Understanding SQL Sequences

In SQL, a **sequence** is a database object that is used to generate unique numeric values in a sequential order. Sequences are commonly used for generating auto-incrementing IDs for tables, ensuring that each row in a table gets a unique identifier. They are independent of any specific table and can be used across multiple tables if needed.

Key Features of a Sequence:

1. Generates unique numbers in sequential order.
2. Can be configured to:
   - Start at a specific number.
   - Increment by a specified value.
   - Have a maximum value (optional).
   - Cycle back to the start when the maximum is reached (optional).
3. Does not reset automatically unless explicitly configured.

Creating a Sequence

Here's how you create a sequence in SQL (example using PostgreSQL/Oracle syntax):

```sql
CREATE SEQUENCE employee_id_seq START WITH 1 -- Start value INCREMENT BY 1 -- Increment value
MINVALUE 1 -- Minimum value MAXVALUE 10000 -- Maximum value (optional) CACHE 10; -- Cache 10 values
for performance
```

Using a Sequence to Auto-Generate IDs

Real-Life Scenario: Employee Management System

Assume you have a table `employees` :

Employee_ID	Name	Department
1	Alice Johnson	HR

Employee_ID	Name	Department
2	Bob Smith	IT
...	...	...

We want to automatically generate unique `Employee_ID` values for new entries.

Inserting Data Using a Sequence

```sql
-- Create the employees table CREATE TABLE employees ( Employee_ID INT PRIMARY KEY, Name
VARCHAR(100), Department VARCHAR(50) ); -- Insert data using the sequence INSERT INTO employees
(Employee_ID, Name, Department) VALUES (NEXTVAL('employee_id_seq'), 'Alice Johnson', 'HR'); INSERT
INTO employees (Employee_ID, Name, Department) VALUES (NEXTVAL('employee_id_seq'), 'Bob Smith',
'IT'); -- View the table SELECT * FROM employees;
```

Employee_ID	Name	Department
1	Alice Johnson	HR
2	Bob Smith	IT

Auto-Incrementing IDs with Sequence in an Insert Statement

If you're frequently inserting data into a table, you can simplify this using a **default value**:

```sql
-- Modify the table to use the sequence by default ALTER TABLE employees ALTER COLUMN Employee_ID
SET DEFAULT NEXTVAL('employee_id_seq'); -- Now, you can insert rows without specifying Employee_ID
INSERT INTO employees (Name, Department) VALUES ('Charlie Brown', 'Marketing'); -- View the table
SELECT * FROM employees;
```

Employee_ID	Name	Department
1	Alice Johnson	HR
2	Bob Smith	IT
3	Charlie Brown	Marketing