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The Google File System

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A Comparison of Approaches to Large-Scale Data Analysis

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Michael Stonebraker Talk

The Google File System

- The paper goes into detail on the Google File System; It goes over every function of the system and how it was implemented.

Google File System cont.

- The google file system is comprised of one master and multiple chunkservers, and is accessed by multiple clients.
- Files are divided into fixed-size chunks(64 MB), which are identified by a unique chunk handle.
- Chunkservers store chunks on local disks as linux files, and replicates each chunk(three by default) on multiple chunkservers.
- The system supports the following operations; create, delete, open, close, read, write, snapshot, and record append.

Google File System Analysis

- The system is very liberal with its use of storage space, spending most of it on redundant data.
- Despite the fact that it is wasteful with storage space, the system is very reliable. With all the replicas created, it’s unlikely that any data will be lost due to system or hardware failures.
- If you have the storage space for all the redundant data, the reliability of the system outweighs the downside of the wasted space.

A Comparison of Approaches to Large-Scale Data Analysis

- This paper compares and contrasts two different data analysis systems, MapReduce and parallel SQL database management systems(parallel DMBS).

A Comparison of Approaches to Large-Scale Data Analysis Cont...

- The paper compares MapReduce and parallel SQL based on their attributes and applications in different scenarios.
  - Aspects such as reliability, runtimes, system installation, and ease of use are taken into account.

A Comparison of Approaches to Large-Scale Data Analysis Cont...

- They highlighted the pros and cons of each system well, and mentioned where certain systems would be best applied in their conclusion.
- Overall, the comparison was thorough and detailed.

GFS vs Large Scale Data Paper

- The GFS works in a similar way to the MapReduce system highlighted in the Large Scale Data Paper, both don't require data to be structured and work with a master that controls queries.
- Parallel SQL runs queries faster than the GFS, because the GFS has to scan the entire input file.
    - Parallel SQL handles errors much worse, requiring queries to be restarted upon a hardware failure where the GFS can continue to run the query on a replica.

Stonebraker Talk

- Stonebraker argues that relational databases are not the solution to all database issues, and are obsolete today.
- He gives examples of markets where relational systems are not optimal and names systems that are better alternatives in those markets.

Final Comparison

- The GFS is more reliable than parallel SQL
  - Even though it does require much more storage space, the reliability gained is worth the tradeoff.
  - If a hardware failure occurs during a query in parallel SQL, the query must be restarted, but in the GFS, the query is automatically run on a replica.
- The GFS is much more inefficient than parallel SQL
  - The master is forced to start each query with a scan of the entire input file