

Competitive Programming

Week-5.9(Assignment 1)Monday

Week 5-9 Implementing Disjoint Set Union -DSU for Connectivity Problems

Network Connectivity in an Online Service Platform

Code:

```
import java.util.*;

public class Main

{
    static int[] parent, rank;

    static int find(int x)

    {
        if (parent[x] != x)

        {
            parent[x] = find(parent[x]);
        }

        return parent[x];
    }

    static void union(int a, int b)

    {
        int pa = find(a);

        int pb = find(b);

        if (pa != pb)

        {
            if (rank[pa] < rank[pb])

            {
                parent[pa] = pb;
            }
        }
    }
}
```

```
else if (rank[pb] < rank[pa])
{
    parent[pb] = pa;
}
else
{
    parent[pb] = pa;
    rank[pa]++;
}
}

static boolean connected(int a, int b)
{
    return find(a) == find(b);
}

public static void main(String[] args)
{
    Scanner sc = new Scanner(System.in);
    System.out.println("Number of Servers: ");
    int n = sc.nextInt();
    System.out.println("Number of Connections: ");
    int m = sc.nextInt();
    parent = new int[n];
    rank = new int[n];
    for (int i = 0; i < n; i++)
    {
        parent[i] = i;
        rank[i] = 0;
```

```
}

System.out.println("Enter Connections: ");

for (int i = 0; i < m; i++)

{

    int u = sc.nextInt();

    int v = sc.nextInt();

    union(u, v);

}

System.out.println("Number of Connectivity Queries: ");

int q = sc.nextInt();

System.out.println("Enter Queries: ");

for (int i = 0; i < q; i++)

{

    int u = sc.nextInt();

    int v = sc.nextInt();

    if (connected(u, v))

    {

        System.out.println("YES");

    }

    else

    {

        System.out.println("NO");

    }

}

sc.close();

}
```

The screenshot shows the OnlineGDB Java compiler interface. The code in the editor is:

```
1 import java.util.*;
2 public class Main
3 {
4     static int[] parent, rank;
5     static int find(int x)
6     {
7         if (parent[x] != x)
8             {
9                 parent[x] = find(parent[x]);
10            }
11            return parent[x];
12    }
13    static void union(int a, int b)
14    {
15        int pa = find(a);
16        int pb = find(b);
17        if (pa != pb)
18        {
19            if (rank[pa] < rank[pb])
20            {
21                parent[pa] = pb;
22            }
23            else if (rank[pb] < rank[pa])
24            {
25                parent[pb] = pa;
26            }
27            else
28            {
29                parent[pb] = pa;
30                rank[pa]++;
31            }
32        }
33    }
34    static boolean connected(int a, int b)
35    {
36        return find(a) == find(b);
37    }
38    public static void main(String[] args)
39    {
40        Scanner sc = new Scanner(System.in);
41        System.out.println("Number of Servers: ");
42        int n = sc.nextInt();
43        System.out.println("Number of Connections: ");
44        int m = sc.nextInt();
45        parent = new int[n];
46        rank = new int[n];
47        for (int i = 0; i < n; i++)
48        {
49            parent[i] = i;
50            rank[i] = 0;
51        }
52        System.out.println("Enter Connections: ");
53        for (int i = 0; i < m; i++)
54        {
55            int u = sc.nextInt();
56            int v = sc.nextInt();
57            union(u, v);
58        }
59        System.out.println("Number of Connectivity Queries: ");
60        int q = sc.nextInt();
61        System.out.println("Enter Queries: ");
62        for (int i = 0; i < q; i++)
63        {
64            int u = sc.nextInt();
65            int v = sc.nextInt();
66            if (connected(u, v))
67            {
68                System.out.println("YES");
69            }
70            else
71            {
72                System.out.println("NO");
73            }
74        }
75    }
}
```

The interface includes a sidebar with navigation links like 'Create New Project', 'My Projects', 'Classroom', 'Learn Programming', 'Programming Questions', 'Upgrade', and 'Logout'. The status bar at the bottom shows weather (27°C, Sunny), system icons, and the date/time (18-02-2026, 11:43).

The screenshot shows the OnlineGDB Java compiler interface. The code in the editor is:

```
1 public static void main(String[] args)
2 {
3     Scanner sc = new Scanner(System.in);
4     System.out.println("Number of Servers: ");
5     int n = sc.nextInt();
6     System.out.println("Number of Connections: ");
7     int m = sc.nextInt();
8     parent = new int[n];
9     rank = new int[n];
10    for (int i = 0; i < n; i++)
11    {
12        parent[i] = i;
13        rank[i] = 0;
14    }
15    System.out.println("Enter Connections: ");
16    for (int i = 0; i < m; i++)
17    {
18        int u = sc.nextInt();
19        int v = sc.nextInt();
20        union(u, v);
21    }
22    System.out.println("Number of Connectivity Queries: ");
23    int q = sc.nextInt();
24    System.out.println("Enter Queries: ");
25    for (int i = 0; i < q; i++)
26    {
27        int u = sc.nextInt();
28        int v = sc.nextInt();
29        if (connected(u, v))
30        {
31            System.out.println("YES");
32        }
33        else
34        {
35            System.out.println("NO");
36        }
37    }
38}
```

The interface includes a sidebar with navigation links like 'Create New Project', 'My Projects', 'Classroom', 'Learn Programming', 'Programming Questions', 'Upgrade', and 'Logout'. The status bar at the bottom shows weather (27°C, Sunny), system icons, and the date/time (18-02-2026, 11:43).

The screenshot shows the OnlineGDB Java compiler interface. The code editor displays a Java file named Main.java with the following content:

```
70     else
71     {
72         System.out.println("NO");
73     }
74 }
75 sc.close();
76 }
77 }
78 }
```

The output window below the code editor shows the following interaction:

```
Number of Servers:
6
Number of Connections:
4
Enter Connections:
0 1
1 2
3 4
4 5
Number of Connectivity Queries:
3
Enter Queries:
0 2
YES
0 5
NO
3 5
YES
```

The interface includes a sidebar with navigation links like 'Create New Project', 'My Projects', 'Classroom', 'Learn Programming', 'Programming Questions', 'Upgrade', and 'Logout'. At the bottom, there are links for 'About', 'FAQ', 'Blog', 'Terms of Use', 'Contact Us', 'GDB Tutorial', 'Credits', and 'Privacy'. The footer also shows the current date and time: 18-02-2026, 11:43.