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
```

The Solution

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

```
∀ t, (∃ x y, t = x.a ∧ R x ∧ R y ∧ x.a = y.a) ↔
     (∃ z, t = z.a ∧ R z)

∀ t x y, (t = x.a ∧ R x ∧ R y ∧ x.a = y.a) → (t = x.a ∧ R x)
∀ t z, (t = z.a ∧ R z) → (t = z.a ∧ R z ∧ R z ∧ z.a = z.a)
```

Evaluation

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