

Course App Development Project

CS 315: Principles Of Database Systems

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KitabGhar

12th April 2022

AIM AND OBJECTIVE

KitabGhar is a library management system developed for schools and colleges. The app will manage the database in a library and perform primary functions in a library like issue, return, check availability and position of books and show and clear dues of members like students and teachers that access the library.

DESIGN

Table Design:

1. Database design:

The screenshot shows the phpMyAdmin interface for a database named 'KitabGhar'. The left sidebar displays a tree view of databases and tables. The main panel shows a list of tables with columns for Table, Action, Rows, Type, Collation, Size, and Overhead. The tables listed are Author, Author_Books, Books, Borrow_log, Course, Member, Staff, and Student. Below the table list, there is a 'Create table' section with fields for Name and Number of columns. The bottom console shows two error messages: 'mysql_real_connect(): (HY000/1045): Access denied for user 'shreyasi'@'localhost' (using password: YES)' and 'Connection for controluser as defined in your configuration failed.'.

Table	Action	Rows	Type	Collation	Size	Overhead
Author	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	32.0 Kib	-
Author_Books	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	32.0 Kib	-
Books	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	64.0 Kib	-
Borrow_log	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	48.0 Kib	-
Course	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	32.0 Kib	-
Member	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_0900_ai_ci	64.0 Kib	-
Staff	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_0900_ai_ci	64.0 Kib	-
Student	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_0900_ai_ci	32.0 Kib	-
8 tables	Sum	3	InnoDB	utf8mb4_0900_ai_ci	368.0 Kib	0 B

2. Author Table design:

The screenshot shows the phpMyAdmin interface for the 'Author' table. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int			No	None		AUTO_INCREMENT	Change Drop More
2	FName	varchar(15)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	LName	varchar(15)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More

Indexes:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	0	A	No	
Edit Drop	Name	BTREE	Yes	No	FName LName	0 0	A A	No Yes	

Partitions: No partitioning defined!

Information:

Space usage		Row statistics	
Data	16.0 KIB	Format	dynamic
Index	16.0 KIB	Collation	utf8mb4_0900_ai_ci
Console		Next autoindex	0

3. Author_Books Table design:

The screenshot shows the phpMyAdmin interface for the 'Author_Books' table. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	AuthorID	int			No	None			Change Drop More
2	BookID	int			No	None			Change Drop More

Indexes:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	entry	BTREE	Yes	No	AuthorID	0	A	No	
Edit Drop	Book	BTREE	No	No	BookID	0	A	No	

Partitions: No partitioning defined!

Information:

Space usage		Row statistics	
Data	16.0 KIB	Format	dynamic
Index	16.0 KIB	Collation	utf8mb4_0900_ai_ci
Overhead		Next autoindex	0
Console	32.0 KIB	Creation	Mar 04, 2022 at 12:33 AM

4. Books Table design:

The screenshot displays the phpMyAdmin interface for the 'Books' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int			No	None		AUTO_INCREMENT	Change Drop More
2	Title	varchar(30)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	Edition	int			Yes	NULL			Change Drop More
4	ShellNo	int			No	None			Change Drop More
5	Row	int			No	None			Change Drop More
6	Section	char(1)	utf8mb4_0900_ai_ci		No	None			Change Drop More
7	Stock	int			Yes	NULL			Change Drop More
8	CourseID	char(5)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
9	Total	int			No	0			Change Drop More

Below the table structure, the indexes are listed:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	0	A	No	
Edit Drop	Position	BTREE	Yes	No	ShellNo Row Section	0	A	No	
Edit Drop	book	BTREE	Yes	No	Title	0	A	No	
Edit Drop	BookCourse	BTREE	No	No	Edition CourseID	0	A	Yes	

5. Borrow_log Table design:

The screenshot displays the phpMyAdmin interface for the 'Borrow_log' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int			No	None		AUTO_INCREMENT	Change Drop More
2	IssueDate	date			No	None			Change Drop More
3	ReturnDate	date			Yes	NULL			Change Drop More
4	Paid	tinyint(1)			No	0			Change Drop More
5	BookID	int			No	None			Change Drop More
6	MemberID	int			No	None			Change Drop More

Below the table structure, the indexes are listed:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	0	A	No	
Edit Drop	BorrowMember	BTREE	No	No	MemberID	0	A	No	
Edit Drop	BorrowBook	BTREE	No	No	BookID	0	A	No	

6. Course Table design:

The screenshot displays the phpMyAdmin interface for the 'Course' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	char(5)	utf8mb4_0900_ai_ci		No	None			Change Drop More
2	Name	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	Dept	varchar(4)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More

Below the table structure, the 'Indexes' section shows the following index:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	0	A	No	
Edit Drop	Name	BTREE	Yes	No	Name	0	A	No	

The 'Partitions' section indicates 'No partitioning defined!'. The 'Information' section provides details on space usage and row statistics.

7. Member Table design:

The screenshot displays the phpMyAdmin interface for the 'Member' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int			No	None		AUTO_INCREMENT	Change Drop More
2	FName	varchar(15)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	LName	varchar(15)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
4	Phone	char(10)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
5	Email	varchar(30)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	Username	varchar(10)	utf8mb4_0900_ai_ci		No	None			Change Drop More
7	Password	varbinary(128)			No	None			Change Drop More

Below the table structure, the 'Indexes' section shows the following index:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	2	A	No	
Edit Drop	Username	BTREE	Yes	No	Username	2	A	No	
Edit Drop	Name	BTREE	Yes	No	FName LName	2	A	Yes	
Edit Drop	Contact	BTREE	Yes	No	Phone Email	2	A	Yes	

The 'Partitions' section indicates 'No partitioning defined!'. The 'Console' section is empty.

8. Staff Table design:

The screenshot displays the phpMyAdmin interface for the 'Staff' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int			No	None		AUTO_INCREMENT	Change Drop More
2	FName	varchar(15)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	LName	varchar(15)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
4	Phone	char(10)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
5	Email	varchar(32)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	Username	varchar(10)	utf8mb4_0900_ai_ci		No	None			Change Drop More
7	Password	varbinary(128)			No	None			Change Drop More

Below the table structure, the 'Indexes' section shows the following:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	PRIMARY	BTREE	Yes	No	ID	1	A	No	
Edit Drop	Username	BTREE	Yes	No	Username	1	A	No	
Edit Drop	Name	BTREE	Yes	No	FName LName	1 1	A A	No Yes	
Edit Drop	Contact	BTREE	Yes	No	Phone Email	1 1	A A	Yes No	

The 'Partitions' section indicates 'No partitioning defined!'.

9. Student Table design:

The screenshot displays the phpMyAdmin interface for the 'Student' table in the 'KitabGhar' database. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	MemID	int			No	None			Change Drop More
2	RollNo	char(6)	utf8mb4_0900_ai_ci		No	None			Change Drop More

Below the table structure, the 'Indexes' section shows the following:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Drop	f1_student	BTREE	No	No	MemID	0	A	No	

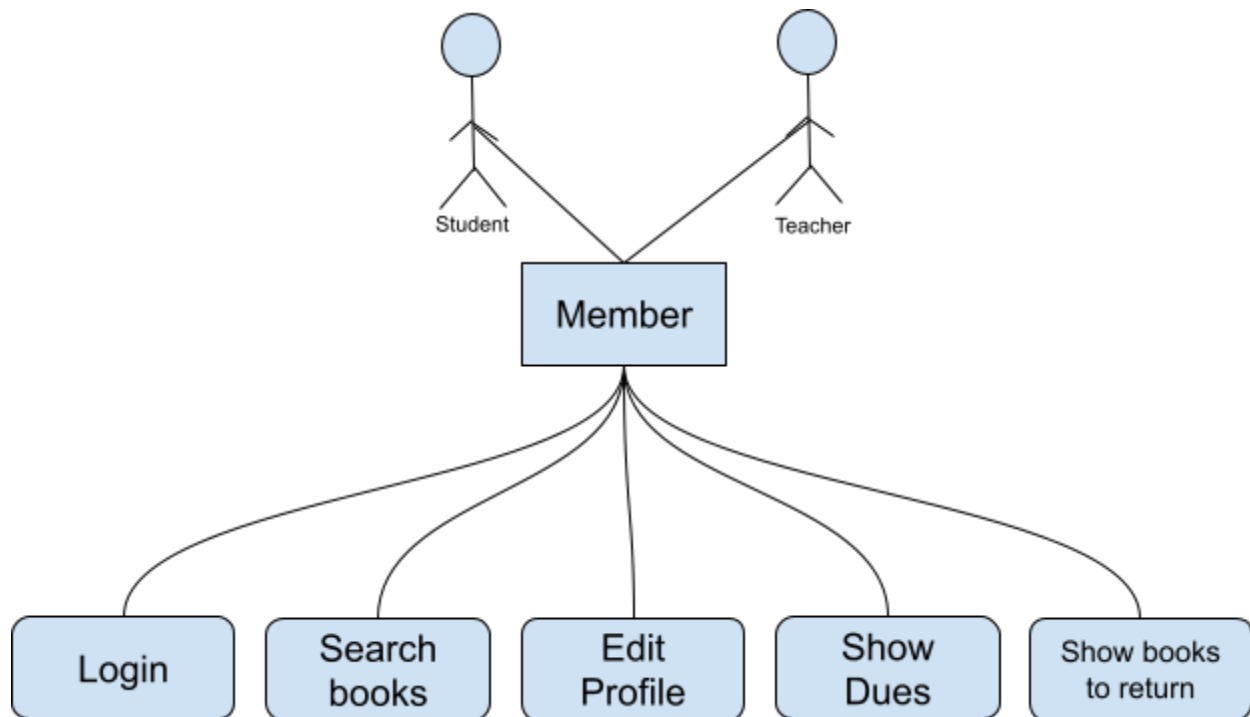
The 'Partitions' section indicates 'No partitioning defined!'.

The 'Information' section provides details about the table's space usage and row statistics:

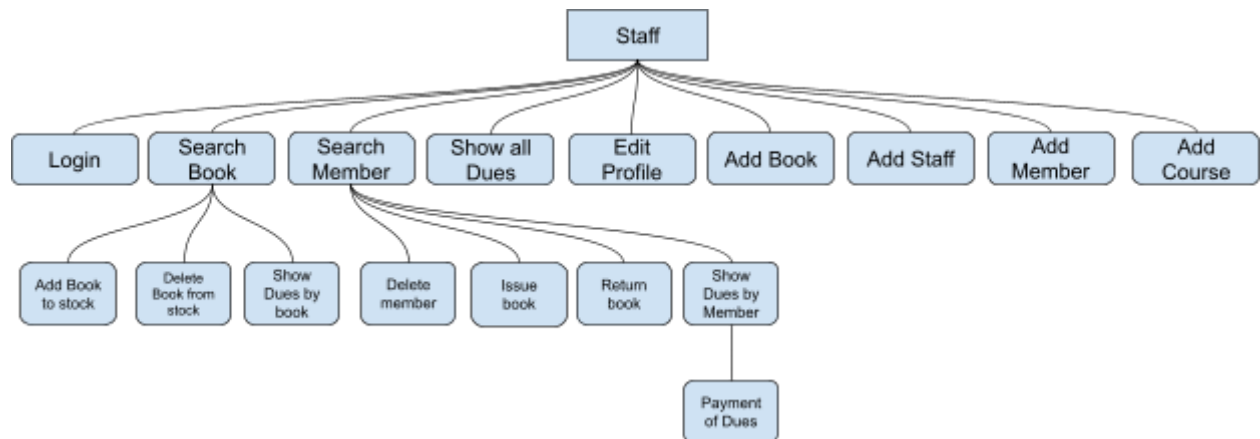
Space usage		Row statistics	
Data	16.0 KIB	Format	dynamic
Index	16.0 KIB	Collation	utf8mb4_0900_ai_ci
Overhead		Next autoindex	0
Effective	32.0 KIB	Creation	Mar 04, 2022 at 12:26 AM
Total	32.0 KIB	Last update	Apr 13, 2022 at 02:36 AM
		Last check	Apr 13, 2022 at 02:36 AM

Use case diagram :

For Member:



For Staff:



IMPLEMENTATION

In making this app, I used Python3 for the backend and MySQL for Database management. The app is to be run on the terminal using the binary produced using PyInstaller. The basic requirement to run this app is any system that supports Python3 and MySQL.

FUNCTIONALITY

1. Login:

Requires username, password and mode of login(member or staff), authenticates from the database and creates a person object of appropriate type.

2. Edit Profile:

Requires to authenticate password before editing information. Can change Last name, password and phone number.

3. Search Book:

Requires the parameter by which we need to search and the value of the parameter. We can search books by title, author name, course and department.

4. Search Member:

Requires the username to be searched and displays the user with the given username. This function can only be used by staff.

5. Add new staff:

Requires first name, email id, username and a password to create a new staff account. Checks if the username is already present. This can only be done by an existing staff.

6. Add new member:

Requires first name, email id, username and a password to create a new member account. Checks if the username is already present. This can only be done by an existing staff.

7. Add new course:

Requires course name, course id and department to add a course. Checks if the course is already present. This can only be done by an existing staff.

8. Add new book:

Requires book name, edition, position, course, number of books and name of authors to add new book. Checks if the book of given name and edition is already present, position is not occupied, course is already present, . This can only be done by an existing staff.

9. Delete member:

Requires member id. Checks if the member is present. This can only be done by staff.

10. Add book to stock:

Add books in the stock of books already present. Requires the number of books to be added. This can only be done by staff.

11. Delete book from stock:

Delete books from the stock of books present. Requires the number of books to be added. This can only be done by staff.

12. Show Dues:

Members can see their personal dues. Staff can see the list of dues of a member or dues to be cleared by on a book or both. Requirement is the id of parameters used to see the dues(bookid for books and memid for members).

13. Fine payment:

Fine payment should be done by a member to the staff then staff will update on the system using this function. This function can only be used by the staff and need the id of the borrow-log.

14. Issue Book:

This function can be used only by staff. Inputs required are member ID and book ID to issue a book to the member.

15. Return Book:

This function can only be used by the staff when a member returns a book to the library. This requires the borrow-log ID.

16. Show books to return:

This function is used by the member to see the books they have to return and their due dates.

FUTURE SCOPE

The future scope of this app is to add many more functionalities like

1. Members can request books and that can get approved by the staff.
2. Members can pay the fine which can be validated by the staff.
3. Front end can be more robust and user friendly.