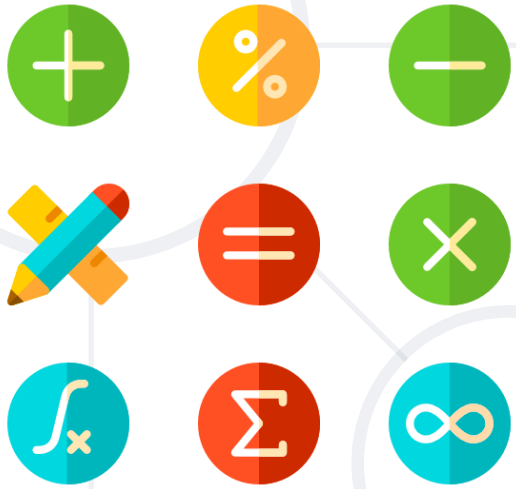
Built-in Functions

Math and Text Functions in SQL Server



SoftUni Team

Technical Trainers

Software University

SoftUni

Software University

https://softuni.bg

Table of Contents

1. Function Overview
2. String Functions
3. Math Functions

Overview

SQL Functions

- **Aggregate functions**
  - It perform a calculation on a set of values and return a single value
  - Examples: AVG, COUNT, MIN, MAX, SUM
- **Analytic functions**
  - It compute an aggregate value based on a group of rows
  - Unlike aggregate functions, analytic functions can return multiple rows for each group

```
PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY Salary DESC)
OVER (PARTITION BY DepartmentId) AS MedianCont
```

SQL Functions

- **Ranking functions**
  - Returns a ranking value for each row in a partition
  - RANK, ROW_NUMBER, DENSE_RANK, NTILE (OVER)
- **Rowset functions**
  - Returns an object that can be used like table references in an statement
  - OPENDATASOURCE, OPENJSON, OPENXML, OPENROWSET
- **Scalar functions**
  - Operate on a single value and then return a single value. Scalar functions can be used wherever an expression is valid

String Functions

String Functions (1)

- **Concatenation** – combines strings

```
SELECT FirstName + ' ' + LastName
    AS [Full Name]
  FROM Employee
```

```
SELECT CONCAT(FirstName, ' ', LastName)
    AS [Full Name]
  FROM Employee
```

- **CONCAT** replaces **NULL** values with **empty string**
- **CONCAT_WS** combines strings with separator

String Functions (2)

- **SUBSTRING** – extracts a part of a string

```
SUBSTRING(String, StartIndex, Length)
```

```
SUBSTRING('SoftUni', 5, 3)
```

```
Uni
```

- Example: get short **summary** of an article

```
SELECT ArticleId, Author, Content,
       SUBSTRING(Content, 1, 200) + '...' AS Summary
  FROM Articles
```

String Functions (3)

- **REPLACE** – replaces a specific string with another

```
REPLACE(String, Pattern, Replacement)
```

```
REPLACE('SoftUni', 'Soft', 'Hard')
```

```
HardUni
```

- Example: **censor** the word blood from album names

```
SELECT REPLACE(Title, 'blood', '*****’)
 AS Title
FROM Album
```

String Functions (4)

- **LTRIM** & **RTRIM** – remove spaces from either side of string

```
LTRIM(String)
```

```
RTRIM(String)
```

- **LEN** – counts the number of characters

```
LEN(String)
```

- **DATALENGTH** – gets the number of used bytes

```
DATALENGTH(String)
```

String Functions (5)

- **LEFT** & **RIGHT** – get characters from the beginning or the end of a string

```
LEFT(String, Count)
```

```
RIGHT(String, Count)
```

- Example: name **shortened** (first 3 letters)

```
SELECT Id, Start,
       LEFT(Name, 3) AS Shortened
  FROM Games
```

String Functions (6)

- **LOWER** & **UPPER** – change letter casing

```
LOWER(String)
```

```
UPPER(String)
```

- **REVERSE** – reverses order of all characters in a string

```
REVERSE(String)
```

- **REPLICATE** – repeats a string

```
REPLICATE(String, Count)
```

- **FORMAT** – format a value with a valid .NET format string

```
FORMAT(SomeDate, 'yyyy-MMMM-dd', 'bg-BG')
```

Problem: Obfuscate CC Numbers

- Our database contains credit card details for customers
- Provide a summary without revealing the serial numbers

ID	FirstName	LastName	PaymentNumber
1	Guy	Gilbert	5645322227179083
2	Kevin	Brown	4417937746396076
…	…		…

ID	FirstName	LastName	PaymentNumber
1	Guy	Gilbert	564532**********
2	Kevin	Brown	441793**********
…	…		…

Solution : Obfuscate CC Numbers

- We reveal the first 6 digits and obfuscate the rest

```
SELECT CustomerID,
       FirstName,
       LastName,
       LEFT(PaymentNumber, 6) + '**********'
  FROM Customers
```

- Bonus – create a View for the use of clients

```
CREATE VIEW v_PublicPaymentInfo AS
…
```

String Functions (7)

- **CHARINDEX** – locates a specific pattern (substring) in a string

Optional, begins at 1

```
CHARINDEX(Pattern, String, [StartIndex])
```

- **STUFF** – inserts a substring at a specific position

```
STUFF(String, StartIndex, Length, Substring)
```

Number of chars to delete

Arithmetic, PI, ABS, ROUND, Etc.

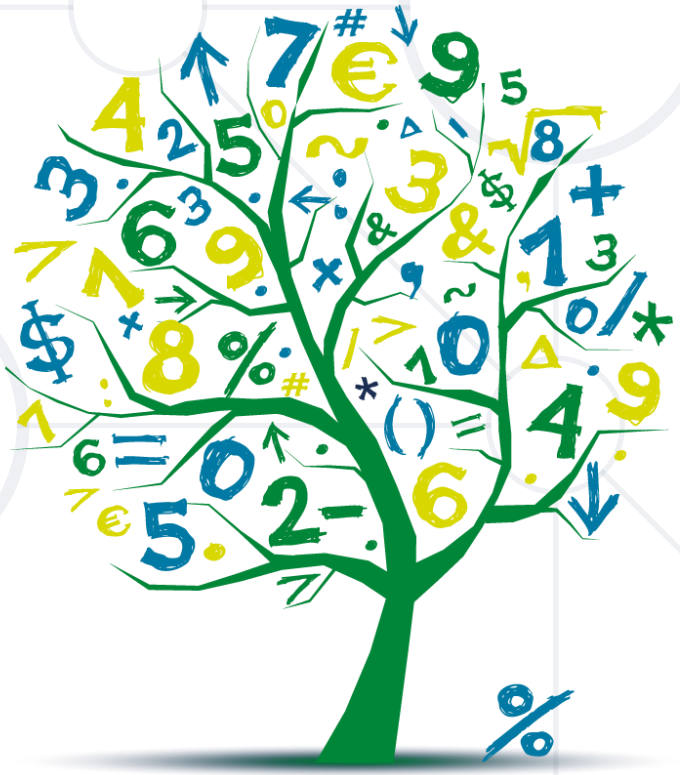
Math Functions (1)

- SQL Server supports **basic arithmetic operations**
- Example: find the area of triangles by the given side and height

Id	A	H
1	2	4
2	1	18
3	4.5	3
4	8	12

Id	Area
1	4
2	9
3	6.75
4	48

```
SELECT Id,
       (A*H)/2 AS Area
  FROM Triangles
```



Math Functions (2)

- **PI** – gets the value of Pi as a float (15 –digit precision)

```
SELECT PI() --3.14159265358979
```

- **ABS** – absolute value

```
ABS(Value)
```

- **SQRT** – square root (the result will be float)

```
SQRT(Value)
```

- **SQUARE** – raise to power of two

```
SQUARE(Value)
```

Example: Line Length

- Find the length of a line by given coordinates of the end points

Id	X1	Y1	X2	Y2
1	0	0	10	0
2	0	0	5	3
4	-1	5	8	-3
5	18	23	8882	134

Id	Length
1	10
2	5.8309518948453
4	12.0415945787923
5	8864.69497501183

```
SELECT Id,
       SQRT(SQUARE(X1-X2) + SQUARE(Y1-Y2))
    AS Length
  FROM Lines
```

Math Functions (3)

- **POWER** – raises value to the desired exponent

```
POWER(Value, Exponent)
```

- **ROUND** – obtains the desired precision
  - Negative precision rounds characters before the decimal point

```
ROUND(Value, Precision)
```

- **FLOOR** & **CEILING** – return the nearest integer

```
FLOOR(Value)
```

```
CEILING(Value)
```

Problem: Pallets

- Calculate the required number of pallets to ship each item
  - **BoxCapacity** specifies how many items can fit in one box
  - **PalletCapacity** specifies how many boxes can fit in a pallet

Id	Name	Quantity	BoxCapacity	PalletCapacity
1	Perlenbacher 500ml	108	6	18
2	Perlenbacher 500ml	10	6	18
3	Chocolate Chips	350	24	3
4	Oil Pump	100	1	12

Number of pallets
1
1
5
9

Solution: Pallets

- Since we can't use half a box or half a pallet, we need to round up to the nearest integer value

```
SELECT
  CEILING(
    CEILING(
      CAST(Quantity AS float) /
      BoxCapacity) / PalletCapacity)
    AS [Number of pallets]
  FROM Products
```

Math Functions (4)

- **SIGN** – returns 1, -1 or 0, depending on the value of the sign

```
SIGN(Value)
```

- **RAND** – gets a random float value in the range [0, 1]
  - If Seed is not specified, it will be assigned randomly

```
RAND()
```

```
RAND(Seed)
```

Summary

- Various **built-in functions**
- String functions - **CONCAT**, **LEFT**/**RIGHT**, **REPLACE**, etc.
- Math functions - **PI**, **ABS**, **POWER**, **ROUND**, etc.

Questions?

SoftUni

Software University

SoftUni Svetlina

SoftUni Creative

SoftUni Digital

SoftUni Foundation

SoftUni Kids

License

- This course (slides, examples, demos, exercises, homework, documents, videos and other assets) is **copyrighted content**
- Unauthorized copy, reproduction or use is illegal
- © SoftUni – https://softuni.org
- © Software University – https://softuni.bg

Trainings @ Software University (SoftUni)

- Software University – High-Quality Education, Profession and Job for Software Developers
  - softuni.bg, softuni.org
- Software University Foundation
  - softuni.foundation
- Software University @ Facebook
  - facebook.com/SoftwareUniversity
- Software University Forums
  - forum.softuni.bg