

Project Report - Implementing a Heap File

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1) Steps to compile and run - code, tests and gtests

- i. **make main** – Command to build the main program.
- ii. **./main** – Command to run the main executable.
- iii. **make test.out** – Command to build the tests.
- iv. **./test.out** – Command to run the tests.
- v. **make DBFileTest.out** – Command to build the gtests.
- vi. **./ DBFileTest.out** – Command to run the gtests.

2) DBFile implementation

Data members

- i. `char *filename` – Used to copy filename in Create and Open functions.
- ii. `File *heapfile` – Used to store pointer to the heapfile object used to store records.
- iii. `Page *deltapage` – Pointer to page holding recent record additions to the file.
- iv. `Page *readpage` – Pointer to page for reading records from the file.
- v. `ComparisonEngine comp` – Used to apply and check CNF with a record
- vi. `int readPageNumber` – Stores page number of current page being read.

Member functions

- i. `void MoveFirst ()` – This function resets the *readPageNumber* variable and empties the *readPage*.
- ii. `[private function] void AddDeltaPageToFile()` – This function adds the *deltapage* to the *heapfile* and clears it out for further additions.
- iii. `void Add (Record &record)` – This function adds a record to the *deltapage*. If the *deltapage* is full, it calls *AddDeltaPageToFile()* and adds the record to the fresh *deltapage*.
- iv. `int GetNext (Record &fetchme))` – This function gets the next record from the file by reading from the *readpage* or incrementing the *readPage* if it runs out. If we reach the end of the file and *deltaPage* contains records, then it is added to the file and read.
- v. `int GetNext (Record &fetchme, CNF &cnf, Record &literal))` – This function repeatedly calls *GetNext* and checks the record against the CNF.
- vi. `int Create (const char * f_path, fType f_Type, void *startup))` – This function creates a DBFile of the type heap. Returns 1 on success.

- vii. `int Open (const char *f_path))` – This function opens an existing DBFile. Returns 1 on success and 0 on failure or when File not found.
- viii. `int Close ()` – This function calls `AddDeltaPageToFile()` and then closes the DBFile.
- ix. `void Load (Schema &file_schema, const char *recPath))` – This function loads data from a given file path. It repeatedly calls `SuckNextRecord()` and then `Add()` to add it to the DBFile.

3) Test.out results for 1GB data

- i. **Query 1 :** `(r_name = 'EUROPE')`

```

arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbggen/
heap files dir: dbfiles/
44 The expected output for these CNF's can be found in the file "output.log"
45
46 Example CNF's
47 =====
48
49 q1
50 (r_name = 'EUROPE')
51
52 q2
53 (r_name < 'middle east') AND
54 (r_regionkey > 1)
55
56 q3
57 (n_regionkey = 3) AND
58 (n_nationkey > 10) AND
59 (n_name > 'japan')
60
61
62 select test:
63 1. load file
64 2. scan
65 3. scan & filter
66 3 DBFileTest.cc M
67
68 select table:
69 1. nation
70 2. region
71 3. customer
72 4. part
73 5. partsupp
74 6. orders
75 7. lineitem
76 7 DBFile.cc M
77
78 Filter with CNF for : region
79 Enter CNF predicate (when done press ctrl-D):
80 (r_name = 'EUROPE')r_regionkey: [3], r_name: [EUROPE], r_comment: [ly final courts cajole furiously final excuse]
81 selected 1 recs
82
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$

```

ii. **Query 2** : (r_name < 'middle east') AND (r_regionkey > 1)

```
arpan@arpan-laptop:~/Desktop/Krutantak/6it/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbgen/
heap files dir: dbfiles/
The expected output for these CNF's can be found in the file 'output.log'

Example CNF's

select test:
1. load file
2. scan
3. scan & filter
3. DBFileTest.cc M 50 (r_name = 'EUROPE')
select table: M 51
1. nation 52 q2
2. region 53 (r_name < 'middle east') AND
3. customer 54 (r_regionkey > 1)
4. part M 55
5. partsupp M 56 q3
6. orders M 57 (n_regionkey = 3) AND
7. lineitem M 58 (n_nationkey > 10) AND
2. excel 59 (n_name > 'japan')
Filter with CNF for : region
Enter CNF predicate (when done press ctrl-D):
(r_name < 'middle east') AND
(r_regionkey > 1)r_regionkey: [2], r_name: [ASIA], r_comment: [ges. thinly even pinto beans ca]
r_regionkey: [3], r_name: [EUROPE], r_comment: [ly final courts cajole furiously final excuse]
r_regionkey: [4], r_name: [MIDDLE EAST], r_comment: [uickly special accounts cajole carefully blithely close requests. carefully final asymptotes hagggle furiousl]
selected 3 recs
arpan@arpan-laptop:~/Desktop/Krutantak/6it/dbi-proj1$ █ = 18) AND
```

- iii. **Query 3 :**
(n_regionkey = 3) AND
(n_nationkey > 10) AND
(n_name > 'japan')

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbggen/
heap files dir: dbfiles/

select test:
  1. load file
  2. scan
  3. scan & filter
  3 DBFileTest.cc M
  DBFile.cc M
select table:
  1. nation
  2. region
  3. customer
  4. part M
  5. partsupp M
  6. orders M
  7. lineitem
  7 lexer.l
Filter with CNF for : nation
Enter CNF predicate (when done press ctrl-D):
(n_regionkey = 3) AND
(n_nationkey > 10) AND
(n_name > 'japan') selected 0 recs
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```

iv. **Query 11 :**

```
(l_shipdate > '1994-01-01') AND  
(l_shipdate < '1994-01-07') AND  
(l_discount > 0.05) AND  
(l_discount < 0.06) AND  
(l_quantity = 4)
```

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out  
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **  
catalog location:      catalog  
tpch files dir:        datagen/tpch-dbgen/  
heap files dir:        dbfiles/  
  
select test:  
  1. load file  
  2. scan  
  3. scan & filter  
  3  
select table:  
  1. nation  
  2. region  
  3. customer  
  4. part  
  5. partsupp  
  6. orders  
  7. lineitem  
  7  
Filter with CNF for : lineitem  
Enter CNF predicate (when done press ctrl-D):  
(l_shipdate > '1994-01-01') AND  
(l_shipdate < '1994-01-07') AND  
(l_discount > 0.05) AND  
(l_discount < 0.06) AND  
(l_quantity = 4.0) selected 0 recs  
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```

v. **Query 12 :**

(l_orderkey > 100) AND
(l_orderkey < 1000) AND
(l_partkey > 100) AND
(l_partkey < 5000) AND
(l_shipmode = 'AIR') AND
(l_linestatus = 'F') AND
(l_tax < 0.07)

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbggen/ (0_totalprice < 1051.89)
heap files dir: dbfiles/

select test:
1. load file
2. scan
3. scan & filter
3. dbfileTest.cc
select table:
1. nation
2. region
3. customer
4. part
5. partsupp
6. orders
7. lineitem
7. lineitem
Filter with CNF for : lineitem
Enter CNF predicate (when done press ctrl-D):
(l_orderkey > 100) AND
(l_orderkey < 1000) AND
(l_partkey > 100) AND
(l_partkey < 5000) AND
(l_shipmode = 'AIR') AND
(l_linestatus = 'F') AND
(l_tax < 0.07)
(l_orderkey: [130], l_partkey: [1739], l_supkey: [4240], l_linenum: [2], l_quantity: [48], l_extendedprice: [78755], l_discount: [0.03], l_tax: [0.02], l_returnflag: [R], l_linestatus: [F], l_shipdate: [1992-07-01], l_commitdate: [1992-07-12], l_receiptdate: [1992-07-24], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [lithely alongside of the regu])
(l_orderkey: [194], l_partkey: [2594], l_supkey: [5095], l_linenum: [1], l_quantity: [17], l_extendedprice: [25442], l_discount: [0.05], l_tax: [0.04], l_returnflag: [R], l_linestatus: [F], l_shipdate: [1992-05-24], l_commitdate: [1992-05-22], l_receiptdate: [1992-05-30], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [regular deposi])
selected 2 recs
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```

4) Test.out results for 10MB data

- i. Query 1 :
(r_name = 'EUROPE')

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        datagen/tpch-dbggen/
heap files dir:        dbfiles/

select test:
  1. load file
  2. scan
  3. scan & filter
  3

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

Filter with CNF for : region
Enter CNF predicate (when done press ctrl-D):
(r_name = 'EUROPE')r_regionkey: [3], r_name: [EUROPE], r_comment: [ly final courts cajole furiously final excuse]
selected 1 recs
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```


ii. **Query 2 :**

(r_name < 'middle east') AND
(r_regionkey > 1)

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbggen/ Using the driver:
heap files dir: dbfiles/

1. SETTINGS: The following variables control the various file locations and they are declared in test.cc (just after
o dbfile_dir -- this is where the created heap db-files will be stored. By default, this is set to "" (thus all
o tpch_dir -- this stores the directory path where the tpch-files can be found. The "/cise/tmp/dbi spl1/DATA/"
o catalog_path -- this stores the catalog file path. By default this is set to ". Again, if you are running th

2. Next replace the stub files DBFile.h and DBFile.cc with your own code. If you are using additional headers, modi

3. Once load of a file has been selected, you can select option 2 or 3 to scan/filter all the records from the heap.

table | CNF
-----
region | q1 q2
nation | q3
supplier | q4 q5
customer | q6
part | q7
partsupp | q8 q9

Filter with CNF for : region
Enter CNF predicate (when done press ctrl-D):
(r_name < 'middle east') AND
(r_regionkey > 1)r_regionkey: [2], r_name: [ASIA], r_comment: [ges. thinly even pinto beans ca]
r_regionkey: [3], r_name: [EUROPE], r_comment: [ly final courts cajole furiously final excuse]
r_regionkey: [4], r_name: [MIDDLE EAST], r_comment: [uickly special accounts cajole carefully blithely close requests. carefully final asymptotes haggle furiously]
selected 3 recs

arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ 1 output for these CNF's can be found in the file "output.log"
```

iii. **Query 3 :**

(n_regionkey = 3) AND
(n_nationkey > 10) AND
(n_name > 'japan')

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
FOLDERS
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbgen/
heap files dir: dbfiles/

select test:
  1. load file
  2. scan
  3. scan & filter
  3

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

Filter with CNF for : nation
Enter CNF predicate (when done press ctrl-D):(n_regionkey = 3) AND (n_nationkey > 10) AND (n_name > 'japan') selected 0 recs
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```

iv. **Query 11 :**

(l_shipdate > '1994-01-01') AND
(l_shipdate < '1994-01-07') AND
(l_discount > 0.05) AND
(l_discount < 0.06) AND
(l_quantity = 4.0)

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        datagen/tpch-dbgen/
heap files dir:        dbfiles/

select test:
    1. load file
    2. scan
    3. scan & filter
    3

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

Filter with CNF for : lineitem
Enter CNF predicate (when done press ctrl-D):
(l_shipdate > '1994-01-01') AND
(l_shipdate < '1994-01-07') AND
(l_discount > 0.05) AND
(l_discount < 0.06) AND
(l_quantity = 4.0) selected 0 recs
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```

v. **Query 12 :**

```
(l_orderkey > 100) AND  
(l_orderkey < 1000) AND  
(l_partkey > 100) AND  
(l_partkey < 5000) AND  
(l_shipmode = 'AIR') AND  
(l_linestatus = 'F') AND  
(l_tax < 0.07)
```

```
arpan@arpan-laptop: ~/Desktop/Krutantak/Git/dbi-proj15 ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: datagen/tpch-dbggen/
heap files dir: dbfiles/

select test:
  1. load file
  2. scan
  3. scan & filter
  3

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

Filter with CNF for : lineitem
Enter CNF predicate (when done press ctrl-D):
(l_orderkey > 100) AND
(l_orderkey < 1000) AND
(l_partkey > 100) AND
(l_partkey < 5000) AND
(l_shipmode = 'AIR') AND
(l_linestatus = 'F') AND
(l_tax < 0.07)

3. Query 12:
(l_orderkey > 100) AND (l_orderkey < 1000) AND (l_partkey > 100) AND (l_partkey <
5000) AND (l_shipmode = 'AIR') AND (l_linestatus = 'F') AND (l_tax < 0.07)

• 1 GB data •

[132], l_partkey: [281], l_suppkey: [63], l_linenumbe: [4], l_quantity: [23], l_extendedprice: [27169.4], l_discount: [0.1], l_tax: [0], l_returnflag: [A], l_lines
tatus: [F], l_shipdate: [1993-06-16], l_commitdate: [1993-08-27], l_receiptdate: [1993-06-23], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [refully blithely bold acco]
l_orderkey: [164], l_partkey: [185], l_suppkey: [38], l_linenumbe: [2], l_quantity: [24], l_extendedprice: [26044.3], l_discount: [0.05], l_tax: [0.05], l_returnflag: [R], l_linestatus: [F]
, l_shipdate: [1992-12-22], l_commitdate: [1992-11-27], l_receiptdate: [1993-01-06], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [side of the slyly unusual theodolites. f]
l_orderkey: [164], l_partkey: [1256], l_suppkey: [68], l_linenumbe: [3], l_quantity: [38], l_extendedprice: [43975.5], l_discount: [0.03], l_tax: [0.06], l_returnflag: [R], l_linestatus: [F]
], l_shipdate: [1992-12-04], l_commitdate: [1992-11-23], l_receiptdate: [1993-01-02], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [AIR], l_comment: [counts cajole fluffily regular packag
es. b]
```



```
{
  "orderkey": 164,
  "partkey": 1889,
  "suppkey": 90,
  "linenumber": 6,
  "quantity": 27,
  "extendedprice": 26732.2,
  "discount": 0.1,
  "tax": 0.04,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1992-12-23",
  "commitdate": "1993-01-16",
  "receiptdate": "1993-01-10",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "ayers wake carefully a"
},
{
  "orderkey": 226,
  "partkey": 487,
  "suppkey": 95,
  "linenumber": 4,
  "quantity": 45,
  "extendedprice": 58833,
  "discount": 0.1,
  "tax": 0.02,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1993-04-17",
  "commitdate": "1993-05-27",
  "receiptdate": "1993-05-11",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": " carefully pending pi"
},
{
  "orderkey": 258,
  "partkey": 1465,
  "suppkey": 5,
  "linenumber": 6,
  "quantity": 36,
  "extendedprice": 49192.6,
  "discount": 0.09,
  "tax": 0.04,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1994-01-11",
  "commitdate": "1994-03-04",
  "receiptdate": "1994-01-18",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "nic asymptotes. slyly silent r"
},
{
  "orderkey": 261,
  "partkey": 1740,
  "suppkey": 25,
  "linenumber": 3,
  "quantity": 28,
  "extendedprice": 45968.7,
  "discount": 0.08,
  "tax": 0.03,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1993-07-24",
  "commitdate": "1993-08-20",
  "receiptdate": "1993-08-05",
  "shipinstruct": "COLLECT COD",
  "shipmode": "AIR",
  "comment": "ironic packages nag slyly. carefully fin"
},
{
  "orderkey": 261,
  "partkey": 970,
  "suppkey": 5,
  "linenumber": 6,
  "quantity": 20,
  "extendedprice": 37419.4,
  "discount": 0.06,
  "tax": 0.06,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1993-10-15",
  "commitdate": "1993-09-05",
  "receiptdate": "1993-11-07",
  "shipinstruct": "NONE",
  "shipmode": "AIR",
  "comment": "ing to the special, ironic deposi"
},
{
  "orderkey": 294,
  "partkey": 597,
  "suppkey": 88,
  "linenumber": 1,
  "quantity": 31,
  "extendedprice": 46425.3,
  "discount": 0,
  "tax": 0.01,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1993-08-06",
  "commitdate": "1993-08-19",
  "receiptdate": "1993-08-13",
  "shipinstruct": "TAKE BACK RETURN",
  "shipmode": "AIR",
  "comment": "le fluffily along the quick"
},
{
  "orderkey": 295,
  "partkey": 914,
  "suppkey": 17,
  "linenumber": 2,
  "quantity": 26,
  "extendedprice": 47187.7,
  "discount": 0.04,
  "tax": 0.03,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1994-12-13",
  "commitdate": "1994-11-30",
  "receiptdate": "1995-01-06",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "ts above the slyly regular requests x-ray q"
},
{
  "orderkey": 322,
  "partkey": 1833,
  "suppkey": 77,
  "linenumber": 4,
  "quantity": 10,
  "extendedprice": 17348.3,
  "discount": 0.06,
  "tax": 0.03,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1992-04-12",
  "commitdate": "1992-05-13",
  "receiptdate": "1992-04-14",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": " deposits grow slyly according to th"
},
{
  "orderkey": 322,
  "partkey": 334,
  "suppkey": 91,
  "linenumber": 6,
  "quantity": 3,
  "extendedprice": 3702.99,
  "discount": 0.08,
  "tax": 0.05,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1992-07-03",
  "commitdate": "1992-05-10",
  "receiptdate": "1992-07-28",
  "shipinstruct": "NONE",
  "shipmode": "AIR",
  "comment": "ending, ironic deposits along the bliith"
},
{
  "orderkey": 327,
  "partkey": 418,
  "suppkey": 48,
  "linenumber": 2,
  "quantity": 9,
  "extendedprice": 11865.7,
  "discount": 0.09,
  "tax": 0.05,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1995-05-24",
  "commitdate": "1995-07-11",
  "receiptdate": "1995-06-05",
  "shipinstruct": "NONE",
  "shipmode": "AIR",
  "comment": " asymptotes are fu"
},
{
  "orderkey": 353,
  "partkey": 1194,
  "suppkey": 67,
  "linenumber": 1,
  "quantity": 41,
  "extendedprice": 44902.8,
  "discount": 0,
  "tax": 0.06,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1994-03-25",
  "commitdate": "1994-03-31",
  "receiptdate": "1994-03-30",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "refully final theodoli"
},
{
  "orderkey": 416,
  "partkey": 1742,
  "suppkey": 85,
  "linenumber": 3,
  "quantity": 25,
  "extendedprice": 41093.5,
  "discount": 0.07,
  "tax": 0.01,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1993-10-16",
  "commitdate": "1993-12-03",
  "receiptdate": "1993-10-29",
  "shipinstruct": "NONE",
  "shipmode": "AIR",
  "comment": "ses boost after the bold requests."
},
{
  "orderkey": 450,
  "partkey": 781,
  "suppkey": 82,
  "linenumber": 5,
  "quantity": 2,
  "extendedprice": 3363.56,
  "discount": 0.09,
  "tax": 0,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1995-03-11",
  "commitdate": "1995-05-21",
  "receiptdate": "1995-03-16",
  "shipinstruct": "COLLECT COD",
  "shipmode": "AIR",
  "comment": "y even pinto beans; qui"
},
{
  "orderkey": 481,
  "partkey": 207,
  "suppkey": 8,
  "linenumber": 2,
  "quantity": 19,
  "extendedprice": 21036.8,
  "discount": 0.08,
  "tax": 0.01,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1993-01-09",
  "commitdate": "1992-11-27",
  "receiptdate": "1993-01-14",
  "shipinstruct": "TAKE BACK RETURN",
  "shipmode": "AIR",
  "comment": "p blithely after t"
},
{
  "orderkey": 481,
  "partkey": 1120,
  "suppkey": 93,
  "linenumber": 5,
  "quantity": 31,
  "extendedprice": 31654.7,
  "discount": 0.05,
  "tax": 0.01,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1993-01-15",
  "commitdate": "1992-12-31",
  "receiptdate": "1993-01-21",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "usly final packages believe. quick"
},
{
  "orderkey": 548,
  "partkey": 568,
  "suppkey": 59,
  "linenumber": 4,
  "quantity": 21,
  "extendedprice": 30839.8,
  "discount": 0.08,
  "tax": 0.03,
  "returnflag": "A",
  "linestatus": "F",
  "shipdate": "1994-10-27",
  "commitdate": "1994-12-04",
  "receiptdate": "1994-11-21",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "engage quickly. regular theo"
},
{
  "orderkey": 549,
  "partkey": 653,
  "suppkey": 54,
  "linenumber": 3,
  "quantity": 36,
  "extendedprice": 55931.4,
  "discount": 0.08,
  "tax": 0.04,
  "returnflag": "R",
  "linestatus": "F",
  "shipdate": "1992-09-11",
  "commitdate": "1992-10-11",
  "receiptdate": "1992-09-12",
  "shipinstruct": "DELIVER IN PERSON",
  "shipmode": "AIR",
  "comment": "ts against the ironic, even theodolit es eng"
}
```

```

    l_orderkey: [577], l_partkey: [259], l_suppkey: [14], l_linenum: [1], l_quantity: [25], l_extendedprice: [28981.2], l_discount: [0.06], l_tax: [0.01], l_returnflag: [A], l_linestatus: [F],
    l_shipdate: [1995-04-09], l_commitdate: [1995-02-20], l_receiptdate: [1995-05-09], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [AIR], l_comment: [ve slyly of the frets. careful]
    l_orderkey: [677], l_partkey: [1497], l_suppkey: [15], l_linenum: [5], l_quantity: [25], l_extendedprice: [34962.2], l_discount: [0], l_tax: [0.05], l_returnflag: [A], l_linestatus: [F],
    l_shipdate: [1994-03-12], l_commitdate: [1994-02-02], l_receiptdate: [1994-03-28], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [ packages integrate blithely]
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    l_shipdate: [1993-03-09], l_commitdate: [1993-04-18], l_receiptdate: [1993-04-07], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ about the ]
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    l_orderkey: [738], l_partkey: [1749], l_suppkey: [34], l_linenum: [5], l_quantity: [38], l_extendedprice: [49522.2], l_discount: [0.02], l_tax: [0], l_returnflag: [A], l_linestatus: [F],
    l_shipdate: [1993-06-12], l_commitdate: [1993-05-29], l_receiptdate: [1993-06-25], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ecial instructions haggle blithely regula]
    l_orderkey: [742], l_partkey: [1919], l_suppkey: [64], l_linenum: [4], l_quantity: [16], l_extendedprice: [29134.6], l_discount: [0.01], l_tax: [0.05], l_returnflag: [A], l_linestatus: [F],
    l_shipdate: [1995-01-15], l_commitdate: [1995-02-25], l_receiptdate: [1995-01-24], l_shipinstruct: [COLLECT C00], l_shipmode: [AIR], l_comment: [eodolites haggle carefully regul]
    l_orderkey: [769], l_partkey: [1751], l_suppkey: [94], l_linenum: [1], l_quantity: [36], l_extendedprice: [59499], l_discount: [0.02], l_tax: [0.02], l_returnflag: [A], l_linestatus: [F],
    l_shipdate: [1993-10-01], l_commitdate: [1993-08-07], l_receiptdate: [1993-10-15], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [es. furiously iro]
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    l_shipdate: [1992-03-14], l_commitdate: [1992-04-01], l_receiptdate: [1992-04-05], l_shipinstruct: [COLLECT C00], l_shipmode: [AIR], l_comment: [wake silently furiously idle deposits. ]
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    l_orderkey: [866], l_partkey: [1358], l_suppkey: [59], l_linenum: [1], l_quantity: [5], l_extendedprice: [6296.75], l_discount: [0.08], l_tax: [0], l_returnflag: [R], l_linestatus: [F], l
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    l_orderkey: [928], l_partkey: [104], l_suppkey: [31], l_linenum: [7], l_quantity: [11], l_extendedprice: [11045.1], l_discount: [0], l_tax: [0.01], l_returnflag: [A], l_linestatus: [F], l
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    l_orderkey: [938], l_partkey: [173], l_suppkey: [52], l_linenum: [2], l_quantity: [47], l_extendedprice: [58439], l_discount: [0.08], l_tax: [0], l_returnflag: [A], l_linestatus: [F], l_s
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    l_orderkey: [933], l_partkey: [992], l_suppkey: [27], l_linenum: [3], l_quantity: [26], l_extendedprice: [49217.7], l_discount: [0.05], l_tax: [0], l_returnflag: [A], l_linestatus: [F], l
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    l_orderkey: [968], l_partkey: [1070], l_suppkey: [6], l_linenum: [1], l_quantity: [1], l_extendedprice: [971.07], l_discount: [0.07], l_tax: [0], l_returnflag: [A], l_linestatus: [F], l_s
    l_shipdate: [1994-12-24], l_commitdate: [1994-10-26], l_receiptdate: [1995-01-20], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [y ironic packages. quickly even ]
selected 35 recs
l_query:

```

arpan@arpan-laptop: ~/Desktop/Krutantak/Git/dbi-proj1s

5) gTest results:

- i. **TEST(DBFileTest, Create_Equal) –**
 - a. Check return value is 1 on successful creation of file.
- ii. **TEST(DBFileTest, Create_NotEqual) –**
 - a. Check program terminates with error message “BAD! Open did not work for ...” on passing empty file path function argument.
 - b. Check return value is 0 on passing wrong file type function argument.
- iii. **TEST(DBFileTest, Open_Equal) –**
 - a. Check return value is 1 on successfully opening file at the specified file path.
- iv. **TEST(DBFileTest, Open_NotEqual) –**
 - a. Check return value is 0 on passing incorrect file name.
- v. **TEST(DBFileTest, Close_Emty_File) –**
 - a. Check return value is 0 on closing files that are not loaded or opened.

vi. TEST(DBFileTest, Close_Nations_DBFile) –

- a. Check return type is not 0 on closing non empty opened files.

```
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$ ./DBFileTest.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        datagen/tpch-dbgen/
heap files dir:        dbfiles/

[=====] Running 6 tests from 1 test case.
[-----] Global test environment set-up.
[-----] 6 tests from DBFileTest
[ RUN      ] DBFileTest.Create_Equal
[ OK       ] DBFileTest.Create_Equal (1 ms)
[ RUN      ] DBFileTest.Create_NotEqual
[ OK       ] DBFileTest.Create_NotEqual (1 ms)
[ RUN      ] DBFileTest.Open_Equal
[ OK       ] DBFileTest.Open_Equal (0 ms)
[ RUN      ] DBFileTest.Open_NotEqual
[ OK       ] DBFileTest.Open_NotEqual (0 ms)
[ RUN      ] DBFileTest.Close_Empty_File
[ OK       ] DBFileTest.Close_Empty_File (0 ms)
[ RUN      ] DBFileTest.Close_Nations_DBFile
[ OK       ] DBFileTest.Close_Nations_DBFile (13 ms)
[-----] 6 tests from DBFileTest (16 ms total)
[-----] Global test environment tear-down
[=====] 6 tests from 1 test case ran. (16 ms total)
[ PASSED  ] 6 tests.
arpan@arpan-laptop:~/Desktop/Krutantak/Git/dbi-proj1$
```