

## 23 –Distributed OLTP Databases

### 1. Atomic Commit Protocols

#### A. Two-Phase Commit

##### i. Process

1. Prepare phase :  
coordinator asks participants whether it is safe to commit  
if responses are all OK, go to commit phase  
if not, go to abort phase
2. Commit phase :  
then coordinator requests participants to commit, and reply server  
that commit was successful
3. Abort phase :  
coordinator reply server that commit is aborted, and requests  
participants to abort

##### ii. Optimizations

1. Early prepare voting
2. Early Acknowledgement after prepare :  
coordinator send SUCCESS message to server when prepare was  
successful

##### iii. Issue

1. If coordinator crashes  
participants must decide what to do
2. If participant crashes  
coordinator assumes that it is aborted

#### B. PAXOS

## 2. Replication

DBMS replicate data across nodes, for availability.

### A. Approach

#### i. Master Replica

1. Updates go to master object
2. Master propagate updates to replica without atomic commit protocol
3. Read only txn can access replicas

#### ii. Multi-Master

1. Txns can access any replica
2. Replicas should be synchronized with each other using an atomic commit protocol

### B. K-Safety

- i. Number of Parallel object that is available.

### C. Propagating scheme

#### i. Synchronous

Master sends update to replicas and wait for response, after response, sends acknowledgement to client

#### ii. Asynchronous

Master doesn't wait for response, but sends acknowledgement to client immediately

### D. Propagating timing

continuous vs. on commit

### E. Active vs. Passive

- i. Active-Active : txn executes at each replica independently
- ii. Active-Passive : txn executes at single replica and propagate updates.

### 3. Consistency Issues

CAP theorem (Consistency, Availability, Partition Tolerant)

#### A. Consistency

if one replica is updated, the update should be applied to other replica

#### B. Availability

if one replica cannot be used, the other replica should be available

#### C. Partition tolerance

if communication is cut, there should be new master

### 4. Federated Databases

### 5. What is it?

#### A. How PAXOS work?

I want to see detailed logic of this

#### B. If there are double master, and network is re-connected, then which master will be chosen?

### 6. Introduced Papers