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1 (1 pkt) Rozważmy relację $R(A, B, C)$. Napisz zapytanie algebry relacji oraz zapytanie rrd/rrk, które zwróci pusty wynik wtedy i tylko wtedy gdy para atrybutów A, B jest kluczem relacji R .

Relational Algebra SQL Group Editor

$\pi \quad \sigma \quad \rho \quad \leftarrow \rightarrow \tau \quad \gamma \quad \wedge \quad \vee \quad \neg \quad = \neq \geq \leq \cap \cup + - \times \ltimes \bowtie \ltimes \ltimes \ltimes \ltimes \gtimes \triangleright = \sim / * \{\}$

```

1 R =  $\pi$  first_name, last_name, id (actors)
2 O = R  $\bowtie$  rho first <- first_name, last <- last_name, i <- id R
3
4 sigma first_name = first and last_name = last and id != i (O)
    
```

▶ execute query

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The diagram illustrates the execution plan for the provided query. It starts with the 'actors' table (7 rows). A projection operation ($R = \pi$) extracts 'first_name', 'last_name', and 'id'. This is followed by a self-join operation ($O = R \bowtie \rho$) where the join condition is implicitly defined as $first_name = first_name$, $last_name = last_name$, and $i = id$. The result has 49 rows. Finally, a selection operation (σ) filters the results based on the conditions $first_name = first$, $last_name = last$, and $id \neq i$, resulting in 2 rows.

$$\{r \mid r \in R \wedge \neg (\exists r') (r' \in R \wedge r \cdot a = r' \cdot a \wedge r \cdot b = r' \cdot b \wedge r \cdot c \neq r' \cdot c)\}$$