# 作业8-10185102142-李泽浩

**加载JDBC驱动程序，利用JDBC连接bank数据库**

**1.使用JDBC批量(addBatch)执行的静态SQL：**

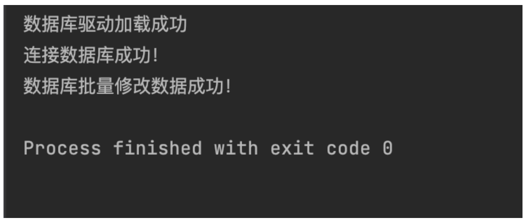
a. 向account中插入数据('6000.29', null, '2018-01-12', '2015-01-12', '正常', '7', '2', '10', 'CS')

b. 更新account中开户员工编号为10的最后活跃时间为（'2021-05-17'）

c. 删除acc_transaction中交易金额最少的数据

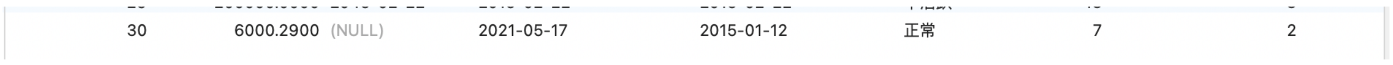
```java
package com.company;
import java.sql.Statement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import java.sql.*;

public class Main {
    Connection con;
    public void getConnection() {
        try {
            Class.forName("com.mysql.jdbc.Driver");
            System.out.println("数据库驱动加载成功");
        } catch(ClassNotFoundException e){
            e.printStackTrace();
        }

        try {
            String url ="jdbc:mysql://localhost:3306/bank";
            String user="root";    //访问数据库的用户名
            String password="123456";    //访问数据库的密码
            con= DriverManager.getConnection(url,user,password);
            System.out.println("连接数据库成功！");

        } catch (SQLException ex) {
            System.out.println("连接数据库失败！");
            ex.printStackTrace();
        }
    }
    public void BatchInsert(){ //批量执行静态SQL语句
        try{
            Statement stmt = con.createStatement();
            stmt.addBatch("insert into account values(null, '6000.29', null, '2018-01-
12', '2015-01-12', '正常', '7', '2', '10', 'CS');");
```

```java
            stmt.addBatch("update account set LAST_ACTIVITY_DATE='2021-05-17' where
OPEN_EMP_ID='10'");
            stmt.addBatch("DELETE FROM acc_transaction where TXN_ID=(select A.TXN_ID
from(select TXN_ID FROM acc_transaction where AMOUNT<=ALL(select AMOUNT FROM
acc_transaction)) as A)");

            stmt.executeBatch();
            stmt.close();
            System.out.println("数据库批量修改数据成功! ");
        }catch(SQLException ec){
            System.out.println("数据库批量插入数据失败! ");
            ec.printStackTrace();
        }
    }
    public static void main(String[] args) {
        Main c = new Main();
        c.getConnection();
        c.BatchInsert();
    }
}
```



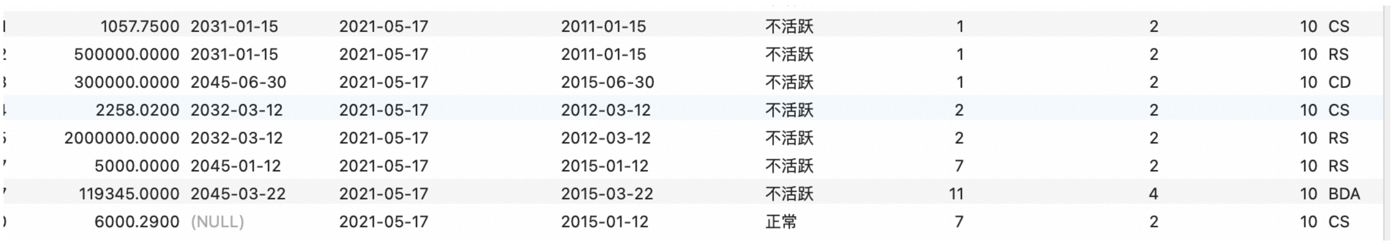
```
数据库驱动加载成功
连接数据库成功!
数据库批量修改数据成功!

Process finished with exit code 0
```

(a)



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30 | 6000.2900 | (NULL) | 2021-05-17 | 2015-01-12 | 正常 | 7 | 2 |

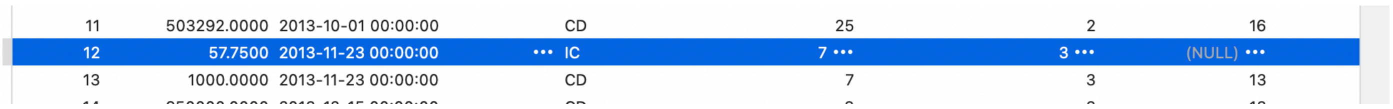
(b)



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1057.7500 | 2031-01-15 | 2021-05-17 | 2011-01-15 | 不活跃 | 1 | 2 | 10 | CS |
| 500000.0000 | 2031-01-15 | 2021-05-17 | 2011-01-15 | 不活跃 | 1 | 2 | 10 | RS |
| 300000.0000 | 2045-06-30 | 2021-05-17 | 2015-06-30 | 不活跃 | 1 | 2 | 10 | CD |
| 2258.0200 | 2032-03-12 | 2021-05-17 | 2012-03-12 | 不活跃 | 2 | 2 | 10 | CS |
| 2000000.0000 | 2032-03-12 | 2021-05-17 | 2012-03-12 | 不活跃 | 2 | 2 | 10 | RS |
| 5000.0000 | 2045-01-12 | 2021-05-17 | 2015-01-12 | 不活跃 | 7 | 2 | 10 | RS |
| 119345.0000 | 2045-03-22 | 2021-05-17 | 2015-03-22 | 不活跃 | 11 | 4 | 10 | BDA |
| 6000.2900 | (NULL) | 2021-05-17 | 2015-01-12 | 正常 | 7 | 2 | 10 | CS |

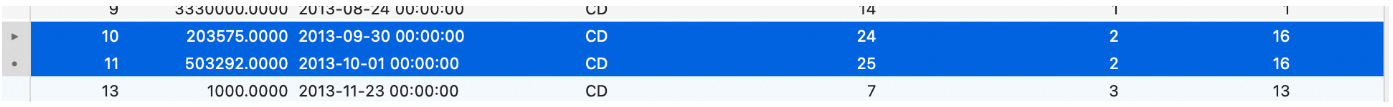
(c)

删除前：



| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 503292.0000 | 2013-10-01 00:00:00 | CD | 25 | 2 | 16 |
| 12 | 57.7500 | 2013-11-23 00:00:00 | IC | 7 | 3 | (NULL) |
| 13 | 1000.0000 | 2013-11-23 00:00:00 | CD | 7 | 3 | 13 |

删除后：

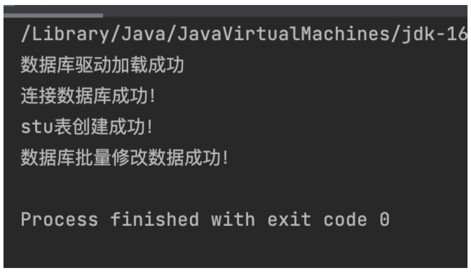


| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | 3330000.0000 | 2013-08-24 00:00:00 | CD | 14 | 1 | 1 |
| 10 | 203575.0000 | 2013-09-30 00:00:00 | CD | 24 | 2 | 16 |
| 11 | 503292.0000 | 2013-10-01 00:00:00 | CD | 25 | 2 | 16 |
| 13 | 1000.0000 | 2013-11-23 00:00:00 | CD | 7 | 3 | 13 |

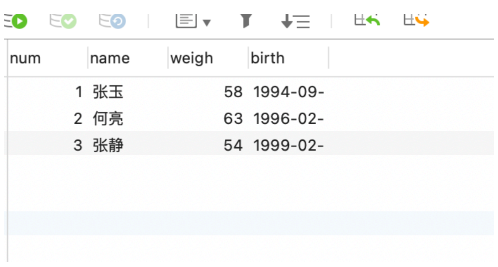
**2.使用JBDC创建表stu包含字段（num(主键),name, weigh, birth）并用批量(addBatch)执行动态SQL向stu插入以下数据：**

('张玉',57.50,'1994-9-1');
('何亮',62.7599,'1996-2-1');
('张静',54.45,'1999-2-3');

```
import java.sql.Statement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import java.sql.*;

public class Main {
    Connection con;
    public void getConnection() {
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            System.out.println("数据库驱动加载成功");
        } catch(ClassNotFoundException e){
            e.printStackTrace();
        }
        //String sql = "SELECT * FROM customer";
        try {
            String url ="jdbc:mysql://localhost:3306/bank_2";
            String user="root";    //访问数据库的用户名
            String password="123456";    //访问数据库的密码
            con= DriverManager.getConnection(url,user,password);
            System.out.println("连接数据库成功！");

        } catch (SQLException ex) {
            System.out.println("连接数据库失败！");
            ex.printStackTrace();
        }
    }
    public void Create_Table(){
        try {
            Statement stmt1 = con.createStatement();
            String sql1 = "CREATE TABLE stu(" +
                    "num INT NOT NULL," +
                    "name varchar(255)," +
                    "weigh INT," +
                    "birth DATE," +
                    "PRIMARY KEY(num));";
            stmt1.executeUpdate(sql1);
            stmt1.close();
            System.out.println("stu表创建成功! ");
        }catch(SQLException ec){
            System.out.println("stu表创建失败! ");
            ec.printStackTrace();
        }
    }

    public void BatchInsert(){ //批量执行静态SQL语句
        try{
            Statement stmt = con.createStatement();
            stmt.addBatch("insert into stu values('1','张玉', '57.50','1994-9-1');");
            stmt.addBatch("insert into stu values('2','何亮','62.7599','1996-2-1');");
            stmt.addBatch("insert into stu values('3','张静','54.45','1999-2-3');");

            stmt.executeBatch();
            stmt.close();
            System.out.println("数据库批量修改数据成功! ");
        }catch(SQLException ec){
            System.out.println("数据库批量插入数据失败! ");
            ec.printStackTrace();
        }
    }
    public static void main(String[] args) {
        Main c = new Main();
        c.getConnection();
        c.Create_Table();
        c.BatchInsert();
    }
}
```



```
/Library/Java/JavaVirtualMachines/jdk-16
数据库驱动加载成功
连接数据库成功!
stu表创建成功!
数据库批量修改数据成功!

Process finished with exit code 0
```

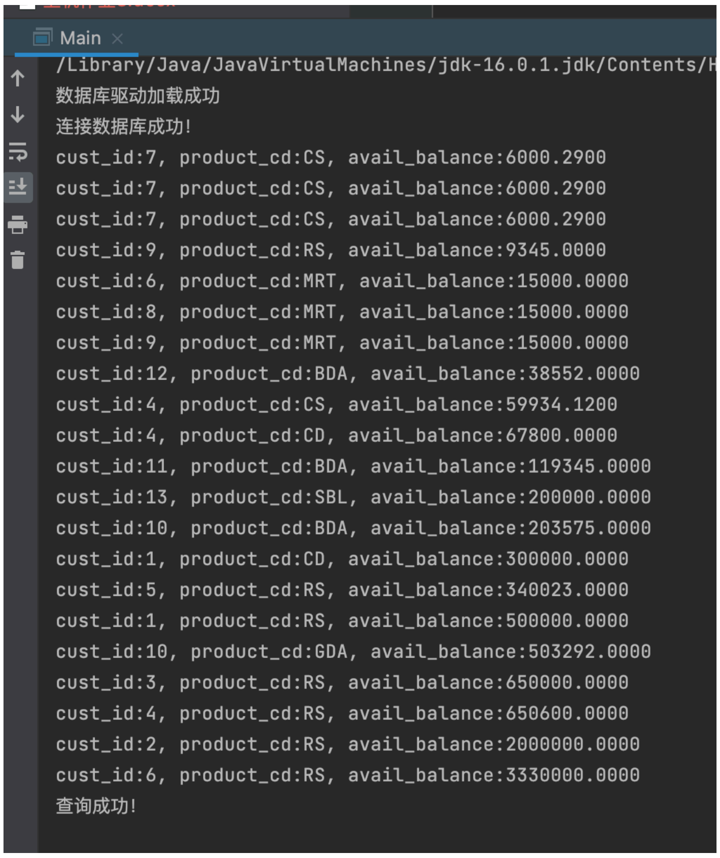


| num | name | weigh | birth |
|---|---|---|---|
| 1 | 张玉 | 58 | 1994-09- |
| 2 | 何亮 | 63 | 1996-02- |
| 3 | 张静 | 54 | 1999-02- |

**3.使用JDBC查询account中可用余额大于5000的客户编号、产品编号、可用余额，按照可用余额升序排列，最终结果用System.out.print打印。**

```
import java.sql.Statement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import java.sql.*;

public class Main {
    Connection con;
    public void getConnection() {
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            System.out.println("数据库驱动加载成功");
        } catch(ClassNotFoundException e){
            e.printStackTrace();
        }
        //String sql = "SELECT * FROM customer";
        try {
            String url ="jdbc:mysql://localhost:3306/bank_2";
            String user="root";    //访问数据库的用户名
            String password="123456";    //访问数据库的密码
            con= DriverManager.getConnection(url,user,password);
            System.out.println("连接数据库成功! ");

        } catch (SQLException ex) {
            System.out.println("连接数据库失败! ");
            ex.printStackTrace();
        }
    }
    public void Select(){
        try {
            Statement stmt1 = con.createStatement();
            String sql1 = "SELECT CUST_ID, PRODUCT_CD, AVAIL_BALANCE FROM account WHERE
AVAIL_BALANCE > 5000\n" +
                    "ORDER BY AVAIL_BALANCE ASC;";
            ResultSet res = stmt1.executeQuery(sql1);

            while (res.next())
            {
                String cust = res.getString(1);
                String type = res.getString(2);
                String amount = res.getString(3);
                System.out.println("cust_id:"+cust+", product_cd:"+type+",
avail_balance:"+amount);
            }
            System.out.println("查询成功! ");
            res.close();
            stmt1.close();
            con.close();
        }catch(SQLException ec){
            System.out.println("查询失败！");
            ec.printStackTrace();
        }
    }

    public static void main(String[] args) {
        Main c = new Main();
        c.getConnection();
        c.Select();
    }
}
```

查询结果部分截图如下：



```
/Library/Java/JavaVirtualMachines/jdk-16.0.1.jdk/Contents/H
数据库驱动加载成功
连接数据库成功!
cust_id:7, product_cd:CS, avail_balance:6000.2900
cust_id:7, product_cd:CS, avail_balance:6000.2900
cust_id:7, product_cd:CS, avail_balance:6000.2900
cust_id:9, product_cd:RS, avail_balance:9345.0000
cust_id:6, product_cd:MRT, avail_balance:15000.0000
cust_id:8, product_cd:MRT, avail_balance:15000.0000
cust_id:9, product_cd:MRT, avail_balance:15000.0000
cust_id:12, product_cd:BDA, avail_balance:38552.0000
cust_id:4, product_cd:CS, avail_balance:59934.1200
cust_id:4, product_cd:CD, avail_balance:67800.0000
cust_id:11, product_cd:BDA, avail_balance:119345.0000
cust_id:13, product_cd:SBL, avail_balance:200000.0000
cust_id:10, product_cd:BDA, avail_balance:203575.0000
cust_id:1, product_cd:CD, avail_balance:300000.0000
cust_id:5, product_cd:RS, avail_balance:340023.0000
cust_id:1, product_cd:RS, avail_balance:500000.0000
cust_id:10, product_cd:GDA, avail_balance:503292.0000
cust_id:3, product_cd:RS, avail_balance:650000.0000
cust_id:4, product_cd:RS, avail_balance:650600.0000
cust_id:2, product_cd:RS, avail_balance:2000000.0000
cust_id:6, product_cd:RS, avail_balance:3330000.0000
查询成功!
```

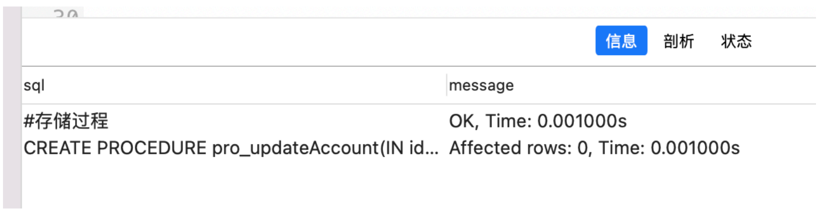
**4.建立存储过程pro_ updateAccount,使用Connection对象的prepareCall调用存储过程pro_updateAccount:**

a.对于客户(customer)所在城市为上海的，若可用余额大于100000，增加可用余额5000，否则增加余额1000；

b.客户城市在杭州的，若LAST_ACTIVATE_DATE与OPEN_DATE间隔大于365天，可用余额增加百分之20，否则增加百分之10.

```
DROP PROCEDURE IF EXISTS pro_updateAccount;
```

```
CREATE PROCEDURE pro_updateAccount( )
BEGIN
    DECLARE id INT;
    DECLARE cid INT;
    DECLARE balance DECIMAL(12,4);
    DECLARE odate DATETIME;
    DECLARE ladate DATETIME;
    DECLARE city VARCHAR(20);

DECLARE cur CURSOR FOR
SELECT ACCOUNT_ID,AVAIL_BALANCE,OPEN_DATE,LAST_ACTIVITY_DATE,CUST_ID
FROM account;
    DECLARE exit HANDLER FOR NOT FOUND CLOSE cur;
    OPEN cur;

    REPEAT
        FETCH cur INTO id,balance,odate,ladate,cid;
        SELECT customer.CITY INTO city
        FROM customer
        WHERE cid=customer.CUST_ID;
        UPDATE account
        SET AVAIL_BALANCE=CASE
            WHEN city="上海市" AND balance>100000 THEN
                balance+5000
            WHEN city="上海市" AND balance<=100000 THEN
                balance+1000
            WHEN city="杭州市" AND TIMESTAMPDIFF(DAY,odate,ladate)>365 THEN
                balance*1.2
            WHEN city="杭州市" AND TIMESTAMPDIFF(DAY,odate,ladate)<=365 THEN
                balance*1.1
            ELSE
                balance
        END
        WHERE id=account.ACCOUNT_ID;
    UNTIL 0 END REPEAT;
    CLOSE cur;
END
```

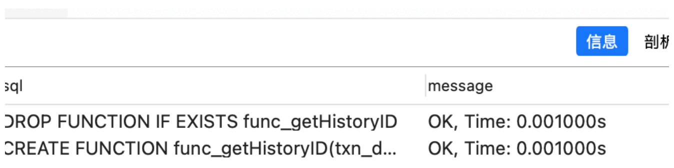


```
sql                                         message
#存储过程                                    OK, Time: 0.001000s
CREATE PROCEDURE pro_updateAccount(IN id...  Affected rows: 0, Time: 0.001000s
```

```
//调用
import java.sql.Statement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import java.sql.*;

public class Main {
    Connection con;
    public void getConnection() {
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            System.out.println("数据库驱动加载成功");
        } catch(ClassNotFoundException e){
            e.printStackTrace();
        }
        //String sql = "SELECT * FROM customer";
        try {
            String url ="jdbc:mysql://localhost:3306/bank_2";
            String user="root";    //访问数据库的用户名
            String password="123456";    //访问数据库的密码
            con= DriverManager.getConnection(url,user,password);
            System.out.println("连接数据库成功！");

        } catch (SQLException ex) {
            System.out.println("连接数据库失败！");
            ex.printStackTrace();
        }
    }
    public void Procedure(){
        try {
            String call="{call pro_updateAccount()}";
            CallableStatement callableStatement = con.prepareCall(call);
            callableStatement.execute();

            System.out.println("procedure 调用成功！");
            con.close();
        }catch(SQLException ec){
            System.out.println("procedure 调用失败！");
            ec.printStackTrace();
        }
    }

    public static void main(String[] args) {
        Main c = new Main();
        c.getConnection();
        c.Procedure();
    }
}
```

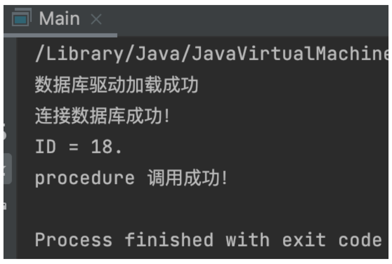
**5.使用Connection对象的prepareCall方法调用存储函数func_getHistoryID，接受输入参数txn_data、txn_type，返回交易时间在txn_data之后且交易类型为txn_type、账户编号最小的的交易历史编号,并在JDBC中用tx_data="2015-01-01",txn_type='CD'验证。**

```
#函数
DROP FUNCTION IF EXISTS func_getHistoryID;

CREATE FUNCTION func_getHistoryID(txn_data DATETIME, txn_type varchar(255))
RETURNS INT
BEGIN
  DECLARE id INT DEFAULT 0;

  SELECT min(TXN_ID) INTO id
  FROM(
    SELECT TXN_ID
    FROM acc_transaction as a
    WHERE a.TXN_DATE > txn_data AND a.TXN_TYPE_CD = txn_type
    ) as M;

  RETURN id;
END;
```



| sql | message |
|---|---|
| DROP FUNCTION IF EXISTS func_getHistoryID | OK, Time: 0.001000s |
| CREATE FUNCTION func_getHistoryID(txn_d... | OK, Time: 0.001000s |

```
//调用
import java.sql.Statement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import java.sql.*;

public class Main {
    Connection con;
    public void getConnection() {
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            System.out.println("数据库驱动加载成功");
        } catch(ClassNotFoundException e){
            e.printStackTrace();
        }
        //String sql = "SELECT * FROM customer";
        try {
            String url ="jdbc:mysql://localhost:3306/bank_2";
            String user="root";    //访问数据库的用户名
            String password="123456";    //访问数据库的密码
            con= DriverManager.getConnection(url,user,password);
            System.out.println("连接数据库成功! ");

        } catch (SQLException ex) {
            System.out.println("连接数据库失败! ");
            ex.printStackTrace();
        }
    }
    public void Procedure(){
        try {

            String call="{? = CALL func_getHistoryID(?,?)}";
            CallableStatement callableStatement=con.prepareCall(call);
            callableStatement.registerOutParameter(1,Types.BIGINT);
            callableStatement.setDate(2,Date.valueOf("2015-01-01"));
            callableStatement.setString(3,"CD");
            callableStatement.execute();

            String res = callableStatement.getString(1);
            System.out.println("ID = "+ res +".");

            System.out.println("procedure 调用成功! ");
            callableStatement.close();
            con.close();
        }catch(SQLException ec){
            System.out.println("procedure 调用失败! ");
            ec.printStackTrace();
        }
    }

    public static void main(String[] args) {
        Main c = new Main();
        c.getConnection();
        c.Procedure();
    }
}
```



```
/Library/Java/JavaVirtualMachine
数据库驱动加载成功
连接数据库成功!
ID = 18.
procedure 调用成功!

Process finished with exit code
```