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**Hong Kong Institute of Information Technology**

Module Name: Object-Oriented Technology  
Module Code: ITP4909  
Assignment Number: ONE  
Hand-in: **Wednesday 16 April 2025 at 16:30**

Weighting of This Assignment: 40% of the Assessment (66.67% 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.**

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**Problem Scenario – CatCat Sweet Cookies Shop** (mobile app CSC-MA for CatCat Sweet Cookies)

CatCat Sweet Cookies Shop sells sweet cookies. The shop is developing an online shopping system to provide an online retailing services to its clients.

Clients must install a mobile app called "CatCat Sweet Cookies" (CSC-MA) to view and purchase cookie products. Anyone visiting the CatCat Sweet Cookies Shop website can download and install the app (CSC-MA). Upon first activating the app, the client enters his/her name, mobile phone number and a password. The system sends a one-time passcode to the client via an SMS (short message service) message to the client's mobile phone through an external SMS gateway. The system validates the potential client by requiring them to enter the one-time passcode into the app within 90 seconds. If the passcode is entered correctly and within the time limit, the registration is successful, and the system sends a confirmation SMS message to the client's phone and activate the CSC-MA app. A client who has successfully activated the app becomes an app client. If the time limit is exceeded or the client entered a wrong passcode, the activation process is terminated.

When an app client launches CSC-MA, the client enters his/her mobile phone number and password for login. If the entered phone number or password is not correct, the app prompts the client to log in again. After successfully login, the app client can view cookie products using CSC-MA. The app displays categories such as milky chocolate, 50% chocolate, 70% chocolate, nuts, and more. The client selects a category. The app lists available products of the selected category. The client can then add a product to the shopping cart. The app displays the detailed product information. The client can repeatedly add products to the shopping cart. The client finalizes an order by pressing the "CHECK OUT" button. Alternatively, the app client can scan a referral QR code to select and add products into the shopping cart and click "CHECK OUT". A referral QR code is generated after a successful payment as described in next paragraphs.

After clicking "CHECK OUT", CSC-MA prompts the client to enter a shipping address. Once the address is provided, if the client has gift points, the app asks whether the client want to use his/her gift points to settle the bill. If the gift points are insufficient (or the client chooses not to use them), the app requests credit card information (card number, verification code, and expiry date). After the client enters the required details, the system forwards the credit card information and payment amount to an external payment gateway. The gateway processes the payment. If successful, the gateway returns an approval code to the system and the system saves the order and the payment record and provides the client with an order number. If the payment fails, the gateway returns a reject code and the above payment process will be repeated again.

Upon successful payment, CSC-MA generates a referral QR code for the client. If the client scans this code within 14 days, the app automatically reselects the same products for a new order. Clients can share the QR code with others via the app to earn gift points as referred clients. If referred clients scan the code and complete a purchase, they receive a 5% discount on their order. The original client earns 1 gift point for every \$100 spent by referred clients, with 1 gift point converting to \$1 when redeemed. The client can check his/her gift points balance in the app.

Once the app has been logged in, an app client can view his/her order history. CSC-MA displays a list of orders with various sorting and filtering options selectable by the client.

A staff member can also view clients' orders when necessary. A staff member has a user account to access system functions for managing orders. A staff member must log in with his/her staff number and password. When an order's products are ready for shipping, the staff member updates the order's status from "OUTSTANDING" to "READY FOR SHIPPING." After all products of an order have been successfully delivered to the shipping address, the staff member updates the status of the order from "READY FOR SHIPPING" to "COMPLETED."

To simplify the diagrams, you may assume the app CSC-MA (front-end client) and the back-end system as a single system.

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## Task Specification

1. Identify the actors. Write a description for each actor.
2. Draw the finalized Use Case Diagram for the online shopping system. Use <<include>> and <<extend>> relationships if appropriate.
3. Write an initial use case description for each use case given in your answer to Task 2.
4. Write the base use case descriptions for all concrete/abstract use cases related to the process of "Place Order".
5. Identify candidate classes by using textual analysis. 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. Consider the following scenario of the “place order” use case:
  - the client successfully logs in the system
  - the client selects a category to view
  - the client selects ONE product from the list and place the product into the shopping cart
  - the client does not have enough gift points to pay for the product and pays the order by a credit card successfully.Draw a three-tier sequence diagram for the above scenario.  
Assume only one boundary object and one control object are required in the diagram.
8. Draw a state machine diagram at design level for the control object for the “Place Order” use case.  
Hints: the state machine diagram at design level for the control object should cover all possible scenarios of the “Place 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
Tasks 1 - 4	30%
Tasks 5 - 6	30%
Tasks 7 - 9	30%
Consistency between Models	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 Wednesday 16 April 2025 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:
  - Actor Descriptions
  - Finalized Use Case Diagram
  - Initial Use Case Descriptions
  - Based Use Case Descriptions (for use cases related to the process of “*place order*”)
  - Data Dictionary for candidate classes
  - Domain Class Diagram for Task 6
  - 3-tiers sequence diagrams for Task 7
  - State Machine Diagram for Task 8
  - Refined Class Diagram for Task 9
4. State any assumptions you have made.

**\*\*\* END OF ASSIGNMENT \*\*\***