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# BOOKreview

by Joseph Kong

## FreeBSD Mastery: Advanced ZFS

by Allan Jude and Michael W. Lucas

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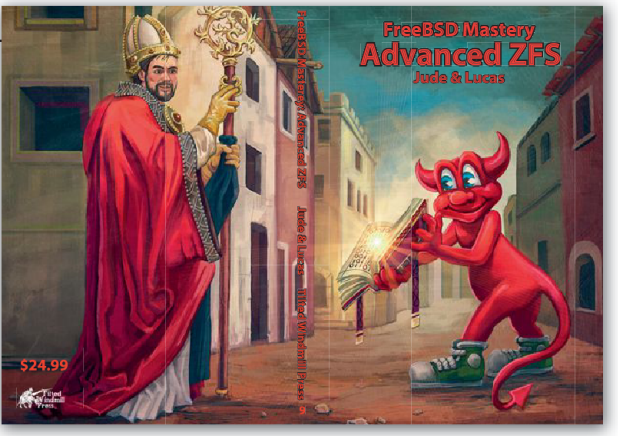


FreeBSD Mastery: Advanced ZFS by Allan Jude and Michael W. Lucas is a clear and concise tour of the more complicated and esoteric parts of managing the Z File System (ZFS). This book is directly on target and does not waste your time. The authors assume you're already familiar with ZFS pools, datasets, snapshots, clones, and so on, and that you're here specifically for the advanced stuff.

**Chapter 1**, Boot Environments, describes using ZFS to create Solaris-style boot environments, which are bootable backups of your operating system's kernel and userland, enabling you to easily revert changes.

**Chapter 2**, Delegation and Jails, describes ZFS's delegation system, which allows you to specify the commands a user or group can issue on each dataset. A discussion on how this delegation system works with FreeBSD jails is also included.

**Chapter 3**, Sharing Datasets, discusses ZFS's network file-sharing features. It walks you through FreeBSD's iSCSI and NFS implementations and how they relate to ZFS.

**Chapter 4**, Replication, describes how to create an exact copy of your filesystem elsewhere—for example, on another dataset in your pool, a second pool on your system, an external drive, a remote system, a tape, or just a file.

**Chapter 5**, ZFS Volumes, goes over the basics of ZFS volumes (zvols) and then delves into some common pitfalls.

**Chapter 6**, Advanced Hardware, covers different types of hardware and how they interact with ZFS, including SCSI enclosures, Host Bus Adapters (HBAs), SAS Multipath, Solid State Disks (SSDs), and Non-Volatile Memory Express (NVMe).

**Chapter 7**, Caches, describes ZFS's caching mechanisms, including an in-depth discussion of ZFS's Adaptive Replacement Cache (ARC), which is actually the bulk of the chapter.

**Chapter 8**, Performance, details how to improve ZFS's performance for your specific environment. This is quite an in-depth chapter and is my favorite of the book. It discusses how to assess ZFS's performance, ZFS's prefetch system, transaction group (txg) tuning, I/O scheduling, I/O queues, throttling writes, and more.

**Chapter 9,** Tuning, is a continuation (of sorts) of chapter 8 and describes how to adjust ZFS for your environment. I particularly enjoyed the discussion on how ZFS interacts with MySQL and PostgreSQL.

**Chapter 10**, ZFS Potpourri, contains an assortment of short guides on using ZFS, including splitting mirrored pools into multiple identical pools, deleting multiple neighboring snapshots, recovering destroyed pools, using the ZFS debugger (zdb), examining datasets in detail, and more.

Like Lucas's other titles, humor is ever-present in this book. For example, on page 195, there are four footnotes that contain a back-and-forth argument between the two authors. I found these tidbits helped break up the dense material; however, some readers may dislike them.

Bottom line, *FreeBSD Mastery: Advanced ZFS* is a superb book for the right reader. If you've already mastered the basics of ZFS and want to learn more, this book is for you. ●

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