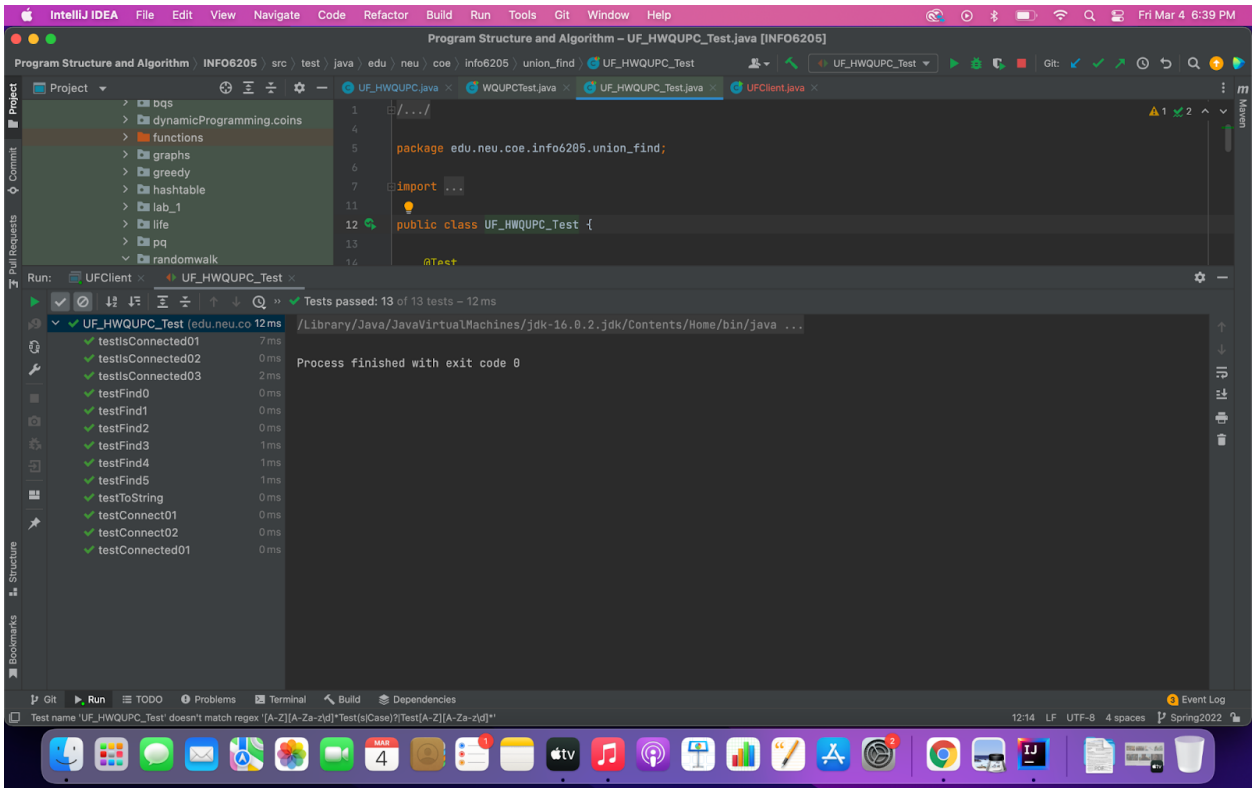
Assignment 3 (WQUPC)
Program Structure and Algorithms

Name - Ayush Gupta
NEU ID - 001554875

Step 1:

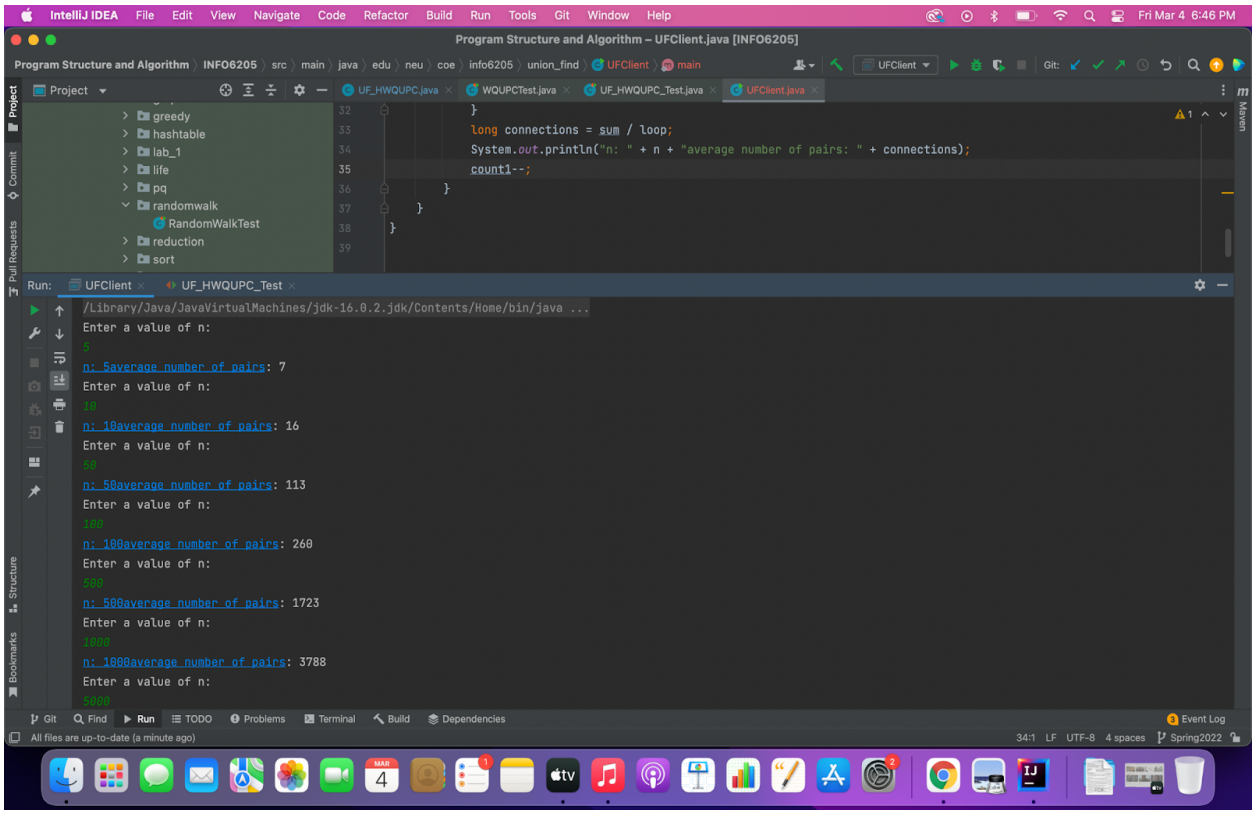
All test cases are passed.

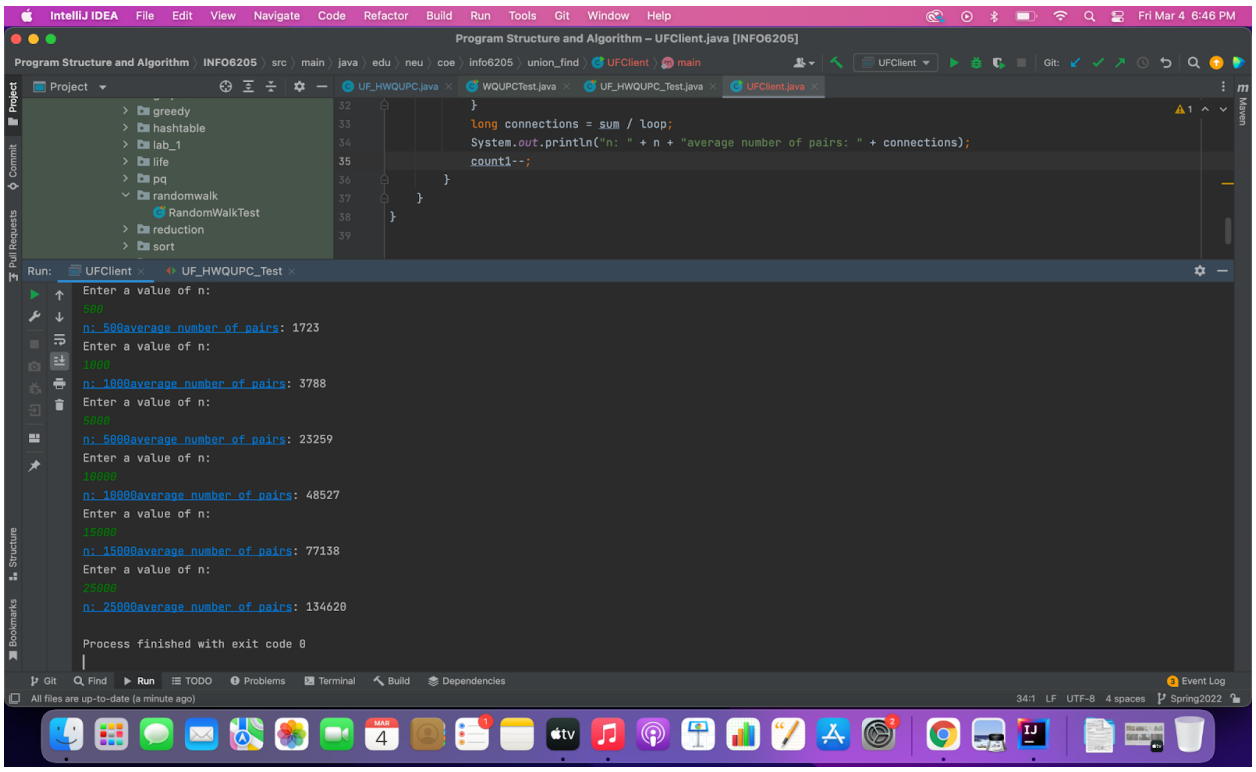


Step 2:

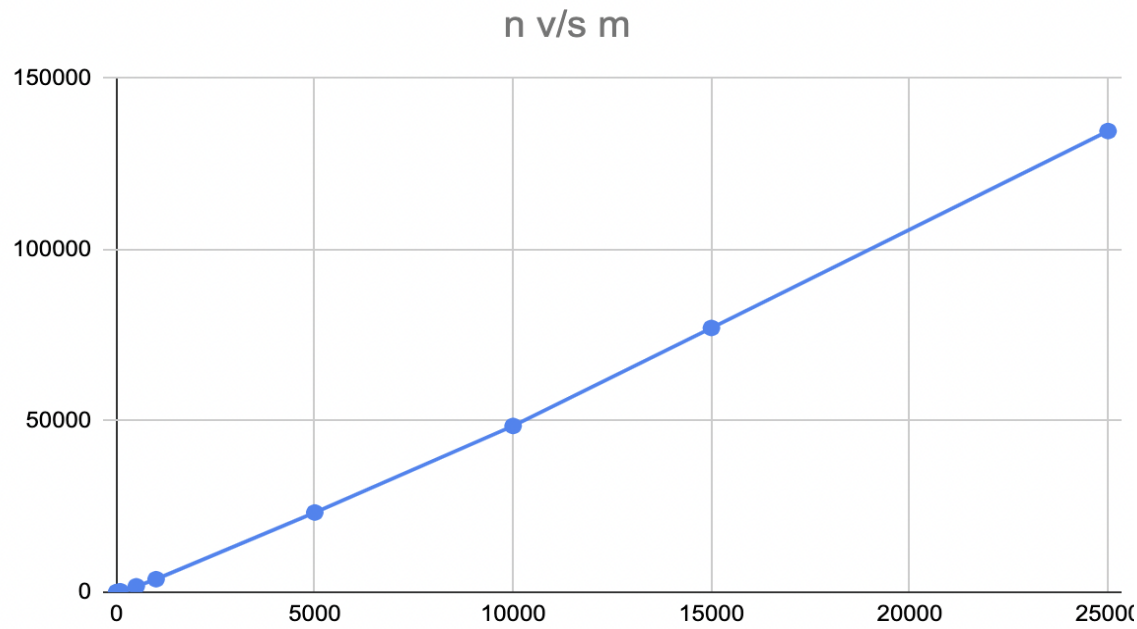
Output of UFClient :

n	m
5	7
10	16
50	113
100	260
500	1723
1000	3788
5000	23259
10000	48527
15000	77138
25000	134620


IntelliJ IDEA File Edit View Navigate Code Refactor Build Run Tools Git Window Help
Fri Mar 4 6:46 PM
Program Structure and Algorithm – UFClient.java [INFO6205]
Program Structure and Algorithm 〉 INFO6205 〉 src 〉 main 〉 java 〉 edu 〉 neu 〉 coe 〉 info6205 〉 union_find 〉 UFClient 〉 main
UFClient
Git:
Project
UF_HWQUPC.java
WQUPCTest.java
UF_HWQUPC_Test.java
UFClient.java
greedy
hashtable
lab_1
life
pq
randomwalk
RandomWalkTest
reduction
sort
}
long connections = sum / loop;
System.out.println("n: " + n + "average number of pairs: " + connections);
count1--;
}
}
}
Run:
UFClient
UF_HWQUPC_Test
/Library/Java/JavaVirtualMachines/jdk-16.0.2.jdk/Contents/Home/bin/java ...
Enter a value of n:
5
n: 5average number of pairs: 7
Enter a value of n:
10
n: 10average number of pairs: 16
Enter a value of n:
50
n: 50average number of pairs: 113
Enter a value of n:
100
n: 100average number of pairs: 260
Enter a value of n:
500
n: 500average number of pairs: 1723
Enter a value of n:
1000
n: 1000average number of pairs: 3788
Enter a value of n:
5000
Git
Find
Run
TODO
Problems
Terminal
Build
Dependencies
Event Log
All files are up-to-date (a minute ago)
34:1
LF
UTF-8
4 spaces
Spring2022


IntelliJ IDEA File Edit View Navigate Code Refactor Build Run Tools Git Window Help
Fri Mar 4 6:46 PM
Program Structure and Algorithm – UFClient.java [INFO6205]
Program Structure and Algorithm 〉 INFO6205 〉 src 〉 main 〉 java 〉 edu 〉 neu 〉 coe 〉 info6205 〉 union_find 〉 UFClient 〉 main
UFClient
Git:
Project
UF_HWQUPC.java
WQUPCTest.java
UF_HWQUPC_Test.java
UFClient.java
greedy
hashtable
lab_1
life
pq
randomwalk
RandomWalkTest
reduction
sort
}
long connections = sum / loop;
System.out.println("n: " + n + "average number of pairs: " + connections);
count1--;
}
}
}
Run:
UFClient
UF_HWQUPC_Test
Enter a value of n:
500
n: 500average number of pairs: 1723
Enter a value of n:
1000
n: 1000average number of pairs: 3788
Enter a value of n:
5000
n: 5000average number of pairs: 23259
Enter a value of n:
10000
n: 10000average number of pairs: 48527
Enter a value of n:
15000
n: 15000average number of pairs: 77138
Enter a value of n:
25000
n: 25000average number of pairs: 134620
Process finished with exit code 0
Git
Find
Run
TODO
Problems
Terminal
Build
Dependencies
Event Log
All files are up-to-date (a minute ago)
34:1
LF
UTF-8
4 spaces
Spring2022

Step 3:



The relationship between the number of objects (*n*) and the number of pairs (*m*) generated to accomplish this (i.e. to reduce the number of components from *n* to 1) which is justified from the above graph:

m = 0.5 *n* log n

Proof:

For n = 1000
m = 0.5 * 1000 * log1000
m = 3454(approx)

And from the code our output for n=1000 ——-> m = 3788, which is approximately equal.