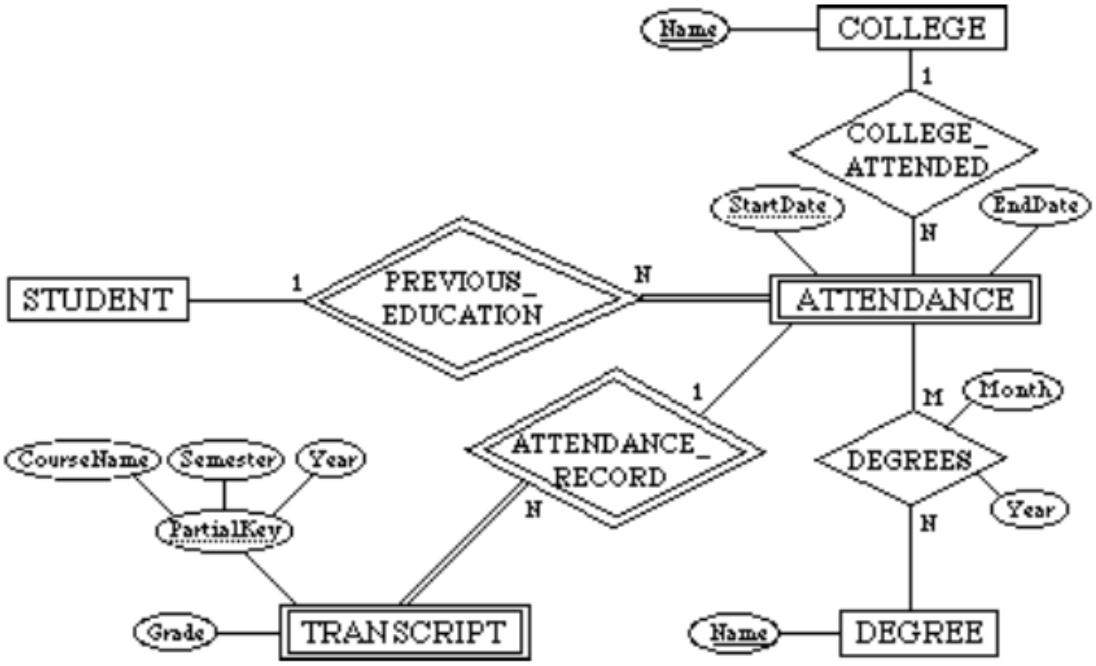
Home exercises (with their solutions) from Chapter 3 of the textbook for Assignment 2.

3.17 - Composite and multi-valued attributes can be nested to any number of levels.
Suppose we want to design an attribute for a STUDENT entity type to keep track of previous college education. Such an attribute will have one entry for each college previously attended, and this entry is composed of: college name, start and end dates, degree entries (degrees awarded at that college, if any), and transcript entries (courses completed at that college, if any). Each degree entry is formed of degree name and the month and year it was awarded, and each transcript entry is formed of a course name, semester, year, and grade. Design an attribute to hold this information. Use the conventions of Figure 3.5.

Answer:
{ PreviousEducation (CollegeName, StartDate, EndDate,
{ Degree (DegreeName, Month, Year) },
{ Transcript (CourseName, Semester, Year, Grade) }) }

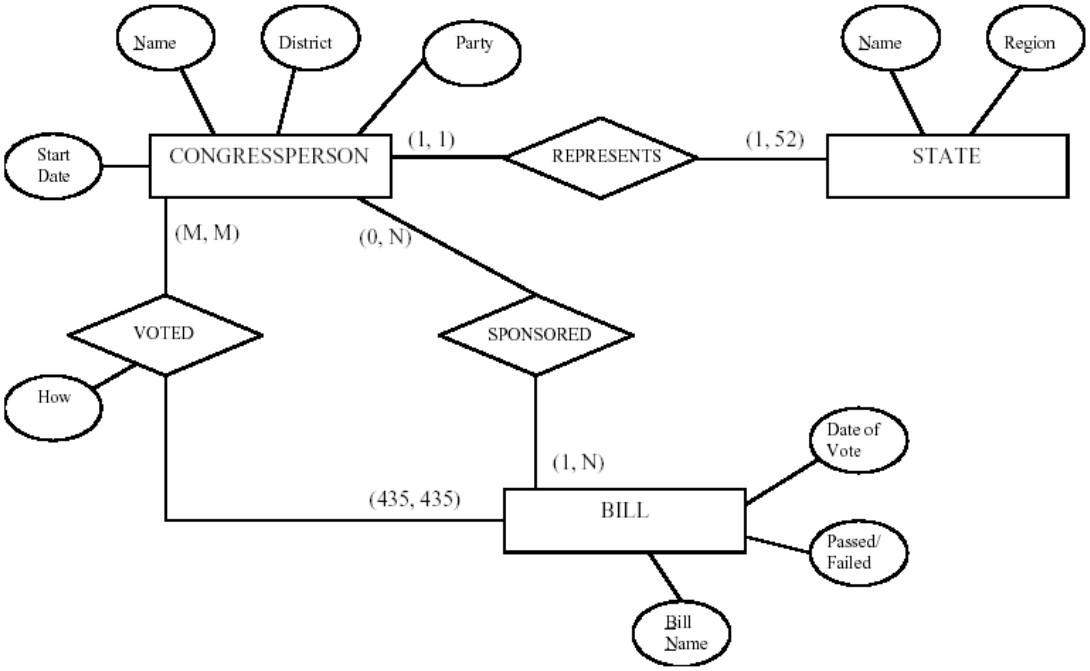
3.18 - Show an alternative design for the attribute described in Exercise 7.17 that uses only entity types (including weak entity types if needed) and relationship types.

Answer:
This example illustrates a perceived weakness of the ER model, which is: how does the database designer decide what to model as an entity type and what to model as a relationship type. In our solution, we created a weak entity type ATTENDANCE; each (weak) entity in ATTENDANCE represents a period in which a STUDENT attended a particular COLLEGE, and is identified by the STUDENT and the StartDate of the period. Hence, the StartDate attribute is the partial key of ATTENDANCE. Each ATTENDANCE entity is related to one COLLEGE and zero or more DEGREEs (the degrees awarded during that attendance period). The TRANSCRIPT of the STUDENT during each attendance period is modeled as a weak entity type, which gives the records of the student during the attendance period. Each (weak) entity in TRANSCRIPT gives the record of the sudent in one course during the attendance period, as shown in the ER diagram below. Other ER schema designs are also possible for this problem.



3.21 – (Please read specifications from the textbook)
Additional information:
- There are 435 congresspersons in the U.S. House of Representatives.
- States have between one (AK, DE, MT, ND, SD, VT, and WY) and 52 (CA) representatives.
- M represents number of bills during the 2-year session.

The resulting ER Diagram is shown in Figure A.


Name
District
Party
Name
Region
Start Date
CONGRESSPERSON
(1, 1)
REPRESENTS
(1, 52)
STATE
(M, M)
(0, N)
VOTED
SPONSORED
How
Date of Vote
(1, N)
(435, 435)
BILL
Passed/ Failed
Bill Name