15721 - Project 3

Query Optimizer

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Pedro Paredes
Qiuwen Kai

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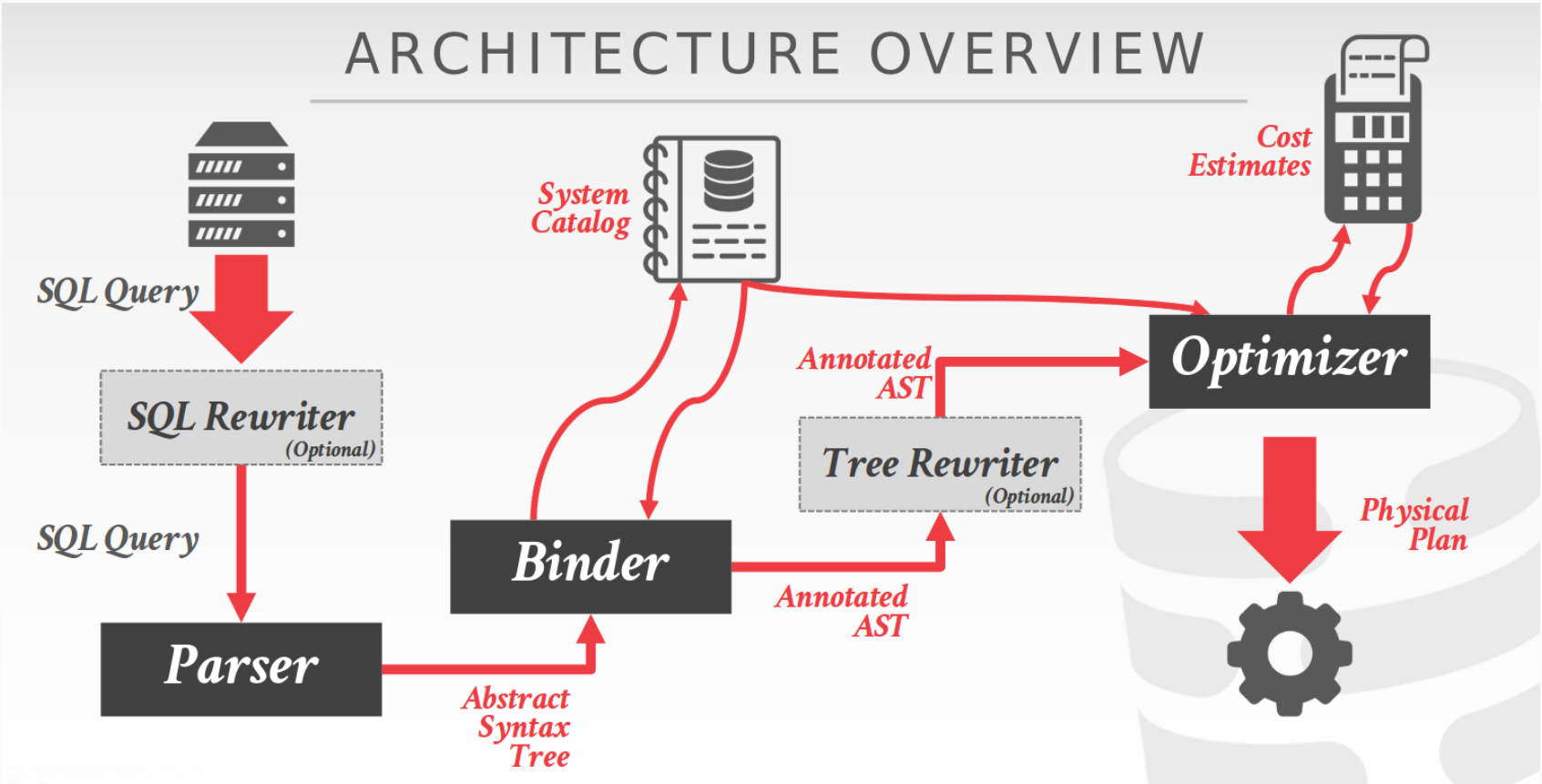
Project overview

Query Optimizer



Goals

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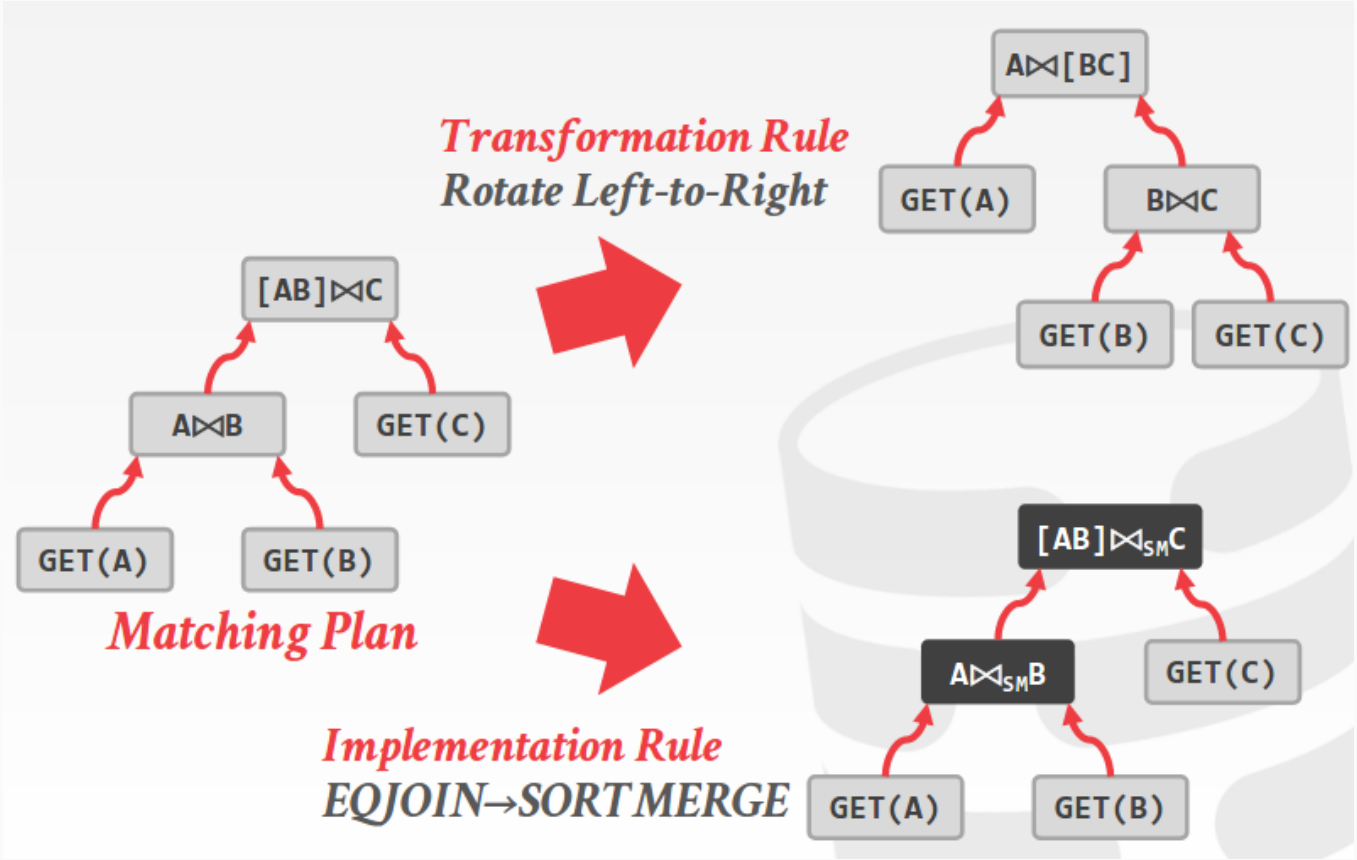
Outer joins

Outer joins - Optimizer



Summary of updates

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+ // Associativity rules taken from
+ // http://15721.courses.cs.cmu.edu/spring2017/papers/14-optimizer1/p539-moerkotte.pdf
+ /*
+  * (A inner B) inner C = A inner (B inner C)
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- Add unified join operator

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- Add unified join operator
- Write outer join rules (Associativity/Commutativity)

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- Fix parse tree to operator tree transform

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- Add unified join operator
- Write outer join rules (Associativity/Commutativity)
- Fix parse tree to operator tree transform
- Add some tests

Query rewrites

Query rewrites - short description

SQL optimizations that **don't** need a cost model

- Constant folding / propagation

Query rewrites - short description

SQL optimizations that **don't** need a cost model

- Constant folding / propagation
- Transitive predicates

Query rewrites - short description

SQL optimizations that **don't** need a cost model

- Constant folding / propagation
- Transitive predicates
- Trivial predicate elimination

Constant folding

```
SELECT * FROM tb1
  WHERE tb1.a = 4 * 5
```

To

```
SELECT * FROM tb1
  WHERE tb1.a = 20
```

Transitive predicates

```
SELECT * FROM tb1, tb2
  WHERE tb1.a = tb2.b AND tb1.a = tb2.c
```

To

```
SELECT * FROM tb1, tb2
  WHERE tb1.a = tb2.b AND tb1.a = tb2.c
        AND tb2.b = tb2.c
```

Trivial elimination

```
SELECT * FROM tb1
  WHERE tb1.a = 5 AND tb1.b = tb1.b
```

To

```
SELECT * FROM tb1
  WHERE tb1.a = 5
```

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- Implemented constant folding as parser step;

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- Implemented constant folding as parser step;
- Implemented transitive predicates as optimizer rule;
- Implemented trivial elimination as optimizer rule;

Demo

Demo

```
postgres=# INSERT INTO t2 VALUES(1,2,3);
INSERT 0 1
postgres=# INSERT INTO t2 VALUES(2,3,4);
INSERT 0 1
postgres=# INSERT INTO t2 VALUES(3,4,5);
INSERT 0 1
postgres=# CREATE TABLE t3(d INT);
CREATE TABLE
postgres=# INSERT INTO t3 VALUES(3);
INSERT 0 1
postgres=# INSERT INTO t3 VALUES(4);
INSERT 0 1
postgres=# INSERT INTO t3 VALUES(5);
INSERT 0 1
postgres=# SELECT * FROM t3 LEFT OUTER JOIN (t1 INNER JOIN t2 ON t1.a=t2.d) on t3.d = t2.d WHERE t2.c = 2;
 b | c | d | a | b | c | d
---+---+---+---+---+---+---
 1 | 2 | 3 | 3 | 4 | 5 | 3
   |   |   |   |   |   | 5
   |   |   |   |   |   | 4
(3 rows)

postgres=# explain SELECT * FROM t3 LEFT OUTER JOIN (t1 INNER JOIN t2 ON t1.a=t2.d) on t3.d = t2.d WHERE t2.c = 2;
                        Query plan
-----------------------------------------------------------
 -----------------------------------------------------------
 -> Plan Type: HASHJOIN
    Info: HashJoin(Expression ::
  expression type = Conjunction,
  conjunction type = CONJUNCTION_AND
   Expression ::
    expression type = Comparison,
    comparison type = COMPARE_EQUAL
     Expression ::
      expression type = Tuple Value,
      table name: t2
      column name: c
     Expression ::
      expression type = Constant Value,
      value: INTEGER(2)
   Expression ::
    expression type = Comparison,
    comparison type = COMPARE_EQUAL
     Expression ::
      expression type = Tuple Value,
      table name: t3
      column name: d
     Expression ::
      expression type = Tuple Value,
      table name: t2
      column name: d
 )
    NumChildren: 2
    -> Plan Type: SEQSCAN
       Info: SeqScan()
       NumChildren: 0
    -> Plan Type: HASH
       Info: Hash
       NumChildren: 1
       -> Plan Type: HASHJOIN
          Info: HashJoin(Expression ::
  expression type = Comparison,
  comparison type = COMPARE_EQUAL
   Expression ::
    expression type = Tuple Value,
    table name: t1
    column name: a
   Expression ::
```

Thanks!