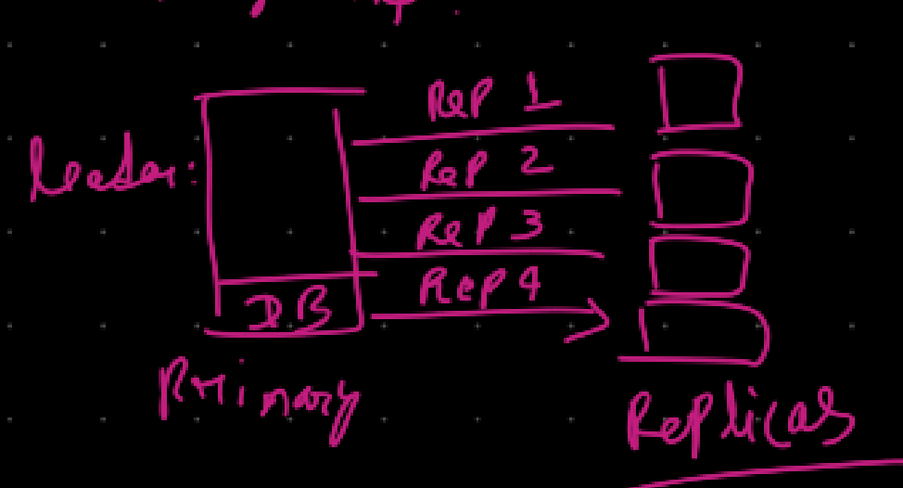
# Database : 1

Replication : means making the replica of same DB to improve DB performance

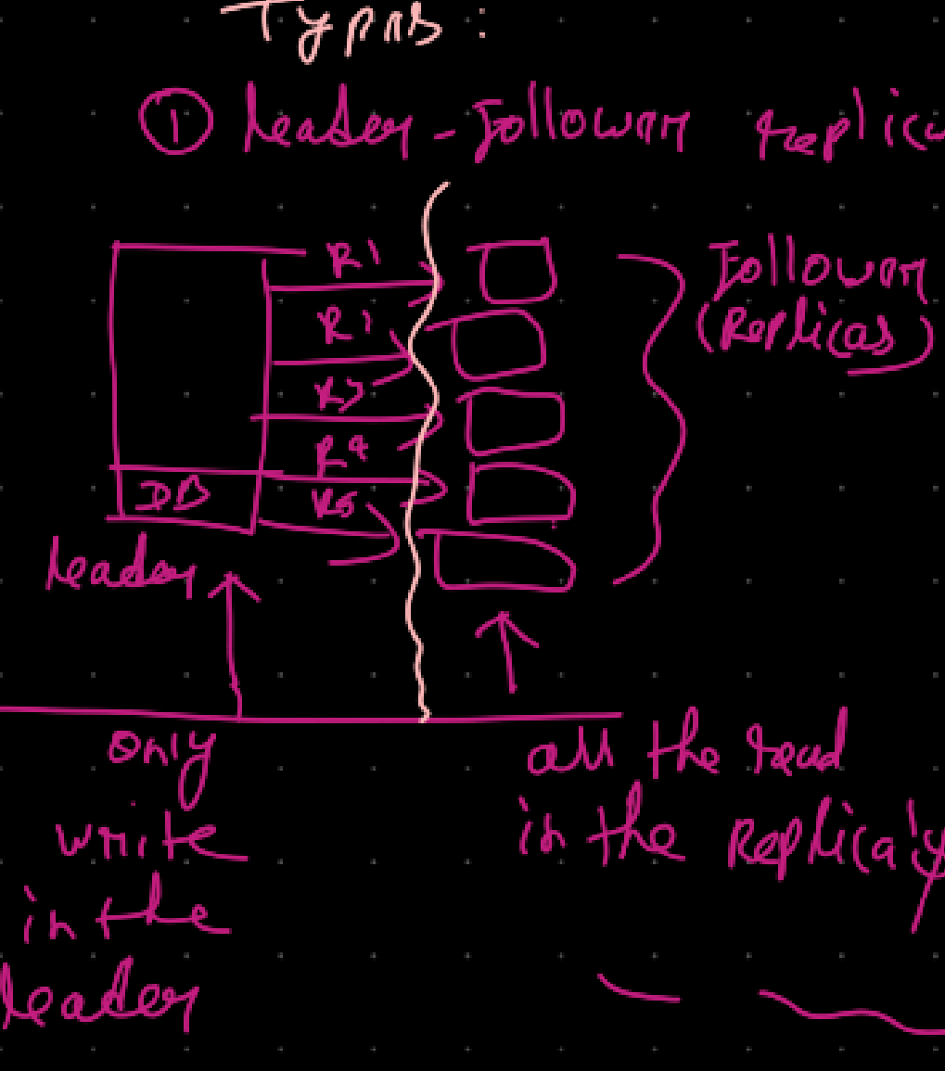


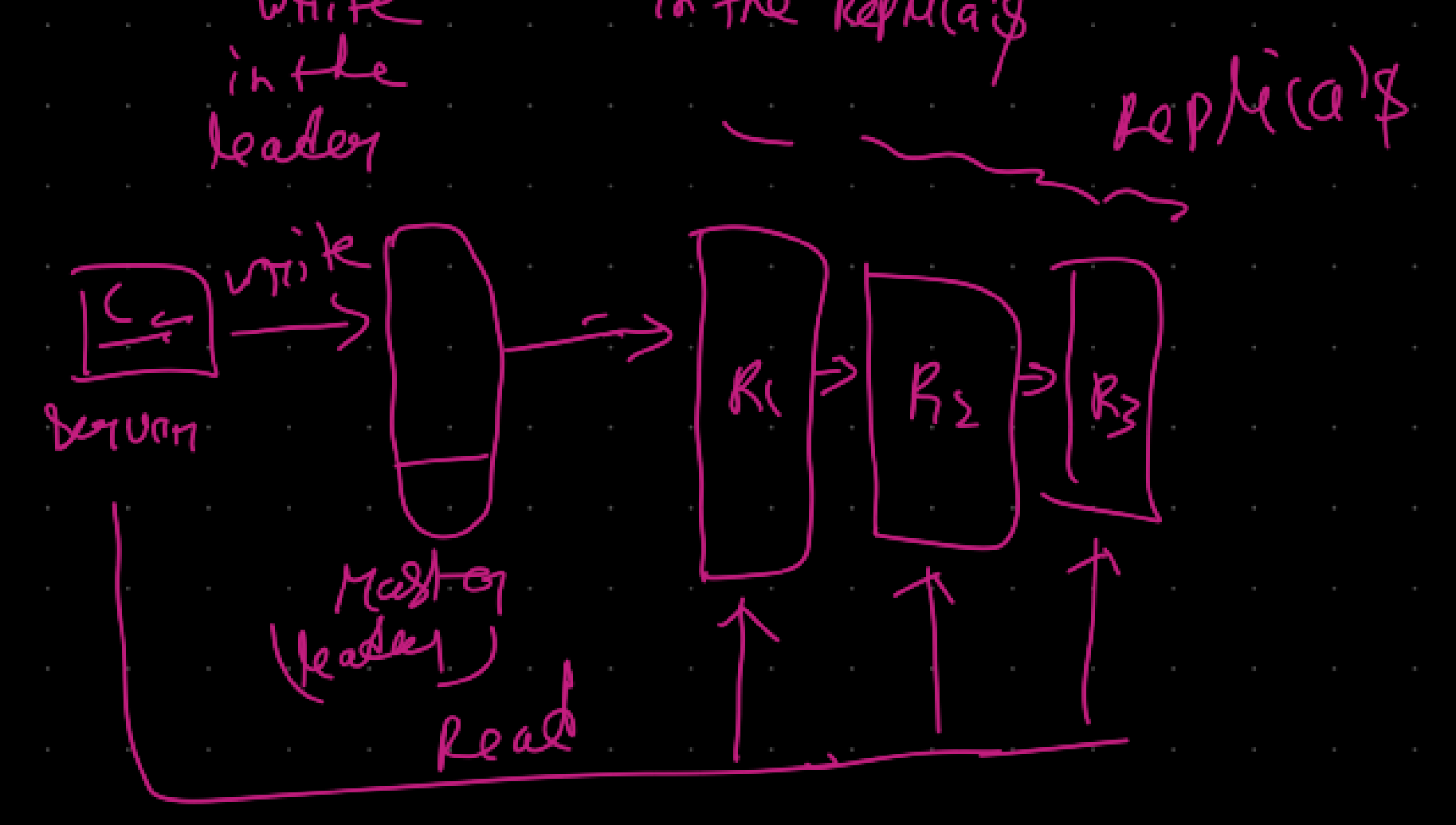
why ?

* The main DB accept only the write operation
* On the otherhand the replicas handle the read only.

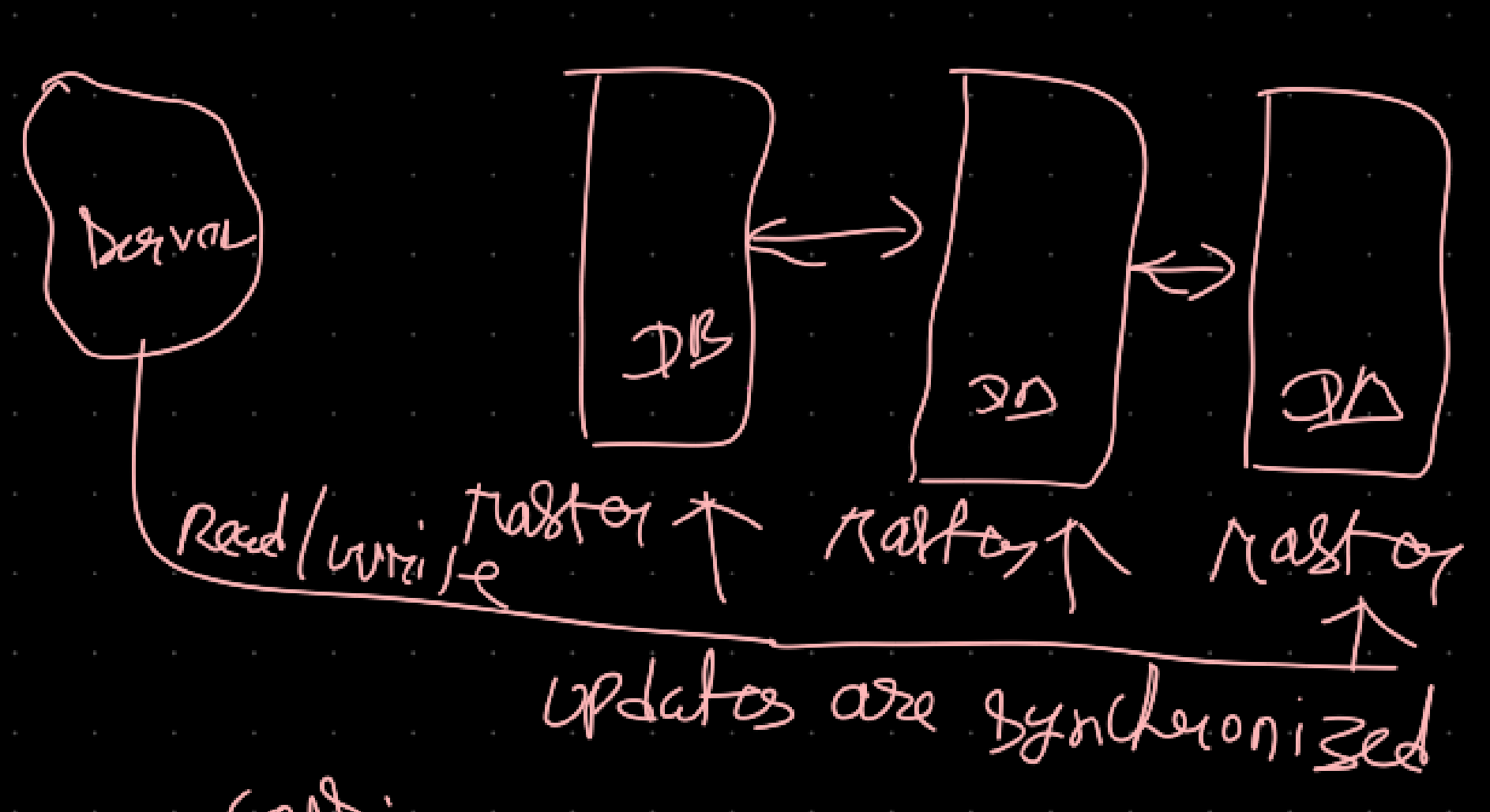
Types :

① leader - follower replication





## (II) leader-leader Replication



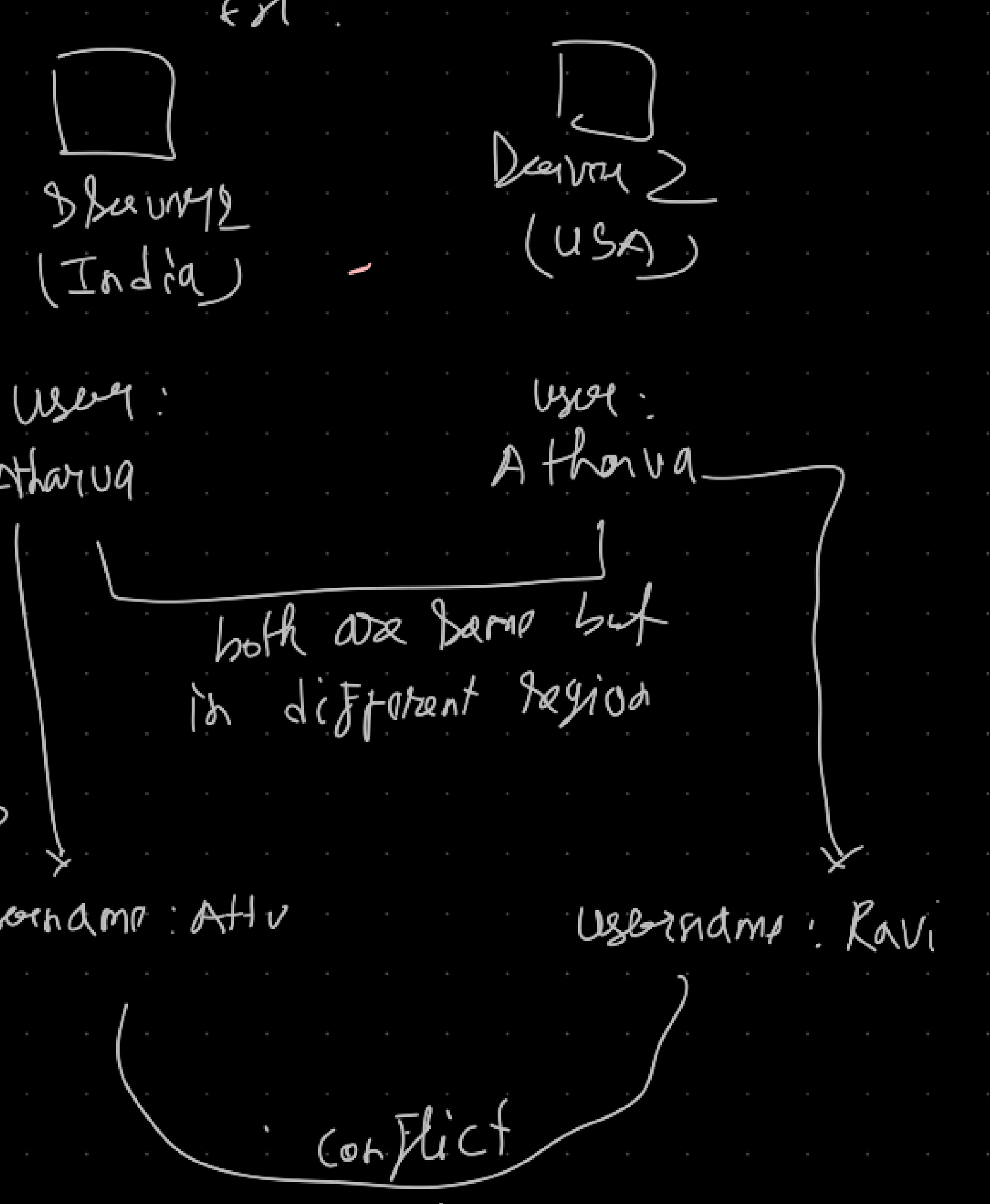
cons :

- → conflicts possible when same record is updated on multiple leaders
- → conflict resolution rules must be implemented

what is conflict ?

when a two servers update the same data field.

Ex :



* Because at the same time same user try to update there profile before the synchronization.

* some strategies to handle

| Strategy | who wins |
|---|---|
| Last write wins (LWW) | latest timestamp wins |
| First write wins | Earlist update |
| High priority region wins | USA > India |
| merge logic | combine updates (for counts) → insta followers counts |
| Application logic | Programmers write custom rules |

Ex : Rules :

for username : last update wins

followers counts : sum updates from both

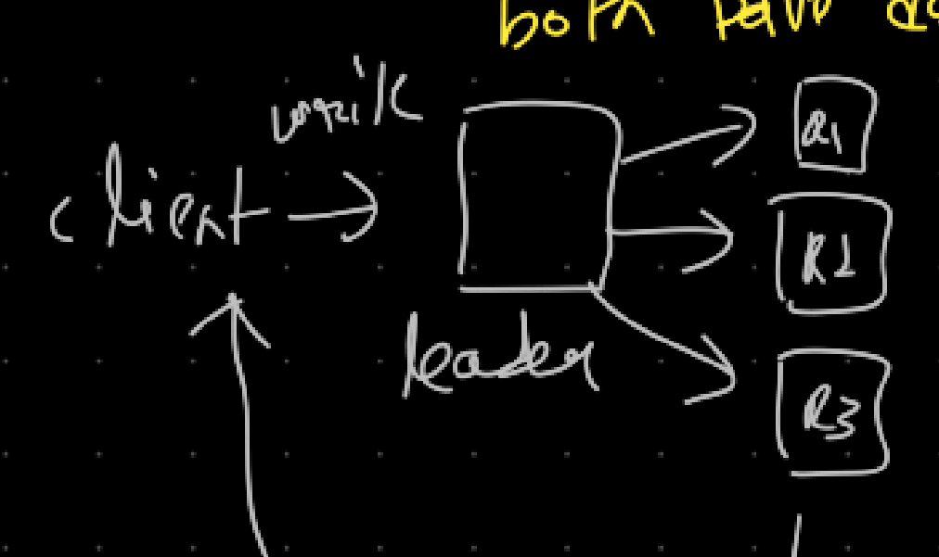
note : Banking are not allowed the lead-leader replication because of the conflicts.

## Synchronous / Asynchronous

Asynchronous → Eventually consistency {for some time we see the old data but eventually we can see actual data}

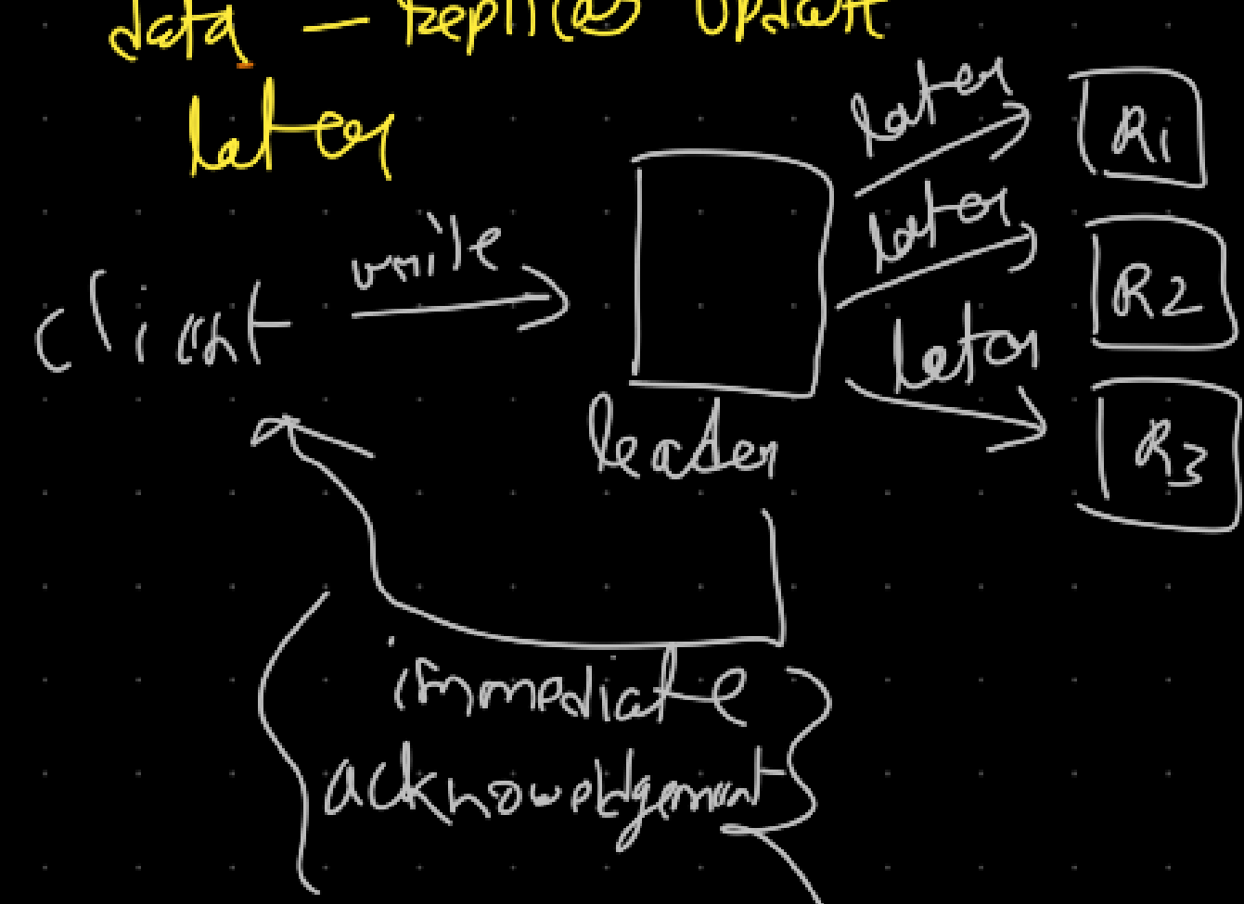
Synchronous → Strong consistency {when write after all updated replica data is to be read}

Synchronous : write is considered successful only when the leader AND replica both save data



after saving in the replica's it sends the acknowledgement

Asynchronous : write is considered successful as long as the leader saves the data — replicas update later



cons :

- Risk of data loss if leader crashes before replica sync
- Temporary inconsistency (Replica = stale data)

Synchronous : wait for replica → safest but slow (Banking)

Asynchronous : don't wait for replica → fastest but risk of inconsistency

Temporary inconsistency → two db not have the same data at the same time

Happens in Asynchronous

- → leader DB gets the new data first
- → replica DB gets the data later (not immediately)

stale data = old data (not updated yet)

| replication model | sync | async |
|---|---|---|
| leader - leader | rarely | mostly |
| leader - follower | yes | yes |
| Distributed leaderless (dynamo / cassandra) | NO | yes |