

KEYS IN SQL AND SSMS

Keys are fundamental in SQL for organizing data and maintaining relationships between tables. Here's an overview of the main types of keys:

1. Primary Key

- Purpose: Uniquely identifies each record in a table.
- Characteristics:
 - Each value must be unique.
 - Cannot be NULL.
 - A table can only have one primary key.
- Example:

```
CREATE TABLE Employees (  
EmployeeID INT PRIMARY KEY,  
FirstName NVARCHAR(50),  
LastName NVARCHAR(50)  
);
```

2. Foreign Key

- Purpose: Connects records in one table to records in another, ensuring data integrity.
- Characteristics:
 - Refers to a primary key or unique key in another table.
 - Ensures that the value exists in the referenced table.
- Example:

```
CREATE TABLE Orders (  
OrderID INT PRIMARY KEY,  
EmployeeID INT,  
FOREIGN KEY (EmployeeID) REFERENCES Employees(EmployeeID)  
);
```

3. Unique Key

- Purpose: Ensures that values in a column or combination of columns are unique.
- Characteristics:
 - Allows NULL values (with some exceptions).

- A table can have multiple unique constraints.

- Example:

```
CREATE TABLE Users (  
    UserID INT PRIMARY KEY,  
    Email NVARCHAR(255) UNIQUE  
);
```

4. Composite Key

- Purpose: A key made up of two or more columns to uniquely identify a record.

- Characteristics:

- Useful when a single column isn't enough to ensure uniqueness.

- Example:

```
CREATE TABLE CourseRegistrations (  
    StudentID INT,  
    CourseID INT,  
    RegistrationDate DATE,  
    PRIMARY KEY (StudentID, CourseID)  
);
```

5. Candidate Key

- Purpose: Any column or combination of columns that could uniquely identify a record.

- Characteristics:

- One of the candidate keys is chosen as the primary key; others are alternatives.

- Example: Both 'EmployeeID' and 'Email' could be candidate keys if each is unique.

6. Alternate Key

- Purpose: A candidate key that is not the primary key but still unique.

- Characteristics :

- Provides an alternative way to uniquely identify records.

- Example:

```
CREATE TABLE Employees (  
    EmployeeID INT PRIMARY KEY,
```

Email NVARCHAR(255) UNIQUE -- Alternate key

);

7. Surrogate Key

- Purpose: A unique identifier for a record, often an auto-incremented number.
- Characteristics:
 - Used when a natural key (real-world attribute) is impractical or unavailable.
- Example:

CREATE TABLE Products (

ProductID INT IDENTITY(1,1) PRIMARY KEY,

ProductName NVARCHAR(100)

);