

COMP 306: Database Management Systems

PS Questions: Relational Model + ER to Relational Conversion

Use the following relational database schema and state to answer Questions 1-3. The database consists of 4 relations:

- Customer(CID, Cname, Phone, City)
- Item(Item_ID, QuantityOnHand, UnitPrice)
- Order(OID, CID, Date, TotalAmount)
- OrderDetail(OID, Item_ID, QuantityOrdered)

Primary keys are underlined above. CID is a foreign key in Order referencing the Customer relation, Item_ID is a foreign key in OrderDetail referencing the Item relation, and OID is a foreign key in OrderDetail referencing the Order relation.

| Customer | | | |
|------------|-------|--------------|-----------|
| <u>CID</u> | Cname | Phone | City |
| 101 | Smith | 770-333-1111 | Marietta |
| 102 | Doe | 770-555-6666 | Marietta |
| 104 | Jones | 404-222-7777 | Atlanta |
| 105 | Brown | 404-222-4444 | Atlanta |
| 106 | Green | 678-444-3333 | Woodstock |

| Order | | | |
|------------|-----|------------|-------------|
| <u>OID</u> | CID | Date | TotalAmount |
| 40 | 101 | 2015-05-21 | 90 |
| 42 | 104 | 2015-05-24 | 50 |
| 43 | 101 | 2015-06-01 | 67 |
| 44 | 105 | 2015-06-02 | 300 |

| Item | | |
|----------------|----------------|-----------|
| <u>Item_ID</u> | QuantityOnHand | UnitPrice |
| 1 | 100 | 5 |
| 2 | 50 | 2 |
| 3 | 10 | 10 |
| 4 | 5 | 50 |
| 5 | 60 | 100 |

| OrderDetail | | |
|-------------|----------------|-----------------|
| <u>OID</u> | <u>Item_ID</u> | QuantityOrdered |
| 40 | 1 | 10 |
| 40 | 3 | 4 |
| 42 | 4 | 1 |
| 43 | 1 | 1 |
| 43 | 2 | 1 |
| 43 | 3 | 1 |
| 43 | 4 | 1 |
| 44 | 3 | 5 |
| 44 | 4 | 5 |

Question 1. True or False?

[T/F] OID is both a superkey and a key of the Order relation.

[T/F] If we assume each customer can make at most one order per day, {CID, Date} would be a candidate key of the Order relation.

[T/F] Given that the current state of the Customer relation is valid, we can say for certain that Cname is a key of Customer.

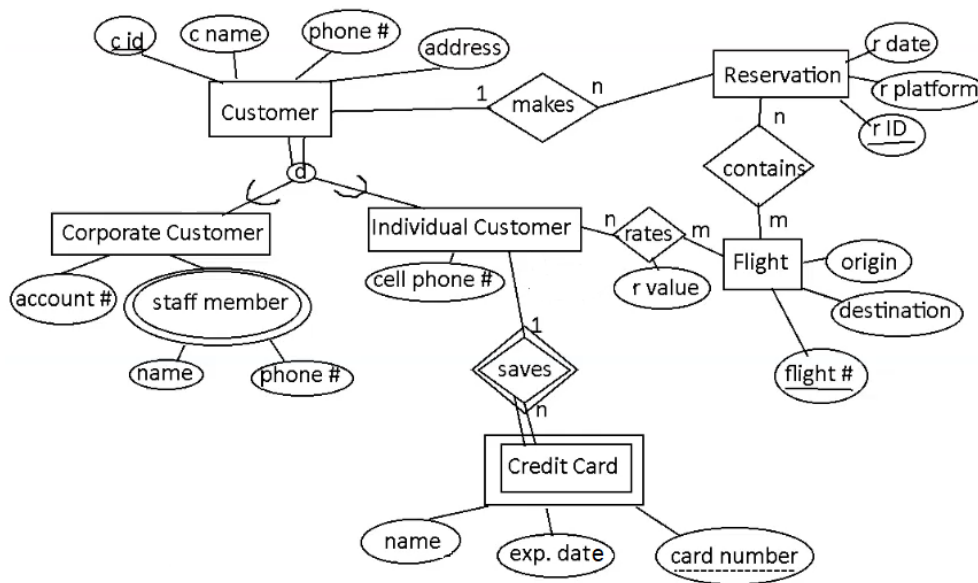
[T/F] Given that the current state of the Customer relation is valid, we can say for certain that City is not a candidate key of Customer.

Question 2. Consider that the customer with CID = 101 is deleted from the Customer relation. If deletions are cascaded throughout the entire database, how would the other relations be impacted?

Question 3. Recall the 4 types of integrity constraints in the relational model: domain constraint, key constraint, entity integrity constraint, referential integrity constraint. For each of the following actions, decide whether they violate any of the constraints; if so, which one and why?

- (i) Insert tuple $\langle \text{NULL}, \text{"Jason"}, \text{"125-111-9999"}, \text{"Athens"} \rangle$ into Customer
- (ii) Insert tuple $\langle 107, \text{"Smith"}, \text{"770-333-1111"}, \text{"Paris"} \rangle$ into Customer
- (iii) Insert tuple $\langle 40, 3, 1 \rangle$ into OrderDetail
- (iv) Insert tuple $\langle 45, 103, \text{"2015-05-21"}, 300 \rangle$ into Order

Question 4. Here is a slightly modified version of one of the ER diagrams we designed in the previous PS. Convert this ER diagram to the relational model using the conversion algorithm from the lecture. Your answer should consist of the CREATE TABLE statements necessary to create the appropriate relations. Make sure you specify all primary keys and foreign keys.



Question 5. Here is another ER diagram. Similar to Q4, convert it to the relational model.

