**INFO 6205 – Assignment 4**


**Union Find Algorithm**


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## Quick Union with Depth

Refer to WeightQuickUnionHeight.java class

Benchmarks

2021-02-27 18:40:51 INFO  Benchmark_Timer - Begin run: input size: 16000 with 100 runs

9.28

2021-02-27 18:40:52 INFO  Benchmark_Timer - Begin run: input size: 32000 with 100 runs

20.05

2021-02-27 18:40:54 INFO  Benchmark_Timer - Begin run: input size: 64000 with 100 runs

43.79

2021-02-27 18:40:59 INFO  Benchmark_Timer - Begin run: input size: 128000 with 100 runs

99.86

2021-02-27 18:41:10 INFO  Benchmark_Timer - Begin run: input size: 256000 with 100 runs

231.1

## Quick Union with Path Compression – Intermediate Node to Root Connection

Refer to WeightQuickUnionWithPathCompression.java class

Benchmarks

2021-02-27 18:40:44 INFO  Benchmark_Timer - Begin run: input size: 16000 with 100 runs

7.63

2021-02-27 18:40:45 INFO  Benchmark_Timer - Begin run: input size: 32000 with 100 runs

8.35

2021-02-27 18:40:46 INFO  Benchmark_Timer - Begin run: input size: 64000 with 100 runs

9.36

2021-02-27 18:40:47 INFO  Benchmark_Timer - Begin run: input size: 128000 with 100 runs

14.22

2021-02-27 18:40:49 INFO  Benchmark_Timer - Begin run: input size: 256000 with 100 runs

21.38

# Quick Union with Path Compression – Assignment 3 Implementation

Refer to UF_HWQUPC.java class

Benchmarks

2021-02-27 18:41:36 INFO  Benchmark_Timer - Begin run: input size: 16000 with 100 runs

8.52

2021-02-27 18:41:37 INFO  Benchmark_Timer - Begin run: input size: 32000 with 100 runs

17.86

2021-02-27 18:41:39 INFO  Benchmark_Timer - Begin run: input size: 64000 with 100 runs

38.81

2021-02-27 18:41:43 INFO  Benchmark_Timer - Begin run: input size: 128000 with 100 runs
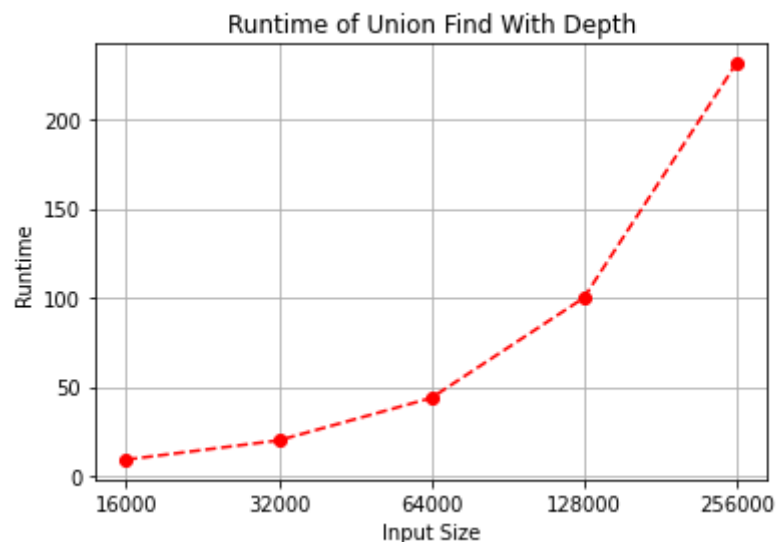
84.17

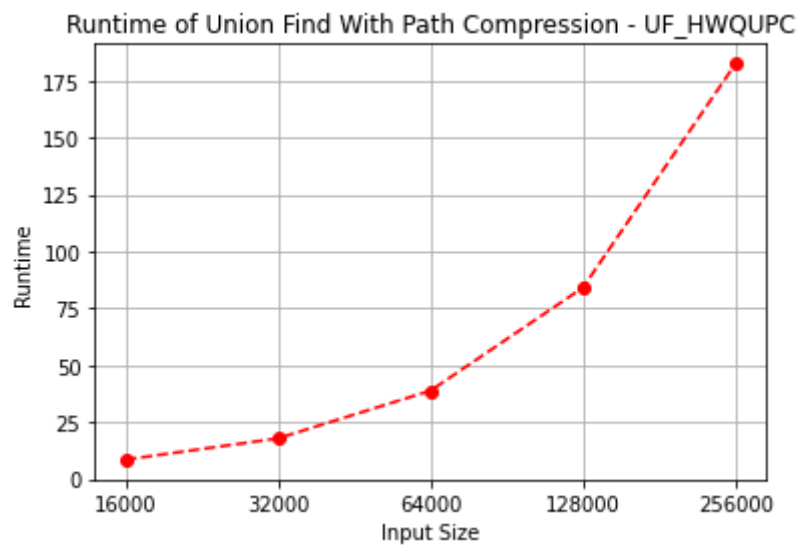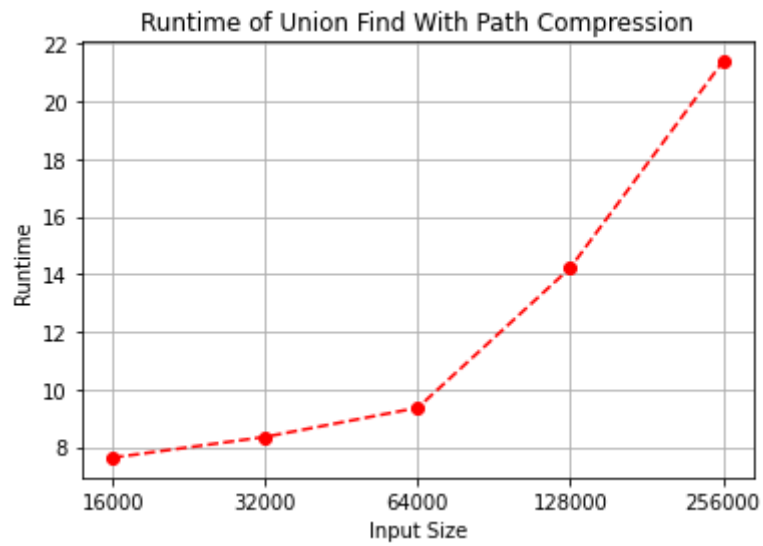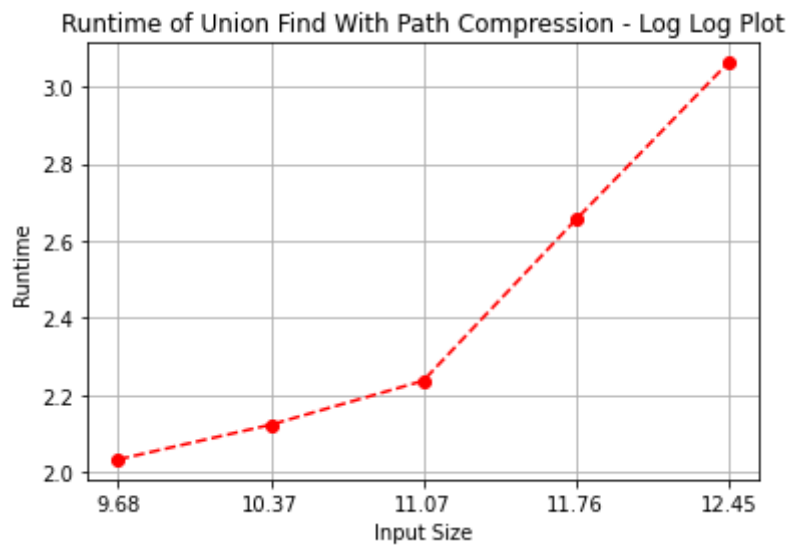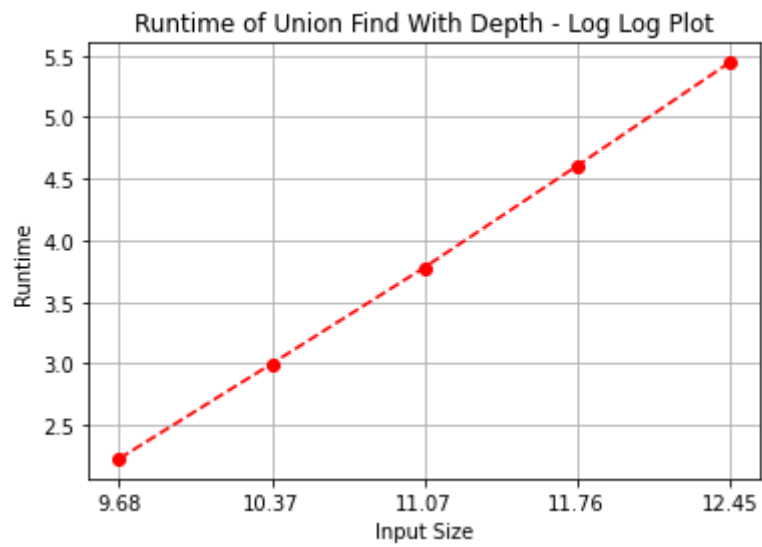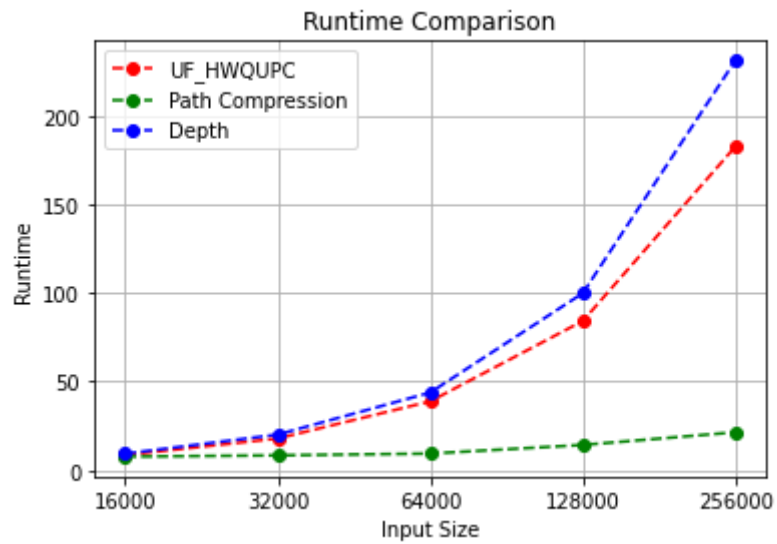2021-02-27 18:41:52 INFO  Benchmark_Timer - Begin run: input size: 256000 with 100 runs

182.57

# Runtime of Weighted Quick Union with Depth

Runtime of weighted quick union with depth will be higher than the other algorithms in question as it deals with a larger tree. This is proven in the benchmarks run in the next section.

# Graphs

Runtime of Union Find With Path Compression



Runtime of Union Find With Path Compression - UF_HWQUPC

## Runtime Comparison



## Runtime of Union Find With Depth - Log Log Plot



## Runtime of Union Find With Path Compression - Log Log Plot

Runtime of Union Find With Path Compression - UF_HWQUPC - Log Log Plot



Runtime Comparison - Log Log Plot