

## Feature Documentation for Lab Research application

Description: The Application is a Spring Boot Application, which has following features.

Time and Scope: Application covers the feature of determining word frequency, similar words and viewing the notebook. I invested 2.5-3 hrs on the application and around 30-45 mins on the documentation

Specs and libraries: Lombok, Controller Advice, Slf4j, Custom Exception, Spring data Validator.

Steps to Run:

- You can run the application on port **8081** from either command line or from any framework using the main class **LabResearchApplication.class**. Log file(lab-research.log) is generated in same folder.
- You can run maven clean install command and run the application using jar named '*lab-research-0.0.1-SNAPSHOT.jar*' inside target folder, you can start the application with command, '*java -jar lab-research-0.0.1-SNAPSHOT.jar*'
- The application doesn't require any vm arguments.

Feature 1: Determine frequency of word occurrence in notebook Entry

- When the words are entered through the API, they are stored in a map of their frequency, in essence the map of string (word) and count (frequency).
- When queried, if the word is present, we'll return the frequency or else return 0
- Just for the viewing purpose the words are stored in another list and are returned through the notebook entry API, which can be removed if not needed.
- It was also possible to use the frequency map to display the words and reduce the space complexity, but as the words are associated with a research, they might have a meaning if placed in the same order as entered.

Feature 2: Determine similar words in notebook Entry

- We need to check the remove, replace or add character count required for a word to convert into another word
- We'll iterate through the frequency map and check for every word for similarity
- Points to check for similarity
  - If the difference between the lengths of two words is more than 2 then they aren't similar
  - Initialize Levenshtein distance variable to zero
  - Take two pointers for both words and check if the character at every pointer matches or not
  - For match: increment both the pointers
  - For mismatch:
    - Check if the Levenshtein distance variable is already 1 then return false
    - Increment the pointers as based on the word's length
    - Increment the Levenshtein distance variable
  - At last, increment the Levenshtein distance variable if the character of any word hasn't been left.
  - Return true if Levenshtein distance variable is equal to 1

Sub Feature: Add words to notebook

- If the notebook entry is new notebook, then the existing frequency map and the actual notebook word list is cleared.
- Else just put the words in the existing list and add to the frequency map

API Documentation

Root Endpoint: /notebook/api

1. Post entry to Notebook API: This API enters the words to the notebook

Endpoint: /entry

Http method: POST

Sample Curl: curl -X POST \ http://localhost:8081/notebook/api/entry \ -H 'content-type: application/json' \ -d '{ "entries" : "Word Word Word word", "isNewBook" : "true" }'

Sample Request Model:

<pre>{   "entries" : "Word Word ",   "isNewBook" : "true" }</pre>	<p>entries (String): contains words to be inserted space separated</p> <p>isNewBook (Boolean): contains true if the entries are for new book</p>
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Sample Response:

<pre>["Word", "Word"]</pre>	<p>List of String : words in the notebook</p>
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Error codes: 400 Bad Request, 200 OK (can use custom error codes)

2. Get Frequency and Similar Words: This API returns the frequency of the given word and similar words. (only one instance of a similar word would appear as it wont make sense to return duplicate similar words)

Endpoint: /frequency-and-similar/{requestedWord}

Http method: GET

Sample Curl: curl -X GET \ http://localhost:8081/notebook/api/frequency-and-similar/word

Sample Response:

<pre>{   "frequency" : 1,   "similarWords" : ["Word", "wor" ] }</pre>	<p>frequency (Long): contains the requested word's frequency</p> <p>similarWords(List of String): contains similar words in the notebook</p>
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Error codes: 400 Bad Request, 200 OK (can use custom error codes)

3. View Notebook: This API returns the list of words in the notebook (can be converted to space separated words as per requirement)

Endpoint: /view

Http method: GET

Sample Curl: curl -X GET \ http://localhost:8081/notebook/api/view

Sample Response:

<pre>["Word", "Word"]</pre>	<p>List of String: words in the notebook</p>
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Future Enhancements:

- Swagger can be used for documentation
- Logger file appender can be configured
- Custom Error codes can be used and Global exceptional handler can be configured accordingly
- Notebook API can be enhanced in case of multiple notebooks and can use database for the same
- The calculation of frequency count can be done asynchronously using thread executor to improve API latency