Tutorial 4 Solutions

Exercise 1:

The "Course" table is:

course_id	course_name	credits	professor	max_students
CS101	Intro to Programming	4	Smith, J	150
MA205	Advanced Calculus	3	Jones, K	60
PH310	Ethics in Tech	3	Smith, J	90
BI401	Molecular Biology	4	Lee, M	45

a. What is the degree of this table?

- **Degree** $= 5$.

b. What is the possible domain for the following fields?

- **course_id:** Strings composed of a 2-3 letter department code followed by a 3-digit number (e.g., CS101, MA205).
- **professor:** Strings that represent last names of people, followed by their first names initials(e.g., "Smith, J", "Jones, K").
- **credits:** The set of positive integers with a maximum value representing credit, such as $\{3, 4, 5\}$.

Exercise 2:

- The **Course** table:
  - separate **professor** attribute into first_name, and last_name
  - put the first_name and last_name of the professor in a separate table
  - **Corrected Tables:**
    - $\text{Course (course\_id, course\_name, credits, professor\_id)}$
      - $\text{Professor (Professor\_id, First\_Name, Last\_Name)}$
- **Employees** table:
  - Separate Name into First_Name and Last_Name.
  - Separate Date_Place_of_Birth into Date and Place_of_Birth
  - **Corrected Tables:**

    - Employee (Employee_ID, First_Name, Last_Name, Date_of_Birth, Place_of_Birth)
- **Projects** table:
    - **Correction:** use one currency for the budget
    - **Corrected Table:**
        - Project (Project_ID, Project_Name, Department_ID, Budget_Dollar)
- **Library_Book** table:
    - **Correction:**
        - remove Author_Names from the Book table
        - create the Author table
        - add an intermediary table to link beween the books and theirs authors
    - **Corrected Tables:**
        - Library_Book (ISBN, Title, Year_Published)
        - Author (Author_ID, Author_First_Name, Author_Last_Name)
        - Book_Author (ISBN, Author_ID)

Exercise 3:

Data Type	Example Domain
String of characters	Product_Descriptions
Integer	Stock_Level
Decimal number	Product_Price
Date	Shipment_Date
Boolean	Is_Discounted

Exercise 4:

Scenario: A database to manage the sales and inventory of a vinyl record store.

a. The main entities:

- **Customers**
- **Vinyls** (or **Records**)
- **Orders**

b. Other necessary entities to extract required information:

- **Artists**
- **Genres** (e.g., Jazz, Rock, Pop)

- **Tracks** (The individual songs on a vinyl)

c. The relationships between these entities:

- A **Customer** can place **one or more Orders** , an **order** is made by **one customer**
- An **Order** can contain **several vinyls** (**Vinyls**), and a **vinyl** can be contained in **several orders**
- A **Track** can have **several Artists** , and an **artist** can perform **several tracks**
- A **Track** belongs to **one Genre** , and a **genre** concerns **multiple tracks**
- A **vinyl** is composed of **many Tracks** , and a **track** can belong **many** records.