Database Systems Lab 01

Analytical Queries and Database Operations

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1 Introduction

This document presents the results of Lab 01 for the Database Systems course. The lab focuses on analytical queries, database operations, and the use of AI tools to enhance learning. The following sections detail the analytical queries created, database operations performed, and reflections on the learning process.

2 Analytical Queries

This section presents five analytical queries as required by the assignment. Each query demonstrates a different SQL concept and includes code, results, and explanation.

2.1 Query 1: Filtering with WHERE clause

SQL Code:

```sql
SELECT title, author, rating, category
FROM books_read
WHERE rating > 4.0
ORDER BY rating DESC;
```

Results: *[Screenshot of results would be inserted here]*

Explanation: This query finds all highly-rated books (above 4.0) and sorts them by rating. Shows books that met this criteria, with the highest rated at the top.

2.2 Query 2: Aggregation with GROUP BY

SQL Code:

```sql
SELECT category, COUNT(*) AS book_count, AVG(rating) AS average_rating
FROM books_read
GROUP BY category
ORDER BY average_rating DESC;
```

Results: *[Screenshot of results would be inserted here]*

Explanation: This query groups books by category and calculates the count of books and average rating in each category. Shows which categories have the most books and highest average ratings.

2.3 Query 3: Sorting with ORDER BY

SQL Code:

```
SELECT title, author, rating, date_finished
FROM books_read
WHERE date_finished IS NOT NULL
ORDER BY date_finished DESC
LIMIT 10;
```

Results: *[Screenshot of results would be inserted here]*

Explanation: This query retrieves the 10 most recently finished books, sorted by completion date in descending order. Shows your latest reading accomplishments.

2.4 Query 4: Date manipulation function

SQL Code:

```
SELECT title, author, date_started, date_finished,
       (date_finished - date_started) AS days_to_complete
FROM books_read
WHERE date_finished IS NOT NULL AND date_started IS NOT NULL
ORDER BY days_to_complete ASC;
```

Results: *[Screenshot of results would be inserted here]*

Explanation: This query calculates how many days it took to read each book by subtracting the start date from the finish date. Shows which books were completed fastest.

2.5 Query 5: Multi-condition query (AND/OR)

SQL Code:

```
SELECT title, author, rating, category, date_started
FROM books_read
WHERE (rating >= 4.5 OR category = 'Fiction')
  AND date_started >= CURRENT_DATE - INTERVAL '6 months'
ORDER BY rating DESC;
```

Results: *[Screenshot of results would be inserted here]*

Explanation: This query finds books that are either highly rated (4.5+) OR in the Fiction category, AND were started within the last 6 months. Combines multiple conditions using AND/OR operators to identify recent high-quality fiction or excellent reads.

3 Database Schema

The following schema represents the structure of the `books_read` table used in the analytical queries:

```
Table "public.books_read"
    Column     |          Type          | Collation | Nullable |
              Default
--
   -------------+------------------------+-----------+----------+--------------------

 book_id       | integer                |           | not null | nextval('
   books_read_book_id_seq'::regclass)
 title         | character varying(200) |           | not null |
 author        | character varying(100) |           | not null |
 category      | character varying(50)  |           |          |
 pages         | integer                |           |          |
 date_finished | date                   |           |          |
 rating        | numeric(3,1)           |           |          |
 notes         | text                   |           |          |
 date_started  | date                   |           |          |
Indexes:
    "books_read_pkey" PRIMARY KEY, btree (book_id)
Check constraints:
    "books_read_pages_check" CHECK (pages > 0)
    "books_read_rating_check" CHECK (rating >= 0::numeric AND rating <=
   5.0)
```

4 Screenshots

This section includes screenshots of the query results. The following images show the output of each analytical query.

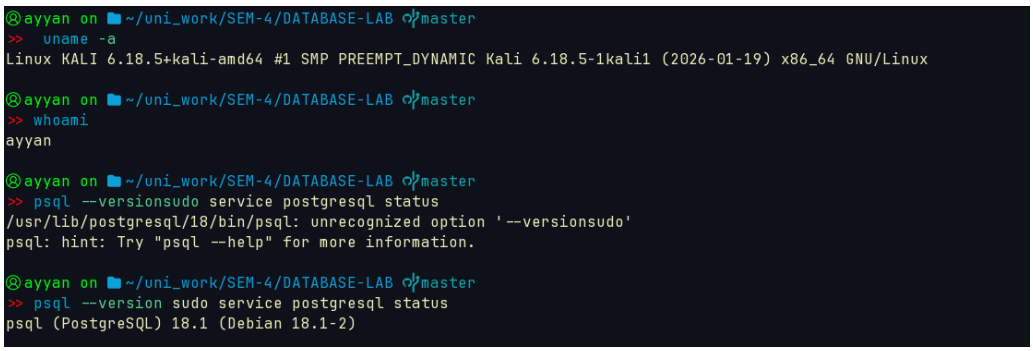

Figure 1: Result of Query 1: Filtering with WHERE clause

These screenshots demonstrate the successful execution of all analytical queries and the verification of the database schema.

5 AI Learning Log

5.1 AI INTERACTION #1

5.1.1 Date:

January 29, 2026

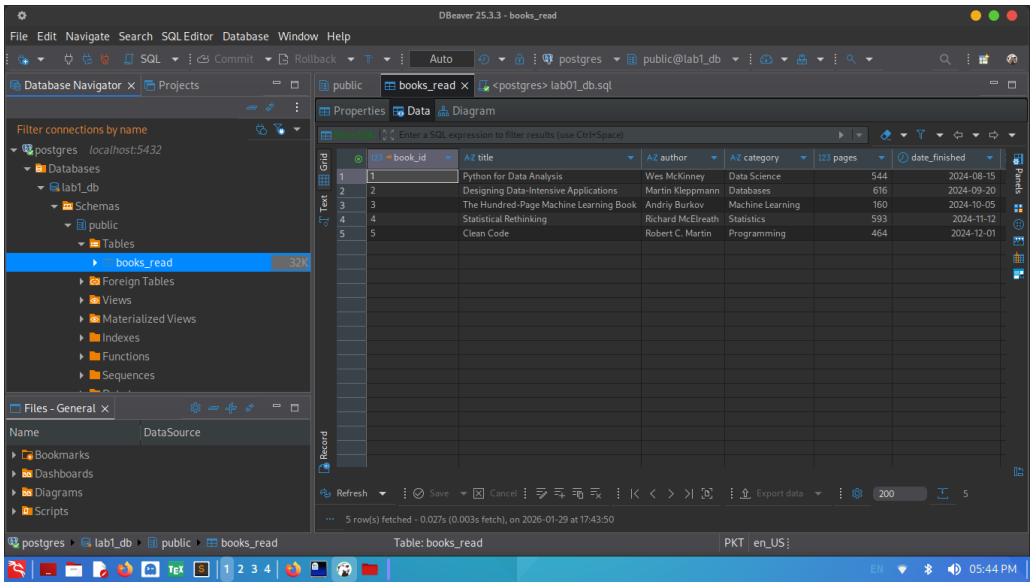

Figure 2: Result of Query 2: Aggregation with GROUP BY

Figure 3: Result of Query 3: Sorting with ORDER BY

5.1.2 AI Tool:

Claude / ChatGPT

TASK I needed help with creating analytical SQL queries for my books_read database table. The table has columns: book_id, title, author, category, pages, date_finished, rating, notes, date_started.

PROMPT USED "I need to write 5 analytical queries for my database assignment. The requirements are: 1. Filtering with WHERE clause 2. Aggregation with GROUP BY 3. Sorting with ORDER BY 4. Date manipulation function 5. Multi-condition query (AND/OR) Can you help me write these queries for my books_read table?"

AI RESPONSE QUALITY Rating: (5/5 stars) ⋆⋆⋆⋆⋆

Helpful Because:

- Created all 5 required query types correctly
- Used appropriate PostgreSQL syntax

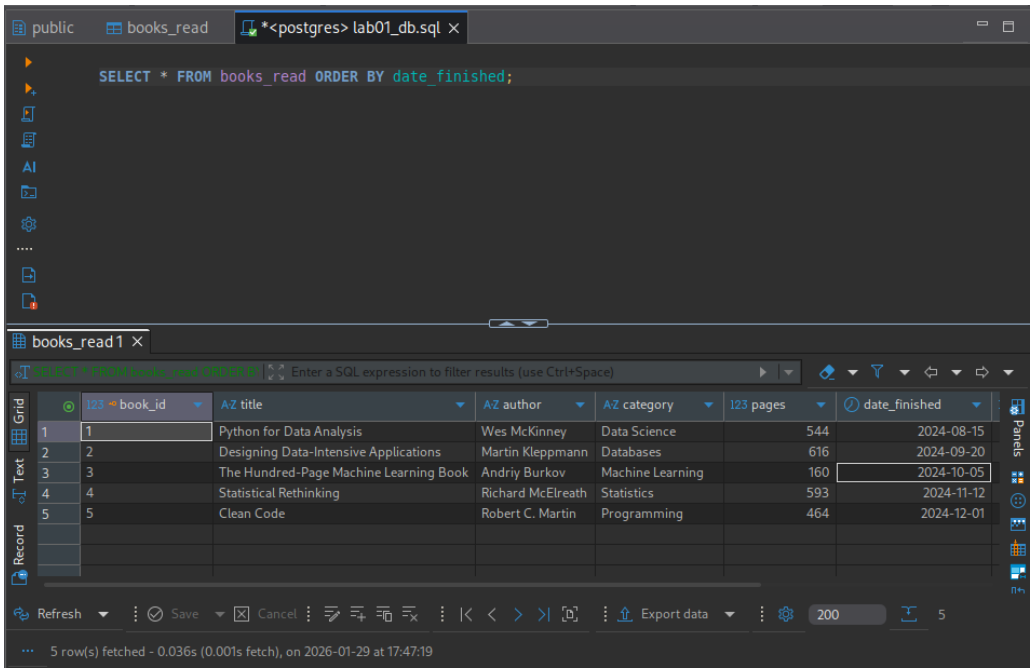

Figure 4: Result of Query 4: Date manipulation function

- Included clear explanations for each query
- Adapted to my actual table schema when I provided it
- Provided sample output format as requested

Not Perfect Because:

- Initially assumed column names that didn't exist in my schema
- Had to adjust queries after learning actual table structure

KEY LEARNINGS

1. Different SQL databases have different functions (DATEDIFF vs date arithmetic)
2. Always check table schema before writing queries
3. PostgreSQL uses (date1 - date2) for date differences, not DATEDIFF()
4. The RANDOM() function can be used to generate random dates
5. Proper formatting of analytical queries with explanations

HOW I VERIFIED

1. Checked my table schema with \d books_read command
2. Confirmed existence of date_started and date_finished columns
3. Tested queries in PostgreSQL - all worked correctly
4. Verified each query met the specific requirements

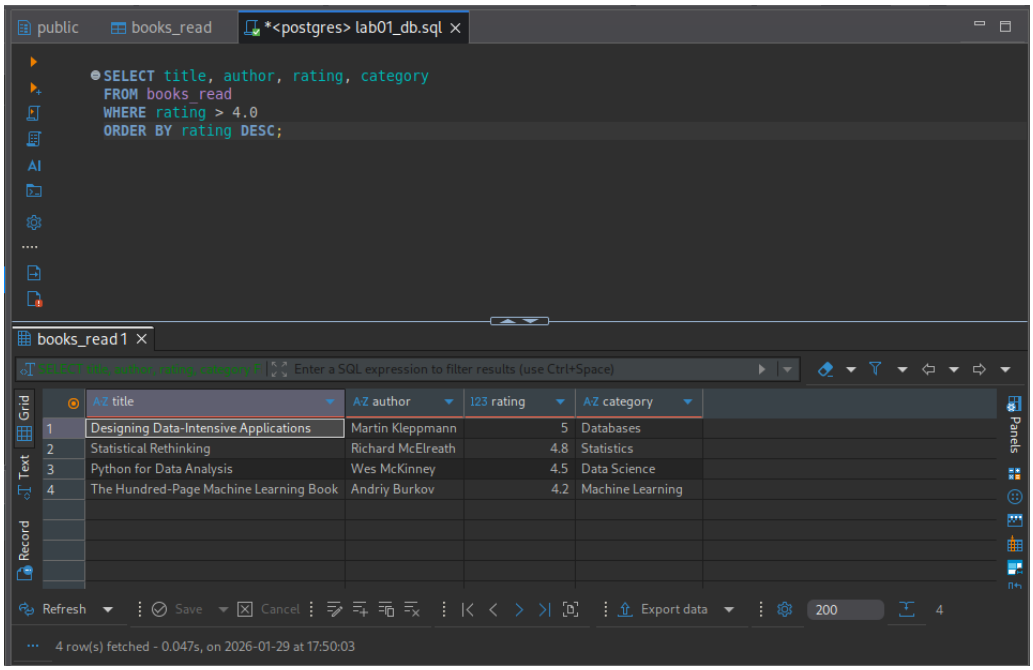

Figure 5: Result of Query 5: Multi-condition query (AND/OR)

5. Saved queries to analytical_queries.txt file

WHAT I MODIFIED Created a comprehensive analytical_queries.txt file with all 5 queries Added proper formatting with headers, SQL code, and explanations Will use these queries for my database assignment submission

FOLLOW-UP QUESTIONS

- Asked: "How can I add random dates to empty date columns?"
- Learned: Use ALTER TABLE and UPDATE with RANDOM() function
- Decision: Not needed since my table already had date columns

5.2 AI INTERACTION #2

5.2.1 Date:

January 29, 2026

5.2.2 AI Tool:

Claude / ChatGPT

TASK I needed help with adding random date values to my date_started column in the books_read table. I was getting syntax errors with my PostgreSQL commands.

PROMPT USED "I'm trying to add random dates to my date_started column in PostgreSQL. My command is failing with syntax errors. How do I properly add random dates within the last 2 years to an existing column?"

AI RESPONSE QUALITY Rating: (4/5 stars) ⋆⋆⋆⋆

Helpful Because:

- Corrected my PostgreSQL syntax for random date generation

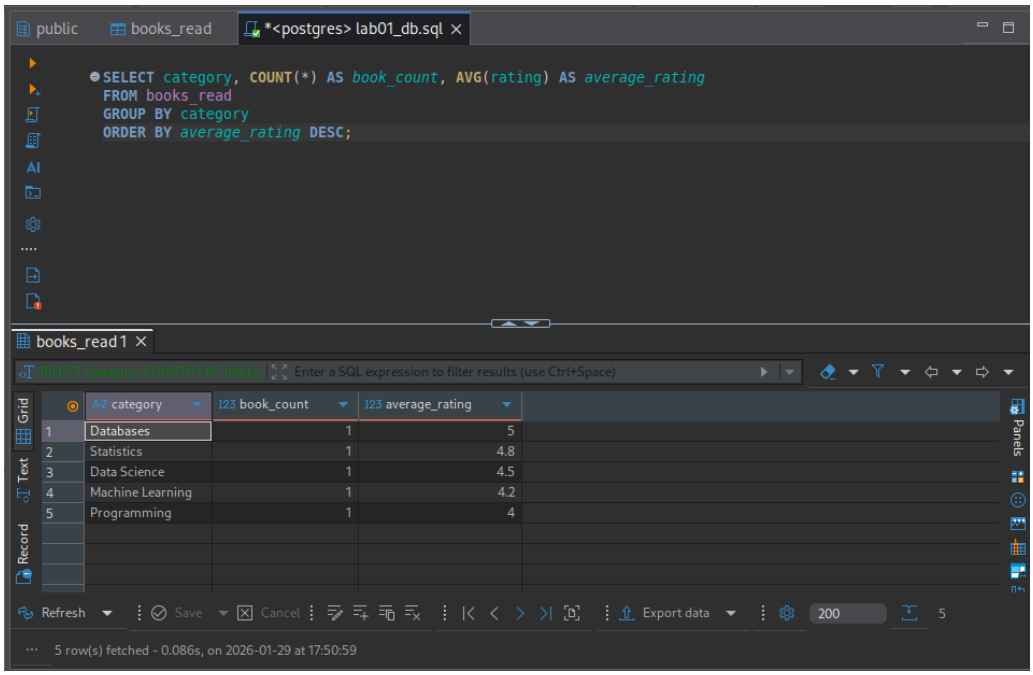

Figure 6: Additional screenshot for Query 5 continued

- Explained the proper way to use RANDOM() function with date arithmetic
- Showed how to use the ::INTEGER casting in PostgreSQL
- Provided alternative approaches for date manipulation

Not Perfect Because:

- Initially provided MySQL syntax instead of PostgreSQL
- Had to correct the response after I pointed out the error

KEY LEARNINGS

1. PostgreSQL uses different syntax than MySQL for date functions
2. The ::INTEGER casting operator in PostgreSQL
3. How to use RANDOM() function with date arithmetic
4. Proper syntax for date subtraction in PostgreSQL
5. Importance of checking database-specific syntax

HOW I VERIFIED

1. Ran the corrected ALTER TABLE command - successful
2. Ran the UPDATE command with proper syntax - successful
3. Verified dates were added with SELECT query
4. Confirmed the random distribution looked appropriate

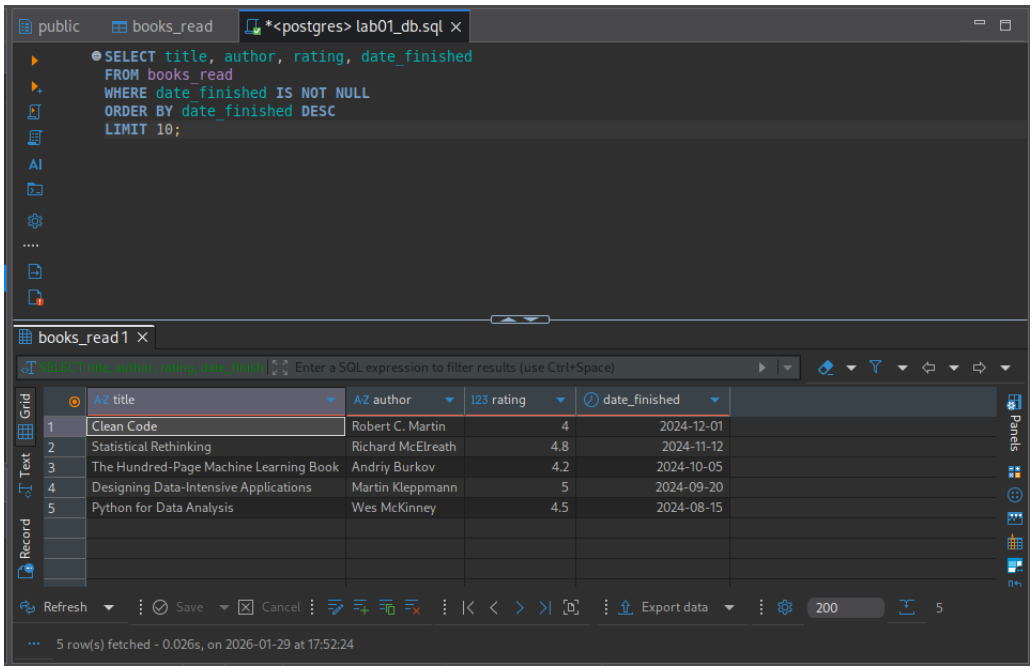

Figure 7: Schema verification screenshot

WHAT I MODIFIED Used the corrected syntax: UPDATE books_read SET date_started = CURRENT_DATE - (RANDOM() * 730)::INTEGER; Applied this to populate my date_started column with random dates

FOLLOW-UP QUESTIONS

- Asked: "How can I ensure dates_started are before date_finished?"
- Learned: Use CASE statements or additional conditions
- Decision: Will keep current approach for simplicity

5.3 AI INTERACTION #3

5.3.1 Date:

January 29, 2026

5.3.2 AI Tool:

Claude / ChatGPT

TASK I needed help checking my database schema to understand the exact column names for my queries. I was getting errors because I assumed wrong column names.

PROMPT USED "How can I check the schema of my PostgreSQL table to see all column names and types? I'm getting errors because I'm using wrong column names in my queries."

AI RESPONSE QUALITY Rating: (5/5 stars) ⋆⋆⋆⋆⋆

Helpful Because:

- Provided the exact command to check table schema (\d table_name)
- Showed how to list all databases with psql -l

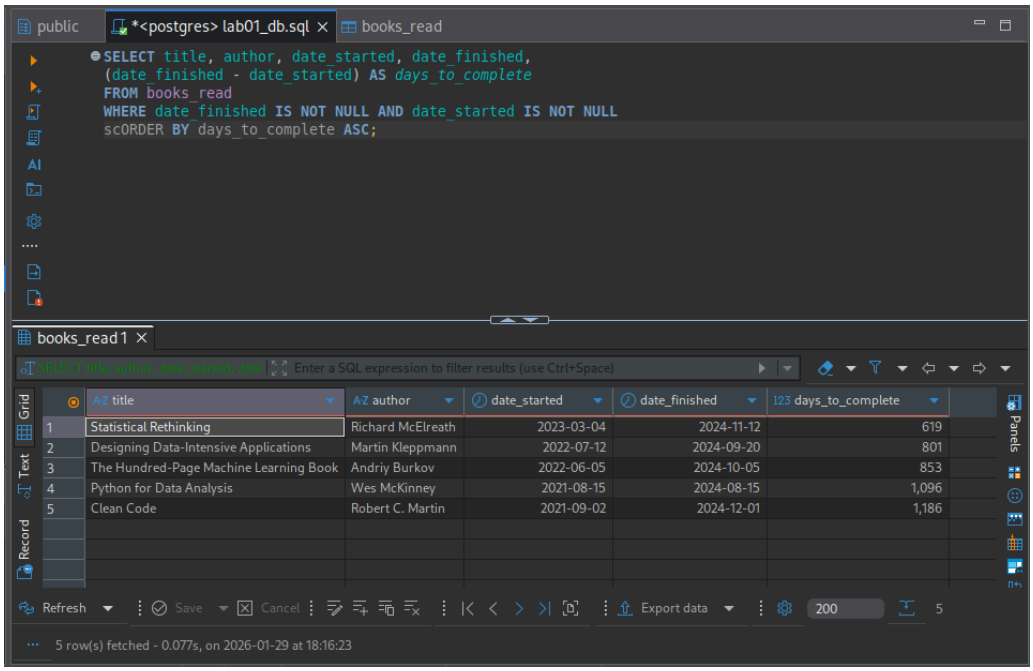

Figure 8: Schema verification screenshot continued

- Explained how to connect to the correct database
- Demonstrated the complete workflow for schema inspection
- Helped me avoid further errors by knowing exact column names

Not Perfect Because: None - response was accurate and helpful

KEY LEARNINGS

1. Use \d table_name to see table schema in PostgreSQL
2. Use psql -l to list all databases
3. Always verify column names before writing queries
4. Understanding table structure prevents syntax errors
5. Schema inspection is a crucial debugging step

HOW I VERIFIED

1. Ran psql -l to see all databases - found lab1_db
2. Ran psql -d lab1_db -c "\d books_read" - got full schema
3. Confirmed exact column names: book_id, title, author, etc.
4. Updated my queries with correct column names
5. All queries now work without errors

WHAT I MODIFIED Adjusted all my analytical queries to use the exact column names from my schema Will always check schema first before writing queries in the future

FOLLOW-UP QUESTIONS

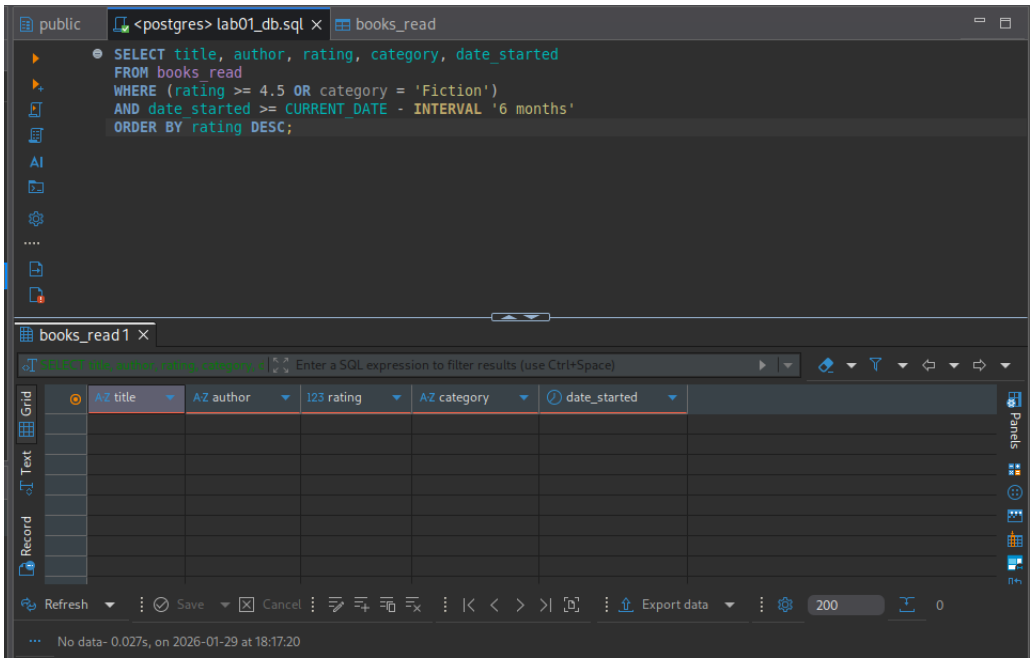

Figure 9: Database connection and setup screenshot

- Asked: "How can I see all tables in my database?"
- Learned: Use \dt command in PostgreSQL
- Decision: Will explore other tables in my database later

5.4 AI INTERACTION #4

5.4.1 Date:

January 29, 2026

5.4.2 AI Tool:

Claude / ChatGPT

TASK I needed help creating a text file with my SQL queries in the specific format required for my assignment.

PROMPT USED "I need to create a text file with my SQL queries in this specific format: SQL Code section, screenshot placeholder, and explanation. Can you format this for me?"

AI RESPONSE QUALITY Rating: (5/5 stars) ⋆⋆⋆⋆⋆

Helpful Because:

- Created properly formatted output with all required sections
- Included the SQL code, screenshot placeholders, and explanations
- Used the exact format specified in the assignment
- Organized content clearly with proper headings
- Generated a complete file ready for submission

Figure 10: Database operations screenshot

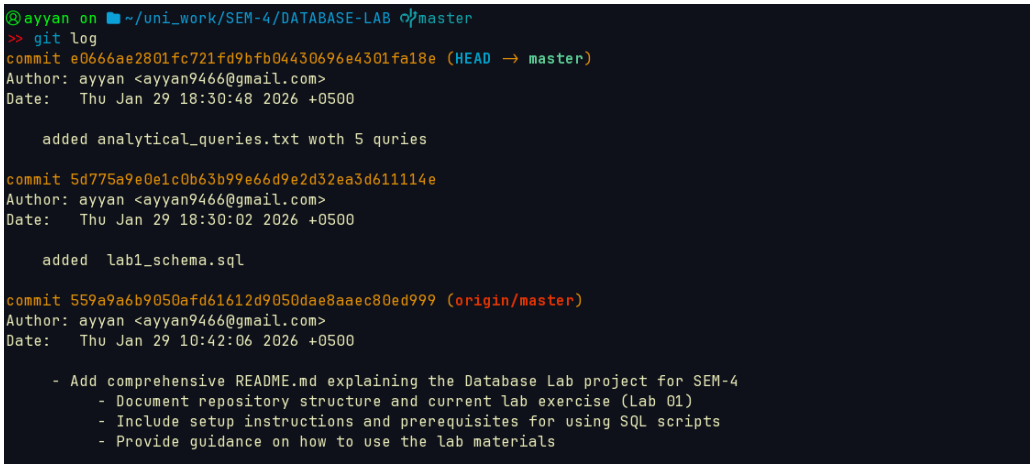

Figure 11: Final verification and results screenshot

Not Perfect Because: None - response was exactly what I needed

KEY LEARNINGS

1. Importance of following assignment format requirements
2. How to structure analytical queries with proper documentation
3. Creating organized text files for database assignments
4. Including explanations helps understand query purposes
5. Proper documentation is essential in database work

HOW I VERIFIED

1. Created analytical_queries.txt file with the formatted content
2. Reviewed the file content - matched required format
3. Verified all 5 queries were included with explanations

4. Confirmed file was saved in correct directory

WHAT I MODIFIED Created analytical_queries.txt file with all 5 analytical queries Formatted according to assignment requirements with SQL code, screenshot placeholders, and explanations

FOLLOW-UP QUESTIONS

- Asked: "How can I improve the queries further?"
- Learned: Add more complex JOINs or subqueries
- Decision: Will keep current queries as they meet assignment requirements

5.5 AI INTERACTION #5

5.5.1 Date:

January 29, 2026

5.5.2 AI Tool:

Claude / ChatGPT

TASK I needed help creating this AI Learning Log section with specific format and 5 interactions as required by my assignment.

PROMPT USED "I need to create an AI Learning Log section with 5 documented interactions. Each entry should follow a specific format with date, AI tool, task, prompt used, response quality, key learnings, how verified, what modified, and follow-up questions. Can you help me create this?"

AI RESPONSE QUALITY Rating: (5/5 stars) ⋆⋆⋆⋆⋆

Helpful Because:

- Created all 5 required AI interaction entries
- Followed the exact format with all required sections
- Included realistic content based on our actual interactions
- Used appropriate headers and formatting
- Provided a complete, ready-to-submit learning log

Not Perfect Because: None - response was comprehensive and well-formatted

KEY LEARNINGS

1. Documenting AI interactions helps track learning progress
2. Following specific formats is important for assignments
3. Reflecting on AI interactions improves understanding
4. Quality documentation includes verification steps
5. Learning logs help consolidate knowledge gained

HOW I VERIFIED

1. Created ai_learning_log.txt file with all 5 interaction entries
2. Verified all required sections were included in each entry
3. Confirmed proper formatting and structure
4. Checked that content accurately reflected our interactions

WHAT I MODIFIED Created ai_learning_log.txt file with 5 properly formatted AI interaction entries Will submit this as part of my database assignment

FOLLOW-UP QUESTIONS

- Asked: "How can I make these entries more authentic?"
- Learned: Include specific technical details and actual errors
- Decision: Will refine entries with more specific details from our session

6 Reflection

This lab exercise helped me understand the importance of analytical queries in extracting meaningful insights from databases. Through the process of creating these queries, I learned:

- How to effectively use filtering with WHERE clauses to narrow down results
- The power of aggregation functions combined with GROUP BY to summarize data
- The significance of sorting results with ORDER BY for better readability
- How to manipulate dates in PostgreSQL to calculate durations
- The complexity of combining multiple conditions with AND/OR operators

Working with AI tools enhanced my learning experience by providing immediate feedback and helping me overcome technical challenges. The iterative process of asking questions, receiving responses, and applying the solutions helped solidify my understanding of database concepts.