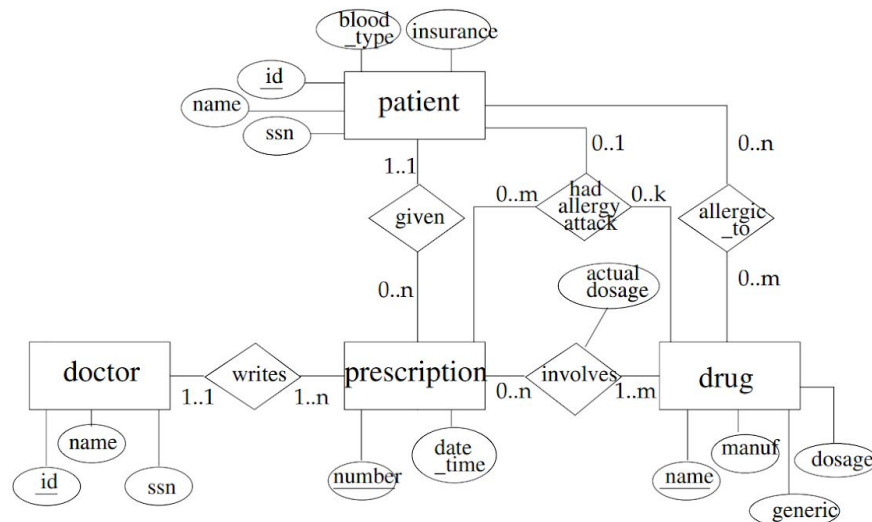


Home Work #1

1.



Schema 1: ER schema designed for XYZ Clinic.

- (a) A doctor is trying to understand Schema 1 and has the following question:
What is the meaning of the cardinality 0..m between the diamond (relationship) allergic-to and rectangle (entity) drug?

Answer the doctor **using non-technical language**.

Please remember the answer must be non-technical. Tell the doctor what it says about the world (involving patients, prescriptions, etc.) without dragging in entities, relationships, tables, etc.!

The 0..m essentially indicates that there can be multiple patients, an amount of m if you will, allergic to a certain drug, or there can possibly be no-one allergic to it at all.

- (b) Does Schema 1 state directly or indirectly the following?

It's impossible that a patient had allergy attacks from the same drug in multiple prescriptions for him/her.

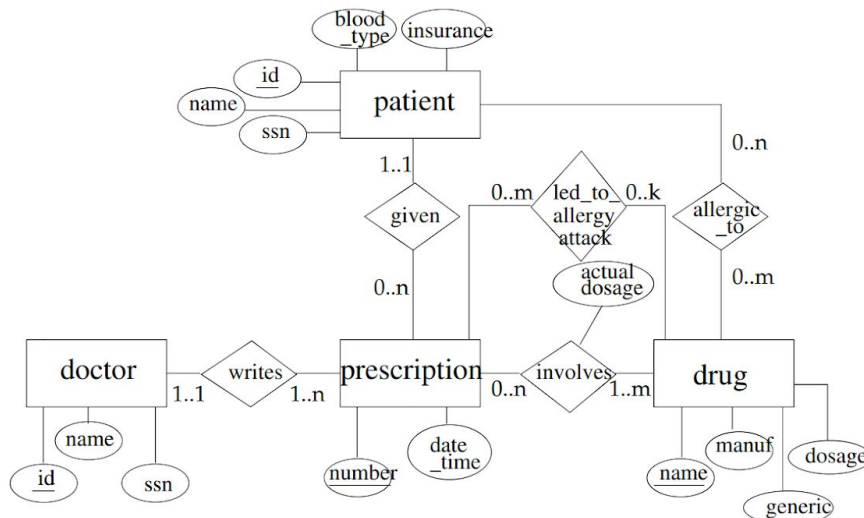
If so, which part of the diagram allows that inference?

If not, how could the diagram be modified to capture it?

Yes it does state the following, the 1..1 cardinality of the relationship between the patient and the prescription as well as the 0..1 cardinality between the patient and their allergic reactions to the prescription/drug indicates that there can only be one prescription for the drugs

in the prescription, so if a patient had an allergy attack it would only be from one prescription not multiple prescriptions.

- (c) Describe the differences, if any, between the worlds captured by Schema 1 and Schema 2. Explain.



Schema 2: Another schema for XYZ Clinic.

The question is not asking for literal readings of the diagrams. For example, "one line — joining the rectangle denoting entity patient to the diamond denoting relationship led to allergy attacks — is missing" is not a good answer; neither is "... the participation of patient in allergy attacks is not considered."

Focus on whether or not something is possible in the world captured by Schema 1 that is impossible in the world captured by Schema 2, or vice-versa. If that's not the case, then why is it that a line could be deleted in the diagram with zero consequences?

Over...

Whether the patient had an allergy attack given a certain drug or prescription is not recorded here, just that a prescription or drug had caused an allergy attack. In the world captured by schema 1, you could deduce if a patient is allergic to a drug that they hadn't known they were allergic to, since whatever allergy attacks they had were recorded and linked to them in schema 1, whereas in world two that deduction is impossible as the patients aren't linked to allergy attacks.

2. A husband and wife share a checking and savings account represented by C and S respectively in the database. They run concurrent transactions T_H , which transfers \$1,000 from checking to savings, and T_W , which transfers \$2,000 from savings to checking.

Assume the initial balance (before either started a transaction) was $C = 5,000$, $S = 50,000$.

What would be the final values of C and S given the following interleaved schedule? Explain by giving the values of C and S before every read operation and after every write operation along with the step numbers.

Step	T_H	T_W	C = 5,000 S = 50,000
1	$R(S, y)$	$y = 50,000$	C = 5,000 S = 50,000
2	$R(C, x)$	$x = 5,000$	C = 5,000 S = 50,000
3		$R(C, y)$	$y = 5,000$ C = 5,000 S = 50,000
4		$R(S, x)$	$x = 50,000$ C = 5,000 S = 50,000
5		$y \leftarrow y + 2000$	$y = 7,000$
6		$x \leftarrow x - 2000$	$x = 48,000$
7	$y \leftarrow y + 1000$	$y = 8,000$	
8	$x \leftarrow x - 1000$	$x = 47,000$	
9	$W(S, y)$	$S = 8,000$ C = 5,000	
10		$W(C, y)$	C = 8,000, S = 8,000
11	$W(C, x)$	$C = 47,000$ S = 8,000	
12		$W(S, x)$	S = 47,000 C = 47,000

Final Values:

$C = 47,000$; $S = 47,000$