

## ABSTRACT

Combining Optimistic and Pessimistic Algorithms to Process Updates to Replicas

In a Distributed System - A JAVA Prototype

Several protocols exist for managing concurrent accesses to replicated items in distributed systems. These protocols generally fall into one of two broad categories – optimistic or pessimistic.

In optimistic protocols there is the assumption that inconsistencies are unlikely to occur and therefore processing can take place at any node in the system without global agreement. On the rare occasion that inconsistencies do arise they will be detected at some later time and handled then.

In pessimistic protocols it is assumed that inconsistencies occur frequently enough to necessitate global agreement among the replicas before any update is applied. The agreement verifies that no inconsistencies will occur as a result of the update. Crichlow in [7] has proposed a protocol that combines an optimistic approach and a pessimistic approach. In this protocol it is suggested that the communication time in the pessimistic protocol can be utilized for optimistic processing (which requires no global agreement) to provide the user with a speedy response. The

optimistic protocol makes no permanent change to the data and is restrained by a cost-bound criterion.

The work done so far establishes an initial cost-bound condition based on general familiarity with the system and is adjusted dynamically based on this as well.

Factors considered include number of servers and the state of the data.

This paper covers the design and implementation of a distributed system using this protocol. The system is designed using object oriented techniques and

furthermore it is designed with an interface to facilitate simulation of various system conditions which will allow administrators and researchers the ability to

predict the system's behavior as certain conditions are varied.

The work done has resulted in a system, which enables the programmer and administrator of an application utilizing the protocol to make sound decisions based on the results of simulations.

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**Keywords:** Distributed Systems; Replication; Cost-bound; Optimistic Concurrency Control; Pessimistic Concurrency Control.

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