Keeping Our Data Durable and Fast With Replication Across Global Data Centers

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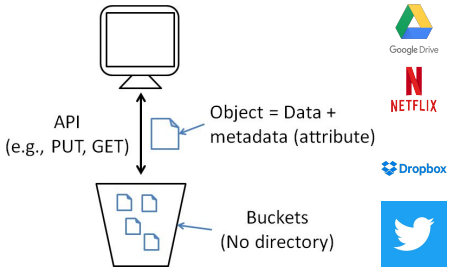
Geo-Replication

- A data center houses many computers that store data uploaded to the Internet
- If something happens to the data center, data stored in the computers could be lost
- To increase durability, data is replicated to multiple datacenters

Target System: Object Storage

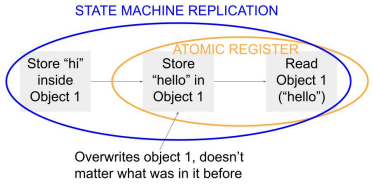


Problem: Consistency

- Even if replicas receive different operations or operations in a different order than the others, they must find a way to "synchronize" their view of the data to avoid inconsistency
- How do we synchronize data across long distances in a way that is fast and can handle many users?

Methods to Achieve Consistency

1. **State machine replication** (EPaxos): find an ordering for <u>all</u> operations, then execute them in order. Useful for a broad range of systems.
2. **Atomic register** (Gryff): focus only on ops that affect the final result of the object. Only useful for the object storage system.

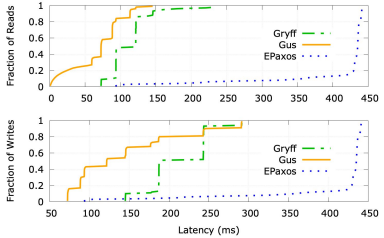


Our Solution

- Since we only focus on object storage, we (Gus) also use an atomic register
- We optimize further by only focusing on the case of 3-way and 5-way replication, the most common number of replicas

Evaluation

Read/Write Latency CDFs



Throughput