A Novel Heuristic Auditor for Revealing Strong Consistency Violations in Cloud

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Abstract

To ensure that the services are always-on and globally distributed, cloud service providers sacrifice consistency for availability. Most Cloud Service Provider’s provide only eventual consistency which is a form of weak consistency. Strong Consistency is required for certain applications which are interactive. In such cases an SLA is to be engaged between the Cloud Service Provider and the users which stipulate the level of consistency the cloud service provider should provide to the users of the data cloud. Existing Commercial clouds provide strong consistency guarantees but it is hard for the users to verify it. This paper proposes a Novel Heuristic Auditor based on loosely synchronized clocks which help the users to verify whether the data cloud provides the assured level of consistency as stated in the SLA. It uses a two level auditing structure to check for strong consistency violations namely Read-After-Write(RAW) consistency and Monotonic-Write(MW) consistency. Experiments were done to verify the strong consistency guarantees provided by Google Cloud Storage (GCS). The different types of storage buckets are tested for consistency violations and are quantified with different metrics.
References

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Index Terms

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Keywords

Cloud Computing, Strong Consistency, Data Staleness, Heuristic Auditor, Google Cloud
Storage.