

Write Up for acmdb-lab5

在 lab5 中，我们实现了数据库中的 2PL 事务机制。

为了实现锁，我主要定义了 LockType, Lock 类，并使用 synchronized 实现多线程锁。

Exercise 1 & 2

当以 READ_ONLY 权限获取页面时，需要为该页面分配一个 Shared lock。当以 READ_WRITE 权限获取页面时，需要为该页面分配一个 Exclusive lock。

为了实现释放锁，只需从锁中移除事务 ID。如果锁中没有事务 ID，则销毁该锁。并使用 notifyAll() 方法通知所有被阻塞的线程。

Exercise 3

在驱逐页面时，检查页面是否是脏页，并且不驱逐 BufferPool 中的脏页。

Exercise 4

如果 commit 为 True，则将与事务关联的所有页面刷新到磁盘；如果为 False，则丢弃所有脏页。

Exercise 5

这里处理死锁的方式为等到超时，事物阻塞后会等待 500ms 到 1000ms 的随机时间，如果超时则中止。

总结

lab5 总体来说编写难度比较高，重点在于 lock 的设计以及 debug 上，这两部分耗费了比较多的时间。

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab5
[junit] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.04
9 sec
[junit]
[junit] Testcase: nameToId took 0.023 sec
[junit] Testcase: numFields took 0 sec
[junit] Testcase: testEquals took 0 sec
[junit] Testcase: combine took 0 sec
[junit] Testcase: getType took 0.001 sec
[junit] Testcase: getSize took 0 sec
[junit] Running simpledb.TupleTest
[junit] Testsuite: simpledb.TupleTest
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.01
7 sec
[junit] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.01
7 sec
[junit]
[junit] Testcase: modifyFields took 0.007 sec
[junit] Testcase: getTupleDesc took 0.001 sec
[junit] Testcase: resetTupleDesc took 0 sec
[junit] Testcase: modifyRecordId took 0.001 sec

BUILD SUCCESSFUL
Total time: 43 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab5$
```

```
yuchen@yuchen-virtual-machine: ~/Desktop/acmdb-lab5
[junit] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.74
sec
[junit] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.74
sec
[junit]
[junit] Testcase: testRewind took 0.065 sec
[junit] Testcase: testCache took 0.387 sec
[junit] Testcase: testSmall took 0.272 sec
[junit] Running simpledb.systemtest.TransactionTest
[junit] Testsuite: simpledb.systemtest.TransactionTest
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 12.2
03 sec
[junit] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 12.2
03 sec
[junit]
[junit] Testcase: testSingleThread took 0.062 sec
[junit] Testcase: testAllDirtyFails took 0.041 sec
[junit] Testcase: testTwoThreads took 0.621 sec
[junit] Testcase: testFiveThreads took 4.086 sec
[junit] Testcase: testTenThreads took 7.379 sec

BUILD SUCCESSFUL
Total time: 57 seconds
yuchen@yuchen-virtual-machine:~/Desktop/acmdb-lab5$
```