1.    Quorum consensus replication is in use at servers X, Y and Z which all hold replicas of data items A and B. The initial values (version 0) of all replicas of A are all 200 and of B are all 100. Let the Read and Write quora be R = W = 2, for both A and B.

1. Suppose a client reads the value of A and then writes it to B. At the time the client performs these operations, a partition separates servers X and Y from server Z. Describe the quora obtained and the operations that take place, if any, if the client can access servers X and Y.

|  |  |  |
| --- | --- | --- |
| X | Y | Z |
| A = 200 (v0) | A = 200 (v0) | A = 200 (v0) |
| B = 100 (v0) | B = 100 (v0) | B = 100 (v0) |

A client reads the value of A and then writes it to B:

client Reads A from X or Y, read quorum = 1+1 for A and B

Client Writes B at X and Y, write quorum = 1+1 for B

1. After the scenario in a. has completed, suppose that the same client wants to read the value of B and then to write it to A. Describe the quora obtained and the operations that take place, if any, if the client can access only server Z.

Client only has access to server Z: read quorum = 1, so it can’t read. Write quorum = 1, it can’t write either. Operations can’t happen.

1. After the senario in a. (not b.) has completed, suppose that the same client wants to read the value of B. The partition from (i) and (ii) has been repaired, but now another partition occurs so that X and Z are separated from Y. Describe the quora obtained and the operation that takes place if the client can access servers X and Z.

Client Read request attempts to obtain a read quorum from X and Z, finds out versions is out of date at Z, and Z will get updated versions of A and B from X. And read and write quorum are the same = 1+1, read and writes operations can be done.

2.

Akamai has a Content Delivery Network of many servers in around the world. The customers of Akamai use the servers to share their web content and application, and they can achieve the configuration and control by using vector exchange.

Vector exchange is a quorum-based agreement scheme. Quorum means when most of (majority) storage points (contents are transmitted by publisher) agrees on a submission, and in future use, the quorum will overlap with earlier majority. Using vector timestamps to change the status of storage point. When majority of bit vectors are set, the storage point knows the “agreement” is taken place. The quorum protocol makes sure the agreement is never lost. Quorum based system eliminates transient faults and allow the users to have more time to deal with the storage point failures.