


Algorithmics	Student information	Date (DD/MM/YYYY)	Number of session
	UO: UO300535	06-02-2025	1-1
	Surname: Cabo Stroup	 Escuela de Ingeniería Informática <small>Universidad de Oviedo</small>	
	Name: José David		



Activity 1. currentTimeMillis()

- Calculate how many more years we can continue using this way of counting. Explain what you did to calculate it.

This built-in Java method returns the time in milliseconds since January 1, 1970, 0:00 UTC as a 64-bit long, which has a maximum value of 9,223,372,036,854,775,807. This means we could keep using this system for another

$$(9,223,372,036,854,775,807 / 1,000 / 60 / 60 / 24 / 365) - 55 = \underline{\underline{292,471,153.7}}$$

years before it overflows.

That sounds pretty good!

Activity 2. Vector2.java

- Why does the measured time sometimes come out as 0?

It comes out as 0 because the algorithm has indeed taken less than a millisecond to run, at least when n is less than 100,000.

- From what size of problem (n) do we start to get reliable times?

We start to get reliable times (i.e. times over 50 ms), at approx. n = 13,000,000.

Activity 3. Vector4.java and beyond

- What happens with time if the problem size is multiplied by 2?

The execution time doubles with each step.

- What happens with time if the problem size is multiplied by a value k other than 2? (try it, for example, for k=3 and k=4 and check the times obtained)

The time is also multiplied by k each time the problem size increases.

- Explain whether the times obtained are those expected from the linear complexity $O(n)$

Yes, they are. As the size increases, the time grows along with it linearly.

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n	Time (ms)			
	Tsum	Tmaximum	Tmatches1	Tmatches2
10000	0,0689	0,111	635	0,12
20000	0,2002	0,246	2461	0,241
40000	0,3053	0,384	8914	0,407
80000	0,5819	0,923	35570	0,845
160000	1,2516	1,685	144195	1,893
320000	2,4527	2,994	OoT	2,485
640000	6,349	7,004	OoT	6,235
1280000	10,982	12,993	OoT	11,799
2560000	19,751	26,343	OoT	25,624
5120000	50,73	62	OoT	58
10240000	95,5	118	OoT	78
20480000	150,42	236	OoT	172
40960000	235	284	OoT	354
81920000	536	812	OoT	707

- Indicate the main features (processor and memory) of the computer where times have been measured.

My computer has an AMD Ryzen 9 6900HX 3.3Ghz processor and 32 GB of RAM.

- Once both tables are filled in, conclude whether the times obtained meet what was expected, given the computational time complexity of the different operations.

They all seem to follow a linear growth pattern, which is what the algorithms would suggest, except for **matches1**, which should be quadratic. I'm not sure why that is...