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Program Structures & Algorithms
Fall 2021
Assignment No. 3

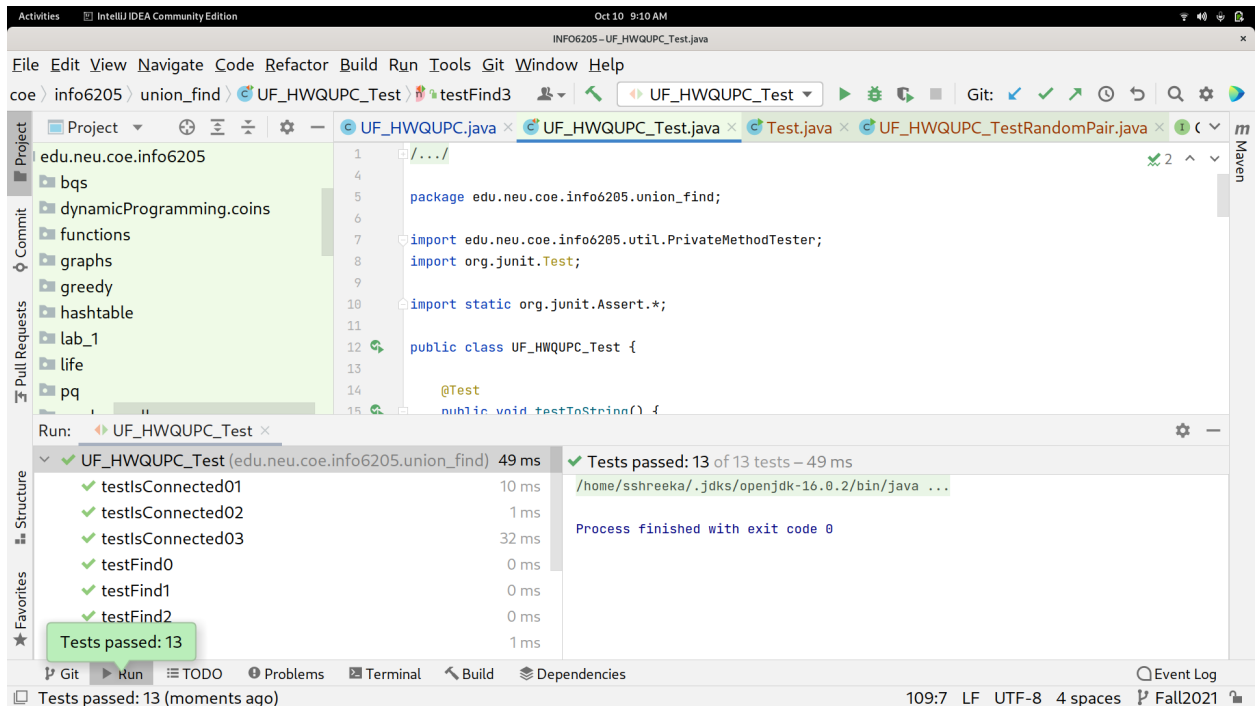
- **Task (List down the tasks performed in the Assignment)**

1. Completed the implementation of methods in the `UF_HWQUPC` class.
2. Created new test class `UF_HWQUPC_TestRandomPair` to test `UF_HWQUPC` class with custom inputs and recorded it in the screenshot
3. Ran unit tests successfully under `src/test/java/edu/neu/coe/info6205/union_find/UF_HWQUPC_Test.java` and recorded in the screenshot
4. With the output from custom inputs, plotted the chart and found the relationship between number of sites and the number of connections

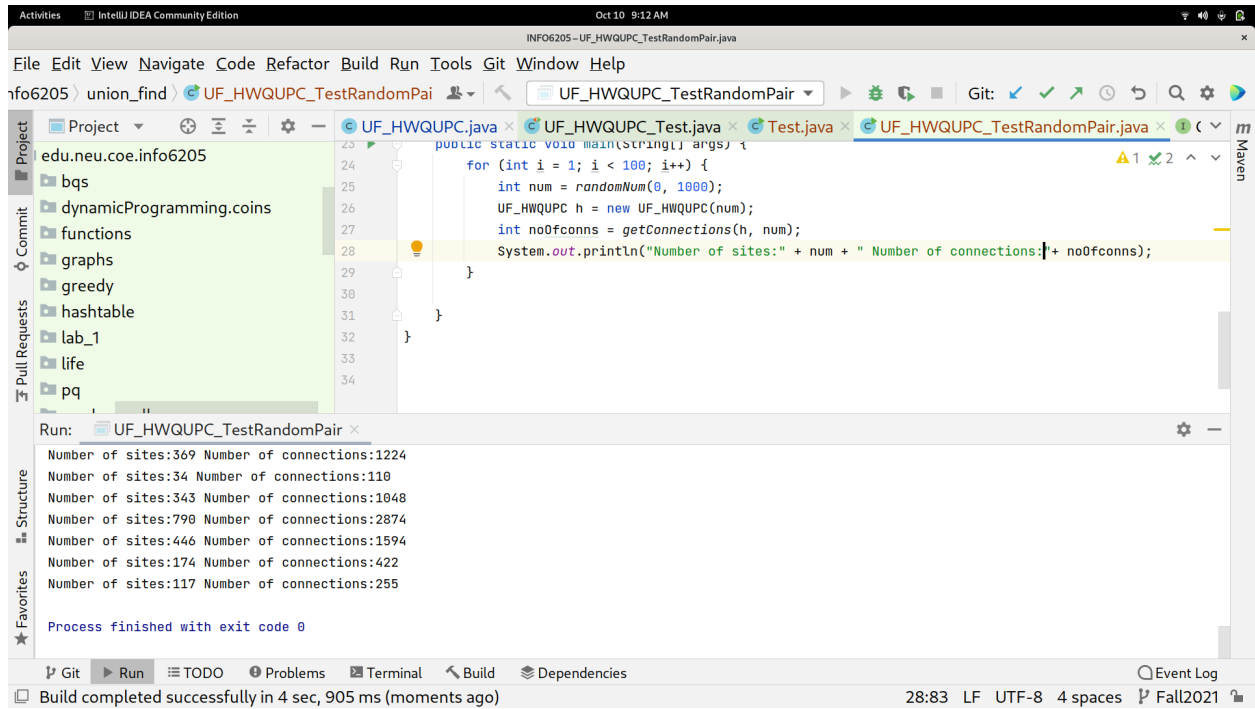
- **Relationship Conclusion: (For ex : $z = a * b$)**

- Considering the values of number of sites and number of connections. It is very clear that the relationship is linear, as the number of sites grows, the number of connections grow linearly.

- Evidence to support the conclusion:
1. Unit tests (Snapshot of Code output in the terminal)



2. Test UF_HWQUPC_TestRandomPair to find number of sites and the number of connections



The screenshot shows the IntelliJ IDEA interface with the following components:

- Project View:** edu.neu.coe.info6205
 - bqs
 - dynamicProgramming.coins
 - functions
 - graphs
 - greedy
 - hashtable
 - lab_1
 - life
 - pq
- Code Editor:** UF_HWQUPC_TestRandomPair.java


```
23 public static void main(String[] args) {  
24     for (int i = 1; i < 100; i++) {  
25         int num = randomNum(0, 1000);  
26         UF_HWQUPC h = new UF_HWQUPC(num);  
27         int noOfconns = getConnections(h, num);  
28         System.out.println("Number of sites:" + num + " Number of connections:" + noOfconns);  
29     }  
30 }  
31 }  
32 }  
33 }  
34 }
```
- Run Window:**
 - Run: UF_HWQUPC_TestRandomPair
 - Number of sites:369 Number of connections:1224
 - Number of sites:34 Number of connections:110
 - Number of sites:343 Number of connections:1048
 - Number of sites:790 Number of connections:2874
 - Number of sites:446 Number of connections:1594
 - Number of sites:174 Number of connections:422
 - Number of sites:117 Number of connections:255
 - Process finished with exit code 0
- Status Bar:** Build completed successfully in 4 sec, 905 ms (moments ago) | 28:83 LF UTF-8 4 spaces | Fall2021

3 .Graphical Representation(Observations from experiments should be tabulated and analyzed by plotting graphs(usually in excel) to arrive on the relationship conclusion)

