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TxFS: LEVERAGING FILE-SYSTEM CRASH CONSISTENCY TO PROVIDE ACID TRANSACTIONS

This paper proposes TxFS, a transactional file system that is an extension on the journaling systems. Transaction-based updating is an intuitive solution to automatically update persistent state. TxFS has a low complexity while maintaining a strong performance. Experiments on the new file systems on modified SQLite and Git show that it provides both strong crash consistency and good performance.

The transactional framework allows users to implement file-system optimizations such as separating order from durability and identify and eliminate redundant application IO. This results in TxFS having a better performance and a better crash-consistency semantic.

Making a transactional file system is proven to be a difficult problem because such system is complex and error-prone. The authors are able to build a simple and less bug-prone transactional file system by taking advantage from a mature, well tested journaling file system. This makes TxFS's implementation simple, having simple API and does not depend on specific hardware.

One limitation of the paper is that evaluation on Git and SQLite does not highlight support for concurrency access. Some experiment on concurrency intensive workloads could be more convincing to further prove the point.