DBMS

Query Optimizer

Indexer

Store
Error Scenarios

- power failure
- fire, flood, earthquake, tsunami, burglary, ...
- hardware error (hard disk crash, memory failure, network problem)
- software error
- janitor's dog...

Dirty noise

Forensics

Diagram:
Recovery in **ANY** Software

- undo-functionality
- backup copies
- journaled file systems (metadata vs content)

"Do not switch off" messages (FAIL!)

will not be able to recover

Recovery := mechanism allowing us to get back to a consistent state
ACID?
ACID recap

Atomicity: all or nothing
Consistency: consistent state preservation
Isolation: concurrent transactions have same effect as some serial schedule
Durability: committed changes will never be lost
Local Error

error or ABORT in application program

or: ABORT triggered by system due to deadlock

database system: just fine, up and running

tasks:

Local **Undo**: remove persisted changes done by non-committed TAs
Example: Local Error

transfer 100 € from account A to account B

committed, must be persisted

transfer 300 € from account C to account B

did not commit, must not be persisted

ABORT!
Loss of Main Memory

=> dirty pages in database buffer lost

database system: still able to restart

tasks:

**Undo**: remove persisted changes done by non-committed TAs

**Redo**: persist all non-persisted changes done by committed TAs
Example: Loss of Main Memory

- Transfer 100 € from account A to account B
  - Committed, must be persisted

- Transfer 300 € from account C to account B
  - Did not commit, must not be persisted

Power failure!
Loss of External Memory/Storage

=> database store and/or log lost

database system: still able to restart (but hey: on what data exactly?)
tasks:

  archive

  get/install database store/log replica/copy!

  proceed as in loss of main memory (see above)
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