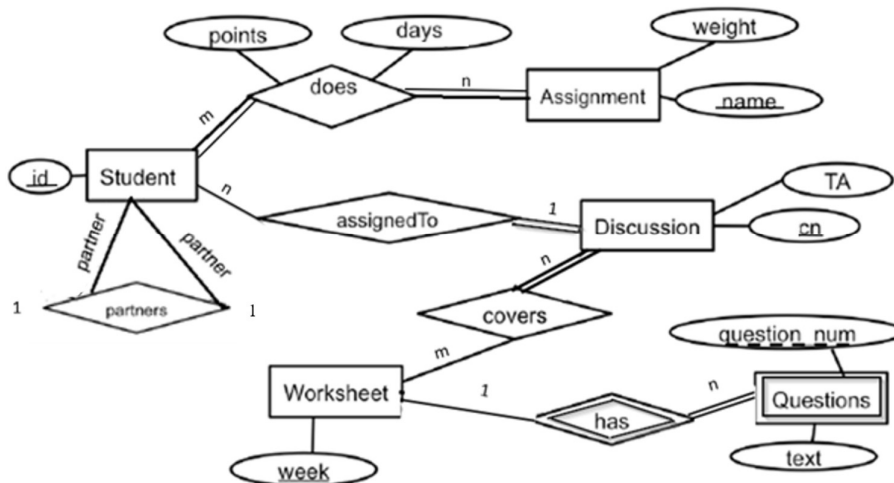
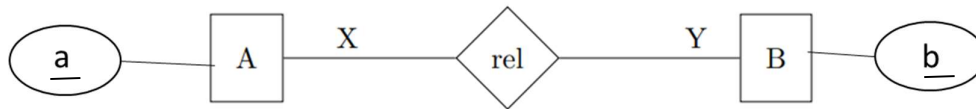


CS3402 Tutorial 2:

1. Translate the ER diagram below to relational tables in the following steps.
 - (a) Map *strong entity* type into relation
 - (b) Map *weak entity + identifying relationship* type into relation
 - (c) Map binary *1:1 relationship* types into attributes
 - (d) Map binary *1:N Relationship* types into attributes
 - (e) Map binary *M:N relationship* type into relation
 - (f) Map *N-ary relationship* type into relation
 - (g) Map *multi-valued attribute* into relation



2. Consider the following ER model with entities A and B (with attributes a and b) connected through a relationship.



2.1 Complete the table below by converting the ER model to relational schema, for all cardinality options. Write down the relations and underline their primary keys.

Hint: Map 1:1 relationship types into attributes; Map 1:N Relationship types into attributes; Map M:N relationship type into relation.

| ER Model (X:Y) | Relational Schema |
|----------------|-------------------|
| M:N | |
| 1:N | |
| N:1 | |
| 1:1 | |

2.2 Suppose we want to add elements to the relations. Mark which tuples from below can be inserted into the relational schemas you created for the M:N relationship:

- (a1, b1)
- (a1, b2)
- (a2, b1)
- (a2, b2)

2.3 How about the 1:N case?

- (a1, b1)
- (a1, b2)
- (a2, b1)
- (a2, b2)

2.4 How about the 1:1 case?

- (a1, b1)
- (a1, b2)
- (a2, b1)
- (a2, b2)

CS3402 Tutorial 2:

1. Answer:

(a) Map *strong entity* type into relation

- Include simple (or atomic) attributes of the entity
- Include components of composite attributes
- Identify the primary key from the attributes
- Don't include: non-simple component of composite attributes, derived attributes, multi-valued attributes (not yet)

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(b) Map *weak entity + identifying relationship* type into relation

- Include simple (or atomic) attributes
- Add the associated strong entity's primary key as attributes (also known as *foreign key* because it refers to another relation's primary key)
- Set the primary key as the combination of the *foreign* key and the partial key of the weak entity

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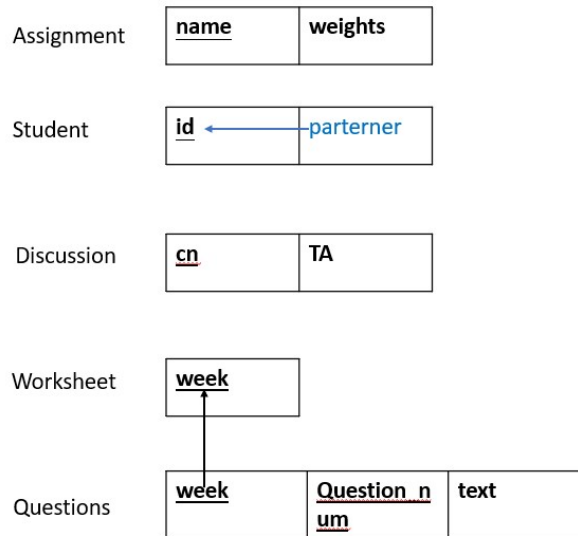
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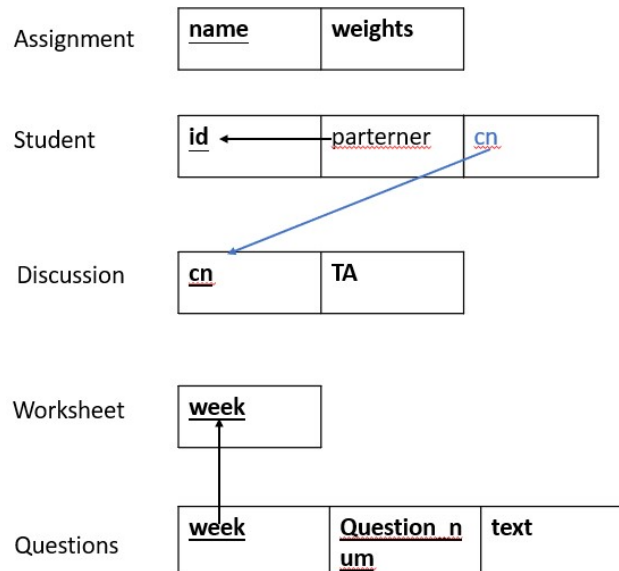
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(c) Map binary *1:1 relationship* types into attributes

- Include the primary keys of one entity type as attributes (foreign keys) of the other entity type (*note: it is better to choose the entity in total participation to include the other entity's key as attribute*)
- Include also the simple attributes of the relationship type

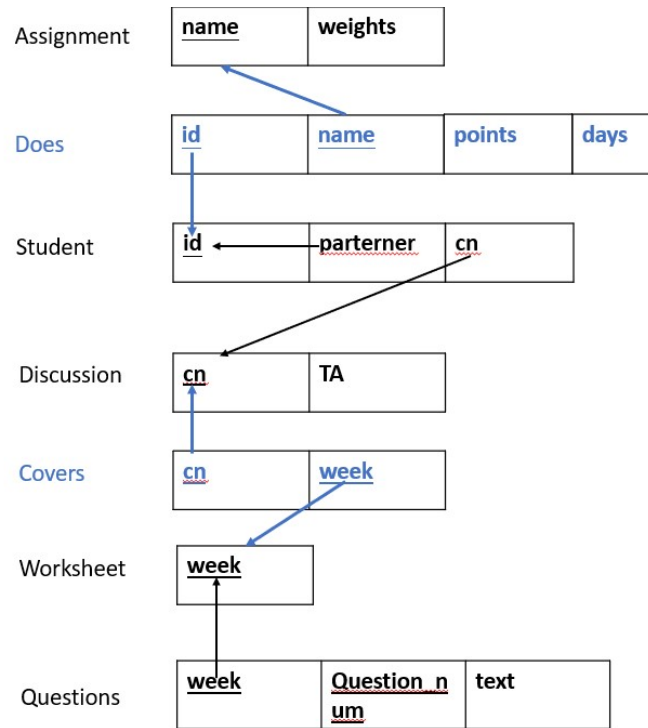
(d) Map binary *1:N Relationship* types into attributes

- In the relation representing the *N-side* entity type, add the primary keys of the *1-side* entity type as attributes (foreign key)
- Include also the simple attributes of the relationship type



(e) Map binary $M:N$ relationship type into relation

- Include the primary keys of the participating entity types as attributes (foreign key)
- Identify the primary key as the combination of the above foreign keys
- Include the simple attributes of the relationship type



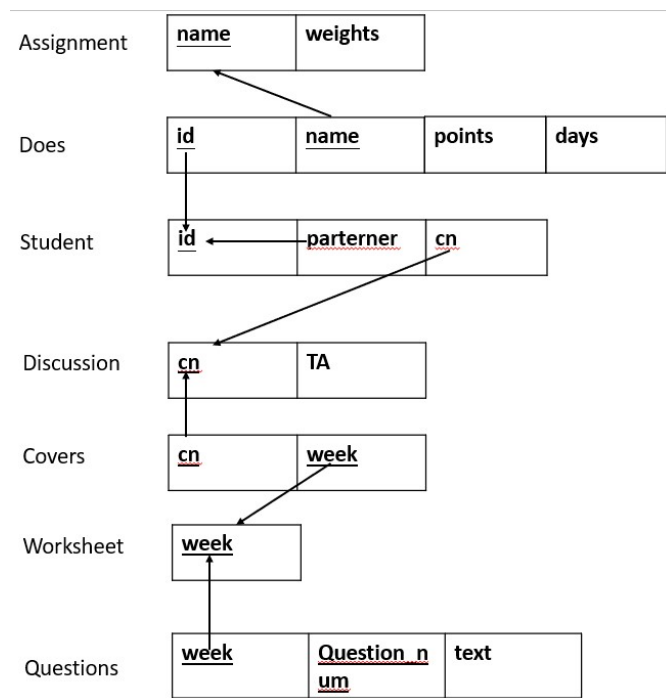
(f) Map N -ary relationship type into relation

- Similar to binary $M:N$ relationship type

(g) Map *multi-valued* attribute into relation

- Include the given attribute
- Include the primary attributes of the entity/relationship type owning the multivalued attribute
- Set the primary key to be the combination of foreign key and its original attribute

To summarize, the ER model will be translated into the following relational tables:



2 Answer:

2.1

| ER Model (X:Y) | Relational Schema |
|----------------|--|
| M:N | $A(\underline{a}) \ B(\underline{b}) \ rel(a,b)$ |
| 1:N | $A(\underline{a}) \ B(\underline{b},a)$ |
| N:1 | $A(\underline{a},b) \ B(\underline{b})$ |
| 1:1 | $A(\underline{a}) \ B(\underline{b},a) \ or \ A(\underline{a},b) \ B(\underline{b})$ |

2.2

 $\sqrt{(a1, b1)}$ $\sqrt{(a1, b2)}$ $\sqrt{(a2, b1)}$ $\sqrt{(a2, b2)}$

2.3 How about the 1:N case?

 $\sqrt{(a1, b1)}$ $\sqrt{(a1, b2)}$ $(a2, b1)$ $(a2, b2)$

OR

 $(a1, b1)$ $(a1, b2)$ $\sqrt{(a2, b1)}$ $\sqrt{(a2, b2)}$

2.4 How about the 1:1 case?

 $\sqrt{(a1, b1)}$ $(a1, b2)$ $(a2, b1)$ $\sqrt{(a2, b2)}$

OR

 $(a1, b1)$ $\sqrt{(a1, b2)}$ $\sqrt{(a2, b1)}$ $(a2, b2)$