

Paper Review: Google File System

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1 Motivation

Cloud-based realization is a necessity in today's time as technology tries to become lighter and more mobile at client side. Moreover, with the large and growing number of internet users, the large volumes of data produced by each user, and the increase in importance of data analytics, there is a need to design special techniques that can help handle these functions.

2 Goal

Providing a filesystem API for efficient data manipulation as required by Google's applications; allowing backups, redundancy, and usage of inexpensive or unreliable hardware for storage.

3 Key Idea

Utilizing a distributed Master-Chunkserver architecture with a single simple master server, and tailoring the design to optimize for use cases specific to Google.

4 Approach

Make following assumptions about the use case: reads are sequential streams, writes are mostly appends, concurrent producer-consumer IO cases must be supported, bandwidth is more important than latency, server failure is common. *Simple Master*: The master is made simple and fast by using a large block size for files to reduce requests, sending extra file blocks adjacent to requested blocks, storing all file metadata non-persistently in memory. *Data Consistency*: The chunkserver carries out mutation management across copies of data, does operations like padding in case of concurrent writes, and expects client to look out for them. The master also managed client leases for data access that are useful in handling concurrency. *Robustness*: The master logs metadata changes, occasionally creates checkpoint images for quick restoration after a crash, and looks out for outdated or garbage data blocks by polling chunkservers.

5 Results

Rigorous evaluation of the proposed file system is done for a test cluster setup, and two real clusters.

6 Issues

GFS is tailor-made for applications and developer paradigms specific to Google, making strict assumptions about use cases. It cannot be considered for cases when underlying assumptions may not always apply.

7 Conclusion

The filesystem is able to meet all the requirements specified in section 2, and is widely used at Google for research as well as production.