

# **ARIES**

Concurrency Control and Recovery

# Components

full operation record      Log

uncommitted transactions      Transaction table

pages not flushed      Dirty page table

snapshots of TT + DPT      Checkpoints

flushed pages      Disk

# Passes

replay log

Analysis

perform updates

Redo

remove effects of  
losing transactions

Undo

# Analysis pass

Reconstruct state of transaction table and dirty page table at time of crash

Start at last checkpoint

Transaction table: add when started, remove when committed

Dirty page table: add only (conservative redo)

# Redo pass

Play forward log

Don't need to apply update if:

- page not in DPT

- LSN of record  $<$  recoveryLSN in DPT

- LSN of record  $\leq$  pageLSN of page

# Undo pass

Undo any transactions left in transaction table

Write CLR's to prevent repeated undos

## Q: 6.830 2012

In an ARIES-based logging system, how could you simplify the system if you knew that the database never wrote dirty pages from uncommitted transactions to disk?

**A:**

In this case, a separate UNDO phase is not required during recovery. Undo related logging work such as before-images of pages also need not be done at run-time.