ASSIGNMENT
ON
DATA STRUCTURE

Submitted to

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Q1.Disjoint Sets and the associated operations (create, union, find)

```
#include <stdio.h>

struct DisjSet {

    int parent[10];

    int rank[10]; //rank[i] is the height of the tree representing the set

    int n;

}dis;

    // Creates n single item sets

   void makeSet()

    {

        for (int i = 0; i < dis.n; i++) {

            dis.parent[i] = i;

            dis.rank[i]=0;

        }
```

```
}

//Displays Disjoint set

void displaySet()

{   printf("\nParent Array\n");

    for (int i = 0; i < dis.n; i++) {

       printf("%d ",dis.parent[i]); }

       printf("\nRank Array\n");

        for (int i = 0; i < dis.n; i++)

        {

            printf("%d ",dis.rank[i]);

        }

       printf("\n");

}

// Finds set of given item x

int find(int x)

{
```

```
    // Finds the representative of the set

    // that x is an element of

    if (dis.parent[x] != x) {



        // if x is not the parent of itself

        // Then x is not the representative of

        // his set,

        dis.parent[x] = find(dis.parent[x]);



        // so we recursively call Find on its parent

        // and move i's node directly under the

        // representative of this set

    }

    return dis.parent[x];

}
```

```
// Do union of two sets represented

// by x and y.

void Union(int x, int y)

{

   // Find current sets of x and y

   int xset = find(x);

   int yset = find(y);



   // If they are already in same set

   if (xset == yset)

      return;



   // Put smaller ranked item under

   // bigger ranked item if ranks are

   // different
```

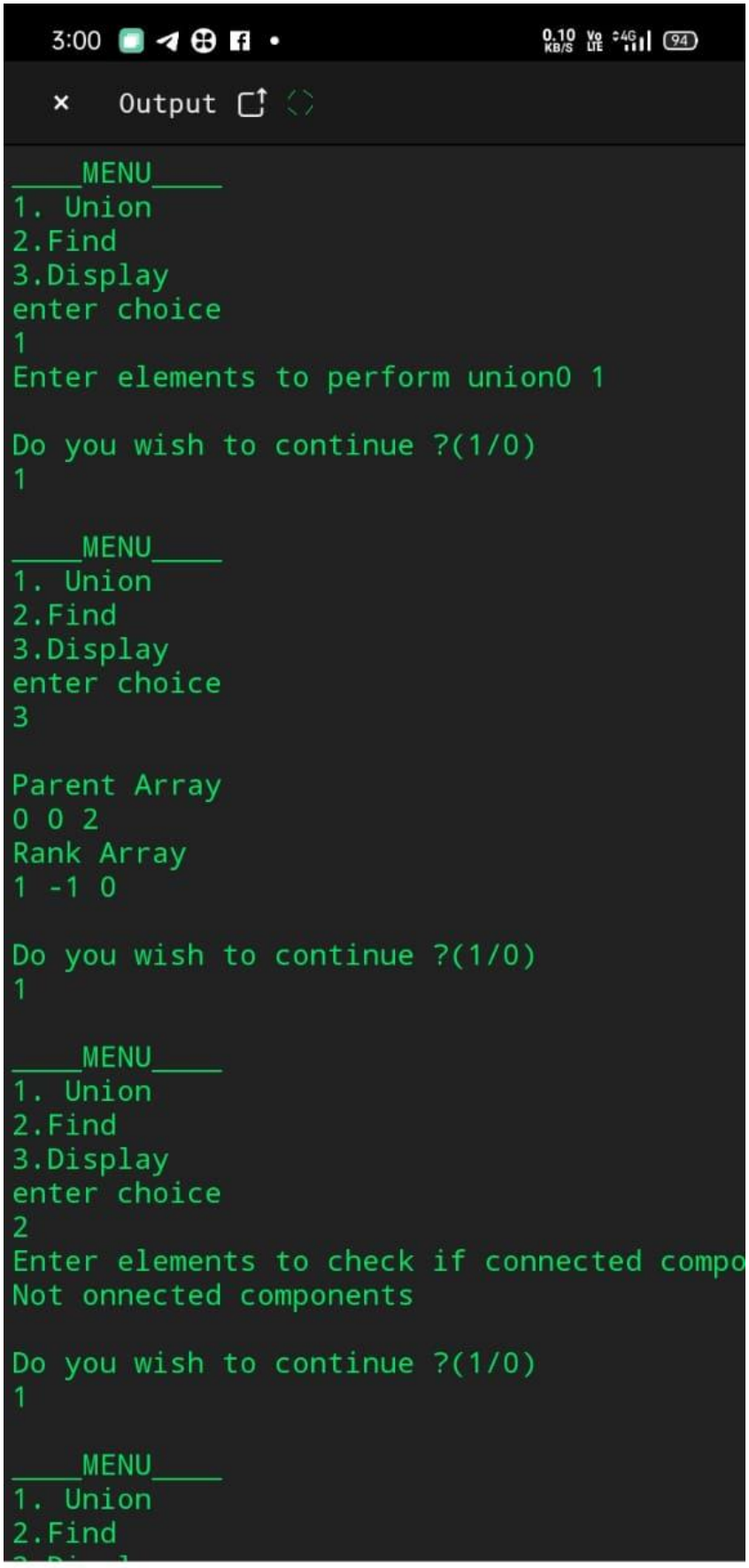
```
if (dis.rank[xset] < dis.rank[yset]) {

    dis.parent[xset] = yset;

    dis.rank[xset]=-1;

}

else if (dis.rank[xset] > dis.rank[yset]) {

    dis.parent[yset] = xset;

    dis.rank[yset]=-1;

}



// If ranks are same, then increment

// rank.

else {

    dis.parent[yset] = xset;

    dis.rank[xset] = dis.rank[xset] + 1;

    dis.rank[yset]=-1;
```

```
        }

    }



int main()

{   int n,x,y;

    printf("How many elements ?");

    scanf("%d",&dis.n);

    makeSet();

      int ch,wish;



 do

  {

  printf("\n___MENU_\n");

  printf("1. Union \n2.Find\n3.Display\n");

  printf("enter choice\n");

  scanf("%d",&ch);
```

```
switch(ch)

{

  case 1: printf("Enter elements to perform union");

            scanf("%d %d",&x,&y);

            Union(x, y);

               break;

  case 2: printf("Enter elements to check if connected components");

            scanf("%d %d",&x,&y);

            if (find(x) == find(y))

            printf("Connected components\n") ;

            else

           printf("Not onnected components \n") ;

            break;

  case 3: displaySet();

            break;
```

```
  }

  printf("\nDo you wish to continue ?(1/0)\n");

  scanf("%d",&wish);

  }while(wish==1);

 return 0;
}
```

Output


3:00
0.10 KB/S
Output
____MENU____
1. Union
2.Find
3.Display
enter choice
1
Enter elements to perform union0 1
Do you wish to continue ?(1/0)
1
____MENU____
1. Union
2.Find
3.Display
enter choice
3
Parent Array
0 0 2
Rank Array
1 -1 0
Do you wish to continue ?(1/0)
1
____MENU____
1. Union
2.Find
3.Display
enter choice
2
Enter elements to check if connected compo
Not onnected components
Do you wish to continue ?(1/0)
1
____MENU____
1. Union
2.Find