

Report: Connected Components Warmup

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Results

Input file	0 connected to 1?
tinyUF.txt	True
mediumUF.txt	False
largeUF.txt	True

Methods

Difference in performance between *UF.java* and *WeightedQuickUnionUF.java* was not significant, so we decided to use the *WeightedQuickUnionUF.java* data structure presented in the *Algorithms* book, as this structure keeps track of the tree size and always connects the smaller tree to the larger.

Below you can see the results of different implementations of Union-Find algorithm:

As we can see, only *UF.java* and *WeightedQuickUnionUF.java* could make it fast, while *QuickFindUF.java* and *QuickUnionUF.java* take too long time to process *largeUF.txt*.

Time: *QuickFindUF.java* (*largeUF.txt*) = 1170 sec / 60 = 19.5 min

Time: *QuickUnionUF.java* (*largeUF.txt*) = 27525 sec / 60 = 458.75 min / 60 = 7.64 hours

UF.java

```
Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ javac UFW.java

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < tinyUF.txt
Using: UF
Connected: true
Time elapsed: 27,051109 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < mediumUF.txt
Using: UF
Connected: false
Time elapsed: 75,881275 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < largeUF.txt
Using: UF
Connected: true
Time elapsed: 3790,234612 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$
```

QuickFindUF.java

```
Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ javac UFW.java

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < tinyUF.txt
Using: QuickFindUF
Connected: true
Time elapsed: 25,533705 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < mediumUF.txt
Using: QuickFindUF
Connected: false
Time elapsed: 76,334683 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < largeUF.txt
Using: QuickFindUF
Connected: true
Time elapsed: 1170710,049490 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ |
```

QuickUnionUF.java

```
Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ javac UFW.java

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < tinyUF.txt
Using: QuickUnionUF
Connected: true
Time elapsed: 25,994170 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < mediumUF.txt
Using: QuickUnionUF
Connected: false
Time elapsed: 74,880011 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < largeUF.txt
Using: QuickUnionUF
Connected: true
Time elapsed: 27525561,788693 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ |
```

WeightedQuickUnionUF.java

```
Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ javac UFW.java

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < tinyUF.txt
Using: WeightedQuickUnionUF
Connected: true
Time elapsed: 27,360920 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < mediumUF.txt
Using: WeightedQuickUnionUF
Connected: false
Time elapsed: 76,043067 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ java UFW < largeUF.txt
Using: WeightedQuickUnionUF
Connected: true
Time elapsed: 3984,529997 ms

Admin@Marvine-5W10 MINGW64 ~/IdeaProjects/AD/src/Warmup (master)
$ |
```