

- Assume you have LFS running on RAID. What type of workloads would perform better on a storage system configured as RAID-1 than RAID-5; why?

Answer:

Random("small") write workloads would perform better on a storage system configured as RAID-1 than RAID-5. Because the random write throughput of RAID1 is  $N/2 \cdot R$  ( $N$  is the number of disks and  $R$  is random throughput of 1 disk), but for RAID5 is  $N/4 \cdot R$ . So RAID1 perform better for random write.

- Ignoring the storage system (e.g., whether it is a single disk or a RAID), what type of workloads do you expect will perform better with LFS than FFS and why? What type of workloads do you expect will perform worse with LFS than FFS and why?

Answer:

Random workloads perform better with LFS than FFS, because LFS first buffers all updates in an in-memory segment, when the segment is full, it is written to disk in one long, sequential transfer to an unused part of the disk. Sequential workloads perform worse with LFS than FFS, because for every data update, LFS must propagate updates all the way up directory tree to root and we need to use imap to find the inode, but for FFS, we find inode with math. In some sense, LFS transfers random workloads to sequential workloads.

Paper review:

As the memory grows larger and larger, the capacity of the Cache can be continuously expanded, which means that the data read operation can be more and more unnecessary to access the disk, and the disk write operation becomes a performance bottleneck.

The speed of the sequential disk data read speed follows the speed at which the disk data is read by the machine. In this case, if the random disk operation can be converted into a sequential disk operation, the profit is considerable.

When dealing with small files, the previous file system is not efficient, but in fact small files are common; in addition, for small file write operations,

the disk itself is not good, because RAID4/RAID5 does not perform well when processing small files.