Siddhartha (001084614) | Program Structures & Algorithms Spring 2021 Assignment No. 3

TASK: Implement height-weighted Quick Union with Path Compression and determine the relationship between the number of objects (*n*) and the number of pairs (*m*) generated

OUTPUT:


```
<terminated> UF_HWQUPC [Java Application] /Library/Internet Plug-Ins/JavaAppletPlugin.plugin/Contents/Home/bin/java  (Feb 13, 2021, 6:10:31 PM – 6:10:32 PM)
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 1359 - 1268
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 1620 - 1298
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 1573 - 2048
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 1768 - 2536
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 25 - 4858
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 6078 - 675
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 1013 - 329
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 3709 - 4209
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 3716 - 3506
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 6084 - 1106
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 4647 - 6209
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 5276 - 4941
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC count
INFO: Connecting 2311 - 5816
Feb 13, 2021 6:10:32 PM edu.neu.coe.info6205.union_find.UF_HWQUPC main
INFO: Result ----- N : 6400 | connections : 36916
```

Relationship Conclusion:

M ~ N^1.2

Evidence to support the conclusion:

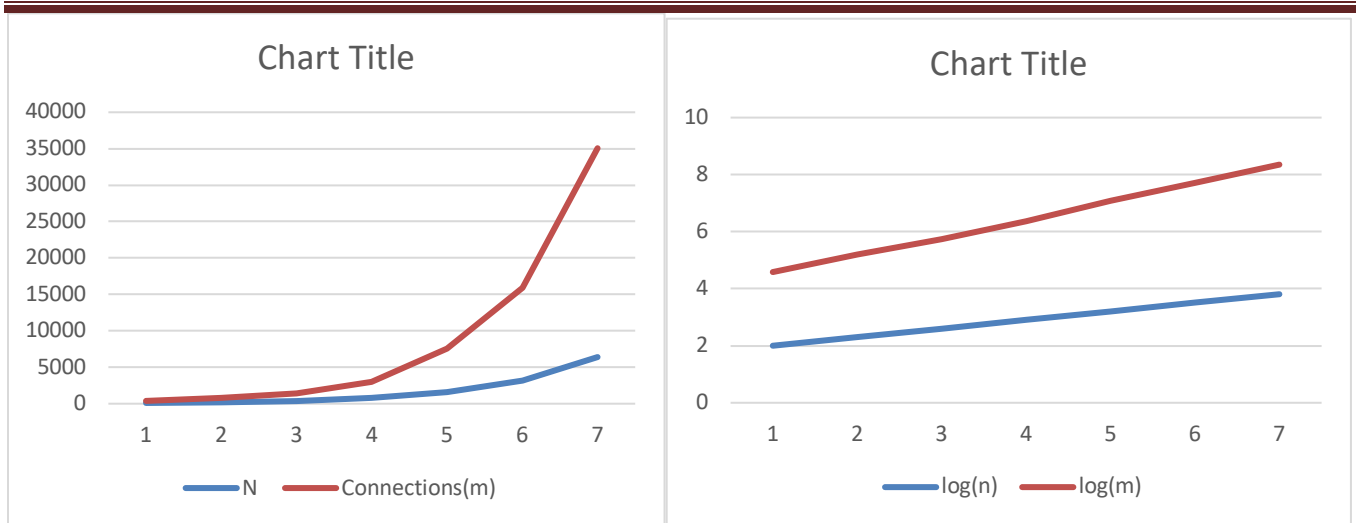1) The program was executed for 7 different values of N and the following data was gathered

N	Connections(m)	log(n)	log(m)	Log(m)/Log(n)
100	383	2	2.58319877	1.291599387
200	802	2.30103	2.90417437	1.2621193
400	1389	2.60205999	3.14270225	1.207774708
800	2977	2.90308999	3.47377883	1.1965798
1600	7543	3.20411998	3.87754411	1.210174441
3200	15867	3.50514998	4.20049482	1.198378057
6400	35064	3.80617997	4.54486146	1.194074239

2) Average of Log(m)/Log(n) was calculated to be 1.22295713316213

Graphical representation:

Unit tests result: