NEW HORIZON
COLLEGE OF ENGINEERING

Department of Electrical and Electronics Engineering

A brief report of Webinar

Advanced data structure

Resource Person: Mr. S. Sathish, Project Engineer, Pantech E-Learning

DATE: 25.11.2024

Introduction

The webinar on ***Advanced Data Structures*** was organized by New Horizon College of Engineering EEE Department on 23.11.24(Saturday) , with Mr. S. Sathish, Project Engineer at Pantech E-Learning, serving as the resource person. The session aimed to provide an in-depth understanding of advanced concepts in data structures, focusing on their applications, optimizations, and usage in solving complex problems in software development.

Key Highlights

1. **Introduction to Advanced Data Structures**
   - Mr. Sathish began the webinar by revisiting the fundamentals of basic data structures like arrays, linked lists, stacks, and queues, before delving into more advanced structures.
   - He emphasized the importance of choosing the right data structure for optimizing performance and memory usage in real-world applications.
2. **Detailed Exploration of Key Data Structures**
   - **Trees**: Mr. Sathish discussed various types of trees, including binary trees, binary search trees (BST), AVL trees, and heaps. He explained how these structures are used in organizing hierarchical data and supporting efficient search, insertion, and deletion operations.
   - **Graphs**: The webinar explored graph representations (adjacency matrix, adjacency list) and algorithms such as DFS (Depth First Search) and BFS (Breadth First Search). Mr. Sathish highlighted their applications in real-world problems like network routing and social network analysis.
   - **Tries**: He also introduced the concept of Tries and explained their use in fast searching, particularly in applications such as autocomplete and dictionary search.
   - **Hash Tables**: Mr. Sathish explained hash tables and their efficiency in search operations, addressing common issues such as collisions and providing techniques like chaining and open addressing.
3. **Complexity Analysis**
   - The resource person emphasized the importance of time and space complexity analysis for choosing optimal data structures. He discussed the computational complexities of operations on trees, graphs, and hash tables, making sure attendees understood how these affect performance in large-scale applications.

4. **Applications of Advanced Data Structures**
    - Mr. Sathish illustrated the practical use of advanced data structures in various domains like machine learning, databases, network algorithms, and operating systems.
    - Case studies were presented to demonstrate how data structures like AVL trees and graphs are used in problems like database indexing and network flow analysis.
5. **Optimization Techniques**
    - Techniques for optimizing operations on complex data structures were covered, including balancing trees (e.g., AVL, Red-Black Tree) and using efficient graph traversal algorithms.
    - He also addressed space-time trade-offs in choosing between different data structures and algorithms.

Audience Interaction

- Throughout the session, attendees actively participated by asking questions regarding the implementation and performance of various data structures in different programming languages (such as C, C++, and Python).
- Mr. Sathish provided clarifications on common misunderstandings related to complex algorithms and data structure design principles.

Conclusion

The webinar provided a comprehensive overview of advanced data structures and their critical role in solving real-world computational problems. Mr. Sathish's in-depth knowledge and practical insights helped participants gain a deeper understanding of both the theoretical and applied aspects of data structures.

This session was highly beneficial for students, researchers, and professionals looking to enhance their understanding of complex data structures and algorithms in programming.

: