David Nallapu (001530978)

Program Structures & Algorithms
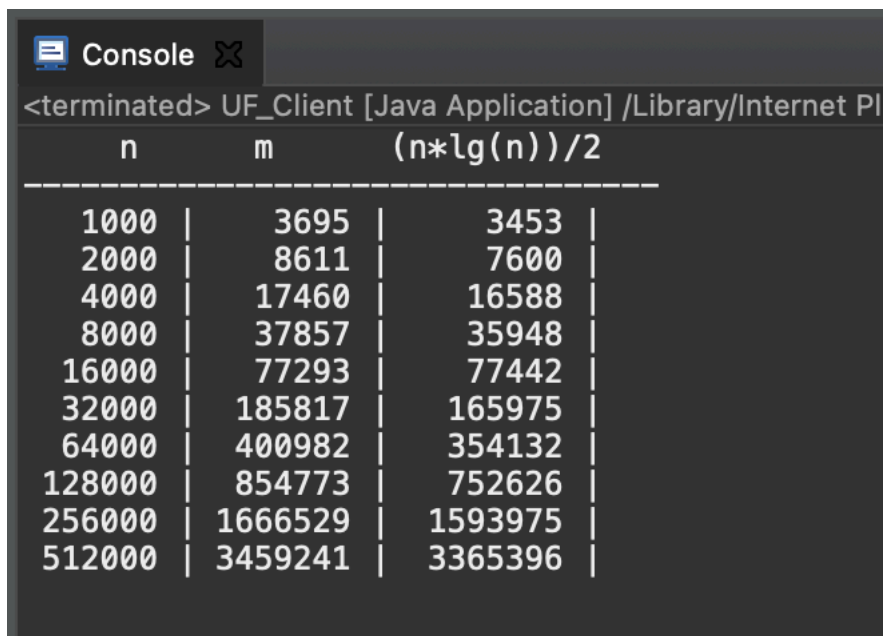
Spring 2021

Assignment No. 3

- **Task**

Implement height-weighted Quick Union with Path Compression. Using my implementation of UF_HWQUPC to develop a UF_client that takes an integer values of n to determine the number of "sites." Determining the relationship between the number of objects (*n*) and the number of pairs (*m*) generated to accomplish this.

- **Relationship Conclusion:**

The number of pairs (*m*) is approximately n*log(n)/2 where n is the number of objects.

- **Evidence to support the conclusion(Output):**

```
Console
<terminated> UF_Client [Java Application] /Library/Internet Pl
       n          m          (n*lg(n))/2
---------------------------------------------
    1000 |      3695 |       3453 |
    2000 |      8611 |       7600 |
    4000 |     17460 |      16588 |
    8000 |     37857 |      35948 |
   16000 |     77293 |      77442 |
   32000 |    185817 |     165975 |
   64000 |    400982 |     354132 |
  128000 |    854773 |     752626 |
  256000 |   1666529 |    1593975 |
  512000 |   3459241 |    3365396 |
```

- **Unit tests result:**

Finished after 0.052 seconds

Runs: 13/13   ☒ Errors: 0   ☒ Failures: 0

edu.neu.coe.info6205.union_find.UF_HWQUPC_Test
- testIsConnected01 (0.001 s)
- testIsConnected02 (0.000 s)
- testIsConnected03 (0.000 s)
- testFind0 (0.000 s)
- testFind1 (0.001 s)
- testFind2 (0.000 s)
- testFind3 (0.000 s)
- testFind4 (0.000 s)
- testFind5 (0.000 s)
- testToString (0.000 s)
- testConnect01 (0.000 s)
- testConnect02 (0.000 s)
- testConnected01 (0.000 s)