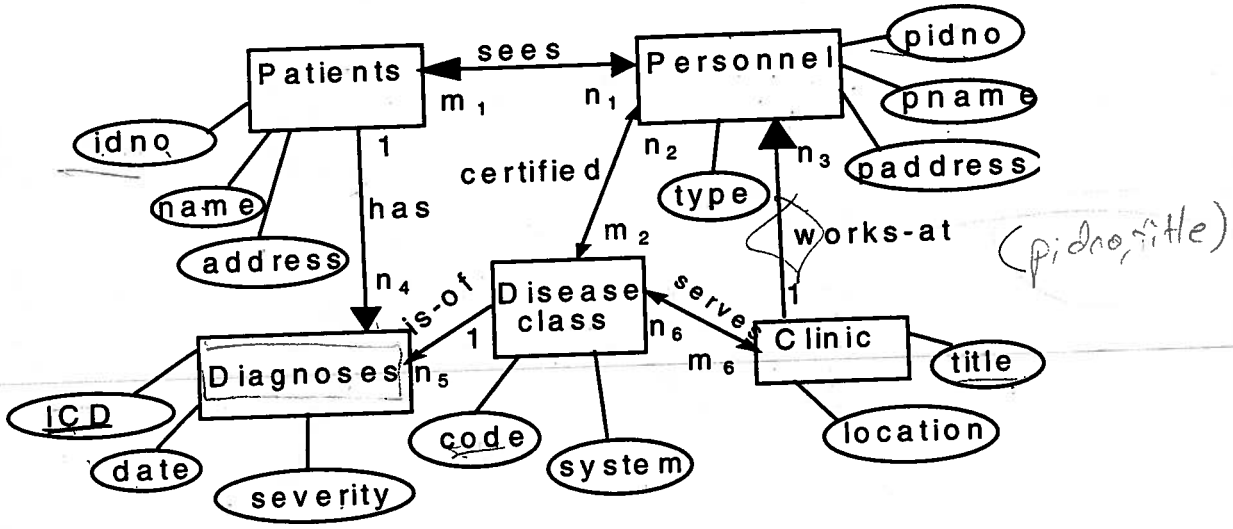
DATABASE comp and solutions

1997/1998 Stanford CSD Database Comprehensive Exam
30 minutes, January 19 1998; Open Book

After a preliminary discussion with a clinic personnel in a hospital, the design committee produced the ER Diagram shown below:



1. Design (7 minutes)
   List the normalized (3NF) relations needed to represent the data corresponding to this E-R model.

   Underline the key-fields.

2. Design revision (5 minutes)
   The committee decides on a refinement: for two of three values of type: { M.D., nurse, clerk },

   distinct data are needed:

   a. for the M.D.: Status {intern, resident, staff, community, consultant}
   b. for the clerk, no certified for Disease-class, nor sees Patients data is needed.

Sketch the diagram revision (only the changes) and list the new relations needed. You can use the attached working sheet as a base.

3. SQL (5 minutes)
   In the paddress text field appears a town name that can match the location of a Clinic.

   Write the SQL query that lists Personnel pnames living in the same town as a Clinic title.

Use the original design (given the E-R diagram above, and the relations obtained from question 1..

4. Relational Algebra (7 minutes)
   Write relational algebra statement that create a relation listing

   Patients name, Diagnoses ICD, and Personnel pname, where the Personnel was NOT certified for the Disease-class for the Diagnoses.

Use the original design (given the original E-R diagram above, and question 1 relations.)

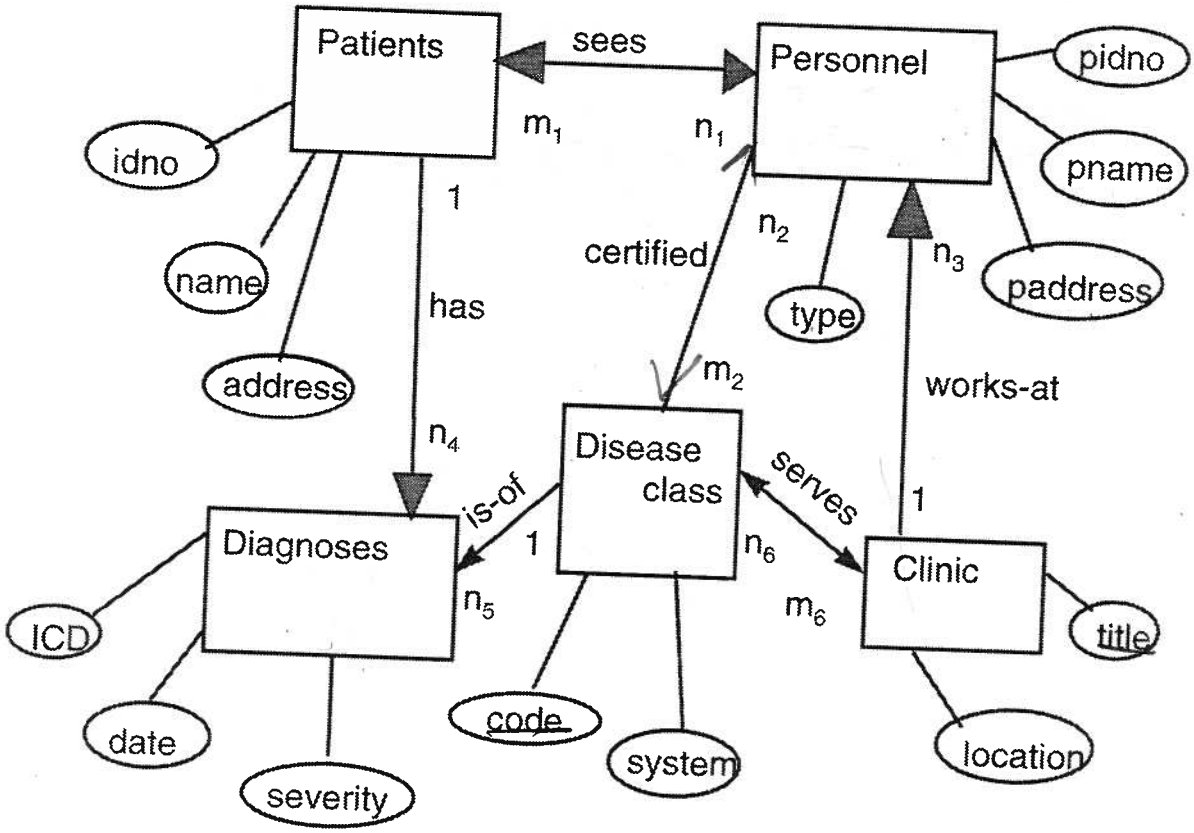
5. Performance (5 minutes)
A database optimization heuristic is to perform selections and projections prior to join operations.

What is the reason for this heuristic?

When is it invalid?

6. Culture (1 minute)
Who defined the relational model and when?
What were the prior alternatives in designing databases?

1997/1998 CSD Database Comprehensive Exam Working sheet for question 2:



(1) → Many, one and One-One pull it in to the same entity set

(2) For Many-Many, create a new Relation

(3)