SQL and Database Objects Assignment

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Course: Database 2

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Specialization: Information systems 5

Part 1: Create the Table and Insert Data

1.1. CREATE TABLE Statement

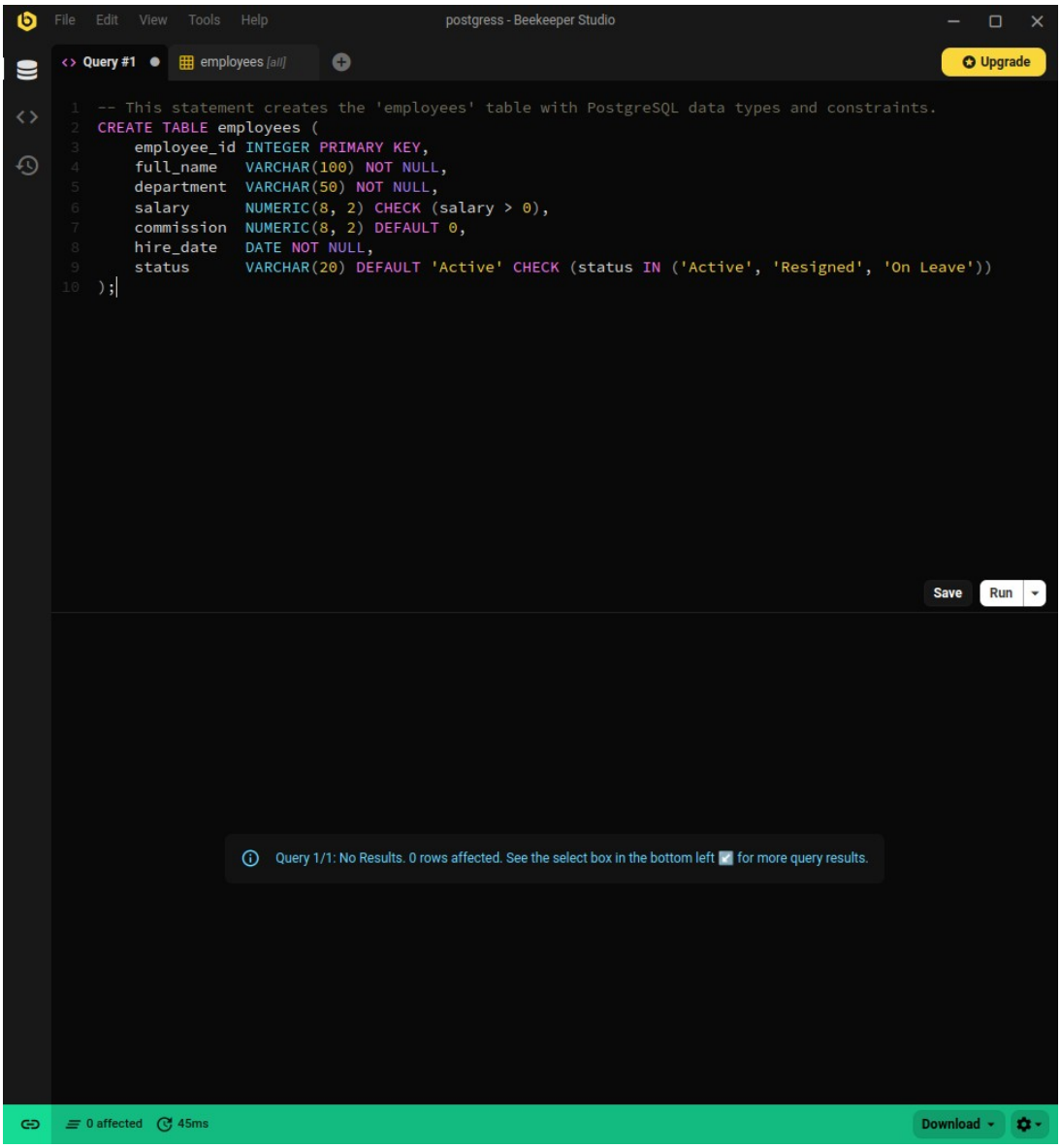
SQL Query

```
-- This statement creates the 'employees' table with PostgreSQL data types and constraints.
CREATE TABLE employees (
    employee_id INTEGER PRIMARY KEY,
    full_name   VARCHAR(100) NOT NULL,
    department  VARCHAR(50) NOT NULL,
    salary      NUMERIC(8, 2) CHECK (salary > 0),
    commission  NUMERIC(8, 2) DEFAULT 0,
    hire_date   DATE NOT NULL,
    status      VARCHAR(20) DEFAULT 'Active' CHECK (status IN ('Active', 'Resigned', 'On Leave'))
);
```

Explanation

This query creates the employees table. It defines each column with an appropriate PostgreSQL data type and applies constraints like PRIMARY KEY for uniqueness, NOT NULL for required fields, DEFAULT for automatic values, and CHECK to ensure data integrity.

Screenshot of Output



1.2. INSERT Statements

SQL Query

-- These statements insert 6 rows of varied data into the employees table.
INSERT INTO employees (employee_id, full_name, department, salary, commission, hire_date, status)
VALUES
(101, 'John Smith', 'Sales', 55000, 5000, TO_DATE('2022-03-15', 'YYYY-MM-DD'), 'Active'),

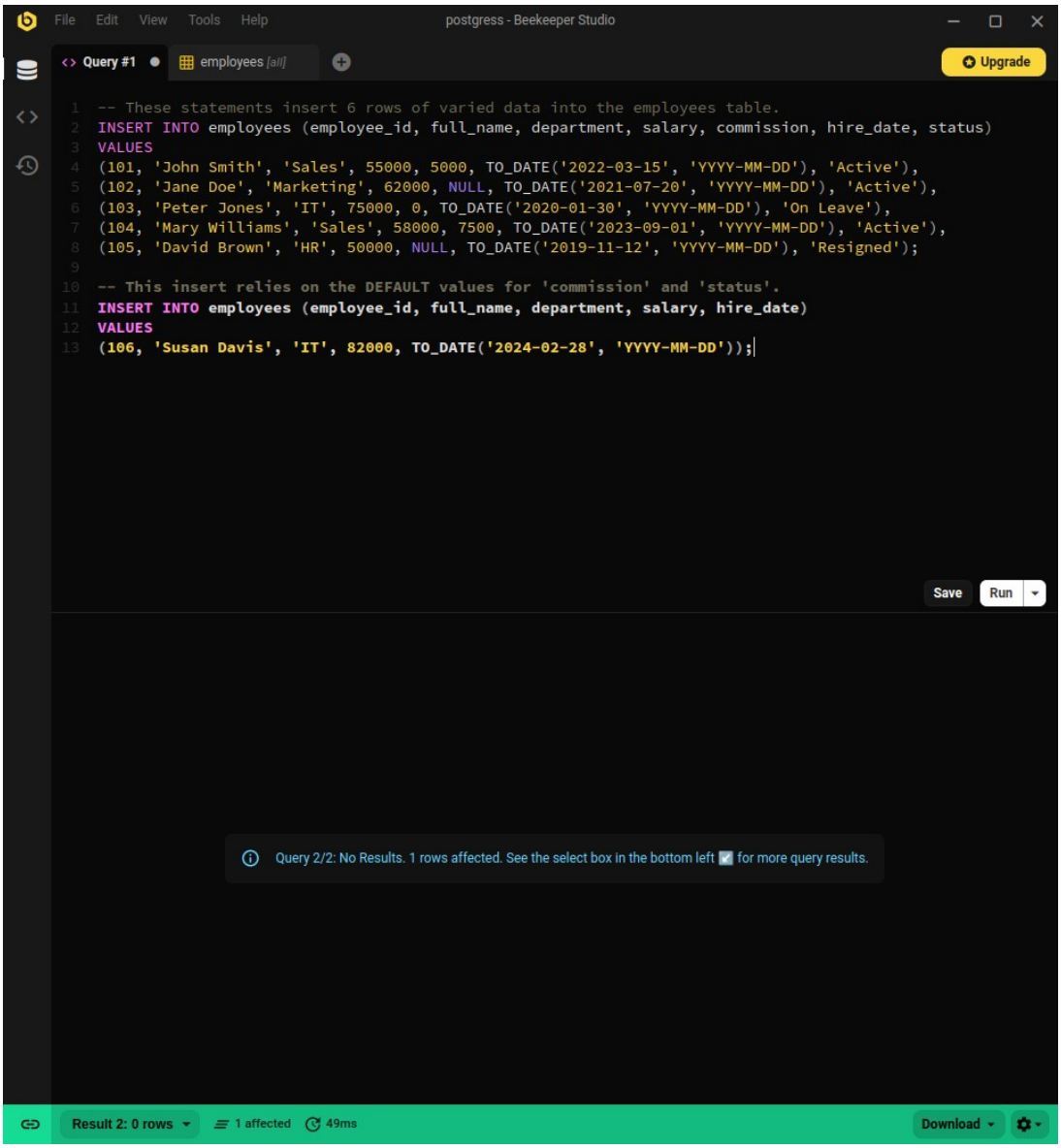
```
(102, 'Jane Doe', 'Marketing', 62000, NULL, TO_DATE('2021-07-20', 'YYYY-MM-DD'),
'Active'),
(103, 'Peter Jones', 'IT', 75000, 0, TO_DATE('2020-01-30', 'YYYY-MM-DD'), 'On Leave'),
(104, 'Mary Williams', 'Sales', 58000, 7500, TO_DATE('2023-09-01', 'YYYY-MM-DD'),
'Active'),
(105, 'David Brown', 'HR', 50000, NULL, TO_DATE('2019-11-12', 'YYYY-MM-DD'),
'Resigned');

-- This insert relies on the DEFAULT values for 'commission' and 'status'.
INSERT INTO employees (employee_id, full_name, department, salary, hire_date)
VALUES
(106, 'Susan Davis', 'IT', 82000, TO_DATE('2024-02-28', 'YYYY-MM-DD'));
```

Explanation

This query populates the employees table with six records, including varied data such as different departments, a NULL commission, and a record that relies on DEFAULT values.

Screenshot of Output



Part 2: Write and Execute SQL Queries

2.1. Select All Columns and Rows

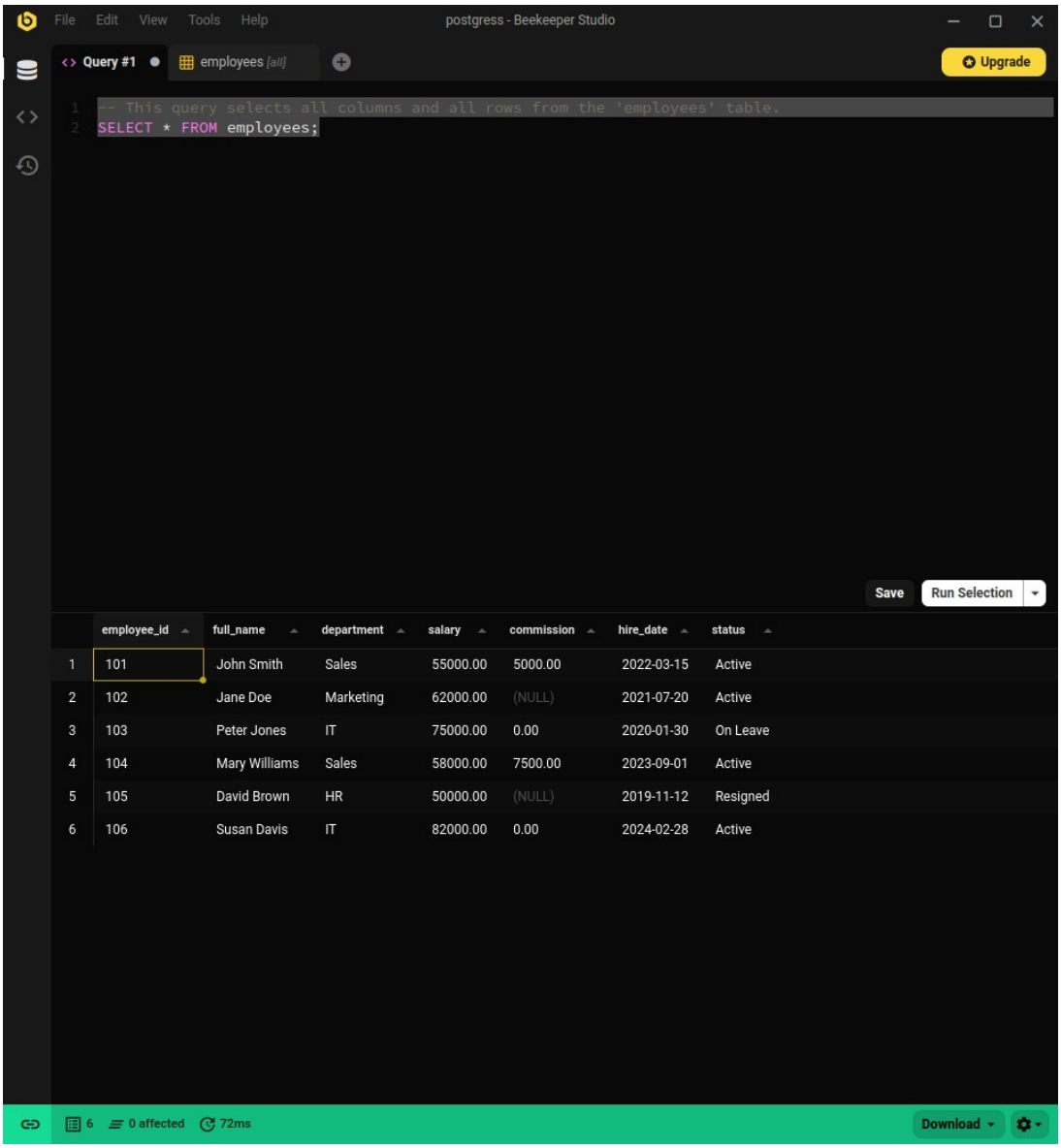
SQL Query

-- This query selects all columns and all rows from the 'employees' table.
SELECT * FROM employees;

Explanation

This query uses SELECT * to retrieve and display every column and every row from the employees table, allowing for a full view of the current data.

Screenshot of Output



2.2. DML Operations

Update an Employee's Salary (with COMMIT)

SQL Query

-- This transaction updates an employee's salary and saves the change

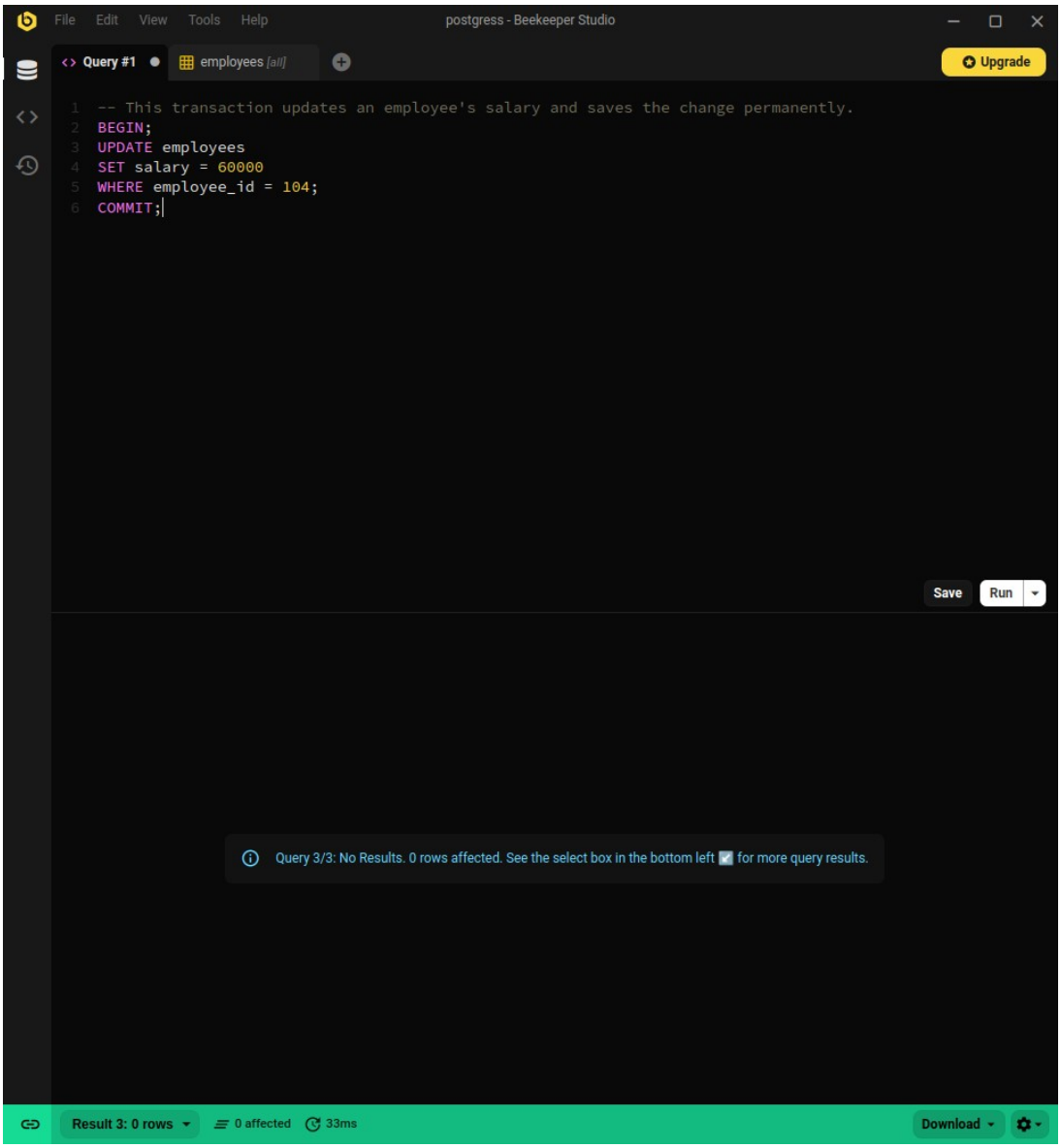
permanently.

```
BEGIN;
UPDATE employees
SET salary = 60000
WHERE employee_id = 104;
COMMIT;
```

Explanation

This transaction permanently increases the salary for employee 104 to 60,000. The COMMIT command saves the change to the database.

Screenshot of Output



Delete and ROLLBACK an Employee

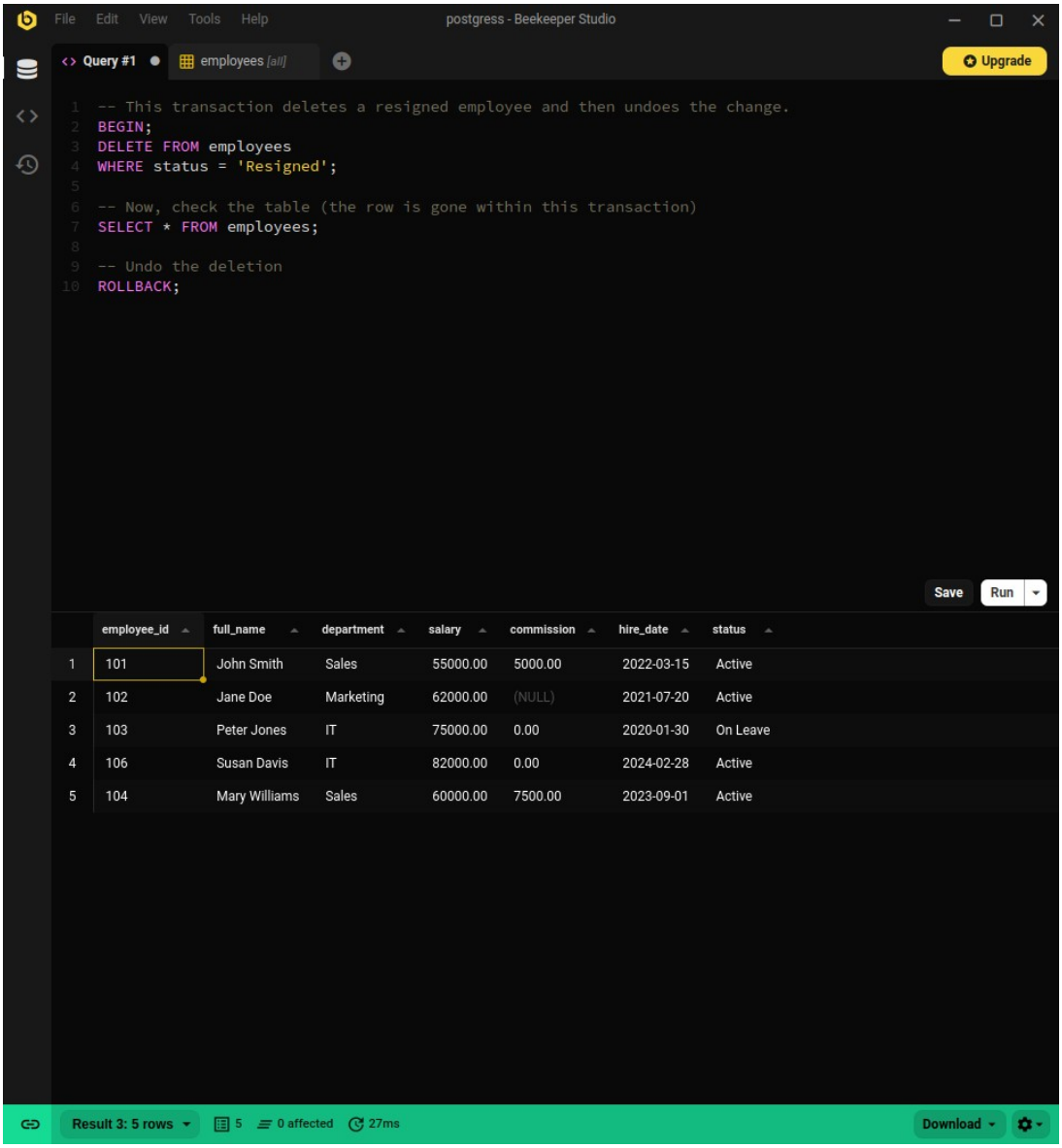
SQL Query

-- This transaction deletes a resigned employee and then undoes the change.
BEGIN;
DELETE FROM employees
WHERE status = 'Resigned';
ROLLBACK;

Explanation

This transaction begins by deleting the employee with the 'Resigned' status. However, the ROLLBACK command is then executed, which undoes the deletion and restores the data to its previous state.

Screenshot of Output



2.3. Simple View

SQL Query

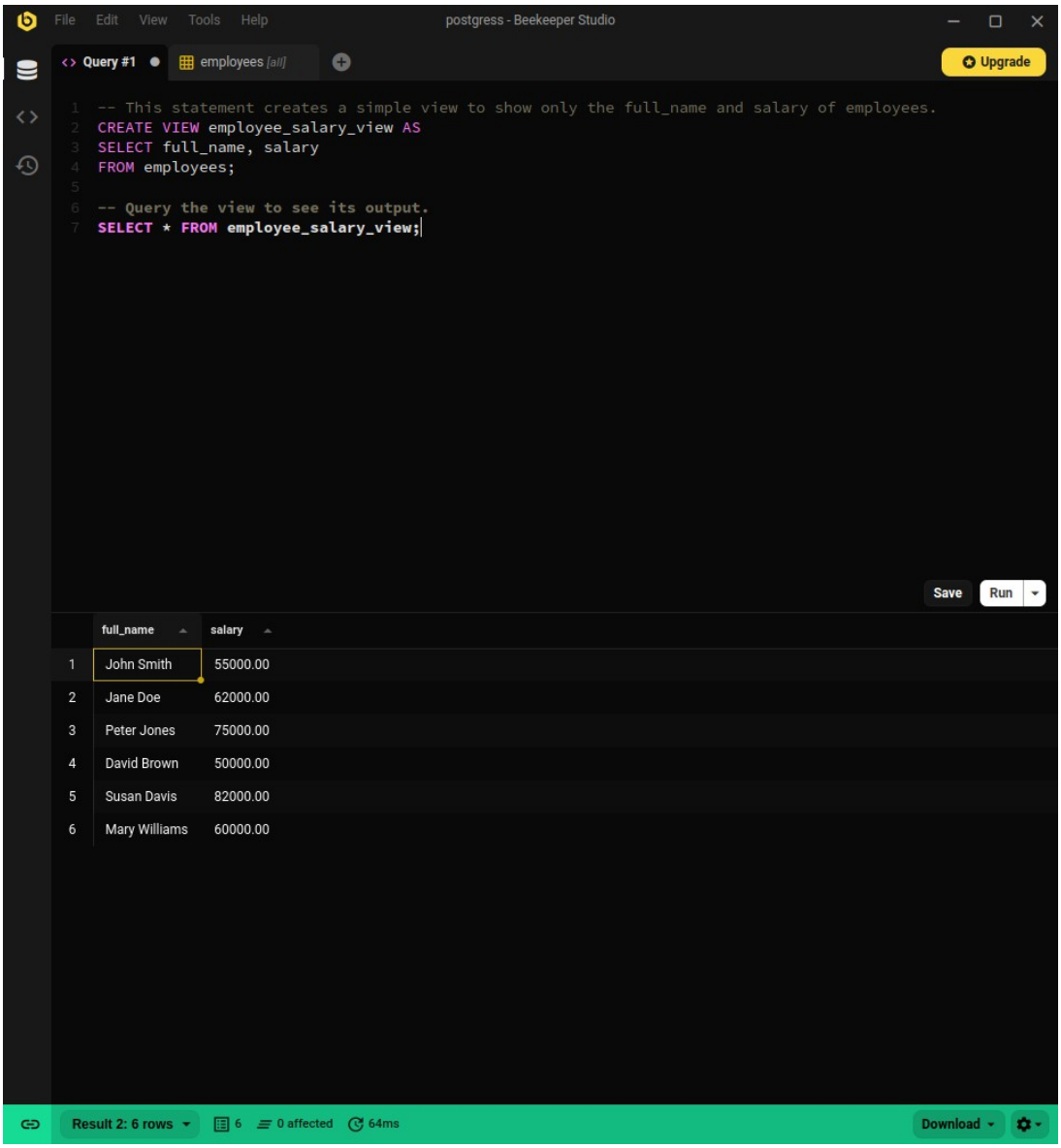
```
-- This statement creates a simple view to show only the full_name and salary of employees.
CREATE VIEW employee_salary_view AS
SELECT full_name, salary
FROM employees;

-- Query the view to see its output.
SELECT * FROM employee_salary_view;
```

Explanation

This CREATE VIEW statement creates a virtual table named employee_salary_view that simplifies the employees table to only show the full_name and salary columns.

Screenshot of Output



2.4. Complex View

SQL Query

```
-- This statement creates a complex view that calculates a 'total_income' column.
CREATE OR REPLACE VIEW employee_income_view AS
SELECT
    full_name,
    department,
    (salary + COALESCE(commission, 0)) AS total_income
```

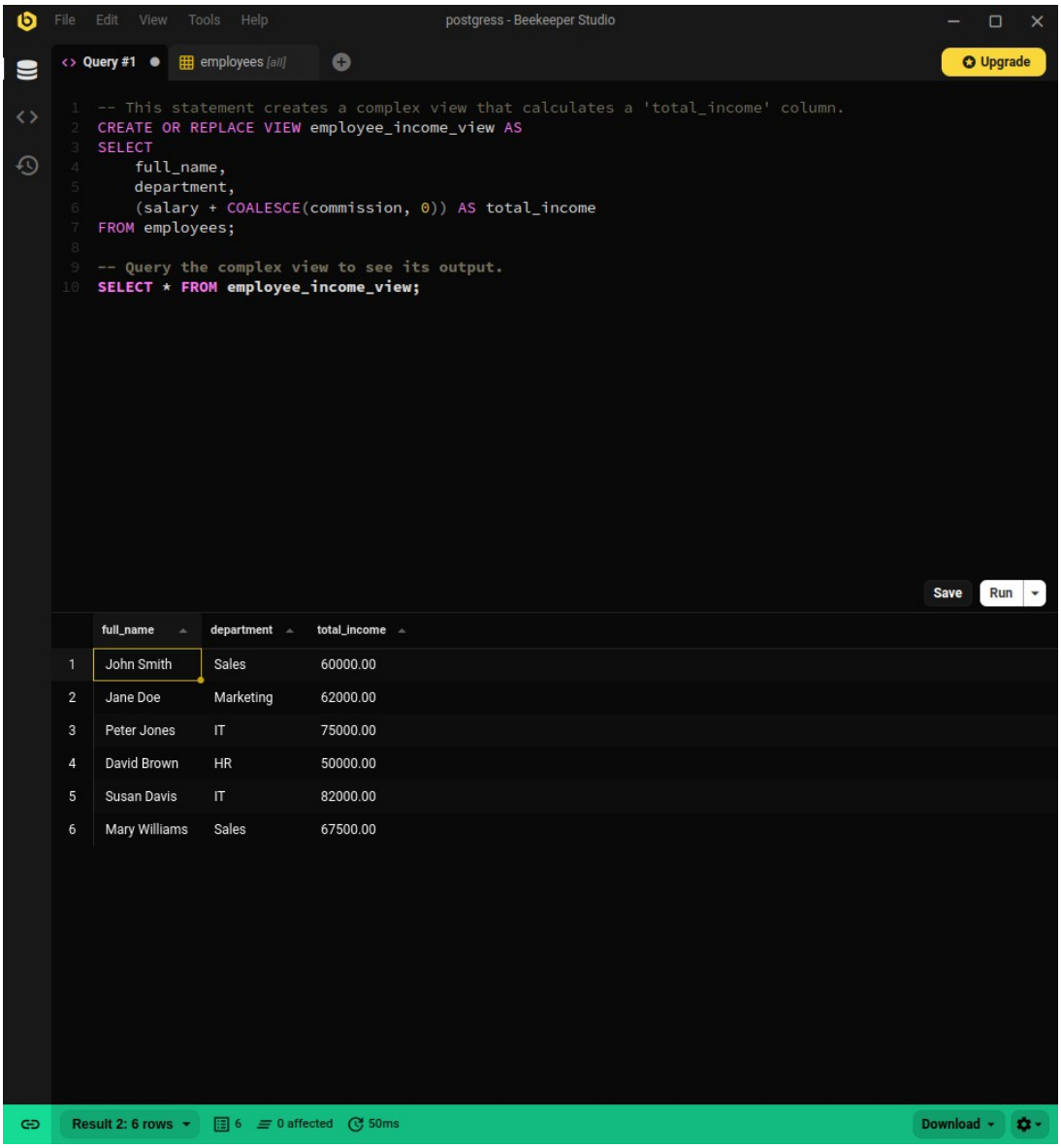
```
FROM employees;

-- Query the complex view to see its output.
SELECT * FROM employee_income_view;
```

Explanation

This query creates a more complex view named employee_income_view. It includes a calculated column called total_income, which is the sum of salary and commission. The COALESCE function is used to treat any NULL commission values as 0.

Screenshot of Output



2.5. Sequence for employee_id

SQL Query

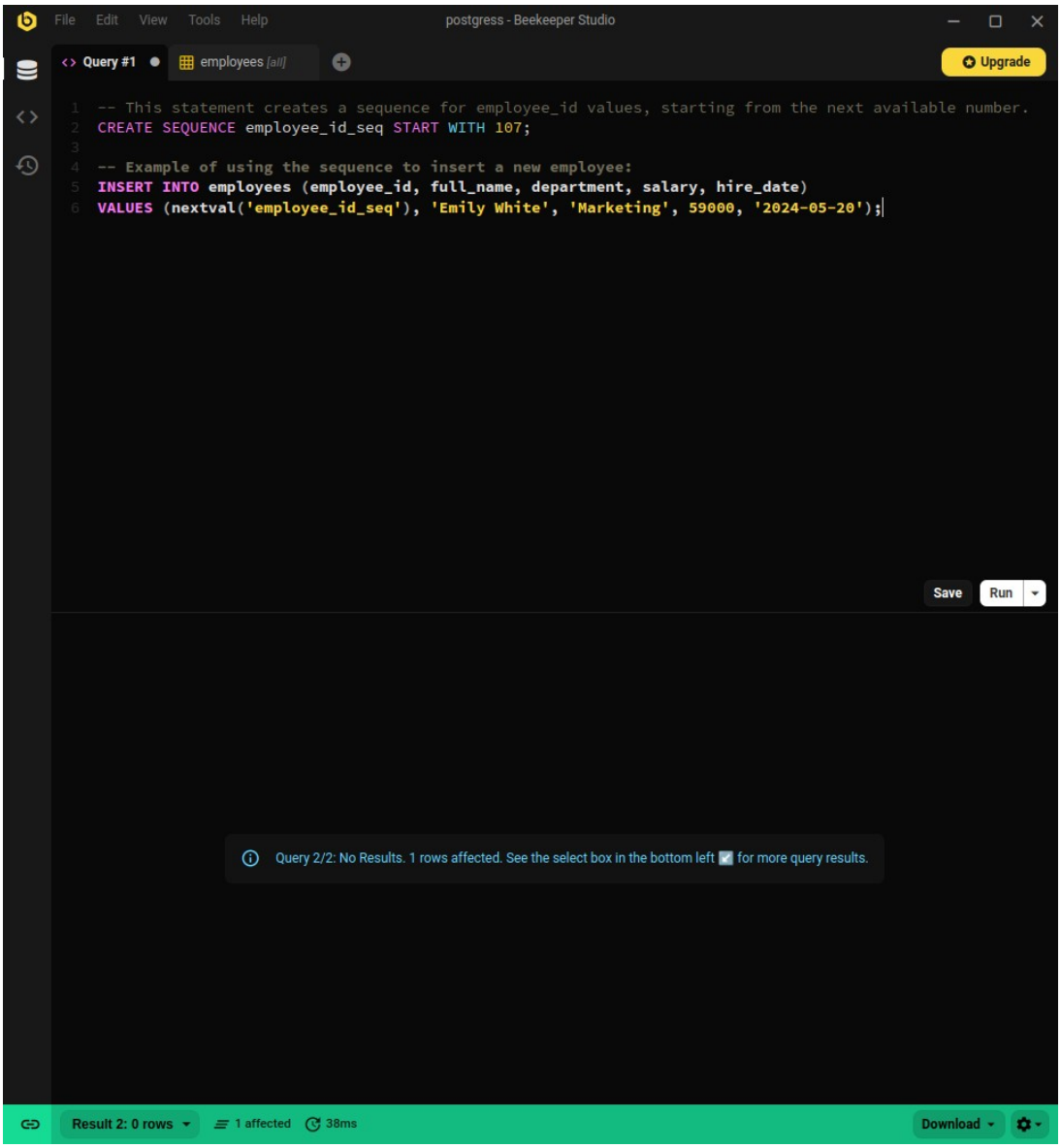
-- This statement creates a sequence for employee_id values, starting from the next available number.
CREATE SEQUENCE employee_id_seq START WITH 107;

Explanation

This query creates a sequence object named employee_id_seq. This object can be

used to automatically generate unique numbers for the employee_id column when inserting new records, starting with 107.

Screenshot of Output



2.6. Index for Performance

SQL Query

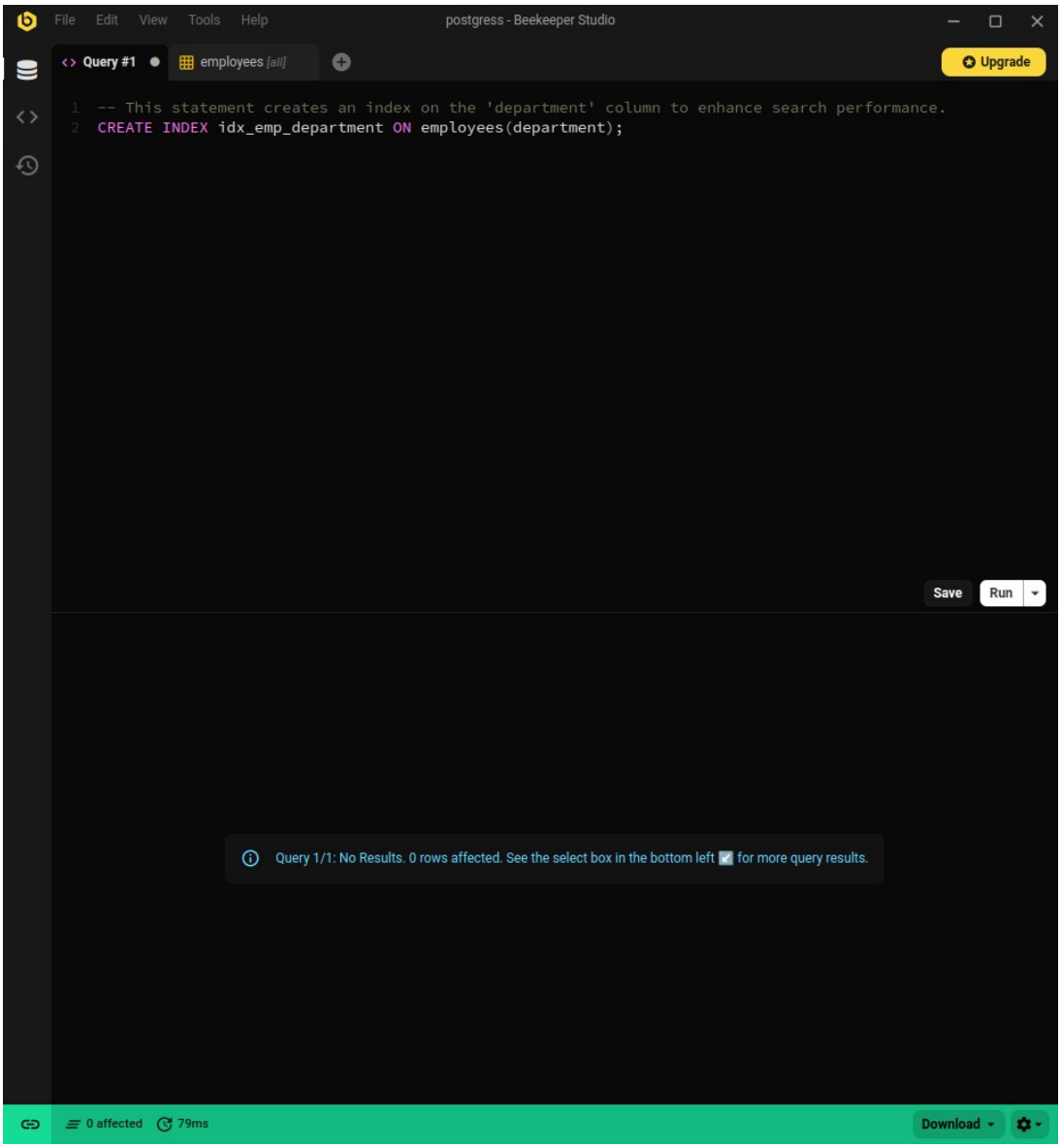
-- This statement creates an index on the 'department' column to enhance search performance.

CREATE INDEX idx_emp_department ON employees(department);

Explanation

This query creates an index named idx_emp_department on the department column of the employees table. This index will speed up queries that filter or sort by department.

Screenshot of Output



2.7. Synonyms (PostgreSQL Workaround)

Public Synonym (Workaround using a View)

SQL Query

```
-- This creates a view in the 'public' schema, making it accessible to all users.
-- This acts as a public synonym.
CREATE VIEW public.all_employees AS
SELECT * FROM public.employees;

-- Now any user can query it directly.
SELECT * FROM all_employees;
```

Explanation

Since PostgreSQL does not have a CREATE SYNONYM command, a view in the public schema is created as a workaround. This all_employees view can be accessed by any user, effectively serving as a public synonym for the employees table.

Screenshot of Output

File Edit View Tools Help postgress - Beekeeper Studio

Query #1 | employees [all] | Upgrade

```sql
-- This creates a view in the 'public' schema, making it accessible to all users.
-- This acts as a public synonym.
CREATE VIEW public.all_employees AS
SELECT * FROM public.employees;

-- Now any user can query it directly.
SELECT * FROM all_employees;
```

Save | Run

	employee_id	full_name	department	salary	commission	hire_date	status
1	101	John Smith	Sales	55000.00	5000.00	2022-03-15	Active
2	102	Jane Doe	Marketing	62000.00	(NULL)	2021-07-20	Active
3	103	Peter Jones	IT	75000.00	0.00	2020-01-30	On Leave
4	105	David Brown	HR	50000.00	(NULL)	2019-11-12	Resigned
5	106	Susan Davis	IT	82000.00	0.00	2024-02-28	Active
6	104	Mary Williams	Sales	60000.00	7500.00	2023-09-01	Active
7	107	Emily White	Marketing	59000.00	0.00	2024-05-20	Active

Result 2: 7 rows | 7 | 0 affected | 81ms | Download