



SOFE 3700U: Data Management Systems

## Lab # 1: Database Fundamentals

Submission Type: **INDIVIDUAL WORK**

**Objectives:**

- Understand fundamentals of databases
- Understand concepts of primary key, foreign key, integrity constraints

**Important Notes:**

- Save all your lab-related files as you may need them for future labs.
- Create a folder (where you would like to save your files). Name your folder Lab1

## **Part I: Database Fundamentals**

Consider the following database schema definition:

**Products**(id: integer, title: string, price: float, quantity: integer, category: string, supplier: string)

**Customers**(id: integer, cname: string, address: string, telephone: string, email: string)

**Suppliers**(sid: integer, sup\_name: string, address: string, city: string, province: string, postal\_code: string)

**Orders**(order\_id: integer, cust\_id: integer, order\_date: string, order\_status: string, total: float)

**ItemsPurchased**(order\_id: integer, product\_id: integer, quantity: integer, price: float, total: float)

This schema represents an online store. The relations and attributes are self-explanatory. The **Products** table consists of products offered by the store; **Customers** table contains records of customers who are registered with the online store; **Suppliers** contains records of the distributors or suppliers for the products; **Orders** relation stores information about each order processed, keeps track of the customer associated with any order (cid refers to the customer id) and refers to the items purchased through a relationship defined using the order\_id; **ItemsPurchased** contains list of items purchased with each order.

Notes:

- Every product in the Products relation has a unique value for the id attribute
- Every customer in the Customers relation has a unique value for the id attribute
- Every supplier in the Suppliers relation has a unique value for the sid attribute
- Every order in the Orders relation has a unique value for the order\_id attribute
- The Orders relation captures the relationships between customers and the products. Another relationship that captures the order information for a customer and products purchased is defined by ItemsPurchased.

Example: Each order may contain one or more purchased items. That is, an order may have one or more item entries in the ItemsPurchased table. The attribute order\_id in the ItemsPurchased table can be repeated multiple times but only one order\_id can exist in the Orders table. For example, a customer ordered two items in an order number 8839. The items are: (1) Laptop cooling pad (product id: 12243259 and (2) iPhone 4s screen protector (product id: 45243211. The following records will appear in the ItemsPurchased table:

8839	12243259	1	39.99	39.99
8839	45243211	2	7.99	15.98

**Exercise 1: Given these relations, answer the following questions:**

- a. Select a primary key(s) for each of these relations
- b. Is the condition (id, cname) a key for the Customer relation?
- c. Is the condition (id, cname) a candidate key for the Customer relation?
- d. Define all possible foreign keys for the relations.
- e. Give an example of a tuple that the DBMS would reject because it would violate a uniqueness constraint
- f. Give an example of a tuple that the DBMS would reject because it would violate a referential integrity constraint
- g. Give an example of a tuple that the DBMS would reject because it would violate a domain constraint

**What to submit:**

Submit a Word or PDF document that includes:

- Exercise 1: Answers to questions in Part I.

Submit via Blackboard: Course Content → Labs → Lab1

- o Name your file as follows: **StudentID.[doc or docx or PDF]**