

CS 450 Final Study Guide

1. Conceptual Design (ER-diagram)
 - a. Basic components: entity sets, relationship sets, attributes
 - b. Various constraints that can be modeled by ER-diagram
 - c. ISA relationship
 - d. Strong entity sets vs. weak entity sets
 - e. N-ary relationship
 - f. Design decisions
2. Logical Design (Relational Model)
 - a. Translation from ER to relational model
 - b. Super keys, candidate keys, foreign keys
3. Relational Algebra
 - a. Basic operators: selection, projection, union, set difference, cross product
 - b. Additional operators: intersection, renaming, division
 - c. Joins: natural join, equi-join, conditional join, outer joins
 - d. Combining operators to write complex queries
4. SQL
 - a. Basic queries
 - b. Joins
 - c. Union, Except/Minus, Intersect
 - d. Aggregation (count, sum, avg, min, max)
 - e. Nested queries / correlated queries
 - f. Division
 - g. Group By
 - h. Null values
 - i. Triggers
 - j. Everything else on the slides
5. Normalization
 - a. Functional dependencies
 - i. Determine whether an FD is in the closure of F
 - ii. Determine whether an FD is satisfied/violated by a relation instance
 - iii. Armstrong's axioms
 - iv. Attribute closure (computation, meaning and usage)
 - v. Identify candidate keys
 - b. Normal forms and decomposition
 - i. Identify the strongest or a specific normal form (2NF, BCNF, 3NF)
 - ii. When to decompose
 - iii. How to check if a decomposition is lossless-join and/or dependency preserving (you can ignore the polynomial-time check for dependency preserving, i.e. slide #7 in Normalization4)
 - iv. Use projection of F^+ to check for dependency preservation
 - v. How to decompose a relation into a set of lossless-join relations that are in BCNF or 3NF (To make things simpler, you only have to consider an FD F for violation if F only uses attributes from the relation, i.e. the conditions stated on Slide 3, Normalization3. So ignore the case "What if F uses attributes not in R?" on Slide 16, Normalization3.)
 - vi. How to preserve dependency after decomposition (use minimal cover)