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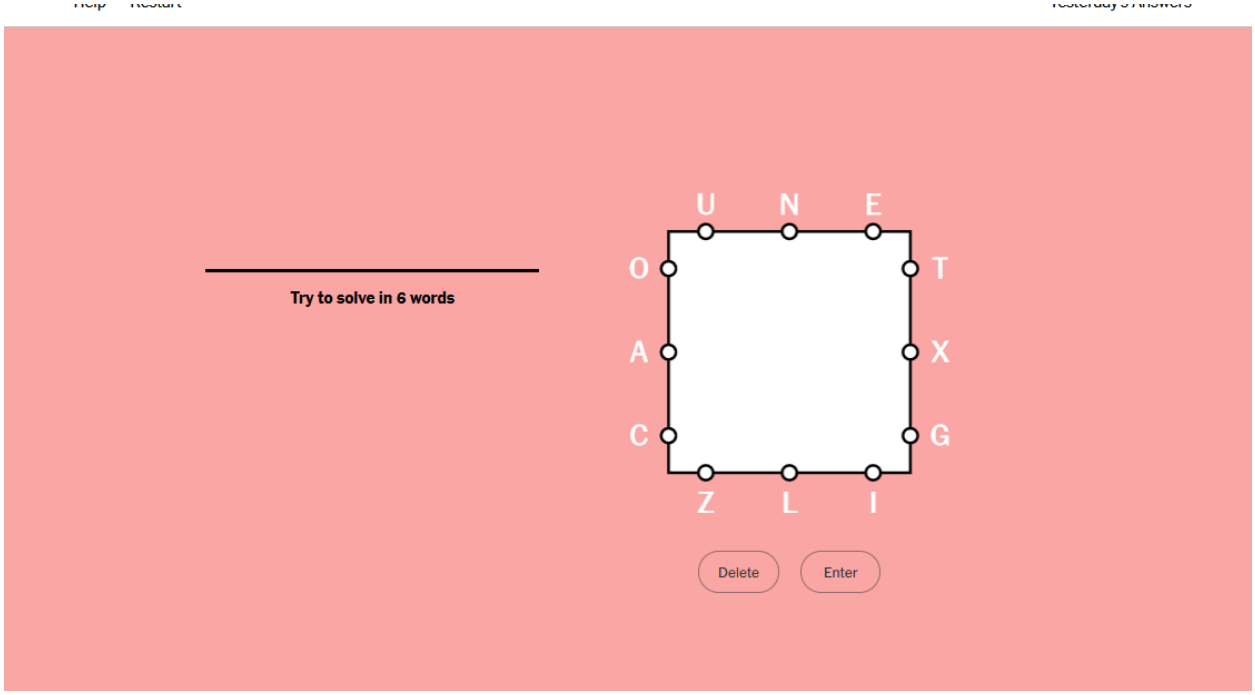
Letter Boxed Summary



Letter Boxed is a daily word game you can play using any web browser. Each puzzle has 12 unique letters arranged around a box. The goal is to connect those letters together to create words.
Rules:

- letters only
- Words must be at least 3 words long
- Consecutive letters cannot be from the same side
- Last letter of a word becomes the first letter of the next word
- Letters can be reused

Program Goal

To write a program that finds all valid two-word solutions, given a puzzle definition and a word list file.

Plan of Attack / Initial Design

1) Create a method that takes in a .txt file (1 word for each line) and returns a Hashmap<Character, ArrayList<String>> while dropping words that are 2 letters or less, containing non-letter characters, and words containing the same letter twice in a row
    a) How to read through a .txt file?
        i) Use BufferedReader to reader the .txt.
            (1) BufferedReader contains the readLine() method which fits

this use-case since the .txt file separates words by new line.

b) How to check if a string contains non-ascii letter characters?
    i) Regex: String.matches("[a-zA-Z]+")
c) How to check if a word contains the same letter twice in a row?
    i) Iterate through the string and check if current char equals next char
d) How to add to existing ArrayList<String>>?
    i) computeIfAbsent, returns the new or old value associated with the specified key
e) Why use a Hashmap?
    i) I want to sort words by first letter. The key is the character of the first letter, while the value is an Arraylist of characters beginning with the key letter.
    ii) Should make searching faster.

2) Create a method that takes in a string in the format of "XXX,XXX,XXX,XXX" where X are unique letters. Converts them into a 2d ArrayList<Character> with the arraylists being a list of characters that make up a row. Verifies that all characters are unique.
    a) Why use ArrayList?
        i) Arraylist has the .contains method, which I can use to easily check if a character is present in a row.
    b) How to read the format?
        i) Split by comma, then iterate through characters of split strings.
    c) How to check that all characters are unique.
        i) Use a set and add characters to the set, compare the sizes of the set to the string.

3) Create a method to retrieve puzzle words that takes in a string in the format of "XXX,XXX,XXX,XXX" where X are unique letters; and returns a Hashmap<Character, ArrayList<String>> of the valid puzzle words.
    a) How to check to make sure that words on the same line aren't consecutive.
        i) Iterate through the string while checking if the next character is any of the other two characters that share the row of the current character.
        ii) How to check which row to check against?
            (1) Iterate through all the rows to see which row contains the character.
    b) How to check if characters of a string are present in the problem
        i) Put all problem letters into an ArrayList
        ii) Iterate through string and use ArrayList.contains()

4) Create a method to check the puzzle words to see which two word combination

uses all the letters of the game.

a) Using a hashmap to organize words by first letter helps in that I can check the last letter of every word and search only through the arraylist at the corresponding character.
b) How to check that all letters are used?

Implementation / Improvements / Observations

Step 1)

- Had to change maven version to 1.8 from 1.7 because I used a lambda expression.

Step 2)

- Split into two methods one to convert into a 2d array and one to check if the input is valid
- Moved functions into their own class, creating the validator class

Step 3)

- I created two helper methods
    - To deal with words that adhere to containing letters contained in the problem
    - To deal with words that do not have consecutive letters belonging to the same row

Step 4)

- In order to check if the two word solution contains all the characters of the problem, I concatenated them and then converted that string into an arraylist so I can use the .contains method.

Post Completed Solution)

- I don't like that swear words are included in the solution
    - Found a .txt file of bad words and used that to write a new file that does not include these words
        - Copied a program to do this
            - https://www.geeksforgeeks.org/java-program-delete-certain-text-file/

Notes

- Split certain methods into their own classes in order to adhere to single responsibility to improve testability, reusability, and readability.
- Applied unit testing to verify functionality and as a form of acceptance criteria.

Working Program

Main located in: src\main\java\letterboxedsolver\game.java

-running main will prompt you to enter the problem in the"xxx,xxx,xxx" format.

-after entering an input, your solutions will be printed along with the number of solutions and the time it took to compute the solutions.

Output for: "ing,aht,oyc,pru"

```
Enter problem in format <xxx,xxx,xxx>: ing,aht,oyc,pru
paunch hygrophytic
pogonophora acuity
pogonophora autotypic
pogonophora autophytic
pyrographic caution
pyrographic crouton
pyrographic cautionary
photographic cautionary
pictographic cautionary
pornographic circuitry
pornographic cautionary
aunt typographic
ayapana autographic
argonaut typographic
argonaut trichophyton
autograph hypnotic
autotypic chronograph
agrypnotic chug
agrypnotic cachou
agrypnotic chough
agrypnotic crouch
agrypnotic craunch
agrypnotic cartouch
agrypnotic caoutchouc
autophytic caragana
autophytic chronograph
autographic crony
autographic canary
autographic canopy
autographic cronyn
autographic cautionary
ragout trichophyton
raunch hygrophytic
cayuga antiphonary
craunch hygrophytic
caragana autophytic
cartographic cautionary
topographic cautionary
typographic cancun
typographic caution
typographic craunch
typographic crouton
typographic cautionary
uncut typographic
gaunt typographic
gaunt trichophyton
guyana autographic
guyana autotrophic
graphic cautionary
gargantua autophytic
hunt typographic
hornpout typographic
hygrophytic cancun
hygrophytic caution
hygrophytic craunch
hygrophytic cautionary
nut typographic
nautch hygrophytic
organa autophytic
There are 64 possible solutions
Time elapsed: 52 ms.
```