CS-354

MIDSEM - ASSIGNMENT

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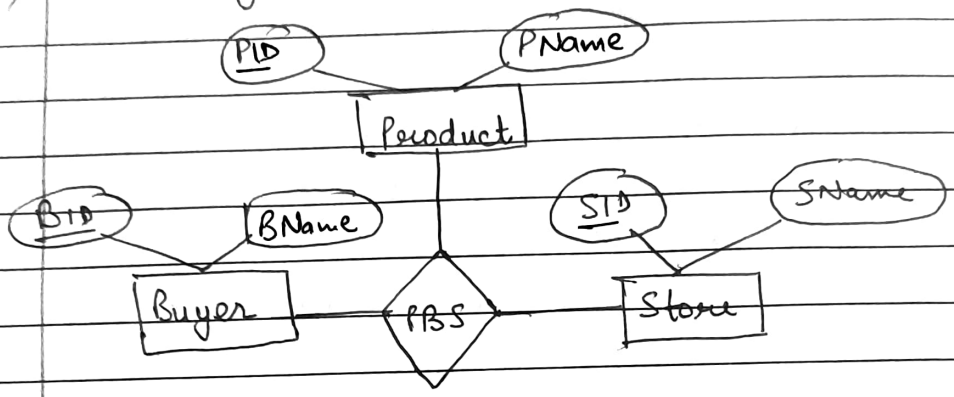
Que 6:- Given two ER Diagrams, justify whether both the representations will be able to express the same requirements. If not then provide the alternate representation that uses only binary relationships and capture all the requirements.

Ans

(a) PBS using ternary Relationship.



⇒ The above ER model represents a PBS using ternary Relationship with: Product (primary key → PID)
Buyer (primary key → BID)
and Store (primary key → SID)

⇒ This PBS relation will be identified by the key's of its entity sets ie (PID, BID, SID) which is the primary key.
It is a many to many relation.
If the primary key is (PID, BID, SID) it will be only containing the attributes of those entities.

⇒ For this relation information is given that tells us which buyer bought what product from which store.
Since it is many to many, so one buyer can purchase more products and one product can be purchased by many buyers.

The table for this relationship can be given as:-

PBS Relationship

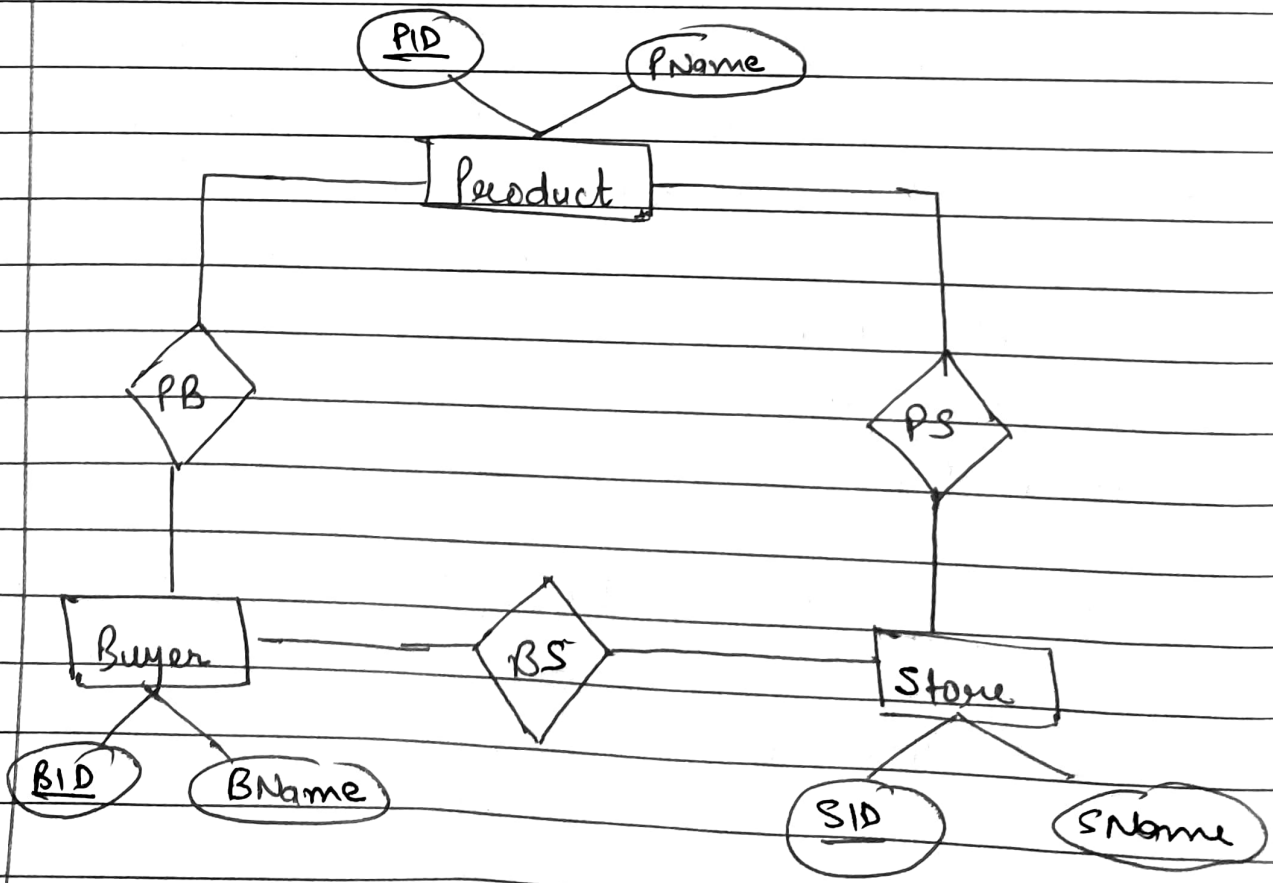
BID	PID	SID	
B_1	P_1	S_1	→ Buyer B_1 bought Product P_1 from Store S_1
B_1	P_1	S_2	
B_1	P_2	S_1	
B_2	P_1	S_1	
B_3	P_5	S_4	

As BID and PID and SID are primary key so entries tuple can't be repeated.

If B_3 P_5 S_4 is already there we cannot have it again in the table

(b)

PBS using binary Relationships



⇒ The second ER model represents an overall relation between product, Buyer and Store by having 3 binary relationships between them. All those binary relationships are many-to-many.
The key attributes of the entities set will be the attributes of the relation.

1) PB is the relation b/w Buyer (with primary key BID) and Product (with primary key PID)
2) PS is the relation b/w Product (with primary key PID) and Store (with primary key SID)
3) BS is the relation b/w Store (with primary key SID) and Buyer (with primary key BID)

So;

Relation	Attribute	Primary key
PB	{BID, PID}	{BID, PID}
PS	{PID, SID}	{PID, SID}
BS	{BID, SID}	{BID, SID}

From this ER model we can infer

1) PB tells us a given buyer has bought what products.

⇒

BID	PID	
B_1	P_1	B_1 bought Product P_1
B_2	P_1	⇒ B_2 bought products P_1 and P_2
B_2	P_2	P_1 was bought by buyers B_1, B_2

2) PS tells us what product is available at what store.

⇒

PID	SID	
P_1	S_1	P_1 is available at S_1, S_2
P_1	S_2	⇒ P_2 is available at S_2
P_2	S_2	At S_2 → P_1, P_2 are there.

3) BS tells us that what buyer went to what store for having product.

⇒

B_ID	S_ID
B_1	S_1
B_1	S_2
B_2	S_2

Buyer 1 went to S_1 and S_2

⇒ S_2 was visited by B_1 and B_2

How they are different. (Comparison)

1. In model (a) if we delete an entry, we will loose the information which would have been important for ~~of~~

consider an entry B_1 P_1 S_1

which implies that Buyer B_1 buys Product P_1 from store S_1. Now if we delete this entry we will loose the information that B_1 buys P_1 or that P_1 is available in S_1. considering they were not present in any other entry.

which leads us to the 2. condition

↙

2) There is no information about (buyer - product), (product - store) and (buyer - store) relations.

~~Note~~ So, we cannot get the above information from model (a).

~~3)~~ Whereas in model (b) above conditions are there

3) but it is not able to tell which store the buyer has bought a particular product from.

eg

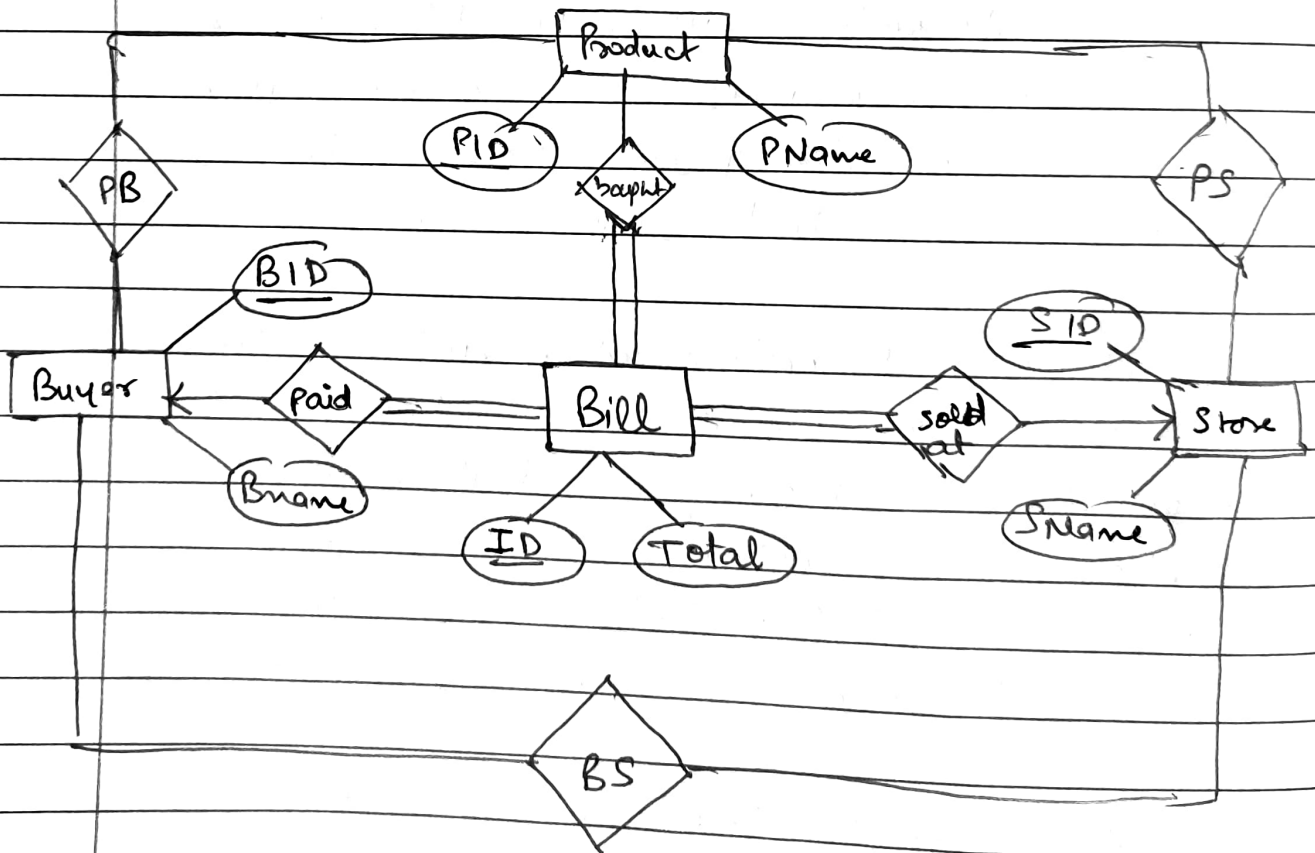
S_1

PB		PS		BS	
BID	PID	PID	SID	BID	SID
B_1	P_1	P_1	S_1	B_1	S_1
B_1	P_2	P_1	S_2	B_1	S_2
		P_2	S_1		

Now if we know B_1 buys P_1 and P_1 is available at both stores also B_1 goes to both stores S_1 and S_2 we cannot infer which store B_1 actually bought P_1 from

⇒ Both the models have their individual pros and cons so we need a new model which will contain all our requirements.

THE REQUIRED MODEL :



Now in this model we have incorporated all the features of both the models.
For this we have taken a new entity set by the name of Bill with 2 attributes (ID{primary key} and Total)

⇒ Now we need the Bill entity because we need to connect the 3 entities set without using the tertinary relationship. Also generally for converting tertinary to binary we need to introduce new entity set and relations.
Talking about relations. 3 binary relations are also introduced.

1) "Sold at" → This is between the bill and the store. It basically tells us at what store that bill was sold. Now this relationship is many-to-one ie many(bills) → one(store)
Since at one store many bills can be ~~stored~~ sold. but one bill can be sold at one store only.

2) "Bought" → This is the relationship between the bill and product bought. It tells us that in a particular what all products were bought. It is a many → many ie many(product) → many(bills) since one bill can contain many product and also one product can be in many bills (as given in model (a)).

3) "Paid" → This is b/w buyer and bill ie which buyer paid which bill. It is many(bills) to one(buyer) relation. because one buyer can have many bills.

In the above relationships (bought, sold at, paid) the bill is in total relationship with the product, store and buyer respectively.
The other 3 relationships PB, BS, PS are same as in our model (b).

Therefore our new model ensures all the properties (required) of both the model. A bill ~~be to~~ will be given when a buyer buys atleast one product from a store.

⇒ All the relationships are intact (PBS) → (PB), (BS)(PS) ep

Paid

BID	ID
B_1	I_1
B_2	I_2
B_3	I_3

Bought

PID	ID
P_1	I_1
P_2	I_2
P_1	I_2
P_2	I_1
P_3	I_3

Sold at

SID	ID
S_1	I_1
S_2	I_2
S_3	I_3

Performing Natural Join → Taking one entity common.

BID	PID	SID	ID
B_1	P_1	S_1	I_1
B_2	P_2	S_2	I_2
B_2	P_1	S_2	I_2
B_1	P_2	S_1	I_1
B_3	P_3	S_3	I_3

So, the above example shows how we have incorporated everything.

1) If we delete anything from the binary relationship tables everything can be preserved individually
2) The relationship b/w each entity set is there
3) We can exactly tell the combination of entities ie which buyer buys what product from which store.

⇒ Also this is all done by using binary relation. So, we have removed the ternary relationship and preserved the properties of both the models that were required.
