RELATIONAL DATABASES

OBJECTIVES

- UNDERSTAND THE CREATION OF A CONCEPTUAL MODEL.
- USING A BUSINESS PROCESS DESCRIPTION:
  - DEFINE AND GIVE AN EXAMPLE OF AN ENTITY
  - DISTINGUISH BETWEEN AN ENTITY AND AN INSTANCE OF AN ENTITY
  - NAME AND DESCRIBE ATTRIBUTES FOR A GIVEN ENTITY
  - DISTINGUISH BETWEEN AN ATTRIBUTE AND ITS VALUE
  - DISTINGUISH BETWEEN MANDATORY AND OPTIONAL ATTRIBUTES, AND BETWEEN VOLATILE AND NONVOLITILE ATTRIBUTES
  - SELECT AND JUSTIFY A UNIQUE IDENTIFIER (UID) FOR AN ENTITY

PURPOSE OF ENTITIES

- KNOWING HOW TO ORGANISE AND CLASSIFY DATA MAKES IT POSSIBLE TO DRAW USEFUL CONCLUSIONS

- OUR TECHNOLOGY-RICH WORLD PRODUCES VAST QUANTITIES OF FACTS IN NEED OF STRUCTURE AND ORDER TO BE STORED

- IT IS IMPORTANT TO LEARN ABOUT ENTITIES BECAUSE THEY ARE THE THINGS ABOUT WHICH WE STORE DATA.

- FOR EXAMPLE:
  - THE WITCARD NEEDS TO STORE DATA ABOUT (AS A MINIMUM) STUDENTS, TRANSACTIONS, MEALS, PRODUCTSS.

- WHAT KIND OF INFORMATION WOULD YOU NEED TO STORE FOR A TIMETABLE?

PURPOSE OF ATTRIBUTES

- IT IS IMPORTANT TO LEARN ABOUT ATTRIBUTES BECAUSE THEY PROVIDE MORE SPECIFIC INFORMATION ABOUT AN ENTITY.

- ATTRIBUTES HELP YOU DISTINGUISH BETWEEN ONE INSTANCE AND ANOTHER BY PROVIDING GREATER DETAIL FOR THE ENTITY.

- FOR EXAMPLE:

    - IN A RESTAURANT YOU NEED TO HAVE AN ORDER FOR EACH TABLE IN YOUR RESTAURANT SO THAT YOU CAN CALCULATE THE BILL. WHAT MIGHT YOU STORE ABOUT EACH ORDER?

    - FOR THE WIT CARD STORING INFORMATION ON STUDENTS, WHAT DETAILS WOULD YOU STORE ABOUT EACH STUDENT?

PURPOSE OF UNIQUE IDENTIFIERS

- WHAT ABOUT UNIQUE IDENTIFIERS?

  - A UNIQUE IDENTIFIER DISTINGUISHES ONE ORDER FROM ANOTHER OR ONE STUDENT FROM ANOTHER.

- FOR EXAMPLE:

  - IN WIT WHAT DISTINGUISHES ONE PROGRAMME FROM ANOTHER?

  - IN A BANK WHAT DISTINGUISHES ONE ACCOUNT FROM ANOTHER?

  - IN IRELAND FOR TAX PURPOSE WHAT DISTINGUISHES ONE PERSON FROM ANOTHER?

ENTITY DEFINED

- AN ENTITY IS:
  - "SOMETHING" OF SIGNIFICANCE TO THE BUSINESS ABOUT WHICH DATA MUST BE KNOWN
  - A NAME FOR A SET OF SIMILAR THINGS THAT YOU CAN LIST
  - USUALLY A NOUN
  - EXAMPLES: OBJECTS, EVENTS, PEOPLE
  - ENTITIES HAVE INSTANCES.
  - AN INSTANCES IS A SINGLE OCCURRENCE OF AN ENTITY

Entities	Instances
PERSON	Mahatma Gandhi, George Washington
PRODUCT	Nike Air Jordan, Gibson Les Paul Custom
PRODUCT TYPE	Shoe, Video Game
JOB	Electrician, IT Technician
SKILL LEVEL	Beginner, Expert
CONCERT	U2 at the Palladium, Beyoncé at the Greek Theatre L.A.
ANIMAL	Dog, Cat
CAR	Volkswagen Beetle, Toyota Corolla

ENTITIES AND INSTANCES

- A DALMATION, A SIAMESE CAT, A COW AND A PIG ARE INSTANCES OF ANIMAL

- A CONVERTIBLE, A HATCHBACK, A SALOON AND A SUV ARE INSTANCES OF CAR

- SOME ENTITIES HAVE MANY INSTANCES SOME ONLY A FEW

- ENTITIES CAN BE:
  - TANGIBLE, LIKE PERSON OR PRODUCT
  - INTANGIBLE, LIKE SKILL OR GRADE
  - AN EVENT, LIKE CONCERT

ENTITIES AND INSTANCES

- IS DOG AN INSTANCE OR AN ENTITY?

- IT DEPENDS:

  - IF WE CONSIDER MANY DIFFERENT KINDS OF ANIMALS, IT MAKES SENSE THE ENTITY ANIMAL WOULD HAVE INSTANCES DOG, CAT, HORSE ETC

  - BUT IF WE ARE BREEDING DOGS THEN THE ENTITY DOG WOULD HAVE INSTANCES TERRIER, POODLE, LABRADOR ETC

WHAT IS AN ATTRIBUTE?

- LIKE AN ENTITY, AN ATTRIBUTE REPRESENTS SOMETHING OF SIGNIFICANCE TO THE BUSINESS.

- AN ATTRIBUTE IS A SPECIFIC PIECE OF INFORMATION THAT HELPS:

  - DESCRIBE AN ENTITY

  - QUANTIFY AN ENTITY

  - CLASSIFY AN ENTITY

  - SPECIFY AN ENTITY

- AN ATTRIBUTE HAS A SINGLE VALUE

ATTRIBUTES

- ATTRIBUTES HAVE VALUES. AN ATTRIBUTE CAN BE A NUMBER, A CHARACTER STRING, A DATE, AN IMAGE, A SOUND ETC

- THESE ARE ALL "DATA TYPES" EVERY ATTRIBUTE HAS ONE DATA TYPE.

Entities	Attributes
CUSTOMER	family name, age, shoe size, town of residence, email
CAR	model, weight, catalog price
ORDER	order date, ship date
JOB	title, description
TRANSACTION	amount, transaction date
EMPLOYMENT CONTRACT	start date, salary

ATTRIBUTES

- WHAT IS THE DATA TYPE FOR EACH ATTRIBUTE IN CUSTOMER?

Entities	Attributes
CUSTOMER	family name, age, shoe size, town of residence, email
CAR	model, weight, catalog price
ORDER	order date, ship date
JOB	title, description
TRANSACTION	amount, transaction date
EMPLOYMENT CONTRACT	start date, salary

ATTRIBUTES

- THE ONLY ATTRIBUTES WE NEED TO MODEL ARE THOSE THAT BUSINESS NEEDS TO TRACK.

- EVERY ATTRIBUTE HAS A DATA TYPE

- EVERY ATTRIBUTE IS SINGLE VALUED

  - AN INSTANCE OF AN ENTITY CAN HAVE ONLY ONE VALUE FOR EACH ATTRIBUTE AT ANY POINT IN TIME. THE ATTRIBUTE VALUE CAN CHANGE OVER TIME.

ATTRIBUTES

- SOME ATTRIBUTES HAVE VALUES THAT CONSTANTLY CHANGE
  - THESE ARE CALLED VOLATILE ATTRIBUTES

- OTHER ATTRIBUTES WILL RARELY CHANGE, IF EVER
  - THESE ARE CALLED NONVOLATILE ATTRIBUTES

- IF YOU HAVE A CHOICE, SELECT THE NONVOLATILE ATTRIBUTE

- WHY?

ATTRIBUTES

- SOME ATTRIBUTES MUST CONTAIN A VALUE
  - THESE ARE MANDATORY ATTRIBUTES.

- OTHER ATTRIBUTES MAY EITHER CONTAIN A VALUE OR BE LEFT EMPTY (NULL)
  - THESE ARE OPTIONAL ATTRIBUTES

- EMAIL ADDRESS COULD BE MANDATORY FOR CUSTOMER BUYING ONLINE BUT OPTIONAL FOR RECORDS ON AN EMPLOYEE

ATTRIBUTES

- IF WE WERE TO MODEL A HUMAN RESOURCE SYSTEM, WE WOULD HAVE AN ENTITY TO STORE DATA FOR EACH WORKER CALLED EMPLOYEE

- WHAT ATTRIBUTES WOULD EMPLOYEE HAVE?

IDENTIFIERS

- AN EMPLOYEE HAS A UNIQUE IDENTIFIER (UID)

- A UID IS EITHER A SINGLE ATTRIBUTE OR A COMBINATION OF MULTIPLE ATTRIBUTES THAT DISTINGUISHES ONE EMPLOYEE FROM ANOTHER

- BEFORE YOU CAME TO WIT HOW WOULD YOU DISTINGUISH YOURSELF FROM OTHER STUDENTS? WHAT ATTRIBUTES WOULD YOU USE?