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INFO 6205
Program Structures & Algorithms
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Assignment 3

Task

Implement height-weighted Quick Union with Path Compression. 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).

Evidence

Execution of UF_HWQUPC code using various values of components (N) and comparing output for average number of pairs (m) and calculation from formula (0.5 * N * ln N), respectively.

N	m	0.5 * N * ln(N)
100000	642493	575646.27
200000	1155653	1220607.26
500000	2996830	3280590.84
800000	5555550	5436946.80
1000000	6989894	6907755.28

Figure 1 : Output from UF_HWQUC code

Conclusion

Number of pairs (m) to reduce the number of components from N to 1 is converges to:

$$\frac{1}{2} \times N \times \ln N$$

Screenshots

Figure 2: Execution of Unit Tests