Week 11

Paper Critique

All File Systems Are Not Cleared Equal: On the Complexity of Crafting Crash-Consistent Applications (OSDI '14)

This paper presents the first study of crash-consistency protocols in application level at that time. The applications uses complex update protocols to persist the state of the application and for the correctness of these protocols is dependent on minor behaviors of the underlying file system. They define those behavior as persistence properties. They additionally develop BOB which is a tool that tests persistence properties and ALICE which is a framework that analyzes application update protocols and finds crash vulnerabilities. Using those tool, they efficiently suggest a file system design on application-level consistency.

The advantage of suggested paper is that it efficiently finds the persistence properties and evaluate the effect of filesystem design in application level very well. However, the limitation lying in this paper is that it is not user-friendly yet. Users need to write application workloads and checkers to use ALICE. Moreover, multi-threaded application issues, ALIC serializes the system calls which may not affect vulnerabilities.

The improvement that can be done here is considering the multi-threaded application and their synchronization issues since todays big issue is with the scalability.

TxFS: Leveraging File-System Crash Consistency to Provide ACID Transactions (ATC '18)

This paper proposes a novel file system that focuses on atomic-update mechanism such as journaling to enhance the performance in database workload. The unique characteristic of TxFS are simple API, portability high performance, low complexity and full ACID transaction.

The contribution of this paper is that it provides strong consistency while providing equal or better performance compared to other file system, but it has a limit of maximum size of a transaction and transactions cannot span multiple processes. .

Similar to the paper above, in database, keeping the scalability and atomicity is important in the database workload. So filesystem that considers those issues would improve the work of this paper.