Online Banking Project

CSCI2141, FALL 2015

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Introduction

Our project program was created with basic update and query functionality in order to be used by a banking company for online banking transactions. The Database must therefore easily be able to handle queries involving multiple customer accounts and display them uniformally in a user interface that is functional as well as easy to navigate. The capability to quickly update balances and transfer funds across accounts easily are of great importance. The backend of the program is written in mySQL the open source DBMS utility. The front end of our implemented database is written in JavaScript, and is designed for online banking functionality. The online implementation stores user account data, both for the user to track and change.

Due to the nature of modelling a database for a bank, security considerations are of paramount importance. Also data integrity constraints must be chosen on a basis of complete integrity over performance. The GUI is created with customer usability in mind, as the end users will be bank tellers, and customers accessing the DB from their laptops. specific constraints on the database based on the business (security issues, business specific considerations).

The objective is to create, populate, and maintain a database for an online banking service. The view for users includes a customer view, banker view, and also an admin view. The GUI for customer view will include options to deposit to accounts, view account info, make payments, as well as transfer funds. Everyday banking operations are intended to be accessable to even the most naive of users.

System Design and Development

The first stage in development was meeting and deciding on the business context of our database. Online Banking was the business context that we decided worked best. The business requirement analysis consisted of us brainstorming features and possible table relations for the database. We decided to focus our early development efforts on planning and creating the backend to our database. We designed a ER diagram(included below) using paper and pencil, taking into consideration the two user pools: bankers and customers.

When designing the front end to the banking website the major issues were creating two different views for the users, as well as separating the permissions for these two groups. Making sure that each group has access only to the data and queries that are relevant.

Actions available in the Customer view:
- Transfer money between personal accounts
- Change their password
- Apply for a loan
- Make a loan payment
- View account information
- View personal information

Actions available in the Banker view:

- Create customer
- Delete customer
- Change customer account info(except account balances)
- Approve a loan
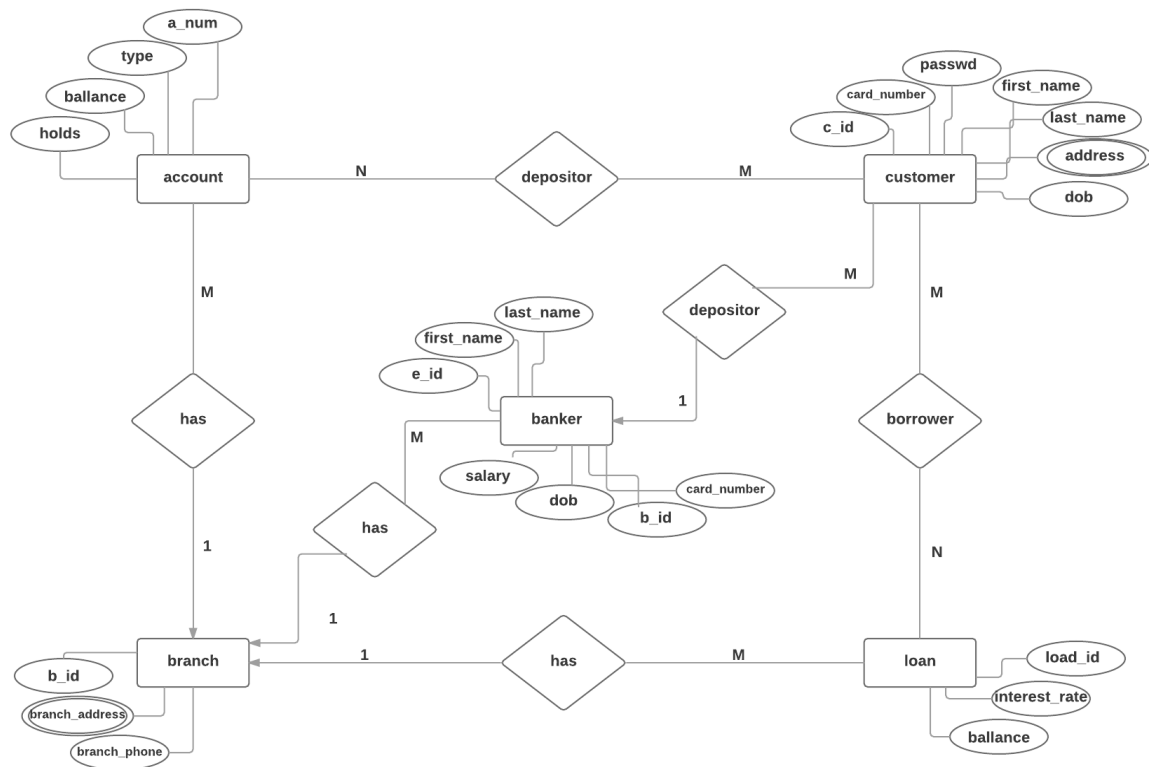- View a list of their customers with their information.
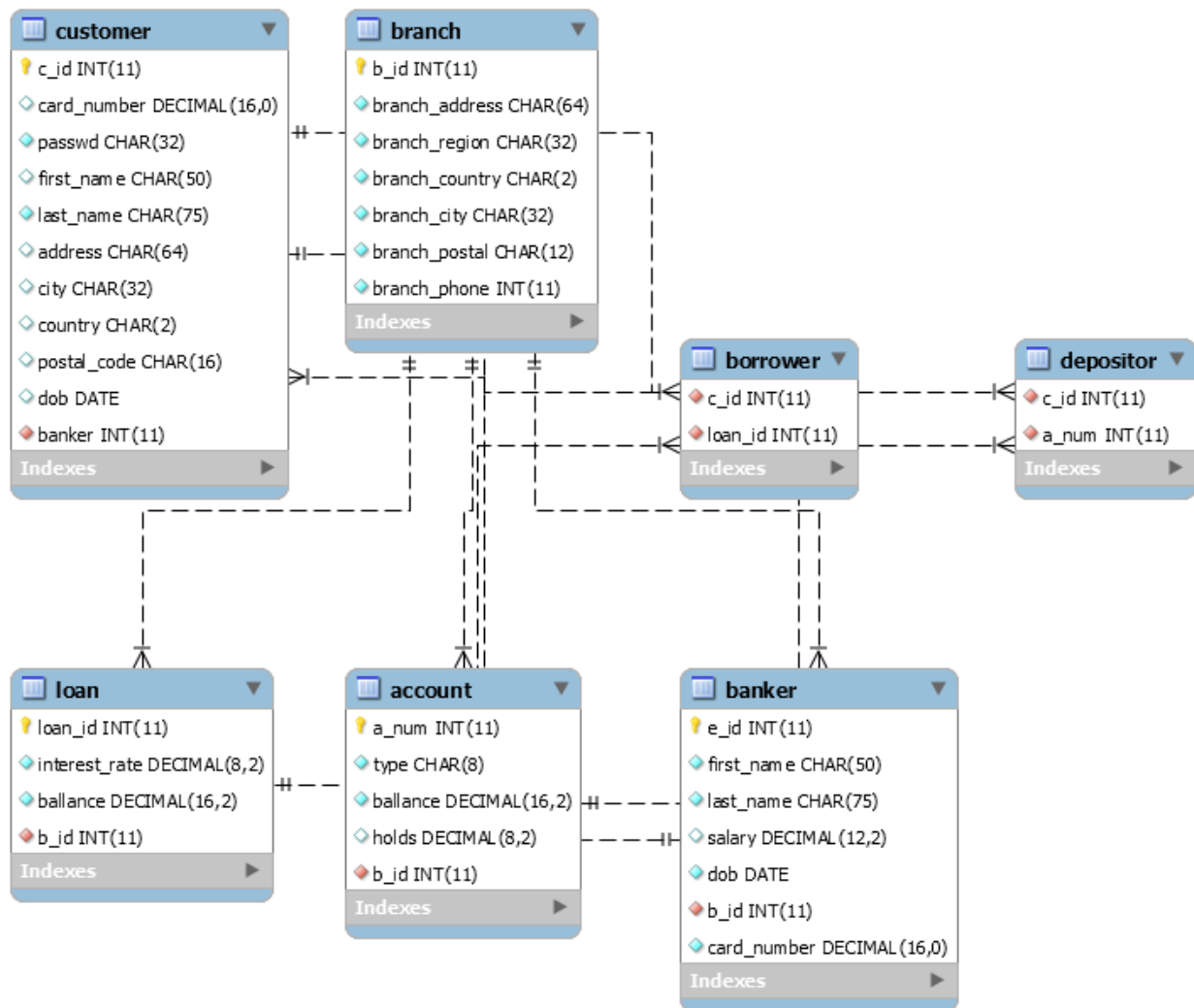
ER diagram

Table Schema

Normalization Analysis

After the ER and rough relational table schema were designed, we proceeded to create the database in mySQL. We emloyed First Normal Form normalization throughout the database creation process. Information fields are very specific throughout all tables, in order to allow more refined queries. One large hurdle we encountered was data redundancy in the Customer table. We initially wanted to have accountID in the customers table, but we instead had to create the relation to Accounts from the Branch table. We made this change in order to accomodate for customers having more than one account at any given time. Also in this normalization step we added another column to the account table to keep track of the account Type.

After making the above mentioned changes, our table schema was normalized according to Second Normal Form. No tables were found to have a transient relation between any two attributes. Therefore our database was in accordance with Third Normal Form.

Sample data from each table

<3-5 TUPLES FROM ALL TABLES>

Results Demonstration

Customer function to transfer money between accounts (same customer):

<transfer money view example>

This query deals with multiple accounts and thus must use transfer data between different account types. These transfers would traverse Borrower and Depositer relationships in certain circumstances. As such, data integrity must be insured using unique ids for the two customer-account relationships.

An example of the queries executed by the transfer command as follows:

<the sql queries>

Customer loan application function:

A customer may apply for a loan, this function sends an application form to the customers associated banker in order to be reviewed.

Examples of the loan forms for both user groups below:

<customer view example>
<Loan application form example>

Both views must execute queries when this function is used, but no data is modified until after approval. The queries execurted by this command are as follows:

<queries>

Customer Loan payment function:

When a customer uses the loan payment function, they are prompted to enter an amount, as well as an account from which the payment will be made.

<loan payment form>

If the account selected by the user has a balance that is greater than the entered payment amount a prompt is sent to the user.
<prompt on successful payment>

Customer money transfer between accounts (to other customer's account)

This function is slightly more complex than the transfer function for accounts with the same associated customer. When using this function, the user is prompted to enter the card number of the targer accounts associated customer, as well as the accounts id. Also, an input field for the amount is presented in the transfer form below.

<transfer form 2>

The queries executed by this transfer command involve moving data from one table to another, which is shown by the code below.

<queries from form2>

Customer function to view personal account information:

This function is a simple selection of customer information that is stored on the customer table. The query is as follows.

<the query>

Banker function to create customer:

This function would be used by a banker in order to create a new entry in the customer table. The banker is prompted to enter all the relevant information (NOT NULL fields) and a new entry is created.
<the create customer form>

This function calls a single query, which inserts the data entered, given that it satisfies the tables data constraints.

<the query>

Additional features:

Views Implemented:

Three views have been implemented to facilitate web development.

customer_info

Shows the customer as well as his banker; names supplementid id numbers for clarity.
Returns (c_id, customer_first_name, customer_last_name, address, city, country, postal_code, dob, b_id, banker_first_name, banker_last_name)

account_info

Shows detailed account info; concatenating the account table and depositor table.
Returns (a_num, type, ballance, holds, c_id)

loan_info

Show detailed loan info; concatenating the loan table and the borrower table.
Returns (loan_id, interest_rate, ballance, c_id)

Procedures Implemented:

Five procedures have been implemented to facilitate web development.
The procedures are called within the php servers backend and implemented within the databases.

getAccountInfo(string type, c_id account)

Given an account type, eg. checking or savings, and an account number, this procedure returns the account ballance and holds.

transferToAcc(a_num from, a_num to, int amount)

Given two account numbers, a source and destination, and an amount, this procedure will transfer funds between accounts.

loanPayment(loan_id loan, a_num account, int amount)

Given a loan number destination (destination of payement), account number (source of payement), and amount to transfer, this procedure will transfer funds from a given account to a given loan.
  eg. bill payement.

setPassword(string passd, c_id id)

Given a password and customer id, this procedure will change a users password within the database.

payHolds(a_num account, int amount)

Given an account, will pay given amount on account's holds.

Trigger Implemented:

acc_check ON account

Triggers on account update and observes the NEW ballance. If an update updates an account to a negative value (overdraft in account ballance) this trigger increments the account's holds by 20.

Transaction Implemented:

Implemented the transfer between account (transferToAcc) as a transaction. Transaction is implemented within php.

Conclusion

Backend development of the database was done primarily by Sam, with database structure input from Padraec, as well as business analysis by Padraec and Mate. Front end development done by Mate, report done by Padraec with input from all group members.

In completing this project, my group has gained a stronger understanding of the steps involved in planning and actualizing a development project. Along with the general project management and group collaboration skills, a deeper understanding of front and back end database development has been gained by all group members. A much better understanding of the SQL language, as well as the mySQL workbench utility was gained from this project. Finally we learned how to host a database on Bluenose, and query it using SQL.

References

Tutorial-Ass2. (2015, October 5) Retrieved December 7 , 2014, from bluenose.cs.dal.ca/users/marker/prof2141

Tutorial-Ass3. (2015, October 17) Retrieved December 7 , 2014, from bluenose.cs.dal.ca/users/marker/prof2141

Tutorial-Ass4. (2015, November 2) Retrieved December 7 , 2014, from bluenose.cs.dal.ca/users/marker/prof2141

Tutorial-Proj1. (2015, November 7) Retrieved December 7 , 2014, from server bluenose.cs.dal.ca/users/marker/prof2141

Tutorial-Proj2. (2015, November 22) Retrieved December 7 , 2014, from server bluenose.cs.dal.ca/users/marker/prof2141

Tisseau, J. (2009, March 26). Sliding Login Panel with jQuery 1.3.2. Retrieved December 26, 2015.

Git Repository:https://github.com/kamiunix/cs2141.git

Source Code

```
-- MySQL dump 10.13  Distrib 5.5.44, for debian-linux-gnu (i686)
--
-- Host: localhost    Database: onlinebanking
-- ------------------------------------------------------
-- Server version       5.5.44-0+deb7u1

/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;
/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS */;
/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;
/*!40101 SET NAMES utf8 */;
/*!40103 SET @OLD_TIME_ZONE=@@TIME_ZONE */;
/*!40103 SET TIME_ZONE='+00:00' */;
/*!40014 SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0 */;
/*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0
*/;
/*!40101 SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='NO_AUTO_VALUE_ON_ZERO' */;
/*!40111 SET @OLD_SQL_NOTES=@@SQL_NOTES, SQL_NOTES=0 */;


--
-- Current Database: `onlinebanking`
--

CREATE DATABASE /*!32312 IF NOT EXISTS*/ `onlinebanking` /*!40100 DEFAULT
CHARACTER SET latin1 */;

USE `onlinebanking`;


--
-- Table structure for table `account`
--

DROP TABLE IF EXISTS `account`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
```

```sql
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `account` (
  `a_num` int(11) NOT NULL,
  `type` char(8) NOT NULL,
  `ballance` decimal(16,2) NOT NULL,
  `holds` decimal(8,2) DEFAULT NULL,
  `b_id` int(11) NOT NULL,
  PRIMARY KEY (`a_num`),
  KEY `fk_branch_id` (`b_id`),
  CONSTRAINT `fk_branch_id` FOREIGN KEY (`b_id`) REFERENCES `branch` (`b_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `account`
--

LOCK TABLES `account` WRITE;
/*!40000 ALTER TABLE `account` DISABLE KEYS */;
INSERT INTO `account` VALUES (1,'checking',17020.12,0.00,1),
(2,'checking',118.43,0.00,1),(3,'checking',352.01,0.00,1),
(4,'checking',0.00,20.00,1),(5,'checking',1029.10,0.00,1),
(6,'checking',1048.49,0.00,1),(7,'checking',11748.49,0.00,1),
(8,'checking',9183.81,0.00,1),(9,'checking',383.74,0.00,1),
(10,'checking',49.05,0.00,1),(11,'checking',4023.05,0.00,1),
(12,'checking',429.55,0.00,1),(13,'checking',632.13,0.00,1),
(14,'checking',732.41,0.00,1),(15,'checking',29.43,0.00,1),
(16,'checking',0.00,20.00,1),(17,'checking',23.01,0.00,1),
(18,'checking',2.11,0.00,1),(19,'checking',222.86,0.00,1),
(20,'checking',921.93,0.00,1),(21,'savings',11230.00,0.00,2),
(22,'checking',872.00,0.00,2),(23,'checking',122.18,0.00,2),
(24,'savings',71000.00,0.00,2),(25,'checking',7123.29,0.00,2),
(26,'checking',824.08,0.00,2),(27,'checking',980.92,0.00,2),
(28,'checking',41.40,0.00,2),(29,'checking',410.80,0.00,2),
(30,'savings',23000.00,0.00,2),(31,'savings',2214.00,0.00,2),
(32,'checking',1243.00,0.00,2),(33,'checking',431.34,0.00,2),
(34,'checking',135.01,0.00,2),(35,'checking',1304.30,0.00,2),
(36,'checking',43.30,0.00,2),(37,'checking',934.90,0.00,2),
(38,'checking',0.00,20.00,2),(39,'checking',124.99,0.00,2),
(40,'checking',999.99,0.00,3),(41,'checking',9343.33,0.00,3),
(42,'checking',99.24,0.00,3),(43,'savings',41000.24,0.00,3),
(44,'checking',3904.95,0.00,3),(45,'checking',2943.24,0.00,3),
(46,'checking',7102.40,0.00,3),(47,'checking',431.03,0.00,3),
(48,'checking',9373.34,0.00,3),(49,'checking',5343.24,0.00,3),
(50,'savings',235.00,0.00,3),(51,'savings',59412.00,0.00,3),
(52,'checking',42523.00,0.00,3),(53,'checking',424.14,0.00,3),
(54,'checking',862.35,0.00,3),(55,'checking',932.23,0.00,3),
(56,'savings',99999999999999.99,0.00,3);
/*!40000 ALTER TABLE `account` ENABLE KEYS */;
UNLOCK TABLES;
/*!50003 SET @saved_cs_client      = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
DELIMITER ;;
/*!50003 CREATE*/ /*!50017 DEFINER=`root`@`localhost`*/ /*!50003 TRIGGER
acc_check BEFORE UPDATE ON account
FOR EACH ROW
BEGIN
  IF NEW.ballance < 0 THEN
```

```
      SET NEW.holds = OLD.holds + 20;
   END IF;
END */;;
DELIMITER ;
/*!50003 SET sql_mode              = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;

--
-- Temporary table structure for view `account_info`
--

DROP TABLE IF EXISTS `account_info`;
/*!50001 DROP VIEW IF EXISTS `account_info`*/;
SET @saved_cs_client     = @@character_set_client;
SET character_set_client = utf8;
/*!50001 CREATE TABLE `account_info` (
  `a_num` tinyint NOT NULL,
  `type` tinyint NOT NULL,
  `ballance` tinyint NOT NULL,
  `holds` tinyint NOT NULL,
  `c_id` tinyint NOT NULL
) ENGINE=MyISAM */;
SET character_set_client = @saved_cs_client;

--
-- Table structure for table `banker`
--

DROP TABLE IF EXISTS `banker`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `banker` (
  `e_id` int(11) NOT NULL,
  `first_name` char(50) NOT NULL,
  `last_name` char(75) NOT NULL,
  `salary` decimal(12,2) DEFAULT NULL,
  `dob` date NOT NULL,
  `b_id` int(11) NOT NULL,
  `card_number` decimal(16,0) NOT NULL,
  PRIMARY KEY (`e_id`),
  KEY `fk_work_id` (`b_id`),
  CONSTRAINT `fk_work_id` FOREIGN KEY (`b_id`) REFERENCES `branch` (`b_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `banker`
--

LOCK TABLES `banker` WRITE;
/*!40000 ALTER TABLE `banker` DISABLE KEYS */;
INSERT INTO `banker` VALUES (1,'James','Anderson',45000.00,'1964-04-
21',1,4521124353940201),(2,'Mark','Walker',42000.00,'1967-02-
12',1,4521124353940202),(3,'Mike','Mitchell',42000.00,'1969-01-
04',1,4521124353940203),(4,'Christopher','Allen',40000.00,'1972-10-
07',1,4521124353940204),(5,'Jeff','Carter',39000.00,'1970-09-
29',1,4521124353940205),(6,'Sarah','Hall',47000.00,'1961-12-
24',2,4521124353940206),(7,'Daniel','Hall',45000.00,'1963-08-
17',2,4521124353940207),(8,'John','Phillips',45000.00,'1965-04-
14',2,4521124353940208),(9,'Andre','Turcotte',48000.00,'1965-03-
17',2,4521124353940209),(10,'Joseph','Allen',42000.00,'1965-03-
23',2,4521124353940210),(11,'Marie','Sartre',42000.00,'1974-07-
```

```
30',3,4521124353940211),(12,'Donald','King',50000.00,'1969-10-
02',3,4521124353940212),(13,'Elizabeth','Collins',48000.00,'1972-01-
09',3,4521124353940213),(14,'Ricardo','Hernandez',46000.00,'1972-05-
04',3,4521124353940214),(15,'James','Green',43000.00,'1977-04-
15',3,4521124353940215);
/*!40000 ALTER TABLE `banker` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Table structure for table `borrower`
--

DROP TABLE IF EXISTS `borrower`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `borrower` (
  `c_id` int(11) NOT NULL,
  `loan_id` int(11) NOT NULL,
  KEY `c_id` (`c_id`),
  KEY `loan_id` (`loan_id`),
  CONSTRAINT `borrower_ibfk_1` FOREIGN KEY (`c_id`) REFERENCES `customer`
(`c_id`) ON DELETE CASCADE,
  CONSTRAINT `borrower_ibfk_2` FOREIGN KEY (`loan_id`) REFERENCES `loan`
(`loan_id`) ON DELETE CASCADE
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `borrower`
--

LOCK TABLES `borrower` WRITE;
/*!40000 ALTER TABLE `borrower` DISABLE KEYS */;
INSERT INTO `borrower` VALUES (1,1),(2,3),(2,2),(4,4),(9,5),(11,6),(14,7),
(16,8),(18,9),(21,10),(22,11),(25,12),(25,13),(28,14),(39,15),(31,16),(32,17),
(34,18),(41,19),(45,20),(44,21),(10,22),(46,23),(37,24),(42,25);
/*!40000 ALTER TABLE `borrower` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Table structure for table `branch`
--

DROP TABLE IF EXISTS `branch`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `branch` (
  `b_id` int(11) NOT NULL,
  `branch_address` char(64) NOT NULL,
  `branch_region` char(32) NOT NULL,
  `branch_country` char(2) NOT NULL,
  `branch_city` char(32) NOT NULL,
  `branch_postal` char(12) NOT NULL,
  `branch_phone` int(11) NOT NULL,
  PRIMARY KEY (`b_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `branch`
--

LOCK TABLES `branch` WRITE;
/*!40000 ALTER TABLE `branch` DISABLE KEYS */;
```

```
INSERT INTO `branch` VALUES (1,'1871 Hollis St-Suite
100','NS','CA','Halifax','B3J 0C3',2147483647),(2,'700 Place
d\'Youville','QC','CA','Quebec City','G1R 3P2',2147483647),(3,'200 Bay
St','ON','CA','Toronto','M5J 2J5',2147483647);
/*!40000 ALTER TABLE `branch` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Table structure for table `customer`
--

DROP TABLE IF EXISTS `customer`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `customer` (
  `c_id` int(11) NOT NULL,
  `card_number` decimal(16,0) DEFAULT NULL,
  `passwd` char(32) NOT NULL,
  `first_name` char(50) DEFAULT NULL,
  `last_name` char(75) NOT NULL,
  `address` char(64) DEFAULT NULL,
  `city` char(32) DEFAULT NULL,
  `country` char(2) DEFAULT NULL,
  `postal_code` char(16) DEFAULT NULL,
  `dob` date DEFAULT NULL,
  `banker` int(11) NOT NULL,
  PRIMARY KEY (`c_id`),
  UNIQUE KEY `unique_card` (`card_number`),
  KEY `fk_banker_id` (`banker`),
  CONSTRAINT `fk_banker_id` FOREIGN KEY (`banker`) REFERENCES `banker` (`e_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `customer`
--

LOCK TABLES `customer` WRITE;
/*!40000 ALTER TABLE `customer` DISABLE KEYS */;
INSERT INTO `customer` VALUES (1,4540025121478301,'123456','Carol','Parker','22
robinson dr.','Halifax','CA','B7L 1K3','1982-03-20',1),
(2,4540025121478302,'58b4e38f66bcdb546380845d6af27187','Syndrom','Parkinson','10
brunswick dr.','Halifax','CA','B7L 1K1','1982-04-11',1),
(3,4540025121478303,'e9fbf92f363e00e495b75aea68a20395','Lisa','Garcia','37
brunswick dr.','Halifax','CA','B3L 1K1','1984-05-08',1),
(4,4540025121478304,'58b4e38f66bcdb546380845d6af27187','Jeff','Evans','71
brunswick dr.','Halifax','CA','B3L 1K4','1983-07-11',2),
(5,4540025121478305,'f73d7a272eaae495900df632965c5265','Chicken','Cambpell','11
Robie dr.','Halifax','CA','B3L 1J8','1983-11-09',2),
(6,4540025121478306,'07631128992a7461d6226b02724a7a47','Summer','Camp','11
Sackville dr.','Halifax','CA','B3K 1J2','1967-01-07',2),
(7,4540025121478307,'ed44beb2b63aaebfc5061ff49c413995','Herald','Jenkins','11
Sackville dr.','Halifax','CA','B3I 1J9','1923-01-08',3),
(8,4540025121478308,'d114cdfe5aaa6925112d87b4878ae06d','Marie','Baker','92 Crow
cr.','Halifax','CA','B3T 1K9','1935-02-04',3),
(9,4540025121478309,'6bcac4aeff5cd16ca48da2d9be231ebe','Frank','Bastard','41
Springfield dr.','Halifax','CA','B3T 1H2','1941-04-11',4),
(10,4404330022180209,'f4ef214abe2f7ef7aa5a20255e93cbf4','Alexander','Robinson','
41 Sackville dr.','Halifax','CA','B3T 1L2','1943-03-12',4),
(11,4404330022180210,'d0c6f41c48021a0e8335accf867188f4','Kenneth','Robinson','41
Sackville dr.','Halifax','CA','B3T 1L1','1951-12-17',4),
(12,4404330022180211,'a6d70b0b180dae9ac94e90d5fa39aba5','Max','Martin','19 Queen
dr.','Halifax','CA','B3T 1T1','1999-11-11',5),
(13,4404330022180212,'a6d70b0b180dae9ac94e90d5fa39aba5','Thomas','Martin','19
```

Queen dr.','Halifax','CA','B3T 1T1','1963-02-01',5),
(14,4404330022180213,'a6d70b0b180dae9ac94e90d5fa39aba5','Jennifer','Martin','19 Queen dr.','Halifax','CA','B3T 1T1','1963-04-12',5),
(15,4404330022180214,'2b867b11b2d488d36d5c8981fed12ff1','Kenneth','White','1900 Watter st.','Halifax','CA','B3T 1X1','1988-02-22',5),
(16,4404330022180215,'9f906341c724e96c30450e73578ac487','Anne','Ste-Piere','8231 Ste-Foy','Quebec City','CA','G1T 1X1','1982-02-20',6),
(17,4404330022180216,'e9c122f3bf5fb113a9a15dc07578de50','David','Lapierre','24 Commercial rue.','Quebec City','CA','G5L 1X3','1986-07-21',6),
(18,4404330022180217,'62fd7eef6738b488e68e5c556bb995c3','Rick','Pedro','42 Commercial rue.','Quebec City','CA','G2L 1X4','1993-02-03',6),
(19,4404330022180218,'b641b6638b0f61092bbaa45c99aa72c3','Simmon','Veilleux','Saint-Jean rue','Quebec City','CA','G2L 1D4','1990-05-05',7),
(20,4404330022180219,'b0e7224319b3c8569be631881474abcf','Peedee','Puffin','Charest ave','Quebec City','CA','G2P 1K4','1984-05-18',7),
(21,4404330022180220,'5f4dcc3b5aa765d61d8327deb882cf99','Sarge','Schau','1244 Saint-Jean ch.','Quebec City','CA','D2P 1R4','1977-09-22',8),
(22,4404330022180221,'bdc87b9c894da5168059e00ebffb9077','Jean-Paul','Trudeau','142 St Joseph','Quebec City','CA','G2P 1T4','1979-11-16',8),
(23,4404330022180222,'59f5719b74522b6d8fbf52f090a77eca','Simone','Trudeau','142 St Joseph','Quebec City','CA','G2P 1T4','1979-11-16',8),
(24,4404330022180223,'5f4dcc3b5aa765d61d8327deb882cf99','Raymond','Robertson','213 Drack rue','Quebec City','CA','G4T 3R2','1966-02-06',9),
(25,4404330022180224,'bdc87b9c894da5168059e00ebffb9077','Christopher','Robertson','213 Drack rue','Quebec City','CA','G4T 3R2','1974-12-14',9),
(26,4404330022180225,'277d3ebc1fc0a21d50db031c9849f868','Ray','Robertson','213 Drack rue','Quebec City','CA','G4T 3R2','2003-02-11',9),
(27,4404330022180226,'402fd6af80d80e346b96c89d37aae805','David','Rousseau','24 Saunier rue','Quebec City','CA','G4T 8T2','1992-09-19',10),
(28,4404330022180227,'61fd809f2d7cfdd91cddc057f3ab65f1','Sean','Richards','73 Sommait rue','Quebec City','CA','G5T 5C2','1993-11-19',10),
(29,4404330022180228,'a9975bb2c410306f9c90560657da79a2','Odessa','Rice','3 Cartier rue','Quebec City','CA','G5T 1C4','1956-05-29',10),
(30,4404330022180229,'5f4dcc3b5aa765d61d8327deb882cf99','Kevin','Rice','3 Cartier rue','Quebec City','CA','G5T 1C4','2009-11-21',10),
(31,4404330022180230,'dec891ce8418e5bc69177f5ae2388a32','Kim','Redds','41 Tongue st.','Toronto','CA','M4L 2C1','1991-03-21',11),
(32,4404330022180231,'84fe120fae9b787b3da40b70cae25cac','Mike','Black','41 Tongue st.','Toronto','CA','M4L 2C1','1998-08-11',11),
(33,4404330022180232,'7f51272ceab12ff751d93522da8edf2f','Jay','Dumbard','491 Stewart st.','Toronto','CA','M0J 1J1','1983-10-10',11),
(34,4404330022180233,'e8dca7cbed3f959b3ecb0b135b4b1707','Karrie','Garret','92 Garner st.','Toronto','CA','M4J 3D1','1943-02-22',11),
(35,4404330022180234,'0db9caf79e1c79f239411a52fc06b405','Santa','Drew','71 Garner st.','Toronto','CA','M4J 3D1','1945-12-31',11),
(36,4404330022180235,'451ebf12064b826f3c773f737808c254','Jack','Seymour','71 Hurt st.','Toronto','CA','M4J 30','1976-11-19',12),
(37,4404330022180236,'499ca86077111653321e583ef73dae7d','Lee','Kei','718 Tabbet st.','Toronto','CA','M4K 3D0','1979-03-19',12),
(38,4404330022180237,'0cbdf75e6c838aa0542d8c45c179b5fe','Lara','Kirk','882 Trevor st.','Toronto','CA','M3L 3D0','1990-04-29',13),
(39,4404330022180238,'31e80aacf74f7171e536a1287ee13603','Sandra','Fraser','8 Travis st.','Toronto','CA','M3L 0R3','1973-10-20',13),
(40,4404330022180239,'5d9a31605bf532bc3bd6e4250c77d5e2','Melissa','Power','9231 Turtle st.','Toronto','CA','M3L 2O0','1974-10-11',13),
(41,4404330022180240,'eb6d55628f5d2365000a0947f095998e','Sarah','Martin','9231 Turks st.','Toronto','CA','M4L 2R0','1987-06-14',13),
(42,4404330022180241,'9e732d703776f6a241f86029ca5a516f','Ronald','MacDonald','9231 Turks st.','Toronto','CA','M4L 2R0','1987-06-14',13),
(43,4404330022180242,'aa2d672f8cced0becb0f05f28bd64a91','Hannah','Cocks','914 Rock st.','Toronto','CA','M3L 2T0','1989-10-10',14),
(44,4404330022180243,'533e529b0b6b76985834dcf129ff1666','Drake','Cocks','914 Rock st.','Toronto','CA','M3L 2T0','1989-10-10',14),
(45,4404330022180244,'1510e7104e3918824dca89a13fcb9e34','Mike','Hawk','462

```
Rockalnd st.','Toronto','CA','M3T 5T4','1984-10-24',15),
(46,4404330022180245,'39d96ef52f8457e09897dbf36d2643e8','Mike','Littoris','462
Rockalnd st.','Toronto','CA','M3T 5T4','1982-08-01',15),
(47,4404330022180246,'bfac43cf998743cf28ab2df433f405ae','Carol','Leak','462
Duvet st.','Toronto','CA','M3T 5R5','1990-10-12',15),
(48,4404330022180247,'0655205d2c277ecc9de8ce9ddc6893bd','Rick','Leak','462 Duvet
st.','Toronto','CA','M3T 5R5','1994-08-10',15);
/*!40000 ALTER TABLE `customer` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Temporary table structure for view `customer_info`
--

DROP TABLE IF EXISTS `customer_info`;
/*!50001 DROP VIEW IF EXISTS `customer_info`*/;
SET @saved_cs_client     = @@character_set_client;
SET character_set_client = utf8;
/*!50001 CREATE TABLE `customer_info` (
  `c_id` tinyint NOT NULL,
  `first_name` tinyint NOT NULL,
  `last_name` tinyint NOT NULL,
  `address` tinyint NOT NULL,
  `city` tinyint NOT NULL,
  `country` tinyint NOT NULL,
  `postal_code` tinyint NOT NULL,
  `dob` tinyint NOT NULL,
  `banker_id` tinyint NOT NULL,
  `banker_fname` tinyint NOT NULL,
  `banker_lname` tinyint NOT NULL
) ENGINE=MyISAM */;
SET character_set_client = @saved_cs_client;

--
-- Table structure for table `depositor`
--

DROP TABLE IF EXISTS `depositor`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `depositor` (
  `c_id` int(11) NOT NULL,
  `a_num` int(11) NOT NULL,
  KEY `c_id` (`c_id`),
  KEY `a_num` (`a_num`),
  CONSTRAINT `depositor_ibfk_1` FOREIGN KEY (`c_id`) REFERENCES `customer`
(`c_id`) ON DELETE CASCADE,
  CONSTRAINT `depositor_ibfk_2` FOREIGN KEY (`a_num`) REFERENCES `account`
(`a_num`) ON DELETE CASCADE
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `depositor`
--

LOCK TABLES `depositor` WRITE;
/*!40000 ALTER TABLE `depositor` DISABLE KEYS */;
INSERT INTO `depositor` VALUES (1,3),(2,4),(3,15),(4,14),(5,1),(6,2),(7,2),
(6,7),(7,13),(8,5),(9,8),(10,12),(11,9),(12,19),(13,20),(14,16),(15,17),(9,18),
(9,6),(15,10),(3,11),(16,39),(17,37),(18,21),(18,22),(19,22),(19,23),(20,31),
(20,34),(21,38),(22,33),(23,24),(24,26),(25,25),(26,36),(26,35),(27,30),(28,27),
(29,28),(30,29),(18,32),(40,40),(31,56),(32,56),(33,41),(34,42),(35,43),(36,44),
(39,45),(37,46),(38,47),(38,48),(41,49),(42,50),(43,50),(44,51),(45,52),(46,53),
```

```
(47,54),(47,55),(48,56);
/*!40000 ALTER TABLE `depositor` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Table structure for table `loan`
--

DROP TABLE IF EXISTS `loan`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `loan` (
  `loan_id` int(11) NOT NULL,
  `interest_rate` decimal(8,2) NOT NULL,
  `ballance` decimal(16,2) NOT NULL,
  `b_id` int(11) NOT NULL,
  PRIMARY KEY (`loan_id`),
  KEY `fk_bank_id` (`b_id`),
  CONSTRAINT `fk_bank_id` FOREIGN KEY (`b_id`) REFERENCES `branch` (`b_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `loan`
--

LOCK TABLES `loan` WRITE;
/*!40000 ALTER TABLE `loan` DISABLE KEYS */;
INSERT INTO `loan` VALUES (1,2.50,2500.00,1),(2,2.50,700.00,1),
(3,2.50,691.21,1),(4,2.50,24000.00,1),(5,5.00,390000.00,1),(6,5.00,494300.00,1),
(7,2.50,4300.00,1),(8,2.50,443300.00,2),(9,2.50,853243.00,2),
(10,5.00,3414.00,2),(11,5.00,593.00,2),(12,5.00,835.00,2),(13,5.00,14534.00,2),
(14,1.00,1453404.00,2),(15,5.00,3553.00,2),(16,10.00,34532.00,3),
(17,10.00,23452.00,3),(18,7.50,93243.00,3),(19,7.50,23524.00,3),
(20,7.50,543.00,3),(21,7.50,4333.00,3),(22,7.50,345.00,3),
(23,10.00,345000.00,3),(24,10.00,345342.00,3),(25,7.50,5343.00,3);
/*!40000 ALTER TABLE `loan` ENABLE KEYS */;
UNLOCK TABLES;

--
-- Temporary table structure for view `loan_info`
--

DROP TABLE IF EXISTS `loan_info`;
/*!50001 DROP VIEW IF EXISTS `loan_info`*/;
SET @saved_cs_client     = @@character_set_client;
SET character_set_client = utf8;
/*!50001 CREATE TABLE `loan_info` (
  `loan_id` tinyint NOT NULL,
  `interest_rate` tinyint NOT NULL,
  `ballance` tinyint NOT NULL,
  `c_id` tinyint NOT NULL
) ENGINE=MyISAM */;
SET character_set_client = @saved_cs_client;

--
-- Dumping routines for database 'onlinebanking'
--
/*!50003 DROP PROCEDURE IF EXISTS `getAccountInfo` */;
/*!50003 SET @saved_cs_client     = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
```

```
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
DELIMITER ;;
CREATE DEFINER=`root`@`localhost` PROCEDURE `getAccountInfo`(IN ty CHAR(11), id
INT)
BEGIN
  SELECT ballance, holds FROM account_info WHERE type=ty AND c_id=id;
END ;;
DELIMITER ;
/*!50003 SET sql_mode              = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;
/*!50003 DROP PROCEDURE IF EXISTS `loanPayment` */;
/*!50003 SET @saved_cs_client      = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
DELIMITER ;;
CREATE DEFINER=`root`@`localhost` PROCEDURE `loanPayment`(IN acc INT, amnt
DECIMAL(16,2), loan INT)
BEGIN
  UPDATE account
  SET ballance = ballance-amnt WHERE a_num=acc;
  UPDATE loan
  SET ballance = ballance-amnt WHERE loan_id=loan;
END ;;
DELIMITER ;
/*!50003 SET sql_mode              = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;
/*!50003 DROP PROCEDURE IF EXISTS `payHolds` */;
/*!50003 SET @saved_cs_client      = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
DELIMITER ;;
CREATE DEFINER=`root`@`localhost` PROCEDURE `payHolds`(IN account INT, amnt
DECIMAL(8,2))
BEGIN  UPDATE account  SET holds = holds-amnt  WHERE a_num = account; END ;;
DELIMITER ;
/*!50003 SET sql_mode              = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;
/*!50003 DROP PROCEDURE IF EXISTS `setPassword` */;
/*!50003 SET @saved_cs_client      = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
```

```
DELIMITER ;;
CREATE DEFINER=`root`@`localhost` PROCEDURE `setPassword`(IN pass CHAR(32), id
INT)
BEGIN
  UPDATE customer SET passwd=pass WHERE c_id=id;
END ;;
DELIMITER ;
/*!50003 SET sql_mode             = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;
/*!50003 DROP PROCEDURE IF EXISTS `transferToAcc` */;
/*!50003 SET @saved_cs_client      = @@character_set_client */ ;
/*!50003 SET @saved_cs_results     = @@character_set_results */ ;
/*!50003 SET @saved_col_connection = @@collation_connection */ ;
/*!50003 SET character_set_client  = utf8 */ ;
/*!50003 SET character_set_results = utf8 */ ;
/*!50003 SET collation_connection  = utf8_general_ci */ ;
/*!50003 SET @saved_sql_mode       = @@sql_mode */ ;
/*!50003 SET sql_mode              = '' */ ;
DELIMITER ;;
CREATE DEFINER=`root`@`localhost` PROCEDURE `transferToAcc`(IN acc1 INT, amnt
DECIMAL(16,2), acc2 INT)
BEGIN
  UPDATE account
  SET ballance = ballance-amnt WHERE a_num=acc1;
  UPDATE account
  SET ballance = ballance+amnt WHERE a_num=acc2;
END ;;
DELIMITER ;
/*!50003 SET sql_mode             = @saved_sql_mode */ ;
/*!50003 SET character_set_client  = @saved_cs_client */ ;
/*!50003 SET character_set_results = @saved_cs_results */ ;
/*!50003 SET collation_connection  = @saved_col_connection */ ;

--
-- Current Database: `onlinebanking`
--

USE `onlinebanking`;

--
-- Final view structure for view `account_info`
--

/*!50001 DROP TABLE IF EXISTS `account_info`*/;
/*!50001 DROP VIEW IF EXISTS `account_info`*/;
/*!50001 SET @saved_cs_client          = @@character_set_client */;
/*!50001 SET @saved_cs_results         = @@character_set_results */;
/*!50001 SET @saved_col_connection     = @@collation_connection */;
/*!50001 SET character_set_client      = utf8 */;
/*!50001 SET character_set_results     = utf8 */;
/*!50001 SET collation_connection      = utf8_general_ci */;
/*!50001 CREATE ALGORITHM=UNDEFINED */
/*!50013 DEFINER=`root`@`localhost` SQL SECURITY DEFINER */
/*!50001 VIEW `account_info` AS select `a`.`a_num` AS `a_num`,`a`.`type` AS
`type`,`a`.`ballance` AS `ballance`,`a`.`holds` AS `holds`,`d`.`c_id` AS `c_id`
from (`account` `a` join `depositor` `d`) where (`a`.`a_num` = `d`.`a_num`) */;
/*!50001 SET character_set_client       = @saved_cs_client */;
/*!50001 SET character_set_results      = @saved_cs_results */;
/*!50001 SET collation_connection       = @saved_col_connection */;

--
-- Final view structure for view `customer_info`
```

```
--

/*!50001 DROP TABLE IF EXISTS `customer_info`*/;
/*!50001 DROP VIEW IF EXISTS `customer_info`*/;
/*!50001 SET @saved_cs_client          = @@character_set_client */;
/*!50001 SET @saved_cs_results         = @@character_set_results */;
/*!50001 SET @saved_col_connection     = @@collation_connection */;
/*!50001 SET character_set_client      = utf8 */;
/*!50001 SET character_set_results     = utf8 */;
/*!50001 SET collation_connection      = utf8_general_ci */;
/*!50001 CREATE ALGORITHM=UNDEFINED */
/*!50013 DEFINER=`root`@`localhost` SQL SECURITY DEFINER */
/*!50001 VIEW `customer_info` AS select `c`.`c_id` AS `c_id`,`c`.`first_name` AS
`first_name`,`c`.`last_name` AS `last_name`,`c`.`address` AS
`address`,`c`.`city` AS `city`,`c`.`country` AS `country`,`c`.`postal_code` AS
`postal_code`,`c`.`dob` AS `dob`,`b`.`e_id` AS `banker_id`,`b`.`first_name` AS
`banker_fname`,`b`.`last_name` AS `banker_lname` from (`customer` `c` join
`banker` `b`) where (`c`.`banker` = `b`.`e_id`) */;
/*!50001 SET character_set_client      = @saved_cs_client */;
/*!50001 SET character_set_results     = @saved_cs_results */;
/*!50001 SET collation_connection      = @saved_col_connection */;

--
-- Final view structure for view `loan_info`
--

/*!50001 DROP TABLE IF EXISTS `loan_info`*/;
/*!50001 DROP VIEW IF EXISTS `loan_info`*/;
/*!50001 SET @saved_cs_client          = @@character_set_client */;
/*!50001 SET @saved_cs_results         = @@character_set_results */;
/*!50001 SET @saved_col_connection     = @@collation_connection */;
/*!50001 SET character_set_client      = utf8 */;
/*!50001 SET character_set_results     = utf8 */;
/*!50001 SET collation_connection      = utf8_general_ci */;
/*!50001 CREATE ALGORITHM=UNDEFINED */
/*!50013 DEFINER=`root`@`localhost` SQL SECURITY DEFINER */
/*!50001 VIEW `loan_info` AS select `l`.`loan_id` AS
`loan_id`,`l`.`interest_rate` AS `interest_rate`,`l`.`ballance` AS
`ballance`,`c`.`c_id` AS `c_id` from (`loan` `l` join `borrower` `c`) where
(`l`.`loan_id` = `c`.`loan_id`) */;
/*!50001 SET character_set_client      = @saved_cs_client */;
/*!50001 SET character_set_results     = @saved_cs_results */;
/*!50001 SET collation_connection      = @saved_col_connection */;
/*!40103 SET TIME_ZONE=@OLD_TIME_ZONE */;

/*!40101 SET SQL_MODE=@OLD_SQL_MODE */;
/*!40014 SET FOREIGN_KEY_CHECKS=@OLD_FOREIGN_KEY_CHECKS */;
/*!40014 SET UNIQUE_CHECKS=@OLD_UNIQUE_CHECKS */;
/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;
/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;
/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;
/*!40111 SET SQL_NOTES=@OLD_SQL_NOTES */;

-- Dump completed on 2015-12-08 17:04:10
```