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

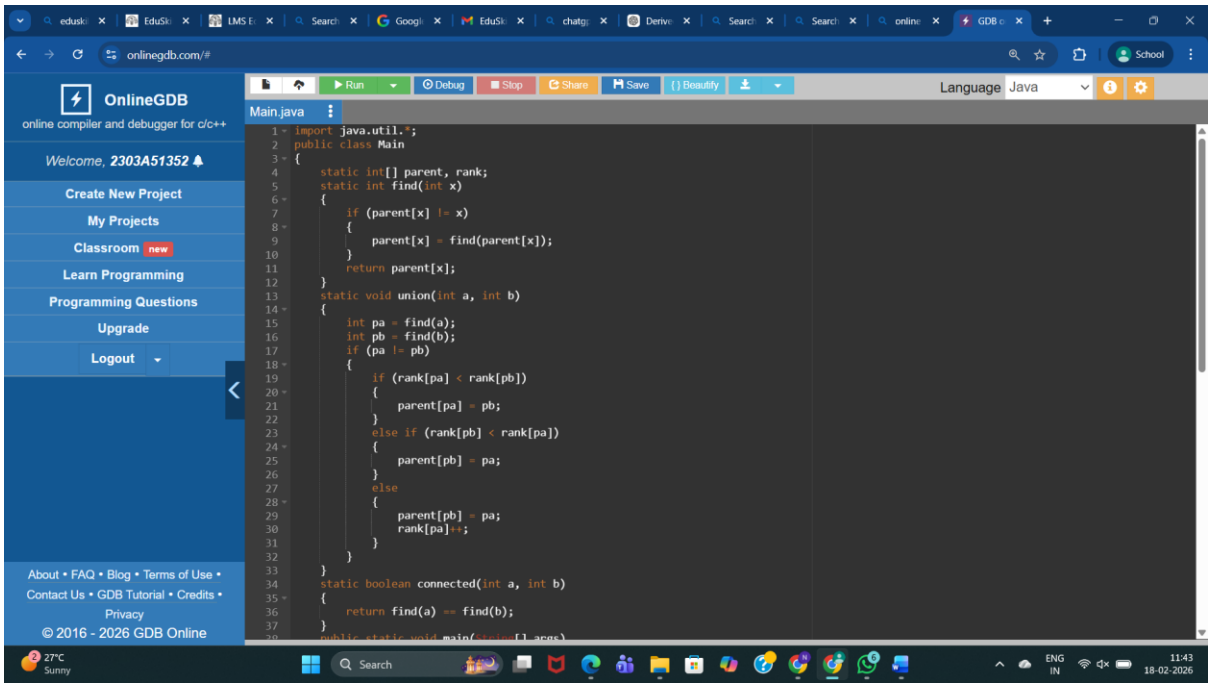
Code:

```
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();
    }
}
```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Language Java
Main.java
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);
}
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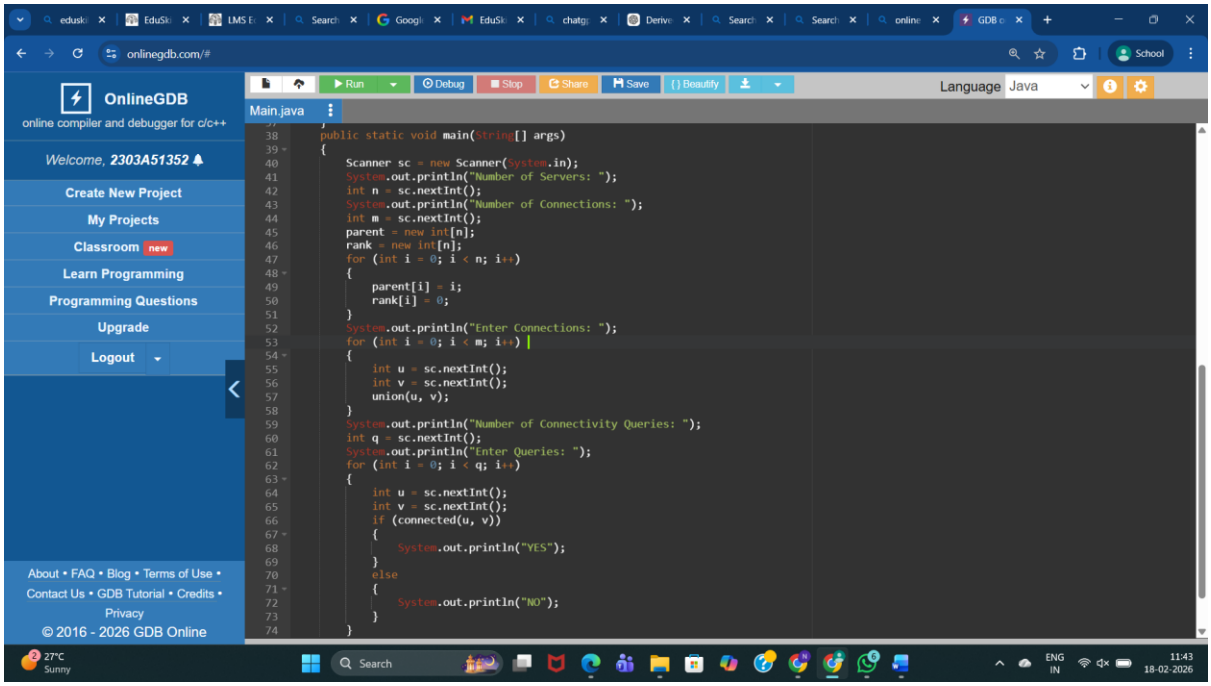
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Language Java
Main.java
public static void main(String[] args)
{
Scanner sc = new Scanner(System.in);
System.out.println("Number of Servers: ");
int n = sc.nextInt();
System.out.println("Number of Connections: ");
int m = sc.nextInt();
parent = new 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");
}
}
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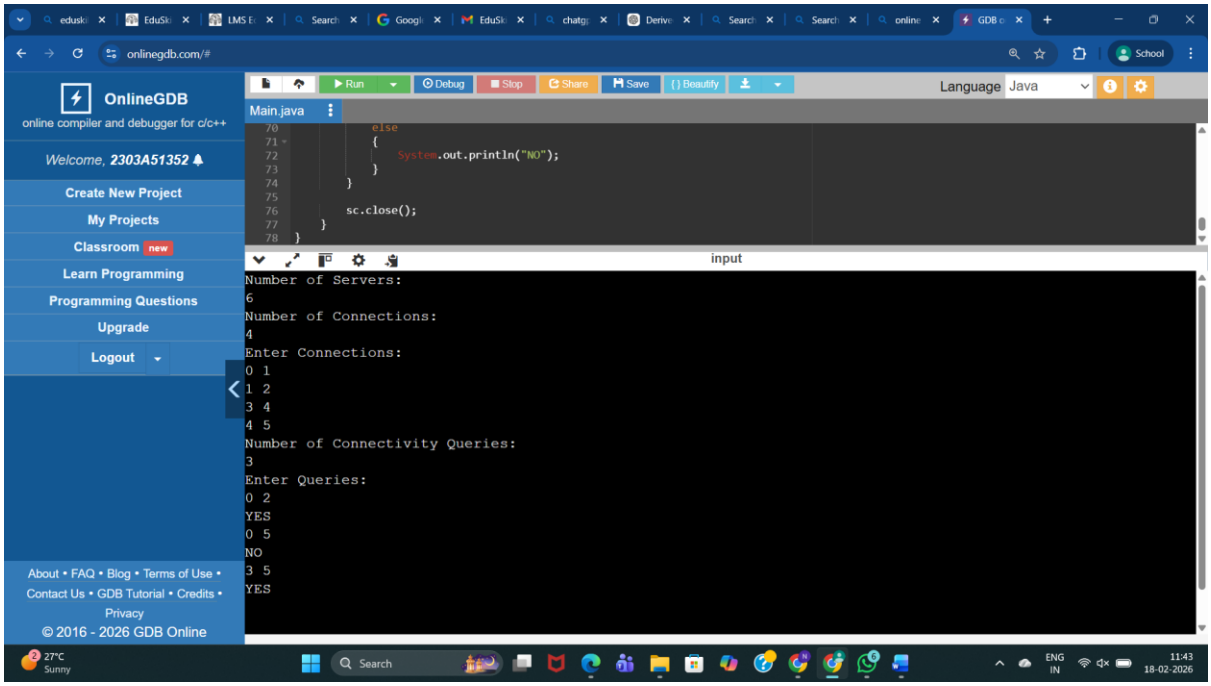
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Run
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{ } Beautify
Language Java
Main.java
else
{
System.out.println("NO");
}
}
sc.close();
}
}
input
Number of Servers:
6
Number of Connections:
4
Enter Connections:
0 1
1 2
3 4
4 5
Number of Connectivity Queries:
3
Enter Queries:
0 2
YES
0 5
NO
3 5
YES
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