Chapter 16

Methodology
Conceptual Databases Design

Design Methodology

- A structured approach that uses procedures, techniques, tools, and documentation aids to support and facilitate the process of design.

Database Design Methodology

- Three main phases
  - Conceptual database design
  - Logical database design
  - Physical database design

Conceptual Database Design

- The process of constructing a model of the data used in an enterprise, independent of *all* physical considerations.

Logical Database Design

- The process of constructing a model of the data used in an enterprise based on a specific data model (e.g. relational), but independent of a particular DBMS and other physical considerations.

Physical Database Design

- The process of producing a description of the implementation of the database on secondary storage; it describes the base relations, file organizations, and indexes design used to achieve efficient access to the data, and any associated integrity constraints and security measures.

Critical Success Factors in Database Design

- Work interactively with the users as much as possible.
- Follow a structured methodology throughout the data modeling process.
- Employ a data-driven approach.
- Incorporate structural and integrity considerations into the data models.
- Combine conceptualization, normalization, and transaction validation techniques into the data modeling methodology.

Critical Success Factors in Database Design

- Use diagrams to represent as much of the data models as possible.
- Use a Database Design Language (DBDL) to represent additional data semantics.
- Build a data dictionary to supplement the data model diagrams.
- Be willing to repeat steps.

Overview Database Design Methodology

Conceptual database design

- Step 1 Build conceptual data model
  - Step 1.1 Identify entity types
  - Step 1.2 Identify relationship types
  - Step 1.3 Identify and associate attributes with entity or relationship types
  - Step 1.4 Determine attribute domains
  - Step 1.5 Determine candidate, primary, and alternate key attributes

Overview Database Design Methodology

- Step 1 Build conceptual data model (continue)
  - Step 1.6 Consider use of enhanced modeling concepts (optional step)
  - Step 1.7 Check model for redundancy
  - Step 1.8 Validate conceptual model against user transactions
  - Step 1.9 Review conceptual data model with user

Overview Database Design Methodology

Logical database design for the relational model

- Step 2 Build and validate logical data model
  - Step 2.1 Derive relations for logical data model
  - Step 2.2 Validate relations using normalization
  - Step 2.3 Validate relations against user transactions
  - Step 2.4 Define integrity constraints

Overview Database Design Methodology

- Step 2 Build and validate logical data model (continue)
  - Step 2.5 Review logical data model with user
  - Step 2.6 Merge logical data models into global model (optional step)
  - Step 2.7 Check for future growth