**National University of Computer & Emerging Sciences**

**Karachi Campus**



**VEHICLE RENTAL SYSTEM**

**Project Proposal**

**Object-Oriented Programming**

**Section: BCS-2F**

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Project Proposal

* **Introduction**

The Vehicle Rental System is intended to simplify car rental by offering an effective, intuitive platform. The system will enable customers to search for available cars, view rental prices, book vehicles, and view rental history. The system will also offer administrative functionality for vehicle inventory management, rental tracking, and report generation. The project is developed in C++ and adhering to the Object-Oriented Programming (OOP) principles to support modularity, scalability, and code reuse.

* **Existing System**

Nowadays, most car rental systems either operate manually or with basic software that lacks advanced features like customer management, rental history tracking, and automated billing. Manual systems are prone to errors, time-consuming, and lack real-time feedback. Existing computer solutions lack good object-oriented design, thereby leading to poor maintainability and extensibility.

* **Problem Statement**

The traditional vehicle rental system faces several issues:

1. **Manual Errors**: Inaccurate record-keeping and incorrect billing.
2. **Limited Access**: Lack of a centralized database for vehicle and customer information.
3. **Inefficiency**: Time-consuming processes for booking and returning vehicles.
4. **Limited Customer Interaction**: No user portal for customers to view or manage their bookings.

* **Proposed Solution**

The proposed Vehicle Rental System will automate and optimize the rental process through a structured OOP approach. It will:

1. Implement classes for core entities (Vehicle, Customer, Booking) to provide clear separation of concerns.
2. Utilize inheritance to define specialized vehicle types (Car, Bike, Truck).
3. Apply polymorphism to manage different rental rates and vehicle-specific behaviors.
4. Use encapsulation to protect sensitive data and provide controlled access.
5. Employ abstraction to simplify complex operations like calculating total rental cost and generating reports.
6. Incorporate file handling to store and retrieve customer details, vehicle information, and booking records for persistent data management.

* **Salient Features**

1. **User Management**: Registration, login, and profile management.
2. **Vehicle Inventory**: Add, update, and remove vehicles.
3. **Booking System**: Rent and return vehicles, calculate costs.
4. **Rental History**: Track and display past rentals.
5. **Search and Filter**: Search vehicles by type, price, or availability.
6. **Admin Panel**: Manage users, vehicles, and generate reports.
7. **Automated Billing**: Calculate rental fees based on time and vehicle type.
8. **File Management**: Save and load data using text files, implement logging, and provide backup/restore options.

* **Tools & Technologies**

1. **Programming Language**: C++
2. **Operating System**: Windows
3. **IDE**: Visual Studio Code
4. **Database**: File-based storage