
CMU 15-640 Project 4

Design Document

Xiaoyun Ye

School of Computer Science
Carnegie Mellon University
Pittsburgh, PA 15213
xye2@andrew.cmu.edu

Protocol between Server and UserNodes

The Server and UserNodes keep independent log files for every collage. They communicate, send and receive messages using the NewMessage Class. The CollageProcess class is responsible for the status and processing work of one collage. The Server and UserNodes call CollageProcess instances when they need to work on the collage.

Timeout thresholds

To avoid blocking forever when waiting for the reply of the UserNodes, the code implements 2 timers for the vote and ack messages from UserNodes. The timeout threshold is 3 seconds. It assumes that a message from the UserNode will take no more than 3 seconds to be delivered if it is not lost.

Lost messages handling

The Server assumes a message to be lost if it takes more than 3 seconds to be delivered.

For a lost vote message from the UserNode, the server will take the lost message as a vote for NO and abort the collage commit.

For a lost ack message from the UserNode, the server will redistribute the decision to the UserNode and wait for another round(3 seconds). This attempt will be repeated until it gets ack message from this UserNode.

Node failures recovery

The Server and each UserNode keep its own log file to store the steps and status of 2PC for every collage. So upon recovery, the Server and the UserNodes read the log file and go through all the collages recorded to restore the failed nodes and broken collages to normal situations. In the process of 2PC, there are 5 possible critical points when failures happen:

Server: Start Commit

If the failure happens before the decision is made, upon recovery, the collage will be regarded as a negative decision, the Server will not commit and distribute the negative decision to UserNodes.

UserNode: Vote sent

If the failure happens after the UserNode sends the vote message, upon recovery, the UserNode will check the vote first. If the vote is yes, the UserNode should re-lock all the images included in this collage. Otherwise, the UserNode will do nothing.

Server: Decision Made

If the failure happens after the decision is made but the collage is not finished, upon recovery, the Server will redistribute the final decision to UserNodes.

UserNode: Decision Received

If the failure happens after the UserNode receives the final decision from the Server, upon recovery, the UserNode will check the final decision first. If the decision is no, the UserNode should unlock all the images included in this collage. Otherwise, the UserNode should remove the included images from its working directory.

Server: Committed

If the failure happens after the commit is finished and the collage is committed completely, the Server will ignore this collage when recovering.