Project Problem Statement

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Project Option

Option 2: Develop an efficient ordered two-phase locking (O2PL) scheduler for conflict-serializability.

Project Title

Developing an O2PL-Based Transaction Scheduler for Efficient Concurrency Control

Project Description

This project focuses on developing a concurrency control mechanism based on Ordered Two-Phase Locking (O2PL) to ensure conflict-serializability.

The key idea involves ensuring that operations execute in the order of their lock acquisitions. To achieve this:

- A linked-list-based queue is maintained per data item to manage read and write conflicts.
- The scheduler constructs a Waits-for Graph (WFG) to detect cycles and prevent deadlocks.
- Conditional variables are used to signal transactions when they become the head of the execution queue.

Our implementation will include:

- Defining core data structures for lock management.
- Implementing an efficient transaction scheduling algorithm.
- Evaluating performance against traditional locking mechanisms.
- Exploring garbage collection mechanisms for the WFG to prevent unbounded growth.
- Investigating lock-free data item list implementations to reduce contention.