J.B. INSTITUTE OF ENGINEERING&TECHNOLOGY

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BhaskarNagar, Yenkapally(V), Moinabad(M), P.O. Himayathnagar, R.R. District, Hyderabad-5000075.

Department of Information Technology

Guest Lecture on

"Advanced Tree Data Structures: AVL, Red-Black, and B-Trees"

Date: 19th April 2025

B.Tech - II Year - II Sem

A.Y: 2024 - 2025

Coordinators

Mr. J.Bharath Kumar, Assistant Professor Mr. U. Karthik, Assistant Professor

Convener

Dr. Ramesh Babu Associate Professor & Head of the Department

Circular

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BhaskarNagar, Yenkapally(V), Moinabad(M), P.O. Himayathnagar, R.R. District, Hyderabad-5000075.

DEPARTMENT OF INFORMATION TECHNOLOGY

DATE: 11 - 04 - 2025

CIRCULAR

This is to inform all II Year students that the Department of Information Technology is organizing a Guest Lecture on "Advanced Tree Data Structures: AVL, Red-Black, and B-Trees" on 19-04-2025 (Wednesday). The Expert Lecture will be conducted in Room No: 126 from 9:30 am onwards.

Dr. Pavan will be the resource person for the Guest Lecture, and is aimed at enhancing students' understanding of Advanced Tree Data Structures: AVL, Red-Black, and B-Trees.
All Students are requested to attend and make the event a grand success.

Signature of Coordinator

Signature of HOL

PREAMBLE

In the realm of data structures, trees form the backbone of many efficient algorithms and systems. As applications scale and the need for high-performance data operations grows, basic binary trees often fall short in maintaining optimal time complexities. This is where advanced tree data structures come into play.

This module/session on Advanced Tree Data Structures: AVL, Red-Black, and B-Trees delves into self-balancing and multi-way trees that ensure efficient data retrieval, insertion, and deletion, even under heavy workloads. These structures are foundational in databases, file systems, memory management, and many other domains requiring predictable and balanced performance.

Participants will explore:

- The AVL Tree, known for its strict balancing and guaranteed O(log n) operations.
- The Red-Black Tree, a more flexible self-balancing tree widely used in standard libraries (e.g., Java's TreeMap, C++ STL).
- The B-Tree, a multi-way tree optimized for systems that read and write large blocks of data, making it ideal for disk-based storage and indexing.

A Glimpse of the Event

Welcome to "Advanced Tree Data Structures: AVL, Red-Black, and B-Trees", an in-depth session designed for learners and professionals looking to deepen their understanding of balanced and efficient data structures.

In this event, we take a closer look at three of the most important tree-based data structures that power the backbone of modern computing systems:

- AVL Trees Pioneers in self-balancing binary search trees, ensuring strict height balance and consistent performance.
- Red-Black Trees Widely adopted in standard libraries for their flexible balancing and guaranteed logarithmic operations.
- B-Trees The go-to data structure for databases and file systems, optimized for systems that read and write large blocks of data.

This session is designed to help you:

- Grasp the underlying principles and operations of advanced trees.
- Learn real-world use cases where these trees provide a performance edge.
- Implement and compare these structures to understand their strengths and trade-offs.

Event Poster/Banner



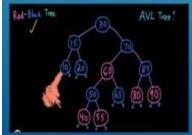
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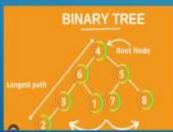
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BhaskarNagar, Yenkapally(V), Moinabad(M), P.O. Himayathnagar, R.R. District, Hyderabad-5000075.

DEPARTMENT OF INFORMATION TECHNOLOGY
GUEST LECTURE ON
"ADVANCED TREE DATA STRUCTURES: AVL, RED-BLACK,
AND B-TREES"

19TH APRIL 2025, 9:30 AM TO 12:20 VENUE : JBIET, HYD

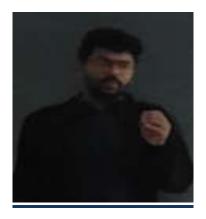






Mr.K. Pavan
Data Integration Specialist
Wave Tronic Solutions

Resource Person Profile



Pavankumar – Data Integration Specialist

Wave Tronic Solutions

Profile Summary:

Pavan Kumar is a skilled Data Integration and ETL professional with hands-on experience in Informatica Power Center 10.x, Informatics Intelligent Cloud Services (IICS), and enterprise databases including Oracle, SQL Server, and Snowflake. With a strong foundation in data warehousing, ETL design, and performance optimization, Pavankumar specializes in building scalable and efficient data pipelines that support business intelligence and analytics platforms.

Currently working at Wave Tronic Solutions, Pavankumar has contributed to various end-to-end data integration projects across domains such as finance, healthcare, and retail, helping organizations streamline their data management processes and enable real-time insights.

Event Outcome

By the end of this program, participants will be able to:

Understand the Need for Balanced Trees

 Recognize the limitations of standard binary search trees and the importance of self-balancing trees for maintaining optimal performance.

Explain the Theory Behind AVL, Red-Black, and B-Trees

Describe the structural properties, balancing mechanisms, and use cases of AVL Trees, Red-Black Trees,
 and B-Trees.

Implement Tree Operations in Code

• Perform insertion, deletion, and search operations in AVL Trees, Red-Black Trees, and B-Trees using Java, C++, or another programming language.

Compare and Contrast Tree Structures

• Evaluate the trade-offs between AVL and Red-Black Trees (e.g., balance vs. performance), and understand where B-Trees are preferred over binary trees.

Apply Trees to Real-World Problems

• Use advanced trees in practical scenarios such as memory indexing, database indexing, file systems, and compiler design.

Analyze Time and Space Complexity

• Assess the performance of various tree operations and understand how balance affects efficiency in worst-case and average-case scenarios.

Photos of the Event



Fig 1: Resource person Mrs. Pavan addressing the Students



Fig 2: Students assembled in the Class for the Gue Lecture



Fig 3: Faculty Coordinator addressing the Resource Person

Attendance Sheet

Date : 19/04/25

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY Advanced Tree Dada II B. Tech- I Sem IT(A) - 2023 Batch - (2024-25) Btuckers: AVL, Red - Black, Information Technology (Branch code: INF) and B-Tree

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3	23671A1203	BALLI ABHINAV	- blai
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Information Technology (Branch code: INF)

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50	23671A1252	BAI SRAVANI	
51	23671A1253	BANDARAM BINDHU	-6 ×
52	23671A1254	BANOTHU GANESH	
53	23671A1255	BATHULA SHESHADRI	
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56	23671A1258	BONTHA VASUDEVA	contact
57	23671A1259	BORRA VARUN DARAM TEJ	
58	23671A1260		Shandsho
59	23671A1261	CHENAMONI SAICHARAN	- Land
60	23671A1262	CODDA MURALI	
61	23671A1263	DAHMAN BIN MOOSA	
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73	23671A1275	KALVAKUNTA VINAY KUMAR	
74	23671A1276	KAMTAM ISHWARYA	guen
75	23671A1277	KATIPALLY AARADHYA REDDY	
76	23671A1278	KAVALI MANI KUMAR	
77	23671A1279	KETHAVATH SRIDHAR NAIK	
78	23671A1280	KOTHURI ADITHYA	Alberga
	23671A1281	LOKA SHRUTHIN REDDY	
79	23671A1282	MACCHITTI MAHESH	Mahesh
80	23671A1283	MALA NARESH	
81		MAYANK KUMAR DUBEY	
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33	23671A1285	NAMPALLY AKSHAYA	
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1	23671A1293	SOURLA SAI KUMAR	
2	23671A1294	SRIPELLI SAINIVAS	
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