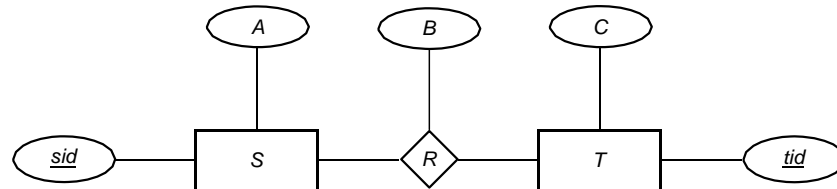


5 Databases (TGG)

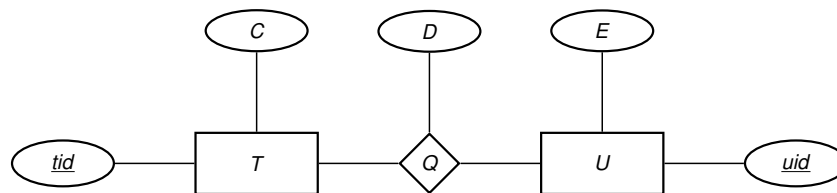
(a) Consider the following Entity-Relationship (ER) diagram.



Suppose we wish to implement this diagram in a relational database using three tables, $S(\underline{sid}, A)$, $T(\underline{tid}, C)$, and $R(\dots)$. Describe the schema you would use for R depending on the cardinality of the relationship.

- (i) When R is a many-to-many relationship between S and T . [2 marks]
 - (ii) When R is a one-to-many relationship between S and T . [2 marks]
 - (iii) When R is a many-to-one relationship between S and T . [2 marks]
 - (iv) When R is a one-to-one relationship between S and T . [2 marks]
- (b) Suppose R is a many-to-one relationship. Rather than implementing a new table for R , can we modify one of the tables representing S or T to implement this relationship? Discuss the advantages and disadvantages of such a representation. [4 marks]

(c) Suppose that we add the following diagram to our ER model.



Note that this implicitly defines a relationship between S and U resulting from the composition of relationships R and Q . Discuss the difficulties that you might encounter in attempting to implement this derived relationship directly in a table W . For example, would the results of evaluating this SQL

```
select sid, tid, B, D
from R
join Q on R.tid = Q.tid
```

always be equivalent to the contents of such a W ? [8 marks]