

ALGORITMI SI STRUCTURI DE DATE

Curs pentru anul II
Facultatea de Informatica

Cadru didactic

► Titular disciplina:

Conf. univ. dr. DANIELA JOIȚA

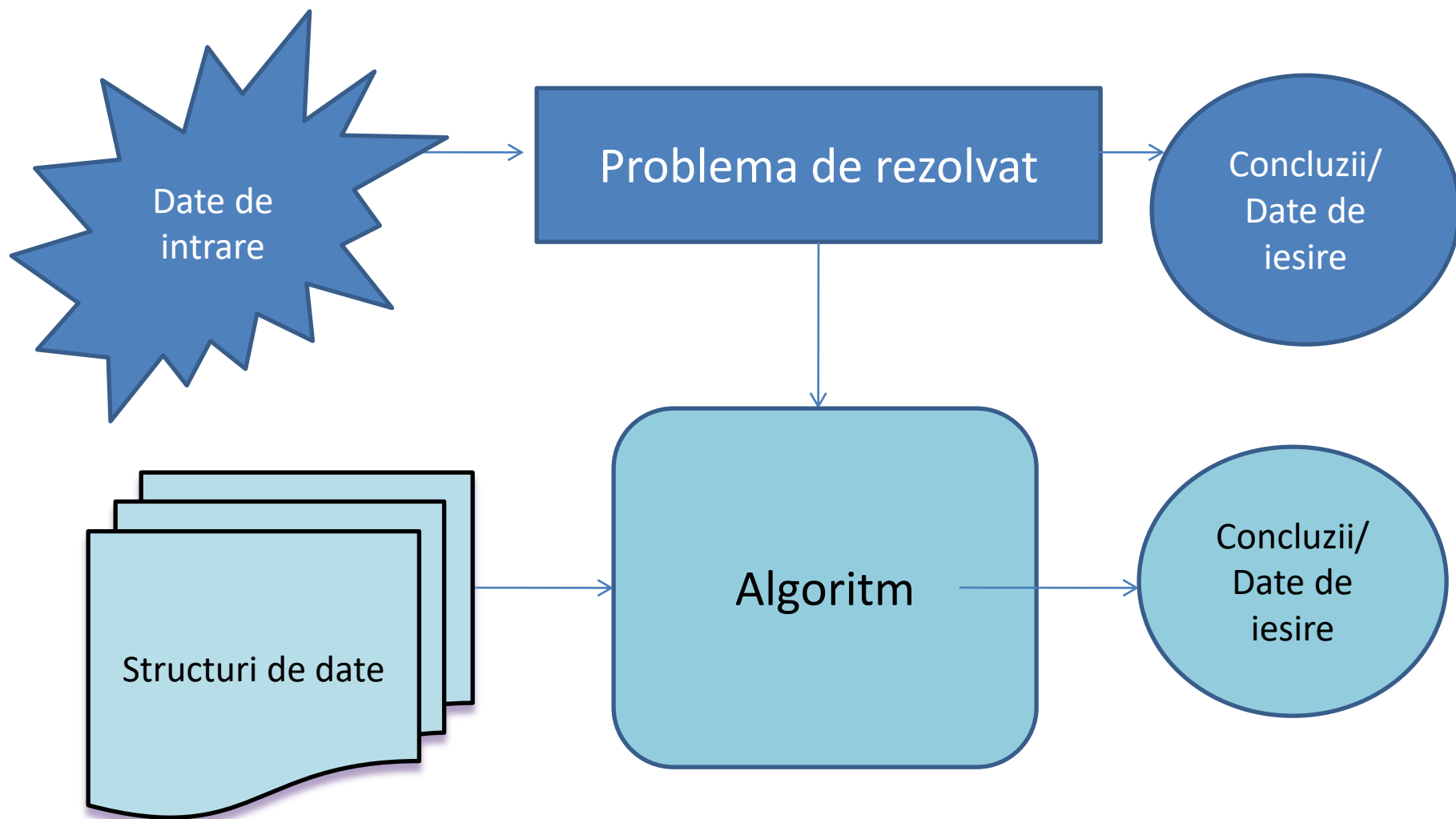


daniela.joita@prof.utm.ro

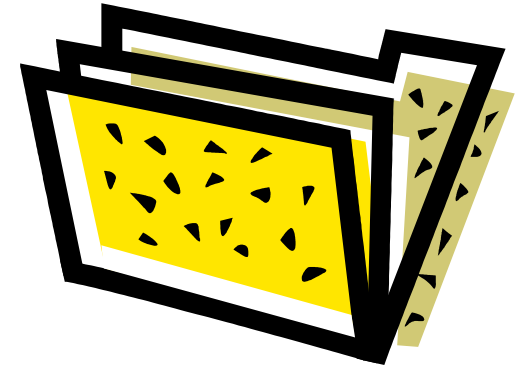
Structura cursului

Algoritmi

Structuri
de date



Continutul cursului (partea I)



- Structuri de date

- Structuri de date liniare

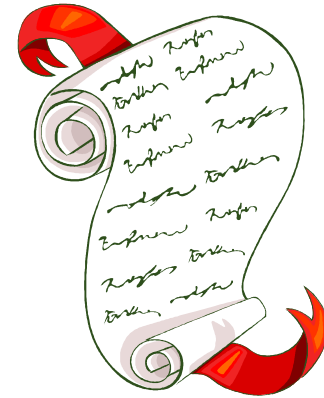
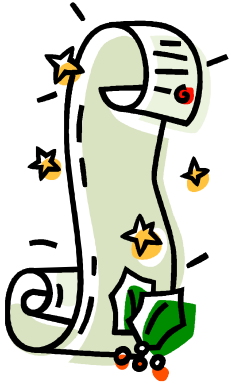
- Liste liniare, stive, cozi; Alocarea secventiala; Alocarea inlantuita; Liste circulare; Liste dublu inlantuite

- Structuri de date neliniare

- Arbori; Arbori binari; Grafuri; Reprezentare; Traversare

Structuri de date liniare

- Liste



Structuri

- Stive



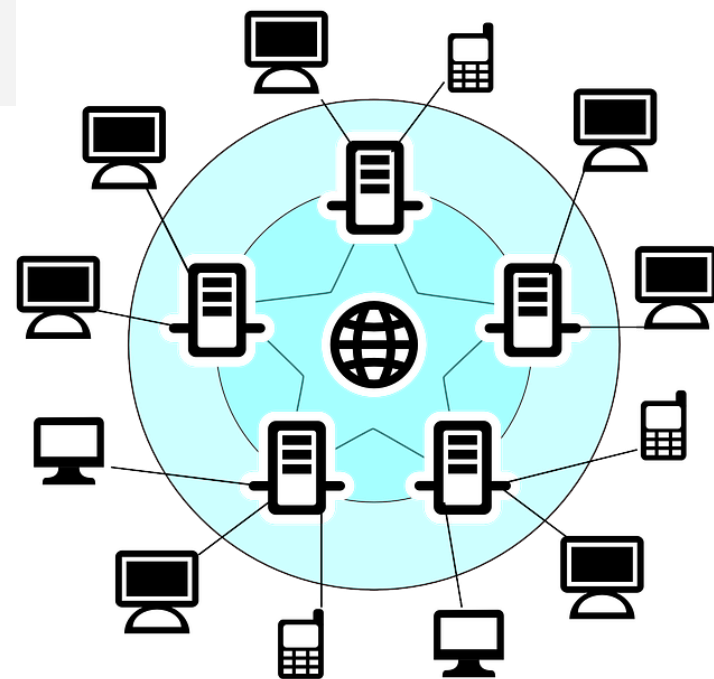
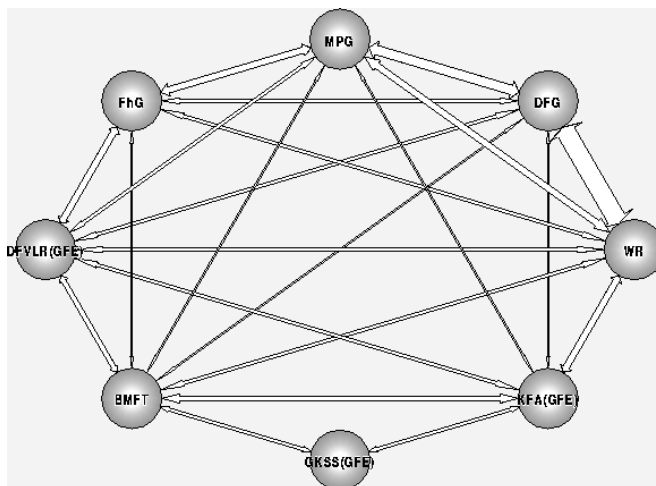
Structuri de date liniare

- Cozi



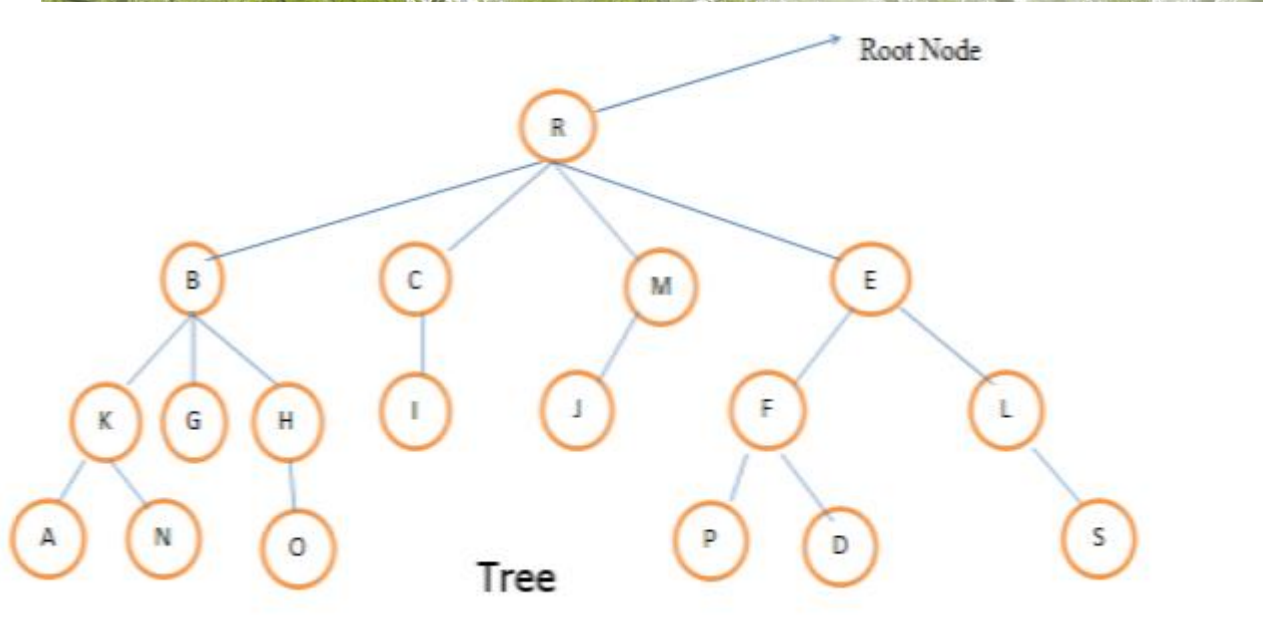
Structuri de date neliniare

Grafuri



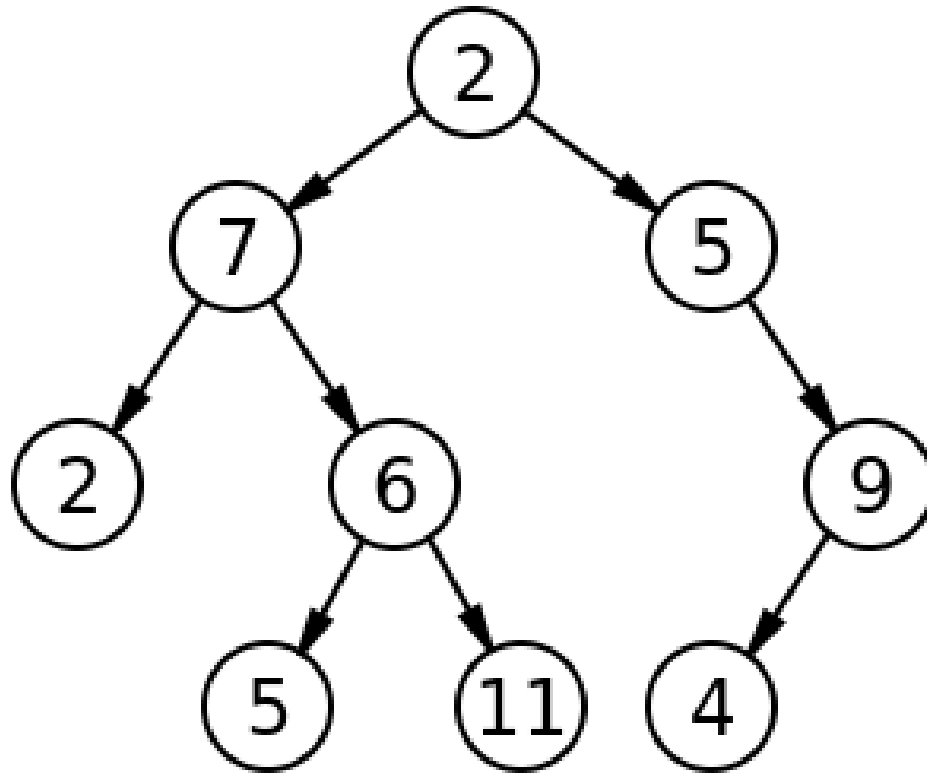
Structuri de date neliniare

Arbori



Structuri de date neliniare

Arbori
binari



Continutul cursului (partea a II-a)

► Algoritmi

– Analiza algoritmilor

Metode de analiza a eficientei algoritmilor;

Complexitatea algoritmilor

◦ Algoritmi de sortare

Sortare prin numarare; Sortare prin inserare;

Bubblesort; Quicksort; Sortare prin selectie;

Mergesort; Heapsort

◦ Algoritmi de cautare

Cautare secventiala; Cautare binara;

Cautare si inserare in arbori binari de cautare;

BIBLIOGRAFIE RECOMANDATA

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- Knuth D. E. *Arta programării calculatoarelor*, vol.1, *Algoritmi fundamentali*, Editura Teora, București, 2002
- Knuth D.E., *Arta programarii calculatoarelor*, V3. Sortare si cautare, Editura Teora, 2002.
- Cormen T.H, Leiserson C.E., Rivest R.L., Stein C, *Introduction to Algorithms*, The MIT Press, 2001
- Daniela Joita, *Programare procedurala*, Editura Titu Maiorescu, 2009
-multe alte surse bibliografice de pe Web

Donald E. Knuth (n. 1938)

Professor Emeritus of
[The Art of Computer Programming](#) at
[Stanford University](#)



Knuth este supranumit “tatal” analizei algoritmilor.
A contribuit la dezvoltarea unor tehnici matematice necesare
unei analize riguroase a complexitatii algoritmilor.
1963 – doctorat in matematica
la [California Institute of Technology](#).

Premii:

- 1971 – primul premiu [ACM Grace Murray Hopper Award](#).
“I have been a happy man ever since January 1, 1990,
when I no longer had an email address. I’d used
Premiul Turing, and it seems to me that 15
years of email is plenty for one lifetime.”
- 1974 – Premiul Turing
- 1995 – Medalia John von Neumann
- 1996 – premiul Kyoto

The Art of Computer Programming

- Initial gandita intr-un singur volum apoi in 7 volume.

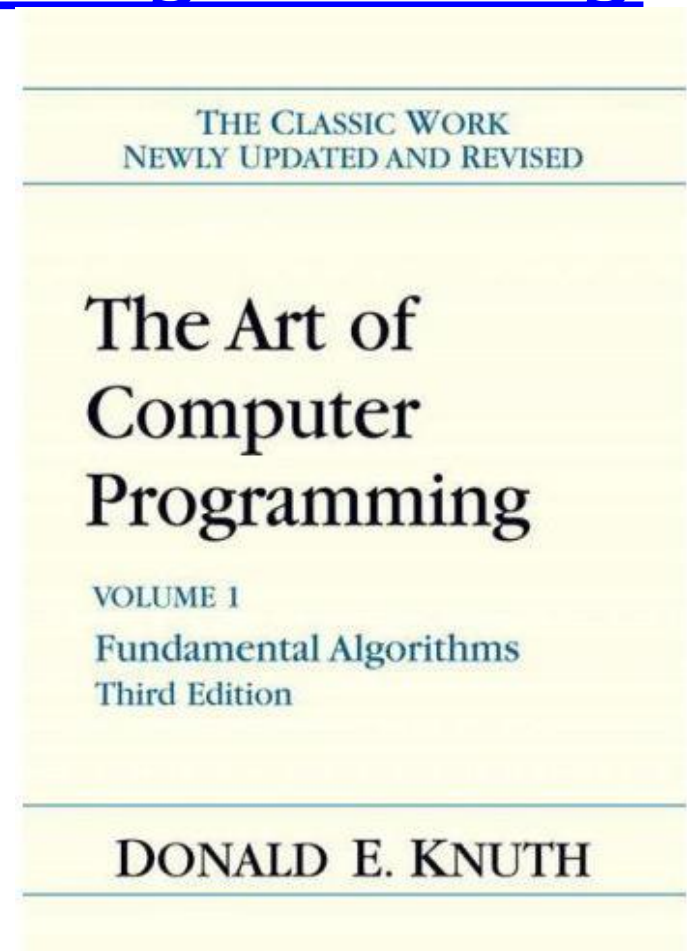
- 1968 vol. 1 *Algoritmi fondamentali*
- 1969 vol. 2 *Algoritmi seminumerici*
- 1973 vol. 3 *Sortare si cautare*

Un prim fascicol al vol. 4 a aparut in 2005, iar prima parte (vol. 4A 883 pag.), *Algoritmi combinatoriali*, a fost publicată in 2011.

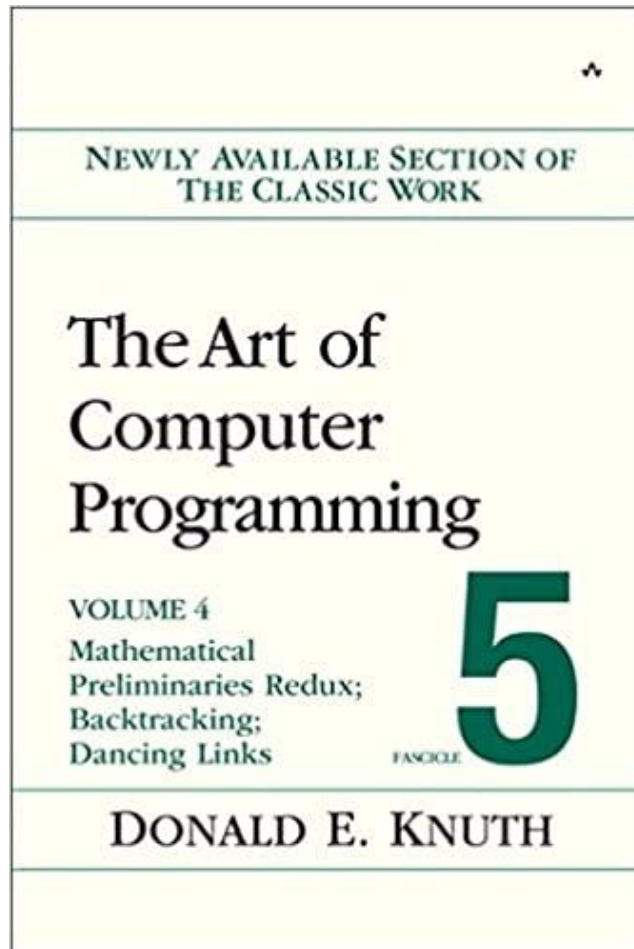
In 2015 a aparut un prim fascicol din vol. 4B.

Vol 5 *Syntactic Algorithms* este in pregatire (estimare 2025)

<https://www-cs-faculty.stanford.edu/~knuth/taocp.html>



https://en.wikipedia.org/wiki/The_Art_of_Computer_Programming



Volume 4 Fascicle 5, Mathematical Preliminaries Redux; Introduction to Backtracking; Dancing Links (2019)

The Art of Computer Programming

- La sfarsitul anului 1999 aceste volume au fost nominalizate de catre *American Scientist* printre cele mai valoroase 12 monografii in stiinte ale secolului XX ("100 or so Books that shaped a Century of Science"), alaturi de carti precum lucrarile lui Einstein despre relativitate.

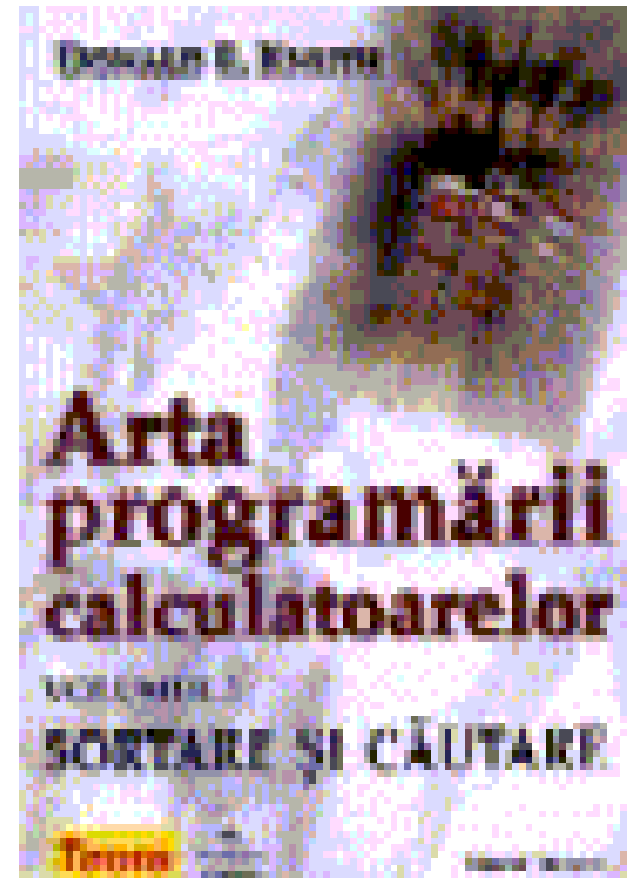



(photo of TAOCP, 1968–2015, by Héctor García-Molina)


<https://cs.stanford.edu/~knuth/taocp.html>

In limba romana

- Knuth D. E. *Tratat de programare al calculatoarelor*, vol 1. Algoritmi fundamentali , Editura Tehnică, 1974
- Knuth D. E. *Tratat de programare al calculatoarelor*, vol 3. Sortare si cautare, Editura Tehnică, 1976
- Knuth D. E. *Tratat de programare al calculatoarelor*, vol 2. Algoritmi seminumerici, Editura Tehnică, 1983
- Knuth D. E. *Arta programării calculatoarelor*, vol.1, *Algoritmi fundamentali*, Editura Teora, București, 2002
- Knuth D. E. *Arta programării calculatoarelor* vol.2, *Algoritmi seminumerici*, Editura Teora, București, 2002.
- Knuth D. E. *Arta programării calculatoarelor*, vol.3, *Sortare și căutare*, Editura Teora, București, 2002
- Knuth D. E. *Generarea tuturor tuplurilor și permutărilor*, Editura Teora, București, 2005



- 
- Pentru fiecare eroare tipografica sau logica gasita in aceste volume, Knuth plateste celui care o descopera \$2.56.
De ce atat?

- Hint: 100 in baza 16?
 - $(100_{(16)} = 256_{(10)})$
 - Pentru ca “256 pennies is one hexadecimal dollar”
- 

Ioan Tomescu

- Profesor univ. dr.
Universitatea din
Bucuresti
Facultatea de matematica
si informatica
- Membru corespondent
al Academiei Romane
(din 2000)

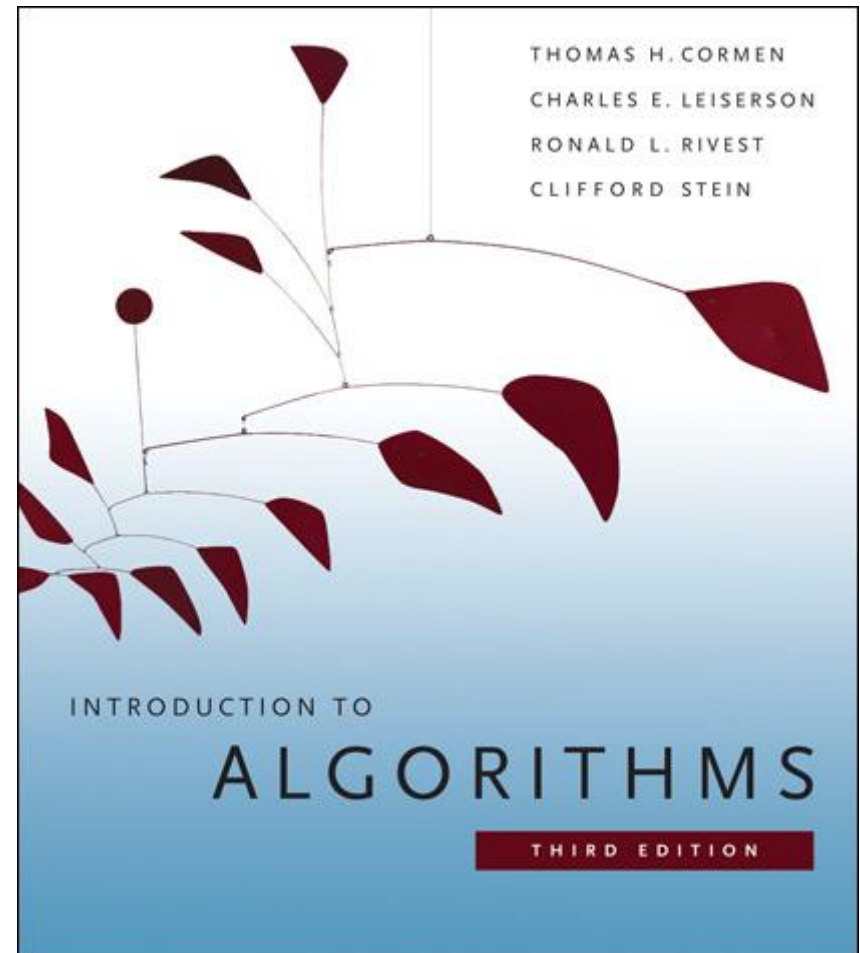


A obtinut urmatoarele premii:

- Premiul Gheorghe Titeica in matematica, (Academia Romana, 1975);
- Premiul pentru matematici aplicate (First Balkan Mathematics Competition for Students and Young Researchers, Bucuresti, 1971);
- Premiul intai si Premiul al doilea, la Olimpiada Nationala de Matematica pentru Studenti, Bucuresti, 1961 si 1962.

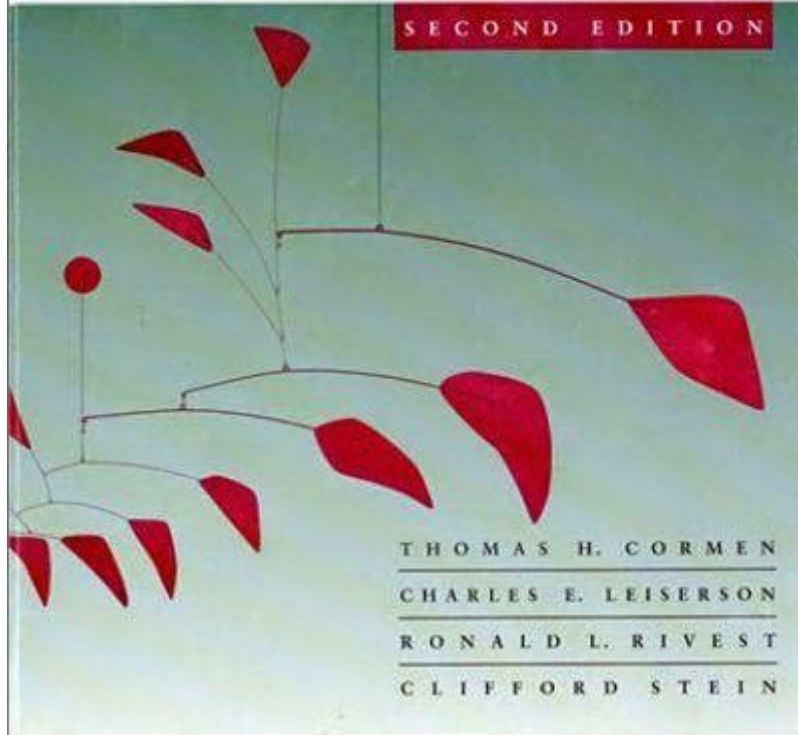
Cartea “alba” a algoritmilor

- Cormen T.H, Leiserson C.E., Rivest R.L., Stein C, *Introduction to Algorithms*, 3rd Ed., The MIT Press, 2009
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2004-
<http://www.byblos.ro/>
- In format electronic ...



INTRODUCTION TO
ALGORITHMS

SECOND EDITION



THOMAS H. CORMEN
CHARLES E. LEISERSON
RONALD L. RIVEST
CLIFFORD STEIN

Introduction to Algorithms, Fourth Edition

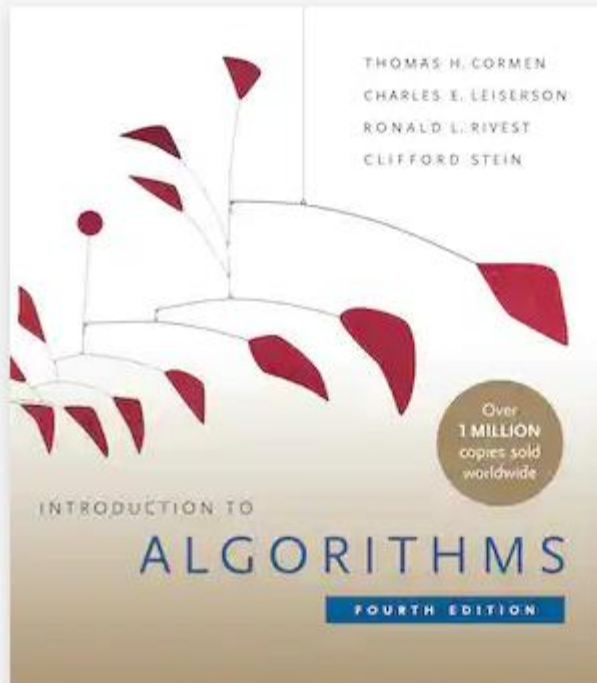
By Thomas H. Cormen, Charles E. Leiserson,
Ronald L. Rivest and Clifford Stein

1312 pp., 8 x 9 in, 231 color illus.

Hardcover

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Published: April 5, 2022



Tema 1

- Cine a fost Alan Turing
si de ce e supranumit
parintele informaticii
teoretice (computer
science)?

