

Data Structures in Java

Module 1: Introduction to Data Structures

- What are Data Structures?
- Importance of Data Structures

Module 2: Overview of Java Programming

- Variables, Data Types, and Operators
- Control Structures (if, else, loops)
- Functions and Methods

Module 3: Arrays in Java

- Declaring and Initializing Arrays
- Accessing Array Elements
- Array Operations and Manipulation

Module 4: Linked Lists

- Singly Linked Lists
- Doubly Linked Lists
- Implementing Linked Lists in Java

Module 5: Stacks

- Basics of Stacks
- Stack Operations (push, pop, peek)
- Implementing Stacks in Java

Module 6: Queues

- Basics of Queues
- Queue Operations (enqueue, dequeue, peek)
- Implementing Queues in Java

Module 7: Trees

- Introduction to Trees
- Binary Trees
- Binary Search Trees (BST)

Module 8: Graphs

- Basics of Graphs
- Graph Representations (adjacency matrix, adjacency list)
- Traversing Graphs (DFS and BFS)

Module 9: Hashing

- Introduction to Hashing
- Hash Functions
- Hash Tables and Collision Resolution

Module 10: Heaps

- Basics of Heaps
- Min Heaps and Max Heaps
- Heap Operations

Module 11: Sorting Algorithms

- Bubble Sort, Selection Sort, Insertion Sort
- Merge Sort and Quick Sort
- Radix Sort or Bucket Sort

Module 12: Searching Algorithms

- Linear Search and Binary Search
- Hash based Searching
- Searching in Trees and Graphs

Module 13: Time and Space Complexity Analysis

- Big O Notation
- Analyzing Data Structure and Algorithm Efficiency