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**INFO – 6205 Section 6**

**Task: –** Benchmarking the performance insertion sort algorithm for varied ordering of array i.e., Random Ordered, Ordered, Partially Ordered and Reverse ordered array.

**Output: -**

A screenshot of a computer

Description automatically generated

2021-12-04 18:52:55 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 200 Order Type- Random Time Taken: 0.5

2021-12-04 18:52:55 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 400 Order Type- Random Time Taken: 0.4

2021-12-04 18:52:55 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 800 Order Type- Random Time Taken: 0.7

2021-12-04 18:52:55 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 1600 Order Type- Random Time Taken: 1.9

2021-12-04 18:52:55 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 3200 Order Type- Random Time Taken: 9.1

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 6400 Order Type- Random Time Taken: 40.9

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2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 200 Order Type- Ordered Time Taken: 0.1

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 400 Order Type- Ordered Time Taken: 0.2

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 800 Order Type- Ordered Time Taken: 0.3

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 1600 Order Type- Ordered Time Taken: 0.4

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 3200 Order Type- Ordered Time Taken: 2.3

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 6400 Order Type- Ordered Time Taken: 5.4

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2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 200 Order Type- Partially Ordered Time Taken: 0.1

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 400 Order Type- Partially Ordered Time Taken: 0.3

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 800 Order Type- Partially Ordered Time Taken: 0.8

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 1600 Order Type- Partially Ordered Time Taken: 2.2

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 3200 Order Type- Partially Ordered Time Taken: 7.9

2021-12-04 18:52:56 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 6400 Order Type- Partially Ordered Time Taken: 18.6

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2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 200 Order Type- Reverse Time Taken: 0.2

2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 400 Order Type- Reverse Time Taken: 0.4

2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 800 Order Type- Reverse Time Taken: 1.4

2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 1600 Order Type- Reverse Time Taken: 6.2

2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 3200 Order Type- Reverse Time Taken: 21.6

2021-12-04 18:52:57 INFO Benchmark\_Timer - Begin run: Benchmark Test with 10 runs

Value of N: 6400 Order Type- Reverse Time Taken: 57.9

Process finished with exit code 0

**Conclusion: –**

As observed from the output we can conclude that,

* In the case of ordered array, time taken for insertion sort to perform sorting is linear and constant with respect to the size of the array i.e., O(N).
* In the average case, i.e., (Partially Ordered Array or Randomly Ordered Array) insertion sort run in O(n2) time.
* In the worst case, where there are to be made n-1 comparisons and perform n-1 swaps the time taken to sort the array is n2.

Therefore, performance of insertion sort is as follows,

Ordered Array < Partial Ordered Array < Randomly Ordered Array < Reverse Ordered Array

**Graphical Representation: -**

**Test Cases: -**

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated with medium confidence