

The background of the slide features a light gray gradient. It is decorated with several realistic water droplets of various sizes, some with highlights and shadows, scattered across the top and bottom edges. In the upper center, there is a faint, circular, textured pattern that resembles a lens flare or a subtle watermark.

# RELATIONAL DATABASES

# OBJECTIVES

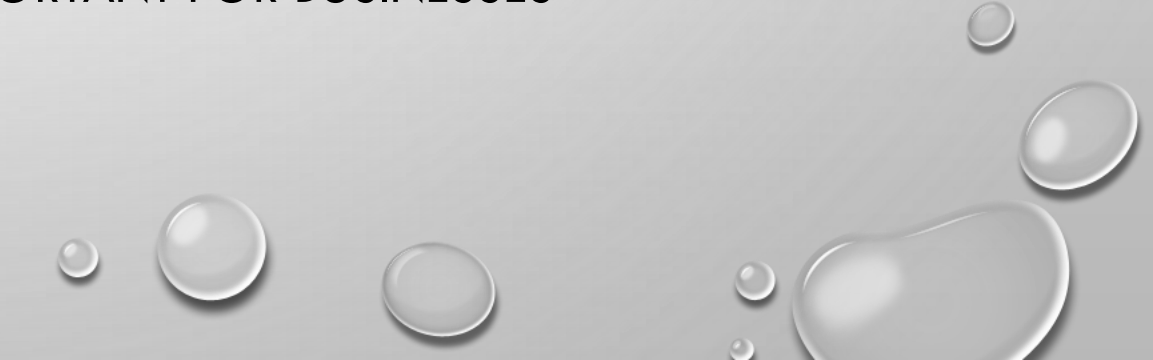
- UNDERSTAND THE USE AND MANAGEMENT OF A DATABASE
- EXPLAIN THE IMPORTANCE OF CLEARLY COMMUNICATING AND ACCURATELY CAPTURING INFORMATION REQUIREMENTS
- DISTINGUISH BETWEEN A CONCEPTUAL MODEL AND ITS PHYSICAL IMPLEMENTATION
- LIST FIVE REASONS FOR BUILDING A CONCEPTUAL DATA MODEL
- GIVE EXAMPLES OF CONCEPTUAL 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 A WEEKLY SCHEDULE
- ALSO, RECOGNISING AND ANALYSING INFORMATION HELPS PREVENT MISTAKES AND MISUNDERSTANDING.
- FOR A BUSINESS, THIS IS IMPORTANT BECAUSE IT SAVES 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
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- THE DESIGN OF THESE STORAGE AREAS IS VERY IMPORTANT FOR BUSINESSES
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# 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
- 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
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# 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 AND 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)