Hong Kong Institute of Vocational Education
IT Discipline

Module Name: Object-oriented Technology
Module Code: ITP4909
Assignment Number: ONE
Hand-in: **Monday 15 April 2024 at 16:30**
Weighting of This Assignment: 30% of the Assessment (50% of the End of Module Assessment)

This assignment must be done by individual only. Plagiarism will be treated seriously. Any answers that are found involved wholly or partly in plagiarism (no matter the answers are from the original authors or from the plagiarists) will score Zero mark. **Late submission will NOT be accepted**.

Problem Scenario – Car Service Management System

A car service company provides car maintenance and repair services. The Chief Executive Officer of the company wants to develop a Car Service Management System (CSMS) for supporting the operation of the company.

There are two kinds of order for customers: Maintenance Order and Repair Order. A maintenance order has an order ID, a date, an amount, a status, and a report. A repair order has an order ID, a date, an amount, a status, a description, a labor cost and a parts cost.

A staff member can create a maintenance order using CSMS. The staff member logs in CSMS by entering user name and password. The system asks the staff member to enter the telephone number and the name of the customer. The staff member enters the telephone number and the name of the customer. The system displays the list of cars of the customer. The staff member selects a car from the list. Optionally, when the list of cars is displayed and before the selection of the car, the staff member can click the "add car" button and enter the registration mark of the car of the customer. The system displays a list of maintenance packages. The staff member selects a maintenance package. The system displays the amount of the order. The staff member clicks the "confirm" button. The system displays the order. A maintenance package has a title, a description and a price.

A staff member can create a repair order using CSMS. As described in previous paragraph, the staff member first logs in CSMS, enters the telephone number and the name of the customer, and selects a car of the customer. The staff member enters the amount, the description, the labor cost and the parts cost of the order and adds parts required for repairing the car. The system creates and displays the repair order. A part has a part ID, a name and a price.

A staff member can submit the report of a maintenance order using CSMS. The staff member logs in CSMS by entering user name and password. The system asks the staff member to enter order ID. The staff member enters the order ID. The system displays the maintenance order. The staff member enters the report of the order. The system updates the status of the order to "completed".

A staff member can update the status of a repair order to "completed" using CSMS. The staff member logs in CSMS by entering user name and password. The system asks the staff member to enter order ID. The staff member enters the order ID. The system changes the status of the order to "completed".

A customer can pay an order by mobile wallet payment using CSMS. The staff member logs in CMS by entering user name and password. The system asks the staff member to enter an order ID. The staff member enters the order ID. The system displays the order and activates the QR code scanner of the system. The customer opens his/her mobile wallet application and scans the QR code for payment. The system sends the payment information to an external payment gateway for approval. The external payment gateway sends back the transaction number of the payment to the system. The system updates the status of the order to "paid".

Task Specification

1. Identify the actors of CSMS and write the actor description for the actors.

2. Draw the finalized use case diagram of CSMS with relationships of use cases (e.g. "extend" and "include" relationships).

3. Write the initial use case description for each base use case given in your answer to Task 2.

4. Prepare the base use case descriptions for all use cases related to the process of "***creating a maintenance order***".

5. Perform textual analysis to identify the candidate classes for the whole system. Prepare a data dictionary for the candidate classes.

6. Draw a domain class diagram to show the relationships among the candidate classes found in Task 5. Show attributes of classes, the inheritances and multiplicities of the associations between classes. Give appropriate names to associations.

7. Draw a 3-tier sequence diagram at design level for the following scenario of the "***Create Maintenance Order***" use case as described as below:
    *   The staff member successfully logs in the system.
    *   The staff member selects a car from the car list.
    *   The staff member creates a maintenance order successfully.

    Assume that one user interface and one controller object are required for the diagram.

8. Draw a state machine diagram at design level for the control object for the "***Create Maintenance Order***" use case. Hints: the state machine diagram at design level for the control object should cover all possible scenarios of the "***Create Maintenance Order***" use case.

9. Refine the class diagram of Task 6 with the information from the sequence diagram of Task 7 and the state machine diagram of Task 8.

Mark Allocation
Your assignment work will be marked according to the following criteria.

Work	Mark Allocated
Actor Descriptions, Initial Use Case Descriptions, finalized Use Case Diagram and base use case descriptions for all use cases related to the process of "***creating a maintenance order***"	35%
Data Dictionary for candidate classes, Domain Class Diagram and Refined Class Diagram at design level	30%
Sequence Diagram at design level	15%
State Machine Diagram at design level	10%
Consistency between Sequence Diagram and State Machine Diagram and Consistency between Sequence Diagram and Refined Class Diagram	10%

Submission of Assignment Work
1. This assignment should be done by you only. Plagiarism will be treated seriously. Any answers that are found involved wholly or partly in plagiarism (no matter the answers are from the original authors or from the plagiarists) will score Zero mark.

2. Upload your work as a Microsoft Word file to Moodle by **Monday 15 April 2024 at 16:30**. Late submission will **NOT** be accepted.

3. Submit all your work described in the Task Specification section. Your report should have page numbers and the following sections:

   o   Actor Descriptions
   o   Initial Use Case Descriptions
   o   Finalized Use Case Diagram
   o   Based Use Case Descriptions (for use cases related to the process of *"creating a maintenance order"*)
   o   Data Dictionary for candidate classes
   o   Domain Class Diagram for Task 6
   o   3-tiers sequence diagrams for Task 7
   o   State Machine Diagram(s) for Task 8
   o   Refined Class Diagram for Task 9

4. You should declare any assumptions you make.

*** END OF ASSIGNMENT ***