UTM UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING
UTM Johor Bahru

Semester I 2024/2025

Subject : Database (SECD2523)
Section : 01 & 09 – Dr Haslina Hashim
Task : LAB 5-1 – ENHANCED ENTITY RELATIONSHIP MODELLING

Instruction:
Students are required to discuss the questions below.

QUESTION 01 – CAR DEALERSHIP

A car dealership wishes to maintain data about the customers who purchase a car. Each customer may purchase one or more vehicles and each vehicle can be purchased by many different customers over time (for example, a customer may purchase a new vehicle, trade that vehicle in and someone else can purchase the vehicle traded in.) Data that the dealership wishes to keep regarding customers includes customer identification number, name, address, home phone, work phone, cell phone and e-mail address.

Information about vehicle includes vehicle identification number, make, model, year, transmission type, engine size and color. Vehicles can be a member of one of the following categories: cars, trucks, minivans or SUVS. A vehicle can be a member of only one category at a given time. Trucks, minivans and SUVS have unique attributes – cars do not. Trucks have the following unique attributes: Cab (example: regular, super or crew) and Driver (for example: 94X2 or (4X4); Minivans have Accessory package and SUVS have SUV style.

The dealership is interested in the date of Purchase, amount of sale and Salesperson(s) completing each sale.

QUESTION 02 – PARKING SPACE

Introduce specialization/generalization concepts into the ER model shown in Figure 1 and to show the following

a. The majority of parking spaces are under cover and each can be allocated for use by a member of staff for a monthly rate.

b. Parking spaces that are not under cover are free to use when available.

c. Up to twenty covered parking spaces are available for use by visitors to the company. However, only members of staff are able to book out a space for the day of the visit. There is no charge for this type of booking, but the member of staff must provide the visitor's vehicle license number.

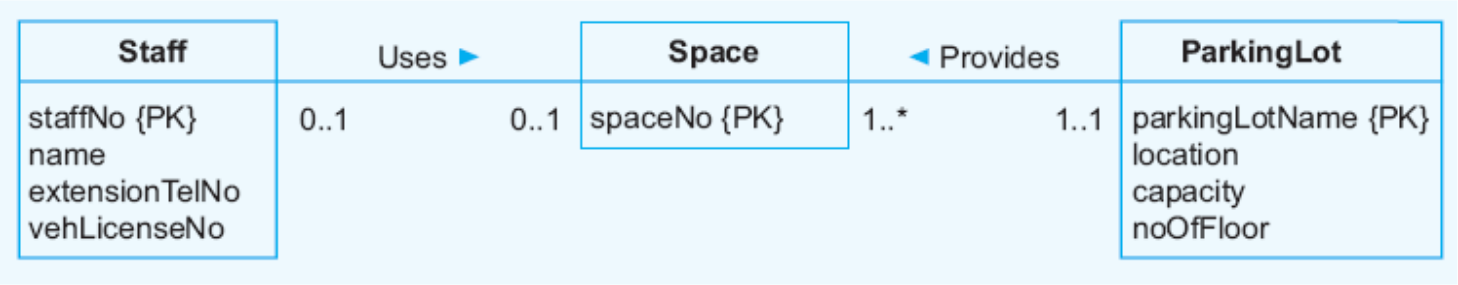

Figure 1 Parking lot ER model

Description of the ER model above.

a. A large organization has several parking lots, which are used by staff.
b. Each parking lot has a unique name, location, capacity, and number of floors (where appropriate).
c. Each parking lot has parking spaces, which are uniquely identified using a space number.
d. Members of staff can request the use of a parking space. Each member of staff has a unique number, name, telephone extension number, and vehicle license number.

QUESTION 03 – FACULTY OF COMPUTER SCIENCE

At Faculty of Computer Science and Information System, students can be categorized as undergraduate student, postgraduate student, research assistant and teaching assistant. Undergraduate students cannot fall into the other categories; however, postgraduate student can also be either research assistant or teaching assistant. Students register subjects at the faculty that can be categorized into three which are Faculty Compulsory, Department Compulsory, University Compulsory and Elective. Students must take all categories of courses in order to get their degree.

a) What is the multiplicity constraint for Specialization/Generalization? (1 mark)
b) What is the participation and disjoint constraints for the entity Student and Course? (4 marks)
c) Draw the Enhance Entity relationship diagram for the entity Student based on this description with the participation and disjoint constraints. (16 marks)

QUESTION 04 – UNIVERSITY STUDENTS TRANSCRIPT DATABASE

Consider the following set of requirements for a UNIVERSITY database that is used to keep track of students' transcripts.

a) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and zip of the student's permanent address, and to the student's last name. Both social security number and student number have unique values for each student.

b) Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.

c) Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of the course number is unique for each course.

d) Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ..., up to the number of sections taught during each semester.

e) A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, 4 for F, D, C, B, A, respectively).

Design an ER schema for this application and draw an ER diagram for that schema.
Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements and make appropriate assumptions to make the specification complete.