Fusion based Fault-Tolerance

Develop a P2P (Chord-like system) that uses fusion to provide fault-tolerance.

Our aim is to implement a peer-to-peer application to efficiently provide fault- tolerance for distributed system. For example, in terms of two distributed databases, both of them share one backup. They store the data into the backup through the approach of AND/OR computation and when one of them confronts an accident or invalid incident, we are able to restore all the information by inverse operation.

One way to implement this is a technique to correct faults in large data structures hosted on distributed servers, based on the concept of fused backups as illustrated in the paper *‘A Fusion-based Approach for Handling Multiple Faults in Distributed Systems’*. Traditionally, the prevalent solution to this problem is replication. The technique uses a combination of error/erasure correcting codes and selective replication to correct f crash faults using just f additional backups consuming O(msf) total backup space, while incurring minimal overhead during normal operation. Since the data is maintained in the coded form, recovery is costly as compared to replication. However, in a system with infrequent faults, the savings in space outweighs the cost of recovery. We try to provide a Java implementation of fused backups for all the data structures and our experimental evaluation confirms that fused backups are space-efficient as compared to replication (almost n times), while they cause very little overhead for updates. An alternate, fusion-based design can result in significant savings in space as well as resources.