LAB 1205 AOOP

1. Project

You need to modify your code in Course 6 with the following requirements:

1) Add a new button “Start Simulation”, a new label “Finish!!”, a new label “Score”, and a new lineEdit for “score”.
2) Add a new timer, which is for simulation, and a new slot “update” in the class “Building”, and add this line into Building’s constructor:
   `connect(timer,SIGNAL(timeout()),this, SLOT(update()));`
3) After clicking the button “Start Simulation”, set the label “Finish!!” invisible and call this function: building.startSimulation. In “startSimulation, you should start the timer in “Building” with 1000ms.
4) Add a new class “Scheduler” with the following definition:

```
class Scheduler
{
public:
    Scheduler();
    int getNowFloor();
private:
    vector<int> nowFloor;  // temp
    int index;             // temp
};
```

   a) Scheduler::**Scheduler**()
      Initialize the vector “nowFloor” with numbers {1, 3, 4, 6, 9, 10, 8, 7, 5, 2, 0}, each number means the floor where now the elevator stops at, and 0 means finishing the schedule. Set index to zero.
   b) int Scheduler::**getNowFloor** ()
      Return the number in the vector “nowFloor” one by one.
5) In class “Data”, add a data member “score” with data type int, and “nowfloor” with data type int, which means your score and the floor where now the elevator stops at, correspondingly.
6) In class “Judge”, add a new data member “score” with data type int. If your answer is correct, add 100 to “score”.
7) In Building’s function “run”: get score from “judge” and assign to “score” in “Data”.
8) In Building’s slot “update”:
   a) You should get “nowfloor” from “scheduler”.

b) If “nowfloor” is not zero, you should call the function “run” to solve the corresponding problem in Floor.

c) If “nowfloor equals zero, you should stop the timer in “Building”.

d) At the end of this slot, you should add this line:

```
emit this->updateGUI();
```

This line means when you finish this function, you should send a signal to update the information in MainWindow’s.

9) You should add this line into MainWindow’s constructor:

```
connect(&building,SIGNAL(updateGUI()),this, SLOT(slot_update_data()));
```

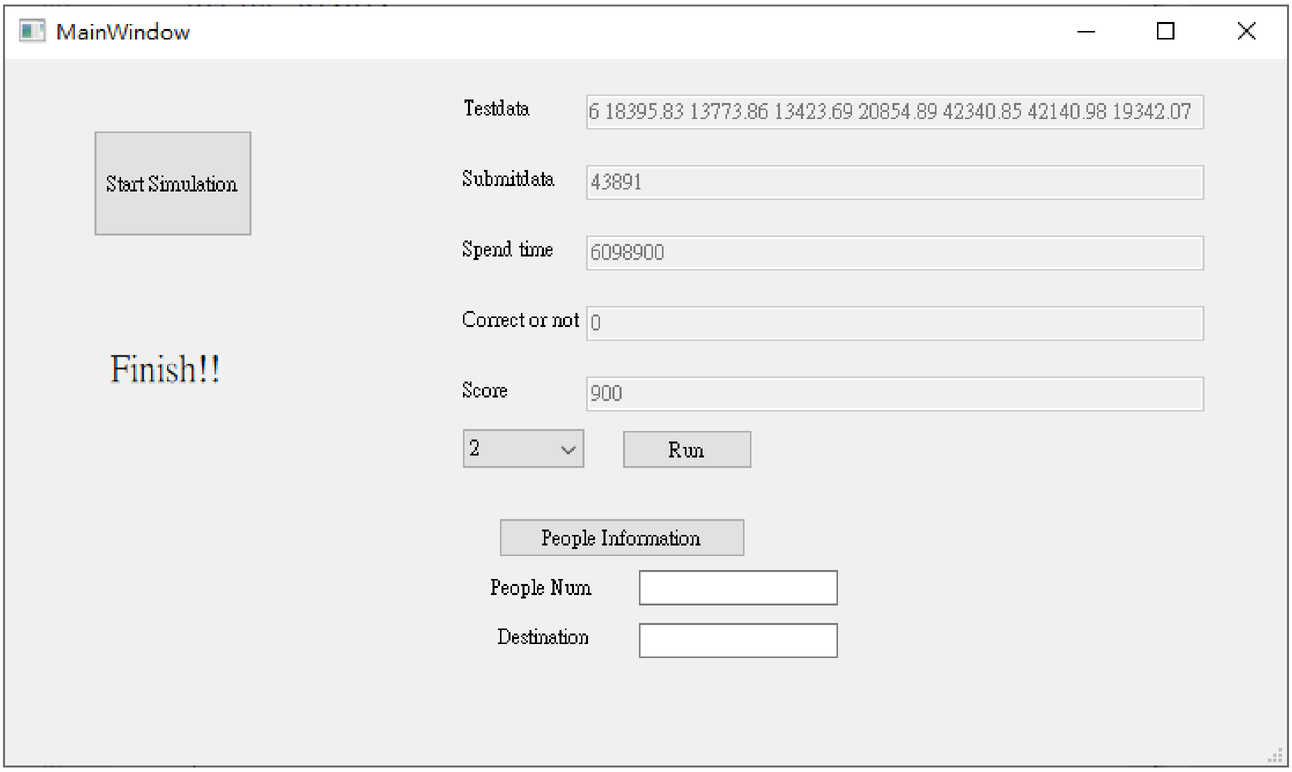
10) In MainWindow’s slot “slot_update_data”:

a) You should get “data” from “building”.

b) If “nowfloor” in data is not zero, update the information in MainWindow’s, such as testdata, submitdata, spend time, correct or not, score, and nowfloor.

c) If “nowfloor” equals zero, set the label “Finish!!” visible, which means finish the simulation.

Sample Output



Finish!!

Testdata 6 18395.83 13773.86 13423.69 20854.89 42340.85 42140.98 19342.07

Submitdata 43891

Spend time 6098900

Correct or not 0

Score 900

2

People Num

Destination

2. The Easy City 2 (MyDatabase) (Easy)

Please implement the C++ code using SQL command in QT, and follow the steps to output the final result: (You have to establish a connection with MySQL Server first.)

1) Drop the schema “CITYDATABASE” if it exists in MySQL server.
2) Create a new schema “CITYDATABASE” in MySQL server.
3) Set “CITYDATABASE” as default database.
4) Drop the table “CITYTABLE” if it exists in “CITYDATABASE”.
5) Create a new table “CITYTABLE” described as follows:

Field	Type
ID	Number (Primary Key)
COUNTRY	VARCHAR (50)
CITY	VARCHAR (60)
LAT	NUMBER
LON	NUMBER

Note: LAT is the latitude and LON is the longitude.

6) Load data from “city.csv” into table “CITYTABLE”. The data format in “city.csv” is as following examle:

```
ID,Country,City,Latitude,Longitude
100,"Taipei","Zhongzheng",121.5198839,25.03240487
130,"Taipei","Datong",121.5130417,25.06342433
104,"Taipei","Zhongshan",121.5381597,25.06969917
150,"Taipei","Songshan",121.5575876,25.05999101
106,"Taipei","Da'an",121.5434446,25.02677012
108,"Taipei","Wanhua",121.4979858,25.02858990
110,"Taipei","Xinyi",121.5716697,25.03062083
111,"Taipei","Shilin",121.5508473,25.12546704
112,"Taipei","Beitou",121.5177992,25.14806820
114,"Taipei","Neihu",121.5923828,25.08370623
115,"Taipei","Nangang",121.6097573,25.03600934
116,"Taipei","Wenshan",121.5736082,24.98857934
200,"Keelung","Ren'ai",121.7434205,25.11945421
201,"Keelung","Xinyi",121.772646,25.125765790
202,"Keelung","Zhongzheng",121.7783549,25.14365754
203,"Keelung","Zhongshan",121.7308913,25.14986365
204,"Keelung","Anle",121.7078325,25.14139521
```

```
205,"Keelung","Nuannuan",121.7447344,25.08097003
206,"Keelung","Qidu",121.683628,25.109620280
556,"Nantou","Xinyi",121.0212867,23.6554647
```

Please use only one query statement to solve each requirement.

7) The size of a country is defined by the number of cities. Query the first three characters of the n^th largest/smallest (lar/sma) country name (sn), and also query the number of the cities (nc) which that country has.
8) Delete the data which meet one of following requirements:
   a) The names of city end with specified characters (che) or do not start with specified characters (chs). The specified character can be one of multiple characters in a specified range.
   b) The latitude is in the range [la, ha] and the longitude is in the range [lo, ho].
9) Swap the value of latitude and the value of longitude if the last number of id is m.
10) If x1 and x2 are the largest value and the smallest value of longitudes, and y1 and y2 are the largest value and the smallest value of latitudes, please query the Euclidean Distance (ed) between points (x1, y1) and (x2, y2). The answer should be rounded to a scale of 4 decimal places. You can use POW(), SQRT() functions in MySQL.

Input Format

```
n lar/sma chs che la ha lo ho m
```

Output Format

```
sn nc ed
```

Sample Input

```
2 sma nz aeiou 121.5 131.5 25.3 30.3 5
```

Sample Output

```
Kee 7 136.7931
```

3. Longest/Shortest Distance (MyDatabase) (Medium)

Please implement the C++ code using SQL command in QT, and follow the steps to output the final result: (You have to establish a connection with MySQL Server first.)

1) Drop the schema “CITYDATABASE” if it exists in MySQL server.
2) Create a new schema “CITYDATABASE” in MySQL server.
3) Set “CITYDATABASE” as default database.
4) Drop the table “CITYTABLE” if it exists in “CITYDATABASE”.
5) Create a new table “CITYTABLE” described as follows:

Field	Type
ID	Number (Primary Key)
COUNTRY	VARCHAR (50)
CITY	VARCHAR (60)
LAT	NUMBER
LON	NUMBER

Note: LAT is the latitude and LON is the longitude.

6) Load data from “city.csv” into table “CITYTABLE”. The data format in “city.csv” is as follows:

```
ID,Country,City,Latitude,Longitude
100,"Taipei","Zhongzheng",121.5198839,25.03240487
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150,"Taipei","Songshan",121.5575876,25.05999101
106,"Taipei","Da'an",121.5434446,25.02677012
108,"Taipei","Wanhua",121.4979858,25.02858990
110,"Taipei","Xinyi",121.5716697,25.03062083
111,"Taipei","Shilin",121.5508473,25.12546704
112,"Taipei","Beitou",121.5177992,25.14806820
114,"Taipei","Neihu",121.5923828,25.08370623
115,"Taipei","Nangang",121.6097573,25.03600934
116,"Taipei","Wenshan",121.5736082,24.98857934
200,"Keelung","Ren'ai",121.7434205,25.11945421
201,"Keelung","Xinyi",121.772646,25.125765790
202,"Keelung","Zhongzheng",121.7783549,25.14365754
203,"Keelung","Zhongshan",121.7308913,25.14986365
204,"Keelung","Anle",121.7078325,25.14139521
```

```
205,"Keelung","Nuannuan",121.7447344,25.08097003
206,"Keelung","Qidu",121.683628,25.109620280
556,"Nantou","Xinyi",121.0212867,23.6554647
```

Please use only one query statement to solve the requirement.

7) Please query the longest distance (ld) and the shortest distance (sd) between two cities according to the following requirements:
   a) In the beginning, the latitudes and longitudes must be rounded to n^th (n<=5) decimal place. Therefore, the duplicated positions must be truncated (the first duplicated position in the database is reserved).
   b) Choose the data in the range of the a^th to the b^th cities ordered by city names in alphabetical/reverse alphabetical (al/ra) order and id in ascending order sequentially to calculate the longest distance and shortest distance.
   c) The answer should be rounded to a scale of 4 decimal places.

Input Format

```
n a b al/ra
```

Output Format

```
ld sd
```

Sample Input

```
1 3 5 al
```

Sample Output

```
1.6125 0.2236
```

4. Symmetric Pairs (MyDatabase) (Hard)

Please implement the C++ code using SQL command in QT, and follow the steps to output the final result: (You have to establish a connection with MySQL Server first.)

1) Drop the schema “CITYDATABASE” if it exists in MySQL server.
2) Create a new schema “CITYDATABASE” in MySQL server.
3) Set “CITYDATABASE” as default database.
4) Drop the table “CITYTABLE” if it exists in “CITYDATABASE”.
5) Create a new table “CITYTABLE” described as follows:

Field	Type
ID	Number (Primary Key)
COUNTRY	VARCHAR (50)
CITY	VARCHAR (60)
LAT	NUMBER
LON	NUMBER

Note: LAT is the latitude and LON is the longitude.

6) Load data from “city.csv” into table “CITYTABLE”. The data format in “city.csv” is as follows:

```
ID,Country,City,Latitude,Longitude
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108,"Taipei","Wanhua",121.4979858,25.02858990
110,"Taipei","Xinyi",121.5716697,25.03062083
111,"Taipei","Shilin",121.5508473,25.12546704
112,"Taipei","Beitou",121.5177992,25.14806820
114,"Taipei","Neihu",121.5923828,25.08370623
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201,"Keelung","Xinyi",121.772646,25.125765790
202,"Keelung","Zhongzheng",121.7783549,25.14365754
203,"Keelung","Zhongshan",121.7308913,25.14986365
204,"Keelung","Anle",121.7078325,25.14139521
```

```
205,"Keelung","Nuannuan",121.7447344,25.08097003
206,"Keelung","Qidu",121.683628,25.109620280
556,"Nantou","Xinyi",121.0212867,23.6554647
```

Please use only one query statement to solve each requirement.

7) Swap the value of latitude and the value of longitude if the last number of id is even/odd (ev/od) number.
8) Update the value of latitude to be equal to the value of longitude in CITYTABLE if the last number of id is m.
9) If there are two points (X1, Y1) and (X2, Y2) that X1 = Y2 and X2 = Y1, they are said to be the symmetric pair. First, make the values of latitude and the value of longitude to be rounded to the nth (n<=5) decimal place. And then let the rounded values of latitude be X and the rounded values of longitude be Y, please write a query to output X (x) and Y (y) of kth symmetric pair ordered by X and Y sequentially. Note that you should truncate the duplicated points, and the X of output answer is smaller than or equal to the Y of output.

   For following example, the ordered symmetric pair are (10, 10), (10,20).

X	Y
10	10
10	10
10	20
20	10
10	20
15	20

Input Format

```
ev/od m n k
```

Output Format

```
x y
```

Sample Input

```
od 6 1 4
```

Sample Output

```
25.1 121.7
```