

Assignment 4 (WQUPC)

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Due Saturday by 11:59pm **Points** 50 **Submitting** a website url or a file upload

Your task is

Step 1:

(a) **Implement height-weighted Quick Union with Path Compression.** For this, you will flesh out the class UF_HWQUPC. All you have to do is to fill in the sections marked with `// TO BE IMPLEMENTED ... //` ...END IMPLEMENTATION.

(b) Check that the unit tests for this class all work. You must show "green" test results in your submission (screenshot is OK).

Step 2:

Using your implementation of UF_HWQUPC, develop a **UF ("union-find") client** that takes an integer **value n** from the command line to determine the number of "sites." Then generates random pairs of integers between 0 and $n-1$, calling **connected()** to determine if they are **connected** and **union()** if not. Loop until all sites are connected then print the number of connections generated. Package your program as **a static method count()** that takes n as the argument and returns the number of connections; and a **main()** that takes n from the command line, calls count() and prints the returned value. If you prefer, you can create a main program that doesn't require any input and runs the experiment for a fixed set of n values. Show evidence of your run(s).

Step 3:

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). Justify your conclusion in terms of your observations and what you think might be going on.

NOTE: although I'm not going to tell you in advance what the relationship is, I can assure you that it is a *simple* relationship.

Don't forget to follow the submission guidelines. And to use sufficient (and sufficiently large) different values of n .