

Write Up for acmdb-lab3

在 lab3 中，我们实现了数据库中基本的一些操作。

Exercise 1 (Filter and join)

Filter 中实现的是返回满足过滤条件的元组，Join 中实现的是两个元素的自然联结。其实实现的逻辑相对较为清晰，因此不多做赘述。

Exercise 2 (Aggregates)

这个 exercise 中完成的的就是 SQL 中的分组与聚合，具体而言，实现的是聚合字段类型为 int 时的 MAX、MIN、SUM、COUNT、AVG，或 String 类型下的 COUNT 操作，再由 Aggregate 进行调用。

Exercise 3 (HeapFile Mutability)

这个 exercise 中完成的是 deleteTuple、insertTuple 的功能，因为他们都是写操作，所以最终修改 HeapPage 中 header 以及 slot 的占用情况。

Exercise 4 (Insertion and Deletion)

此 Exercise 完成的是操作符中的插入与删除，相当于前面实现方法的调用。

总结

lab3 实现的内容量相当大，我花了相当多的时间才完成了此次 lab。在写完这些 Operator 之后，我对于这些运算符形成了更底层更深刻的理解。

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
yuchen@yuchen-virtual-machine:~$ cd Desktop/acmdb-lab3
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=PredicateTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:
  [depend] Deleted 3 out of date files in 0 seconds
  [javac] Compiling 3 source files to /home/yuchen/Desktop/acmdb-lab3/bin/src

testcompile:

runtest:
  [junit] Running simpledb.PredicateTest
  [junit] Testsuite: simpledb.PredicateTest
  [junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.073 sec
  [junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.073 sec
  [junit]
  [junit] Testcase: filter took 0.04 sec

BUILD SUCCESSFUL
Total time: 1 second
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
BUILD SUCCESSFUL
Total time: 1 second
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=JoinPredicateTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
  [junit] Running simpledb.JoinPredicateTest
  [junit] Testsuite: simpledb.JoinPredicateTest
  [junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.06 sec
  [junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.06 sec
  [junit]
  [junit] Testcase: filterVaryingVals took 0.038 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.FilterTest
[junit] Testsuite: simpledb.FilterTest
[junit] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.03
1 sec
[junit] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.03
1 sec
[junit]
[junit] Testcase: filterAllLessThan took 0.014 sec
[junit] Testcase: filterEqual took 0.001 sec
[junit] Testcase: filterEqualNoTuples took 0 sec
[junit] Testcase: filterSomeLessThan took 0 sec
[junit] Testcase: getTupleDesc took 0.001 sec
[junit] Testcase: rewind took 0 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=JoinTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.JoinTest
[junit] Testsuite: simpledb.JoinTest
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.03
6 sec
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.03
6 sec
[junit]
[junit] Testcase: eqJoin took 0.01 sec
[junit] Testcase: gtJoin took 0.001 sec
[junit] Testcase: getTupleDesc took 0.001 sec
[junit] Testcase: rewind took 0.001 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3

compile:

testcompile:

runtest:
[junit] Running simpledb.HashEquiJoinTest
[junit] Testsuite: simpledb.HashEquiJoinTest
[junit] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.34
8 sec
[junit] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.34
8 sec
[junit] ----- Standard Output -----
[junit] JOIN PRODUCED 300010 ROWS
[junit] JOIN PRODUCED 300010 ROWS
[junit] -----
[junit]
[junit] Testcase: bigJoin took 0.333 sec
[junit] Testcase: getTupleDesc took 0 sec
[junit] Testcase: eqJoin took 0 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3

gregatorTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.IntegerAggregatorTest
[junit] Testsuite: simpledb.IntegerAggregatorTest
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.04
6 sec
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.04
6 sec
[junit]
[junit] Testcase: mergeMin took 0.013 sec
[junit] Testcase: mergeSum took 0.001 sec
[junit] Testcase: mergeMax took 0 sec
[junit] Testcase: mergeAvg took 0.001 sec
[junit] Testcase: testIterator took 0.001 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=StringAggregatorTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.StringAggregatorTest
[junit] Testsuite: simpledb.StringAggregatorTest
[junit] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.025 sec
[junit] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.025 sec
[junit]
[junit] Testcase: testIterator took 0.013 sec
[junit] Testcase: mergeCount took 0.001 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
compile:

testcompile:

runtest:
[junit] Running simpledb.AggregateTest
[junit] Testsuite: simpledb.AggregateTest
[junit] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.046 sec
[junit] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.046 sec
[junit]
[junit] Testcase: countStringAggregate took 0.019 sec
[junit] Testcase: sumAggregate took 0.001 sec
[junit] Testcase: avgAggregate took 0 sec
[junit] Testcase: maxAggregate took 0.001 sec
[junit] Testcase: minAggregate took 0.001 sec
[junit] Testcase: sumStringGroupBy took 0 sec
[junit] Testcase: getTupleDesc took 0 sec
[junit] Testcase: rewind took 0 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=HeapPageWriteTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.HeapPageWriteTest
[junit] Testsuite: simpledb.HeapPageWriteTest
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.10
2 sec
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.10
2 sec
[junit]
[junit] Testcase: deleteNonexistentTuple took 0.04 sec
[junit] Testcase: deleteTuple took 0.002 sec
[junit] Testcase: testDirty took 0.002 sec
[junit] Testcase: addTuple took 0.036 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
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```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=HeapFileWriteTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
[junit] Running simpledb.HeapFileWriteTest
[junit] Testsuite: simpledb.HeapFileWriteTest
[junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.11
4 sec
[junit] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.11
4 sec
[junit]
[junit] Testcase: addTuple took 0.097 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runtest -Dtest=InsertTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runtest:
    [junit] Running simpledb.InsertTest
    [junit] Testsuite: simpledb.InsertTest
    [junit] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.045 sec
    [junit] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.045 sec
    [junit]
    [junit] Testcase: getTupleDesc took 0.024 sec
    [junit] Testcase: getNext took 0.011 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$ ant runsystest -Dtest=InsertTest
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runsystest:
    [junit] Running simpledb.systemtest.InsertTest
    [junit] Testsuite: simpledb.systemtest.InsertTest
    [junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.088 sec
    [junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.088 sec
    [junit]
    [junit] Testcase: testEmptyToEmpty took 0.043 sec
    [junit] Testcase: testEmptyToOne took 0.006 sec
    [junit] Testcase: testOneToEmpty took 0.016 sec
    [junit] Testcase: testOneToOne took 0.009 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab3
Test
Buildfile: /home/yuchen/Desktop/acmdb-lab3/build.xml

compile:

testcompile:

runsystest:
[junit] Running simpledb.systemtest.DeleteTest
[junit] Testsuite: simpledb.systemtest.DeleteTest
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.24
1 sec
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.24
1 sec
[junit]
[junit] Testcase: testEquals took 0.121 sec
[junit] Testcase: testLessThan took 0.016 sec
[junit] Testcase: testLessThanOrEq took 0.016 sec
[junit] Testcase: testGreaterThan took 0.024 sec
[junit] Testcase: testGreaterThanOrEq took 0.032 sec

BUILD SUCCESSFUL
Total time: 0 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab3$
```