

COMP 440 | Exam 1 Study Guide

California State University, Northridge

Textbook: Database System Concepts, 7th Edition

The textbook chapters are listed below along with their associated topics. Students should also review the relevant lecture slides, examples, exercises, and additional links and references (Canvas and online resources) provided in the class schedule.

Chapter 1: Introduction to Database Systems

- Databases and Database Management Systems (DBMS)
 - What, Why, and How?
 - Advantages of using a DBMS
- Relational Data Model
 - Relations, Tuples, and Attributes
 - Database Schema vs. Database Instance
- Database Design
 - Conceptual, Logical, and Physical Design
- Database Architecture
 - Centralized, Client-Server, Parallel, and Distributed Databases
- Data Independence
- Database Transactions

Chapter 3: Introduction to SQL

- Overview of the SQL Query Language
- SQL Data Definition and Manipulation
 - DDL vs. DML
 - CREATE TABLE, ALTER TABLE, DROP TABLE
 - Basic SQL Data Types
- Keys and Integrity Constraints
 - Superkeys, Candidate Keys, Primary Keys, Foreign Keys
 - Composite Keys
 - PRIMARY KEY, FOREIGN KEY, NOT NULL
- Basic SQL Query Structure
 - SELECT, FROM, WHERE
 - INSERT, UPDATE, DELETE
 - DISTINCT, AS
 - Comparison and Logical Operators (AND, OR, NOT)
- Additional SQL Operations
 - ORDER BY (ASC, DESC)
 - LIKE, BETWEEN, IN
- Set Operations
 - UNION, INTERSECT, EXCEPT (Set Difference)
- NULL Values

- IS NULL, IS NOT NULL
- Comparisons Involving NULL
- Aggregate Functions
 - COUNT(), MIN(), MAX(), SUM(), AVG()
 - COUNT(*) vs. COUNT(attribute)
- Grouping and Aggregation
 - GROUP BY
 - HAVING
 - WHERE vs. HAVING

Chapter 6: Database Design – Data Modeling

- Database Design Process
 - Conceptual, Logical, and Physical Data Models
- Conceptual Data Model: Entity-Relationship (ER) Model
 - Entities, Entity Sets, Relationships, and Attributes
 - ER Diagrams and Notation
- Strong vs. Weak Entity Sets
 - Identifying Relationships
 - Partial Keys (Discriminators)
- Relationship Cardinality
 - One-to-One (0..1 to 0..1)
 - One-to-Many (1..1 to 0..*)
 - Many-to-Many (0..* to 0..*)
 - Minimum and Maximum Cardinality (min..max): 0..1, 1..1, 0..*, 1..*
- Participation Constraints
 - Total (min cardinality = 1) vs. Partial Participation (min cardinality = 0)
- Attributes
 - Simple vs. Composite
 - Single-Valued vs. Multivalued
 - Derived Attributes
- Relationship Types
 - Unary (Recursive), Binary, and Ternary Relationships
- Extended ER Concepts
 - Specialization and Generalization (IS-A Relationships and Inheritance)
 - Aggregation
- ER Diagram Design
 - Identifying Entities, Relationships, Attributes, and Constraints
 - Drawing ER Diagrams from Given Requirements
 - Common ER Design Problems (Fan Traps and Chasm Traps)

ER Model to Relational Schema Transformation

- Logical Data Model: Relational Data Model
- Converting ER Diagrams into Relational Schemas

- Strong Entity Sets
- Weak Entity Sets
- One-to-One Relationships
- One-to-Many Relationships
- Many-to-Many Relationships
- Unary and Ternary Relationships
- Composite and Multivalued Attributes
- IS-A Hierarchies
- Identifying Primary Keys and Foreign Keys
- Creating Relational Tables from ER Diagrams

Important: Review the lecture examples, ER modeling exercises, SQL practice problems, and additional resources posted on Canvas.