Name: Sarthak Shandilya

Coding Challenge 5 (Loan Management)

Submitted to: Karthika

Create SQL Schema from the customer and loan class, use the class attributes for table column names.

1. Define a `Customer` class with the following confidential attributes:

a. Customer ID

b. Name

c. Email Address

d. Phone Number

e. Address

f. creditScore

```
mysql> create table customers(
    -> customer_id int primary key auto_increment,
    -> name varchar(30),
    -> email varchar(40),
    -> phone long,
    -> address text,
    -> creditScore int);
Query OK, 0 rows affected (0.39 sec)
```

2. Define a base class `Loan` with the following attributes:

a. loanId

b. customer (reference of customer class)

c. principalAmount

d. interestRate

e. loanTerm (Loan Tenure in months)

f. loanType (CarLoan, HomeLoan)

g. loanStatus (Pending, Approved)

```
mysql> create table loan(
    -> loan_id int primary key auto_increment,
    -> customer_id int,
    -> principal_amount float,
    -> interest_rate float,
    -> loan_term int,
    -> loan_type enum('HomeLoan', 'CarLoan'),
    -> loan_status enum('Pending', 'Approved'),
    -> foreign key(customer_id) references customers(customer_id) on delete
cascade on update cascade);
Query OK, 0 rows affected (0.22 sec)
```

3. Create two subclasses: `HomeLoan` and `CarLoan`. These subclasses should inherit from the Loan class and add attributes specific to their loan types.

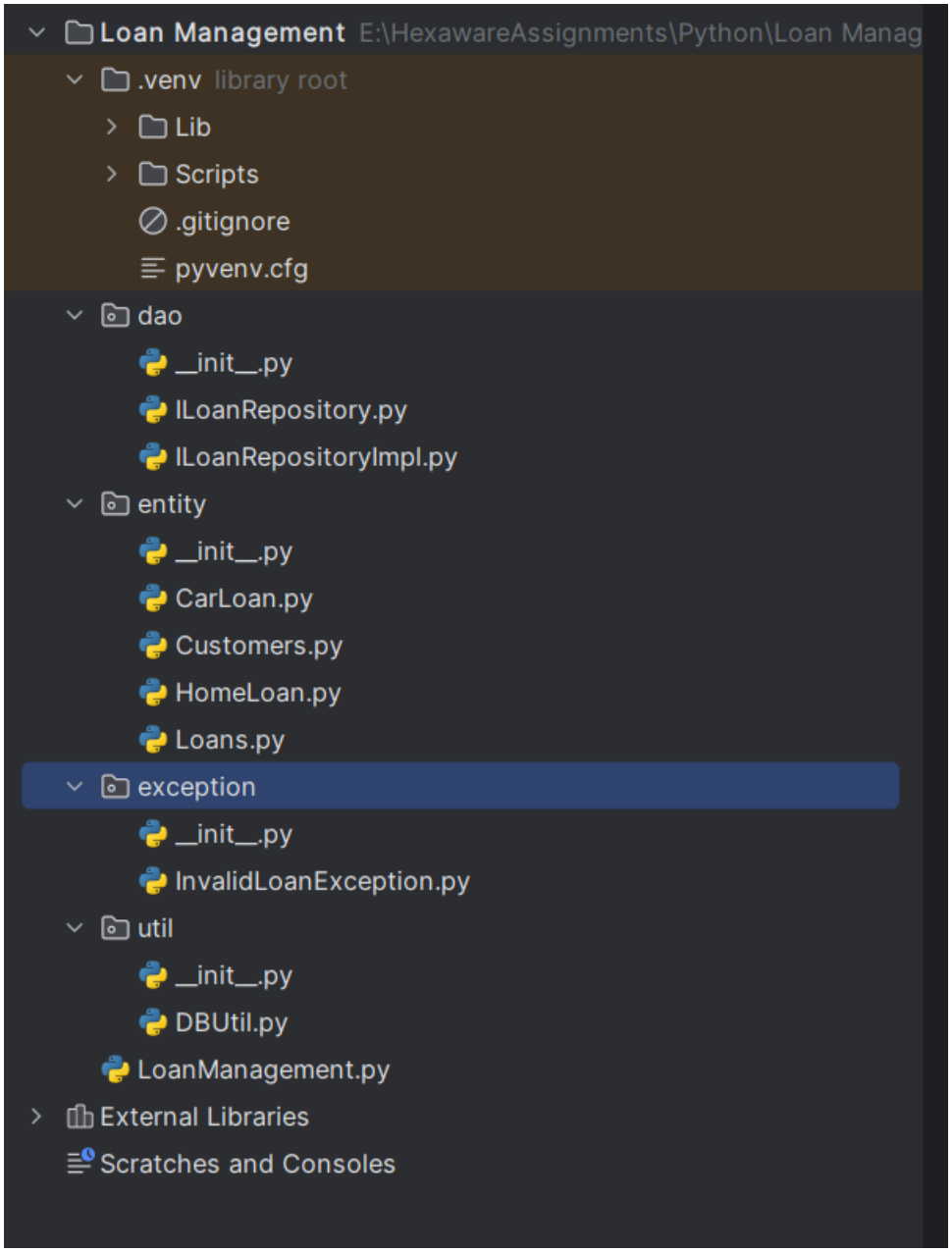
For example:

a. HomeLoan should have a propertyAddress (String) and propertyValue (int) attribute.

```
mysql> create table HomeLoan(
    -> loan_id int primary key,
    -> propertyAddress varchar(255),
    -> propertyValue decimal(10,2),
    -> foreign key(loan_id) references loan(loan_id) on delete cascade on update cascade);
Query OK, 0 rows affected (0.06 sec)
```

b. CarLoan should have a carModel (String) and carValue (int) attribute.

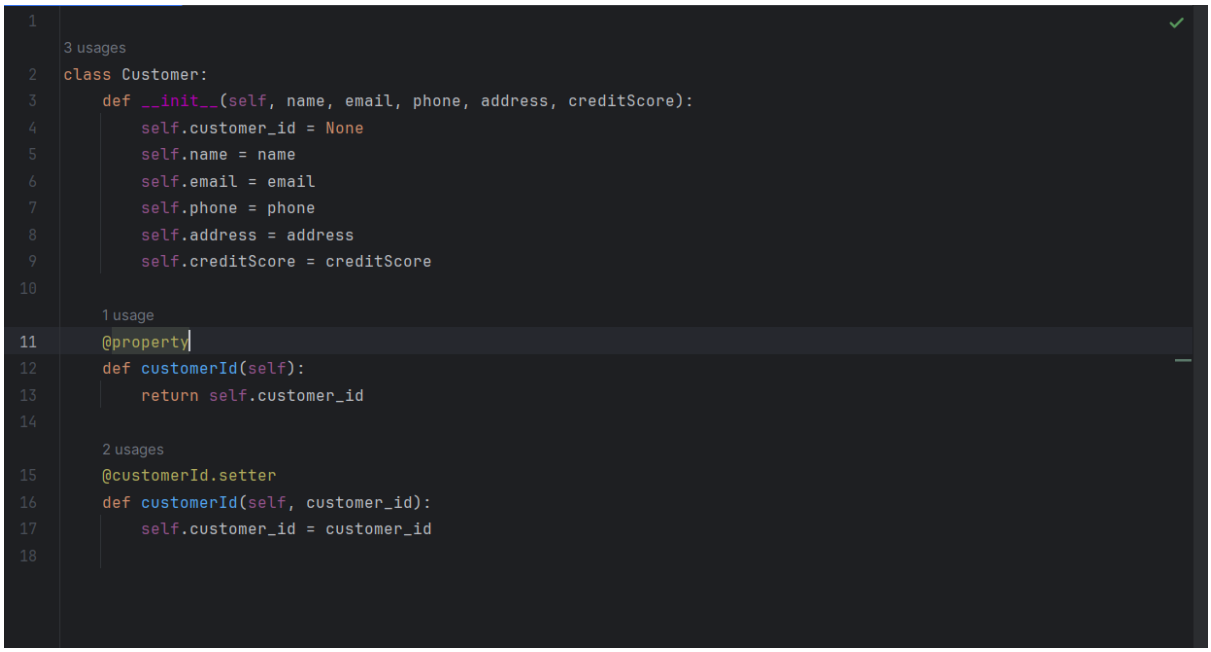
```
mysql> create table CarLoan(
    -> loan_id int primary key,
    -> carModel varchar(50),
    -> carValue decimal(10,2),
    -> foreign key(loan_id) references loan(loan_id) on delete cascade on update cascade);
Query OK, 0 rows affected (0.09 sec)
```



This is the packages and project structure.

Below are the classes implementations:

Customers:

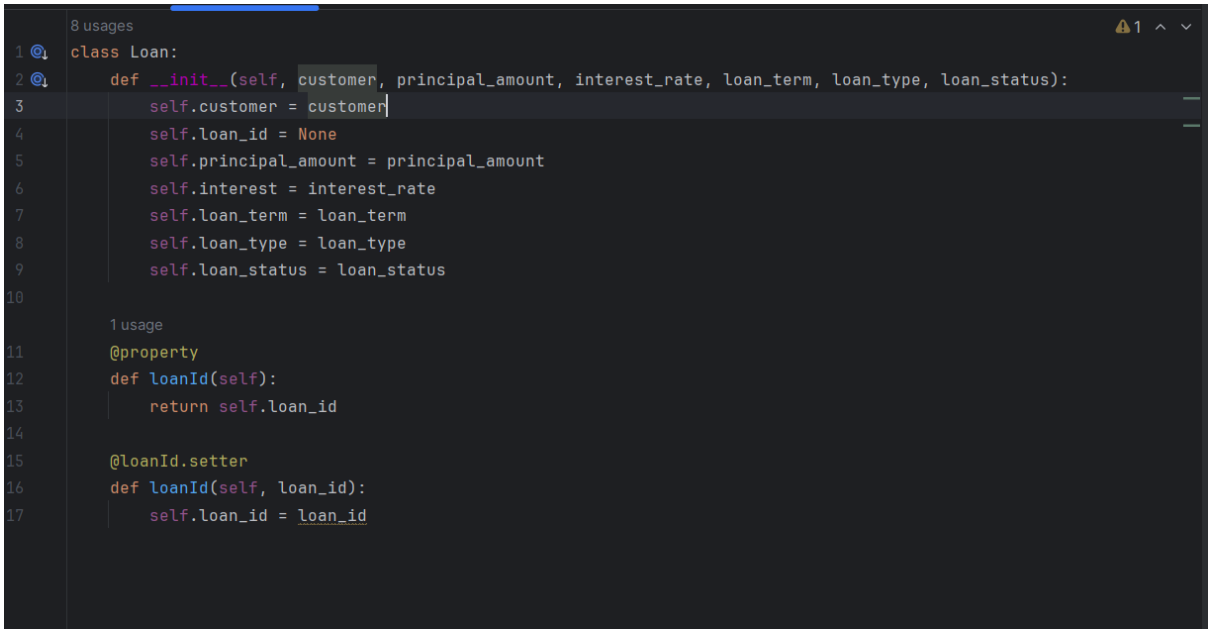


```
3 usages
class Customer:
    def __init__(self, name, email, phone, address, creditScore):
        self.customer_id = None
        self.name = name
        self.email = email
        self.phone = phone
        self.address = address
        self.creditScore = creditScore

    1 usage
    @property
    def customerId(self):
        return self.customer_id

    2 usages
    @customerId.setter
    def customerId(self, customer_id):
        self.customer_id = customer_id
```

Loans:

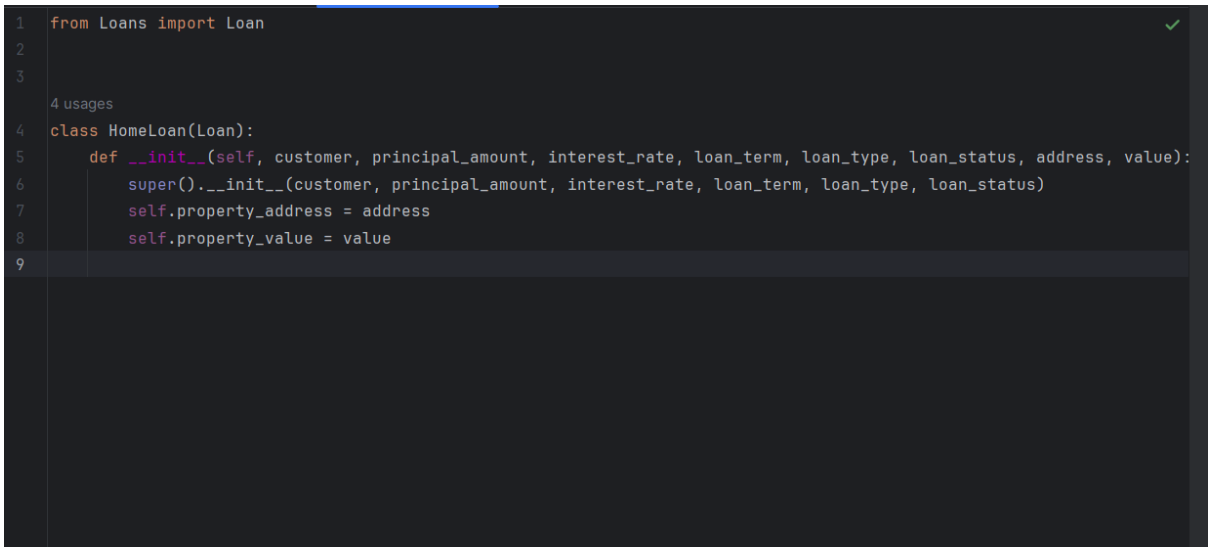


```
8 usages
class Loan:
    def __init__(self, customer, principal_amount, interest_rate, loan_term, loan_type, loan_status):
        self.customer = customer
        self.loan_id = None
        self.principal_amount = principal_amount
        self.interest = interest_rate
        self.loan_term = loan_term
        self.loan_type = loan_type
        self.loan_status = loan_status

    1 usage
    @property
    def loanId(self):
        return self.loan_id

    @loanId.setter
    def loanId(self, loan_id):
        self.loan_id = loan_id
```

Home Loan:

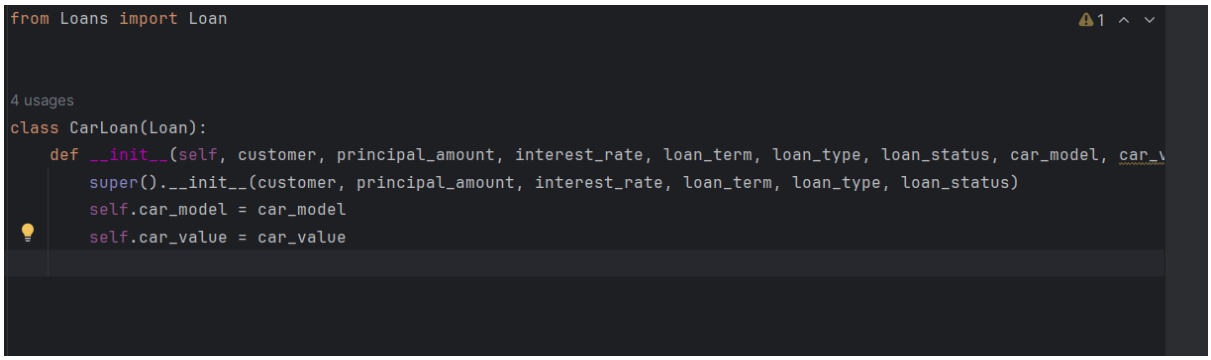


```
from Loans import Loan


4 usages
class HomeLoan(Loan):
    def __init__(self, customer, principal_amount, interest_rate, loan_term, loan_type, loan_status, address, value):
        super().__init__(customer, principal_amount, interest_rate, loan_term, loan_type, loan_status)
        self.property_address = address
        self.property_value = value

```

Car Loan:



```
from Loans import Loan


4 usages
class CarLoan(Loan):
    def __init__(self, customer, principal_amount, interest_rate, loan_term, loan_type, loan_status, car_model, car_v
        super().__init__(customer, principal_amount, interest_rate, loan_term, loan_type, loan_status)
        self.car_model = car_model
        self.car_value = car_value
```

Interface ILoanRepository:

```python
from entity.Loans import Loan


2 usages
class ILoanRepository(ABC):

    @abstractmethod
    def applyLoan(self, loan: Loan):
        pass

    @abstractmethod
    def calculateInterest(self, loanId):
        pass

    @abstractmethod
    def loanStatus(self, loanId):
        pass

    @abstractmethod
    def calculateEMI(self, loanId):
        pass

    @abstractmethod
    def loanRepayment(self, loanId, amount):
        pass

    @abstractmethod
    def getAllLoan(self):
        pass
```

```python
    @abstractmethod
    def getLoanById(self, loanId):
        pass
```

Implementation of ILoanRepositoryImpl:

```python
from entity.CarLoan import CarLoan
from entity.Customers import Customer
from util.DBUtil import DBUtil
from entity.HomeLoan import HomeLoan
from dao.ILoanRepository import ILoanRepository
from exception.InvalidLoanException import InvalidLoanException
from entity.Loans import Loan


2 usages
class ILoanRepositoryImpl(ILoanRepository):
    def __init__(self):
        super().__init__()
        self.con = DBUtil.getDBConn()

    1 usage
    def get_customer(self):
        print("Are you a new customer?")
        choice = input("Enter yes or no : ").lower()
        if choice == "no":
            customer_id = int(input("Enter your customer id : "))
            cursor = self.con.cursor()
            cursor.execute("select * from customers where customer_id = %s", (customer_id,))
            customer_data = cursor.fetchone()
            if customer_data:
                name = customer_data[1]
                email = customer_data[2]
                phone = customer_data[3]
                address = customer_data[4]
                creditscore = customer_data[5]
                customer = Customer(name, email, phone, address, creditscore)
```

```python
                address = customer_data[4]
                creditscore = customer_data[5]
                customer = Customer(name, email, phone, address, creditscore)
                customer.customerId = customer_id
                return customer
        elif "yes":
            name = input("Enter your name : ")
            email = input("Enter your email : ")
            phone = input("Enter your phone : ")
            address = input("Enter your address : ")
            creditScore = int(input("Enter your credit score : "))
            cursor = self.con.cursor()
            q = "insert into customers(name,email,phone,address,creditScore) values (%s,%s,%s,%s,%s)"
            cursor.execute(q, (name, email, phone, address, creditScore,))
            self.con.commit()
            customer_id = cursor.lastrowid
            customer = Customer(name, email, phone, address, creditScore)
            customer.customerId = customer_id
            print("You're successfully registered as a new customer.")
            print(f"Your customer id is {customer_id}")
            return customer

    1 usage
    def applyLoan(self, loan: Loan):
        confirm = input("Please confirm if you want to apply for loan (Yes/No)").lower()
        if confirm == "yes":
            cursor = self.con.cursor()
            query = "insert into loan (customer_id,principal_amount,interest_rate,loan_term,loan_type,loan_status
            values = (loan.customer.customer_id, loan.principal_amount, loan.interest, loan.loan_term, loan.loan_
                      loan.loan_status)
            cursor.execute(query, values)
```

applyLoan():

```
1 usage
def applyLoan(self, loan: Loan):
    confirm = input("Please confirm if you want to apply for loan (Yes/No)").lower()
    if confirm == "yes":
        cursor = self.con.cursor()
        query = "insert into loan (customer_id,principal_amount,interest_rate,loan_term,loan_type,loan_status)
        values = (loan.customer.customer_id, loan.principal_amount, loan.interest, loan.loan_term, loan.loan_
                  loan.loan_status)
        cursor.execute(query, values)
        self.con.commit()
        loan.loan_id = cursor.lastrowid
        loan_id = loan.loan_id
        if isinstance(loan, HomeLoan):
            q_home = "insert into HomeLoan (loan_id,propertyAddress,propertyValue) values (%s,%s,%s)"
            loanData = (loan_id, loan.property_address, loan.property_value)
            cursor.execute(q_home, loanData)
            self.con.commit()
        elif isinstance(loan, CarLoan):
            q_car = "insert into CarLoan (loan_id, carModel, carValue) values (%s,%s,%s)"
            loanData = (loan_id, loan.car_model, loan.car_value)
            cursor.execute(q_car, loanData)
            self.con.commit()
        print("Congratulations! You've successfully applied for the loan.")
        print(f"Your loan id is {loan_id}")
    else:
        print("Loan application cancelled.")
```

calculateInterest() and loanStatus():

```
1 usage
def calculateInterest(self, loanId):
    cursor = self.con.cursor()
    cursor.execute("select interest_rate from loan where loan_id=%s", (loanId, ))
    monthly_interest = cursor.fetchone()
    if monthly_interest:
        return monthly_interest[0]/1200
    else:
        raise InvalidLoanException("Loan not found")

1 usage
def loanStatus(self, loanId):
    cursor = self.con.cursor()
    cursor.execute("select loan_status from loan where loan_id = %s", (loanId, ))
    stat = cursor.fetchone()
    if stat:
        print(f"Your loan status is {stat[0]}")
    else:
        raise InvalidLoanException("Loan not found.")
```

CalculateEMI() and LoanRepayment():

```python
def calculateEMI(self, loanId):
    cursor = self.con.cursor()
    query = "select principal_amount,interest_rate,loan_term from loan where loan_id=%s"
    cursor.execute(query, (loanId,))
    loan_data = cursor.fetchone()
    if loan_data:
        principal, interest_annual, term = loan_data
        interest = self.calculateInterest(loanId)
        emi = (principal*interest*(1+interest)**term)/(((1+interest)**term)-1)
        return emi
    else:
        InvalidLoanException("Loan not exists.")

1 usage
def loanRepayment(self, loanId, amount):
    cursor = self.con.cursor()
    query = "select principal_amount,interest_rate,loan_term from loan where loan_id=%s"
    cursor.execute(query, (loanId,))
    loan_data = cursor.fetchone()
    if loan_data:
        principal, interest, loanTerm = loan_data
        emi = self.calculateEMI(loanId)
        emi_possible = amount//emi
        if emi_possible < 1:
            print("Payment Rejected. Amount is less than a single EMI. ")
        else:
            print(f"{int(emi_possible)} EMI's paid from the amount.")
    else:
        raise InvalidLoanException("Loan Not Found.")
    print("We're heading you to main menu.")
```

getAllLoan() and getLoanbyId():

```python
1 usage
def getAllLoan(self):
    cursor = self.con.cursor()
    cursor.execute("select * from loan")
    return cursor.fetchall()

1 usage
def getLoanById(self, loanId):
    cursor = self.con.cursor()
    cursor.execute("select * from loan where loan_id=%s", (loanId,))
    return cursor.fetchall()
```

LoanManagement:

```python
from entity.CarLoan import CarLoan
from entity.HomeLoan import HomeLoan
from dao.ILoanRepositoryImpl import ILoanRepositoryImpl


1 usage
class LoanManagement(ILoanRepositoryImpl):
    def __init__(self):
        super().__init__()

    1 usage
    def main(self):
        while True:
            print("----Menu----")
            print("1. Apply loan.")
            print("2. Get All Loan History.")
            print("3. Get Your Loan Details.")
            print("4. Make Loan repayment.")
            print("5. Get Loan status.")
            print("6. Exit")
            choice = int(input("Enter your choice here : "))
            match choice:
                case 1:
                    loan = None
                    customer = self.get_customer()
                    loan_amount = float(input("Enter the amount you want to borrow : "))
                    interestRate = float(input("Enter the interest rate : "))
                    loanterm = int(input("Enter the tenure for which you want to take loan : "))
                    loanType = input("Enter your loan type (HomeLoan/CarLoan) : ")
                    loanstatus = "Pending"
                    if loanType == "HomeLoan":
```

```python
                    if loanType == "HomeLoan":
                        propertyAddress = input("Enter the address of the property : ")
                        propertyValue = float(input("Enter the value of the property : "))
                        loan = HomeLoan(customer, loan_amount, interestRate, loanterm, loanType, loanstatus,
                                        propertyAddress, propertyValue)
                    elif loanType == "CarLoan":
                        carModel = input("Enter car model : ")
                        carValue = float(input("Enter the value of car : "))
                        loan = CarLoan(customer, loan_amount, interestRate, loanterm, loanType, loanstatus, carModel
                                       carValue)
                    self.applyLoan(loan)
                    print("We're heading you to main menu.")
                    print()
                case 2:
                    loans = self.getAllLoan()
                    for l in loans:
                        print("Loan id : ", l[0])
                        print("Customer Id : ", l[1])
                        print("Principal Amount : ", l[2])
                        print("Interest Rate : ", l[3])
                        print("Loan term : ", l[4])
                        print("Loan type : ", l[5])
                        print("Loan status : ", l[6])
                case 3:
                    loanId = int(input("Please enter your loan ID : "))
                    loans = self.getLoanById(loanId)
                    for l in loans:
                        print("Loan id : ", l[0])
                        print("Customer Id : ", l[1])
                        print("Principal Amount : ", l[2])
                        print("Interest Rate : ", l[3])
```

```
                    print("Customer Id : ", l[1])
                    print("Principal Amount : ", l[2])
                    print("Interest Rate : ", l[3])
                    print("Loan term : ", l[4])
                    print("Loan type : ", l[5])
                    print("Loan status : ", l[6])

                case 4:
                    loanId = int(input("Enter your loan Id : "))
                    amount = float(input("Enter the amount you want to repay : "))
                    self.loanRepayment(loanId, amount)
                    print()
                case 5:
                    loanId = int(input("Enter your loan id : "))
                    self.loanStatus(loanId)
                    print()
                case 6:
                    print("Thanks for visiting us. Have a good day.")
                    break
                case _:
                    print("Invalid input please try again.")


loan = LoanManagement()
loan.main()
```

Outputs:

1. Apply Loan (Car/Home) with existing/Not existing customer

```
"E:\HexawareAssignments\Python\Loan Management\.venv\Scripts\python.exe" "E:\HexawareAssignments\Python\Loan Management\LoanManagement.py"
----Menu----
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 1
Are you a new customer?
Enter yes or no : yes
Enter your name : Mayank
Enter your email : mayank@gmail.com
Enter your phone : 9430203375
Enter your address : Aghoria Chowk
Enter your credit score : 750
You're successfully registered as a new customer.
Your customer id is 2
Enter the amount you want to borrow : 54000
Enter the interest rate : 5
Enter the tenure for which you want to take loan : 60
Enter your loan type (HomeLoan/CarLoan) : CarLoan
Enter car model : Verna
Enter the value of car : 200000
Please confirm if you want to apply for loan (Yes/No)Yes
Congratulations! You've successfully applied for the loan.
Your loan id is 2
We're heading you to main menu.
```

```
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 1
Are you a new customer?
Enter yes or no : no
Enter your customer id : 2
Enter the amount you want to borrow : 4000000
Enter the interest rate : 9
Enter the tenure for which you want to take loan : 120
Enter your loan type (HomeLoan/CarLoan) : HomeLoan
Enter the address of the property : Professor colony
Enter the value of the property : 10000000
Please confirm if you want to apply for loan (Yes/No)Yes
Congratulations! You've successfully applied for the loan.
Your loan id is 3
We're heading you to main menu.

----Menu----
```

2. GetAll loan histosy:

```
----Menu----
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 2
Loan id :  1
Customer Id :  1
Principal Amount :  4500000.0
Interest Rate :  9.0
Loan term :  120
Loan type :  HomeLoan
Loan status :  Pending
--------------------------------
Loan id :  2
Customer Id :  2
Principal Amount :  54000.0
Interest Rate :  5.0
Loan term :  60
Loan type :  CarLoan
Loan status :  Pending
--------------------------------
Loan id :  3
Customer Id :  2
Principal Amount :  4000000.0
Interest Rate :  9.0
```

3. Get Loan history by Id

```
----------------------------------
----Menu----
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 3
Please enter your loan ID : 3
Loan id :  3
Customer Id :  2
Principal Amount :  4000000.0
Interest Rate :  9.0
Loan term :  120
Loan type :  HomeLoan
Loan status :  Pending
----------------------------------
----Menu----
```

4. Make loan repayment

```
----------------------------------
----Menu----
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 4
Enter your loan Id : 2
Enter the amount you want to repay : 10000
9 EMI's paid from the amount.
We're heading you to main menu.
```

5. Get loan status

```
----Menu----
1. Apply loan.
2. Get All Loan History.
3. Get Your Loan Details.
4. Make Loan repayment.
5. Get Loan status.
6. Exit
Enter your choice here : 5
Enter your loan id : 2
Your loan status is Pending
```