

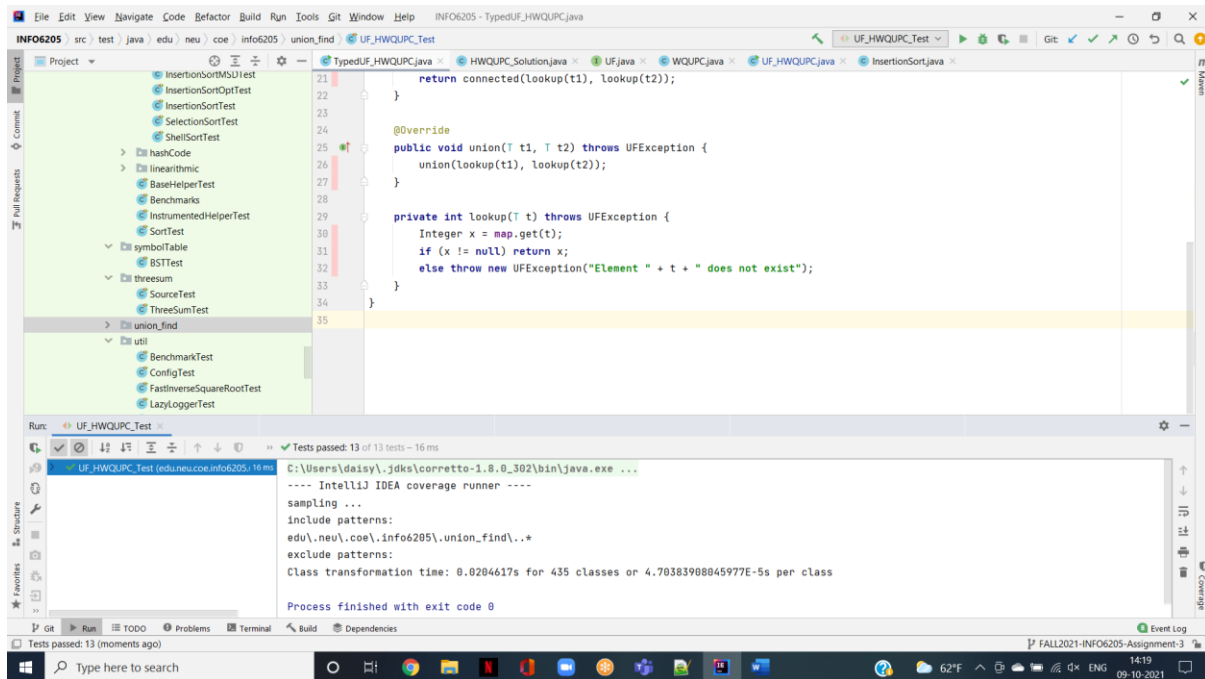
PSA Assignment 3

Submitted by Daisy Quadros (001568823)

Github repository

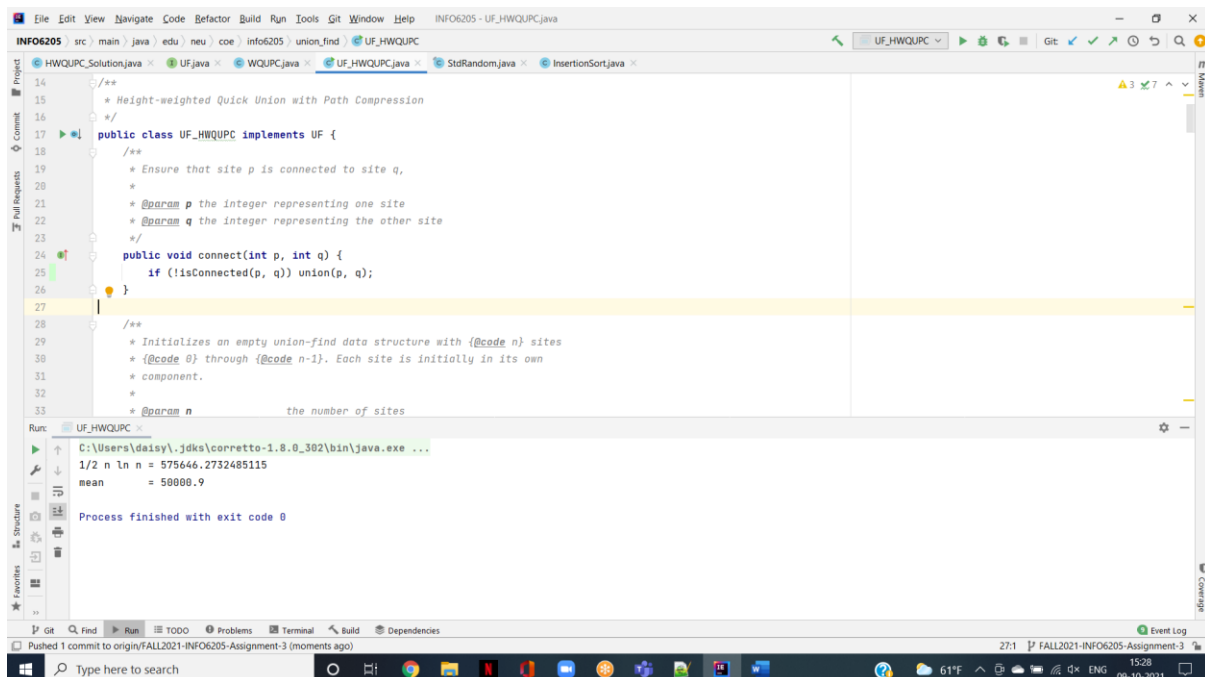
<https://github.com/daisyvquadros/INFO6205/tree/FALL2021-INFO6205-Assignment-3>

Test cases



```
File Edit View Navigate Code Refactor Build Run Tools Git Window Help INFO6205 - TypedUF_HWQUPC.java
INFO6205 src > test > java > edu > neu > coe > info6205 > union_find > UF_HWQUPC_Test
Project
  InsertionSortMajTest
  InsertionSortOptTest
  InsertionSortTest
  SelectionSortTest
  ShellSortTest
  hashCode
  linearithmic
  BaseHelperTest
  Benchmarks
  InstrumentedHelperTest
  SortTest
  symbolTable
  BSTTest
  threesum
  SourceTest
  ThreeSumTest
  union_find
    util
      BenchmarkTest
      ConfigTest
      FastInverseSquareRootTest
      LazyLoggerTest
  TypedUF_HWQUPC.java
  HWQUPC_Solution.java
  UF.java
  WQUPC.java
  UF_HWQUPC.java
  InsertionSort.java
  TypedUF_HWQUPC.java
21      return connected(lookup(t1), lookup(t2));
22    }
23  }
24
25  @Override
26  public void union(T t1, T t2) throws UFException {
27    union(lookup(t1), lookup(t2));
28  }
29
30  private int lookup(T t) throws UFException {
31    Integer x = map.get(t);
32    if (x != null) return x;
33    else throw new UFException("Element " + t + " does not exist");
34  }
35
Run: UF_HWQUPC_Test
Tests passed: 13 of 13 tests - 16 ms
C:\Users\daisy\jdk\corretto-1.8.0_302\bin\java.exe ...
---- IntelliJ IDEA coverage runner ----
sampling ...
include patterns:
edu\neu\coe\info6205\union_find\.*
exclude patterns:
Class transformation time: 0.0204617s for 435 classes or 4.70383988045977E-5s per class
Process finished with exit code 0
Tests passed: 13 (moments ago)
```

Average obtained after N trials



```
File Edit View Navigate Code Refactor Build Run Tools Git Window Help INFO6205 - UF_HWQUPC.java
INFO6205 src > main > java > edu > neu > coe > info6205 > union_find > UF_HWQUPC
Project
  HWQUPC_Solution.java
  UF.java
  WQUPC.java
  UF_HWQUPC.java
  StdRandom.java
  InsertionSort.java
  UF_HWQUPC.java
14  /**
15   * Height-weighted Quick Union with Path Compression
16   */
17  public class UF_HWQUPC implements UF {
18    /**
19     * Ensure that site p is connected to site q,
20     *
21     * @param p the integer representing one site
22     * @param q the integer representing the other site
23     */
24    public void connect(int p, int q) {
25      if (!isConnected(p, q)) union(p, q);
26    }
27
28    /**
29     * Initializes an empty union-find data structure with {@code n} sites
30     * {@code 0} through {@code n-1}. Each site is initially in its own
31     * component.
32     *
33     * @param n the number of sites
34     */
35
Run: UF_HWQUPC
C:\Users\daisy\jdk\corretto-1.8.0_302\bin\java.exe ...
1/2 n ln n = 575646.2732485115
mean = 50000.9
Process finished with exit code 0
Pushed 1 commit to origin/FALL2021-INFO6205-Assignment-3 (moments ago)
```

Analysis – I conducted the experiment over a batch of 100000 elements and 10000 trials and got a mean of about 50000 which is approximately near to $0.5 * n \log(n)$