JAVA TRAINING

Java Data Structures Course

Master Java Data Structures to optimize algorithms and build efficient applications. Learn to implement crucial data types and solve complex programming challenges.

DURATION
40 hours

LEVEL
Intermediate

FORMAT
Instructor-Led

- Globally Recognized Certification
- Expert-Led Hands-On Training
- Flexible Scheduling

Computer Pride | 1st Floor, ICEA Building, Kenyatta Avenue, Nairobi | www.computer-pride.co.ke

COURSE OVERVIEW

The Java Data Structures course at Computer Pride is an intermediate-level program designed to equip aspiring and professional developers with a robust understanding of fundamental and advanced data structures using the Java programming language. This comprehensive 40-hour course delves into the core principles of organizing, managing, and storing data efficiently, which is critical for developing high-performance and scalable software applications. Participants will master various data structures, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables, while also gaining proficiency in analyzing algorithm complexity using Big O notation.

Through a blend of theoretical knowledge and hands-on coding exercises, students will learn to implement and apply these data structures effectively in real-world scenarios. The course emphasizes practical problem-solving, teaching you how to choose the right data structure for a given problem and optimize your code for speed and memory usage. By the end of this certification, you will possess the critical thinking and analytical skills required to tackle complex coding challenges, significantly enhancing your ability to design efficient Java-based solutions and excel in technical interviews for software development roles.

Duration	40 hours
Level	Intermediate
Vendor	Java

COURSE CURRICULUM

01 Module 1: Foundations of Data Structures and Algorithmic Analysis

- Introduction to Data Structures and Algorithms
- Review of Java Object-Oriented Programming (OOP) Concepts
- Variables, Control Flow, and Methods in Java
- Big O Notation: Time and Space Complexity Analysis
- Mathematical Foundations for Algorithm Analysis
- Recursion and its applications in Data Structures

02 Module 2: Linear Data Structures

- Arrays and ArrayLists: Implementation and Operations
- Linked Lists: Singly, Doubly, and Circular Linked Lists
- Stacks: LIFO Principle, Array and Linked List Implementations
- Queues: FIFO Principle, Array and Linked List Implementations
- Priority Queues: Concepts and Implementations

03 Module 3: Non-Linear Data Structures - Trees

- Introduction to Trees: Terminology and Types
- Binary Trees: Properties and Implementation
- Binary Search Trees (BST): Operations and Balancing
- AVL Trees and Red-Black Trees (Introduction)
- Heaps: Min-Heap and Max-Heap Implementations
- Tree Traversals: Inorder, Preorder, Postorder, Level Order

04 Module 4: Non-Linear Data Structures - Graphs

- Introduction to Graphs: Terminology and Representations (Adjacency Matrix, Adjacency List)
- Graph Traversals: Breadth-First Search (BFS) and Depth-First Search (DFS)

- Minimum Spanning Trees: Prim's and Kruskal's Algorithms
- Shortest Path Algorithms: Dijkstra's Algorithm
- Introduction to Network Flow (Basic Concepts)

05 Module 5: Hashing and Advanced Techniques

- Hashing Concepts: Hash Functions and Collision Resolution
- Hash Tables: Implementation and Performance
- HashMap and HashSet in Java Collections Framework
- Introduction to Sorting Algorithms: Merge Sort, Quick Sort
- Searching Algorithms: Linear Search, Binary Search
- Practical Application: Choosing the Right Data Structure for Real-world Problems

CAREER PATHWAYS

Graduates of this program are prepared for the following roles:

> **Backend Java Developer**

> **Algorithms Engineer**

> **Software Development Engineer in Test (SDET)**

FREQUENTLY ASKED QUESTIONS

Q: What specific Java programming knowledge should I have before enrolling in this Java Data Structures course?

To get the most out of this course, participants should have a solid foundation in core Java programming. This includes proficiency with object-oriented programming (OOP) concepts like classes, objects, inheritance, polymorphism, and interfaces. Familiarity with basic Java syntax, data types, control structures (loops, conditionals), and working with Java collections like ArrayLists is highly recommended. While we briefly review some foundational concepts, the course primarily focuses on the implementation and application of data structures.

Q: How will mastering data structures through this course directly enhance my performance in technical interviews for software development roles?

This course is meticulously designed to sharpen the algorithmic thinking and problem-solving skills highly sought after in technical interviews. By thoroughly understanding and implementing various data structures and their associated algorithms, you will gain the ability to analyze complex problems, determine the most efficient data organization, and write optimized code – key skills assessed in coding challenges and whiteboarding sessions. You'll be well-prepared to articulate your design choices, evaluate time/space complexity, and confidently tackle common interview questions involving trees, graphs, sorting, and searching.

Q: Beyond theoretical understanding, what practical problem-solving skills will I acquire from this course that are directly applicable to building scalable Java applications?

This course goes beyond theory by embedding practical application at its core. You will develop critical decision-making skills in choosing the most appropriate data structure for specific application requirements, directly impacting performance and scalability. You'll learn to identify bottlenecks in existing code, optimize memory usage, and improve execution speed by applying efficient data structures. Furthermore, the hands-on labs will provide experience in implementing these structures, giving you the practical expertise to design and refactor robust, efficient, and maintainable Java-based

solutions for complex business logic.

ABOUT COMPUTER PRIDE

East Africa's Premier IT Training Center

With over 15 years of excellence, Computer Pride delivers globally recognized certification programs from leading technology vendors. Located on Kenyatta Avenue in Nairobi's CBD, our state-of-the-art facilities and expert instructors have empowered thousands of professionals across East Africa.

15+	10,000+	50+
Years of Excellence	Professionals Trained	Vendor Certifications

READY TO ENROL?

Take the next step in your technology career.

Location
1st Flr, ICEA Building
Kenyatta Ave, Nairobi

Email
info@computer-pride.co.ke

Phone
+254 705 900 900

www.computer-pride.co.ke