

## Assignment Task

### Data Management Systems

- **Part A deals with database design, using E-R modelling.**
- **Part B concerns database creation and querying, using SQL.**

#### Part A. Conceptual modelling

A human resource management (HRM) department wishes to create a database to monitor its employees. The company is divided into a number of departments, and employees are assigned to one department. A department is identified by department id and title, whereas an employee is identified by employee id and name. Two types of employee have been identified: shop floor employee and office employee. Each shop floor employee has a main skill (identified by skill id) and performs a specific task. Office employees on the other hand, are identified by their role in the department to which they belong, and the number of years they have been in the company.

The department has a designated manager who has overall responsibility for the department and the employees in the department. However, to help manage the department, a number of employees are nominated to supervise groups of staff. When a new employee joins the company, information on their previous work history and qualifications is required. On a regular basis, each employee is required to undergo a review on a specific date, which results in a review document and which is normally carried out by the manager, but may be delegated to a nominated representative.

Employees have the opportunity to take part in projects, for a specific period of time. Projects are identified by a project id and a title, and have a budget. Employees are required to record the numbers of hours they dedicate to each project.

The company has defined a number of position types, such as Manager, Business Analyst, Salesperson, Secretary etc., and each position type has a number of grades associated with it, which for most non-senior positions determines the employee's salary. Positions are allocated to a department depending on its workload. For example, a department may be allocated two new Business Analyst positions. A position will be filled by one employee, although over time, employees will fill a number of different positions.

1. Create an ER diagram for the above scenario (not UML), and indicate the cardinality of relationships and the nature of the associations (mandatory or optional). You should allocate adequate attributes to the entities/relationships of interest, especially the identifiers.
2. Generate, with justification, relational tables from the ER diagram. Indicate clearly the names of the tables, the attributes, the primary keys and the foreign keys.

**Guidance:** i) Please use the notation given in the lecture notes (*Not UML*). Create the ER diagram and clearly identify any identifiers, indicate the cardinality of relationships and the nature of the associations (mandatory or optional). ii) Generate tables and include primary and foreign keys. Use the schema notation for the tables; you do not have to produce SQL statements.

## Part B: SQL programming

Consider the following “Publication” Database schema, where AuthorId, CategoryId, PublicationId, UserId are unique identifiers.

**Category** (CategoryId, Type)

**Author** (AuthorId, Name)

**Publisher**(PublisherID, PublisherName)

**Publication** (PublicationId, AuthorId, Title, CategoryId, PublishedYear, PublisherId)

**Request** (UserId, PublicationId, RequestDate)

**Users** (UserId, Name, Email, Password)

**TABLE: Author**

AuthorId	Name
A011	Dingle R
A012	Ransome A
A013	Wardale R
A014	Alexander T
A015	Spurrier S

**TABLE: Publisher**

PublisherId	PublisherName
P01	Pearson
P02	HarperCollins
P03	Simon and Schuster

**TABLE: Category**

CategoryId	Type
C911	Short stories
C912	Journal articles
C913	Biography
C914	Illustrations

**TABLE: Publication**

PubId	AuthorId	Title	CategoryId	PublishedYear	PublisherId
P001	A011	The Blue Treacle	C911	1911	P01
P002	A012	In Aleppo Once	C911	2001	P01
P003	A012	Illustrating Arthur Ransome	C914	1973	P03
P004	A012	Ransome the Artist	C914	1994	P03
P005	A014	Bohemia In London	C912	2008	P02
P006	A011	The Best of Childhood	C911	2002	P01
P007	A015	Distilled Enthusiasms	C912	2010	P02

**TABLE: Request**

Userld	PublicationId	RequestDate
U016	P001	05-Oct-2020
U241	P001	28-Sep-2020
U55	P002	08-Sep-2020
U016	P004	06-Oct-2020
U121	P002	23-Sep-2020

**TABLE: Users**

Userld	Name	Email	Password
U111	Kenderine J	KenderineJ@hotmail.com	Kenj2
U241	Wang F	WangF@hotmail.com	Wanf05
U55	Flavel K	FlavelK@hotmail.com	Flak77
U016	Zidane Z	ZidaneZ@hotmail.com	Zidz13
U033	Patel M	PatelM@hotmail.com	PatelManish
U121	Keita R	KeitaR@hotmail.com	Keir22

1. Use appropriate data types and write the SQL statements to create the tables defined in the schema above.
2. Write SQL statements to return the following data from the Publication database.
  - a) The names and the email of the users and the dates of all their requests.
  - b) The details of the publications that were requested during September 2020 in descending order of requested dates. The details should include publication ids, titles and dates on which publications were requested.

- c) The names of the users, the title of the publications they requested, and the names of their authors.
- d) The number of publications requested for each of the categories (e.g. 'Illustrations').
- e) The names of users who requested more than one publication.

**Guidance:** Please use Oracle standard SQL. Indicate clearly the primary keys and the foreign keys. State the SQL statements and give the results. Select and use appropriate data. The presentation of each query should have a text summary which includes i) the query itself (the question), ii) the corresponding SQL statement answer/solution, iii) the result of the execution of the statement **with** iv) evidence that you have used standard SQL and implemented each statement on a database (use screenshots or spool facility).