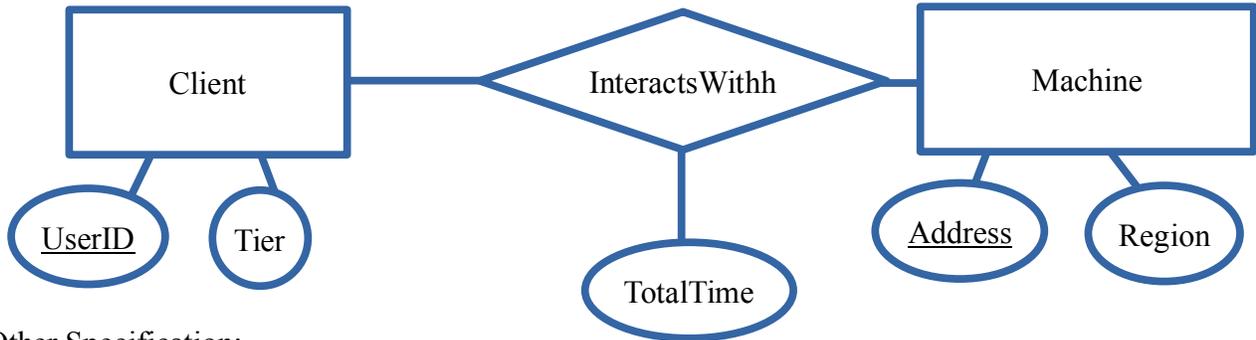


Section 8 Worksheet

ER → SQL

Coming up with ER diagrams is relatively simple compared to coming up with a representation in SQL. In this part we will try to convert some ER diagrams into SQL CREATE TABLE statements. **For the following ER Diagrams and respective specifications, come up with the appropriate schema and implement it in SQL.** Feel free to abbreviate names to save time and assume attribute types as appropriate.

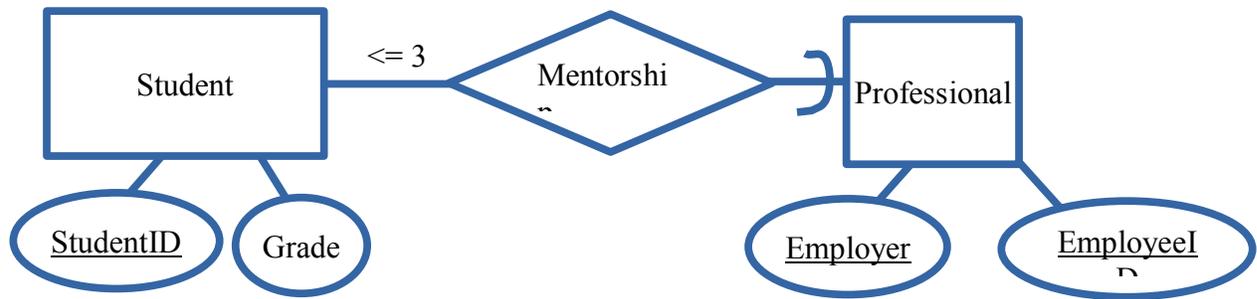


Other Specification:

If a Client is removed, we want to retain the interaction history.

If a Machine is removed, we don't want to retain the interaction history.

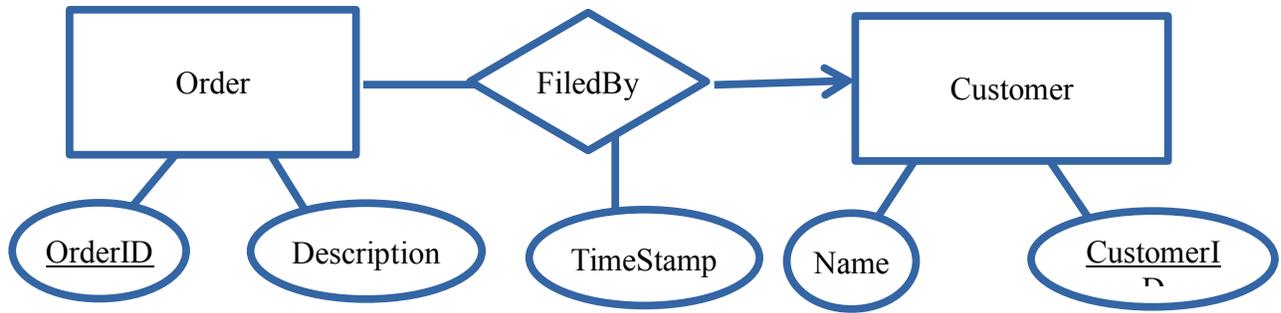
Any updates for a Client or Machine should also update respective interaction records.



Other Specification:

Only Students that are grade 8 or higher are allowed to have mentorships.

Any updates for a Student or Professional should also update respective interaction records.

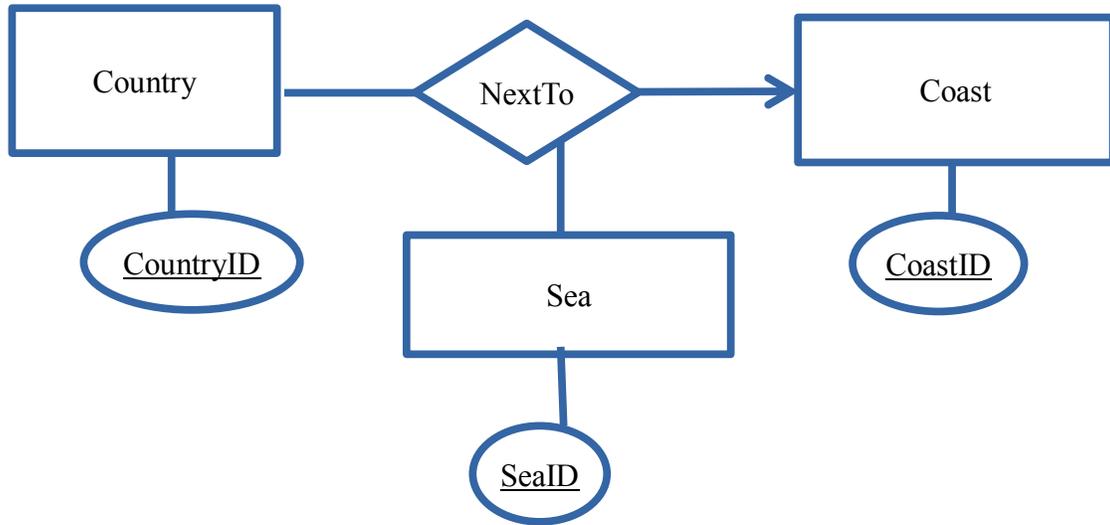


Other Specification:

If a customer is removed we should have all respective orders altered so they are from the default anonymous user with CustomerID 0.

Order descriptions should be sufficiently specific, so we need to make sure the description is at least 25 characters long.

Any updates for an Order or Customer should also update respective interaction records.



Other Specification:

Any updates for an Country, Sea, or Coast should also update respective interaction records.

1. **(14AU Final Q10)**

A lossless decomposition is one in which all of the data in the original table is recovered exactly, if the decomposed tables are combined with natural joins.

Every BCNF decomposition is lossless.

TRUE or FALSE

2. **(17WI Final Q1)**

BCNF is a lossless decomposition and it does not preserve all functional dependencies.

TRUE or FALSE

3. **(14WI Final Q2)**

Consider Relation R(ABCD). and functional dependencies (FDs): $BD \rightarrow AC$; $AB \rightarrow D$; $AC \rightarrow B$.

This relation is in Boyce-Codd Normal Form (BCNF).

TRUE or FALSE.

Identify a key (not a superkey)

4. **(14 WI Final Q2)**

Consider Relation R(ABCDE). and functional dependencies (FDs): $A \rightarrow C$; $B \rightarrow AE$; $E \rightarrow D$.

This relation is in Boyce-Codd Normal Form (BCNF).

TRUE or FALSE

Identify a key (not a superkey)

5. **(15AU Final Q2c)**

Consider the following relational schema and set of functional dependencies.

R(A,B,C,D,E,F,G) with functional dependencies: $E \rightarrow C$ $G \rightarrow AD$ $B \rightarrow E$ $C \rightarrow BF$

Give one example of non-trivial functional dependency implied by the ones above:

Compute E^+ , the closure of E.

(17WI Final Q4)

Given $R(A, B, C, D, E)$, and functional dependencies: $A \rightarrow C$, $BD \rightarrow A$, $D \rightarrow E$

a) Decompose R into BCNF. In each step, explain which functional dependency you used to decompose and explain why further decomposition is needed. Your answer should consist of a list of table names and attributes. Make sure you indicate the keys for each relation.

c) Convert the E/R diagram below to relations in BCNF form. Assume no values are NULL, and the arrow between OfferedBy and Depts is a round one. Include all keys and foreign keys. Use the following notation and explicitly state foreign key relationships. For instance:

R(a, b)

S(c, d) -- c is a foreign key to R

