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**The Smart File System for Amiga**

The Amiga Smart File System (SFS) was independently developed by John Hendrikx in 1998 as a viable replacement of the Amiga Fast File System (FFS) for Commodore computers using the AmigaOS (\*Note: the Amiga FFS discussed here is not to be confused with the better known Unix File System that also goes by FFS). The basis for how SFS organizes data is by grouping multiple directories under a single block, and similarly clusters the metadata together. Block sizes range from 512 bytes to approximately 32 kilobytes, with a partition cap at 128 GB, and a maximum file size of 4 GB (4). Quintessential to its’ design are the attributes of performance, scalability, and integrity (4). During the 1990’s and early 2000’s, computers using Amiga were often undervalued because the potential of its advanced multimedia features were ahead of its time (1). Personally, I like to think of what Amiga offered as a less sexy version of modern Mac’s with all the personality. Prior to SFS, the dominant filesystem on Amiga-based computers was FFS, a simple yet effective filesystem praised at the time for removing the redundancy of data that had slowed older filesystems (2). Eventually, problems arose that led to the need for FFS to be replaced. Among the holes in FFS were its 32 bit addressing, which placed heavy limitations on hard drive sizes, as FFS was incapable of reading past 4 GB without corruption (2). FFS was further weakened by a myriad of problems related to the disk-validator, both performance and security related, and quickly dropped from cutting-edge to outdated.

Because SFS was developed as a modernization of FFS, it borrowed considerably from its Amiga ancestor, while also being sure to learn from some of its mistakes. Like its predecessor, SFS is a journaling based filesystem, meaning that uncommitted changes are kept track of in a transaction log. In SFS, only metadata changes are recorded to this log, first writing to free space and then overwriting oldest data in the journal. This is known as a circular log, and keeps the log at a fixed size containing the most recent entries (5). By only recording metadata to the log, SFS prioritizes overall performance at the expense of higher risk for data corruption. It’s recovery options are less robust than other Amiga based file systems meant to replace FFS (such as the Professional File System), but its directory of deleted files and inability for partitions to be invalidated makes it a popular choice among Amiga users (6). In the event of a crash, the filesystem is rolled back to its most recent known stable state. File data itself can be damaged or corrupted, particularly in the event of an unexpected termination of a write operation (4).

Another important similarity between SFS and FFS is in their management of the space available to the filesystem. Both made use of the bitmap, although SFS used it primarily as a simple yet effective tool for recognizing free blocks on the disk. As previously mentioned, SFS organizes data from multiple directories under a single block. This is realized largely in part to the implementation of B+ trees as representation of written space on the disk. SFS holds a list of block pointers to determine what blocks and segments belong to a particular file (3). According to its documentation, SFS allocates administrative space “differently” than AFS, another replacement to FFS (3). This is a presumably vague way of expressing that SFS does not reserve a fixed space for admin purposes. By using both the bitmap and B+ tree as a data structure, SFS has efficient means of accessing any part of the disk.

The Smart File System also has several unique features of interest. One noteworthy feature that both SFS and FFS share is the allowance of very long filenames, up to 107 characters (4). Where FFS was limited to 32 bit addressing, SFS’s scalability addressed the issue of data corruption past the 4GB mark in a drive petition, something that was a major problem for Amiga users in the face of rapidly increasing hard drives (2). A rare feature found in SFS is the ability to defragment itself while in use. This is achieved through a defragmentation process that is stateless besides the region it is working on, allowing for the process to be interrupted or started almost instantly (4).

While SFS started as an independently developed file system, it became widely popular among Amiga users in the turn of the millennia. Although Amiga systems have yet to make a comeback, the continual development and usage of SFS into the mid 2000’s left its mark on the development of future filesystems, as well as an independently adapted Linux version.

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