Activity 1. Factor 1: Problem size

|  |  |
| --- | --- |
| **N** | **A1 (Python)** |
| 10000 | 2942 ms |
| 20000 | 10324 ms |
| 40000 | 41350 ms |
| 80000 | Oot |
| 160000 | Oot |
| 320000 | Oot |
| 64000 | Oot |

Activity 2. Factor 2: computer performance

|  |  |  |
| --- | --- | --- |
| **N** | **A1 (Python) (computer 1)** | **A1 (Python) (computer 2)** |
| 10000 | 2942 ms | 4377 ms |
| 20000 | 10324 ms | 15943 ms |
| 40000 | 41350 ms | 58588 ms |
| 80000 | Oot | Oot |
| 160000 | Oot | Oot |
| 320000 | Oot | Oot |
| 64000 | Oot | Oot |

Computer 1:

* CPU: Intel® Core™ I7-4790 CPU @ 3.60 GHz
* RAM: 8.0 GB DDR3

Computer 2:

* CPU: AMD Ryzen 7 5800H with Radeon Graphics
* RAM: 16.0 GB

Activity 3. Factor 3: Implementation environment

These measures were taken with my personal laptop (CPU: AMD Ryzen 7 5800H with Radeon Graphics; RAM: 16.0 GB),

|  |  |  |
| --- | --- | --- |
| **N** | **A1 (Python)** | **A1 (Java)** |
| 10000 | 4377 ms | 992 ms |
| 20000 | 15943 ms | 4127 ms |
| 40000 | 58588 ms | 17084 ms |
| 80000 | Oot | Oot |
| 160000 | Oot | Oot |
| 320000 | Oot | Oot |
| 64000 | Oot | Oot |

As it can be seen, the same algorithm in Java is faster than the python one

Activity 4. Factor 4: algorithm that is used

As these measures were taken with my personal laptop (CPU: AMD Ryzen 7 5800H with Radeon Graphics; RAM: 16.0 GB), the measures for A1 are different from the ones before

|  |  |  |  |
| --- | --- | --- | --- |
| N | A1 (Python) | A2 (Python) | A3 (Python) |
| 10000 | 4377 ms | 471 ms | 261 ms |
| 20000 | 15943 ms | 1565 ms | 941 ms |
| 40000 | 58588 ms | 6053 ms | 3633 ms |
| 80000 | Oot | 22082 ms | 12890 ms |
| 160000 | Oot | Oot | 48302 ms |
| 320000 | Oot | Oot | Oot |
| 64000 | Oot | Oot | Oot |

Java implementations WITHOUT OPTIMIZATION:

|  |  |  |  |
| --- | --- | --- | --- |
| N | JavaA1 | JavaA2 | JavaA3 |
| 10000 | 992 ms | 119 ms | 82 ms |
| 20000 | 4127 ms | 502 ms | 322 ms |
| 40000 | 17084 ms | 1709 ms | 1098 ms |
| 80000 | Oot | 6487 ms | 4321 ms |
| 160000 | Oot | 25062 ms | 15549 ms |
| 320000 | Oot | Oot | 59518 ms |
| 64000 | Oot | Oot | Oot |

Java implementations WITH OPTIMIZATION:

|  |  |  |  |
| --- | --- | --- | --- |
| N | JavaA1 | JavaA2 | JavaA3 |
| 10000 | 79 ms | 13 ms | 6 ms |
| 20000 | 299 ms | 32 ms | 16 ms |
| 40000 | 1191 ms | 120 ms | 61 ms |
| 80000 | 4768 ms | 443 ms | 223 ms |
| 160000 | 19178 ms | 1661 ms | 834 ms |
| 320000 | Oot | 6287 ms | 3136 ms |
| 64000 | Oot | 30360 ms | 16823 ms |

Comparison:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N | A1 (.py) | JavaA1 (No opt) | JavaA1  (opt) | A2 (.py) | JavaA2  (no opt) | JavaA2  (opt) | A3 (.py) | JavaA3  (no opt) | JavaA3  (opt) |
| 10000 | 4377 | 992 | 79 | 471 | 119 | 13 | 261 | 82 | 6 |
| 20000 | 15943 | 4127 | 299 | 1565 | 502 | 32 | 941 | 322 | 16 |
| 40000 | 58588 | 17084 | 1191 | 6053 | 1709 | 120 | 3633 | 1098 | 61 |
| 80000 | Oot | Oot | 4768 | 22082 | 6487 | 443 | 12890 | 4321 | 223 |
| 160000 | Oot | Oot | 19178 | Oot | 25062 | 1661 | 48302 | 15549 | 834 |
| 320000 | Oot | Oot | Oot | Oot | Oot | 6287 | Oot | 59518 | 3136 |
| 64000 | Oot | Oot | Oot | Oot | Oot | 30360 | Oot | Oot | 16823 |

As it can be clearly seen for all cases, both java programs (with and without optimization) are faster than the python one, but the optimized version of the Java program is way better than the non optimized one