

The Apple File System's killer features: clones and snapshots

APFS replaces the hoary HFS+ - a relic with roots in the 1980s - and offers a laundry list of 21st century features.



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Apple's APFS is already on millions of iOS devices - it's on a couple of mine - but it's invisible to users. By the time it ships on Mac OS later this year, it will have thousands of user-years of experience.

APFS replaces the hoary HFS+ - a relic with roots in the 1980s - and offers a laundry list of 21st century features, such as

- **64-bit inodes.** Supports over 9 quintillion files on a single volume.
- **Sparse file support.** Handles file empty space more efficiently.
- **Nanosecond time stamps.** Improves sorting of file updates.
- **Atomic Safe-Save.** Eliminates partial write corruption.
- **Clones and snapshots.** Time Machine on steroids.

WHAT IS A CLONE?

Cloning isn't replication. Instead, a file is cloned when the file system says any future changes to the file are stored separately. The changed blocks are written in new blocks with pointers to the unchanged blocks. No old file blocks are overwritten. Thus both the updated file and the original are available.

It remains to be seen what options APFS will offer for cloning. Assuming you can clone as often as you like, it will be a great feature for writers, developers, and anyone

who likes the freedom to experiment while preserving prior versions if the experiment doesn't work out.

WHAT IS A SNAPSHOT?

A snapshot is a read-only version of your file system at a particular time, and - magically - does so without using more storage capacity. Snapshots make it easy to revert to an earlier version of the file system, or of any document in the file system. So how does it handle file updates?

When a file is updated, then, as with clones, the changes are written to a fresh blocks, with pointers back to the unchanged blocks already stored. Unlike clones, a snapshot does this for all files in the file system, not just a single file.

WILL SNAPSHOTS ELIMINATE BACKUP?

Sadly, no. If all your originals, clones and snapshots are stored on the same drive, they all disappear when that drive fails.

But that suggests a better kind of backup and - I hope - a better Time Machine. Copy current data to an external drive or the cloud, and have APFS write new blocks to the external drive. Then use the Time Machine interface to retrieve old versions of files or the entire system.

THE STORAGE BITS TAKE

APFS is a long-overdue upgrade to the buggy and feature-poor HFS+. It won't [fully satisfy sticklers for data integrity and future-proofing](#) like me. But even if it only lasts 10 years, its many improvements will make Macs more reliable and efficient.

Apple plans to offer non-destructive, in-place system drive upgrades to APFS when it ships this year, with tools to upgrade external drives as well. That sounds good, and I'm sure it will usually work, but I'll have everything backed up before I upgrade, just in case.

I'm looking forward to using snapshots and clones to protect my data, as enterprise storage systems have for years. Hopefully you will too.

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