

- Ports Secteam
- Security Officer
- Bugmeisters
- Ports Security Team
- Continuous Integration Testing Admins
- Postmaster Team
- Webmaster Team
- Phabricator Code Review Administration
- Core Team - 9
- Committers - ~400
- Contributors - Thousands



We need your help!



How to Contribute to FreeBSD

- Code, write documentation, maintain ports, and advocacy.
- Easy to get started contributing.

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

Some Suggestions:

- Start by translating or improving our documentation
- Pick one of the many ports to maintain or add
- Go through the PR list and fix some bugs

Check out FreeBSD Fridays and our How-To Guides for more getting started information

<https://freebsd.foundation.org/freebsd-fridays/>

<https://freebsd.foundation.org/freebsd-project/resources/>



Why Companies Use FreeBSD?

- History of innovation
- High performance
- Great tools
- ABI stability within major releases – Remember POLA
- Mature release model
- Excellent documentation
- Business Friendly License
- ZFS
- Open community
- Smaller footprint than most operating systems

“We choose FreeBSD for many of our internal services and product service offerings because we know we can rely on its consistent reliability and performance. Its portability not only allows us to run it on almost any commodity or enterprise server, but allows for the possibility to move a hard drive from one server to another, boot, and get back to normal operation with minimal fuss.”

The Power to Connect – Excerpt from Netflix Case Study

Netflix Open Connect
Appliance
2RU 40Gb/s Storage
Appliance with 248TB
storage



Application

N Open Connect is the name of the global network that delivers Netflix TV shows and movies to members world-wide.

- The building blocks are purpose-built Open Connect Appliances (OCAs).
- FreeBSD was selected as the operating system for OCA because of its balance of stability and features, strong development community, staff expertise, and license.

Results

- Delivers over **100 Tb/second** globally at peak
- **400 Gb/s** from an **OCA** – using commodity parts and FreeBSD
- FreeBSD is central to pushing this much content **cost-effectively**. By minimizing kernel to userspace copies, data stays in the kernel as long as possible
- Async Sendfile, a Netflix and NGINX innovation, is available to all FreeBSD users
 - Web server tells kernel to send this chunk of this file out over this socket
 - Kernel returns to userspace so the web server can do other things
 - Kernel continues in background sending files to users

<https://freebsd.foundation.org/blog/freebsd-case-study-netflix/>

Other Features

- **Robust file systems** including UFS and ZFS (Active work happening on ZFS)
- **DTrace** - an advanced event-based performance analysis and troubleshooting tool. DTrace can help you identify and quantify the root cause of virtually any performance issue, in both user-level and kernel code. It can be executed using custom and powerful one-liners and scripts.
- **Jails** – Lightweight virtualization added to FreeBSD in the early 2000s.
- **bhyve** – Full-blown hypervisor. This hypervisor supports a number of guests, including FreeBSD, OpenBSD, Microsoft Windows, and many Linux distributions.
- **TCP/IP** was originally developed on BSD and FreeBSD remains the reference implementation for several network protocols.
- **Capsicum** – Capsicum is a lightweight OS capability and sandbox framework developed at the [University of Cambridge Computer Laboratory](#). Capsicum extends the POSIX API, providing several new OS primitives **to support object-capability security** on UNIX-like operating systems

Desktop Distributions

- MidnightBSD
- GhostBSD
- NomadBSD
- helloSystem

Containerization

- FreeBSD pioneered containers with **Jails**
- **Linuxulator** - provides binary compatibility with Linux®
- **bhyve** – Full-blown hypervisor. This hypervisor supports a number of guests, including FreeBSD, OpenBSD, Microsoft Windows, and many Linux distributions.
- **Pot** – Another container framework based on jails, to run FreeBSD containers on FreeBSD
- **Bastille** - is an open-source system for automating deployment and management of containerized applications on FreeBSD.
- **locage** – Convenient, lightweight, and easy container management



Why Linux and FreeBSD Should Work Together

- May work on multiple operating systems during your employment
- Learn from each other. We both have successes and failures.
- Different coding methodologies and philosophies – Understanding the reasons for both.
- FreeBSD's smaller code base makes it a great reference platform.
- “Using and learning FreeBSD made me a better Linux admin and systems engineer.”



Join the
FreeBSD
Project
Today!!



Why Contribute to FreeBSD

- Be part of an inclusive and welcoming community with a strong mentoring culture
- Learn about other technologies including File Systems, Networking Storage Security, Virtualization, ...
- Great way to learn systems programming and study operating systems.
- The size of the project allows for a greater chance for anyone to make a notable impact.
- Some of the most notable BSD and FreeBSD Founders are still involved in the Project – and, they are approachable!
- Democratically run open source project allowing committers to commit their changes directly to the source tree without having to go through hierarchy of lieutenant model.
- Learn about best practices

A screenshot of the FreeBSD website. The header features the FreeBSD logo and the tagline 'The Power To Serve'. Below the header is a navigation menu with links for Home, About, Get FreeBSD, Documentation, Community, Developers, Support, and Found. The main content area is divided into several sections: 'Resources for Newbies', 'Getting FreeBSD', 'Learning about FreeBSD', and 'Questions and Support'. Each section contains links to various resources and information.

FreeBSD The Power To Serve

Home About Get FreeBSD Documentation Community Developers Support Found

» [Documentation](#)

» [FAQ](#)

» [Handbook](#)

» [Manual Pages](#)

» [Books and Articles Online](#)

» [Publications](#)

» [Web Resources](#)

» [For Newbies](#)

» [Documentation Project](#)

» [Archive](#)

Resources for Newbies

Getting FreeBSD

The latest FreeBSD releases are available [here](#). Before you begin, please care

Learning about FreeBSD

- The [FreeBSD Handbook](#) and [Frequently Asked Questions \(FAQ\)](#) are the m they contain a lot of material for newbies as well as advanced users. For [Windows](#) chapter.
- [Manual pages](#) are good for reference but not always the best introduction information on a specific command, driver or service.

Questions and Support

- Join the FreeBSD-Questions mailing list to see the questions you were to filling out the following form: <http://lists.FreeBSD.org/mailman/listinfo/fr> and answers via the [search](#) page.



How to get started with FreeBSD!

- Go to Newbies page - <https://www.freebsd.org/projects/newbies/>
- Read Contributing to FreeBSD (https://www.freebsd.org/doc/en_US.ISO8859-1/articles/contributing/)
- Read The FreeBSD Handbook <https://www.freebsd.org/doc/handbook/book.html>
- Learn about the history of FreeBSD here: <https://www.mckusick.com/history/>
- FreeBSD Foundation's resource page with how-to guides! <https://freebsd.foundation.org/freebsd-project/resources/>
- FreeBSD Fridays Introductory Series <https://freebsd.foundation.org/freebsd-fridays/>
- Install FreeBSD on a virtual machine by following the instructions here: <https://freebsd.foundation.org/freebsd-project/resources/installing-freebsd-with-virtualbox/>
- LPI BSD Certification provides good learning sequence to follow: <https://www.lpi.org/our-certifications/exam-702-objectives>
- Have a question? There are many resources to get help:
 - <https://www.facebook.com/groups/FreeSBD>
 - freebsd-questions@freebsd.org
 - Join Mailing Lists [Forums, Mailing Lists, IRC and Events \(https://www.freebsd.org/community.html\)](https://www.freebsd.org/community.html)



Some Advice

- Anything new will be intimidating at first - technology, new job, running group,...
- Think about what you want out of this.
- Research the project first before contributing
- Ask your friends if they are familiar with the project
- Ask your friends which projects they like
- Understand the fundamentals of computers
- Do something that you enjoy
- Get outside!



Resources

▶ Mailing Lists

Forums, Mailing Lists, IRC and Events
(<https://www.freebsd.org/community.html>)

▶ Contributing to FreeBSD

(https://www.freebsd.org/doc/en_US.ISO8859-1/articles/contributing/)

▶ FreeBSD Handbook

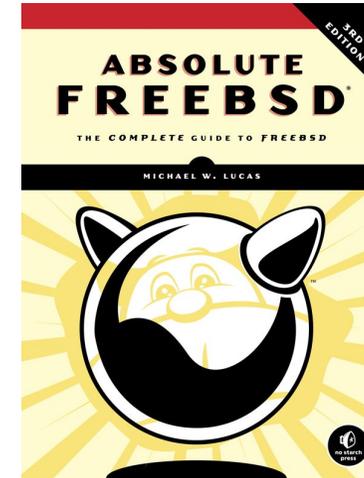
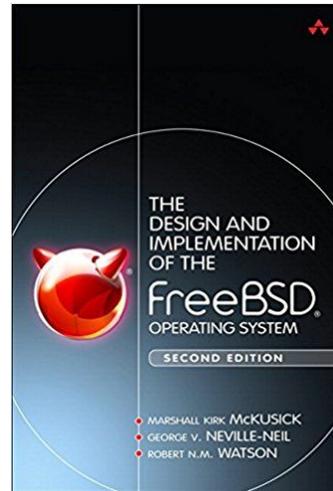
<https://www.freebsd.org/doc/handbook/book.html>

▶ History

<https://www.mckusick.com/history/>

▶ Forums:

<http://forums.freebsd.org/>



FreeBSD FOUNDATION

Our Work FreeBSD Project Get Involved About Us Our Donors Donate Q

Goal: \$1,250,000 Current Donations: \$1,242,373 Donors: 788

DONATE NOW

FreeBSD Resources

Getting Started with FreeBSD

As part of the FreeBSD Foundation's education initiative, we've worked with community members and new recruits to develop guides that make getting started with FreeBSD a straight forward process. For an overview, see our [FreeBSD Quickstart Guide](#). Stay tuned for more how-tos as they become available.

How-To Guides

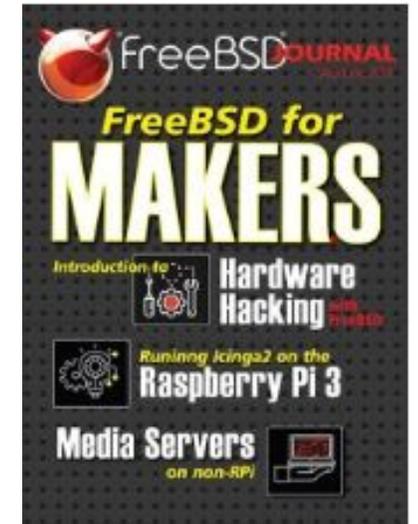
FreeBSD Installation Guides:

- [Installing FreeBSD with VirtualBox \(Mac/Windows\)](#)
- [Installing FreeBSD as a Primary Operating System](#)

Video Guides:

- [Installing FreeBSD with VirtualBox \(Mac/Windows\)](#)
- [Easy Minecraft Server on FreeBSD](#)

<https://freebsd.foundation.org/freebsd-project/resources/>



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

Questions?

- Email questions to [deb@freebsd.foundation.org](mailto:deb@freebsd.foundation)
- [dgoodkin@twitter.com](https://twitter.com/dgoodkin)
- IRC: #freebsd, #freebsd-soc on Libera.Chat
- Visit us during the career fair today!

