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**Class Day: T**hursday

**Class Time:** Wednesday 9am

**Work Distribution**: 100%, start to finish

ASSIGNMENT 2

**Question 1 (selected additional exercises)**

1. **Questions α and γ in the Additional Exercises for Practical 8**

**α** **question:**

Describe a simple database of your choice or design, along with the table/s representing the data, and illustrate the **Deletion Anomaly** through the real data or records there. Your database should be different from those already covered in the lectures or practicals.

Graphical user interface, text, application

Description automatically generated

**Answer:** If I delete sales agent 1114 then all the details related to which agency the agent belongs to will be lost in the process, as the branch\_ID and the address are not separated from agent details

**γ Question:**

For database in the previous question along with its inserted records prac8data.sql, do **any 2** of the following database queries. For each query, take a screenshot for the query result and the screen shot is to include the SQL script window as well. Before finalising your answers, **refresh your database** by reloading prac8tables.sql and prac8data.sql, if necessary, so that the results are uniform across the board.

A.

List P\_CODE for a product and the name V\_NAME of the vendor who can supply the product. The output should be sorted according to P\_CODE and then the V\_NAME, all in the alphabetic order.

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B.

Pick a specific customer CUS\_CODE, list the names of all the vendors who ever supplied parts to this customer. Do not repeat the vendor names in the result.

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(ii) **Complete Questions δ in the Additional Exercises for Practical 9.**

**δ Question:**

Give a table of your own that is already in 1NF but not in 2NF, along with the functional dependencies among the attributes of the table drawn as a diagram. Illustrate the normalisation of your table to 2NF. Do not use any tables that already appeared in lecture notes or the practicals. Do not just rename the attributes of tables there.

**1NF**

Diagram, timeline

Description automatically generated

**Dependencies:**

**Customers** (customerID 🡪 customerName)

**Branch** (branchID 🡪 branchName)

**Account\_info** (accountNumber 🡪 bsb, customerID\*, customername, accountBal, BranchID\*, branchName, type\*, accountName)

**2NF**

Diagram

Description automatically generated with medium confidence

(iii) **Complete Questions α and β in the Additional Exercises for Practical 10.**

**α Question:**

Give a table of your own that is already in 2NF but not in 3NF, along with the functional dependencies among the attributes of the table drawn as a diagram. Illustrate the process of normalisation of your table to 3NF. Do not use any tables that already appeared in lecture notes or the practicals. Do not just rename the attributes of tables there.

**Part 1 of answer**

**2nf**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| sales\_ID(pk) | Staff\_ID(fk) | car\_ID(fk) | sold\_price | comm\_structure | com\_type |
| 1111 | 2211 | C1 | 35,000 | 1 | Tiered Commission |
| 1122 | 2211 | C2 | 40,000 | 1 | Tiered Commission |
| 1133 | 2233 | C1 | 36,000 | 2 | Base Pay Rate Only |
| 1144 | 2244 | C7 | 83,000 | 2 | Base Pay Rate Only |
| 1155 | 2255 | C10 | 94,000 | 4 | Residual commission |

This is a sales table is for a car yard. It list the car sold, the price it was sold at and the commission structure and type.

**Dependencies:**

**Staff** (staff\_ID 🡪 firstName, lastname)

**Vehicles** (car\_ID 🡪 make, colour, price)

**Sales\_Info** (sales\_ID 🡪 staff\_ID\*, car\_ID\*, sold\_price, commission\_structure, com\_type)

**Transitive**

**Comm\_Type** (commission\_structure 🡪 com\_type)

**Part 2 of the answer**

**3nf**

Diagram

Description automatically generated

**β Question**

1. For the Pet Database described in the previous practical, write an SQL statement with a subquery to list all the people in the **Owner** table who own at least a pet dog.

Graphical user interface, application

Description automatically generated

(iv) **Complete Questions α and β in the Additional Exercises for Practical 11**

**α** **Question:**

What does each letter in ACID stand for in the context of database transactions? Describe a *concrete example* (i.e. a scenario) to illustrate the property the letter "I" refers to, in terms how it works or how it breaks in the example.

**Answer:**

A: atomicity, C: consistency, I: isolation, D: durability

**Example:** transferring funds and checking the balance. Isolation ensures that other transactions see the transferred funds in one account or the other and not both.

**β Question:**

For the Pet Database described in a previous practical, write an SQL statement to list all the people in the **Owner** table, along with their pets' names if any. That is, for each pet an owner has, there will be a record containing the owner and the pet's name. For any owner contained in the Owner table, the output should always contain the owner's record even if no pets are associated with this owner. Hint: outer join/s may be needed.

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Description automatically generated

**Question 2 Database modeling**

1. **ERD \*\*\* note: a pdf of the ERD is located in the zip file \*\*\***

Diagram

Description automatically generated

**Business rules**:

* the timedService (y/n) attribute must not be a null value.
* the istimeBased(y/n) attribute must not be a null value.
* the walk\_in\_customers (y/n) attribute must not be a null value.

**ERD Details:**

Above is the ERD that I have created for the beauty salon database.

As you can see there are several entities and relationship that link these entities. Below, I will list and describe in detail.

**Staff entity:**

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Staff | Offers | Treatments |

**Multiplicities**

0..\*

* Its optional for staff to offer treatments

0..\*

* Many treatment are available for staff to offer

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Staff | performs | Bus\_Activitites |

**Multiplicities**

1..1

* 1 and 1 staff can perform a business activity at one a time

0.. \*

* It optional for staff to perform many business activities.

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Staff | Has-a | Specialty |

**Multiplicities**

1..1

* 1 and only 1 staff member has a specialty

1.. \*

* A staff member has 1 or many specialties

**Treatments Entity:**

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Treatments | Available | Bus\_Activitites |

**Multiplicities**

1..1

* 1 and only treatment is available per business activity

1..\*

* 1 or many treatments are available in business activities.

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Treatments | Is-a | Specialty |

**Multiplicities**

1..1

* 1 and only treatment is-a specialty

1..\*

* A therapist can specialise in 1 or many treatments

**Clients Entity:**

|  |  |  |
| --- | --- | --- |
| Entity | Relationship | Entity |
| Clients | Recorded-in | Bus\_Activities |

**Multiplicities**

1..1

* 1 and only client is recorded per business activity

0..\*

* Its optional that a client can be recorded in many business activities.

1. **GRD \*\*\* note: a pdf of the GRD is located in the zip file \*\*\***

Diagram, schematic

Description automatically generated

**Question 3 More analysis and SQL**

1. **Creating tables**

**Position table:**

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**Staff2 table:**

Graphical user interface, application

Description automatically generated

**T\_Rates table (Therapist\_rates):**

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**Treatments table:**

Graphical user interface, application, Word

Description automatically generated

**Specialise table:**

Graphical user interface, application, Word

Description automatically generated

**Client\_info table:**

Graphical user interface, application

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**Bus\_Activities table:**

Graphical user interface, application

Description automatically generated

2. **Query:**

List all the timed services along with the therapists who can provide such services. The list should be sorted alphabetically in the service names.

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1. **Query:**

For a given day, say, 2021-11-11, list all the names of the therapists who have/had at least one booking/appointment on that day. Don't repeat the names in the list.

Graphical user interface, text, application, email

Description automatically generated

1. **Query:**

List the names of all the clients along with the corresponding total number of bookings.

Graphical user interface, text, application

Description automatically generated

1. **Query:**

List all therapists and the corresponding therapeutic services they are registered to provide at the Beauty Salon. Sort the output according to their staff name, type of service (timed or itemised), and finally the name of the service.

Graphical user interface, application, Word

Description automatically generated

1. **Query:**

For each timed service, list the names of the therapists whose hourly rates are the cheapest, along with their actual hourly rates

Graphical user interface, text, application

Description automatically generated

**(iii)**

**Query:**

For your final designed database, find a scenario in which a relatively prominent business data integrity cannot be ensured by your current primary keys and foreign keys, nor by adding directly more of such keys or check clauses in the created tables. In other words, the data integrity ensured by the keys within the database may not be enough to ensure all the data integrity within the business context. Write a SQL statement that will determine if such a problem exists or not, and where, for any given state of the database.

**Answer:** Double booking appointments.

Graphical user interface, text, application

Description automatically generated