**Laptop Rental Management System Documentation**

**1. Problem Statement**

In many universities, students from remote areas face challenges in completing academic projects and assignments due to the unavailability of laptops. Purchasing a laptop is often not feasible for these students due to financial constraints. This lack of access limits their ability to work on Final Year Projects (FYPs), university assignments, and freelance opportunities, which can impact their academic and professional growth.

**2. Proposed Solution**

To address this problem, we propose a Laptop Rental Management System that allows students to rent laptops for a specified duration. This system will facilitate students to complete their academic tasks without the burden of purchasing a laptop. The system will also ensure proper management of laptops, transactions, and student records through an efficient and user-friendly interface.

**3. Project Overview**

The Laptop Rental Management System will be developed in the C programming language. The project will follow a modular structure, dividing the workload into four distinct modules to be assigned to a team of four members. The system will include features such as student registration, laptop inventory management, rental transactions, search functionality, and user authentication.

**Features:**

* **Student Registration**: Register students with their details.
* **Laptop Inventory Management**: Maintain a record of available laptops.
* **Rental Transactions**: Manage the rental process, including booking and returns.
* **Authentication**: Ensure secure access for admins and students.
* **Search Functionality**: Allow users to search for laptops and student records.

**Constraints:**

* No use of dynamic memory allocation (malloc(), calloc(), etc.).
* No use of advanced string manipulation functions (strlen(), strcpy(), etc.).
* No use of time functions (time(), strftime(), etc.).
* Data storage will be handled using file I/O.

**4. Module Breakdown**

**Module 1: Registration and User Management**

**Description**:

* Register new students by collecting basic details such as name, student ID, and contact information.
* Store student details in a file for persistent storage.
* Implement functions to display, update, and search for student records.

**Key Functions**:

* registerStudent()
* displayStudents()
* searchStudent()

**Module 2: Laptop Inventory Management**

**Description**:

* Maintain a list of available laptops with details such as laptop ID, brand, and specifications.
* Add new laptops to the inventory and update their availability status.

**Key Functions**:

* addLaptop()
* displayLaptops()
* updateLaptopStatus()

**Module 3: Booking and Rental Transactions**

**Description**:

* Handle the process of booking laptops for students.
* Record rental details such as student ID, laptop ID, and rental duration.
* Manage laptop returns and update the inventory accordingly.

**Key Functions**:

* bookLaptop()
* returnLaptop()
* displayRentalTransactions()

**Module 4: Authentication and Search Functionality**

**Description**:

* Implement a login system with roles (admin and student).
* Validate user credentials against pre-defined data.
* Provide search functionality for laptops and students.

**Key Functions**:

* login()
* searchLaptop()
* searchStudent()

**5. Team Member Assignments**

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| --- | --- |
| **Team Member** | **Assigned Module** |
| Dina | Registration and User Management |
| Uqbah | Laptop Inventory Management |
| Saad Jangda | Booking and Rental Transactions |
| Abdul Rafay | Authentication and Search Functionality |

**6. Development Plan**

* **Phase 1**: Understand the requirements and design the module structure.
* **Phase 2**: Develop individual modules with file I/O for data storage.
* **Phase 3**: Integrate all modules and test the system.
* **Phase 4**: Finalize the project, prepare documentation, and conduct a demo.

**7. Tools and Technologies**

* **Programming Language**: C
* **Development Environment**: Code::Blocks, Visual Studio Code, or Turbo C++
* **File Format**: .txt files for data storage

**8. Conclusion**

The Laptop Rental Management System aims to provide an effective solution for students who lack access to laptops. By dividing the project into well-defined modules, each team member can focus on specific responsibilities, ensuring smooth development and successful completion of the project.