

1. Introduction to Databases

What is a Database?

A database is a shared collection of logically related data that has a description of this data. The data is self-defining, meaning there are system tables within the database that define each attribute of the database itself.

- ◆ The logical relation of data depends on the context or domain the database is being used for.
- ◆ For example, in a retail store like Woolworths, the related data would include product attributes such as name, description, weight, volume, size, quantity, recommended retail price, and purchase price.
- ◆ In a university context, the related data would include student enrolment information, programs, and units.

Types of Databases

- ◆ Relational databases are based on mathematical foundations, including the concept of a relation, which is related to set theory.
- ◆ There are other types of databases, but relational databases are the most commonly used and the focus of this unit.

Databases as a Component of Information Systems

Databases are a crucial component of information systems, which are used everywhere to automate processes and support operations in organizations.

Examples of information systems that use databases:

- ◆ Learning management systems (e.g., Canvas)
- ◆ Public transport systems (e.g., Go Card)
- ◆ Petrol stations
- ◆ Smartphones (contact management)

Importance of Database Design

- ◆ Databases are generally static over time and can be considered a long-term investment, lasting up to 10 years or more.

- ◆ A well-designed database ensures that data and facts are easily recorded and accessed, which impacts the efficiency of applications and information systems that use the database.

Principles of Good Database Design

1. Record a piece of data only once and in one place.
2. Avoid duplicating data across multiple tables or rows.
3. Ensure that each table has a primary key to uniquely identify records.
4. Use separate tables for different entities and link them using foreign keys.

Examples of Bad Database Design

- ◆ Recording the same data (e.g., passwords) in multiple rows or tables.
- ◆ Storing multiple values in a single cell (e.g., multiple actors for a movie).

Example of Good Database Design

- ◆ Using separate tables for movies, directors, and actors.
- ◆ Linking the tables using primary and foreign keys to establish relationships.

See Also

[2. Understanding Relational Databases](#)