


Algorithmics	Student information	Date	Number of session
	UO: 271580	24/02/2000	2
	Surname: Lopez Amado	 Escuela de Ingeniería Informática Universidad de Oviedo	
	Name: Pablo		



## Activity 1. Sorting Algorithms

All measurements are in milliseconds.

Bubble			
n	Inverse	Sorted	Random
10000	0,1474	0,0553	0,2328
20000	0,5833	0,1125	0,8299
40000	2,1209	0,4975	3,5951
80000	8,1828	1,9707	12,6351
160000	33,1444	7,3794	50,6949
320000		31,1638	

N1 = 10000    t1 = 0,232

N2 = 160000    t2 = ?

$$t2 = \frac{n^2}{n1^2} * t1 \rightarrow \frac{n^2}{n1^2} * t1 \rightarrow \frac{160000^2}{10000^2} * 0,232 \rightarrow t2 = 59,5968$$

N1 = 10000    t1 = 0,232

N2 = ?    t2 = 50,6949

$$n2 = \frac{t2}{t1} * n1 \rightarrow \sqrt{\frac{t2}{t1} * n1^2} \rightarrow \sqrt{\frac{50,6949}{0,232} * 10000} \rightarrow n2 = 147821,68$$

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Insertion			
n	Inverse	Sorted	Random
10000	0,06		0,0273
20000	0,1565		0,0688
40000	0,6064		0,3499
80000	2,5404	0,00045	1,2086
160000	9,2933	0,0009	4,7808
320000	35,9898	0,00194	17,1484
640000		0,00459	71,6139
1280000		0,00972	
2560000		0,01943	

N1 = 10000    t1 = 0,0273

N2 = 160000    t2 = ?

$$t2 = \frac{n2}{n1^2} * t1 \rightarrow \frac{n2^2}{n1^2} * t1 \rightarrow \frac{160000^2}{10000^2} * 0,0273 \rightarrow t2 = 6,9888$$

N1 = 10000    t1 = 0,0273

N2 = ?    t2 = 17,1484

$$n2 = \frac{t2}{t1} * n1 \rightarrow \sqrt{\frac{t2}{t1} * n1^2} \rightarrow \sqrt{\frac{17,1484}{0,0273} * 10000} \rightarrow n2 = 250628,51$$

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Selection			
n	Inverse	Sorted	Random
10000	0,0523	0,043	0,029
20000	0,2219	0,1472	0,0792
40000	0,8886	0,4022	0,4405
80000	3,1383	1,2684	1,3895
160000	13,1491	5,3551	5,4353
320000	49,3949	22,2904	21,0878
640000			91,3074

N1 = 10000    t1 = 0,029

N2 = 160000    t2 = ?

$$t2 = \frac{n2^2}{n1^2} * t1 \rightarrow \frac{n2^2}{n1^2} * t1 \rightarrow \frac{160000^2}{10000^2} * 0,029 \rightarrow t2 = 7,424$$

N1 = 10000    t1 = 0,029

N2 = ?    t2 = 21,0878

$$n2 = \frac{t2}{t1} * n1 \rightarrow \sqrt{\frac{t2}{t1} * n1^2} \rightarrow \sqrt{\frac{21,0878}{0,029} * 10000} \rightarrow n2 = 269660,6$$

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QuickSort	Central element		
n	Inverse	Sorted	Random
10000	0,0006	0,00022	0,00093
20000	0,00045	0,00025	0,00172
40000	0,00087	0,00055	0,00362
80000	0,00148	0,00118	0,00737
160000	0,00363	0,00238	0,01577
320000	0,00659	0,00536	0,03303
640000	0,01367	0,01115	0,06973
1280000	0,02849	0,02189	0,14648
2560000	0,05838	0,04863	0,30261
5120000	0,12254	0,10396	

N1 = 10000    t1 = 0,00093

N2 = 2560000    t2 = ?

$$t2 = \frac{n2}{n1^2} * t1 \rightarrow \frac{n2 * \log(n2)}{n1 * \log(n1)} * t1 \rightarrow$$

$$\frac{2560000 * \log(2560000)}{10000 * \log(10000)} * 0,00093 \rightarrow t2 = 0,3814$$

Every time gotten is higher than the real value since they are calculated on the worst case and the times taken on the table possibly are not on the worst case.