

CSE 344 Section 5 Worksheet

1. Consider the following database schema for a restaurant.

Ingredient(iid, name, allergen)

Dish(did, name, description, category)

IngredientIn(iid, did)

Order(oid, customer)

DishOrder(oid, did, num)

Draw an E/R diagram to represent the database, with the Ingredient, Dish, and Order tables as the entities, and IngredientIn and DishOrder as the relationships.

Make sure to enforce the following constraints:

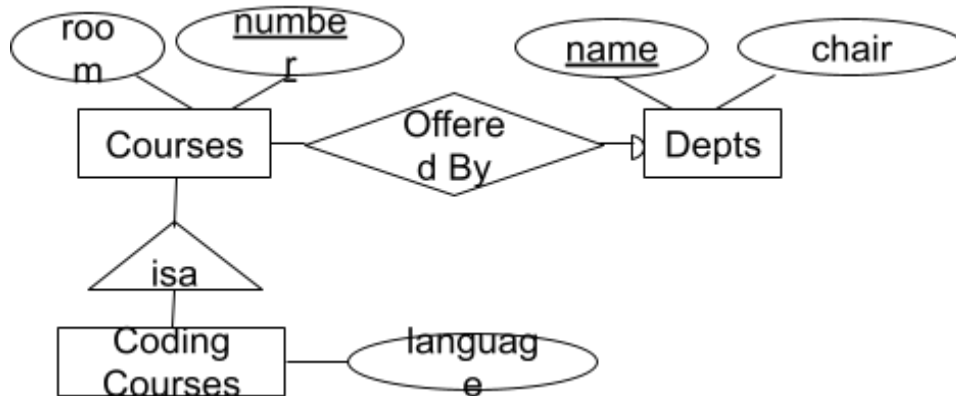
- Ingredient.iid, Dish.did, Order.oid are the primary keys of the respective tables
- A Dish should have **at least one** Ingredient.
- An Order should have **at least one** Dish.

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

For instance:

$R(\underline{a}, b)$

$S(\underline{c}, d)$ -- c is a foreign key to R



3. Given $R(A, B, C, D, E)$, and functional dependencies: $A \rightarrow B$, $BC \rightarrow E$, $DE \rightarrow A$.

a. Find minimal key(s) for R.

b. Is ACDE a super key?

c. Is CDE a super key?

4. Given $R(A, B, C, D, E, F)$ and FDs: $B \rightarrow A$, $E \rightarrow B$, $D \rightarrow C$, $A \rightarrow C$

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.

5. **(17WI Final Q4)** Given $R(A, B, C, D, E)$, and FDs: $A \rightarrow C$, $BD \rightarrow A$, $D \rightarrow E$

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.