

# COP 6726 – Database System Implementation

## Project 2: Sorted File Implementation Report

### **Group Members:**

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### **Compilation and Execution:**

To compile the code, run the following command:

```
>> make
```

To execute the test.cc code, change the directory to the specific folder (a2test) and run the following command:

```
>> ./test.out
```

To compile the gTest (gtest.cc) code, run the following command:

```
>> g++ -o gtest gtests.cc BigQ.cc DBFile.cc Schema.cc File.cc Record.cc  
ComparisonEngine.cc Pipe.cc Comparison.cc -lgtest -lpthread
```

To execute the gTest (gtest.cc) code, run the following command:

```
>> ./gtest
```

### **Code Explanation (modified methods):**

Filename: BigQ.cc

1. *BigQ::TPMMS(\* args) method* –  
It performs external sort using Two-Pass Multiway Merge Sort algorithm.
2. *BigQ::SortRecords(records, om) method* –  
Sorts the records in the vector using Order Maker.
3. *BigQ::WriteSortedBufferToFile(buffer, pindex, file, page) method* –  
Writes the sorted run into a temporary file.
4. *RecordPQ::RecordPQ(curroffset, eoffset, fp) method* –  
Constructor for the RecordPQ class that is used a data object in the Priority Queue.
5. *RecordPQ::GetNextRecord(record) method* –  
Gets the next record and returns true, otherwise returns false.
6. *OrderCompare::operator(record\_a, record\_b) method* –

Overloading the compare method to perform the sort functionality.

7. *OrderCompare::operator(record\_PQ\_a, record\_PQ\_b) method* -

Overloading the compare method to perform the sort functionality in Priority Queue.

8. *BigQ::BigQ(in, out, sortorder, runLen) method* -

Constructor for BigQ class that creates a worker thread to run TPMMS algorithm.

Filename: Pipe.cc

1. *Pipe::GetDone() method* -

Returns 1 if pipe is closed, otherwise 0 is returned.

Filename: Comparison.cc

1. *CNF::GetSortOrderByOne(order) method* -

Creates the CNF for the given order.

Filename: gtest.cc

```
TEST(BigQ_Test_RunLen, InValidRunLen) -  
    Google test for invalid run length scenario.  
TEST(BigQ_Test_RunLen, ValidPipeOpen) -  
    Google test for valid open pipe scenario.  
TEST(BigQ_Test_RunLen, InPipeClosed) -  
    Google test for valid closed input pipe scenario.  
TEST(BigQ_Test_RunLen, OutPipeClosed) -  
    Google test for valid closed output pipe scenario.
```

**Results for output1.txt:**

```
azitee > ./output1.txt  
1 n_nationkey: [6], n_name: [FRANCE], n_regionkey: [3], n_comment: [refully final requests. regular, ironi]  
2 n_nationkey: [19], n_name: [ROMANIA], n_regionkey: [3], n_comment: [ular asymptotes are about the furious multipliers. express dependencies nag above the ironically ironic account]  
3 n_nationkey: [22], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint]  
4 n_nationkey: [23], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [eans boost carefully special requests. accounts are. carefull]  
5 n_nationkey: [13], n_name: [JORDAN], n_regionkey: [4], n_comment: [ic deposits are blithely about the carefully regular pa]  
6 n_nationkey: [4], n_name: [EGYPT], n_regionkey: [4], n_comment: [y above the carefully unusual theodolites. final digouts are quickly across the furiously regular d]  
7 n_nationkey: [11], n_name: [IRAQ], n_regionkey: [4], n_comment: [nic deposits boost atop the quickly final requests? quickly regula]  
8 n_nationkey: [28], n_name: [SAUDI ARABIA], n_regionkey: [4], n_comment: [ts. silent requests haggle. closely express packages sleep across the blithely]  
9 n_nationkey: [18], n_name: [IRAN], n_regionkey: [4], n_comment: [efully alongside of the slyly final dependencies. ]  
10 consumer: removed 25 recs from the pipe  
11 *****  
12 producer: opened DBFile customer.bin  
13 producer: inserted 150000 recs into the pipe  
14 consumer: removed 150000 recs from the pipe  
15 *****  
16 o_orderkey: [4515876], o_custkey: [308683], o_orderstatus: [F], o_totalprice: [518062], o_orderdate: [1993-11-02], o_orderpriority: [4-NOT SPECIFIED], o_clerk: [Clerk#0000000185], o_shippriority: [0], o_comment: [caref  
17 o_orderkey: [2185667], o_custkey: [51796], o_orderstatus: [F], o_totalprice: [511360], o_orderdate: [1992-10-08], o_orderpriority: [1-URGENT], o_clerk: [Clerk#0000000574], o_shippriority: [0], o_comment: [ deposits wa  
18 o_orderkey: [2199712], o_custkey: [66790], o_orderstatus: [0], o_totalprice: [515532], o_orderdate: [1996-09-30], o_orderpriority: [2-HIGH], o_clerk: [Clerk#0000000658], o_shippriority: [0], o_comment: [ the final, fro  
19 o_orderkey: [3586919], o_custkey: [24849], o_orderstatus: [F], o_totalprice: [522644], o_orderdate: [1992-11-07], o_orderpriority: [1-URGENT], o_clerk: [Clerk#0000000924], o_shippriority: [0], o_comment: [are alongside  
20 o_orderkey: [2232932], o_custkey: [13940], o_orderstatus: [0], o_totalprice: [522721], o_orderdate: [1997-04-13], o_orderpriority: [2-HIGH], o_clerk: [Clerk#0000000245], o_shippriority: [0], o_comment: [lithely stealth  
21 o_orderkey: [4570548], o_custkey: [480931], o_orderstatus: [0], o_totalprice: [525591], o_orderdate: [1997-12-26], o_orderpriority: [1-URGENT], o_clerk: [Clerk#0000000356], o_shippriority: [0], o_comment: [he slyly fro  
22 o_orderkey: [3943270], o_custkey: [144617], o_orderstatus: [0], o_totalprice: [536084], o_orderdate: [1997-02-12], o_orderpriority: [5-LOW], o_clerk: [Clerk#0000000620], o_shippriority: [0], o_comment: [riously final d  
23 o_orderkey: [4722021], o_custkey: [128120], o_orderstatus: [F], o_totalprice: [544889], o_orderdate: [1994-04-07], o_orderpriority: [1-URGENT], o_clerk: [Clerk#0000000230], o_shippriority: [0], o_comment: [al, express  
24 o_orderkey: [1758460], o_custkey: [21433], o_orderstatus: [F], o_totalprice: [555285], o_orderdate: [1992-11-30], o_orderpriority: [4-NOT SPECIFIED], o_clerk: [Clerk#0000000040], o_shippriority: [0], o_comment: [ ironi  
25 consumer: removed 150000 recs from the pipe  
26 *****  
27 n_nationkey: [7], n_name: [GERMANY], n_regionkey: [3], n_comment: [l platelets. regular accounts x-ray: unusual, regular acco]  
28 n_nationkey: [19], n_name: [ROMANIA], n_regionkey: [3], n_comment: [ular asymptotes are about the furious multipliers. express dependencies nag above the ironically ironic account]  
29 n_nationkey: [22], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint]  
30 n_nationkey: [23], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [eans boost carefully special requests. accounts are. carefull]  
31 n_nationkey: [4], n_name: [EGYPT], n_regionkey: [4], n_comment: [y above the carefully unusual theodolites. final digouts are quickly across the furiously regular d]  
32 n_nationkey: [13], n_name: [JORDAN], n_regionkey: [4], n_comment: [ic deposits are blithely about the carefully regular pa]  
33 n_nationkey: [11], n_name: [IRAQ], n_regionkey: [4], n_comment: [nic deposits boost atop the quickly final requests? quickly regula]  
34 n_nationkey: [18], n_name: [SAUDI ARABIA], n_regionkey: [4], n_comment: [ts. silent requests haggle. closely express packages sleep across the blithely]  
35 consumer: removed 25 recs from the pipe  
36  
37
```

### Results for gTests:

```
sanjay@sanjay-VirtualBox:~/Documents/Database-Implementation/a2test$ ./gtest

** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /home/sanjay/Documents/Database-Implementation/git/tpch-dbggen/
heap files dir:

[=====] Running 4 tests from 2 test suites.
[-----] Global test environment set-up.
[-----] 1 test from BigQ_Test_RunLen
[ RUN      ] BigQ_Test_RunLen.InvalidRunLen
[      OK   ] BigQ_Test_RunLen.InvalidRunLen (2 ms)
[-----] 1 test from BigQ_Test_RunLen (3 ms total)

[-----] 3 tests from BigQ_Test_Pipe
[ RUN      ] BigQ_Test_Pipe.ValidPipeOpen
[      OK   ] BigQ_Test_Pipe.ValidPipeOpen (0 ms)
[ RUN      ] BigQ_Test_Pipe.InPipeClosed
[      OK   ] BigQ_Test_Pipe.InPipeClosed (1 ms)
[ RUN      ] BigQ_Test_Pipe.OutPipeClosed
[      OK   ] BigQ_Test_Pipe.OutPipeClosed (1 ms)
[-----] 3 tests from BigQ_Test_Pipe (3 ms total)

[-----] Global test environment tear-down
[=====] 4 tests from 2 test suites ran. (8 ms total)
[ PASSED  ] 4 tests.
```