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Relational Databases Unit

Lesson 3 - Database Design and Terminology

Objectives of Good Design

- A good database design is like a set of blueprints
- Supports required and ad hoc data retrieval
- Contains efficient table structures
- Imposes data integrity at the **field**, **table**, and **relationship** levels
- Supports business rules
- Reduces redundant data
- Lends itself to future growth

Design Methodology

- Requirements Analysis
 - Examine the business being modeled
 - Interview users and management
- Data Modeling
 - Define tables/objects
 - Define relationships
 - Define relationship characteristics
- Normalization
 - Decompose larger tables into smaller tables to eliminate redundant data

Normalization

- What does this term mean?
 - 1st Normal Form
 - All attributes are atomic.
 - No repeating groups.
 - 2nd Normal Form
 - All nonkey attributes are dependent on the entire PK.
 - No partial dependencies.
 - 3rd Normal Form
 - No nonPK attributes are dependent on any other nonkey attribute.
 - No transitive dependencies.

3rd Normal Form

- 1st Normal Form
 - All attributes are atomic
- 2nd Normal Form
 - 1st NF + no composite keys
- 3rd Normal Form
 - 2nd NF + each field in the table should describe the subject that the table represents

Why is Terminology Important?

- It is used to express and define the special ideas and concepts associated with the relational database model
- It is used to express and define the database design process
- It is used anywhere a relational database or RDBMS is discussed

Terminology Categories

- Value-related
- Structure-related
- Relationship-related
- Integrity-related

Value-Related Terms

- Data

- Ex: John Smith 22345 5/12/03 89.45
 - What does this data represent? Cannot know until data is processed...

- Information

- Data that has been processed in such a way as to make it meaningful

Value-Related Terms (continued)

- Null
 - If a value is missing or unknown it is said to be **null**
 - NULL and no value are the **same thing** in a relational database but in Java, Null and undefined are different.

| Client ID | Fname | Lname | City | Phone |
|-----------|-------|---------|----------|----------|
| 9001 | Jim | Smith | Columbus | |
| 9002 | John | Doe | | 444-8989 |
| 9003 | Sally | Jones | Canton | 333-8999 |
| 9004 | Joe | Walters | Akron | |

Structure-Related Terms

- Table
 - Known as a **relation** in relational database theory
 - Composed of **fields** and **records**
 - Always represents a single, specific subject — either an object or an event

Structure-Related Terms (continued)

Table

| Client ID | Fname | Lname | City | Phone |
|-----------|-------|---------|----------|----------|
| 9001 | Jim | Smith | Columbus | |
| 9002 | John | Doe | | 444-8989 |
| 9003 | Sally | Jones | Canton | 333-8999 |
| 9004 | Joe | Walters | Akron | |

Records

Fields