COMS 363 Fall 2022

Practice Problems for Exam 1
Topic: Relational Data Model

Suppose our client tells us real-world constraints that can be formally captured by the following functional dependencies.

{pid}→{pname}
{supplier}→{sname}
{supplier}→{address}
{sid,pid}→{cost}

Suppose three design choices are given to you.

Design A has three tables: parts, suppliers, catalog

parts(pid int, pname varchar(30), PRIMARY KEY (pid));

suppliers (sid int, sname varchar(30), address varchar(50), PRIMARY KEY (sid));

catalog (sid int, pid int, cost decimal(10,0), PRIMARY KEY (sid,pid), FOREIGN KEY (pid) REFERENCES parts (pid), FOREIGN KEY (sid) REFERENCES suppliers(sid));

Design B has two tables: suppliers and parts2.

suppliers (sid int, sname varchar(30), address varchar(50), PRIMARY KEY (sid));

parts2 (pid int, pname varchar(30), sid **int not null**, cost decimal(10,0), PRIMARY KEY (pid), foreign key(sid) references suppliers(sid));

Design C has one table suppliers_parts.

suppliers_parts (sid int, sname varchar(30), address varchar(50), pid int, pname varchar(30), cost decimal(10,0), primary key(sid, pid))

sid	sname	address	pid	pname	cost
1	Amazon	Ames	202	Oxygen Sensor	50
5	Walmart	Des Moines	102	Wiper Blades	60
5	Walmart	Des Moines	201	Catalytic Converter	45
5	Walmart	Des Moines	202	Oxygen Sensor	65
5	Walmart	Des Moines	301	Ignition Coil	90

Figure 1. Instance of suppliers_parts

1. Can data in all the rows in suppliers_parts in Design C be stored in relations in Design A? If your answer is no, give an example showing the rows in the relation in Fig. 1 that cannot be stored in relations in Design A. If your answer is yes, provide a reason why. The reason must not be specific to the instances in Fig. 1.

Note that we have learned how to store the same data across multiple tables and how to obtain the data from multiple through join operations or outer join operations.

Yes/No (2 points)

Reason (6 points)

2. Can data in all the rows in Design C be stored in relations in Design B? If your answer is no, give an example showing the rows in the relation in Fig. 1 that cannot be stored in relations in Design B. If your answer is yes, give a reason why. The reason must not be specific to the instance in Fig. 1.

Answer: yes or no (2 points)

Reason: (6 points)

3. Does a relational DBMS allow insertion of information about a new supplier who has not supplied any part in the suppliers_parts relation in Design C? This new supplier is given a sid value that is not already used in the suppliers_parts relation. Provide the reason to support your answer.

Answer (Yes/No): (2 points)

Reason to support your answer (4 points):

4. Describe at least three problems caused by redundancy in Design C and give an example to illustrate each problem using the data in Figure 1.

Problem 1

Example:

Problem 2
Example:

Problem 3
Example: