Algorithmics	Student information	Date	Number of session
	UO: 300827	03/02/2025	0
	Surname: Leiras		
	Name: Sofía		

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Activity 1. Factor 1: problem size

n	Time (milliseconds)
10000	1549
20000	6533
40000	26166
80000	OoT
160000	OoT
320000	OoT
640000	OoT

Activity 2. Factor 2: computer performance

If we compare the time obtained in the previous exercise (done with the computer of the lab), with the time obtained with my own computer we obtain the following results:

n	Time of the computer of the lab	Time with my own computer	Difference (own computer – lab computer)
10000	1549	2126	577
20000	6533	8842	2309
40000	26166	33951	7785
80000	OoT	OoT	--
160000	OoT	OoT	--
320000	OoT	OoT	--
640000	OoT	OoT	--

Computer of the lab: RAM: 16GB; CPU: 12th Gen Intel(R) Core(TM) i5-12400 2.50 GHz.

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My own computer: RAM: 16GB; CPU: 11th Gen Intel(R) Core(TM) i7-1185G7 @ 3.00GHz 3.00 GHz

We can conclude that the first computer is faster than the second one.

Activity 3. Factor 3: implementation environment

n	Java	Python	Difference (Python - Java)
10000	392	2126	1734
20000	1415	8842	7427
40000	5619	33951	28332
80000	21854	OoT	--
160000	OoT	OoT	--
320000	OoT	OoT	--
640000	OoT	OoT	--

We can conclude that, using Java, the program is run faster than using Python.

Activity 4. Factor 4: algorithm that is used

Table showing the execution time in Python:

n	PythonA1	PythonA2	PythonA3
10000	2126	269	122
20000	8842	888	477
40000	33951	3358	1784
80000	OoT	12214	6391
160000	OoT	46529	24003
320000	OoT	OoT	OoT
640000	OoT	OoT	OoT

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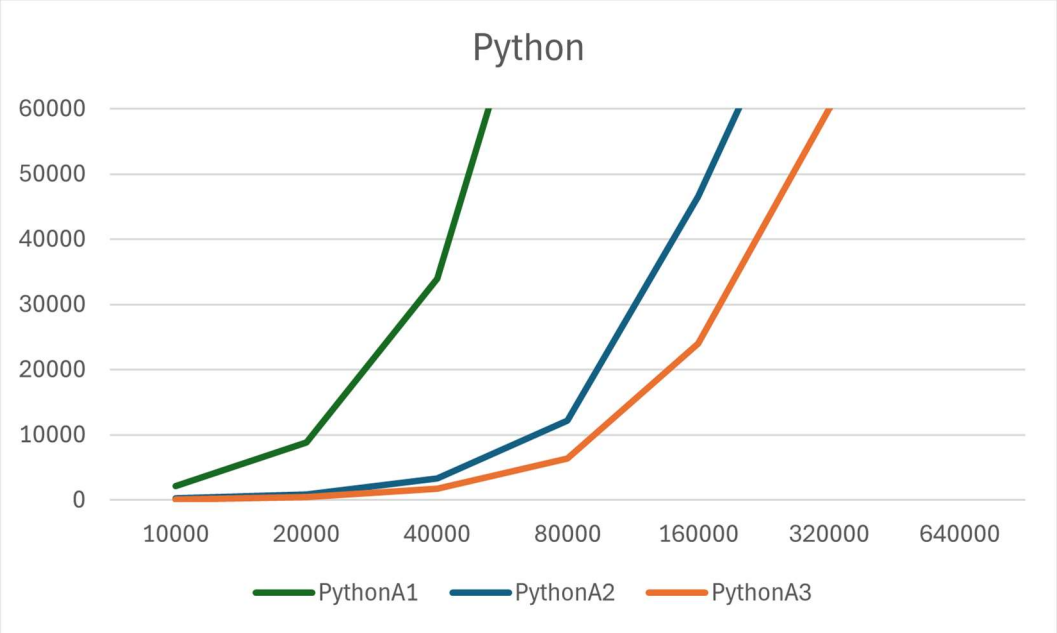

Table showing the execution time in Java WITHOUT optimization:

n	JavaA1	JavaA2	JavaA3
10000	392	43	24
20000	1415	151	80
40000	5619	544	294
80000	21854	2031	1091
160000	OoT	7656	4048
320000	OoT	28589	15410
640000	OoT	OoT	58052

Algorithmics	Student information	Date	Number of session
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	Surname: Leiras		
	Name: Sofía		

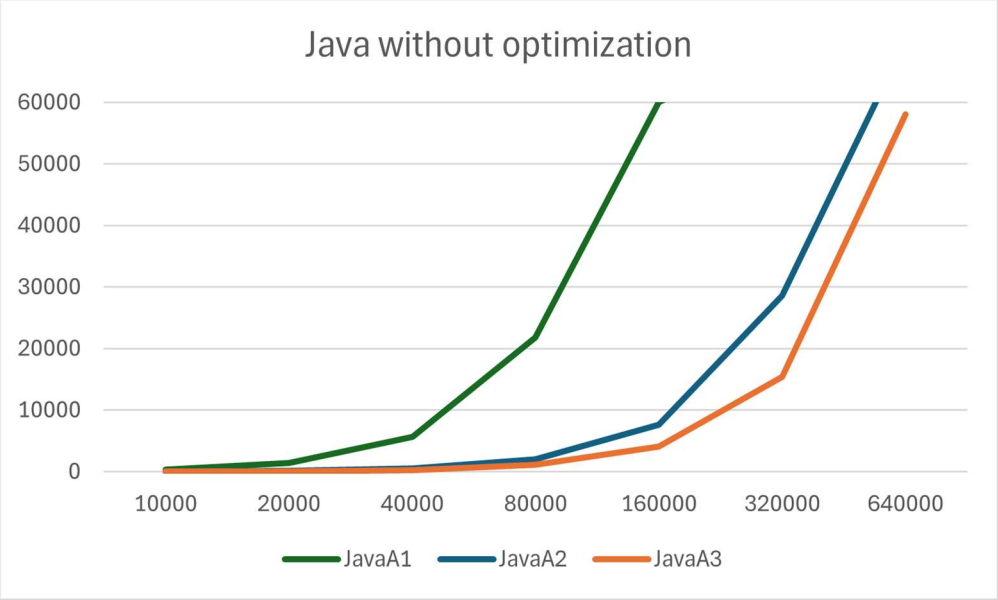

Table showing the execution time in Java WITH optimization:

n	JavaA1	JavaA2	JavaA3
10000	67	11	6
20000	258	30	16
40000	1035	103	60
80000	4113	385	197
160000	16337	1425	717
320000	OoT	5386	2696
640000	OoT	20345	10166

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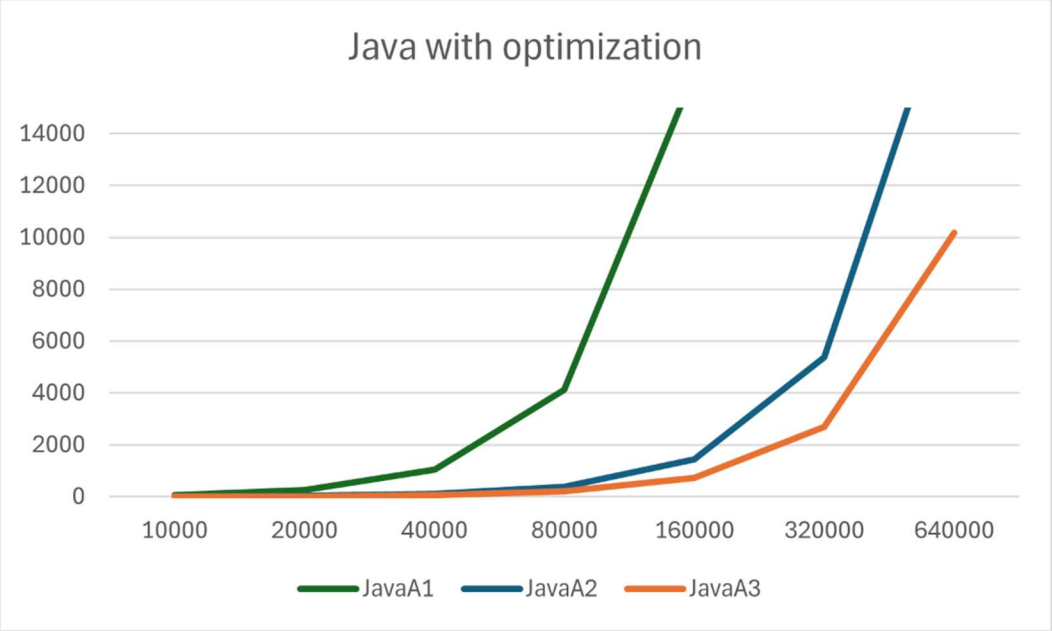

In conclusion, we can assure that Java executes significantly faster than Python, with even its unoptimized versions. Besides, among the three implementations (A1, A2, and A3), A3 consistently delivers the best performance, suggesting a more efficient algorithm. In summary, for tasks requiring high performance and scalability, optimized Java implementations are the best ones.

Finally, I will show the execution times obtained when running the same program with a more optimized implementation:

n	JavaA4
10000	1
20000	2
40000	5
80000	11
160000	26
320000	63
640000	158