

BARRIER-ENABLED IO STACK FOR FLASH STORAGE

In this paper, the authors proposed a new file system that overcomes the limitations of traditional Flash-based storages. Those limitations are caused by the unnecessary constraints inherited from the legacy methodology of enforcing the write order, “Transfer-and-Flush”. This method dispatches the following requests only after the data blocks associated with the preceding requests are completely transferred to the storage device and made durable.

The proposed system overcomes this bottleneck by eliminating Transfer-and-Flush bottleneck with the Barrier-enabled I/O stack. In the Barrier-enabled IO stack, there is a cache barrier-aware storage device, an order-preserving block device layer and a barrier enabled file system. A modified EXT4 file system on multiple platforms is used to benchmark this approach and receive significant increase in performance as much as 43 times in MySQL and 73 times in SQLite.

The traditional Flash storage contains unnecessary constraints from the old legacy that limit the performance of them. The strength of this paper is that the authors designed a novel file system that overcome those limitations. This work could provide a new foundation in designing better Flash storage.

However, workloads that are used to evaluate the system does not require high bandwidth. Evaluation on some workloads that require high bandwidth such as reading from high resolution video files would be interesting.