About Data-Structures & Algorithms

***Source*:** https://www.synergisticit.com/data-structures-and-algorithms/

>> What are they—i.e., DSs?
Linear and non-linear ways of organizing data.
>>> Linear: arrays, queues, linked-lists, stacks.
>>> Non-linear: sets, trees, graphs, and tables.

>> Types of DS—i.e. linear and non-linear—add details (!):
>>>—Linear: 1—Arrays, 2—stacks, 3—linked-lists, and 4—queues.
>>>—Non-linear: 1—Trees, 2—graphs, 3—tables, 4—sets.

>> Definition of algos;
A set of well-defined steps for solving a problem.

>> The seven key algos to learn;
1)—Sort, 2)—Search, 3)—Hashing, 4)—Dynamic programming, 5)—Binary exponentiation, 6)—String matching and parsing, and 7)—Primality testing.

>> Rel'n between algos and DSs;

Part A:

>>> Search: Helps w- finding an item in a data-structure;
>>> Insert: Inserting an item into a data-structure;
>>> Sort: Helps to sort/arrange items in a specific order;
>>> Update: For updating an existing item in a data structure;
>>> Delete: Deleting an existing item in a data structure.

Part B: Three main supra-elements and their constituent elements.

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                                    +>>_>> —> (Under Program) a.I—Data-Structure > a.I.i—ADT > Domain
                                                 ————————> (Under Domain) Data-Element
                                                 ————————> (Under Domain) Organization

                                    +>>_>> —> (Under Program) a.I—Data-Structure > a.I.i—ADT > Function
                                                                                    +—> (Under Data-Structure)—a.I.ii—Implementation
>>> —a—Program————————+
                                                 +>>_>> (Under Program) a.II—Algorithm


>>> —b—Data-Element
        >>_>> b.I—Simple
        >>_>> b.II—Compound


>>> —c—Function
        >>_>> c.I—Access
        >>_>> c.II—Modification


                                                          +>>_>> (Under Organization) d.I—Linear > d.I.i—Restricted
                                                                —> (Under Organization) Linear > d.I.ii—Unrestricted
>>> —d—Organization————————+
                                                          + >>_>> (Under Organization) d.II—Non-Linear
                                                                       +>>_>> (Under Non-Linear) d.II.i—Tree
                                                                       +>>_>> (Under Non-Linear) d.II.ii—Graph
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>> Related Useful topics:

1. >>>—Their potential roles in general problem solving
2. >>>—Types of DS
3. >>>—Techniques for designing algos
4. >>>—Sorting data via bubble-sort
5. >>>—Linear search
6. >>>—Selection-sort
7. >>>—Binary search
8. >>>—Shell-sort
9. >>>—Dynamic memory-allocation
10. >>>—Insertion of node into a linked list
11. >>>—Traversing a doubly-linked list
12. >>>—Implementing a circular linked list
13. >>>—Merge sort
14. >>>—Addition of polynomials via linked lists
15. >>>—Implementation of stacks via arrays
16. >>>—‘’ via linked lists
17. >>>—Queue operations
18. >>>—Implementation of queues via arrays
19. >>>—Hashing
20. >>>—Storage via trees
21. >>>—Binary search trees
22. >>—Indexation and definition of threaded binary trees
23. >>>—Height-balanced trees
24. >>>—Storing data in graphs