

Your Name:

(1) For the schema of a library management system, try to identify the primary keys and foreign keys. In the process, you should also look out for issues with the schema as is (e.g., no clear primary key, foreign key not properly set up, other issues you might fix, etc).

- **Books:** Title, Author, Publisher, Publication Year, ISBN, Genre, Copies available, Borrowed count, Rating (average)
- **Authors:** Name, Biography, Nationality, Birth Year, Death Year (if applicable), Website
- **Members:** Name, Email, Address, Phone Number, Membership Level (e.g., Standard, Gold), Account Balance
- **Borrowings:** Member ID, Book Title, Borrow Date, Due Date, Return Date (if returned)
- **Fines:** Member ID, Fine Amount, Reason (e.g., Late return, Damaged book)
- **Reviews:** Member ID, Book Title, Rating, Review Text
- **Reservations:** Member ID, Book Title, Reserve Date, Pickup Date (if confirmed)

(2) Consider the following three create table statements, and their instances.

- create table Parts (part\_id integer primary key, part\_name string);
- create table Customers (cust\_id string primary key, cust\_name string);
- create table Orders (order\_id integer primary key,  
part\_id integer **references Parts on update cascade**,  
cust\_id string **references Customers on delete cascade**);

	part_id	part_name		order_id	part_id	cust_id		cust_id	cust_name
Tuple 1	1	Bolt	Tuple 4	10	1	u1	Tuple 8	u1	Jack
Tuple 2	2	Screw	Tuple 5	10	2	u1	Tuple 9	u2	Jill
Tuple 3	3	Nut	Tuple 6	20	2	u2	Tuple 10	u3	Taylor
			Tuple 7	30	3	u4			

Explain what happens in each independently (i.e., we are not doing these in sequence).

- We try to delete Tuple 1 from Parts
- We try to delete Tuple 8 from Customers.
- We try to update Tuple 3 from (3, Nut) to (3, HexNut).
- We try to update Tuple 3 from (3, Nut) to (4, HexNut).
- We try to update Tuple 8 from (u1, Jack) to (u4, Jack).

(3) The following few questions are about the relations shown here (R1 on the left, R2 on the right)

- Write out the groups created if I group R1 by "A". For each of the groups, compute sum(C).

A	B	C
$\alpha$	a	1
$\beta$	b	2
$\alpha$	c	1
$\alpha$	a	3
$\gamma$	c	3
$\gamma$	a	2
$\beta$	b	2
$\alpha$	c	2
$\beta$	c	2

C	D
1	a
2	b
3	c
2	a

- Write out the groups created if I group R1 by "B". For each of the groups, compute sum(C).

- Compute the result of:
  - select \* from R1 natural join R2 where A = \alpha;

- select \* from R2 x join R2 y on (x.C = y.C);