

```

1 #include "bintree.h"
2 #include <iostream>
3
4 #include <cmath>
5 #include <queue>
6 #include <iomanip>
7
8 using namespace std;
9
10 void Expr_post(string expr, int pos, bintree<char> &A, bintree<char>::node aux_node)
11 {
12     if (pos >= 0)
13     {
14         A.insert_right(aux_node, expr[pos]);
15         pos--;
16         A.insert_left(aux_node, expr[pos]);
17
18         pos--;
19         if (*aux_node.right() == '+' || *aux_node.right() == '-' || *aux_node.right()
== '*' || *aux_node.right() == '/')
20         {
21             Expr_post(expr, pos, A, aux_node.right());
22             pos--;
23         }
24         if (*aux_node.left() == '+' || *aux_node.left() == '-' || *aux_node.left() ==
'*' || *aux_node.left() == '/')
25         {
26             Expr_post(expr, pos, A, aux_node.left());
27         }
28     }
29 }
30 bintree<char> Expr_post(string expr)
31 {
32     bintree<char> resultado(expr[expr.size() - 1]);
33     int i = expr.size() - 2;
34     bintree<char>::node aux_node = resultado.root();
35     if (i >= 0)
36     {
37         resultado.insert_right(aux_node, expr[i]);
38
39         i--;
40         resultado.insert_left(aux_node, expr[i]);
41
42         i--;
43         if (*aux_node.right() == '+' || *aux_node.right() == '-' || *aux_node.right()
== '*' || *aux_node.right() == '/')
44         {
45             Expr_post(expr, i, resultado, aux_node.right());
46             i--;
47         }
48         if (*aux_node.left() == '+' || *aux_node.left() == '-' || *aux_node.left() ==
'*' || *aux_node.left() == '/')
49         {
50             Expr_post(expr, i, resultado, aux_node.left());
51         }
52     }
53     return resultado;
54 }
55
56 template <class T>

```

```
57 void postorden(const bintree<T> &A, const typename bintree<T>::node &v)
58 {
59     if (!v.null())
60     {
61
62         postorden(A, v.left());
63         postorden(A, v.right());
64         cout << *v;
65     }
66 }
67
68
69 template <class T>
70 void MostrarArbol(const bintree<T> &A, typename bintree<T>::node root)
71 {
72     queue<typename bintree<T>::node> colaNodos;
73     int totalNodos = A.size();
74     int techo = log2(totalNodos + 1);
75     colaNodos.push(root);
76     int pot = 0;
77     while (colaNodos.size() > 0)
78     {
79         int niveles = colaNodos.size();
80         while (niveles > 0)
81         {
82             typename bintree<T>::node nodoAux = colaNodos.front();
83             colaNodos.pop();
84             cout << setw((niveles == pow(2, pot)) ? pow(2, (techo - pot)) : pow(2,
(techo - pot + 1)));
85             cout << *nodoAux;
86             if (!nodoAux.left().null())
87                 colaNodos.push(nodoAux.left());
88             if (!nodoAux.right().null())
89                 colaNodos.push(nodoAux.right());
90             niveles--;
91         }
92         pot++;
93         cout << endl;
94     }
95 }
96
97 int main()
98 {
99     bintree<char> aux = Expr_post("ab*b*d/e+");
100     MostrarArbol(aux, aux.root());
101     postorden(aux, aux.root());
102     cout << endl;
103 }
```