

INFO 6205 Assignment 3 Report

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Task:



Part 1: Implement height-weighted Quick Union with Path Compression.


Part 2: Using your implementation of UF_HWQUPC, develop a UF ("union-find") client that takes an integer value n from the command line to determine the number of "sites." Then generates random pairs of integers between 0 and $n-1$, calling `connected()` to determine if they are connected and `union()` if not.

Part3: Determine the relationship between the number of objects (n) and the number of pairs (m) generated to accomplish this (i.e. to reduce the number of components from n to 1).














Unit test

Finished after 0.045 seconds

Runs: 13/13  Errors: 0  Failures: 0



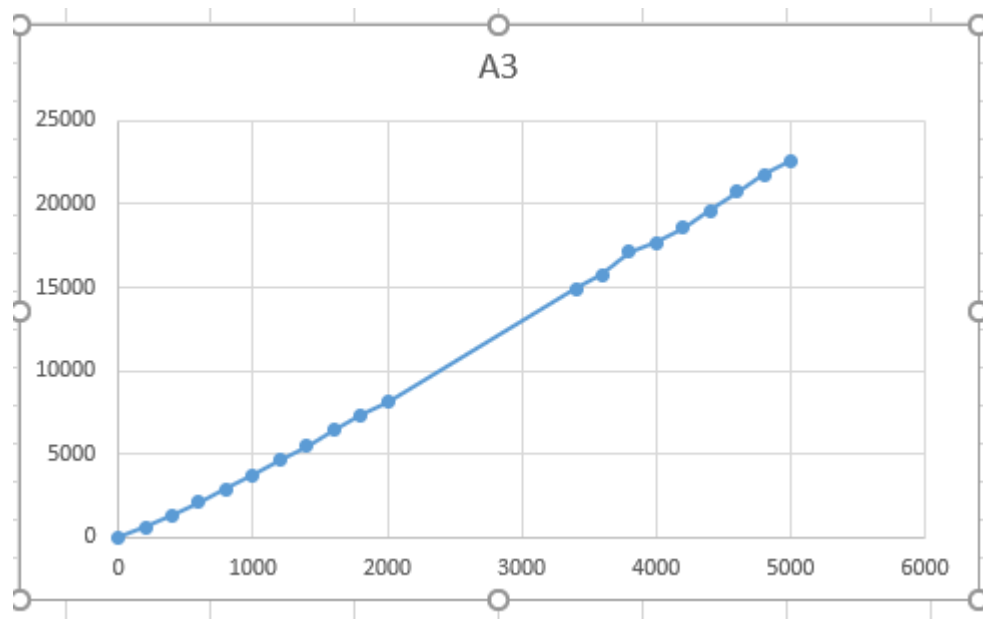
▼ edu.neu.coe.info6205.union_find.UF_HWQUPC_1

-  testIsConnected01 (0.000 s)
-  testIsConnected02 (0.000 s)
-  testIsConnected03 (0.001 s)
-  testFind0 (0.000 s)
-  testFind1 (0.000 s)
-  testFind2 (0.000 s)
-  testFind3 (0.000 s)
-  testFind4 (0.000 s)
-  testFind5 (0.000 s)
-  testToString (0.000 s)
-  testConnect01 (0.003 s)
-  testConnect02 (0.000 s)
-  testConnected01 (0.000 s)

Output screenshots

```
n = 0 average number of pairs generated over 200 runs were: 0.0
Slope: NaN
n = 200 average number of pairs generated over 200 runs were: 588.0
Slope: 2.94
n = 400 average number of pairs generated over 200 runs were: 1303.0
Slope: 3.2575
n = 600 average number of pairs generated over 200 runs were: 2106.0
Slope: 3.51
n = 800 average number of pairs generated over 200 runs were: 2875.0
Slope: 3.59375
n = 1000 average number of pairs generated over 200 runs were: 3740.0
Slope: 3.74
n = 1200 average number of pairs generated over 200 runs were: 4621.0
Slope: 3.8508333333333336
n = 1400 average number of pairs generated over 200 runs were: 5485.0
Slope: 3.9178571428571427
n = 1600 average number of pairs generated over 200 runs were: 6420.0
Slope: 4.0125
n = 1800 average number of pairs generated over 200 runs were: 7314.0
Slope: 4.0633333333333335
n = 2000 average number of pairs generated over 200 runs were: 8103.0
Slope: 4.0515
```

Graph:



Conclusion:

The relationship between m and n is close to $m = 0.55n \cdot \log(n)$ based on the data and graph generated.