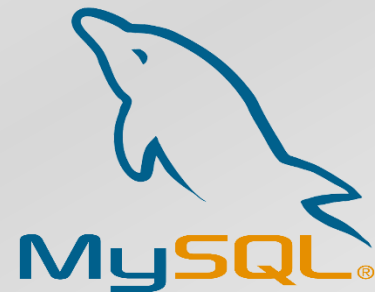


Chapter 10

Database System Development Life Cycle

Fadia Ala'eddin

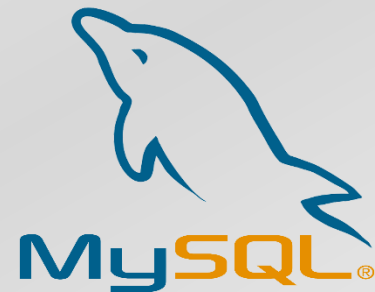
Dr. Mohammed Eshtay



The Information Systems Lifecycle

Information System: The resources that enable the collection, management, control, and dissemination of information throughout an organization.

A computer-based information system includes a database, database software, application software, computer hardware, and personnel using and developing the system.



The Database System Development Lifecycle

As a database system is a fundamental component of the larger organization-wide information system, the database system development lifecycle is inherently associated with the lifecycle of the information system

It is important to recognize that the stages of the database system development lifecycle are not strictly sequential, but involve some amount of repetition of previous stages through *feedback loops*.

For example: problems encountered during database design may necessitate additional requirements collection and analysis. As there are feedback loops between most stages.

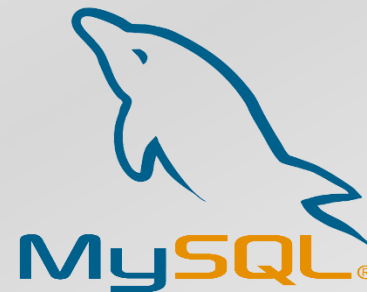


TABLE 10.1 Summary of the main activities associated with each stage of the database system development lifecycle.

STAGE	MAIN ACTIVITIES
<i>Database planning</i>	Planning how the stages of the lifecycle can be realized most efficiently and effectively.
<i>System definition</i>	Specifying the scope and boundaries of the database system, including the major user views, its users, and application areas.
<i>Requirements collection and analysis</i>	Collection and analysis of the requirements for the new database system.
<i>Database design</i>	Conceptual, logical, and physical design of the database.
<i>DBMS selection</i>	Selecting a suitable DBMS for the database system.
<i>Application design</i>	Designing the user interface and the application programs that use and process the database.
<i>Prototyping (optional)</i>	Building a working model of the database system, which allows the designers or users to visualize and evaluate how the final system will look and function.
<i>Implementation</i>	Creating the physical database definitions and the application programs.
<i>Data conversion and loading</i>	Loading data from the old system to the new system and, where possible, converting any existing applications to run on the new database.
<i>Testing</i>	Database system is tested for errors and validated against the requirements specified by the users.
<i>Operational maintenance</i>	Database system is fully implemented. The system is continuously monitored and maintained. When necessary, new requirements are incorporated into the database system through the preceding stages of the lifecycle.

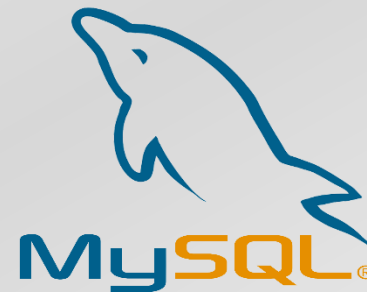
Database Planning

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

Clearly define the **mission statement** for the database system; the major aims of the database system.

Three main issues involved:

- Identification of enterprise plans and goals with subsequent determination of information systems needs;
- Evaluation of current information systems to determine existing strengths and weaknesses;
- Appraisal of IT opportunities that might yield competitive advantage.

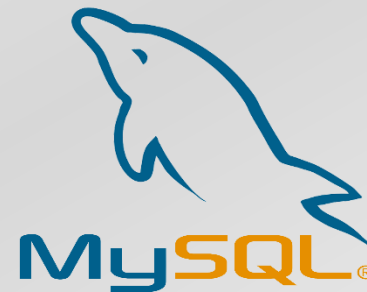


System Definition

System definition: Describes the scope and boundaries of the database system and the major user views.

Identifying the boundaries of the system that we are investigating and how it interfaces with other parts of the organization's information system.

It is important that we include within our system boundaries not only the current users and application areas, but also future users and applications.



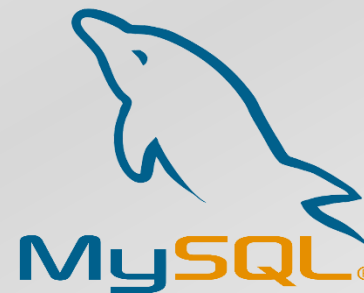
User Views

User view: Defines what is required of a database system from the perspective of a particular job role (such as Manager or Supervisor) or enterprise application area (such as marketing, personnel, or stock control).

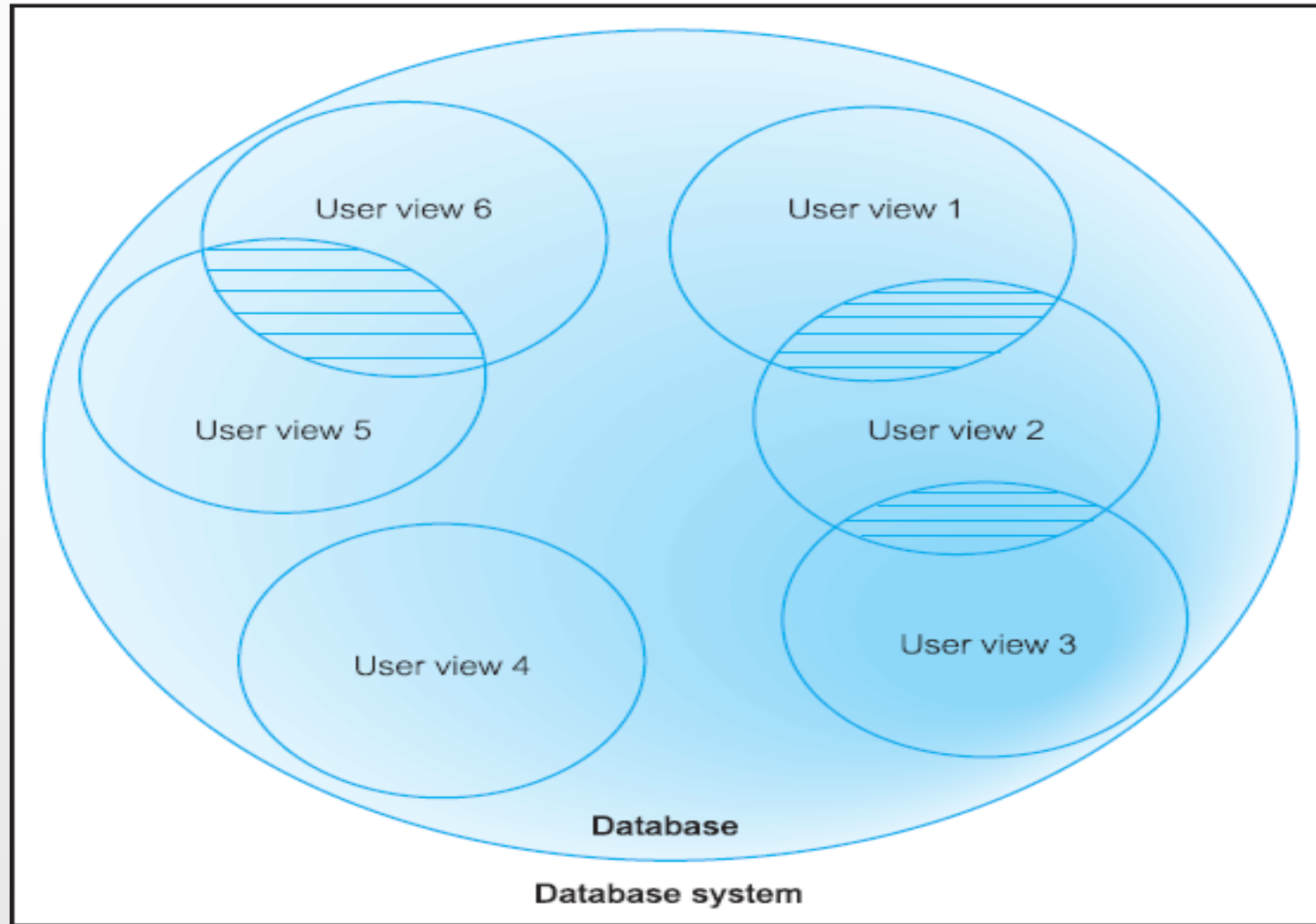
It helps to ensure that no major users of the database are forgotten when developing the requirements for the new database system.

User views are also particularly helpful in the development of a relatively complex database system by allowing the requirements to be broken down into manageable pieces.

A user view defines what is required of a database system in terms of the data to be held and the transactions to be performed on the data (in other words, what the users will do with the data).



User Views



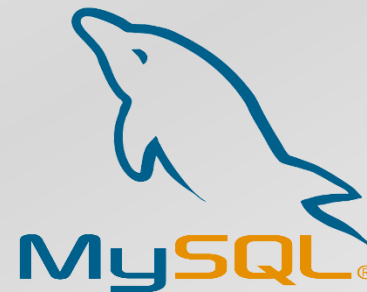
Requirements Collection and Analysis

Requirements collection and analysis: The process of collecting and analyzing information about the part of the organization that is to be supported by the database system, and using this information to identify the requirements for the new system.

This stage involves the collection and analysis of information about the part of the enterprise to be served by the database.

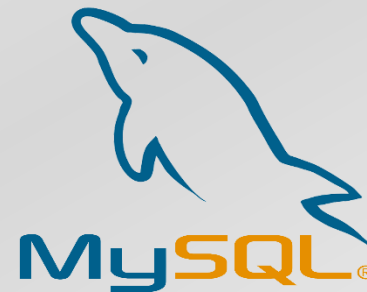
Information is gathered for each major user view, including:

- A description of the data used or generated;
- The details of how data is to be used or generated;
- Any additional requirements for the new database system.



Requirements Collection and Analysis

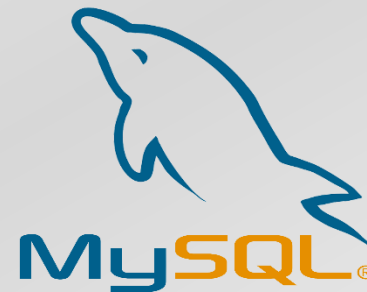
- This information is then analyzed to identify the requirements (or features) to be included in the new database system. These requirements are described in documents collectively referred to as **requirements specifications** for the new database system.
- The information collected at this stage may be poorly structured and include some informal requests, which must be converted into a more structured statement of requirements.
- Identifying the required functionality for a database system is a critical activity, as systems with inadequate or incomplete functionality will annoy the users, which may lead to rejection or underutilization of the system



Requirements (Example)

- **Branches**

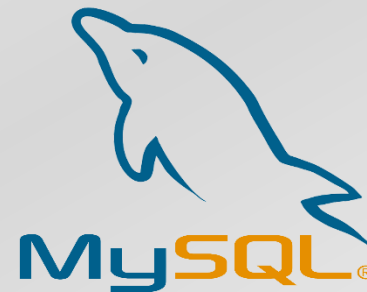
DreamHome has branch offices in cities throughout the United Kingdom. Each branch office is allocated members of staff, including a Manager, who manages the operations of the office. The data describing a branch office includes a **unique** branch number, address (street, city, and postcode), telephone numbers (up to a maximum of three), and the name of the member of staff who currently manages the office. Additional data is held on each Manager, which includes the date that the manager assumed his or her position at the current branch office, and a monthly bonus payment based upon his or her performance in the property for rent market.



Requirements (Example)

- **Staff**

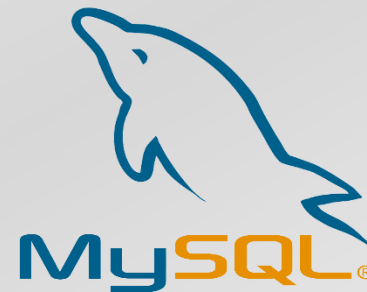
Members of staff with the role of Supervisor are responsible for the day-to-day activities of an allocated group of staff called Assistants (up to a maximum of 10, at any one time). Not all members of staff are assigned to a Supervisor. The data stored regarding each member of staff includes staff number, name, address, position, salary, name of Supervisor (where applicable), and the details of the branch office at which a member of staff is currently working. **The staff number is unique across all branches of *DreamHome***



Requirements (Example)

- Properties for rent

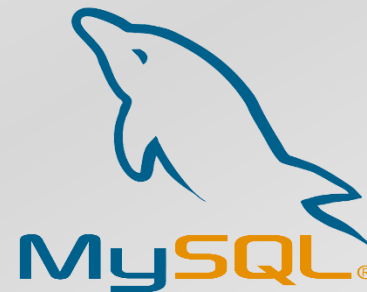
Each branch office offers a range of properties for rent. The data stored for each property includes property number, address (city), type, number of rooms, monthly rent, and the details of the property owner. The property number is unique across all branch offices. The management of a property is assigned to a member of staff whenever it is rented out or requires to be rented out. A member of staff may manage a maximum of 100 properties for rent at any one time. When a given property is available for rent, the property details will be displayed on the DreamHome Web site and, when necessary, as advertisements in local and national newspapers.



Requirements (Example)

- **Property owners**

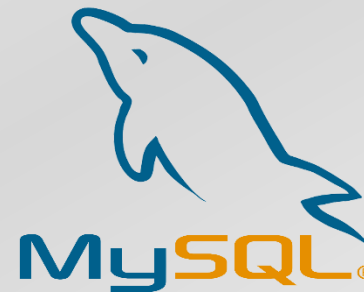
The details of property owners are also stored. There are two main types of property owner: private owners and business owners. The data stored for private owners includes owner number, name, address, telephone number, email, and password. The data stored on business owners includes name of business, type of business, address, telephone number, email, password, and contact name. The password will allow owners access to parts of the *DreamHome* database using the Web.



Requirements (Example)

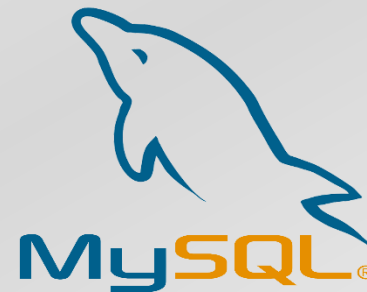
- **Clients**

DreamHome refers to members of the public interested in renting property as clients. To become a client, a person must first register at a branch office of *DreamHome*. The data stored on clients includes client number, name, telephone number, email, preferred type of accommodation, and the maximum rent that the client is prepared to pay. Also stored is the name of the member of staff who processed the registration, the date the client joined, and some details on the branch office at which the client registered. The client number is unique across all *DreamHome* branches.



Database design

- Database design is made up of three main phases: conceptual, logical, and physical 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, 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 used to achieve efficient access to the data, and any associated integrity constraints and security measures.



End of Chapter 10

