Design Pattern and Object Oriented Programming Project Report on

Library Management System

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Introduction

The Library management system is implementing 4 design patterns : Abstract Factory , Facade, Singleton and Template Method. This system is designed from the perspective of a the Librarian. All the functionality of the Library such as Adding books, searching Book, book issue, adding Member records(Student/Faculty) , Retrieve book and member information is carried by the Librarian or Library_admin.I have chosen this project because of its simplicity and as per my understanding of the design patterns.

Design Patterns: Abstract Factory, Facade, Template Method and Singleton

a.Abstract Factory(Creational Pattern)

The abstract factory pattern provides a way to encapsulate a group of individual factories that have a common theme without specifying their concrete classes.Here, BookFactory is the the abstract class which will create the Books of type Novels and ReferenceBook. Book is the parent class for Novel and Reference book. Using Abstract Factory design pattern the client does not have to bother about which subclass object to create. This can be done automatically by BookFactory class.

b.Facade (Structural Pattern)

Facade design pattern provides a Facade object which will handle the entire subsystem. Here, in Library management system, Library_admin is managing all the functionality of the library. Call to all the functions such as Adding books and members, searching and issuing books etc is done by librarian.

c.Template Method (Behavioural Pattern)

A template class Library_Member is created for the members of the library. Student and Faculty are the two types of member which use the Template Library_Member as a base class. With Template Factory we do not have to define different functionality for Student and Faculty.

d.Singleton(Creational Pattern)

Singleton is used to create only one instance of the DataBase object. All the classes should use the same Database object for information manipulation.

Class Diagram
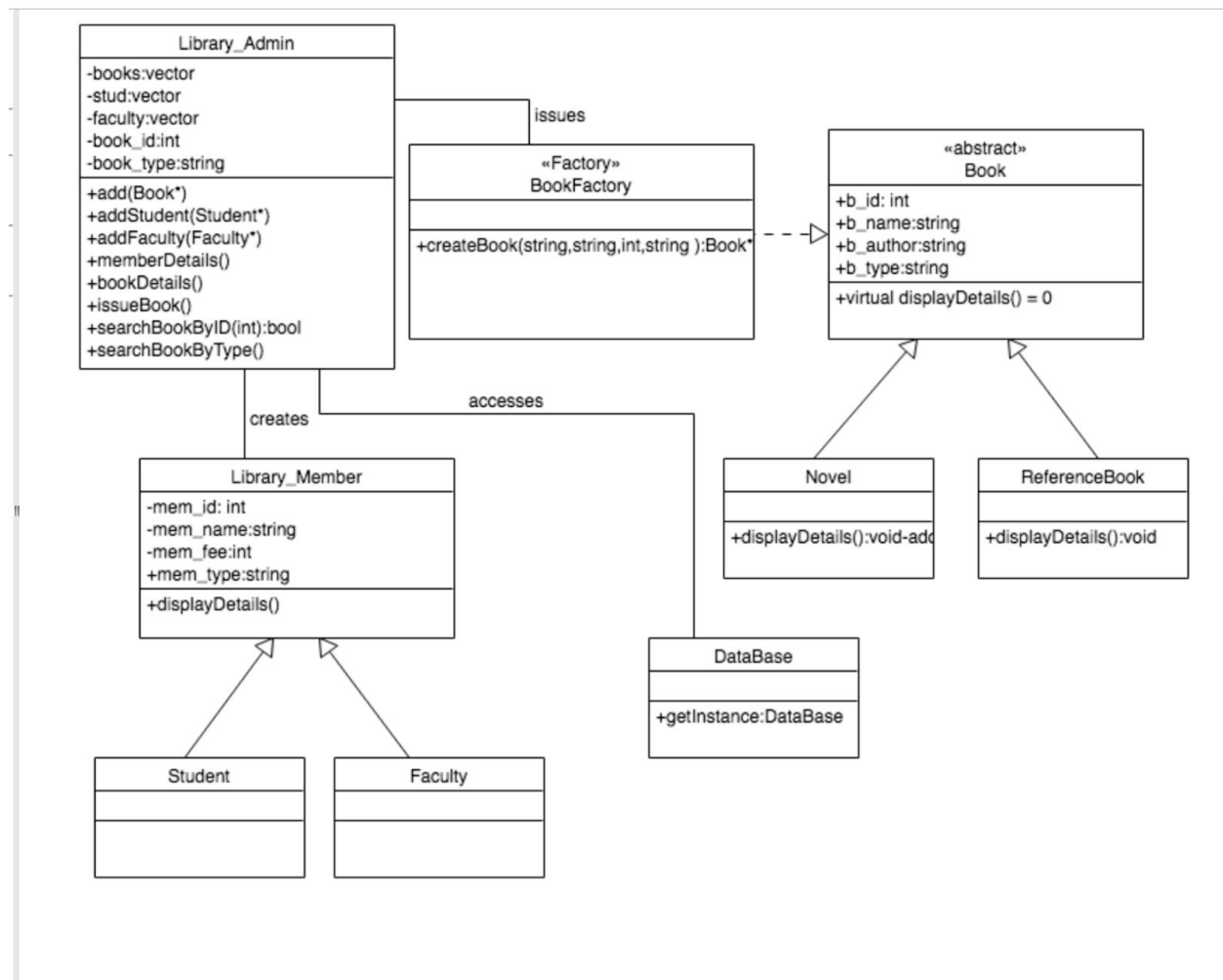
Functionality

The user menu functionality is as follows and should be followed step wise

Case 1: Librarian Adds the book records to the library system and display the add record successfully message. No user input is required for addition. To add new books create new objects.

Case 2: Displays the book records that are in the system.

Case 3: Adds the member records to the library system and display the add record successfully message. No user input is required for member addition.To add new members create new objects.

Case 4: Displays the memberrecords that are in the system.

Case 5: Issues the requested book by book_id (first checks if book is available then assigns). User need to input the book_id to be issued.

Case 6: Search books based on book_type(Novel/Reference_Book)

References

1. https://en.wikipedia.org/wiki/Abstract_factory_pattern
2. http://www.ijarcs.info/index.php/Ijarcs/article/viewFile/3084/3067
3. http://www.ijarse.com/images/fullpdf/1484287907_Y1051ijarse.pdf
4.