**Assignment 3**

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1. Task
2. Implemented three functions named as find(), mergeComponent, doPathCompression() in UF\_HWQUPC class.
3. Created class Client.java in unionFind package which has main method. Main method take n from client and returns number of pairs generated in counts method.
4. Checked all test cases are working fine.
5. Created table and graph for my observation.
6. Also Wrote conclusion as per my observations
7. Code
8. private void doPathCompression(int i) {
9. // TO BE IMPLEMENTED update parent to value of grandparent
10. //int p = find(i);
11. if(pathCompression)
12. parent[i]=parent[parent[i]];
13. }
15. private void mergeComponents(int i, int j) {
16. // TO BE IMPLEMENTED make shorter root point to taller one

19. if(height[j]>height[i])
20. {
21. parent[i]=j;
22. //height[j]=height[j]+(height[j]-height[i]);
23. }else if(height[i]>height[i]) {
24. parent[j]=i;
25. height[i]=height[i]+1;
26. }else {
27. parent[j]=i;
28. //if(parent[])
30. height[i]=height[i]+1;
31. }
33. public int find(int p) {
34. validate(p);
35. int root = p;
36. // TO BE IMPLEMENTED
37. while(parent[root]!=root)
38. {
39. doPathCompression(root);
40. root=parent[root];
42. }

45. return root;
46. }
48. Output

Graphical user interface, text, application

Description automatically generated

1. Graph and Table

Table

Description automatically generated

Chart, line chart

Description automatically generated

1. **Test Cases:**

Graphical user interface, application, table, Excel

Description automatically generated

**6.Conclusion**

As value of n increases number of pairs also increases. So, we are getting linear graph.

m=n/2 log n;