

CIT 170—Introduction to Database Design (3)

Course Description

This course introduces the standards for designing relational databases. Design criteria include first, second, and third normal forms to eliminate modification anomalies. Discussions review the capabilities of three major types of data models—hierarchical, network, and relational – as they apply to hypothetical sets of data objects. Experiences include the creation of a logical design, and translation into a physical database using the relational model. Queries will be performed using both a host language interface and Structured Query Language. Lecture: 3 hours. Prerequisites: none

Course Competencies

Upon successful completion of this course, the student can:

1. Differentiate between traditional files and databases.
2. Define a database management system (DBMS) and describe the services a DBMS provides to users.
3. Identify and describe the main features of three primary types of models upon which databases are built: hierarchical, network, and relational.
4. Demonstrate an understanding of the difference between logical and physical design.
5. Define and be able to use normalization in the logical design of a database.
6. Define and be able to use data definition language, data manipulation language, and instructions that apply relational algebra.
7. Design a realistic business application using a technology-independent data model with emphasis on data integrity and security.
8. Demonstrate an understanding of the database administration function.
9. Demonstrate an understanding of distributed databases.

Course Outline

- I. Introduction to Database Management
 - A. Introduction
 - B. Advantages of Database Processing
 - C. Disadvantages of Database Processing
 - D. Models of Database Processing
- II. Database Design 1
 - A. Functional dependence
 - B. Keys
 - C. First Normal Form
 - D. Second Normal Form
 - E. Third Normal Form
 - F. Incorrect Decompositions
- III. Database Design 2
 - A. Information-level design
 - B. Physical-level design
- IV. The Relational Model – Introduction
 - A. Relational Databases Defined

- B. Relational Algebra
- C. Database Creation
- D. Simple Retrieval
- E. Compound Conditions
- V. The Relational Model – Advanced
 - A. Nesting Queries
 - B. Joining Tables
 - C. Union Compatibility
 - D. Views
 - E. Indexes
 - F. Security
 - G. Integrity Rules
- VI. Functions of Database Management System
 - A. Data Storage, Retrieval and Update
 - B. The Catalog
 - C. Shared Update
 - D. Backup and Recovery
 - E. Data Independence
 - F. Replication
 - G. Utilities
- V. Database Administration
 - A. Policy Formulation
 - B. Data Dictionary Management
 - C. Training
 - D. DBMS Support
 - E. Database Design