BAN5501 Final Project: Project Management Database

By Nathan Minkwitz, Noah Skole, & Steven Caione

Project Overview

Introduction

- □ **Industry:** Consulting
- □ **Business Type:** Multiple-Branch Business Consulting Company
- □ **Company Information:**

  We are the new executives for DevKings Consulting Group, a US-based consulting company that has just scaled operations to service all four time zones in the US. DevKings was founded in 2019 in Boston, MA.

  - □ The company just expanded operations, opening three more offices in Chicago, IL, Denver, CO, and Los Angeles, CA,

DK

DEVKINGS
CONSULTING GROUP

Business Situation

❑ Our existing database works for managing projects for our original office in Boston, MA.

❑ It will not be able to maintain data integrity and security across an additional three offices in Chicago, IL, Denver, CO, and Los Angeles, CA.

❑ We need our Dev Team to build a new project management database that enables the executives, managers, and consultants at DevKings to operate successfully at scale.

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CALIFORNIA
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NEBRASKA
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MISS OURI
KENTUCKY
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OKLAHOMA
ARKA NSAS
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Database Considerations

- ❑ Preliminary
    - ❑ What industry are we looking at?
    - ❑ What does our company do?
    - ❑ How many employees do we have
    - ❑ Where are they located?
    - ❑ What is the current situation?
    - ❑ What are the business requirements?
- ❑ Secondary
    - ❑ How many tables do we need?
    - ❑ What type of information will they hold?
    - ❑ Which are our fact tables? Lookup?
    - ❑ Are there any relationships?
        - ❑ PK or FK?

Database Design

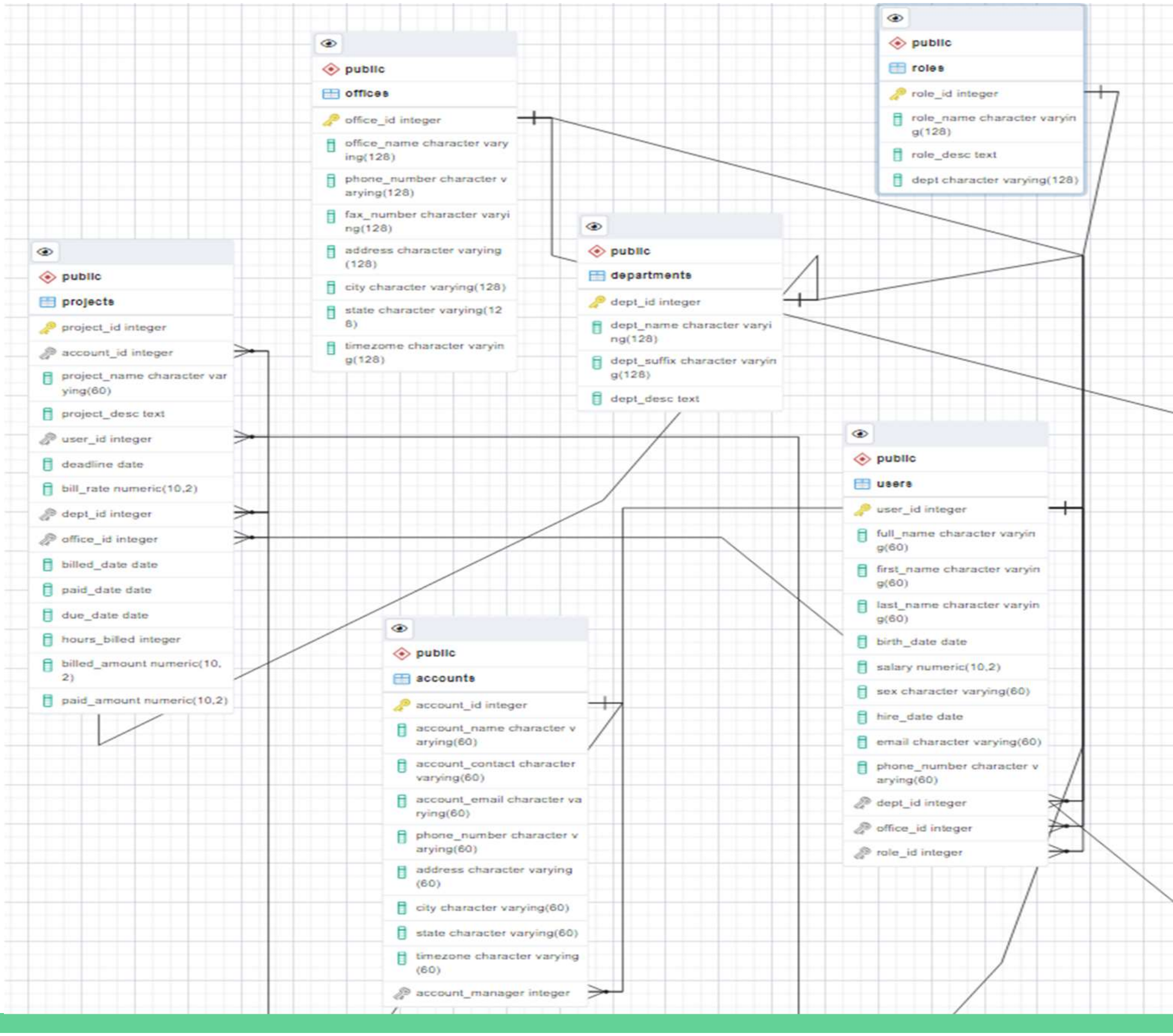
Database Schema: Fact Tables

- ❑ **Roles**
  - ❑ **Primary Key:** role_id
  - ❑ **Fields:** role_name, role_description, dept
- ❑ **Departments**
  - ❑ **Primary Key:** dept_id
  - ❑ **Fields:** dept_name, dept_suffix, dept_description
- ❑ **Offices**
  - ❑ **Primary Key:** office_id
  - ❑ **Fields:** office_name, phone_number, fax_number, address, city, state, timezone
- ❑ **Accounts**
  - ❑ **Primary Key:** account_id
  - ❑ **Fields:** account_name, account_manager (user_id), account_contact, account_email, account_phone_number, city, state, timezone

Database Schema: Lookup Tables

- ❑ **Users**
  - ❑ **Primary Key:** user_id
  - ❑ **Foriegn Keys**: dept_id, office_id, role_id
  - ❑ **Fields:** full_name, first_name, last_name, birthdate, salary, sex, hire_date, address, email, phone number
- ❑ **Projects**
  - ❑ **Primary Key:** project_id
  - ❑ **Foreign Keys:** account_id, dept_id, office_id, project_consultant(user_id)
  - ❑ **Fields:** project_name, project_description, deadline, bill_rate, bill_date, paid_date, due_date, hours_billed, billed_amount, paid_amount

Database Schema: Entity Relationship Diagram (ERD)



public
offices
- office_id integer
- office_name character varying(128)
- phone_number character varying(128)
- fax_number character varying(128)
- address character varying (128)
- city character varying(128)
- state character varying(128)
- timezome character varying(128)

public
roles
- role_id integer
- role_name character varying(128)
- role_desc text
- dept character varying(128)

public
departments
- dept_id integer
- dept_name character varying(128)
- dept_suffix character varying(128)
- dept_desc text

public
projects
- project_id integer
- account_id integer
- project_name character varying(60)
- project_desc text
- user_id integer
- deadline date
- bill_rate numeric(10,2)
- dept_id integer
- office_id integer
- billed_date date
- paid_date date
- due_date date
- hours_billed integer
- billed_amount numeric(10, 2)
- paid_amount numeric(10,2)

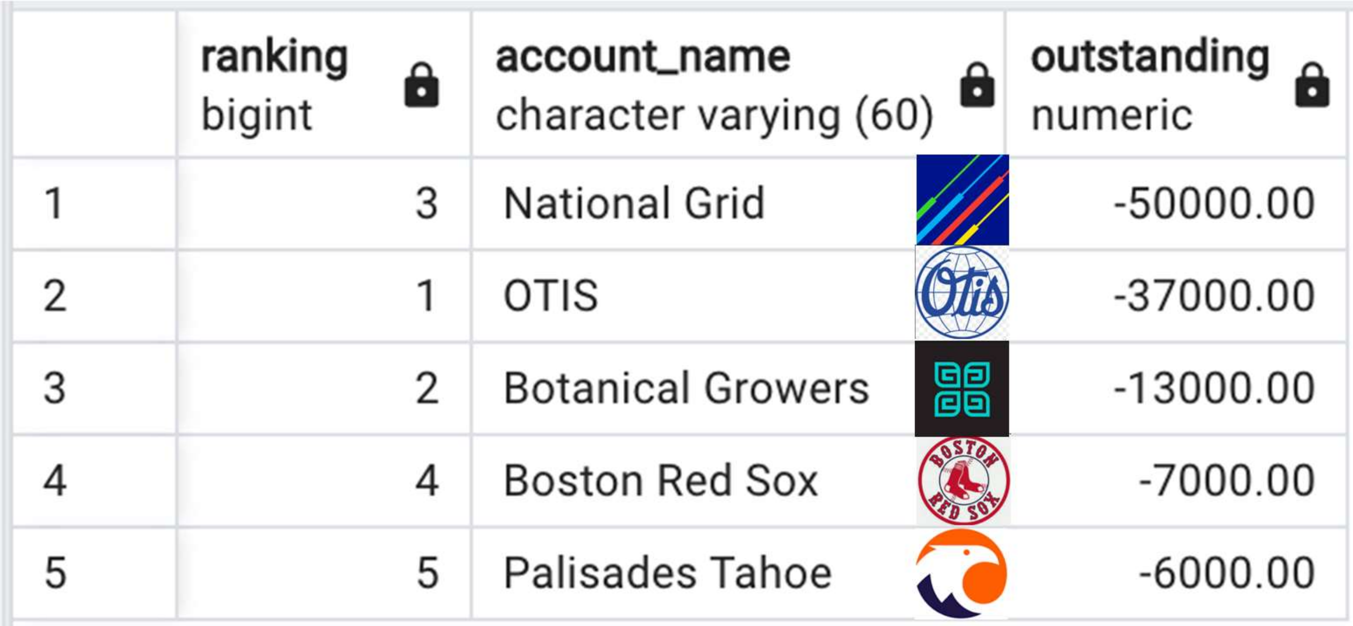
public
users
- user_id integer
- full_name character varying(60)
- first_name character varying(60)
- last_name character varying(60)
- birth_date date
- salary numeric(10,2)
- sex character varying(60)
- hire_date date
- email character varying(60)
- phone_number character varying(60)
- dept_id integer
- office_id integer
- role_id integer

public
accounts
- account_id integer
- account_name character varying(60)
- account_contact character varying(60)
- account_email character varying(60)
- phone_number character varying(60)
- address character varying (60)
- city character varying(60)
- state character varying(60)
- timezone character varying (60)
- account_manager integer

Application: SQL Queries

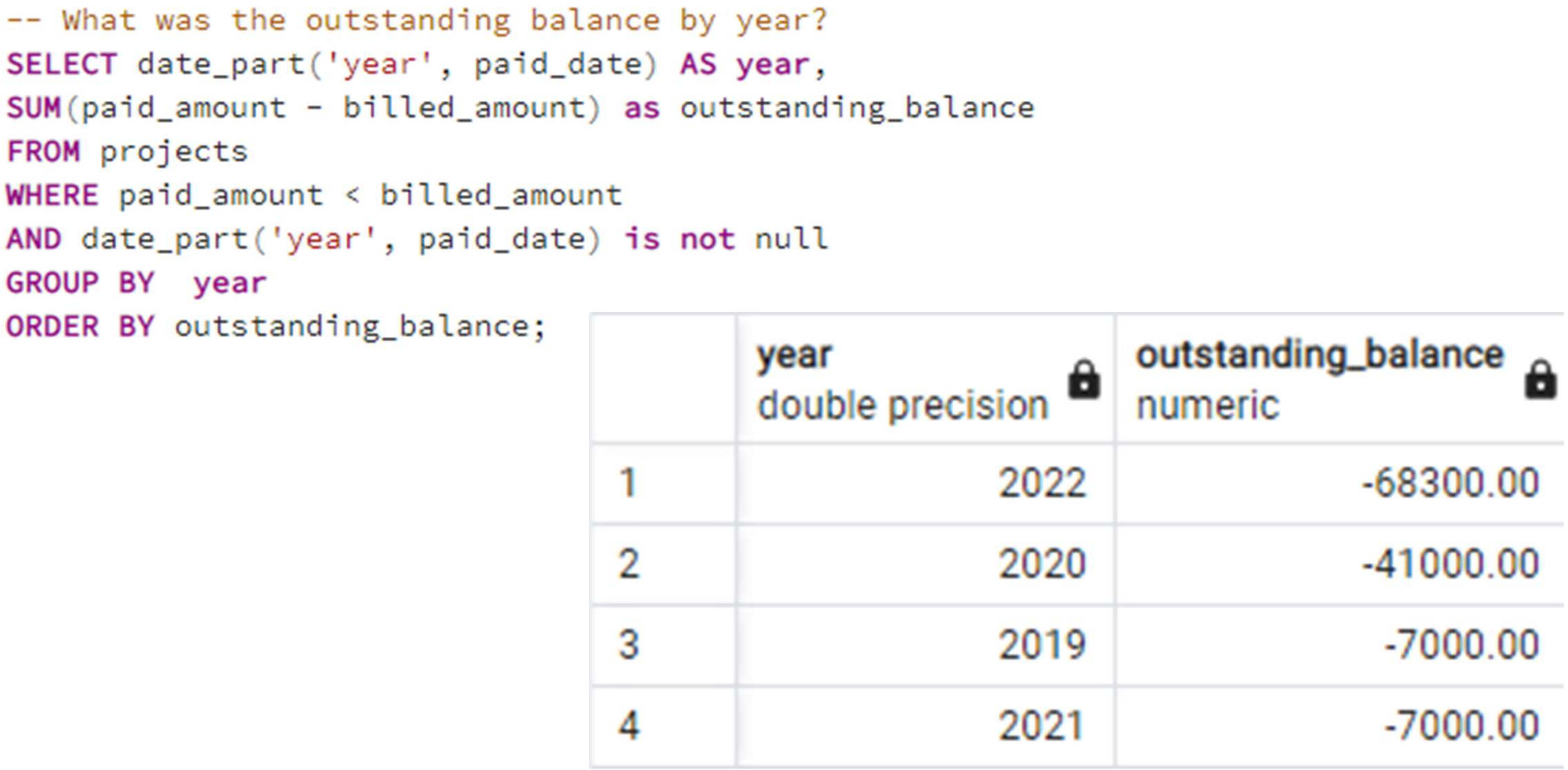
Query 1.0: Ranking Accounting Analysis

```sql
-- Outstanding Balance by Account?
SELECT RANK() OVER(ORDER BY SUM(p.paid_amount) DESC) AS ranking,
    a.account_name,
    SUM(p.paid_amount - p.billed_amount) AS outstanding
FROM projects p
JOIN accounts a
ON p.account_id = a.account_id
where paid_amount < billed_amount
GROUP BY account_name
LIMIT 5;
```



	ranking bigint	account_name character varying (60)	outstanding numeric
1	3	National Grid	-50000.00
2	1	OTIS	-37000.00
3	2	Botanical Growers	-13000.00
4	4	Boston Red Sox	-7000.00
5	5	Palisades Tahoe	-6000.00

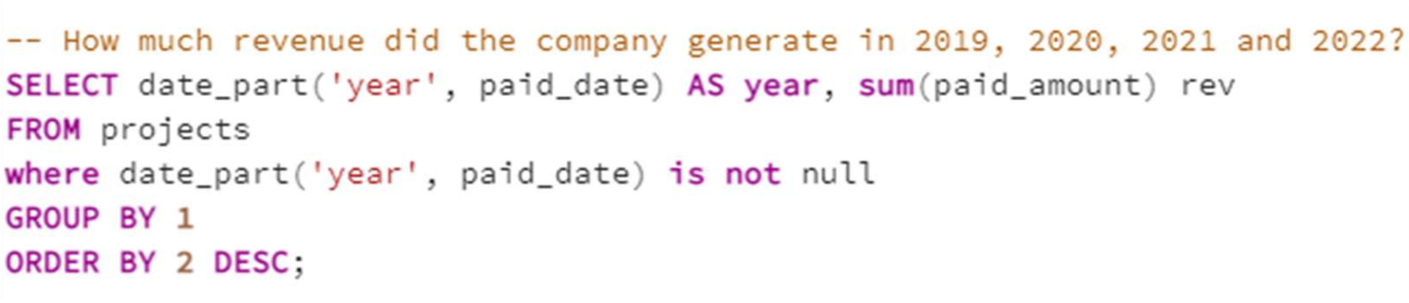
Query 1.1: YoY Accounting Analysis



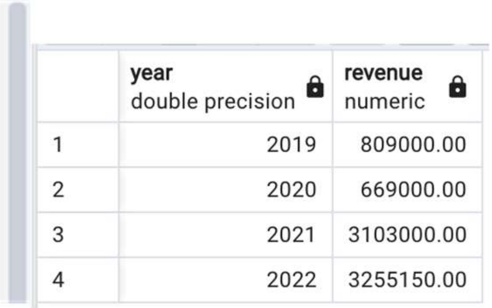
```
-- What was the outstanding balance by year?
SELECT date_part('year', paid_date) AS year,
SUM(paid_amount - billed_amount) as outstanding_balance
FROM projects
WHERE paid_amount < billed_amount
AND date_part('year', paid_date) is not null
GROUP BY  year
ORDER BY outstanding_balance;
```

	year double precision	outstanding_balance numeric
1	2022	-68300.00
2	2020	-41000.00
3	2019	-7000.00
4	2021	-7000.00

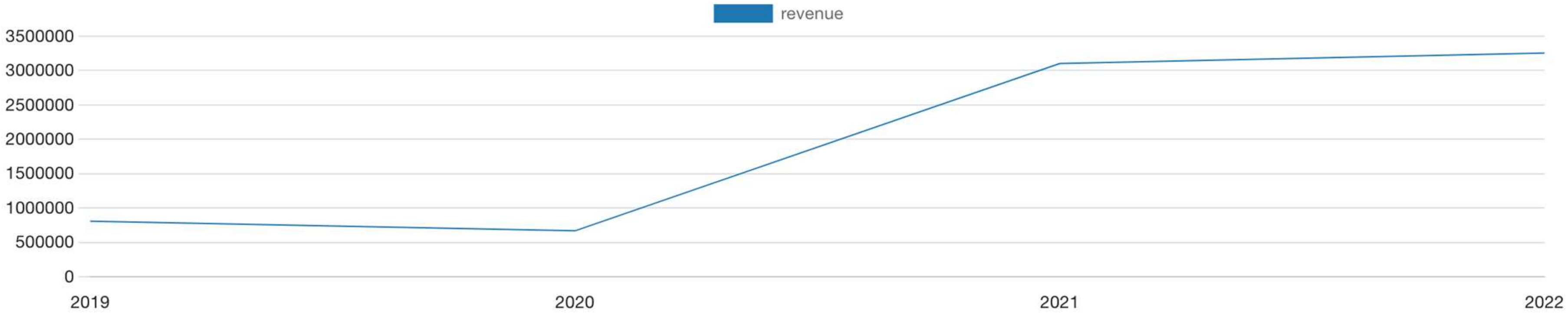
Query 2: Analyzing YoY Revenue Growth of DevKings Consulting Group



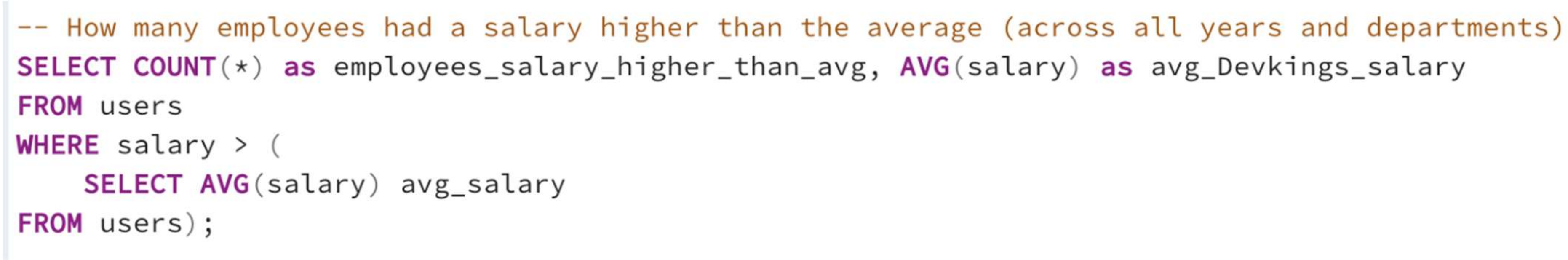
```
-- How much revenue did the company generate in 2019, 2020, 2021 and 2022?
SELECT date_part('year', paid_date) AS year, sum(paid_amount) rev
FROM projects
where date_part('year', paid_date) is not null
GROUP BY 1
ORDER BY 2 DESC;
```



	year double precision 🔒	revenue numeric 🔒
1	2019	809000.00
2	2020	669000.00
3	2021	3103000.00
4	2022	3255150.00

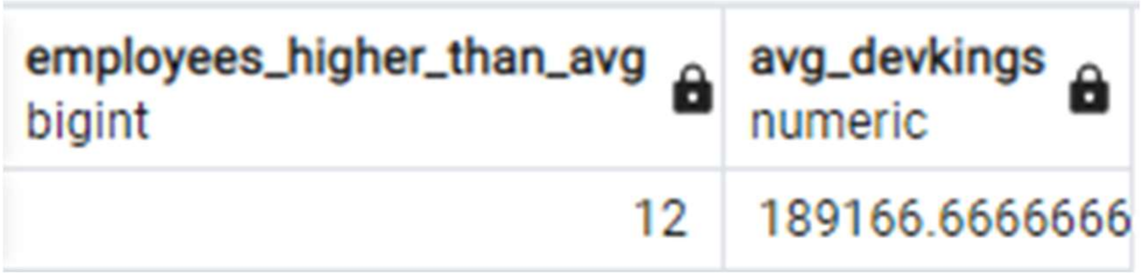


Query 3: Average Salary Analysis



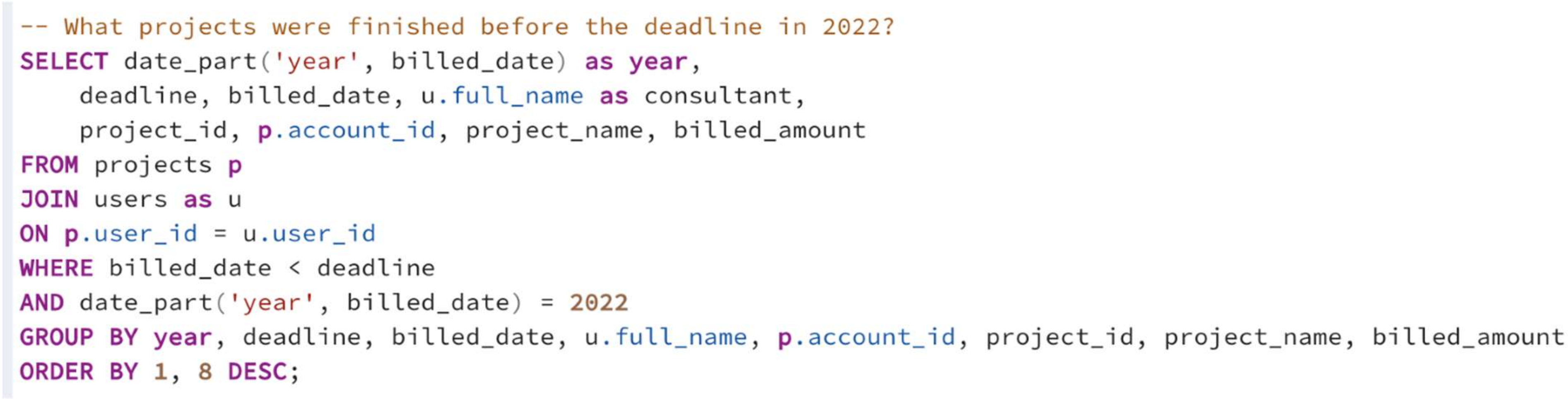
```sql
-- How many employees had a salary higher than the average (across all years and departments)
SELECT COUNT(*) as employees_salary_higher_than_avg, AVG(salary) as avg_Devkings_salary
FROM users
WHERE salary > (
    SELECT AVG(salary) avg_salary
FROM users);
```

- □ 12 employees had higher than the average salary of $189,167

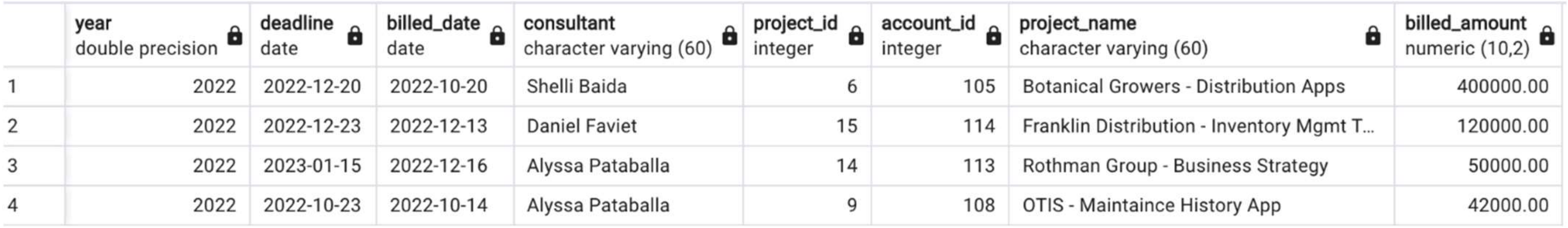


employees_higher_than_avg bigint	avg_devkings numeric
12	189166.6666666

Query 4: Consultant Productivity Analysis

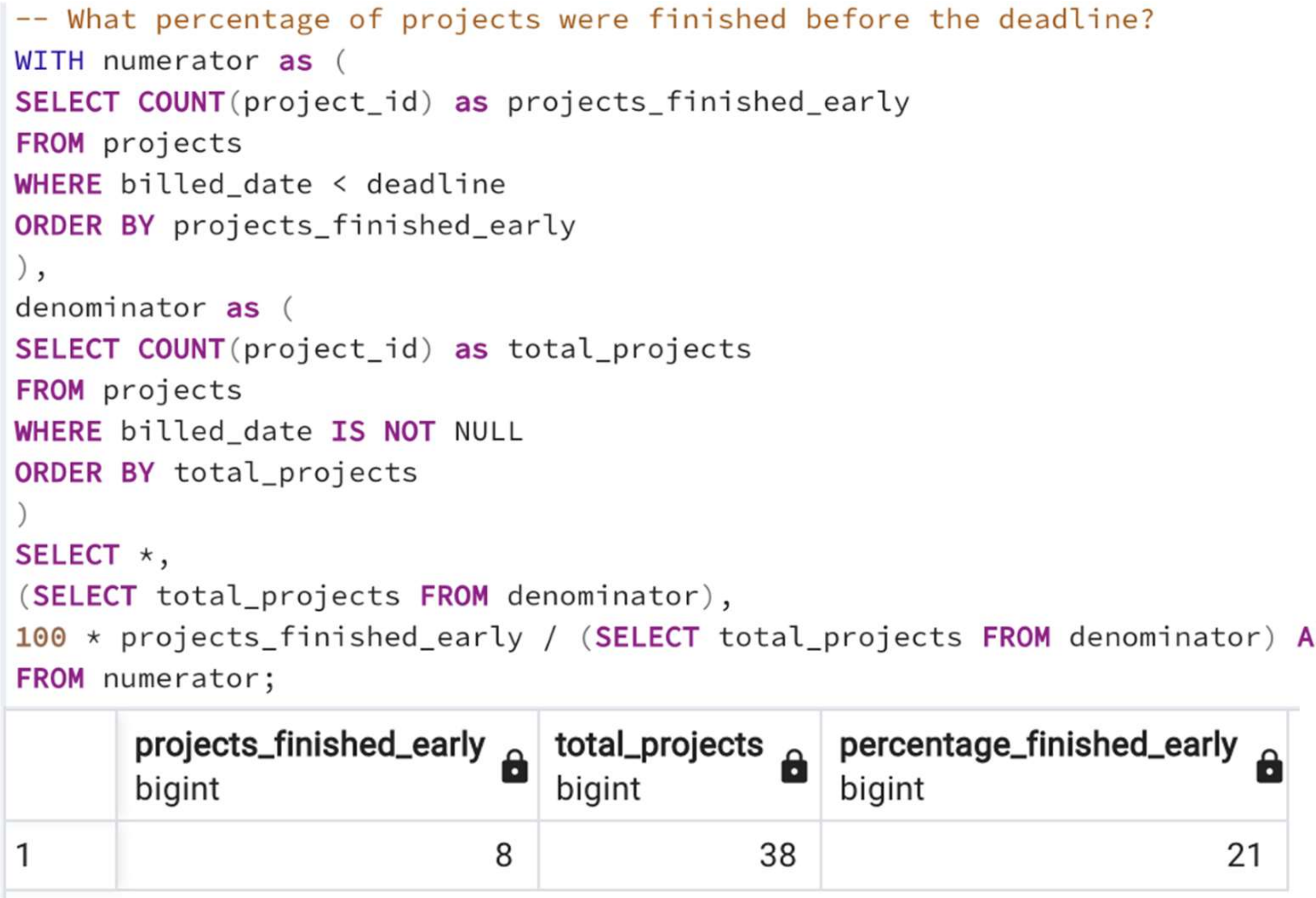


```
-- What projects were finished before the deadline in 2022?
SELECT date_part('year', billed_date) as year,
    deadline, billed_date, u.full_name as consultant,
    project_id, p.account_id, project_name, billed_amount
FROM projects p
JOIN users as u
ON p.user_id = u.user_id
WHERE billed_date < deadline
AND date_part('year', billed_date) = 2022
GROUP BY year, deadline, billed_date, u.full_name, p.account_id, project_id, project_name, billed_amount
ORDER BY 1, 8 DESC;
```



	year double precision	deadline date	billed_date date	consultant character varying (60)	project_id integer	account_id integer	project_name character varying (60)	billed_amount numeric (10,2)
1	2022	2022-12-20	2022-10-20	Shelli Baida	6	105	Botanical Growers - Distribution Apps	400000.00
2	2022	2022-12-23	2022-12-13	Daniel Faviet	15	114	Franklin Distribution - Inventory Mgmt T...	120000.00
3	2022	2023-01-15	2022-12-16	Alyssa Pataballa	14	113	Rothman Group - Business Strategy	50000.00
4	2022	2022-10-23	2022-10-14	Alyssa Pataballa	9	108	OTIS - Maintaince History App	42000.00

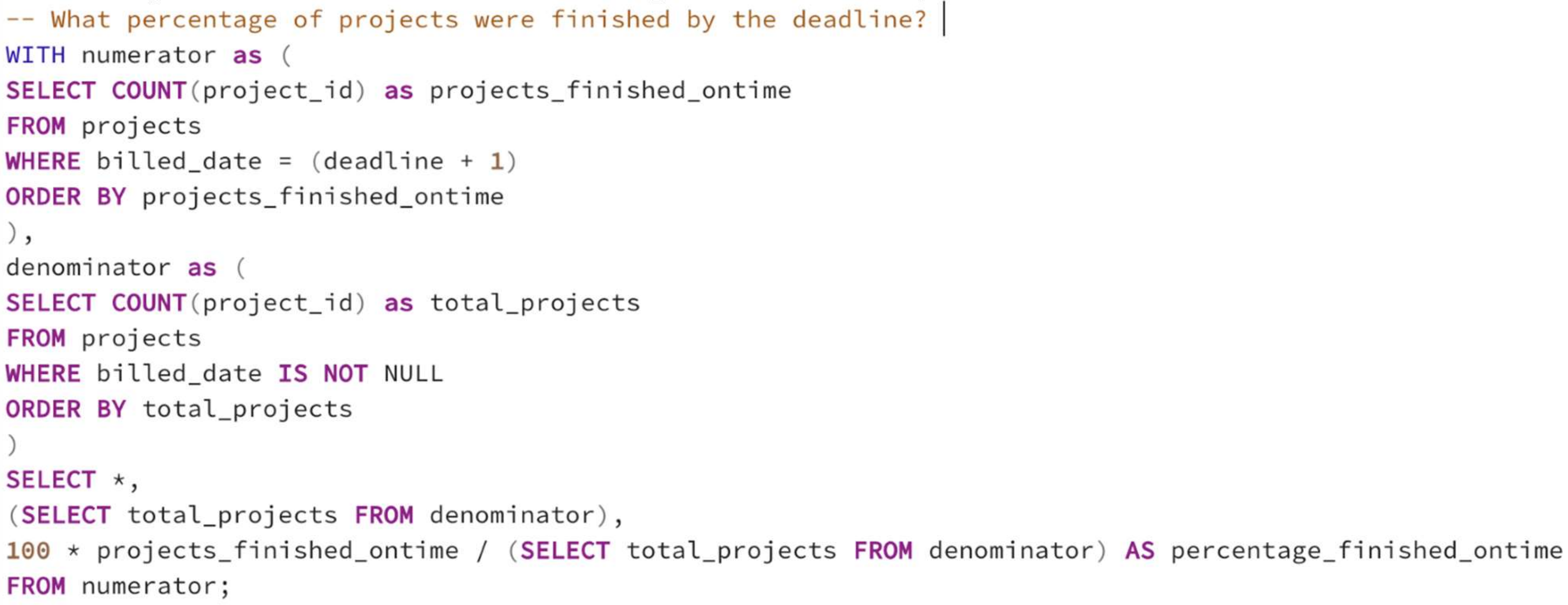
Query 5.0: Early Project Completion Rate



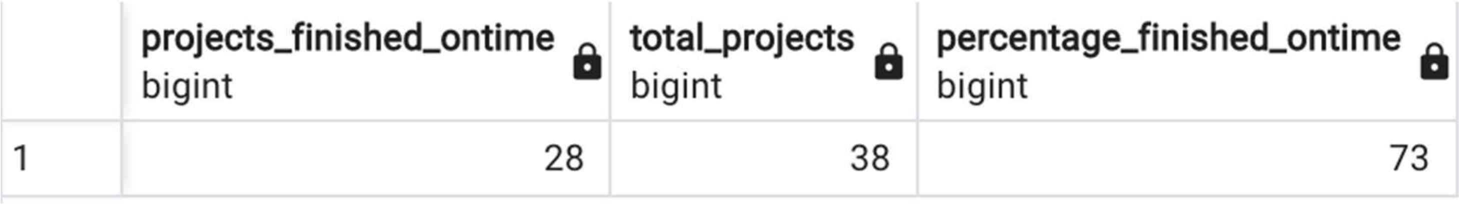
```
-- What percentage of projects were finished before the deadline?
WITH numerator as (
SELECT COUNT(project_id) as projects_finished_early
FROM projects
WHERE billed_date < deadline
ORDER BY projects_finished_early
),
denominator as (
SELECT COUNT(project_id) as total_projects
FROM projects
WHERE billed_date IS NOT NULL
ORDER BY total_projects
)
SELECT *,
(SELECT total_projects FROM denominator),
100 * projects_finished_early / (SELECT total_projects FROM denominator) AS percentage_finished_early
FROM numerator;
```

	projects_finished_early bigint	total_projects bigint	percentage_finished_early bigint
1	8	38	21

Query 5.1: On-time Project Completion Rate

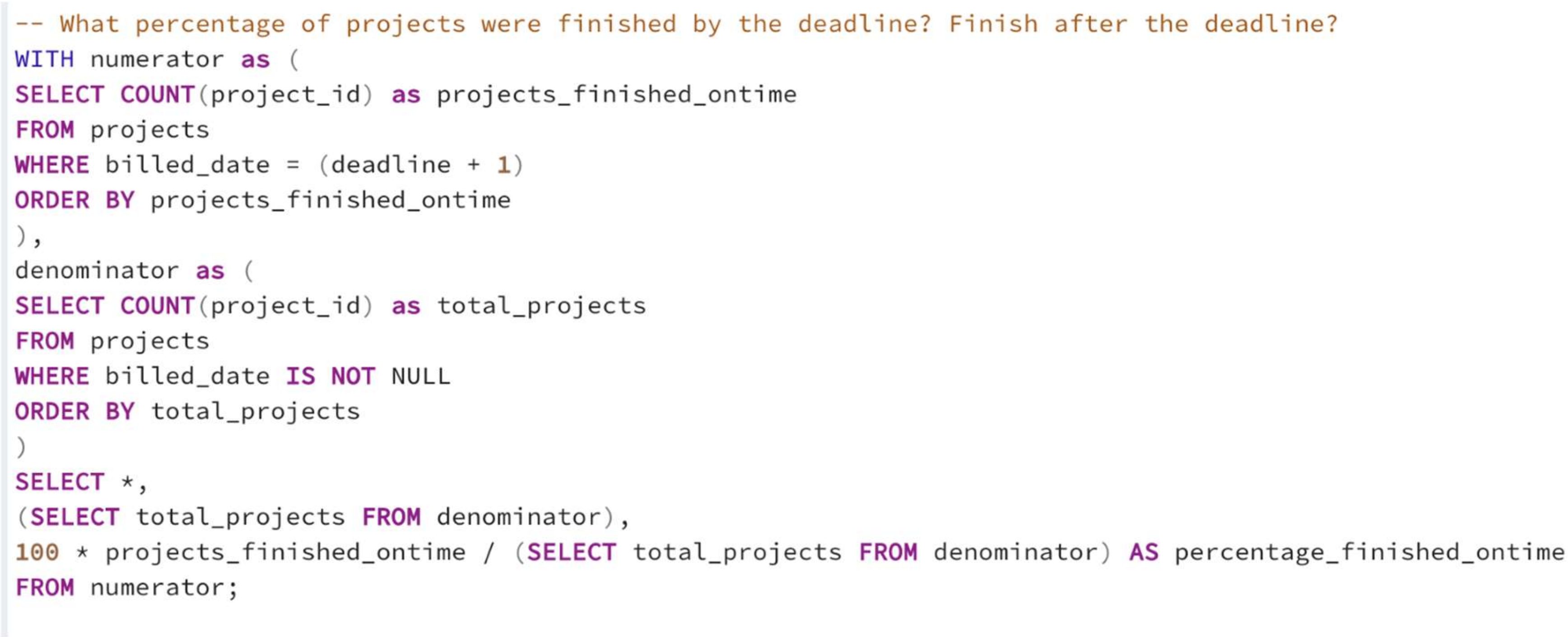


```sql
-- What percentage of projects were finished by the deadline?
WITH numerator as (
SELECT COUNT(project_id) as projects_finished_ontime
FROM projects
WHERE billed_date = (deadline + 1)
ORDER BY projects_finished_ontime
),
denominator as (
SELECT COUNT(project_id) as total_projects
FROM projects
WHERE billed_date IS NOT NULL
ORDER BY total_projects
)
SELECT *,
(SELECT total_projects FROM denominator),
100 * projects_finished_ontime / (SELECT total_projects FROM denominator) AS percentage_finished_ontime
FROM numerator;
```

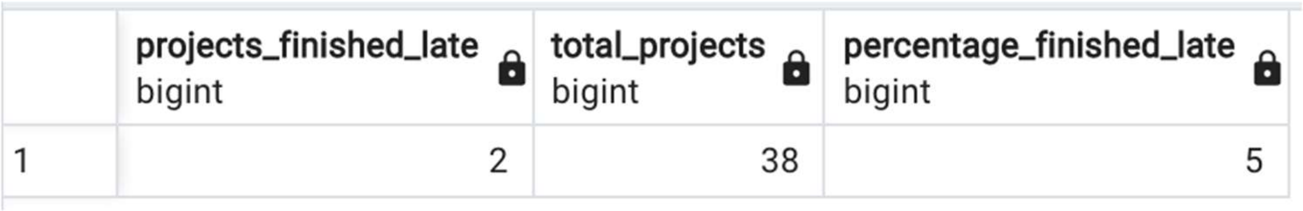


	projects_finished_ontime bigint	total_projects bigint	percentage_finished_ontime bigint
1	28	38	73

Query 5.2: Late Project Completion Rate

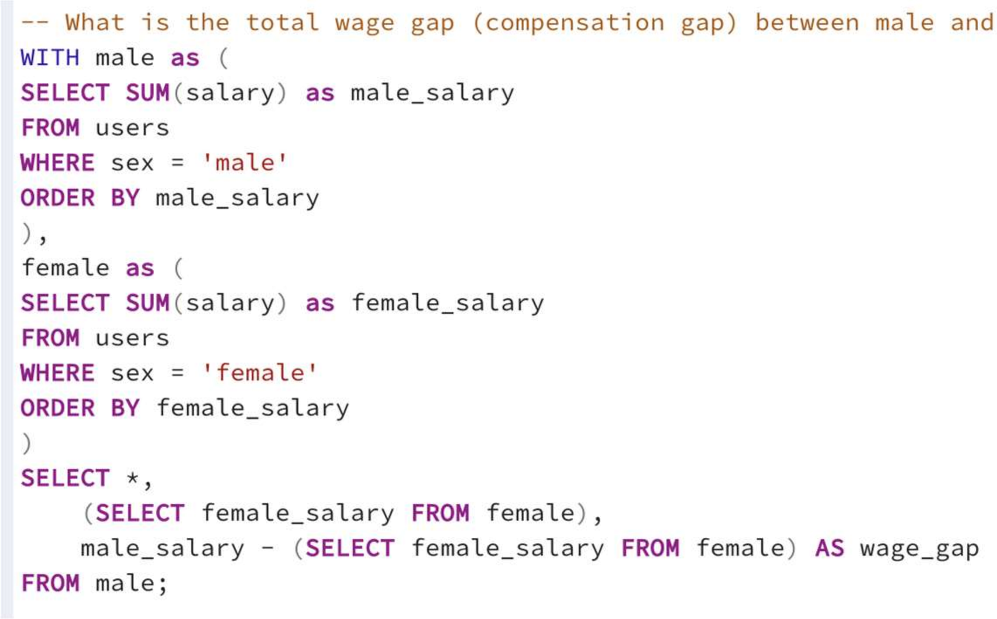


```
-- What percentage of projects were finished by the deadline? Finish after the deadline?
WITH numerator as (
SELECT COUNT(project_id) as projects_finished_ontime
FROM projects
WHERE billed_date = (deadline + 1)
ORDER BY projects_finished_ontime
),
denominator as (
SELECT COUNT(project_id) as total_projects
FROM projects
WHERE billed_date IS NOT NULL
ORDER BY total_projects
)
SELECT *,
(SELECT total_projects FROM denominator),
100 * projects_finished_ontime / (SELECT total_projects FROM denominator) AS percentage_finished_ontime
FROM numerator;
```

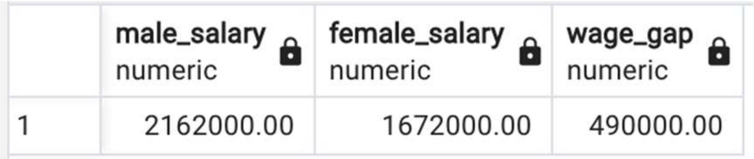


	projects_finished_late bigint	total_projects bigint	percentage_finished_late bigint
1	2	38	5

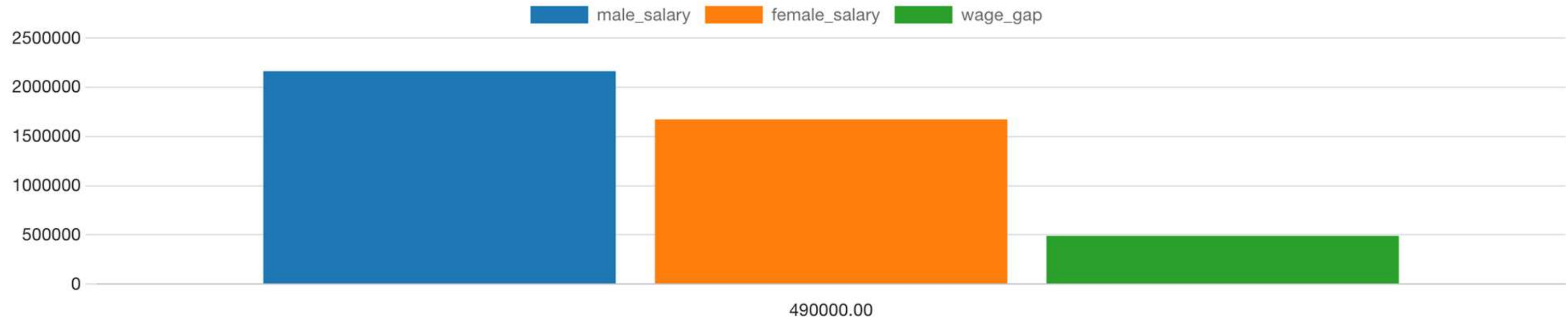
Query 6.0: Investigating Compensation Gaps



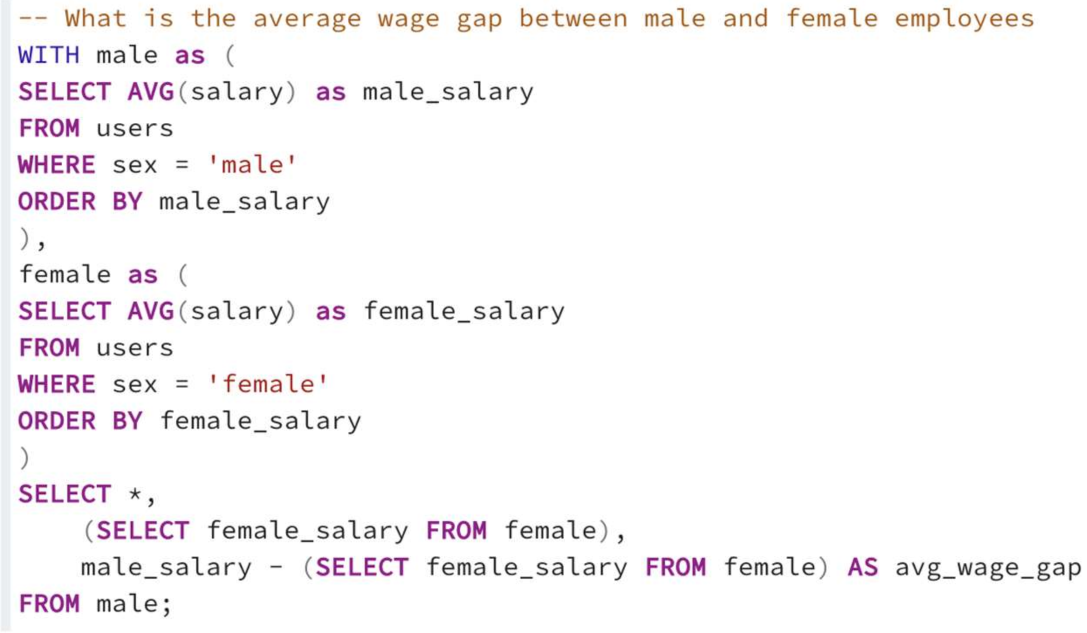
```
-- What is the total wage gap (compensation gap) between male and female employees?
WITH male as (
SELECT SUM(salary) as male_salary
FROM users
WHERE sex = 'male'
ORDER BY male_salary
),
female as (
SELECT SUM(salary) as female_salary
FROM users
WHERE sex = 'female'
ORDER BY female_salary
)
SELECT *,
    (SELECT female_salary FROM female),
    male_salary - (SELECT female_salary FROM female) AS wage_gap
FROM male;
```



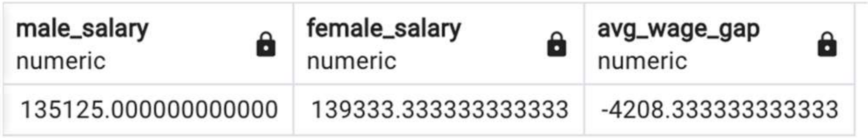
	male_salary numeric	female_salary numeric	wage_gap numeric
1	2162000.00	1672000.00	490000.00



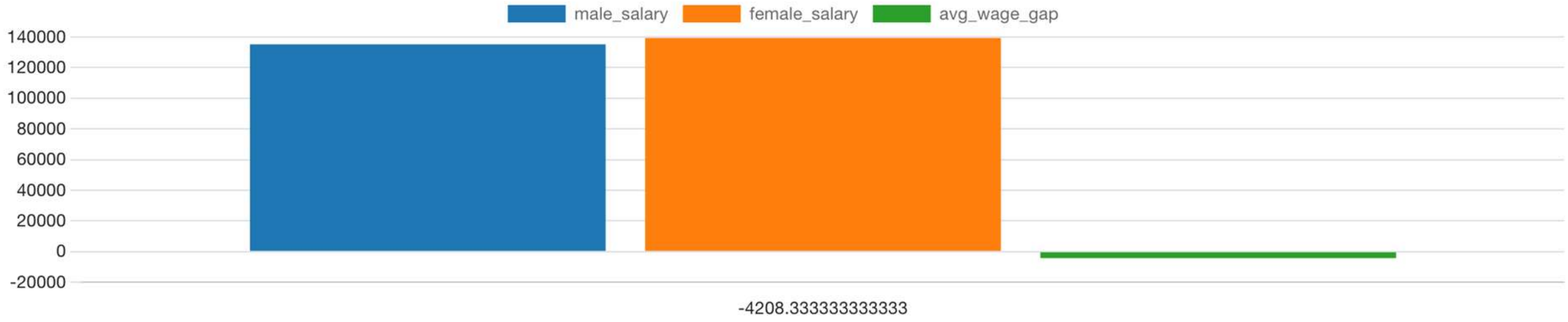
Query 6.1: Average Salary Gap



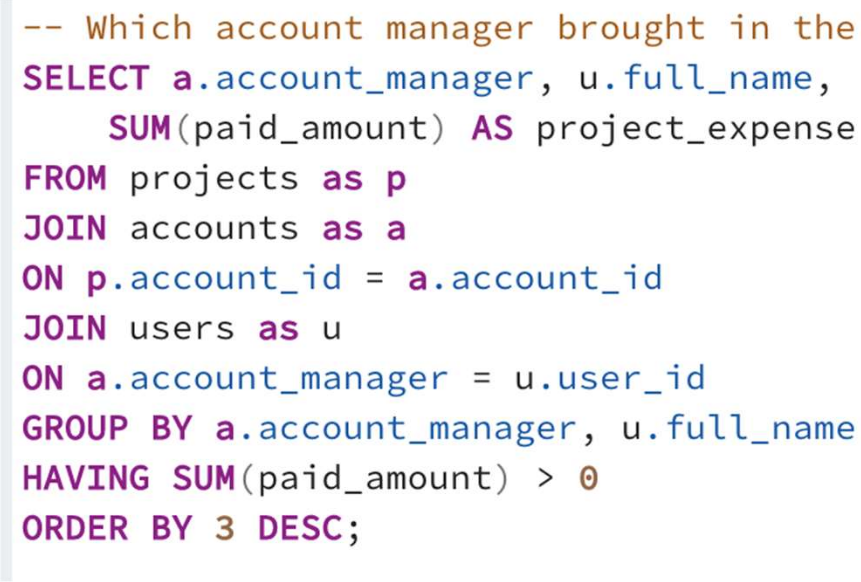
```
-- What is the average wage gap between male and female employees
WITH male as (
SELECT AVG(salary) as male_salary
FROM users
WHERE sex = 'male'
ORDER BY male_salary
),
female as (
SELECT AVG(salary) as female_salary
FROM users
WHERE sex = 'female'
ORDER BY female_salary
)
SELECT *,
    (SELECT female_salary FROM female),
    male_salary - (SELECT female_salary FROM female) AS avg_wage_gap
FROM male;
```



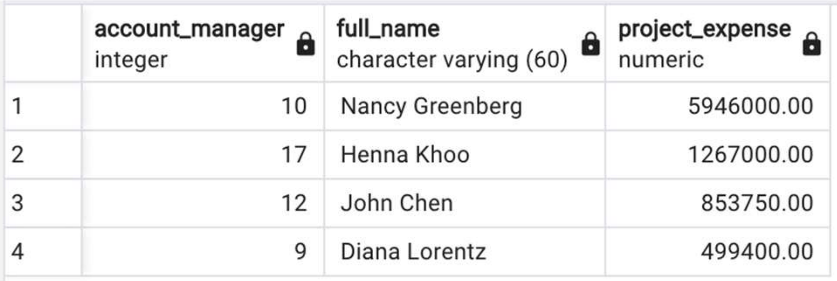
male_salary numeric	female_salary numeric	avg_wage_gap numeric
135125.000000000000	139333.333333333333	-4208.333333333333



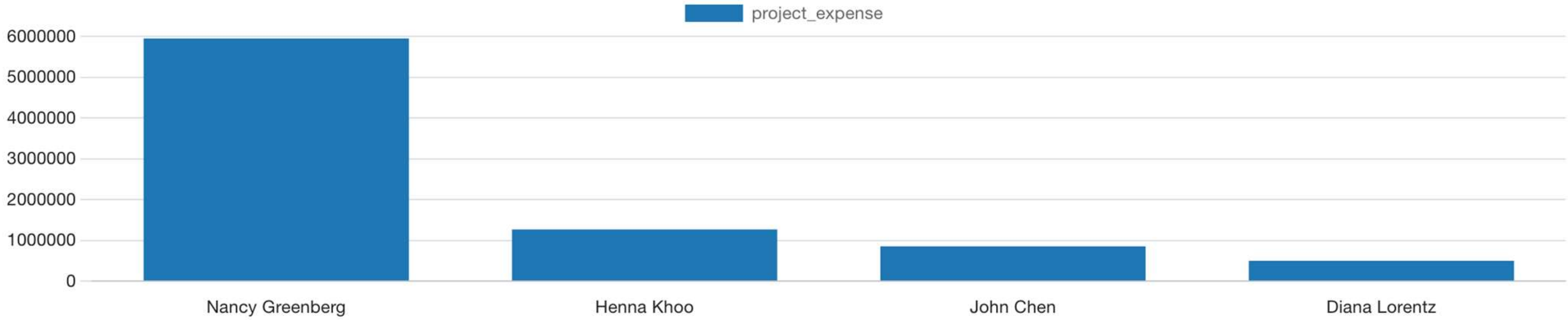
Query 7: Analyzing Account Manager Performance



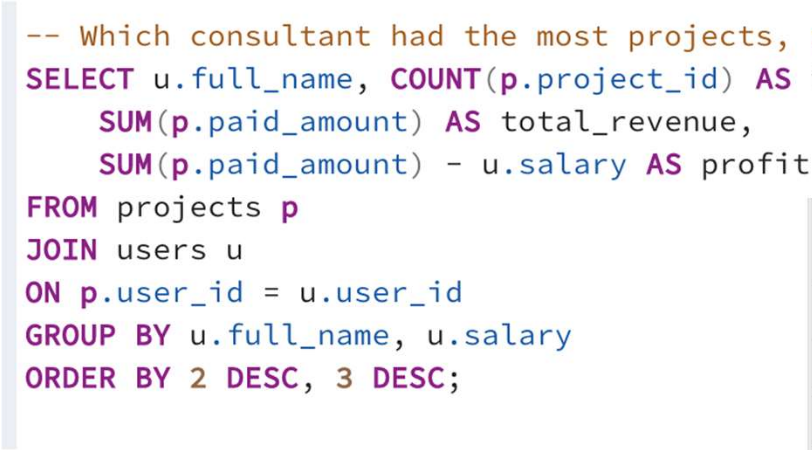
```
-- Which account manager brought in the most revenue?
SELECT a.account_manager, u.full_name,
    SUM(paid_amount) AS project_expense
FROM projects as p
JOIN accounts as a
ON p.account_id = a.account_id
JOIN users as u
ON a.account_manager = u.user_id
GROUP BY a.account_manager, u.full_name
HAVING SUM(paid_amount) > 0
ORDER BY 3 DESC;
```



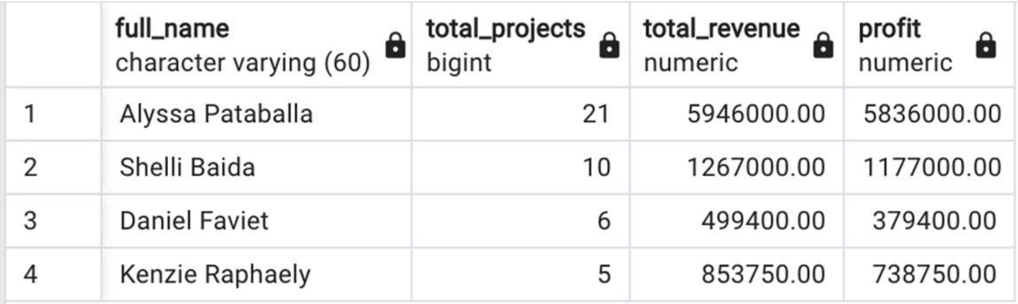
	account_manager integer	full_name character varying (60)	project_expense numeric
1	10	Nancy Greenberg	5946000.00
2	17	Henna Khoo	1267000.00
3	12	John Chen	853750.00
4	9	Diana Lorentz	499400.00



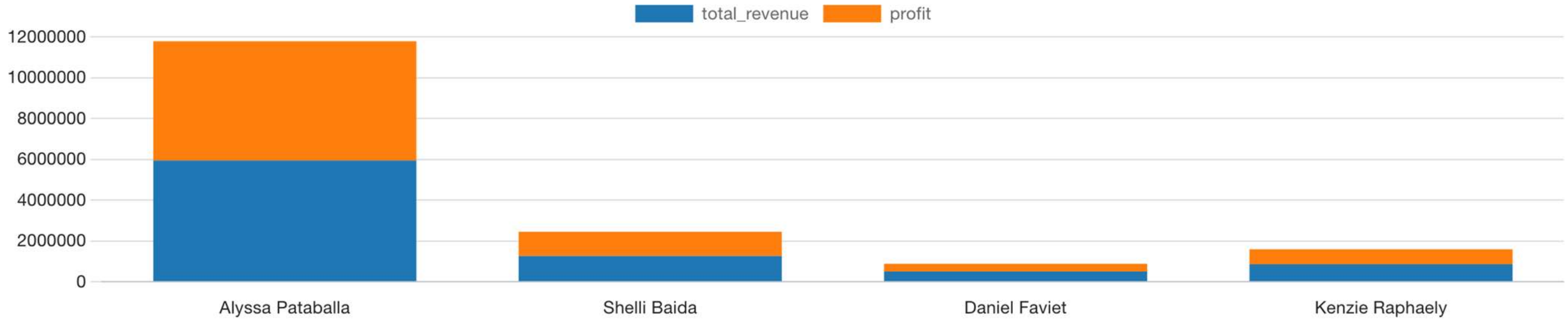
Query 8: Analyzing Consultant Profitability



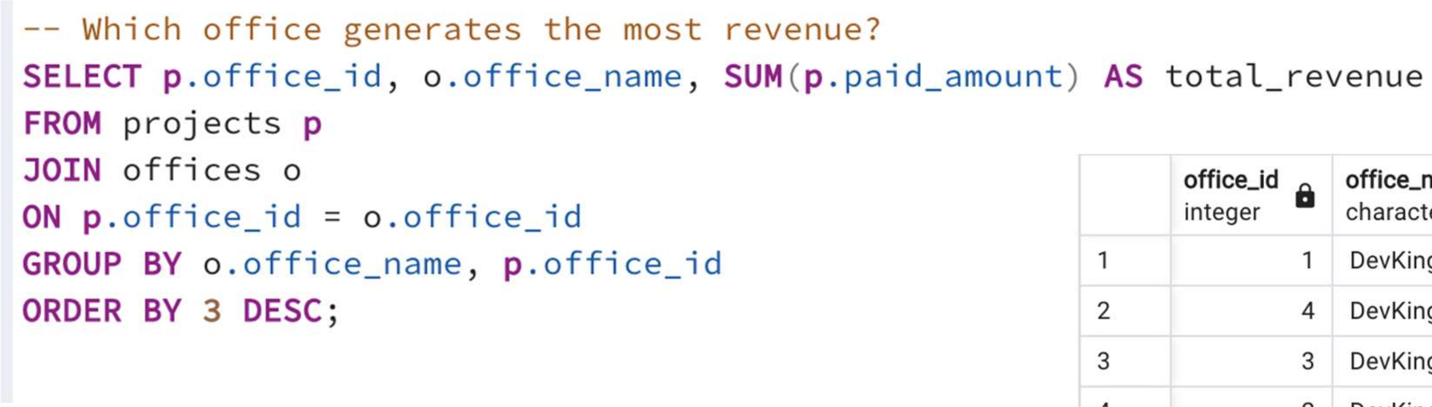
```
-- Which consultant had the most projects, revenue and profit?
SELECT u.full_name, COUNT(p.project_id) AS total_projects,
    SUM(p.paid_amount) AS total_revenue,
    SUM(p.paid_amount) - u.salary AS profit
FROM projects p
JOIN users u
ON p.user_id = u.user_id
GROUP BY u.full_name, u.salary
ORDER BY 2 DESC, 3 DESC;
```



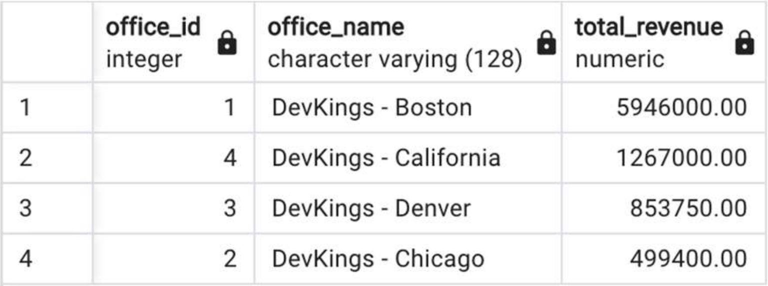
	full_name character varying (60)	total_projects bigint	total_revenue numeric	profit numeric
1	Alyssa Pataballa	21	5946000.00	5836000.00
2	Shelli Baida	10	1267000.00	1177000.00
3	Daniel Faviet	6	499400.00	379400.00
4	Kenzie Raphaely	5	853750.00	738750.00



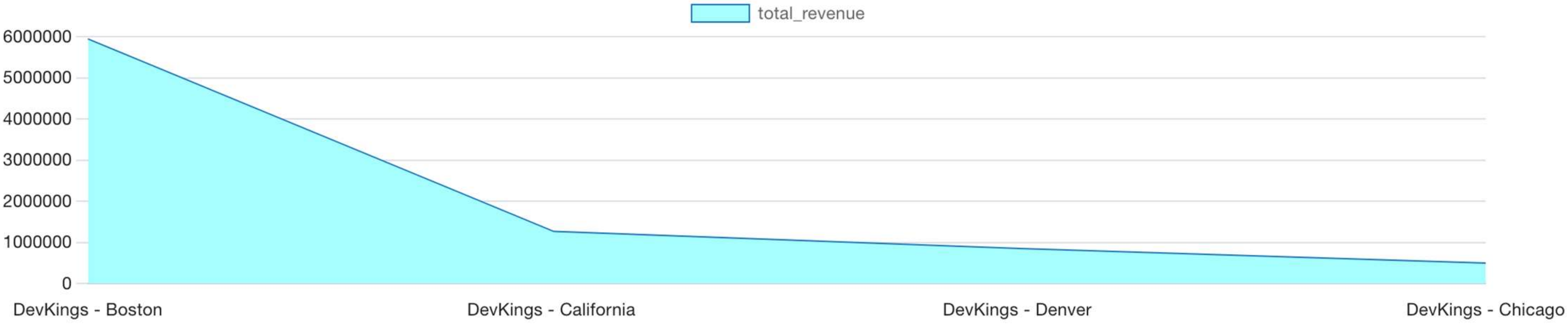
Query 9: Analyzing Office Profitability



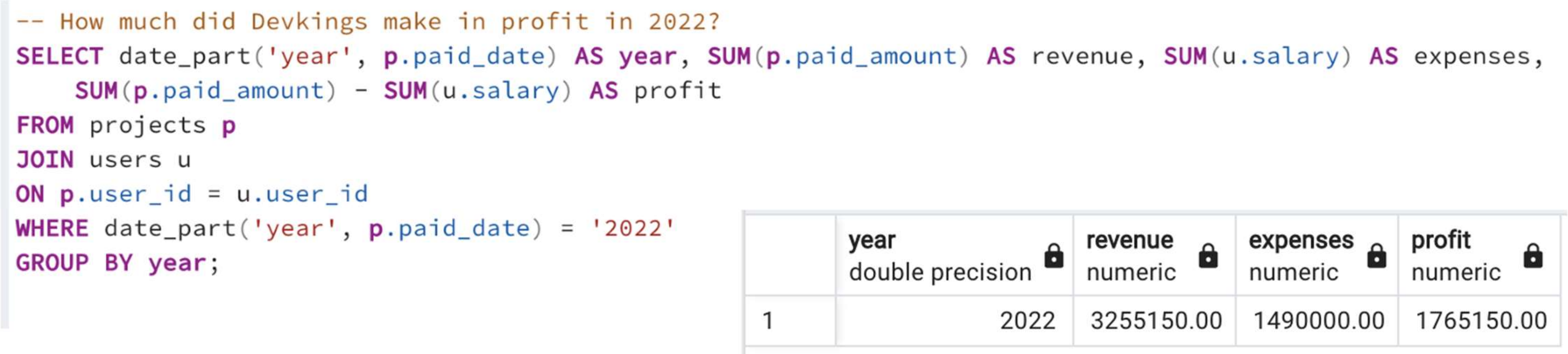
```
-- Which office generates the most revenue?
SELECT p.office_id, o.office_name, SUM(p.paid_amount) AS total_revenue
FROM projects p
JOIN offices o
ON p.office_id = o.office_id
GROUP BY o.office_name, p.office_id
ORDER BY 3 DESC;
```



	office_id integer	office_name character varying (128)	total_revenue numeric
1	1	DevKings - Boston	5946000.00
2	4	DevKings - California	1267000.00
3	3	DevKings - Denver	853750.00
4	2	DevKings - Chicago	499400.00

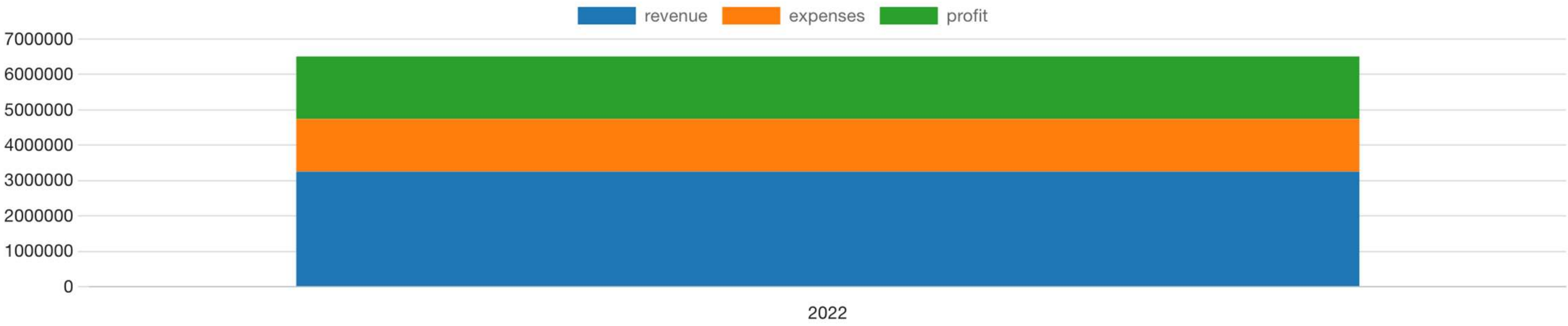


Query 10: DevKings Profit Analysis for 2022

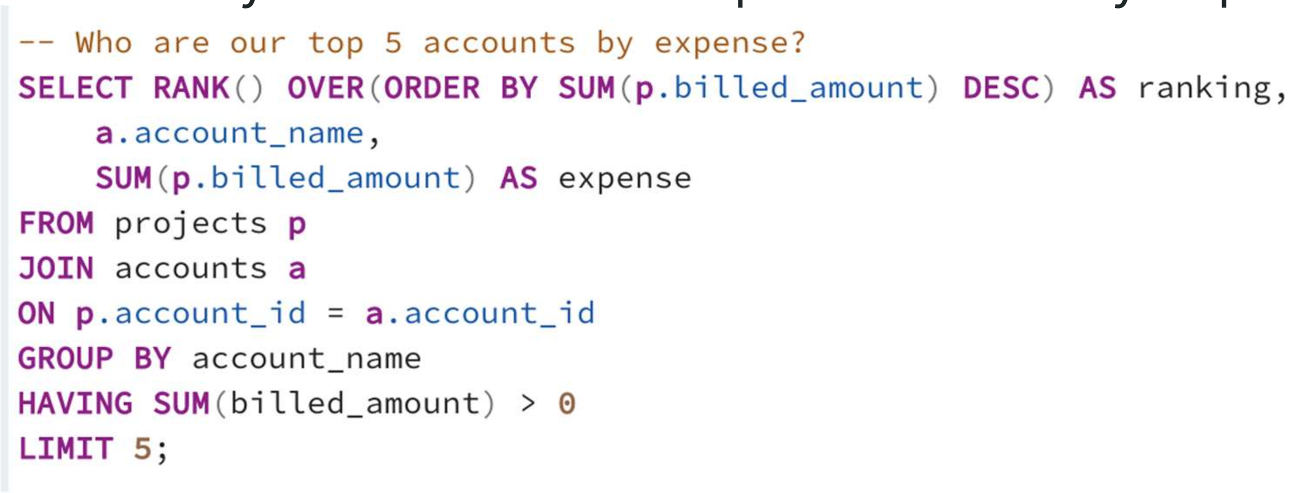


```
-- How much did Devkings make in profit in 2022?
SELECT date_part('year', p.paid_date) AS year, SUM(p.paid_amount) AS revenue, SUM(u.salary) AS expenses,
    SUM(p.paid_amount) - SUM(u.salary) AS profit
FROM projects p
JOIN users u
ON p.user_id = u.user_id
WHERE date_part('year', p.paid_date) = '2022'
GROUP BY year;
```

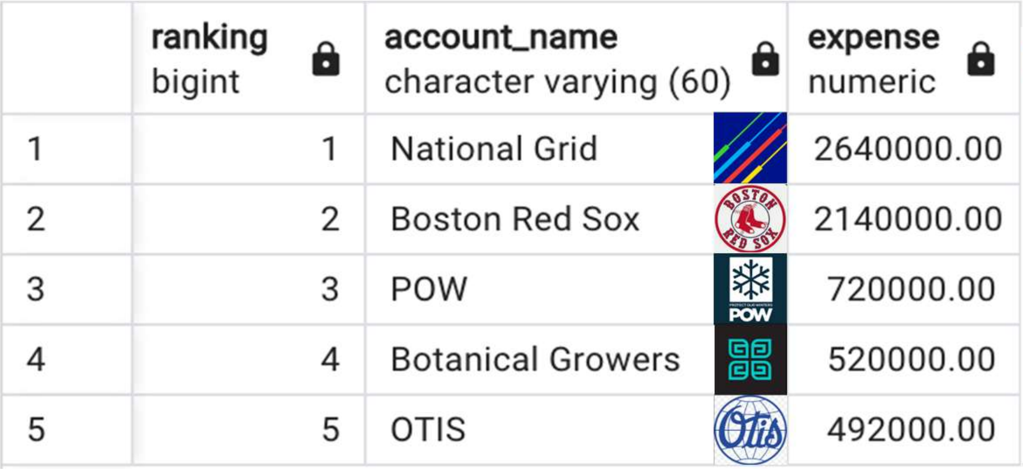
	year double precision 🔒	**revenue** numeric 🔒	**expenses** numeric 🔒	**profit** numeric 🔒
1	2022	3255150.00	1490000.00	1765150.00



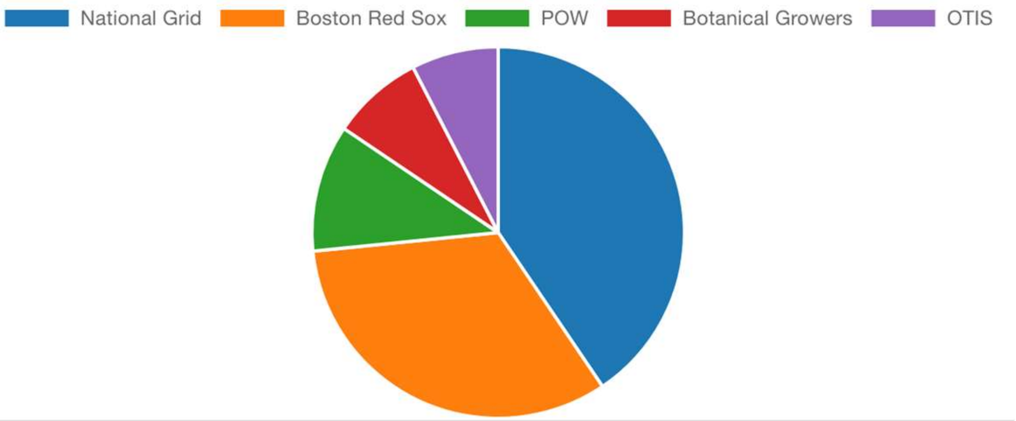
Query 11: Who are our top 5 accounts by expense?



```sql
-- Who are our top 5 accounts by expense?
SELECT RANK() OVER(ORDER BY SUM(p.billed_amount) DESC) AS ranking,
    a.account_name,
    SUM(p.billed_amount) AS expense
FROM projects p
JOIN accounts a
ON p.account_id = a.account_id
GROUP BY account_name
HAVING SUM(billed_amount) > 0
LIMIT 5;
```



	ranking bigint 🔒	account_name character varying (60) 🔒	expense numeric 🔒
1	1	National Grid	2640000.00
2	2	Boston Red Sox	2140000.00
3	3	POW	720000.00
4	4	Botanical Growers	520000.00
5	5	OTIS	492000.00



Thank you ☺

DK

DEVKINGS

CONSULTING GROUP

Questions?