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Title: Library Management System In ALP

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Introduction

This project implements a Library Management System using 8086 Assembly Language to demonstrate how database operations can be performed at the hardware level. Unlike high-level implementations, the system directly uses memory addressing, register operations, and DOS interrupts to manage user authentication, book records, and transactions, providing deeper insight into low-level system architecture and data management.
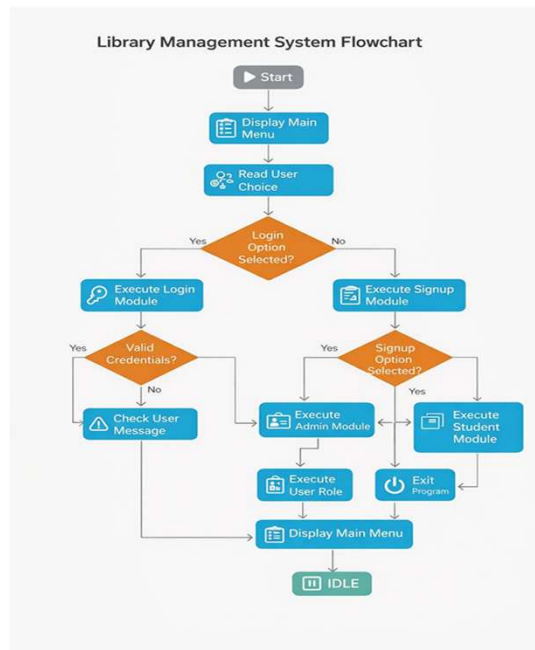
Problem Definition

Libraries require an efficient system to manage large volumes of books, student records, issue/return transactions, and access permissions. Manual or poorly organized digital systems often lead to data redundancy, record mismanagement, unauthorized access, and delays in retrieving information. Therefore, there is a need to develop a structured Library Management System that ensures secure user authentication, accurate inventory tracking, controlled book issuance, and efficient record maintenance in a reliable and organized manner.

Objectives

• To develop a Library Management System that manages book inventory, student records, and issue/return transactions efficiently.
• To implement secure user authentication and role-based access control for administrators and students.
• To ensure accurate record maintenance and quick retrieval of library data through a structured digital system.

Methodology

Library Management System Flowchart

The project was developed using a structured, modular approach where the library system was designed to handle user authentication, book inventory management, and transaction processing. The system logic was organized into functional modules such as login validation, record management, book issue/return handling, and administrative control. Data was stored and managed systematically, ensuring secure access, accurate record updates, and efficient retrieval. Continuous testing and validation were performed to ensure correct system behavior, data integrity, and smooth user interaction throughout all operations.
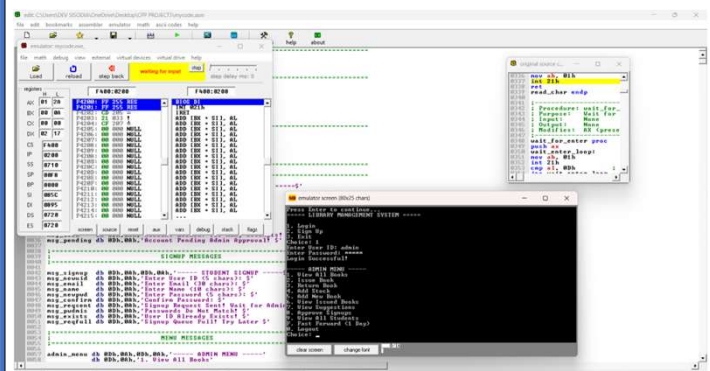
Tools used

• 8086 Microprocessor / Emulator
• Assembly Language (ALP)
• DOS Interrupt Services (INT 21h)
• MASM / TASM Assembler
• DOSBox / EMU8086 Simulator
• Text Editor / IDE (for coding and debugging)

Results and Discussions

• The system successfully performed user authentication, book issue/return, and record management without errors.

• Real-time updates of book inventory and student records were accurately reflected after each transaction.

• Role-based access control ensured secure separation between admin and student operations.

• The system handled invalid inputs and edge cases reliably, maintaining data integrity.

• Overall performance was stable and efficient within the designed operational constraints.

Conclusions

The project successfully demonstrates the design and implementation of a Library Management System capable of managing user records, book inventory, and transactions in an organized and secure manner. The system ensures accurate data handling, controlled access, and efficient operation, highlighting the effectiveness of structured system design in solving real-world library management challenges.

Outcome of the work

The project resulted in a fully functional Library Management System that efficiently manages student records, book inventory, and issue/return transactions. It demonstrates secure authentication, accurate data maintenance, and smooth operational flow, providing a practical solution for organized library administration while reinforcing key concepts of system design and record management.

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