

Banking System
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Project Description

This project will be a database application that is based in the general banking system.

The goal of this application is to provide a convenient way to access user's banking information. Users will be able to login with designated username and password, access bank account, deposit, withdraw, get a report of transaction if a user wishes to. This application will also provide a user-friendly interface that is clear and intuitive. We use bank system in our daily lives. We login into bank systems like Chase, Wells Fargo, Bank of America, and list goes on. Deposits, withdraws, transfers, statements are some of the example of our daily used operations on the bank systems. But we never thought what actually runs behind the screen. Since we are taking database class, we are getting great opportunity to explore system behind the screen. We got the motivation from our daily used operations in the bank system. Let's start with simple structure our structure of the banking system

Word on structure

We will be Apache Tomcat webserver to run our banking system.

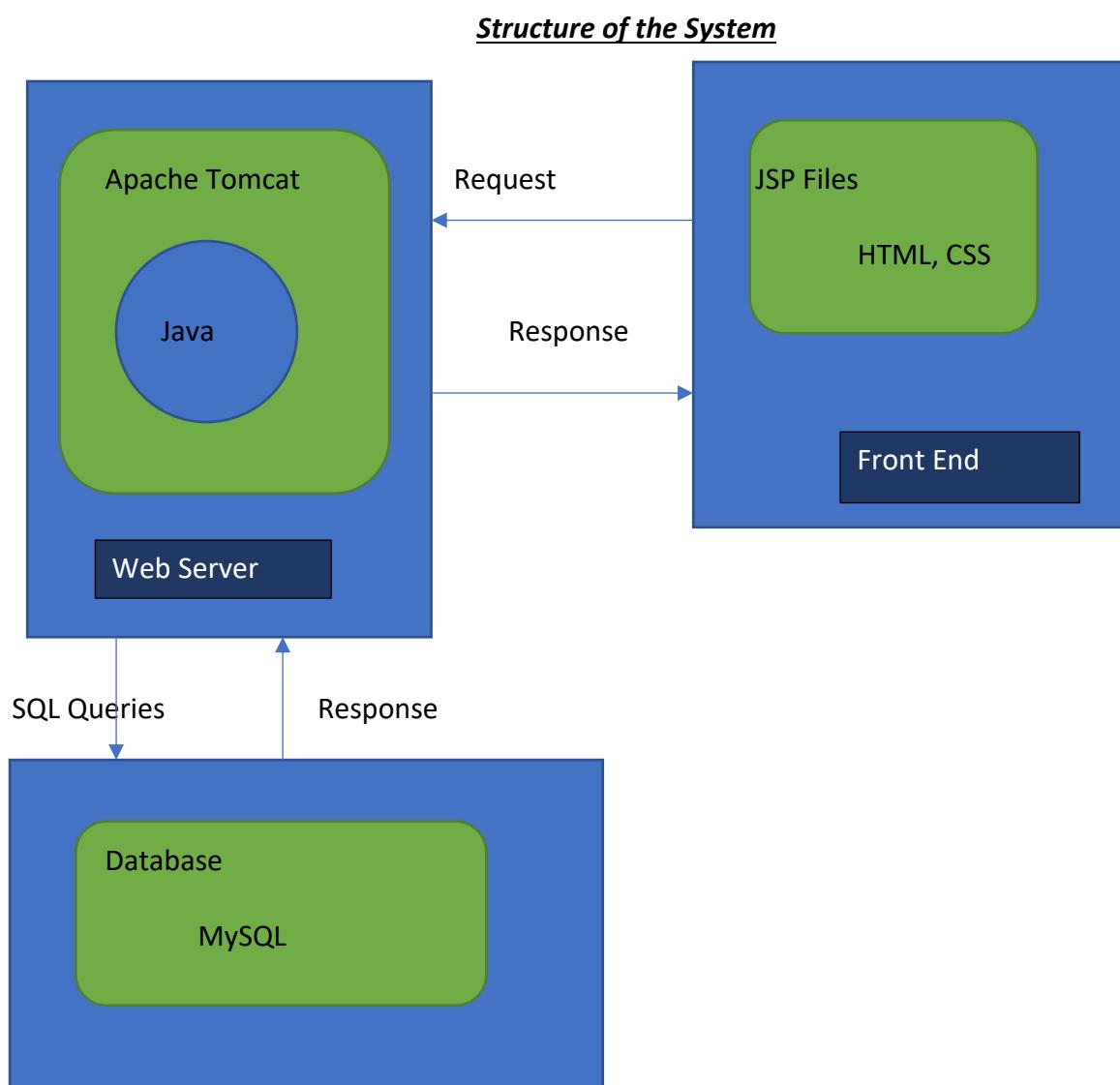
We will be implementing our code through Java IDE.

For database system, we are using MySQL but data entries.

We will be using DMLs, and DDLs for operations like deposits, withdrawals, and get statement.

We will be using HTML and CSS for beautify our banking system. It is important to give user-friendly look to users.

System Environment



Hardware and Software

Apache Tomcat

MacOS

RDMS

MySQL Community Server 8.0.20

Application Languages

Java, HTML, CSS, PHP (maybe), SQL

Functional Requirements

How user will access the system

The system provides functionality to create an account. User will be asked to set up a new account if he/she is new user else simply log in using their existing user credential in the database. If user wishes to setup a new account, the system opens new page for the user where the system asks several information for setting up the account such as First name, Last name, Date of Birth, Email Address, Gender, username, and password. Once the setup process completed, user will be redirected to banking system where they can select different operations. User cannot login if user's credential is not saved in the database. User cannot access without setting up the account. If user tries to access with fake username and password, they will be redirected to login page to use valid username or password. However, once user logs in, system will not ask to sign in again. System will assume user logged in through trusted device. Once logged in, users will be able to use several functions.

Functions

Log in

User shall set up an account to get an access to the banking system.

User's credentials must be saved in the database.

Withdraw

Once logged in, user shall select the withdraw option to get their money.

Once user chooses this function, the withdrawal sum will be deducted from the total amount.

Deposit

Once logged in, user shall use this function to deposit the money.

Once deposited, the deposited sum will be added to the total amount.

Statement

User shall choose this function to get a statement of the transaction after successful withdrawal and deposits.

Apply for Loan

User shall use this function to apply for a loan.

User gets approved only if thousand dollars is available in his bank account.

Order a cheque book

User can use this function to order a cheque book.

There will be a charge of \$1.00 for ordering a check.

Manage/update account information

User shall use this function to edit account information such as address, and phone number.

Transfer fund

User shall use this function to transfer fund to other.

Receiving person much be setup before transferring.

Search statement by date

If user wants to search statement from specific date, they can choose this function to select the date and search.

Sort the transactions

If user wishes to sort the transactions from higher to lower or lower higher, they can use this function to sort as wished.

Delete account.

If user wishes to terminate the account, they can simply use this function to delete the account. Once deleted, account will not be recovered. It will be permanent.

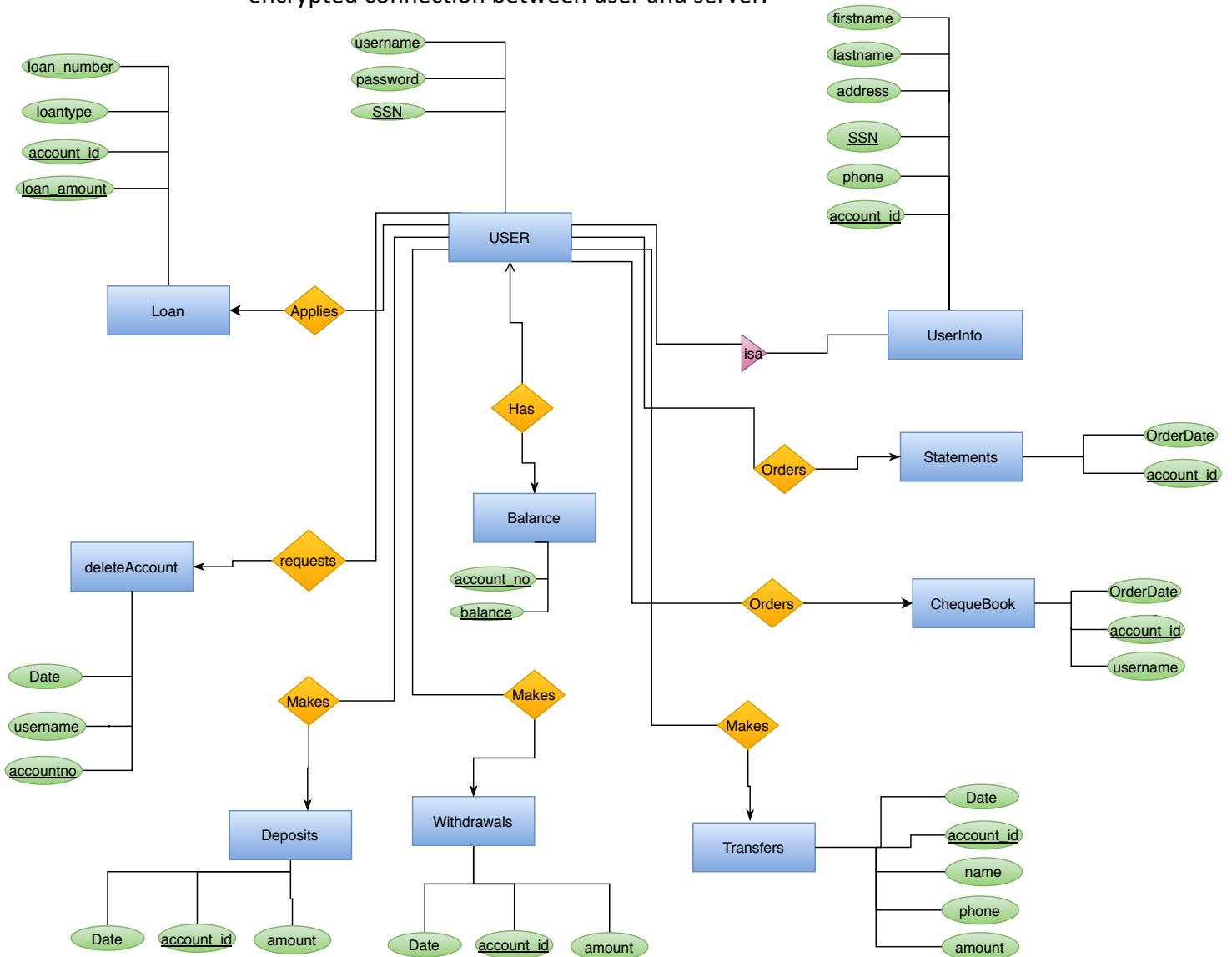
Display Account Information

The user will be able to view the account information through this function.

Graphics User Interface (GUI)

For the GUI, we will be using HTML to provide user-friendly environment. If possible, we will allow user to upload a picture of them for the account.

The security of each user account will be protected by a username and password created by the user. The username for each account will not be their email. User name will be the one which they choose while setting up the account. The user account information will be securely stored in the server. In order to login to the system the user must provide an existing username account along with the associated password. The website will be implemented using https providing an encrypted connection between user and server.



USERS:

User entity is the service offered by the bank where one may deposit, withdraw or transfer money, check balance, apply loan, check statement in their account information. Every customer has a unique account. The entity set contains the customers username and password to login and the SSN. SSN is the primary key.

USERINFO:

The userInfo entity is the entity that holds the information of the user. This entity represents the unique customer information, which is the customer's firstname, lastname, address, phone, SSN, account_id. The SSN and the account_id is the primary key. It is child of userInfo so it inherits the attributes from the USERS.

BALANCE:

The Balance entity is the entity that represents the total amount of the fund in the user's account. Every user has a balance. It has two attributes the account_no and the balance which gives them the information. Account_id is primary key.

LOAN:

Loan entity represents lending money to one or more individuals with the required interest rate from the bank. The user can apply for a loan. So the loan entity has the attributes loan number, Loan_type, account_id, loan amount where account_id is primary key.

DELETEDACCOUNT:

This is an entity provided to the user as a service to delete an account. A user can request to delete the account if they no longer are interested in the service. Its attributes are date, username, and account_no where account number is the primary key.

STATEMENTS:

Statement entity represents a record of the financial activities done by the customer which are also given as the written reports. It basically keeps track of the record list of transactions done by the customer over a certain period of time. User can order the statement any time. So, orderdate and the account_id are the attributes where account_id is the primary key.

CHEQUEBOOK:

This entity is another service provided to the customer where user can order the cheque book providing their account_id, and username. OrderDate keeps track when it was ordered.

DEPOSITS:

Deposit is entity set which is available to customer to deposit money into their bank account. These deposits can be made through cash, check by the customer. So, for the security of the customer's information. Deposits entity set has the account_id, Date and the amount as an attribute.

WITHDRAWALS:

Withdrawal entity set represents giving the customer an option to withdraw money whenever they want. The bank grants access to the customer for the withdrawals except for the unusual activities. This entity set contains withdraw amount, account_id and the DATE to withdraw from their account as an attribute.

TRANSFERS:

This entity set represents the electronic fund transfer from one person to another to the bank accounts. It is one of the services provided by the bank so that people can transfer, making people's lives easier. This entity set has the amount, date, name, phone number and the account_id so they can transfer directly to their account.

The screenshot shows the MySQL Workbench interface with the following details:

- Toolbar:** Includes icons for Home, Schemas, Tables, Views, Stored Procedures, Functions, Arren Baral, Banking System, bankingSystem, and cs157a.
- Menu Bar:** File, Edit, View, Query, Database, Server, Tools, Scripting, Help.
- Server Tab:** Active tab.
- Schemas:** Shows the 'ABCbank' schema with tables: chequeBookOrder, deletedAccount, deposits, hasBalance, Loan, Statements, Transfers, userinfo, and USERS.
- Table Selection:** Table 'USERS' selected.
- Query Editor:** A query is being run: `SELECT * FROM ABCbank.chequeBookOrder;`. The results are displayed in a grid.
- Result Grid:** Shows 18 rows of data from the 'chequeBookOrder' table. The columns are account_id, username, and orderDate. The data includes entries for John, Poela, Sam, Lay, Selene, Meq, Hawa, Ziyap, Jose, Pema, Luis, and Pema.
- Right Panel:** Contains context help and various tool buttons for result grid, form editor, field types, query stats, and execution plan.
- Bottom Status:** Shows the query completed message and the time: 09:21:30.

MySQL Workbench Schemas

```
1 • SELECT * FROM ABCbank.deletedAccount;
```

accountno	username	DATE
19	John	2020-07-29
19	John	2020-07-29
18	Mike	2020-07-29
20	Mike	2020-07-29
18	Mike	2020-07-29
44	clare	2020-07-30
51	Pao	2020-07-30
55	abc	2020-07-30
56	abc	2020-07-30
63	some	2020-08-01
63	some	2020-08-01
63	some	2020-08-01
64	some	2020-08-01
65	some	2020-08-01
66	some	2020-08-01
51	Pao	2020-08-01
52	Pao	2020-08-01
5	Pao	2020-08-01
5	Pao	2020-08-01

deletedAccount 1

Action Output

Time	Action	Response	Duration / Fetch Time
11 09:21:51	SELECT * FROM ABCbank.deletedAccount LIMIT 0, 1000	39 row(s) returned	0.000050 sec / 0.000...

Query Completed

MySQL Workbench Schemas

```
1 • SELECT * FROM ABCbank.deposits;
```

account_id	amount	DATE
24	400	2020-07-29
25	400	2020-07-29
26	400	2020-07-29
26	400	2020-07-29
27	400	2020-07-29
28	400	2020-07-29
29	400	2020-07-29
30	400	2020-07-29
31	400	2020-07-29
31	400	2020-07-29
37	400	2020-07-29
37	400	2020-07-29
35	400	2020-07-29
35	400	2020-07-29
36	400	2020-07-29
24	100	2020-07-29
24	40	2020-07-29
25	120	2020-07-29
28	120	2020-07-29
29	120	2020-07-29

deposit 1

Action Output

Time	Action	Response	Duration / Fetch Time
11 09:21:51	SELECT * FROM ABCbank.deposits	39 row(s) returned	0.000050 sec / 0.000...

Query Completed

MySQLWorkbench

File Edit View Query Database Server Tools Scripting Help

MySQL Workbench

Administration Schemas

ABCbank

Tables

- chequeBookOrder
- deletedAccount
- deposits
- hasBalance
- Loan
- Statements
- Transfers
- userinfo
- USERS
- withdrawals

Views

Stored Procedures

Functions

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Banking System

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Object Info Session

Table: USERS

Columns:

username	varchar(45)
password	varchar(45)
SSN	varchar(45) PK

hasBalance 1

Action Output

Time	Action	Response	Duration / Fetch Time
09:20:44	SELECT * FROM ABCbank.hasBalance LIMIT 0, 1000	36 row(s) returned	0.00034 sec / 0.000...

Result Grid

Filter Rows: Search

Edit: Export/Import:

Context Help Snippets

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid

Form Editor

Field Types

Query Stats

Execution Plan

Apply Revert

Query Completed

The screenshot shows the MySQL Workbench interface on a Mac OS X desktop. The main window displays a query result grid for the 'hasBalance' table. The grid has two columns: 'SSN' and 'balance'. The data consists of 36 rows, each containing a unique SSN and its corresponding balance value. The interface includes a sidebar for 'Administration' and 'Schemas', and a central workspace for writing and executing SQL queries. A status bar at the bottom shows the time as 09:20:44 and the duration of the query as 0.00034 sec / 0.000... The Mac OS X dock is visible at the bottom, showing various application icons.

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

MySQL Workbench

Administration Schemas

SCHEMAS Filter objects ABCbank

Tables: chequeBookOrder, deletedAccount, deposits, hasBalance, Loan, Statements, Transfers, userinfo

USERS

Views

Stored Procedures

Functions

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object info Session

Table: USERS

Columns:

- username varchar(45)
- password varchar(45)
- SSN varchar(45) PK

Result Grid

loan_number account_id loantype loan_amount

23	36	Home	150000
24	35	Auto	60000
25	34	Laptop	40000
26	33	Student	50000
27	32	Personal	20000
28	31	TV	20000
29	30	Bike	100000
30	29	Auto	90000
31	28	Watch	1000
32	27	iPad	400
33	26	Aimods	200
34	25	Phone	1000
35	24	Laptop	3000
36	23	Boat	150000
37	22	Home	225000
38	21	Auto	30000
HULL	HULL	HULL	HULL

Loan 1

Action Output

Time	Action	Response	Duration / Fetch Time
10 09:21:42	SELECT * FROM ABCbank.Loan LIMIT 0, 1000	16 row(s) returned	0.0026 sec / 0.00001...

Query Completed

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

MySQL Workbench

Administration Schemas

SCHEMAS Filter objects ABCbank

Tables: chequeBookOrder, deletedAccount, deposits, hasBalance, Loan, Statements, Transfers, userinfo

USERS

Views

Stored Procedures

Functions

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object info Session

Table: USERS

Columns:

- username varchar(45)
- password varchar(45)
- SSN varchar(45) PK

Result Grid

account_id orderDate

23	2020-07-29
38	2020-07-29
24	2020-07-29
23	2020-07-29
33	2020-07-29
31	2020-07-29
31	2020-07-29
36	2020-07-29
27	2020-07-29
26	2020-07-29
22	2020-07-29
29	2020-07-29
30	2020-07-29
30	2020-07-29
40	2020-07-30
45	2020-07-30
46	2020-07-30
47	2020-07-30
47	2020-07-30
HULL	2020-07-30
HULL	2020-07-30

Statements 1

Action Output

Time	Action	Response	Duration / Fetch Time
8 09:21:20	SELECT * FROM ABCbank.Statements LIMIT 0, 1000	55 row(s) returned	0.00032 sec / 0.000...

Query Completed

MySQL Workbench Schemas

Administration Schemas

ABCbank Tables

- chequeBookOrder
- deletedAccount
- deposits
- hasBalance
- Loan
- Statements
- Transfers
- userinfo

Users

Withdrawals

Views

Stored Procedures

Functions

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Object Info Session

Table: USERS

Columns:

- username varchar(45)
- password varchar(45)
- SSN varchar(45) PK

Transfers 1

Action Output

Time	Action	Response	Duration / Fetch Time
7 09:21:07	SELECT * FROM ABCbank.Transfers	33 row(s) returned	0.00040 sec / 0.000...

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid Form Editor Field Types Query Stats Execution Plan

ABCbank Tables

- chequeBookOrder
- deletedAccount
- deposits
- hasBalance
- Loan
- Statements
- Transfers
- userinfo

userinfo 1

Action Output

Time	Action	Response	Duration / Fetch Time
2 09:19:59	SELECT * FROM ABCbank.userInfo	38 row(s) returned	0.0014 sec / 0.00006...

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid Form Editor Field Types Query Stats Execution Plan

MySQLWorkbench

File Edit View Query Database Server Tools Scripting Help

MySQL Workbench

Administration Schemas

SCHEMAS

ABCbank

Tables

- chequeBookOrder
- deletedAccount
- deposits
- hasBalance
- Loan
- Statements
- Transfers
- userinfo
- USERS
- withdrawals

Views

Stored Procedures

Functions

Arren Baral

Banking System

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Object Info Session

Table: USERS

Columns:

username	varchar(45)
password	varchar(45)
SSN	varchar(45) PK

Result Grid

username password SSN

Jose	Lente2	1113
Selena	Selena1	1114
John	John13	1115
Lay	Lay13	1116
Sam	Sam2	1117
Luis	Luis2	1118
Zyad	Zyad1	1119
Hannah	Hannah1	1121
Meq	Meq12	1122
Alegra	Alegra1	1123
Listia	Listia2	1124
Pal	Pal12	1125
Perna	Perna12	1126
Extre	Extre1	1127
Poala	poala3	1128
juan	juan12	1212...
arrenb...	baral1	1234
abc	abc1	2122
tomhank	password	2334
mikel	wu12	3232
rwan	rwan	3434

Action Output

Time	Action	Response	Duration / Fetch Time
3	09:20:27	SELECT * FROM ABCbank.USERS LIMIT 0, 1000	36 row(s) returned 0.00050 sec / 0.000...

Query Completed

MySQLWorkbench

File Edit View Query Database Server Tools Scripting Help

MySQL Workbench

Administration Schemas

SCHEMAS

ABCbank

Tables

- chequeBookOrder
- deletedAccount
- deposits
- hasBalance
- Loan
- Statements
- Transfers
- userinfo
- USERS
- withdrawals

Views

Stored Procedures

Functions

Arren Baral

Banking System

bankingsystem

cs157a

Object Info Session

Table: withdrawals

Columns:

account_id	amount	DATE
30	40	2020-07-29
22	120	2020-07-29
21	120	2020-07-29
27	222	2020-07-29
27	323	2020-07-29
22	36	2020-07-29
23	700	2020-07-29
35	300	2020-07-29
36	980	2020-07-29
32	10000	2020-07-29
32	408	2020-07-29
33	796	2020-07-29
34	900	2020-07-29
34	340	2020-07-29
28	36	2020-07-29
39	100	2020-07-30
40	20	2020-07-30
40	40	2020-07-30
40	450	2020-07-30
46	400	2020-07-30
47	20	2020-07-30

Result Grid

account_id amount DATE

30	40	2020-07-29
22	120	2020-07-29
21	120	2020-07-29
27	222	2020-07-29
27	323	2020-07-29
22	36	2020-07-29
23	700	2020-07-29
35	300	2020-07-29
36	980	2020-07-29
32	10000	2020-07-29
32	408	2020-07-29
33	796	2020-07-29
34	900	2020-07-29
34	340	2020-07-29
28	36	2020-07-29
39	100	2020-07-30
40	20	2020-07-30
40	40	2020-07-30
40	450	2020-07-30
46	400	2020-07-30
47	20	2020-07-30

Action Output

Time	Action	Response	Duration / Fetch Time
6	09:21:01	SELECT * FROM ABCbank.withdrawals LIMIT 0, 1000	43 row(s) returned 0.00035 sec / 0.000...

Query Completed

