**​​1DV503/1DT903 Database Technology and Modeling**

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### **Task 1. The Hospital database (25 points)**

***1.1******Identify all entities and their attributes from the description of database requirements using the following Table template:***

| **Entity** | **Attribute** | **Attribute Type** | **Key Attribute** | **The value type of attribute (type, NULL/NOT NULL, unique)** |
| --- | --- | --- | --- | --- |
| Entity 1 | Attribute 1 | Simple | true | String, not null, unique |
|  | Attribute 2 | Composite | false | Integer, null |
|  | Attribute 3 | Multivalued | false |  |
| … | … | …. | … | …. |

***1.2 Identifying the relationship between entity sets using the following table template:***

| **Entity A** | **Relationship name** | **Entity B** | **Cardinality Ration**  **(1:1,1:N,N:1,M:N)** | **Attribute of Relationship Types** | **Justify your decision** |
| --- | --- | --- | --- | --- | --- |
| Entity 1 | PRESCRIBES | Entity 2 | 1:1 | Date |  |
|  |  |  |  |  |  |
| .. | … | … | … | … |  |

***1.3 Design an ER schema for hospital database based on information provided in task 1, and entities defined in 1.2 with relationships defined in 1.3.***

The ER schema should contain entities with their corresponding attributes, key attributes of each entity, relationship types, and their corresponding cardinality ratio.

### **Task 2 Conference Review Database (25 points)**

***2.1******Identify all entities and their attributes from the description of Conference review database requirements using the following Table template:***

| Entity | Attribute | Attribute Type | Key Attribute | Value type of attribute (type, min, max, unique, NULL/NOT NULL) |
| --- | --- | --- | --- | --- |
| Entity 1 | Attribute 1 | Simple and Derived | true | String, not null |
|  | Attribute 2 | Composite | false | Integer, not null |
|  | Attribute 3 | Multivalued | false |  |
| … | … | …. | … | …. |

***2.2 Identifying the relationship between entity sets using the following table template:***

| Entity A | Participation Entity A | Relationship name | Particpiaiton  Entity B | Entity B | Cardinality Ration  (1:1,1:N,N:1,M:N) | Attribute of Relationship Types | Justify your answer |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Entity 1 | Total | Reviewing | Partial | Entity 2 | 1:N | Comment |  |
|  |  |  |  |  |  |  |  |

***2.3 Design an ER schema for review database based on information provided in task 2, and entities defined in 2.1 with relationships defined in 2.2.*** You are free to make additional assumptions if you feel that some information is missing. Make sure to **document** **all assumptions** that you make. Please justify your assumptions.

### **Task 3. Bank database (25 points)**

Consider the ER diagram shown below for part of a BANK database. Each bank can have multiple branches, and each branch can have multiple accounts and loans. Provide answers on the following statements:

1. List a strong (nonweak) entities in the ER diagram

**Answer:**

1. Is there a weak entity? If so, give its name, partial key, and identifying relationship (owner entity)

**Answer:**

1. What constraints do the partial key and the identifying relationship (owner) of the weak entity have in this diagram

**Answer:**

1. List the names of all relation (entity) and specify the (min, max) constraint using the total/partial participation of an entity in a relationship (on both sides of the relation: left and right). Justify your answer.

| **Entity name** | **Relationship**  **name** | **(min,max)** | **Justify your answer** |
| --- | --- | --- | --- |
| Bank | Has\_Branches | (1,N) | …. |
| Bank\_Branch | Has\_Branches | (1,1) | … |
| …. | … |  |  |

### **Task 4. Airport Management database (25 points)**

***4.1******Given the constraints shown in the ER schema below, respond to the following statements with True, False, or Maybe.***

| **N** | **Statement** | **True/False/Maybe** | **Justify your answer** |
| --- | --- | --- | --- |
| 1 | Every pilot has been a passenger in some flight. |  |  |
| 2 | Every flight has at least one deadheading pilot. |  |  |
| 3 | Every flight has at least 2 pilots. |  |  |
| 4 | Every pilot has flown at least 2 times. |  |  |
| 5 | There are tickets that do not belong to any flight |  |  |
| 6 | Some airline does not have flights |  |  |
| 7 | Some flight does not have assigned aircraft |  |  |
| 8 | Each flight has a departure and arrival airport assigned |  |  |
| 9 | A passenger can be a pilot |  |  |
| 10 | Passengers can buy one ticket for the flight |  |  |
| 11 | There are tickets that do not have a class type (Economy, Business, etc.) |  |  |
| 12 | There are some tickets without payment |  |  |
| 13 | There are some flights without tickets |  |  |
| 14 | There are some aircraft that are not assigned to a flight |  |  |
| 15 | Some airlines do not have any flights. |  |  |