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INFO 6205
Program Structures & Algorithms
Fall 2020
Assignment 3 - alternatives

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Task

We mentioned two alternatives for implementing Union-Find:

1. For weighted quick union, store the depth rather than the size;
2. For weighted quick union with path compression, do two loops, so that all intermediate nodes point to the root, not just the alternates.

For both of these, code the alternative and benchmark it against the implementation in the repository. You have all of that available from a previous assignment.

If you can explain why alternative #1 is unnecessary to be benchmarked, you may skip benchmarking that one.

Usual submission rules apply. 40 points only for this one.

Output

For weighted quick union, store the depth rather than the size;

Compare the running time for unioning 10000 sites

```
"C:\Program Files\Java\jdk1.8.0_221\bin\java.exe" ...  
2020-10-13 13:00:05 INFO Benchmark_Timer - Begin run: WeightedUnionFindRun 10000 with 1,000 runs  
Weighted UnionFind to union 10000 sites takes 0.32 milliseconds  
2020-10-13 13:00:06 INFO Benchmark_Timer - Begin run: WeightedUnionFindAlterRun 10000 with 1,000 runs  
Weighted UnionFind to union 10000 sites takes 0.28 milliseconds
```

The time cost of storing size and storing depth are pretty same.

For weighted quick union with path compression, do two loops, so that all intermediate nodes point to the root, not just the alternates.

Compare the running time for unioning 10000 sites

```
"C:\Program Files\Java\jdk1.8.0_221\bin\java.exe" ...  
2020-10-13 13:00:22 INFO Benchmark_Timer - Begin run: WeightedUnionFindRun 10000 with 1,000 runs  
Weigthed UnionFind to union 10000 sites takes 1.51 milliseconds  
2020-10-13 13:00:23 INFO Benchmark_Timer - Begin run: WeightedUnionFindAlterRun 10000 with 1,000 runs  
Weigthed UnionFind to union 10000 sites takes 0.35 milliseconds
```

The alter version is faster than previous one.

Implementation - Code

[WeightedUnionFind.java](#)

[WeightedUnionFindAlter.java](#)

[WeigthedUnionFindAlterAndNonAlterBenchmarking.java](#)

[UF_HWQUPC.java](#)

[UF_HWQUPC_ALTER.java](#)

[WeigthedUnionFindAlterAndNonAlterBenchmarking.java](#)