

04/10/18 04:56:13 D:\git-repos\data-structure-homework\06\e15.cpp

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1  #include <stdio>
2  #include <cstring>
3  #include <iostream>
4  #define MXN 1007
5  using namespace std;
6
7  struct node {
8      int dep, id;
9      node *fa[11];
10     node *c[2];
11     node() { dep = id = 0; }
12 } nds[MXN];
13 void dfs(node *root, node *f) {
14     if (!root || !(root - nds)) return;
15     root->dep = f->dep + 1;
16     root->fa[0] = f;
17     dfs(root->c[0], root);
18     dfs(root->c[1], root);
19 }
20 node *lca(node *x, node *y) {
21     if (x->dep > y->dep) swap(x, y);
22     for (int d = y->dep - x->dep, i = 0; d; ++i, d >>= 1)
23         if (d & 1)
24             y = y->fa[i];
25     if (x == y) return x;
26     for (int i = 10; i >= 0; --i)
27         if (x->fa[i] != y->fa[i])
28             x = x->fa[i], y = y->fa[i];
29     return x->fa[0];
30 }
31 int n;
32 int main() {
33     scanf("%d", &n);
34     for (int i = 1; i <= n; ++i) {
35         int a, b;
36         nds[i].id = i;
37         scanf("%d %d", &a, &b);
38         nds[i].c[0] = nds + a;
39         nds[i].c[1] = nds + b;
40     }
41     nds[0].fa[0] = nds;
42     dfs(nds + 1, nds);
43     for (int j = 1; j < 11; ++j) {
44         for (int i = 0; i <= n; ++i) {
45             nds[i].fa[j] = nds[i].fa[j - 1]->fa[j - 1];
46         }
47     }
48     int a, b;
49     while (~scanf("%d %d", &a, &b)) {
50         printf("The LCA is %d\n", lca(nds + a, nds + b)->id);
51     }
52 }
53 /**
54 d:\git-repos\data-structure-homework\06>g++ e15.cpp
55
56 d:\git-repos\data-structure-homework\06>a
57 7 2 3 4 5 6 7 0 0 0 0 0 0 0 0
58 1 2
59 The LCA is 1
60 1 3
61 The LCA is 1
62 4 5
63 The LCA is 2
64 4 6
65 The LCA is 1
66 5 7
67 The LCA is 1
68 2 6
69 The LCA is 1
70 ^Z
71
72 d:\git-repos\data-structure-homework\06>
73 */

```