



Data Structure and Algorithms Tutorial

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Data Structures are the programmatic way of storing data so that data can be used efficiently. Almost every enterprise application uses various types of data structures in one or the other way. This tutorial will give you a great understanding on Data Structures needed to understand the complexity of enterprise level applications and need of algorithms, and data structures.

Why to Learn Data Structure and Algorithms?

As applications are getting complex and data rich, there are three common problems that applications face now-a-days.

- **Data Search** – Consider an inventory of 1 million(10^6) items of a store. If the application is to search an item, it has to search an item in 1 million(10^6) items every time slowing down the search. As data grows, search will become slower.
- **Processor speed** – Processor speed although being very high, falls limited if the data grows to billion records.
- **Multiple requests** – As thousands of users can search data simultaneously on a web server, even the fast server fails while searching the data.

To solve the above-mentioned problems, data structures come to rescue. Data can be organized in a data structure in such a way that all items may not be required to be searched, and the required data can be

searched almost instantly.

Applications of Data Structure and Algorithms

Algorithm is a step-by-step procedure, which defines a set of instructions to be executed in a certain order to get the desired output. Algorithms are generally created independent of underlying languages, i.e. an algorithm can be implemented in more than one programming language.

From the data structure point of view, following are some important categories of algorithms –

- **Search** – Algorithm to search an item in a data structure.
- **Sort** – Algorithm to sort items in a certain order.
- **Insert** – Algorithm to insert item in a data structure.
- **Update** – Algorithm to update an existing item in a data structure.
- **Delete** – Algorithm to delete an existing item from a data structure.

The following computer problems can be solved using Data Structures –

- Fibonacci number series
- Knapsack problem
- Tower of Hanoi
- All pair shortest path by Floyd-Warshall
- Shortest path by Dijkstra
- Project scheduling

Audience

This tutorial is designed for Computer Science graduates as well as Software Professionals who are willing to learn data structures and algorithm programming in simple and easy steps.

After completing this tutorial you will be at intermediate level of expertise from where you can take yourself to higher level of expertise.

Prerequisites

Before proceeding with this tutorial, you should have a basic understanding of C programming language, text editor, and execution of programs, etc.