EXPERIMENT 1:

Structured Query Execution for Information Retrieval

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1. INTRODUCTION

Information Retrieval (IR) focuses on obtaining relevant data from vast collections using query-based mechanisms. Structured queries like SQL provide precise control, whereas unstructured queries mirror natural language interactions. This experiment aims to explore structured queries, their execution, and performance evaluation while contrasting them with unstructured approaches. Applications include search engines, digital libraries, biomedical databases, and enterprise data systems. By combining structured queries with advanced IR techniques, systems can offer faster, more accurate, and context-aware search capabilities.

QUERIES:

1. Creating PERSON table

```
Schema SQL ●

1 CREATE TABLE coder (
2    id SERIAL PRIMARY KEY,
3    name VARCHAR(50),
4    age INT,
5    rating DECIMAL(3,1), -- rating out of 10
6    dob DATE,
7    language VARCHAR(30) -- main programming language
8 );
9
10
11 INSERT INTO coder (name, age, rating, dob, language) VALUES
12 ('Alice Johnson', 25, 8.5, '2000-05-12', 'Python'),
13 ('Brian Smith', 30, 9.2, '1995-03-28', 'JavaScript'),
14 ('Catherine Lee', 27, 7.8, '1998-11-15', 'Java'),
15 ('David Brown', 22, 9.0, '2003-01-04', 'C++'),
16 ('Emily Davis', 29, 8.1, '1996-07-20', 'Ruby'),
17 ('Frank Wilson', 26, 9.5, '1999-09-13', 'Go'),
18 ('Grace Miller', 24, 8.3, '2001-02-18', 'C#'),
19 ('Henry Thompson', 28, 7.9, '1997-08-30', 'PHP'),
20 ('Isabella White', 23, 8.7, '2002-04-25', 'Swift'),
21 ('Jack Harris', 31, 9.4, '1994-06-09', 'TypeScript');
```

1. Retrieve all records from the "employees" table

SELECT * FROM coder;

Query #1 Execution time: 0.27ms					
id	name	age	rating	dob	language
1	Alice Johnson	25	8.5	2000-05-12	Python
2	Brian Smith	30	9.2	1995-03-28	JavaScript
3	Catherine Lee	27	7.8	1998-11-15	Java
4	David Brown	22	9.0	2003-01-04	C++
5	Emily Davis	29	8.1	1996-07-20	Ruby
6	Frank Wilson	26	9.5	1999-09-13	Go
7	Grace Miller	24	8.3	2001-02-18	C#
8	Henry Thompson	28	7.9	1997-08-30	PHP
9	Isabella White	23	8.7	2002-04-25	Swift
10	Jack Harris	31	9.4	1994-06-09	TypeScript

2. Retrieve names from coder where language is java

SELECT name FROM coder WHERE language = "Python";

name
Alice Johnson

3. Retrieve the average age of the coder

SELECT AVG(age) AS avg_age FROM coder;

26.5000	

4. Sort coder by age in ascending order

SELECT name, age FROM coder ORDER BY age ASC;

Query #1 Execution time: 0.28ms	
name	age
David Brown	22
Isabella White	23
Grace Miller	24
Alice Johnson	25
Frank Wilson	26
Catherine Lee	27
Henry Thompson	28
Emily Davis	29
Brian Smith	30
Jack Harris	31

5. Retrieve total avg rating per language category.

SELECT language, AVG(rating) AS avg_rating FROM coder GROUP BY language;

Query #2 Execution time: 0.32ms	
language	avg_rating
C++	8.93333
JavaScript	8.90000
Python	8.06667
Swift	8.70000

6. Retrieve coder names with rating above avg

SELECT name FROM coder WHERE rating > (SELECT AVG(rating) FROM coder);

Query #3 Execution time: 0.21ms	
name	
Brian Smith	
David Brown	
Frank Wilson	
Isabella White	
Jack Harris	

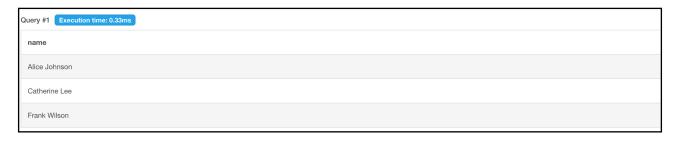
7. List coders who code in Python or Java

SELECT name FROM coder WHERE language = 'Python' UNION SELECT name FROM coder WHERE language = 'Java';

Query #1 Execution time: 0.45ms	
name	
Alice Johnson	
Catherine Lee	
Henry Thompson	

8. Coders born between Jan 1, 1998 and Jan 1, 2001

SELECT name FROM coder WHERE dob BETWEEN "1998-01-01" AND "2001-01-01";



Insert for join

9. Coders working on language-specific projects

SELECT c.name AS coder name, p.project name FROM coder c JOIN projects p ON c.language = p.language;

Query #1 Execution time: 0.27ms		
coder_name	project_name	
Alice Johnson	E-Commerce Website	
David Wilson	E-Commerce Website	
Isabella Moore	E-Commerce Website	
Brian Smith	Banking System	
Frank Harris	Banking System	
Charlotte Brown	Game Engine	
Alice Johnson	Chatbot Al	
David Wilson	Chatbot Al	
Isabella Moore	Chatbot Al	
Ella Thompson	Weather App	
Brian Smith	Inventory Management	
Frank Harris	Inventory Management	
Grace Miller	Cloud Monitoring Tool	

2. CONCLUSION

This experiment bridges theoretical and practical understanding of structured query execution for information retrieval. Participants learned to convert real-world needs into SQL queries, evaluate their efficiency, and explore the contrast with unstructured, NLP-driven approaches. This foundational knowledge is essential for building efficient retrieval systems across various domains.