CS-262A-Read-Assignment-3

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Summary: A Fast File System for UNIX

Brief Summary

This paper reimplements the UNIX file system to allow higher throughput and file access rate than the old file system. This is done by designing more specific and flexible allocation/layout policies. Besides this, some changes which are widely used in the current file system is being proposed in this paper, inluding symbolic links, advisory locks, long file names, etc.

Two most Important things

First, optimization. The optimization focuses on reducing I/O times. Consequently, the new file system uses a bigger block size, combining the fragment block to reduce the undue waste. And a bit map block is used to replace the previous free list to ensure quick check of available blocks. The new system also considered the hardware parameters to maximize the time efficiency of accessing disk I/O with specific CPU design. Finally, it will try to place inodes under same directory and blocks of same files in the rotationally optimized positions to maintain locality.

Second, metrics. I think one of the best part in this paper compared to the last three papers I have read is the "performance" part, in which the author not only gives some numbers of testing to illustrate the performance of the new file system, but also talks deeply about why the performance is behaving like that. For example, the analysis of the read/write speed in the old and new file system.

One major flaw

One thing I think this paper can be improved is in the description of the cylinder groups part, I think graphs can better illustrate the point. For example, a picture of hard disk tracks will be very helpful for readers to understand the cylinder groups, seeking distance and other concepts, which are common but needs imagination.

Summary: Analysis and Evolution of Journaling File Systems

Brief Summary

This paper proposes SBA (Semantic Block-Level Analysis) and STP (Semantic Trace Playback) to analyze the different file systems' behaviors and evaluate file system changes.

Two most Important things

First, metrics. This paper's metrics and the related discussion is really impressive. Based on the SBA and STP design principle, it uses the thoughts of control variables to conduct the experiments. Finally, according to the graphs, it obtains some accurate factors to the performance of the file system, including workload, journaling modes, journal structure, metadata/data timers, etc.

Second, I think this paper proposes a very effective approach of measuring file system performance for both SBA and STP, without obtaining the system source code and time-effecient. Another advantage of this method can also be concluded by the paper itself – several file systems are evaluated using the same approach.

One major flaw

I think the author should talk more about the implementation of the STP part (maybe with some workflow figures?), which I think is kind of confused on how the trace information such as the block stream is used to conduct the modification experiment.