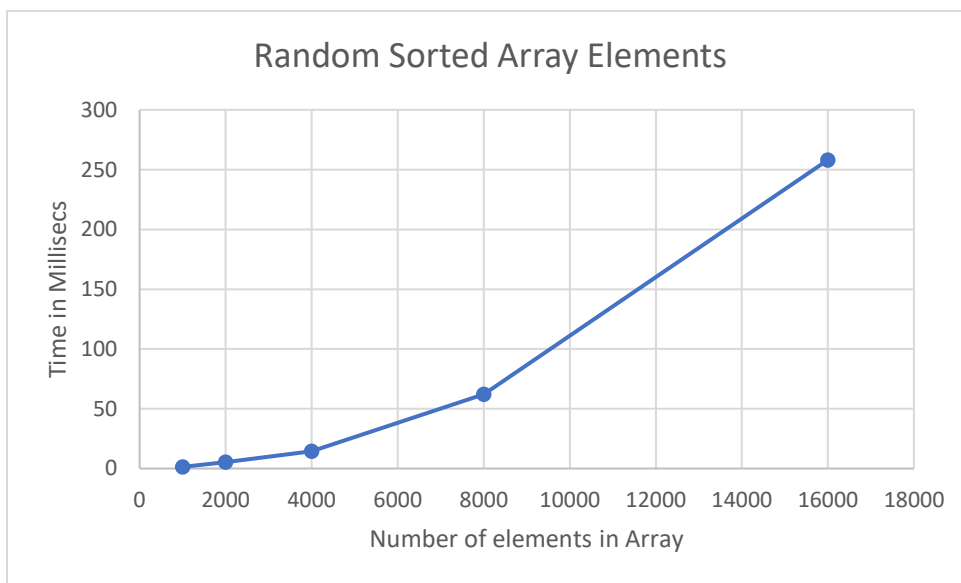


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ASSIGNMENT 2: HIRAL RAJESH NAGDA (001560027)

Random Array elements

```
Run: Assignment2 x
C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
Benchmarking InsertionSort for random array elements:
2021-09-25 20:34:17 INFO Benchmark_Timer - Begin run: Insertion sort for 1000 Integers with 100 runs
1.39ms
2021-09-25 20:34:17 INFO Benchmark_Timer - Begin run: Insertion sort for 2000 Integers with 100 runs
5.38ms
2021-09-25 20:34:18 INFO Benchmark_Timer - Begin run: Insertion sort for 4000 Integers with 100 runs
14.53ms
2021-09-25 20:34:19 INFO Benchmark_Timer - Begin run: Insertion sort for 8000 Integers with 100 runs
62.11ms
2021-09-25 20:34:26 INFO Benchmark_Timer - Begin run: Insertion sort for 16000 Integers with 100 runs
258.13ms

Process finished with exit code 0
```



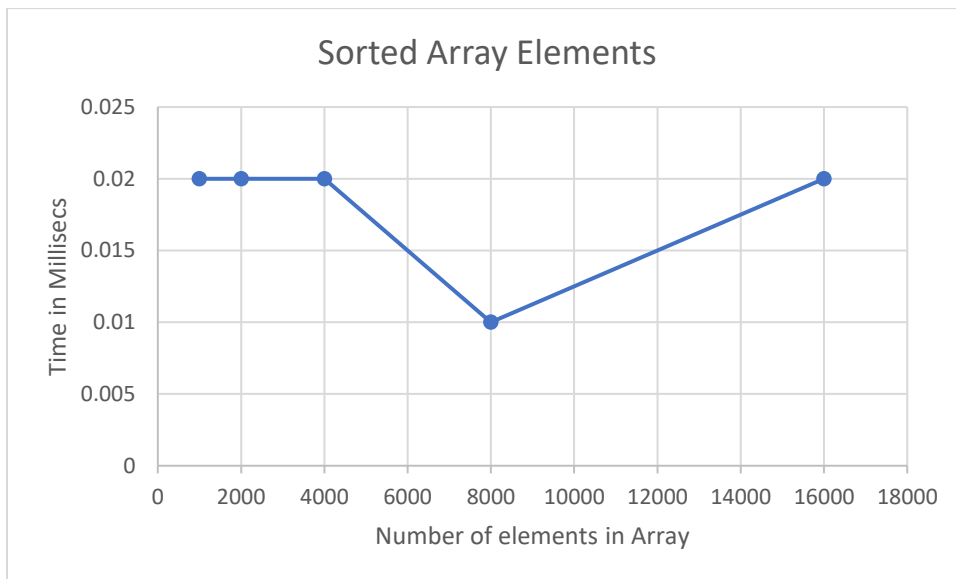
For random elements in array elements, after running insertion sort on the array, it shows $O(N^2)$ time complexity, this result is as expected for random elements

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ASSIGNMENT 2: HIRAL RAJESH NAGDA (001560027)

Sorted array elements

```
Run: Assignment2 x
C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
Benchmarking InsertionSort for sorted array elements:
2021-09-26 12:53:39 INFO Benchmark_Timer - Begin run: Insertion sort for 1000 Integers with 100 runs
0.02ms
2021-09-26 12:53:39 INFO Benchmark_Timer - Begin run: Insertion sort for 2000 Integers with 100 runs
0.02ms
2021-09-26 12:53:39 INFO Benchmark_Timer - Begin run: Insertion sort for 4000 Integers with 100 runs
0.02ms
2021-09-26 12:53:39 INFO Benchmark_Timer - Begin run: Insertion sort for 8000 Integers with 100 runs
0.01ms
2021-09-26 12:53:39 INFO Benchmark_Timer - Begin run: Insertion sort for 16000 Integers with 100 runs
0.02ms

Process finished with exit code 0
```



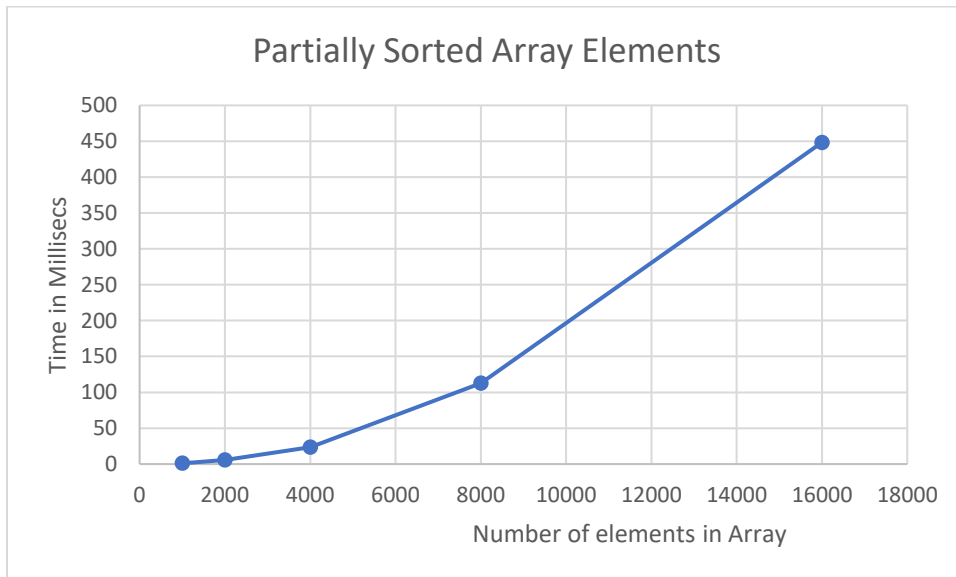
For sorted elements in array elements, after running insertion sort on the array, it shows approximately $O(N)$ time complexity, this is as expected for sorted elements

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ASSIGNMENT 2: HIRAL RAJESH NAGDA (001560027)

Partially sorted array elements

```
Run: Assignment2 x
C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
Benchmarking InsertionSort for partially sorted array elements:
2021-09-26 12:49:35 INFO Benchmark_Timer - Begin run: Insertion sort for 1000 Integers with 100 runs
1.07ms
2021-09-26 12:49:35 INFO Benchmark_Timer - Begin run: Insertion sort for 2000 Integers with 100 runs
5.68ms
2021-09-26 12:49:36 INFO Benchmark_Timer - Begin run: Insertion sort for 4000 Integers with 100 runs
23.49ms
2021-09-26 12:49:39 INFO Benchmark_Timer - Begin run: Insertion sort for 8000 Integers with 100 runs
112.82ms
2021-09-26 12:49:51 INFO Benchmark_Timer - Begin run: Insertion sort for 16000 Integers with 100 runs
448.39ms

Process finished with exit code 0
```



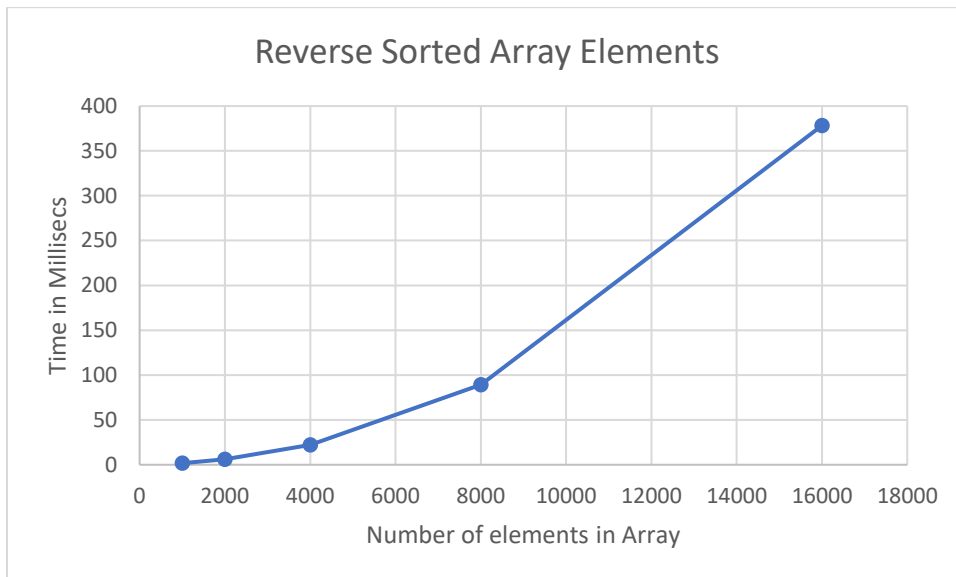
For partially sorted elements in array elements, after running insertion sort on the array, it shows $O(N^2)$ time complexity. This result is as expected for partially sorted elements

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ASSIGNMENT 2: HIRAL RAJESH NAGDA (001560027)

Reverse sorted array elements

```
Run: Assignment2 x
C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
Benchmarking InsertionSort for reverse sorted array elements:
2021-09-26 12:43:10 INFO Benchmark_Timer - Begin run: Insertion sort for 1000 Integers with 100 runs
1.72ms
2021-09-26 12:43:11 INFO Benchmark_Timer - Begin run: Insertion sort for 2000 Integers with 100 runs
5.96ms
2021-09-26 12:43:11 INFO Benchmark_Timer - Begin run: Insertion sort for 4000 Integers with 100 runs
22.06ms
2021-09-26 12:43:14 INFO Benchmark_Timer - Begin run: Insertion sort for 8000 Integers with 100 runs
89.07ms
2021-09-26 12:43:23 INFO Benchmark_Timer - Begin run: Insertion sort for 16000 Integers with 100 runs
378.22ms

Process finished with exit code 0
```



For reverse sorted elements in array elements, after running insertion sort on the array, it shows $O(N^2)$ time complexity. This result is as expected for partially sorted elements

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ASSIGNMENT 2: HIRAL RAJESH NAGDA (001560027)

Test Cases run on InsertionSortTest.java

```
Run: InsertionSortTest x
>> Tests passed: 6 of 6 tests - 110 ms

InsertionSortTest (edu.neu.coe 110 ms)
  testMutatingInsertionSort 100 ms
  sort0 0 ms
  sort1 0 ms
  sort2 10 ms
  sort3 0 ms
  testStaticInsertionSort 0 ms

C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
2021-09-26 14:36:16 DEBUG Config - Config.get(helper, instrument) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(helper, seed) = 0
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, copies) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, swaps) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, compares) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, inversions) = 1
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, fixes) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(instrumenting, hits) = true
2021-09-26 14:36:16 DEBUG Config - Config.get(helper, cutoff) =
Helper for InsertionSort with 4 elements
StatPack {hits: 9,880; copies: 0; inversions: 2,421; swaps: 2,421; fixes: 2,421; compares: 2,519}
StatPack {hits: 19,800; copies: 0; inversions: 4,950; swaps: 4,950; fixes: 4,950; compares: 4,950}

Tests passed: 6
Process finished with exit code 0

Git Run TODO Problems Terminal Build Dependencies
Tests passed: 6 (moments ago) 20:1 CRLF UTF-8 4 spaces Fall2021 3 Δ/up-to-date Blame: UrviAr
```

Test Cases run on BenchmarkTest.java

```
Run: BenchmarkTest x
>> Tests passed: 2 of 2 tests - 1 sec 464 ms

BenchmarkTest (edu.neu.coe 1 sec 464 ms)
  testWaitPeriods 1 sec 464 ms
  getWarmupRuns 0 ms

C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...
2021-09-26 14:34:51 INFO Benchmark_Timer - Begin run: testWaitPeriods with 2 runs

Tests passed: 2
Process finished with exit code 0

Git Run TODO Problems Terminal Build Dependencies
Tests passed: 2 (moments ago) 12:14 CRLF UTF-8 4 spaces Fall2021 3 Δ/up-to-d
```

Test Cases on TimerTest.java

```
Run: TimerTest x
>> Tests passed: 10 of 10 tests - 2 sec 577 ms

TimerTest (edu.neu.coe.in 2 sec 577 ms)
  testPauseAndLapResume0 200 ms
  testPauseAndLapResume1 320 ms
  testLap 209 ms
  testPause 210 ms
  testStop 111 ms
  testMillisecs 102 ms
  testRepeat1 175 ms
  testRepeat2 263 ms
  testRepeat3 885 ms
  testPauseAndLap 102 ms

C:\Users\hiral\Downloads\openjdk-14+36_windows-x64_bin\jdk-14\bin\java.exe ...

Tests passed: 10
Process finished with exit code 0

Git Run TODO Problems Terminal Build Dependencies
Tests passed: 10 (a minute ago) 137:35 CRLF UTF-8
```