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INFO 6205 - Fall 2021

Assignment No: 3

Task:

- To implement height-weighted Quick Union with Path Compression and check that the unit tests for this class all work.
- Using the implementation of UF_HWQUPC, develop a UF client that takes an integer value n from the command line to determine the number of connections.
- To determine the relationship between the number of objects (n) and the number of pairs (m) generated.

Relationship Conclusion: After performing a series of experiments by passing different arguments of N (100,200,400,800,1600), it can be concluded that the relation between number of random pairs generated (edges) 'M' and the number of objects 'N' is

 $M \approx 1/2 N \ln N$

Findings:

For N = 100, M = 229, $1/2N \ln N = 230.25$

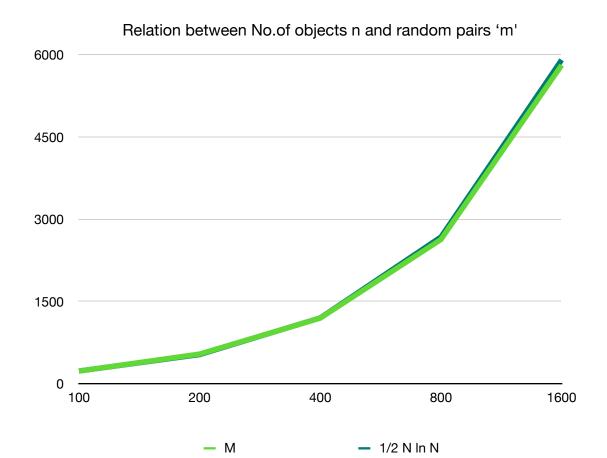
For N = 200, M = 540, 1/2nN In N = 529.83

For N = 400, M = 1195, $1/2N \ln N = 1198.29$

For N = 800, M = 2628, 1/2N In N = 2673.84

For N = 1600, M = 5806, 1/2N In N = 5902.20

N	M(Actual)	M = 1/2 N In N (Expected)
10	229	230,25
200	540	529,83
400	1195	1198,29
800	2628	2673,84
1600	5806	5902,20



Output Screenshot:

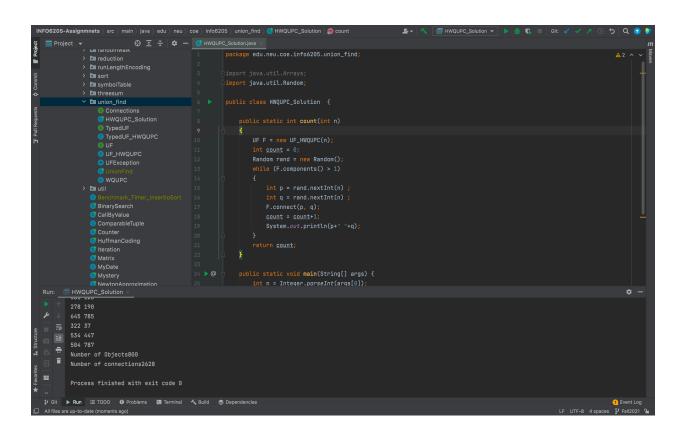
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F06205-Assignmnets 
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angle main 
angle java 
angle edu 
angle neu 
angle coe 
angle info6205 
angle union_find 
angle 
angle HWQUPC_Solution 
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angle count
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reduction
               > to runLengthEncoding
> to sort
               > > symbolTable > > threesum
               public class HWQUPC_Solution {
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                                                                                  UF F = new UF HWOUPC(n):
                     G UF_HWQUPC
UFException
                   CallByValue
ComparableTuple
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          21 52
          Number of Objects100
==
          Process finished with exit code 0
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                                                                              age edu.neu.coe.info6205.union_find;
            > to runLengthEncoding
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Connections
HWQUPC_Solution
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TypedUF_HWQUPC
UF
UF
UF_HWQUPC
                                                                                   UF F = new UF HWOUPC(n):
                                                                                    while (F.components() > 1)
                                                                                        F.connect(p, q);
               © CallByValue
© ComparableTuple
© Counter
© HuffmanCoding
               © Iteration
© Matrix
© MyDate
© Mystery
© NewtonAc
                                                                         public static void main(String[] args) {
    ist n = T-
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                > reduction
> runLengthEncoding
                                                                           =
import java.util.Arrays;
import java.util.Random;
                > S sort > S symbolTable
                > b threesum

> b union_find
                                                                                 public static int count(int n)
                      UF_HWQUPCUFException
                                                                                      Random rand = new Random();
                    Benchmark_TiBinarySearchCallByValue
                                                                                           count = count+1;
System.out.println(p+" "+q);
                   © ComparableTuple
© Counter
© HuffmanCoding
                   IterationMatrix
           MyDate
Mystery
NewtonApproximation
HWQUPC_Solution ×
                                                                                    int n = Integer.parseInt(args[0]);
                                                                                                                                                                                                                                                 $ -
    366 1388
     Number of Objects1600
Number of connections5806
==
```

Unit Test Screenshot:

```
## OP02036-Assignments and test jens edu new coe inhot205 union_find @ UF_HYKOUPC_Test

## OP02046-Assignments and heat jens edu new coe inhot205 union_find @ UF_HYKOUPC_Test

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