Session 3

UO283069

Activity 1: Two algorithms with the same complexity

N	loop2(t)	loop3(t)	loop2(t)/loop3(t)
8			
16			
32			
64			
128	174	99	1,757575758
256	662	322	2,055900621
512	2640	1390	1,899280576
1024	10472	5230	2,002294455
2048	41352	20655	2,002033406
4096	164113	82644	1,985782392
.....			

Processor: Intel(R) Pentium(R) Gold G5400 CPU @ 3.70GHz

Memory: 8 GB

Yes, the results make sense taking into account the complexity of each algorithm, and if we calculate the theoretical values for each one, we can check that the times are very similar.

For example, the theoretical value for n=128 n loop2 is 174.25, and for n=4096 on loop3 is 82648.

Activity 2: Two algorithms with different complexity

N	loop1(t)	loop2(t)	loop1(t)/loop2(t)
8	5	9	0,555555556
16	11	27	0,407407407
32	23	112	0,205357143
64	65	407	0,15970516
128	104	1618	0,064276885
256	237	6518	0,036360847
512	513	26086	0,019665721
1024	1111		
2048	2438		
4096	5307		

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Memory: 8 GB

Again, the expected times are very similar to the actual ones:

	loop1(O(nlogn))	loop2 (O (n**2))
8	5,375	9,25
16	11,4	27,25
32	23,41666667	112,25
64	65,42857143	407,25
128	104,4375	1618,25
256	237,4444444	6518,25
512	513,45	26086,25
1024	1111,454545	
2048	2438,458333	
4096	5309,181818	

Activity 3: Complexity of other algorithms

N	*loop4(t)*	*loop5t)*	*loop4(t)/loop5(t)*
8	8	5	1,6
16	53	23	2,304347826
32	611	207	2,951690821
64	8087	1873	4,317672184
128	119415	18054	6,614323696

Processor: Intel(R) Pentium(R) Gold G5400 CPU @ 3.70GHz

Memory: 8 GB

The theoretical and actual times are really close for both loops.

	loop4 (O (n**4))	loop5 (O(n**3log(n)))
8	8,0625	5,09375
16	53,0625	23,1
32	611,0625	207,1041667
64	8087,0625	1873,107143
128	119415,0625	18054,10938

Processor: Intel(R) Pentium(R) Gold G5400 CPU @ 3.70GHz

Memory: 8 GB

Activity 4: Study of Unknown.java

N	*Unknown*
8	0
16	1
32	6
64	29
128	195
256	1146
512	8492
1024	60203
2048	
4096	

Processor: Intel(R) Pentium(R) Gold G5400 CPU @ 3.70GHz

Memory: 8 GB

The theoretical complexity of the algorithm is O(N^3), but the results do not match those calculated as theoretical values.

For a given n like 512 the expected time would be:

T2 = 512^3/256^3 + 1146 = 1154