Review of

# Dynamo

Giuseppe DeCandia et al.

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## What is the problem?

Even small outages cause significant financial consequences and impacts customer trust for companies as big as Amazon. Reliability at a massive scale is a big challenge.

## Summary

This paper presents the design and implementation of Dynamo, a highly available key-value storage system that some of Amazon's core services use to provide an "always-on" experience. To achieve this level of availability, Dynamo sacrifices consistency under certain failure scenarios.

## Key Insights

- Dynamo uses a synthesis of well known techniques to achieve scalability and availability: Data is partitioned and replicated using consistent hashing, and consistency is facilitated by object versioning. The consistency among replicas during updates is maintained by a quorum-like technique and a decentralized replica synchronization protocol.

## Strengths

- Dynamo has provided the desired levels of availability and performance and has been successful in handling server failures, data center failures and network partitions in real world situations.
- Paper claims porting Amazon's applications to Dynamo was a simple task.

## Weaknesses

- It doesn't seem to have an easy way to garbage collect keys that are no longer needed. It wasn't entirely clear whether a given instance of Dynamo is intended to be used with multiple applications.
- The gossip-based membership protocol may significantly limit the scalability of the whole system.

## Summary of Key Results

- The production use of Dynamo for the past year demonstrates that decentralized techniques can be combined to provide a single highly-available system.
- Many Amazon internal services have used Dynamo for the past two years and it has provided significant levels of availability to its applications. Notably, applications have received successful responses (without timing out) for 99.9995% of its requests.

## Open Questions

- How are the ideas in the paper that apply to Amazon's applications and Dynamo going to translate to real-world systems?