Program Structures and Algorithms

Summer I 2023(SEC – 1)

Assignment-4 (HWQUPC)

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**Task:**

* **Implement height-weighted Quick Union with Path Compression.**
* **Implement static method count () that takes n as the argument and returns the number of connections.**
* **Determine the relationship between the number of objects (n) and the number of pairs (m) generated.**
* **Plot graph for graphical representation of relationship between n and m.**

**Relationship Conclusion:**

After conducting multiple experiments on different numbers of objects (n), it has been observed that the number of pairs generated (m) to accomplish the task of reducing the number of components from n to 1 in the height-weighted Quick Union with Path Compression is approximately 1/2 \* n \* LN(n).

**m ~ 1/2 \* n \* LN(n)**

The algorithm repeatedly executes union operations until all n items are connected to a single component.

To perform this connection, total no of pairs generated can be calculated as roughly 1/2 \* n \* LN(n).

And the below graph representation also supports this relationship.

**Evidence to support that conclusion:**

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**Graphical Representation:**

**Screenshots of runs and Unit Test:**

**A screenshot of a computer program

Description automatically generated with medium confidence**

**A screenshot of a computer

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