

Database Implementation System

Project : 1

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Instruction to Compile and Run:

To run main:

```
> make clean  
> make main  
> ./main
```

Note: Make sure you update the variable “FILE *tableFile” with the correct path location.

To run test.out:

```
> make clean  
> make test.out  
> ./test.out
```

Note: Make sure you update the variable dbfile_dir, tpch_dir and catalog_path with the appropriate location.

To run gtest:

```
> make clean  
> make gtest  
> ./gtest
```

Note: Make sure you update the variable dbfile_dir, tpch_dir and catalog_path with the appropriate location.

Project Flow and Structure:

The DBFile class has the following private class

```
private:  
// Used to read & write page to the disk.  
File myFile;  
// Used as a buffer to read and write data.  
Page myPage;  
// Used to keep track of the state.  
Preference myPreference;  
// Used to keep track of the state.  
ComparisonEngine myCompEng;
```

Public Functions added apart from the required one.

```
public:  
// Function to load preference from the disk. This is needed to make read and writes persistent.  
// @input – the file path of the table to be created or opened. Each .tbl file has a  
corresponding .pref  
void LoadPreference(char*f_path);  
  
// Function to dump the preference to the disk. This is needed to make read and writes  
persistent.  
void DumpPreference();  
  
// Function to get the next page location to write. i.e. if there are 10 pages written this  
will give the location to write the 11th page.  
int GetPageLocationToWrite();  
  
// Function to get the page location from which we need to start the disk read.  
// @input : Buffer Mode : Will give different locations according to current state of the  
DBFile.  
int GetPageLocationToRead(BufferMode mode);  
  
// Function to get the same current page location when we want to rewrite data.
```

```
int GetPageLocationToReWrite();
```

The DBFile creates a preference file for each .tbl data created using the create function. The preference class looks like below.

Preference Class

```
class Preference{
public:

    // Variable to store the state in which the page buffer is present;
    // Possible values : WRITE,READ and IDLE(default state when the file is just created )
    BufferMode pageBufferMode;

    // Variable to track Current Page from which we need to READ or WRITE to with the file. May
    have different value according to the mode.
    off_t currentPage;

    // Variable to track the Current record during the READ and WRITE to the file.
    int currentRecordPosition;

    // Boolean to check if the page isFull or not.
    bool isPageFull;

    // Variable to store the file path to the preference file
    char * preferenceFilePath;

    // Boolean indicating if all the records in the page have been written in the file(disk) or
    not.
    bool allRecordsWritten;

    // Boolean indicating if the page needs to be rewritten or not.
    bool reWriteFlag;
};
```

Function Descriptions

```
int Create (const char *fpath, fType file_type, void *startup);
```

This function after validating the file type, proceeds to check whether a .bin file already exists at the same file location with the same name or not and exits the flow if that is the case. After the check is complete, the the function uses the myFile object to call its open function with the params 0 and file path to signal a new file creation. Also it loads the myPreference object with the initial values. Return 1 on success, 0 on failure.

```
int Open (const char *fpath);
```

This function looks for the existence of a file at the provided fpath. The it proceeds to open the file using myFile object by passing it 1 as param to signify not to recreate the file. The function proceeds to load the last state of the DBFile using the load preference function. If the last state was READ, the it loads the page buffer with last read in page with the help of the function GetPageLocationToRead which determines the page location based on the variable currentPage present in myPreference object. It also removes the unnecessary records which were already read earlier. In case of WRITE mode the function loads the page buffer with the last page which was written. Return 1 on success, 0 on failure.

```
int GetNext (Record &fetchme);
```

This function validates whether the file is open or not. Having validated this the function check whether the current state of DBFile. If the current state is write and if all the records have not been written to file we write the page to the last page of the disk and the flush the buffer using the function EmptyItOut. After this the function set the DBFile in read mode and keeps reading pages into the buffer using a while loop till the time we run out of pages to read from. During every read the appropriate variable are updated to keep track of the read progress.

```
int GetNext (Record &fetchme, CNF &cnf, Record &literal);
```

This function is built upon the previous read function and used readFlag and compareFlag to evaluate whether the record read from the buffer matches the criteria or not. When the it does math it returns the record. This function also checks the DBFile previous state and writes unwritten records to disk before the read begins.

```
void Load (Schema &myschema, const char *loadpath);
```

Load helps load raw records from text file in bulk and write them in a persistent file. We have used the Add function of DBFile, to add records to a page and write them in file, when the page buffer is full. If it was already being read and we need to load records, the page is flushed and records are loaded on a fresh page. It then iteratively calls the Add() function to complete its task.

```
void Add (Record &addme);
```

Add function adds record to DBFile one by one. If the buffer Page was open for read we first flush the buffer. If the last page in the persistent file was not full, we then reload it. If it was full, then we start adding the records onto a fresh buffer. We keep writing on this buffer page until it's full post which we write the page to the file and start afresh from on the page buffer. DBFile's load method uses this for bulk loading.

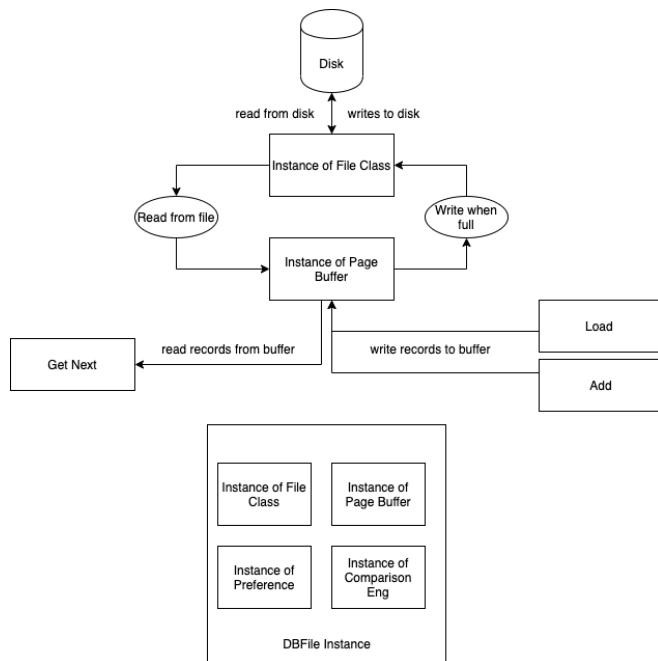
```
int Close ();
```

Close function helps use close the DBFile's file instance graciously. If we try to close a file which is not open, we throw back a message. If the current page was being written to in memory and has not been written to the file, we write the page into the file. We correspondingly set the state of the file in the preferences, and store the state preferences in our desired location for reloading. We return 1 on a successful close or 0 otherwise.

```
void MoveFirst ();
```

Move first function moves the current DBFile pointer to the first record of the DBFile. If the file is open in write mode for this function, we first write the current page BufferMode records in the persistent file. We then empty the page buffer to load a page from file for reading and pointing to its first record by calling File classes' MoveToFirst() function.

Basic Flow



In this assignment we have used a preference class to keep track of database file's state. Whenever DBFile is created a .pref file associated to the .tbl file is generated which saves all the data necessary for saving the state of the DBfile. A DBfile operates in 3 modes, namely, READ, WRITE and IDLE. Whenever the state changes from one mode to another, the page buffer which is used to read or write records decides to either write the data into the disk incase of switch from write to read mode, or decides to flush the buffer incase of the READ mode. Apart from this, various functions are defined to get the correct location of the page to work on according to the state.

Results:

Results for 10MB data

Test 1

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /Users/sathyasairam/tpch-dbggen/
heap files dir: /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

select table:
 1. nation
 2. region
 3. customer
 4. part
 5. partsupp
 6. orders
 7. lineitem
 1
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/nation.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/nation.tbl
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /Users/sathyasairam/tpch-dbggen/
heap files dir: /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

select table:
 1. nation
 2. region
 3. customer
 4. part
 5. partsupp
 6. orders
 7. lineitem
 2
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/region.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/region.tbl
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /Users/sathyasairam/tpch-dbggen/
heap files dir: /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

select table:
 1. nation
 2. region
 3. customer
 4. part
 5. partsupp
 6. orders
 7. lineitem
 7
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/lineitem.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/lineitem.tbl
Program ended with exit code: 0
```

Test 2

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv/
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

n_nationkey: [8], n_name: [ALGERIA], n_regionkey: [0], n_comment: [ a haggle. carefully final deposits detect slyly agai]
n_nationkey: [1], n_name: [ARGENTINA], n_regionkey: [1], n_comment: [ al foxes promise slyly according to the regular accounts. bold requests alone]
n_nationkey: [2], n_name: [BRAZIL], n_regionkey: [1], n_comment: [ y alongside of the pending deposits. carefully special packages are about the ironic forges. slyly special ]
n_nationkey: [3], n_name: [CANADA], n_regionkey: [1], n_comment: [ eas hang ironic, silent packages. slyly regular packages are furiously over the tithes. fluffily bold]
n_nationkey: [4], n_name: [EGYPT], n_regionkey: [4], n_comment: [ y above the carefully unusual theodolites. final dugouts are quickly across the furiously regular d]
n_nationkey: [5], n_name: [ETHIOPIA], n_regionkey: [8], n_comment: [ ven packages wake quickly. regu]
n_nationkey: [6], n_name: [FRANCE], n_regionkey: [3], n_comment: [ refully final requests. regular, ironi]
n_nationkey: [7], n_name: [GERMANY], n_regionkey: [3], n_comment: [ l platelets. regular accounts x-ray: unusual, regular acco]
n_nationkey: [8], n_name: [INDIA], n_regionkey: [2], n_comment: [ ss excuse cajole slyly across the packages. deposits print aroun]
n_nationkey: [9], n_name: [INDONESIA], n_regionkey: [2], n_comment: [ ss slyly express asymptotes. regular deposits haggle slyly. carefully ironic hockey players sleep blithely. carefull]
n_nationkey: [10], n_name: [IRAN], n_regionkey: [4], n_comment: [ fully alongside of the slyly final dependencies. ]
n_nationkey: [11], n_name: [ISRAEL], n_regionkey: [4], n_comment: [ nice deposits boost stop the quickly final requests? quickly regula]
n_nationkey: [12], n_name: [JORDAN], n_regionkey: [2], n_comment: [ tious deposits finally express give up ]
n_nationkey: [13], n_name: [KENYA], n_regionkey: [0], n_comment: [ pending excuses haggle furiously deposits. pending, express pinto beans wake fluffily past t]
n_nationkey: [15], n_name: [MOROCCO], n_regionkey: [8], n_comment: [ rns. blithely hold courts among the closely regular packages use furiously bold platelets?]
n_nationkey: [16], n_name: [MOZAMBIQUE], n_regionkey: [0], n_comment: [ s. ironic, unusual asymptotes wake blithely r]
n_nationkey: [17], n_name: [PERU], n_regionkey: [1], n_comment: [ platelets. blithely pending dependencies use fluffily across the even pinto beans. carefully silent accoun]
n_nationkey: [18], n_name: [CHINA], n_regionkey: [2], n_comment: [ c dependencies, furiously express notornis sleep slyly regular accounts. ideas sleep. depos]
n_nationkey: [19], n_name: [ROMANIA], n_regionkey: [3], n_comment: [ ulax asymptotes are about the furious multipliers. express dependencies nag above the ironically ironic account]
n_nationkey: [20], n_name: [SAUDI ARABIA], n_regionkey: [4], n_comment: [ ts. silent requests haggle. closely express packages sleep across the blithely]
n_nationkey: [21], n_name: [VIETNAM], n_regionkey: [2], n_comment: [ hely enticingly express accounts. even, final ]
n_nationkey: [22], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint]
n_nationkey: [23], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [ sans boost carefully special requests. accounts are. carefull]
n_nationkey: [24], n_name: [UNITED STATES], n_regionkey: [1], n_comment: [ y final packages. slow foxes cajole quickly. quickly silent platelets breach ironic accounts. unusual pinto be]
scanned 25 recs
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv/
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

r_regionkey: [0], r_name: [AFRICA], r_comment: [lar deposits. blithely final packages cajole. regular waters are final requests. regular accounts are according to ]
r_regionkey: [1], r_name: [AMERICA], r_comment: [hs use ironic, even requests. s]
r_regionkey: [2], r_name: [ASIA], r_comment: [ges. thinly even pinto beans ca]
r_regionkey: [3], r_name: [EUROPE], r_comment: [iy 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 furiosus]
scanned 5 recs
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv/
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

l_orderkey: [1], l_partkey: [1552], l_suppkey: [93], l_linenumber: [1], l_quantity: [17], l_extendedprice: [24720.3], l_discount: [0.94], l_tax: [0.02], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-03-13], l_commitdate: [1994-02-12], l_receiptdate: [1994-03-22], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [TRUCK], l_comment: [ugular courts above the]
l_orderkey: [1], l_partkey: [674], l_suppkey: [75], l_linenumber: [2], l_quantity: [36], l_extendedprice: [56688.1], l_discount: [0.99], l_tax: [0.04], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-04-12], l_commitdate: [1994-02-28], l_receiptdate: [1994-04-28], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [MAIL], l_comment: [y final dependencies: slyly bold ]
l_orderkey: [1], l_partkey: [637], l_suppkey: [38], l_linenumber: [3], l_quantity: [8], l_extendedprice: [12301], l_discount: [0.1], l_tax: [0.02], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-01-29], l_commitdate: [1994-03-05], l_receiptdate: [1994-01-31], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [REG AIR], l_comment: [riously, regular, express dep]
l_orderkey: [1], l_partkey: [22], l_suppkey: [48], l_linenumber: [4], l_quantity: [28], l_extendedprice: [25816.6], l_discount: [0.99], l_tax: [0.06], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-04-21], l_commitdate: [1994-03-30], l_receiptdate: [1994-05-16], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [lites, fluffily even de]
l_orderkey: [1], l_partkey: [241], l_suppkey: [23], l_linenumber: [5], l_quantity: [24], l_extendedprice: [27389.8], l_discount: [0.1], l_tax: [0.04], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-03-30], l_commitdate: [1994-03-14], l_receiptdate: [1994-04-01], l_shipinstruct: [NONE], l_shipmode: [FOB], l_comment: [ pending foxes, slyly re]
l_orderkey: [1], l_partkey: [157], l_suppkey: [10], l_linenumber: [6], l_quantity: [32], l_extendedprice: [33828.8], l_discount: [0.97], l_tax: [0.02], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1994-01-30], l_commitdate: [1994-02-07], l_receiptdate: [1994-02-03], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [MAIL], l_comment: [arefully slyly ex]
l_orderkey: [2], l_partkey: [1062], l_suppkey: [33], l_linenumber: [1], l_quantity: [38], l_extendedprice: [36596.3], l_discount: [0], l_tax: [0.05], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1997-01-28], l_commitdate: [1997-01-14], l_receiptdate: [1997-02-02], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [RAIL], l_comment: [ven requests. deposits breach a]
l_orderkey: [3], l_partkey: [43], l_suppkey: [19], l_linenumber: [1], l_quantity: [45], l_extendedprice: [42436.8], l_discount: [0.99], l_tax: [0], l_returnflag: [R], l_linenstatus: [F],
  l_shipdate: [1994-02-02], l_commitdate: [1994-01-04], l_receiptdate: [1994-02-23], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [longide of the furiously brave acco]
[0], l_shipdate: [1995-07-13], l_commitdate: [1995-05-29], l_receiptdate: [1995-08-10], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [MAIL], l_comment: [s dependencies, furiously
unusual the]
l_orderkey: [60000], l_partkey: [1843], l_suppkey: [44], l_linenumber: [2], l_quantity: [23], l_extendedprice: [46131.3], l_discount: [0.95], l_tax: [0.03], l_returnflag: [N], l_linenstatus:
[0], l_shipdate: [1995-08-09], l_commitdate: [1995-06-07], l_receiptdate: [1995-08-23], l_shipinstruct: [COLLECT COD], l_shipmode: [FORB], l_comment: [ ideas about the permanent ]
l_orderkey: [60000], l_partkey: [1057], l_suppkey: [63], l_linenumber: [3], l_quantity: [45], l_extendedprice: [43122.2], l_discount: [0.92], l_tax: [0.02], l_returnflag: [R], l_linenstatus:
[F], l_shipdate: [1995-05-15], l_commitdate: [1995-05-31], l_receiptdate: [1995-06-03], l_shipinstruct: [COLLECT COD], l_shipmode: [SHIP], l_comment: [ fully bold pinto beans alongside ]
l_orderkey: [60000], l_partkey: [271], l_suppkey: [53], l_linenumber: [4], l_quantity: [29], l_extendedprice: [33966.8], l_discount: [0.92], l_tax: [0.01], l_returnflag: [N], l_linenstatus:
[0], l_shipdate: [1995-07-28], l_commitdate: [1995-06-07], l_receiptdate: [1995-08-17], l_shipinstruct: [COLLECT COD], l_shipmode: [SHIP], l_comment: [ly final ideas boost s]
l_orderkey: [60000], l_partkey: [585], l_suppkey: [16], l_linenumber: [5], l_quantity: [31], l_extendedprice: [46653], l_discount: [0], l_tax: [0.05], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1995-08-06], l_commitdate: [1995-07-18], l_receiptdate: [1995-08-19], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [TRUCK], l_comment: [ly even instr]
l_orderkey: [60000], l_partkey: [836], l_suppkey: [3], l_linenumber: [6], l_quantity: [45], l_extendedprice: [78157.4], l_discount: [0.94], l_tax: [0.08], l_returnflag: [N], l_linenstatus: [0],
  l_shipdate: [1995-07-23], l_commitdate: [1995-07-17], l_receiptdate: [1995-07-24], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [TRUCK], l_comment: [ke final packages. carefully final
fo]
scanned 60175 recs
Program ended with exit code: 0
```

Test 3

Q1

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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
Program ended with exit code: 0
```

Q2

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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 < '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]
selected 2 recs
Program ended with exit code: 0
```

Q3

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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
 4

Filter with CNF for : nation
Enter CNF predicate (when done press ctrl-D):
 (n_regionkey = 3) AND (n_nationkey > 10) AND (n_name > 'JAPAN')
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]
n_nationkey: [22], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint]
n_nationkey: [23], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [eans boost carefully special requests. accounts are. carefull]
selected 3 recs
Program ended with exit code: 0
```

Q11

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbgcn/
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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
Program ended with exit code: 0
```

Q12

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbgcn/
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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 < 5000) AND (l_shipmode = 'AIR') AND (l_linenstatus = 'F') AND (l_tax < 0.07)
l_orderkey: [132], l_partkey: [281], l_suppkey: [63], l_linenumber: [4], l_quantity: [23], l_extendedprice: [27169.4], l_discount: [0.1], l_tax: [0], l_returnflag: [A], l_linenstatus: [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_linenumber: [2], l_quantity: [24], l_extendedprice: [26044.3], l_discount: [0.05], l_tax: [0.05], l_returnflag: [R], l_linenstatus: [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_linenumber: [3], l_quantity: [38], l_extendedprice: [43975.5], l_discount: [0.03], l_tax: [0.03], l_returnflag: [R], l_linenstatus: [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 packages. f]
l_orderkey: [164], l_partkey: [1889], l_suppkey: [99], l_linenumber: [6], l_quantity: [27], l_extendedprice: [26722.2], l_discount: [0.1], l_tax: [0.04], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1992-12-23], l_commitdate: [1993-01-16], l_receiptdate: [1993-01-10], l_shipinstruct: [AIR], l_comment: [ayers wake carefully al]
l_orderkey: [226], l_partkey: [407], l_suppkey: [95], l_linenumber: [4], l_quantity: [45], l_extendedprice: [58833], l_discount: [0.1], l_tax: [0.02], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-04-17], l_commitdate: [1993-05-27], l_receiptdate: [1993-05-11], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [carefully pending pil]
l_orderkey: [258], l_partkey: [1445], l_suppkey: [55], l_linenumber: [6], l_quantity: [36], l_extendedprice: [49192.6], l_discount: [0.09], l_tax: [0.04], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1994-01-11], l_commitdate: [1994-02-04], l_receiptdate: [1994-01-18], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [nic asymptotes. slyly silent r]
l_orderkey: [261], l_partkey: [1740], l_suppkey: [25], l_linenumber: [3], l_quantity: [28], l_extendedprice: [45968.7], l_discount: [0.08], l_tax: [0.03], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-07-24], l_commitdate: [1993-08-26], l_receiptdate: [1993-08-05], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [ironic packages nag slyly. carefully fin]
l_orderkey: [261], l_partkey: [978], l_suppkey: [51], l_linenumber: [6], l_quantity: [28], l_extendedprice: [37429.4], l_discount: [0.06], l_tax: [0.03], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-10-15], l_commitdate: [1993-10-25], l_receiptdate: [1993-11-07], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [to the special, ironic deposi]
l_orderkey: [294], l_partkey: [597], l_suppkey: [88], l_linenumber: [1], l_quantity: [31], l_extendedprice: [46425.3], l_discount: [0], l_tax: [0.01], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-08-06], l_commitdate: [1993-08-25], l_receiptdate: [1993-08-13], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [AIR], l_comment: [le fluffily along the quick]
l_orderkey: [295], l_partkey: [914], l_suppkey: [17], l_linenumber: [2], l_quantity: [26], l_extendedprice: [47387.7], l_discount: [0.04], l_tax: [0.03], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1994-12-13], l_commitdate: [1994-12-23], l_receiptdate: [1995-01-06], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [t's above the slyly regular requests x-ray r]
l_orderkey: [322], l_partkey: [1833], l_suppkey: [77], l_linenumber: [4], l_quantity: [18], l_extendedprice: [17348.3], l_discount: [0.06], l_tax: [0.03], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1992-04-12], l_commitdate: [1992-05-13], l_receiptdate: [1992-04-14], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [ deposits grow slyly according to th]
l_orderkey: [322], l_partkey: [334], l_suppkey: [91], l_linenumber: [6], l_quantity: [3], l_extendedprice: [3782.99], l_discount: [0.08], l_tax: [0.05], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1992-07-07], l_commitdate: [1992-07-28], l_receiptdate: [1992-07-21], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ending, ironic deposits along the blith]
l_orderkey: [327], l_partkey: [418], l_suppkey: [48], l_linenumber: [2], l_quantity: [1], l_extendedprice: [12865.7], l_discount: [0.09], l_tax: [0.05], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1995-06-24], l_commitdate: [1995-07-11], l_receiptdate: [1995-06-05], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [are fu]
l_orderkey: [353], l_partkey: [1194], l_suppkey: [67], l_linenumber: [1], l_quantity: [41], l_extendedprice: [44962.8], l_discount: [0.0], l_tax: [0.06], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1994-03-25], l_commitdate: [1994-03-31], l_receiptdate: [1994-03-30], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [refully final theodoli]
l_orderkey: [416], l_partkey: [1742], l_suppkey: [85], l_linenumber: [3], l_quantity: [25], l_extendedprice: [42493.5], l_discount: [0.07], l_tax: [0.01], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-10-16], l_commitdate: [1993-12-03], l_receiptdate: [1993-10-29], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ses bold requests.]
l_orderkey: [468], l_partkey: [781], l_suppkey: [82], l_linenumber: [8], l_quantity: [2], l_extendedprices: [36363.6], l_discount: [0.09], l_tax: [0], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-09-16], l_commitdate: [1993-10-16], l_receiptdate: [1993-10-16], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [even packages.]
l_orderkey: [481], l_partkey: [207], l_suppkey: [8], l_linenumber: [2], l_quantity: [10], l_extendedprice: [40205.8], l_discount: [0.06], l_tax: [0.01], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-01-09], l_commitdate: [1992-11-27], l_receiptdate: [1992-01-14], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [AIR], l_comment: [p blithely after t]
l_orderkey: [481], l_partkey: [1120], l_suppkey: [93], l_linenumber: [5], l_quantity: [31], l_extendedprice: [31654.7], l_discount: [0.05], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-01-15], l_commitdate: [1992-12-31], l_receiptdate: [1993-01-21], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [usly final packages.]
l_orderkey: [548], l_partkey: [568], l_suppkey: [59], l_linenumber: [4], l_quantity: [1], l_extendedprice: [38839.8], l_discount: [0.08], l_tax: [0.03], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1994-10-27], l_commitdate: [1994-11-21], l_receiptdate: [1994-11-21], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [ engage quickly. regular theor]
l_orderkey: [549], l_partkey: [653], l_suppkey: [54], l_linenumber: [3], l_quantity: [36], l_extendedprice: [55931.4], l_discount: [0.08], l_tax: [0.04], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1992-09-11], l_commitdate: [1992-10-11], l_receiptdate: [1992-09-12], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [t's against the ironic, even theodolites eng]
l_orderkey: [577], l_partkey: [259], l_suppkey: [14], l_linenumber: [1], l_quantity: [25], l_extendedprice: [28981.2], l_discount: [0.06], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1995-04-09], l_commitdate: [1995-05-09], 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_linenumber: [5], l_quantity: [25], l_extendedprice: [34962.2], l_discount: [0], l_tax: [0.05], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1994-08-25], l_commitdate: [1994-08-28], l_receiptdate: [1994-08-28], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ packages integrate blithely]
l_orderkey: [678], l_partkey: [975], l_suppkey: [1], l_linenumber: [5], l_quantity: [16], l_extendedprice: [39891.5], l_discount: [0.06], l_tax: [0.04], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1995-06-09], l_commitdate: [1995-06-16], l_receiptdate: [1995-06-16], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ever packages.]
l_orderkey: [738], l_partkey: [1871], l_suppkey: [72], l_linenumber: [2], l_quantity: [1], l_extendedprice: [7931.48], l_discount: [0], l_tax: [0.03], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-06-28], l_commitdate: [1993-07-09], l_receiptdate: [1993-07-09], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [av packages. fluffy bo]
l_orderkey: [738], l_partkey: [1749], l_suppkey: [34], l_linenumber: [5], l_quantity: [38], l_extendedprice: [45822.1], l_discount: [0.02], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-06-12], l_commitdate: [1993-06-29], l_receiptdate: [1993-06-25], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [acial instructions haggle blithely regul]
l_orderkey: [742], l_partkey: [1919], l_suppkey: [64], l_linenumber: [4], l_quantity: [16], l_extendedprice: [47492.6], l_discount: [0.01], l_tax: [0.05], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1995-01-15], l_commitdate: [1996-02-25], l_receiptdate: [1995-01-24], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [eodolites haggle carefully regul]
l_orderkey: [769], l_partkey: [1751], l_suppkey: [94], l_linenumber: [1], l_quantity: [36], l_extendedprice: [50499], l_discount: [0.02], l_tax: [0.02], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-01-01], l_commitdate: [1993-08-07], l_receiptdate: [1993-10-15], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [es furiously iro]
l_orderkey: [772], l_partkey: [1799], l_suppkey: [26], l_linenumber: [4], l_quantity: [10], l_extendedprice: [17007.9], l_discount: [0.08], l_tax: [0.02], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1993-05-17], l_commitdate: [1993-06-09], l_receiptdate: [1993-05-29], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [o the furiously final deposits. furi]
l_orderkey: [801], l_partkey: [947], l_suppkey: [16], l_linenumber: [2], l_quantity: [21], l_extendedprice: [38806.7], l_discount: [0.05], l_tax: [0.02], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1992-03-14], l_commitdate: [1992-04-01], l_receiptdate: [1992-04-05], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [wake silently furiously idle deposits. ]
l_orderkey: [802], l_partkey: [1328], l_suppkey: [20], l_linenumber: [2], l_quantity: [34], l_extendedprice: [47796.9], l_discount: [0.05], l_tax: [0.06], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1992-01-01], l_commitdate: [1992-02-16], l_receiptdate: [1992-01-16], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [Instructions cajole carefully. quiet]
l_orderkey: [846], l_partkey: [1388], l_suppkey: [59], l_linenumber: [1], l_quantity: [5], l_extendedprice: [4206.76], l_discount: [0.08], l_tax: [0.01], l_returnflag: [R], l_linenstatus: [F], l_shipdate: [1993-01-22], l_commitdate: [1993-01-14], l_receiptdate: [1993-02-07], l_shipinstruct: [TAKE BACK RETURN], l_shipmode: [AIR], l_comment: [tegrate fluffily. carefully f]
l_orderkey: [928], l_partkey: [104], l_suppkey: [31], l_linenumber: [7], l_quantity: [11], l_extendedprice: [31845.1], l_discount: [0.01], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1995-04-29], l_commitdate: [1995-04-30], l_receiptdate: [1995-04-30], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [longside of]
l_orderkey: [930], l_partkey: [173], l_suppkey: [52], l_linenumber: [2], l_quantity: [47], l_extendedprice: [50439], l_discount: [0.01], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1995-03-20], l_commitdate: [1995-02-04], l_receiptdate: [1995-04-04], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [ackages. fluffy e]
l_orderkey: [933], l_partkey: [992], l_suppkey: [27], l_linenumber: [3], l_quantity: [26], l_extendedprice: [49217.7], l_discount: [0.05], l_tax: [0], l_returnflag: [A], l_linenstatus: [F], l_shipdate: [1992-11-09], l_commitdate: [1992-11-03], l_receiptdate: [1992-11-16], l_shipinstruct: [DELIVER IN PERSON], l_shipmode: [AIR], l_comment: [ the deposits affix slyly after t]
l_orderkey: [960], l_partkey: [1070], l_suppkey: [6], l_linenumber: [1], l_quantity: [1], l_extendedprice: [971.07], l_discount: [0.07], l_tax: [0.01], l_returnflag: [A], l_linenstatus: [F], 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
Program ended with exit code: 0
```

Results for 1GB data

Test 1

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/

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

select table:
  1. nation
  2. region
  3. customer
  4. part
  5. partsupp
  6. orders
  7. lineitem
  1
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/nation.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/nation.tbl
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/

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

select table:
  1. nation
  2. region
  3. customer
  4. part
  5. partsupp
  6. orders
  7. lineitem
  2
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/region.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/region.tbl
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbggen/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/

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

select table:
  1. nation
  2. region
  3. customer
  4. part
  5. partsupp
  6. orders
  7. lineitem
  7
DBFile will be created at /Users/sathyasairam/DatabaseSystemsImplemenataion/Tables/lineitem.bin
tpch file will be loaded from /Users/sathyasairam/tpch-dbggen/lineitem.tbl
Program ended with exit code: 0
```

Test 2

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

_nationkey: [0], n_name: [ALGERIA], n_regionkey: [0], n_comment: [ haggles. carefully final deposits detect slyly again ]
_nationkey: [1], n_name: [ARGENTINA], n_regionkey: [1], n_comment: [ 2 foxes promise slyly according to the regular accounts. bold requests along ]
_nationkey: [2], n_name: [BRAZIL], n_regionkey: [1], n_comment: [ y alongside the pending deposits. carefully special packages are about the ironic forges. slyly special ]
_nationkey: [3], n_name: [CANADA], n_regionkey: [1], n_comment: [ far have ironic silent packagers. slyly regular packages are furiously over the tithes. fluffy bold ]
_nationkey: [4], n_name: [EGYPT], n_regionkey: [4], n_comment: [ y above the carefully unusual theodolites. final dugouts are quickly across the furiously regular d ]
_nationkey: [5], n_name: [ETHIOPIA], n_regionkey: [0], n_comment: [ even packages wake quickly. regulu ]
_nationkey: [6], n_name: [FRANCE], n_regionkey: [3], n_comment: [ refully final requests. regular, ironi ]
_nationkey: [7], n_name: [GERMANY], n_regionkey: [3], n_comment: [ l platelets. regular accounts x-ray: unusual. regular acco ]
_nationkey: [8], n_name: [INDONESIA], n_regionkey: [2], n_comment: [ ss excuses cajole slyly across the packages. deposits print aroun ]
_nationkey: [9], n_name: [IRAN], n_regionkey: [2], n_comment: [ slyly express asymptotes. regular deposits haggle slyly. carefully ironic hockey players sleep blithely. carefull ]
_nationkey: [10], n_name: [IRAQ], n_regionkey: [4], n_comment: [ fully alongside of the slyly final dependencies. ]
_nationkey: [11], n_name: [JAPAN], n_regionkey: [4], n_comment: [ nic deposits boost stop the quickly final requests? quickly regula ]
_nationkey: [12], n_name: [JORDAN], n_regionkey: [2], n_comment: [ usly. final, express gifts cajole a ]
_nationkey: [13], n_name: [KENYA], n_regionkey: [4], n_comment: [ ss deposits are blithely about the carefully regular pa ]
_nationkey: [14], n_name: [LAOS], n_regionkey: [0], n_comment: [ pending excuses haggle furiously deposits pending. express pinto beans wake fluffily past t ]
_nationkey: [15], n_name: [MADAGASCAR], n_regionkey: [0], n_comment: [ rm blithely bold come along the class. regular packages use furiously bold platelets? ]
_nationkey: [16], n_name: [MOZAMBIQUE], n_regionkey: [0], n_comment: [ s, even, final asymptotes wake blithely. ]
_nationkey: [17], n_name: [PERU], n_regionkey: [1], n_comment: [ platelets. blithely pending dependencies use fluffily across the even pinto beans. carefully silent accoun ]
_nationkey: [18], n_name: [CHINA], n_regionkey: [2], n_comment: [ c dependencies. furiously express nocturns sleep slyly regular accounts. ideas sleep. depos ]
_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 ]
_nationkey: [20], n_name: [SAUDI ARABIA], n_regionkey: [4], n_comment: [ ts. silent requests haggle. closely express packages sleep across the blithely]
_nationkey: [21], n_name: [VIETNAM], n_regionkey: [2], n_comment: [ helly enticingly express accounts. even, final ]
_nationkey: [22], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint ]
_nationkey: [23], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [ sans boost carefully special requests. accounts are. carefull ]
_nationkey: [24], n_name: [UNITED STATES], n_regionkey: [1], n_comment: [ y final packages. slow foxes cajole quickly. quickly silent platelets breach ironic accounts. unusual pinto be ]
scanned 25 recs
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

_r_regionkey: [0], r_name: [AFRICA], r_comment: [iar deposits. blithely final packages cajole. regular waters are final requests. regular accounts are according to ]
_r_regionkey: [1], r_name: [AMERICA], r_comment: [hs use ironic, even requests. s]
_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 furiousl]
scanned 5 recs
Program ended with exit code: 0
```

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:  /Users/sathyasairam/tpch-dbgenv
heap files dir:  /Users/sathyasairam/DatabaseSystemsImplementaion/Tables/

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

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

1000000
2000000
3000000
4000000
5000000
6000000
scanned 6001215 recs
Program ended with exit code: 0
```

(Note the program was changed to print the count as printing 6 Million records was difficult)

Test 3

Q1

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbgcn/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementation/Tables/

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
Program ended with exit code: 0
```

Q2

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbgcn/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementation/Tables/

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 < '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]
selected 2 recs
Program ended with exit code: 0
```

Q3

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir:   /Users/sathyasairam/tpch-dbgcn/
heap files dir:   /Users/sathyasairam/DatabaseSystemsImplementation/Tables/

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')
n_nationkey: [1], n_name: [ROMANIA], n_regionkey: [3], n_comment: [ular asymptotes are about the furious multipliers. express dependencies nag above the ironically ironic account]
n_nationkey: [2], n_name: [RUSSIA], n_regionkey: [3], n_comment: [ requests against the platelets use never according to the quickly regular pint]
n_nationkey: [3], n_name: [UNITED KINGDOM], n_regionkey: [3], n_comment: [eans boost carefully special requests. accounts are. carefull]
selected 3 recs
Program ended with exit code: 0
```

Q11

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /Users/sathyasairam/tpch-dbgcn/
heap files dir: /Users/sathyasairam/DatabaseSystemsImplementation/Tables/

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

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 9 rows
Program ended with exit code: 0
```

Q12

```
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location: catalog
tpch files dir: /Users/sathyasairam/tpch-dbgcn/
heap files dir: /Users/sathyasairam/DatabaseSystemsImplementation/Tables/

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 < 5000) AND (l_shipmode = 'AIR') AND (l_linenumber = 'F') AND (l_tax < 0.07)
l_orderkey: [130], l_partkey: [1739], l_suppkey: [246], l_linenumber: [2], l_quantity: [48], l_extendedprice: [7875], l_discount: [0.03], l_tax: [0.02], l_returnflag: [R], l_linenumber: [F], l_shipdate: [1992-07-01], l_commitdate: [1992-07-01], l_receiptdate: [1992-07-24], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [literally alongside of the regu]
l_orderkey: [194], l_partkey: [2594], l_suppkey: [895], l_linenumber: [1], l_quantity: [17], l_extendedprice: [28442], l_discount: [0.05], l_tax: [0.04], l_returnflag: [R], l_linenumber: [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 deposit]
selected 2 rows
Program ended with exit code: 0
```

Gtest

```
(base) mk@mk:~/Documents/uf docs/sem 2/Database Implementation/DBI$ ./gtest
[=====] Running 6 tests from 2 test suites.
[-----] Global test environment set-up.
[-----] 2 tests from DBFileTestingCreate
[ RUN   ] DBFileTestingCreate.Scenario1_Create
[      OK ] DBFileTestingCreate.Scenario1_Create (0 ms)
[ RUN   ] DBFileTestingCreate.Scenario2_Create
file you are about to create already exists!
[      OK ] DBFileTestingCreate.Scenario2_Create (0 ms)
[-----] 2 tests from DBFileTestingCreate (0 ms total)

[-----] 4 tests from DBFileTesting
[ RUN   ] DBFileTesting.Scenario1_Open
Trying to open a file which is not created yet!
[      OK ] DBFileTesting.Scenario1_Open (1 ms)
[ RUN   ] DBFileTesting.Scenario2_Open
[      OK ] DBFileTesting.Scenario2_Open (0 ms)
[ RUN   ] DBFileTesting.Scenario3_Open
[      OK ] DBFileTesting.Scenario3_Open (0 ms)
[ RUN   ] DBFileTesting.Close
trying to close a file which is not open!
[      OK ] DBFileTesting.Close (0 ms)
[-----] 4 tests from DBFileTesting (1 ms total)

[-----] Global test environment tear-down
[=====] 6 tests from 2 test suites ran. (1 ms total)
[ PASSED ] 6 tests.
(base) mk@mk:~/Documents/uf docs/sem 2/Database Implementation/DBI$
```