

# Data Structures & Algorithms - Overview

Advertisements



⬅ Previous Page

Next Page ➡

Data Structure is a systematic way to organize data in order to use it efficiently. Following terms are the foundation terms of a data structure.

**Interface** – Each data structure has an interface. Interface represents the set of operations that a data structure supports. An interface only provides the list of supported operations, type of parameters they can accept and return type of these operations.

**Implementation** – Implementation provides the internal representation of a data structure. Implementation also provides the definition of the algorithms used in the operations of the data structure.

## Characteristics of a Data Structure

**Correctness** – Data structure implementation should implement its interface correctly.

**Time Complexity** – Running time or the execution time of operations of data structure must be as small as possible.

**Space Complexity** – Memory usage of a data structure operation should be as little as possible.

## Need for Data Structure

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.

## Execution Time Cases

There are three cases which are usually used to compare various data structure's execution time in a relative manner.

**Worst Case** – This is the scenario where a particular data structure operation takes maximum time it can take. If an operation's worst case time is  $f(n)$  then this operation will not take more than  $f(n)$  time where  $f(n)$  represents function of  $n$ .

**Average Case** – This is the scenario depicting the average execution time of an operation of a data structure. If an operation takes  $f(n)$  time in execution, then  $m$  operations will take  $mf(n)$  time.

**Best Case** – This is the scenario depicting the least possible execution time of an operation of a data structure. If an operation takes  $f(n)$  time in execution, then the actual operation may take time as the random number which would be maximum as  $f(n)$ .

## Basic Terminology

**Data** – Data are values or set of values.

**Data Item** – Data item refers to single unit of values.

**Group Items** – Data items that are divided into sub items are called as Group Items.

**Elementary Items** – Data items that cannot be divided are called as Elementary Items.

**Attribute and Entity** – An entity is that which contains certain attributes or properties, which may be assigned values.

**Entity Set** – Entities of similar attributes form an entity set.

**Field** – Field is a single elementary unit of information representing an attribute of an entity.

**Record** – Record is a collection of field values of a given entity.

**File** – File is a collection of records of the entities in a given entity set.

[⬅ Previous Page](#)[Next Page ➡](#)

## Advertisements

An advertisement for Ultra Librarian. It features a red vertical banner on the left with the text "Search Less Find More" in white. To the right, there's a black rectangular area with white text that reads "Comprehensive Part Data and Verified PCB Libraries". Below this, a grey button-like shape contains the text "Find Your Parts Fast >". At the bottom, there's a red-tinted image of a PCB with the "Ultra Librarian" logo in the bottom right corner. The logo consists of a red square with a white 'U' inside, followed by the text "Ultra Librarian".[Privacy Policy](#) [Cookies Policy](#) [Contact](#)

© Copyright 2019. All Rights Reserved.

Enter email for newsletter

go