第一次实验

实验目标

4. 用 SQL 语句建立第 2 章习题 6 中的 4 个表；针对建立的 4 个表用 SQL 完成第 2 章习题 6 中的查询。

5. 针对习题 4 中的 4 个表试用 SQL 完成以下各项操作：

（1）找出所有供应商的姓名和所在城市；

（2）找出所有零件的名称、颜色、重量；

（3）找出使用供应商 S1 所供应零件的工程号码；

（4）找出工程项目 J2 使用的各种零件的名称及其数量；

（5）找出上海厂商供应的所有零件号码；

（6）找出使用上海产的零件的工程名称；

（7）找出没有使用天津产的零件的工程号码；

（8）把全部红色零件的颜色改成蓝色；

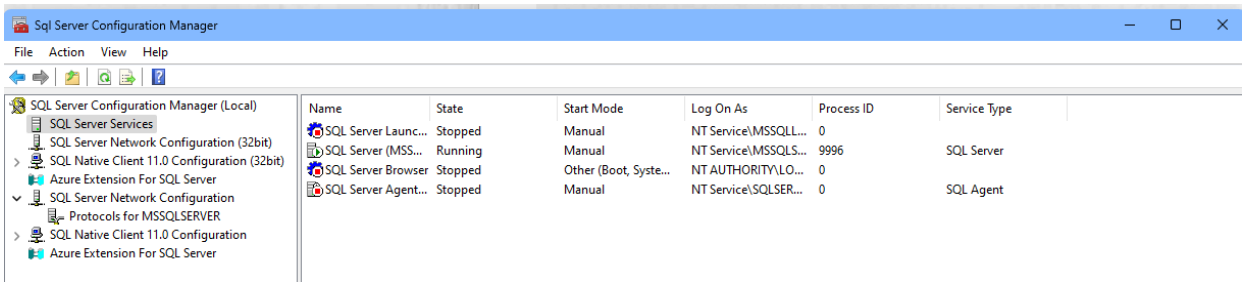
（9）由 S5 供给 J4 的零件 P6 改为由 S3 供应，请作必要的修改；

（10）从供应商关系中删除 S2 的记录，并从供应情况关系中删除相应的记录；

（11）请将 (S2,J6,P4,200) 插入供应情况关系。

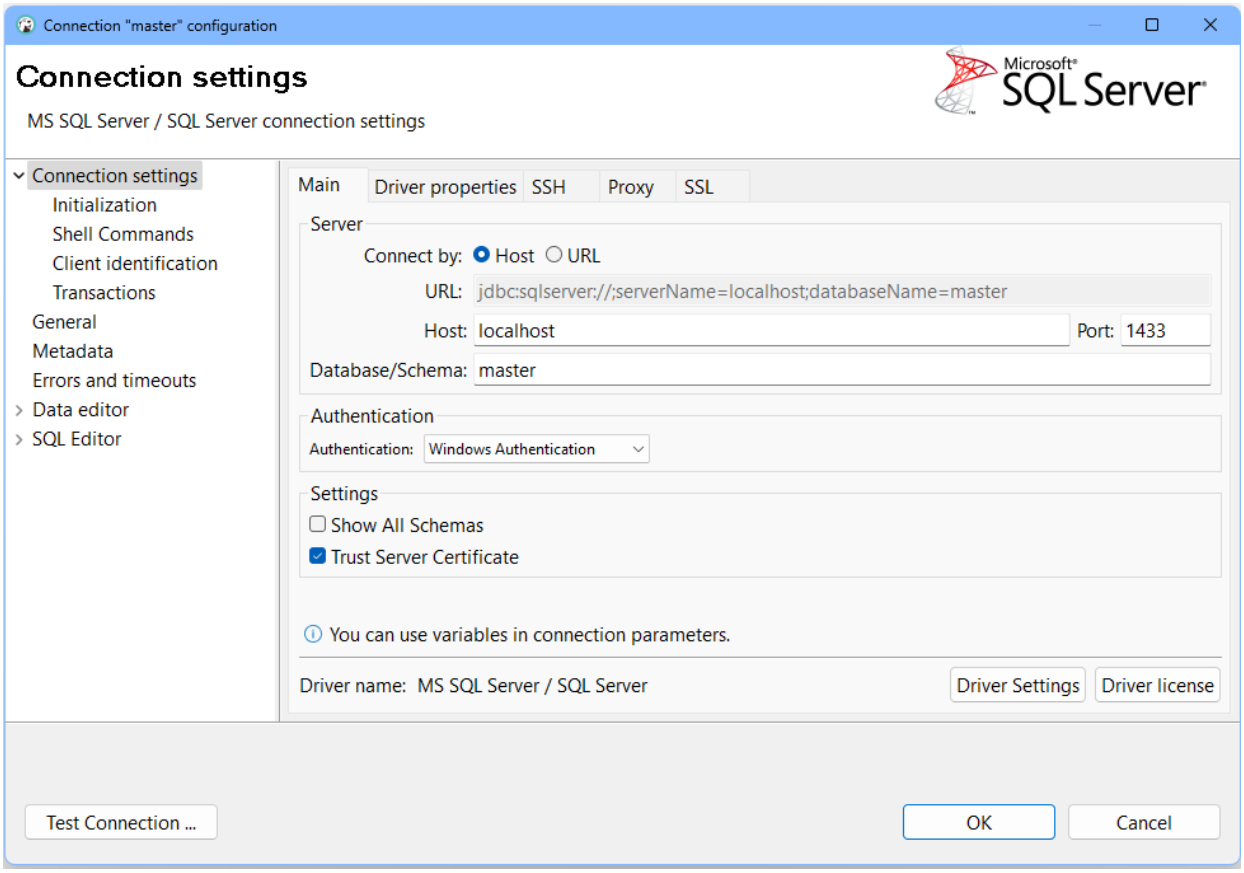
实验环境

我在我的电脑上安装了最新的SQL Server 2022开发者版，安装完成后从SQL Server的控制面板启动服务进程。



由于我之前学习过MySQL，所以我决定还是使用我习惯的数据库图形化管理工具来进行实验，我这里使用的工具是`DBeaver`。

使用`DBeaver`连接SQL Server



实验过程

1. （第四题）创建四个表，并执行查询操作
    1. 创建表：
        1. 创建S表：

```
2
3  CREATE TABLE S(
4      Sno VARCHAR(5) PRIMARY KEY,
5      Sname VARCHAR(20),
6      status int,
7      city VARCHAR(20)
8  );
9
10 CREATE TABLE P(
11     Pno VARCHAR(5) PRIMARY KEY,
12     Pname VARCHAR(20),
13     color VARCHAR(10),
14     weight int
15 );
16
```

```
Enter a part of a message to search for here
Changed database context to 'hello'.
```

Statistics 1	
ne	Value
ated Rows	0
ry	CREATE TABLE S(Sno VARCHAR(5) PRIMARY KEY, Sname VARCHAR(20), status int, city VARCHAR(20));
t time	Fri Mar 17 16:29:39 CST 2023
h time	Fri Mar 17 16:29:39 CST 2023

2. 创建P表：

```
10 CREATE TABLE P(
11     Pno VARCHAR(5) PRIMARY KEY,
12     Pname VARCHAR(20),
13     color VARCHAR(10),
14     weight int
15 );
16
17 CREATE TABLE J(
```

tatistics 1	
ne	Value
dated Rows	0
ery	CREATE TABLE P(Pno VARCHAR(5) PRIMARY KEY, Pname VARCHAR(20), color VARCHAR(10), weight int);
rt time	Fri Mar 17 16:31:10 CST 2023
sh time	Fri Mar 17 16:31:11 CST 2023

3. 创建J表：

```
17 CREATE TABLE J(
18     Jno VARCHAR(5) PRIMARY KEY,
19     Jname VARCHAR(20),
20     city VARCHAR(20)
21 );
22
23 CREATE TABLE SPJ(
```

Statistics 1

Name	Value
Updated Rows	0
Query	CREATE TABLE J(Jno VARCHAR(5) PRIMARY KEY, Jname VARCHAR(20), city VARCHAR(20));
Start time	Fri Mar 17 16:31:33 CST 2023
Finish time	Fri Mar 17 16:31:33 CST 2023

4. 创建SPJ表：

```
23 CREATE TABLE SPJ(
24     Sno VARCHAR(5),
25     Pno VARCHAR(5),
26     Jno VARCHAR(5),
27     qty int,
28     PRIMARY KEY(Sno,Pno,Jno),
29     FOREIGN KEY(Sno) REFERENCES S(Sno),
30     FOREIGN KEY(Pno) REFERENCES P(Pno),
31     FOREIGN KEY(Jno) REFERENCES J(Jno)
32 );
```

Statistics 1 | Output

Name	Value
Updated Rows	0
Query	CREATE TABLE SPJ(Sno VARCHAR(5), Pno VARCHAR(5), Jno VARCHAR(5), qty int, PRIMARY KEY(Sno,Pno,Jno), FOREIGN KEY(Sno) REFERENCES S(Sno), FOREIGN KEY(Pno) REFERENCES P(Pno), FOREIGN KEY(Jno) REFERENCES J(Jno)

2. 给表插入数据

1. 向S表插入数据：

```
34 INSERT INTO S(Sno,Sname,status,city) VALUES
35 ('S1','精益',20,'天津'), ('S2','盛锡',10,'北京'),
36 ('S3','东方红',30,'北京'), ('S4','丰泰盛',20,'天津'),
37 ('S5','为民',30,'上海');
```

	Value
lated Rows	5
ry	INSERT INTO S(Sno,Sname,status,city) VALUES ('S1','精益',20,'天津'), ('S2','盛锡',10,'北京'), ('S3','东方红',30,'北京'), ('S4','丰泰盛',20,'天津'), ('S5','为民',30,'上海');
t time	Fri Mar 17 16:41:16 CST 2023
sh time	Fri Mar 17 16:41:16 CST 2023

2. 向P表插入数据：

```
40 INSERT INTO P(Pno,Pname,color,weight) VALUES
41 ('P1','螺母','红',12), ('P2','螺栓','绿',17),
42 ('P3','螺丝刀','蓝',14), ('P4','螺丝刀','红',14),
43 ('P5','凸轮','蓝',40), ('P6','齿轮','红',30);
```

Name	Value
Updated Rows	6
Query	INSERT INTO P(Pno,Pname,color,weight) VALUES ('P1','螺母','红',12), ('P2','螺栓','绿',17), ('P3','螺丝刀','蓝',14), ('P4','螺丝刀','红',14), ('P5','凸轮','蓝',40), ('P6','齿轮','红',30);
Start time	Fri Mar 17 16:46:57 CST 2023
Finish time	Fri Mar 17 16:46:57 CST 2023

3. 向J表插入数据：

```
45 INSERT INTO J(Jno,Jname,city) VALUES
46 ('J1','三建','北京'), ('J2','一汽','长春'),
47 ('J3','弹簧厂','天津'), ('J4','造船厂','天津'),
48 ('J5','机车厂','唐山'),('J6','无线电厂','常州'),
49 ('J7','半导体厂','南京');
```

Name	Value
Updated Rows	7
Query	INSERT INTO J(Jno,Jname,city) VALUES ('J1','三建','北京'), ('J2','一汽','长春'), ('J3','弹簧厂','天津'), ('J4','造船厂','天津'), ('J5','机车厂','唐山'),('J6','无线电厂','常州'), ('J7','半导体厂','南京');
Start time	Fri Mar 17 16:50:30 CST 2023
Finish time	Fri Mar 17 16:50:30 CST 2023

4. 向SPJ表插入数据：

```
51 INSERT INTO SPJ(Sno,Pno,Jno,qty) VALUES
52 ('S1','P1','J1',200), ('S1','P1','J3',100),
53 ('S1','P1','J4',700), ('S1','P2','J2',100),
54 ('S2','P3','J1',400), ('S2','P3','J2',200),
55 ('S2','P3','J4',500), ('S2','P3','J5',400),
56 ('S2','P5','J1',400), ('S2','P5','J2',100),
57 ('S3','P1','J1',200), ('S3','P3','J1',200),
58 ('S4','P5','J1',100), ('S4','P6','J3',300),
59 ('S4','P6','J4',200), ('S5','P2','J4',100),
60 ('S5','P3','J1',200), ('S5','P6','J2',200),
61 ('S5','P6','J4',500);
62
```

Statistics 1 | Output

Name	Value
Updated Rows	19
Query	INSERT INTO SPJ(Sno,Pno,Jno,qty) VALUES ('S1','P1','J1',200), ('S1','P1','J3',100), ('S1','P1','J4',700), ('S1','P2','J2',100), ('S2','P3','J1',400), ('S2','P3','J2',200), ('S2','P3','J4',500), ('S2','P3','J5',400), ('S2','P5','J1',400), ('S2','P5','J2',100), ('S3','P1','J1',200), ('S3','P3','J1',200), ('S4','P5','J1',100), ('S4','P6','J3',300), ('S4','P6','J4',200), ('S5','P2','J4',100),

3. 开始查询

1. 供应工程J1零件的供应商号码SNO

```
63 --第一题
64 SELECT SNO FROM SPJ
65 WHERE JNO = 'J1';
66
```

Results 1 | Output

SELECT SNO FROM SPJ WHERE JNO = 'J1'; Enter a SQL expression to filter results (use Ctrl+Space)

Grid | Text | Record

	SNO
1	S1
2	S2
3	S2
4	S3
5	S3
6	S4
7	S5

2. 供应工程J1零件P1的供应商号码SNO

```sql
--第二题
SELECT Sno FROM SPJ
WHERE Jno = 'J1' AND Pno = 'P1';
```

Results 1 | Output

SELECT Sno FROM SPJ WHERE Jno = 'J1' AND Pno = 'P1';

	Sno
1	S1
2	S3

3. 求供应工程J1零件为红色的供应商号码SNO

```sql
--第三题
SELECT Sno
FROM SPJ JOIN P ON SPJ.Pno = P.Pno
WHERE Jno = 'J1' AND COLOR = '红';
```

Results 1 | Output

SELECT Sno FROM SPJ JOIN P ON SPJ.Pno = P.Pno WHERE Jno = 'J

	Sno
1	S1
2	S3

4. 求没有使用天津供应商生产的红色零件的工程号码JNO

```sql
--第四题
SELECT Jno
FROM SPJ JOIN P ON SPJ.Pno = P.Pno
JOIN S ON S.Sno = SPJ.Sno
WHERE color = '红' AND city <> '天津';
```

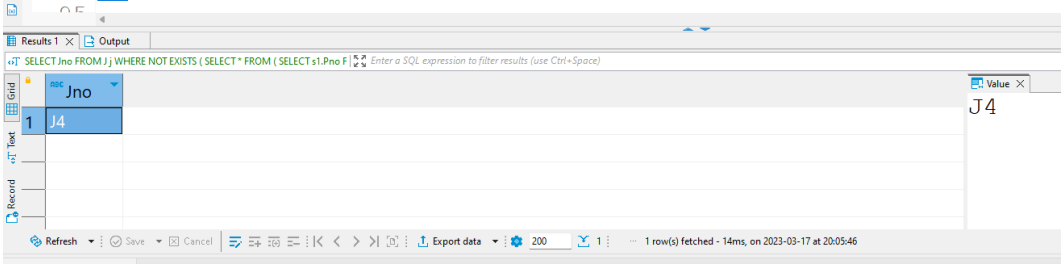
Results 1 | Output

SELECT Jno FROM SPJ JOIN P ON SPJ.Pno = P.Pno JOIN S ON S.Sn

	Jno
1	J1
2	J2
3	J4

5. 求至少用了供应商S1所供应的全部零件的工程号JNO

```sql
--第五题
SELECT Jno FROM J j
WHERE NOT EXISTS (
    SELECT * FROM (
        SELECT s1.Pno FROM SPJ s1 --得到S1制造的零件列表
        WHERE s1.Sno = 'S1'
    ) AS t
    WHERE t.Pno NOT IN( --S1制造的所有零件都不出现在当前工程的零件表中
        SELECT s2.Pno --得到当前工程的零件列表
        FROM SPJ s2
        WHERE s2.Jno = j.Jno
    )
);
```



4. 代码汇总

```sql
USE hello;

CREATE TABLE S(
    Sno VARCHAR(5) PRIMARY KEY,
    Sname VARCHAR(20),
    status int,
    city VARCHAR(20)
);

CREATE TABLE P(
    Pno VARCHAR(5) PRIMARY KEY,
    Pname VARCHAR(20),
    color VARCHAR(10),
    weight int
);

CREATE TABLE J(
    Jno VARCHAR(5) PRIMARY KEY,
```

```
    Jname VARCHAR(20),
    city VARCHAR(20)
);

CREATE TABLE SPJ(
    Sno VARCHAR(5),
    Pno VARCHAR(5),
    Jno VARCHAR(5),
    qty int,
    PRIMARY KEY(Sno,Pno,Jno),
    FOREIGN KEY(Sno) REFERENCES S(Sno),
    FOREIGN KEY(Pno) REFERENCES P(Pno),
    FOREIGN KEY(Jno) REFERENCES J(Jno)
);

INSERT INTO S(Sno,Sname,status,city) VALUES
('S1','精益',20,'天津'), ('S2','盛锡',10,'北
京'),
('S3','东方红',30,'北京'), ('S4','丰泰盛',20,'天
津'),
('S5','为民',30,'上海');


INSERT INTO P(Pno,Pname,color,weight) VALUES
('P1','螺母','红',12), ('P2','螺栓','绿',17),
('P3','螺丝刀','蓝',14), ('P4','螺丝
刀','红',14),
('P5','凸轮','蓝',40), ('P6','齿轮','红',30);

INSERT INTO J(Jno,Jname,city) VALUES
```

```
('J1','三建','北京'), ('J2','一汽','长春'),
('J3','弹簧厂','天津'), ('J4','造船厂','天津'),
('J5','机车厂','唐山'),('J6','无线电厂','常州'),
('J7','半导体厂','南京');

INSERT INTO SPJ(Sno,Pno,Jno,qty) VALUES
('S1','P1','J1',200), ('S1','P1','J3',100),
('S1','P1','J4',700), ('S1','P2','J2',100),
('S2','P3','J1',400), ('S2','P3','J2',200),
('S2','P3','J4',500), ('S2','P3','J5',400),
('S2','P5','J1',400), ('S2','P5','J2',100),
('S3','P1','J1',200), ('S3','P3','J1',200),
('S4','P5','J1',100), ('S4','P6','J3',300),
('S4','P6','J4',200), ('S5','P2','J4',100),
('S5','P3','J1',200), ('S5','P6','J2',200),
('S5','P6','J4',500);

--第一题
SELECT SNO FROM SPJ
WHERE JNO = 'J1';

--第二题
SELECT Sno FROM SPJ
WHERE Jno = 'J1' AND Pno = 'P1';

--第三题
SELECT Sno
FROM SPJ JOIN P ON SPJ.Pno = P.Pno
WHERE Jno = 'J1' AND COLOR = '红';
```

```
--第四题
SELECT Jno
FROM SPJ JOIN P ON SPJ.Pno = P.Pno
JOIN S ON S.Sno = SPJ.Sno
WHERE color = '红' AND city <> '天津';

--第五题
SELECT Jno FROM J j
WHERE NOT EXISTS (
    SELECT * FROM (
        SELECT s1.Pno FROM SPJ s1 --得到S1制造的零件列表
        WHERE s1.Sno = 'S1'
    ) AS t
    WHERE t.Pno NOT IN( --S1制造的所有零件都不出现在当前工程的零件表中
        SELECT s2.Pno --得到当前工程的零件列表
        FROM SPJ s2
        WHERE s2.Jno = j.Jno
    )
);
```

2. (第五题)

    1. 找出所有供应商的姓名和所在城市

```
10
11 --1.
12 SELECT Sname, city
13 FROM S;
```

Results 1 | Output

SELECT Sname, city FROM S; | Enter a SQL expression to filter results (use Ctrl+Space)

Grid | Text

	Sname	city
1	精益	天津
2	盛锡	北京
3	东方红	北京
4	丰泰盛	天津
5	为民	上海

2. 找出所有零件的名称、颜色、重量

```
--2.
SELECT Pname, color, weight
FROM P;
```

Results 1 | Output

SELECT Pname, color, weight FROM | Enter a SQL expression to filter results (use Ctrl+Space)

	Pname	color	weight
1	螺母	红	12
2	螺栓	绿	17
3	螺丝刀	蓝	14
4	螺丝刀	红	14
5	凸轮	蓝	40
6	齿轮	红	30

Value: 螺母

3. 找出使用供应商 S1所供应零件的工程号码

```
--3.
SELECT Jno
FROM SPJ
WHERE Sno = 'S1';
```

Results 1 | Output

SELECT Jno FROM SPJ WHERE Sno | Enter a SQL expression to filter results (use Ctrl+Space)

	Jno
1	J1
2	J3
3	J4
4	J2

J

4. 找出工程项目J2 使用的各种零件的名称及其数量

```sql
--4.
SELECT p.Pname, s.qty
FROM SPJ s join P p on s.Pno = p.Pno
WHERE s.Jno = 'J2';
```

Results 1 | Output

SELECT p.Pname, s.qty FROM SPJ s | Enter a SQL expression to filter results (use Ctrl+Space)

	Pname	qty
1	螺栓	100
2	螺丝刀	200
3	凸轮	100
4	齿轮	200

Value

螺栓

5. 找出上海厂商供应的所有零件号码

```sql
--5.
SELECT p.Pno
FROM P p
WHERE p.Pno IN (
    SELECT sp.Pno
    FROM SPJ sp join S s on sp.Sno = s.Sno
    WHERE s.city = '上海'
);
```

Results 1 | Output

SELECT p.Pno FROM P p WHERE p. | Enter a SQL expression to filter results (use Ctrl+Space)

	Pno
1	P2
2	P3
3	P6

Value

P2

6. 找出使用上海产的零件的工程名称

```sql
--6.
SELECT j.Jno
FROM J j
WHERE EXISTS (
    SELECT *
    FROM (
        SELECT spj1.Sno
        FROM SPJ spj1
        WHERE spj1.Jno = j.Jno
    ) AS tmp
    WHERE tmp.Sno IN(
        SELECT DISTINCT spj.Sno
        FROM SPJ spj JOIN S s ON spj.Sno = s.Sno
        WHERE s.city = '上海'
    )
)
```

Results 1 | Output

SELECT j.Jno FROM J j WHERE EXISTS (SE | Enter a SQL expression to filter results (use Ctrl+Space)

	Jno
1	J1
2	J2
3	J4

Value: J1

Refresh | Save | Cancel | Export data | 200 | 3

3 row(s) fetched - 20ms, on 2023-03-17 at 21:07:42

7. 找出没有使用天津产的零件的工程号码

```sql
--7.
SELECT j.Jno
FROM J j
WHERE NOT EXISTS (
    SELECT *
    FROM (
        SELECT spj1.Sno
        FROM SPJ spj1
        WHERE spj1.Jno = j.Jno
    ) AS tmp
    WHERE tmp.Sno IN(
        SELECT DISTINCT spj.Sno
        FROM SPJ spj JOIN S s ON spj.Sno = s.Sno
        WHERE s.city = '天津'
    )
)
```

Results 1 | Output

SELECT j.Jno FROM J j WHERE NOT EXISTS (S | Enter a SQL expression to filter results (use Ctrl+Space)

	Jno
1	J5
2	J6
3	J7

Value: J5

8. 把全部红色零件的颜色改成蓝色

```
67  --8.
68  UPDATE P
69  SET color = '蓝'
70  WHERE color = '红';
71
```

Statistics 1 | Output

Name	Value
Updated Rows	3
Query	UPDATE P
	SET color = '蓝'
	WHERE color = '红';
Start time	Fri Mar 17 21:21:08 CST 2023
Finish time	Fri Mar 17 21:21:08 CST 2023

9. 由S5供给J4的零件P6改为由S3供应，请作必要的修改

```
72  --9.
73  UPDATE SPJ
74  SET Sno = 'S3'
75  WHERE Sno = 'S5' AND Jno = 'J4';
```

Statistics 1 | Output

Name	Value
Updated Rows	2
Query	--9.
	UPDATE SPJ
	SET Sno = 'S3'
	WHERE Sno = 'S5' AND Jno = 'J4';
Start time	Fri Mar 17 21:25:36 CST 2023
Finish time	Fri Mar 17 21:25:37 CST 2023

10. 从供应商关系中删除 S2 的记录，并从供应情况关系中删除相应的记录

```
77 --10.
78 DELETE FROM SPJ
79 WHERE Sno = 'S2';
80 DELETE FROM S
81 WHERE Sno = 'S2';
82
```

Statistics 1 | Output

Name	Value
Updated Rows	1
Query	--10.
	DELETE FROM SPJ
	WHERE Sno = 'S2';
	DELETE FROM S
	WHERE Sno = 'S2';
Start time	Fri Mar 17 21:35:25 CST 2023
Finish time	Fri Mar 17 21:35:25 CST 2023

11. 请将(S2,J6,P4,200)插入供应情况关系

```
83 --11.
84 INSERT INTO S(Sno,Sname,status,city) VALUES
85 ('S2','盛锡',10,'北京');
86 INSERT INTO SPJ(Sno,Jno,Pno,qty) VALUES
87 ('S2','J6','P4',200);
```

Statistics 1 | Output

Name	Value
Updated Rows	2
Query	--11.
	INSERT INTO S(Sno,Sname,status,city) VALUES
	('S2','盛锡',10,'北京');
	INSERT INTO SPJ(Sno,Jno,Pno,qty) VALUES
	('S2','J6','P4',200);
Start time	Fri Mar 17 21:38:33 CST 2023
Finish time	Fri Mar 17 21:38:33 CST 2023

12. 完整代码

```sql
USE hello;


--1.
SELECT Sname, city
FROM S;
```

```sql
--2.
SELECT Pname, color, weight
FROM P;

--3.
SELECT Jno
FROM SPJ
WHERE Sno = 'S1';

--4.
SELECT p.Pname, s.qty
FROM SPJ s join P p on s.Pno = p.Pno
WHERE s.Jno = 'J2';

--5.
SELECT p.Pno
FROM P p
WHERE p.Pno IN (
    SELECT sp.Pno
    FROM SPJ sp join S s on sp.Sno = s.Sno
    WHERE s.city = '上海'
);

--6.
SELECT j.Jno
FROM J j
WHERE EXISTS (
    SELECT *
    FROM (
        SELECT spj1.Sno
```

```
        FROM SPJ spj1
        WHERE spj1.Jno = j.Jno
    ) AS tmp
    WHERE tmp.Sno IN(
        SELECT DISTINCT spj.Sno
        FROM SPJ spj JOIN S s ON spj.Sno =
s.Sno
        WHERE s.city = '上海'
    )
)

--7.
SELECT j.Jno
FROM J j
WHERE NOT EXISTS (
    SELECT *
    FROM (
        SELECT spj1.Sno
        FROM SPJ spj1
        WHERE spj1.Jno = j.Jno
    ) AS tmp
    WHERE tmp.Sno IN(
        SELECT DISTINCT spj.Sno
        FROM SPJ spj JOIN S s ON spj.Sno =
s.Sno
        WHERE s.city = '天津'
    )
)

--8.
```

```sql
UPDATE P
SET color = '蓝'
WHERE color = '红';

--9.
UPDATE SPJ
SET Sno = 'S3'
WHERE Sno = 'S5' AND Jno = 'J4';

--10.
DELETE FROM SPJ
WHERE Sno = 'S2';
DELETE FROM S
WHERE Sno = 'S2';

--11.
INSERT INTO S(Sno,Sname,status,city) VALUES
('S2','盛锡',10,'北京');
INSERT INTO SPJ(Sno,Jno,Pno,qty) VALUES
('S2','J6','P4',200);
```