
FFS: Fast File System

cse homework 2

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1. What is the problem this paper tried to solve? (Hint: please state the problem using data)

– Disk bandwidth

The old file system was still using only about four percent of the disk bandwidth.

– Transfer Rates

Although old file systems provided transfer rates of up to 175 kilobytes per second when they were first created, this rate deteriorated to 30 kilobytes per second after a few weeks of moderate use because of this randomization of data block placement.

2. What is the root cause of the problem? In one sentence.

The main problem was that although the free list was initially ordered for optimal access, it quickly became scrambled as files were created and removed. Eventually the free list became entirely random, causing files to have their blocks allocated randomly over the disk.

3. For each optimization, how does the author get the idea? (Hint: just imagine you're the author. Given the problem, what experiment would you do to get more info?)

– Optimizing Storage Utilization

Author thought It would be good idea if data are laid out so that larger blocks can be transferred in a single disk transaction, greatly increasing file system throughput.

- File System Parameterization

Author thought the parameters of the underlying hardware could give great effect on the optimization of the blocks' layout which would be allocated in an optimum configuration dependent way.

- Layout Policies

Author knew Two methods for improving file system performance are to increase the locality of reference to minimize seek latency as described by Trivedi, and to improve the layout of data to make larger transfers possible as described by Nevalainen.

4. For each optimization, does it always work? In which case it cannot work?

- Optimizing Storage Utilization

No it depends on the number of free blocks. If the number of free blocks falls to zero, the file system throughput tends to be cut in half, because of the inability of the file system to localize blocks in a file.

- File System Parameterization

Yes, it is.

- Layout Policies

Yes, it is.

5. Do you have some better ideas to implement a faster FS?

Find another way to optimize locality of the file system.