CS401 Lab 4: Stack Data Structure Implementation

Overview

- This lab is to be completed individually.
- Focus: Understanding and implementing the Stack data structure using an Array.
- Objective: Create a Stack to manage Employee objects read from a file.

Requirements

1. File Input
   - Read employee data from *emp.txt*
   - Each line format: *Name ID* (Name and ID separated by a space)
   - The file contains data for 30 employees

2. Employee Class
   - Create an *Employee* class with:
     - Name (String)
     - ID (int or String, based on input format)
     - Constructor, getters, and *toString* method

3. Stack Implementation
   - Implement a Stack using an Array
   - The Stack should support the following operations:
     - Push: Add an element to the top of the stack
     - Pop: Remove and return the top element from the stack
     - Top: Return the top element without removing it
     - Include appropriate error handling (e.g., for stack overflow or underflow)

4. Main Program
   - Read *emp.txt* and create Employee objects
   - Push each Employee object onto the stack
   - Demonstrate stack operations as follows:
     - Print the top element from the stack
     - Pop two elements from the stack
     - Perform Top operation and print the result
     - Manually push a new Employee and print the top element

5. Code Documentation
   - Include inline comments for all methods and complex code sections
   - Provide a README file with:
     - Description of the program
     - Instructions on how to compile and run the program
     - Explanation of the Stack implementation
     - Command to run the JAR file

Input

- A single text file named "emp.txt"
- Format: One employee per line, "Name ID"

Output

Your program should demonstrate the following operations:

- Print the top element from the initial stack
- Pop and display two elements from the stack
- Display the new top element after the pop operations
- Push a new manually created Employee and display the new top

Submission Requirements

1. Source Code:
    - All .java files (including Employee and Stack classes)
2. Compiled Bytecode:
    - All .class files
3. Output:
    - PDF file containing program output
4. Executable JAR file
5. README file
6. emp.txt (the input file)

Important Notes

- Ensure your Stack implementation uses an Array, not Java's built-in collections
- Test your program thoroughly with the provided emp.txt file
- Pay attention to error handling in your Stack implementation