Laboratory practice No. 2: Big O Notation

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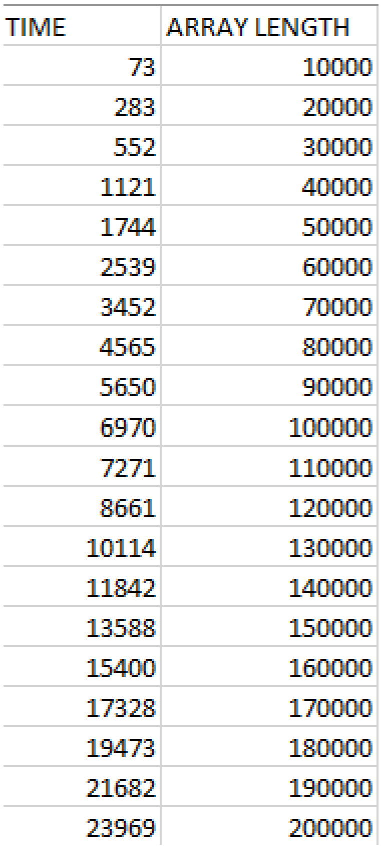
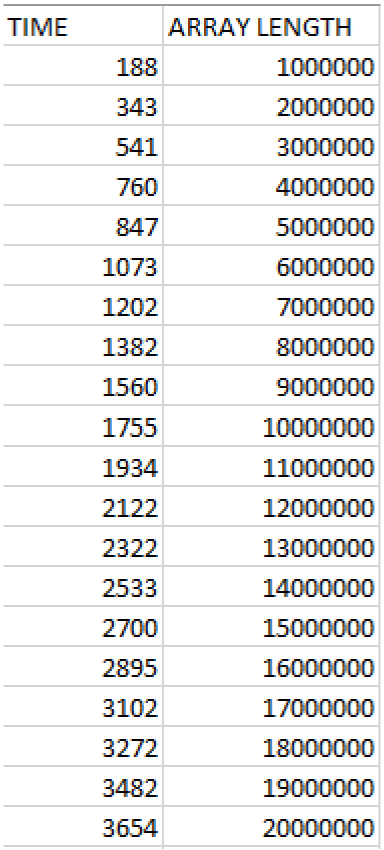
3) Practice for final project defense presentation

1. **Insertion sort**



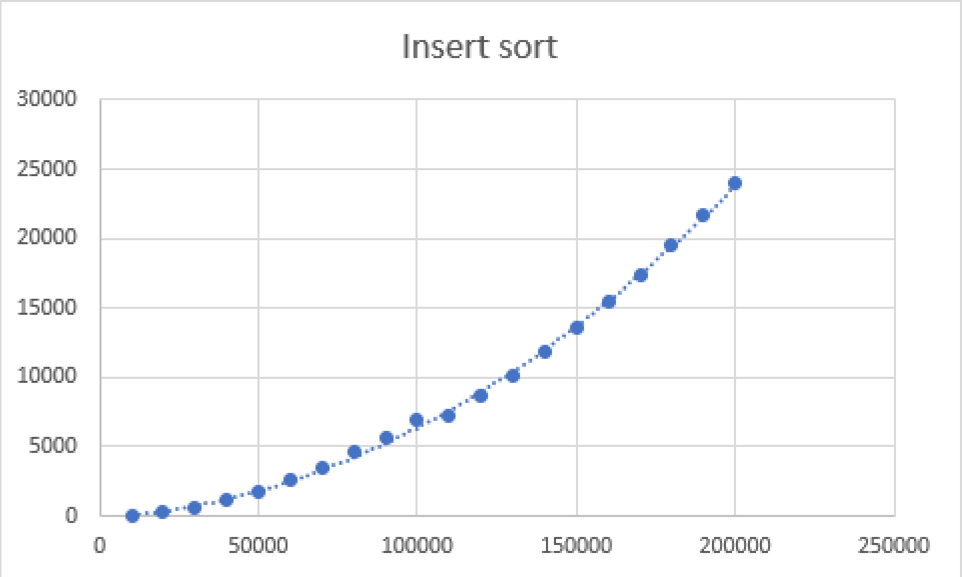
TIME	ARRAY LENGTH
73	10000
283	20000
552	30000
1121	40000
1744	50000
2539	60000
3452	70000
4565	80000
5650	90000
6970	100000
7271	110000
8661	120000
10114	130000
11842	140000
13588	150000
15400	160000
17328	170000
19473	180000
21682	190000
23969	200000

Merge sort

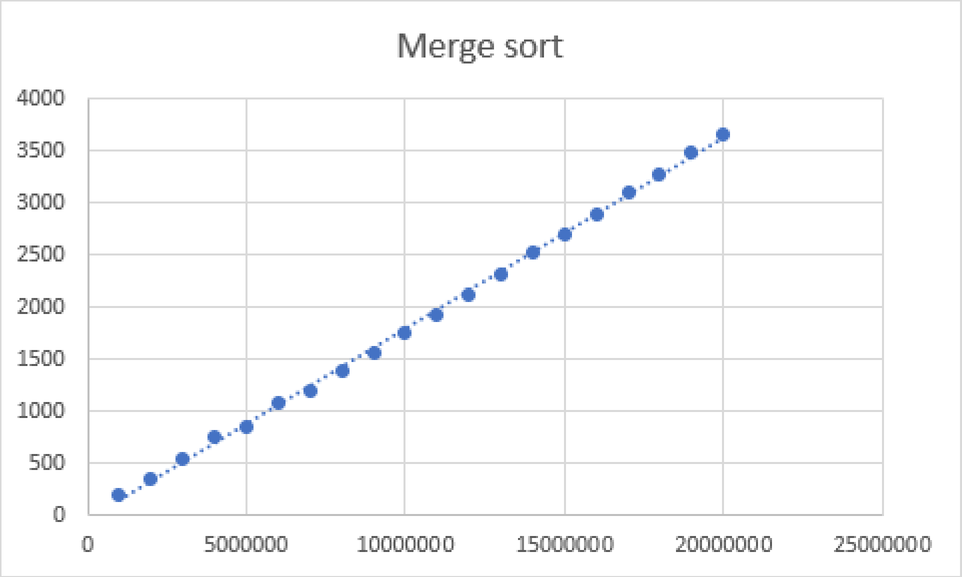


TIME	ARRAY LENGTH
188	1000000
343	2000000
541	3000000
760	4000000
847	5000000
1073	6000000
1202	7000000
1382	8000000
1560	9000000
1755	10000000
1934	11000000
2122	12000000
2322	13000000
2533	14000000
2700	15000000
2895	16000000
3102	17000000
3272	18000000
3482	19000000
3654	20000000

2. Insertion sort



Merge sort



3. Merge sort is faster than insertion sort, because mergeSort's complexity is O(n) and insertionSort's complexity is O(n^2). That means that use insertion sort for one million length array will take about 31 years to sort the array.

4. MaxSpan problem defines a "span" as the quantity of numbers between two equal numbers, these ones included.The aim is to find the max span. In order to solve it, we use two loops and a variable called

"maxSpan" initialized to 0(it will be used as an auxiliary variable). The first loop is used to choose one element of the array and we also initialize a variable called "sum" with 0. Into the internal loop, it compares the number in the position selected by the external-loop's index with the others elements in the array determined by the second-loop's index. At the same time the sum variable is increased one by one, until find two equal elements. When two equal elements have been found, sum variable becomes into a span and then it compares if that new span is bigger than current maxSpan variable. If it is bigger, maxSpan variable gets sum's value, if it is not, sum's value does not matter and gets useless. After that, the loop begins again with another number of the array, and so on until all the array numbers are use in the external loop.

5. **Array2:**
countEvens

$$T(n) = c1 * n + c2 * n$$
$$T(n) = O(n)$$

bigDiff

$$T(n) = c1 * n + c2 * n$$
$$T(n) = O(n)$$

centeredAverage

$$T(n) = c1 * n + c2 * n + c3 * n$$
$$T(n) = O(n)$$

sum13

$$T(n) = c1 * n + c2 * n$$
$$T(n) = O(n)$$

sum67

$$T(n) = c1 * n$$
$$T(n) = O(n)$$

Array 3:
maxSpan

$$T(n) = c1 * (n - 1) * n + c2 * (n - 1) * n$$

$$T(n) = O(n^2)$$

fix34

$$T(n) = c1 * (n - 1) * n + c2 * (n - 1) * n$$

$$T(n) = O(n^2)$$

fix45

$$T(n) = c1 * (n - 1) * n + c2 * (n - 1) * n$$

$$T(n) = O(n^2)$$

canBalance

$$T(n) = c1 * (n - 1) * n$$

$$T(n) = O(n^2)$$

linearIn

$$T(n) = c1 * (n - 1) * n$$

$$T(n) = O(n^2)$$

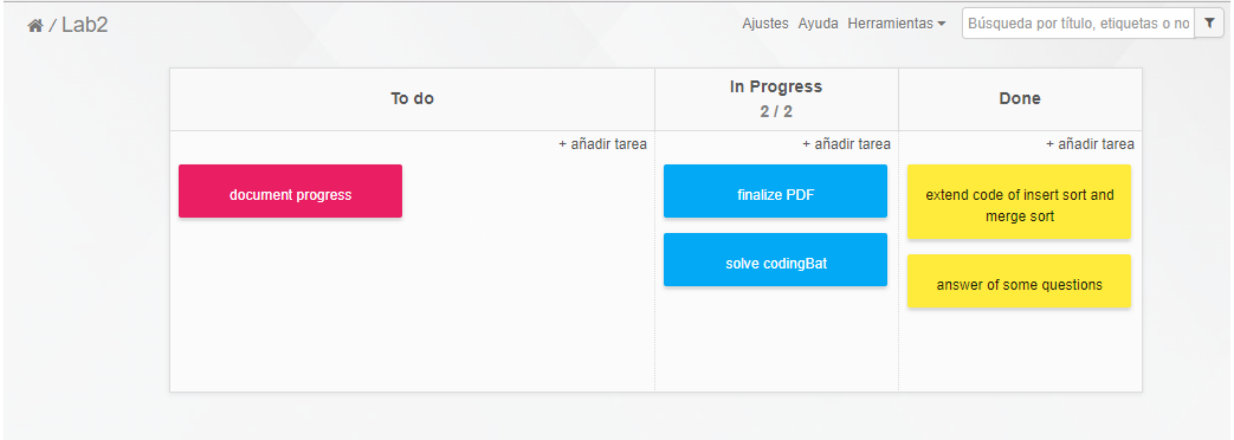
6. n represents one variable of which depends on the algorithm and with it we calculate the complexity. Thanks to that we know the ejecution time.

4) Practice for midterms

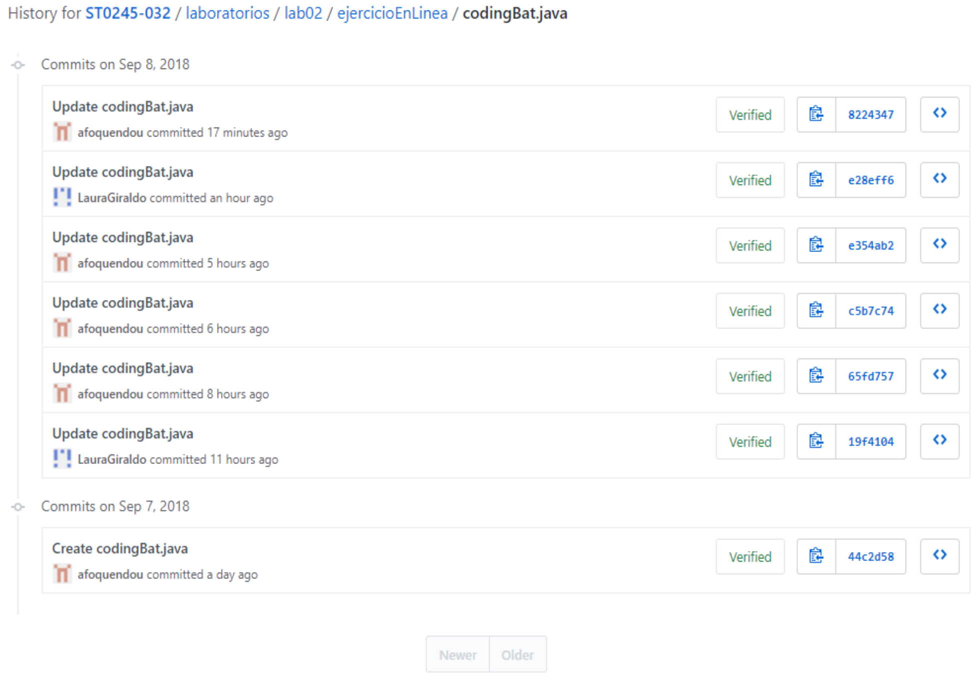
1. *c*
2. *d*
3. *b*
4. *a*
5. d
6. a
7. t(n) = c+(n-1), O(n)
8. b
9. d
10. b

11. c
12. b
13. a

5) *Team work and gradual progress*


/ Lab2
Ajustes Ayuda Herramientas
Búsqueda por título, etiquetas o no

To do	In Progress 2 / 2	Done
+ añadir tarea	+ añadir tarea	+ añadir tarea
document progress	finalize PDF	extend code of insert sort and merge sort
	solve codingBat	answer of some questions


History for ST0245-032 / laboratorios / lab02 / ejercicioEnLinea / codingBat.java

Commits on Sep 8, 2018

Update codingBat.java
afoquendou committed 17 minutes ago — Verified 8224347

Update codingBat.java
LauraGiraldo committed an hour ago — Verified e28eff6

Update codingBat.java
afoquendou committed 5 hours ago — Verified e354ab2

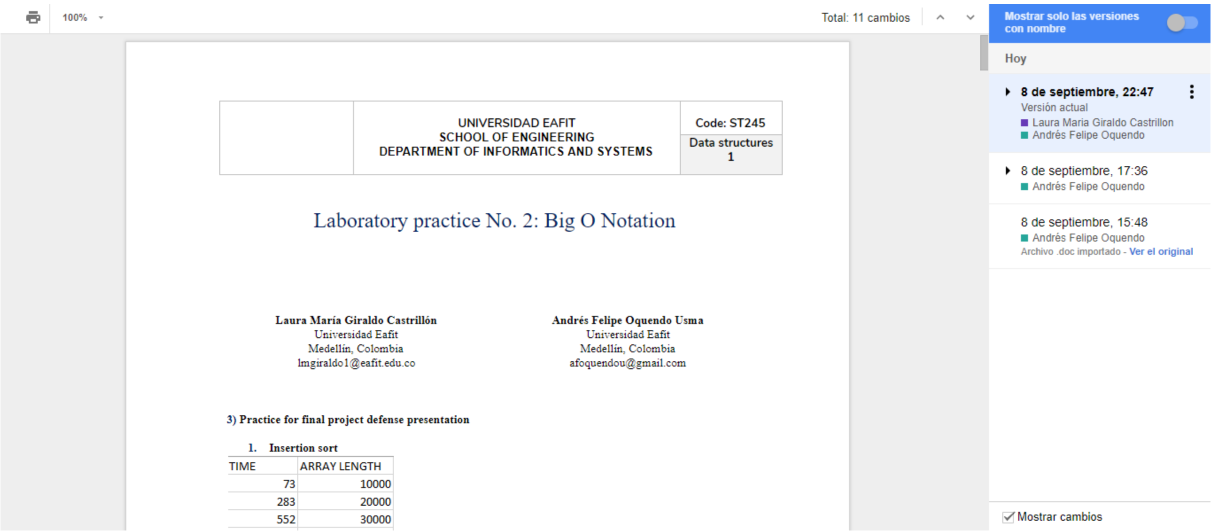
Update codingBat.java
afoquendou committed 6 hours ago — Verified c5b7c74

Update codingBat.java
afoquendou committed 8 hours ago — Verified 65fd757

Update codingBat.java
LauraGiraldo committed 11 hours ago — Verified 19f4104

Commits on Sep 7, 2018

Create codingBat.java
afoquendou committed a day ago — Verified 44c2d58



- 8 de septiembre, 22:47
  Versión actual
  Laura Maria Giraldo Castrillon
  Andrés Felipe Oquendo
- 8 de septiembre, 17:36
  Andrés Felipe Oquendo
- 8 de septiembre, 15:48
  Andrés Felipe Oquendo
  Archivo .doc importado - Ver el original

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	UNIVERSIDAD EAFIT SCHOOL OF ENGINEERING DEPARTMENT OF INFORMATICS AND SYSTEMS	Code: ST245 Data structures 1

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