

Data Structure and Algorithms Lab

Lab Program 8

1. Design and implement a Java program to sort a list of numbers using both **Selection Sort** and **Insertion Sort** algorithms. The program should allow the user to input an array of elements, apply each sorting technique separately, and display the array before and after sorting for both methods. After implementing the algorithms, analyze and find the **time complexity** of Selection Sort and Insertion Sort.
- 2.
3. Design and implement a Java program to sort a list of numbers using the **Heap Sort algorithm**. The program should allow the user to input an array of elements, build a binary heap (max-heap or min-heap as required), and then perform the heap sort operation to arrange the elements in sorted order. The program should display the array before and after sorting and demonstrate how elements are extracted from the heap to achieve the final sorted list. After implementing the algorithm, analyze and find the **time complexity** of Heap Sort.
4. Design and implement a Java program to perform **Topological Sorting** on a **Directed Acyclic Graph (DAG)**. The program should allow the user to input the number of vertices and edges, build the directed graph, and then generate a valid topological ordering of the vertices. The program should display the adjacency representation of the graph and the resulting topological order. After implementation, analyze and find the **time complexity** of the topological sorting algorithm.