

Nithya Viswanathan (001046065)

Program Structures & Algorithms

Fall 2021

Assignment No. 3

GitHub URL: <https://github.com/Nithya-Viswanathan/INFO-6205-Assignments.git>

⦿ **Task (List down the tasks performed in the Assignment)**

1. Implemented height-weighted Quick Union with Path Compression. Made sure all the unit tests ran.
2. Wrote a main function that counts the connections after taking the number of sites as the input
3. Determined the relationship between the no. of objects(n) and the no. of pairs(m)

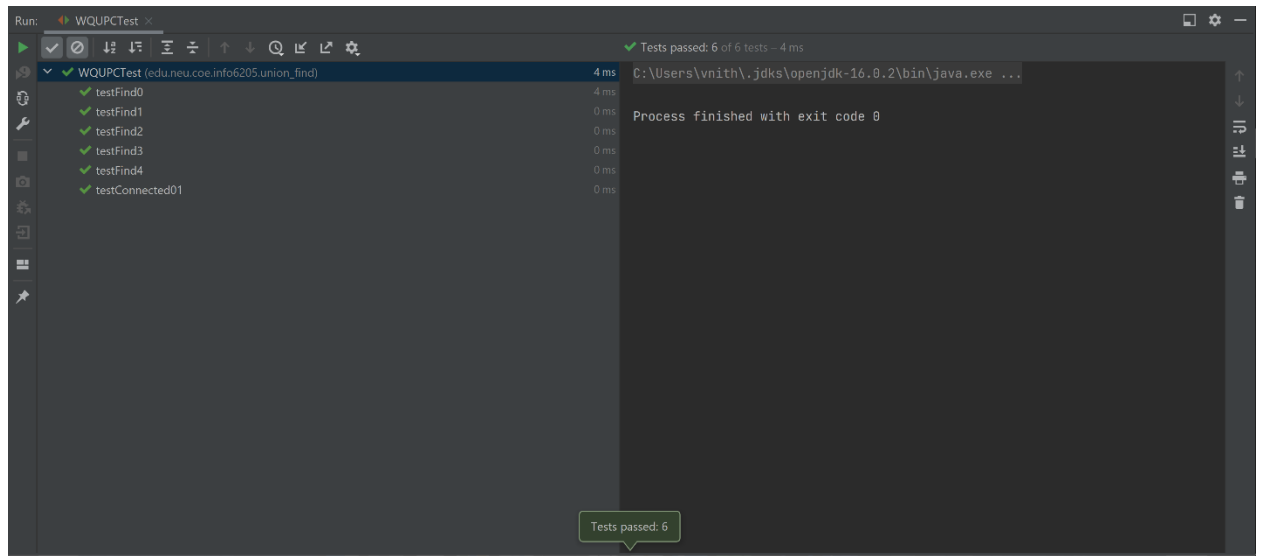
⦿ **Relationship Conclusion:**

The relationship between the number of objects(n) and the no. of pairs(m) is:

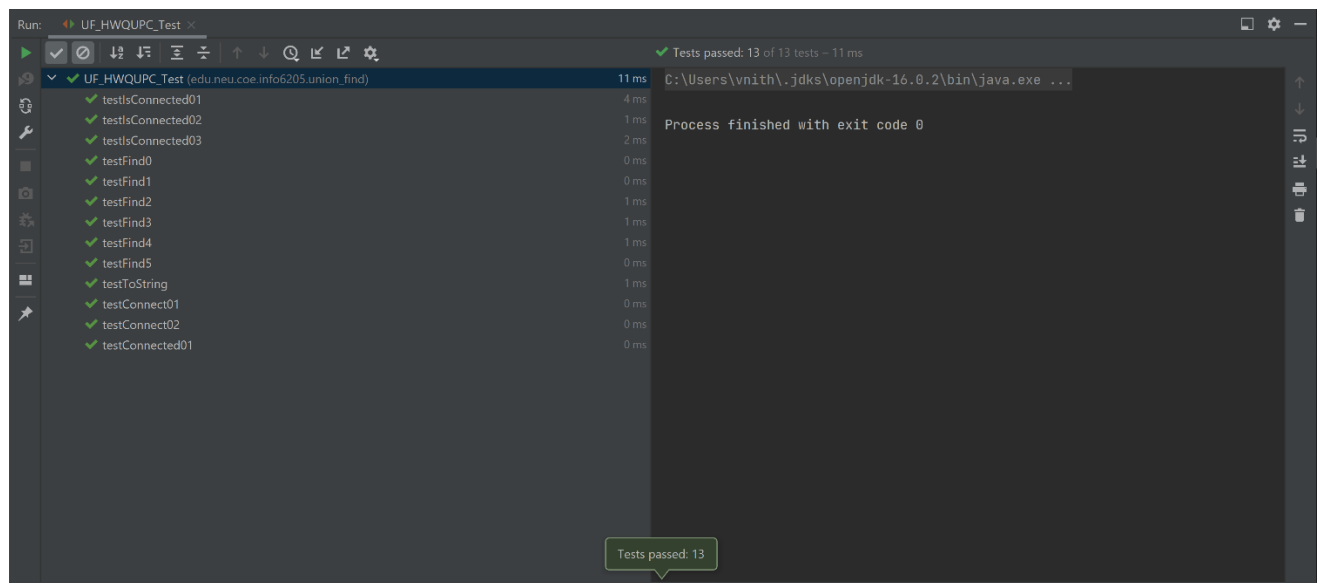
$$n = \text{approx. } (n/2) \ln n$$

⦿ **Evidence to support the conclusion:**

1. Unit Tests of WQUPCTest:



2. Unit Tests of UF_HWQUPCTest:



3. Output for different sizes:

```
Run: HWQUPC_Solution
C:\Users\vnith\.jdk\openjdk-16.0.2\bin\java.exe ...
Please input the size of sites: 500
the number of pairs is: 1383
the number of connections happening is: 1383
Please input the size of sites: 1000
the number of pairs is: 3284
the number of connections happening is: 3278
Please input the size of sites: 5000
the number of pairs is: 20754
the number of connections happening is: 20748
Please input the size of sites: 10000
the number of pairs is: 47090
the number of connections happening is: 47087
Please input the size of sites: 20000
the number of pairs is: 88918
the number of connections happening is: 88914
Please input the size of sites: 40000
the number of pairs is: 216484
the number of connections happening is: 216478

Process finished with exit code 0
```

4. Graphs:

Size	No. of Pairs
500	1383
1000	3284
5000	20754
10000	47090
20000	88918
40000	216484



