

北京邮电大学 实验报告



课程名称:

数据库系统原理

实验名称:

实验四: 数据查询与修改实验

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1 目录

1	目录	2
2	实验目的:	4
3	实验内容:	4
4	实验环境:	4
5	实验要求:	4
6	实验步骤:	5
6.1	Basic structure of SQL Queries	5
6.1.1	Query on a A Single Relation---The select, where Clause	5
6.1.2	Query on multiple relations---The from Clause	5
6.1.3	natural join	6
6.2	Additional Basic Operations	7
6.2.1	The Rename Operation	7
6.2.2	String Operations & Attribute Specification	7
6.2.3	Ordering the Display of Tuples	8
6.2.4	Where Clause Predicates	9
6.3	Set Operation	10
6.3.1	Union	10
6.3.2	interset	11
6.3.3	except	11
6.3.4	Except	12
6.4	Null Values	12
6.5	Aggregate Functions	13
6.5.1	分组聚集, 降序排列	13
6.5.2	Max,min,avg	14
6.6	Nested (嵌套) Subqueries	15
6.6.1	Set Membership	15
6.6.2	Set Comparison – “some” Clause	15
6.6.3	Test for Empty Relations---Use of “not exists” Clause	16
6.6.4	Test for Absence of Duplicate Tuples	17
6.6.5	Subqueries in the From Clause	18
6.6.6	With Clause	19

6.6.7 Scalar Subquery—Subqueries in the Select Clause	20
6.7 综合---查询语句	21
6.8 Modification of the Database	22
6.8.1 Deletion	22
6.8.2 Insertion	23
6.8.3 Updates	23
7 实验总结	26
7.1 分组聚集	26
7.2 Null values	27
7.3 查找失败	27
7.4 查询结果中有空值	27
7.5 Exists、Not exists	27
7.6 Unique 结构	27
7.7 With as	27

2 实验目的：

对实验三中建立的 GSM 数据库关系表和视图进行各种类型的查询操作和修改操作，加深对 SQL 语言中 DML 的了解，掌握相关查询语句和数据修改语句的使用方法。

3 实验内容：

1. 简单的查询操作，包括单表的查询、选择条件、结果排序等的练习；
2. 复杂的查询操作，包括等值连接、自然连接等；
3. 统计查询操作，包括带有分组、集函数的查询操作；
4. 嵌套查询操作，包括带有 in、exists、not exists、集合操作的嵌套查询；
5. 练习对关系表的其他操作如插入、删除、更新；
6. 练习视图查询、视图修改等视图操作。

4 实验环境：

1. Windows10 操作系统
2. Microsoft SQL Server 2012 数据库管理系统

5 实验要求：

1. 用 Transact_SQL 语句完成以上操作。

2. 要求学生独立完成以上内容。
3. 实验完成后完成要求的实验报告内容。

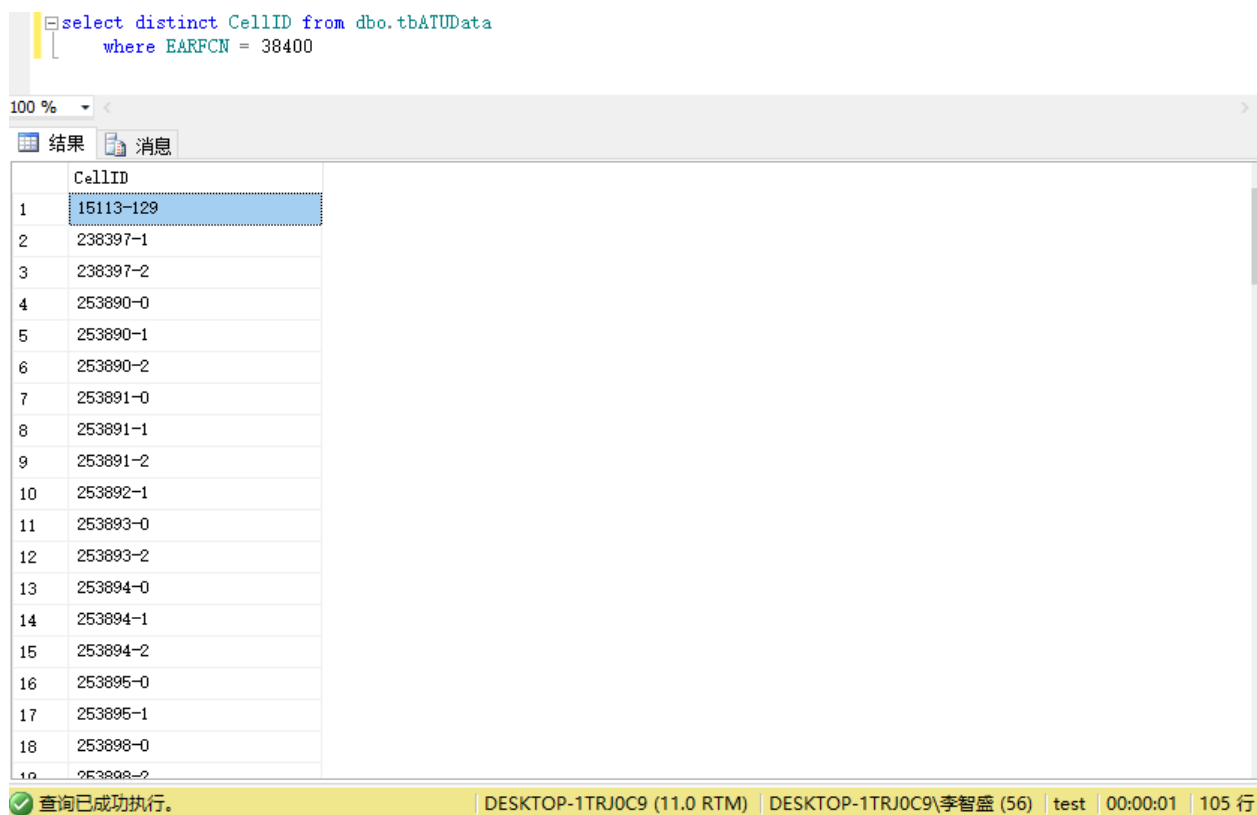
6 实验步骤：

6.1 Basic structure of SQL Queries

6.1.1 Query on a A Single Relation---The select, where Clause

根据路测 ATU 数据表，使用 distinct 语句列出服务小区频点为 38400 的所有去重后的服务小区 ID。

```
select distinct CellID from dbo.tbATUData  
where EARFCN = 38400
```



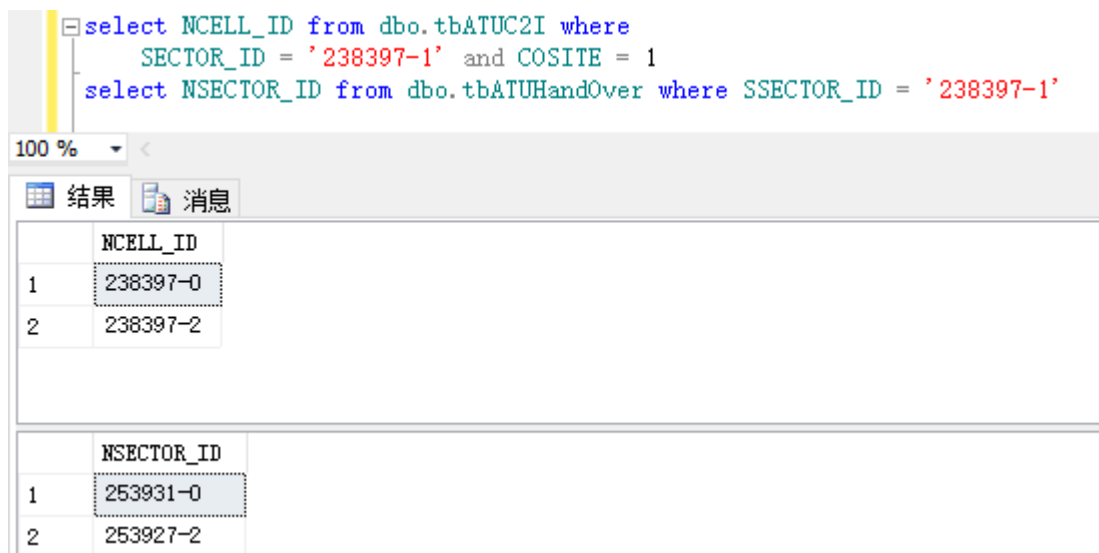
	CellID
1	15113-129
2	238397-1
3	238397-2
4	253890-0
5	253890-1
6	253890-2
7	253891-0
8	253891-1
9	253891-2
10	253892-1
11	253893-0
12	253893-2
13	253894-0
14	253894-1
15	253894-2
16	253895-0
17	253895-1
18	253898-0
19	253898-2

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (56) | test | 00:00:01 | 105 行

6.1.2 Query on multiple relations——The from Clause

根据路测 ATU C2I 干扰矩阵表和路测 ATU 切换统计矩阵表, 查询主小区 ID 为 “238397-1” 的小区的同站干扰小区 ID 和切换目标小区 ID。

```
select NCELL_ID from dbo.tbATUC2I where  
SECTOR_ID = '238397-1' and COSITE = 1  
select NSECTOR_ID from dbo.tbATUHandOver where SSECTOR_ID = '238397-1'
```



```
select NCELL_ID from dbo.tbATUC2I where  
SECTOR_ID = '238397-1' and COSITE = 1  
select NSECTOR_ID from dbo.tbATUHandOver where SSECTOR_ID = '238397-1'
```

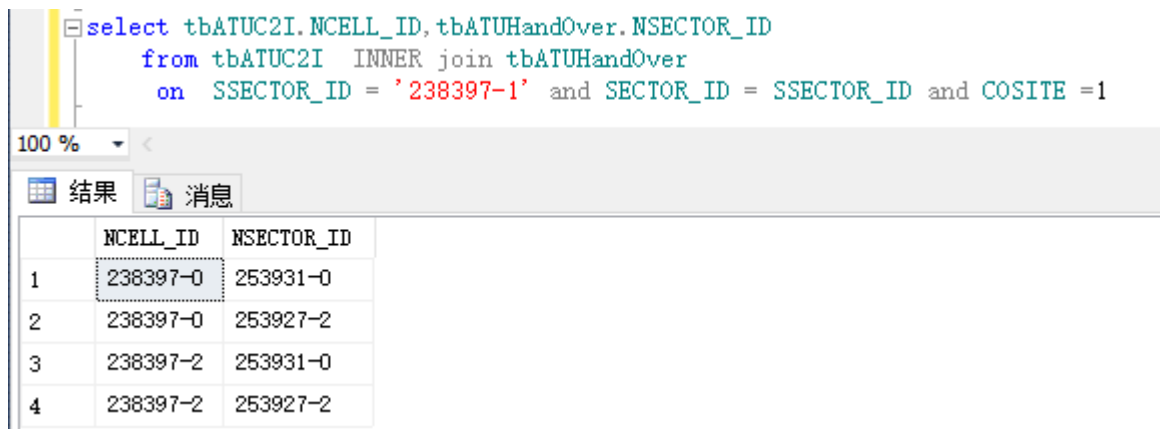
	NCELL_ID
1	238397-0
2	238397-2

	NSECTOR_ID
1	253931-0
2	253927-2

6.1.3 natural join

使用 nature join 语句重写 1.2 中的查询。

```
select tbATUC2I.NCELL_ID, tbATUHandOver.NSECTOR_ID  
from tbATUC2I INNER join tbATUHandOver  
on SSECTOR_ID = '238397-1' and SECTOR_ID = SSECTOR_ID and COSITE =1
```



```
select tbATUC2I.NCELL_ID, tbATUHandOver.NSECTOR_ID  
from tbATUC2I INNER join tbATUHandOver  
on SSECTOR_ID = '238397-1' and SECTOR_ID = SSECTOR_ID and COSITE =1
```

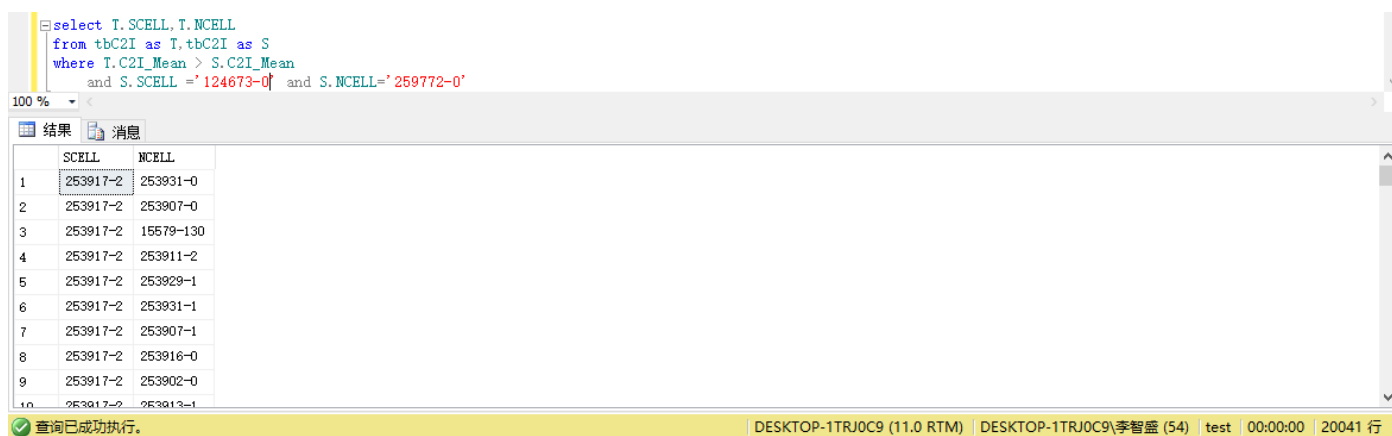
	NCELL_ID	NSECTOR_ID
1	238397-0	253931-0
2	238397-0	253927-2
3	238397-2	253931-0
4	238397-2	253927-2

6.2 Additional Basic Operations

6.2.1 The Rename Operation

根据基于 MR 测量报告的干扰分析表，使用 as 语句查询所有比主小区 ID 为 “124673-0”，邻小区 ID 为 “259772-0” 的小区 C2I 干扰均值高的主小区 ID、邻小区 ID。

```
select T.SCELL, T.NCELL
from tbC2I as T, tbC2I as S
where T.C2I_Mean > S.C2I_Mean
      and S.SCELL = '124673-0' and S.NCELL = '259772-0'
```



The screenshot shows a SQL query execution window. The query is: `select T.SCELL, T.NCELL from tbC2I as T, tbC2I as S where T.C2I_Mean > S.C2I_Mean and S.SCELL = '124673-0' and S.NCELL = '259772-0'`. The results are displayed in a table with two columns: SCELL and NCELL. The table contains 10 rows of data.

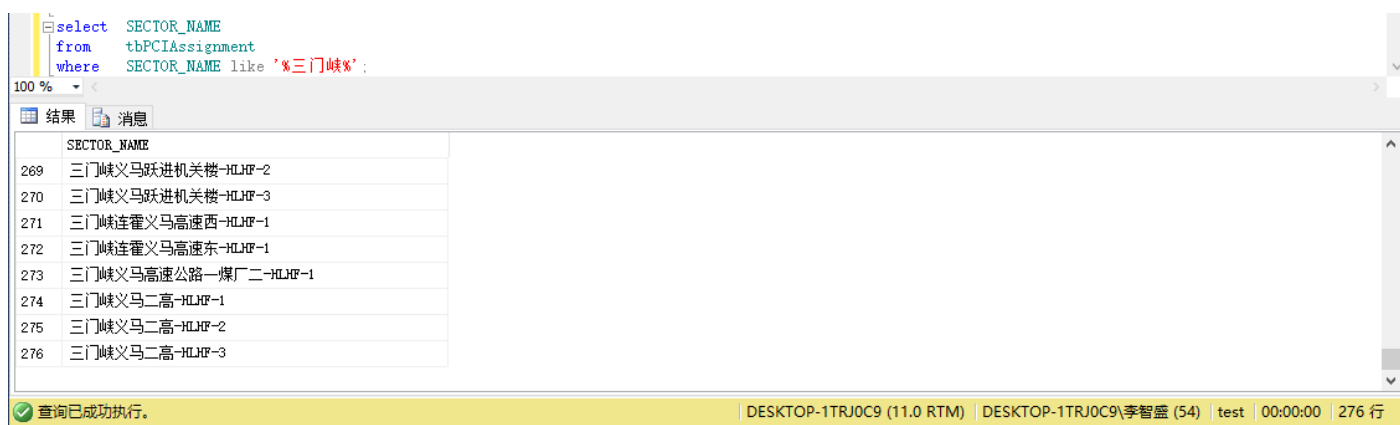
	SCELL	NCELL
1	253917-2	253931-0
2	253917-2	253907-0
3	253917-2	15579-130
4	253917-2	253911-2
5	253917-2	253929-1
6	253917-2	253931-1
7	253917-2	253907-1
8	253917-2	253916-0
9	253917-2	253902-0
10	253917-2	253913-1

At the bottom of the window, a status bar indicates: 查询已成功执行。 (Query executed successfully). On the right side of the status bar, it shows: DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (54) | test | 00:00:00 | 20041 行

6.2.2 String Operations & Attribute Specification

根据小区 PCI 优化调整结果表，使用 like 语句查询小区名中包含 “三门峡” 的相关信息。

```
select SECTOR_NAME
from tbPCIAssignment
where SECTOR_NAME like '%三门峡%';
```



```
select SECTOR_NAME
from tbPCIAssignment
where SECTOR_NAME like '%三门峡%';
```

	SECTOR_NAME
269	三门峡义马跃进机关楼-HLHF-2
270	三门峡义马跃进机关楼-HLHF-3
271	三门峡连霍义马高速西-HLHF-1
272	三门峡连霍义马高速东-HLHF-1
273	三门峡义马高速公路一煤厂二-HLHF-1
274	三门峡义马二高-HLHF-1
275	三门峡义马二高-HLHF-2
276	三门峡义马二高-HLHF-3

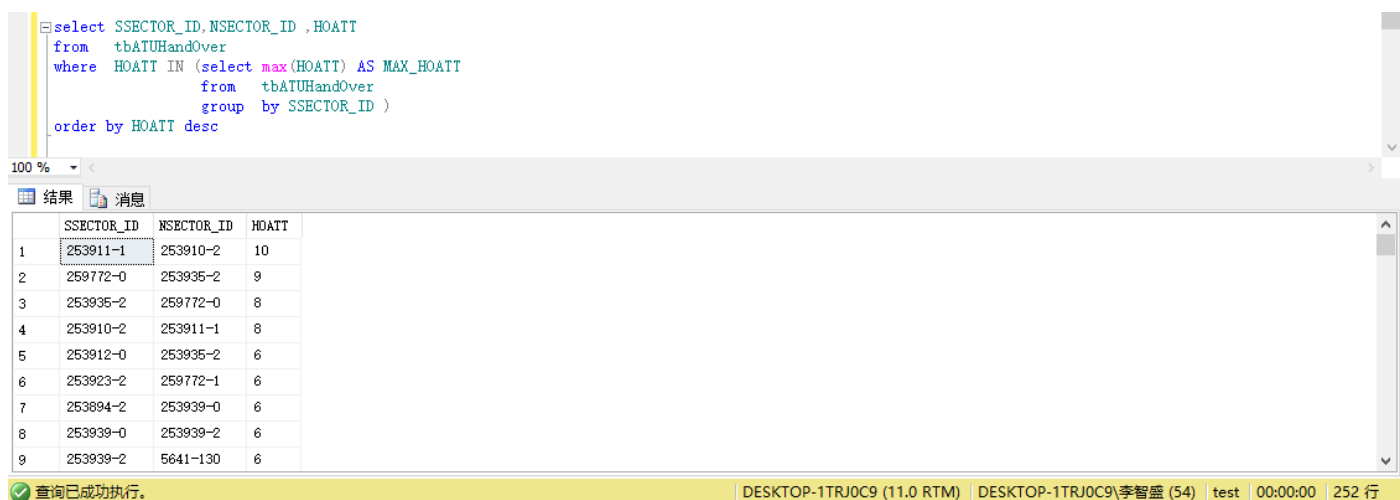
查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (54) | test | 00:00:00 | 276 行

6.2.3 Ordering the Display of Tuples

根据路测 ATU 切换统计矩阵表，查询各小区的最大切换次数及相应的切换目标小区 ID，并按降序排列。

为了便于验证，将符合条件的 SSECTOR_ID,NSECTOR_ID ,HOATT 一并输出

```
select SSECTOR_ID,NSECTOR_ID ,HOATT
from tbATUHandOver
where HOATT IN (select max(HOATT) AS MAX_HOATT
                from tbATUHandOver
                group by SSECTOR_ID )
order by HOATT desc
```



```
select SSECTOR_ID,NSECTOR_ID ,HOATT
from tbATUHandOver
where HOATT IN (select max(HOATT) AS MAX_HOATT
                from tbATUHandOver
                group by SSECTOR_ID )
order by HOATT desc
```

	SSECTOR_ID	NSECTOR_ID	HOATT
1	253911-1	253910-2	10
2	259772-0	253935-2	9
3	253935-2	259772-0	8
4	253910-2	253911-1	8
5	253912-0	253935-2	6
6	253923-2	259772-1	6
7	253894-2	253939-0	6
8	253939-0	253939-2	6
9	253939-2	5641-130	6

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (54) | test | 00:00:00 | 252 行

对于第二条数据（259772-0, 253935-2, 9）,在源数据 8. tbATUHandOver.csv 中查

得:

SSECTOR	NSECTOR	HOATT		
259772-0	253935-2	9		
259772-0	253935-0	5		
259772-0	259772-1	3		
259772-0	253923-2	1		
259772-0	253890-1	1		

其 HOATT 最大值为 9, 与数据库查询结果一致

6.2.4 Where Clause Predicates

根据小区/基站工参表和基于 MR 测量报告的干扰分析表, 使用 between 语句查询经度位于 111 到 112 之间、纬度位于 34.7 到 34.9 之间的小区的 C2I 干扰的均值最大的邻小区 ID。

```
/*
with sector_id as (
    select SECTOR_ID
    from   tbCell
    where  (LONGITUDE between 111 and 112)
    and    (LATITUDE  between 34.7 and 34.9)),
max_c2i as (
    select max(C2I_Mean) as max_c2i_mean
    from   tbC2I
    where  SCELL IN (
        select SECTOR_ID
        from   tbCell
        where  (LONGITUDE between 111 and 112)
        and    (LATITUDE  between 34.7 and 34.9) ) )
*/
select NCELL
from   tbC2I
where  C2I_Mean in (
    select max(C2I_Mean) as max_c2i_mean
    from   tbC2I
    where  SCELL IN (
        select SECTOR_ID
        from   tbCell
        where  (LONGITUDE between 111 and 112)
        and    (LATITUDE  between 34.7 and 34.9) ) )
```

上面的绿字部分便于让自己能够看清结构，嵌套时条理清晰；（使用 AS 语句实现失败）

```
-- 使用between语句查询
-- 经度位于111到112之间、纬度位于34.7到34.9之间的小区
-- 的C2I干扰的均值最大的
-- 邻小区ID
with sector_id as (
    select SECTOR_ID
    from   tbCell
    where  (LONGITUDE between 111 and 112)
    and    (LATITUDE  between 34.7 and 34.9)),
max_c2i as (
    select max(C2I_Mean) as max_c2i_mean
    from   tbC2I
    where  SCELL IN (
        select SECTOR_ID
        from   tbCell
        where  (LONGITUDE between 111 and 112)
        and    (LATITUDE  between 34.7 and 34.9) ) )

select NCELL
from   tbC2I
where  C2I_Mean in (
    select max(C2I_Mean) as max_c2i_mean
    from   tbC2I
    where  SCELL IN (
        select SECTOR_ID
        from   tbCell
        where  (LONGITUDE between 111 and 112)
        and    (LATITUDE  between 34.7 and 34.9) ) )
```

100 %

结果 消息

NCELL	
1	253787-1

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:00 | 1 行

6.3 Set Operation

6.3.1 Union

根据小区/基站工参表，使用 union 语句中查询所属城市为宜阳、频点为 38544，或所属城市为三门峡、频点为 38400 的小区。

```
select SECTOR_ID from test.dbo.tbCell where CITY = '宜阳' and EARFCN = 38544
union
select SECTOR_ID from dbo.tbCell where CITY = '三门峡' and EARFCN = 38400;
```

```
select SECTOR_ID from test.dbo.tbCell where CITY = '宜阳' and EARFCN = 38544
union
select SECTOR_ID from dbo.tbCell where CITY = '三门峡' and EARFCN = 385400;
```

100 %

结果 消息

	SECTOR_ID
1	11317-129
2	11317-130
3	246333-3
4	246341-3
5	246702-0
6	246702-1
7	246702-2
8	246704-0
9	246705-0
10	246705-1
11	246705-2
12	246706-1

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:00 | 17 行

6.3.2 intersect

根据小区一阶邻区关系表和二阶（同频）邻区关系表，使用 intersect 语句查询一阶邻区和二阶邻区相同的小区。

```
select tbAdjCell.S_SECTOR_ID
from tbAdjCell
where N_SECTOR_ID in(select N_SECTOR_ID from tbAdjCell intersect select N_SECTOR_ID from tbSecAdjCell)
```

```
select tbAdjCell.S_SECTOR_ID
from tbAdjCell
where N_SECTOR_ID in(select N_SECTOR_ID from tbAdjCell intersect select N_SECTOR_ID from tbSecAdjCell)
```

100 %

结果 消息

	S_SECTOR_ID
1	124673-0
2	124673-0
3	124673-0
4	124673-0
5	124673-0
6	124673-0
7	124673-0
8	124673-0

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:00 | 14848 行

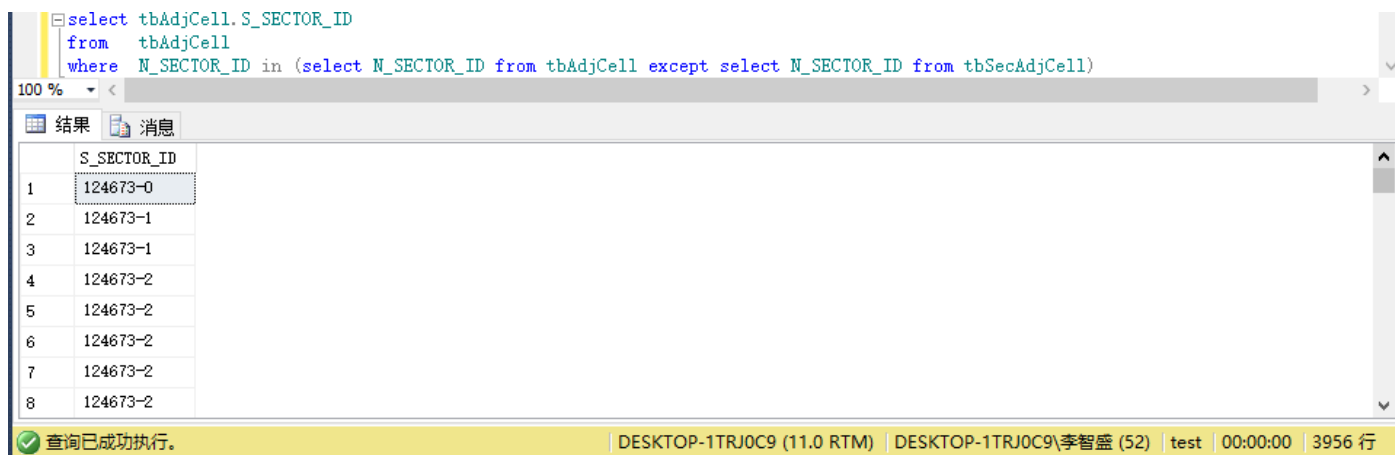
6.3.3 except

根据一阶邻区关系表和二阶（同频）邻区关系表，使用 except 语句查询二阶邻区不是一阶邻区

的小区。

--NOTES:EXCEPT 仅返回那些不存在于第二个 SELECT 语句结果的记录（差集）

```
select tbAdjCell.S_SECTOR_ID
from   tbAdjCell
where  N_SECTOR_ID in (select N_SECTOR_ID from tbAdjCell except select N_SECTOR_ID from tbSecAdjCell)
```



```
select tbAdjCell.S_SECTOR_ID
from   tbAdjCell
where  N_SECTOR_ID in (select N_SECTOR_ID from tbAdjCell except select N_SECTOR_ID from tbSecAdjCell)
```

	S_SECTOR_ID
1	124673-0
2	124673-1
3	124673-1
4	124673-2
5	124673-2
6	124673-2
7	124673-2
8	124673-2

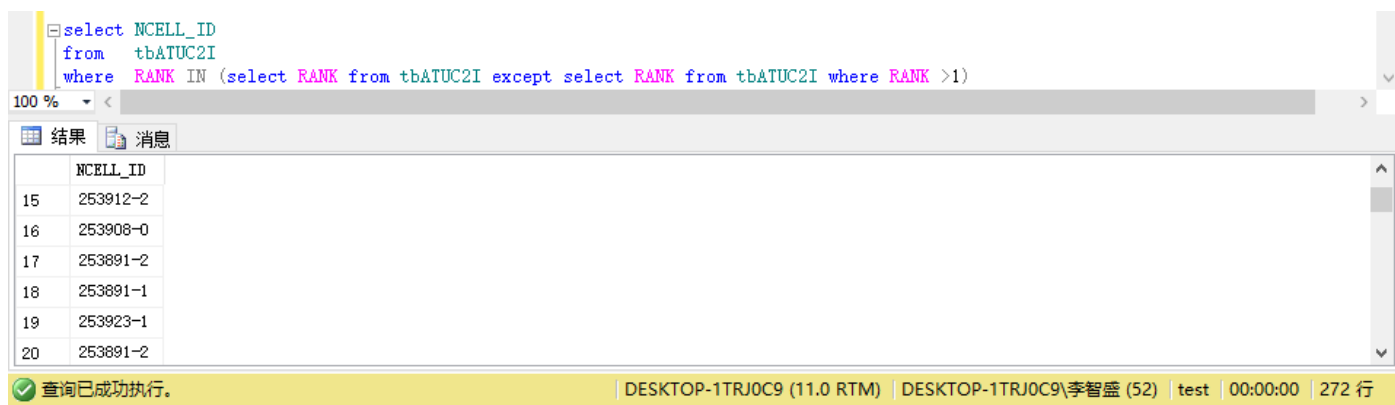
查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:00 | 3956 行

6.3.4 Except

根据路测 ATU C2I 干扰矩阵表，使用 except 语句查询主小区和邻小区间干扰强度最大的小

区

```
select NCELL_ID
from   tbATUC2I
where  RANK IN (select RANK from tbATUC2I except select RANK from tbATUC2I where RANK >1)
```



```
select NCELL_ID
from   tbATUC2I
where  RANK IN (select RANK from tbATUC2I except select RANK from tbATUC2I where RANK >1)
```

	NCELL_ID
15	253912-2
16	253908-0
17	253891-2
18	253891-1
19	253923-1
20	253891-2

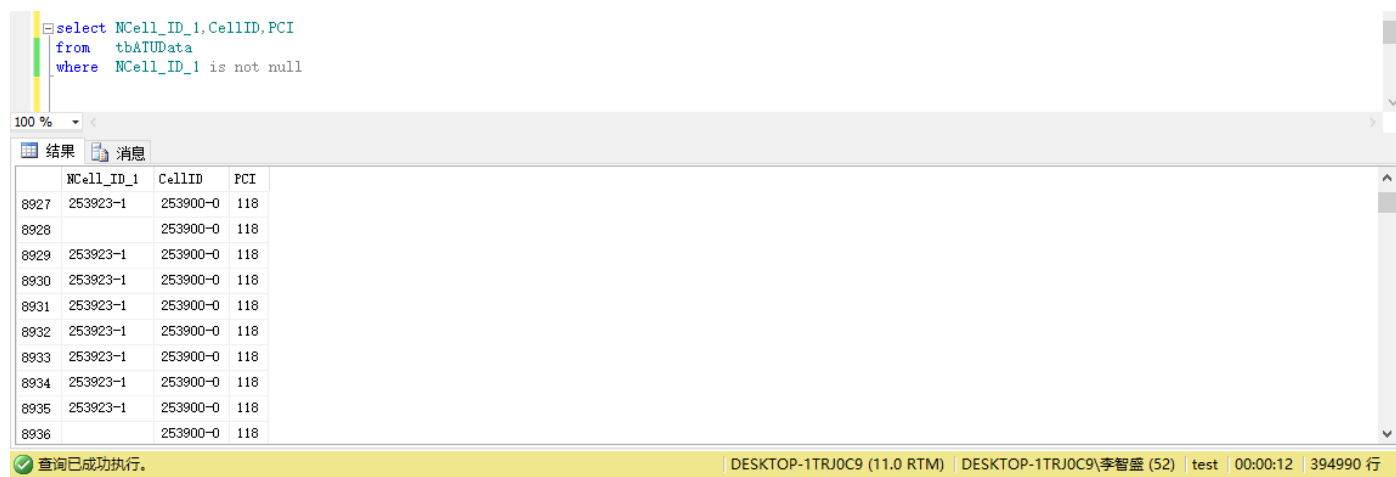
查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:00 | 272 行

6.4 Null Values

根据路测 ATU 数据表，查询第 1 邻小区/干扰小区物理小区标识不为空的服务小区 ID、服务

小区 PCI。

```
select NCell_ID_1, CellID, PCI
from   tbATUData
where  NCell_ID_1 is not null
```



	NCell_ID_1	CellID	PCI	
8927	253923-1	253900-0	118	
8928		253900-0	118	
8929	253923-1	253900-0	118	
8930	253923-1	253900-0	118	
8931	253923-1	253900-0	118	
8932	253923-1	253900-0	118	
8933	253923-1	253900-0	118	
8934	253923-1	253900-0	118	
8935	253923-1	253900-0	118	
8936		253900-0	118	

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (52) | test | 00:00:12 | 394990 行

但是查询结果有空值

6.5 Aggregate Functions

6.5.1 分组聚集，降序排列

根据优化小区/保护带小区表和小区一阶邻区关系表，查询一阶邻区数大于 10 的优化小区，并将查询结果降序排列。

```
select SECTOR_ID
from   tbOptCell
where  CELL_TYPE='优化区'
       and SECTOR_ID IN (select SECTOR_ID
                           from   tbOptCell
                           where  EXISTS (select S_SECTOR_ID, count( N_SECTOR_ID) as num
                                           from     tbAdjCell
                                           group by S_SECTOR_ID
                                           having  count( N_SECTOR_ID)>10) )
order by SECTOR_ID desc
```

```
select SECTOR_ID
from tbOptCell
where CELL_TYPE='优化区'
and SECTOR_ID IN (select SECTOR_ID
from tbOptCell
where EXISTS (select S_SECTOR_ID, count( N_SECTOR_ID) as num
from tbAdjCell
group by S_SECTOR_ID
having count( N_SECTOR_ID)>10) )
order by SECTOR_ID desc
```

SECTOR_ID
7400-130
7400-129
7400-128
7385-144
7367-144
7360-144
7336-144
7335-144
7320-144
7319-144

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:00 | 323 行

6.5.2 Max,min,avg

根据小区/基站工参表和路测 ATU 数据表, 查询所属基站为“253903”的小区的最大信噪比 SINR, 最小信噪比 SINR, 平均信噪比 SINR。

```
select max(RS_SINR) as max_sinr,
       min(RS_SINR) as min_sinr,
       avg(RS_SINR) as avg_sinr
from tbATUData
where CellID in (
    select SECTOR_ID
    from tbCell
    where ENODEBID = 253903 )
```

```
select max(RS_SINR) as max_sinr,
       min(RS_SINR) as min_sinr,
       avg(RS_SINR) as avg_sinr
from tbATUData
where CellID in (
    select SECTOR_ID
    from tbCell
    where ENODEBID = 253903 )
```

max_sinr	min_sinr	avg_sinr
30	-17.3	14.3419395103217

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:00 | 1 行

6.6 Nested (嵌套) Subqueries

6.6.1 Set Membership

根据优化小区/保护带小区表和小区 PCI 优化调整结果表，查询小区类型为“优化区”的小区经调整后的 PCI。

```
select SECTOR_ID, PCI
from   tbPCIAssignment
where  SECTOR_ID IN(
        select SECTOR_ID
        from   tbOptCell
        where  CELL_TYPE = '优化区' )
```



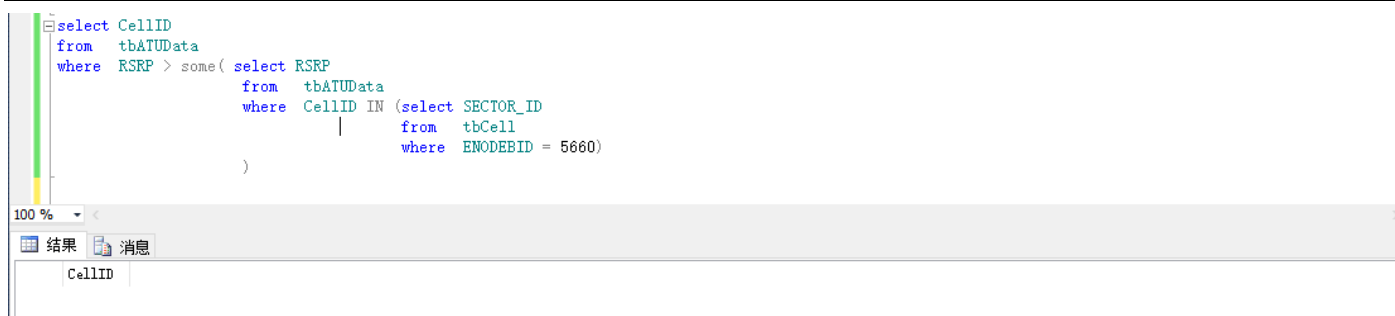
	SECTOR_ID	PCI
1	124711-0	185
2	124711-1	183
3	124711-2	184
4	124712-0	188
5	124712-1	186
6	124712-2	187

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:00 | 276 行

6.6.2 Set Comparison – “some” Clause

1. 根据路测 ATU 数据表和小区/基站工参表，使用 some 语句查询“服务小区参考信号接收功率 RSRP”大于部分（至少一个）所属基站 ID 为 5660 的小区的“服务小区参考信号接收功率 RSRP”的服务小区。

```
select CellID
from   tbATUData
where  RSRP > some( select RSRP
                    from   tbATUData
                    where  CellID IN (select SECTOR_ID
                                      from   tbCell
                                      where  ENODEBID = 5660)
                    )
```



未能查找到结果，查看源数据得知，表 tbATUData 中没有符合条件的 CellID

2.根据路测 ATU 切换统计矩阵表和 MRO 测量报告数据表，使用 all 语句查询切换次数最多的小区干扰小区 ID，干扰小区 PCI。

```
select InterferingSector,LteNcPci
from tbMROData
where ServingSector in (
    select SSECTOR_ID
    from tbATUHandOver
    where HOATT>=all (
        select HOATT
        from tbATUHandOver
    )
)
```



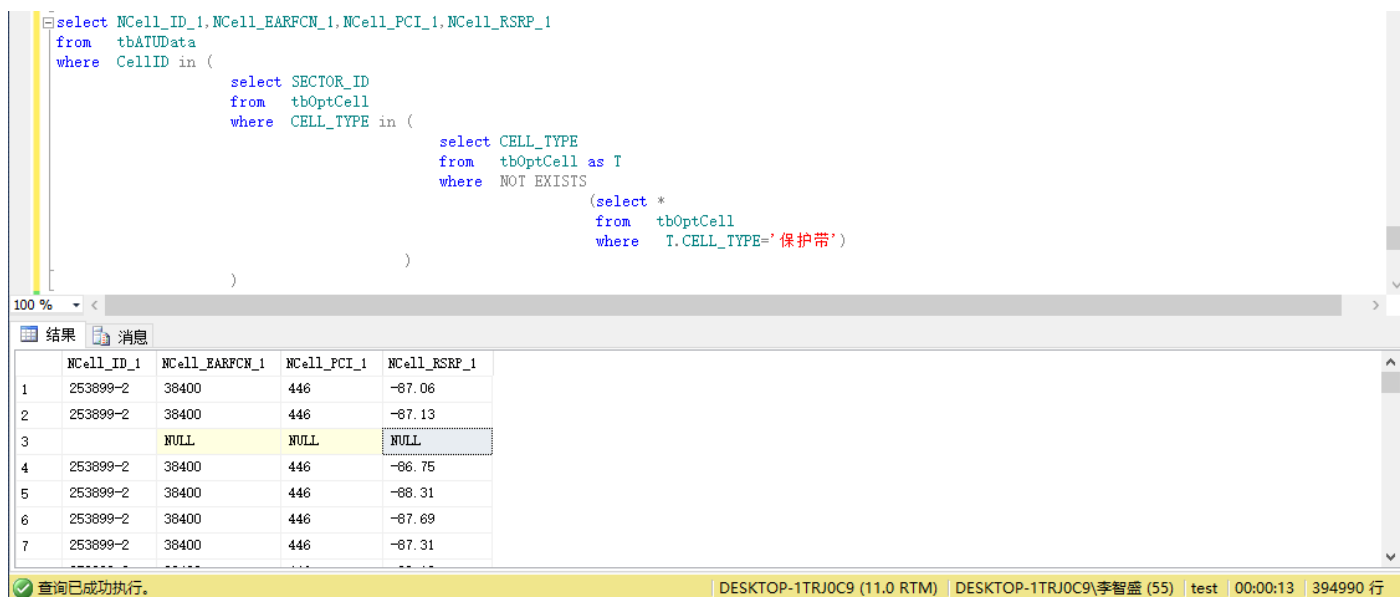
未能查找到结果，表 tbMROData 没有 ServingSector=259311-1 的小区 ID

6.6.3 Test for Empty Relations---Use of “not exists” Clause

根据路测 ATU 数据表和优化小区表，使用 not exists 语句查询小区类型不为保护带小区的

第 1 邻小区/干扰小区的标识、第 1 邻小区/干扰小区频点、第 1 邻小区/干扰小区物理小区标识、第 1 邻小区/干扰小区参考信号接收强度。

```
select NCell_ID_1,NCell_EARFCN_1,NCell_PCI_1,NCell_RSRP_1
from   tbATUData
where  CellID in (
        select SECTOR_ID
        from   tbOptCell
        where  CELL_TYPE in (
                select CELL_TYPE
                from   tbOptCell as T
                where  NOT EXISTS
                    (select *
                     from   tbOptCell
                     where  T.CELL_TYPE='保护带')
            )
    )
)
```



```
select NCell_ID_1,NCell_EARFCN_1,NCell_PCI_1,NCell_RSRP_1
from   tbATUData
where  CellID in (
        select SECTOR_ID
        from   tbOptCell
        where  CELL_TYPE in (
                select CELL_TYPE
                from   tbOptCell as T
                where  NOT EXISTS
                    (select *
                     from   tbOptCell
                     where  T.CELL_TYPE='保护带')
            )
    )
)
```

	NCell_ID_1	NCell_EARFCN_1	NCell_PCI_1	NCell_RSRP_1
1	253899-2	38400	446	-87.06
2	253899-2	38400	446	-87.13
3		NULL	NULL	NULL
4	253899-2	38400	446	-86.75
5	253899-2	38400	446	-88.31
6	253899-2	38400	446	-87.69
7	253899-2	38400	446	-87.31

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:13 | 394990 行

但查询结果隔一段会有空行、空值，尚未解决

6.6.4 Test for Absence of Duplicate Tuples

根据基于 MR 测量报告的干扰分析表和路测 ATU 切换统计矩阵表，查询主小区 ID 在路测 ATU 切换统计矩阵表中只出现过一次的加权 C2I 干扰。

用 unique 结构实现：

```
SELECT WeightedC2I
from tbC2I
where SCELL in ( select T.SSECTOR_ID
                  from tbATUHandOver as T
                  where unique(select count(S.SSECTOR_ID)
                               from tbATUHandOver as S
                               where T.SSECTOR_ID = S.SSECTOR_ID )
                )
```

消息

消息 156, 级别 15, 状态 1, 第 226 行
关键字 'unique' 附近有语法错误。
消息 102, 级别 15, 状态 1, 第 229 行
“)” 附近有语法错误。

提示有语法错误；

换另一种该方法：

```
SELECT WeightedC2I
from tbC2I
where SCELL in ( select T.SSECTOR_ID
                  from tbATUHandOver as T
                  where 1>= (select count(S.SSECTOR_ID)
                             from tbATUHandOver as S
                             where T.SSECTOR_ID = S.SSECTOR_ID )
                )
```

```
SELECT WeightedC2I
from tbC2I
where SCELL in ( select T.SSECTOR_ID
                  from tbATUHandOver as T
                  where 1>= (select count(S.SSECTOR_ID)
                             from tbATUHandOver as S
                             where T.SSECTOR_ID = S.SSECTOR_ID )
                )
```

结果

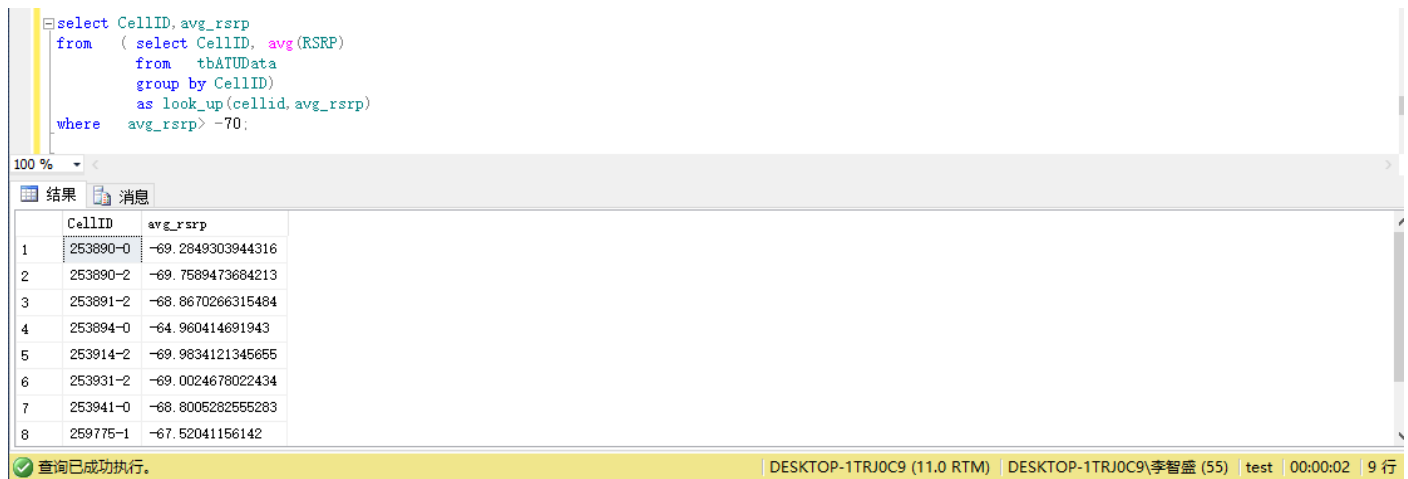
	WeightedC2I
1	29400
2	21780
3	40572
4	70462
5	13824
6	5264
7	108006
8	4888

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:00 | 1635 行

6.6.5 Subqueries in the From Clause

根据路测 ATU 数据表，查询服务小区参考信号接收功率 RSRP 的均值大于-70 的小区。

```
select CellID, avg_rsrp
from ( select CellID, avg(RSRP)
      from tbATUData
      group by CellID)
as look_up(cellid, avg_rsrp)
where avg_rsrp > -70;
```



The screenshot shows a SQL query execution window. The query is the same as the one above. The results are displayed in a table with two columns: CellID and avg_rsrp. The table contains 8 rows of data. At the bottom, a status bar indicates the query was successful and shows the number of rows returned (9 rows).

	CellID	avg_rsrp
1	253890-0	-69.2849303944316
2	253890-2	-69.7589473684213
3	253891-2	-68.8670266315484
4	253894-0	-64.960414691943
5	253914-2	-69.9834121345655
6	253931-2	-69.0024678022434
7	253941-0	-68.8005282555283
8	259775-1	-67.52041156142

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:02 | 9 行

6.6.6 With Clause

根据路测 ATU 切换统计矩阵表和 MRO 测量报告数据表, 使用 with 语句找出所有具有最低切换次数的小区 MRO 测量信息

```
with min_hoatt(hoatt) as
( select min(HOATT)
  from tbATUHandOver)
select ServingSector
from tbMROData
where ServingSector in(select SSECTOR_ID
                       from tbATUHandOver
                       where HOATT = hoatt);
```

```
with min_hoatt(hoatt) as
(
select min(HOATT)
from tbATUHandOver)
select ServingSector
from tbMROData
where ServingSector in(select SSECTOR_ID
                        from tbATUHandOver
                        where HOATT = hoatt);
```

ServingSector
5641-130
5641-130
5641-130
5641-130
5641-130
5641-130
5641-130
5641-130
5641-130

查询已成功执行。 | DESKTOP-1TRJ0C9 (11.0 RTM) | DESKTOP-1TRJ0C9\李智盛 (55) | test | 00:00:12 | 453185 行

一开始根据题目要求筛选出的数据过多，怀疑语句有错误

写简单的语句试错的过程不清楚 with as 的语法结构，网上资料也很少；自己写的用来检验结果的简单语句一直报错，花了大量时间研究 with as 的结构。几次简单验证后发现一开始写的应该没有错误：因为取得最小值的小区 ID 不止一个。

6.6.7 Scalar Subquery——Subqueries in the Select Clause

根据小区/基站工参表和一阶邻区关系表，列出频点为 38400 的所有小区的一阶邻区数目。

采用了标量子查询，将结果命名为 num1

```
select( select count(N_SECTOR_ID)
        from tbAdjCell
        where S_SECTOR_ID IN
              ( select SECTOR_ID
                from tbCell
                where EARFCN =38400)
        ) as num1
```

普通的直接查询，将结果命名为 num1

```
select count(N_SECTOR_ID) as num2
from tbAdjCell
where S_EARFCN = 38400
```



结果相同

6.7 综合---查询语句

根据小区/基站工参表和小区切换统计性能表，查询具有最多二阶邻区数的小区的最大切换成功次数、相应的切换目标小区 ID、尝试切换次数。

```
select HOSUCC, SCELL, HOATT
from tbHandOver
where HOSUCC IN ( select max(HOSUCC)
                  from tbHandOver
                  where SCELL in ( select S_SECTOR_ID
                                    from tbSecAdjCell
                                    group by S_SECTOR_ID
                                    HAVING COUNT(N_SECTOR_ID) >=all ( select count(N_SECTOR_ID)
                                                                        from tbSecAdjCell
                                                                        group by S_SECTOR_ID
                                                                        )
                                )
                )
```

```
select HOSUCC, SCELL, HOATT
from tbHandOver
where HOSUCC IN( select max(HOSUCC)
from tbHandOver
where SCELL in ( select S_SECTOR_ID
from tbSecAdjCell
group by S_SECTOR_ID
HAVING COUNT(N_SECTOR_ID) >=all( select count(N_SECTOR_ID)
from tbSecAdjCell
group by S_SECTOR_ID
)
)
)
```

100 %

结果 消息

	HOSUCC	SCELL	HOATT
1	3282	124712-0	3296

查询已成功执行。 DESKTOP-1TRJ0C9 (11.0 RTM) DESKTOP-1TRJ0C9\李智盛 (54) test 00:00:01 1 行

6.8 Modification of the Database

6.8.1 Deletion

根据路测 ATU 切换统计矩阵表和小区切换统计性能表，删除切换次数均值小于 3 的小区切换性能统计数据。

删除前

删除后

▼ 常规	
Vardecimal 存储格式已启用	False
索引空间	0.289 MB
行计数	7336
数据空间	0.406 MB
▼ 文件组	
文本文件组	
文件组	PRIMARY
FILESTREAM 文件组	

▼ 常规	
Vardecimal 存储格式已启用	False
索引空间	0.289 MB
行计数	4970
数据空间	0.406 MB
▼ 文件组	
文本文件组	
文件组	PRIMARY
FILESTREAM 文件组	

```
delete from tbHandOver
where SCELL IN (
    select SSECTOR_ID
    from tbATUHandOver
    group by SSECTOR_ID
    having avg(HOATT) < 3
)
```

100 %

消息

(2366 行受影响)

6.8.2 Insertion

向小区/基站工参表中插入一条新信息

```
insert into tbCell
values (
    '北京', 50000-0, '北京-HLHF-1', 124672, '北京-HLHF',
    38400, 40, 2, 5, 1200, '华为', 100.0000, 30.0000,
    '宏站', 30, 20, 5, 3, 8)
```

再次查询

```
insert into tbCell
values (
    '北京', 50000-0, '北京-HLHF-1', 124672, '北京-HLHF',
    38400, 40, 2, 5, 1200, '华为', 100.0000, 30.0000,
    '宏站', 30, 20, 5, 3, 8)

select *from tbCell]
where CITY = '北京'
```

	CITY	SECTOR_ID	SECTOR_NAME	ENODEBID	ENODEB_NAME	EARFCN	PCI	PSS	SSS	TAC	VENDOR	LONGITUDE	LATITUDE	STYLE	AZIMUTH	HEIGHT	ELECTTILT	MECHTILT	TOTLETILT
1	北京	50000	北京-HLHF-1	124672	北京-HLHF	38400	40	2	5	1200	华为	100	30	宏站	30	20	5	3	8

6.8.3 Updates

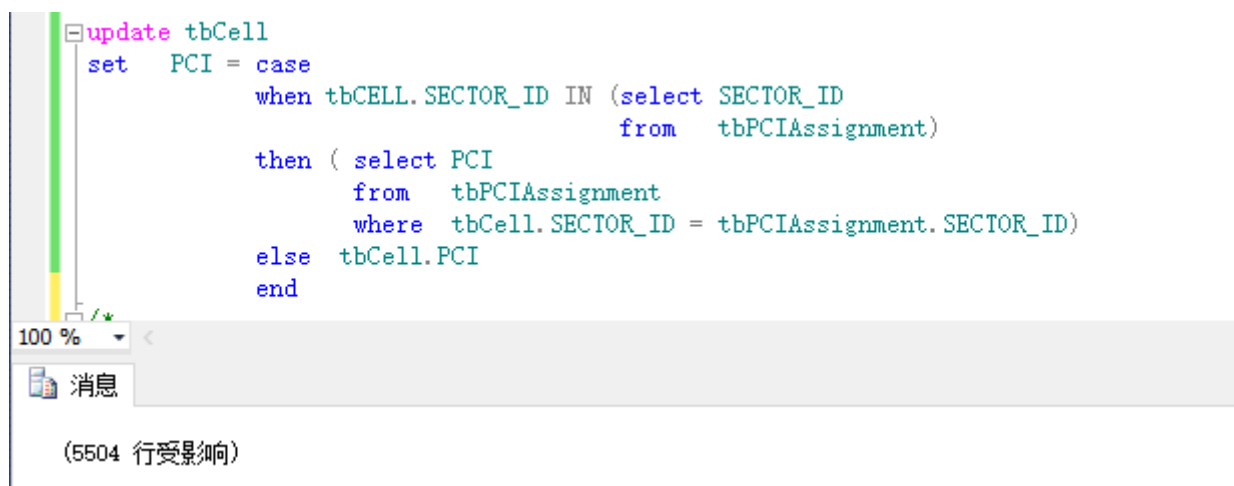
- 将优化小区/保护带小区表中, 小区 ID 为 “246506-3” 的小区的小区类型改为 “优化区”。

```
update tbOptCell
set
where
select SECTOR_ID, CELL_TYPE
from tbOptCell
where SECTOR_ID='246506-3'
```

	SECTOR_ID	CELL_TYPE
1	246506-3	优化区

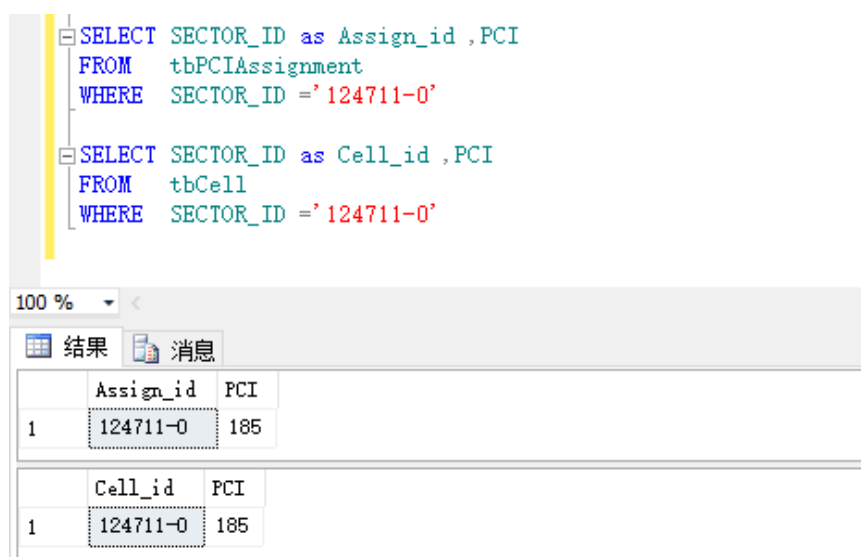
- 用小区 PCI 优化调整结果表中 “优化调整后的本小区 PCI 值”，替换小区/基站工参表中小区的 “物理小区标识”。

```
update tbCell
set   PCI = case
      when tbCELL.SECTOR_ID IN (select SECTOR_ID
                                from   tbPCIAssignment)
      then ( select PCI
              from   tbPCIAssignment
              where  tbCell.SECTOR_ID = tbPCIAssignment.SECTOR_ID)
      else tbCell.PCI
      end
```



实际上 tbCELL 表项 5504,而 tbPCIAssignment 仅有 276 项;只有 tbCELL 的 SECTOR_ID 能在 tbPCIAssignment 中找到时, 这些 ID 对应的 PCI 被修改, 否则不变 (等于它本身的值)

简单的测试:



再选取部分，验证成功：

```
SELECT TOP 10 SECTOR_ID as Assign_id ,PCI
FROM    tbPCIAssignment
ORDER BY SECTOR_ID
```

```
SELECT TOP 150 SECTOR_ID as Cell_id ,PCI
FROM    tbCell
ORDER BY SECTOR_ID
```

	Assign_id	PCI
3	124711-2	184
4	124712-0	188
5	124712-1	186
6	124712-2	187
7	124713-0	181
8	124713-1	182
9	124713-2	180
10	124818-0	174

	Cell_id	PCI
120	124712-0	188
121	124712-1	186
122	124712-2	187
123	124713-0	181
124	124713-1	182
125	124713-2	180
126	124716-0	61
127	124716-1	60
128	124716-2	62
129	124717-0	344
130	124717-1	343

针对路测 ATU C2I 干扰矩阵表表，使用 case 语句作出如下修改：如果主小区与干扰小区为同站小区且干扰强度排序不小于 1，则干扰强度排序减 1；如果主小区与干扰小区不为同站，干扰强度排序加 1。

```
update tbATUC2I
set RANK = case
    when COSITE = 1 and RANK>1 then RANK -1
    when COSITE = 0              then RANK +1
end
```

修改前:

	SECTOR_ID	NCELL_ID	RATIO_ALL	RANK	COSITE						
1	15113-129	253890-1	51	1	0	18	238397-2	238397-1	6	0	1
2	15113-129	253914-1	26	2	0	19	238397-2	259772-2	0	3	0
3	15113-129	253899-0	7	3	0	20	238397-2	259778-1	0	4	0
4	15113-129	253935-1	5	4	0	21	238397-2	5641-129	0	5	0
5	15113-129	259775-1	0	5	0	22	238397-2	253905-1	0	6	0
6	15113-129	253904-1	0	6	0	23	238397-2	253806-1	0	7	0
7	15113-129	253936-1	0	7	0	24	238397-2	25393...	0	8	0
8	238397-1	253931-0	31	1	0	25	253890-0	253934-1	31	1	0
9	238397-1	259772-2	21	2	0	26	253890-0	15113...	11	2	0
						27	253890-0	253890-2	3	0	1

修改后:

	SECTOR_ID	NCELL_ID	RATIO_ALL	RANK	COSITE		SECTOR_ID	NCELL_ID	RATIO_ALL	RANK	COSITE
1	15113-129	253890-1	51	2	0	18	238397-2	238397-1	6	NULL	1
2	15113-129	253914-1	26	3	0	19	238397-2	259772-2	0	4	0
3	15113-129	253899-0	7	4	0	20	238397-2	259778-1	0	5	0
4	15113-129	253935-1	5	5	0	21	238397-2	5641-129	0	6	0
5	15113-129	259775-1	0	6	0	22	238397-2	253905-1	0	7	0
6	15113-129	253904-1	0	7	0	23	238397-2	253806-1	0	8	0
7	15113-129	253936-1	0	8	0	24	238397-2	25393...	0	9	0
8	238397-1	253931-0	31	2	0	25	253890-0	253934-1	31	2	0
9	238397-1	259772-2	21	3	0	26	253890-0	15113...	11	3	0

7 实验总结

7.1 分组聚集

6.5.1 分组聚集, 降序排列

当 SQL 查询使用分组时, 一个很重要的事情时需要保证出现在 **select** 语句中但是没有被聚集的属性只能是出现在 **group by** 子句中的那些属性。

换句话说, 任何没有出现在 **group by** 子句中的属性如果出现在 **select** 子句中的话, 它只能出现在聚集函数 (如 **avg**) 内部, 否则这样的查询就是错误的。

7.2 Null values

6.4 Null Values

7.3 查找失败

6.6.2 Set Comparison – “some” Clause

6.6.3 Test for Empty Relations---Use of “not exists” Clause

7.4 查询结果中有空值

6.6.3 Test for Empty Relations---Use of “not exists” Clause

7.5 Exists、Not exists

exists 对主表用 loop 逐条查询，每次查询都会查看 exists 的条件语句，当 exists 里的条件语句能够返回记录行时(无论记录行是的多少，只要能返回)，条件就为真，返回当前 loop 到的这条记录，反之如果 exists 里的条件语句不能返回记录行，则当前 loop 到的这条记录被丢弃，exists 的条件就像一个 bool 条件，当能返回结果集则为 true，不能返回结果集则为 false。

7.6 Unique 结构

6.6.4 Test for Absence of Duplicate Tuples

7.7 With as

6.6.6 With Clause

一开始根据题目要求筛选出的数据过多，怀疑语句有错误

写简单的语句试错的过程不清楚 with as，语句一直报错，花了大量时间研究 with as 的结构，几次简单验证后发现一开始写的应该没有错误：因为取得最小值的小区 ID 不止一个。