



A11.1 Data models and entity relationships

Databases and big data · A level · OCR H446 1.3.2, AQA 7517 4.10.1,
Eduqas A500QS 2.5 · about 55 min

Name _____

Class _____

Date _____

What this lesson is about

Model the data before building anything: entities, attributes, entity descriptions and the degree of each relationship, drawn as an entity relationship diagram.

- Conceptual data models
- Entity descriptions
- The degree of a relationship
- Resolving a many-to-many relationship
- Checking a degree against data

Questions

6 marks in all

- In a data model, what is an entity? [1 mark]
 - ☐ A A category of object, person, event or thing about which data is recorded
 - ☐ B A single property, such as a robot's colour
 - ☐ C A line joining two tables
 - ☐ D One row of a table
- A team owns many robots, and each robot belongs to exactly one team. What is the degree of the relationship from Team to Robot? [1 mark]
 - ☐ A One-to-many
 - ☐ B Many-to-one
 - ☐ C One-to-one
 - ☐ D Many-to-many
- In an E-R diagram of that relationship, where is the crow's foot drawn? [1 mark]
 - ☐ A At the Robot end
 - ☐ B At the Team end
 - ☐ C At both ends
 - ☐ D At neither end
- How is a many-to-many relationship between Student and Robot implemented in a relational database? [1 mark]
 - ☐ A With a link entity, such as Booking, holding both keys, giving two one-to-many relationships
 - ☐ B By storing a list of robot IDs in one Student attribute
 - ☐ C By merging Student and Robot into one table
 - ☐ D It cannot be stored at all
- In the entity description Robot (RobotID, Name, Colour, TeamID), which attribute should be underlined? [1 mark]

6. A sample of bookings shows no student has booked more than one robot. What can you conclude? [1 mark]
- ☐ A Nothing certain: a sample can show a side is many, but only the requirements can say it is one
 - ☐ B The relationship is one-to-one
 - ☐ C The relationship is one-to-many
 - ☐ D Students cannot book robots

The task: the degree of a relationship

Each list below holds pairs (left, right) taken from the club's records. Write a function `degree(pairs)` that takes one list of 2-tuples and returns a string: "one-to-one", "one-to-many", "many-to-one" or "many-to-many". - The **right** side is **many** if any left value appears with two or more different right values; otherwise it is **one**. - The **left** side is **many** if any right value appears with two or more different left values; otherwise it is **one**. - The string is the left side, then **-to-**, then the right side. Call it on each list and print four lines, in this order, exactly like this (with the degree your function returns): The robot does not move.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

teams_robots = [("Hawks", "Ada"), ("Hawks", "Bolt"), ("Owls", "Cog"), ("Owls", "Dot")]
students_robots = [("Amir", "Ada"), ("Beth", "Ada"), ("Amir", "Cog"), ("Chen", "Bolt"),
("Beth", "Dot")]
robots_chargers = [("Ada", "C1"), ("Bolt", "C2"), ("Cog", "C3"), ("Dot", "C4")]
runs_robots = [(1, "Ada"), (2, "Ada"), (3, "Bolt"), (4, "Cog")]
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/a11-1-entity-relationship-modelling/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. A school library lends books to students. Write the requirements as entity descriptions and draw the E-R diagram, resolving any many-to-many relationship.
2. Add a Sensor entity: a robot carries several sensors, and one sensor model is fitted to many robots. What link entity do you need, and what is its identifier?
3. Why would making Colour the identifier of Robot be a poor choice?