```
1 /Users/Aashay/Library/Java/JavaVirtualMachines/
  openjdk-19.0.2/Contents/Home/bin/java -javaagent:/
  Applications/IntelliJ IDEA CE.app/Contents/lib/
  idea_rt.jar=61736:/Applications/IntelliJ IDEA CE.
  app/Contents/bin -Dfile.encoding=UTF-8 -Dsun.stdout
  .encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -
  classpath /Users/Aashay/Desktop/Spring2023/PSA/
  INFO6205/target/classes:/Users/Aashay/.m2/
  repository/com/phasmidsoftware/args_2.13/1.0.3/
  args_2.13-1.0.3.jar:/Users/Aashay/.m2/repository/
  org/scala-lang/scala-library/2.13.7/scala-library-2
  .13.7.jar:/Users/Aashay/.m2/repository/org/scala-
  lang/modules/scala-parser-combinators_2.13/1.1.2/
  scala-parser-combinators_2.13-1.1.2.jar:/Users/
  Aashay/.m2/repository/org/apache/logging/log4j/
  log4j-api/2.19.0/log4j-api-2.19.0.jar:/Users/Aashay
  /.m2/repository/log4j/log4j/1.2.17/log4j-1.2.17.jar
  :/Users/Aashay/.m2/repository/com/google/guava/
  guava/31.1-jre/guava-31.1-jre.jar:/Users/Aashay/.m2
  /repository/com/google/guava/failureaccess/1.0.1/
  failureaccess-1.0.1.jar:/Users/Aashay/.m2/
  repository/com/google/guava/listenablefuture/9999.0
  -empty-to-avoid-conflict-with-guava/
  listenablefuture-9999.0-empty-to-avoid-conflict-
  with-guava.jar:/Users/Aashay/.m2/repository/com/
  google/code/findbugs/jsr305/3.0.2/jsr305-3.0.2.jar
  :/Users/Aashay/.m2/repository/org/checkerframework/
  checker-qual/3.12.0/checker-qual-3.12.0.jar:/Users/
  Aashay/.m2/repository/com/google/errorprone/
  error_prone_annotations/2.11.0/
  error_prone_annotations-2.11.0.jar:/Users/Aashay/.
  m2/repository/com/google/j2objc/j2objc-annotations/
  1.3/j2objc-annotations-1.3.jar:/Users/Aashay/.m2/
  repository/org/ini4j/ini4j/0.5.4/ini4j-0.5.4.jar
  edu.neu.coe.info6205.sort.elementary.HeapSort
2 2023-03-12 00:11:26 INFO  Benchmark_Timer - Begin
  run: Sorting with with 20 runs
3 When array size is: 10000
4 Compares: 5611727
5 Swaps: 3010268
6 hits: 23264526
```

```
 7  Time: 94.40959375
 8
 9
10
11  2023-03-12 00:11:28 INFO  Benchmark_Timer - Begin
    run: Sorting with with 20 runs
12  When array size is: 15000
13  Compares: 8800507
14  Swaps: 4703879
15  hits: 36416530
16  Time: 243.01139374999997
17
18
19
20  2023-03-12 00:11:34 INFO  Benchmark_Timer - Begin
    run: Sorting with with 20 runs
21  When array size is: 20000
22  Compares: 12151730
23  Swaps: 6485735
24  hits: 50246400
25  Time: 441.14744375
26
27
28
29  2023-03-12 00:11:44 INFO  Benchmark_Timer - Begin
    run: Sorting with with 20 runs
30  When array size is: 25000
31  Compares: 15570033
32  Swaps: 8299906
33  hits: 64339690
34  Time: 718.4170895999999
35
36
37
38  2023-03-12 00:12:01 INFO  Benchmark_Timer - Begin
    run: Sorting with with 20 runs
39  When array size is: 30000
40  Compares: 18988895
41  Swaps: 10115916
42  hits: 78441454
43  Time: 1063.9407292
```

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44
45
46
47 2023-03-12 00:12:26 INFO  Benchmark_Timer - Begin
   run: Sorting with with 20 runs
48 When array size is: 35000
49 Compares: 22511275
50 Swaps: 11980529
51 hits: 92944666
52 Time: 1483.8479604
53
54
55
56 2023-03-12 00:13:02 INFO  Benchmark_Timer - Begin
   run: Sorting with with 20 runs
57 When array size is: 40000
58 Compares: 26156587
59 Swaps: 13911666
60 hits: 107959838
61 Time: 2010.09175
62
63
64
65 2023-03-12 00:13:49 INFO  Benchmark_Timer - Begin
   run: Sorting with with 20 runs
66 When array size is: 45000
67 Compares: 29806277
68 Swaps: 15841682
69 hits: 122979282
70 Time: 2567.50754585
71
72
73
74 2023-03-12 00:14:49 INFO  Benchmark_Timer - Begin
   run: Sorting with with 20 runs
75 When array size is: 50000
76 Compares: 33454357
77 Swaps: 17773461
78 hits: 138002558
79 Time: 3192.4183333499996
80
```

```
81
82
83 2023-03-12 00:16:04 INFO  Benchmark_Timer - Begin
   run: Sorting with with 20 runs
84 When array size is: 55000
85 Compares: 37108428
86 Swaps: 19705178
87 hits: 153037568
88 Time: 3936.2655895999997
89
90
91
92
93 Process finished with exit code 0
94
```