

Source File: ~/2336/48/lab48.cpp
Input: under control of main function
Output: under control of main function
Value: 2

Write a function template that receives a priority queue and an output stream as parameters. The function determines the distribution of the elements in the priority queue; that is, the function counts the number of occurrences of each element. The format of the output is “value(count)” where `value` is an element in the priority queue and `count` is the number of occurrences. Each value should appear on a separate line and be directed to the output stream passed as a parameter to the function. A sample `main` function for testing your implementation is shown in Figure 1, and a sample execution sequence is shown in Figure 2. You will need to add a target of `lab48main` to the definition of `targets1srcfile` in your Makefile.

```
1 #include <iostream>
2 #include <iomanip>
3 #include <random>
4 #include <queue>
5
6 using namespace std;
7
8 template<typename T>
9 void distribution(const priority_queue<T>& pq, ostream& os);
10
11 #include "lab48.cpp"
12
13 int main()
14 {
15     priority_queue<int> pq1;
16     priority_queue<char> pq2;
17     priority_queue<double> pq3;
18     default_random_engine ran;
19     uniform_int_distribution<> dis1(0, 4), dis2(0,25), dis3(0,7);
20     int i;
21
22     cout << "Distribution of PQ1 with size() = " << pq1.size() << endl;
23     distribution(pq1, cout);
24
25     for (i = 0; i < 5; ++i)
26     {
27         pq1.push(dis1(ran));
28         cout << endl << "Distribution of PQ1 with size() = " << pq1.size()
29             << endl;
30         distribution(pq1, cout);
31     }
32
33     for (i = 0; i < 10000; ++i)
34     {
35         pq1.push(dis1(ran));
36         pq2.push(static_cast<char>(dis2(ran) + 65));
37         pq3.push(dis3(ran) * 0.125);
38     }
39 }
```

Figure 1. /usr/local/2336/src/lab48main.C (Part 1 of 2)

```
40  cout << endl << "Distribution of PQ1" << endl;
41  distribution(pq1, cout);
42  cout << endl << "Distribution of PQ2" << endl;
43  distribution(pq2, cout);
44  cout << fixed << showpoint << setprecision(3);
45  cout << endl << "Distribution of PQ3" << endl;
46  distribution(pq3, cout);
47
48  return 0;
49 }
```

Figure 1. /usr/local/2336/src/lab48main.C (Part 2 of 2)

```
1  newuser@csunix ~> cd 2336
2  newuser@csunix ~/2336> ./getlab.ksh 48
3  * Checking to see if a folder exists for Lab 48. . .No
4  * Creating a folder for Lab 48
5  * Checking to see if Lab 48 has sample input and output files. . .Yes
6  * Copying input and output files for Lab 48
7  from folder /usr/local/2336/data/48 to folder ./48
8  * Checking to see if /usr/local/2336/src/lab48main.C exists. . .Yes
9  * Copying file /usr/local/2336/src/lab48main.C to folder ./48
10 * Checking to see if /usr/local/2336/include/lab48.h exists. . .No
11 * Copying file /usr/local/2336/src/Makefile to folder ./48
12 * Adding a target of lab48main to targets1srcfile
13 * Touching file ./48/lab48.cpp
14 * Edit file ./48/lab48.cpp in Notepad++
15 newuser@csunix ~/2336> cd 48
16 newuser@csunix ~/2336/48> ls
17 01.out      Makefile    lab48.cpp   lab48main.C
18 newuser@csunix ~/2336/48> make lab48main
19 g++ -g -Wall -std=c++11 -c lab48main.C -I/usr/local/2336/include -I.
20 g++ -o lab48main lab48main.o -L/usr/local/2336/lib -lm -lbits
```

Figure 2. Commands to Compile, Link, & Run Lab 48 (Part 1 of 2)

```

21 newuser@csunix ~/2336/48> ./lab48main
22 Distribution of PQ1 with size() = 0
23
24 Distribution of PQ1 with size() = 1
25 0(1)
26
27 Distribution of PQ1 with size() = 2
28 0(2)
29
30 Distribution of PQ1 with size() = 3
31 3(1)
32 0(2)
33
34 Distribution of PQ1 with size() = 4
35 3(1)
36 2(1)
37 0(2)
38
39 Distribution of PQ1 with size() = 5
40 3(1)
41 2(2)
42 0(2)
43
44 Distribution of PQ1
45 4(2043)
46 3(2032)
47 2(1978)
48 1(1979)
49 0(1973)
50
51 Distribution of PQ2
52 Z(355)
53 Y(368)
54 X(397)
55 W(390)
56 V(363)
57 U(380)
58 T(371)
59 S(401)
60 R(345)
61 Q(377)
62 P(411)
63 O(373)
64 N(386)
65 M(384)
66 L(397)
67 K(382)
68 J(418)
69 I(403)
70 H(387)
71 G(402)
72 F(425)
73 E(395)
74 D(367)
75 C(396)
76 B(353)
77 A(374)
78
79 Distribution of PQ3
80 0.875(1232)
81 0.750(1226)
82 0.625(1234)
83 0.500(1312)
84 0.375(1248)
85 0.250(1199)
86 0.125(1295)
87 0.000(1254)
88 newuser@csunix ~/2336/48> ./lab48main > my.out
89 newuser@csunix ~/2336/48> diff 01.out my.out
90 newuser@csunix ~/2336/48>

```

Figure 2. Commands to Compile, Link, & Run Lab 48 (Part 2 of 2)