BulkCommit: Scalable and Fast Commit of Atomic Blocks in a Lazy Multiprocessor Environment

Xuehai Qian, Josep Torrellas (UIUC)
Benjamin Sahelices (Univ of Valladolid) and Depei Qian (Beihang Univ.)

• Problem:
  • Current atomic block (chunk) execution incurs unnecessary squashes
  • Atomic block commit operation in a lazy environment has sequential bottlenecks

• Our solution:
  • IntelliSquash: no squash on WAW-only conflict
  • IntelliCommit: parallel directory group formation

Sequential Dir Group Formation [MICRO’10]
IntelliSquash: No Squash on WAW-only Conflict

- Insight: WAW is a name dependence. It does not break semantic atomicity.
- Similarity with two conflict stores from two processors.
- If two chunks only have WAW conflicts, IntelliSquash serializes them without squash.
IntelliCommit: Parallel Directory Group Formation

On chunk commit:

- Processor sends commit requests to all the relevant directory modules
- Directory module receives commit request:
  - Locks the memory lines
  - Responds with commit_ack
- Processor counts the number of commit_acks received
- Processor sends commit_confirm when it receives the expected number of commit_acks

Challenge: resolving conflicts from two processors

ChunkSort: ordering all the conflicting chunks in the same order in all relevant directories by preemption