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**Design Notebook**

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**Max Santomauro**

**Step 1: Problem Statement**

This program is about the decryption of a secret message left by traveling parrots with the use of a 2D array, array lists, queues, and iterators. The purpose is to decrypt a message file using a key grid file and find the parrots.

The file used for this program include:

* **KeyGrid.txt** – contains a key (a bunch of characters) that is used to decode messages.
* **Message1.txt** – contains the 1st secret message.
* **Message2.txt** – contains the 2nd secret message.

**Step 2: Design Sketch**

**A diagram of a program

AI-generated content may be incorrect.**

**Step 3: Pseudocode**

* **Within the Main method**
  + Creates a new File object for each file. The files are **KeyGrid.txt**, **Message1.txt**, and **Message2.txt.**
  + Create a scanner for each file named **keyGridScanner**, **message1Scanner**, and **message2Scanner**.
  + Read the key grid dimension (rows, columns) from the KeyGrid.txt file
  + Create and fill an ArrayList called **characters** with the characters in the file *KeyGrid.txt*
    - *Use while loop with gridKeyScanner.hasNextLine() as condition and charAt() method within loop.*
    - *Make sure to close the scanner file for the key grid.*
  + Create an instance of a **DecodingMachine** object with reference variable named **decodingMachine** that takes in rows and columns
  + Fill the key grid with the characters from the KeyGrid.txt file by using the **fillKeyGrid** method from the **decodingMachine** class.
  + Display the key grid from the KeyGrid.txt file using the **printKeyGrid** method from the **decodingMachine** class.
  + Create queues for both messages named **queue1** and **queue2** to store the KeyGridElement
  + Fill the queue with the message from Message1.txt file using the **fillQueue** method that takes in queue1 and message1Scanner.
  + Create an iterator for Message1.txt file called **message1Decoded** that traverse through the key elements in the queue one by one.
  + Create an iterator for Message1.txt file called **messageDecoded** that traverse through the characters in the queue one by one.
  + Display the coded message for Message1.txt file with messageDecoded.hasNext() as a condition in a while loop
  + Fill the queue with the message from Message1.txt file using the **fillQueue** method that takes in queue2 and message2Scanner.
  + Create an iterator for Message2.txt file called **message2Decoded** that traverse through the key elements in the queue one by one.
  + Use the same **messageDecoded** iterator used for Message1.txt on **Message2.txt** that traverses through the characters in the queue one by one.
  + Display the coded message for Message2.txt file with messageDecoded.hasNext() as a condition in a while loop
    - Make sure to close the scanner for the message file.

* **Outside the Main method within the same class**
  + Create a method called **fillQueue** for filling the queues with the message file values.
    - Fill the queue with hasNextLine method as a condition in a while loop.
* **Outside the class where Main method resides** 
  + Create a class that presents the location (row/column) of one character in the key grid called **KeyGridElement** class
    - Create a private data field of variables called **row** and **column** that represent the element number in the key grid
    - Create a public constructor method that takes in the row and column values and initializes them
    - Create getters for row and Column (there are no setters)
  + Create a class called **DecodingMachine** for decoding secret messages
    - For the private data field:
      * Create a 2D array called **keyGrid** for characters that contain the key to decode messages
      * A variable named **numRows** & a variable named **numCols** to represent the number of rows and columns in the key grid
    - Create a public constructor that takes in numRows and numCols and initializes them
      * Creates a 2D array of characters of size numRows by numCols
    - No getters or setters
    - Create method called **fillKeyGrid** that takes in the the 2D array and fills it with the key used to decode messages.
      * Use a for loop with a nested for loop to iterate through the rows and columns.
      * Iterate through the 2D array and fill it with characters from the iterator
    - Create method called **decodeMessage** that takes in the 2D array and decodes the message.
      * Create array list called **secretMessage** for characters.
      * Use the hasNext() as a condition in a while loop
    - Create a method called **printKeyGrid** that prints every character in the 2D array key grid row by row