DBMS PROJECT

ON

LIBRARY MANAGEMENT

SYSTEM

DATABASE DESIGN

SUBMITTED BY:

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PROBLEM STATEMENT:

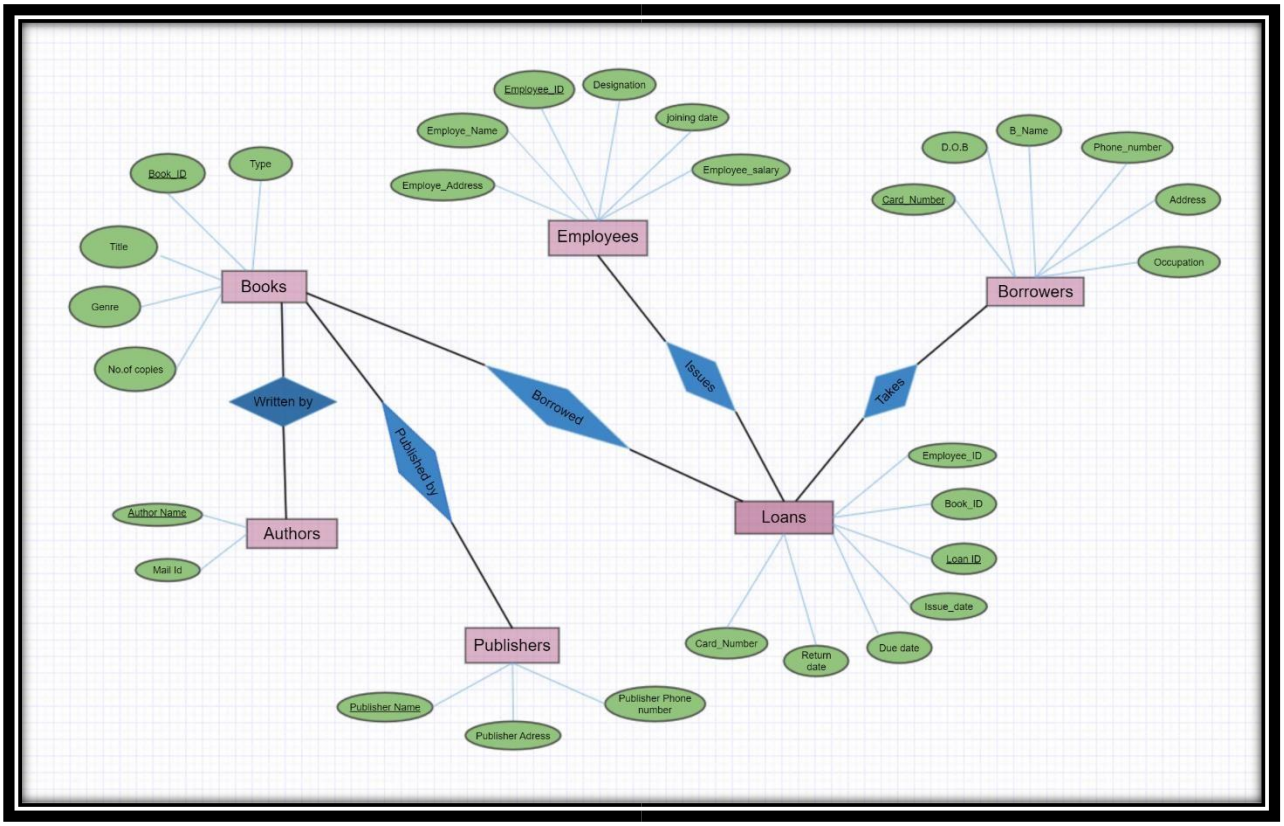
Library Management Systems are a great way to monitor books, add them, update information in it, search for the suitable one, issue it, and return it when needed. This Library Management System Project is to provide all the features that a Library Management System should usually have and overcome the drawbacks of the present system such as:

- Paper-based record keeping.
- Mis-management of data due to manual and paper-based handling.
- A vast amount of time consumption in searching for books and library management.
- Book-thefts from the library.

FACTS and ASSUMPTIONS:

1. Two books can have a same title written by different authors.
2. ISBN uniquely identify the books.
3. Authors cannot have same name, as they use initials of their first name and middle name in their name to differentiate them from others.
4. Two Different publishers cannot have same Publishing name.
5. Salary of an employee in a particular designation will be determined by his date of joining.
6. Here we declared fixed salary for a particular designation.
7. Due date of a book to return is determined by the issued date.

ER DIAGRAM:



ENTITIES

Books

Authors

Publishers

Employees

Borrowers

Loans

RELATIONS

Written By

Published By

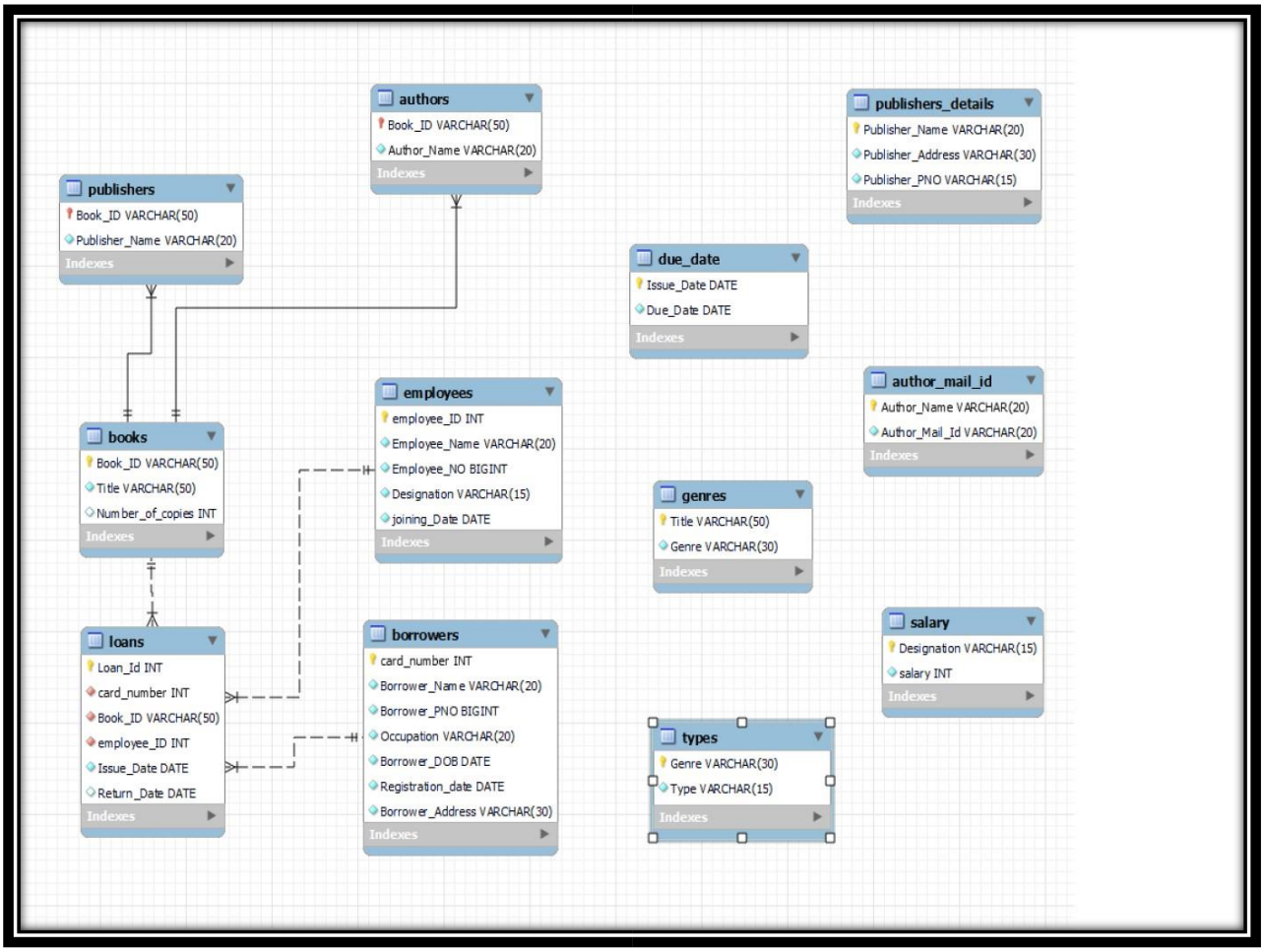
Book Borrowed

Issued By

Borrowed By

ER DIAGRAM : **LINK**

RELATIONAL MODEL:



RELATIONAL MODEL : LINK

FUNCTIONAL DEPENDENCIES AND TABLES BEFORE NORMALIZATION:

1. **BOOKS:**

   (Book_ID,Title,Genre,Type,Number_of_copies)
   Book_ID-> Title, Number_of_copies
   Title->Genre
   Genre->Type
   Normal form: 2NF

2. **AUTHORS:**

   (Book_ID,Author_Name,Author_Mail_ID)
   Book_ID->Author_Name
   Author_Name->Author_Mail_ID
   Normal form: 2NF

3. **PUBLISHERS:**

   (Book_ID,Publisher_Name,Publisher_Address,Publisher_PNO)
   Book_ID-> Publisher_Name
   Publisher_Name-> Publisher_Address,Publisher_PNO
   Normal form: 2NF

4. **EMPLOYEES:**

   (Employee_ID,Employee_Name,Employee_PNO,Designation,
   Salary,Joining_Date)
   Employee_ID->Employee_Name,Employee_PNO,Designation,
   Salary,Joining_Date Normal
   form: 2NF

5. **BORROWERS:**

(Card_Number,Borrower_Name,Borrower_PNO,Occupation, Borrower_DOB,Registration_Date,Borrower_Address)
Card_Number->Borrower_Name,Borrower_PNO,Occupation, Borrower_DOB,Registration_Date,Borrower_Address Normal form: BCNF

6. **LOANS:**

(Loan_ID,Card_Number,Book_ID,Employee_ID,Issue_date, Due_date,Return_Date)
Loan_ID->Card_Number,Book_ID,Employee_ID,Issue_date, Return_Date
Issue_Date->Due_Date Normal
Form:2NF

FUNCTIONAL DEPENDENCIES AND TABLES AFTER NORMALIZATION:

Books table after normalization decomposed into **Books, Genre, Type**

1. **BOOKS:**

(Book_ID, Title, Number_of_copies)
Book_ID->Title,Number_of_copies Normal
form: BCNF

2. **Genres:**

(Title,Genre)
Title->Genre
Normal form: BCNF

3. **Types:**
(Genre, Type)
Genre->Type
Normal form: BCNF

Authors table after normalization decomposed into **Author, Author Mail ID**

4. **AUTHORS:**
(Book_ID, Author_Name)
Book_ID->Author_Name Normal
form: BCNF

5. **Author Mail ID:**
(Author_Name, Author_Mail_ID)
Author_Name->Author_Mail_ID Normal
form: BCNF

Publisher table after normalization decomposed into **Publisher Name, Publisher Details**

6. **PUBLISHERS:**
(Book_ID, Publisher_Name)
Book_ID->Publisher_Name Normal
form: BCNF

7. **PUBLISHER DETAILS:**
(Publisher_Name, Publisher_Address, Publisher_PNO)
Publisher_Name->Publisher_Address,Publisher_PNO Normal
form: BCNF

Employee table after normalization decomposed into **Employee, Salary**

8. **EMPLOYEES:**
(Employee_ID, Employee_Name, Employee_PNO, Designation, Joining_Date)
Employee_ID->Employee_Name, Employee_PNO, Designation, Joining_Date
Normal form: BCNF

9. **SALARY:**
(Designation, Salary)
Designation->Salary Normal
form: BCNF

10. **BORROWERS:**
(Card_Number,Borrower_Name,Borrower_PNO,Occupation, Borrower_DOB,Registration_Date,Borrower_Address)
Card_Number->Borrower_Name,Borrower_PNO,Occupation, Borrower_DOB,Registration_Date,Borrower_Address Normal form: BCNF

Loans table after normalization decomposed into **Loans, Due Date**

11. **LOANS:**
(Loan_ID, Card_Number, Book_ID, Employee_ID, Issue_date, Return_Date)
Loan_ID->Card_Number, Book_ID, Employee_ID, Issue_date, Return_Date
Normal form: BCNF

12. **DUE DATE:**
(Issue_Date,Due_Date)
Issue_Date->Due_Date Normal form: BCNF **IMPLEMENTATION IN SQL**

```
CREATE DATABASE library;

USE library;

CREATE TABLE Books (
  Book_ID varchar(50) NOT NULL,
  Title varchar(50) not null,
  Number_of_copies int,
  PRIMARY KEY (Book_ID)
);

CREATE TABLE Genres(
Title varchar(50) NOT NULL,
Genre varchar(30) NOT NULL,
PRIMARY KEY (Title)
);

CREATE TABLE Types(
Genre varchar(30) NOT NULL,
Type varchar(15) not null,
```

```
PRIMARY KEY (Genre)
);

CREATE TABLE Authors(
Book_ID varchar(50) NOT NULL primary key,
Author_Name varchar(20) not null, foreign
key(Book_ID) references Books(Book_ID)
);

create table Author_Mail_Id(
 Author_Name varchar(20) not null primary key,
 Author_Mail_Id varchar(20) not null
);

create table Publishers(
Book_ID varchar(50) NOT NULL primary key,
Publisher_Name varchar(20) not null, foreign
key(Book_ID) references Books(Book_ID)
);

 create table Publishers_Details(
Publisher_Name varchar(20) not null primary key,
Publisher_Address varchar(30) not null,
Publisher_PNO varchar(15) not null
);
```

```
create table employees( employee_ID
int primary key,
Employee_Name varchar(20) not null,
Employee_NO bigint not null, Designation
varchar(15) not null, joining_Date date
not null
);

create table salary(
Designation varchar(15) not null primary key, salary
int not null
);

create table borrowers( card_number
int not null primary key,
Borrower_Name varchar(20) not null,
Borrower_PNO bigint not null,
Occupation varchar(20) not null,
Borrower_DOB date not null,
Registration_date date not null,
Borrower_Address varchar(30) not null
);

create table loans(
```

```
Loan_Id int not null primary key,
card_number int not null, Book_ID
varchar(50) NOT NULL,
employee_ID int not null,
Issue_Date date not null, Return_Date
date,
foreign key(card_number) references borrowers(card_number),
foreign key(Book_ID) references Books(Book_ID), foreign
key(employee_id) references employees(employee_id)
);

create table Due_Date(
Issue_Date date not null primary key,
Due_Date date not null
);


insert into Books values('ISBN 99921-58-10-7','basic physics',5);
insert into Books values('ISBN 9971-5-0210-0','basic maths',7);
insert into Books values('ISBN 960-425-059-0','marvel',9); insert
into Books values('ISBN 80-902734-1-6','atomic habits',2); insert
into Books values('ISBN 80-906734-4-8','mastering creativity',4);
insert into Books values('ISBN 85-359-0277-5','walter sawitch',7);
insert into Books values('ISBN 85-359-0457-5','c++ primer',4);
```

```
insert into genres values ('basic physics','physics' );
insert into genres values ('basic maths','maths' ); insert
into genres values ( 'marvel','comics');
insert into genres values ( 'atomic habits','personality development');
insert into genres values ( 'walter sawitch','computer'); insert into
genres values ( 'c++ primeer','computer'); insert into genres values
('mastering creativity','personality development');

insert into Types values ('physics','non fiction' );
insert into Types values ('maths','non fiction' ); insert
into Types values ('marvel',' fiction' );
insert into Types values ( 'personality development','non fiction');
insert into Types values ('computer' ,'non fiction' );

insert into Authors values ('ISBN 99921-58-10-7', 'HC Verma');
insert into Authors values ('ISBN 9971-5-0210-0', 'iyenger'); insert
into Authors values ('ISBN 960-425-059-0', 'stan lee'); insert into
Authors values ('ISBN 85-359-0277-5', 'walter sawitch'); insert
into Authors values ('ISBN 85-359-0457-5', 'stanley'); insert into
Authors values ('ISBN 80-902734-1-6', 'james '); insert into
Authors values ('ISBN 80-906734-4-8', 'james ');
```

```
insert into Author_Mail_Id values('HC Verma','hcverma@gmail.com');
insert into Author_Mail_Id values('iyenger','iyer@gmail.com'); insert
into Author_Mail_Id values('walter sawitch','walter@gmail.com');
insert into Author_Mail_Id values('stanley','stan@gmail.com');
insert into Author_Mail_Id values('stan lee','lee@gmail.com'); insert
into Author_Mail_Id values('james','james@gmail.com');

insert into Publishers values('ISBN 99921-58-10-7','khanna');
insert into Publishers values('ISBN 9971-5-0210-0','khanna');
insert into Publishers values('ISBN 960-425-059-0','M.S.K'); insert
into Publishers values('ISBN 80-902734-1-6','MCgrawhill'); insert
into Publishers values('ISBN 80-906734-4-8','MCgrawhill'); insert
into Publishers values('ISBN 85-359-0277-5','MCgrawhill'); insert
into Publishers values('ISBN 85-359-0457-5','MCgrawhill');

insert into Publishers_Details values ('MCgrawhill','New
Delhi','9346907122');
insert into Publishers_Details values
('khanna','Banglore','8765428902'); insert
into Publishers_Details values
('M.S.K','vijayawada','9705242829');

insert into   employees values
(1,'Rajesh','6472896524','Librarian','2019-08-23'); insert
into   employees values
```

(2,'varun','913262829','Librarian','2004-03-03');

insert into employees values (3,'anil','9268275347','cleaner','2015-05-24');

insert into employees values (4,'vasu','8726352739','security','2020-07-25');

insert into employees values (5,'tharun','9826253765','security','2015-08-03'); insert

into employees values

(6,'vamsi','9725143789','Manager','2003-12-16');

insert into salary values('Librarian',8000);

insert into salary values('Manager',12000);

insert into salary values('cleaner',4000); insert

into salary values('security',3000);

insert into borrowers values(100,'rupesh','9826457836','student','2012-01-24','2021-0524','nitw');

insert into borrowers values(101,'akash','9264758264','teacher','1996-06-20','2022-02-19','chourasta');

insert into borrowers values(102,'alekya','9264848264','bussiness man','2000-05-22','2019-11-12','kazipet'); insert into borrowers values(103,'vishnu','9174035284','student','2015-12-24','2022-08-24','nitw'); insert into

borrowers

values(104,'yochana','6972647593','pilot','1987-05-02','2015-01-14','hanumakonda'); insert

into borrowers

values(105,'ruthvika','8265036279','manager','1993-02-14','2020-08-08','manchiryal'); insert

into borrowers

values(106,'jayanth','9363726280','director','1994-05-24','218-0729','nitw');

insert into loans values(1000,103,'ISBN 99921-58-10-7',1,'2022-01-17','2022-06-23');

insert into loans values(1001,104,'ISBN 99921-58-10-7',2,'2021-11-08','2022-03-23');

insert into loans values(1002,100,'ISBN 80-902734-1-6',2,'2022-05-08','2022-06-18');

insert into loans values(1003,105,'ISBN 960-425-059-0',1,'2022-0117','2022-06-18');

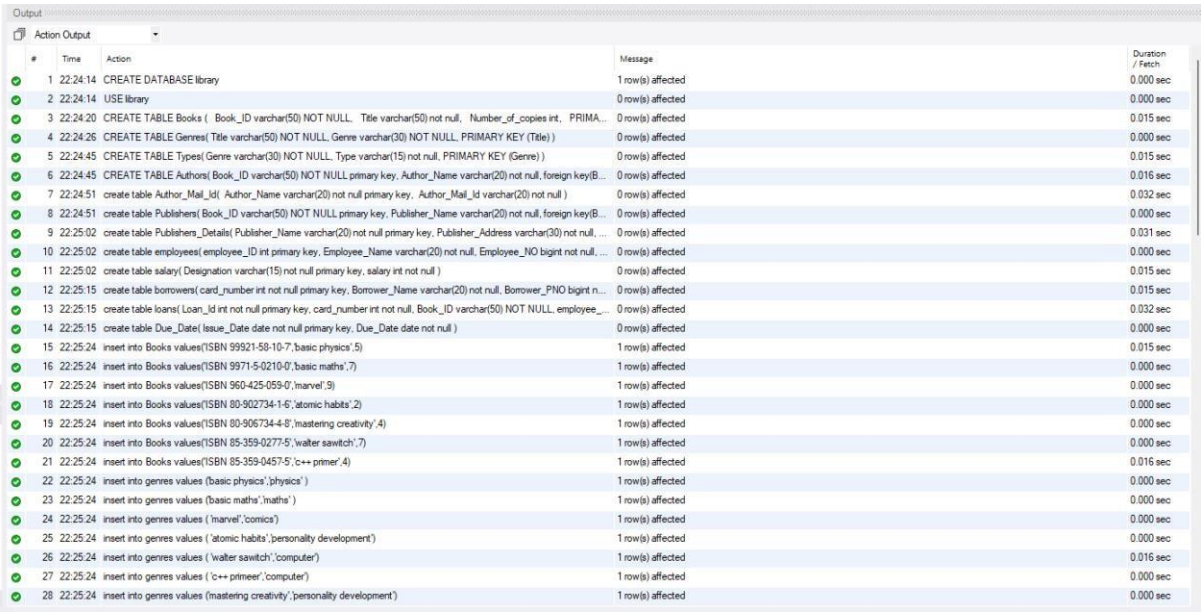
insert into loans values(1004,105,'ISBN 9971-5-0210-0',1,'2016-04-27','2016-08-08');

insert into loans values(1005,102,'ISBN 80-902734-1-6',2,'2021-11-08','2022-06-18');

insert into loans values(1006,104,'ISBN 80-906734-4-8',1,'2014-1208','2014-04-08');

insert into Due_Date values('2022-01-17','2022-02-17'); insert into Due_Date values('2021-11-08','2021-12-08'); insert into Due_Date values('2022-05-08','2022-06-08'); insert into Due_Date values('2016-04-27','2016-05-27'); insert into Due_Date values('2014-12-08','2015-01-08');

OUTPUT OF CREATION



Output

Action Output

#	Time	Action	Message	Duration / Fetch
1	22:24:14	CREATE DATABASE library	1 row(s) affected	0.000 sec
2	22:24:14	USE library	0 row(s) affected	0.000 sec
3	22:24:20	CREATE TABLE Books (Book_ID varchar(50) NOT NULL, Title varchar(50) not null, Number_of_copies int, PRIMA...	0 row(s) affected	0.015 sec
4	22:24:26	CREATE TABLE Genres(Title varchar(50) NOT NULL, Genre varchar(30) NOT NULL, PRIMARY KEY (Title))	0 row(s) affected	0.000 sec
5	22:24:45	CREATE TABLE Types(Genre varchar(30) NOT NULL, Type varchar(15) not null, PRIMARY KEY (Genre))	0 row(s) affected	0.015 sec
6	22:24:45	CREATE TABLE Authors(Book_ID varchar(50) NOT NULL primary key, Author_Name varchar(20) not null, foreign key(B...	0 row(s) affected	0.016 sec
7	22:24:51	create table Author_Mail_Id(Author_Name varchar(20) not null primary key, Author_Mail_Id varchar(20) not null)	0 row(s) affected	0.032 sec
8	22:24:51	create table Publishers(Book_ID varchar(50) NOT NULL primary key, Publisher_Name varchar(20) not null, foreign key(B...	0 row(s) affected	0.000 sec
9	22:25:02	create table Publishers_Details(Publisher_Name varchar(20) not null primary key, Publisher_Address varchar(30) not null, ...	0 row(s) affected	0.031 sec
10	22:25:02	create table employees(employee_ID int primary key, Employee_Name varchar(20) not null, Employee_NO bigint not null, ...	0 row(s) affected	0.000 sec
11	22:25:02	create table salary(Designation varchar(15) not null primary key, salary int not null)	0 row(s) affected	0.015 sec
12	22:25:15	create table borrowers(card_number int not null primary key, Borrower_Name varchar(20) not null, Borrower_PNO bigint n...	0 row(s) affected	0.015 sec
13	22:25:15	create table loans(Loan_Id int not null primary key, card_number int not null, Book_ID varchar(50) NOT NULL, employee_...	0 row(s) affected	0.032 sec
14	22:25:15	create table Due_Date(Issue_Date date not null primary key, Due_Date date not null)	0 row(s) affected	0.000 sec
15	22:25:24	insert into Books values('ISBN 99921-58-10-7','basic physics',5)	1 row(s) affected	0.015 sec
16	22:25:24	insert into Books values('ISBN 9971-5-0210-0','basic maths',7)	1 row(s) affected	0.000 sec
17	22:25:24	insert into Books values('ISBN 960-425-059-0','marvel',9)	1 row(s) affected	0.000 sec
18	22:25:24	insert into Books values('ISBN 80-902734-1-6','atomic habits',2)	1 row(s) affected	0.000 sec
19	22:25:24	insert into Books values('ISBN 80-906734-4-8','mastering creativity',4)	1 row(s) affected	0.000 sec
20	22:25:24	insert into Books values('ISBN 85-359-0277-5','walter sawitch',7)	1 row(s) affected	0.000 sec
21	22:25:24	insert into Books values('ISBN 85-359-0457-5','c++ primer',4)	1 row(s) affected	0.016 sec
22	22:25:24	insert into genres values ('basic physics','physics')	1 row(s) affected	0.000 sec
23	22:25:24	insert into genres values ('basic maths','maths')	1 row(s) affected	0.000 sec
24	22:25:24	insert into genres values ('marvel','comics')	1 row(s) affected	0.000 sec
25	22:25:24	insert into genres values ('atomic habits','personality development')	1 row(s) affected	0.000 sec
26	22:25:24	insert into genres values ('walter sawitch','computer')	1 row(s) affected	0.016 sec
27	22:25:24	insert into genres values ('c++ primeer','computer')	1 row(s) affected	0.000 sec
28	22:25:24	insert into genres values ('mastering creativity','personality development')	1 row(s) affected	0.000 sec

INSERTION OF VALUES INTO DATABASE

insert into Books values('ISBN 99921-58-10-7','basic physics',5); insert into Books values('ISBN 9971-5-0210-0','basic maths',7); insert into Books values('ISBN 960-425-059-0','marvel',9); insert into Books values('ISBN 80-902734-1-6','atomic habits',2); insert into Books values('ISBN 80-906734-4-8','mastering creativity',4); insert into Books values('ISBN 85-359-0277-5','walter sawitch',7); insert into Books values('ISBN 85-359-0457-5','c++ primer',4);

insert into genres values ('basic physics','physics');
insert into genres values ('basic maths','maths'); insert into genres values ('marvel','comics');

```
insert into genres values ( 'atomic habits','personality development');
insert into genres values ( 'walter sawitch','computer'); insert into
genres values ( 'c++ primeer','computer');
insert into genres values ('mastering creativity','personality development');


insert into Types values ('physics','non fiction' );
insert into Types values ('maths','non fiction' ); insert
into Types values ('marvel',' fiction' );
insert into Types values ( 'personality development','non fiction'); insert
into Types values ('computer' ,'non fiction' );


insert into Authors values ('ISBN 99921-58-10-7', 'HC Verma');
insert into Authors values ('ISBN 9971-5-0210-0', 'iyenger'); insert
into Authors values ('ISBN 960-425-059-0', 'stan lee'); insert into
Authors values ('ISBN 85-359-0277-5', 'walter sawitch'); insert into
Authors values ('ISBN 85-359-0457-5', 'stanley'); insert into
Authors values ('ISBN 80-902734-1-6', 'james '); insert into
Authors values ('ISBN 80-906734-4-8', 'james ');


insert into Author_Mail_Id values('HC Verma','hcverma@gmail.com');
insert into Author_Mail_Id values('iyenger','iyer@gmail.com'); insert
into Author_Mail_Id values('walter sawitch','walter@gmail.com'); insert
into Author_Mail_Id values('stanley','stan@gmail.com'); insert into
Author_Mail_Id values('stan lee','lee@gmail.com');
insert into Author_Mail_Id values('james','james@gmail.com');

insert into Publishers values('ISBN 99921-58-10-7','khanna');
insert into Publishers values('ISBN 9971-5-0210-0','khanna');
insert into Publishers values('ISBN 960-425-059-0','M.S.K'); insert
into Publishers values('ISBN 80-902734-1-6','MCgrawhill'); insert
into Publishers values('ISBN 80-906734-4-8','MCgrawhill'); insert
into Publishers values('ISBN 85-359-0277-5','MCgrawhill'); insert
into Publishers values('ISBN 85-359-0457-5','MCgrawhill'); insert
into Publishers_Details values ('MCgrawhill','New
Delhi','9346907122'); insert into Publishers_Details values
('khanna','Banglore','8765428902'); insert into Publishers_Details
values ('M.S.K','vijayawada','9705242829');

insert into   employees values (1,'Rajesh','6472896524','Librarian','2019-08-23');
insert into   employees values (2,'varun','913262829','Librarian','2004-03-03');
insert into   employees values (3,'anil','9268275347','cleaner','2015-05-24'); insert
into   employees values (4,'vasu','8726352739','security','2020-07-25'); insert into
employees values (5,'tharun','9826253765','security','2015-08-03'); insert into
employees values (6,'vamsi','9725143789','Manager','2003-12-16');
```

```
insert into   salary values('Librarian',8000); insert
into   salary values('Manager',12000); insert into
salary values('cleaner',4000);
insert into   salary values('security',3000);

insert into   borrowers values(100,'rupesh','9826457836','student','2012-01-24','2021-05-24','nitw');
insert into   borrowers values(101,'akash','9264758264','teacher','1996-06-20','2022-02-
19','chourasta');
insert into   borrowers values(102,'alekya','9264848264','bussiness man','2000-05-22','2019-11-
12','kazipet');
insert into   borrowers values(103,'vishnu','9174035284','student','2015-12-24','2022-08-24','nitw');
insert into   borrowers values(104,'yochana','6972647593','pilot','1987-05-02','2015-01-
14','hanumakonda');
insert into   borrowers values(105,'ruthvika','8265036279','manager','1993-02-14','2020-08-
08','manchiryal');
insert into   borrowers values(106,'jayanth','9363726280','director','1994-05-24','218-07-29','nitw');


insert into   loans values(1000,103,'ISBN 99921-58-10-7',1,'2022-01-17','2022-06-23'); insert
into   loans values(1001,104,'ISBN 99921-58-10-7',2,'2021-11-08','2022-03-23'); insert into
loans values(1002,100,'ISBN 80-902734-1-6',2,'2022-05-08','2022-06-18'); insert into   loans
values(1003,105,'ISBN 960-425-059-0',1,'2022-01-17','2022-06-18'); insert into   loans
values(1004,105,'ISBN 9971-5-0210-0',1,'2016-04-27','2016-08-08'); insert into   loans
values(1005,102,'ISBN 80-902734-1-6',2,'2021-11-08','2022-06-18'); insert into   loans
values(1006,104,'ISBN 80-906734-4-8',1,'2014-12-08','2014-04-08');

insert into  Due_Date values('2022-01-17','2022-02-17'); insert
into  Due_Date values('2021-11-08','2021-12-08'); insert into
Due_Date values('2022-05-08','2022-06-08'); insert into
Due_Date values('2016-04-27','2016-05-27'); insert into
Due_Date values('2014-12-08','2015-01-08');
```