Update Anomaly

Introduction to Normalization of Database Tables

- **Occurs when a change of a single attribute in one record requires changes in multiple records**
- **Example:**
  - A staff person changes their telephone number and every potential customer that person ever worked with has to have the corrected number inserted.
- **Solution:**
  - Put the employees telephone number in one location--as an attribute in the employee table.

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Insertion Anomaly

Introduction to Normalization of Database Tables

- **Occurs when there does not appear to be any reasonable place to assign attribute values to records in the database. Probably have overlooked a critical entity.**
- **Example:**
  - Adding new attributes or entire records when they are not needed. Where do you place information on new Evaluator's? Do you create a dummy Lead.
- **Solution:**
  - Create a new table with a primary key that contains the relevant or functional dependent attributes.

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Database Tables and Normalization

Introduction to Normalization of Database Tables

- **Conversion to First Normal Form**
  - A relational table must not contain repeating groups.
  - Repeating groups can be eliminated by adding the appropriate entry in at least the primary key column(s). (See Database Table 5.3)

PROJ_NUM	PROJ_NAME	EMP_NUM	EMP_NAME	JOB_CLASS	CHG_HOUR	HOURS
15	Evergreen	103	June E. Arbough	Elect. Engineer	$84.50	23.8
		101	John G. News	Database Designer	$105.00	19.4
		105	Alice K. Johnson "	Database Designer	$105.00	35.7
		106	William Smithfield	Programmer	$35.75	12.6
		102	David H. Senior	Systems Analyst	$96.75	23.8

Database Table 5.2 The Evergreen Data

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Database Tables and Normalization

Introduction to Normalization of Database Tables

- **Dependency Diagram**
  - The arrows above the entity indicate that the entity's attributes are dependent on the combination of PROJ_NUM and EMP_NUM.
  - The arrows below the dependency diagram indicate less desirable dependencies based on only a part of the primary key -- partial dependencies.
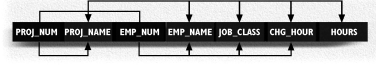

Figure 5.1 A Dependency Diagram: First Normal Form

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Database Tables and Normalization

Introduction to Normalization of Database Tables

- **1NF Definition**
  - The term first normal form (1NF) describes the tabular format in which:
    - All the key attributes are defined.
    - There are no repeating groups in the table.
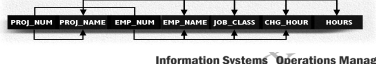   - All attributes are dependent on the primary key.

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Database Tables and Normalization

Introduction to Normalization of Database Tables

- **Conversion to Second Normal Form**
  - Starting with the 1NF format, the database can be converted into the 2NF format by
    - Writing each key component on a separate line, and then writing the original key on the last line and
    - Writing the dependent attributes after each new key.

  PROJECT (PROJ_NUM, PROJ_NAME)
  EMPLOYEE (EMP_NUM, EMP_NAME, JOB_CLASS, CHG_HOUR)
  ASSIGN (PROJ_NUM, EMP_NUM, HOURS)

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