

Functions

Data that is stored in your database tables is often not in the exact format needed by your applications. We will be using functions to help us get our data exactly how we want it.

A function is something that will ...

take input and processes it in some way and based on the input and what the function does ...

it produces an output. So for us and our data we will be inputting data into a function that will produce the desired output.

So again, functions are operations that, when performed on data, will manipulate or convert it in some way. Functions take one or more parameters as input. These parameters could represent the data and ways to manipulate it. Then output will be returned.

For example, say you need to show a whole number in your application but your data has decimal places. This function called ROUND will round the number to the nearest digit you specify. It takes two parameters in the parenthesis following the function name. Each parameter is separated by a comma. In this function, the first parameter is the data to be manipulated 12.39 and then another parameter that specifies zero decimal places,...

then the result of the converted data using the ROUND function ...

would be 12. Be aware that the returning data from the function also has a data type and can be treated like any other data of that data type whether it's a number, string, date, etc. Sometimes not only is the data manipulated and changed but the data type as well.

Different DBMS systems support different functions so some functions are not portable across systems. Many of these same types of functions can also be performed later in the programming and development of the application that presents the data to the user. Some developers opt to manipulate or convert the data after it is queried and the data is out of the database and part of the output of the application. Then at that point they will use a different programming language to run functions to convert or manipulate the data. This is an option but it's a matter of realizing what is the best interest of application performance. If the conversion is something the database could do more efficiently you will want to consider converting it as part of the database back-end processing. If that is the choice you choose then these functions will come in handy as you code your queries. We won't cover all the functions that are available but some of the common ones.

String Functions are among the most used functions. Strings refer to characters or text. Sometimes we want to format the strings or manipulate it or find parts of the text. String functions can help with that.

For example we might want to take column values from two different tables and six different attributes and combine them together and, in this case, make them upper case, while we are at it, for mailing labels for example.

Maybe we want a number to look more like currency with commas and dollar signs so we can use functions to add those to the number.

Maybe we want to know the length of different text . String functions also allow us to find out the length of text or how many characters are in the text.

Or search for certain text or characters inside other text.

Let's look at concatenation where we can combine values together by appending them to each other to form a single longer value.

For example maybe we want to take the first and last name in our database and list them on a report together. We can use the CONCAT function with the parameters being each value that we want to combine. The result of a CONCAT will always be a string no matter what data is combined together. You could concatenate a string and a date and an integer, but the result will always be a string.

Or something like this. here again column names are being used the string values surrounded by quotation marks as the parameters. The first name value combined with a string in quotes of a space and 'was born on' another space and then combined with the dob value to give us "Sue was born on 1996-12-30".

The upper and lower functions will take any string and convert all the letters to uppercase or to lower case. If we had last name of Jones. (capital J and lowercase ones), it would be converted to all uppercase with UPPER and all lower case with LOWER.

The length function will find the length in characters of any string. So if you need to find the length of a password value that was stored in the database for example you could use the length function. If the password attribute had the value mypw43! as the password then it is 7 characters long so 7 is returned.

The Substring function will return part of a string from another string. For example say you just need the first three numbers of the last four digits of their social security number. So with this SSN the last four are 1234 and you want just the 123 of that 1234. You could use the substring function with three parameters: first the string to be searched then the start position and then the length of characters returned. So we start at the 8th character in (that includes dashes as characters) and return three characters in length.

Numeric functions operate over a single value and return a single value. Don't confuse these functions with aggregate functions that take a whole set of values and perform a calculation. These are just taking one single value as the parameter.

For example again, the round function will round a number to the nearest whole number. The ceiling function will round to the next highest whole number regardless of decimal amount. So 12.2 becomes 13. The floor function will get the next lower whole number regardless of decimal amount. So 12.8 would become 12.

And abs function gets the absolute value of the number and the sqrt will get the square root of the number.

The Date functions and the Time functions are implemented differently by different database management vendors. So you might see other ways to do similar things depending on what system you are using. Here are some common date functions.

If you had a date of December 20th 1999 and it was the dob or date of birth attribute value. If you used the YEAR function with dob as the parameter, it would return only the four digit year from the entire date. Similarly MONTH and DAY will extract the two-digit month code and number of the day.

The NOW function returns the current local date and time from your system's clock.

You could return a date plus a specific interval such as months, years or in this case days using the DATE_ADD function. A date would be returned that is 30 past the invoice_date.

You could use the DATEDIFF function that takes two dates as parameters, it returns the difference in days between two dates. In our case it's today's date and a date of birth. Again this will return in number of day and if you wanted the difference in years, you would have to divide it by 365 days.

Since the only way for a database to recognize a date is with the format of yyyy-mm-dd then it is nice to be able to format the date in different ways.

The DATE_FORMAT function returns a formatted string from a date value. With DATE_FORMAT there are two parameters, the date you are formatting, and then the format string, which contains codes used for how you want the date to be formatted. There are quite a few codes that you can include in the format string, but, we are only using a few here. So again if you had the dob (date of birth) as December 20th 1999, then DATE_FORMAT with the parameters of the date as the first parameter and then the second parameter of how you wanted to format it would; in this case the month name represented as %M, the two digit day of the month represented as %d and the 4-digit year presented as %Y.

Then you would get the following formatted string returned.

There are many other functions that we did not cover. We just saw some of the more common ones. Remember it's all about 'give and take'; functions receive parameters based on data type and return results based on data types. Raw data input being processed in the function and becoming the output we need in our applications.

Also, remember there are two general types of functions. The ones we just covered are referred to as scalar functions; which operate on individual values or rows one at a time. There are also aggregate functions that operate on sets of rows or whole tables of rows at a time. We cover those in a different lesson.