Review of Topics

• Query Optimization
  – Reduction factor
  – Result size estimation
  – Single-relation plans
    • Cost estimation using indexes
  – Multiple-relation plans
    • Plan space
    • Given a plan, estimate its cost (see example plans in the lecture on query optimization)
    • Cost estimation of joins
  – Example questions: HW3, Midterm, HW4
Review of Topics

• Schema Refinement
  – Redundancy and associated anomalies
  – Functional dependencies
  – Normal forms (BCNF, 3NF)
    • Identify the candidate key(s) of a relation R
    • Identify the best normal form that R is in
    • Identify redundancy associated with 3NF
  – Decomposition into BCNF
    • Must be lossless-join
    • Check if also dependency-preserving
  – Example questions: HW4, in-class exercise
Review of Topics

• XML and XQuery
  – XML documents and DTD
  – XQuery queries
    • Path expressions: path operators, predicates
    • FLOWR expressions: more predicates, element and attribute construction
  – Questions very similar to those in HW4
Review of Topics

• Transaction Management
  – Concurrency control: Consistency, Isolation
  – Recovery: Atomicity, Durability

• Concurrency Control
  – Serializability:
    • Precedence graph and conflict serializability
  – Recoverability
    • Anomalies associated with aborts
    • Schedules that can avoid those anomalies
  – Two phase locking: protocols and guarantees
    • Strict 2PL
    • (Nonstrict) 2PL
Review of Topics

• Concurrency Control:
  – Deadlock management
    • Deadlock detection: waits-for graph
    • Deadlock prevention: wait-die, wound-wait
  – B+tree locking protocols
    • Simple protocol
    • Bayer-Schkolnick improvement

• Recovery
  – Steal, no force
  – WAL logging protocol
  – Basic ideas of the recovery algorithm
    • Checkpointing
    • Analysis, REDO, UNDO

• Example questions: HW5