

SQL UNIQUE Constraint

The UNIQUE constraint uniquely identifies each record in a database table.

The UNIQUE and PRIMARY KEY constraints both provide a guarantee for uniqueness for a column or set of columns.

A PRIMARY KEY constraint automatically has a UNIQUE constraint defined on it.

Note that you can have many UNIQUE constraints per table, but only one PRIMARY KEY constraint per table.

SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons
(
P_Id int NOT NULL UNIQUE,
LastName varchar(255) NOT NULL,
FirstName varchar(255),
Address varchar(255),
City varchar(255)
)
```

To allow naming of a UNIQUE constraint, and for defining a UNIQUE constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons
(
P_Id int NOT NULL,
LastName varchar(255) NOT NULL,
FirstName varchar(255),
Address varchar(255),
City varchar(255),
CONSTRAINT uc_PersonID UNIQUE (P_Id,LastName)
)
```

SQL UNIQUE Constraint on ALTER TABLE

To create a UNIQUE constraint on the "P_Id" column when the table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD UNIQUE (P_Id)
```

To allow naming of a UNIQUE constraint, and for defining a UNIQUE constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CONSTRAINT uc_PersonID UNIQUE (P_Id,LastName)
```

To DROP a UNIQUE Constraint

To drop a UNIQUE constraint, use the following SQL:

MySQL:

```
ALTER TABLE Persons
DROP INDEX uc_PersonID
```

SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
DROP CONSTRAINT uc_PersonID
```

SQL PRIMARY KEY Constraint

The PRIMARY KEY constraint uniquely identifies each record in a database table.
 Primary keys must contain unique values.
 A primary key column cannot contain NULL values.
 Each table should have a primary key, and each table can have only ONE primary key.

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons
(
P_Id int NOT NULL,
LastName varchar(255) NOT NULL,
FirstName varchar(255),
Address varchar(255),
City varchar(255),
CONSTRAINT pk_PersonID PRIMARY KEY (P_Id,LastName)
)
```

Note: In the example above there is only ONE PRIMARY KEY (pk_PersonID). However, the value of the pk_PersonID is made up of two columns (P_Id and LastName).

SQL PRIMARY KEY Constraint on ALTER TABLE

To create a PRIMARY KEY constraint on the "P_Id" column when the table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD PRIMARY KEY (P_Id)
```

To allow naming of a PRIMARY KEY constraint, and for defining a PRIMARY KEY constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CONSTRAINT pk_PersonID PRIMARY KEY (P_Id,LastName)
```

Note: If you use the ALTER TABLE statement to add a primary key, the primary key column(s) must already have been declared to not contain NULL values (when the table was first created).

To DROP a PRIMARY KEY Constraint

To drop a PRIMARY KEY constraint, use the following SQL:

MySQL:

```
ALTER TABLE Persons
DROP PRIMARY KEY
```

SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
DROP CONSTRAINT pk_PersonID
```

SQL FOREIGN KEY Constraint

A FOREIGN KEY in one table points to a PRIMARY KEY in another table.
 Let's illustrate the foreign key with an example. Look at the following two tables:
 The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

The "Orders" table:

O_Id	OrderNo	P_Id
1	77895	3
2	44678	3
3	22456	2
4	24562	1

Note that the "P_Id" column in the "Orders" table points to the "P_Id" column in the "Persons" table.

The "P_Id" column in the "Persons" table is the PRIMARY KEY in the "Persons" table.

The "P_Id" column in the "Orders" table is a FOREIGN KEY in the "Orders" table.

The FOREIGN KEY constraint is used to prevent actions that would destroy links between tables.

The FOREIGN KEY constraint also prevents that invalid data form being inserted into the foreign key column, because it has to be one of the values contained in the table it points to.

SQL FOREIGN KEY Constraint on CREATE TABLE

The following SQL creates a FOREIGN KEY on the "P_Id" column when the "Orders" table is created:

MySQL:

```
CREATE TABLE Orders
(
O_Id int NOT NULL,
OrderNo int NOT NULL,
P_Id int,
PRIMARY KEY (O_Id),
FOREIGN KEY (P_Id) REFERENCES Persons(P_Id)
)
```

SQL Server / Oracle / MS Access:

```
CREATE TABLE Orders
(
O_Id int NOT NULL PRIMARY KEY,
OrderNo int NOT NULL,
P_Id int FOREIGN KEY REFERENCES Persons(P_Id)
)
```

To allow naming of a FOREIGN KEY constraint, and for defining a FOREIGN KEY constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Orders
(
O_Id int NOT NULL,
OrderNo int NOT NULL,
P_Id int,
PRIMARY KEY (O_Id),
CONSTRAINT fk_PerOrders FOREIGN KEY (P_Id)
REFERENCES Persons(P_Id)
)
```

SQL FOREIGN KEY Constraint on ALTER TABLE

To create a FOREIGN KEY constraint on the "P_Id" column when the "Orders" table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Orders
ADD FOREIGN KEY (P_Id)
REFERENCES Persons(P_Id)
```

To allow naming of a FOREIGN KEY constraint, and for defining a FOREIGN KEY constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Orders
ADD CONSTRAINT fk_PerOrders
FOREIGN KEY (P_Id)
REFERENCES Persons(P_Id)
```

To DROP a FOREIGN KEY Constraint

To drop a FOREIGN KEY constraint, use the following SQL:

MySQL:

```
ALTER TABLE Orders
DROP FOREIGN KEY fk_PerOrders
```

SQL Server / Oracle / MS Access:

```
ALTER TABLE Orders
```

```
DROP CONSTRAINT fk_PerOrders
```

SQL CHECK Constraint

The CHECK constraint is used to limit the value range that can be placed in a column.

If you define a CHECK constraint on a single column it allows only certain values for this column.

If you define a CHECK constraint on a table it can limit the values in certain columns based on values in other columns in the row.

SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons
(
P_Id int NOT NULL CHECK (P_Id>0),
LastName varchar(255) NOT NULL,
FirstName varchar(255),
Address varchar(255),
City varchar(255)
)
```

To allow naming of a CHECK constraint, and for defining a CHECK constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons
(
P_Id int NOT NULL,
LastName varchar(255) NOT NULL,
FirstName varchar(255),
Address varchar(255),
City varchar(255),
CONSTRAINT chk_Person CHECK (P_Id>0 AND City='Sandnes')
)
```

SQL CHECK Constraint on ALTER TABLE

To create a CHECK constraint on the "P_Id" column when the table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CHECK (P_Id>0)
```

To allow naming of a CHECK constraint, and for defining a CHECK constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CONSTRAINT chk_Person CHECK (P_Id>0 AND City='Sandnes')
```

To DROP a CHECK Constraint

To drop a CHECK constraint, use the following SQL:

SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
DROP CONSTRAINT chk_Person
```

MySQL:

```
ALTER TABLE Persons
DROP CHECK chk_Person
```

The ORDER BY Keyword

The ORDER BY keyword is used to sort the result-set by a specified column.

The ORDER BY keyword sort the records in ascending order by default.

If you want to sort the records in a descending order, you can use the DESC keyword.

SQL ORDER BY Syntax

```
SELECT column_name(s)
FROM table_name
ORDER BY column_name(s) ASC|DESC
```

ORDER BY Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Tom	Vingvn 23	Stavanger

Now we want to select all the persons from the table above, however, we want to sort the persons by their last name.

We use the following SELECT statement:

```
SELECT * FROM Persons
```

```
ORDER BY LastName
```

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
4	Nilsen	Tom	Vingvn 23	Stavanger
3	Pettersen	Kari	Storgt 20	Stavanger
2	Svendson	Tove	Borgvn 23	Sandnes

ORDER BY DESC Example

Now we want to select all the persons from the table above, however, we want to sort the persons descending by their last name.

We use the following SELECT statement:

```
SELECT * FROM Persons
```

```
ORDER BY LastName DESC
```

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Tom	Vingvn 23	Stavanger
1	Hansen	Ola	Timoteivn 10	Sandnes

The INSERT INTO Statement

The INSERT INTO statement is used to insert a new row in a table.

SQL INSERT INTO Syntax

It is possible to write the INSERT INTO statement in two forms.

The first form doesn't specify the column names where the data will be inserted, only their values:

```
INSERT INTO table_name
```

```
VALUES (value1, value2, value3,...)
```

The second form specifies both the column names and the values to be inserted:

```
INSERT INTO table_name (column1, column2, column3,...)
```

```
VALUES (value1, value2, value3,...)
```

SQL INSERT INTO Example

We have the following "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes

2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

Now we want to insert a new row in the "Persons" table.

We use the following SQL statement:

```
INSERT INTO Persons
VALUES (4,'Nilsen', 'Johan', 'Bakken 2', 'Stavanger')
```

The "Persons" table will now look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger

Insert Data Only in Specified Columns

It is also possible to only add data in specific columns.

The following SQL statement will add a new row, but only add data in the "P_Id", "LastName" and the "FirstName" columns:

```
INSERT INTO Persons (P_Id, LastName, FirstName)
VALUES (5, 'Tjessem', 'Jakob')
```

The "Persons" table will now look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger
5	Tjessem	Jakob		

The UPDATE Statement

The UPDATE statement is used to update existing records in a table.

SQL UPDATE Syntax

```
UPDATE table_name
SET column1=value, column2=value2,...
WHERE some_column=some_value
```

Note: Notice the WHERE clause in the UPDATE syntax. The WHERE clause specifies which record or records that should be updated. If you omit the WHERE clause, all records will be updated!

SQL UPDATE Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger
5	Tjessem	Jakob		

Now we want to update the person "Tjessem, Jakob" in the "Persons" table.

We use the following SQL statement:

```
UPDATE Persons
SET Address='Nissestien 67', City='Sandnes'
WHERE LastName='Tjessem' AND FirstName='Jakob'
```

The "Persons" table will now look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger
5	Tjessem	Jakob	Nissestien 67	Sandnes

SQL UPDATE Warning

Be careful when updating records. If we had omitted the WHERE clause in the example above, like this:
UPDATE Persons

SET Address='Nissestien 67', City='Sandnes'

The "Persons" table would have looked like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Nissestien 67	Sandnes
2	Svendson	Tove	Nissestien 67	Sandnes
3	Pettersen	Kari	Nissestien 67	Sandnes
4	Nilsen	Johan	Nissestien 67	Sandnes
5	Tjessem	Jakob	Nissestien 67	Sandnes

The DELETE Statement

The DELETE statement is used to delete rows in a table.

SQL DELETE Syntax

DELETE FROM table_name

WHERE some_column=some_value

Note: Notice the WHERE clause in the DELETE syntax. The WHERE clause specifies which record or records that should be deleted. If you omit the WHERE clause, all records will be deleted!

SQL DELETE Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger
5	Tjessem	Jakob	Nissestien 67	Sandnes

Now we want to delete the person "Tjessem, Jakob" in the "Persons" table.

We use the following SQL statement:

DELETE FROM Persons

WHERE LastName='Tjessem' AND FirstName='Jakob'

The "Persons" table will now look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger
4	Nilsen	Johan	Bakken 2	Stavanger

Delete All Rows

It is possible to delete all rows in a table without deleting the table. This means that the table structure, attributes, and indexes will be intact:

```
DELETE FROM table_name
```

or

```
DELETE * FROM table_name
```

Note: Be very careful when deleting records. You cannot undo this statement!

The 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.

AND Operator Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

Now we want to select only the persons with the first name equal to "Tove" AND the last name equal to "Svendson":

We use the following SELECT statement:

```
SELECT * FROM Persons
WHERE FirstName='Tove'
AND LastName='Svendson'
```

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
2	Svendson	Tove	Borgvn 23	Sandnes

OR Operator Example

Now we want to select only the persons with the first name equal to "Tove" OR the first name equal to "Ola":

We use the following SELECT statement:

```
SELECT * FROM Persons
WHERE FirstName='Tove'
OR FirstName='Ola'
```

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes

Combining AND & OR

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

Now we want to select only the persons with the last name equal to "Svendson" AND the first name equal to "Tove" OR to "Ola":

We use the following SELECT statement:

```
SELECT * FROM Persons WHERE
LastName='Svendson'
AND (FirstName='Tove' OR FirstName='Ola')
```

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
2	Svendson	Tove	Borgvn 23	Sandnes

The SQL SELECT DISTINCT Statement

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.

SQL SELECT DISTINCT Syntax

```
SELECT DISTINCT column_name(s)
FROM table_name
```

SELECT DISTINCT Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

Now we want to select only the distinct values from the column named "City" from the table above.

We use the following SELECT statement:

```
SELECT DISTINCT City FROM Persons
```

The result-set will look like this:

City
Sandnes
Stavanger

The SQL SELECT Statement

The SELECT statement is used to select data from a database.

The result is stored in a result table, called the result-set.

SQL SELECT Syntax

```
SELECT column_name(s)
FROM table_name
and
SELECT * FROM table_name
```

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

An SQL SELECT Example

The "Persons" table:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes

2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

Now we want to select the content of the columns named "LastName" and "FirstName" from the table above.

We use the following SELECT statement:

```
SELECT LastName,FirstName FROM Persons
```

The result-set will look like this:

LastName	FirstName
Hansen	Ola
Svendson	Tove
Pettersen	Kari

SELECT * Example

Now we want to select all the columns from the "Persons" table.

We use the following SELECT statement:

```
SELECT * FROM Persons
```

Tip: The asterisk (*) is a quick way of selecting all columns!

The result-set will look like this:

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger