

Laboratory practice No. 2: Algorithm complexity

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3) Practice for final project defense presentation

3.1

Insertion sort

size	time
4000	1,812
4200	1,671
4400	1,685
4600	1,955
4800	2,781
5000	2,932
5200	2,943
5400	3,304
5600	3,359
5800	3,580
6000	4,389
6200	4,285
6400	4,479
6600	4,278
6800	4,809
7000	4,653
7200	5,317
7400	5,591
7600	5,487
7800	6,062

Recuperado de : <https://www.geeksforgeeks.org/python-program-for-insertion-sort/>

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ESTRUCTURA DE DATOS 1

Código ST0245

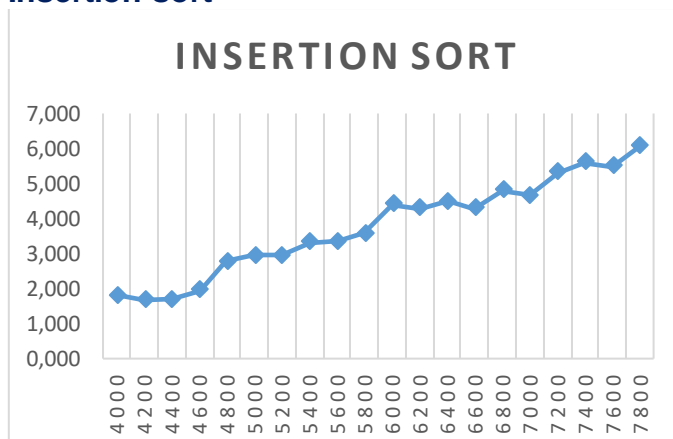
Merge sort

size	Time
200000	1,8048
202000	1,8156
204000	1,8875
206000	1,8178
208000	1,8680
210000	1,8299
212000	2,0097
214000	1,9431
216000	1,8913
218000	1,9835
220000	1,9374
222000	1,8740
224000	2,0136
226000	2,0735
228000	2,0228
230000	1,9785
232000	2,0448
234000	2,0082
236000	2,0490
238000	2,2062

Recuperado de: <https://www.geeksforgeeks.org/merge-sort/>

3.2

Insertion sort



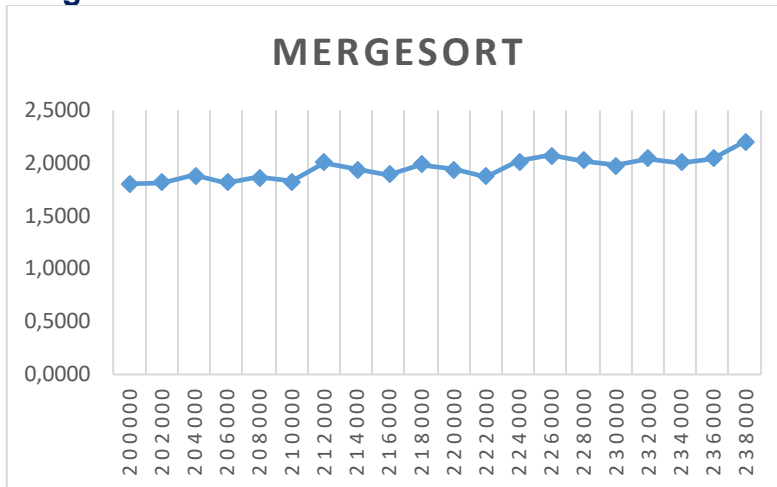
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Merge sort



3.3 Merge sort is much more efficient than insertion sort because even though both successfully organize arrays, Merge sort's complexity is $O(n \times \log(n))$ and insertion sort's is $O(n^2)$. This means that Merge sort will take less time to organize very large arrays.

3.4 Insertion sort is not recommended to be used in videogames with millions of elements and real-time demands on rendering since its complexity is defined by a quadratic equation. This causes the running time to increase extremely fast and, in the case of a large n value, the algorithm will take too much time.

3.5 Insertion sort runs quicker than Merge sort when most of the elements in the array are already organized.

3.7

- a. **CountEvens:** $T(n) = c_1 + c_2n = O(n)$
- b. **BigDiff:** $T(n) = c_1 + c_2n = O(n)$
- c. **CenteredAverage:** $T(n) = c_1 + c_2n = O(n)$
- d. **Sum13:** $T(n) = c_1 + c_2n = O(n)$
- e. **HaveThree:** $T(n) = c_1 + c_2n = O(n)$

3.8 n = length of the Arrays

4) Practice for midterms

- 4.1 c
- 4.2 b
- 4.3 b
- 4.4 b
- 4.5 1) d 2) a
- 4.6 se demorará 100 segundos.
- 4.7 1,2 y 4
- 4.8
- 4.9 a
- 4.10

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4.11	c
4.12	b
4.13	
4.14	c

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