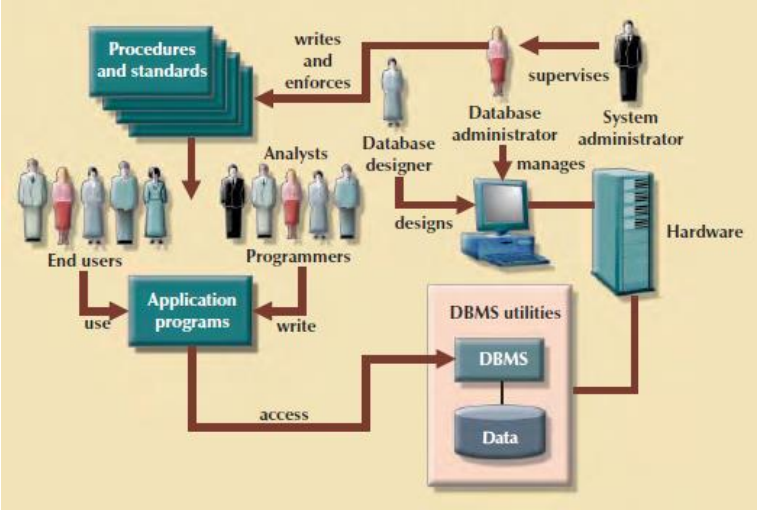
Chapter 10
Database System Development Lifecycle

Objectives

- The main stages of the database system development lifecycle (DSDLC).
- The main phases of database design:
  - Conceptual design
  - Logical design
  - Physical design

The database system environment



Database System Development Lifecycle (Table 10.1)

STAGE	MAIN ACTIVITIES
Database Planning	Planning how the stages of the lifecycle can be realized most effectively and efficiently.
System Definition	Specifying the major user views, its users, and application areas
Requirements collection and analysis	Collection and analysis of the requirements for the new database system
Database Design	**Conceptual, logical and physical design of the database**
DBMS selection (optional)	Selecting a suitable DBMS for the database system
Application Design	Designing the user interface and the application programs that use and process the database

Database Planning

- The management activities that allow the stages of the database system development lifecycle to be realized as efficiently and effectively as possible.

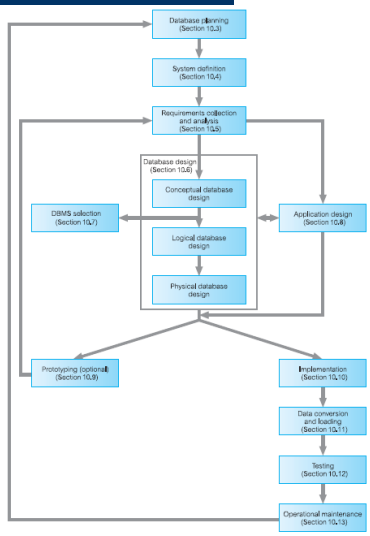


Figure 10.1 The stages of the database system development lifecycle.

Database Design

- Database Design
  - The organization of data according to a database model to meet the needs of an organization.
  - The designer determines what data must be stored and how the data elements interrelate.
  - In the case of relational databases the storage objects are tables which store data in rows and columns.
  - Database design is more art than science, as you have to make many decisions.
  - Guidelines (usually in terms of what not to do instead of what to do) are provided in making these design decision, but the choices ultimately rest on the you - the designer.

Database Design (con't)

- A well-designed database shall
  - **Reduce Data Redundancy**: the same piece of data shall not be stored in more than one place. This is because duplicate data not only waste storage spaces but also easily lead to inconsistencies.
  - However, do not be hard on avoiding redundancy, if performance is the key.
  - Ensure Data Integrity and Accuracy

Phases of Database Design

- There are mainly three phases for the process of database design:
  - Conceptual
  - Logical
  - Physical

Phases of Database Design

- Conceptual database design
  - The process of constructing a model of the data used in an enterprise, independent of all physical considerations
  - Covered in Ch. 16
- Logical database design
  - The process of constructing a model of the data used in an enterprise based on a specific data model (relational, network, hierarchical, or object-oriented), but independent of a particular DBMS and other physical considerations.
  - Normalization is used to test the correctness of a logical data model.
  - Covered in Ch. 17

Phases of Database Design (cont'd)

- Physical database design
  - The process of producing a description of the implementation of the database on a secondary storage;
  - it describes the base relations, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures.
  - Covered in Ch. 18 & 19

Summary

We have covered the following:

- The main stages of the database system development lifecycle (DSDLC).
- The main phases of database design:
  - Conceptual design
  - Logical design
  - Physical design