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## COMPUTING SCIENCE FACULTY

**Bachelor of Science in Computing**

**Relational Databases**

# Lab Workbook 5

**Question 1**

Every Christmas, Santa Claus has to distribute several billion presents to several hundred million children. For everything to be done right, Santa and his elves need to handle large amounts of information. For example, they have to keep track of all the children, where they live, if they have been good or bad, which presents they wish to get, etc.

Previously, all this work has been done using paper, but last year the entire archive department sank through the ice at the north pole, where Santa lives, due to global warming. Because of this, Santa will now use computers to handle the administration.

Santa needs to store the following :

1. All the information to uniquely identify each child in the world.
2. All significant acts that each child has carried out.
3. All the things that each child wants for Christmas
4. All the things that each child will actually get for Christmas.

a. Identify the Candidate Entities

|  |
| --- |
| Santa Claus  Presents  Children  Elf  Information  Wishes |

1. Choose the entities and state why some candidates have been excluded

|  |
| --- |
| Santa Claus  Presents  Children  Elf  Information and Wishes were excluded because they are attributes of the Children. |

c. Identify the relationships between the entities and specify the cardinality of the relationships

|  |
| --- |
| 0..\*  1..1  Santa Claus  Presents  distributes  1..1  0..\*  gets  Children  Presents  employs  0..\*  1..1  Santa Claus  Elf |

d. Draw the ER Diagram

|  |
| --- |
| 0..\*  1..1  employs  Elf  distributes  0..\*  1..1  gets  Child  Presents  Santa Claus  0..\*  1..1  has |

**Question 2**

A publishing company produces scientific books on various subjects. The books are written by authors who specialise in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications. A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist on a particular subject.

a. Identify the Candidate Entities

|  |
| --- |
| Book  Subject  Author  Editor  Publication |

b. Choose the entities and state why some candidates have been excluded

|  |
| --- |
| Subject  Author  Editor  Publication  Book was excluded because it is one type of publication. |

c. Identify the relationships between the entities and specify the cardinality of the relationships

|  |
| --- |
| 1..1  1..\*  Author  Editor  works  0..\*  1..1  Author  Publication  writes  1..1  1..\*  Publication  Subject  has  1..\*  1..\*  Publication  Editor  edit |

d. Draw the ER Diagram

|  |
| --- |
| 1..1  writes  Publication  works  Author  1..\*  1..1  0..\*  1..\*  1..\*  Editor  edit  0..\*  1..\*  has  1..1  Subjects |

**Question 3**

A database is to be designed for a Car Rental Co. (CRC). The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addressees, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC was made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources - car hire, car sales, insurance claims - must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards care accepted. Personal details (such as name, address, telephone number, driving licence, number) about each customer are kept in the database.

a. Identify the Candidate Entities

|  |
| --- |
| Car  Garage  Expenditure  Revenue  Customer  Repair  Credit Facility  Deposit  CRC |

b. Choose the entities and state why some candidates have been excluded

|  |
| --- |
| CRC  Customer  Garage  Car  Deposit  Expenditures, Credit Facility and Revenue were excluded for being attributes of Customer.  Repair is a relationship. |

c. Identify the relationships between the entities and specify the cardinality of the relationships

|  |
| --- |
| 1..\*  1..\*  CRC  Customer  has  1..\*  1..1  CRC  Garage  hires  0..\*  1..\*  Customer  Car  rents  0..\*  1..\*  Garage  Car  repairs  0..\*  1..\*  Customer  Deposit  pays |

d. Draw the ER Diagram

|  |
| --- |
| 0..\*  1..\*  0..\*  1..\*  1..\*  has  1..\*  1..1  1..\*  0..\*  Deposit  pays  CRC  hires  Garage  1..\*  rents  Car  Customer  repairs |

END