RELATIONAL DATABASES

BSc IoT

Objectives

- Understand the use and management of a database
- Explain the importance of clearly communicating and accurately capturing information requirements
- Distinguish between a conceptual model and its physical implementation
- List five reasons for building a conceptual data model
- Give examples of conceptual models and physical models

Purpose

- When you are able to recognise and analyse information you can better understand how things work and potentially make them better.
- For example:
  - *How to make a line at the food counter go faster*
  - *How to successfully exchange an item you purchased*
  - *How to organise and keep track of weekly schedule*
- Also, recognising and analysing information helps prevent mistakes and misunderstanding. For a business, this is important because it save time and money.

Purpose

- All systems now store data
- Many systems analyse and process data
- Access to data must be managed
- Accuracy and security of data must be managed

- The design of these storage areas is very important for businesses

Database Concepts

- A relational database holds related data (and a description of the data) designed to meet the needs of an organisation
- Database Management System (DBMS) is software that enables users to define, create, maintain, and control access to the database.
- Data Definition Language (DDL) allows you to specify data types, structures and constraints
- Data Manipulation Language (DML) allows you to query the database

Advantages of Relational Databases

- Control of data redundancy
- Data consistency
- Sharing of data
- Improved data integrity
- Improved security
- Enforcement of standards
- Economy of scale
- Improved access and response
- Increased productivity
- Improved maintenance through data independence
- Increased concurrency
- Improved backup and recovery services

Disadvantages of Relational Databases

- Complexity
- Size
- Cost
- Performance

Designing a Relational Database

- Involves database designers and business representatives
- Requirements need to be identified with the business reps
- Business rules that affect the storage and processing of data need to be identified
- First step is the conceptual model

What is a Conceptual Model?

A conceptual model:

- Capture the functional and informational needs of a business
- Is based on current needs but it may reflect future needs
- Addresses the needs of a business (what is conceptually ideal), but does not address its implementation (what is physically possible)

What is a Conceptual Model?

A Conceptual Model:

- Is called an “Entity Relationship Model”
- Is illustrated using an “Entity Relationship Diagram” (ERD)
- Is the result of completing the Data Modelling process
- Businesses use data to increase sales and/or reduce costs
- In order to accurately collect data, a business must create a conceptual model of the data it considers important

What is a Conceptual Model?

A conceptual model is important to a business because it:

- Describes exactly the information needs of the business
- Facilitates discussion
- Prevents mistakes and misunderstandings
- Forms important “ideal system” documentation
- Forms a sound basis for physical database design

What is a Conceptual Model?

A conceptual model is important to a business because it:

- Documents the process (also known as the “business rules” of the business
- Takes into account regulations and laws governing this industry

Conceptual and Physical Models

- It is the art of planning, developing, and communicating that allows a group of people to work together to achieve a desired outcome
- Data modelling is the process of capturing the important concepts ad rules that shape a business and depicting them visually on a diagram
- This diagram becomes the blueprint for designing the physical thing
- The client's dream (conceptual model) will become a physical reality (physical model)