

# DB AS3 Report1

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## ● How to implement EXPLAIN operation

1. 對 *lexer*、*parser* 進行更動，使 EXPLAIN 能被 sql 判別；並在 *QueryData* 中新增 flag，以紀錄是否要進行 EXPLAIN。
2. 在 *BasicQueryPlanner* 的最後面添加 *ExplainPlan*，並使用 *QueryData* 中的 flag 判斷是否執行。
3. 在 *ProjectPlan*、*ProductPlan*、*SelectPlan*、*TablePlan* 新增 *toString()* 來記錄各項 Plan 累積（包含該 Plan）的資訊。
4. 在 *ExplainPlan* 中，對 schema 新增“query-plan”的 field，使 *ConsoleSQLInterpreter* 能獲取 EXPLAIN 要回傳的字串；將傳入的 plan open 之後得到相應的 scan，接著計算 scan 包含幾筆資料，即計算 actual records 數量，之後該數量結合 *toString()*，得到 EXPLAIN 該回傳的字串為何，並將此傳入 *ExplainScan* 中。
5. 在 *ExplainScan* 中，*getVal()* 回傳從 *ExplainPlan* 得到的字串；*next()* 的部分，則利用 flag 來控制回傳值，避免有幾個 record 就印了幾次。

## ● Screenshot of query

### ■ A query accessing single table with WHERE

```
SQL> EXPLAIN SELECT d_id FROM district WHERE d_id = 5
```

```
query-plan
```

```
-----  
->ProjectPlan (#blks=2, #recs=1)  
  ->SelectPlan pred:(d_id=5.0) (#blks=2, #recs=0)  
    ->TablePlan on (district) (#blks=2, #recs=10)
```

```
Actual #recs: 1
```

### ■ A query accessing multiple tables with WHERE

```
SQL> EXPLAIN SELECT d_id, w_id FROM district, warehouse WHERE d_id = w_id
```

```
query-plan
```

```
-----  
->ProjectPlan (#blks=22, #recs=1)  
  ->SelectPlan pred:(d_id=w_id) (#blks=22, #recs=0)  
    ->ProductPlan (#blks=22, #recs=10)  
      ->TablePlan on (warehouse) (#blks=2, #recs=1)  
      ->TablePlan on (district) (#blks=2, #recs=10)
```

```
Actual #recs: 1
```

### ■ A query with ORDER BY

```
SQL> EXPLAIN SELECT d_id FROM district ORDER BY d_id
```

```
query-plan
```

```
-----  
->SortPlan (#blks=1, #recs=10)  
  ->ProjectPlan (#blks=2, #recs=10)  
    ->SelectPlan pred:() (#blks=2, #recs=10)  
      ->TablePlan on (district) (#blks=2, #recs=10)
```

```
Actual #recs: 10
```

### ■ A query with GROUP BY and at least one aggregation function

```
SQL> EXPLAIN SELECT AVG(d_id) FROM district, warehouse WHERE d_w_id = w_id GROUP BY w_id
```

```
query-plan
```

```
-----  
->ProjectPlan (#blks=2, #recs=1)  
  ->GroupByPlan: (#blks=2, #recs=1)  
    ->SortPlan (#blks=2, #recs=10)  
      ->SelectPlan pred:(d_w_id=w_id) (#blks=22, #recs=10)  
        ->ProductPlan (#blks=22, #recs=10)  
          ->TablePlan on (warehouse) (#blks=2, #recs=1)  
          ->TablePlan on (district) (#blks=2, #recs=10)
```

```
Actual #recs: 1
```

## ● Screenshot of JUnit Test

Finished after 2.176 seconds

Runs: 26/26

Errors: 0

Failures: 0

```
> org.vanilladb.core.query.algebra.materialize.MaterializeTest [Runner: JUnit 4] (0.257 s)  
> org.vanilladb.core.query.parse.ParserTest [Runner: JUnit 4] (0.009 s)  
> org.vanilladb.core.query.algebra.BasicQueryTest [Runner: JUnit 4] (0.174 s)  
> org.vanilladb.core.query.planner.BasicQueryPlannerTest [Runner: JUnit 4] (0.216 s)  
> org.vanilladb.core.query.planner.VerifierTest [Runner: JUnit 4] (0.057 s)  
> org.vanilladb.core.query.parse.ParseTest [Runner: JUnit 4] (0.003 s)
```