



J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC Autonomous

Accredited by NBA & NAAC, Approved by AICTE & Permanently Affiliated to JNTUH

Bhaskar Nagar, 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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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 HOD

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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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 Guest Lecture



Fig 3: Faculty Coordinator addressing the Resource Person

Attendance Sheet

Date: 19/04/25

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY Advanced Tree Data

II B.Tech- I Sem IT(A) - 2023 Batch - (2024-25)

Information Technology (Branch code: INF)

Structures : AVL, Red - Black, and B-Tree

Sl.No.	Roll No.	Name of the Student	
1	23671A1201	AKKALDEVI LAXMAN CHANDRA	Akkanth
2	23671A1202	BALAM DEEKSHA	Deeksha
3	23671A1203	BALLI ABHINAV	Abhinav
4	23671A1204	BANAVATH SRIRAM	Sriram
5	23671A1205	BANDA ABHIRAM	Abhiram
6	23671A1206	BANDI SAI SHARANYA	Sai
7	23671A1208	BODDUPALLY SAIBHARGAVI	Saibhargavi
8	23671A1209	BOINA VENKAT SAI	Venkat Sai
9	23671A1210	CHANDAKA PAVAN SAI	Pavan Sai
10	23671A1211	D HASINI	Hasini
11	23671A1212	DASARI NAVYA TEJA YADAV	Navya
12	23671A1213	EDLA ANIRUDH	Anirudh
13	23671A1214	ELASAGARAM RAMESH	Ramesh
14	23671A1215	ELETI SAHASRA REDDY	Sahasra
15	23671A1216	G JASWANTH VEER	Jaswanth
16	23671A1217	G RAMESH	Ramesh
17	23671A1218	GADDE CHARAN	Charan
18	23671A1219	INDURI PRAKASH	Prakash
19	23671A1220	JINUGU SAMBASHIVA REDDY	Sambashiva
20	23671A1221	KANJARLA PAVANI	Pavani
21	23671A1222	KATPALLY CHARAN	Charan
22	23671A1223	KETHAVATH SRINIVAS	Srinivas
23	23671A1225	KONDA VARUN	Varun
24	23671A1226	KUMMARI SHIVA PRASAD	Shiva
25	23671A1227	MADAGOWNI GANESH GOUD	Ganesh
26	23671A1228	MALADODDI ABHINAV BENNY	Abhinav
27	23671A1229	MEKA GOUTHAM	Goutham
28	23671A1230	MOHAMMED AKIF UDDIN	Akif
29	23671A1231	MOHAMMED AOILUDDIN	Aoil
30	23671A1232	MOHAMMED ZAIN	Zain
31	23671A1233	MOTHUKURI VENU	Venu
32	23671A1234	MULA USHASHREE	Usha
33	23671A1235	NARIGE ABHINAV	Abhinav
34	23671A1236	ORAGANTI SRINATH	Srinath
35	23671A1237	PENDEM MANISH	Manish
36	23671A1238	POOLLA CHETHANANANTH	Chethan
37	23671A1239	POSA VISHAL	Vishal
38	23671A1240	PULAPALLY GUNASHEKAR	Gunasekar
39	23671A1241	RAHMATH ALAM	Rahmath
40	23671A1242	RAJABOYINA Koushik YADAV	Koushik
41	23671A1243	SHASHANK KASALA	Shashank
42	23671A1244	SHATTAMONI TAMESHWAR	Tameshwar
43	23671A1245	SHRAWAN KAVITHA	Kavitha
44	23671A1246	THADAGAM NAVEEN	Naveen
45	23671A1247	THOTAKURA ARJUN SHIVARAM GOUD	Arjun
46	23671A1248	VANGALA JANAPRIYA	Janapriya
47	23671A1249	VUPPALA ANJANI	Anjani
48	23671A1250	ZAFIRA FATIMA NAYEEM	Fatima

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
II B.Tech- I Sem IT(B) - 2023 Batch - (2024-25)
Information Technology (Branch code: INF)

Sl.No.	Roll No.	Name of the Student	
49	23671A1251	AGIRISHETTY SHIVA KUMAR	
50	23671A1252	BAI SRAVANI	
51	23671A1253	BANDARAM BINDHU	
52	23671A1254	BANOTHU GANESH	
53	23671A1255	BATHULA SHESHADRI	
54	23671A1256	BATTU TARUN	Battu Tarun
55	23671A1257	BHUKYA VINOD KUMAR	
56	23671A1258	BONTHA VASUDEVA	Sarathy
57	23671A1259	BORRA VARUN DARAM TEJ	
58	23671A1260	CHELLAM BHAVYA JYOTHI	Bhavya Jyo
59	23671A1261	CHENAMONI SAICHARAN	
60	23671A1262	CODDA MURALI	
61	23671A1263	DAHMAN BIN MOOSA	
62	23671A1264	DODDIKINDI SHREYA	Shreyen
63	23671A1265	ETIKALA KARISHMA	Karishma
64	23671A1266	GADDAMIDA JYOTHIKA	
65	23671A1267	GANDHASIRI SURYA PRAKASH	
66	23671A1268	GUNDEDI SRAVYA REDDY	
67	23671A1269	HANUMANTHU VAMSI	
68	23671A1270	INDROJU SRI VAMSHI KUMAR	Sri Vamshi
69	23671A1271	J EVANGEELINA	
70	23671A1272	JAIDEEP REDDY ETIKALA	
71	23671A1273	JAKKALA NANDU	Nandu
72	23671A1274	DEVARKONDA SHARATH CHANDRA	
73	23671A1275	KALVAKUNTA VINAY KUMAR	
74	23671A1276	KAMTAM ISHWARYA	Shyam
75	23671A1277	KATIPALLY AARADHYA REDDY	
76	23671A1278	KAVALI MANI KUMAR	
77	23671A1279	KETHAVATH SRIDHAR NAIK	
78	23671A1280	KOTHURI ADITHYA	Aditya
79	23671A1281	LOKA SHRUTHIN REDDY	Shruthin
80	23671A1282	MACCHITTI MAHESH	Mahesh
81	23671A1283	MALA NARESH	
82	23671A1284	MAYANK KUMAR DUBEY	
83	23671A1285	MULASTHAM VINUTHNA	Vinuthna
84	23671A1286	NAMPALLY AKSHAYA	
85	23671A1287	R NANDHINI	Randhini
86	23671A1288	RAJAT PERSHAD	Vikas
87	23671A1289	RAVLAKOLU VIKAS	
88	23671A1290	RUDRARAJU SURAJ VARMA	
89	23671A1291	SATHURI SHIVA KUMAR	
90	23671A1292	SHAIK SAMI UDDIN	Sai
91	23671A1293	SOURLA SAI KUMAR	
92	23671A1294	SRIPELLI SAINIVAS	
93	23671A1295	SRIRAMOJU ROHITHSAI	
94	23671A1296	VADLA BHARGAV CHARY	
95	23671A1297	VELPULA AKSHAYTEJA	
96	23671A1299	YELGAM SANDHYA	Sandhya
97	23671A12A0	YENDURI SAI SHARANYA	