

CRASH RECOVERY

Concepts

- ARIES recovery algorithm
- LOG
- Recovery related data structures
- Write-Ahead Logging Protocol
- Checkpointing

ARIES recovery algorithm

- Restart proceeds in 3 phases
 - Analysis (identifies dirty pages and active xns)
 - Redo (repeats all actions acc to logs)
 - Undo (undoes all actions of xns that did not commit)
- Three principles
 - Write-ahead logging (logs in stable storage)
 - Repeating history during Redo
 - Logging changes during Undo (to avoid repeated action on repeated restarts)

The Log

- History of actions executed by DBMS
- File of records stored in stable storage
- Multiple copies at different disks
- Log tail
- LSN (log sequence number-unique id)
- PageLSN

Actions

Log record is written for following actions

- Updating a page
- Commit
- Abort
- End
- Undoing an update

- `<prevLSN, transID, type>`

For update log record

- `<prevLSN, transID, type, pageid, length, offset, before-image, after-image>`
- Compensation log records (CLR)

Other recovery related data structures

- Transaction table (tid, lastLSN, status)
- Dirty page table (pageid, recLSN)