Assignment 1 UML Design

Scenario description

A huge percentage of traffic in popular city districts like Shenzhen are generated by drivers searching for parking. Usually, they have to wait for long time, which represents waste of money and fuel and increase environmental concerns as cars are a significant source of smog in the city. Thus, there is a need for designing an efficient parking management system which help drivers search for and pay for available partking slots. In particular, the design of this system needs to meet the following **requirements**:
When a car entering to the parking area, an intelligent device scan the license plate of the car and register the entry time and the car's info in a local database. A few minutes before leaving the parking slot, the driver needs to pay the parking fee, otherwise he/she is not allowed to abandon the area. The calculation of the parking fee is according to the start price, and the increment price for each 15 minutes. The payment can be done using cash or deducted from his/her VIP points provided by the shopping mall. All the drivers need to pay for the parking space 15 minutes before leaving the parking area, otherwise the cost will be recalculated. The administrator in the parking area can keep a list of parking cars, can query and modify information of each car, and can query the parking history. In addition, the shoping mall set a VIP Day on the 1st day of each month to promote sales for its clients. Specifically, the parking management system could automatically send points in each VIP account at 12:00 am in each VIP Day.

Question 1: Draw a use case diagram according to the scenario above. (30 points)

Question 2: Class diagram: Finding out all entity class and one control class according to your design, and draw the class diagram. (30 points)

In this section, you need to indicate the class name, relevant attributes, the necessary methods (at least include the ones listed below) and the relationship between those classes.
Please highlight the control class according to your design.

- findAllCarRecord
- findOneCarRecord
- modifyOneCarRecord
- createCarRecord
- getCarObjectByPlateNumber
- payment
- calculateFee

- changeCarStatus
- getEnterTime
- getLeavingTime
- addvipPoints
- consumevipPoints

Payment Scenario

For the payment, customer needs to scan the QR code to open the parking management app in the electronic invoice and then register the license plate number. If the number is valid, the app can return the parking infomation about the parking time and how much it will cost, otherwise it will return an error message. After that, if the costumer need to pay the parking fees, he/she can click the payment button to accomplish the payment process. In the process, if the costumer has a VIP account of the shopping mall, he/she can use the VIP points to deduct all or some of the parking fees. Once the payment is done, a message is displayed in the screen, indicating the driver that need to leave the parking in 15 minutes.

Question 3: Draw a sequence diagram to represent the payment process (40 points).

What to submit

Complete all the questions and combine the UML diagrams into a single PDF file. If necessary, given several explanations about your diagrams.