ESTRUCTURA DE DATOS 1
Código ST0245

Laboratory practice No. 2
Algorithm complexity

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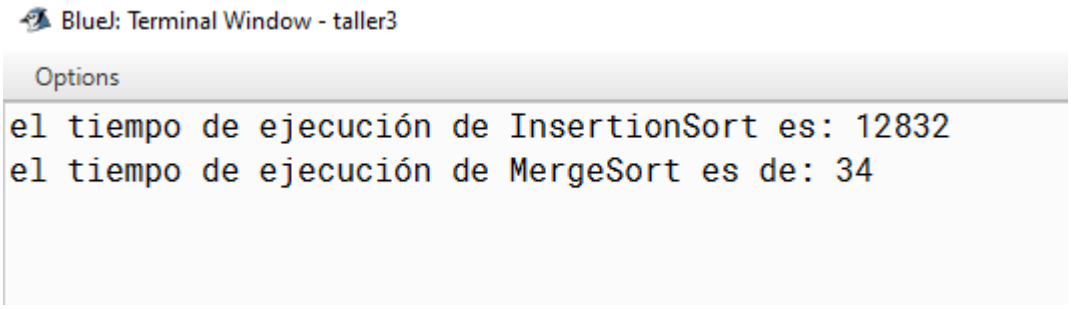
1.1



Disclaimer: Both algorithms had an array of 300,000 spaces and all numbers were randomized.

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3) Practice for final project defense presentation

3.1

Insertion sort		MergeSort	
valor de n	tiempo	valor de n	tiempo
10000	20	100000	16
20000	60	200000	32
30000	129	300000	32
40000	248	400000	42
50000	342	500000	51
60000	496	600000	62
70000	699	700000	73
80000	889	800000	83
90000	1129	900000	93
100000	1408	1000000	106
110000	1727	1100000	115
120000	1979	1200000	124
130000	2417	1300000	142
140000	2800	1400000	152
150000	3279	1500000	161
160000	3627	1600000	178
170000	4073	1700000	189
180000	4636	1800000	195
190000	5166	1900000	215
200000	5728	2000000	219

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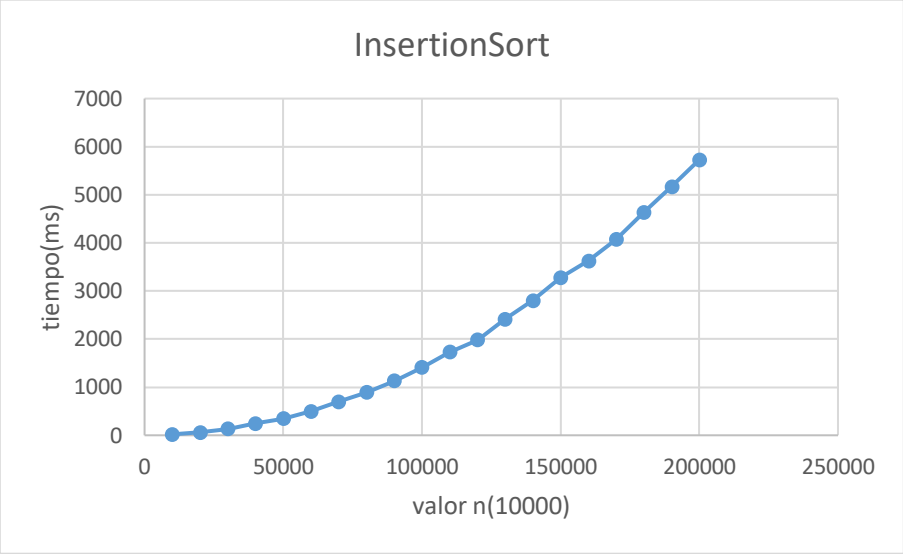
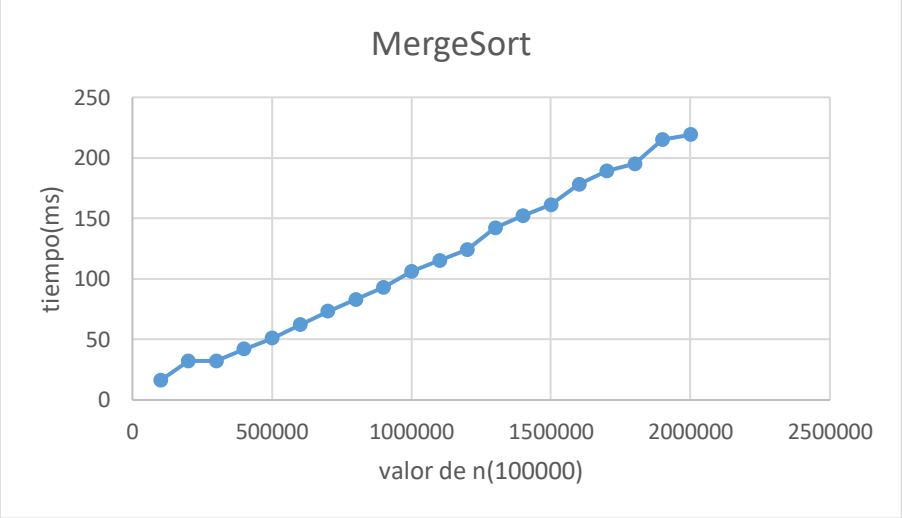
3.2





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3.3 The complexity of the insert is O (n ^ 2), taking into account the case of applying this algorithm in a game of millions of elements in a scene and demands for 3D rendering time, mainly this algorithm would not be appropriate for this. case and more taking into account that the algorithm having a complexity of n ^ 2 means that it requires the n ^ 2 of steps to order elements, that is, twice, which makes it efficient with small lists but in the case of having a large list would be completely inefficient.

3.4 The complexity of the marge sort is O (n log n). And this is due to the nature of this algorithm, in which it consists of dividing an array recursively, in short the data vector divides itself until reaching the size '1' of elements, that means that the vector of size 1 is ordered. When the vector is in this part, each sub-vector is recursively ordered 'joining' them and comparing values with the vector next to it, in the case of the complexity that is O (n log n) it is due to the entire input it must be iterated , and this must happen O (log (n)) times (the input can only be halved O (log (n)) times) and therefore n iterated elements log (n) times give O (n log (n)).

3.5

Array 2

Exercise 1(countEvens)
Complexity = O(1)+O(n) // C+T(n)
O (n)

Exercise 2(sum13)
Complexity = O(1)+O(n+1) // C+T(n+1)
O (n)

Exercise 3 (bigDiff)
Complexity = O(1)+O(n) // C+T(n)
O (n)

Exercise 4 (bigDiff)
Complexity = O(1)+O(n) // C+T(n)
O (n)

Exercise 5(squareUp)
Complexity = O(1)+O(n) // C+T(n)
O (n)

Array 3

Exercise 1(maxSpan)
Complexity = O(1)+O(n^2) // T(n)+C
O (n ^ 2)

Exercise 2(canBalance) (the for are not nested)
Complexity = O(1)+O(n) // C+T(n)
O (n)

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Exercise 3 (linearIn)
Complexity = O(1)+O(n^2) // T(n)*T(n)+C
O (n ^ 2)

Exercise 4 (seriesUp)
Complexity = O(1)+O(n^2) // T(n)* T(n)+C
O (n ^ 2)

Exercise 5(squareUp)
Complexity = O(1)+O(n^2) // T(n)*T(n)+C
O (n ^ 2)

3.4 (opcional) (solución del max span)

```
public int maxSpan(int[] nums) {
    int max = 0;
    int min = 0;


    if(nums.length == 0){
    return 0;
    }

    if(nums[0] == nums[nums.length-1]){
        max = nums.length;
    }



        for(int i = 0; i < nums.length; i++){
        for(int j = 1; j < nums.length; j++){



          if(nums[i] == nums[j]){
           min = j;
```

Max and min will help us find the maximum interval

to check if the array is empty

It is compared if the number furthest to the left and the number furthest to the right are equal, that means that the interval is the size of the array

the first for will allow us to compare the first arrangement position (which will change positions) and the second for will not serve to compare that first arrangement position with the other positions that follow and so on.

and the if will be responsible for making the aforementioned comparison, and if the positions are equal it means that we already have an interval which will be in size of j (position more to the right) and it is stored in the variable min

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```
            if(min>max){
             max=min;
           }
          }
       }
    }
    return max;
 }
```

And then a comparison is made with the variable max (which at the beginning will be 0) and since the minimum will be greater than the maximum, the minimum will be assigned to the maximum in order to compare the new js that are had and if it allows us to find the maximum interval

4) Practice for midterms

4.1 100ms
4.2 b) O(m×n×√n)
4.3 c) O(n 3× n)
4.4 1 O(n+m+n*m)= O(n*m)
2 O(n+m+n*m)
4.5 1 (d)T(n)=T(n/10)+c, what is a O(log10 n)
2(a) Yes
4.7 3. Si f=O(g) y g=O(h), then f=O(h) (the correct answer 3)

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