

**SAVITRIBAI PHULE PUNE UNIVERSITY**



**A**

**MINI PROJECT REPORT**

**ON**

**“LIBRARY MANAGEMENT SYSTEM”**

*Submitted to the Department of Computer Engineering, SITS, Narhe, Pune,  
in partial fulfillment of the requirements for the*

**LP-II LAB**

**THIRD YEAR (COMPUTER ENGINEERING)**

**By**

**Pratik Abhang (3101001)**

**Vaishnavi Ajabe (3101002)**

**Rutuja Bankar (310113)**

**Under the guidance of Ms. K. O. Akhade**



**Sinhgad Institutes**

**DEPARTMENT OF COMPUTER ENGINEERING**

**SINHGAD INSTITUTE OF TECHNOLOGY & SCIENCE**

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SINHGAD INSTITUTE OF TECHNOLOGY AND SCIENCE**



**Sinhgad Institutes  
DEPARTMENT OF COMPUTER ENGINEERING**

**CERTIFICATE**

This is to certify that mini project work entitled “**LIBRARY MANAGEMENT SYSTEM**” was successfully carried by

**Pratik Abhang**

**Vaishnavi Ajabe**

**Rutuja Bankar**

In the partial fulfillment of the LP-II Laboratory course in Third Year Computer Engineering, in the Academic Year 2023-2024 prescribed by the Savitribai Phule Pune University.

**Ms. K. O. Akhade**  
Guide

**Dr. G. S. Navale**  
HOD

**Dr. S. D. Markande**  
Principal

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**Pratik Abhang**

**Vaishnavi Ajabe**

**Rutuja Bankar**

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## **1. PROBLEM STATEMENT**

Select a moderately complex system and narrate concise requirement Specification for the same. Design the system indicating system elements organizations using applicable architectural styles and design patterns with the help of a detailed Class diagram depicting logical architecture. Specify and document the architecture and design pattern with the help of templates. Implement the system features and judge the benefits of the design patterns accommodated.

## **2. OBJECTIVES**

- To facilitate efficient management of library resources including books, journals, and multimedia materials.
- To enable users to easily search and access library resources through an intuitive interface.
- To provide librarians with tools for cataloging, tracking, and managing library inventory and circulation.
- To implement user authentication and authorization mechanisms to ensure secure access to library resources.
- To support various administrative functions such as generating reports, managing fines, and monitoring library usage statistics.
- To enable integration with external systems for tasks such as online resource sharing and inter-library loan management.

### 3. REQUIREMENTS

#### **Hardware:**

- **CPU:** Fast processor (e.g., Intel Core i5 or equivalent)
- **RAM:** 8GB RAM (more for many users/large data)
- **Storage:** Enough for data & software (scales with organization size)
- **Network:** Reliable connection for user access

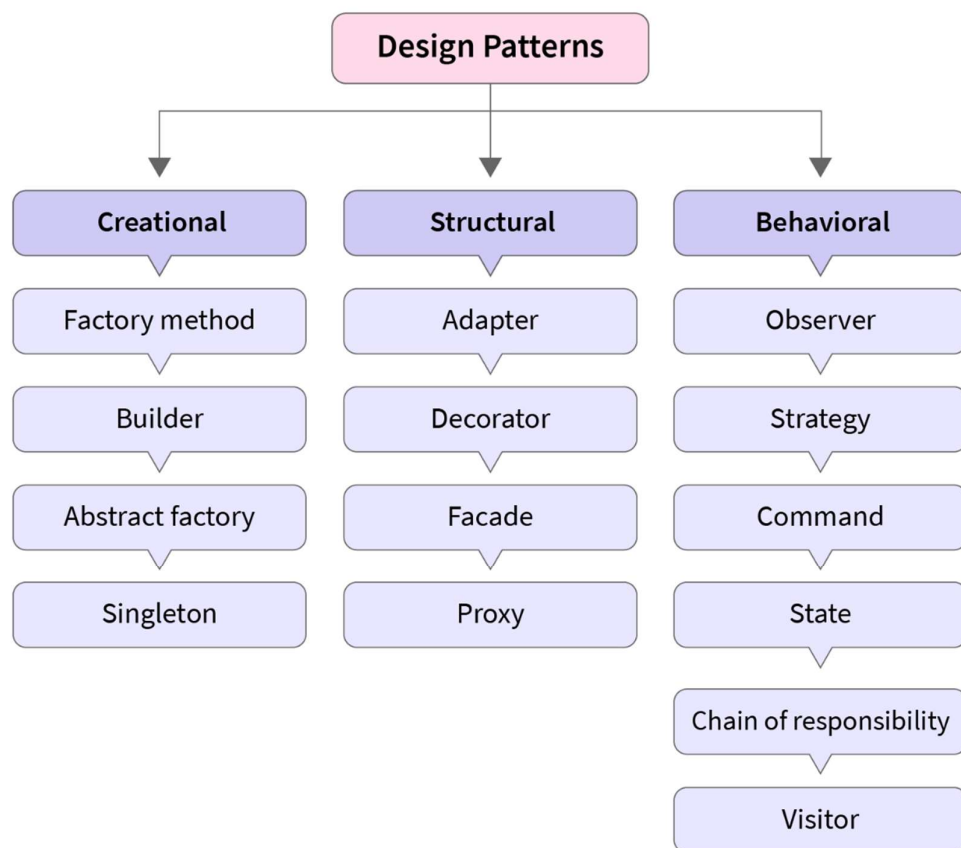
#### **Software:**

- **OS:** Windows, Linux, MacOS
- **Tool:** Star UML Software

## 4. DESIGN PATTERN

A design pattern names, abstracts, and identifies the key aspects of a common design structure that make it useful for creating a reusable object-oriented design. The design pattern identifies the participating classes and instances, their roles and collaborations, and the distribution of responsibilities.

There are three main categories of design patterns:





**1. Creational Patterns:** These patterns focus on object creation mechanisms that provide flexibility and reusability. Some common creational patterns include Singleton, Factory Method, and Builder.

- **Singleton:** This pattern ensures that only a single instance of a class exists. It's useful for global access to resources or configurations.
- **Factory Method:** This pattern centralizes object creation logic, allowing you to choose the type of object to create at runtime.

**2. Structural Patterns:** These patterns deal with the composition of classes and objects to form larger structures. Examples of structural patterns include Adapter, Facade, and Composite.

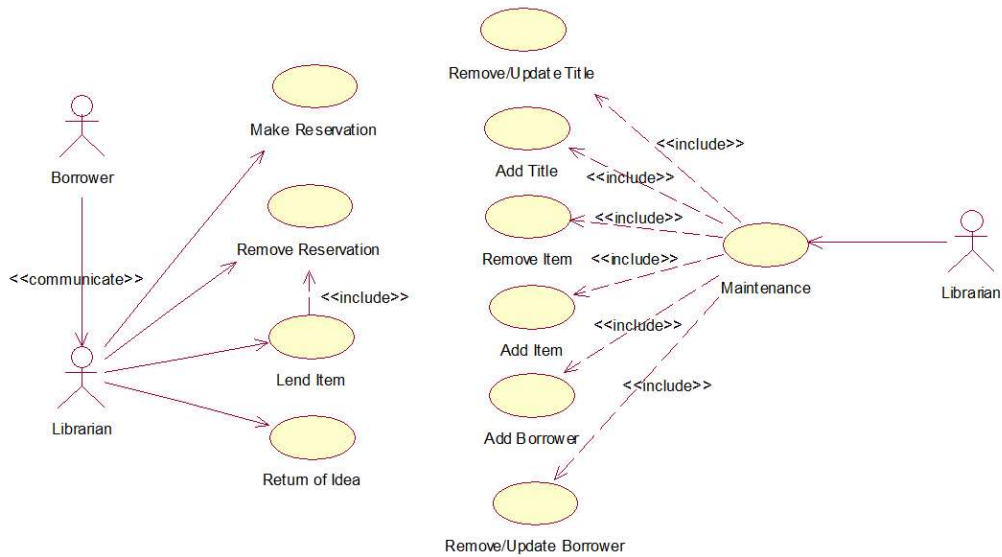
- **Adapter:** This pattern lets incompatible interfaces work together. It acts as a wrapper that translates calls between them.
- **Proxy:** This pattern provides a surrogate or placeholder for another object, controlling access to the original object.

**3. Behavioral Patterns:** These patterns address communication strategies between objects and how they interact with each other. Some well-known behavioral patterns include Observer, Strategy, and Iterator.

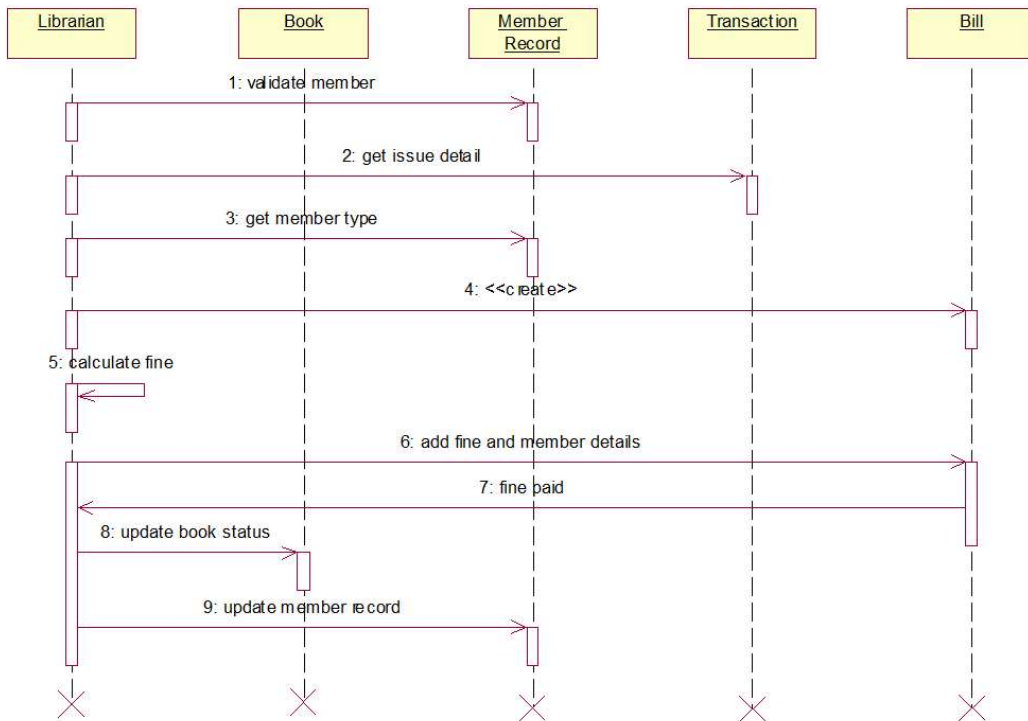
- **Iterator:** This pattern allows you to access elements of a collection object in a sequential manner without exposing its underlying structure.
- **Observer:** This pattern defines a one-to-many dependency between objects, where changes to one object (subject) notify all its dependents (observers).

## 5. UML DIAGRAM

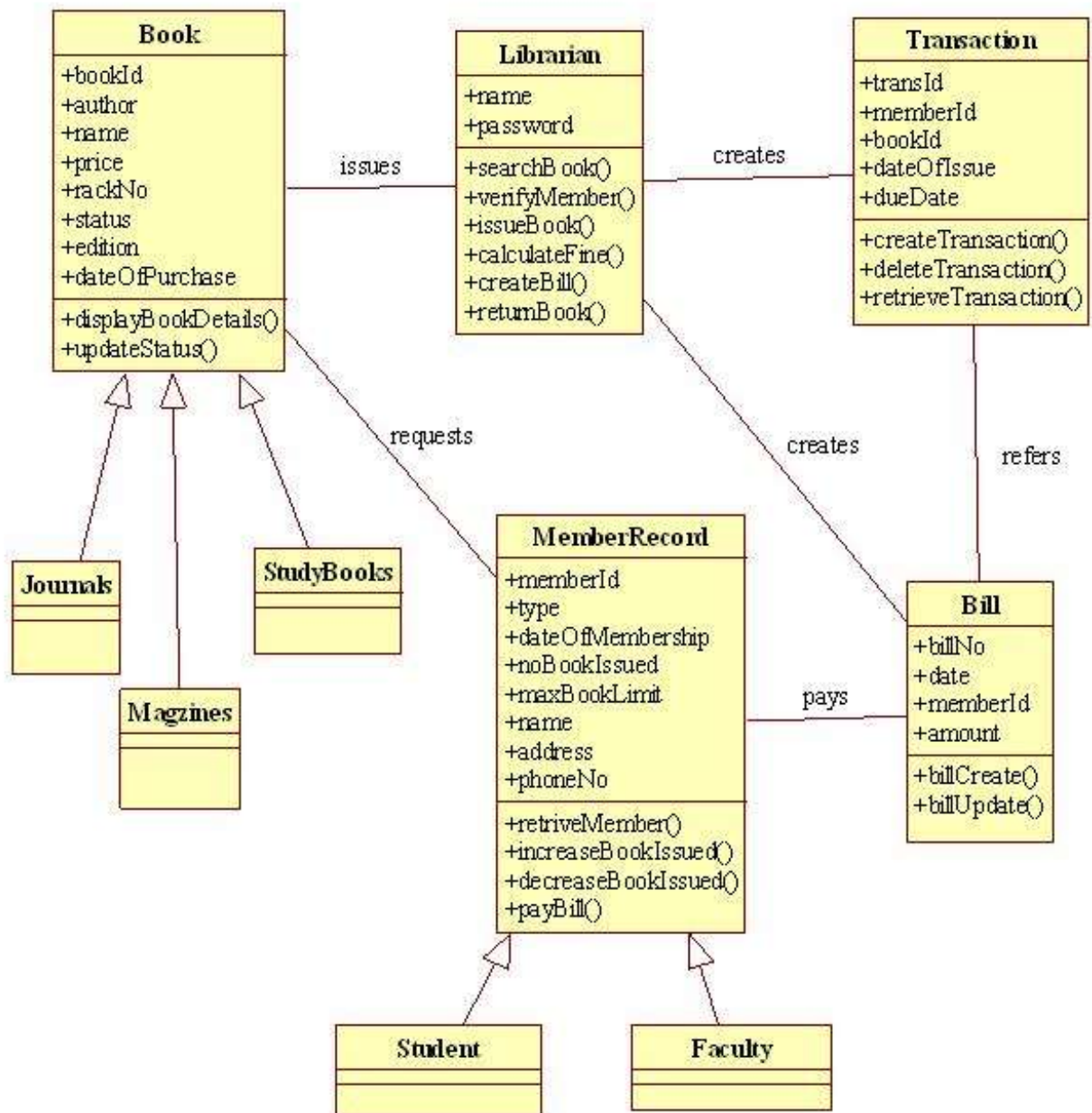
### LMS Use Case Diagram



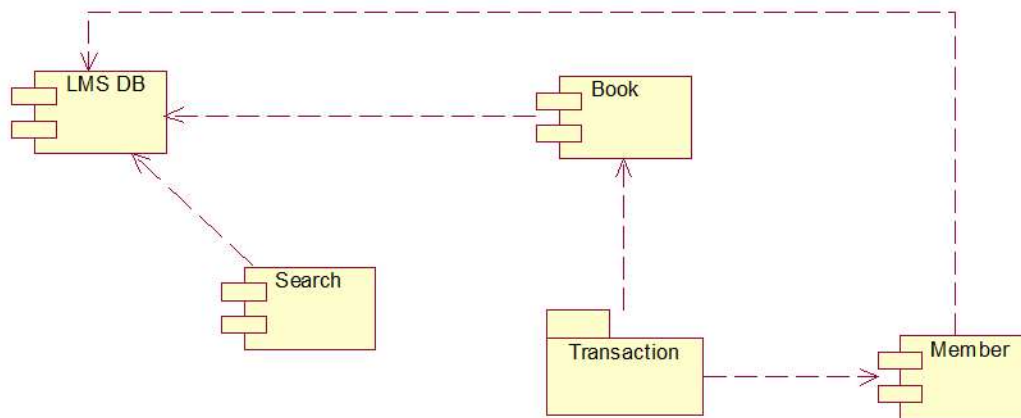
### LMS Sequence Diagram



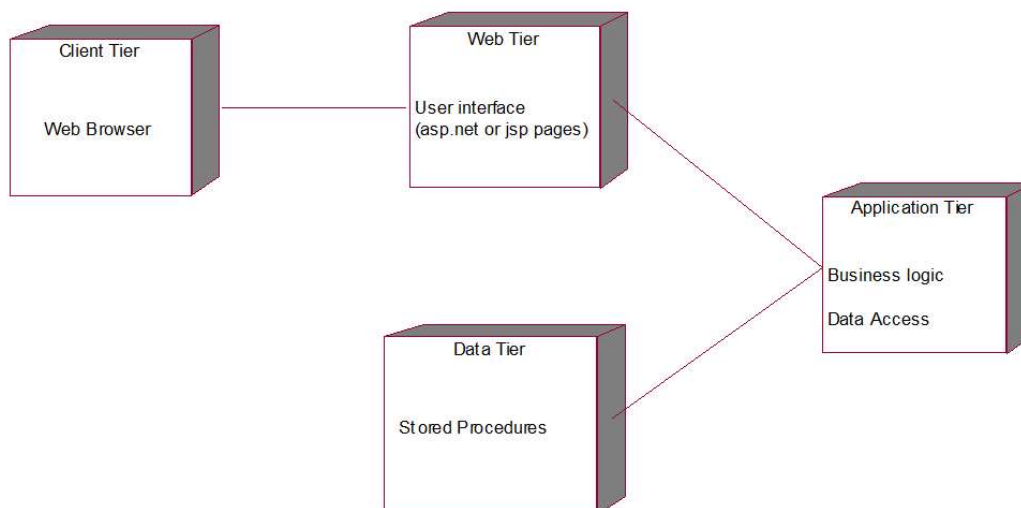
## LMS Class Diagram



## LMS Component Diagram



## LMS Deployment Diagram



## **6. CONCLUSION**

In conclusion, by implementing a layered library management system with a focus on user experience, security, and data sharing, libraries can significantly improve their operations. This system will empower librarians with efficient tools and provide patrons with a user-friendly interface. The use of common design patterns will ensure a robust and adaptable system that can cater to the diverse needs of libraries and their users. This well-designed approach will ultimately lead to a more efficient and enjoyable library experience for everyone.

## 7. REFERENCES

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