

COP 6726 – Database System Implementation

Project 2_2: Sorted File Implementation Report (Part 2)

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 (a2-2test) and run the following command:

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

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

```
>> g++ -o gtest gtest.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):

We have changed the class structure compared to the previous submission to accommodate SortedDBFile class. We have defined BaseDBFile class which consists of virtual functions that are common to both SortedDBFile and HeapDBFile class. SortedDBFile and HeapDBFile classes inherit BaseDBFile class. DBFile class will create an instance of BaseDBFile class. Depending upon the meta-data or the given input, HeapDBFile or SortedDBFile instance is created dynamically during runtime.

Filename: DBFile.cc

1. *SortedDBFile::Create(* f_path) method* –
It creates the sorted DB file with specified path.
2. *SortedDBFile::Load(&f_schema, *Loadpath) method* –
Loads the sorted DB file with specified schema, bin file located at load path.
3. *SortedDBFile::Open(* f_path) method* –
Opens the sorted DB file with specified path.
4. *SortedDBFile::MoveFirst() method* –
Moves the current pointer to first record in the sorted DB file.

5. *SortedDBFile::Close()* method -
Closes the sorted DB file.
6. *SortedDBFile::Add(rec)* method -
Adds a record to the sorted DB file.
7. *SortedDBFile::GetNext(fetchRec)* method -
Gets the next record from the sorted DB file.
8. *SortedDBFile::GetNext(fetchRec, cnf, literal)* method -
Gets the next record from the sorted DB file with the specified CNF.
9. *SortedDBFile::MergeBigQToFile()* method -
Merges the records of BigQ to the file.
10. *SortedDBFile::QueryOrderGenerator(query, order, cnf)* method -
Generates query order based on the specified CNF.
11. *SortedDBFile::BinarySearch(fetchme, cnf, literal)* method -
Searches/Scans the record based on CNF (Binary Search Algorithm).
12. *SortedDBFile::GetNextSequential(fetchme, cnf, literal)* method -
Gets the next record sequentially based on the parameters.
13. *SortedDBFile::GetNextWithQuery(fetchme, cnf, literal)* method -
Gets the next record sequentially based on the query provided.
14. *SortedDBFile::InitializeBigQ()* method -
Initializes the BigQ object with input and output pipe and writing mode.

Filename: gtest.cc

```
TEST(Heap_DBFile_Test, ValidCreate) -  
    Google test for valid heap DB file create scenario.  
TEST(Heap_DBFile_Test, ValidOpen) -  
    Google test for valid heap DB file open scenario.  
TEST(Heap_DBFile_Test, ValidClose) -  
    Google test for valid heap DB file close scenario.  
TEST(Sorted_DBFile_Test, LoadTest) -  
    Google test for valid sorted DB file load scenario.  
TEST(Sorted_DBFile_Test, OrderTest) -  
    Google test for valid sorted DB file order scenario.
```

Results for the Test Cases:

Test Case 1:

Input - 1; 3; (c_phone); 8; 2

```
g++ -O2 -Wno-deprecated -o test.out Record.o Comparison.o ComparisonEngine.o Schema.o File.o BigQ.o DBFile.o Pipe.o y.tab.o lex.yy.o test.o -lfl -lpthread
sanjay@sanjay-VirtualBox:~/Documents/Database-Implementation/A2-2test$ ./test.out

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

select test option:
1. create sorted dbfile
2. scan a dbfile
3. run some query
1

select table:
1. nation
2. region
3. customer
4. part
5. partsupp
6. supplier
7. orders
8. lineitem
3

specify sort ordering (when done press ctrl-D):
(c_phone)

specify runlength:
8

output to dbfile : customer.bin
input row file : /home/sanjay/Documents/Database-Implementation/tpch-dbgen/customer.tbl

select option for : customer.bin
1. add a few (1 to 1k recs)
2. add a lot (1k to 1e+06 recs)
3. run some query
2

*****
added 150000 recs..so far 150000
Create finished.. 150000 recs inserted

sanjay@sanjay-VirtualBox:~/Documents/Database-Implementation/A2-2test$
```

Test Case 2:

Input - 2; 3

```
sanjay@sanjay-VirtualBox: ~$ cat a2-test5
eep blithely across the regular deposits. accounts make. slyly ironic gifts above th]
.c_custkey: [2968], c_name: [Customer#000002968], c_address: [q3hQ0wHhha32n], c_nationkey: [24], c_phone: [34-996-906-1652], c_acctbal: [-839.34], c_mktsegment: [HOUSEHOLD], c_comment: [ the closely express ex
cuses make furiously special requ]
.c_custkey: [101355], c_name: [Customer#0000101355], c_address: [s35tAx90lFOW], c_nationkey: [24], c_phone: [34-997-188-9666], c_acctbal: [32.59], c_mktsegment: [FURNITURE], c_comment: [even sheaves make quickl
y exp]
.c_custkey: [37888], c_name: [Customer#000037888], c_address: [I2kfDo3FodhGvOn50MJs5], c_nationkey: [24], c_phone: [34-997-284-5897], c_acctbal: [2484.13], c_mktsegment: [AUTOMOBILE], c_comment: [al theodolite
s haggle across the quickly ir]
.c_custkey: [3174], c_name: [Customer#00003174], c_address: [9XGPFKLWZMU], c_nationkey: [24], c_phone: [34-997-244-3206], c_acctbal: [6117.29], c_mktsegment: [BUILDING], c_comment: [round the furiously expres
s packages. furiously regular courts are furio]
.c_custkey: [86364], c_name: [Customer#000086364], c_address: [vMkHm Ez2a75U3yVwI2Rnp8jC9], c_nationkey: [24], c_phone: [34-997-251-4190], c_acctbal: [2691.67], c_mktsegment: [AUTOMOBILE], c_comment: [ even f
oxes haggle quickly blithely regular pinto beans. slyly regular ideas sleep slyly along the f]
.c_custkey: [35286], c_name: [Customer#000035286], c_address: [P HNGQXTwL8p35Xps], c_nationkey: [24], c_phone: [34-997-517-4668], c_acctbal: [120.81], c_mktsegment: [AUTOMOBILE], c_comment: [und the permanent
packages sleep blithely according to the special, even requests. express foxes ]
.c_custkey: [40253], c_name: [Customer#000040253], c_address: [pVusA00FvBERZg0r 5lQc9vWd07gVYtLRK6], c_nationkey: [24], c_phone: [34-997-697-4316], c_acctbal: [4429.69], c_mktsegment: [AUTOMOBILE], c_commen
t: [express farges use after the carefully ironic ideas. slyly express foxes sleep quickly. carefully special]
.c_custkey: [31537], c_name: [Customer#000031537], c_address: [82Fr5r7gWxt2a5], c_nationkey: [24], c_phone: [34-998-198-8709], c_acctbal: [-252.7], c_mktsegment: [HOUSEHOLD], c_comment: [ructions cajole ideas.
slyly express depos]
.c_custkey: [117513], c_name: [Customer#0000117513], c_address: [cuB2 TE0EONnPFo0dv8EiHxKHU34V], c_nationkey: [24], c_phone: [34-998-315-4817], c_acctbal: [2334.66], c_mktsegment: [AUTOMOBILE], c_comment: [c i
deas are. accounts haggle again]
.c_custkey: [63730], c_name: [Customer#000063730], c_address: [6fv7Iw9Pr9lQntCZwsile2GX0xJ9A ], c_nationkey: [24], c_phone: [34-998-382-6518], c_acctbal: [4923.4], c_mktsegment: [MACHINERY], c_comment: [ sil
ent requests haggle carefully regular. regular packages. enticing, even deposits make slyly among the]
.c_custkey: [12022], c_name: [Customer#000012022], c_address: [PwVDRfqZtHw0], c_nationkey: [24], c_phone: [34-998-488-4382], c_acctbal: [2877.36], c_mktsegment: [HOUSEHOLD], c_comment: [Layers. regular pinto
beans about the quickly regular ideas cajole blithely]
.c_custkey: [125210], c_name: [Customer#0000125210], c_address: [8JlJAg79TVTSdxgPeb635UqKADVV], c_nationkey: [24], c_phone: [34-998-711-2597], c_acctbal: [6678.32], c_mktsegment: [FURNITURE], c_comment: [ly iro
nic, ironic accounts. theodolites among the slyly even patterns nag slyly fluffl]
.c_custkey: [58667], c_name: [Customer#000058667], c_address: [9aGwxCYLcG6yZeA], c_nationkey: [24], c_phone: [34-999-115-2195], c_acctbal: [8764.52], c_mktsegment: [FURNITURE], c_comment: [mptotes around the s
lyly bold instructions boost fur]
.c_custkey: [7288], c_name: [Customer#00007288], c_address: [dZCqJe9U5QXQ]xAd7WxRWYvFVW6d4pFTrAshk], c_nationkey: [24], c_phone: [34-999-121-7718], c_acctbal: [82.07], c_mktsegment: [HOUSEHOLD], c_comment: [
ns sublate furiously. carefully ironic platelets grow furiously. ironic, bold theodolites hang above th]
.c_custkey: [80642], c_name: [Customer#000080642], c_address: [M3erpr0N0VVRK], c_nationkey: [24], c_phone: [34-999-195-7029], c_acctbal: [6912.63], c_mktsegment: [BUILDING], c_comment: [totes above the pending,
regular hockey players sleep blithely after the blithely even deposits. carefully regula]
.c_custkey: [134611], c_name: [Customer#0000134611], c_address: [h0NMAELd2WMydhp2Zg3hab97F0dNIH64], c_nationkey: [24], c_phone: [34-999-203-6448], c_acctbal: [24.12], c_mktsegment: [HOUSEHOLD], c_comment: [
requests above the blithely pending asymptotes sleep carefully about the slyly even excu]
.c_custkey: [102689], c_name: [Customer#0000102689], c_address: [uPFxngv50AdQIL], c_nationkey: [24], c_phone: [34-999-363-7145], c_acctbal: [6256.97], c_mktsegment: [AUTOMOBILE], c_comment: [ly regular asymptot
es haggle fluffily according to the furiously bold courts. daring ]
.c_custkey: [35480], c_name: [Customer#000035480], c_address: [0TsZcyi1hZXXivXV2FeToqJ,lovs6zya], c_nationkey: [24], c_phone: [34-999-379-6016], c_acctbal: [6097.10], c_mktsegment: [MACHINERY], c_comment: [f
ithout the fluffily ironic packages. daring, even de]
.c_custkey: [103505], c_name: [Customer#0000103505], c_address: [XPNXpdcD7HRqCvBA8bpJF3ixDc9A6X ZB2 ], c_nationkey: [24], c_phone: [34-999-404-9770], c_acctbal: [582.88], c_mktsegment: [FURNITURE], c_comment: [f
ully even deposits boost. quickly ironic requests could have to be according to the final accounts. final]
.c_custkey: [62707], c_name: [Customer#000062707], c_address: [bRbtSTIXhh], c_nationkey: [24], c_phone: [34-999-473-9448], c_acctbal: [7429.32], c_mktsegment: [FURNITURE], c_comment: [zzle slyly after the slyl
y ironic pinto beans. bold, fina]
.c_custkey: [41774], c_name: [Customer#000041774], c_address: [DpHfJFKVkr4LQeif9t5SSKZDUaHG3asKeya5M7dz], c_nationkey: [24], c_phone: [34-999-535-1203], c_acctbal: [7118.29], c_mktsegment: [FURNITURE], c_comme
nt: [c requests sleep. quickly silent requests make fluffily. furiously close packages nag furiously across the caref]
.c_custkey: [94308], c_name: [Customer#000094308], c_address: [5aE9PLelngeVg8v6KCGoYR,NDT5u4C], c_nationkey: [24], c_phone: [34-999-618-6653], c_acctbal: [8636.13], c_mktsegment: [FURNITURE], c_comment: [g, e
ven deposits. carefully unus]
.c_custkey: [102414], c_name: [Customer#0000102414], c_address: [Xzg9e1Wb5xIQW_LUCYUacPOeNdLQIL], c_nationkey: [24], c_phone: [34-999-618-6881], c_acctbal: [9614.62], c_mktsegment: [MACHINERY], c_comment: [usl
y final packages. carefully even packages by the permanently special gifts ne]

scanned 150000 recs

sanjay@sanjay-VirtualBox: ~/Documents/Database-Implementation/a2-2test$
```

Test Case 3:

Input - 3; 3; (c_phone > '34-999-195-7029') AND (c_mktsegment = 'FURNITURE')

```
sanjay@sanjay-VirtualBox: ~/Documents/Database-Implementation/a2-2test$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /home/sanjay/Documents/Database-Implementation/git/tpch-dbg/en/
heap files dir:

select test option:
1. create sorted dfile
2. scan a dfile
3. run some query
3

select table:
1. nation
2. region
3. customer
4. part
5. partsupp
6. supplier
7. orders
8. lineitem
3

enter CNF predicate (when done press ctrl-D):
(c_phone > '34-999-195-7029') AND (c_mktsegment = 'FURNITURE')
SORTED: GetNext : start
SORTED: QueryOrderGenerator: start query 0x5580fc8e56b0
SORTED: QueryOrderGenerator : End NumItts 0
Query Gen fail! go Sequential:
.c_custkey: [103505], c_name: [Customer#0000103505], c_address: [XPNXpdcD7HRqCvBA8bpJF3ixDc9A6X ZB2 ], c_nationkey: [24], c_phone: [34-999-404-9770], c_acctbal: [582.88], c_mktsegment: [FURNITURE], c_comment: [fu
lly even deposits boost. quickly ironic requests could have to be according to the final accounts. final]
SORTED: GetNext : start
.c_custkey: [62707], c_name: [Customer#000062707], c_address: [bRbtSTIXhh], c_nationkey: [24], c_phone: [34-999-473-9448], c_acctbal: [7429.32], c_mktsegment: [FURNITURE], c_comment: [zzle slyly after the slyly
ironic pinto beans. bold, fina]
SORTED: GetNext : start
.c_custkey: [41774], c_name: [Customer#000041774], c_address: [DpHfJFKVkr4LQeif9t5SSKZDUaHG3asKeya5M7dz], c_nationkey: [24], c_phone: [34-999-535-1203], c_acctbal: [7118.29], c_mktsegment: [FURNITURE], c_commen
t: [c requests sleep. quickly silent requests make fluffily. furiously close packages nag furiously across the caref]
SORTED: GetNext : start
.c_custkey: [94308], c_name: [Customer#000094308], c_address: [5aE9PLelngeVg8v6KCGoYR,NDT5u4C], c_nationkey: [24], c_phone: [34-999-618-6653], c_acctbal: [8636.13], c_mktsegment: [FURNITURE], c_comment: [g, ev
en deposits. carefully unus]
SORTED: GetNext : start

query over customer.bin returned 4 recs

sanjay@sanjay-VirtualBox: ~/Documents/Database-Implementation/a2-2test$
```

Results for gTests:

```
sanjay@sanjay-VirtualBox:~/Documents/Database-Implementation/a2-2test$ ./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 5 tests from 2 test suites.
[*****] Global test environment set-up.
[*****] 3 tests from Heap_DBFile_Test
[ RUN    ] Heap_DBFile_Test.ValidCreate
[ OK     ] Heap_DBFile_Test.ValidCreate (0 ms)
[ RUN    ] Heap_DBFile_Test.ValidOpen
[ OK     ] Heap_DBFile_Test.ValidOpen (1 ms)
[ RUN    ] Heap_DBFile_Test.ValidClose
[ OK     ] Heap_DBFile_Test.ValidClose (7 ms)
[*****] 3 tests from Heap_DBFile_Test (10 ms total)

[*****] 2 tests from Sorted_DBFile_Test
[ RUN    ] Sorted_DBFile_Test.LoadTest
[ OK     ] Sorted_DBFile_Test.LoadTest (3639 ms)
[ RUN    ] Sorted_DBFile_Test.OrderTest
[ OK     ] Sorted_DBFile_Test.OrderTest (1 ms)
[*****] 2 tests from Sorted_DBFile_Test (3639 ms total)

[*****] Global test environment tear-down
[*****] 5 tests from 2 test suites ran. (3651 ms total)
[ PASSED ] 5 tests.
```

```
sanjay@sanjay-VirtualBox:~/Documents/Database-Implementation/a2-2test$
```

