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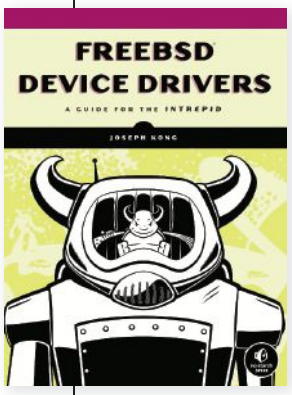
BOOKreview

by Simon Gerraty

FreeBSD Device Drivers

A Guide for the Intrepid by Joseph Kong



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Device drivers are the code that allows an operating system to deal with hardware. They differ from most of the code in the kernel in that they are often maintained by people more familiar with the hardware than any given operating system.

FreeBSD Device Drivers covers the infrastructure within FreeBSD that is important to device drivers. As such, it should be very useful to those wishing to write or adapt drivers for FreeBSD.

The author makes it clear in his introduction that the reader is assumed to have some familiarity with operating system internals, and he even provides suggested prerequisite reading. In keeping with its intended audience, the book presents the services the kernel provides to device drivers in terms of their APIs only. There is not very much discussion of what happens behind those APIs except where it helps to make sense of them.

The content is arranged in a reasonable progression, starting from the basic scaffolding that every device driver needs as well as resource allocation and thread synchronization. The auto-configuration process by which drivers claim hardware they recognize is covered, as is the Common Access Method (CAM) used for storage devices, DMA, USB, and finally network adapters and their interactions with the network stack.

There are plenty of code listings with commentary to explain what is going on. There are also some simple examples in the early sections on pseudo devices (things that look and smell like a device, but have no associated hardware), but most of the listings are from real device drivers. The format is perhaps a little terse for those reading for general interest, but should generally be appreciated by the intended audience. I thought it worked quite well.

Since many drivers have code to do the same things, the later chapters skipped over those that had effectively been fully described earlier. I appreciated that. I hate the way many technical books unnecessarily pad themselves with redundant information—the worst culprits being those that give you say a hundred pages of useful info, and then three or four hundred pages of verbatim man pages!

I think I fit within the intended audience for this book. I've studied the internals of several operating systems, have ported and tweaked a few device drivers, but have had little to do with hardware since the CP/M days and the Z80. I can at least attest to the fact that transistors do not work after you let the smoke out!

The chapters I found most interesting were those that dealt with the strictly device driver-related APIs. There were a couple of sections where I thought a bit more depth might have helped. There are lots of DMA-related APIs, and obviously few drivers use them all, but seeing some real examples might have been useful.

USB is weird (probably designed by a committee) and something I knew very little about, but was interested to learn. The ulpt driver covered in this chapter is a decent example, but USB can be used for a broad range of devices, and perhaps a second example might have been useful.

All in all, though, I think the book strikes a pretty good balance for its stated purpose. Its mostly "just the facts ma'am" style works well, but it provides plenty of references for those wanting more detail or background.

This is definitely worth a read if device drivers in FreeBSD are something you need or want to know about. ●

SIMON GERRATY is a Distinguished Engineer at Juniper Networks where he has worked on Junos (FreeBSD-derived OS) since 2000. He is a NetBSD and FreeBSD committer, and has maintained bmake since 1993. He has used various UNIX systems (PCs to mainframes) since about 1984.