Program Structures and Algorithms Spring 2024

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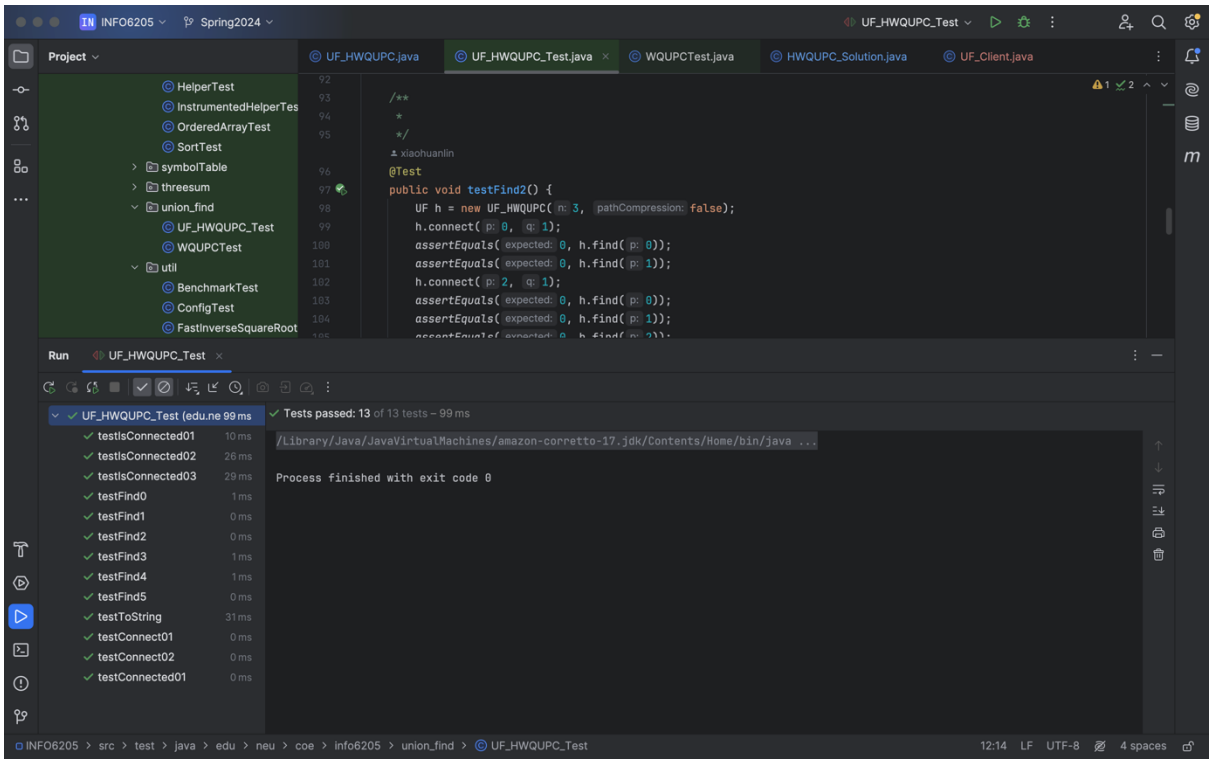
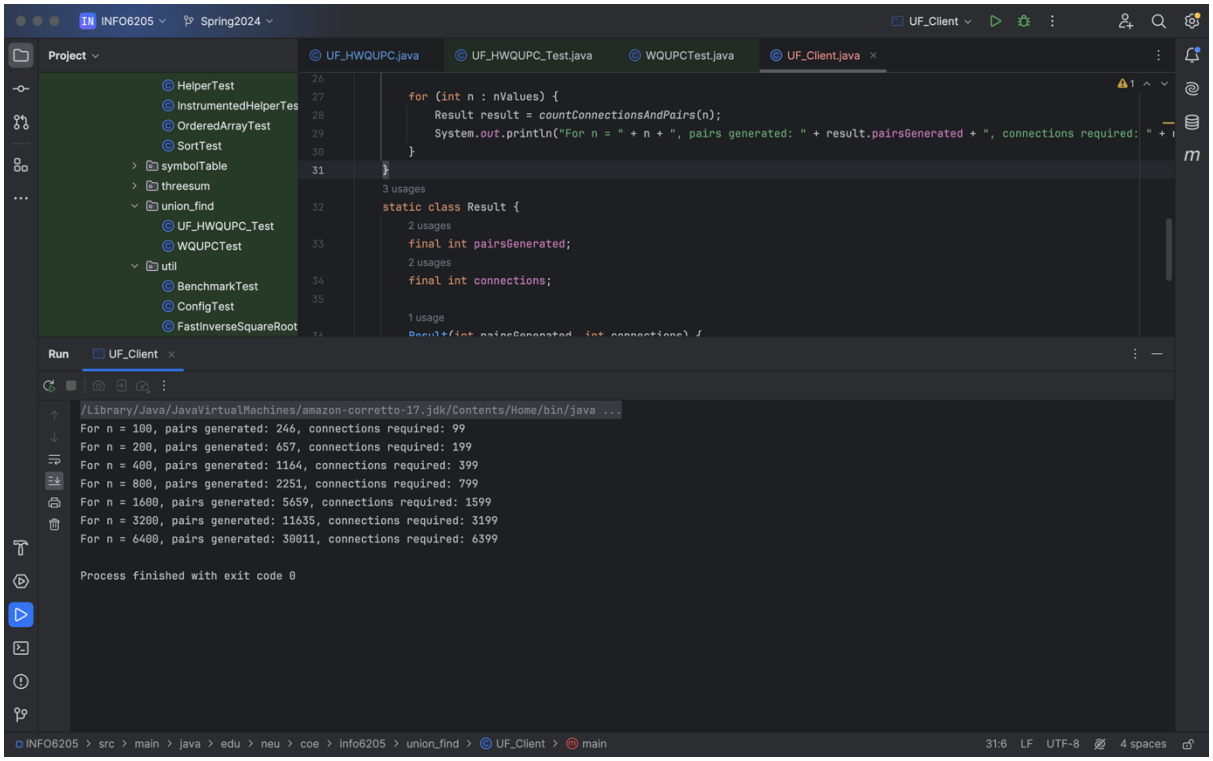
GITHUB LINK: https://github.com/ssaurabh760/INFO6205

Assignment 4:

Unit Test Screenshots



Screenshot for UF_Client.java



Observations:

For n = 100, pairs generated: 246, connections required: 99

For n = 200, pairs generated: 657, connections required: 199

For n = 400, pairs generated: 1164, connections required: 399

For n = 800, pairs generated: 2251, connections required: 799

For n = 1600, pairs generated: 5659, connections required: 1599

For n = 3200, pairs generated: 11635, connections required: 3199

For n = 6400, pairs generated: 30011, connections required: 6399

The observations depict an almost linear relationship between m and n generated to reduce the components from n to 1. The difference between the number of generated pairs and the actual connections (n-1) showcases the algorithm's efficiency in handling redundant checks without affecting the final outcome. The union-find algorithm, especially with path compression and height-weighting optimizations, efficiently manages to minimize the work done during each union operation.