Program Structures and Algorithms
Spring 2023(SEC – 08)

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Task: Determine 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).

Relationship Conclusion:
To connect objects until only one component remaining, assume we need to connect m times. After m times connection, there are n – m components remaining. Let n – m equals to 1, then m is:

$$\boldsymbol{m = n - 1}$$

Evidence to support that conclusion:
Number of connections when n equals to 1 is: 0
Number of connections when n equals to 2 is: 1
Number of connections when n equals to 3 is: 2
Number of connections when n equals to 4 is: 3
Number of connections when n equals to 5 is: 4
Number of connections when n equals to 6 is: 5
Number of connections when n equals to 7 is: 6
Number of connections when n equals to 8 is: 7
Number of connections when n equals to 9 is: 8
Number of connections when n equals to 10 is: 9
Number of connections when n equals to 11 is: 10
Number of connections when n equals to 12 is: 11
Number of connections when n equals to 13 is: 12
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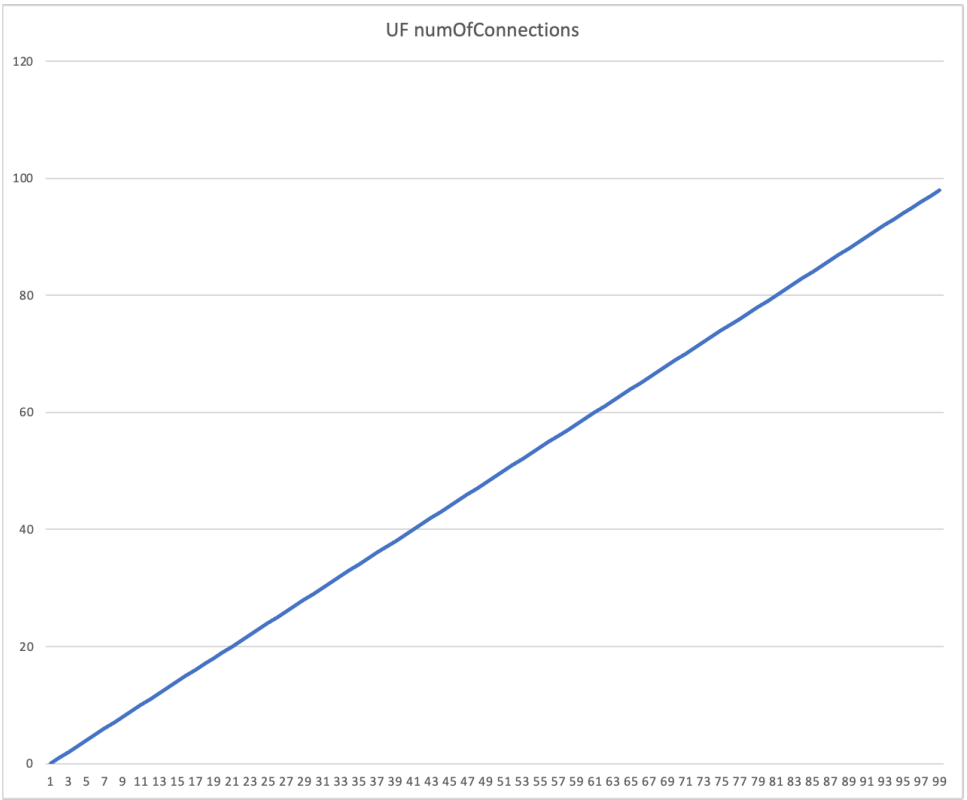
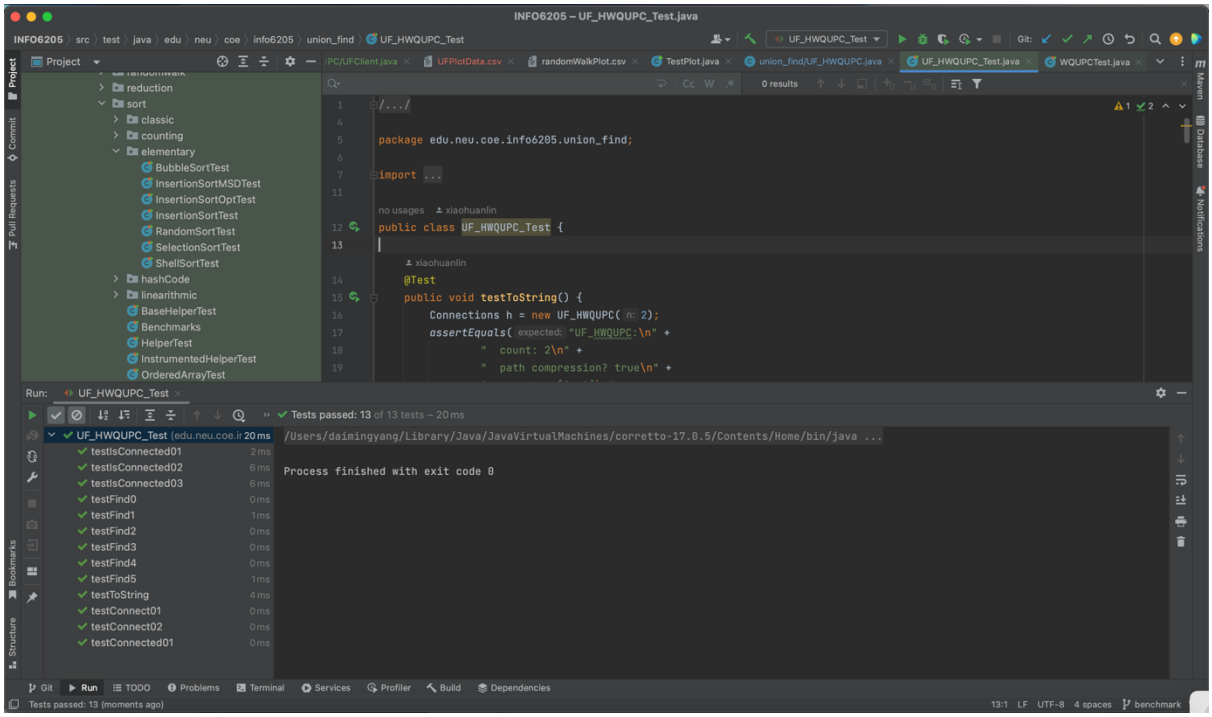
Number of connections when n equals to 95 is: 94
Number of connections when n equals to 96 is: 95
Number of connections when n equals to 97 is: 96
Number of connections when n equals to 98 is: 97
Number of connections when n equals to 99 is: 98

Graphical Representation:



Unit Test Screenshots:


INFO6205 – UF_HWQUPC_Test.java
INFO6205 › src › test › java › edu › neu › coe › info6205 › union_find › UF_HWQUPC_Test
Project
reduction
sort
classic
counting
elementary
BubbleSortTest
InsertionSortMSDTest
InsertionSortOptTest
InsertionSortTest
RandomSortTest
SelectionSortTest
ShellSortTest
hashCode
linearithmic
BaseHelperTest
Benchmarks
HelperTest
InstrumentedHelperTest
OrderedArrayTest
/.../
package edu.neu.coe.info6205.union_find;
import ...
no usages xiaohuanlin
public class UF_HWQUPC_Test {
xiaohuanlin
@Test
public void testToString() {
Connections h = new UF_HWQUPC(n: 2);
assertEquals(expected: "UF_HWQUPC:\n" +
" count: 2\n" +
" path compression? true\n" +
Run: UF_HWQUPC_Test
Tests passed: 13 of 13 tests – 20 ms
UF_HWQUPC_Test (edu.neu.coe.ir 20 ms
testIsConnected01 2 ms
testIsConnected02 6 ms
testIsConnected03 6 ms
testFind0 0 ms
testFind1 1 ms
testFind2 0 ms
testFind3 0 ms
testFind4 0 ms
testFind5 1 ms
testToString 4 ms
testConnect01 0 ms
testConnect02 0 ms
testConnected01 0 ms
/Users/daimingyang/Library/Java/JavaVirtualMachines/corretto-17.0.5/Contents/Home/bin/java ...
Process finished with exit code 0
Git
Run
TODO
Problems
Terminal
Services
Profiler
Build
Dependencies
Tests passed: 13 (moments ago)
13:1 LF UTF-8 4 spaces benchmark