



哈爾濱工業大學  
HARBIN INSTITUTE OF TECHNOLOGY

# 数据库系统

## 实验报告之二

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## 实验二 使用高级语言操作 MySQL 数据库

### 第 1 章 实验目的

学会使用高级语言访问 MySQL 数据库, 并进行查询。

### 第 2 章 实验环境

- Ubuntu 16.04.5; MySQL Ver 14.14 Distrib 5.7.25
- Java version 1.8.0\_181; IDEA 2018.3.5

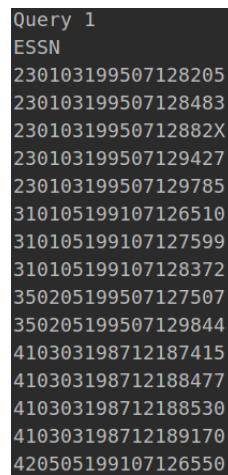
### 第 3 章 实验过程及结果

实验中统一使用的命令行语句如下所示

```
java -cp /lib/java_lib/commons-cli-1.4.jar:\
/lib/java_lib/mysql-connector-java-5.1.47.jar:\
COMPANY_Query -q <Number> -p [Parameters]
```

```
1.    String PARA_PNO = "%PNO%";
      String query = "SELECT ESSN FROM WORKS_ON
                      WHERE PNO = '\" + PARA_PNO + '\"";
      System.out.println("Query " + count);
      System.out.println("Please input pno:");
      String pno = cin.nextLine();
      query = query.replace(PARA_PNO, pno);
      resultSet = statement.executeQuery(query);
      System.out.println("ESSN");
      while (resultSet.next())
          System.out.println(resultSet.getString("ESSN"));
```

当输入%PNO% 为 P1 时, 实验结果如图3.1所示, 由于结果过长, 此处仅仅截取了部分结果。



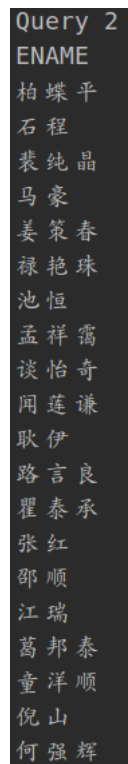
```
Query 1
ESSN
230103199507128205
230103199507128483
23010319950712882X
230103199507129427
230103199507129785
310105199107126510
310105199107127599
310105199107128372
350205199507127507
350205199507129844
410303198712187415
410303198712188477
410303198712188530
410303198712189170
420505199107126550
```

图 3.1: 参加了项目编号为 %PNO% 的项目的员工姓名

```
2.    String PARA_PNAME = "%PNAME%";
      String query = "SELECT ENAME FROM EMPLOYEE, WORKS_ON, PROJECT
                      WHERE EMPLOYEE.ESSN = WORKS_ON.ESSN
                      AND PROJECT.PNO = WORKS_ON.PNO
                      AND PROJECT.PNAME = \" + PARA_PNAME + \"";

      System.out.println("Query " + count);
      System.out.println("Please input pname:");
      String pname = cin.nextLine();
      query = query.replace(PARA_PNAME, pname);
      resultSet = statement.executeQuery(query);
      System.out.println("ENAME");
      while (resultSet.next())
          System.out.println(resultSet.getNString("ENAME"));
```

当输入%PNAME% 为 SQL Project 时, 实验结果如图3.2所示.



Query 2  
ENAME  
柏蝶平  
石程  
裴纯晶  
马豪  
姜策春  
禄艳珠  
池恒  
孟祥雷  
谈怡奇  
闻莲谦  
耿伊  
路言良  
瞿泰承  
张红  
邵顺  
江瑞  
葛邦泰  
童洋顺  
倪山  
何强辉

图 3.2: 参加了项目名为%PNAME% 的员工名字

```
3. String PARA_DNAME = "%DNAME%";  
String query = "SELECT ENAME, ADDRESS FROM EMPLOYEE, DEPARTMENT  
               WHERE EMPLOYEE.DNO = DEPARTMENT.DNO  
               AND DEPARTMENT.DNAME = \"";  
  
System.out.println("Query " + count);  
System.out.println("Please input dname:");  
String dname = cin.nextLine();  
query = query.replace(PARA_DNAME, dname);  
resultSet = statement.executeQuery(query);  
System.out.println("ENAME");  
while (resultSet.next())  
    System.out.println(resultSet.getString("ENAME") +  
                        "\t" + resultSet.getString("ADDRESS"));
```

当输入%DNAME% 为 International Department 时, 实验结果如图3.3所示.

Query 3

ENAME	ADDRESS
封鸿馨	黑龙江省哈尔滨市道里区安阳路1号
司马善	哈尔滨市道里区河松街219号
孟祥霭	哈尔滨市道里区河松街219号
赫连友	哈尔滨市道里区抚利街与抚顺街交会处
路瑞	哈尔滨市南岗区松花江街139号
葛邦泰	哈尔滨市道里区河松街219号
杨以	哈尔滨市道里区顾新路295号
师强	哈尔滨市南岗区学府三道街27号
魏裕	顾新路396号
童洋顺	哈尔滨市道里区河松街219号
倪山	大民兴街9号
长孙韦	顾新路396号
于凝刚	哈尔滨市道里区顾新路295号

图 3.3: 在%PNAME% 工作的所有工作人员的名字和地址

```

4.  String PARA_SALARY = "%SALARY%";
    String PARA_DNAME = "%DNAME%";
    String query = "SELECT ENAME, ADDRESS FROM EMPLOYEE, DEPARTMENT
                    WHERE EMPLOYEE.DNO = DEPARTMENT.DNO
                      AND DEPARTMENT.DNAME = '\" + PARA_DNAME + '\"
                      AND SALARY < \" + PARA_SALARY;

    System.out.println("Query " + count);
    System.out.println("Please input dname:");
    dname = cin.nextLine();
    System.out.println("Please input salary:");
    int salary = Integer.parseInt(cin.nextLine());
    query = query.replace(PARA_DNAME, dname)
                .replace(PARA_SALARY, String.valueOf(salary));
    resultSet = statement.executeQuery(query);
    System.out.println("ENAME\tADDRESS");
    while (resultSet.next())
        System.out.println(resultSet.getString("ENAME") +
                            "\t" + resultSet.getString("ADDRESS"));

```

当输入%DNAME% 为 International Department, 输入%SALARY% 为 4000 时, 实验结果如图3.4所示.

```
Query 4
ENAME    ADDRESS
司马善   哈尔滨市道里区河松街219号
孟祥霏   哈尔滨市道里区河松街219号
赫连友   哈尔滨市道里区抚利街与抚顺街交会处
葛邦泰   哈尔滨市道里区河松街219号
杨以     哈尔滨市道里区顾新路295号
魏裕     顾新路396号
童洋顺   哈尔滨市道里区河松街219号
倪山     大民兴街9号
长孙韦   顾新路396号
于凝刚   哈尔滨市道里区顾新路295号
```

图 3.4: 在%DNAME% 工作且工资低于%SALARY% 的员工的名字和地址

```
5.      String PARA_PNO = "%PNO%";
        String query = "SELECT ENAME FROM EMPLOYEE
        WHERE ESSN NOT IN (
            SELECT DISTINCT ESSN
            FROM WORKS_ON
            WHERE WORKS_ON.PNO =\" + PARA_PNO + "\")";
        System.out.println("Query " + count);
        System.out.println("Please input pno");
        pno = cin.nextLine();
        query = query.replace(PARA_PNO, pno);
        resultSet = statement.executeQuery(query);
        System.out.println("ENAME");
        while (resultSet.next())
            System.out.println(resultSet.getString("ENAME"));
```

当输入%PNO% 为 P2 时, 实验结果如图3.5所示.

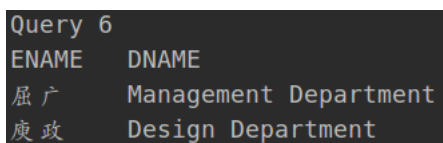
```
Query 5
ENAME
关琴
柏蝶平
石程
叶中晶
桑桂
马豪
齐娟
丁江毓
溥羽娟
裴启竹
禄艳珠
```

图 3.5: 没有参加项目编号为%PNO% 的项目的员工姓名

```
6. String PARA_ENAME = "%ENAME%";
String query = "SELECT ENAME, DNAME FROM EMPLOYEE, DEPARTMENT
               WHERE EMPLOYEE.DNO = DEPARTMENT.DNO
               AND EMPLOYEE.SUPERSSN IN (
               SELECT ESSN FROM EMPLOYEE
               WHERE ENAME = '\" + PARA_ENAME + '\")";

System.out.println("Query " + count);
System.out.println("Please input ename");
String ename = cin.nextLine();
query = query.replace(PARA_ENAME, ename);
resultSet = statement.executeQuery(query);
System.out.println("ENAME\tDNAME");
while (resultSet.next())
    System.out.println(resultSet.getString("ENAME") +
                       "\t" + resultSet.getString("DNAME"));
```

当输入%ENAME% 为张红时, 实验结果如图3.6所示.



ENAME	DNAME
屈广	Management Department
庾政	Design Department

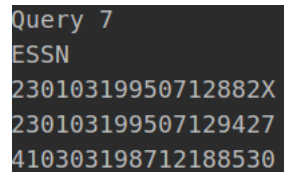
图 3.6: 由%ENAME% 领导的工作人员的姓名和所在的部门名字

```
7. String PARA_PNO = "%PNO%";
String query = "SELECT ESSN FROM WORKS_ON
               WHERE PNO = '\" + PARA_PNO + \"1\"
               AND ESSN IN (
               SELECT ESSN FROM WORKS_ON
               WHERE PNO = '\" + PARA_PNO + \"2\")";

System.out.println("Query " + count);
System.out.println("Please input pno1");
pno = cin.nextLine();
query = query.replace(PARA_PNO+1, pno);
System.out.println("Please input pno2");
pno = cin.nextLine();
query = query.replace(PARA_PNO+2, pno);
resultSet = statement.executeQuery(query);
System.out.println("ESSN");
```

```
while (resultSet.next())  
    System.out.println(resultSet.getString("ESSN"));
```

当输入%PN01% 为 P1, %PN0% 为 P2 时, 实验结果如图3.7所示.

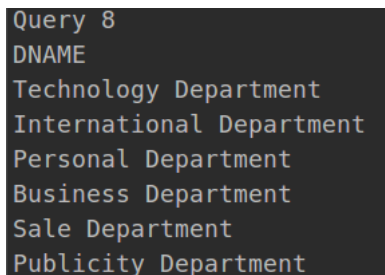


```
Query 7  
ESSN  
23010319950712882X  
230103199507129427  
410303198712188530
```

图 3.7: 至少参加了项目编号为%PN01% 和%PN02% 的项目的员工号

```
8. String PARA_SALARY = "%SALARY%";  
String query = "SELECT DNAME FROM EMPLOYEE, DEPARTMENT  
               WHERE EMPLOYEE.DNO = DEPARTMENT.DNO  
               GROUP BY DEPARTMENT.DNO  
               HAVING AVG(SALARY) < " + PARA_SALARY;  
  
System.out.println("Query " + count);  
System.out.println("Please input salary:");  
salary = Integer.parseInt(cin.nextLine());  
query = query.replace(PARA_SALARY, String.valueOf(salary));  
resultSet = statement.executeQuery(query);  
System.out.println("DNAME");  
while (resultSet.next())  
    System.out.println(resultSet.getString("DNAME"));
```

当输入%SALARY% 为 3000 时, 实验结果如图3.8所示.



```
Query 8  
DNAME  
Technology Department  
International Department  
Personal Department  
Business Department  
Sale Department  
Publicity Department
```

图 3.8: 员工平均工资低于%SALARY% 元的部门名称

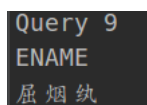
```
9. String PARA_N = "%N%";  
String PARA_HOURS = "%HOURS%";  
String query = "SELECT ENAME FROM EMPLOYEE, WORKS_ON
```



```
WHERE EMPLOYEE.ESSN = WORKS_ON.ESSN
GROUP BY EMPLOYEE.ESSN
HAVING COUNT(PNO) >= " + PARA_N + "
        AND SUM(HOURS) <= " + PARA_HOURS;      ;

System.out.println("Query " + count);
System.out.println("Please input n:");
int n = Integer.parseInt(cin.nextLine());
query = query.replace(PARA_N, String.valueOf(n));
System.out.println("Please input hours:");
int hours = Integer.parseInt(cin.nextLine());
query = query.replace(PARA_HOURS, String.valueOf(hours));
resultSet = statement.executeQuery(query);
System.out.println("ENAME");
while (resultSet.next())
    System.out.println(resultSet.getString("ENAME"));
```

当输入%N% 为 3, 输入%HOURS% 为 8 时, 实验结果如图3.9所示.



```
Query 9
ENAME
屈烟纨
```

图 3.9: 至少参加了%N% 个项目且工作总时间不超过%HOURS% 小时的员工名字

## 第 4 章 实验心得

本次实验可以选择使用不同的高级语言来完成, 此处用 JAVA 来完成实验, 相比使用 C 连接数据库, 仅仅需要将相应的 jar 包导入即可. 总的来说, 实验的难度不大.