NYU – TANDON SCHOOL OF ENGINEERING
CS-GY 6083 - B, FALL 2021
Principles of Database Systems

Possible Solutions: Assignment: 1 [100 points]

Please submit your assignment to NYU Brightspace with PDF document attachment. Please mention Student ID, Name, Course, Section Number, and date of submission on the first page of your submission. Insert picture of ERD diagrams in the same PDF document. For each entity in your database design use your initial as prefix, e.g. AP_CUSTOMER where AP is the initial of the student.

Problem 1: 30 points

Consider a university semester with following entities and attributes.

STUDENT (sID, sName, sAddress, sMajor,sGender, sAge)

COURSE (cID, cName, cCredit)

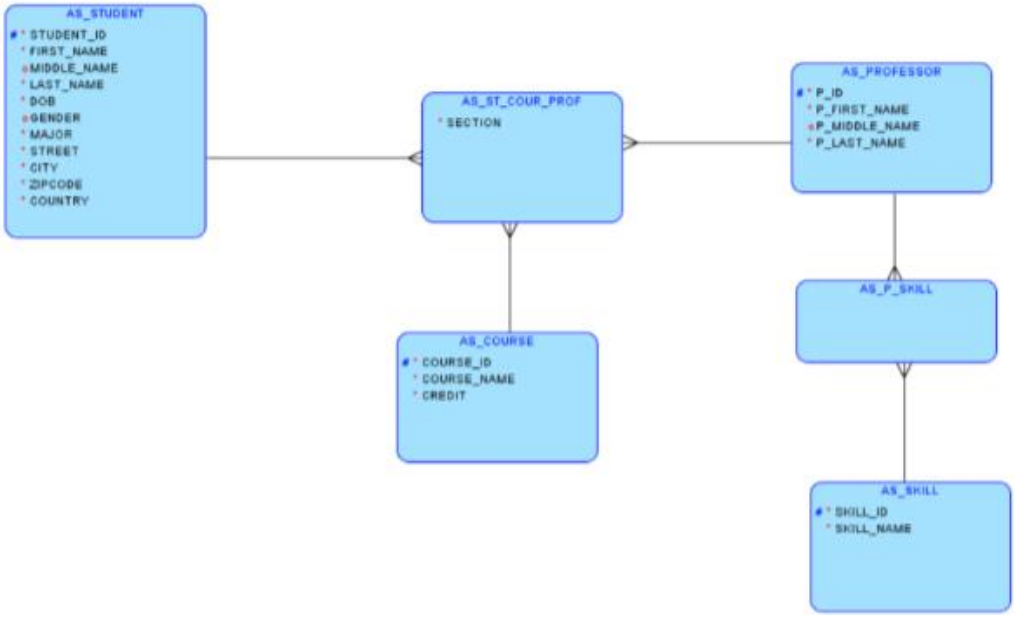
PROFESSOR (pID, pName, pSkill)

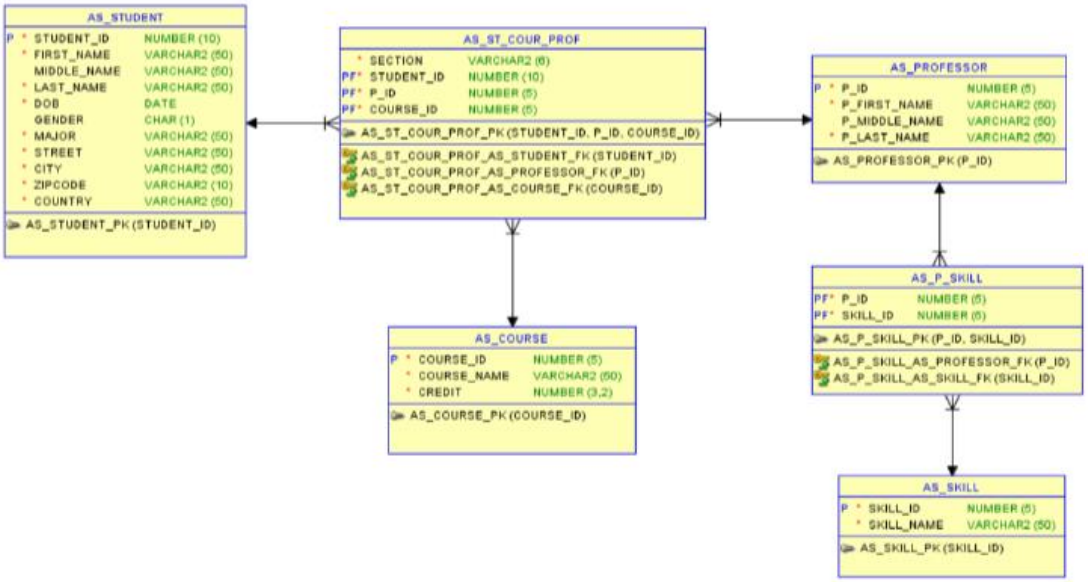
Assume that professor can have many skills such as Database principles, Database management, Project management, Web enabled databases, Data analytics etc. The same course can have many sections such as A, B, C etc. A professor can teach multiple sections of the same course or of different courses. Students can take multiple courses from the same or different professors. Students can have only one major and it could be any of Computer Science, Computer Engineering, Electrical Engineering, Management and Technology, or Information Systems.

Using Oracle Data Modeler, draw ERD (Logical and Relational Model) with proper relationships among entities by resolving any composite/multivalued/derived attributes. Identify relationships among entities. For each entity identify primary key, datatype and size of each attributes, and mandatory/optional attributes)

If you have made any assumptions other than specified in the business case, please clearly state along with your solution to support the validity of your database design.

Logical and Relational Model: [stdents may have different designs based upon valid assumptions stated]





ASSUMPTIONS:

1. A professor may have one or more skills and one skill may be possessed by one or more professors. Hence, a new entity has been created for skills.
2. Middle name and Gender are optional attributes.
3. Date of Birth (DOB) has been added as an attribute as we know that age is a derived attribute. Age can be calculated from DOB.

Problem 2: 70 points

EASE (Easy Accommodation System Enterprise) is a startup company. EASE itself operates as a leasing company and helps their customers to find accommodation of their choices and preferences in NYC and its suburbs. EASE intends to build a centralized database system so that their potential customers can browse and choose apartments of their choices and preferences.

The business analyst at EASE has identified following business requirements as minimum:

a) **The database system should include following details about apartment the building:**

   Name of the building, Address, Total number of floors, Total number of apartment units, Fitness Center (Y/N), Swimming pool (Y/N), Laundry room (Y/N), Wheelchair Accessibility (Y/N), Intercom Facility (Y/N), Power backup (Y/N), Main door security (Y/N), Mailbox facility (Y/N)

b) **Building neighborhood details should include numbers of following accessibilities features within 5 miles of building location.**

   School, Children Park, Bank, Grocery store, ATM, Subway station, Bus station, Railroad station, Pharmacy, Hospital, Restaurants, Coffee shops

c) **Each apartment unit should include following details,**

   Apartment number, Floor number, Carpet area, Number of bathroom, Number of bedrooms, Maximum number of people allowed, Available (Y/N), date of availability of an apartment unit, and rental price/month in USD.

d) **Customers should be able to find status of following features for the apartment they are looking for,**

   Central Air-conditioning, Individual Air-conditioning, Number of assigned parking, Carpet (Y/N), Hardwood floor (Y/N), Balcony (Y/N), Fireplace (Y/N), Garden view (Y/N), City view (Y/N), Pets allowed (Y/N)

e) **Customer should provide following details,**

   Name, Permanent address, Date of birth, Gender, Cell number, Email address, Emergency contact name, Emergency contact number, School/Business name, School/ Business address.

The business analyst at EASE has identified following business rules:

a) **EASE will provide its services to individual customers and not any leasing company**
b) **Customer must be at least 21 years of old at the start date of the rental**
c) **EASE will allow apartment sharing up to the limit of maximum allowable people for given apartment unit**
d) **Apartment building can have multiple accessibility features**
e) **Apartment unit can have multiple features**
f) **For each apartment rental, EASE intends to store details of all tenants (if apartment is shared), rental start date, rental end date, deposit and subsequent payments in USD. EASE also stores payment details like payment mode (Cash, Credit, Debit etc.), account name, payment date etc. Every month EASE will generate an Invoice for each rental unit with invoice number, invoice date and invoice amount. The customer will pay against Invoice generated. The customer can make multiple payments against the same invoice and also can make single payment using different payment method.**

Using Oracle Data Modeler, draw ERD (Logical and Relational Model) with proper relationships among entities by resolving any composite/multivalued/derived attributes. Identify relationships among entities. For each entity identify primary key, datatype and size of each attributes, and mandatory/optional attributes)

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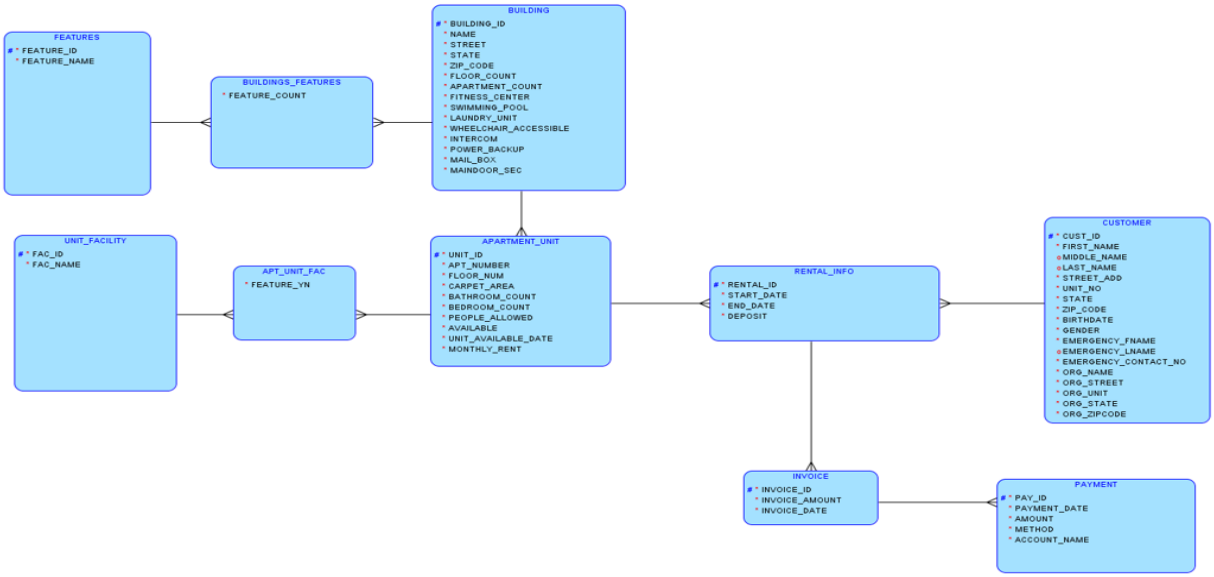

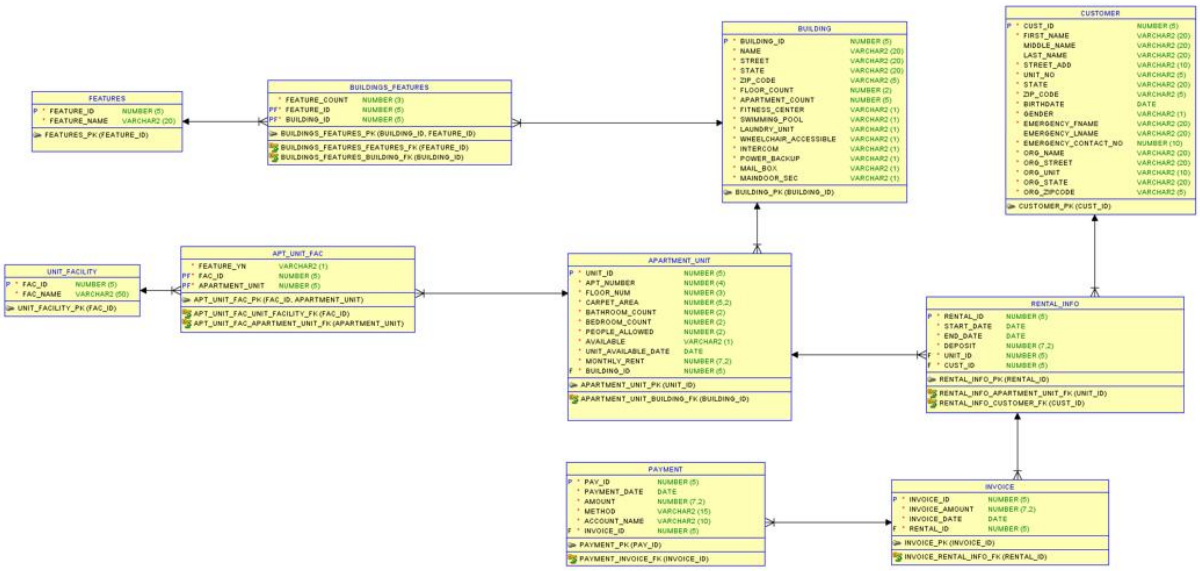

ASSUMPTIONS:

1. Buildings and features have M:N relationship which is resolved by an intersect table named "BUILDING_FEATURES".
2. Apartment_Unit and unit_facility have M:N relationship which is resolved by an intersect table named "APT_UNIT_FAC".
3. Customer's and Emergency Contact's names are resolved into first name, last name because they are composite attributes.
4. Customers and their emergency contacts may or may not have middle and last names. Hence, they are kept as optional attributes.