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BSc Vertiefung: Extending the PostgreSQL kernel

The goal of this project is to get acquainted with the kernel of PostgreSQL, understand its workflow from the point where a query is received to the point where results are returned to the client, and extend it by adding a new SQL operator.

For this purpose matrix multiplication operation will be used. Assume the following matrixes

$A = \begin{bmatrix} 5 & 5 & 2 \\ 0 & 0 & 2 \end{bmatrix}, B = \begin{bmatrix} 5 & 3 \\ 0 & 0 \end{bmatrix}$	

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represanted by the following relations.

Α			В		
r	С	V	r	С	v
1	1	2	1	1	5
1	2	1	3 8	2	3
2	1	5	1	3	2
2	2	3	2	1	1
3	1	3	2	2	4
3	2	4	2	3	3

An operator MMUL must be implemented that can be used in a query like the following:

SELECT R.r, R.c, R.v FROM (A MMUL B) AS R



and generate the following result

r	С	V				
1	1	31			[21	99]
11	2	22	representing matrix	R =	1 21	22
8	-				31	25
2	1	31			L]
2	2	25	-			

Tasks

- 1. Study [1, 2] and the source code of PostgreSQL to understand the workflow of parsing, analyzing, optimizing, and executing a query.
- 2. Extend the PostgreSQL parser to accept operator MMUL with two operand relations with schema relation(r int, c int, v float).
- 3. Extend the PostgreSQL analyzer and optimizer that integrates MMUL into a query plan tree.
- 4. Develop a plan node that implements the matrix multiplication.
- 5. Describe your work in a report.

References

- [1] The PostgreSQL Global Development Group, PostgreSQL 9.4.10 Documentation, Ch. 47. Overview of PostgreSQL Internals, pp. 1766-1773.
 URL https://www.postgresql.org/files/documentation/pdf/9.4/postgresql-9. 4-A4.pdf
- [2] N. Conway, Introduction to hacking postgresql, pgCon (2007). URL http://www.neilconway.org/talks/hacking/ottawa/ottawa_slides.pdf

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