

CSC2231 – Internet Systems and Services

Paper Review – Glacier

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The authors propose a replication scheme over P2P that's intended to provide high availability even in the face of catastrophic failures. Their scheme is erasure coding based and operates alongside a primary store of complete replicas. High availability is achieved through aggressive erasure coding (11-fold storage overhead to achieve six 9's when 60% of the nodes fail). Glacier also stores data as immutable objects (no overwriting or deleting) as an additional layer of protection against failures. Although the execution details of Glacier are different from TotalRecall, the concept of erasure coding large objects in an overlay network is essentially the same.

Unlike TotalRecall, the authors of Glacier do not target public overlays. They instead propose using Glacier within an organization of mostly available workstations and only a few unstable hosts. This is a more practical use case than heavy-churn public P2Ps. Their concept of no data deletion or overwrites also makes Glacier desirable for critical data archival. Versioning objects adds an extra level of redundancy that would be beneficial for critical data and applications that naturally require old versions of data to be stored.

However, their garbage collection functionality seems to go against the object-immutability design – especially when coupled with a lease mechanism. It is unclear whether object leasing is a good idea since there is potential for data loss (of critical data) if leases are not properly managed by applications. In this sense, it may be more beneficial for organizations to stick with traditional permanent archival techniques (tape storage, NAS, etc.). Also, expansion of storage capacity in Glacier implicitly requires purchasing entire workstations. In comparison, dedicated data archival systems can be expanded much more easily and yield much larger capacity increases for an equivalent cost. In fact, the amount of idle disk space (average of 90%) quoted by the authors seems intuitively much too high.

It is not clear that Glacier is suitable for critical data archival. However, there seems to be a use case for Glacier in creating a global storage volume from all of an organization's workstations. There would definitely be availability benefits over current single point of failure data storage units.