1. Abstract

A client in a cloud storage system outsources her data to a server, which is supposed to keep the data intact and make it available to the client. However, the server may not be secure, or even if it is trustworthy, the data may be corrupted by hardware or software failures. A model guaranteeing data integrity in the dynamic storage setting is Dynamic Provable Data Possession (DPDP), which requires an underlying authenticated data structure called rank-based authenticated skip list, which, unlike an authenticated skip list, allows a search with indices of the blocks but becomes inefficient when variable size data updates are performed. To overcome the limitations of the prior models, FlexList, a skip list like authenticated data structure having efficient variable block size updates, and a DPDP scheme FlexDPDP employing FlexList were proposed.

In this poster, we address peer-to-peer cloud storage system requirements, and building upon efficient methods for cloud data integrity, we propose InterLocal: a novel integrity- and replication-guaranteed locality-based peer-to-peer storage system. The key contribution of InterLocal is a locality-based skip graph as the underlying overlay, which enables efficient and local placement of replicas as well as content retrieval operation. InterLocal is based on landmark multidimensional scaling for peer locality calculation, on top of FlexDPDP at each node to provide data integrity. The locality-based replication mechanism is shown to play a significant role in the efficiency of the client’s access to the files. We implemented both a regular skip graph based storage system and InterLocal, and evaluated their performance on the PlanetLab network tested under various scenarios. InterLocal was shown to provide 3x speed up in terms of file operations, and a gradual performance decrease in case of replica failures, having a worst-case performance that is equal to that of a regular skip graph based storage system.

Figure 1: A Skip Graph

Figure 2: Time measurement on proof receipt for a regular skip graph based system and InterLocal.

Figure 3: Search in a skip graph based system and InterLocal.

References


