GROUP PROJECT (35%)

Due: 18 SEPTEMBER 2025, THURSDAY, 12:00 NOON (GMT +7)

OBJECTIVES

This project offers students the opportunity to apply the concepts learned throughout the course so far, providing hands-on experience in analyzing, designing, and developing a software application. The project aims to simulate real-world development scenarios, helping you prepare for professional life. For simplicity, the application will use a basic text interface (no GUI required), but it will include all essential functionalities of a practical application, with potential for further development after completion.

INTRODUCTION

In response to Vietnam's upcoming shift away from gasoline-powered motorbikes and government support for electric mobility, this project simulates a peer-to-peer electric motorbike rental system. The system enables registered members to list and rent electric motorbikes from one another using a credit point (CP) system. The application should be console-based, written in C++, and demonstrate principles of object-oriented programming and system design.

DESCRIPTION

E-MOTORBIKE RENTAL APPLICATION

Develop a C++ console-based electric motorbike rental application that allows users to register as members, list their electric motorbike for rent, browse and book other members' motorbikes, top up credit points (CPs), and provide ratings after each completed ride. The system manages user registration and authentication, CP transactions, eligibility checks based on rating, license and credit points (CPs), booking and rental process and ratings for both renters and motorbikes.

CORE FUNCTIONALITIES

1. **User roles**
   - **Guest:** Can view general motorbike listings (brand, model, engine size and location only); cannot view other details such ratings and reviews; cannot make rental requests.
   - **Member:** Can list their own motorbike for rent; can search for and request to rent other members' motorbikes (if eligible); can top up CPs, rate others, and manage their profile.
   - **Admin:** Can view all member profiles and motorbike listings without restriction.

2. **Member profile registration**
   - Required information for registration: username, password, full name, email, phone number, ID type (Citizen ID or Passport) and ID number, and driver's license number and expiry date (it's optional if the member does not have driver's license number).
   - Strong password policy must be enforced (e.g., no weak password like "12345" or "password").
   - Optional: Register electric motorbike at signup with the following information: brand, model, color, engine size (in cc), year made and license plate.
   - New members pay a $20 registration fee, earning 20 CPs and have a default renter rating of 3.

3. **Profile management**
   - Members can view and update their profile information, except username.
   - Members can change their password.

- Members can view and top up CP balance ($1 = 1 CP, password authenticated).
- Members can view their booking history and rating statistics.

4. **Electric motorbike listings**
   - Each member may register only one electric motorbike.
   - To list a motorbike, owners must specify:
     - ✓ Available rental period (start and end date)
     - ✓ City (HCMC or Hanoi only)
     - ✓ Daily rental rate (in CP)
     - ✓ Minimum required renter-rating
   - Motorbikes can be unlisted anytime unless already booked.

5. **Motorbike search and filtering**
   - Members can search for available motorbikes by date and city.
   - Motorbike listings include brand, model, engine size, and motorbike-rating score.
   - Members can view reviews (average score and comments) for each listing.
   - Only listings matching all the following criteria will be shown:
     - ✓ Member's current renter rating meets or exceeds requirement
     - ✓ Sufficient CPs to cover full rental cost
     - ✓ Active license if engine size exceeds 50 cc
     - ✓ Motorbike is located in the selected city
   - For example, *Michael has renter rating of 3, 60 CPs and expired license. He searches for motorbikes in HCMC on 15 August 2025. As a result, he will only see listings with required renter rating <= 3, cost <= 60 CPs total, engine size <= 50 cc and availability in HCMC on 15 August 2025.*

6. **Rental requests and approval**
   - A member can submit a rental request if:
     - ✓ Their renter-rating meets or exceeds the listing's requirement
     - ✓ They have sufficient CPs
     - ✓ They have an active license if the motorbike exceeds 50 cc
     - ✓ They are not already renting another motorbike
   - The owner can view all rental requests for their motorbike. They can accept one request per availability window.
   - Upon acceptance:
     - ✓ CPs are deducted from the renter's balance
     - ✓ The motorbike is marked as **rented** for the renter period
     - ✓ All overlapping requests are automatically rejected
     - ✓ Rental cancellations are not allowed

7. **Ride completion and ratings**
   - After the rental period ends, members "return" the motorbike.
   - Renter rates the motorbike (1 - 5 stars + comment).
   - Owner rates the renter (1 – 5 stars + comment).
   - Ratings are averaged over time and updated accordingly.
     - ✓ Motorbike rating reflects ride condition and performance
     - ✓ Renter rating reflects how well the motorbike was handled

8. **Data Persistence**
   - All data must be saved to file(s) when the application ends.
   - Upon starting the application, data files should be loaded and restored into memory for use.

CONSTRAINTS

(1) Credit point balances must never go negative.
(2) Each member may register only one motorbike and rent only one motorbike at a time.
(3) Rental requests cannot be cancelled once accepted.
(4) Members without a valid license (none or expired) cannot view or rent motorbikes above 50 cc.

ASSUMPTIONS

(1) Transactions involving CP top-up are authorized only via password.
(2) Members without a license can still register, list a motorbike for others to rent, and earn CPs from rentals.

PROCESS AND GUIDE

A. Class Diagram: Create class diagrams that identify the classes, attributes, methods, and the relationships between the classes for the e-motorbike rental application.

B. *Basic Features:*

Implement and test the following core features for the e-motorbike rental application. **Ensure that all user input is validated appropriately. All attributes must be private to enforce data encapsulation.**

1. Guests can browse general motorbike listings with limited details: brand, model, engine size and location.
2. Admin can view all member profiles and motorbike listings without restriction.
3. Users can register as members and register one electric motorbike. Registration must include a strong password policy. Upon successful registration and payment, the member receives 20 credit points and a default renter rating of 3. All members and motorbike information must be recorded and stored.
4. Members can log in with their username and password. They can view and update their profile information as specified in the **Profile management** section, change their password, and top up their credit points.
5. Members can list an electric motorbike as specified in the **Motorbike listing** section.
6. Members can un-list their motorbike at any time, unless it is already booked.
7. Members can search for available motorbikes by date and city. Search results should follow the filtering criteria defined in the Motorbike search and filtering section.
8. Members can view complete listings, including the average rating score and user comments for each motorbike.
9. Members can submit rental requests. A license restriction must be enforced: members without a valid motorbike license cannot rent electric motorbikes over 50cc.
10. Motorbike owners can view all rental requests for their listed motorbike and choose to accept one. All overlapping rental requests are automatically rejected upon acceptance.
11. When a request is accepted, CPs are deducted from the renter's balance, and the motorbike is marked as rented for the selected period. Rental cancellations are not allowed once confirmed.

12. After the rental period ends, both the renter and the owner must rate each other (1-5 stars and a comment). Ratings and comments are tied to the specific transaction.
13. Member and motorbike ratings are automatically averaged over time and updated accordingly.
14. All data must be saved to data file(s) before the application closes. Upon starting the application, the data must be loaded and made available for continued use.

C. *Advanced Features:*

15. ***Identity verification:*** Implement an identity verification mechanism and display a "Verified" status for members who successfully complete the process. The method of verification is flexible and can be designed creatively based on your implementation approach.

16. ***Activity dashboard:*** When a member logs into the application, a personalized dashboard should be displayed showing their account overview, active rental booking (as renter) and active rental requests (as motorbike owner). Below is a sample dashboard. You can design your own dashboard format as needed.

```
Account Overview: iAmMember1
----------------------------
Current Credit Points: 80
Renter rating:      3.5     | Motorbike rating: 4.6

Your active rental booking
--------------------------
Rent Period           | Brand   | Model   | Color | Size | Plate No.   | Owner      | Status
15/08/2025-17/08/2025 | VinFast | Klara S | Red   | 50cc | 59X3-216.86 | iAmMember8 | Rejected

Your active rental requests
---------------------------
Rent period           | Renter rating | Renter
20/08/2025-21/08/2025 | 3             | IAmMember3
21/08/2025-24/08/2025 | 4             | IAmMember4
21/08/2025-23/08/2025 | 4             | IAmMember5
21/08/2025-22/08/2025 | 3             | IAmMember2
```

17. ***Date range filter:*** Enhance the motorbike search functionality by allowing members to specify a date range (start date and end date) when searching for available motorbikes. The system should only display listings that are available for the entire selected period and meet all rental criteria specified in the **Motorbike search and filtering** section.

D. Welcome Screen

When starting the application, display a welcome screen with an example content structure as shown below. You may adjust the format and content as needed. **Note:** the **bold** content is compulsory, and **…** indicates that you can add additional information as needed.

```
EEET2482/EEET2653/COSC2082/COSC2721(Delete whichever is not needed) GROUP PROJECT
Semester 2 2025
E-MOTORBIKE RENTAL APPLICATION

Instructor: Dr Ling Huo Chong, Dr Ushik Shrestha, Dr Tri Huynh
Group: Group No.
XXXXXXX, Student Name
XXXXXXX, Student Name
XXXXXXX, Student Name
XXXXXXX, Student Name

Use the app as 1. Guest   2. Member   3. Admin

Enter your choice: 2
Enter username: iAmMember1
```

```
Enter password: ********

You have successfully logged in.

Account Overview: iAmMember1
----------------------------
Current Credit Points: 80
Renter rating:      3.5     | Motorbike rating: 4.6

Your active rental booking
--------------------------
Rent Period           | Brand   | Model   | Color | Size | Plate No.    | Owner      | Status
15/08/2025-17/08/2025 | VinFast | Klara S | Red   | 50cc | 59X3-216.86 | iAmMember8 | Rejected

Your active rental requests
---------------------------
Rent period           | Renter rating | Renter
20/08/2025-21/08/2025 | 3             | IAmMember3
21/08/2025-24/08/2025 | 4             | IAmMember4
21/08/2025-23/08/2025 | 4             | IAmMember5
21/08/2025-22/08/2025 | 3             | IAmMember2

This is your menu:
0.  Exit
1.  View Information
2.  ...

Enter your choice: 1
...
```

IMPORTANT INSTRUCTIONS

1. You are required to write your program in C++ programming language only.
2. You will need to demonstrate the OOP skills that you have learned on the course.
3. You must thoroughly document your code using comments (// or /* … */).
4. Your code should be separated logically into multiple source code (.cpp) and header (.h) files that overall have a single purpose, i.e., your code should be structured in a way that each file has a clear scope and goal. Marks will be deducted if you put everything together into one single source code file. Make sure you use the header files and header guard correctly.

USING GITHUB

You are recommended to use GitHub for your group project. GitHub is a widely used platform for version control and project collaboration. It allows team members to collaborate effectively, manage code efficiently, and track issues seamlessly. For guidance on using GitHub, please refer to the following tutorial: https://github.com/TriHuynh00/github-demo.

ACADEMIC INTEGRITY

This assessment requires that you meet RMIT's expectations for academic integrity. You must not ask for or accept help from anyone else on completing the tasks. You must not show your work to another student/group enrolled in this course who might gain unfair advantage from it. These things are considered plagiarism or collusion. Plagiarism is a form of cheating. It is the presentation of the work, ideas, or creation of another person as though it is your own. If you use any resources, write an acknowledgment in the file where the resources were used. Any submission found in whole or in part plagiarized will be considered as plagiarism. To be on the safe side, never ever release your code to the public. For example, **if you use GitHub to store your code, make sure that you set the repository as private.** For more information, visit RMIT's website for Academic Integrity.

The penalty for plagiarism is extremely severe at RMIT. If you are found to plagiarize, you will receive a mark of zero for an assessment or even an entire course. Repeated plagiarism will lead to exclusion from RMIT.

RUBRIC

Refer to the rubric available on the Group Project page in the course Canvas.

REPORT AND PRESENTATION

Report: Complete your report using the Report Template provided on the Group Project page of the course Canvas.

Video Presentation: Record a video of approximately 10 minutes to showcase and demonstrate your project. Ensure that all group members participate in the presentation. The video should begin with a brief introduction to the topic and its relevance, followed by a demonstration of your program with clear explanations and any assumptions made. Make sure that your video is recorded at normal speed. Upload your final video to YouTube and ensure the link is accessible. Video exceeding 10 minutes will not be considered.

Group Q&A Session: Each group will participate in a Q&A session on **Thursday, 19 September 2025**, where your team will briefly introduce your project and respond to questions from your instructor. All members must be present and actively participate to receive full marks for this component.

SUBMISSION INSTRUCTIONS

As a group, submit the following files separately to the course Canvas, DON'T zip them together (*only ONE member needs to do the submission***):**

1. An executable file of your program, i.e., ***GroupX_Program.exe*** *(where X denotes your group number).*
2. A zip file of all source code including .h and .cpp files and data files, i.e., ***GroupX_Sources.zip.***
3. A report in PDF format, i.e., ***GroupX_Report.pdf***.
4. A text file with a link to your presentation video, i.e., ***GroupX_Video_GitHub.txt.*** If your group is using GitHub, put the link of your GitHub to the same text file as well, and invite your lecturer to your GitHub, i.e., **Ushik-rmit** (username for Dr Ushik) and **TriHuynh00** (username for Dr Tri).
5. Record of Individual Contribution in PDF format, i.e., ***GroupX_Individual_Contribution.pdf.*** Refer to the Individual Contribution form available on the Group Project page in the course Canvas. **Note:** The commit history on GitHub can serve as proof of members' participation in the group project if there is a dispute.

Note: *The files must also be submitted separately to TURNITIN, and make sure your executable file can run. If you do not submit it, or it fails to run/crashes, you may lose up to 50% of the grade (although some marks may be given for the effort).*

Late work: 10% penalty per day. Submission later than 03 days will not be accepted and a mark of zero will be given.

--- END OF GROUP PROJECT ---