免费电子书

学习

SQL

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#sql

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1: SQL

SQL。 。

ISO / ANSI SQL ;。

1986	SQL-86	ANSI X3.135-1986ISO 90751987	198611
1989	SQL-89	ANSI X3.135-1989ISO / IEC 90751989	1989-01-01
1992	SQL-92	ISO / IEC 90751992	1992-01-01
1999	SQL1999	ISO / IEC 90751999	1999-12-16
2003	SQL2003	ISO / IEC 90752003	2003-12-15
2006	SQL2006	ISO / IEC 90752006	2006-06-01
2008	SQL2008	ISO / IEC 90752008	2008-07-15
2011	SQL2011	ISO / IEC 90752011	2011-12-15
2016	SQL 2016	ISO / IEC 90752016	2016121

Examples

SQLRDBMS。 SQLRDSMS“SQL”NoSQL。

SQL3

1. DDL;
2. DML;
3. DCL。

SQL

DMLCRUD`INSERT SELECT UPDATEDELETEINSERT` 。
`MERGE`3INSERTUPDATEDELETE。

CRUD

SQL/;“SQL”。
Microsoft“SQL Server”。 SQLSQL Server 。

SQL https://riptutorial.com/zh-CN/sql/topic/184/sql

2: ANDOR

1. SELECT * FROMWHERECondition1ANDcondition2;
2. SELECT * FROMWHERECondition1ORcondition2;

Examples

AND OR

10
20
24

```
select Name from table where Age>10 AND City='Prague'
```

```
select Name from table where Age=10 OR City='Prague'
```

ANDOR https://riptutorial.com/zh-CN/sql/topic/1386/and-or

3: DROPDELETE

- MSSQL
- DROP DATABASE [IF EXISTS] {database_name | database_snapshot_name} [... n] [;]
- MySQL
- DROP {DATABASE | SCHEMA} [IF EXISTS] db_name

`DROP DATABASE`SQL◦ ◦

Examples

DROP

◦ ◦

Employees Database

```
DROP DATABASE [dbo].[Employees]
```

DROPDELETE https://riptutorial.com/zh-CN/sql/topic/3974/dropdelete

4: DROP

DROP TABLE。

Examples

```
Drop Table MyTable;
```

MySQL 3.19

```
DROP TABLE IF EXISTS MyTable;
```

PostgreSQL 8.x

```
DROP TABLE IF EXISTS MyTable;
```

SQL Server 2005

```
If Exists(Select * From Information_Schema.Tables
          Where Table_Schema = 'dbo'
            And Table_Name = 'MyTable')
  Drop Table dbo.MyTable
```

SQLite 3.0

```
DROP TABLE IF EXISTS MyTable;
```

DROP https://riptutorial.com/zh-CN/sql/topic/1832/drop

5: EXISTS

Examples

EXISTS

ID		
1	Özgür	OZTURK
2		MEDI
3		

ID	ID	
1	2	123.50
2	3	14.80

```
SELECT * FROM Customer WHERE EXISTS (
    SELECT * FROM Order WHERE Order.CustomerId=Customer.Id
)
```

ID		
2		MEDI
3		

```
SELECT * FROM Customer WHERE NOT EXISTS (
    SELECT * FROM Order WHERE Order.CustomerId = Customer.Id
)
```

ID		
1	Özgür	OZTURK

EXISTS INJOIN

- EXISTS

- `IN`
- `JOIN`S

EXISTS https://riptutorial.com/zh-CN/sql/topic/7933/exists

6: GRANTREVOKE

- GRANT [privilege1] [[privilege2] ...] ON [table] TO [grantee1] [[grantee2] ...] [WITH GRANT OPTION]
- REVOKE [privilege1] [[privilege2] ...] ON [table] FROM [grantee1] [[grantee2] ...]

◦ WITH GRANT OPTION◦

Examples

/

```
GRANT SELECT, UPDATE
ON Employees
TO User1, User2;
```

User1User2EmployeesSELECTUPDATE◦

```
REVOKE SELECT, UPDATE
ON Employees
FROM User1, User2;
```

User1User2Employees SELECTUPDATE◦

GRANTREVOKE https://riptutorial.com/zh-CN/sql/topic/5574/grantrevoke

7: IN

Examples

IN

id

```
select *
from products
where id in (1,8,3)
```

```
select *
from products
where id = 1
   or id = 8
   or id = 3
```

IN

```
SELECT *
FROM customers
WHERE id IN (
    SELECT DISTINCT customer_id
    FROM orders
);
```

。

IN https://riptutorial.com/zh-CN/sql/topic/3169/in

8: LIKE

- SELECT * FROM [table] WHERE [column_name]'Value'

  Wild Card with _ SELECT * FROM [table] WHERE [column_name] Like'V_n'

  [charlist] SELECT * FROM [table] WHERE [column_name]'V [abc] n'

WHERELIKE。

- -
- _ -

Examples

%0。

''0。

Employees

ID	FName	LName		ID	DepartmentID		
1			2468101214	1	1	400	23-03-2005
2		Amudsen	2479100211	1	1	400	11-01-2010
3			2462544026	2	1	600	201568
4			2454124602	1	1	400	23-03-2005
			2468021911	2	1	800	01-01-2000

FName Employees Table'on'。

```
SELECT * FROM Employees WHERE FName LIKE '%on%';
```

ID	FName	LName		ID	DepartmentID		
3	R **on** ny		2462544026	2	1	600	201568
4	J **on**		2454124602	1	1	400	23-03-2005

PhoneNumber Employees'246' 。

```
SELECT * FROM Employees WHERE PhoneNumber LIKE '246%';
```

ID	FName	LName		ID	DepartmentID		
1			**246** 8101214	1	1	400	23-03-2005
3			**246** 2544026	2	1	600	201568
			246 8021911	2	1	800	01-01-2000

PhoneNumber Employees'11' 。

```
SELECT * FROM Employees WHERE PhoneNumber LIKE '%11'
```

ID	FName	LName		ID	DepartmentID		
2		Amudsen	24791002 **11**	1	1	400	11-01-2010
			24680219 **11**	2	1	800	01-01-2000

Fname 'n'。

```
SELECT * FROM Employees WHERE FName LIKE '__n%';
```

'n'2

ID	FName	LName		ID	DepartmentID		
3			2462544026	2	1	600	201568
4			2454124602	1	1	400	23-03-2005

SQL-SELECT_。

_ 。

Fname“j”“n”Fname3。

```
SELECT * FROM Employees WHERE FName LIKE 'j_n'
```

_ 。

“jon”“jan”“jen”。

“jn”“john”“jordan”“justin”“jason”“julian”“jillian”“joann”3Fname。

“LaSt”“LoSt”“HaLt”。

```
SELECT * FROM Employees WHERE FName LIKE '_A_T'
```

`[af]` set `[abcdef]` ◦

“gary”“mary”

```
SELECT * FROM Employees WHERE FName LIKE '[a-g]ary'
```

“mary”“gary”

```
SELECT * FROM Employees WHERE Fname LIKE '[lmnop]ary'
```

^

“gary” “mary”

```
SELECT * FROM Employees WHERE FName LIKE '[^a-g]ary'
```

“mary” “gary”

```
SELECT * FROM Employees WHERE Fname LIKE '[^lmnop]ary'
```

ANYALL

◦ “”“”“”◦

```
SELECT *
FROM   purchase_table
WHERE  product_type LIKE ANY ('electronics', 'books', 'video');
```

◦
“” “” “”◦

```
SELECT *
FROM   customer_table
WHERE  full_address LIKE ALL ('%united kingdom%', '%london%', '%eastern road%');
```

ALL◦
“”“”“”◦

```
SELECT *
FROM   customer_table
WHERE  product_type NOT LIKE ALL ('electronics', 'books', 'video');
```

FNameEmployees TableAF◦

```
SELECT * FROM Employees WHERE FName LIKE '[A-F]%'
```

LIKEESCAPE

`LIKE` -query

```
SELECT *
FROM T_Whatever
WHERE SomeField LIKE CONCAT('%', @in_SearchText, '%')
```

`LIKE`“50”“a_b”。

`LIKE` -escape

```
SELECT *
FROM T_Whatever
WHERE SomeField LIKE CONCAT('%', @in_SearchText, '%') ESCAPE '\'
```

\ESCAPE。 `\\%_` 。

```
string stringToSearch = "abc_def 50%";
string newString = "";
foreach(char c in stringToSearch)
     newString += @"\" + c;

sqlCmd.Parameters.Add("@in_SearchText", newString);
// instead of sqlCmd.Parameters.Add("@in_SearchText", stringToSearch);
```

。 1utf-8。 `string stringToSearch = "Les Mise\u0301rables";`。 //。 graphemeCluster。

ReverseStringC

SQL LIKE。 SQL。

SQL_[charlist][^ charlist]

-

```
   Eg:  //selects all customers with a City starting with "Lo"
        SELECT * FROM Customers
        WHERE City LIKE 'Lo%';

       //selects all customers with a City containing the pattern "es"
      SELECT * FROM Customers
       WHERE City LIKE '%es%';
```

_ -

```
Eg://selects all customers with a City starting with any character, followed by "erlin"
SELECT * FROM Customers
WHERE City LIKE '_erlin';
```

[charlist] -

```
Eg://selects all customers with a City starting with "a", "d", or "l"
SELECT * FROM Customers
WHERE City LIKE '[adl]%';

//selects all customers with a City starting with "a", "d", or "l"
SELECT * FROM Customers
WHERE City LIKE '[a-c]%';
```

[^ charlist] -

```
Eg://selects all customers with a City starting with a character that is not "a", "p", or "l"
SELECT * FROM Customers
WHERE City LIKE '[^apl]%';

or

SELECT * FROM Customers
WHERE City NOT LIKE '[apl]%' and city like '_%';
```

LIKE https://riptutorial.com/zh-CN/sql/topic/860/like

9: SKIP TAKE

Examples

ISO / ANSI SQL

```
SELECT Id, Col1
FROM TableName
ORDER BY Id
OFFSET 20 ROWS
```

MySQL

```
SELECT * FROM TableName LIMIT 20, 42424242424242;
-- skips 20 for take use very large number that is more than rows in table
```

```
SELECT Id,
   Col1
FROM (SELECT Id,
           Col1,
           row_number() over (order by Id) RowNumber
      FROM TableName)
WHERE RowNumber > 20
```

PostgreSQL

```
SELECT * FROM TableName OFFSET 20;
```

SQLite

```
SELECT * FROM TableName LIMIT -1 OFFSET 20;
```

ISO / ANSI SQL

```
SELECT * FROM TableName FETCH FIRST 20 ROWS ONLY;
```

MySQL; PostgreSQL; SQLite

```
SELECT * FROM TableName LIMIT 20;
```

```
SELECT Id,
   Col1
FROM (SELECT Id,
           Col1,
           row_number() over (order by Id) RowNumber
      FROM TableName)
WHERE RowNumber <= 20
```

SQL Server

```
SELECT TOP 20 *
FROM dbo.[Sale]
```

ISO / ANSI SQL

```
SELECT Id, Col1
FROM TableName
ORDER BY Id
OFFSET 20 ROWS FETCH NEXT 20 ROWS ONLY;
```

MySQL

```
SELECT * FROM TableName LIMIT 20, 20; -- offset, limit
```

; SQL Server

```
SELECT Id,
   Col1
 FROM (SELECT Id,
           Col1,
           row_number() over (order by Id) RowNumber
      FROM TableName)
WHERE RowNumber BETWEEN 21 AND 40
```

PostgreSQL; SQLite

```
SELECT * FROM TableName LIMIT 20 OFFSET 20;
```

SKIP TAKE https://riptutorial.com/zh-CN/sql/topic/2927/skip-take--

10: SQL CURSOR

Examples

。

sql。

。

```
DECLARE @db_name nvarchar(255)
DECLARE @sql nvarchar(MAX)

DECLARE @schema nvarchar(255)
DECLARE @table nvarchar(255)
DECLARE @column nvarchar(255)




DECLARE db_cursor CURSOR FOR
SELECT name FROM sys.databases


OPEN db_cursor
FETCH NEXT FROM db_cursor INTO @db_name

WHILE @@FETCH_STATUS = 0
BEGIN
    SET @sql = 'SELECT * FROM ' + QUOTENAME(@db_name) + '.information_schema.columns'
    PRINT ''
    PRINT ''
    PRINT ''
    PRINT @sql
    -- EXECUTE(@sql)



    -- For each database

    DECLARE @sqlstatement nvarchar(4000)
    --move declare cursor into sql to be executed
    SET @sqlstatement = 'DECLARE  columns_cursor CURSOR FOR SELECT TABLE_SCHEMA, TABLE_NAME,
COLUMN_NAME FROM ' + QUOTENAME(@db_name) + '.information_schema.columns ORDER BY TABLE_SCHEMA,
TABLE_NAME, ORDINAL_POSITION'



    EXEC sp_executesql @sqlstatement


    OPEN columns_cursor
    FETCH NEXT FROM columns_cursor
    INTO @schema, @table, @column

    WHILE @@FETCH_STATUS = 0
    BEGIN
        PRINT @schema + '.' + @table + '.' + @column
```

```
        --EXEC asp_DoSomethingStoredProc @UserId

    FETCH NEXT FROM columns_cursor --have to fetch again within loop
    INTO @schema, @table, @column

    END
    CLOSE columns_cursor
    DEALLOCATE columns_cursor

    -- End for each database




    FETCH NEXT FROM db_cursor INTO @db_name
END

CLOSE db_cursor
DEALLOCATE db_cursor
```

SQL CURSOR https://riptutorial.com/zh-CN/sql/topic/8895/sql-cursor

11: SQL Group By vs Distinct

Examples

GROUP BYDISTINCT

GROUP BY◦

ID		STORENAME	orderValue	
1	43	A.	25	20-03-2016
2	57	B	50	22-03-2016
3	43	A.		25-03-2016
4	82	C	10	26-03-2016
	21	A.	45	29-03-2016

GROUP BY◦

```
SELECT
    storeName,
    COUNT(*) AS total_nr_orders,
    COUNT(DISTINCT userId) AS nr_unique_customers,
    AVG(orderValue) AS average_order_value,
    MIN(orderDate) AS first_order,
    MAX(orderDate) AS lastOrder
FROM
    orders
GROUP BY
    storeName;
```

STORENAME	total_nr_orders	nr_unique_customers	average_order_value		
A.	3	2	33.3	20-03-2016	29-03-2016
B	1	1	50	22-03-2016	22-03-2016
C	1	1	10	26-03-2016	26-03-2016

DISTINCT。

```
SELECT DISTINCT
    storeName,
    userId
FROM
    orders;
```

STORENAME	
A.	43
B	57
C	82
A.	21

SQL Group By vs Distinct https://riptutorial.com/zh-CN/sql/topic/2499/sql-group-by-vs-distinct

12: SQL

SQLSQL。WebSQLSQL。SQL。

Examples

SQL

Web

```
https://somepage.com/ajax/login.ashx?username=admin&password=123
```

login.ashx

```
strUserName = getHttpsRequestParameterString("username");
strPassword = getHttpsRequestParameterString("password");
```

。

SQL

```
txtSQL = "SELECT * FROM Users WHERE username = '" + strUserName + "' AND password = '"+
strPassword +"'";
```

。

SQL

```
-- strUserName = "d'Alambert";
txtSQL = "SELECT * FROM Users WHERE username = 'd'Alambert' AND password = '123'";
```

d'AlambertdSQL。

```
strUserName = strUserName.Replace("'", "''");
strPassword = strPassword.Replace("'", "''");
```

```
cmd.CommandText = "SELECT * FROM Users WHERE username = @username AND password = @password";

cmd.Parameters.Add("@username", strUserName);
cmd.Parameters.Add("@password", strPassword);
```

SQL。

/

```
lol'; DROP DATABASE master; --
```

SQL

```
"SELECT * FROM Users WHERE username = 'somebody' AND password = 'lol'; DROP DATABASE master; --'";
```

SQLDB

SQL。

。

。

。 。

SQL

```
SQL = "SELECT * FROM Users WHERE username = '" + user + "' AND password ='" + pw + "'";
db.execute(SQL);
```

`pw' or '1'='1`;SQL

```
SELECT * FROM Users WHERE username = 'somebody' AND password ='pw' or '1'='1'
```

`Users'1'='1'`true。

SQL

```
SQL = "SELECT * FROM Users WHERE username = ? AND password = ?";
db.execute(SQL, [user, pw]);
```

SQL https://riptutorial.com/zh-CN/sql/topic/3517/sql

13: UNION / UNION ALL

SQL***UNIONSELECT***。 UNIONSELECT。

- SELECT column_1 [column_2] FROM table_1 [table_2] [WHERE condition]
  UNION | UNION ALL
  SELECT column_1 [column_2] FROM table_1 [table_2] [WHERE condition]

UNIONUNION ALLSELECT/。

UNION / UNION ALL。

UNIONUNION ALLUNIONUNION ALL。

UNION ALL。

Examples

UNION ALL

```
CREATE TABLE HR_EMPLOYEES
(
    PersonID int,
    LastName VARCHAR(30),
    FirstName VARCHAR(30),
    Position VARCHAR(30)
);

CREATE TABLE FINANCE_EMPLOYEES
(
    PersonID INT,
    LastName VARCHAR(30),
    FirstName VARCHAR(30),
    Position VARCHAR(30)
);
```

managers。

UNIONmanager position

```
SELECT
    FirstName, LastName
FROM
    HR_EMPLOYEES
WHERE
    Position = 'manager'
UNION ALL
SELECT
    FirstName, LastName
FROM
    FINANCE_EMPLOYEES
```

```
WHERE
    Position = 'manager'
```

UNION◦ UNION ALL ◦

select

```
SELECT
    FirstName as 'First Name', LastName as 'Last Name'
FROM
    HR_EMPLOYEES
WHERE
    Position = 'manager'
UNION ALL
SELECT
    FirstName, LastName
FROM
    FINANCE_EMPLOYEES
WHERE
    Position = 'manager'
```

- UNION2
- UNION ALL2

  UNIONUNION◦ ◦

UNION

2◦ UNION◦

```
SELECT C1, C2, C3 FROM Table1 WHERE C1 = @Param1
UNION
SELECT C1, C2, C3 FROM Table1 WHERE C2 = @Param2
```

◦ ◦

UNION ALL

2◦

```
SELECT C1 FROM Table1
UNION ALL
SELECT C1 FROM Table2
```

◦ ◦

UNION / UNION ALL https://riptutorial.com/zh-CN/sql/topic/349/union---union-all

14: UPDATE

- SET *column_name = value column_name2 = value_2 ... column_name_n = value_n* condition_n

Examples

Cars Table 。

```
UPDATE Cars
SET Status = 'READY'
```

“Cars”“status”“READY”WHERE。

Cars Table 。

```
UPDATE
    Cars
SET
    Status = 'READY'
WHERE
    Id = 4
```

ID4'Cars'“READY”。

WHERE。 。 。

Cars Table 。

```
UPDATE Cars
SET TotalCost = TotalCost + 100
WHERE Id = 3 or Id = 4
```

。 TotalCost100

- Car3TotalCost100200
- Car4TotalCost12541354

。

CustomerEmployeesEmployeesPhoneNumber 。

EmployeesCustomers。

SQL

```
UPDATE
```

```
    Employees
SET PhoneNumber =
    (SELECT
         c.PhoneNumber
     FROM
         Customers c
     WHERE
         c.FName = Employees.FName
         AND c.LName = Employees.LName)
WHERE Employees.PhoneNumber IS NULL
```

SQL2003

MERGE

```
MERGE INTO
    Employees e
USING
    Customers c
ON
    e.FName = c.Fname
    AND e.LName = c.LName
    AND e.PhoneNumber IS NULL
WHEN MATCHED THEN
   UPDATE
      SET PhoneNumber = c.PhoneNumber
```

SQL Server

INNER JOIN

```
UPDATE
    Employees
SET
    PhoneNumber = c.PhoneNumber
FROM
    Employees e
INNER JOIN Customers c
        ON e.FName = c.FName
        AND e.LName = c.LName
WHERE
    PhoneNumber IS NULL
```

。

```
CREATE TABLE #TempUpdated(ID INT)

Update TableName SET Col1 = 42
    OUTPUT inserted.ID INTO #TempUpdated
    WHERE Id > 50
```

UPDATE https://riptutorial.com/zh-CN/sql/topic/321/update

15: XML

Examples

XML

```
DECLARE @xmlIN XML = '<TableData>
<aaa Main="First">
  <row name="a" value="1" />
  <row name="b" value="2" />
  <row name="c" value="3" />
</aaa>
<aaa Main="Second">
  <row name="a" value="3" />
  <row name="b" value="4" />
  <row name="c" value="5" />
</aaa>
<aaa Main="Third">
  <row name="a" value="10" />
  <row name="b" value="20" />
  <row name="c" value="30" />
</aaa>
</TableData>'

SELECT t.col.value('../@Main', 'varchar(10)') [Header],
t.col.value('@name', 'VARCHAR(25)') [name],
t.col.value('@value',  'VARCHAR(25)') [Value]
FROM    @xmlIn.nodes('//TableData/aaa/row') AS t (col)
```

```
Header    name    Value
First      a        1
First      b        2
First      c        3
Second     a        3
Second     b        4
Second     c        5
Third      a        10
Third      b        20
Third      c        30
```

XML https://riptutorial.com/zh-CN/sql/topic/4421/xml

16:

- MySQLCREATE TABLE EmployeesId int NOT NULLPRIMARY KEYId...;
- CREATE TABLE EmployeesId int NOT NULL PRIMARY KEY...;

Examples

```
CREATE TABLE Employees (
    Id int NOT NULL,
    PRIMARY KEY (Id),
    ...
);
```

Employees“Id”。。。

```
CREATE TABLE EMPLOYEE (
    e1_id INT,
    e2_id INT,
    PRIMARY KEY (e1_id, e2_id)
)
```

。。

MySQL

```
CREATE TABLE Employees (
    Id int NOT NULL AUTO_INCREMENT,
    PRIMARY KEY (Id)
);
```

PostgreSQL

```
CREATE TABLE Employees (
    Id SERIAL PRIMARY KEY
);
```

SQL Server

```
CREATE TABLE Employees (
    Id int NOT NULL IDENTITY,
    PRIMARY KEY (Id)
);
```

SQLite

```
CREATE TABLE Employees (
    Id INTEGER PRIMARY KEY
);
```

https://riptutorial.com/zh-CN/sql/topic/505/

17:

Examples

Apply。

Department。Employee。EmployeeDepartment。

DepartmentCROSS APPLYDepartmentEmployee。DepartmentEmployee。

```
SELECT *
FROM Department D
CROSS APPLY (
    SELECT *
    FROM Employee E
    WHERE E.DepartmentID = D.DepartmentID
) A
GO
SELECT *
FROM Department D
INNER JOIN Employee E
  ON D.DepartmentID = E.DepartmentID
```

;JOIN。

2DepartmentOUTER APPLYDepartmentEmployee。EmployeeNULL56。DepartmentEmployee LEFT OUTER JOIN。Department;Employee。

```
SELECT *
FROM Department D
OUTER APPLY (
    SELECT *
    FROM Employee E
    WHERE E.DepartmentID = D.DepartmentID
) A
GO
SELECT *
FROM Department D
LEFT OUTER JOIN Employee E
  ON D.DepartmentID = E.DepartmentID
GO
```

。 。

APPLY。3DepartmentID。DepartmentCROSS APPLY。DepartmentDepartmentID。OUTER APPLYCROSS APPLYCROSS APPLYOUTER APPLYNULL。

```
CREATE FUNCTION dbo.fn_GetAllEmployeeOfADepartment (@DeptID AS int)
RETURNS TABLE
AS
  RETURN
```

```
  (
  SELECT
    *
  FROM Employee E
  WHERE E.DepartmentID = @DeptID
  )
GO
SELECT
  *
FROM Department D
CROSS APPLY dbo.fn_GetAllEmployeeOfADepartment(D.DepartmentID)
GO
SELECT
  *
FROM Department D
OUTER APPLY dbo.fn_GetAllEmployeeOfADepartment(D.DepartmentID)
GO
```

NOINNER JOIN / LEFT OUTER JOINCROSS / OUTER APPLYON1 = 1“” D.DepartmentID“”。。JOIN/。APPLY。

https://riptutorial.com/zh-CN/sql/topic/2516/-

18:

◦ ◦

Examples

```
BEGIN TRANSACTION
    INSERT INTO DeletedEmployees(EmployeeID, DateDeleted, User)
        (SELECT 123, GetDate(), CURRENT_USER);
    DELETE FROM Employees WHERE EmployeeID = 123;
COMMIT TRANSACTION
```

```
BEGIN TRY
    BEGIN TRANSACTION
        INSERT INTO Users(ID, Name, Age)
        VALUES(1, 'Bob', 24)

        DELETE FROM Users WHERE Name = 'Todd'
   COMMIT TRANSACTION
END TRY
BEGIN CATCH
   ROLLBACK TRANSACTION
END CATCH
```

https://riptutorial.com/zh-CN/sql/topic/2424/

19: WHEREHAVING

- SELECT column_name
  FROM table_name
  WHERE column_name
- SELECT column_nameaggregate_functioncolumn_name
  FROM table_name
  GROUP BY column_name
  aggregate_functioncolumn_name

Examples

WHERE

Steam10。

```
SELECT *
FROM Items
WHERE Price < 10
```

IN

Car Table 。

```
SELECT *
FROM Cars
WHERE TotalCost IN (100, 200, 300)
```

Car2200Car3100。 `OR`

```
SELECT *
FROM Cars
WHERE TotalCost = 100 OR TotalCost = 200 OR TotalCost = 300
```

LIKE

LIKE 。

Employees 。

```
SELECT *
FROM Employees
WHERE FName LIKE 'John'
```

“John”Employee1。

```
SELECT *
FROM Employees
WHERE FName like 'John%'
```

%

- John% - “John”
- %John - “John”
- %John% - “John”

“John”Employee2“Johnathon”Employee4。

NULL / NOT NULLWHERE

```
SELECT *
FROM Employees
WHERE ManagerId IS NULL
```

ManagerIdNULLEmployee。

```
Id    FName    LName    PhoneNumber    ManagerId    DepartmentId
1     James    Smith    1234567890     NULL         1
```

```
SELECT *
FROM Employees
WHERE ManagerId IS NOT NULL
```

ManagerId NULLEmployee。

```
Id    FName       LName     PhoneNumber    ManagerId    DepartmentId
2     John        Johnson   2468101214     1            1
3     Michael     Williams  1357911131     1            2
4     Johnathon   Smith     1212121212     2            1
```

WHEREWHERE ManagerId = NULLWHERE ManagerId <> NULL 。

HAVING

WHERE HAVING。

。

COUNT() SUM() MIN()MAX() 。

Car Table 。

```
SELECT CustomerId, COUNT(Id) AS [Number of Cars]
```

```
FROM Cars
GROUP BY CustomerId
HAVING COUNT(Id) > 1
```

Number of CarsCustomerIdNumber of Cars。 1。

ID	
1	2

BETWEEN

Item SalesCustomers。

BETWEEN。

BETWEENNumbers

```
SELECT * From ItemSales
WHERE Quantity BETWEEN 10 AND 17
```

ItemSales1017.

ID		Id		
1	2013-07-01	100	10	34.5
4	2013723	100	15	34.5
	2013724	145	10	34.5

BETWEEN

```
SELECT * From ItemSales
WHERE SaleDate BETWEEN '2013-07-11' AND '2013-05-24'
```

ItemSalesSaleDate20137112013524。

ID		Id		
3	2013711	100	20	34.5
4	2013723	100	15	34.5
	2013724	145	10	34.5

24。

BETWEEN

```
SELECT Id, FName, LName FROM Customers
WHERE LName BETWEEN 'D' AND 'L';
```

SQL

“D”“L”。13。2“M”。

ID	FName	LName
1		
3		

```
SELECT * FROM Employees
```

Employees。

```
Id    FName      LName     PhoneNumber    ManagerId    DepartmentId     Salary   Hire_date
CreatedDate    ModifiedDate
1     James      Smith     1234567890     NULL         1                1000     01-01-2002     01-01-
2002     01-01-2002
2     John       Johnson   2468101214     1            1                400      23-03-2005     23-03-
2005     01-01-2002
3     Michael    Williams  1357911131     1            2                600      12-05-2009     12-05-
2009     NULL
4     Johnathon  Smith     1212121212     2            1                500      24-07-2016     24-07-
2016     01-01-2002
```

SELECTWHERE。 =

```
SELECT * FROM Employees WHERE DepartmentId = 1
```

DepartmentId1

```
Id    FName      LName     PhoneNumber    ManagerId    DepartmentId     Salary   Hire_date
CreatedDate    ModifiedDate
1     James      Smith     1234567890     NULL         1                1000     01-01-2002     01-01-
2002     01-01-2002
2     John       Johnson   2468101214     1            1                400      23-03-2005     23-03-
2005     01-01-2002
4     Johnathon  Smith     1212121212     2            1                500      24-07-2016     24-07-
2016     01-01-2002
```

ANDOR

WHERE。 Employees

```
Id    FName      LName     PhoneNumber    ManagerId    DepartmentId     Salary   Hire_date
```

```
CreatedDate   ModifiedDate
1    James      Smith    1234567890    NULL        1               1000    01-01-2002    01-01-
2002    01-01-2002
2    John       Johnson  2468101214    1           1               400     23-03-2005    23-03-
2005    01-01-2002
3    Michael    Williams 1357911131    1           2               600     12-05-2009    12-05-
2009    NULL
4    Johnathon Smith     1212121212    2           1               500     24-07-2016    24-07-
2016    01-01-2002
```

```
SELECT * FROM Employees WHERE DepartmentId = 1 AND ManagerId = 1
```

```
Id   FName      LName    PhoneNumber   ManagerId   DepartmentId    Salary  Hire_date
CreatedDate   ModifiedDate
2    John       Johnson  2468101214    1           1               400     23-03-2005    23-03-
2005    01-01-2002
```

```
SELECT * FROM Employees WHERE DepartmentId = 2 OR ManagerId = 2
```

```
Id   FName      LName    PhoneNumber   ManagerId   DepartmentId    Salary  Hire_date
CreatedDate   ModifiedDate
3    Michael    Williams 1357911131    1           2               600     12-05-2009    12-05-
2009    NULL
4    Johnathon Smith     1212121212    2           1               500     24-07-2016    24-07-
2016    01-01-2002
```

HAVING

ID			
1	2		100
1	3	2	200
1	4	1	500
2	1	4	50
3		6	700

ID 2ID 3HAVING

```
 select customerId
 from orders
 where productID in (2,3)
 group by customerId
 having count(distinct productID) = 2
```

ID
1

IDHAVING2productId。

```
select customerId
from orders
group by customerId
having sum(case when productID = 2 then 1 else 0 end) > 0
   and sum(case when productID = 3 then 1 else 0 end) > 0
```

productID 2productID 3。

EXISTS

TableNameTableName1。

```
SELECT * FROM TableName t WHERE EXISTS (
    SELECT 1 FROM TableName1 t1 where t.Id = t1.Id)
```

WHEREHAVING https://riptutorial.com/zh-CN/sql/topic/636/wherehaving

20:

- WHERE“RowCnt = 1”
- RankSumWHERERank= 1

Examples

```
WITH CTE (StudentId, Fname, LName, DOB, RowCnt)
as (
SELECT StudentId, FirstName, LastName, DateOfBirth as DOB, SUM(1) OVER (Partition By
FirstName, LastName, DateOfBirth) as RowCnt
FROM tblStudent
)
SELECT * from CTE where RowCnt > 1
ORDER BY DOB, LName
```

。

https://riptutorial.com/zh-CN/sql/topic/1585/

21:

Examples

RDBMS。

2。

T-SQL

```
SELECT *
FROM INFORMATION_SCHEMA.COLUMNS
WHERE COLUMN_NAME LIKE '%Institution%'
```

。

https://riptutorial.com/zh-CN/sql/topic/3151/

22:

Examples

SQL。;。 - 。

- 。
-

Departments

ID	Dept
1	Production
2	Quality Control

People

ID	PersonName	StartYear	ManagerID	DepartmentID
1	Darren	2005		1
2	David	2006	1	1
3	Burt	2006	1	1
4	Sarah	2004		2
5	Fred	2008	4	2
6	Joanne	2005	4	2

---

select。
<table> ***where*** *<condition>*

DepartmentID= 2

σDepartmentID = 2 (People)

PeopleDepartmentID2

ID	PersonName	StartYear	ManagerID	DepartmentID
4	Sarah	2004		2
5	Fred	2008	4	2
6	Joanne	2005	4	2

StartYear> 2005 DepartmentID= 2

ID	PersonName	StartYear	ManagerID	DepartmentID
5	Fred	2008	4	2

。
<table> ***over*** *<field list>*

StartYear

$$\pi_{\text{StartYear}}(\text{People})$$

PeopleStartYear。

StartYear
2005
2006
2004
2008

closure。

。
StartYearDepartmentID

StartYear	DepartmentID
2005	1
2006	1
2004	2
2008	2
2005	2

2006 *StartYear*1 *DepartmentID*。

GIVING

giving。

<> <>

DepartmentID= 2
A **over** PersonName B

BA。

A

ID	PersonName	StartYear	ManagerID	DepartmentID
4	Sarah	2004		2
5	Fred	2008	4	2
6	Joanne	2005	4	2

B

PersonName
Sarah
Fred
Joanne

A.B.

DepartmentID= 2 PERSONNAME

。

。

join *<table 1> <table 2> <field 1> = <field 2>*
<field 1><table 1><field 2><table 2>。

DepartmentIDIDPeopleDepartments
DepartmentIDID =

ID	PersonName	StartYear	ManagerID	DepartmentID	Dept
1	Darren	2005		1	Production
2	David	2006	1	1	Production
3	Burt	2006	1	1	Production
4	Sarah	2004		2	Quality Control
5	Fred	2008	4	2	Quality Control
6	Joanne	2005	4	2	Quality Control

DepartmentIDID。 。

。 *NamePersonNameDept*Person NameDepartment Name。 *People.NameDepartments.Name*

selectproject

DepartmentID= ID
A StartYear = 2005 Dept ='Production' B
B PersonName C

DepartmentID= ID StartYear = 2005 =“” PERSONNAME Ç

PersonName
Darren

ALIAS

=

TIMES

https://riptutorial.com/zh-CN/sql/topic/7311/

23:

- CREATE DATABASE dbname;

Examples

SQL

```
CREATE DATABASE myDatabase;
```

myDatabase。

https://riptutorial.com/zh-CN/sql/topic/2744/

24:

CREATE TABLE。 。

- CREATE TABLE tableName[ColumnName1] [datatype1] [[ColumnName2] [datatype2] ...]

	“”。 。

。

Examples

`Employees`ID

```
CREATE TABLE Employees(
    Id int identity(1,1) primary key not null,
    FName varchar(20) not null,
    LName varchar(20) not null,
    PhoneNumber varchar(10) not null
);
```

Transact-SQL

`CREATE TABLEEmployees`

ID

```
Id int identity(1,1) not null
```

`Id`	。
`int`	。
`identity(1,1)`	11。
`primary key`	
`not null`	

Select

```
CREATE TABLE ClonedEmployees AS SELECT * FROM Employees;
```

SELECT。 。

```
CREATE TABLE ModifiedEmployees AS
SELECT Id, CONCAT(FName," ",LName) AS FullName FROM Employees
WHERE Id > 10;
```

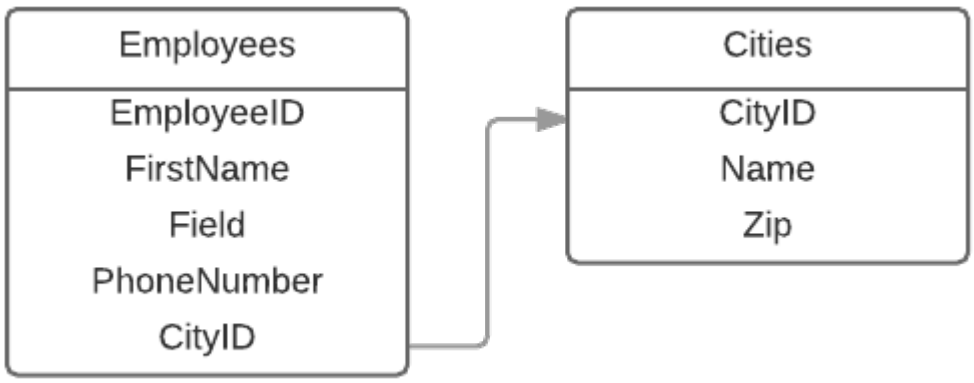
```
CREATE TABLE newtable LIKE oldtable;
INSERT newtable SELECT * FROM oldtable;
```

FOREIGN KEY

EmployeesCities◦

```
CREATE TABLE Cities(
    CityID INT IDENTITY(1,1) NOT NULL,
    Name VARCHAR(20) NOT NULL,
    Zip VARCHAR(10) NOT NULL
);

CREATE TABLE Employees(
    EmployeeID INT IDENTITY (1,1) NOT NULL,
    FirstName VARCHAR(20) NOT NULL,
    LastName VARCHAR(20) NOT NULL,
    PhoneNumber VARCHAR(10) NOT NULL,
    CityID INT FOREIGN KEY REFERENCES Cities(CityID)
);
```

◦



Employees CityIDCities CityID◦ ◦

```
CityID INT FOREIGN KEY REFERENCES Cities(CityID)
```

CityID	
int	
FOREIGN KEY	
REFERENCES Cities(CityID)	CitiesCityID

◦ CitiesEmployees ◦ ◦

PostgreSQLSQLite

```
CREATE TEMP TABLE MyTable(...);
```

SQL Server

```
CREATE TABLE #TempPhysical(...);
```

```
CREATE TABLE ##TempPhysicalVisibleToEveryone(...);
```

```
DECLARE @TempMemory TABLE(...);
```

https://riptutorial.com/zh-CN/sql/topic/348/

25:

- CREATE FUNCTION function_name[list_of_paramenters]RETURNS return_data_type AS BEGIN function_body RETURN scalar_expression END

FUNCTION_NAME	
list_of_paramenters	
return_data_type	returs。SQL
FUNCTION_BODY	
scalar_expression	

CREATE FUNCTIONSELECTINSERTUPDATEDELETE。。

Examples

```
CREATE FUNCTION FirstWord (@input varchar(1000))
RETURNS varchar(1000)
AS
BEGIN
    DECLARE @output varchar(1000)
    SET @output = SUBSTRING(@input, 0, CASE CHARINDEX(' ', @input)
        WHEN 0 THEN LEN(@input) + 1
        ELSE CHARINDEX(' ', @input)
    END)

    RETURN @output
END
```

FirstWordvarcharvarchar。

https://riptutorial.com/zh-CN/sql/topic/2437/

26:

DELETE。

1. *TableName*[WHERE] [LIMIT *count*]

Examples

WHERE

WHERE。

```
DELETE FROM Employees
WHERE FName = 'John'
```

WHERE。

```
DELETE FROM Employees
```

TRUNCATETRUNCATE。

TRUNCATE

。 。 。

```
TRUNCATE TABLE Employees
```

DELETE。

TargetSourceDELETE。

```
DELETE FROM Source
WHERE  EXISTS ( SELECT 1 -- specific value in SELECT doesn't matter
                FROM Target
                Where Source.ID = Target.ID )
```

RDBMSMySQLOraclePostgresSQLTeradataDELETE。

AggregateTargetID。 。

MySQLOracleTeradata

```
DELETE FROM Source
WHERE  Source.ID = TargetSchema.Target.ID
       AND TargetSchema.Target.Date = AggregateSchema.Aggregate.Date
```

PostgreSQL

```
DELETE FROM Source
USING  TargetSchema.Target, AggregateSchema.Aggregate
WHERE  Source.ID = TargetSchema.Target.ID
       AND TargetSchema.Target.DataDate = AggregateSchema.Aggregate.AggDate
```

SourceTargetAggregateINNER JOIN。IDID。

MySQLOracleTeradata

```
DELETE Source
FROM   Source, TargetSchema.Target, AggregateSchema.Aggregate
WHERE  Source.ID = TargetSchema.Target.ID
       AND TargetSchema.Target.DataDate = AggregateSchema.Aggregate.AggDate
```

RDBMSOracleMySQL`Delete`Teradata

```
NOT EXISTSNOT EXISTS
```

```
DELETE FROM Source
WHERE NOT EXISTS ( SELECT 1 -- specific value in SELECT doesn't matter
               FROM Target
               Where Source.ID = Target.ID )
```

https://riptutorial.com/zh-CN/sql/topic/1105/

27:

◦ ◦

1. FIRST_VALUEscalar_expressionOVER[partition_by_clause] order_by_clause [rows_range_clause]
2. LAST_VALUEscalar_expressionOVER[partition_by_clause] order_by_clause [rows_range_clause]
3. LAGscalar_expression [offset] [default]OVER[partition_by_clause] order_by_clause
4. LEADscalar_expression [offset][default]OVER[partition_by_clause] order_by_clause
5. PERCENT_RANKOVER[partition_by_clause] order_by_clause
6. CUME_DISTOVER[partition_by_clause] order_by_clause
7. PERCENTILE_DISCnumeric_literalWITHIN GROUPORDER BY order_by_expression [ASC | DESC]OVER[<partition_by_clause>]
8. PERCENTILE_CONTnumeric_literalWITHIN GROUPORDER BY order_by_expression [ASC | DESC]OVER[<partition_by_clause>]

Examples

FIRST_VALUE

FIRST_VALUE◦

```
SELECT StateProvinceID, Name, TaxRate,
       FIRST_VALUE(StateProvinceID)
        OVER(ORDER BY TaxRate ASC) AS FirstValue
FROM SalesTaxRate;
```

FIRST_VALUEID ◦ OVER◦

StateProvinceID			FirstValue
74		5.00	74
36		6.75	74
		7.00	74
1		7.00	74
57		7.00	74
63		7.00	74

LAST_VALUE

LAST_VALUE。

```
SELECT TerritoryID, StartDate, BusinessentityID,
       LAST_VALUE(BusinessentityID)
        OVER(ORDER BY TerritoryID) AS LastValue
FROM SalesTerritoryHistory;
```

LAST_VALUE。

TerritoryID		BusinessentityID	LastValue
1	2005-07-01 00.00.00.000	280	283
1	2006-11-01 00.00.00.000	284	283
1	2005-07-01 00.00.00.000	283	283
2	2007-01-01 00.00.00.000	277	275
2	2005-07-01 00.00.00.000	275	275
3	2007-01-01 00.00.00.000	275	277

LAGLEAD

LAG。 SELECT。

- offset。 。

defaultoffsetNULL。 NULL。

LEAD。 SELECT。

- offset。

defaultoffsetNULL。 NULL。

```
SELECT BusinessEntityID, SalesYTD,
       LEAD(SalesYTD, 1, 0) OVER(ORDER BY BusinessEntityID) AS "Lead value",
       LAG(SalesYTD, 1, 0) OVER(ORDER BY BusinessEntityID) AS "Lag value"
FROM SalesPerson;
```

LEADLAGBusinessEntityID。

BusinessEntityID	SalesYTD		
274	559697.5639	3763178.1787	0.0000
275	3763178.1787	4251368.5497	559697.5639

BusinessEntityID	SalesYTD		
276	4251368.5497	3189418.3662	3763178.1787
277	3189418.3662	1453719.4653	4251368.5497
278	1453719.4653	2315185.6110	3189418.3662
279	2315185.6110	1352577.1325	1453719.4653

PERCENT_RANKCUME_DIST

PERCENT_RANK◦ ◦

◦ 1◦

CUME_DIST◦ ◦

```
SELECT BusinessEntityID, JobTitle, SickLeaveHours,
PERCENT_RANK() OVER(PARTITION BY JobTitle ORDER BY SickLeaveHours DESC)
       AS "Percent Rank",
CUME_DIST() OVER(PARTITION BY JobTitle ORDER BY SickLeaveHours DESC)
       AS "Cumulative Distribution"
FROM Employee;
```

ORDERSELECT◦

BusinessEntityID		SickLeaveHours		
267		57	0	0.25
268		56	0.333333333333333	0.75
269		56	0.333333333333333	0.75
272		55	1	1
262	Cheif	48	0	1
239		45	0	1
252		50	0	0.111111111111111
251		49	0.125	0.333333333333333
256		49	0.125	0.333333333333333
253		48	0.375	0.555555555555555
254		48	0.375	0.555555555555555

PERCENT_RANK。 。

CUME_DIST。

PERCENTILE_DISCPERCENTILE_CONT

PERCENTILE_DISCnumeric_literal。

WITHIN GROUP。

PERCENTILE_CONTPERCENTILE_DISC。

```
SELECT BusinessEntityID, JobTitle, SickLeaveHours,
       CUME_DIST() OVER(PARTITION BY JobTitle ORDER BY SickLeaveHours ASC)
       AS "Cumulative Distribution",
       PERCENTILE_DISC(0.5) WITHIN GROUP(ORDER BY SickLeaveHours)
          OVER(PARTITION BY JobTitle) AS "Percentile Discreet"
FROM Employee;
```

0.5PERCENTILE_DISC。 Percentile Discreet。

BusinessEntityID		SickLeaveHours		
272		55	0.25	**56**
268		56	0.75	**56**
269		56	0.75	**56**
267		57	1	**56**

PERCENTILE_CONT。 “Percentile Continuous”。

```
SELECT BusinessEntityID, JobTitle, SickLeaveHours,
       CUME_DIST() OVER(PARTITION BY JobTitle ORDER BY SickLeaveHours ASC)
       AS "Cumulative Distribution",
       PERCENTILE_DISC(0.5) WITHIN GROUP(ORDER BY SickLeaveHours)
          OVER(PARTITION BY JobTitle) AS "Percentile Discreet",
       PERCENTILE_CONT(0.5) WITHIN GROUP(ORDER BY SickLeaveHours)
          OVER(PARTITION BY JobTitle) AS "Percentile Continuous"
FROM Employee;
```

BusinessEntityID		SickLeaveHours			
272		55	0.25	56	**56**
268		56	0.75	56	**56**
269		56	0.75	56	**56**

BusinessEntityID		SickLeaveHours			
267		57	1	56	**56**

https://riptutorial.com/zh-CN/sql/topic/8811/--

28: /

SQL。 。

T-SQL。

- CASTAS data_type []
- CONVERTdata_type [length][style]
- PARSEstring_value AS data_type [USING culture]
- DATENAME
- GETDATE
- DATEDIFFdatepartstartdateenddate
- DATEADDdatepartnumberdate
- indexval_1val_2 [val_n]
- IIFboolean_expressiontrue_valuefalse_value
- SIGNnumeric_expression
- POWERfloat_expressiony

。

。

1. SQL。
2. 。 。
3. 。 。 。

SQL。

4. 。 。
5. 。 。
6. 。
7. 。
8. 。

。

9. SQL
10. SQL - 。

Examples

。

`lower(char)`。

```
SELECT customer_id, lower(customer_last_name) FROM customer;
```

“SMITH”“smith”。

SQL。timedatesmalldatetimedatetimedatetime2datetimeoffset。。

	HHMMSS [.nnnnnnn]
	YYYY-MM-DD
SMALLDATETIME	YYYY-MM-DD hhmmss
	YYYY-MM-DD hhmmss [.nnn]
DATETIME2	YYYY-MM-DD hhmmss [.nnnnnnn]
DATETIMEOFFSET	YYYY-MM-DD hhmmss [.nnnnnnn] [+/-] hhmm

DATENAME。

```
SELECT DATENAME (weekday,'2017-01-14') as Datename
```

DATENAME

GETDATESQL。。

```
SELECT GETDATE() as Systemdate
```

Systemdate
2017-01-14 111147.7230728

DATEDIFF。

datepart。datepart。startdateenddate。

```
SELECT SalesOrderID, DATEDIFF(day, OrderDate, ShipDate)
AS 'Processing time'
FROM Sales.SalesOrderHeader
```

SalesOrderID	
43659	7

SalesOrderID	
43660	7
43661	7
43662	7

DATEADD。

```
SELECT DATEADD (day, 20, '2017-01-14') AS Added20MoreDays
```

Added20MoreDays
2017-02-03 000000.000

SQL@@SERVERNAME。 SQL。

```
SELECT @@SERVERNAME AS 'Server'
```

SQL064

SQL。

CASTCONVERT。

CASTCONVERT。

CASTCONVERTdatetimevarchar。

CAST。 YYYY-MM-DD。

CONVERT。 3dd / mm / yy。

```
USE AdventureWorks2012
GO
SELECT FirstName + ' ' + LastName + ' was hired on ' +
       CAST(HireDate AS varchar(20)) AS 'Cast',
       FirstName + ' ' + LastName + ' was hired on ' +
       CONVERT(varchar, HireDate, 3) AS 'Convert'
FROM Person.Person AS p
JOIN HumanResources.Employee AS e
ON p.BusinessEntityID = e.BusinessEntityID
GO
```

David Hamiltion2003-02-04	David Hamiltion04/02/03

PARSE◦ ◦

AS◦ ◦ ◦

◦ CASTCONVERT◦

```
SELECT PARSE('Monday, 13 August 2012' AS datetime2 USING 'en-US') AS 'Date in English'
```

2012-08-13 000000.0000000

SQL - CHOOSEIIF ◦

CHOOSE◦ ◦

index◦ val_1 ... val_n◦

```
SELECT CHOOSE(2, 'Human Resources', 'Sales', 'Admin', 'Marketing' ) AS Result;
```


CHOOSE◦

IIF◦ true◦ false◦

boolean_expression◦ true_valueboolean_expressiontruefalse_valueboolean_expressionfalse◦

```
SELECT BusinessEntityID, SalesYTD,
       IIF(SalesYTD > 200000, 'Bonus', 'No Bonus') AS 'Bonus?'
FROM Sales.SalesPerson
GO
```

BusinessEntityID	SalesYTD	
274	559697.5639	
275	3763178.1787	
285	172524.4512	

IIF◦ 200,000◦ 200,000◦

SQL◦

SIGN。 -1+10。

```
SELECT SIGN(-20) AS 'Sign'
```

-1

“”-1。

POWER。 。

float_expressiony。

```
SELECT POWER(50, 3) AS Result
```

125000

/ https://riptutorial.com/zh-CN/sql/topic/6898/---

29:

- [*DISTINCT*]-DISTINCT
- AVG[ALL | DISTINCT]
- COUNT{[ALL | DISTINCT]] | *}
- GROUPING<column_expression>
- MAX[ALL | DISTINCT]
- MIN[ALL | DISTINCT]
- SUM[ALL | DISTINCT]
- VAR[ALL | DISTINCT]
  OVER[partition_by_clause] order_by_clause
- VARP[ALL | DISTINCT]
  OVER[partition_by_clause] order_by_clause
- STDEV[ALL | DISTINCT]
  OVER[partition_by_clause] order_by_clause
- STDEVP[ALL | DISTINCT]
  OVER[partition_by_clause] order_by_clause

。

```
MIN         returns the smallest value in a given column
MAX         returns the largest value in a given column
SUM         returns the sum of the numeric values in a given column
AVG         returns the average value of a given column
COUNT       returns the total number of values in a given column
COUNT(*)    returns the number of rows in a table
GROUPING    Is a column or an expression that contains a column in a GROUP BY clause.
STDEV       returns the statistical standard deviation of all values in the specified
expression.
STDEVP      returns the statistical standard deviation for the population for all values in the
specified expression.
VAR         returns the statistical variance of all values in the specified expression. may be
followed by the OVER clause.
VARP        returns the statistical variance for the population for all values in the specified
expression.
```

SELECT“”。 。 - SQLCourse2.com

NULL。

Examples

Sum。 group by。

```
select sum(salary) TotalSalary
from employees;
```

TotalSalary
2500

```
select DepartmentId, sum(salary) TotalSalary
from employees
group by DepartmentId;
```

DepartmentID	TotalSalary
1	2000
2	500

		100
		300
		1000
		500

```
select customer,
       sum(case when payment_type = 'credit' then amount else 0 end) as credit,
       sum(case when payment_type = 'debit' then amount else 0 end) as debit
from payments
group by customer
```

	400	0
	1000	500

```
select customer,
       sum(case when payment_type = 'credit' then 1 else 0 end) as credit_transaction_count,
       sum(case when payment_type = 'debit' then 1 else 0 end) as debit_transaction_count
from payments
group by customer
```

	credit_transaction_count	debit_transaction_count
	2	0
	1	1

AVG

AVG。。

	8550405	2015
	...	...
	8000906	2005

QUERY

```
select city_name, AVG(population) avg_population
from city_population
where city_name = 'NEW YORK CITY';
```

。

	avg_population
	8250754

AVG。。

SO。

List Concatenation。。SQL。

MySQL

```
SELECT ColumnA
     , GROUP_CONCAT(ColumnB ORDER BY ColumnB SEPARATOR ',') AS ColumnBs
  FROM TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

OracleDB2

```
SELECT ColumnA
     , LISTAGG(ColumnB, ',') WITHIN GROUP (ORDER BY ColumnB) AS ColumnBs
  FROM TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

PostgreSQL

```
SELECT ColumnA
     , STRING_AGG(ColumnB, ',' ORDER BY ColumnB) AS ColumnBs
  FROM TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

SQL Server

SQL Server 2016

CTEDRY

```
  WITH CTE_TableName AS (
       SELECT ColumnA, ColumnB
         FROM TableName)
SELECT t0.ColumnA
     , STUFF((
       SELECT ',' + t1.ColumnB
         FROM CTE_TableName t1
        WHERE t1.ColumnA = t0.ColumnA
        ORDER BY t1.ColumnB
          FOR XML PATH('')), 1, 1, '') AS ColumnBs
  FROM CTE_TableName t0
 GROUP BY t0.ColumnA
 ORDER BY ColumnA;
```

SQL Server 2017SQL Azure

```
SELECT ColumnA
     , STRING_AGG(ColumnB, ',') WITHIN GROUP (ORDER BY ColumnB) AS ColumnBs
  FROM TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

SQLite

```
SELECT ColumnA
     , GROUP_CONCAT(ColumnB, ',') AS ColumnBs
  FROM TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

CTE

```
  WITH CTE_TableName AS (
```

```
       SELECT ColumnA, ColumnB
         FROM TableName
        ORDER BY ColumnA, ColumnB)
SELECT ColumnA
     , GROUP_CONCAT(ColumnB, ',') AS ColumnBs
  FROM CTE_TableName
 GROUP BY ColumnA
 ORDER BY ColumnA;
```

```
SELECT count(*) TotalRows
FROM employees;
```

TotalRows
4

```
SELECT DepartmentId, count(*) NumEmployees
FROM employees
GROUP BY DepartmentId;
```

DepartmentID	NumEmployees
1	3
2	1

NULL/

```
SELECT count(ManagerId) mgr
FROM EMPLOYEES;
```

3

managerID

COUNTDISTINCT DISTINCT。

```
 SELECT COUNT(ContinentCode) AllCount
 ,      COUNT(DISTINCT ContinentCode) SingleCount
 FROM Countries;
```

。 *SingleCount*Continents*AllCount*。

ContinentCode
OC

ContinentCode
NA
NA
AF
AF

AllCount7 SingleCount5

```
select max(age) from employee;
```

employeeage◦

```
SELECT MAX(column_name) FROM table_name;
```

```
 select min(age) from employee;
```

employeeage◦

```
 SELECT MIN(column_name) FROM table_name;
```

https://riptutorial.com/zh-CN/sql/topic/1002/--

30:

JOIN。 INNER / OUTER / CROSSLEFT / RIGHT / FULL。

。 FROM。

- `[ { INNER | { { LEFT | RIGHT | FULL } [ OUTER ] } } ] JOIN`

。

Examples

“”join。

EmployeesFNameDepartmentsName

```
SELECT Employees.FName, Departments.Name
FROM   Employees
JOIN   Departments
ON Employees.DepartmentId = Departments.Id
```

Employees.FName	Departments.Name
	HR
	HR

from,where。 join。

RDBMS。

- 。
- CROSS JOIN。

```
SELECT e.FName, d.Name
FROM   Employee e, Departments d
WHERE  e.DeptartmentId = d.Id
```

e.FName	d.Name
	HR
	HR

;NULL。

。 NULL

```
SELECT          Departments.Name, Employees.FName
FROM            Departments
LEFT OUTER JOIN Employees
ON              Departments.Id = Employees.DepartmentId
```

Departments.Name	Employees.FName
HR	
HR	
HR	

FROM

ID	FName	LName		ID	DepartmentID		
1			1234567890		1	1000	200211
2			2468101214	1	1	400	23-03-2005
3			1357911131	1	2	600	12-05-2009
4			1212121212	2	1	500	24-07-2016

ID	
1	HR
2	
3	

。

Departments.Id = Employees.DepartmentId ;。

LEFT OUTER JOINLEFTDepartmentsRIGHTNULL。 NULL **Tech**

ID		ID	FName	LName		ID	DepartmentID		
1	**HR**	**1**			**1234567890**		**1**	**1000**	**200211**

ID		ID	FName	LName		ID	DepartmentID		
1	**HR**	**2**			**2468101214**	**1**	**1**	**400**	**23-03-2005**
1	HR	3			1357911131	1	2	600	12-05-2009
1	**HR**	**4**			**1212121212**	**2**	**1**	**500**	**24-07-2016**
2		1			1234567890		1	1000	200211
2		2			2468101214	1	1	400	23-03-2005
2		**3**			**1357911131**	**1**	**2**	**600**	**12-05-2009**
2		4			1212121212	2	1	500	24-07-2016
3		1			1234567890		1	1000	200211
3		2			2468101214	1	1	400	23-03-2005
3		3			1357911131	1	2	600	12-05-2009
3		4			1212121212	2	1	500	24-07-2016

SELECT

Departments.Name	Employees.FName
HR	
HR	

。 。

EmployeesEmployee。

```
SELECT
    e.FName AS "Employee",
    m.FName AS "Manager"
FROM
    Employees e
JOIN
    Employees m
    ON e.ManagerId = m.Id
```

ID	FName	LName		ID	DepartmentID		
1			1234567890		1	1000	200211
2			2468101214	1	1	400	23-03-2005
3			1357911131	1	2	600	12-05-2009
4			1212121212	2	1	500	24-07-2016

FROM。 Employees

e.Id	e.FName	e.ManagerId		m.FName	m.ManagerId
1			1		
1			2		1
1			3		1
1			4		2
2		1	1		
2		1	2		1
2		1	3		1
2		1	4		2
3		1	1		
3		1	2		1
3		1	3		1
3		1	4		2
4		2	1		
4		2	2		1
4		2	3		1
4		2	4		2

JOIN`eManagerIdmId`

e.Id	e.FName	e.ManagerId		m.FName	m.ManagerId
2		1	1		
3		1	1		
4		2	2		1

SELECT

e.FName	m.FName

e.FNamem.FNameAS

◦ TABLEA20TABLEB2020*20 = 400◦

```
SELECT d.Name, e.FName
FROM   Departments d
CROSS JOIN Employees e;
```

d.Name	e.FName
HR	
HR	
HR	
HR	

CROSS JOIN◦

//◦ ◦ ◦ ◦ Purchase OrdersPurchaseOrderLineItems◦

```
SELECT po.Id, po.PODate, po.VendorName, po.Status, item.ItemNo,
```

```
  item.Description, item.Cost, item.Price
FROM PurchaseOrders po
LEFT JOIN
     (
       SELECT l.PurchaseOrderId, l.ItemNo, l.Description, l.Cost, l.Price, Min(l.id) as Id
       FROM PurchaseOrderLineItems l
       GROUP BY l.PurchaseOrderId, l.ItemNo, l.Description, l.Cost, l.Price
     ) AS item ON item.PurchaseOrderId = po.Id
```

JOINLATERAL JOINPostgreSQL 9.3+
SQL-ServerOracleCROSS APPLY / OUTER APPLY。

。

。
“CROSS APPLY”。

PostgreSQL 9.3+

||JOIN **LATERAL**

SQL-

CROSS |

```
INNER JOIN LATERALCROSS APPLY
LEFT JOIN LATERALOUTER APPLY
```

PostgreSQL 9.3+

```
SELECT * FROM T_Contacts

--LEFT JOIN T_MAP_Contacts_Ref_OrganisationalUnit ON MAP_CTCOU_CT_UID = T_Contacts.CT_UID AND
MAP_CTCOU_SoftDeleteStatus = 1
--WHERE T_MAP_Contacts_Ref_OrganisationalUnit.MAP_CTCOU_UID IS NULL -- 989


LEFT JOIN LATERAL
(
    SELECT
         --MAP_CTCOU_UID
         MAP_CTCOU_CT_UID
        ,MAP_CTCOU_COU_UID
        ,MAP_CTCOU_DateFrom
        ,MAP_CTCOU_DateTo
   FROM T_MAP_Contacts_Ref_OrganisationalUnit
   WHERE MAP_CTCOU_SoftDeleteStatus = 1
   AND MAP_CTCOU_CT_UID = T_Contacts.CT_UID

    /*
    AND
    (
        (__in_DateFrom <= T_MAP_Contacts_Ref_OrganisationalUnit.MAP_KTKOE_DateTo)
        AND
        (__in_DateTo >= T_MAP_Contacts_Ref_OrganisationalUnit.MAP_KTKOE_DateFrom)
    )
```

```
    */
   ORDER BY MAP_CTCOU_DateFrom
   LIMIT 1
) AS FirstOE
```

SQL-Server

```
SELECT * FROM T_Contacts

--LEFT JOIN T_MAP_Contacts_Ref_OrganisationalUnit ON MAP_CTCOU_CT_UID = T_Contacts.CT_UID AND
MAP_CTCOU_SoftDeleteStatus = 1
--WHERE T_MAP_Contacts_Ref_OrganisationalUnit.MAP_CTCOU_UID IS NULL -- 989

-- CROSS APPLY -- = INNER JOIN
OUTER APPLY    -- = LEFT JOIN
(
    SELECT TOP 1
         --MAP_CTCOU_UID
         MAP_CTCOU_CT_UID
        ,MAP_CTCOU_COU_UID
        ,MAP_CTCOU_DateFrom
        ,MAP_CTCOU_DateTo
   FROM T_MAP_Contacts_Ref_OrganisationalUnit
   WHERE MAP_CTCOU_SoftDeleteStatus = 1
   AND MAP_CTCOU_CT_UID = T_Contacts.CT_UID

    /*
    AND
    (
        (@in_DateFrom <= T_MAP_Contacts_Ref_OrganisationalUnit.MAP_KTKOE_DateTo)
        AND
        (@in_DateTo >= T_MAP_Contacts_Ref_OrganisationalUnit.MAP_KTKOE_DateFrom)
    )
    */
   ORDER BY MAP_CTCOU_DateFrom
) AS FirstOE
```

JOINFULL JOIN。
2016MySQLFULL JOIN

FULL OUTER JOIN。

。

1

```
SELECT * FROM Table1

FULL JOIN Table2
     ON 1 = 2
```

2

```
SELECT
     COALESCE(T_Budget.Year, tYear.Year) AS RPT_BudgetInYear
```

```
    ,COALESCE(T_Budget.Value, 0.0) AS RPT_Value
FROM T_Budget

FULL JOIN tfu_RPT_All_CreateYearInterval(@budget_year_from, @budget_year_to) AS tYear
      ON tYear.Year = T_Budget.Year
```

WHEREFULL JOINUNION;
AP_SoftDeleteStatus = 1join。

FULL JOINWHERENULL;NULLINNER。

```
SELECT
     T_AccountPlan.AP_UID
    ,T_AccountPlan.AP_Code
    ,T_AccountPlan.AP_Lang_EN
    ,T_BudgetPositions.BUP_Budget
    ,T_BudgetPositions.BUP_UID
    ,T_BudgetPositions.BUP_Jahr
FROM T_BudgetPositions

FULL JOIN T_AccountPlan
    ON T_AccountPlan.AP_UID = T_BudgetPositions.BUP_AP_UID
    AND T_AccountPlan.AP_SoftDeleteStatus = 1

WHERE (1=1)
AND (T_BudgetPositions.BUP_SoftDeleteStatus = 1 OR T_BudgetPositions.BUP_SoftDeleteStatus IS
NULL)
AND (T_AccountPlan.AP_SoftDeleteStatus = 1 OR T_AccountPlan.AP_SoftDeleteStatus IS NULL)
```

JOIN

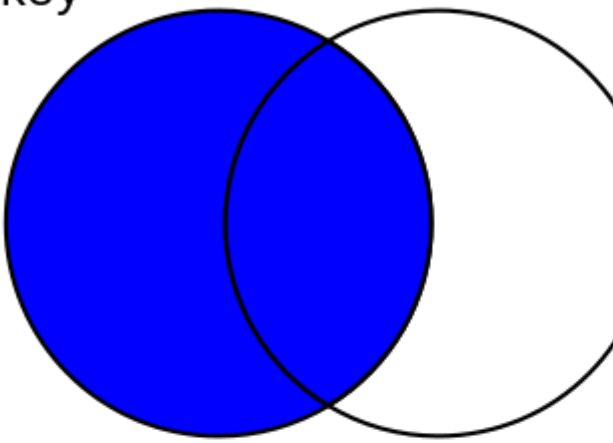
◦ SQL

```
WITH RECURSIVE MyDescendants AS (
    SELECT Name
    FROM People
    WHERE Name = 'John Doe'

    UNION ALL

    SELECT People.Name
    FROM People
    JOIN MyDescendants ON People.Name = MyDescendants.Parent
)
SELECT * FROM MyDescendants;
```

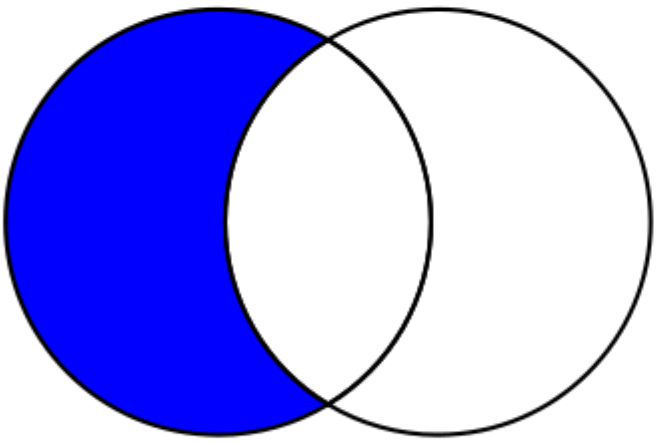
/

SQL `INNER JOIN` `LEFT OUTER JOIN` `RIGHT OUTER JOIN`FULL OUTER JOIN `INNER`OUTER◦ ◦

```
SELECT <fields>
FROM TableA  A
LEFT JOIN TableB  B
ON A.key = B.key
```



```
SELECT <fields>
FROM TableA  A
LEFT JOIN TableB  B
ON A.key = B.key
WHERE B.key IS NULL
```



31:

MERGEUPSERT“”。/SQL。

Examples

MERGE

```
MERGE INTO targetTable t
    USING sourceTable s
        ON t.PKID = s.PKID
    WHEN MATCHED AND NOT EXISTS (
            SELECT s.ColumnA, s.ColumnB, s.ColumnC
            INTERSECT
            SELECT t.ColumnA, t.ColumnB, s.ColumnC
            )
        THEN UPDATE SET
            t.ColumnA = s.ColumnA
            ,t.ColumnB = s.ColumnB
            ,t.ColumnC = s.ColumnC
    WHEN NOT MATCHED BY TARGET
        THEN INSERT (PKID, ColumnA, ColumnB, ColumnC)
        VALUES (s.PKID, s.ColumnA, s.ColumnB, s.ColumnC)
    WHEN NOT MATCHED BY SOURCE
        THEN DELETE
    ;
```

AND NOT EXISTS。 INTERSECT。

MySQL

。 users

```
create table users(
    id int primary key auto_increment,
    name varchar(8),
    count int,
    unique key name(name)
);
```

Joe。 ;。

MySQL insert ... on duplicate key update ....

```
insert into users(name, count)
       values ('Joe', 1)
       on duplicate key update count=count+1;
```

PostgreSQL

◦ users

```
create table users(
    id serial,
    name varchar(8) unique,
    count int
);
```

Joe◦ ;◦

PostgreSQL insert ... on conflict ... do update ....

```
insert into users(name, count)
    values('Joe', 1)
    on conflict (name) do update set count = users.count + 1;
```

https://riptutorial.com/zh-CN/sql/topic/1470/

32:

Examples

```
CREATE SYNONYM EmployeeData
FOR MyDatabase.dbo.Employees
```

https://riptutorial.com/zh-CN/sql/topic/2518/

33: SQL

SQL。

Examples

/

/CamelCasesnake_case

```
SELECT FirstName, LastName
FROM Employees
WHERE Salary > 500;
```

```
SELECT first_name, last_name
FROM employees
WHERE salary > 500;
```

。 。 。

tblcol。 SQL。

SQL。 。

*

SELECT *。

SELECT * 。 。

I / O。

```
--SELECT *                                  don't
  SELECT ID, FName, LName, PhoneNumber  -- do
  FROM Emplopees;
```

。

SELECT *EXISTSEXISTS。 EXISTSSELECT *

```
-- list departments where nobody was hired recently
SELECT ID,
       Name
FROM Departments
```

```
WHERE NOT EXISTS (SELECT *
                  FROM Employees
                  WHERE DepartmentID = Departments.ID
                    AND HireDate >= '2015-01-01');
```

。

```
SELECT d.Name, COUNT(*) AS Employees FROM Departments AS d JOIN Employees AS e ON d.ID =
e.DepartmentID WHERE d.Name != 'HR' HAVING COUNT(*) > 10 ORDER BY COUNT(*) DESC;
```

```
SELECT d.Name,
       COUNT(*) AS Employees
FROM Departments AS d
JOIN Employees AS e ON d.ID = e.DepartmentID
WHERE d.Name != 'HR'
HAVING COUNT(*) > 10
ORDER BY COUNT(*) DESC;
```

SQL

```
SELECT   d.Name,
         COUNT(*) AS Employees
FROM     Departments AS d
JOIN     Employees AS e ON d.ID = e.DepartmentID
WHERE    d.Name != 'HR'
HAVING   COUNT(*) > 10
ORDER BY COUNT(*) DESC;
```

SQL。

```
SELECT
    d.Name,
    COUNT(*) AS Employees
FROM
    Departments AS d
JOIN
    Employees AS e
    ON d.ID = e.DepartmentID
WHERE
    d.Name != 'HR'
HAVING
    COUNT(*) > 10
ORDER BY
    COUNT(*) DESC;
```

```
SELECT Model,
       EmployeeID
FROM Cars
WHERE CustomerID = 42
  AND Status     = 'READY';
```

SQL。C`@"..."` `"""..."""` Python`"""..."""`C ++`R"(...)"`。

;

- WHERE。。
- 。
- SQL

```
SELECT d.Name,
       e.Fname || e.LName AS EmpName
FROM      Departments AS d
LEFT JOIN Employees   AS e ON d.ID = e.DepartmentID;
```

- USING

```
SELECT RecipeID,
       Recipes.Name,
       COUNT(*) AS NumberOfIngredients
FROM      Recipes
LEFT JOIN Ingredients USING (RecipeID);
```

。
USING`RecipeID`。

SQL https://riptutorial.com/zh-CN/sql/topic/9843/sql

34:

Examples

SuperHeros ◦

ID ◦

```
CREATE TABLE HeroPowers
(
    ID int NOT NULL PRIMARY KEY,
    Name nvarchar(MAX) NOT NULL,
    HeroId int REFERENCES SuperHeros(ID)
)
```

HeroIdSuperHeros ◦

◦

◦

```
CREATE TABLE Department (
    Dept_Code        CHAR (5)     PRIMARY KEY,
    Dept_Name        VARCHAR (20) UNIQUE
);
```

```
INSERT INTO Department VALUES ('CS205', 'Computer Science');
```

```
CREATE TABLE Programming_Courses (
    Dept_Code       CHAR(5),
    Prg_Code        CHAR(9) PRIMARY KEY,
    Prg_Name        VARCHAR (50) UNIQUE,
    FOREIGN KEY (Dept_Code) References Department(Dept_Code)
);
```

◦

Dept_CodeDepartment Dept_Code◦

```
INSERT INTO Programming_Courses Values ('CS300', 'FDB-DB001', 'Database Systems');
```

DepartmentCS300 ◦

```
INSERT INTO Programming_Courses VALUES ('CS205', 'FDB-DB001', 'Database Systems');
INSERT INTO Programming_Courses VALUES ('CS205', 'DB2-DB002', 'Database Systems II');
```

◦

- UNIQUEPRIMARY。
- NULL。
- 。
- 。

https://riptutorial.com/zh-CN/sql/topic/1533/

35:

set。

() 。 。 FROM。

Examples

WHERE

。 。

```
SELECT *
FROM Employees
WHERE Salary = (SELECT MAX(Salary) FROM Employees)
```

FROM

FROM。

```
SELECT Managers.Id, Employees.Salary
FROM (
  SELECT Id
  FROM Employees
  WHERE ManagerId IS NULL
) AS Managers
JOIN Employees ON Managers.Id = Employees.Id
```

SELECT

```
SELECT
  Id,
  FName,
  LName,
  (SELECT COUNT(*) FROM Cars WHERE Cars.CustomerId = Customers.Id) AS NumberOfCars
FROM Customers
```

FROM

“”FROM。

```
SELECT * FROM (SELECT city, temp_hi - temp_lo AS temp_var FROM weather) AS w
WHERE temp_var > 20;
```

20。

	temp_var
	21
	31
	23
	31
	27
	28
	28
	32

。

WHERE

qquery

```
SELECT name, pop2000 FROM cities
WHERE pop2000 < (SELECT avg(pop2000)  FROM cities);
```

SELECT avgpop2000FROM citiesWHERE。

	POP2000
	776733
	348189
	146866

SELECT

SELECT。 citiesweather。

```
SELECT w.*,  (SELECT c.state FROM cities AS c WHERE c.name = w.city ) AS state
FROM weather AS w;
```

Supervisors。

```
SELECT *
FROM Employees
WHERE EmployeeID not in (SELECT EmployeeID
```

```
                            FROM Supervisors)
```

LEFT JOIN。

```
SELECT *
FROM Employees AS e
LEFT JOIN Supervisors AS s ON s.EmployeeID=e.EmployeeID
WHERE s.EmployeeID is NULL
```

```
SELECT EmployeeId
    FROM Employee AS eOuter
    WHERE Salary > (
       SELECT AVG(Salary)
       FROM Employee eInner
       WHERE eInner.DepartmentId = eOuter.DepartmentId
    )
```

`SELECT AVG(Salary) ...Employee` row `eOuter` 。

https://riptutorial.com/zh-CN/sql/topic/1606/

36:

◦

◦

- CONCATstring_value1string_value2 [string_valueN]
- LTRIMcharacter_expression
- RTRIMcharacter_expression
- SUBSTRING
- ASCIIcharacter_expression
- REPLICATEstring_expressioninteger_expression
- REVERSEstring_expression
- UPPERcharacter_expression
- TRIM[characters FROM] string
- STRING_SPLIT
- STUFFcharacter_expressionstartlengthreplaceWith_expression
- REPLACEstring_expressionstring_patternstring_replacement

Transact-SQL / Microsoft

MySQL

PostgreSQL

Examples

Trim

MSSQL`TRIM()`

```
SELECT LTRIM('  Hello  ') --returns 'Hello  '
SELECT RTRIM('  Hello  ') --returns '  Hello'
SELECT LTRIM(RTRIM('  Hello  ')) --returns 'Hello'
```

MySqlOracle

```
SELECT TRIM('  Hello  ') --returns 'Hello'
```

CONCATENATE

ANSI / ISOSQL`||` ◦ SQL Server

```
SELECT 'Hello' || 'World' || '!'; --returns HelloWorld!
```

`CONCAT`

```
SELECT CONCAT('Hello', 'World'); --returns 'HelloWorld'
```

CONCATOracle

```
SELECT CONCAT('Hello', 'World', '!'); --returns 'HelloWorld!'
```

```
SELECT CONCAT('Foo', CAST(42 AS VARCHAR(5)), 'Bar'); --returns 'Foo42Bar'
```

Oracle。 CLOBNCLOBCONCATNCLOB。 CONCATvarchar2varchar2

```
SELECT CONCAT(CONCAT('Foo', 42), 'Bar') FROM dual; --returns Foo42Bar
```

+ +

```
SELECT 'Foo' + CAST(42 AS VARCHAR(5)) + 'Bar';
```

SQL Server <2012CONCAT +。

```
SELECT UPPER('HelloWorld') --returns 'HELLOWORLD'
SELECT LOWER('HelloWorld') --returns 'helloworld'
```

SUBSTRING (string_expression, start, length) 。 SQL1。

```
SELECT SUBSTRING('Hello', 1, 2) --returns 'He'
SELECT SUBSTRING('Hello', 3, 3) --returns 'llo'
```

LEN()n。

```
DECLARE @str1 VARCHAR(10) = 'Hello', @str2 VARCHAR(10) = 'FooBarBaz';
SELECT SUBSTRING(@str1, LEN(@str1) - 2, 3) --returns 'llo'
SELECT SUBSTRING(@str2, LEN(@str2) - 2, 3) --returns 'Baz'
```

。 STRING_SPLIT()。

```
SELECT value FROM STRING_SPLIT('Lorem ipsum dolor sit amet.', ' ');
```

```
value
-----
Lorem
ipsum
dolor
sit
amet.
```

0。

start110。

```
STUFF ( character_expression , start , length , replaceWith_expression )
```

```
SELECT STUFF('FooBarBaz', 4, 3, 'Hello') --returns 'FooHelloBaz'
```

SQL Server

LEN。

```
SELECT LEN('Hello') -- returns 5

SELECT LEN('Hello '); -- returns 5
```

DATALENGTH。

```
SELECT DATALENGTH('Hello') -- returns 5

SELECT DATALENGTH('Hello '); -- returns 6
```

DATALENGTH。

```
DECLARE @str varchar(100) = 'Hello ' --varchar is usually an ASCII string, occupying 1 byte
per char
SELECT DATALENGTH(@str) -- returns 6

DECLARE @nstr nvarchar(100) = 'Hello ' --nvarchar is a unicode string, occupying 2 bytes per
char
SELECT DATALENGTH(@nstr) -- returns 12
```

Lengthchar

```
SELECT Length('Bible') FROM dual; --Returns 5
SELECT Length('righteousness') FROM dual; --Returns 13
SELECT Length(NULL) FROM dual; --Returns NULL
```

LengthBLengthCLength2Length4

```
REPLACE(,,)
```

```
SELECT REPLACE( 'Peter Steve Tom', 'Steve', 'Billy' ) --Return Values: Peter Billy Tom
```

LEFT

```
SELECT LEFT('Hello',2)  --return He
SELECT RIGHT('Hello',2) --return lo
```

Oracle SQLLEFTRIGHT。SUBSTRLENGTH。

SUBSTRstring-expression1integer
SUBSTRstring-expressionlengthstring-expression-integer + 1integer

```
SELECT SUBSTR('Hello',1,2)  --return He
SELECT SUBSTR('Hello',LENGTH('Hello')-2+1,2) --return lo
```

REVERSEstring-expression

```
SELECT REVERSE('Hello') --returns olleH
```

REPLICATE。

REPLICATEstring-expressioninteger

```
SELECT REPLICATE ('Hello',4) --returns 'HelloHelloHelloHello'
```

REGEXP

MySQL 3.19

。

```
SELECT 'bedded' REGEXP '[a-f]' -- returns True

SELECT 'beam' REGEXP '[a-f]' -- returns False
```

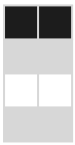
sql

SQLReplace。MySQLOracleSQL ServerREPLACE。

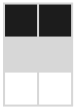
Replace

```
REPLACE (str, find, repl)
```

EmployeesSouthSouthern



```
SELECT
    FirstName,
    REPLACE (Address, 'South', 'Southern') Address
FROM Employees
ORDER BY FirstName
```



。

```
Update Employees
Set city = (Address, 'South', 'Southern');
```

WHERE

```
Update Employees
Set Address = (Address, 'South', 'Southern')
Where Address LIKE 'South%';
```

PARSENAME

SQL Server

PARSENAME。。

MSDN PARSENAME

```
PARSENAME('NameOfStringToParse',PartIndex)
```

1

```
SELECT PARSENAME('ServerName.DatabaseName.SchemaName.ObjectName',1)  // returns `ObjectName`
SELECT PARSENAME('[1012-1111].SchoolDatabase.school.Student',1)     // returns `Student`
```

2

```
SELECT PARSENAME('ServerName.DatabaseName.SchemaName.ObjectName',2)  // returns `SchemaName`
SELECT PARSENAME('[1012-1111].SchoolDatabase.school.Student',2)     // returns `school`
```

3

```
SELECT PARSENAME('ServerName.DatabaseName.SchemaName.ObjectName',3) // returns `DatabaseName`
SELECT PARSENAME('[1012-1111].SchoolDatabase.school.Student',3)    // returns `SchoolDatabase`
```

4

```
SELECT PARSENAME('ServerName.DatabaseName.SchemaName.ObjectName',4)  // returns `ServerName`
SELECT PARSENAME('[1012-1111].SchoolDatabase.school.Student',4)     // returns `[1012-1111]`
```

PARSENAMEnull

INSTR

INSTRstringsubstring

```
SELECT INSTR('FooBarBar', 'Bar') -- return 4
SELECT INSTR('FooBarBar', 'Xar') -- return 0
```

https://riptutorial.com/zh-CN/sql/topic/1120/

37:

SQL。。。

WikipeidaSQL。

Examples

GUI SQL Server SQL

```
-- Define a name and parameters
CREATE PROCEDURE Northwind.getEmployee
    @LastName nvarchar(50),
    @FirstName nvarchar(50)
AS

-- Define the query to be run
SELECT FirstName, LastName, Department
FROM Northwind.vEmployeeDepartment
WHERE FirstName = @FirstName AND LastName = @LastName
AND EndDate IS NULL;
```

```
EXECUTE Northwind.getEmployee N'Ackerman', N'Pilar';

-- Or
EXEC Northwind.getEmployee @LastName = N'Ackerman', @FirstName = N'Pilar';
GO

-- Or
EXECUTE Northwind.getEmployee @FirstName = N'Pilar', @LastName = N'Ackerman';
GO
```

https://riptutorial.com/zh-CN/sql/topic/1701/

38:

- WITH QueryName [ColumnName...] AS
  ...

  SELECT ... FROM QueryName ...;

- WITH RECURSIVE QueryName [ColumnName...] AS
  ...
  UNION []
  SELECT ... FROM QueryName ...

  SELECT ... FROM QueryName ...;

WITH

。WITH。 CTETempDBTemp TableTable。

- 。
- 。
- 。
- /。
- SQL。
- ;。
- 。 CTE。

Examples

。

```
WITH ReadyCars AS (
  SELECT *
  FROM Cars
  WHERE Status = 'READY'
)
SELECT ID, Model, TotalCost
FROM ReadyCars
ORDER BY TotalCost;
```

ID		
1	F-150	200
2	F-150	230

```
SELECT ID, Model, TotalCost
```

```
FROM (
  SELECT *
  FROM Cars
  WHERE Status = 'READY'
) AS ReadyCars
ORDER BY TotalCost
```

```
WITH RECURSIVE ManagersOfJonathon AS (
    -- start with this row
    SELECT *
    FROM Employees
    WHERE ID = 4

    UNION ALL

    -- get manager(s) of all previously selected rows
    SELECT Employees.*
    FROM Employees
    JOIN ManagersOfJonathon
        ON Employees.ID = ManagersOfJonathon.ManagerID
)
SELECT * FROM ManagersOfJonathon;
```

ID	FName	LName		ID	DepartmentID
4			1212121212	**2**	1
2			2468101214	**1**	1
1			1234567890		1

;◦

`Numbersi`1-5

```
--Give a table name `Numbers" and a column `i` to hold the numbers
WITH Numbers(i) AS (
    --Starting number/index
    SELECT 1
    --Top-level UNION ALL operator required for recursion
    UNION ALL
    --Iteration expression:
    SELECT i + 1
    --Table expression we first declared used as source for recursion
    FROM Numbers
    --Clause to define the end of the recursion
    WHERE i < 5
)
--Use the generated table expression like a regular table
SELECT i FROM Numbers;
```

1
2

3
4

。

```
WITH RECURSIVE ManagedByJames(Level, ID, FName, LName) AS (
    -- start with this row
    SELECT 1, ID, FName, LName
    FROM Employees
    WHERE ID = 1

    UNION ALL

    -- get employees that have any of the previously selected rows as manager
    SELECT ManagedByJames.Level + 1,
           Employees.ID,
           Employees.FName,
           Employees.LName
    FROM Employees
    JOIN ManagedByJames
        ON Employees.ManagerID = ManagedByJames.ID

    ORDER BY 1 DESC   -- depth-first search
)
SELECT * FROM ManagedByJames;
```

	ID	FName	LName
1	1		
2	2		
3	4		
2	3		

CTEOracle CONNECT BY

OracleCONNECT BYSQLCTE。SQL Server。Oracle。

```
  WITH tbl AS (
       SELECT id, name, parent_id
         FROM mytable)
     , tbl_hierarchy AS (
       /* Anchor */
       SELECT 1 AS "LEVEL"
            --, 1 AS CONNECT_BY_ISROOT
            --, 0 AS CONNECT_BY_ISBRANCH
            , CASE WHEN t.id IN (SELECT parent_id FROM tbl) THEN 0 ELSE 1 END AS
CONNECT_BY_ISLEAF
            , 0 AS CONNECT_BY_ISCYCLE
```

```
            , '/' + CAST(t.id   AS VARCHAR(MAX)) + '/' AS SYS_CONNECT_BY_PATH_id
            , '/' + CAST(t.name AS VARCHAR(MAX)) + '/' AS SYS_CONNECT_BY_PATH_name
            , t.id AS root_id
            , t.*
         FROM tbl t
        WHERE t.parent_id IS NULL                           -- START WITH parent_id IS NULL
       UNION ALL
       /* Recursive */
       SELECT th."LEVEL" + 1 AS "LEVEL"
            --, 0 AS CONNECT_BY_ISROOT
            --, CASE WHEN t.id IN (SELECT parent_id FROM tbl) THEN 1 ELSE 0 END AS
CONNECT_BY_ISBRANCH
            , CASE WHEN t.id IN (SELECT parent_id FROM tbl) THEN 0 ELSE 1 END AS
CONNECT_BY_ISLEAF
            , CASE WHEN th.SYS_CONNECT_BY_PATH_id LIKE '%/' + CAST(t.id AS VARCHAR(MAX)) +
'/%' THEN 1 ELSE 0 END AS CONNECT_BY_ISCYCLE
            , th.SYS_CONNECT_BY_PATH_id   + CAST(t.id   AS VARCHAR(MAX)) + '/' AS
SYS_CONNECT_BY_PATH_id
            , th.SYS_CONNECT_BY_PATH_name + CAST(t.name AS VARCHAR(MAX)) + '/' AS
SYS_CONNECT_BY_PATH_name
            , th.root_id
            , t.*
         FROM tbl t
              JOIN tbl_hierarchy th ON (th.id = t.parent_id) -- CONNECT BY PRIOR id =
parent_id
        WHERE th.CONNECT_BY_ISCYCLE = 0)                    -- NOCYCLE
SELECT th.*
     --, REPLICATE(' ', (th."LEVEL" - 1) * 3) + th.name AS tbl_hierarchy
  FROM tbl_hierarchy th
       JOIN tbl CONNECT_BY_ROOT ON (CONNECT_BY_ROOT.id = th.root_id)
 ORDER BY th.SYS_CONNECT_BY_PATH_name;                      -- ORDER SIBLINGS BY name
```

CONNECT BY

- ◦ CONNECT BY。
  ◦ START WITH。
  ◦ SIBLINGS BY。
- ◦ NOCYCLE。。
- ◦ PRIOR。
  ◦ CONNECT_BY_ROOT。
- ◦ LEVEL。
  ◦ CONNECT_BY_ISLEAF。
  ◦ CONNECT_BY_ISCYCLE。
- ◦ SYS_CONNECT_BY_PATH/。

```
DECLARE @DateFrom DATETIME = '2016-06-01 06:00'
DECLARE @DateTo DATETIME = '2016-07-01 06:00'
DECLARE @IntervalDays INT = 7

-- Transition Sequence = Rest & Relax into Day Shift into Night Shift
-- RR (Rest & Relax) = 1
-- DS (Day Shift) = 2
-- NS (Night Shift) = 3

;WITH roster AS
(
```

```
   SELECT @DateFrom AS RosterStart, 1 AS TeamA, 2 AS TeamB, 3 AS TeamC
   UNION ALL
   SELECT DATEADD(d, @IntervalDays, RosterStart),
          CASE TeamA WHEN 1 THEN 2 WHEN 2 THEN 3 WHEN 3 THEN 1 END AS TeamA,
          CASE TeamB WHEN 1 THEN 2 WHEN 2 THEN 3 WHEN 3 THEN 1 END AS TeamB,
          CASE TeamC WHEN 1 THEN 2 WHEN 2 THEN 3 WHEN 3 THEN 1 END AS TeamC
   FROM roster WHERE RosterStart < DATEADD(d, -@IntervalDays, @DateTo)
)

SELECT RosterStart,
       ISNULL(LEAD(RosterStart) OVER (ORDER BY RosterStart), RosterStart + @IntervalDays) AS
RosterEnd,
       CASE TeamA WHEN 1 THEN 'RR' WHEN 2 THEN 'DS' WHEN 3 THEN 'NS' END AS TeamA,
       CASE TeamB WHEN 1 THEN 'RR' WHEN 2 THEN 'DS' WHEN 3 THEN 'NS' END AS TeamB,
       CASE TeamC WHEN 1 THEN 'RR' WHEN 2 THEN 'DS' WHEN 3 THEN 'NS' END AS TeamC
FROM roster
```

1TeamARRTeamBDay ShiftTeamC。

Results Messages

	RosterStart	RosterEnd	TeamA	TeamB	TeamC
1	2016-06-01 06:00:00.000	2016-06-08 06:00:00.000	RR	DS	NS
2	2016-06-08 06:00:00.000	2016-06-15 06:00:00.000	DS	NS	RR
3	2016-06-15 06:00:00.000	2016-06-22 06:00:00.000	NS	RR	DS
4	2016-06-22 06:00:00.000	2016-06-29 06:00:00.000	RR	DS	NS
5	2016-06-29 06:00:00.000	2016-07-06 06:00:00.000	DS	NS	RR

20。

Common Table Expressions

```
SELECT category.description, sum(product.price) as total_sales
FROM sale
LEFT JOIN product on sale.product_id = product.id
LEFT JOIN category on product.category_id = category.id
GROUP BY category.id, category.description
HAVING sum(product.price) > 20
```

```
WITH all_sales AS (
  SELECT product.price, category.id as category_id, category.description as
category_description
  FROM sale
  LEFT JOIN product on sale.product_id = product.id
  LEFT JOIN category on product.category_id = category.id
)
, sales_by_category AS (
  SELECT category_description, sum(price) as total_sales
  FROM all_sales
  GROUP BY category_id, category_description
)
SELECT * from sales_by_category WHERE total_sales > 20
```

SQL

“”“”。

```
-- all_sales: just a simple SELECT with all the needed JOINS
WITH all_sales AS (
  SELECT
  product.price as product_price,
  category.id as category_id,
  category.description as category_description
  FROM sale
  LEFT JOIN product on sale.product_id = product.id
  LEFT JOIN category on product.category_id = category.id
)
-- Group by category
, sales_by_category AS (
  SELECT category_id, category_description,
  sum(product_price) as total_sales
  FROM all_sales
  GROUP BY category_id, category_description
)
-- Filtering total_sales > 20
, top_categories AS (
  SELECT * from sales_by_category WHERE total_sales > 20
)
-- all_products: just a simple SELECT with all the needed JOINS
, all_products AS (
  SELECT
  product.id as product_id,
  product.description as product_description,
  product.price as product_price,
  category.id as category_id,
  category.description as category_description
  FROM product
  LEFT JOIN category on product.category_id = category.id
)
-- Order by product price
, cheapest_products AS (
  SELECT * from all_products
  ORDER by product_price ASC
)
-- Simple inner join
, cheapest_products_from_top_categories AS (
  SELECT product_description, product_price
  FROM cheapest_products
  INNER JOIN top_categories ON cheapest_products.category_id = top_categories.category_id
)
--The main SELECT
SELECT * from cheapest_products_from_top_categories
```

https://riptutorial.com/zh-CN/sql/topic/747/

39:

Examples

```
CREATE SEQUENCE orders_seq
START WITH     1000
INCREMENT BY   1;
```

10001。

seq_name .NEXTVAL。 。 NEXTVAL。

NEXTVALINSERTS

```
INSERT INTO Orders (Order_UID, Customer)
        VALUES (orders_seq.NEXTVAL, 1032);
```

```
UPDATE Orders
SET Order_UID = orders_seq.NEXTVAL
WHERE Customer = 581;
```

SELECTS

```
SELECT Order_seq.NEXTVAL FROM dual;
```

https://riptutorial.com/zh-CN/sql/topic/1586/

40:

TRUNCATE。DELETE。

- TRUNCATE TABLE table_name;

TRUNCATEDDLDELETEDML。TRUNCATETRUNCATE。

- TRUNCATE。TRUNCATEDMLON DELETE。。
- TRUNCATEDELETE
- MS SQL ServerTRUNCATE。
- SQLTRUNCATE

Examples

Employee

```
TRUNCATE TABLE Employee;
```

truncate tableDELETE TABLE。

。。delete table。

DELETETRUNCATETRUNCATE。1。

。

https://riptutorial.com/zh-CN/sql/topic/1466/

41:

Examples

BEGIN ... END

```
BEGIN
  UPDATE Employees SET PhoneNumber = '5551234567' WHERE Id = 1;
  UPDATE Employees SET Salary = 650 WHERE Id = 3;
END
```

https://riptutorial.com/zh-CN/sql/topic/1632/

42:

Examples

SQL

```
/*(8)*/  SELECT /*9*/ DISTINCT /*11*/ TOP
/*(1)*/  FROM
/*(3)*/       JOIN
/*(2)*/      ON
/*(4)*/  WHERE
/*(5)*/  GROUP BY
/*(6)*/  WITH {CUBE | ROLLUP}
/*(7)*/  HAVING
/*(10)*/ ORDER BY
/*(11)*/ LIMIT
```

。

VT“”

1. FROMFROMVT1。
2. ONONVT1。TRUEVT2。
3. OUTERjoinOUTER JOINCROSS JOININNER JOINVT2VT3。FROMFROM13。
4. WHEREWHEREVT3。TRUEVT4。
5. GROUP BYVT4GROUP BY。VT5。
6. CUBE | ROLLUPVT5VT6。
7. HAVINGHAVINGVT6。TRUEVT7。
8. SELECTSELECTVT8。
9. DISTINCTVT8。VT9。
10. ORDER BYVT9ORDER BY。VC10。
11. TOPVC10。VT11。 LIMITSQLTOPPostgresNetezza。

https://riptutorial.com/zh-CN/sql/topic/3671/

43:

- INSERT INTO table_namecolumn1column2column3...VALUESvalue1value2value3...;
- INSERT INTO table_namecolumn1column2 ...SELECT value1value2 ... from other_table

Examples

```
INSERT INTO Customers
VALUES ('Zack', 'Smith', 'zack@example.com', '7049989942', 'EMAIL');
```

Customers◦ Id◦ ◦

```
INSERT INTO Customers (FName, LName, Email, PreferredContact)
VALUES ('Zack', 'Smith', 'zack@example.com', 'EMAIL');
```

Customers◦ - PhoneNumber◦ not null◦

SELECT

```
INSERT INTO Customers (FName, LName, PhoneNumber)
SELECT FName, LName, PhoneNumber FROM Employees
```

EmployeesCustomers◦ ◦ ◦ Id◦

```
INSERT INTO Table1
SELECT * FROM Table2
```

insert

```
INSERT INTO tbl_name (field1, field2, field3)

VALUES (1,2,3), (4,5,6), (7,8,9);
```

DBMS◦

MySQL - LOAD DATA INFILE

MSSQL - BULK INSERT

https://riptutorial.com/zh-CN/sql/topic/465/

44:

Examples

DECIMALNUMERIC

◦ DECIMALNUMERIC◦

```
DECIMAL ( precision [ , scale] )
NUMERIC ( precision [ , scale] )
```

```
SELECT CAST(123 AS DECIMAL(5,2)) --returns 123.00
SELECT CAST(12345.12 AS NUMERIC(10,5)) --returns 12345.12000
```

FLOATREAL

◦

```
SELECT CAST( PI() AS FLOAT) --returns 3.14159265358979
SELECT CAST( PI() AS REAL) --returns 3.141593
```

◦

BIGINT	-2 ^ 63-9,223,372,036,854,775,8082 ^ 63-19,223,372,036,854,775,807	8
INT	-2 ^ 31-2,147,483,6482 ^ 31-12,147,483,647	4
SMALLINT	-2 ^ 15-32,7682 ^ 15-132,767	2
TINYINT	0255	1

◦

	-922,337,203,685,477.5808922,337,203,685,477.5807	8
SMALLMONEY	-214,748.3648214,748.3647	4

BINARYVARBINARY

◦

```
BINARY [ ( n_bytes ) ]
VARBINARY [ ( n_bytes | max ) ]
```

`n_bytes`18000。 `max`2 ^ 31-1。

```
SELECT CAST(12345 AS BINARY(10)) -- 0x0000000000000003039
SELECT CAST(12345 AS VARBINARY(10)) -- 0x00003039
```

CHARVARCHAR

。

```
CHAR [ ( n_chars ) ]
VARCHAR [ ( n_chars ) ]
```

```
SELECT CAST('ABC' AS CHAR(10)) -- 'ABC       ' (padded with spaces on the right)
SELECT CAST('ABC' AS VARCHAR(10)) -- 'ABC' (no padding due to variable character)
SELECT CAST('ABCDEFGHIJKLMNOPQRSTUVWXYZ' AS CHAR(10))  -- 'ABCDEFGHIJ' (truncated to 10
characters)
```

NCHARNVARCHAR

UNICODE。

```
NCHAR [ ( n_chars ) ]
NVARCHAR [ ( n_chars | MAX ) ]
```

`MAX`8000。

16GUID / UUID。

```
DECLARE @GUID UNIQUEIDENTIFIER = NEWID();
SELECT @GUID -- 'E28B3BD9-9174-41A9-8508-899A78A33540'
DECLARE @bad_GUID_string VARCHAR(100) = 'E28B3BD9-9174-41A9-8508-899A78A33540_foobarbaz'
SELECT
    @bad_GUID_string,   -- 'E28B3BD9-9174-41A9-8508-899A78A33540_foobarbaz'
    CONVERT(UNIQUEIDENTIFIER, @bad_GUID_string) -- 'E28B3BD9-9174-41A9-8508-899A78A33540'
```

https://riptutorial.com/zh-CN/sql/topic/1166/

45:

SQLALTER/

- ALTER TABLE [table_name] ADD [column_name] [datatype]

Examples

```
ALTER TABLE Employees
ADD StartingDate date NOT NULL DEFAULT GetDate(),
    DateOfBirth date NULL
```

`StartingDate`NULL`DateOfBirth`EmployeesNULL。

```
ALTER TABLE Employees
DROP COLUMN salary;
```

。

```
ALTER TABLE Employees
DROP CONSTRAINT DefaultSalary
```

employeesDefaultSalary。

-。

```
ALTER TABLE Employees
ADD CONSTRAINT DefaultSalary DEFAULT ((100)) FOR [Salary]
```

DefaultSalarySalary100。

。

- -
- -
- -
- -
- -
- -

Oracle 。

```
ALTER TABLE Employees
ALTER COLUMN StartingDate DATETIME NOT NULL DEFAULT (GETDATE())
```

`StartingDatedatedatetime` default。

```
ALTER TABLE EMPLOYEES ADD pk_EmployeeID PRIMARY KEY (ID)
```

IDEmployees。ID。。

```
ALTER TABLE EMPLOYEES ADD pk_EmployeeID PRIMARY KEY (ID, FName)
```

https://riptutorial.com/zh-CN/sql/topic/356/

46:

Examples

```
CREATE VIEW new_employees_details AS
SELECT E.id, Fname, Salary, Hire_date
FROM Employees E
WHERE hire_date > date '2015-01-01';
```

```
select * from new_employees_details
```

ID	FName		
4		500	24-07-2016

。

```
Create VIEW dept_income AS
SELECT d.Name as DepartmentName, sum(e.salary) as TotalSalary
FROM Employees e
JOIN Departments d on e.DepartmentId = d.id
GROUP BY d.Name;
```

```
SELECT *
FROM dept_income;
```

	TotalSalary
HR	1900
	600

https://riptutorial.com/zh-CN/sql/topic/766/

47:

CASEif-then。

- CASE input_expression
  11
  [22] .....
  [ELSE resultX]
- 11
  [22] .....
  [ELSE resultX]

`compareXinput_expression` 。

CASE`conditionX`true。

Examples

SELECTCASE

TRUE CASE。

。

```
SELECT Id, ItemId, Price,
  CASE WHEN Price < 10 THEN 'CHEAP'
       WHEN Price < 20 THEN 'AFFORDABLE'
       ELSE 'EXPENSIVE'
  END AS PriceRating
FROM ItemSales
```

ID	Id		PriceRating
1	100	34.5	
2	145	2.3	
3	100	34.5	
4	100	34.5	
	145	10	

CASE。

`CASESUM`。 Excel`COUNTIF`。

“1”。

ItemSales “”

ID	Id		PriceRating
1	100	34.5	
2	145	2.3	
3	100	34.5	
4	100	34.5	
	145	10	

```
SELECT
    COUNT(Id) AS ItemsCount,
    SUM ( CASE
            WHEN PriceRating = 'Expensive' THEN 1
            ELSE 0
          END
        ) AS ExpensiveItemsCount
FROM ItemSales
```

ItemsCount	ExpensiveItemsCount
3	

```
SELECT
    COUNT(Id) as ItemsCount,
    SUM (
        CASE PriceRating
            WHEN 'Expensive' THEN 1
            ELSE 0
        END
       ) AS ExpensiveItemsCount
FROM ItemSales
```

SELECTCASE

CASE◦ ◦ ELSE

```
SELECT Id, ItemId, Price,
  CASE Price WHEN 5  THEN 'CHEAP'
             WHEN 15 THEN 'AFFORDABLE'
             ELSE         'EXPENSIVE'
  END as PriceRating
FROM ItemSales
```

◦ WHEN◦

```
SELECT
    CASE ABS(CHECKSUM(NEWID())) % 4
        WHEN 0 THEN 'Dr'
        WHEN 1 THEN 'Master'
        WHEN 2 THEN 'Mr'
        WHEN 3 THEN 'Mrs'
    END
```

NULL◦ WHEN NEWID()◦

```
SELECT
    CASE
        WHEN ABS(CHECKSUM(NEWID())) % 4 = 0 THEN 'Dr'
        WHEN ABS(CHECKSUM(NEWID())) % 4 = 1 THEN 'Master'
        WHEN ABS(CHECKSUM(NEWID())) % 4 = 2 THEN 'Mr'
        WHEN ABS(CHECKSUM(NEWID())) % 4 = 3 THEN 'Mrs'
    END
```

WHENNULL ◦

CASEORDER BY

1,2,3 ..

```
SELECT * FROM DEPT
ORDER BY
CASE DEPARTMENT
      WHEN 'MARKETING' THEN  1
      WHEN 'SALES' THEN 2
      WHEN 'RESEARCH' THEN 3
      WHEN 'INNOVATION' THEN 4
      ELSE        5
      END,
      CITY
```

ID				EMPLOYEES_NUMBER
12			MARKETING	9
15			MARKETING	12
9				8
14				12
				11
10				13
4				11
2				9

UPDATECASE

```
UPDATE ItemPrice
SET Price = Price *
  CASE ItemId
    WHEN 1 THEN 1.05
    WHEN 2 THEN 1.10
    WHEN 3 THEN 1.15
    ELSE 1.00
  END
```

CASENULL

'0''1'NULL

```
SELECT ID
      ,REGION
      ,CITY
      ,DEPARTMENT
      ,EMPLOYEES_NUMBER
  FROM DEPT
  ORDER BY
  CASE WHEN REGION IS NULL THEN 1
  ELSE 0
  END,
  REGION
```

ID				EMPLOYEES_NUMBER
10				13
14				12
9				8
12			MARKETING	9
				11
15			MARKETING	12
4				11
2				9

ORDER BYCASE2

◦ MIN()LEAST() ... ORDER BY MIN(Date1, Date2) SQLCASE◦

CASEDate1Date2◦

ID	1	DATE2
1	201711	2017131
2	2017131	201713
3	2017131	201712
4	201716	2017131
	2017131	201715
6	201714	2017131

```
SELECT Id, Date1, Date2
FROM YourTable
ORDER BY CASE
           WHEN COALESCE(Date1, '1753-01-01') < COALESCE(Date2, '1753-01-01') THEN Date1
           ELSE Date2
         END
```

ID	1	DATE2
1	**201711**	2017131
3	2017131	**201712**
2	2017131	**201713**
6	**201714**	2017131
	2017131	**201715**
4	**201716**	2017131

Id = 1Date12017-01-01Id = 3Date22017-01-02 ◦

2017-01-012017-01-06Date1Date2◦

https://riptutorial.com/zh-CN/sql/topic/456/

48:

◦ ◦ OraclePostgreSQL◦ SQL ServerDB2◦

Examples

PostgreSQL

```
CREATE TABLE mytable (number INT);
INSERT INTO mytable VALUES (1);

CREATE MATERIALIZED VIEW myview AS SELECT * FROM mytable;

SELECT * FROM myview;
 number
--------
      1
(1 row)

INSERT INTO mytable VALUES(2);

SELECT * FROM myview;
 number
--------
      1
(1 row)

REFRESH MATERIALIZED VIEW myview;

SELECT * FROM myview;
 number
--------
      1
      2
(2 rows)
```

https://riptutorial.com/zh-CN/sql/topic/8367/

49:

Examples

- ◦ ◦

SQL

- 0
- 01
- 0

ID	
1	HR
2	
3	

SQL

```
CREATE TABLE Departments (
    Id INT NOT NULL AUTO_INCREMENT,
    Name VARCHAR(25) NOT NULL,
    PRIMARY KEY(Id)
);

INSERT INTO Departments
    ([Id], [Name])
VALUES
    (1, 'HR'),
    (2, 'Sales'),
    (3, 'Tech')
;
```

ID	FName	LName		ID	DepartmentID		
1			1234567890		1	1000	200211
2			2468101214	1	1	400	23-03-2005
3			1357911131	1	2	600	12-05-2009
4			1212121212	2	1	500	24-07-2016

SQL

```
CREATE TABLE Employees (
    Id INT NOT NULL AUTO_INCREMENT,
    FName VARCHAR(35) NOT NULL,
    LName VARCHAR(35) NOT NULL,
    PhoneNumber VARCHAR(11),
    ManagerId INT,
    DepartmentId INT NOT NULL,
    Salary INT NOT NULL,
    HireDate DATETIME NOT NULL,
    PRIMARY KEY(Id),
    FOREIGN KEY (ManagerId) REFERENCES Employees(Id),
    FOREIGN KEY (DepartmentId) REFERENCES Departments(Id)
);

INSERT INTO Employees
    ([Id], [FName], [LName], [PhoneNumber], [ManagerId], [DepartmentId], [Salary], [HireDate])
VALUES
    (1, 'James', 'Smith', 1234567890, NULL, 1, 1000, '01-01-2002'),
    (2, 'John', 'Johnson', 2468101214, '1', 1, 400, '23-03-2005'),
    (3, 'Michael', 'Williams', 1357911131, '1', 2, 600, '12-05-2009'),
    (4, 'Johnathon', 'Smith', 1212121212, '2', 1, 500, '24-07-2016')
;
```

ID	FName	LName			PreferredContact
1			william.jones@example.com	3347927472	
2			dmiller@example.net	2137921892	
3			richard0123@example.com		

SQL

```
CREATE TABLE Customers (
    Id INT NOT NULL AUTO_INCREMENT,
    FName VARCHAR(35) NOT NULL,
    LName VARCHAR(35) NOT NULL,
    Email varchar(100) NOT NULL,
    PhoneNumber VARCHAR(11),
    PreferredContact VARCHAR(5) NOT NULL,
    PRIMARY KEY(Id)
);

INSERT INTO Customers
    ([Id], [FName], [LName], [Email], [PhoneNumber], [PreferredContact])
VALUES
    (1, 'William', 'Jones', 'william.jones@example.com', '3347927472', 'PHONE'),
    (2, 'David', 'Miller', 'dmiller@example.net', '2137921892', 'EMAIL'),
    (3, 'Richard', 'Davis', 'richard0123@example.com', NULL, 'EMAIL')
;
```

ID	ID	ID			
1	1	2	F-150		230
2	1	2	F-150		200
3	2	1			100
4	3	3			1254

SQL

```
CREATE TABLE Cars (
    Id INT NOT NULL AUTO_INCREMENT,
    CustomerId INT NOT NULL,
    EmployeeId INT NOT NULL,
    Model varchar(50) NOT NULL,
    Status varchar(25) NOT NULL,
    TotalCost INT NOT NULL,
    PRIMARY KEY(Id),
    FOREIGN KEY (CustomerId) REFERENCES Customers(Id),
    FOREIGN KEY (EmployeeId) REFERENCES Employees(Id)
);

INSERT INTO Cars
    ([Id], [CustomerId], [EmployeeId], [Model], [Status], [TotalCost])
VALUES
    ('1', '1', '2', 'Ford F-150', 'READY', '230'),
    ('2', '1', '2', 'Ford F-150', 'READY', '200'),
    ('3', '2', '1', 'Ford Mustang', 'WAITING', '100'),
    ('4', '3', '3', 'Toyota Prius', 'WORKING', '1254')
;
```

Authors BooksBooksAuthors。

SQL

◦ *BooksAuthors BooksAuthors*。

- 1
- 1

ID		
1	JD	
2	F.◦	
3	.	
4		

ID		
	Jason N. Gaylord	
6	Pranav Rastogi	
7		
8		

SQL

```
CREATE TABLE Authors (
    Id INT NOT NULL AUTO_INCREMENT,
    Name VARCHAR(70) NOT NULL,
    Country VARCHAR(100) NOT NULL,
    PRIMARY KEY(Id)
);

INSERT INTO Authors
    (Name, Country)
VALUES
    ('J.D. Salinger', 'USA'),
    ('F. Scott. Fitzgerald', 'USA'),
    ('Jane Austen', 'UK'),
    ('Scott Hanselman', 'USA'),
    ('Jason N. Gaylord', 'USA'),
    ('Pranav Rastogi', 'India'),
    ('Todd Miranda', 'USA'),
    ('Christian Wenz', 'USA')
;
```

ID	
1	
2	
3	
4	
6	
7	CVBASP.NET 4.5

SQL

```
CREATE TABLE Books (
    Id INT NOT NULL AUTO_INCREMENT,
    Title VARCHAR(50) NOT NULL,
    PRIMARY KEY(Id)
```

```
);

INSERT INTO Books
    (Id, Title)
VALUES
    (1, 'The Catcher in the Rye'),
    (2, 'Nine Stories'),
    (3, 'Franny and Zooey'),
    (4, 'The Great Gatsby'),
    (5, 'Tender id the Night'),
    (6, 'Pride and Prejudice'),
    (7, 'Professional ASP.NET 4.5 in C# and VB')
;
```

BooksAuthors

BOOKID	AUTHORID
1	1
2	1
3	1
4	2
	2
6	3
7	4
7	
7	6
7	7
7	8

SQL

```
CREATE TABLE BooksAuthors (
    AuthorId INT NOT NULL,
    BookId  INT NOT NULL,
    FOREIGN KEY (AuthorId) REFERENCES Authors(Id),
    FOREIGN KEY (BookId) REFERENCES Books(Id)
);

INSERT INTO BooksAuthors
    (BookId, AuthorId)
VALUES
```

```
    (1, 1),
    (2, 1),
    (3, 1),
    (4, 2),
    (5, 2),
    (6, 3),
    (7, 4),
    (7, 5),
    (7, 6),
    (7, 7),
    (7, 8)
;
```

```
SELECT * FROM Authors;
```

```
SELECT * FROM Books;
```

```
SELECT
  ba.AuthorId,
  a.Name AuthorName,
  ba.BookId,
  b.Title BookTitle
FROM BooksAuthors ba
  INNER JOIN Authors a ON a.id = ba.authorid
  INNER JOIN Books b ON b.id = ba.bookid
;
```

Countries。/。

SQL

BloombergAPI23/。2ISO3ISO3。

ID	ISO	ISO3	ISONumeric			ContinentCode	
1	AU	AUS	36			OC	AUD
2	DE		276				
2		IND	356				INR
3	LA	LAO	418				LAK
4			840			NA	
	ZW		716			AF	ZWL

SQL

```
CREATE TABLE Countries (
```

```
    Id INT NOT NULL AUTO_INCREMENT,
    ISO VARCHAR(2) NOT NULL,
    ISO3 VARCHAR(3) NOT NULL,
    ISONumeric INT NOT NULL,
    CountryName VARCHAR(64) NOT NULL,
    Capital VARCHAR(64) NOT NULL,
    ContinentCode VARCHAR(2) NOT NULL,
    CurrencyCode VARCHAR(3) NOT NULL,
    PRIMARY KEY(Id)
)
;

INSERT INTO Countries
    (ISO, ISO3, ISONumeric, CountryName, Capital, ContinentCode, CurrencyCode)
VALUES
    ('AU', 'AUS', 36, 'Australia', 'Canberra', 'OC', 'AUD'),
    ('DE', 'DEU', 276, 'Germany', 'Berlin', 'EU', 'EUR'),
    ('IN', 'IND', 356, 'India', 'New Delhi', 'AS', 'INR'),
    ('LA', 'LAO', 418, 'Laos', 'Vientiane', 'AS', 'LAK'),
    ('US', 'USA', 840, 'United States', 'Washington', 'NA', 'USD'),
    ('ZW', 'ZWE', 716, 'Zimbabwe', 'Harare', 'AF', 'ZWL')
;
```

https://riptutorial.com/zh-CN/sql/topic/280/

50:

SQLNULL“”。 SQL“”。

''0 NULL 。

NULL 'NULL' NULL。

Examples

NULL

WHERENULL 。

```
SELECT * FROM Employees WHERE ManagerId IS NULL ;
SELECT * FROM Employees WHERE ManagerId IS NOT NULL ;
```

NULL= NULL<> NULL != NULL UNKNOWN WHERE。

WHEREFALSEUKNOWNTRUE。

。

```
CREATE TABLE MyTable
(
    MyCol1 INT NOT NULL, -- non-nullable
    MyCol2 INT NULL      -- nullable
) ;
```

NOT NULL。

NULL。

```
INSERT INTO MyTable (MyCol1, MyCol2) VALUES (1, NULL) ;  -- works fine

INSERT INTO MyTable (MyCol1, MyCol2) VALUES (NULL, 2) ;
        -- cannot insert
        -- the value NULL into column 'MyCol1', table 'MyTable';
        -- column does not allow nulls. INSERT fails.
```

NULL

NULL

```
UPDATE Employees
SET ManagerId = NULL
WHERE Id = 4
```

NULL

Employees

```
INSERT INTO Employees
    (Id, FName, LName, PhoneNumber, ManagerId, DepartmentId, Salary, HireDate)
VALUES
    (5, 'Jane', 'Doe', NULL, NULL, 2, 800, '2016-07-22') ;
```

https://riptutorial.com/zh-CN/sql/topic/3421/

51:

Examples

```
SELECT your_columns, COUNT(*) OVER() as Ttl_Rows FROM your_data_set
```

ID		Ttl_Rows
1		
2	FOO	
3		
4		
	QUUX	

◦

◦

ID		
1		unique_tag
2	FOO	
42		
3		
51	QUUX	

```
SELECT id, name, tag, COUNT(*) OVER (PARTITION BY tag) > 1 AS flag FROM items
```

ID			
1		unique_tag	
2	FOO		
42			
3			
51	QUUX		

OVERPARTITION

```
SELECT id, name, tag, (SELECT COUNT(tag) FROM items B WHERE tag = A.tag) > 1 AS flag FROM
items A
```

2016312	200
2016311	-50
2016314	100
2016315	100
2016310	-250

```
SELECT date, amount, SUM(amount) OVER (ORDER BY date ASC) AS running
FROM operations
ORDER BY date ASC
```

2016310	-250	-250
2016311	-50	-300
2016312	200	-100
2016314	100	0
2016315	100	-100

N

1	2016720
1	2016721
2	2016720
2	2016721
2	2016722

```
;with CTE as
(SELECT *,
        ROW_NUMBER() OVER (PARTITION BY User_ID
                           ORDER BY Completion_Date DESC) Row_Num
FROM    Data)
```

```
SELECT * FORM CTE WHERE Row_Num <= n
```

n = 1`user_id`

		ROW_NUM
1	2016721	1
2	2016722	1

LAG“”

ID		STATUS_TIME	STATUS_BY
1		2016-09-28-19.47.52.501398	USER_1
3		2016-09-28-19.47.52.501511	USER_2
1		2016-09-28-19.47.52.501517	USER_3
3		2016-09-28-19.47.52.501521	USER_2
3		2016-09-28-19.47.52.501524	USER_4

`IDSTATUS` "TWO"THREE'。 `STATUS_BY` “ONE”“THREE”。

`LAG()`

```
SELECT * FROM (
 SELECT
  t.*,
  LAG(status) OVER (PARTITION BY id ORDER BY status_time) AS prev_status
  FROM test t
) t1 WHERE status = 'THREE' AND prev_status != 'TWO'
```

LAG

```
SELECT A.id, A.status, B.status as prev_status, A.status_time, B.status_time as
prev_status_time
FROM Data A, Data B
WHERE A.id = B.id
AND   B.status_time = (SELECT MAX(status_time) FROM Data where status_time < A.status_time and
id = A.id)
AND   A.status = 'THREE' AND NOT B.status = 'TWO'
```

https://riptutorial.com/zh-CN/sql/topic/647/

52:

◦ book◦

◦ WHEREJOINORDER BY◦

◦

◦ ◦

◦ ◦ INSERT◦ SELECT◦

Examples

```
CREATE INDEX ix_cars_employee_id ON Cars (EmployeeId);
```

Cars EmployeeId◦ EmployeeId

```
SELECT * FROM Cars WHERE EmployeeId = 1
```

1;

```
CREATE INDEX ix_cars_e_c_o_ids ON Cars (EmployeeId, CarId, OwnerId);
```

◦ ◦

;

```
SELECT * FROM Cars WHERE EmployeeId = 1 Order by CarId DESC
```

;

```
SELECT * FROM Cars WHERE OwnerId = 17 Order by CarId DESC
```

EmployeeIdCarID`OwnerId = 17` ◦

;`OwnerId`◦

◦

```
CREATE CLUSTERED INDEX ix_clust_employee_id ON Employees(EmployeeId, Email);
```

SQLEmployees◦ ;◦ ◦ ◦ ◦

```
CREATE UNIQUE INDEX uq_customers_email ON Customers(Email);
```

CustomersEmail。。。

```
CREATE UNIQUE INDEX ix_eid_desc ON Customers(EmployeeID);
```

CustomersEmployeeID。 - ID。

```
CREATE INDEX ix_eid_desc ON Customers(EmployeeID Desc);
```

。MSSQL。

```
UPDATE Customers SET Email = "richard0123@example.com" WHERE id = 1;
```

Customers“ ”。

```
UPDATE Customers SET Email = "richard0123@example.com" WHERE id = 1 ON DUPLICATE KEY;
```

SAP ASE

。SAP ASE。

```
DROP INDEX [table name].[index name]
```

```
DROP INDEX Cars.index_1
```

SELECT。

```
CREATE INDEX ix_scoreboard_score ON scoreboard (score DESC);
```

```
SELECT * FROM scoreboard ORDER BY score DESC;
```

。

```
DROP INDEX ix_cars_employee_id ON Cars;
```

DROP。 *Cars*DROP*ix_cars_employee_id*。

。。

```
ALTER INDEX ix_cars_employee_id ON Cars DISABLE;
```

。

。;

```
ALTER INDEX ix_cars_employee_id ON Cars REBUILD;
```

NULLS

```
CREATE UNIQUE INDEX idx_license_id
   ON Person(DrivingLicenseID) WHERE DrivingLicenseID IS NOT NULL
GO
```

0..1 -

//B-Tree。SQLServer。。

```
ALTER INDEX index_name REBUILD;
```

DMLRDBMS。`REORGANIZE` SQLServer`COALESCE` / `SHRINK SPACE` Oracle。

。。

。。

Employee_SurnameEmployees

```
CREATE CLUSTERED INDEX ix_employees_name ON Employees(Employee_Surname);
```

。。

。。。。

EmployeesEmployee_Surname

```
CREATE NONCLUSTERED INDEX ix_employees_name ON Employees(Employee_Surname);
```

。。。

SQL ServerSQLite。

`order_state_id`finished2`order_state_id equal` started1。

```
SELECT id, comment
  FROM orders
 WHERE order_state_id =  1
   AND product_id = @some_value;
```

```
CREATE INDEX Started_Orders
          ON orders(product_id)
       WHERE order_state_id = 1;
```

。

https://riptutorial.com/zh-CN/sql/topic/344/

53:

Examples

ON DELETE CASCADE

。

。

。

。

N。

。

```
ALTER TABLE dbo.T_Room  WITH CHECK ADD  CONSTRAINT FK_T_Room_T_Client FOREIGN KEY(RM_CLI_ID)
REFERENCES dbo.T_Client (CLI_ID)
GO
```

。

```
DELETE FROM T_Client WHERE CLI_ID = x
```

。

。 。 。 N。 。

。

ON DELETE CASCADE。

```
ALTER TABLE dbo.T_Room  -- WITH CHECK -- SQL-Server can specify WITH CHECK/WITH NOCHECK
ADD  CONSTRAINT FK_T_Room_T_Client FOREIGN KEY(RM_CLI_ID)
REFERENCES dbo.T_Client (CLI_ID)
ON DELETE CASCADE
```

```
DELETE FROM T_Client WHERE CLI_ID = x
```

。

- 。

Microsoft SQL-Server。

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =
OBJECT_ID(N'[dbo].[FK_T_FMS_Navigation_T_FMS_Navigation]') AND parent_object_id =
OBJECT_ID(N'[dbo].[T_FMS_Navigation]'))
ALTER TABLE [dbo].[T_FMS_Navigation]  WITH CHECK ADD  CONSTRAINT
```

```
[FK_T_FMS_Navigation_T_FMS_Navigation] FOREIGN KEY([NA_NA_UID])
REFERENCES [dbo].[T_FMS_Navigation] ([NA_UID])
ON DELETE CASCADE
GO

IF  EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =
OBJECT_ID(N'[dbo].[FK_T_FMS_Navigation_T_FMS_Navigation]') AND parent_object_id =
OBJECT_ID(N'[dbo].[T_FMS_Navigation]'))
ALTER TABLE [dbo].[T_FMS_Navigation] CHECK CONSTRAINT [FK_T_FMS_Navigation_T_FMS_Navigation]
GO
```

Microsoft-SQL-server`ON DELETE CASCADE`◦ ◦

PostgreSQL;

◦

◦

◦

“T_Room”...

https://riptutorial.com/zh-CN/sql/topic/3518/

54:

- ROW_NUMBER
- OVER[PARTITION BY value_expression... [n]] order_by_clause

Examples

。

```
SELECT
  ROW_NUMBER() OVER(ORDER BY Fname ASC) AS RowNumber,
  Fname,
  LName
FROM Employees
```

。

```
SELECT
  ROW_NUMBER() OVER(PARTITION BY DepartmentId ORDER BY DepartmentId ASC) AS RowNumber,
  DepartmentId, Fname, LName
FROM Employees
```

1

```
WITH cte AS (
  SELECT ProjectID,
         ROW_NUMBER() OVER (PARTITION BY ProjectID ORDER BY InsertDate DESC) AS rn
  FROM ProjectNotes
)
DELETE FROM cte WHERE rn > 1;
```

https://riptutorial.com/zh-CN/sql/topic/1977/

55:

1999Block 2Milton Keynes。

Examples

。

SQL。

。

;。 “”。

1. ;。
2. 。
3. 。
4. 。
5. 。

ID		DOB	
1		1971112	3
2		1971112	3
3		197587	2

- 1。 `Id Name DOBManager`。
- 2 `Id Name DOB ManagerManager`。
- 3 `Id Name DOBManager`。
- 4`Id`。

ID		DOB	
1		1971112	3
1		1971112	3
3		1975718	2,1

- 1 - 21。
- 2DOB。
- 3'name'。
- 4。
-

5。

https://riptutorial.com/zh-CN/sql/topic/2515/

56:

Examples

DESCRIBE tablename;

DESCRIBEEXPLAIN◦ DESCRIBE◦

```
DESCRIBE tablename;
```

```
COLUMN_NAME     COLUMN_TYPE     IS_NULLABLE     COLUMN_KEY     COLUMN_DEFAULT    EXTRA
id              int(11)         NO              PRI            0
auto_increment
test            varchar(255)    YES                            (null)
```

◦ null◦ auto_increment ◦

EXPLAIN

selectExplain◦ ◦

```
explain select * from user join data on user.test = data.fk_user;
```

```
id  select_type  table   type    possible_keys  key     key_len ref       rows  Extra
1   SIMPLE       user    index   test           test    5       (null)    1     Using where;
Using index
1   SIMPLE       data    ref     fk_user        fk_user 5       user.test 1     (null)
```

type◦ possible_keys◦ keyacutal used index◦ key_len◦ ◦ rows◦

https://riptutorial.com/zh-CN/sql/topic/2928/

57:

Examples

MyTableMyAudit。“”Microsoft SQL ServerINSERTUPDATE。“”DELETE。

```
CREATE TRIGGER MyTrigger
    ON MyTable
    AFTER INSERT

AS

BEGIN
    -- insert audit record to MyAudit table
    INSERT INTO MyAudit(MyTableId, User)
    (SELECT MyTableId, CURRENT_USER FROM inserted)
END
```

“”“”

```
CREATE TRIGGER BooksDeleteTrigger
    ON MyBooksDB.Books
    AFTER DELETE
AS
  INSERT INTO BooksRecycleBin
    SELECT *
    FROM deleted;
GO
```

https://riptutorial.com/zh-CN/sql/topic/1432/

58:

Examples

ORDER BYTOPx

GROUP BYTOP。

5。

ORDER BY

5“Id”。

```
SELECT TOP 5 DisplayName, Reputation
FROM Users
```

...

	1
	12567
Jarrod Dixon	11739
	37628
	25784

ORDER BY

```
SELECT TOP 5 DisplayName, Reputation
FROM Users
ORDER BY Reputation desc
```

...

JonSkeet	**865023**
	661741
BalusC	**650237**
	625870

	601636

SQLMySQL`SELECTLIMITTOP`

```
SELECT DisplayName, Reputation
FROM Users
ORDER BY Reputation DESC
LIMIT 5
```

```
SELECT DisplayName, JoinDate, Reputation
FROM Users
ORDER BY JoinDate, Reputation
```

	JoinDate	
	2008-09-15	**1**
	2008-09-16	**25784**
	2008-09-16	**37628**
Jarrod Dixon	**2008-10-03**	**11739**
	2008-10-03	**12567**

“1”。

Pro。

Con'ORDER BY Reputation''ORDER BY 14'。

select`3Reputation`。

```
SELECT DisplayName, JoinDate, Reputation
FROM Users
ORDER BY 3
```

	JoinDate	
	2008-09-15	**1**
Jarrod Dixon	2008-10-03	**11739**
	2008-10-03	**12567**
	2008-09-16	**25784**
	2008-09-16	**37628**

。

```
SELECT DisplayName, JoinDate as jd, Reputation as rep
FROM Users
ORDER BY jd, rep
```

select。1Jd2

```
SELECT DisplayName, JoinDate as jd, Reputation as rep
FROM Users
ORDER BY 2, 3
```

`Employee ORDER BY Department ◦ Department`;CASE

	HR
	HR
	HR

```
SELECT *
FROM Employee
ORDER BY CASE Department
         WHEN 'HR'         THEN 1
         WHEN 'Accountant' THEN 2
         ELSE                   3
         END;
```

	HR
	HR
	HR

https://riptutorial.com/zh-CN/sql/topic/620/

59:

Examples

--

```
SELECT *
FROM Employees -- this is a comment
WHERE FName = 'John'
```

/* ... */

```
/* This query
   returns all employees */
SELECT *
FROM Employees
```

```
SELECT /* all columns: */ *
FROM Employees
```

https://riptutorial.com/zh-CN/sql/topic/1597/

60:

。

SQLSQL。

Examples

`a-z 0-9 _`。

SQL/

- MS SQL `@ $ #`Unicode
- MySQL `$`
- Oracle`$ #`
- PostgreSQL `$`Unicode

。 SQL

- MS SQL。
- MySQL。
- Oracle。
- PostgreSQL。
- SQLite;ASCII。

https://riptutorial.com/zh-CN/sql/topic/9677/

61:

TRY / CATCHMS SQL ServerT-SQL。

T-SQL.NET。

Examples

TRY / CATCH

```
BEGIN TRANSACTION
BEGIN TRY
    INSERT INTO dbo.Sale(Price, SaleDate, Quantity)
    VALUES (5.2, GETDATE(), 1)
    INSERT INTO dbo.Sale(Price, SaleDate, Quantity)
    VALUES (5.2, 'not a date', 1)
    COMMIT TRANSACTION
END TRY
BEGIN CATCH
    THROW
    ROLLBACK TRANSACTION
END CATCH
```

```
BEGIN TRANSACTION
BEGIN TRY
    INSERT INTO dbo.Sale(Price, SaleDate, Quantity)
    VALUES (5.2, GETDATE(), 1)
    INSERT INTO dbo.Sale(Price, SaleDate, Quantity)
    VALUES (5.2, GETDATE(), 1)
    COMMIT TRANSACTION
END TRY
BEGIN CATCH
    THROW
    ROLLBACK TRANSACTION
END CATCH
```

https://riptutorial.com/zh-CN/sql/topic/4420/

62:

SELECTSQL。FROM。

- SELECT [DISTINCT] [column1] [[column2] ...]
  []
  []
  [GROUP BY [column1] [[column2] ...]

  [HAVING [column1] [[column2] ...]

  [ASC| DESC]

SELECT - 。

```
SELECT Name, SerialNumber
FROM ArmyInfo
```

NameSerial NumberRank

```
SELECT *
FROM ArmyInfo
```

。 SELECT *。

Examples

。

。

ID	FName	LName	DEPTID
1			3
2			4

ID	
1	
2	
3	
4	

* 。

FROM。 JOIN 。

```
SELECT * FROM Employees
```

Employees

ID	FName	LName	DEPTID
1			3
2			4

。

```
SELECT
    Employees.*,
    Departments.Name
FROM
    Employees
JOIN
    Departments
    ON Departments.Id = Employees.DeptId
```

EmployeeDepartmentsName

ID	FName	LName	DEPTID	
1			3	
2			4	

*

1. IO。 。
2. IO`SELECT <columns> FROM <table>`。
3. /IO
   -
   - /
4. 。 `SELECT * FROM orders JOIN people ON people.id = orders.personid ORDER BY displayname` - `displayname`orders`ORDER BY`MS SQL Server“”。

*

* *。

tablealias.** 。

EXISTS SELECT A.col1, A.Col2 FROM A WHERE EXISTS (SELECT * FROM B where A.ID = B.A_ID) B。 B*。 COUNT(*)。

SELECT with WHERE

```
SELECT column1, column2, columnN
FROM table_name
WHERE [condition]
```

*[condition]*SQL><=<>> =<=LIKENOTINBETWEEN。

“READY”'Cars'

```
SELECT * FROM Cars WHERE status = 'READY'
```

WHEREHAVING 。

```
SELECT
    PhoneNumber,
    Email,
    PreferredContact
FROM Customers
```

CustomersPhoneNumber EmailPreferredContact。 SELECT。

		PreferredContact
3347927472	william.jones@example.com	
2137921892	dmiller@example.net	
	richard0123@example.com	

[table_name].[column_name]

```
SELECT
    Customers.PhoneNumber,
    Customers.Email,
    Customers.PreferredContact,
    Orders.Id AS OrderId
FROM
    Customers
LEFT JOIN
    Orders ON Orders.CustomerId = Customers.Id
```

* AS OrderIdOrdersIdOrderId。 。

。 。 。 Customers cCustomers AS c。 cCustomersEmail c.Email。

```
SELECT
```

```
    c.PhoneNumber,
    c.Email,
    c.PreferredContact,
    o.Id AS OrderId
FROM
    Customers c
LEFT JOIN
    Orders o ON o.CustomerId = c.Id
```

SELECT

。

2IDID 。 。

。

SQL

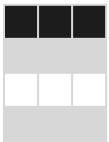
" SQL。

```
SELECT
    FName AS "First Name",
    MName AS "Middle Name",
    LName AS "Last Name"
FROM Employees
```

SQL

' " [] Microsoft SQL Server。

```
SELECT
    FName AS "First Name",
    MName AS 'Middle Name',
    LName AS [Last Name]
FROM Employees
```

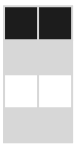


FNameLName。 AS。 。

```
SELECT
    FName "First Name",
    MName "Middle Name",
    LName "Last Name"
FROM Employees
```

AS◦

```
SELECT
    FName AS FirstName,
    LName AS LastName
FROM Employees
```



MS SQL Server`<alias> = <column-or-calculation>`

```
SELECT FullName = FirstName + ' ' + LastName,
       Addr1    = FullStreetAddress,
       Addr2    = TownName
FROM CustomerDetails
```

```
SELECT FirstName + ' ' + LastName As FullName
       FullStreetAddress          As Addr1,
       TownName                   As Addr2
FROM CustomerDetails
```

	1	ADDR2
	123 AnyStreet	TownVille
	668 MyRoad	
Michael Williams	999	Williamsburgh

=As◦ =◦

SQL

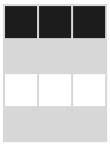
```
SELECT
    FName as "SELECT",
    MName as "FROM",
    LName as "WHERE"
FROM Employees
```

SQL

MSSQL

```
SELECT
```

```
    FName AS "SELECT",
    MName AS 'FROM',
    LName AS [WHERE]
FROM Employees
```



ORDER BY

```
SELECT
    FName AS FirstName,
    LName AS LastName
FROM
    Employees
ORDER BY
    LastName DESC
```

```
SELECT
    FName AS SELECT,
    LName AS FROM
FROM
    Employees
ORDER BY
    LastName DESC
```

SELECTFROM ◦

◦

```
SELECT * FROM Employees ORDER BY LName
```

Employees◦

ID	FName	LName	
2			2468101214
1			1234567890
3			1357911131

```
SELECT * FROM Employees ORDER BY LName DESC
```

```
 SELECT * FROM Employees ORDER BY LName ASC
```

◦

◦

```
SELECT * FROM Employees ORDER BY LName ASC, FName ASC
```

LNameLName LNameFName。 。

ORDER BY。 1。

```
SELECT Id, FName, LName, PhoneNumber FROM Employees ORDER BY 3
```

ORDER BYCASE。

```
SELECT Id, FName, LName, PhoneNumber FROM Employees ORDER BY CASE WHEN LName='Jones` THEN 0
ELSE 1 END ASC
```

LName“Jones”。

SQL

```
SELECT
    "ORDER",
    ID
FROM ORDERS
```

。

DBMS。 SQL Server

```
SELECT
    [Order],
    ID
FROM ORDERS
```

MySQLMariaDB

```
SELECT
    `Order`,
    id
FROM orders
```

SQL 2008FETCH FIRST。

```
SELECT Id, ProductName, UnitPrice, Package
FROM Product
ORDER BY UnitPrice DESC
FETCH FIRST 10 ROWS ONLY
```

RDMS。 。 OpenEdge 11.xFETCH FIRST <n> ROWS ONLY。

FETCH FIRST <n> ROWS ONLYOFFSET <m> ROWS。

```
SELECT Id, ProductName, UnitPrice, Package
FROM Product
ORDER BY UnitPrice DESC
OFFSET 5 ROWS
FETCH FIRST 10 ROWS ONLY
```

SQL ServerMS Access

```
SELECT TOP 10 Id, ProductName, UnitPrice, Package
FROM Product
ORDER BY UnitPrice DESC
```

MySQLPostgreSQL`LIMIT`

```
SELECT Id, ProductName, UnitPrice, Package
FROM Product
ORDER BY UnitPrice DESC
LIMIT 10
```

Oracle`ROWNUM`

```
SELECT Id, ProductName, UnitPrice, Package
FROM Product
WHERE ROWNUM <= 10
ORDER BY UnitPrice DESC
```

10。

```
Id    ProductName               UnitPrice             Package
38    Côte de Blaye             263.50                12 - 75 cl bottles
29    Thüringer Rostbratwurst   123.79                50 bags x 30 sausgs.
9    Mishi Kobe Niku            97.00                 18 - 500 g pkgs.
20    Sir Rodney's Marmalade    81.00                 30 gift boxes
18    Carnarvon Tigers          62.50                 16 kg pkg.
59    Raclette Courdavault      55.00                 5 kg pkg.
51    Manjimup Dried Apples     53.00                 50 - 300 g pkgs.
62    Tarte au sucre            49.30                 48 pies
43    Ipoh Coffee               46.00                 16 - 500 g tins
28    Rössle Sauerkraut         45.60                 25 - 825 g cans
```

Microsoft SQL`TOPWHEREROWNUMWHERE`。

```
SELECT e.Fname, e.LName
FROM Employees e
```

Employees“e”。。

```
SELECT e.Fname, e.LName, m.Fname AS ManagerFirstName
FROM Employees e
    JOIN Managers m ON e.ManagerId = m.Id
```

。

```
SELECT e.Fname, Employees.LName, m.Fname AS ManagerFirstName
FROM Employees e
JOIN Managers m ON e.ManagerId = m.Id
```

。

- '' - SQL`INNER JOIN`。 1992SQL`NATURAL JOIN` mySQLPostgreSQLOracleSQL Server。 `IdManagerId LName FName`

```
SELECT Fname, LName, ManagerFirstName
FROM Employees
     NATURAL JOIN
     ( SELECT Id AS ManagerId, Fname AS ManagerFirstName
       FROM Managers ) m;
```

dervied/SQL。

```
SELECT *
FROM
    table1,
    table2
```

```
SELECT
    table1.column1,
    table1.column2,
    table2.column1
FROM
    table1,
    table2
```

SQL

。

。

`AVG()`。

```
SELECT AVG(Salary) FROM Employees
```

where。

```
SELECT AVG(Salary) FROM Employees where DepartmentId = 1
```

group by。

。

```
SELECT AVG(Salary) FROM Employees GROUP BY DepartmentId
```

MIN()。

```
SELECT MIN(Salary) FROM Employees
```

MAX()。

```
SELECT MAX(Salary) FROM Employees
```

COUNT()。

```
SELECT Count(*) FROM Employees
```

where。

```
SELECT Count(*) FROM Employees where ManagerId IS NOT NULL
```

。 NULL。

```
Select Count(ManagerId) from Employees
```

Countdistinct。

```
Select Count(DISTINCT DepartmentId) from Employees
```

SUM()。

```
SELECT SUM(Salary) FROM Employees
```

null

```
SELECT Name FROM Customers WHERE PhoneNumber IS NULL
```

null。 = IS NULLIS NOT NULL 。

CASE

“”CASE。

```
SELECT CASE WHEN Col1 < 50 THEN 'under' ELSE 'over' END threshold
FROM TableName
```

```
SELECT
    CASE WHEN Col1 < 50 THEN 'under'
```

```
         WHEN Col1 > 50 AND Col1 <100 THEN 'between'
         ELSE 'over'
    END threshold
FROM TableName
```

CASECASE

```
SELECT
    CASE WHEN Col1 < 50 THEN 'under'
         ELSE
            CASE WHEN Col1 > 50 AND Col1 <100 THEN Col1
            ELSE 'over' END
    END threshold
FROM TableName
```

LOCK。

SQL Server

```
SELECT * FROM TableName WITH (nolock)
```

MySQL

```
SET SESSION TRANSACTION ISOLATION LEVEL READ UNCOMMITTED;
SELECT * FROM TableName;
SET SESSION TRANSACTION ISOLATION LEVEL REPEATABLE READ;
```

```
SET TRANSACTION ISOLATION LEVEL READ UNCOMMITTED;
SELECT * FROM TableName;
```

DB2

```
SELECT * FROM TableName WITH UR;
```

UR“”。

。

```
SELECT DISTINCT ContinentCode
FROM Countries;
```

CountriesContinentCodeDISTINCT

ContinentCode
OC

ContinentCode
NA
AF

SQLFiddle

```
SELECT * FROM Cars  WHERE status IN ( 'Waiting', 'Working' )
```

```
SELECT * FROM Cars  WHERE ( status = 'Waiting' OR status = 'Working' )
```

value IN (<value list>)OR ◦

```
SELECT category, COUNT(*) AS item_count
FROM item
GROUP BY category;
```

```
SELECT department, AVG(income)
FROM employees
GROUP BY department;
```

GROUP BY ◦

WHEREGROUP BYWHERE

```
SELECT department, AVG(income)
FROM employees
WHERE department <> 'ACCOUNTING'
GROUP BY department;
```

1000HAVING

```
SELECT department, AVG(income)
FROM employees
WHERE department <> 'ACCOUNTING'
GROUP BY department
HAVING avg(income) > 1000;
```

1◦

AND◦

18		
	21	

22		
	23	F

```
SELECT name FROM persons WHERE gender = 'M' AND age > 20;
```

OR

```
SELECT name FROM persons WHERE gender = 'M' OR age < 20;
```

```
SELECT name
FROM persons
WHERE (gender = 'M' AND age < 20)
   OR (gender = 'F' AND age > 20);
```

https://riptutorial.com/zh-CN/sql/topic/222/

63: ...

GROUP BYSELECT◦ ◦ GROUP BYHAVING◦

- ... {

  | ROLLUP<group_by_expression> [... n]
  | CUBE<group_by_expression> [... n]
  |[... n]
  | -
  }[...]

- <group_by_expression> :: =

  | column-expression [... n]

- <grouping_set> :: =
  -
  | <grouping_set_item>
  | <grouping_set_item> [... n]

- <grouping_set_item> :: =
  <group_by_expression>
  | ROLLUP<group_by_expression> [... n]
  | CUBE<group_by_expression> [... n]

Examples

GROUP BY

◦

“Westerosians”

	GreatHouseAllegience
Cercei	
Myrcella	
Sansa	

GROUP BYCOUNT

```
SELECT Count(*) Number_of_Westerosians
FROM Westerosians
```

...

Number_of_Westerosians
6

GROUP BYGreat House

```
SELECT GreatHouseAllegience House, Count(*) Number_of_Westerosians
FROM Westerosians
GROUP BY GreatHouseAllegience
```

...

	Number_of_Westerosians
	3
	1
	2

GROUP BYORDER BY

```
SELECT GreatHouseAllegience House, Count(*) Number_of_Westerosians
FROM Westerosians
GROUP BY GreatHouseAllegience
ORDER BY Number_of_Westerosians Desc
```

...

	Number_of_Westerosians
	3
	2
	1

HAVINGGROUP BY

HAVINGGROUP BY。Library。

。

```
SELECT
  a.Id,
  a.Name,
  COUNT(*) BooksWritten
FROM BooksAuthors ba
  INNER JOIN Authors a ON a.id = ba.authorid
GROUP BY
  a.Id,
  a.Name
HAVING COUNT(*) > 1    -- equals to HAVING BooksWritten > 1
;
```

。

```
SELECT
  b.Id,
  b.Title,
  COUNT(*) NumberOfAuthors
FROM BooksAuthors ba
  INNER JOIN Books b ON b.id = ba.bookid
GROUP BY
  b.Id,
  b.Title
HAVING COUNT(*) > 3    -- equals to HAVING NumberOfAuthors > 3
;
```

GROUP BY

GROUP BY“”。

```
SELECT EmpID, SUM (MonthlySalary)
FROM Employee
GROUP BY EmpID
```

“ EmpIDMonthlySalary”

```
+-----+-------------+
|EmpID|MonthlySalary|
+-----+-------------+
|1    |200          |
+-----+-------------+
|2    |300          |
+-----+-------------+
```

```
+-+---+
|1|200|
+-+---+
|2|300|
+-+---+
```

Sum。

```
+-----+-------------+
|EmpID|MonthlySalary|
```

```
+-----+-------------+
|1    |200          |
+-----+-------------+
|1    |300          |
+-----+-------------+
|2    |300          |
+-----+-------------+
```

```
+-+---+
|1|500|
+-+---+
|2|300|
+-+---+
```

EmpID 1。

ROLAP

SQL。“ALL”。

- `with data cube` 。
- `with roll up` 。

SQL1999,2003,2006,2008,2011。

	Brand1	100
	Brand2	250
	Brand2	300

```
select Food,Brand,Total_amount
from Table
group by Food,Brand,Total_amount with cube
```

	Brand1	100
	Brand2	250
		350
	Brand2	300
		300
	Brand1	100
	Brand2	550

		650

```
select Food,Brand,Total_amount
from Table
group by Food,Brand,Total_amount with roll up
```

	Brand1	100
	Brand2	250
	Brand2	300
		350
		300
		650

... https://riptutorial.com/zh-CN/sql/topic/627/---

64:

EXCEPTEXCEPT。

Examples

```
--dataset schemas must be identical
SELECT 'Data1' as 'Column' UNION ALL
SELECT 'Data2' as 'Column' UNION ALL
SELECT 'Data3' as 'Column' UNION ALL
SELECT 'Data4' as 'Column' UNION ALL
SELECT 'Data5' as 'Column'
EXCEPT
SELECT 'Data3' as 'Column'
--Returns Data1, Data2, Data4, and Data5
```

https://riptutorial.com/zh-CN/sql/topic/4082/

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