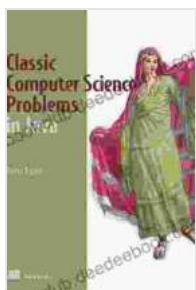# Classic Computer Science Problems in Java: A Comprehensive Guide for Beginners

Classic Computer Science Problems in Java by David Kopec

★★★★☆ 4.8 out of 5

Language	: English
File size	: 4185 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 263 pages

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Welcome to the fascinating world of classic computer science problems! These problems have been studied and refined for decades, serving as fundamental building blocks for countless real-world applications. In this comprehensive guide, we will embark on a journey to solve these problems using the powerful Java programming language, gaining invaluable problem-solving skills and a deeper understanding of computer science concepts.

Problem 1: Fibonacci Sequence

The Fibonacci sequence is a series of numbers where each number is the sum of the two preceding ones. The sequence starts with 0 and 1, and continues as follows: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Here's how to find the nth Fibonacci number in Java:

java public static int fibonacci(int n){if (n Problem 2: Tower of Hanoi

The Tower of Hanoi is a classic puzzle game that involves moving disks of different sizes between three poles. The goal is to move all the disks from the first pole to the last one, following these rules:

- Only one disk can be moved at a time.

- A larger disk cannot be placed on top of a smaller disk.

Here's how to solve the Tower of Hanoi problem in Java:

```
public static void towerOfHanoi(int n, int from, int to, int aux){if (n
```

Problem 3: Sorting Algorithms

Sorting algorithms are used to organize a collection of elements in a specific order. There are various sorting algorithms, each with its strengths and weaknesses. Let's explore two popular ones:

Bubble Sort

```
public static void bubbleSort(int[] arr){for (int i = 0; i arr[j + 1]){s
```

Merge Sort

```
public static void mergeSort(int[] arr, int low, int high){if (low Probl
```

java public static int fibonacciDP(int n){int[] fib = new int[n + 2]; fib[0] = 0; fib[1] = 1; for (int i = 2; i Problem 5: Graph Algorithms

Graph algorithms deal with the study of graphs, which are data structures representing relationships between objects. Here are a couple of common
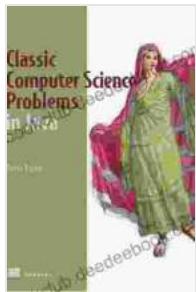
graph problems:

Depth-First Search (DFS)

```
public static void depthFirstSearch(Graph graph, int start){Stack<intege
```

Breadth-First Search (BFS)

java public static void breadthFirstSearch(Graph graph, int start){Queue queue = new Queue(); queue.enqueue(start); visited[start] = true;

while (!queue.isEmpty()){int curr = queue.

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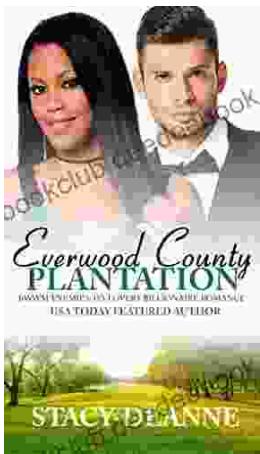
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