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Program Structures & Algorithms

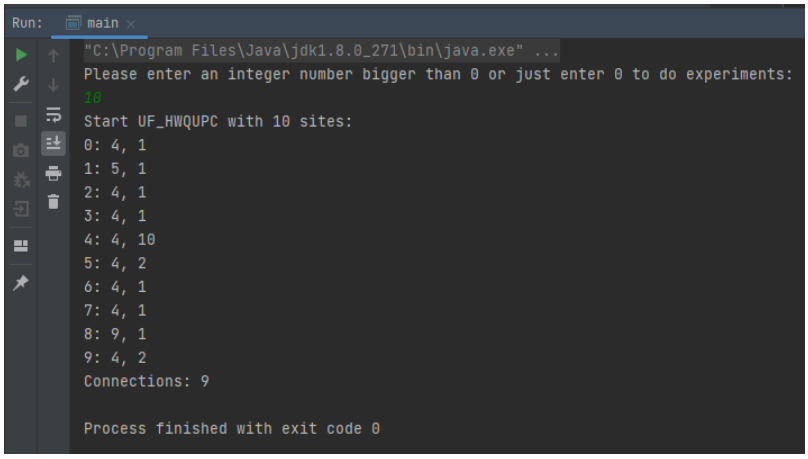
Assignment NO.3

1. Task

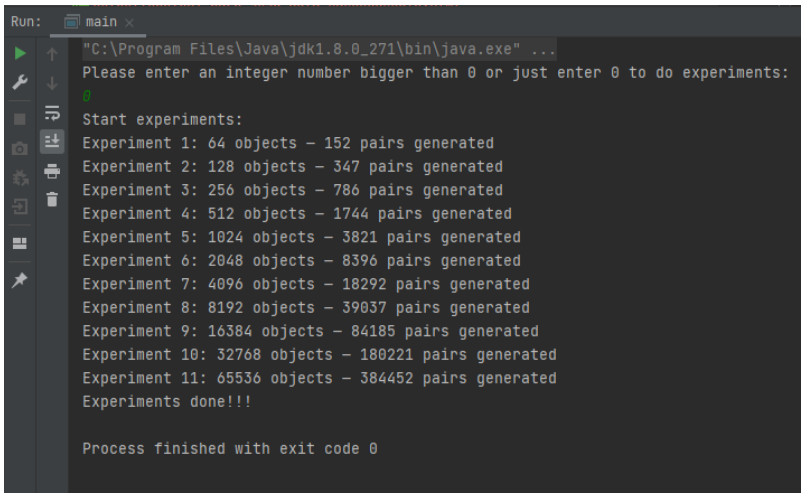
- Implement height-weighted Quick Union with Path Compression in the class called UF_HWQUPC.
- Develop a UF client using UF_HWQUPC by requirements.
- Determine the relationship between the number of objects (n) and the number of pairs (m) from those experiments.

2. Output

- Take an integer value from command line to do a UF_HWQUPC:



- Doing experiments (n from 64 to 65536) and 1000-times running of each n:

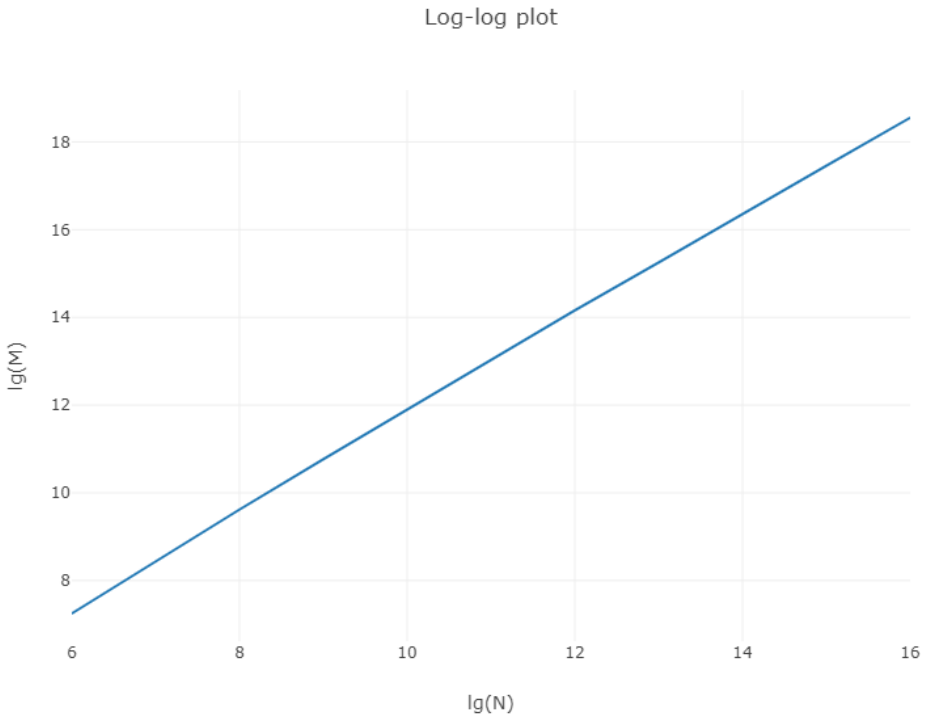


3. Relationship Conclusion

$$N \propto M$$

4. Evidence to support the conclusion:

- Chart



- Table

lg(N)	lg(M)	N	M
6	7.247928	64	152
7	8.438792	128	347
8	9.618386	256	786
9	10.76818	512	1744
10	11.89973	1024	3821
11	13.03549	2048	8396
12	14.15893	4096	18292
13	15.25255	8192	39037
14	16.36128	16384	84185
15	17.45941	32768	180221
16	18.55244	65536	384452

As chart and table shown above, the slope of line in log-log plot and results in table indicate that N has a linear relationship with M.

5. Unit test result