

MC202: Data Structures

Since 2011.

Prerequisite: MC102

Description:

Basic structures for information representation: lists, trees, graphs and their generalizations. Algorithms for construction, querying and manipulation of such structures. Development, implementation and tests of programs using such structures in specific applications.

Programme:

1. Linked structures: node, pointer, pointer variable, memory dynamic allocation
2. Singly linked list: basic operations
3. Comparison of linked list with vectors
4. General algorithms for singly linked lists: enumeration, inversion, copy, concatenation
5. Stacks, queues and their applications (including elimination of recursion)
6. Merge of lists and mergesort: informal analysis
7. Variations: headed circular lists, headed doubly linked lists, free lists
8. Sorting algorithms
9. Binary trees: representation and traversal (recursive)
10. Application: search trees (insertion and deletion)
11. Balanced search binary trees
12. Heap: implementation with array and heapsort
13. General trees: definition, representation with lists, traversal
14. Generalized lists and its use to represent linked structures in general
15. B-trees and generalizations
16. Introduction to hashing: concept, implementation with linked lists. Hashing techniques for files
17. Graphs: concept, representations by matrices and linked lists
18. Graph traversal in width and depth
19. Implementation of data structures in disk

Recommended Literature:

- I. A. V. Aho, J. E. Hopcroft, J. Ullmann. Data Structures and Algorithms. Addison-Wesley, 1983
- II. W. Celes, R. Cerqueira, J. L. Rangel. Introdução a Estruturas de Dados. Campus, 2004
- III. T. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein. Algoritmos - Teoria e Prática. Campus, 2002
- IV. M. J. Folk and B. Zoellick. File Structures. Addison-Wesley, 1992
- V. F. Lorenzi, P. N. de Mattos, T. P. de Carvalho. Estruturas de Dados. Thomson, 2007
- VI. S. L. Pereira. Estruturas de Dados Fundamentais. Érica, 1996
- VII. E. M. Reingold and W. J. Hanson, Data Structures. Little-Brown (1983)
- VIII. R. Sedgewick, Algorithms in C. Addison-Wesley ,1990

- IX. J. L. Szwarcfiter and L. Markenzon. Estruturas de Dados e Seus Algoritmos. Editora LTC (1994)
- X. D. E. Knuth, The Art of Computer Programming, Vol I: Fundamental Algorithms. Addison-Wesley (1978)
- XI. N. Wirth, Algorithms + Data Structures = Programs. Prentice-Hall (1976)
- XII. A. M. Tenenbaum. Estruturas de Dados Usando C. Makron Books, 1995
- XIII. N. Ziviani. Projeto de Algoritmos. Thomson, 2004
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