7 SELECT

The SELECT statement is probably the most used SQL command. The SELECT statement is used for retrieving rows from the database and enables the selection of one or many rows or columns from one or many tables in the database.

We will use the CUSTOMER table as an example.

The CUSTOMER table has the following columns:

Column Name	Data Type	Allow Nulls
CustomerId	int	☐
CustomerNumber	varchar(20)	☐
LastName	varchar(50)	☐
FirstName	varchar(50)	☐
AreaCode	int	☑
Address	varchar(50)	☑
Phone	varchar(20)	☑

The CUSTOMER table contains the following data:

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222
3	3	1002	Johnsen	John	32	London	33333333

Example:

```
select * from CUSTOMER
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222
3	3	1002	Johnsen	John	32	London	33333333

This simple example gets all the data in the table CUSTOMER. The symbol “*” is used when you want to get all the columns in the table.

If you only want a few columns, you may specify the names of the columns you want to retrieve, example:

```
select CustomerId, LastName, FirstName from CUSTOMER
```

	CustomerId	LastName	FirstName
1	1	Smith	John
2	2	Jackson	Smith
3	3	Johnsen	John

So in the simplest form we can use the SELECT statement as follows:

```
select <column_names> from <table_names>
```

If we want all columns, we use the symbol "*"

Note! SQL is not case sensitive. SELECT is the same as select.

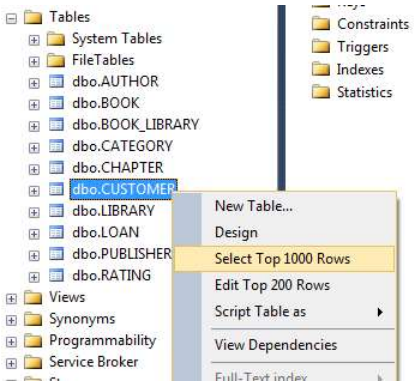
The full syntax of the SELECT statement is complex, but the main clauses can be summarized as:

```
SELECT
[ ALL | DISTINCT ]
    [TOP ( expression ) [PERCENT] [ WITH TIES ] ]
select_list [ INTO new_table ]
[ FROM table_source ] [ WHERE search_condition ]
[ GROUP BY group_by_expression ]
[ HAVING search_condition ]
[ ORDER BY order_expression [ ASC | DESC ] ]
```

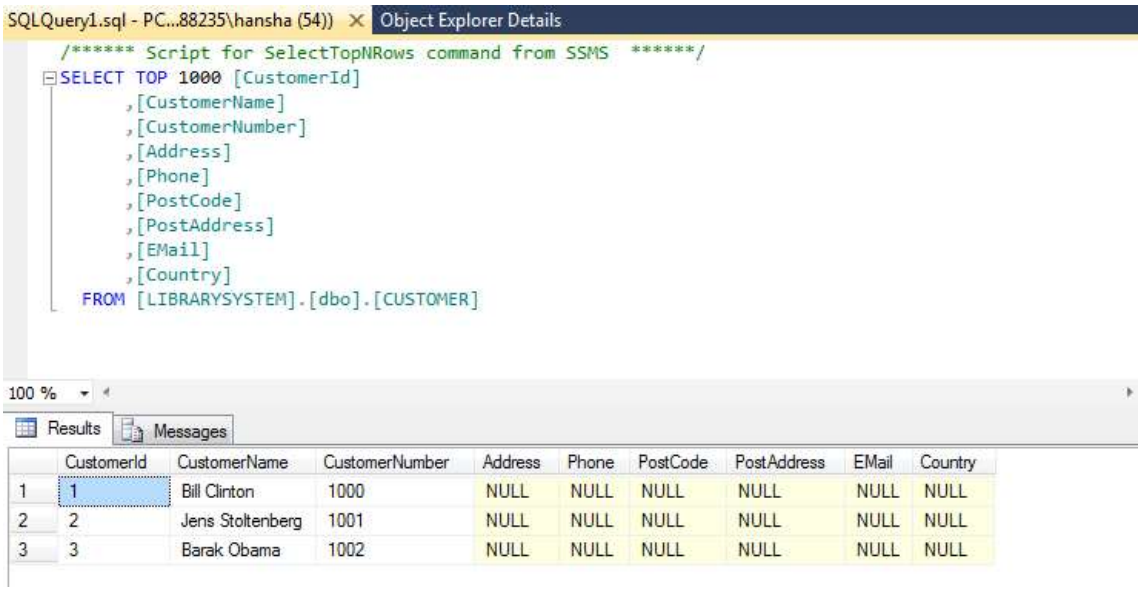
It seems complex, but we will take the different parts step by step in the next sections.

Select Data in the Designer Tools:

Right-click on a table and select "Select Top 1000 Rows":



The following will appear:



	CustomerId	CustomerName	CustomerNumber	Address	Phone	PostCode	PostAddress	EMail	Country
1	1	Bill Clinton	1000	NULL	NULL	NULL	NULL	NULL	NULL
2	2	Jens Stoltenberg	1001	NULL	NULL	NULL	NULL	NULL	NULL
3	3	Barak Obama	1002	NULL	NULL	NULL	NULL	NULL	NULL

A Select query is automatically created for you which you can edit if you want to.

7.1 The ORDER BY Keyword

If you want the data to appear in a specific order you need to use the “order by” keyword.

Example:

```
select * from CUSTOMER order by LastName
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222
2	3	1002	Johnsen	John	32	London	33333333
3	1	1000	Smith	John	12	California	11111111

You may also sort by several columns, e.g. like this:

```
select * from CUSTOMER order by Address, LastName
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222
3	3	1002	Johnsen	John	32	London	33333333

If you use the “order by” keyword, the default order is ascending (“asc”). If you want the order to be opposite, i.e., descending, then you need to use the “desc” keyword.

```
select * from CUSTOMER order by LastName desc
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	3	1002	Johnsen	John	32	London	33333333
3	2	1001	Jackson	Smith	45	London	22222222

7.2 SELECT DISTINCT

In a table, some of the columns may contain duplicate values. This is not a problem, however, sometimes you will want to list only the different (distinct) values in a table.

The DISTINCT keyword can be used to return only distinct (different) values.

The syntax is as follows:

```
select distinct <column_names> from <table_names>
```

Example:

```
select distinct FirstName from CUSTOMER
```

	FirstName
1	John
2	Smith

7.3 The WHERE Clause

The WHERE clause is used to extract only those records that fulfill a specified criterion.

The syntax is as follows:

```
select <column_names>
from <table_name>
where <column_name> operator value
```

Example:

```
select * from CUSTOMER where CustomerNumber='1001'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222

Note! SQL uses single quotes around text values, as shown in the example above.

7.3.1 Operators

With the WHERE clause, the following operators can be used:

Operator	Description
=	Equal
<>	Not equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
BETWEEN	Between an inclusive range
LIKE	Search for a pattern
IN	If you know the exact value you want to return for at least one of the columns

Examples:

```
select * from CUSTOMER where AreaCode>30
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222
2	3	1002	Johnsen	John	32	London	33333333

7.3.2 LIKE Operator

The LIKE operator is used to search for a specified pattern in a column.

Syntax:

```
SELECT column_name(s)
FROM table_name
WHERE column_name LIKE pattern
```

Example:

```
select * from CUSTOMER where LastName like 'J%'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222
2	3	1002	Johnsen	John	32	London	33333333

Note! The "%" sign can be used to define wildcards (missing letters in the pattern) both before and after the pattern.

```
select * from CUSTOMER where LastName like '%a%'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222

You may also combine with the NOT keyword, example:

```
select * from CUSTOMER where LastName not like '%a%'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	3	1002	Johnsen	John	32	London	33333333

7.3.3 IN Operator

The IN operator allows you to specify multiple values in a WHERE clause.

Syntax:

```
SELECT column_name(s)
FROM table_name
WHERE column_name IN (value1,value2,...)
```

7.3.4 BETWEEN Operator

The BETWEEN operator selects a range of data between two values. The values can be numbers, text, or dates.

Syntax:

```
SELECT column_name(s)
FROM table_name
WHERE column_name
BETWEEN value1 AND value2
```

7.4 Wildcards

SQL wildcards can substitute for one or more characters when searching for data in a database.

Note! SQL wildcards must be used with the SQL LIKE operator.

With SQL, the following wildcards can be used:

Wildcard	Description
%	A substitute for zero or more characters
_	A substitute for exactly one character
[charlist]	Any single character in charlist
[^charlist] or [!charlist]	Any single character not in charlist

Examples:

```
SELECT * FROM CUSTOMER WHERE LastName LIKE 'J_cks_n'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	2	1001	Jackson	Smith	45	London	22222222

```
SELECT * FROM CUSTOMER WHERE CustomerNumber LIKE '[10]%'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222
3	3	1002	Johnsen	John	32	London	33333333

7.5 AND & OR Operators

The AND operator displays a record if both the first condition and the second condition is true.

The OR operator displays a record if either the first condition or the second condition is true.

Examples:

```
select * from CUSTOMER where LastName='Smith' and FirstName='John'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111

```
select * from CUSTOMER where LastName='Smith' or FirstName='John'
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	3	1002	Johnsen	John	32	London	33333333

Combining AND & OR:

You can also combine AND and OR (use parenthesis to form complex expressions).

Example:

```
select * from CUSTOMER
where LastName='Smith' and (FirstName='John' or FirstName='Smith')
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111

7.6 SELECT TOP Clause

The TOP clause is used to specify the number of records to return.

The TOP clause can be very useful on large tables with thousands of records. Returning a large number of records can impact on performance.

Syntax:

```
SELECT TOP number|percent column_name(s)
FROM table_name
```

Examples:

```
select TOP 1 * from CUSTOMER
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111

You can also specify in percent:

```
select TOP 60 percent * from CUSTOMER
```

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222

This is very useful for large tables with thousands of records

7.7 Alias

You can give a table or a column another name by using an alias. This can be a good thing to do if you have very long or complex table names or column names.

An alias name could be anything, but usually it is short.

SQL Alias Syntax for Tables:

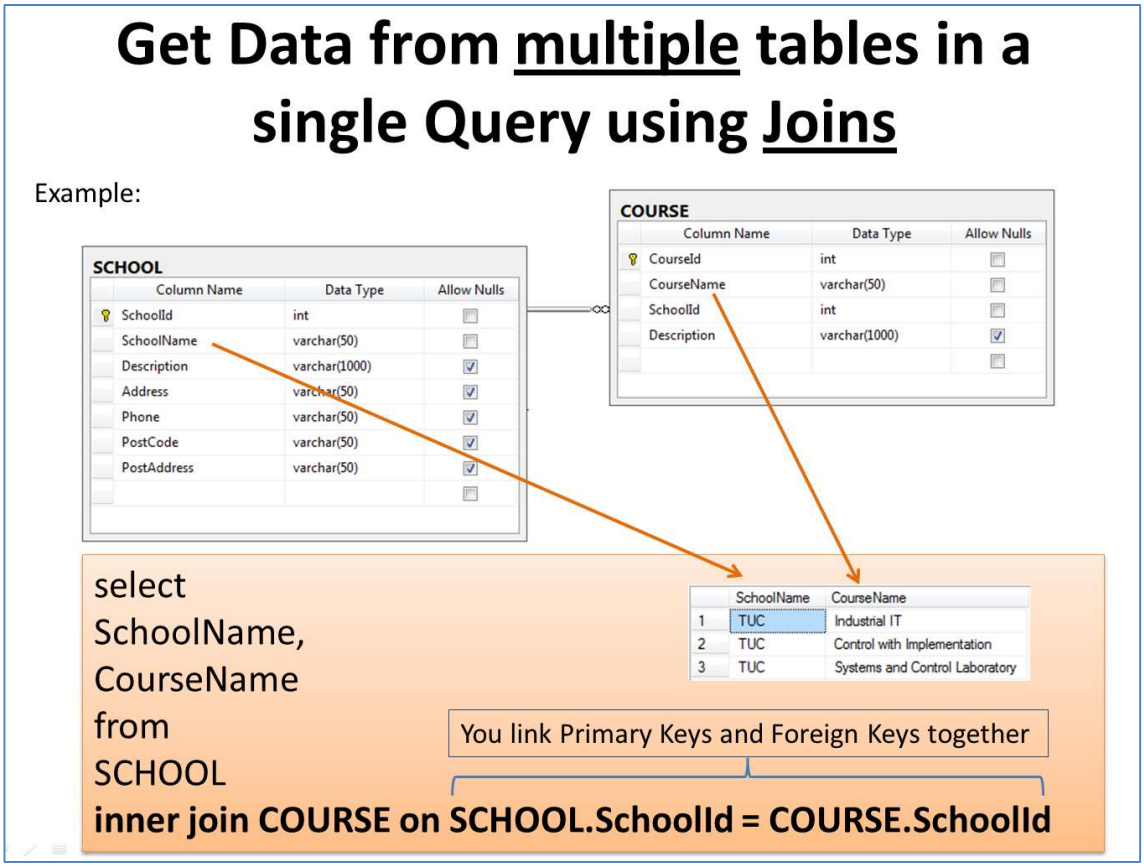
```
SELECT column_name(s)
FROM table_name
AS alias_name
```

SQL Alias Syntax for Columns:

```
SELECT column_name AS alias_name
FROM table_name
```

7.8 Joins

SQL joins are used to query data from two or more tables, based on a relationship between certain columns in these tables.



7.8.1 Different SQL JOINs

Before we continue with examples, we will list the types of JOIN you can use, and the differences between them.

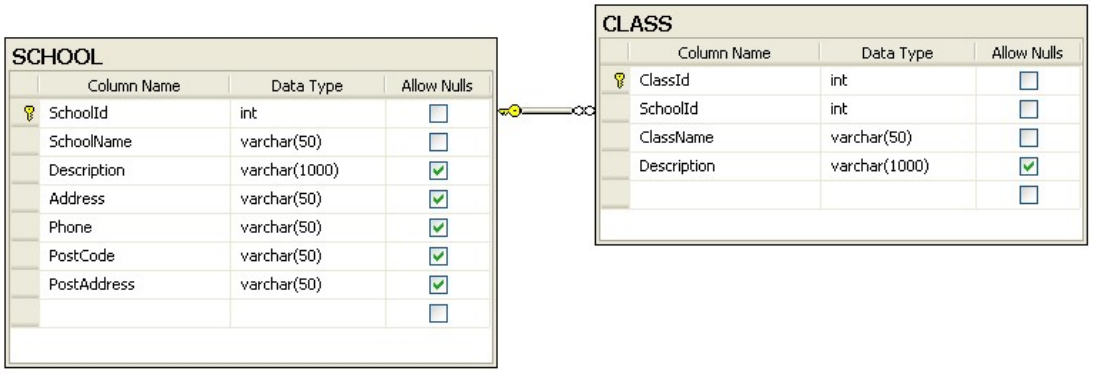
- JOIN: Return rows when there is at least one match in both tables
- LEFT JOIN: Return all rows from the left table, even if there are no matches in the right table
- RIGHT JOIN: Return all rows from the right table, even if there are no matches in the left table
- FULL JOIN: Return rows when there is a match in one of the tables

Example:

Given 2 tables:

- SCHOOL
- CLASS

The diagram is shown below:



We want to get the following information using a query:

SchoolName	ClassName
…	…
…	…

In order to get information from more than one table we need to use the JOIN. The JOIN is used to join the primary key in one table with the foreign key in another table.

```
select
SCHOOL.SchoolName,
CLASS.ClassName
from
SCHOOL
INNER JOIN CLASS ON SCHOOL.SchoolId = CLASS.SchoolId
```

	SchoolName	ClassName
1	TUC	SCE1
2	TUC	SCE2
3	TUC	PT1
4	TUC	PT2
5	NTNU	A1
6	NTNU	A2