Assignment 2
Practical Exercises

Advanced Object Oriented Programming - Java

Instructions:

1. Read all instructions.
2. Prepare your algorithms.
3. Write your program code.

Total : _____/70

Practical Exercises : Advanced Object Oriented Programming - Java

For each of the following problems, start by developing the program logic, (Flowchart, or algorithm (pseudocode), then develop each solution in Java code.

1. **Eight Queens**

   A puzzler for chess buffs is the Eight Queens problem, which asks: Is it possible to place eight queens on an empty chessboard so that no queen is “attacking” any other (i.e., no two queens are in the same row, in the same column or along the same diagonal)? For example, if a queen is placed in the upper-left corner of the board, no other queens could be placed in any of the marked squares shown in Fig. 1.

   Solve the problem recursively. [Hint: Your solution should begin with the first column and look for a location in that column where a queen can be placed—initially, place the queen in the first row. The solution should then recursively search the remaining columns. In the first few columns, there will be several locations where a queen may be placed. Take the first available location. If a column is reached with no possible location for a queen, the program should return to the previous column, and move the queen in that column to a new row. This continuous backing up and trying new alternatives is an example of recursive backtracking.]

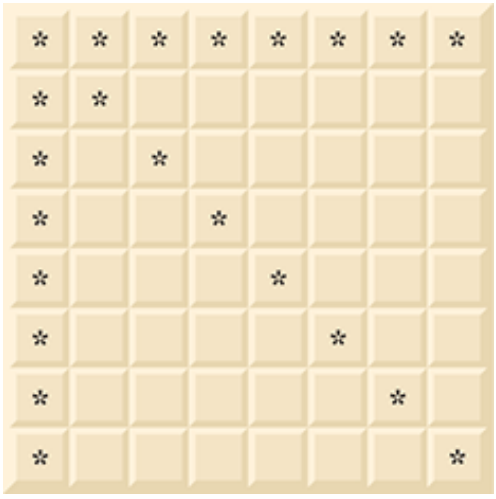

Fig.1 Squares eliminated by placing a queen in the upper-left corner of a chessboard.

2. Recursive File and Directory Manipulation

Using the String-processing capabilities of textbook **Chapter 14** , the file and directory capabilities of **Section 15.3** and a Map **Section 16.10** , create an application that *recursively* walks a directory structure supplied by the user and reports the number of files of each file type (such as .java, .txt, .class, .docx, etc.) that exist in the specified directory path. Display the filename extensions in sorted order. Next, investigate method walk of class the Files. This method returns a stream that walks a directory and its subdirectories and returns the contents to you as a stream. Then, reimplement the first part of this exercise, using lambdas and streams, rather than recursion.

3. Calculating Factorials with Lambdas and Streams

Reimplement the factorial methods of Figs. 18.3 –18.4 in the textbook page 761 to calculate factorials using lambdas and streams, rather than recursion.

Submission requirements:
Your submission must include a document with the logic for each problem in this assignment as well as each problem's source code.

Due Session 12