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INFO 6205
Program Structures & Algorithms
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Assignment 4

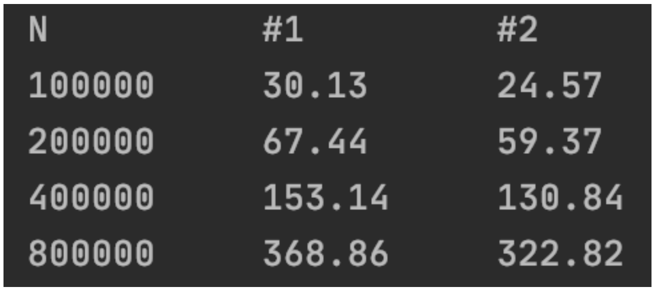
Task

Code & benchmark the alternatives for union find i.e. weighted quick union with depth & weighted quick union with path compression (grandparent fix).

Evidence

#1 – Weighted Quick Union with depth
#2 – Weighted Quick Union with Path Compression (grandparent fix)

Execution of #1 & #2 code using various values of components (N) and comparing output for benchmarking runtimes.



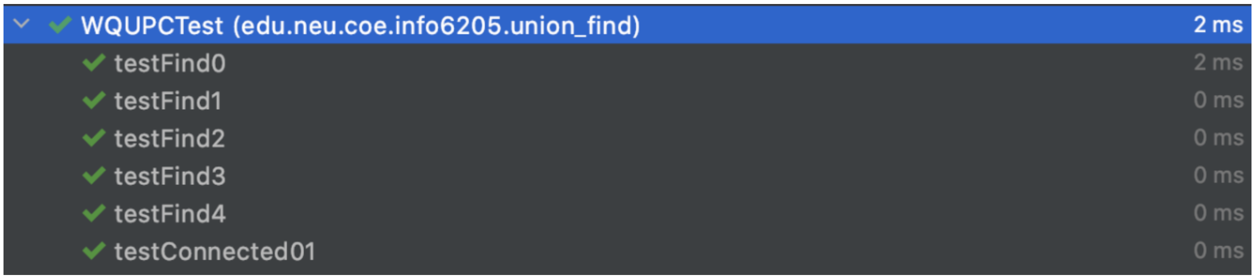
```
N          #1         #2
100000     30.13      24.57
200000     67.44      59.37
400000     153.14     130.84
800000     368.86     322.82
```

Figure 1 : Output benchmark run times for #1 & #2

Conclusion

As evident from benchmarking both the alternatives, #2 offers better runtime performance than #1 as number of objects increases. The path compression in #2 significantly improves the performance of the algorithm.

Screenshots



```
✓ WQUPCTest (edu.neu.coe.info6205.union_find)   2 ms
    ✓ testFind0                                 2 ms
    ✓ testFind1                                 0 ms
    ✓ testFind2                                 0 ms
    ✓ testFind3                                 0 ms
    ✓ testFind4                                 0 ms
    ✓ testConnected01                           0 ms
```

Figure 2: Execution of Unit Tests for WUPC