

# A Comparative Study of Multiple Table Data Queries Based on SQL Server 2008

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Abstract: Using SQL language to complete multi table queries in databases is a key learning point for database learners. This article compares and studies three methods of implementing multi table queries: join query, view query, and stored procedure query, exploring their respective advantages and disadvantages, in order to improve learning efficiency.

## 1 INTRODUCTION

In the process of learning databases, the most important knowledge point is to use SQL language to complete data queries on basic tables in the database, and the most difficult point of data queries is precisely multi table queries, which often troubles database learners, but it is unavoidable. In order to improve the learning efficiency of multi table queries based on SQL Server 2008, this article will take a common student database as an example to design and implement multi table data queries. By comparing and studying the advantages and disadvantages of connection queries, view queries, and stored procedure queries, it will improve the efficiency of students' learning this knowledge point.

## 2 CREATE A STUDENT DATABASE AND BASIC TABLES

### 2.1 Creating a Student Database Using T-SQL Program

The student database is a data warehouse that stores students' daily learning and life information. It is designed as an information management tool to facilitate the management of student data information by teachers and counselors. Design the corresponding program in SSMS as follows:

```
create database student
on
(name=student_data,
filename='d:\student_data.mdf',
size=3,
maxsize=300,
filegrowth=2)
log on
(name=student_log,
filename='d:\student_log.ldf',
size=4,
maxsize=400,
filegrowth=10%)
```

### 2.2 Creating Three Basic Tables Using SSMS

Using SSMS, create three basic tables in the student database student, namely the student information table stuinfo, to store students' basic information. Course information table, used to store course information. The score information table is used to store students' course grades.

The stuinfo structure of the student information table is shown in Table 1.

Table 1. Student information table stuinfo structure.

column	type	length	meaning	Other
stuid	varchar	10	Student ID	PK
sname	char	8	name	Not null
sex	char	2	gender	male or female
phone	char	11	Phone	Not null

The procedure for creating the student information table stuinfo table is as follows:

```
create table stuinfo
( stuid varchar(10) primary key,
  sname char(8),
  sex char(2) check(sex in(' male ',' female ')),
  phone char(11)
)
```

The course structure of the course information table is shown in Table 2.

Table 2. Course structure of student information table.

column	type	length	meaning	Other
cid	varchar	10	Course ID	PK
cname	varchar	20	Course Name	Not null
credit	float		credit	Not null

The procedure for creating a student information table course is as follows:

```
use student
go
create table course
( cid varchar(10) primary key,
  cname varchar(20) not null,
  credit float not null
)
```

The score structure of the grade information table is shown in Table 3.

Table 3. Score structure of the score information table.

column	type	length	meaning	Other
stuid	varchar	10	Student ID	PK
cid	varchar	10	Course ID	PK
grade	float		achievement	Not null

The procedure for creating a student information table score is as follows:

```
use student
go
create table score1
( stuid varchar(10) primary key,
  cid varchar(10) not null,
  grade float not null
)
```

After the three tables are created, the relevant data can be entered using the insert into statement in the T-SQL program, forming a complete database for subsequent data queries to provide a data source.

### 3 SQL STATEMENT IMPLEMENTATION FOR MULTI TABLE QUERIES

#### 3.1 Connection Query

In the FROM clause, use commas to separate multiple tables, and then provide a join condition through the

WHERE clause, and use this condition to join the tables. For the multi table query of the three tables created above, it is mainly applied to personal information query and score summary statistics.

For example, by querying the student's student ID, name, and grade for the course "Principle of Database System", the program design is completed using a linked query statement, and the results are shown in Figure 1.

```
use student
go
select t1.stuid,sname,t2.cid,cname,grade
from stuinfo t1,course t2,score t3
where t1.stuid=t3.stuid and t2.cid=t3.cid and
cname='Principle of Database System'
```

	stuid	sname	cid	cname	grade
1	200302	yanhong	T02	Principle of Database System	69
2	200303	guanzhen	T02	Principle of Database System	78

Figure 1. Connection query result 1.

For example, using an aggregation function to query the student ID and name of each student, as well as the average score of the courses they have studied, and ranking them in descending order of average score. Complete the program design using the connection query statement, and the results are shown in Figure 2.

```
use student
go
select t1.stuid,sname,AVG(grade) as average
from stuinfo t1,score t3
where t1.stuid=t3.stuid
group by t1.stuid,sname
order by AVG(grade) desc
```

	stuid	sname	average
1	200301	xiyu	85
2	200303	guanzhen	78
3	200302	yanhong	69

Figure 2 .Connection Query Result 2.

#### 3.2 View Query

Multi table queries can be completed using other database objects, such as views, in addition to connection queries. A view is a virtual table exported from a basic table that does not occupy database memory space, but it also has all the functions of a basic table and can be used just like a basic table. Taking the query of students' course grades as an example, the view query method is used to explore its advantages and disadvantages. Firstly, create a view

v\_s1 using the command create view. Then, use this view to query students' grades, and you can also statistically summarize the query results.

Create view program as follows:

```
create view v_s1
as
select t1.stuid,sname,t2.cid,cname,grade
from stuinfo t1,course t2,score t3
where t1.stuid=t3.stuid and t2.cid=t3.cid
```

Then, using this view v\_s1 can query the student ID, name, course ID, course name, and grades of each student. The program code is as follows:

```
use student
go
select stuid,sname,cid,cname,grade
from v_s1
```

	stuid	sname	cid	cname	grade
1	200301	xiyu	T01	software project management	85
2	200302	yanhong	T02	Principle of Database System	69
3	200303	guanzhen	T02	Principle of Database System	78

Figure 3. View query result 1.

For example, to query the average score, highest score, and lowest score of each course that a student has studied, you can directly use this view to query.

The program code is as follows:

```
use student
go
select cid,cname,AVG(grade) as average,MAX(grade)
as Maximum,
MIN(grade) as Minimum
from v_s1
group by cid,cname
```

	cid	cname	average	Maximum	Minimum
1	T02	Principle of Database System	73.5	78	69
2	T01	software project management	85	85	85

Figure 4. View query result 2.

From the program code designed in the above example, whether it is the number of lines to write the program or the running efficiency of the program, compared to the multi table query designed using the join query method before, the view query is more concise and easy to understand, and the program code is also relatively easy to write.

As a special database object, a view is a virtual table. Once defined, a view can be queried, modified, deleted, and updated like a basic table. Moreover, querying through a view involves relatively simple program code, which can simplify operations. This is highly recognized by database learners or users, especially those unfamiliar with multi table queries. Due to the fact that the view only stores the definition of data and does not store the data itself, it is

beneficial for data security. However, it is also necessary to have a clear place for the storage of the data itself, which should be used in conjunction with the basic table in a reasonable manner.

### 3.3 Stored Procedure Query

In addition to connection queries and view queries, multi table queries can also be completed through stored procedures. A stored procedure is a database object composed of a set of T-SQL statements and stored in the form of a storage unit on the server (Mingyuan Zhao, 2023). Taking querying students' course grades as an example, first create a stored procedure, and then use the EXEC command to call the stored procedure to complete the query of students' course grades.

The program for creating stored procedure proc1 is as follows:

```
use student
go
create procedure proc1
as
select t1.stuid,sname,cname,grade
from stuinfo t1,course t2,score t3
where t1.stuid=t3.stuid and t2.cid=t3.cid
```

Then, if you want to query the score information of each course that all students have studied, use the program command EXEC to call the above stored procedure proc1, that is, directly enter the command EXEC proc1 in SSMS to achieve data query. The query results are as follows:

	stuid	sname	cname	grade
1	200301	xiyu	software project management	85
2	200302	yanhong	Principle of Database System	69
3	200303	guanzhen	Principle of Database System	78

Figure 5. Stored procedure query result 1.

If you want to query the score information of a single student or course, you need to create a stored procedure with parameters to implement it. The program for creating a stored procedure with parameters, proc2, is as follows:

```
use student
go
create procedure proc2(@sid varchar(10))
as
select t1.stuid,sname,cname,grade
from stuinfo t1,course t2,score t3
where t1.stuid=t3.stuid and t2.cid=t3.cid and
t1.stuid=@sid
```

Next, use the program command EXEC to call the above stored procedure proc2, that is, directly enter the command EXEC proc2 '200301' in SSMS to query the data. The query results are as follows:

	stuid	sname	cname	grade
1	200301	xiyu	software project management	85

Figure 6. Stored procedure query result 2.

A stored procedure is a collection of T-SQL statements executed on the database server side, compiled and stored in the database server (Jun Ma, 2021). Stored procedures are processed as a unit and identified by a name. When querying data, users only need to provide the name of the stored procedure and necessary parameters to easily call them. The processing of stored procedures is very flexible, allowing users to use declared variables and can also have input and output parameters to return single or multiple result sets and processed result values.

### 3.4 Comparison of Data for Three Types of Queries Corresponding to Execution Plans

When using the SSMS platform to run connection queries, view queries, and stored procedure queries, check the parameters reflected in their corresponding execution plans for data comparison, mainly analyzing and comparing CPU overhead, I/O overhead, and operator overhead (table scanning), as shown in Table 4.

Table 4 .Data Comparison Table for Different Query Methods.

Connection Method/Cost	CPU Cost (seconds)	I/O Cost (seconds)	Operator Cost (table scan) (seconds)
Join Query	0.0178693	0.003125	0.0036853
View Query	0.0178064	0.003125	0.0021531
Stored Procedure Query	0.0178078	0.003125	0.0021533

It is evident from the above table that these three query methods are similar in terms of CPU and I/O overhead, but in terms of operator overhead, that is, when scanning the same three tables, the overhead of connecting queries is significantly higher.

## 4 CONCLUSION

Data query is one of the more complex knowledge points faced by database learners and users, and it is also the most core knowledge for learning SQL language, and multi table query is the most difficult part to understand and master. This article explores three methods that can achieve multi table queries to

help database learners and users increase their interest in learning and improve the efficiency of learning and using databases. From the comparison of three query methods, it can be seen that connection queries are more traditional and commonly used. However, the reuse rate of the code written is too low, and the memory space occupied will also increase with the increase of data in the database, invisibly causing additional burden on data storage (Yong Wang, 2014); The query function of the view is consistent with the basic table and does not require memory usage. The code can be written repeatedly, which can reduce the amount of code written. However, it must be used in conjunction with the basic table, otherwise it is easy to do useless work; Stored procedure query, which can be modularized and encapsulated, has the structural characteristics of face objects. Once created, stored procedures can be called any number of times in future programs, which can improve the maintainability of applications, reduce network traffic, and speed up operation efficiency. For hundreds of lines of programs, this stored procedure query is suitable, but for beginners or those with a small number of program segments, this module design method is not very suitable, too wasteful, and the flexibility is far less than that of connection queries and view queries.

## REFERENCES

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