Program Structures & Algorithms
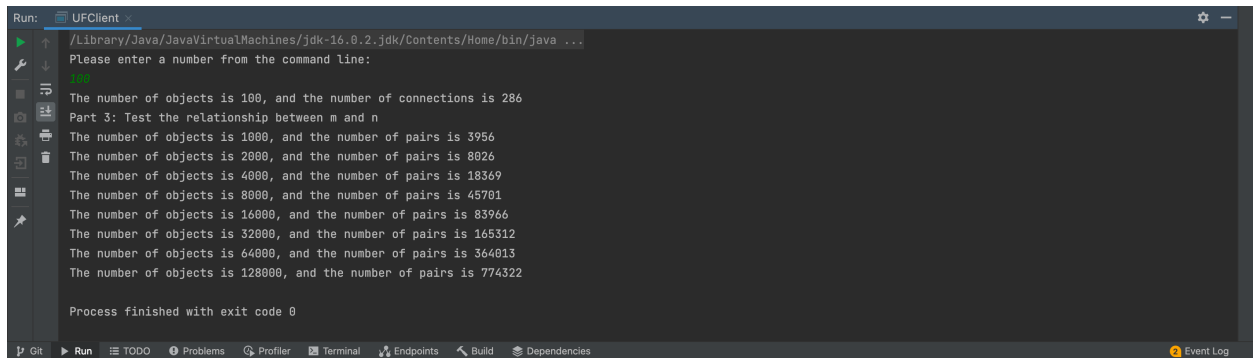# Spring 2022
Assignment No. 3 (WQUPC)

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- **Task**
  1. Two classes implemented.
     - UF_HWQUPC.java (Step 1 implementation)
     - UFClient.java (Step 2 implementation)
  2. Completed the UF_HWQUPC.java file which had below methods implemented.
     - find() – void method which increments x and y variables as the drunken person moves in north, south, east or west direction.
     - mergeComponents() – returns the Euclidean distance (using Pythagoras Theorem) of the drunken man from the pole (origin) to a point (d)
     - doPathCompression() – void method where the randomMove() method is called for the m no of steps in random di**rec**tion
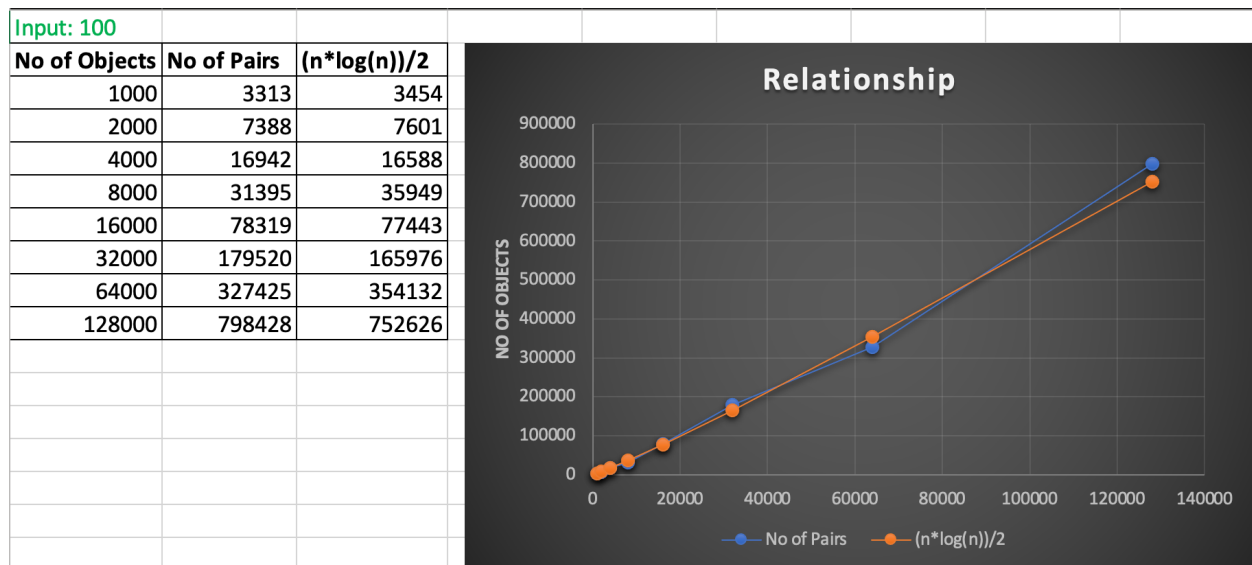
- **Output screenshot**

Evidence of running UFClient.java

- **Relationship Conclusion**
  The relationship between the Euclidean Distance (d) from the pole and number of steps taken to reach position by n steps is
  m = ½ (n * log(n))

- **Evidence / Graph**

Input: 100		
No of Objects	No of Pairs	(n*log(n))/2
1000	3313	3454
2000	7388	7601
4000	16942	16588
8000	31395	35949
16000	78319	77443
32000	179520	165976
64000	327425	354132
128000	798428	752626

- **Unit tests result**

The below output is test case output for UF_HWQUPC.

Run: ◇ WQUPCTest ×

▶ ✓ ⊘ ↓↑ ↓↑ ↓↑ ↑ ↓ ⊘ »   ✓ Tests passed: 6 of 6 tests – 9 ms

✓ ✓ WQUPCTest (edu.neu.coe.info6: 9 ms   /Library/Java/JavaVirtualMachines/jdk-16.0.2.jdk/Contents/Home/bin/java ...
    ✓ testFind0   7 ms
    ✓ testFind1   0 ms   Process finished with exit code 0
    ✓ testFind2   1 ms
    ✓ testFind3   0 ms
    ✓ testFind4   1 ms
    ✓ testConnected01   0 ms

⑂ Git   ▶ Run   ≡ TODO   ❶ Problems   ⊙ Profiler   ▣ Terminal   ⚙ Endpoints   ⚒ Build   ⬚ Dependencies   ❷ Event Log