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Correctness

Hash Function:

Takes an integer key as input and returns an array of three integer values. The hash function is designed to distribute the keys across multiple servers, using a technique called double hashing.

1. Modulo Operation (% 7): The modulo operation with 7 is used to map the key to one of the seven possible servers (0 to 6) to ensure that the hash values are within a certain range.

2. key % 7 | (key + 2) % 7 | (key + 4) % 7 to distribute to 3 servers.

3. Array of Hash Values: The function returns an array of three integer values, each representing the result of one of the three servers for this object.

The safety condition for a hash table ensures that no duplicate object on the same server

Liveness Condition: It is always possible to insert a object

```
public static int[] hashFunction(int key) {
    // hashResult array with 3 values: key % 7, (key+2) %7, (key+4) % 7
    int[] hashResult = new int[3];
    hashResult[0] = key % 7;
    hashResult[1] = (key + 2) % 7;
    hashResult[2] = (key + 4) % 7;
    return hashResult;
}
```

Socket:

Use socket connection, ensure reliable and FIFO connection
Provided by Java library, safety and liveness ensured

Permitting Write & Read:

boolean value to indicate if the process is in recovery, basically ensure mutual exclusion access to this object on the server

Total Order:

Write request comes to a server(hash(key), so concurrent request will be numbered and handled by this server as a leader, ensure the same objects on other server update correctly

Report

Write request handles correctly, update the correct object and the server sends out requests to other servers to also update that copy.

Read requests give back the correct result, if the server fails it will give error code.

If channel is disrupted, error code will throw out using try catch

Test working goods with duplicate and concurrent requests

Permitting write and read when needed.

Avoid read-write conflict and write-write conflict

Detailed explanations on demo day