Online Loan Management System

Advanced Database Design CS-603-D

Avalons

Sacred Heart University
School of Computer Science & Engineering
The Jack Welch College of Business & Technology

Submitted To:
Dr. Reza Sadeghi

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Project Report of Online Loan Management System

Team Name

Name of the Team	Avalons

Team Members

1. Sambasiva Rao Chennamsetty chennamsettys@mail.sacredheart.edu(Team Head)
2. Jagadishwar Reddy Velma velmaj@mail.sacredheart.edu (TM)
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6. Siva Rama Krishna Ch chirumamillas2@mail.sacredheart.edu (TM)

Description of Team Members

1. **Sambasiva Rao Chennamsetty**

   I completed my Bachelor's in Information Technology. I had 3+ years of experience as a full-stack developer with Java programming as a backend. I do like to work with a team that has more commitment to work. As long as we all understand the goals and know our priorities, we will work well as a team to complete tasks effectively.
2. **Jagadishwar Reddy Velma**

   I hold 7+ years of experience in SQL Database Administration. I am here to learn and improve better development skills which help me to become an extensive experienced Core Developer.
3. **Arif Pasha Shaik**

   I have completed my Bachelor's in Information Technology, I have done a couple of internships on Visual Basic .net, and I have also done a course on Business Analytics: Data mining and Data warehousing. I have learned about Big data, data analysis, and data management which made me learn more about data. And I love working in a team that has its full dedication towards the work or project.
4. **Teja Sri Ravula**

   I have done my under graduation in computer science and engineering at Sphoorthy Engineering College and started working as a trainee engineer. I worked on Java and PostgreSQL. I do have good knowledge of C, Python, and MySQL. I zeal to learn new trending technologies like artificial intelligence. I would like to work with people who are committed to the work.
5. **Vamsi Kiran Kakkera**

   I have done my Bachelor's degree in the stream of computer science. I'm having work Experience of 2.5 years in the AWS cloud as an Associate Developer. I've chosen this team as they are very coordinative and discuss everything with the team members.

6. **Siva Rama Krishna Chirumamilla**

   I have completed my bachelor's degree in computer science and have 5+ years of work experience as a DevOps engineer and good knowledge of Microsoft technologies. I would describe myself as a cohesive team member and able to do whatever task is necessary to complete the project.

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(1) Introduction

Online loan Management System (OLMS) is a project which is taken and being developed by our team which helps people to apply for loans online. Customers need to enter loan applications online. Only Staff or admin has the authority to approve or reject loan applications. Customer can view their Loan account details, Interest rate, repayment schedule details, etc. Customers can make loan payments online as well. After the payment, the system updates with the total paid amount and the balance amount. Administrators can view payment details, loan account details, pending payment details, and do terminate the accounts, etc.

- Admin is the one who verifies the user or the customer who is going to register on the loan management system. There can be only one account of admin and all other accounts can be either of user or customer.
- After verifying the customer's loan request admin can approve the loan and the respected information will be updated in the system with the calculated interest amount. And admin can be able to update customer profiles and add or delete accounts.
- A customer must register him/herself in the application to apply for any type of loan such as a home loan, study loan, car loan, etc. Once customer registration is completed, he can log in with the given credentials in the user module.
- Once the customer has logged in and he/she has made a loan request with the amount, duration, and interest rate. Then Customers loan request goes to the admin module, and if it gets approved, the requested information for that customer will get updated in the system.

(2) Business Model

The business model we choose for the project are Happy Money Loan Provider [1], PenFed Credit Union [2], and Light Stream Loans [3]. Which provides loans to the customers online based on their credit card score. With digital transformation assuming a faster pace, loan management software is gaining wider adoption. Faster and more efficient than the legacy lending system, loan software helps automate every stage of the loan lifecycle, from application to closing. We are interested to know how they make the business in the backend and work to grow their organization high and keep being a leading loan provider in the USA.

(3) Merits of the project

- This system is designed to easily maintain the data of the loan customers specifically. Customers can apply for loans without visiting the bank.
- Customer can apply for a loan account online. Customer needs to fill their requirements in the loan application.
- This system is made to keep the records of the customers who have taken a loan from a bank.
- This system allows customers to make payments online.
- The admin is the main user of this web application and he can add employee details, Loan types, penalty charges, etc.

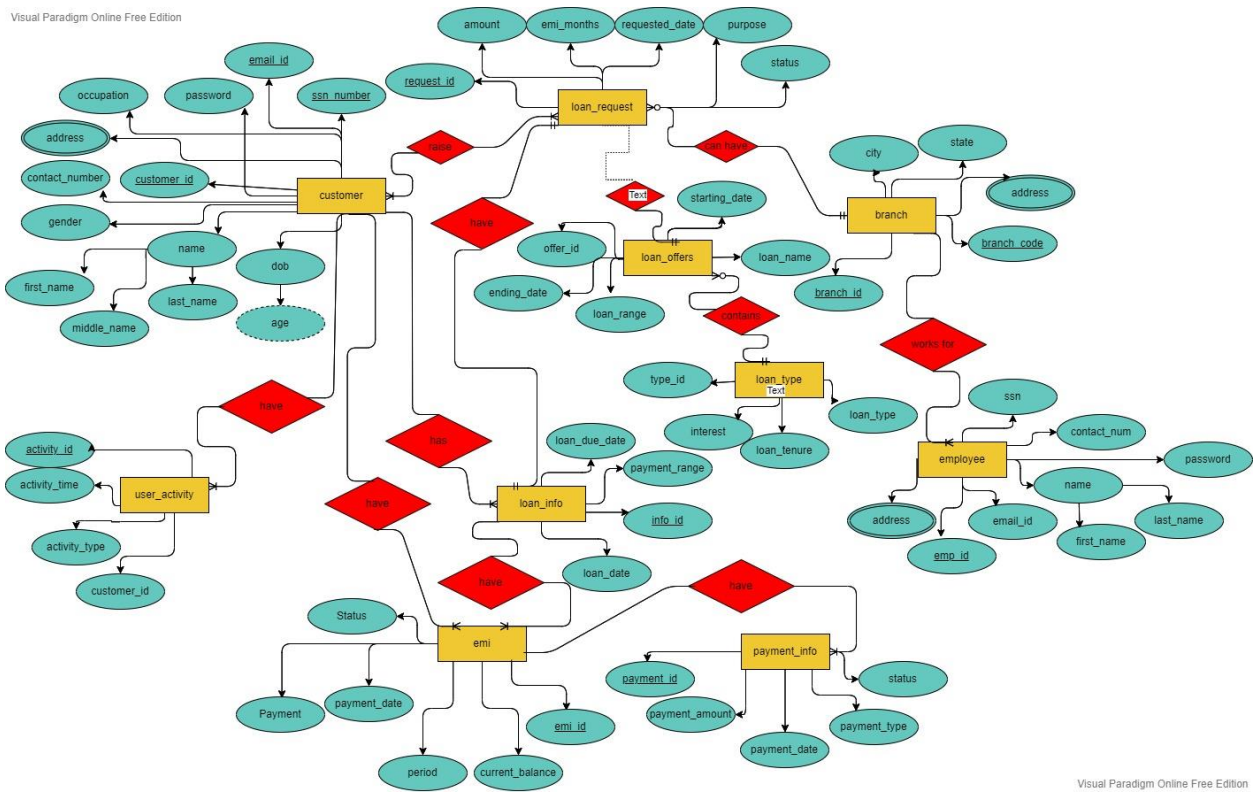
(4) Modules of Online Loan Management System

1. **Customer Account module**: This module stores customer account details with login credentials. After the login, the customer can apply for a loan. The customer can update his profile in the profile module and he can change the password in the change password module.
2. **Loan Application Module**: In the loan application module customer can apply for loans by entering loan requirement details. The loan amount will be sanctioned after the admin approves.
3. **Loan Account Module**: This module shows various loan accounts to the customer. Customers can view loan account details with the total loan amount, paid amount, Balance amount, installment details, etc.
4. **Loan Payment Module**: This module allows the customer to make payment for his loan.
5. **Admin Dashboard Module**: This module is for administrators and Employees to manage all web application activities. The administrator is having full authority over the application.
6. **Settings module**: Only the administrator can access this module. The administrator has a unique account with many special access permissions over normal users. In this module administrators or employees can manage the details of Loan types, Employees, processing fees, Delay payment charges, etc.
7. **Report Module**: In the report module Employee or admin can view Loan Payment Report, Loan Account Report, Pending Accounts report, and others.

(5) ER Model

In the diagram below we have tables Loan Type, Loan Offers, Loan Request, Customer, Branch, Loan Information, Payment Information, Emi, User Activity. Here we have the cardinality of 1-N between customer and loan requests. One customer can request multiple loans and 1-1 cardinality between loan request and loan information. One loan request contains one loan information. Loan request table has columns request_id where it acts as primary of the table and branch_id, loan_offers_id and customer_id columns as a foreign keys. Branch_id is the primary in branch table whereas it acts as a foreign key in this table to give the information like to which branch customer raised the loan request. Customer table has a column customer_id acts as primary key and foreign key in loan_request table.

Figure 1: ER Diagram of Online Loan Management System

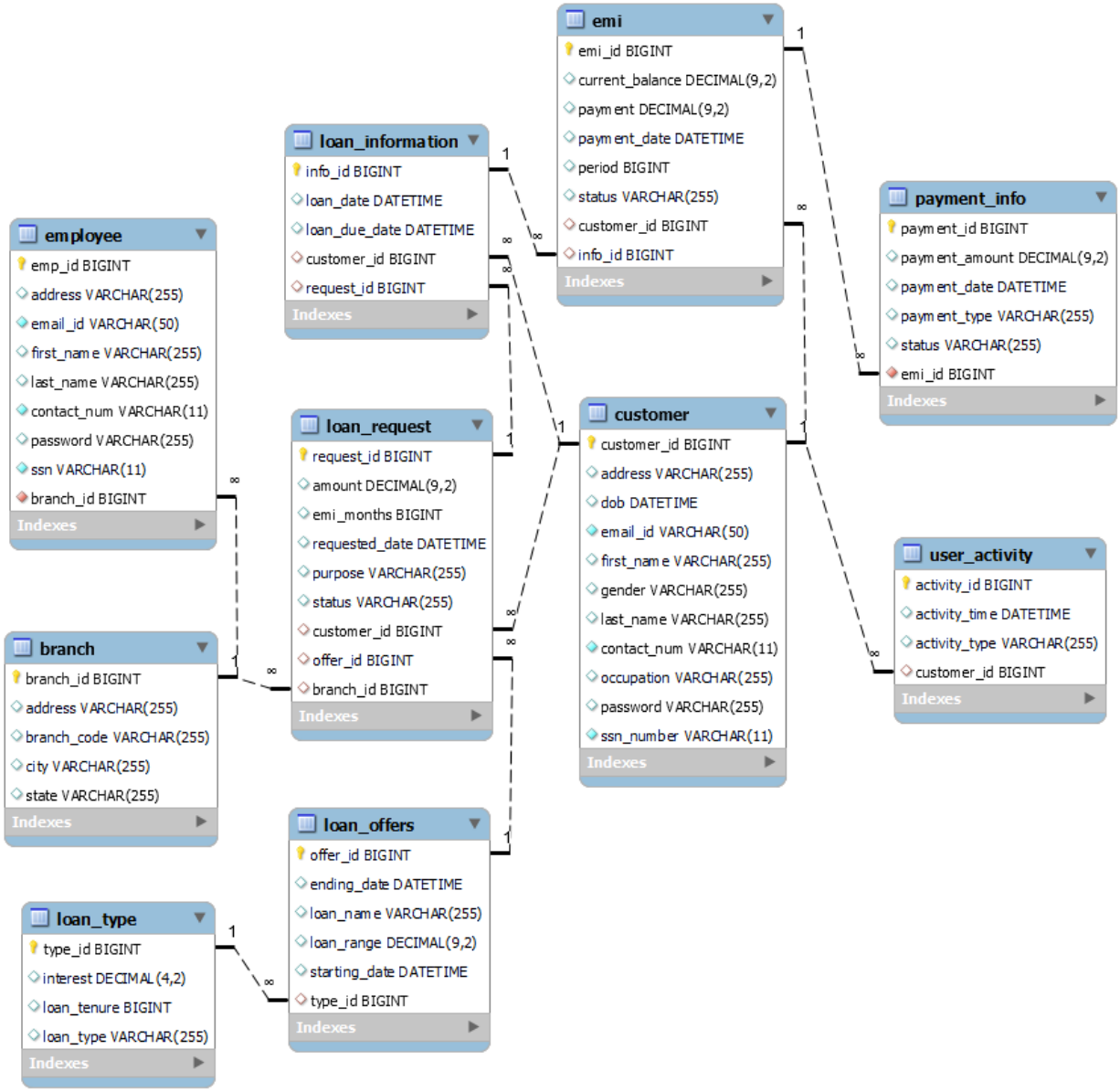


(6) Enhanced Entity Relationship (EER) Diagram

The figure below representing Enhanced Entity Relationship of the database we are using for the project of Online loan management system. Figures have multiple tables which are stored in the schema called loan. Each rectangle box denotes as a table of the schema and inside of it describes attributes of the table. The dotted lines describe a table has a relationship with another table. Each such established relation has a constraint that connects one with another. We have

designed this EER diagram for the project by using the MySQL workbench reverse engineering feature.

Figure 2 : EER Diagram of Online Loan Management System



(7) Description of tables

branch: The purpose of the table is used to store branch-related information. In this table, we have taken a total of 5 columns. Admin & user has to select the particular branch that, on which branch admin is going to work on, and on which branch customer is going to apply for the loan. Once select's branch particular branch code(unique) will assign to the members. This table doesn't have any direct relationship with other tables, but the employee table has a **many-to-one** relationship with this.

Table 1: Branch

Column Name	Datatype	Length	Key type	Cardinality	Description
branch_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
address	varchar	255		-	To store the address of the branch
branch_code	varchar	255		-	Its unique code for each branch
city	varchar	255		-	In which city the branch is located
state	varchar	255		-	In which state the branch is located

employee: Table is used to store employee-related information. The table consists of 9 columns that collect complete information about the employee. The employee has to log in with his credentials which are stored in the table to do their operations from the employee module. The table has a **many-to-one** relationship with the branch table, where multiple employees can work for a branch.

Table 2: Employee

Column Name	Datatype	Length	Key type	Cardinality	Description
emp_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
address	varchar	255		-	To store the address of the employee
email_id	varchar	50		-	Email id of the employee
first_name	varchar	255		-	First name of the employee.
last_name	varchar	255		-	Last name of the employee
contact_num	varchar	11		-	Contact no of the employee.

password	varchar	255		-	The password of the employee.
Ssn	varchar	11		-	Ssn of the employee.
branch_id	bigint		FK	many-to-one	In which branch the employee is working. Branch table pk will store here as a foreign key.

customer: The purpose of the Table is used to store customer information. In this table, we have taken a total of 11 columns. which collects complete information about the customer. The customer must log in with his credentials which are stored in this table. This table has complete customer information. The table has a **one-to-many** relationship with the loan request, user_activity, loan_information, and emi Tables.

Table 3: Customer

Column Name	Datatype	Length	Key type	Cardinality	Description
customer_id	Bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
address	varchar	255		-	To store the address of the Customer
dob	datetime	-		-	Date of birth of the Customer
email_id	varchar	50		-	Email id of the Customer
first_name	varchar	255		-	First name of the Customer
gender	varchar	255		-	Gender of the Customer
last_name	varchar	255		-	Last Name of the Customer.
contact_num	varchar	11		-	Contact No of the Customer.
occupation	varchar	255		-	Occupation details of the Customer.
password	varchar	255		-	The customer password is stored.
ssn_number	varchar	11		-	SSN No of the Customer.

user_activity: The purpose of the Table is used to store user activity. In this table, we have taken a total of 4 columns. User activities are stored in this table like activity time and activity type. customer id which is the primary key in the customer table is taken as a foreign key. This table has **many to one** relationship with the customer table.

Table 4: User Activity

Column Name	Datatype	Length	Key type	Cardinality	Description
activity_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
activity_time	datetime	-		-	To store the activity time.
activity_type	varchar	255		-	To store the activity type.
customer_id	bigint	-	Fk	Many-to-one	In which id of customer is showed. Customer table pk will store here as a foreign key here.

loan_type: The purpose of the table is used to store the type of loan which is applied by the customer. In this table, we have taken total of 4 columns. Each loan type has its unique type_id. This table has **one to many** relationships with loan_offer table.

Table 5: Loan Type

Column Name	Datatype	Length	Key type	Cardinality	Description
type_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
interest	decimal	4,2		-	Interest of the loan is stored.
loan_tenure	bigint	-		-	This stores the time period of loan.
loan_type	varchar	255		-	Stores the type of loan.

loan_offers: The purpose of the Table is used to store loan offers. In this table, we have taken a total of 6 columns. This table stores the loan name and its starting and ending dates and the type of loan. This table has a **many-to-one** relationship with loan_type table where type_id which is the primary key in loan type is taken as a foreign key.

Table 6: Loan Offers

Column Name	Datatype	Length	Key type	Cardinality	Description
offer_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
ending_date	datetime	-		-	to store the ending date of the loan offer.
loan_name	varchar	255		-	Stores the loan name.
loan_range	decimal	9,2		-	Range of the loan is stored.
starting_date	datetime	-			to store the starting date of the loan offer.
type_id	bigint	-	Fk	Many-to-one	Type_id which is the primary key in loan type is taken as foreign key here.

loan_request: The purpose of the Table is used to store loan requests. In this table, we have taken a total of 8 columns. This table stores a unique request_id. The request raised by the customer for a loan and the status of the loan are stored in this table. This table has **many-to-one** relationship with the customer table and **one-to-one** relationship with the loan information and loan offer table.

Table 7: Loan Request

Column Name	Datatype	Length	Key type	Cardinality	Description
request_id	bigint	-	Pk	-	It's the primary key of the table. int is a 32-bit long while bigint is 64-bit long, therefore it can store much

					larger numbers like 123456789123456789.
amount	decimal	9,2		-	Stores the amount requested by the customer.
emi_months	bigint	-		-	No of months to repay the loan.
requested_date	datetime	-		-	Stores the loan requested date.
purpose	varchar	255			The purpose of the loan is stored.
status	varchar	255			Status of loan requested by the customer.
customer_id	bigint	-	Fk	Many-to-one	Customer id which is the primary key in the customer table is used as a foreign key in this table.
offer_id	bigint	-	Fk	One-to-one	Offer id which is the primary key in the loan offer table is used as a foreign key in this table.

loan_information: The purpose of the Table is used to store loan information. In this table, we have taken a total of 5 columns. This table has a customer id which is the primary key in the customer table and is taken as a foreign key in this table. The table has request id which is the primary key in loan offers table is taken as a foreign key in this table. This table has **many-to-one** relationship with the customer table and **one-to-one** relationship with the loan request table.

Table 8: Loan Information

Column Name	Datatype	Length	Key type	Cardinality	Description
info_id	bigint	-	Pk	-	It's the primary key of the table.int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
loan_date	datetime	-		-	to store the loan date.
loan_due_date	datetime	-		-	Stores the loan due date.

customer_id	bigint	-	**FK**	Many to one	Customer id which is primary key in customer table is used as foreign key in this table.
request_id	bigint	-	**FK**	One to one	request id which is primary key in loan request table is used as foreign key in this table.

payment_info: The purpose of the table is used to store payment related information. In this table, we have taken a total of 6 columns. This table has emi id which is the primary key in the emi table and is taken as a foreign key in this table. This table has **many-to-one** relationship with the emi table.

Table 9: Payment Information

Column Name	Datatype	Length	Key type	Cardinality	Description
payment_id	Bigint	-	Pk	-	It's the primary key of the table.int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
payment_amount	Decimal	9,2		-	To store the payment amount.
payment_date	Datetime	-		-	To store the payment date.
payment_type	Varchar	255		-	To store the payment type.
Status	Varchar	255			The status of the payment is stored.
emi_id	Bigint	-	Fk	Many to one	emi id which is the primary key in emi table is used as a foreign key in this table.

emi: The purpose of the table is used to store emi-related information. In this table, we have taken a total of 8 columns. This table has a customer id which is the primary key in the customer table and is taken as a foreign key in this table. This table has **many-to-one** relationship with the customer table and info id which is the primary key in the loan information table is taken as a foreign key here. This table has **many-to-one** relationship with the loan information table.

Table 10: EMI

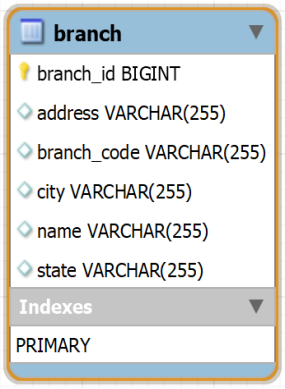
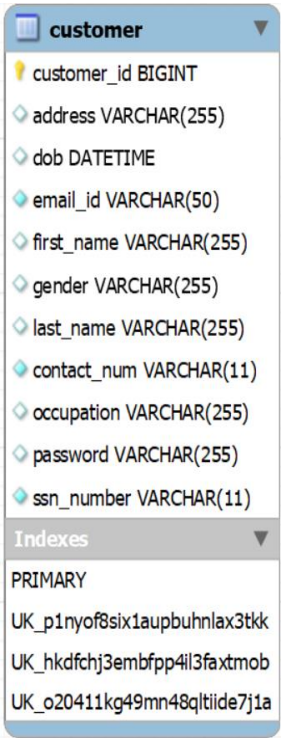
Column Name	Datatype	Length	Key type	Cardinality	Description
emi_id	bigint	-	Pk	-	It's the primary key of the table.int is a 32-bit long while bigint is 64-bit long, therefore it can store much larger numbers like 123456789123456789.
current_balance	decimal	9,2		-	to store the current balance of emi amount.
Payment	decimal	9,2		-	Payment amount of the emi.
payment_date	datetime	-		-	To show payment date.
Period	bigint	-			Month of the emi.
Status	varchar	255			To show the status of the emi.
customer_id	bigint	-	Fk	Many-to-one	In which customer_id is stored. customer table pk will store here as a foreign key here.
info_id	bigint	-	Fk	Many-to-one	In which information id is stored. Loan information pk will store here as a foreign key here.

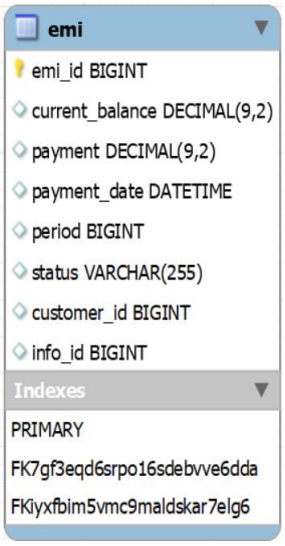
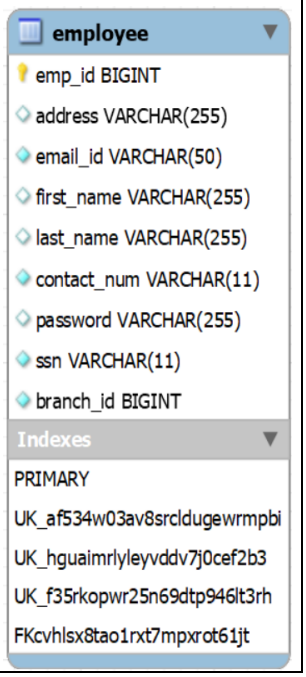
(8) DDL (Data Definition Language) of Database

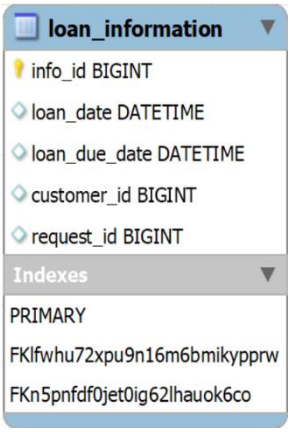
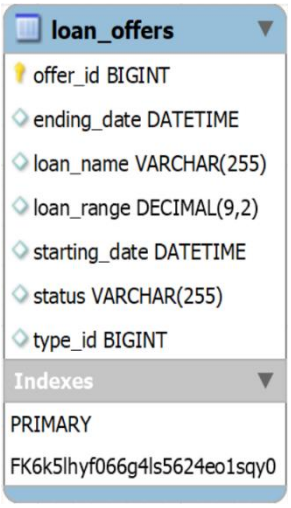
The database 'loan' is designed as per the EER diagram as shown above. It is created with the help of Structured Query Language (SQL) if the database is not exists. Database contains 10 tables which has relations between them.

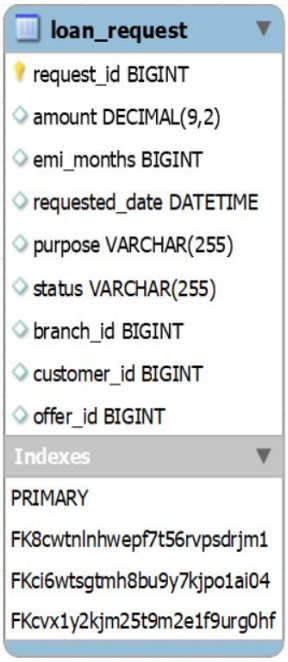
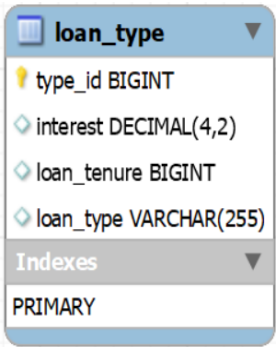
```
-- /* drop database if exists
DROP DATABASE loan;
-- /* create database loan
CREATE DATABASE IF NOT EXISTS loan;
```

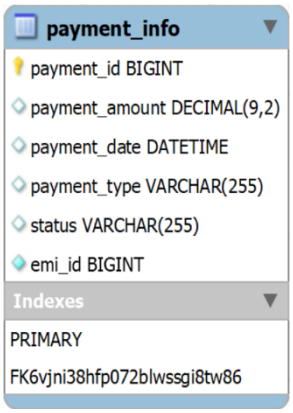
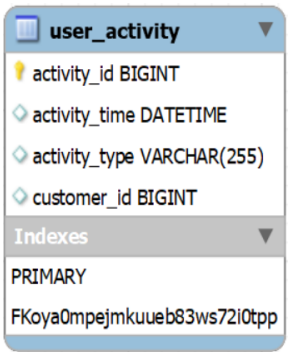
(9) DDL (Data Definition Language) of Tables

Table Name	Sql query	EER Model
branch	CREATE TABLE `branch` (`branch_id` *bigint* NOT NULL AUTO_INCREMENT, `address` *varchar*(255) DEFAULT NULL, `branch_code` *varchar*(255) DEFAULT NULL, `city` *varchar*(255) DEFAULT NULL, `name` *varchar*(255) DEFAULT NULL, `state` *varchar*(255) DEFAULT NULL, PRIMARY KEY (`branch_id`));	
customer	CREATE TABLE `customer` (`customer_id` *bigint* NOT NULL AUTO_INCREMENT, `address` *varchar*(255) DEFAULT NULL, `dob` *datetime* DEFAULT NULL, `email_id` *varchar*(50) NOT NULL, `first_name` *varchar*(255) DEFAULT NULL, `gender` *varchar*(255) DEFAULT NULL, `last_name` *varchar*(255) DEFAULT NULL, `contact_num` *varchar*(11) NOT NULL, `occupation` *varchar*(255) DEFAULT NULL, `password` *varchar*(255) DEFAULT NULL, `ssn_number` *varchar*(11) NOT NULL, PRIMARY KEY (`customer_id`), UNIQUE KEY `UK_p1nyof8six1aupbuhnlax3tkk` (`email_id`), UNIQUE KEY `UK_hkdfchj3embfpp4il3faxtmob` (`contact_num`), UNIQUE KEY `UK_o20411kg49mn48qltiide7j1a` (`ssn_number`)) ;	

emi	CREATE TABLE `emi` (`emi_id` *bigint* NOT NULL AUTO_INCREMENT, `current_balance` *decimal*(9,2) DEFAULT NULL, `payment` *decimal*(9,2) DEFAULT NULL, `payment_date` *datetime* DEFAULT NULL, `period` *bigint* DEFAULT NULL, `status` *varchar*(255) DEFAULT NULL, `customer_id` *bigint* DEFAULT NULL, `info_id` *bigint* DEFAULT NULL, PRIMARY KEY (`emi_id`)); ALTER TABLE `loan`.`emi` ADD INDEX `customer_id_idx` (`customer_id` ASC , `info_id` ASC) VISIBLE; ;ALTER TABLE `loan`.`emi` ADD CONSTRAINT `customer_id` FOREIGN KEY (`customer_id` , `info_id`) REFERENCES `loan`.`customer` (`customer_id` , `c ustomer_id`), ADD CONSTRAINT `info_id` FOREIGN KEY (`customer_id`) REFERENCES `loan`.`loan_information` (`info_id`) ;	
employee	CREATE TABLE `employee` (`emp_id` *bigint* NOT NULL AUTO_INCREMENT, `address` *varchar*(255) DEFAULT NULL, `email_id` *varchar*(50) NOT NULL, `first_name` *varchar*(255) DEFAULT NULL, `last_name` *varchar*(255) DEFAULT NULL, `contact_num` *varchar*(11) NOT NULL, `password` *varchar*(255) DEFAULT NULL, `ssn` *varchar*(11) NOT NULL, `branch_id` *bigint* NOT NULL, PRIMARY KEY (`emp_id`), UNIQUE KEY `UK_af534w03av8srcldugewrmpbi` (`email_id`), UNIQUE KEY `UK_hguaimrlyleyvddv7j0cef2b3` (` contact_num`), UNIQUE KEY `UK_f35rkopwr25n69dtp946lt3rh` (`	

	ssn`) ); ALTER TABLE `loan`.`employee` ADD CONSTRAINT `branch_id` FOREIGN KEY (`branch_id`) REFERENCES `loan`.`branch` (`branch_id`)	
loan_information	CREATE TABLE `loan_information` (`info_id` *bigint* NOT NULL AUTO_INCREMENT, `loan_date` *datetime* DEFAULT NULL, `loan_due_date` *datetime* DEFAULT NULL, `customer_id` *bigint* DEFAULT NULL, `request_id` *bigint* DEFAULT NULL, PRIMARY KEY (`info_id`)); ALTER TABLE `loan`.`loan_information` ADD INDEX `request_id_idx` (`request_id` ASC, `customer_id` ASC) VISIBLE; ; ALTER TABLE `loan`.`loan_information` ADD CONSTRAINT `customer_id` FOREIGN KEY () REFERENCES `loan`.`customer` () ADD CONSTRAINT `request_id` FOREIGN KEY (`request_id` , `customer_id`) REFERENCES `loan`.`loan_request` (`request_id` , `customer_id`)	
loan_offers	CREATE TABLE `loan_offers` (`offer_id` *bigint* NOT NULL AUTO_INCREMENT, `ending_date` *datetime* DEFAULT NULL, `loan_name` *varchar*(255) DEFAULT NULL, `loan_range` *decimal*(9,2) DEFAULT NULL, `starting_date` *datetime* DEFAULT NULL, `status` *varchar*(255) DEFAULT NULL, `type_id` *bigint* DEFAULT NULL, PRIMARY KEY (`offer_id`),); ALTER TABLE `loan`.`loan_offers` ADD CONSTRAINT `type_id` FOREIGN KEY (`type_id`)	

	REFERENCES `loan`.`loan_type` (`type_id`)	
loan_requests	CREATE TABLE `loan_request` (`request_id` *bigint* NOT NULL AUTO_INCREMENT , `amount` *decimal*(9,2) DEFAULT NULL, `emi_months` *bigint* DEFAULT NULL, `requested_date` *datetime* DEFAULT NULL, `purpose` *varchar*(255) DEFAULT NULL, `status` *varchar*(255) DEFAULT NULL, `branch_id` *bigint* DEFAULT NULL, `customer_id` *bigint* DEFAULT NULL, `offer_id` *bigint* DEFAULT NULL, PRIMARY KEY (`request_id`)); ALTER TABLE `loan`.`loan_request` ADD CONSTRAINT `branch_id` FOREIGN KEY (`branch_id`) REFERENCES `loan`.`branch` (`branch_id`), ADD CONSTRAINT `customer_id` FOREIGN KEY (`customer_id`) REFERENCES `loan`.`customer` (`customer_id`), ADD CONSTRAINT `offer_id` FOREIGN KEY (`branch_id`) REFERENCES `loan`.`loan_offers` (`offer_id`);	
loan_type	CREATE TABLE `loan_type` (`type_id` *bigint* NOT NULL AUTO_INCREMENT, `interest` *decimal*(4,2) DEFAULT NULL, `loan_tenure` *bigint* DEFAULT NULL, `loan_type` *varchar*(255) DEFAULT NULL, PRIMARY KEY (`type_id`));	

payment_info	CREATE TABLE `payment_info` (`payment_id` *bigint* NOT NULL AUTO_INCREMENT, `payment_amount` *decimal*(9,2) DEFAULT NULL, `payment_date` *datetime* DEFAULT NULL, `payment_type` *varchar*(255) DEFAULT NULL, `status` *varchar*(255) DEFAULT NULL, `emi_id` *bigint* NOT NULL, PRIMARY KEY (`payment_id`)); ALTER TABLE `loan`.`payment_info` ADD CONSTRAINT `emi_id` FOREIGN KEY (`emi_id`) REFERENCES `loan`.`emi` (`emi_id`)	
user_activity	CREATE TABLE `user_activity` (`activity_id` *bigint* NOT NULL AUTO_INCREMENT, `activity_time` *datetime* DEFAULT NULL, `activity_type` *varchar*(255) DEFAULT NULL, `customer_id` *bigint* DEFAULT NULL, PRIMARY KEY (`activity_id`)); ALTER TABLE `loan`.`user_activity` ADD CONSTRAINT `customer_id` FOREIGN KEY (`customer_id`) REFERENCES `loan`.`customer` (`customer_id`)	

GitHub Repository:

https://github.com/samba-chennamsetty/online-loan-management-system-avalons

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