



FreeBSD Friday

BY DEB GOODKIN

The first of several introductory talks and 101 classes designed to get you started with FreeBSD. The program kicks off with Deb Goodkin's Intro to FreeBSD.

I'm Deb Goodkin, Executive Director of the FreeBSD Foundation. Welcome to our FreeBSD Friday presentation, the first of many introductory topics that we'll cover over the next few months.

Many of you may be new to FreeBSD, but I'm also making the assumption that we have people online from our community, and so this will be a very basic introductory-level, informational session on FreeBSD—and probably a refresher for some.

As I myself am also constantly learning more about FreeBSD, I will be watching these talks and learning alongside you. So, thank you for joining in this adventure with me.

Today's presentation is a very basic introduction to FreeBSD. The next two FreeBSD Fridays will be about getting started with FreeBSD with sessions Installfest, Parts 1 and 2, hosted by Roller Angel. The idea is that you can watch him for the hour, which will be recorded. Later, when you're ready to install FreeBSD on your system, you can access the sessions and follow along at your own pace.

Following Roller Angel's sessions will be Dr. Marshall Kirk McKusick (History of the BSD Fast Filesystem). Most of you know him as Kirk McKusick, who created the Fast Filesystem. It'll be a recorded talk, but Kirk will be available for a Q&A at the end. And then the last session we have planned will be An Introduction to ZFS by Dan Langille. You possibly know Dan not only from the community but as the person who runs BSDCan.

I encourage you to keep an eye on the Foundation's webpage for more of these FreeBSD 101-level talks, which will all be geared toward introducing you to various areas of FreeBSD.

I already introduced myself but here's a little more background. I joined the FreeBSD Foundation in 2005. Before that, I was a developer in the storage world and worked mostly on disk-drives—starting out as a firmware engineer, then moving into different areas of research and development and then to marketing and technical sales. As the Foundation's purpose is to support the FreeBSD operating system and community, it's really important for me to understand it. I have personally found studying it really interesting and enjoy learning about it.

The goal today is to give you a very basic overview of FreeBSD, why people use it, how the Project works, and why you should use it and contribute to FreeBSD. Our goal is to get information out there, to educate people, and to get more people using and contributing to FreeBSD.

Let me say that even now, in 2020, some people are still not clear that FreeBSD is not a Linux distribution. It can be very confusing when someone asks about your favorite Linux distro and they



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include FreeBSD as one of the choices. So, we just keep making sure people understand that it's not Linux. It's not a Linux distribution. And yet, I know the reason they include FreeBSD is because FreeBSD is so popular. The question should have been what's your favorite operating system?

FreeBSD is comprised of three different components, the first of which is the actual operating system and that's what you're going to load on your computers with Roller Angel's guidance. The second component is the community—people who are watching this livestream, those who are interested in learning about FreeBSD and would like to start using it, trying it out, playing around with it, and contributing. The third component is the Foundation, which I run. It is actually a separate organization and I'll talk about what we do before we conclude today.

So, what is FreeBSD? It is one of the oldest, largest, most successful open-source projects in the world. It's a complete operating system, and we support over 33,000 third-party software packages. We have a community of highly technical and committed contributors and over a thousand contributors to the Project. FreeBSD runs on all of the major platforms out there, and we continue to make sure that FreeBSD runs on newer architectures, too, as well as on most of the main cloud providers. There truly are over tens of millions of deployed systems out there.

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A little history now: FreeBSD descended from BSD, which came about from the original AT&T UNIX. And both FreeBSD and NetBSD branched out from BSD, and then OpenBSD branched out from NetBSD. When you have a chance, take a look at the timeline on the Foundation website as it's really interesting. UNIX was developed in 1969. It came out of the labs of AT&T, and then Berkeley actually started improving and modifying it in 1974. The first unencumbered operating system, 386BSD, came out in 1992. And it branched out from there. We celebrate BSD's birthday on June 19 because that's when the name was chosen—Berkeley Software Distribution. We've enjoyed 27 years of innovation and growth.

One thing I want to mention at this juncture is that there was a relevant lawsuit in 1992. I bring it up because it lasted for around two years and it really limited the development and adoption of BSD during that time. Most of the developers who were working on it got focused on that lawsuit. And it really slowed things down, and as some of you may know, that's actually the same time Linux came around. Sometimes, people will ask why did Linux take off? And one response is that the lawsuit was actually the reason or certainly one of the reasons.

When UNIX was developed in 1969, most major computer companies used it and created their own versions of UNIX. So, you had IBM and HP and Sun. They were all proprietary versions.

Most of the open-source versions that came out of UNIX were from Berkeley UNIX, and FreeBSD has lineage from Berkeley UNIX, which came from the original UNIX. Linux, however, came about all on its own, and it came out with its own open-source version of UNIX. If you'd like to find out more about the history, there are many interesting online resources.

A lot of companies use FreeBSD. Most likely, you're using FreeBSD. You may know that Apple originally used components of BSD and that there is a lot of FreeBSD that was or is in those operating systems. If you're watching a Netflix movie and you're streaming it, it's running on FreeBSD-based servers. And if you're using a PlayStation, that's FreeBSD-based. People may not realize it, but there are a lot of products and companies that base their products on FreeBSD. We're just trying to raise awareness of that.

So why use FreeBSD? Well, there are different reasons if you're a user, if you're developing a product, or if you're doing research. And there's the broad community of users. Why do

people join open-source products? Why do they contribute? A lot of times, it's because of the technology they're interested in. But when you look at the thousands of open-source projects out there, there are a lot to choose from, and many times, the choice ends up being due to the community.

There's also a high regard for our excellent documentation. And that's not only because of access but also the ability to find most of it in one location, plus all the manual pages, and you can have the handbook installed, too. It's up to you. Remember, it's a small base system. You get what you need, and then you add the software packages that you want to do what you need to do or want to do. Those packages are up-to-date and you get them from one location. If I want to run Firefox, I don't have to go to the Firefox site. It's all on our own infrastructure.

As I mentioned earlier, there are a lot of CPU architectures that are supported—and then there's the BSD license. If you're just an end-user, if you're putting it on your desktop like I do, maybe you don't care so much about the BSD license, but a lot of developers care about it as do a lot of commercial users. And it's stable and secure. It's reliable in its performance.

Let's move along to how the FreeBSD Project works. The FreeBSD Project is independent of the FreeBSD Foundation. It is led by a Core Team. You get your commit bit through a mentorship process. You have one community that supports FreeBSD and it's made up of individuals and functional teams that put the operating system together and support it. It is a collaborative development model.

We have two high-level functions or organizations. The FreeBSD Foundation is an organization. The FreeBSD Project is the volunteer arm. Under the Project, you have a Core Team and under them, you have many different functional teams like Security Team, Document Team and so on. You have all of these different teams that work together, and they are the ones who produce the product. There are many different teams of people who support FreeBSD. This gives people teams to be part of and allows them to contribute in different ways.

The Core Team is elected every two years. They're self-nominated and then voted on by active committers—and there are currently around 400 committers. They are all volunteers, and they typically meet every two weeks or at least once a month.

If there are any conflicts within the community, Core may step in to help. They also help provide strategic direction. But they don't step in and say, this is what we're going to do. No, in our project people want to work on the things they want to work on. But Core can help encourage people to work in certain areas that we know will help strengthen FreeBSD. We don't have a benevolent dictator. We don't have a 1% who oversee the Project and who make all the decisions. It's a community.

In terms of age range, we do have a lot of younger people who join the Project. Most are between 30 and 40. But we also have the older, more experienced, more knowledgeable people. And one nice thing is that a lot of the older people have been with the Project since the beginning.

Some of these people were with BSD when BSD was at Berkeley, which is really cool because they bring that very particular experience and knowledge with them. Younger people

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can go to the more experienced people and learn from them. The people who've been with the Project forever are very approachable. And so, you can go to a conference, meet them in person, and they can tell you why decisions were made, why we changed things up, how we did it when we were at Berkeley, and why it still works now. And so, it's sharing and handing over that knowledge, that experience, which is really what helps make this project vibrant and sustainable. And I should add that there are many countries represented, which makes for a diverse, global community.

In terms of the particular community philosophy, the Principle of Least Astonishment (POLA) means that changes are only made to improve, to add features, and to make FreeBSD better. It's not a community that makes changes for the sake of making a change. And because of that philosophy, the changes don't typically break things. And because it works so well, that philosophy is followed across the Project.

Regarding releases, we have two major types of releases—the major release and the point release. The major releases, for example, are when 12.0 came out or when 13.0 will come out next year. So, major releases happen every couple of years. The point—the in-between—releases fall more in the category of something like security fixes that are added. And those can happen about every nine months.

And we have two branches of the source code. We have a Current and Stable. If you make a change and you commit it, that goes into the Current branch. And Stable is the version where those changes that went into Current appear after they go through testing. Only then may they be moved over to Stable.

How can you contribute to FreeBSD? Let me count the ways! Usually when you think about a software project, you think, well, I have to contribute by writing code. And, yes, that's the most obvious way. But there are so many other areas that are just as important—for example, documentation. When I was talking about how we're known for our excellent documentation, I was referring to doc committers. People who can commit documentation are viewed very highly in the community as are those who maintain the ports—those 33,000 or more software packages that are out there.

And advocacy, which is what I'm doing right now, can be fun. There are people who have their own YouTube channels, people who are doing their own videos on FreeBSD, creating

how-to guides, writing up blogposts about a special feature in FreeBSD and how they got it working. There are so many different ways that you can contribute!

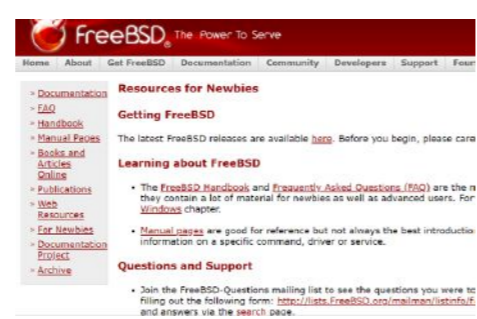
And it really is easy to get started contributing. My suggestion—even if you're a software engineer—would be to start by contributing documentation. By doing that, you're learning about the operating system. You might update a man page, and then you learn about how that command works.

Or you may translate into your native language. By doing that, you're learning as you go. We can always use people to improve documentation. We can always use ports maintainers, or if you have a software package that you love and isn't supported, you could bring it into the fold and support that.

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Why Contribute to FreeBSD

- Be part of an inclusive and welcoming community with a strong mentoring culture
- 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.



My other suggestion is to go through the PR (Problem Report) list and fix some bugs. We can always use people to do that.

But let's move on to a little on why companies use FreeBSD.

When I go to a company and talk to them about the use of FreeBSD, they already know about FreeBSD. They usually know the history and they feel comfortable using it because of that. And companies tend to like the POLA philosophy and knowing that when they install FreeBSD and they have it on their systems or in their product that it's going to be really reliable and stable. And when we come out with new releases, they understand that everything will work. Companies use it for its high performance and the tools, the mature release model and the excellent documentation.

One of the most frequent reasons companies tell me they use FreeBSD is the BSD license. It's a permissive license, and what that means is that they can put their own IP, their own secret sauce, their own stuff, into that code. They don't have to give it back. However, we find that most of the time they do give back most of the code upstream (except for their IP), which is really beneficial to them as well as to us.

The other most frequently cited reason for using FreeBSD is the ZFS support.

By the way, I highly recommend a book called *The Design and Implementation of the FreeBSD Operating System* [Marshall Kirk McKusick and George V. Neville-Neill]. I recommend it because it is a great resource for learning about the internals of the kernel.

I'm going to conclude by talking a little bit about the FreeBSD Foundation. We are classified as a 501(c)(3), which is a U.S.-based tax code. And what that means is we're a nonprofit public charity and really work for the public good. And so our whole focus is supporting the FreeBSD Project and community. We are funded 100% by donations from individuals and commercial users. We will get individual donations from \$5 to \$50,000, and corporate donors typically will donate between \$10,000 and a million dollars. That's how we keep going, and we use that funding to do the work that we do to support FreeBSD.

We are separate from the Project and we don't oversee the Project. We don't tell the Project what to do. What we try to do is assess what the Project needs—especially the most critical needs. And we try to step in to help in those most critical areas. To do that, we meet with companies to understand their uses and their pain points and their needs. We ask what they need to start using FreeBSD or to continue using FreeBSD.

We also hear from you. We hear from the community. We keep our eyes on mailing lists and social media and we keep an eye on the questions that come in. We listen to people who say they're having problems with things and we try to help.

We fund projects internally and we fund projects externally and we do a lot of advocacy. Since we're not going to conferences right now—which we typically do—we have started this FreeBSD Friday Series to introduce people to various areas of FreeBSD and to help us all learn from one another.

Let's say you want to learn about operating systems. FreeBSD's smaller code base is a great way to learn about operating systems. For example, our kernel is just over 5 million lines of code compared to Linux, which is about 26 million lines of code. And this is just the kernel. So, if you want to actually look at code, if you want to look at the source code, there's a lot less to look at in FreeBSD, which makes it a great way to learn.

Why chose our project? Part of the reason is that we're inclusive and welcoming and that we have a strong mentoring culture. Because we're a smaller project, you can make a more notable impact.

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