

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:

- 向account中插入数据('6000.29', null, '2018-01-12', '2015-01-12', '正常', '7', '2', '10', 'CS')
- 更新account中开户员工编号为10的最后活跃时间为 ('2021-05-17')
- 删除acc_transaction中交易金额最少的数据

```
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();
        }

        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 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');");
            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.clearBatch();
        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)

| | | | | | | | | | |
|---|------------------|------------|------------|------------|-----|----|---|----|-----|
| 1 | 1057.7500 | 2031-01-15 | 2021-05-17 | 2011-01-15 | 不活跃 | 1 | 2 | 10 | CS |
| 2 | 500000.0000 | 2031-01-15 | 2021-05-17 | 2011-01-15 | 不活跃 | 1 | 2 | 10 | RS |
| 3 | 300000.0000 | 2045-06-30 | 2021-05-17 | 2015-06-30 | 不活跃 | 1 | 2 | 10 | CD |
| 4 | 2258.0200 | 2032-03-12 | 2021-05-17 | 2012-03-12 | 不活跃 | 2 | 2 | 10 | CS |
| 5 | 2000000.0000 | 2032-03-12 | 2021-05-17 | 2012-03-12 | 不活跃 | 2 | 2 | 10 | RS |
| 6 | 5000.0000 | 2045-01-12 | 2021-05-17 | 2015-01-12 | 不活跃 | 7 | 2 | 10 | RS |
| 7 | 119345.0000 | 2045-03-22 | 2021-05-17 | 2015-03-22 | 不活跃 | 11 | 4 | 10 | BDA |
| 8 | 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JDBC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 auto_increment," +
                "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(){ //
    try{
        String insert="insert into stu(name,weigh,birth) values(?,?,?)";
        PreparedStatement preparedStatement=con.prepareStatement(insert);

        preparedStatement.setString(1,"张玉");
        preparedStatement.setDouble(2,57.50);
        preparedStatement.setDate(3,Date.valueOf("1994-09-01"));
        preparedStatement.addBatch();

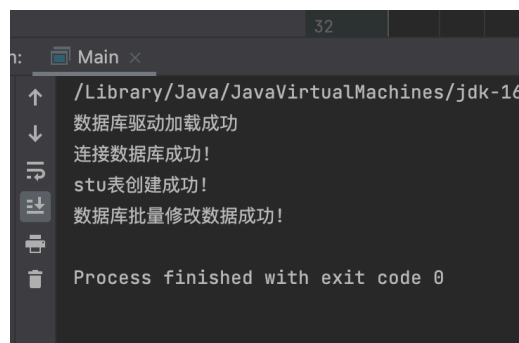
        preparedStatement.setString(1,"何亮");
        preparedStatement.setDouble(2,62.7599);
        preparedStatement.setDate(3,Date.valueOf("1996-02-01"));
        preparedStatement.addBatch();

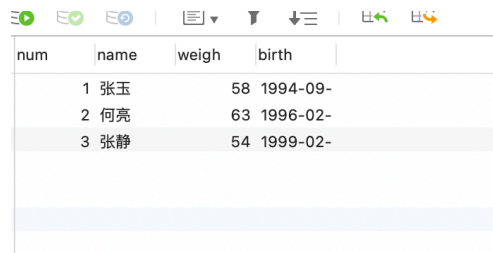
        preparedStatement.setString(1,"张静");
        preparedStatement.setDouble(2,54.45);
        preparedStatement.setDate(3,Date.valueOf("1999-02-03"));
        preparedStatement.addBatch();

        preparedStatement.executeBatch();
        System.out.println("数据库批量修改数据成功!");
        preparedStatement.clearBatch();
        con.close();
    }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();
}
}

```





| 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：

```

Main x
/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 ldate 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,ldate,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,ldate)>365 THEN
                balance*1.2
            WHEN city="杭州市" AND TIMESTAMPDIFF(DAY,odate,ldate)<=365 THEN
                balance*1.1
            ELSE
                balance
            END
        WHERE id=account.ACCOUNT_ID;
    UNTIL 0 END REPEAT;
    CLOSE cur;
END
```

| 信息 剖析 状态 | |
|---|-----------------------------------|
| 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();
        }
    }
}
```

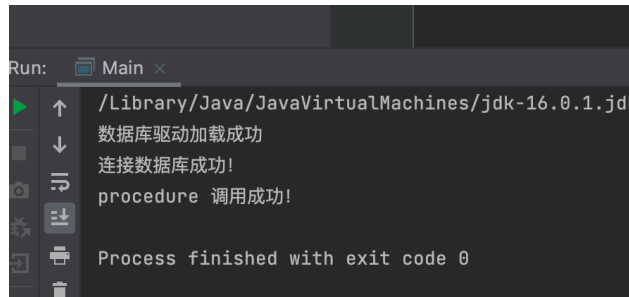


```

    }
}

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;

```

| 信息 剖析 | |
|--|---------------------|
| 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();
}
}
```



The screenshot shows a Java application window titled "Main" with a dark background. The text inside the window is as follows:

```
/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
```