COP6726 – Database System Implementation

Project 5 – Report

Team members:

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Project Demo video included inside the zip file.

Steps to execute project code:

The code was executed using **Windows Subsystem for Linux (Ubuntu 18.04)** environment.

1. The project source code is in the folder "a5-test". Its contents include the following:
   a. Code needed to run main.cc.
   b. All ".bin" and ".meta" files included in the "a5-test" folder.
   c. Google test framework has been added in the directory "googletest". This framework is needed to run gtest unit test cases.
   d. All the gtest unit test cases have been added in "a5-test" folder.
   e. Makefile to compile main.cc and gtest unit test cases.
2. To run main.cc, from project root execute command "make a5.out". Run a5.out by command "./a5.out" followed by list of commands:
   1. Fireup the database: It starts the database
   2. Enter your CNF: It is used to enter the query we want to execute
   3. Close the database: It stops the database
3. To run gtest unit test cases, from project root execute command "make gtest.out" and then execute "./gtest.out".

The following are the methods with their description:

Method	Description
bool createTable();	This function is used to create a table if it does not exist by taking attributes and type as input. Using those values table is created and Boolean value true is returned. If table already exists Boolean value false is returned meaning that the table already exists.
bool insertInto();	This function is used for loading data into a table using the file specified. It is mainly used for loading data in bulk from the file. It returns true if data is

	loaded successfully and returns false if data loading fails
bool dropTable();	This function is used to remove table and delete the binary file respectively. It returns true if drop is successful and false if dropping table failed
bool exists();	This function is used to check if a relation in all lines of file read. It returns true if a relation exists and false otherwise.
void run();	This function is called by a5main.cc. It is used to create the Queryops and QueryPlan objects. It takes the user input about action to be performed such as fire up the database, execute a cnf or close the database and calls the corresponding functions to perform the specified operation.
void clear();	This function is used to clear all the variables and lists used for an operation and to remove all the temporary files.
void setOutput(char* out);	This function in used to specify the location where the result of an operation is to be directed. It usually one of "STDOUT", "FILE" or "NONE".

The following are the screenshots of the output:

1. Query 1: SELECT n.n_nationkey FROM nation AS n WHERE (n.n_name = 'UNITED STATES');

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/db1/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT n.n_nationkey FROM nation AS n WHERE (n.n_name = 'UNITED STATES');
----------------------------------------------------------------
24|
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

2. Query 2: SELECT n.n_name FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_nationkey > 5);

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/db1/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT n.n_name FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_nationkey > 5);
----------------------------------------------------------------
KENYA|
MOROCCO|
MOZAMBIQUE|
PERU|
UNITED STATES|
INDIA|
INDONESIA|
JAPAN|
CHINA|
VIETNAM|
FRANCE|
GERMANY|
ROMANIA|
RUSSIA|
UNITED KINGDOM|
IRAN|
IRAQ|
JORDAN|
SAUDI ARABIA|
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

3. Query 3: SELECT SUM (n.n_nationkey) FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_name = 'UNITED STATES');

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/db1/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT SUM (n.n_nationkey) FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_name = 'UNITED STATES');
--------------------------------------------------------------
24|
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

4. Query 4: SELECT SUM (n.n_regionkey) FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_name = 'UNITED STATES') GROUP BY n.n_regionkey;

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/db1/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT SUM (n.n_regionkey) FROM nation AS n, region AS r WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_name = 'UNITED STATES') GROUP BY n.n_regionkey;
--------------------------------------------------------------
1|1|
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

5. Query 5: SELECT SUM DISTINCT (n.n_nationkey + r.r_regionkey) FROM nation AS n, region AS r, customer AS c WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_nationkey = c.c_nationkey) AND (n.n_nationkey > 10) GROUP BY r.r_regionkey;

```
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT SUM (n.n_regionkey)
FROM nation AS n, region AS r
WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_name = 'UNITED STATES')
GROUP BY n.n_regionkey;
--------------------------------------------------------------
1|1|
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SELECT SUM DISTINCT (n.n_nationkey + r.r_regionkey)
FROM nation AS n, region AS r, customer AS c
WHERE (n.n_regionkey = r.r_regionkey) AND (n.n_nationkey = c.c_nationkey) AND (n.n_nationkey > 10)
GROUP BY r.r_regionkey;
--------------------------------------------------------------
2772|0|
2208|1|
3432|2|
4339|3|
3396|4|
1: Fire up the Database
2: Enter your CNF
3: Close Database
3
*********CLOSED DATABASE**********
akshayg1996@LAPTOP-ACV24OQ1:/mnt/d/Gitlab/dbi/Project 5$
```

6. Create Table for HEAP Data: CREATE TABLE test_table (id INTEGER, name STRING) AS HEAP;

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SET OUTPUT STDOUT;
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
CREATE TABLE test_table (id INTEGER, name STRING) AS HEAP;
Created  test_table Table;
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

7. Insert: INSERT 'file.txt' INTO test_table;

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SET OUTPUT STDOUT;
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
CREATE TABLE test_table (id INTEGER, name STRING) AS HEAP;
Created  test_table Table;
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
INSERT 'file.txt' INTO test_table;
Inserted into test_table
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

8. Drop Table: DROP TABLE test_table;

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
SET OUTPUT STDOUT;
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
CREATE TABLE test_table (id INTEGER, name STRING) AS HEAP;
Created  test_table Table;
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
INSERT 'file.txt' INTO test_table;
Inserted into test_table
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
DROP TABLE test_table;
Dropped table test_table table
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

9. Create Table for SORTED Data: CREATE TABLE test_table (id INTEGER, name STRING) AS SORTED ON id,name;

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$ ./a5.out
1: Fire up the Database
2: Enter your CNF
3: Close Database
1
*********DATABASE FIRED UP**********
1: Fire up the Database
2: Enter your CNF
3: Close Database
2
Enter your CNF(dont forget to add a ';' at the end of your query):
CREATE TABLE test_table (id INTEGER, name STRING) AS SORTED ON id,name;
Created  test_table Table;
1: Fire up the Database
2: Enter your CNF
3: Close Database
```

The following are the results of gtest unit test cases:

Result: All the unit test cases passed

```
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$ ./gtest.out
[==========] Running 5 tests from 3 test suites.
[----------] Global test environment set-up.
[----------] 2 tests from CREATETEST
[ RUN      ] CREATETEST.CREATETABLEPASS
[       OK ] CREATETEST.CREATETABLEPASS (20 ms)
[ RUN      ] CREATETEST.CREATETABLEFAIL
[       OK ] CREATETEST.CREATETABLEFAIL (69 ms)
[----------] 2 tests from CREATETEST (98 ms total)

[----------] 1 test from INSERTTEST
[ RUN      ] INSERTTEST.INSERTINTO
[       OK ] INSERTTEST.INSERTINTO (81 ms)
[----------] 1 test from INSERTTEST (81 ms total)

[----------] 2 tests from DROPTEST
[ RUN      ] DROPTEST.DROPTABLEPASS
[       OK ] DROPTEST.DROPTABLEPASS (11 ms)
[ RUN      ] DROPTEST.DROPTABLEFAIL
[       OK ] DROPTEST.DROPTABLEFAIL (14 ms)
[----------] 2 tests from DROPTEST (25 ms total)

[----------] Global test environment tear-down
[==========] 5 tests from 3 test suites ran. (206 ms total)
[  PASSED  ] 5 tests.
riyaz@Riyaz-PC:/mnt/d/UFL/coursework/Spring 2021/COP6726 Database System Implementation/project/git/dbi/Project 5$
```