

# LIBRARY DATABASE MANAGEMENT

CS101 PROJECT

*BY*

*HARSHAL MAHAJAN (Team Leader)*

*APRAJIT LOHAN*

*ROHAN KUMAR*

# Abstract

This project is based on Library Database Management System. The program written focuses for small libraries with book capacity of around 2000- 3000 books. The program is a versatile workhorse and can be easily manipulated for ones need.

The project is an all-platform software and with very few requirements which every developer has. It works very good on Linux, Windows(with GTKmm) and the hardware required is just a pointing device, keyboard with 122 keys, and a monitor. However for larger databases, a faster processor is suggested.

The project has variety of functions and is really useful for a mini-library. It focuses on the graphical interface and being in developing stage is really simple and lucid. The software is secure enough for daily use. However improvements can definitely made. The project can add members, edit member details, book details, calculate fine and give feedback, thus allowing the library to mould itself according to the customers making it more customer friendly. There is even request a book option using which the library can expand itself by adding in the most useful books to the customers.

There is really huge scope in improvement and increasing the size of the data. The graphical interface can be improved and most of all new features like claiming can be added. The security can be increased and thus increasing its potential.

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# Acknowledgements

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The T.A's were a real help. We are really grateful to our T.A Aman Jain, who would reply even at midnight time. They are really a great facility enjoyed by us and they act as a link between us and the professors.

Last but not the least, we would like to express our gratitude to all our friends especially Amey Gupta, Shubham Goel, Sumith without whose moral and educational support this project would not be this good.

# Introduction

The Library Database management system is a project assigned In the course CS101 by IIT, Bombay. The project encapsulates a software designed by First Year B.Tech Students Harshal Mahajan, Aprajit Lohan, and Rohan Kumar. Our team has worked really hard to make this project, however it was an amazing joyful learning experience. In this project we have added feedback and fine calculators which are unique to this project as compared to the past projects.

## Objectives

- Enhance our knowledge of Database Management.
- Learn Graphic interface.
- Study Serialization
- Inculcate the habits of professional coding
- Develop an inclination towards Software Engineering

## Procedure

We have followed a standard procedure for this project. We at this stage have completed designing and started coding. The procedure followed is:

- 1) Topic Selection
- 2) Making algorithm and Designing
- 3) Coding (Current Stage)
- 4) Testing the Code using sample data
- 5) Maintaining it.

## About The Topic

Library Database Management System is used in libraries to keep a track of the books in the libraries. It makes the life of the reader more comfortable by easily allowing him to search for any book and check out a book. It is useful for the library staff too as it helps them keep a track of their books.

# Statement of Purpose

This project is based on Library Database Management. The essence of this project is to let our imaginations run wild, and create a professional program. Thus imbibing a feeling of teamwork. The selection of topic was based on grounds of various factors.

The world has grown from 1 GB pen drive available at Rs 3000/- to a 1TB hard drive in Rs 5000/- in 5 years. This is a consequence of vast increment in data. Database management is really the hot topic of the century. As Information Technology develops, more and more data is needed to be stored and there is a real demand of data management. We answer the question 'what is the use of the data if we cannot analyse it, sort it or use it for any purpose. We at IIT Bombay (first year) try to take a peek in this vast field and thus inculcate an interest in this field.

This project uses the most common however a large database accessible to man during his college years, a library. The library being most used by student like us is a database we know and feel the need to handle it easily the most.

Our project caters to these demands and we have tried our best for the project to be user friendly and accurate.

# Body of the Report

## Design

The project has a really unique design and really new features for freshmen. The software has a graphical interface with welcome screen in the beginning. The user has to first login if he is a registered user. If he is a guest user, then no login is required. The advantages enjoyed by the user login is as follows:

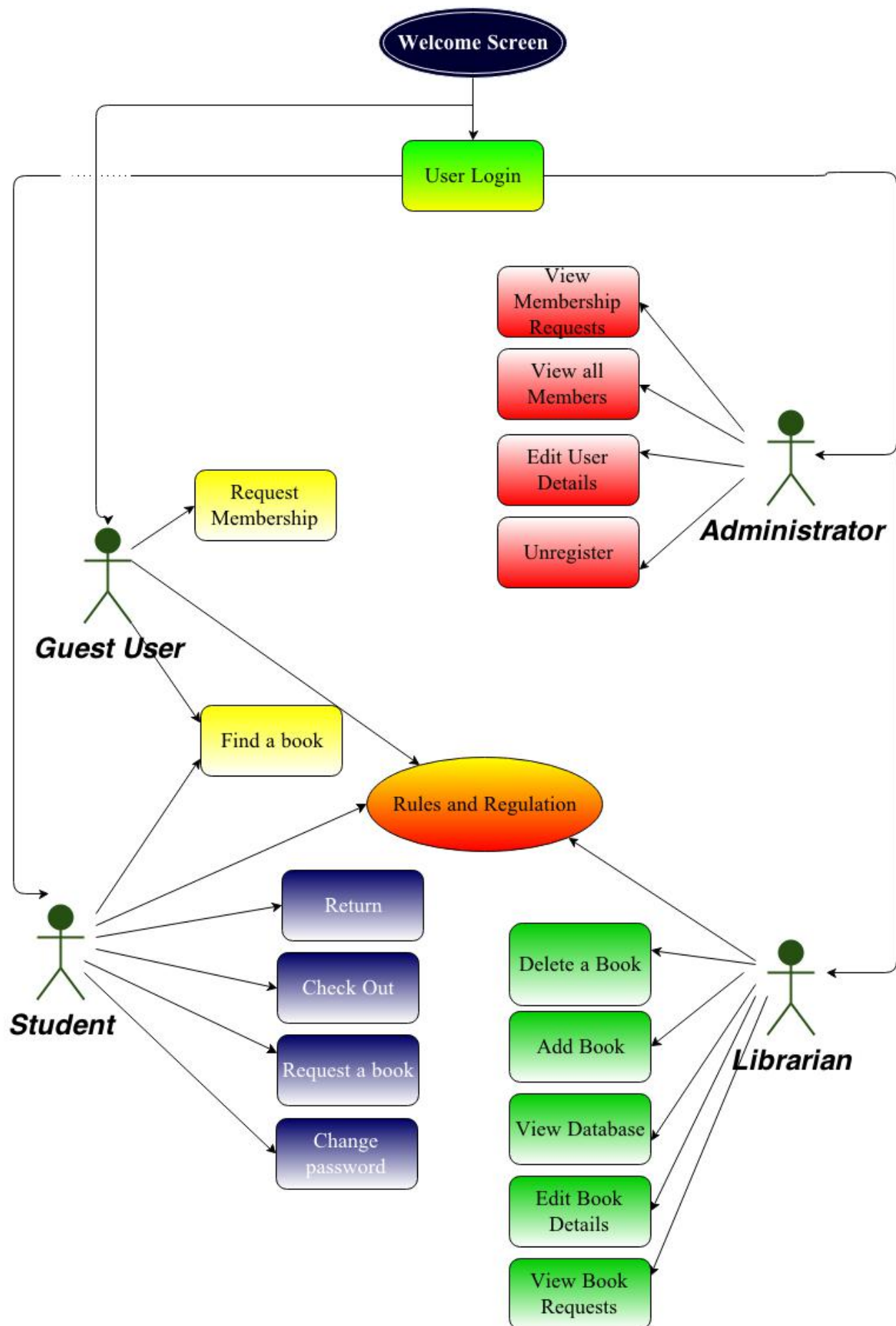
- 1) The user can borrow a book from the library and return it with 14 days. The book check out facility is not enjoyed by the guest users.
- 2) The user can request a book they want and if more than 1 users demand this book, then the book will be made available.
- 3) The guest users are deprived of the ability to give feedback.

The users can check out a book for a period of 14 days. However later fine will be charged irrespective of holidays. They can give a feedback which will be looked upon and then tried best to be implemented. They can edit any of their details by approaching the administrator. They can find a book using search engine and they can even place a claim on the book. They can view fines and pay the same to the administrator immediately.

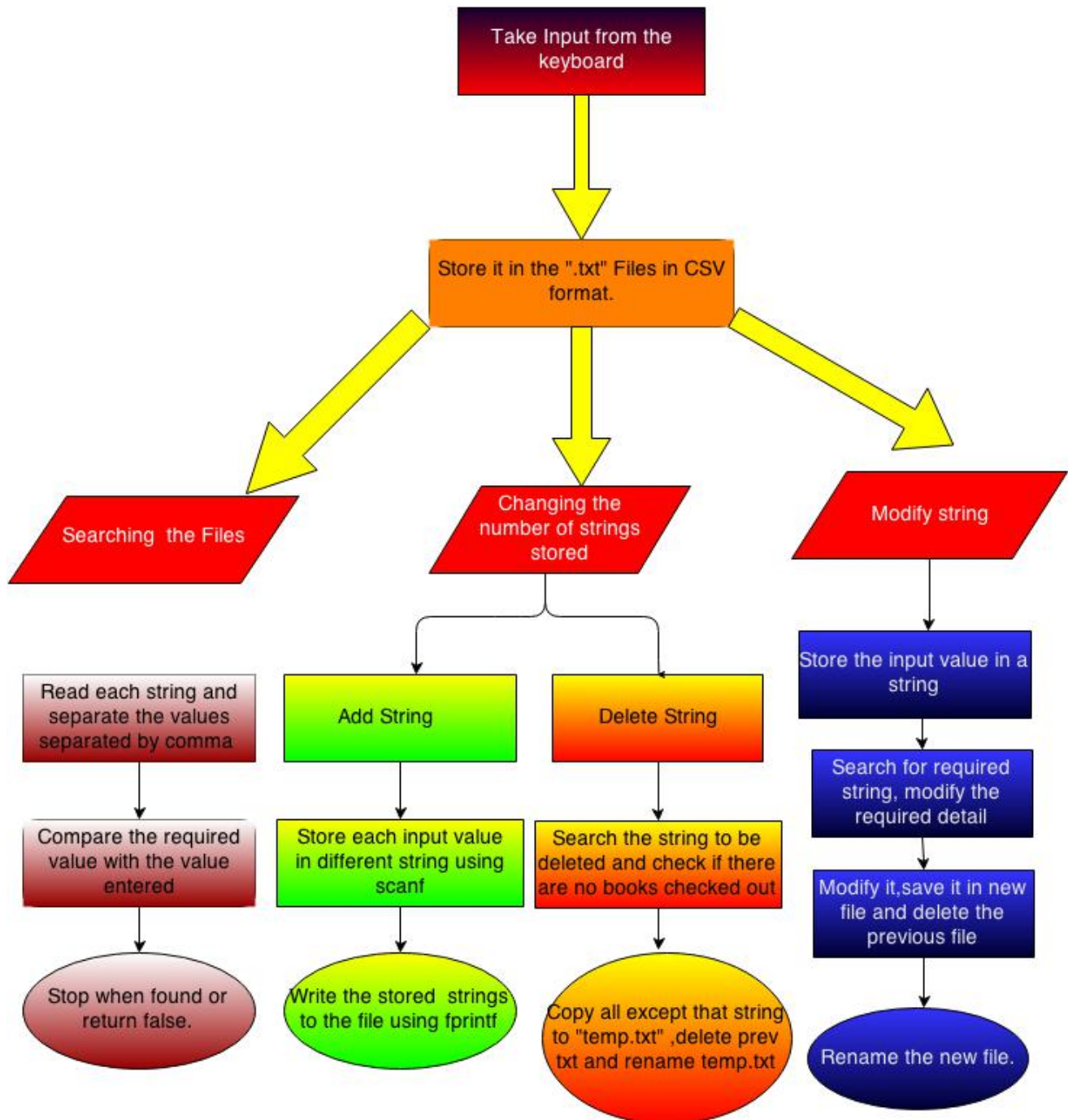
The library also has administrator login and librarian login. These two logins facilitate a healthy maintenance and a secured environment to prevent malpractices.

The librarian can manage book database. He can edit book details, add new books to the database, delete books, as well as view books details individually or completely.

The administrator has the power to manage the user database. He can edit user details, view feedback provided by the users and also validate new registrations. He is the one to approach if any user forgets a student id.



## Serialization of Files



# Implementation

The implementation will be really profound and the knowledge we are going to gain is immense. The implementation is as follows:

For database, there will be 2 databases namely user database and book database. Each database will be serialized to the program which will be written. The database will be read from these data files and searching will be done using linear search.

The book database will store the following attributes of the book:

- 1) Name of the book as string
- 2) The author of the book as string
- 3) The Book ID as character array.
- 4) Check out state.

The searches can be done using all the above attributes.

The user database will comprise of the user ID, password, name, current book checked out and check out Date, book checked out.

The program uses a graphical interface called gtkmm, a C++ interface of gtk+. The interface is most commonly used in gnome environment by Linux Operating System

## Implementation of various functions:

- 1) Request a book: The book title and author name will be inputted by the user in the book request text file. The administrator can see the books request by looking at the books.
- 2) View/Search Database part or whole: The database will be stored in respective dimensional arrays and sorted. If the book is requested the Book ID will be negative and the user has to then request that book
- 3) Check out: The checkout will be done by member and the checkout status will be 1 (default 0).
- 4) Return: The return book will reset the Book and member check out status to default. And the fine amount will be notified.
- 5) Register: The registration details like name, user id and password will be stored in the database from the admin login only. The user ID will be provided by the library.

- 6) Rules and Regulations: This will be a text completely stored as a string. It can be edited only by librarian and viewed by all.
- 7) Login: The person will be able to login if the user ID stored in the database matches the password entered. For that the person has to first type user ID. He/She will be directed to a new window then allowing him to enter password whilst searching for his user ID.

## List of Functions used.

- a) void copy\_usttring(char \*a, string u )
- b) void dialog(Glib::usttring msg)
- c) Search strings Functions
  - a. bool search\_mid(char \*mem\_id,FILE \*fp)
  - b. bool search\_bid(char \*b\_id,FILE \*fp)
  - c. bool search\_mem(char \*mem\_id,char \*mem\_name, FILE \*fp)
  - d. bool book\_search(char \*b\_name)
- d) Delete strings Function
  - a. void del\_book(char \*b\_id,FILE \*fp)
  - b. void del\_member(char \*mem\_id,FILE \*fp)
- e) bool mem\_login(char \*mem\_id,char \*mem\_pwd)
- f) Modify Member Functions
  - a. void mem\_modify(char \*mem\_id,char \*mem\_name,char \*new\_mystring)
  - b. void book\_modify(char \*b\_id,char \*b\_name,char \*a\_name,char \*new\_mystring)
  - c. void book\_modify\_beta(char \*b\_id,char \*b\_name,char \*a\_name, char \*b\_status)
  - d. void mem\_modify\_beta(char \*m\_id,char \*m\_name,char \*m\_pwd, char \*m\_status)
- g) void get(char \*b\_id,char \*b\_name,char \*a\_name,char \*b\_status)
- h) void get\_mem(char \*m\_id,char \*m\_name,char \*m\_pwd,char \*m\_status)
- i) Check Functions
  - a. bool check\_book(char \*b\_id)
  - b. bool check\_member(char \*m\_id,char \*b\_id)
  - c. bool check\_book\_return(char \*b\_id)
  - d. bool check\_member\_return(char \*m\_id,char \*b\_id)
  - e. bool check\_mem\_rq(char \*m\_id)
  - f. bool check\_mem\_issue(char \*m\_id)
- j) void issue\_book(char \*b\_id)

k) Find Functions

- a. void find\_book\_issued(char \*m\_id,char \*b\_id)
- b. void find\_mem\_issued(char \*b\_id,char \*m\_id)
- l) void return\_book(char \*b\_id)
- m) bool changpwd(char \*m\_id,char \*m\_pwd,char \*m\_pwd)
- n) void get\_curr\_mem(char \*m\_id)
- o) void mem\_book\_request(char \*m\_id,char \*b\_name,char \*a\_name)
- p) void guest\_apply\_acc(char \*m\_name){

## Evaluation

The evaluation of this project is done with the past projects made by students of IIT Bombay. The past project is a DOS interface with command prompt which is run by typing commands. We have improvised on this and have introduced a graphical interface. As the man learns from experience we have learnt from the experience of the past projects that we can add a lot of new features. Although it will take us some time as investment, but we will finish it and accomplish our project. Our project includes usage of serialization as against use of arrays or RAM occupying storage. We also intend to add new features like feedback and user login.

Comparing with a management software made by a professional programmer, we lack the stylish graphics, large database management, additional features like claim which we think wont be a problem, considering our potential customers and their usage. We may also lack some features unknown to us, but we believe that this project will definitely be the best we have done based on our current knowledge and experience. However as time passes revisions of this version may overcome these problems.

# Conclusions

The project has completely fulfilled its goal- learning. We learnt serialization, Graphics interface and also time libraries. Working together as a team is one of the most important part of this project. We learnt to cooperate with each other.

Serialization is a necessity for today's programmer. Serialization makes it possible to save large volume of data without occupying RAM and the best part of it is that the data stays even after closing the software. Opening files in C++ was taught in the course .However this project helped us strengthen our concepts as also enrich our knowledge about that subject. Having an in depth knowledge was a must, and the exploration of various libraries, functions greatly enhanced our learning outside the class. GTK is one of the best and most used graphical interface and it was a pleasure learning it. The graphical interfaces opened doors to many graphical features we see in the Operating System. Exploring new and new libraries for our project and finding the best libraries was the best part of these project. The advantages, disadvantages and the complications involved in libraries like ctime, fstream, boost, simplecpp, and gtkmm were studied. We learnt how to unlock C++ and do magic for us. Sadly we could not implement the fine system.

However this is not the end. Our learning doesn't end here. We being starters couldn't successfully complete all challenges. We couldn't implement Binary Searches and Merge Sort algorithms which are useful for larger databases. The graphics can be improved by large amount. The sector of Auto Saving and multiple book borrowing was untouched as the aim of this project was to to reach to small libraries. The groundwork definitely shows that being small in the quantity of books multiple books cannot be borrowed by 1 person. However this will change whilst expanding the library. There were many limitations which we could not think of. Most of all, it is possible that bugs are found in the code. Thus this is not at all the end but actually a new beginning of

learning. Maintenance, improvising the code releasing new versions can be done and thus the product can be made better and better.

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