Foreign Keys & Altering Tables

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WHAT'S COVERED

This lesson explores using the ALTER TABLE command to add a foreign key, in two parts. Specifically, this lesson will cover:

1. ALTER TABLE
2. ON DELETE Clause

1. ALTER TABLE

An **ALTER TABLE** statement can be used to add a foreign key to a table. Although typically, the foreign key is added during a CREATE TABLE statement, there are instances when it can be beneficial to add foreign keys after the table has been created and the data has been loaded. When we use a CREATE TABLE statement, we do not have to define the foreign key constraint name, as PostgreSQL and other databases will assign an auto-generated name. However, when adding a foreign key with ALTER TABLE, we do, using the ADD CONSTRAINT clause. The basic syntax to add a foreign key constraint to an existing table looks like this:

```
ALTER TABLE <child table name>
ADD CONSTRAINT <constraint_name>
FOREIGN KEY (<fk_column>)
REFERENCES <parent table name> (<parent_key_column>);
```

Consider the following tables:

```
CREATE TABLE representative ( representative_id
INT PRIMARY KEY,
first_name VARCHAR (30) NOT NULL, last_name
VARCHAR (30) NOT NULL );

CREATE TABLE department ( department_id INT
PRIMARY KEY,
```

```
department_name VARCHAR (100) NOT NULL,
manager_id INT );
```

We can add a foreign key to the department table for the manager_id by doing the following:

```
ALTER TABLE department
ADD CONSTRAINT fk_manager
FOREIGN KEY (manager_id)
REFERENCES representative (representative_id);
```

It is not that different from the syntax used in the CREATE TABLE statement, but the ordering of the statements is important.

TERM TO KNOW

ALTER TABLE

A clause that changes the structure of a table.

2. ON DELETE Clause

You can optionally add other clauses in the ALTER TABLE statement that specify what to do with a record in the child table when the parent table's corresponding record is deleted. For example, adding ON DELETE SET NULL will set the value in the child table to NULL if the parent record is deleted.

We can also use the ON DELETE SET DEFAULT clause and pass in a specific value. This means that if the parent record is deleted, the child record would update to a set value. For example, if a manager is deleted, the department could automatically be moved under a specific generic employee and reallocated later on.

The ON DELETE CASCADE clause can be dangerous, but it has common uses. Using this clause, a delete on a parent record would also delete all of the referencing rows in the child table. For example, in our database, let's assume we used the ON DELETE CASCADE clause on the support_rep_id in the customer table. If this was the case, and we deleted employee_id 1 from the employee table, rather than throwing an error due to the foreign key constraint, it would instead attempt to delete all of the customer records that had the support_rep_id. Subsequently, if we used ON DELETE CASCADE on all of our tables' foreign keys, the database would then try to delete all the invoices that reflected those customers with the support_rep_id equal to 1. Then it would also delete the invoice_line records that reflect the deleted invoices. You can quickly see why this could create many potential issues in the database if we were not careful.

If we wanted to add these additional clauses to the table, we would have to first drop the constraint:

```
ALTER TABLE department
DROP CONSTRAINT fk_manager;
```

Then we could add it back on with any changes to the clauses:

```
ALTER TABLE department
ADD CONSTRAINT fk_manager
FOREIGN KEY (manager_id)
REFERENCES representative (representative_id)
ON DELETE CASCADE;
```

WATCH

TRY IT

Your turn! Open the SQL tool by clicking on the LAUNCH DATABASE button below. Then, enter in one of the examples above and see how it works. Next, try your own choices for which columns you want the query to provide.

SUMMARY

In this lesson, you learned how to use an **ALTER TABLE** statement to add a foreign key to an existing table. This involves defining the foreign key constraint name, unlike when you create a foreign key at the same time that you create the table (in which case, the name is auto-generated). The clauses involved in this operation are ADD CONSTRAINT, FOREIGN KEY, and REFERENCES.

You also learned about some optional **ON DELETE clauses** that you can use with ALTER TABLE to define what will happen in the child table (the foreign key side) if the parent record is deleted. The ON DELETE SET NULL clause sets the value in the child table to NULL, for example, and ON DELETE CASCADE deletes the referencing rows in the child table.

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TERMS TO KNOW

ALTER TABLE

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