Design Document for Fault Tolerant Systems using GigaPaxos

The following are the methods that are written for the implementation of a fault tolerant system using GigaPaxos:

1. Execute() – This method just takes the query from the client and the request is executed here. In addition to execution, we also save the request query received in an Array list. This list indicates all the queries that have been executed by the system, but has still not been saved in stable storage. As Paxos is a replicated state machine, all the paxos servers would run the query on their own.

2. Checkpoint() – This method periodically saves the state information into stable storage. In our system, the same is achieved by periodically querying all the data from the table and saving the results from this. In addition to this, we also store all the queries that were executed by this server, but has not been saved. After we save this in stable storage, we go ahead and clear this array list. The checkpoint returns this information and this will be used by the Paxos protocol, in case this server crashes and wants to restore the state.

3. Restore() – This is the method that will be called by the GigaPaxos system when the server wishes to recover from a crash. The second parameter in the method restore will give us the state information from the last checkpoint() done by this server. Thus, in restore, we just iterate over all the queries that have been executed (in the same order as was seen before the crash, so that the state info is not corrupted) and again execute the queries, to get this server to the checkpoint position before the server crashes. If there is any issue in restore () method, we return false to the Paxos protocol, otherwise we return true.

By doing the following, I was able to pass all the tests present in GraderFaultTolerantTest.java