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FLASHFQ: A FAIR QUEUEING I/O SCHEDULER FOR FLASH-BASED SSDS

In this paper, the authors present FlashFQ, a fair queueing Flash I/O scheduler that enhances the start-time of fair queueing schedulers to fully utilize parallelism in Flash I/O while still preserving fairness. The scheduler also performs I/O anticipation to minimize fairness violation. To evaluate the method, FlashFQ is implemented in Linux and is compared with existing I/O schedulers.

In this paper, the authors solve the problems for fair resource management in multi-program computer systems and multi-tenant cloud systems, caused by difference in resource usage. This problem makes existing I/O schedulers trade-off between fairness and responsiveness, especially when there is a large number of I/O tasks. By using the proposed approaches, both responsiveness and fairness can be achieved on Flash-based SSDs.

Other than providing the original proposal, the authors also identifies implementation issues when implementing the FlashFQ scheduler on Linux. They also came up with solutions to those issues which makes the integration process for future developer easier.

One limitation of FlashFQ is that it does not provides fine-grained performance-control mechanism to guarantee storage performance in virtualized systems.