What's the difference between a primary key and unique key? (hint: there can only exists one) can you give an example?

SQL Expert

The primary difference between a primary key and a unique key in SQL is in their constraints and roles in database structure:

> Primary Key:
> - A primary key uniquely identifies each row in a table.
> - There can be only one primary key in a table.
> - A primary key automatically creates a unique constraint on the column or set of columns it is defined on, ensuring all values are unique and not null.
> - By default, a primary key is often used to define the main way to reference rows in relationships between tables (foreign keys).
>
> Example:
>
> sql
>
> Copy code

```sql
CREATE TABLE Students (

 student_id INT PRIMARY KEY,

 name VARCHAR(100),

 email VARCHAR(100)

);
```

> In this case, `student_id` is the primary key and must be unique and not null for every row in the `Students` table.
> Unique Key:
> - A unique key also ensures that all values in the column are unique, similar to a primary key.
> - However, a table can have multiple unique keys.
> - Unlike primary keys, columns defined with a unique constraint can accept null values (but only one null per unique constraint in SQL standard, though some DBMS might allow multiple nulls).
> - A unique key can also uniquely identify each row in a table, but it is not used as the primary means of row identification.
>
> Example:
>
> sql
>
> Copy code

```
CREATE TABLE Employees (

  employee_id INT PRIMARY KEY,

  passport_number VARCHAR(50) UNIQUE,

  email VARCHAR(100) UNIQUE

);
```

In this example, `employee_id` is the primary key, while `passport_number` and `email` are unique keys. Each of these columns must contain unique values, but unlike `employee_id`, `passport_number` and `email` can contain null values, assuming the database management system follows the SQL standard that allows for a single null in unique columns.

The primary key serves as the main unique identifier for rows within the table, often used in foreign key relationships, while unique keys also enforce uniqueness but can exist multiple times within a table and allow for null values (with the exception noted above). Both are critical for ensuring data integrity and enforcing business rules within the database.