

SQL Rewrite Rule Verification

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The Problem

Database engines use **rewrite rules** to improve the performance of SQL queries. In practice, these rules are not verified, leading to costly bugs.

```
SELECT x.a FROM R AS x, R AS y WHERE x.a = y.a
=
SELECT z.a FROM R AS z
```

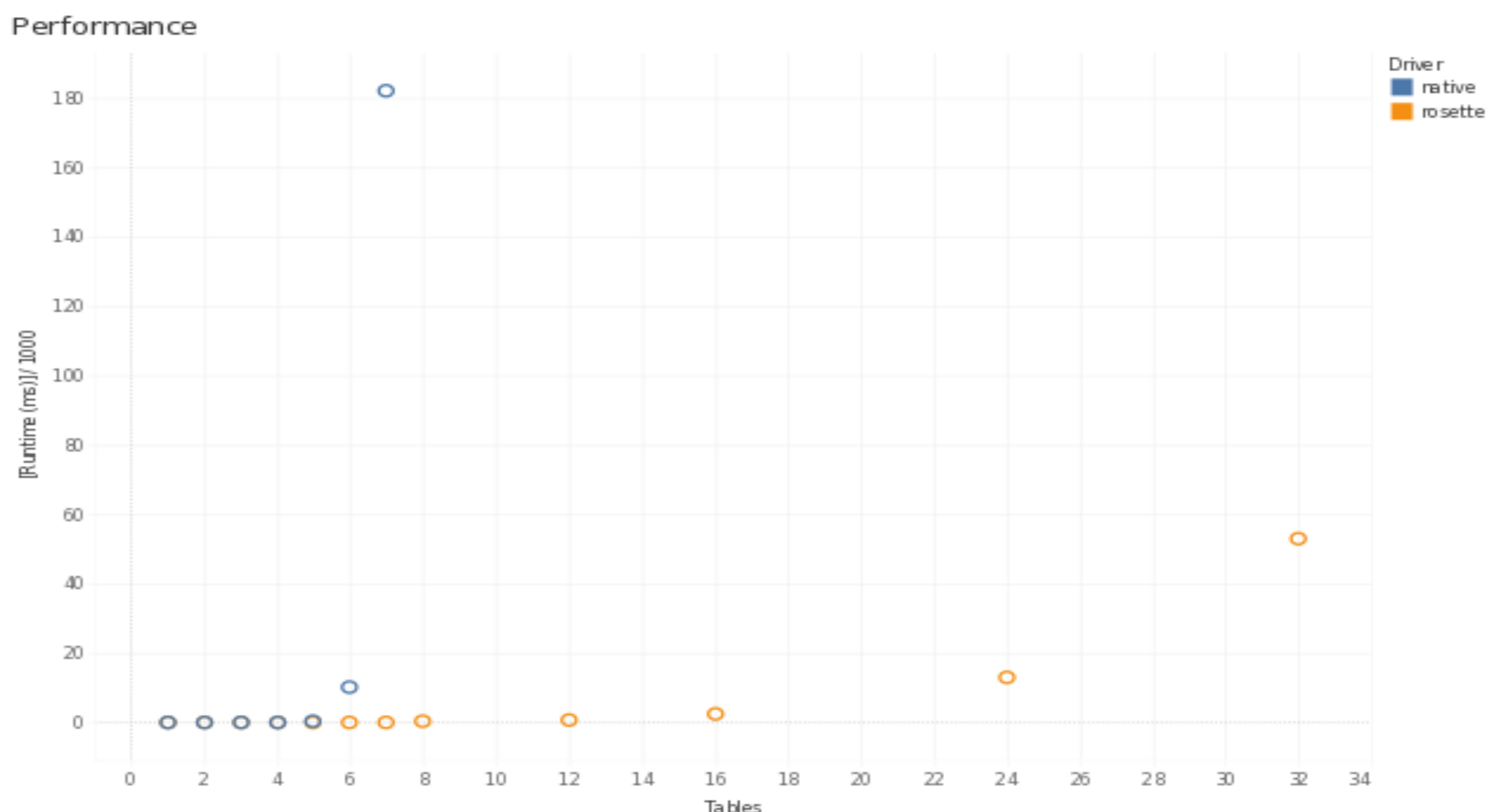
We provide a tool, VeriCQ, to **efficiently** and **automatically** check the correctness of conjunctive SQL query rewrites. VeriCQ is **verified** in Coq.

The Solution

$$\forall t, (\exists x y, t = x.a \wedge R x \wedge R y \wedge x.a = y.a) \leftrightarrow (\exists z, t = z.a \wedge R z)$$
$$\forall t x y, (t = x.a \wedge R x \wedge R y \wedge x.a = y.a) \rightarrow (t = x.a \wedge R x)$$
$$\forall t z, (t = z.a \wedge R z) \rightarrow (t = z.a \wedge R z \wedge R z \wedge z.a = z.a)$$

Using a **SAT** solver to proof query equivalence leads to significant speedups over brute force search, on medium and large queries.

Evaluation



Tables vs. [Runtime (ms)] / 1000. Color shows details about Driver.