While it is very much possible to first fetch data from a database and then perform operations on it, most databases come with built-in functions to allow you to perform operations on data right within the database.

Using Database functions can significantly reduce the amount of data that needs to be retrieved from the database (reduces network traffic and use of bandwidth) and may also be faster. (It is also possible to create your own functions in the database but that is beyond the scope of this course).

Lets consider the following PETSALE table in a database:

PETSALE

ID INTEGER	ANIMAL VARCHAR(20)	QUANTITY INTEGER	SALEPRICE DECIMAL(6, 2)	SALEDATE DATE
1	Cat	9	450.09	2018-05-29
2	Dog	3	666.66	2018-06-01
3	Dog	1	100.00	2018-06-04
4	Parrot	2	50.00	2018-06-04
5	Dog	1	75.75	2018-06-10
6	Hamster	6	60.60	2018-06-11
7	Cat	1	44.44	2018-06-11
8	Goldfish	24	48.48	2018-06-14
9	Dog	2	222.22	2018-06-15

Aggregate or Column Functions

An aggregate function takes a collection of like values (such as all of the values in a column) as input and returns a single value (or NULL). Examples of aggregate functions include SUM(), MIN(), MAX(), AVG(), etc. Lets look at some examples based on the PETSALE table above.

1. Add up all the values in the SALEPRICE column:

select SUM(SALEPRICE) from PETSALE

2. Now explicitly name the output column SUM_OF_SALEPRICE :

select SUM(SALEPRICE) as SUM_OF_SALEPRICE from PETSALE

3. Maximum QUANTITY of any ANIMAL sold:

select MAX(QUANTITY) from PETSALE

4. Average value of SALEPRICE :

select AVG(SALEPRICE) from PETSALE

5. Average SALEPRICE per 'Dog' :

select AVG(SALEPRICE / QUANTITY) from PETSALE where ANIMAL = 'Dog'

Notice above that we can perform mathematical operations between columns. In this case the SALEPRICE is for multiple units so we first divide the SALEPRICE by the QUANTITY of the sale.

SCALAR and STRING FUNCTIONS

Scalar functions perform operation on individual values.

6. Round UP/DOWN every value in SALEPRICE column to nearest integer:

select ROUND(SALEPRICE) from PETSALE

There is a class of Scalar functions that can be used for operations on string (CHAR and VARCHAR) values:

7. Retrieve the length of each value in ANIMAL column:

select LENGTH(ANIMAL) from PETSALE

8. Retrieve the ANIMAL column values in UPPERCASE format:

select UCASE(ANIMAL) from PETSALE

9. Use the function in a WHERE clause:

*select * from PETSALE where LCASE(ANIMAL) = 'cat'*

The above is useful if you are not sure whether the values are stored in upper, lower or mixed case.

10. Use DISTINCT() function to get unique values:

select DISTINCT(UCASE(ANIMAL)) from PETSALE

(OPTIONAL) Date, Time functions

Most databases contain special datatypes for dates and times. Db2 contains DATE, TIME, and TIMESTAMP types:

DATE has 8 digits: YYYYMMDD

TIME has six digits: HHMMSS

TIMESTAMP has 20 digits: YYYYXXDDHHMMSSZZZZZZ where XX represents month and ZZZZZZ represents microseconds.

Functions exist to extract the DAY, MONTH, DAYOFMONTH, DAYOFWEEK, DAYOFYEAR, WEEK, HOUR, MINUTE, SECOND.

11. Extract the DAY portion from a date:

select DAY(SALEDATE) from PETSALE where ANIMAL = 'Cat'

12. Get the number of sales during the month of may (i.e. month 5):

select COUNT(*) from PETSALE where MONTH(SALEDATE)='05'

You can also perform DATE or TIME arithmetic.

13. What date is it 3 days after each saledate [maybe you want to know this because the order needs to be processed with 3 days]:

select (SALEDATE + 3 DAYS) from PETSALE

Special registers CURRENT TIME and CURRENT DATE are also available:

14. Find how many days have passed since each SALEDATE till now:

select (CURRENT DATE - SALEDATE) from PETSALE