RUTGERS

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Newark and New Brunswick

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Accounting Information Systems

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A.I.S. Class 5: Outline

- Group Work for Chapters 1 & 2
- Learning Objectives for Chapter 6
- Elements of Database Systems
- Group Work for Chapter 6

Group Work for Chapters 1 & 2

- Discussion Questions Chapters 1 & 2
- Chapter 2 Problems 3, 4, 5, 7
- Narrative and flowcharts in the Chapter 1 Appendix for automated sales

Group Contracts

- Please turn in if you have not already . . .
- Most of the rest of the documentation is "just in case"
- But the last three pages are logs that you need to maintain continuously – and you must turn copies in with *each* stage of the project

Learning Objectives for Chapter 6

- After studying this chapter you should be able to:
  * distinguish between the file-oriented approach and the database approach
  * discuss fundamental relational database concepts such as composite and foreign keys
  * specify the types of relationships that can be represented in database systems
  * provide a detailed description of the relational database model

Learning Objectives for Chapter 6

- After studying this chapter you should be able to:
  * discuss database integrity, emphasizing entity and referential integrity in particular
  * explain and provide examples of validation rules in relational database systems
  * discuss how views and permissions can be used to restrict access to sensitive data in relational database systems
  * explain the data dictionary concept

Learning Objectives for Chapter 6

- After studying this chapter you should be able to:
  * describe the types of database languages
  * construct SQL queries to extract information from relational database systems
  * discuss database backup and recovery methods
  * explain concepts such as concurrency control
  * explain in general terms concepts such as the object-oriented approach to developing database systems

File Oriented Approach

- Data redundancy
- Proliferation of files
- Lengthy application development
- Lack of data independence
- Duplicate processing
- Data inconsistencies

Database Approach

- Data redundancy virtually eliminated
- Eliminate data inconsistencies
- Data independence
- Rapid application development
- Centralized backup, control and security
- Avoid duplicate processing

Database Approach

- Complexity
- Data integrity requires programming and knowledge of DBMS
- Data accessible only through DBMS
- Centralized backup, control and security

Database Concepts

- Keys
  - Primary keys
  - Composite (concatenated) keys
  - Foreign keys
  - Non-key attributes
- Cardinalities
  - 1:1
  - 1:M and M:1
  - M:M

Our Notation

- The textbook used to show primary keys underlined and foreign keys dotted underlined; sometimes they showed primary keys in italics and marked foreign keys with an asterisk. Now they show primary keys underlined and foreign keys with an asterisk.
  We will stick to the notation shown here, with primary keys underlined and foreign keys in square brackets.

  Customer (Customer#, Name, Address, . . .)

  Invoices (Invoice#, Date, [Customer#], . . .)

  InvoiceItems ([Invoice#], Item#, Qty, UnitPrice)

  or

  Inventory (Inventory#, InventoryName, . . .)

  InvoiceItems ([Invoice#], [Inventory#], Qty, UnitPrice)

Database Models

- Hierarchical
  - 1:1 and 1:M relationships (parent-child)
  - single root (entry point)
  - explicit pointers
- Network
  - 1:1, 1:M, M:1 and M:M relationships
  - multiple parents (multiple entry points)
  - explicit pointers

Database Models

- Relational
  - Relations (tables)
  - Tuples (rows)
  - Attributes (columns)
  - Relationships between tables are *implicit*

The Relational Database Model

- Relation (table) names must be unique
- Every relation must have a primary key
- Duplicate rows and columns are not allowed
- The order of rows and columns is immaterial (except by convention)
- Entity integrity
- Referential integrity

The Relational Database Model

- Entity integrity
  - Primary key cannot be null
  - Primary key must be unique
- Referential integrity
  - foreign keys (when part of a composite key)
    - must match an existing value (cannot be null)
  - foreign keys (when non-key attributes)
    - must match an existing value or be null

Validation Rules

- Greater than minimum value
- Less than maximum value
- One of the acceptable values
- Correct number of digits
- Correct mathematical or logical relationship between fields

Restricting Access

- Specifying permissions
- Restricted logical views

Data Dictionary

- Stores information about the tables, attributes (columns), formats, access privileges etc.

RDBMS Languages

- Data Definition Language (DDL)
- Data Manipulation Language (DML)
- Data Query Language (DQL)
  - Query By Example (QBE)
  - Structured Query Language (SQL)
- Report writers
- Forms editors

SQL

- SELECT <table_name1>.<field_name1>, <table_name2>.<field_name2> . . .
  FROM table_name1, table_name2, . . .
  WHERE
  <table_name1>.<common_field1> = <table_name2>.<common_field2> . . .
  AND
  <condition> [INTO <result table>]

- SELECT CUSTOMERS.NAME, CUSTOMERS.BALANCE
  FROM CUSTOMERS, SALES, ITEMS_SOLD
  WHERE
  CUSTOMERS.CUSTOMERNO = SALES.CUSTOMERNO
  AND
  SALES.INVOICENO = ITEMS_SOLD.INVOICENO
  AND
  ITEMS_SOLD.ITEMNO = 1250

DBMS Backup and Control

- Static backup
- Dynamic backup
  * Redundant Array of Independent Disks (RAID)
- Concurrency control
  * lock out
  * write lock

OODBMS

- Encapsulation
- Polymorphism
- Inheritance
- Currently relatively high cost and weak performance
- Hybrid systems for the future?
  * ORDBMS (Object-Relational Database Management System)
  * SQL-1999
  * PostgreSQL

Group Work for Chapter 6

- Discussion Questions – if there are problems
- Please work on Problems 2, 5, 6, 7
- Narrative and flowcharts in the Chapter 1 Appendix for manual Purchases
- Group Projects – Sheldon Shirts
  - Stage 1 documents the *existing* manual systems
    - Submit your assigned flowcharts in the box outside my office before class on Monday