

# Αλγόριθμοι Ταξινόμησης

Εργασία 1<sup>ου</sup> εξαμήνου στο μάθημα “Εισαγωγή στους υπολογιστές” - Ομάδα 06

Παναγιώτης Κουτσουμάνης, Παπαλάμπρου Κωνσταντίνος - 2026



# Το πρόβλημα της ταξινόμησης

Τυχαία Λίστα Αριθμών
[6, 7, 2, 5, 8, 10, 3, 1, 9, 4]

Αλγόριθμος



Ταξινομημένη Λίστα Αριθμών
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]



# Σειριακή και Παράλληλη υλοποίηση

Κανονικά ο κώδικας τρέχει **σειριακά** δηλαδή “βήμα-βήμα” μια εντολή την φορά

Στη Παράλληλη υλοποίηση μπορούμε να εκτελέσουμε κώδικα **ταυτόχρονα**



# Οι Αλγόριθμοι Ταξινόμησης

Bubble Sort/Parallel Bubble Sort (Odd-Even Transposition Sort)

Merge Sort/Parallel Merge Sort

Quicksort/Parallel Quicksort and Partition Schemes (Lomuto, Hoare)



# Γραφική Διεπαφή Χρήστη

1st Semester Python Project - Sort Algorithms (v1.2)

Generate the Sequence

Enter size of the sequence between 0 and 1000000

100

^  
v

Generate

Select a Sorting Algorithm & Number of Threads

Bubble Sort

▼

1

^  
v

Sort

===== Manual =====

1. On the "Generate Sequence" Section you must first select the size of the sequence you want & click generate for your sequence to be generated

NOTE: The sequence will be a list of numbers from 1 to the number you selected in a random order

WARNING: You must generate a sequence before sorting otherwise the sort button will be disabled

2. Then on the "Select a Sorting Algorithm & Number of Threads" you can choose from a variety of single and parallel processing sorting algorithms to sort your list and if the algorithm is parallel you could select a different number of processes from the box next

WARNING: The thread option will be deactivated for single threaded algorithms

3. When you press the "Sort" button the sorting results will appear under here

===== Results =====

Made by Koutsoumanis Panagiotis and Papalamprou Konstantinos, 2026



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===== Results =====

Generated new Sequence: [9, 77, 67, 98, 36, 59, 76, 68, 88, 57, 62, 21, 27, 74, 32, 49, 79, 22, 35, 83, 48, 11, 60, 41, 10, 56, 51, 12, 1, 23, 64, 50, 90, 5, 44, 65, 25, 61, 53, 93, 66, 87, 37, 54, 80, 17, 95, 28, 33, 52, 70, 19, 96, 2, 100, 46, 72, 45, 8, 94, 63, 29, 20, 3, 34, 99, 71, 14, 18, 92, 78, 31, 85, 13, 43, 91, 38, 40, 6, 4, 39, 58, 86, 75, 81, 24, 26, 69, 15, 7, 97, 16, 84, 89, 73, 42, 47, 82, 55, 30],

size: 100

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# Γραφική Διεπαφή Χρήστη

1st Semester Python Project - Sort Algorithms (v1.2)

Generate the Sequence

Enter size of the sequence between 0 and 1000000

100

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v

Generate

Select a Sorting Algorithm & Number of Threads

Bubble Sort

Bubble Sort

Parallel Bubble Sort

Odd-Even Transposition Sort

Merge Sort

Parallel Merge Sort

Quicksort

Lomuto Quicksort

Hoare Quicksort

Parallel Quicksort

1

^  
v

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=====

===== Results =====

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# Γραφική Διεπαφή Χρήστη

1st Semester Python Project - Sort Algorithms (v1.2)

Generate the Sequence  
Enter size of the sequence between 0 and 1000000

100

Generate

Select a Sorting Algorithm & Number of Threads

Bubble Sort

5

Sort

===== Results =====

Generated new Sequence: [94, 45, 84, 48, 59, 3, 58, 26, 13, 7, 79, 47, 98, 67, 28, 86, 43, 99, 2, 30, 20, 36, 93, 75, 14, 97, 12, 66, 22, 57, 90, 34, 54, 63, 70, 65, 50, 24, 69, 38, 19, 100, 51, 92, 55, 71, 5, 96, 15, 44, 10, 33, 72, 85, 81, 77, 1, 74, 82, 4, 88, 16, 87, 32, 40, 21, 80, 89, 95, 61, 18, 53, 11, 78, 8, 76, 64, 31, 49, 46, 60, 6, 91, 23, 52, 29, 73, 25, 9, 41, 83, 17, 68, 62, 42, 37, 39, 56, 35, 27], size: 100

Bubble Sort	BigO:	$O(n^2)$	Threads:	1	Size:	100	Time Taken:	0.826ms
Parallel Bubble Sort	BigO:	$O(n)$	Threads:	2	Size:	100	Time Taken:	346.481ms
Odd-Even Transposition Sort	BigO:	$O(n^2)$	Threads:	1	Size:	100	Time Taken:	0.781ms
Parallel Bubble Sort	BigO:	$O(n)$	Threads:	3	Size:	100	Time Taken:	212.351ms
Merge Sort	BigO:	$O(n \log n)$	Threads:	1	Size:	100	Time Taken:	0.269ms
Parallel Merge Sort	BigO:	$O(n)$	Threads:	3	Size:	100	Time Taken:	189.333ms
Quicksort	BigO:	$O(n \log n)$	Threads:	1	Size:	100	Time Taken:	0.258ms
Lomuto Quicksort	BigO:	$O(n \log n)$	Threads:	1	Size:	100	Time Taken:	0.277ms
Hoare Quicksort	BigO:	$O(n \log n)$	Threads:	1	Size:	100	Time Taken:	0.244ms
Parallel Quicksort	BigO:	$O(n)$	Threads:	5	Size:	100	Time Taken:	346.045ms
Bubble Sort	BigO:	$O(n^2)$	Threads:	1	Size:	100	Time Taken:	0.526ms

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# Συμπεράσματα

**Θεωρητικά** η παράλληλη υλοποίηση των αλγορίθμων θα έπρεπε να παρουσιάσει σημαντική **επιτάχυνση** της ταξινόμησης

Όμως, στην **πραγματικότητα** το *overhead* των *Processes* **αυξάνει** τον **χρόνο εκτέλεσης**



# GitHub

## github.com/konst3/python\_project

The screenshot shows the GitHub repository page for `konst3/python_project`. The repository is public and has 2 stars, 1 watcher, and 0 forks. The main branch is `main`, with 2 branches and 2 tags. The repository contains a file tree with folders `assets`, `reports`, and `src`, and files `.gitignore`, `LICENSE`, and `README.md`. The `README.md` file is selected, showing the title "1st Semester Python Project ECE upatras - Single and Parallel Sorting Algorithms with GUI". The repository description is "1st semester python project at ECE upatras; Sorting Application". The repository includes tags for `sorting`, `quicksort`, `mergesort`, `parallel-computing`, `tkinter`, `bubble-sort`, `sorting-algorithms`, and `odd-even-transposition-sort`. The repository also has a `Readme` file, an `Unlicense license`, and an `Activity` section. The repository has 2 stars, 1 watching, and 0 forks. The repository has 2 releases, with the latest release being `v1.2 - Reports and minor bug ...` from yesterday.

konst3 / python\_project

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main 2 Branches 2 Tags

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About

1st semester python project at ECE upatras; Sorting Application

sorting quicksort mergesort parallel-computing tkinter bubble-sort sorting-algorithms odd-even-transposition-sort

Readme Unlicense license Activity 2 stars 1 watching 0 forks

Releases 2

v1.2 - Reports and minor bug ... Latest yesterday

konst3 git clone fix 2049f56 · yesterday 44 Commits

assets	stable v1.2	yesterday
reports	reports	yesterday
src	reports	yesterday
.gitignore	reports	yesterday
LICENSE	LICENSE	yesterday
README.md	git clone fix	yesterday

README Unlicense license

### 1st Semester Python Project ECE upatras - Single and Parallel Sorting Algorithms with GUI