Project Design Document

Replicated Concurrency Control and Recovery

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Design

The database system consists of two parts, the Transaction Manager (TM) and the Site Manager (SM). The database system receives input through stdin and passes it to the TM. The TM keeps track of the transactions and sends the input/output transactions to the relevant sites where the data is stored as pending operations. The SM processes the pending operations at a particular time step if they are input/output operations else processes failure and recovery of individual sites.

The input / output is performed using the two-phase locking handled by the SM. Each site has a copy of the lock attached to each variable. Each site also has a history of committed as well as uncommitted transactions at every timestamp on each variable. This helps us achieve multiversion read concurrency as well. The Lock Manager(LM) grants the locks and the Data Manager(DM) processes the io transactions.

Initialisation

Data is initialized at startup and stored in each site based on the sharding criterion. Each site is made available and the locks and transactions are initialised to empty sets.

Design Diagram

RepCrec Design

Control Flow — stdin → Database

Instructions

grant lock — transaction designer — Site Manager. Transaction Manager.

request lock — to — request

fail — o? —

Site 1	Site 2	Site 3 ?
Lock Manager	Lock Manager.	Lock Manager.
Data Manager	Data Manager.	Data Manager?

grant lock — request permission
permission

grant lock permission