Transaction Systems
Exercise Session 08

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Today’s Plan

- Last week’s homework
- Layered protocols
- Hybrid protocols
- Homework
Layered Locking and Hybrid Protocols

- Credits: Dr. Andrey Gubichev, 2013
Layered locking by example

- locks for high level operations
- page-level locks held only during corresponding high level operation
- this schedule would not be possible in page model
Layered locking: formally

- Lock acquisition: acquire $L_i$ lock on $x$ before the $f(x)$ can start at level $L_i$
- Lock release: once the $L_i$ lock is released, no other child of this subtransaction can get any lock
- Subtransaction: once the operation $f(x)$ of $L_i$ is finished, all locks at $L_{i-1}$ for the children of $f(x)$ are released
- Modular-based lock manager: for every level $L_i$
Layered locking: selective layered 2PL

- choose some layers, skip all the rest
- skip the layer $L_i$ by extending the scope of subtransactions above $L_i$
- less lock management overhead, but also less concurrency
Layered Locking

Investigate what kind of deadlocks can arise in a layered system with layered 2PL, and how they can be detected and eliminated.
Hybrid protocols

- Idea of modularity: for every level use its own protocol
- Why? E.g., the fraction of read-only operation at a page level is higher than the fraction of read-only operations at the root level
- 2PL at object level, FOCC at the page level
- 2PL at $L_1$ and ROMV at $L_0$
Layered Locking and Hybrid Protocols

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Homework

- Already uploaded to our website.