

Algorithmics	Student information	Date	Number of session
	UO: 300084	17/02/25	2
	Surname: Seijo Martínez		
	Name: Sergio		

## Activity 1. Some iterative models

Table 1(times in milliseconds and Without Optimization)

N	tLoop1(ms)	tLoop2(ms)	tLoop3(ms)	tLoop4(ms)
100	$68/10^4=0,0068$	$165/10^3=0,165$	$84/10^2=0,82$	$68/10^2=0,68$
200	$120/10^4=0,0120$	$575/10^3=0,575$	$353/10^2=3,53$	$476/10^2=4,76$
400	$316/10^4=0,0316$	$2648/10^3=2,648$	$1441/10^2=14,41$	$3613/10^2=36,13$
800	$661/10^4=0,0661$	$12128/10^3=12,128$	$6106/10^2=61,06$	$26914/10^2=269,14$
1600	$1592/10^4=0,1592$	$48082/10^3=48,082$	$25641/10^2=256,41$	2107
3200	$3256/10^4=0,3256$	$2175/10=217,5$	$10772/10=1077,2$	16860
6400	$7120/10^4=0,7120$	$8707/10=870,7$	$45943/10=4594,5$	OoT
12800	$14879/10^4=1,4879$	$39059/10=3905,9$	19077	OoT
25600	$32444/10^4=3,2444$	$17349/1=17349$	OoT	OoT
51200	$61066/10^4=6,1066$	OoT	OoT	OoT

The loop1 has a complexity of  $O(\log(n)*n)$  we can see the results of the timings increase like that (more or less). The loop2 has a complexity of  $O(\log(n)*n^2)$  much larger than loop1

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and we can see that in the time measurements. Loop3's complexity is  $O(n^2 \cdot \log(n))$ , that is the same as the loop2 and so we can see that the time measurements are similar, they are not equals because this complexity are theoretical. The complexity of loop4  $O(n^3)$  that is why it grows faster than the rest.

## Activity 2. Creation of iterative models of a given time complexity

Table 2(time in milliseconds and WITHOUT OPTIMIZATION)

N	tLoop5(ms)	tLoop6(ms)	tLoop7(ms)
100	44/10=4,4	55	555
200	197/10=19,7	449	8785
400	925/10=92,5	3856	OoT
800	4333/10=433,3	33662	OoT
1600	2022	OoT	OoT
3200	9207	OoT	OoT
6400	41948	OoT	OoT

The results are as expected being loop5 the fastest of them and loop7 the slowest due to their complexities.

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## Activity 3. Two algorithms with different complex.

Table3 (times in milliseconds and WITHOUT OPTIMIZATION)

N	tLoop1(ms)	tLoop2(ms)	T1 / T2
100	$68/10^4=0,0068$	$165/10^3=0,165$	0,041212
200	$120/10^4=0,0120$	$575/10^3=0,575$	0,02087
400	$316/10^4=0,0316$	$2648/10^3=2,648$	0,011934
800	$661/10^4=0,0661$	$12128/10^3=12,128$	0,00545
1600	$1592/10^4=0,1592$	$48082/10^3=48,082$	0,003311
3200	$3256/10^4=0,3256$	$2175/10=217,5$	0,001497
6400	$7120/10^4=0,7120$	$8707/10=870,7$	0,000818
12800	$14879/10^4=1,4879$	$39059/10=3905,9$	0,000381
25600	$32444/10^4=3,2444$	$17349/1=17349$	0,000187
51200	$61066/10^4=6,1066$	OoT	...

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## Activity 4. Two algorithms with same complex.

N	tLoop3(ms)	tLoop2(ms)	T1 / T2
100	$84/10^2=0,82$	$165/10^3=0,165$	4,969697
200	$353/10^2=3,53$	$575/10^3=0,575$	6,13913
400	$1441/10^2=14,41$	$2648/10^3=2,648$	5,441843
800	$6106/10^2=61,06$	$12128/10^3=12,128$	5,034631
1600	$25641/10^2=256,41$	$48082/10^3=48,082$	5,332765
3200	$10772/10=1077,2$	$2175/10=217,5$	4,952644
6400	$45943/10=4594,5$	$8707/10=870,7$	5,276789
12800	19077	$39059/10=3905,9$	4,88415
25600	OoT	$17349/1=17349$	...
51200	OoT	OoT	...

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## Activity 5. Same algorithm different environments

N	Python-t41	Java without optimization-t42	Java with optimization-t43	T42/T41	T43/T42
200	$357 / 10 = 35,7$	$80 / 10 = 8$	$76 / 100 = 0,78$	0,22409	0,0975
400	$2813 / 10 = 281,3$	61	$558 / 100 = 5,58$	0,21685	0,091475
800	$23103 / 10 = 2310,3$	474	$4275 / 100 = 42,75$	0,205168	0,09019
1600	19938	3784	$3361 / 10 = 336,1$	0,189788	0,088821
3200	OoT	30191	$26639 / 10 = 2663,9$	OoT	0,088235
6400	OoT	OoT	21180 ms	OoT	OoT