

Database System Implementation (COP 6726)

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Project Deliverable 1

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Instructions to Run the Code:

1. Changing the file path locations:

To run the code in the server, directory path links in 3 of the files submitted in the zip folder should be changed.

- **main.cc** : In main.cc file, replace the path of the **tableFile* Open to the path of the table line item inside tpch-dbgen directory.

```
// now open up the text file and start procesing it
FILE *tableFile = fopen ("/mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbgen/lineitem.tbl", "r");
```

- **test.cc**: In the test.cc file we need to change the paths for the **dbfile_dir* and **tpch_dir*. For **dbfile_dir*, replace the path with the location of the bin file and for **tpch_dir*, replace the path with the location where table line items (*.tbl) files are present. We can keep the catalog path the same.

```
// make sure that the file path/dir information below is correct
const char *dbfile_dir = "/mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/"; // dir where binary heap files should be stored
const char *tpch_dir = "/mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbgen/"; // dir where dbgen tpch files (extension *.tbl) can be found
const char *catalog_path = "catalog"; // full path of the catalog file
```

- **DBFile_test.cc** : In the DBFile_test.cc file, first change the file location of the *#define filepath* with the location of the bin file. Then for the next two *#define invalidfilepath* and *#define errormessage* replace the path in the file with some invalid file path to verify the invalid file path test cases.

```
// name of bin file and path where it should be created and also used to open .bin file
#define filepath "/mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/lineitem.bin"
// invalid filepath for open testcase
#define invalidfilepath "/mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/lineitem1.bin"
// error message for invalid file opening
#define errormessage "BAD! Open did not work for /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/lineitem1.bin"
```

2. Running the make commands:

- Once these file paths are changed, execute the **make** command. We will get that *"make: test.out is up to date"*. Then we need to execute the **./test.out** command. We will be given options to load, scan & scan and filter, after choosing on of these we will be getting the list of 7 tables to perform the action that we chose before and appropriate results will be show for each combination of these.
- Next, we need to execute the **make main** command. We will get that *"make : main is up to date"*. Then we need to run the **./main** command. We will be asked to enter the cnf to test out. We then need to enter the query filters present and after executing (ctrl+d), we will be displayed with appropriate results for the cnf we have given.
- Finally, we need to run the **make DBFile_test.out** command. We will be shown that *"make: 'DBFile_test.out' is up to date"*. Then we need to run the **./DBFile_test.out** command. We will be shown the results of the test cases of DBFile that have been provided.

Explanation of DBFile Code:

- i. **int DBFile::Create (const char *f_path, fType f_type, void *startup):** This function creates the file with the given variables. The variable *f_path gives the bin file location of the data and this function opens the bin data given if the file type is Heap. It returns 1 after successful creation of the file, otherwise it returns 0, if the file type is not Heap.
- ii. **void DBFile::Load (Schema &f_schema, const char *loadpath):** This function reads each record present in the file and then writes it to the bin file. If there is no space left in the page it empties out the page by writing it to the file and then writes the records into the page. It closes the opened file at the end of the load operation.

- iii. **int DBFile::Open (const char *f_path):** This function opens the file present in the given file path. It returns 1 after successful open of the file and 0 if the opening of the file fails.
- iv. **void DBFile::MoveFirst ():** This function calls the *GetPage* function of the File class and makes the pointer to point to the first record of the Page.
- v. **int DBFile::Close ():** This function just closes the open file. It returns integer 1 if the file is closed successfully or else it returns 0.
- vi. **void DBFile::Add (Record &rec):** This function first checks whether the record fits in the current page. If it fits, then it adds the record to the page and if it doesn't fit, it adds a new page and increments the page index and deletes all the records present in the page and then adds this record to the page. This is done recursively till the record gets added to the page.
- vii. **int DBFile::GetNext (Record &fetchme):** This function returns the next record from the file and points the pointer towards the next record. This function returns 0 if there is no next record (pointer already at last record of the page). Else, the function returns 1.
- viii. **int DBFile::GetNext (Record &fetchme, CNF &cnf, Record &literal):** This GetNext function checks the next record with an additional cnf and literal. If there is no next record it returns 0 otherwise it compares the records and cnf and return 0 if the comparison fails. Finally, it returns 1 if the comparison is success and pointer points to next record.

Test.out Results:

Below are the screenshots of the output generated from the 10 MB file.

Test Query 1:

```
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbggen/
heap files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/

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
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$
```

Test Query 2:

```
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out
** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbggen/
heap files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/

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]
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
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$
```

Test Query 3:

```

prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out

** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbggen/
heap files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/

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: [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
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$

```

Test Query 11:

```

prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out

** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbggen/
heap files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/

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 < '1994-01-04') AND
  (l_discount > 0.05) AND
  (l_discount < 0.06) AND
  (l_quantity = 4.0)
selected 0 recs
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$

```


Test Query 12:

```
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./test.out

** IMPORTANT: MAKE SURE THE INFORMATION BELOW IS CORRECT **
catalog location:      catalog
tpch files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/tpch-dbgcn/
heap files dir:        /mnt/c/Prajan/Sem-2/DBI/DBI/P1/bin/

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)

slyly of the frets. careful]
l_orderkey: [677], l_partkey: [1497], l_supkey: [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]
l_orderkey: [678], l_partkey: [975], l_supkey: [76], l_linenum: [5], l_quantity: [16], l_extendedprice: [30015.5], l_discount: [0.06], l_tax: [0.04], l_returnflag: [R], l_linestatus: [F], 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 ]
l_orderkey: [738], l_partkey: [1871], l_supkey: [72], l_linenum: [2], l_quantity: [4], l_extendedprice: [7091.48], l_discount: [0], l_tax: [0.03], l_returnflag: [A], l_linestatus: [F], l_shipdate: [1993-06-20], l_commitdate: [1993-04-08], l_receiptdate: [1993-07-09], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [ar packages. fluffily bo]
l_orderkey: [738], l_partkey: [1749], l_supkey: [34], l_linenum: [5], l_quantity: [30], 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_supkey: [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 COD], l_shipmode: [AIR], l_comment: [eodolites haggle carefully regul]
l_orderkey: [769], l_partkey: [1751], l_supkey: [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]
l_orderkey: [772], l_partkey: [1799], l_supkey: [26], l_linenum: [4], l_quantity: [10], l_extendedprice: [17007.9], l_discount: [0.08], l_tax: [0.02], l_returnflag: [A], l_linestatus: [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. funi]
l_orderkey: [801], l_partkey: [947], l_supkey: [16], l_linenum: [2], l_quantity: [21], l_extendedprice: [38806.7], l_discount: [0.05], l_tax: [0.02], l_returnflag: [A], l_linestatus: [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 si lantly furiously idle deposits. ]
l_orderkey: [802], l_partkey: [1328], l_supkey: [29], l_linenum: [2], l_quantity: [34], l_extendedprice: [41796.9], l_discount: [0.08], l_tax: [0.06], l_returnflag: [A], l_linestatus: [F], l_shipdate: [1995-03-01], l_commitdate: [1995-03-15], l_receiptdate: [1995-03-12], l_shipinstruct: [COLLECT COD], l_shipmode: [AIR], l_comment: [instructions cajole carefully. quietl]
l_orderkey: [866], l_partkey: [1358], l_supkey: [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_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_supkey: [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_shipdate: [1995-04-29], l_commitdate: [1995-04-16], l_receiptdate: [1995-04-30], l_shipinstruct: [NONE], l_shipmode: [AIR], l_comment: [longside of]
l_orderkey: [930], l_partkey: [173], l_supkey: [52], l_linenum: [2], l_quantity: [47], l_extendedprice: [50439], l_discount: [0.08], l_tax: [0], l_returnflag: [A], l_linestatus: [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: [ackage s. fluffily e]
l_orderkey: [933], l_partkey: [992], l_supkey: [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_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_supkey: [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_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 iron ic packages. quickly even ]
selected 35 recs
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$
```

G Test Results:

```
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ make DBFile_test.out
g++ -O2 -Wno-deprecated -g -c DBFile_test.cc
g++ -O2 -Wno-deprecated -o DBFile_test.out Record.o Comparison.o ComparisonEngine.o Schema.o File.o DBFile.o y.tab.o lex.yy.o DBFile_test.o -lfl -lpthread -lgtest
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$ ./DBFile_test.out
[*****] Running 5 tests from 3 test cases.
[-----] Global test environment set-up.
[-----] 2 tests from DBFileCreateTest
[ RUN      ] DBFileCreateTest.TestingHeapFileType
[ OK       ] DBFileCreateTest.TestingHeapFileType (0 ms)
[ RUN      ] DBFileCreateTest.TestingNonHeapFileType
[ OK       ] DBFileCreateTest.TestingNonHeapFileType (0 ms)
[-----] 2 tests from DBFileCreateTest (4 ms total)
[-----] 2 tests from DBFileOpenTest
[ RUN      ] DBFileOpenTest.TestingValidPath
[ OK       ] DBFileOpenTest.TestingValidPath (0 ms)
[ RUN      ] DBFileOpenTest.TestingInvalidPath
[ OK       ] DBFileOpenTest.TestingInvalidPath (41 ms)
[-----] 2 tests from DBFileOpenTest (45 ms total)
[-----] 1 test from DBFileCloseTest
[ RUN      ] DBFileCloseTest.TestingCloseWithOpening
[ OK       ] DBFileCloseTest.TestingCloseWithOpening (12 ms)
[-----] 1 test from DBFileCloseTest (14 ms total)
[-----] Global test environment tear-down
[*****] 5 tests from 3 test cases ran. (69 ms total)
[ PASSED ] 5 tests.
prajan@LAPTOP-UB7FO9IS: /mnt/c/Prajan/Sem-2/DBI/DBI/P1$
```