Metropolitan University of Tirana
Data Structures
Stacks in Java

6.1   Balanced Parentheses

The balanced parentheses problem is an important problem in computer science because it has a wide range of practical applications, particularly in parsing and compilers. It is used to check the correctness of expressions containing parentheses, such as mathematical expressions, programming code, and markup languages.

Write a Java program to check whether a given expression containing only parentheses is balanced or not using stack data structure.

Example: Input: {()}[]

Output: Balanced

6.2   The Stock Span Problem

The stock span problem is a classic algorithmic problem in which we are given an array of stock prices for a particular stock and we need to calculate the "span" of the stock for each day. The span of a stock for a particular day is defined as the number of consecutive days (including the current day) for which the stock price was less than or equal to the price on the current day.

In other words, the span of a stock price for a given day is the number of days for which the price of the stock was less than or equal to the price on that day, including the current day itself.

Write a Java program to find the stock span for each day of a given stock price using stack data structure.

6.3   The Celebrity Problem

Given a group of people and an array of their acquaintances, write a Java program to find the celebrity in the group (if there is any) using stack data structure. A celebrity is a person who is known by everyone but does not know anyone.

- The program should accept an array of acquaintances as input, where each element is an array of integers representing the acquaintances of a person. The program should find the celebrity (if any) in the group of people using stack data structure.

- A celebrity is defined as a person who is known by everyone but does not know anyone in the group. The program should output the index of the celebrity, if found. If there is no celebrity, the program should output a message saying that there is no celebrity in the group.

- The program should handle cases where the input is invalid, such as when the input array is empty