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 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)