filesubmission.cpp

```cpp
1   /*
2   Shivam Walia and Om Upadhyay
3   */
4
5   #include <iostream>
6   #include <fstream>
7   #include <cmath>
8   #include <iomanip>
9
10  using namespace std;
11
12  void latLongToXY(double latitude, double longitude, double &xCoord, double &yCoord)
13  {
14      xCoord = longitude * (111 * cos(latitude * (M_PI / 180)));
15      yCoord = latitude * 111;
16  }
17
18  double calculateDistance(double x1, double y1, double x2, double y2)
19  {
20      return sqrt(pow((x2 - x1), 2) + pow((y2 - y1), 2));
21  }
22
23  bool spillsOverlap(double radius1, double lat1, double long1, double radius2, double lat2, double long2)
24  {
25      double x1 = 0, y1 = 0, x2 = 0, y2 = 0;
26      latLongToXY(lat1, long1, x1, y1);
27      latLongToXY(lat2, long2, x2, y2);
28      double distanceBetweenSpills = calculateDistance(x1, y1, x2, y2);
29      double radiusSum = radius1 + radius2;
30      return (distanceBetweenSpills <= radiusSum);
31  }
32
33  bool isLocationInSpill(double locationLat, double locationLong, double spillLat, double spillLong, double spillRadius)
34  {
35      double locX = 0, locY = 0, spillX = 0, spillY = 0;
36      latLongToXY(locationLat, locationLong, locX, locY);
37      latLongToXY(spillLat, spillLong, spillX, spillY);
38      return calculateDistance(locX, locY, spillX, spillY) <= spillRadius;
39  }
40
41  int main()
42  {
43      ifstream spillFile("spill.txt");
44      ifstream locationFile("location.txt");
45      ofstream outputFile("output.txt");
46
```

```cpp
47        string locationName = " ";
48        double locationLatitude = 0, locationLongitude = 0;
49        const int maxSpills = 10;
50
51        double spillLatitudes[maxSpills];
52        double spillLongitudes[maxSpills];
53        double spillRadii[maxSpills];
54        int numSpills = 0;
55
56        if (!spillFile.fail() && !locationFile.fail() && !outputFile.fail())
57        {
58            int spillsAffectingLocation = 0;
59            int reactionCount = 0;
60
61            spillFile >> numSpills;
62            for (int i = 0; i < numSpills; i++)
63            {
64                spillFile >> spillLatitudes[i] >> spillLongitudes[i] >> spillRadii[i];
65            }
66
67            while (locationFile >> locationName)
68            {
69                spillsAffectingLocation = 0;
70                locationFile >> locationLatitude >> locationLongitude;
71                for (int i = 0; i < numSpills; i++)
72                {
73                    if (isLocationInSpill(locationLatitude, locationLongitude,
spillLatitudes[i], spillLongitudes[i], spillRadii[i]))
74                    {
75                        spillsAffectingLocation++;
76                    }
77                }
78                if (spillsAffectingLocation > 0)
79                {
80                    outputFile << setw(25) << locationName << ": " << setw(3) <<
spillsAffectingLocation << " spills" << endl;
81                }
82            }
83
84            for (int i = 0; i < numSpills; i++)
85            {
86                for (int j = i + 1; j < numSpills; j++)
87                {
88                    if (spillsOverlap(spillRadii[i], spillLatitudes[i], spillLongitudes[i],
spillRadii[j], spillLatitudes[j], spillLongitudes[j]))
89                    {
90                        reactionCount++;
91                    }
92                }
93            }
94
```

```cpp
 95         outputFile << setw(27) << "Total amount of reaction: " << setw(3) <<
    reactionCount << " reactions" << endl;
 96
 97         spillFile.close();
 98         locationFile.close();
 99         outputFile.close();
100     }
101     else
102     {
103         cout << "Error Opening File" << endl;
104     }
105 }
106
107 /*
108                  WEEF_Lab:   3 spills
109        Ryan_Favourite_Pub:   4 spills
110               WCI_School:   2 spills
111      Grand_River_Hospital:   2 spills
112                      RCH:   3 spills
113              SJAM_School:   1 spills
114            Michael_House:   1 spills
115       Perimeter_Institute:   1 spills
116       Waterloo_City_Hall:   3 spills
117     Pineview_Nursing_Home:   1 spills
118              Fiona_House:   2 spills
119        St_Marys_Hospital:   3 spills
120   Total amount of reaction:   8 reactions
121 */
```